User's guide

DDS 2010
MMS 6850 DS

Ref: 07062010mka

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Contents:

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

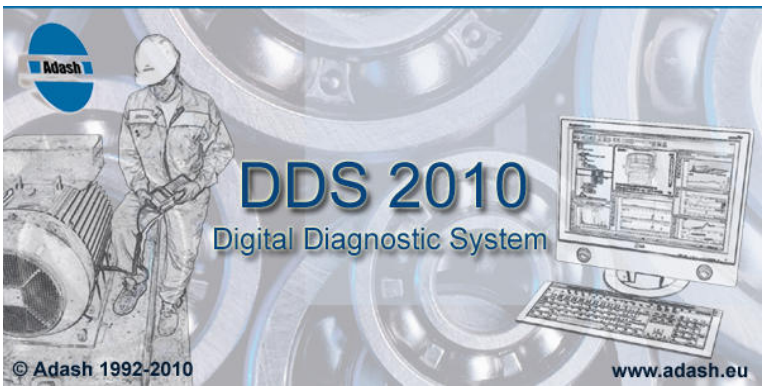
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

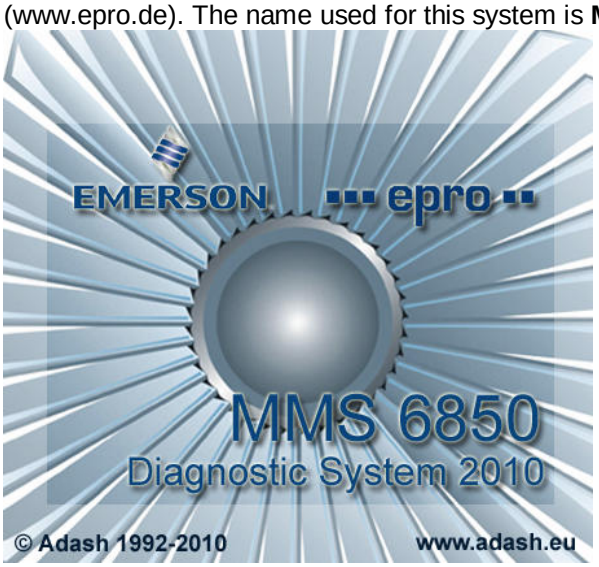
DDS 2010 and MMS 6850 DS system .

The whole software system is sold in two ways:

The first way is **DDS 2010**, which is distributed directly by producer Adash Ltd. (www.adash.cz) and is usually sold together with measurement instrument of the same producer.



The same software system is used for monitoring system MMS 6000 (producer EPRO Germany (www.epro.de). The name used for this system is **MMS 6850 DS**.



Both software systems (DDS 2010 and MMS 6850 DS) are identical, they differ just in name. Both are fully supported by producer Adash Ltd. on www.adash.cz. User manuals and upgrades are also available there.

In further text we speak only about the DDS 2010. This is for simplification so that both names need not to be mentioned.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

How do we sell software?

The DDS 2010 is a very large system. User who needs all its functions, is not all over the world. This is why we developed a complex structure of the DDS 2010, which enables selection of the best set for every user. Such solution is also cost effective.
The DDS 2010 can load data from many measurement instruments. Every instrument needs the software interface. This is the first customer's choice. He buys only interfaces for the instruments he has. The DDS 2010 enables many various data acquisition. Also here is the space for selection. The customer orders only those procedures, which he really needs in this time.
Every item from the list of DDS 2010 options, which customer can buy, has the permission to use it. This permission is called LICENSE.

When you bought the DDS 2010 and opened the package then you found a small plastic thing. It has a serial number. It is HASP key and it can be connected to your computer (to the USB or parallel port). HASP key (dongle) is a carrier of all your licenses. Together with licence file it contains data, which are needed to run Adash software (not only DDS 2010, also the others). Licence files are in our terms called “AKY” files (the name is DDS2010.aky for DDS2010 and MMS6850DS.aky). Once you have saved this file to the DDS 2010 folder then the system will start with the ordered features.
aky file must by located in the same folder as DDS 2010, in default way it is ***Program Files\Adash\DDS2010EN\DDS2010.aky.***

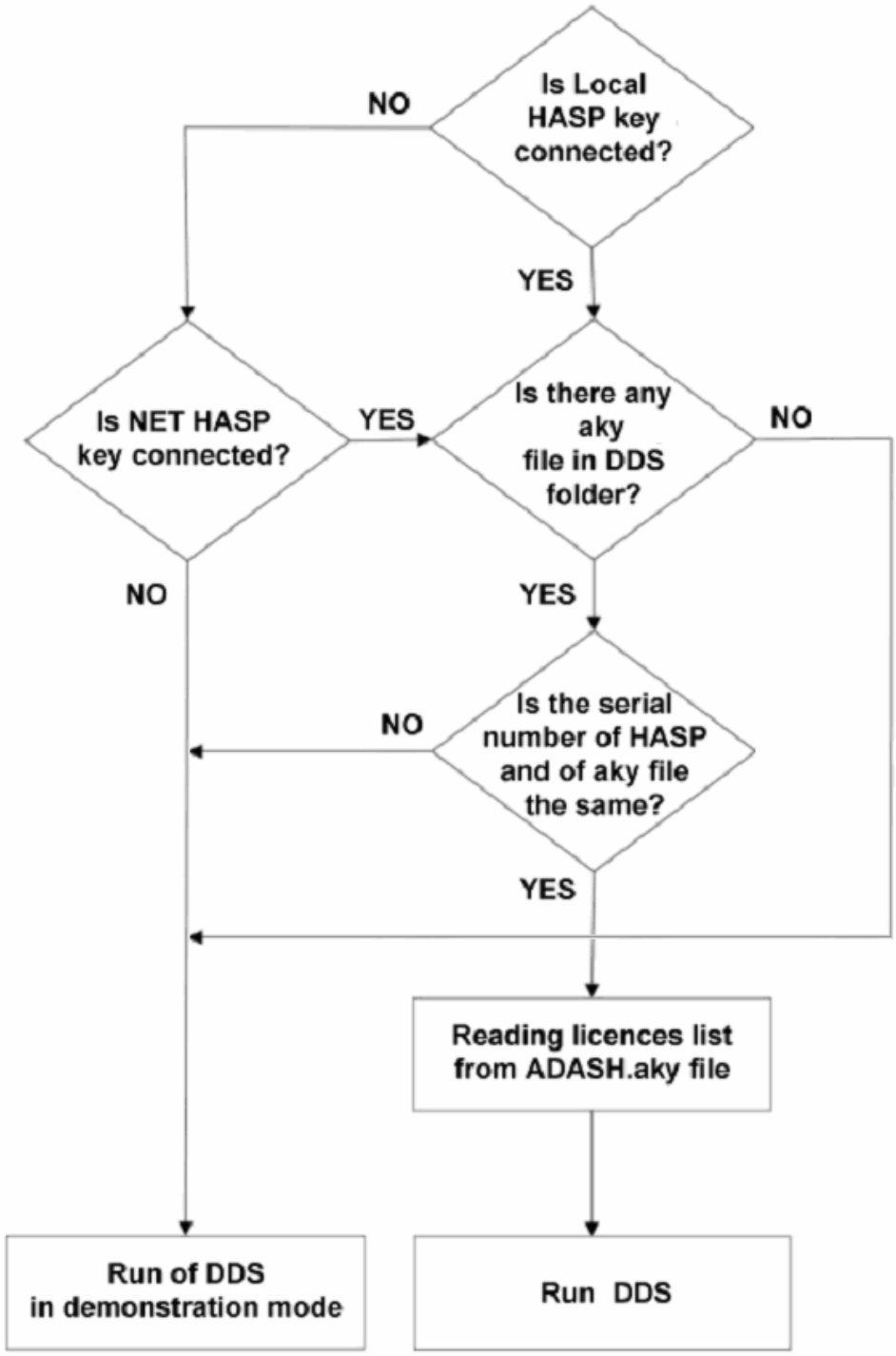
Be careful of your aky file. You should save it also to another place in your computer. Deleting installation directory and new install requires the licence file again. You have to copy your correct aky file to the DDS 2010 folder again.

IMPORTANT !

When you buy software, you buy licence to use it. Our licences are saved in HASP key and in aky file. If you loose aky file, we will send the new file to you, this is not problem. If you lose HASP key, it is a serious trouble. Lost key means lost licences. We cannot send you a new HASP key.
Pay maximum attention to protecting your HASP key. Do NOT lose your HASP key!

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Block diagram of searching and checking HASP key procedure:



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Software Installation

ADASH Company distributed the program DDS 2010 in the past on CD-ROM. We left this archaic way. Because we release a new updated version approx. each week, the CD versions were always old. All ADASH software is being distributed by web today; you should always check and install files from web, which are always up-to-date. Only the first installation is provided on the CD.
Program DDS 2010 is generally free. You can install it on any number of computers. License for using of this program is covered on Hardware dongle (HASP), which is required for running this program. It means, you can install DDS 2010 to all your computers. But you can run it only on the computer, where the Hasp key is connected.

If you use the NET HASP key then it works in different way. The NET HASP key is installed on server computer and in its memory is written the number of licenses, which can be run together. The installation of NET is described in other chapter.

Installation from website

Browse http://www.adash.cz/ section downloads, Software ADASH, and download files of DDS 2010 or MMS 6850 DS.

(Names of files could be different from these as these files are being updated, there should always be a Full version and an Upgrade). Installation will be described for DDS 2010, but it is exactly the same as for MMS 6850 DS.

Once you have all DDS 2010 files downloaded, run file *DDS 2010 Full 100 en.exe* and follow instructions of the wizard. Then run file *DDS 2010_Update_101 en.exe* which updates full version of DDS 2010.
Run DDS 2010 from Start Programs menu or run file DDS 2010.exe located in default way ***Program Files\Adash\DDS2010EN\DDS 2010.exe***
We again remind - for running this program hardware dongle (HASP) must be connected to PC.

Update from the web:
When a new update is released on the web, download only this file. Run it and your DDS 2010 will be again up-to-date.

The HASP driver is installed during first start of DDS. The user must have the administrator rights for this operation. User rights finding is described in manual:
Windows_administration_for_Adash_Software_en.pdf - see ***Appendix A***.

NOTE: The installation software may occasionally report "not enough space" on target hard disk. In this case, please ensure yourself that your temporary directories (usually TEMP, TMP) do not contain "read-only" parts of previous installations (of any software).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Hasp driver installation

HASP driver is installed automatically together with the installation of DDS2010. If you just copy the installed directory HASP driver can be reinstalled using the “haspdinst.exe -i” which is available in DDS2010 directory.

The HASP key must be connected to the PC before the start of the DDS 2010. This key is a standard accessory of DDS 2010. Information about various modules of DDS 2010 is stored in the HASP key which enables using them.

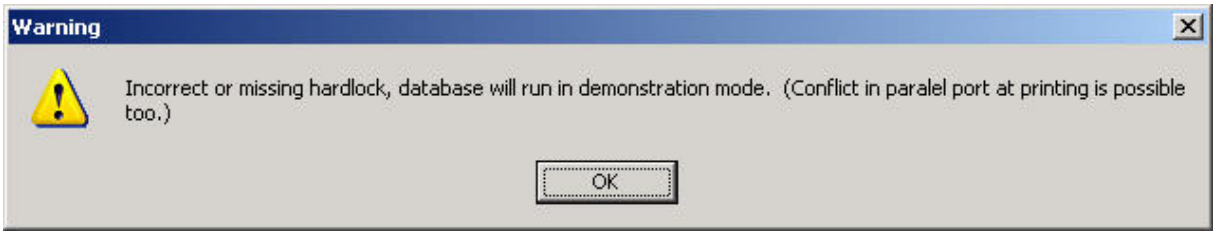
If the HASP key isn’t connected to the PC, then the DDS 2010 program will start only in the demonstration mode. Possibilities of the DDS 2010 are restricted in this mode. The error messages are being displayed during start of the program. These messages are related to the missing HASP key.

The DDS 2010 is searching for the HASP key immediately after start. Then the program checks information, which is stored in the key.

By Stop searching button you quit both HASP key searching and running program.
If the HASP key is not found, the program displays the error message. Then program starts in the demonstration mode.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Program functions are restricted in this mode. If a disallowed function is chosen in this mode then the alert message is displayed again.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

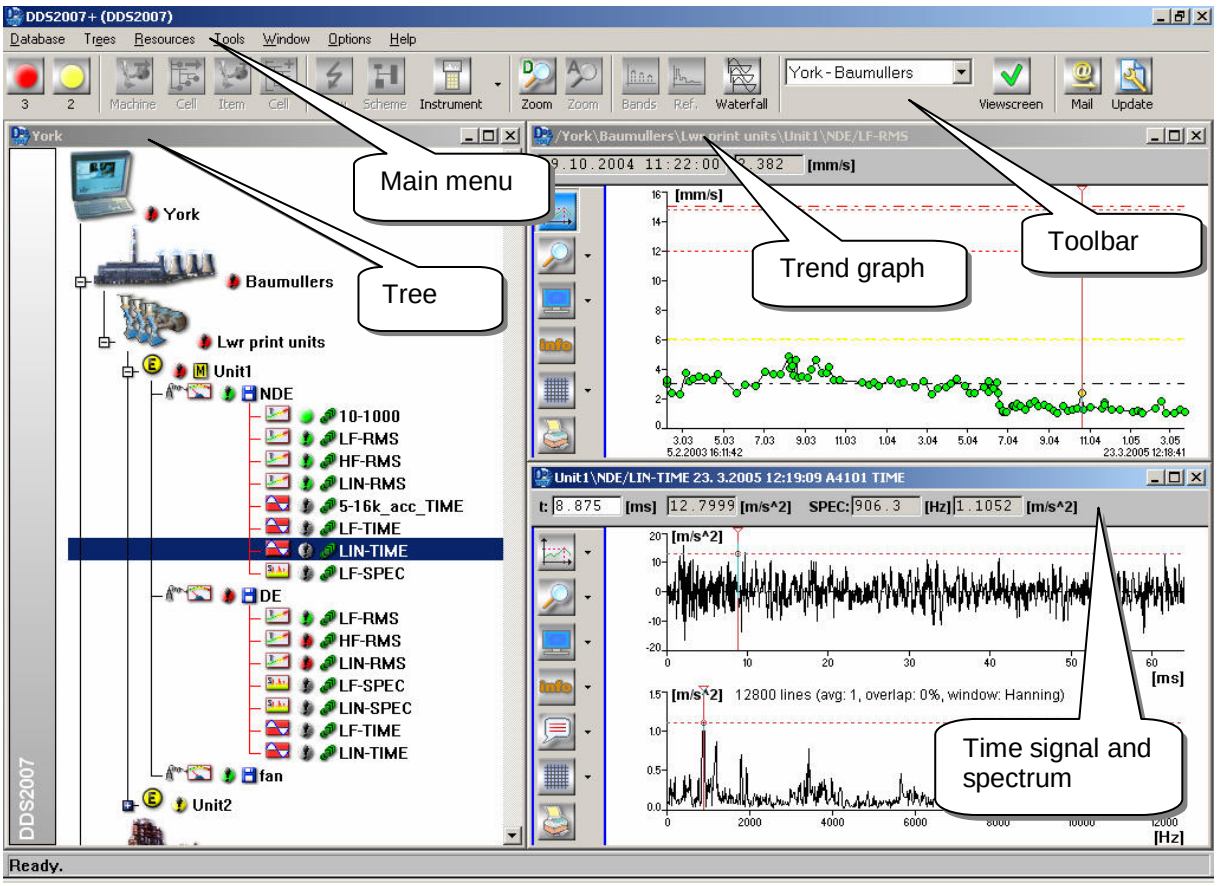
How to start easily

Pictures in this manual are taken from different versions of DDS (2000, 2007) and may slightly differ in DDS2010 version, but controlling the application is basically the same.

In this chapter we are going to introduce the program and teach you the essential use of it. Detailed information and description of all functions can be found in following sections. Use of program will be explained on an imaginary plant producing lemonade. We can call it ***YORK***. We will create one branch of tree, three data cells and we will set danger and alert values for automated evaluation of vibration levels.

User environment

User environment is divided into operating and working sections and dialogue boxes. Operating section consists of main menu and toolbar. Toolbar can be redefined. Besides buttons it contains combo-box configurations. Those enable saving of contemporary settings of open databases and dialogue boxes for later use. Configurations can be easily open by using toolbar. Configuration contains information about which database or dialogue box (graphs, trees) should be opened. Configuration remembers their position on the screen, too.
Working section can be modified and trees, graphs or schemes can be added.

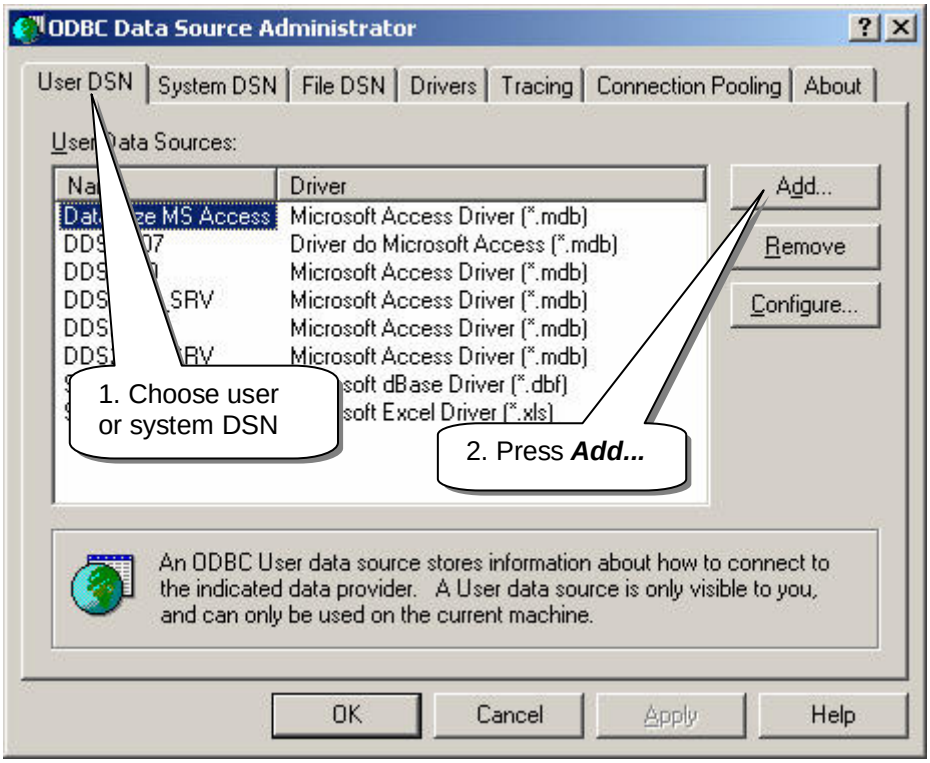


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

New database creation

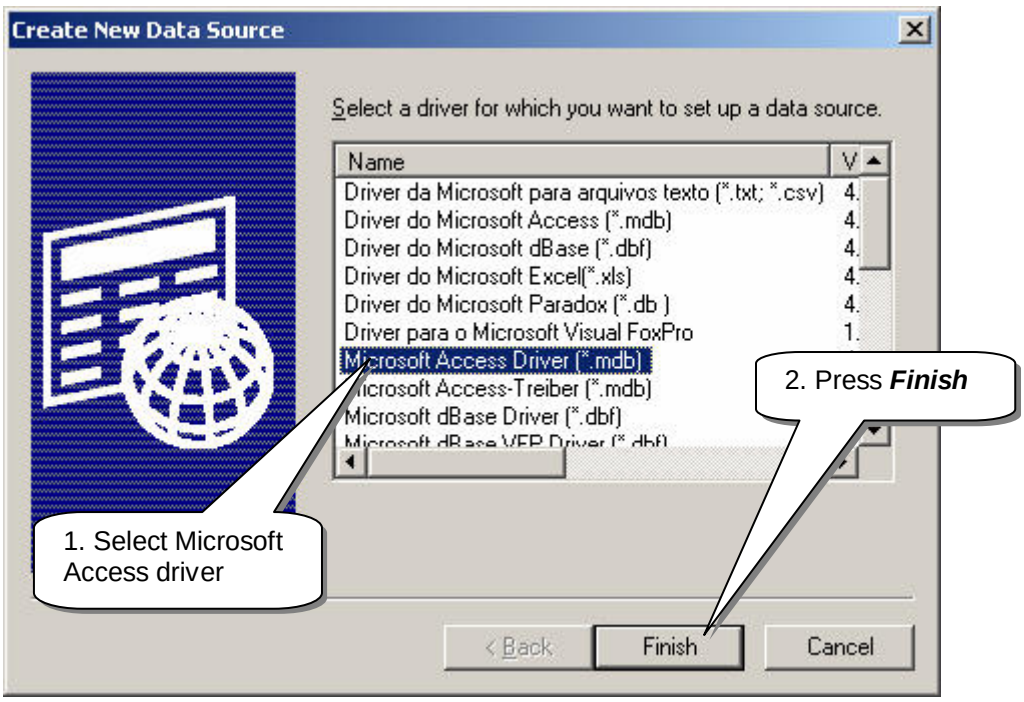
When we start working with this program, we want to create a new database and modify it according to our company desires. We will create a Microsoft Access database (.mdb). Program can work with MS SQL databases, too, MS SQL database creation is described in another chapter.

1. Open dialogue box ***ODBC Data Source Administrator***
2. Choose ***USER DSN*** and press ***Add...***



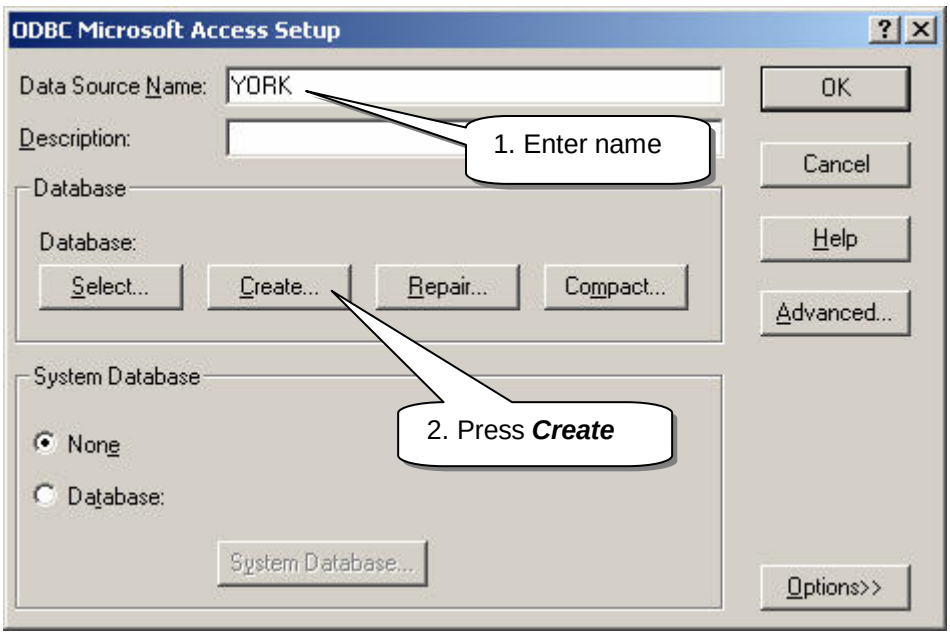
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

3. Box ***Create New Data Source*** is opened, choose ***Microsoft Access Driver (*.mdb)***. Press ***Finish***.



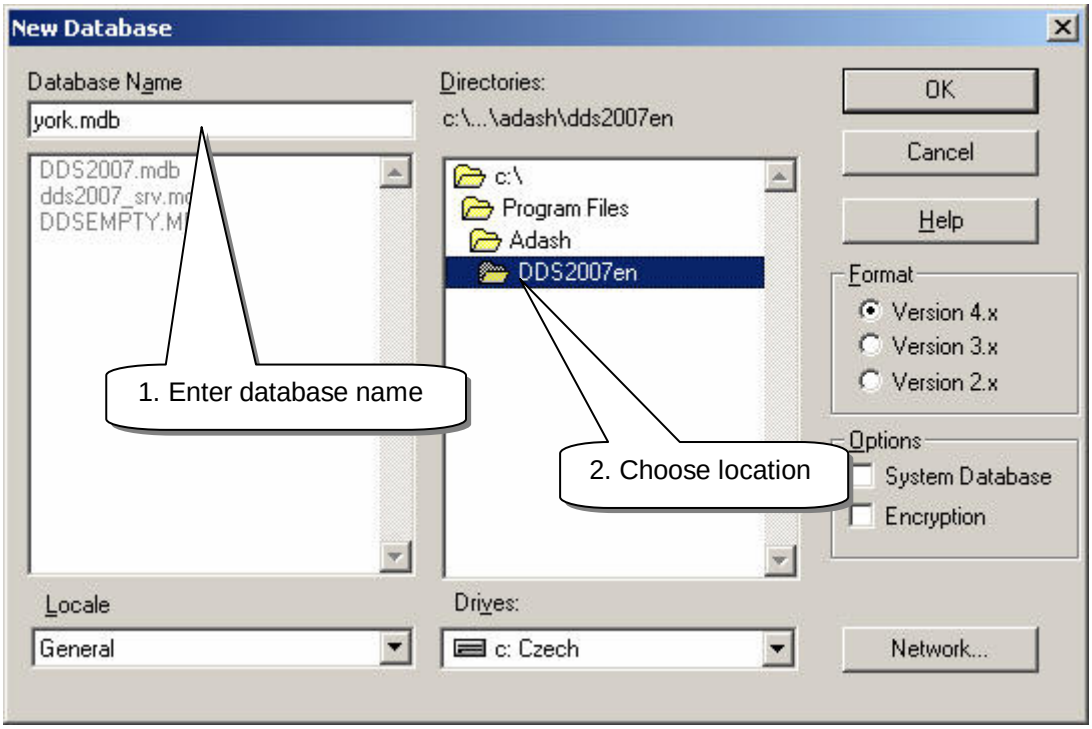
4. Box ***ODBC Microsoft Access Setup*** is opened, fill in item responding to name, which occurs in the list of existing database source. We recommend using names without diacriticals.

5. Existing or new database must be assigned to ODBC database source. To create new database, press ***Create***.

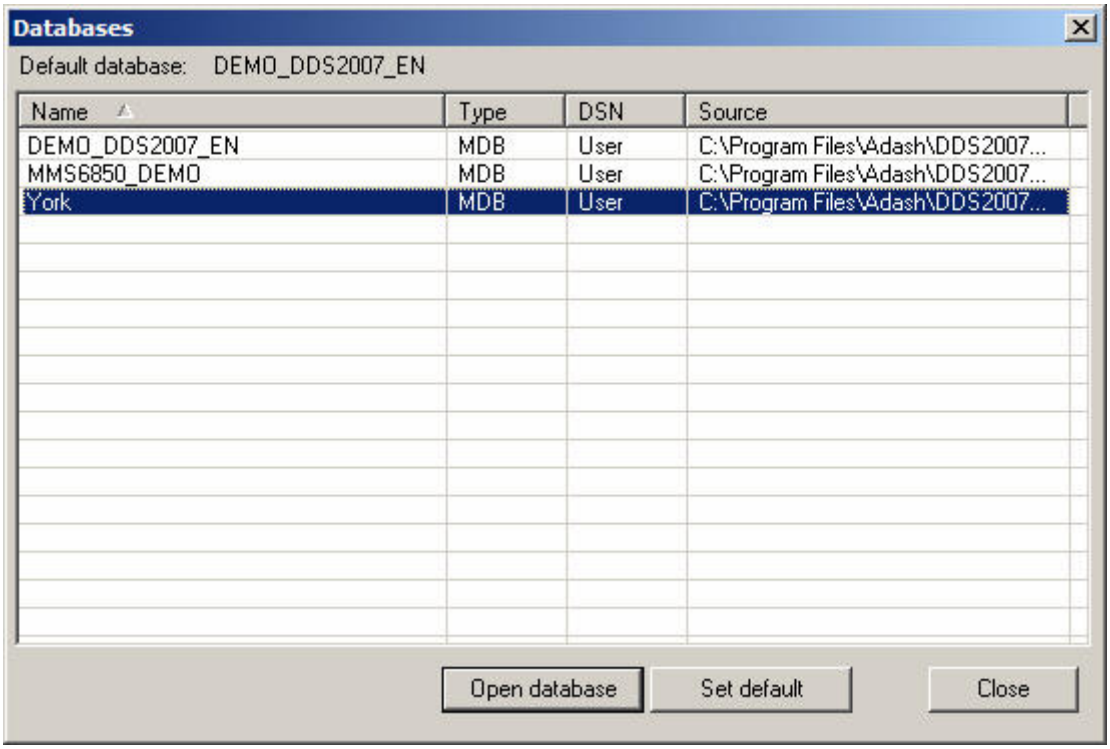


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

6. Enter name of new database and select database-file location (default ***C:\Program Files\Adash\DDS2010EN***) Press ***OK***.

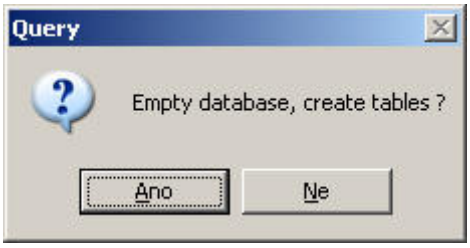


Database is now created successfully, leave ***ODBC Data Source Administrator*** box. Database is opened via menu ***Database – select and open***. Choose required database and press ***Open database***.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

When opening empty database, query occurs: Empty database, create tables? Press Yes. On the first sight, nothing changes (only the name appears in the top left-hand corner). The reason is, that no tree is defined. That is why it needs to be created.



Tree design and creation

Basic and largest component of database is the **Tree** item. The **Tree** is usually only one in the database and contains the whole organizational structure. But if a company owns a few separated production lines, than creating and designing individual **Trees** for each production line is advisable. Working with data will be faster then.

Next step is creation of database tree and its structure. When creating tree, the best idea is to hold on to the plant structure. The highest database item is tree – this level responds to the entire plant or its independent section. Tree divides into branches, e.g. assembly lines – machine set – machines – and measurement points. We are not going to create the whole tree in our fictional plant, but only one branch. YORK structure:

Level 0	TREE	- YORK
Level 1	Assembly lines	- Baumullers
Level 2	Machine set	- Lwr print units
Level 3	Machines	- Unit1, Unit2
Level 4	Measurement points	- NDE, DE, fan
Last level	Data cells	

Note. You can make other branches effectively by copying and renaming.

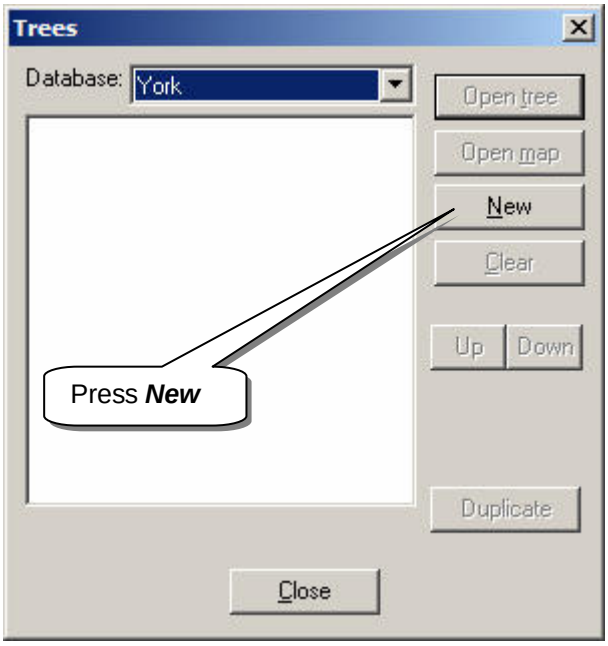
In demonstrating database Demo_DDS2010_EN has been created a sample tree. For practice basic controls we will create the new tree.

Tree creation

1. Select ***Trees*** in Main Menu. Dialogue box ***Trees*** appears with the list of all existing database trees. Window is now empty – no tree is created.
2. Choose database York instead of Demo_DDS2010_EN (with different demonstrating data)

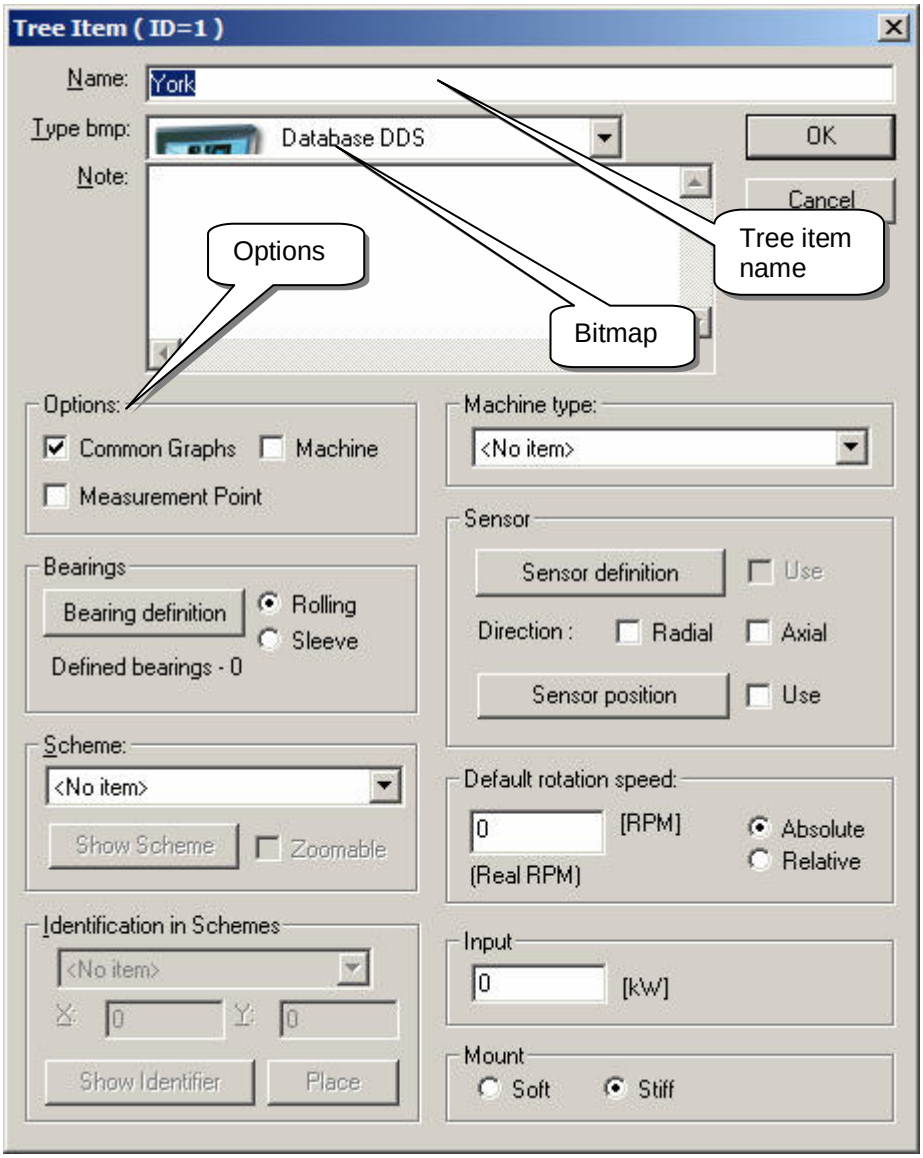
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

3. Press ***New*** to create a new tree.

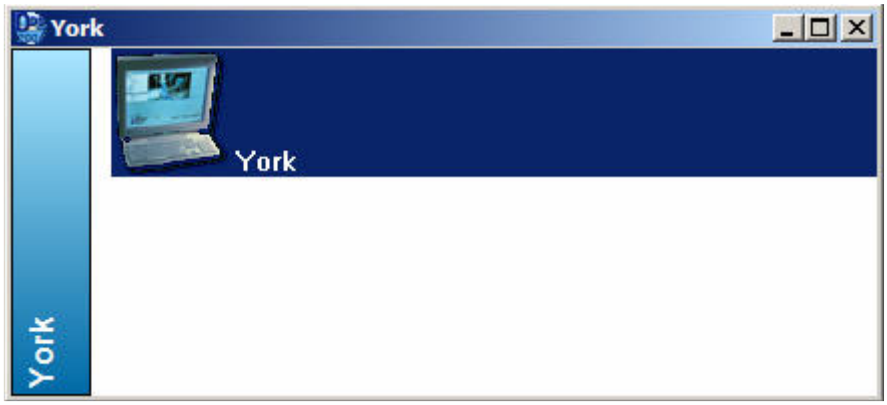


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

3. New window – ***Tree item*** appears. Fill in the Name of the tree and in Type bmp choose the bitmap which will be displayed in tree. Confirm by the ***OK*** button.



Empty tree opens, we will branch it out.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

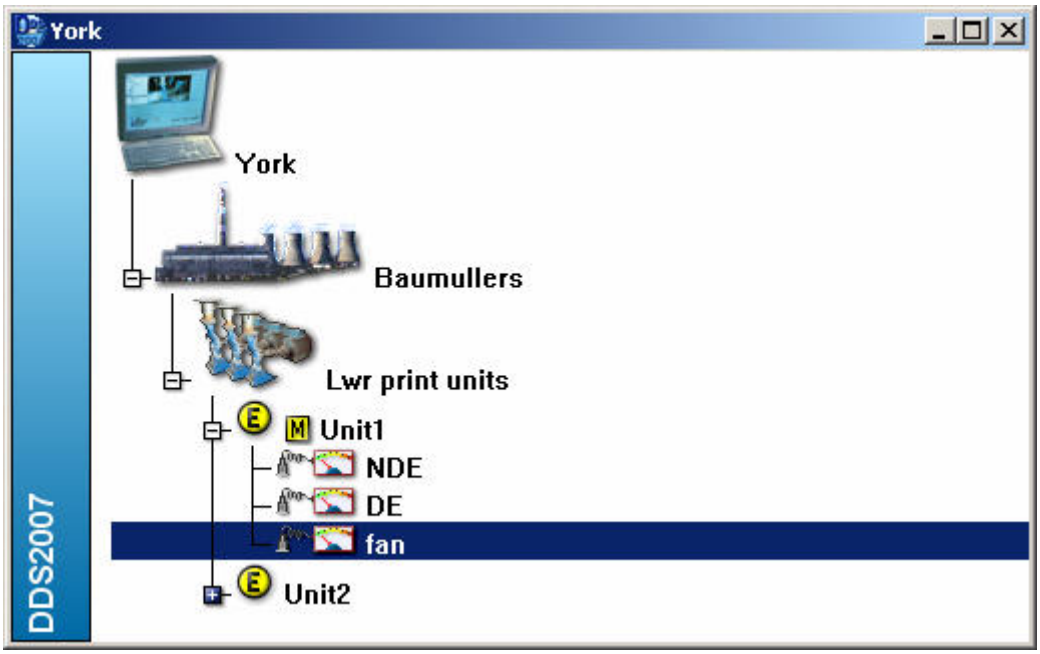
4. By right mouse button click on root-tree item and choose ***Add item*** from Local menu. Tree item window appears again. Enter name ***Baumullers*** and type. Other tree levels will be created via the same way.
- by clicking on ***Baumullers*** create ***Lwr print units***,
- by clicking on ***Lwr print units*** create ***Unit1*** and ***Unit2***
- by clicking on ***Unit1*** create Measurement points labeled ***NDE***, ***DE***, ***fan***

Now the basic structure of one branch is set. Now flags ***machine*** and ***measurement point*** must be set. These flags are of great importance in tree structure.

Machine - this flag serves to identify a Machine element. It is useful to set a Machine element in all branches for example for route creation (route is a machine list). This flag enables to define ***sensor*** (if it is the same for entire machine), ***machine type*** and ***speed***. The condition reports are usually related to Machine tree elements. The Machine specification represents basic concept vibration diagnosis. In one branch only one machine can be defined (do not confuse branch and tree, many branches can be in one tree and also many machines). In our fictional plant ***York*** machine is defined as the ***Lwr print units***.

The ***Measurement Point*** - has sense in route creating and report printing and it makes sensor definition available. This concept represents the fact, that the machine usually has a set of measurement places. In DDS may be several additional levels between ***Machine element*** and ***Measurement Point*** element. Measurement point does not have to be the lowest level containing only data cells but can be further divided. In our plant ***York*** we define measurement points: ***NDE***, ***DE***, ***fan***.

Then the final tree looks this way:



Data cells creation

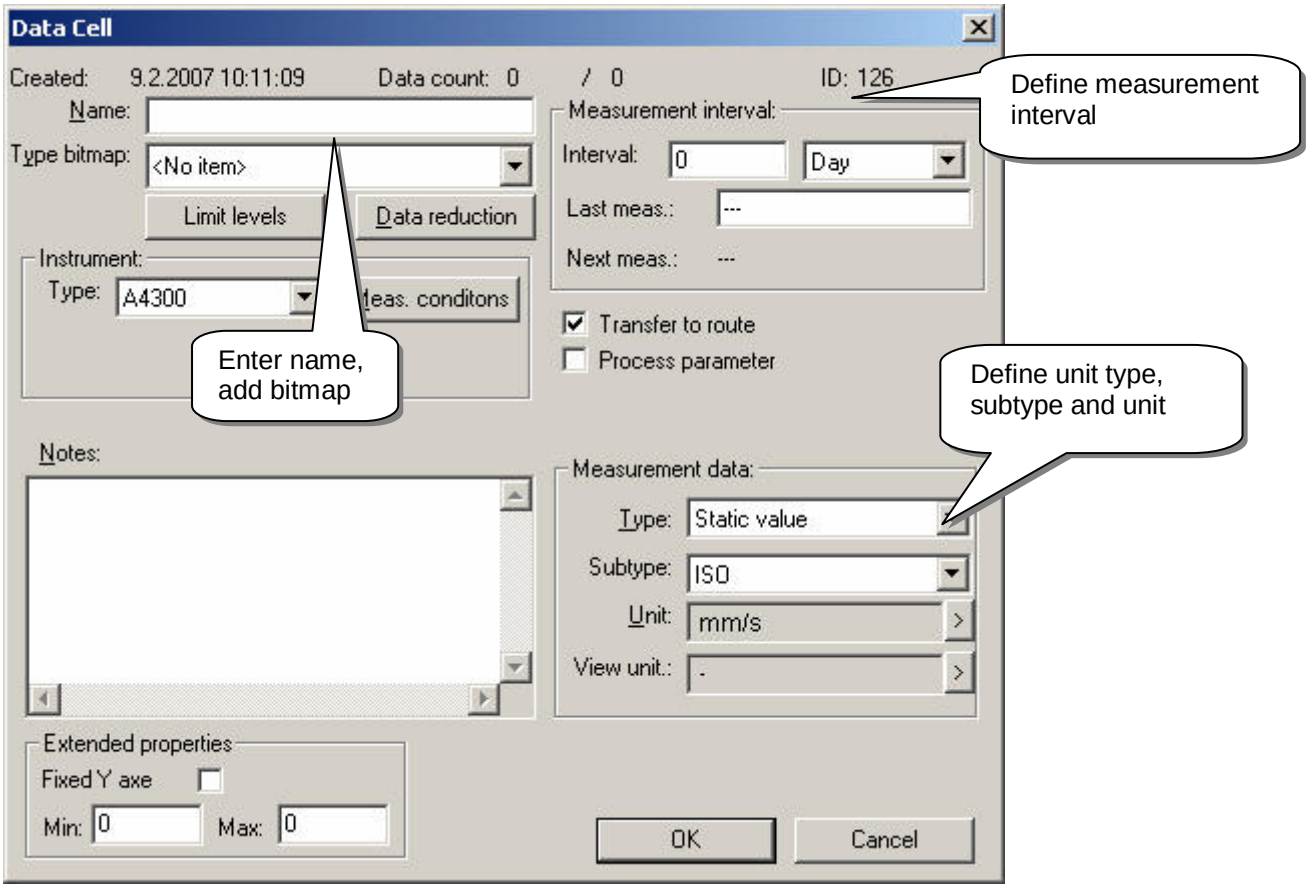
Data cells contain measured values and cannot be divided. They can be created in any branch of the tree (there is NO rule that a data cell can be located only in the lowest levels of the tree). Before creating them, decide which types you are going to need. There are two fundamental data cell types.

- ***static data*** - that is represented by single value (real or complex), for example wide band vibration measurement (e.g. ISO 2372).
- ***dynamic data*** - that is represented by array of values. The typical example is a spectrum or a time waveform (signal).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

We will create 3 data cells. The first one will be static, the other two will be dynamic (spectrum and time waveform). All data cells will be created in measurement point ***NDE***.

1. Use right button to click on item ***NDE*** and select ***Add data cell*** from Local menu. Dialogue window ***Data cell*** appears.



2. Fill in the name, choose type bitmap. In ***Measurement data*** field define ***Type***, ***Subtype*** and ***Unit***. In ***Measurement interval*** enter time units of measurement. If a specific measurement instrument will be used for measurement, choose it.

Name – choose always so as you know what measurements data cell includes. In this example choose:
- ***10-1000_vel_RMS*** effective value of vibrations velocity, measured in range 10-1000Hz
- ***10-16k_acc_SPEC*** spectrum of vibrations acceleration, measured in range 10-16000Hz
- ***5k-16k_acc_TIME*** time waveform of vibrations acceleration in range 5-16kHz

Type bitmap – choose bitmaps, which were predefined for specific data cells types

 - for static data cells – trends
 - for spectrum data cells
 - for time waveforms

Type – define data cell type. By this definition you decide what format can be stored in this data cell. Each type has a different format (e.g. time waveform cannot be stored in spectrum data cell).

Subtype - each data type usually contains several subsequent subtypes. This item is not necessary to

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

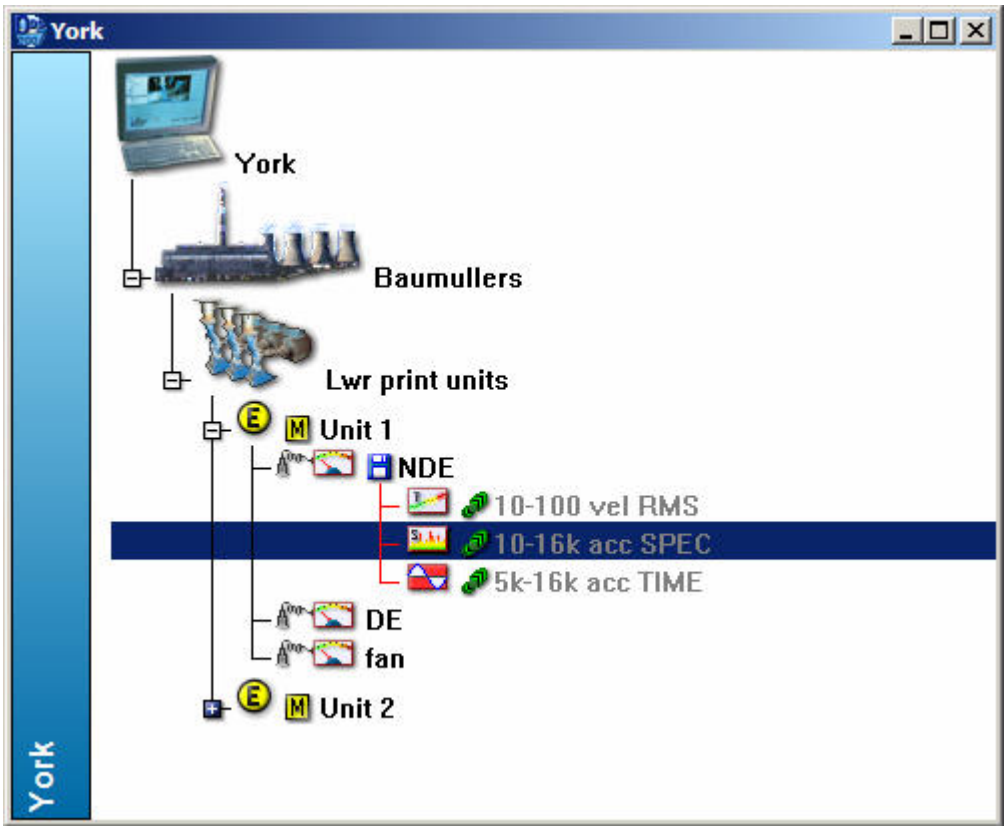
change.

Unit – if the unit of results is known, it can be defined. We can use
- static data cell: mm/s
- spectrum: g
- time waveform: g

If data is stored in the data cell, its type, subtype or unit cannot be changed. Unskilled change of data could cause confusion in measurements.

Measurement interval – the rule for vibration diagnostics says – the more frequent measuring, the better results. In practice, there are some restrictions and so choose reasonable measurement intervals. Program alerts to expired measurement interval by exclamation mark in tree.
We will choose daily static – data measurement and weekly dynamic-data measurement. Dynamic data measurement will always be performed after static data increase, too. (we will add them into route manually)

3. Close data cell window. Now the branch is complete. We miss only measured data. Empty data cells are indicated with grey name. Grey light with exclamation mark informs about expired measurement interval and trace lies with data cells included into the route. At measurement point ***NDE*** is sign of diskette that informs, that tree element contains data cells. Notice, that marks of exclamation are throughout the branch so in a fully closed tree you can easily find cells with expired measurement, or exceeded alert or danger values.(see next chapter)



Now the tree is complete and you can read data into data cells. Measure static data, spectrum and time signal with your instrument and move it into database. (Description is in your instrument manual).

Note. When creating a tree, it is common, that its structure (branches) is similar and the only difference lies in names. You can make other branches effectively by copying and renaming.

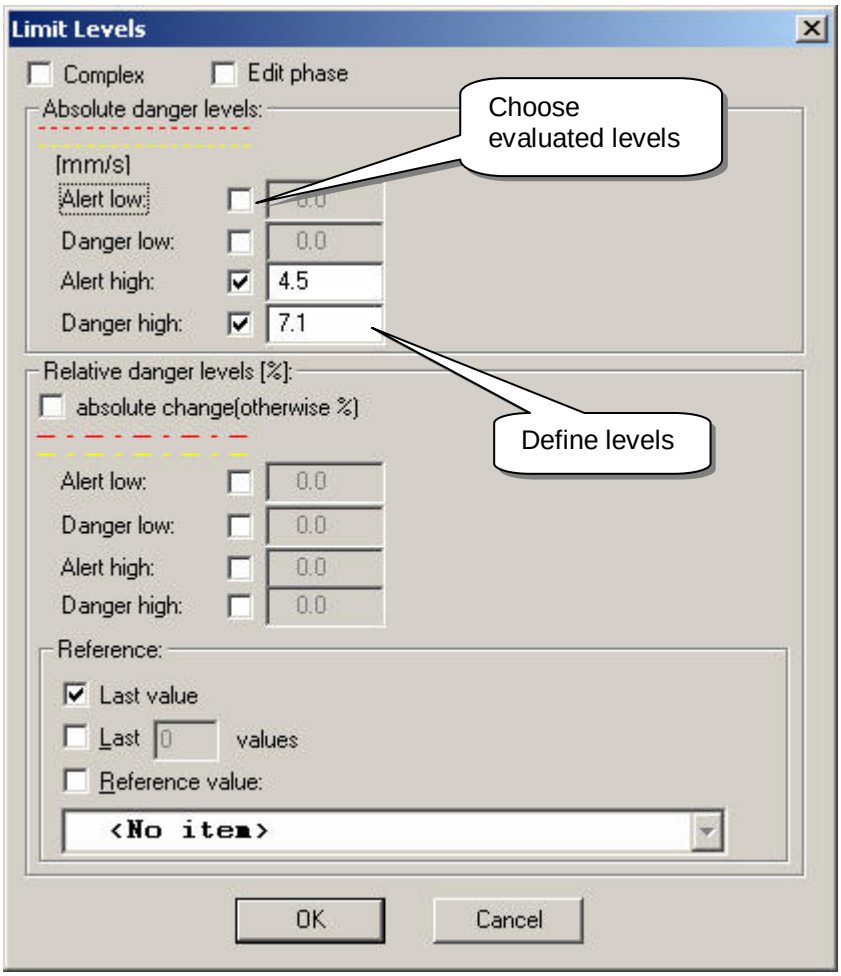
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Alert and danger levels definition

Permanent controlling of vibrations level by user is very protracted and almost impossible in big plants. DDS enables setting of automatic vibrations control. For automatic evaluation of vibrations level you can define alert and danger levels. These levels can be set in each data cell through ***Data cell*** box or on a large scale via Tree local menu. Alert and danger levels are available only for static data and spectra.

Alert and danger levels setting in static data cell

1. Open ***Data cell*** window and press ***Limit levels***. Here you can define ***vibrations levels*** for this data cell.



2. We set Absolute high danger and alert level. Other descriptions are in chapter ***Data cells – Critical values for static data***. Absolute levels define exact vibrations level. After exceeding, the program will inform user. This information is shown by changing semaphore color to yellow (exceeding alert level) or red (exceeding danger level). If measurement is without problem, the semaphore is green. Information about exceeding levels can be seen throughout the whole branch, too. We will set it according to the picture. In practice, you can define levels according to your experience or to values set by machine producer.

- 🟢 - no level was exceeded
- 🟡 - alert level was exceeded

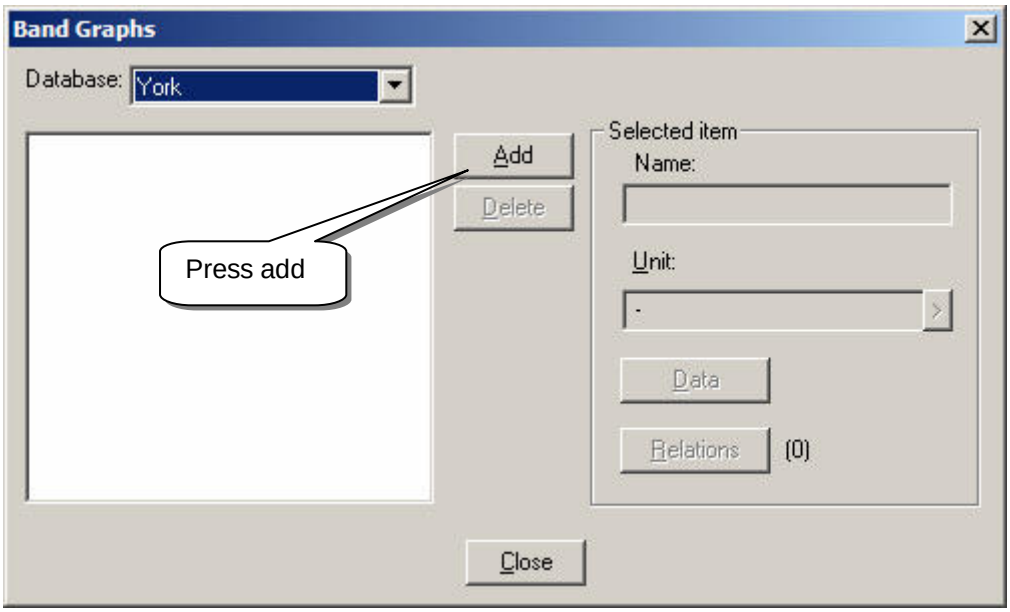
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

- danger level was exceeded

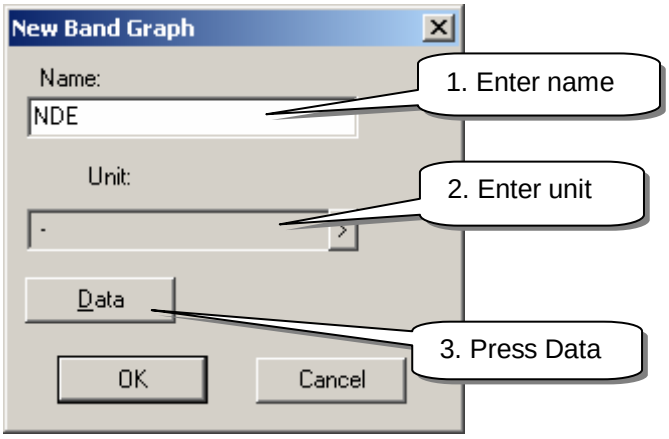
Alert and danger levels setting in spectra

For spectra, critical levels cannot be set with just one number. For spectra, band graphs are usually used in modern systems. If we evaluate spectra from single measurement point, we always know what we can expect in measured spectra. We are usually interested in rotation frequency and its nearest harmonic multiples. Next we are interested in special frequencies depended on measured machine type (gearbox, fan and pump) or bearing frequencies in envelope analysis e.t.c. It is thus possible to mark frequency intervals in spectrum, in which we can expect change of operational condition. We define these intervals in so-called ***Band graphs***. Levels are defined for each band similar as for static data cell. If a band graph is defined, it can be assigned to spectrum data cells.

1. In Main menu choose item ***Tools - Band graphs***. Band graphs window appears.

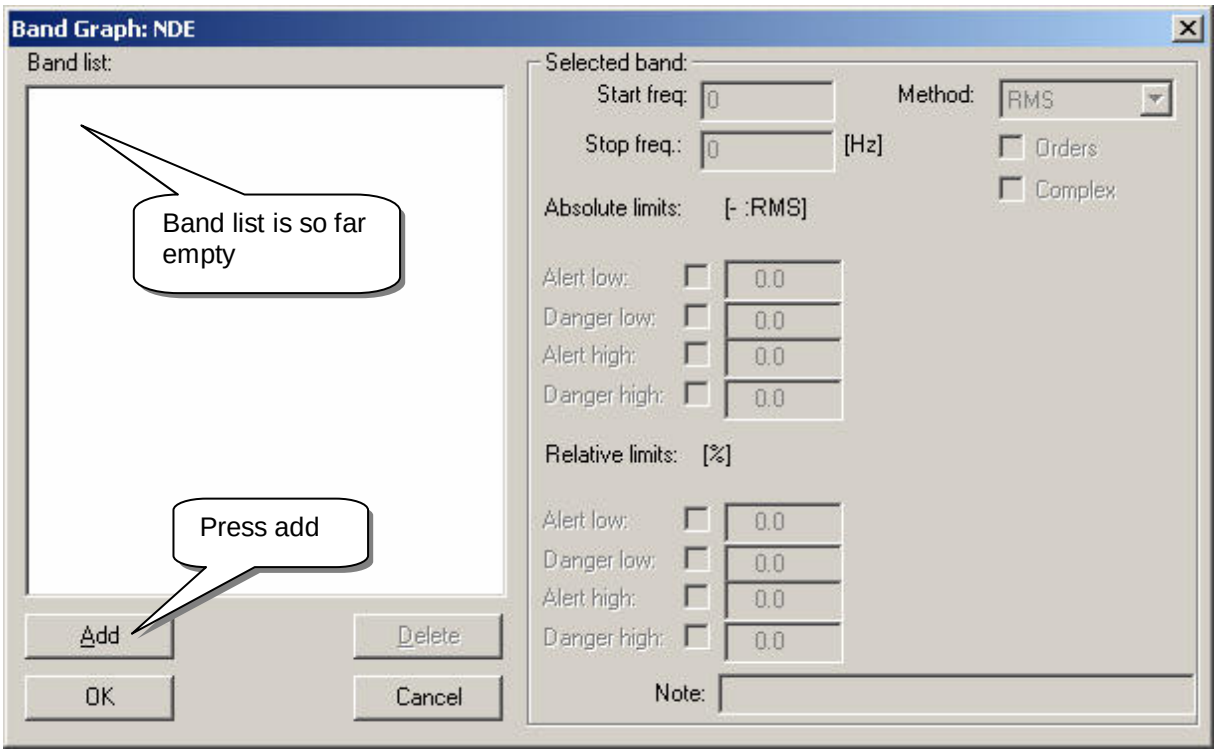


2. After pressing ***Add***, New Band Graph window appears. Enter its ***name***, choose ***Unit***. Unit must be the same as in the unit in spectrum (in our case ***g – acceleration***) and press ***Data***.

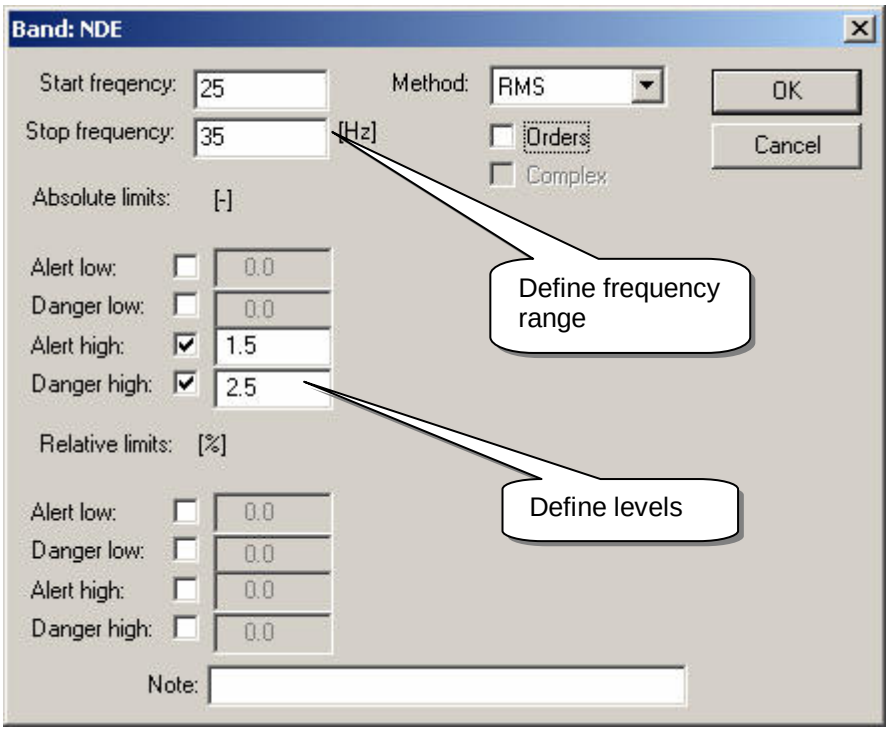


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

3. A new window appears where you can define single bands and their levels. We will now define only one band responding to speed of the machine.

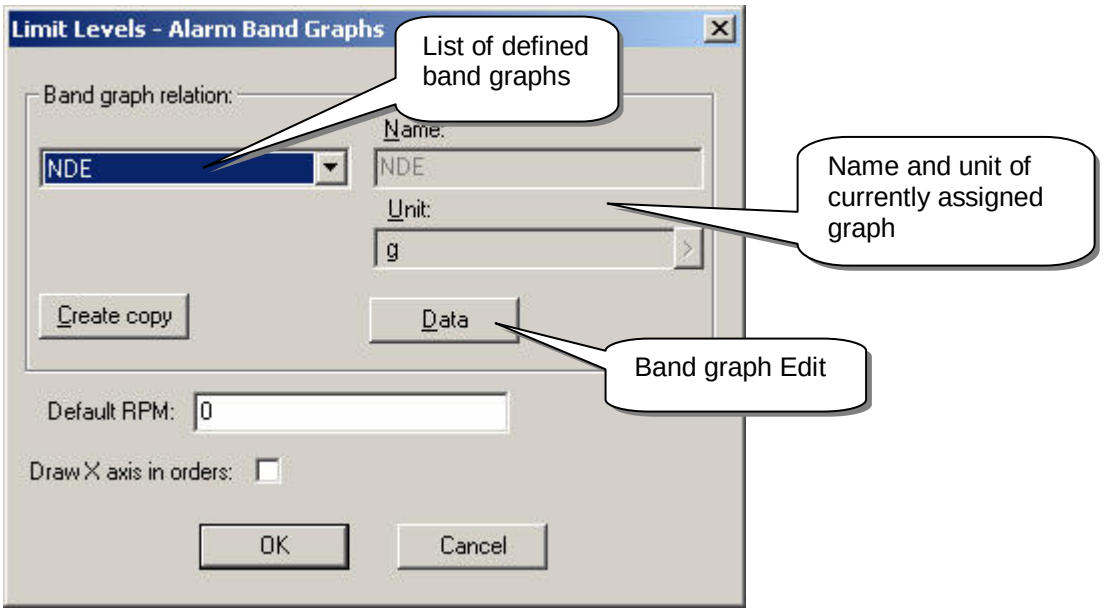


4. Press ***Add*** button located in the bottom left-hand corner and in the new window define frequency range of band and alert and danger level. After pressing ***OK*** button, this band appears in the list of bands. Leave this window.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

5. If the band graph is defined, open ***Data cell*** window (via Local menu) and press ***Limit levels*** button. Now a new window opens, where you can select a band graph from a list. Select it.



Press ***OK*** and close data-cell window. Semaphore appears, indicating status of defined bands (OK, alert, danger).

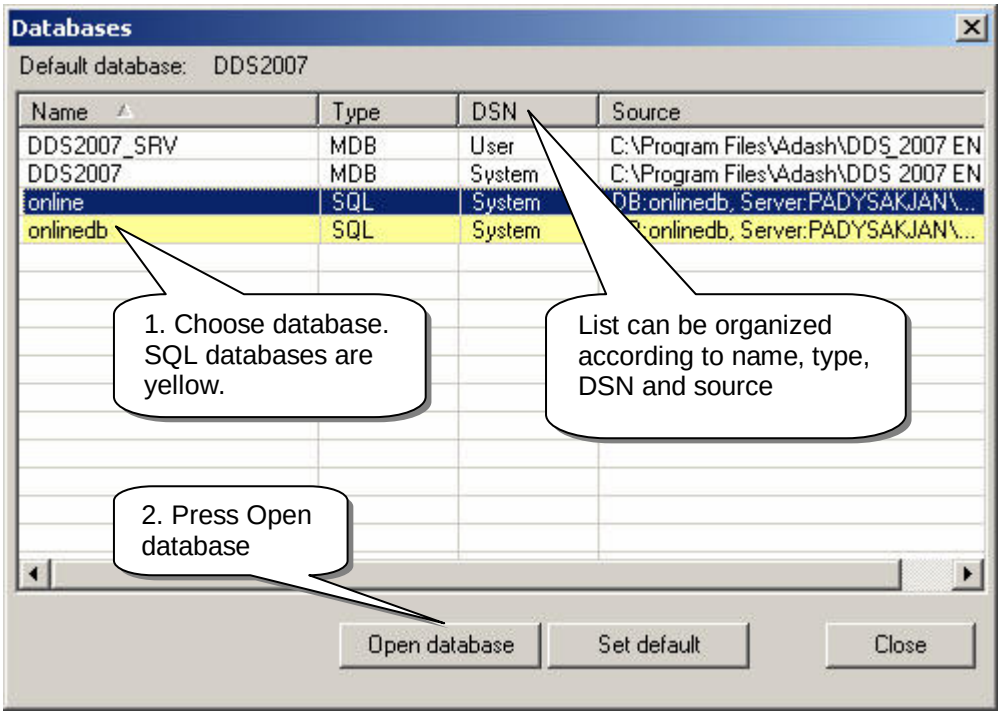
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Database

Fundamental information

All measured data are stored in databases. Databases in DDS 2010 program are in ***Microsoft Access*** format (***MDB*** files). Alternatively it is possible in on-line versions of DDS to use databases in ***Microsoft SQL Server***. After program installation there are two demo databases connected (Demo_DDS2010_EN and Demo_MMS6850DS). These databases contain demo data for easy beginning with the program. Next connected database DDS2010_SRV_EN contains system information for all databases, not for measurements. User can create more databases according to his requirements of stored data organization. Every database contains trees. Tree represents general-purpose structure in DDS. Every tree item can have branches (max. 256 branches) up to 32 levels. In vibration analyses the division: "Plant - Machine group - Machine - Measure place" is usually used. In DDS program these four levels are not used. You can create optimal levels number for the best-measured machines organization description. There can be a lot of trees in one database. For the beginning we recommend to work with one database only and divide it internally to several trees (for example one tree for one plant). Only when the database file grows too much it is a good idea to use more databases. When the program ***DDS 2010*** is started for the first time the default database ***Demo_DDS2010_EN*** is opened automatically.

The database can be closed by the ***Database - Close*** command from the main menu. In case of more opened databases, the list of open databases is displayed and it is necessary to select the database to be closed. The open databases list appears automatically only when more databases are open. By the ***Database - Select and open*** command you can open next database. After this menu item selection the dialog window ***Database List*** will be displayed. It is necessary to create interconnection to every database in ODBC (excluding the default Demo_DDS2010_EN). This operation requires more knowledge and careful approach, as some incorrect steps can have irreversible results.

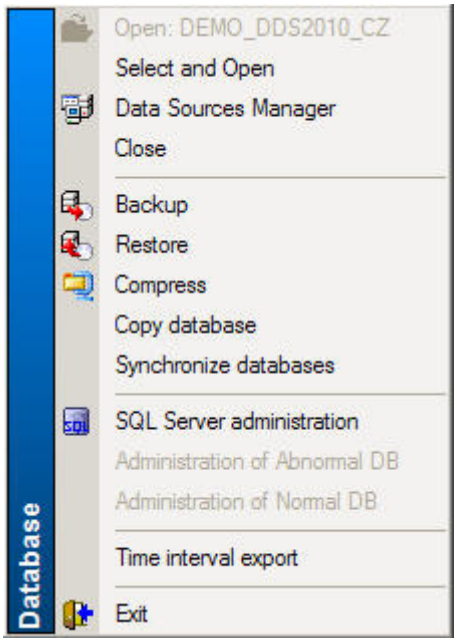


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

In this window, select the database you want to work with and press then ***Open database*** button. One database can be marked as default (the ***Set default*** button).
This database will be open automatically in every program start. It can also be open by menu item ***Database/Open + name***.

Program ***DDS 2010*** allows working with maximum of five databases open at the same time. Thus copying and moving items from one database to another is enabled, which ensures significant time saving.

Database menu:



Note. ODBC is a standard application interface (API) for data access. Applications can approach data through it, independent on database system which operates these data. ODBC are used with Windows, Unix (Linux), OS/2 Mac OS and others.
We can imagine it as a phone central providing connection between database and program.

Note2. DDS2010 automatically opens the last normal database. Older online databases are available in “Administration of Normal DB”. “Administration of abnormal DB” shows the “Abnormal Databases” that are present in the actually opened “Normal database”

New database creation

New database (type Microsoft Access) creation

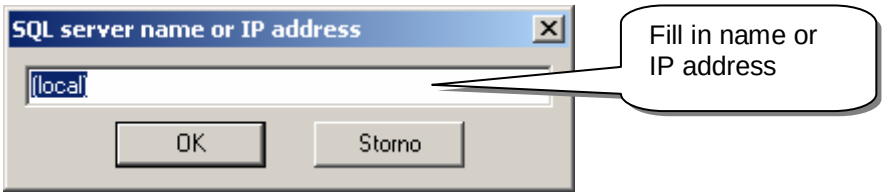
See chapter ***How to start easily – New database creation***

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

MS SQL database creation

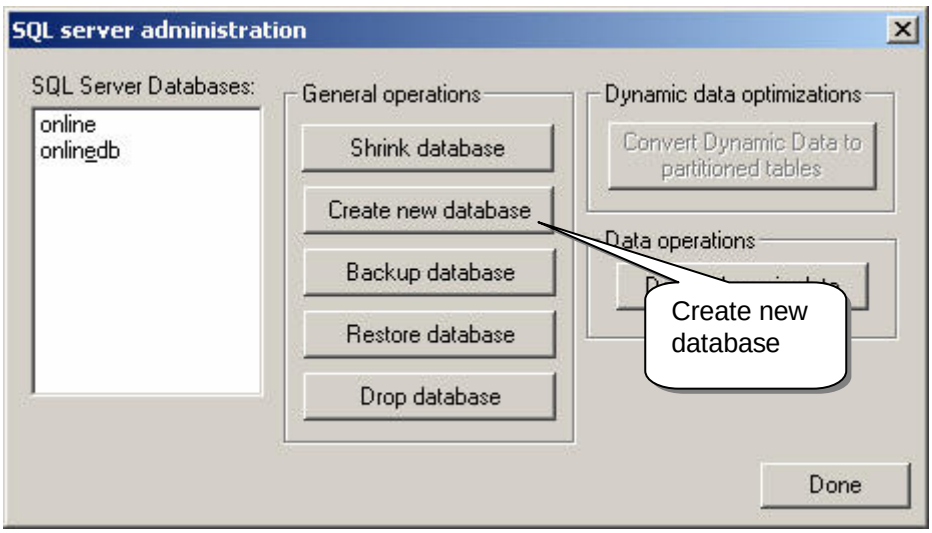
If you work with MS SQL Server and you cannot use ***Enterprise Manager***, use ***DDS SQL Server Administration***

1. Choose item of Database menu – ***SQL Server Administration***.
2. Fill in the name or IP address of SQL Server. In case that server runs on a local computer, write only "***(local)***", or for new MS SQL EXPRESS: ***(local)\SQLEXPRESS***.

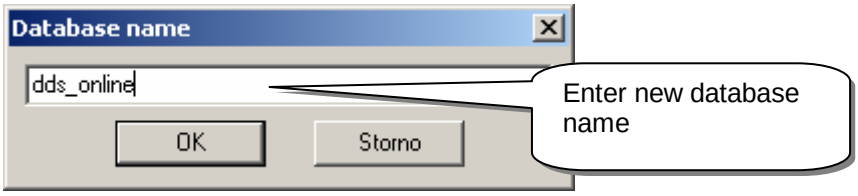


3. Fill in ID of server.

4. In following window you can administer SQL databases. To create new database, press ***Create new database*** button.

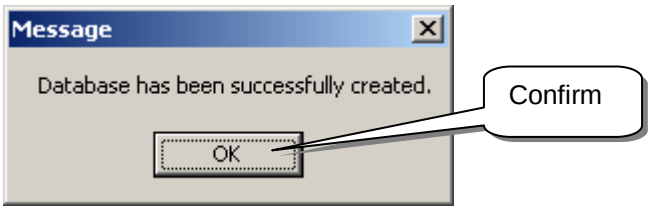


5. In next window enter new Database name and confirm by ***OK*** button.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

6. Information box appears, press ***OK***.



7. SQL database is successfully created now. ***ODBC*** database source with the same name as database is created automatically. Quit administration of SQL Server by button ***Done***. If you want to change database source parameters, use ***ODBC Data Source Administrator***. ODBC new database source is located in ***System DNS***.

Connecting database with DDS 2010

Note. Connected database must have structure compatible with DDS structure. Databases with uncompatible structure cannot be open.

Microsoft Access database connection

The procedure is similar to creating a new database. Only in the ***ODBC Microsoft Access 97 Setup*** press the ***Select…*** button instead of the ***Add…*** and select a database file from list in the ***Select Database*** dialog window. The next procedure is the same as in case of a new database creating.
In case of **SQL Server** database you should create connection the same way as described above.
Warning: mdb file must be on local or network discs. Databases located in shared directories cannot be opened directly.

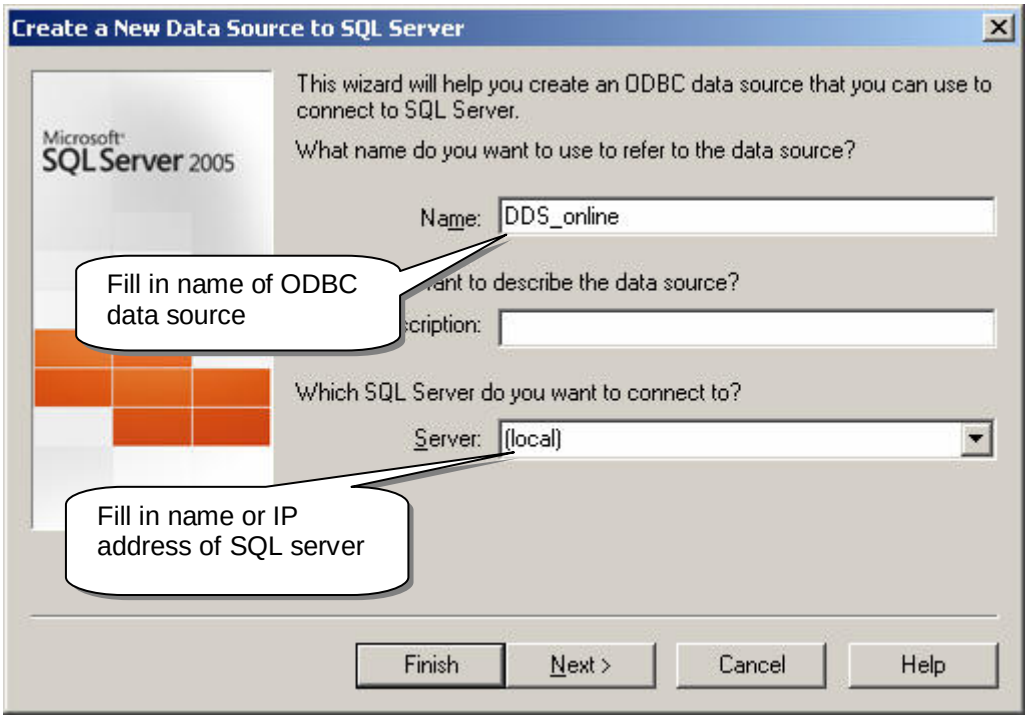
MS SQL database connection

Connect existing MS SQL database to database source via Database sources Manager.

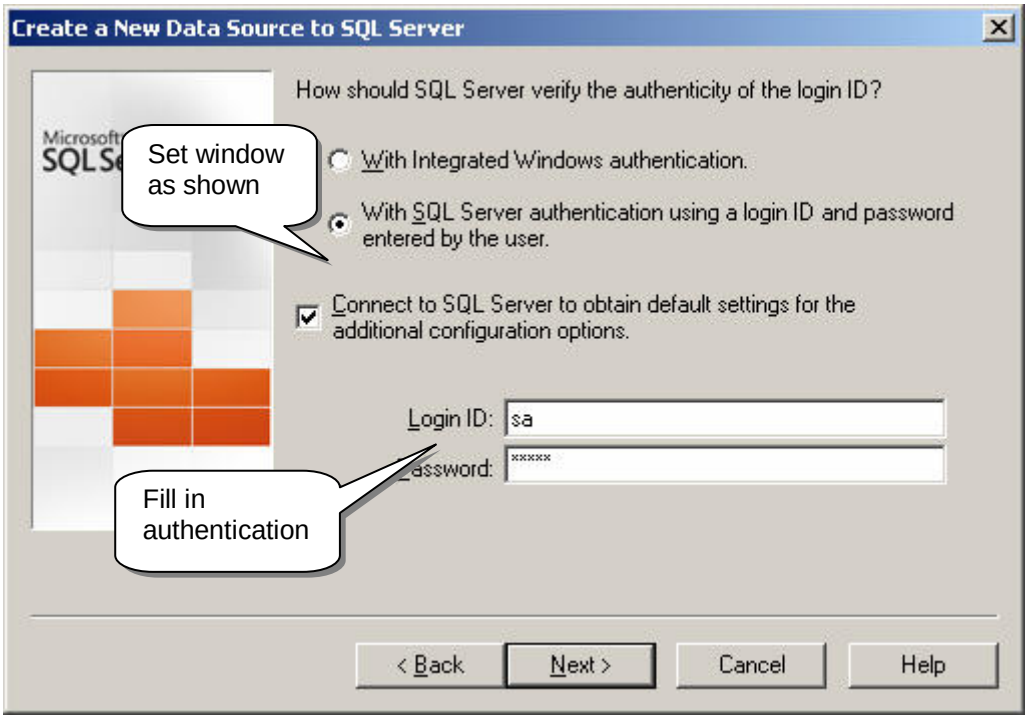
1. As with ***MS Access*** database, first press ***Add...*** button in ***Database sources Manager***. In box ***Create a New Data Source*** choose type ***SQL Server*** or ***SQL Native Client***. Confirm by ***OK*** button.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

2. In new box fill in name of new ODBC data source and name or IP address of SQL Server. In case that server runs on a local computer, write ***(local)***, or for new MS SQL EXPRESS: ***(local)\SQLEXPRESS***. Press ***Next***.

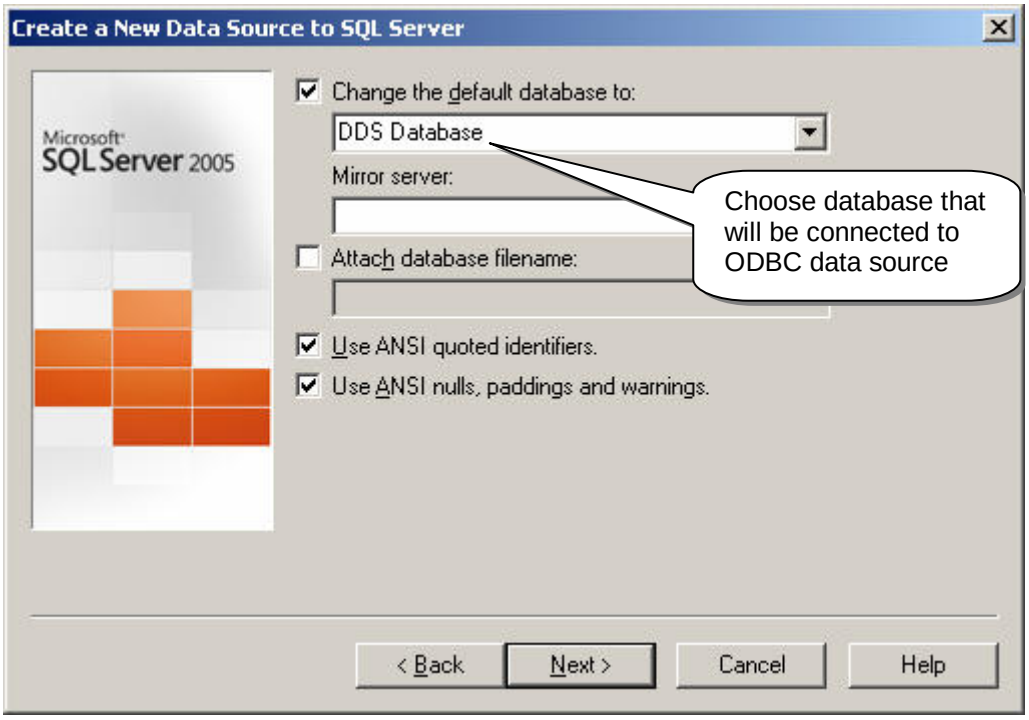


3. Set the new window according to the picture, fill in ID (name and password) of SQL server. Press ***Next***.

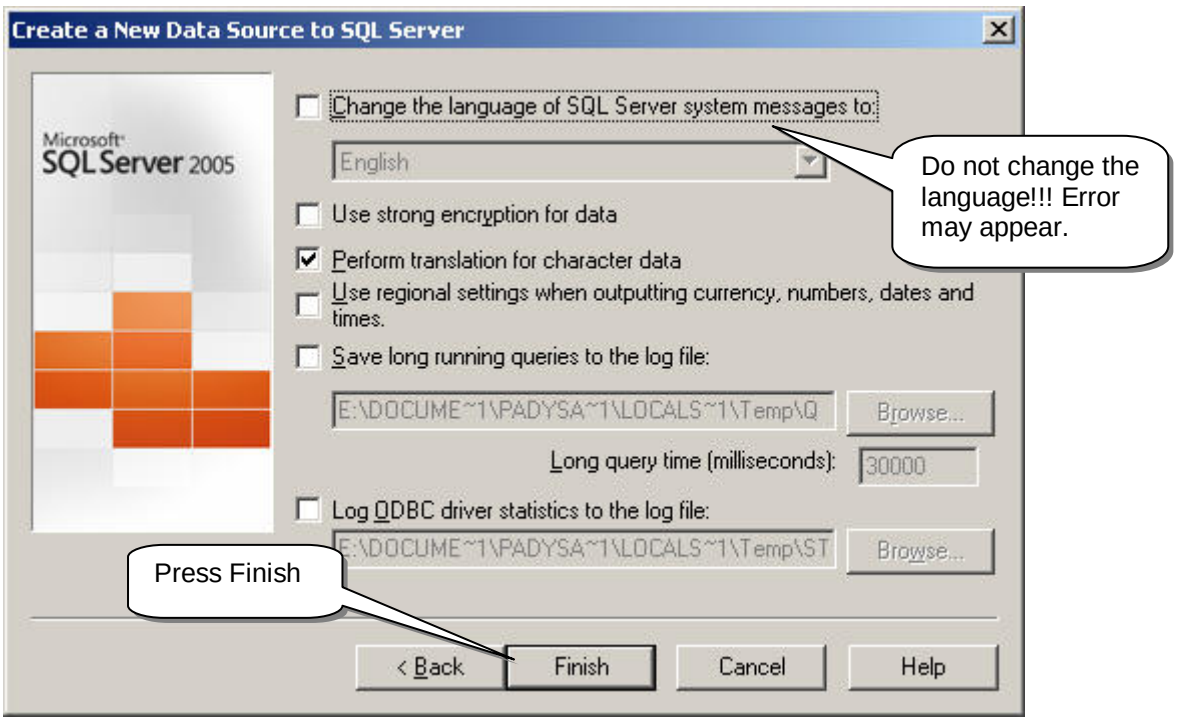


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

4. In next box choose SQL database, which you want to connect to ODBC Data source. Press ***Next***.

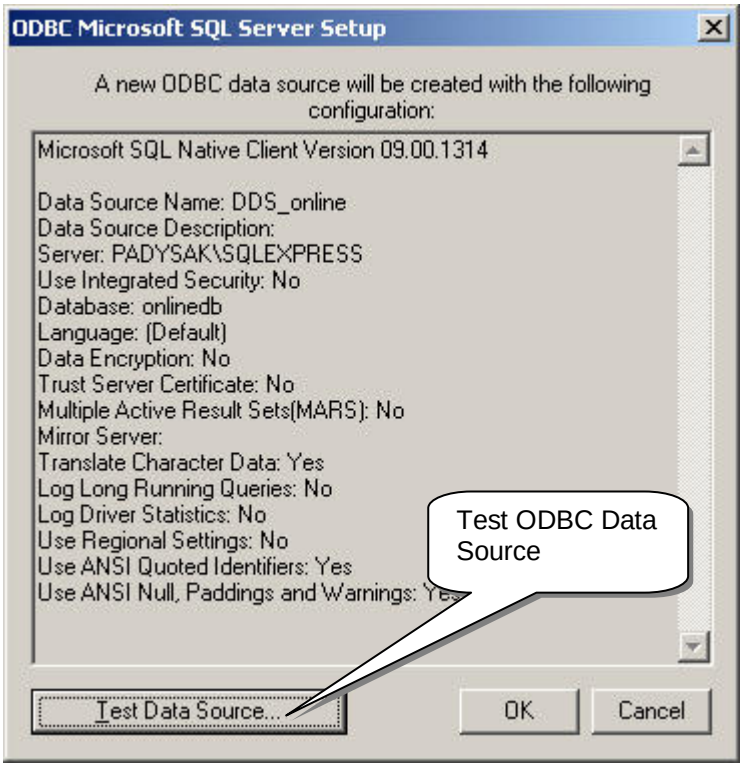


5. Press ***Finish*** in the next box. Data source test proceeds.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

6. Test ODBC data source by pressing ***Test Data source...***



7. If everything is all right, press ***OK***.

Now connection of SQL database is successful. Database can be open by DDS program.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Database repair

Over the database opening there can occur a situation, when the program refuses to open the database. In this case it is necessary to repair it. Switching off the computer without correct closing windows usually causes such a trouble. This results in not storing part of data. Microsoft Access driver provides multiple data backup thus most of problems can be solved by the Repair command. Nevertheless we recommend protecting the computer from unpredictable switching off.
The repair procedure is equivalent as in procedures above. Only press the ***Repair…*** button in ***ODBC Microsoft Access*** dialog window.
If the program refuses to open the database to repair it, you should look for the error outside the DDS 2010 program.
SQL Server databases cannot be repaired in this way. For all database services as repairing, compacting, backup you should use the ***Enterprise manager***.

Database delete

The database deletion does not cause physical deletion of the MDB file, but disconnecting the file from ODBC system. To delete the file you should use standard system tools.
The procedure is similar to the procedure described above. In main menu select the ***Database - Data sources manager*** item, mark the selected database and press the ***Delete*** button. After confirmation the database is deleted from the ODBC.

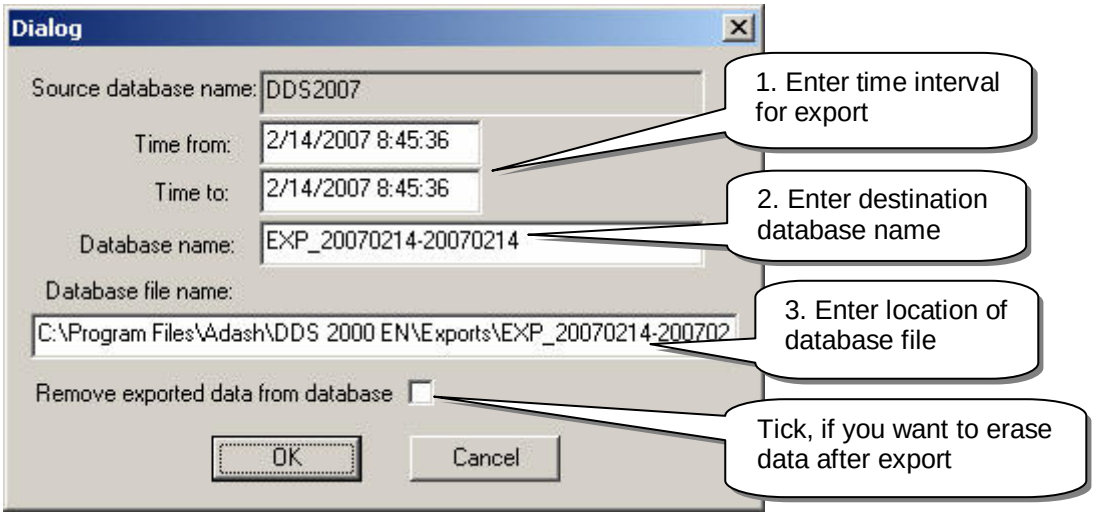
Notice

Whenever you change location of some DDS database, you have to correct path for this database in ODBC source (for example, if you install DDS 2010 into different folder than previous installation of DDS 2010, then you have to correct path to Demo_DDS2010_EN.mdb and DDS2010_SRV_EN.mdb databases in ODBC source).
The procedure is similar to the procedure described above. In main menu select the ***Database - Data sources manager*** item, mark the selected database, press the ***Configure*** button and correct path for selected database.

Time interval export

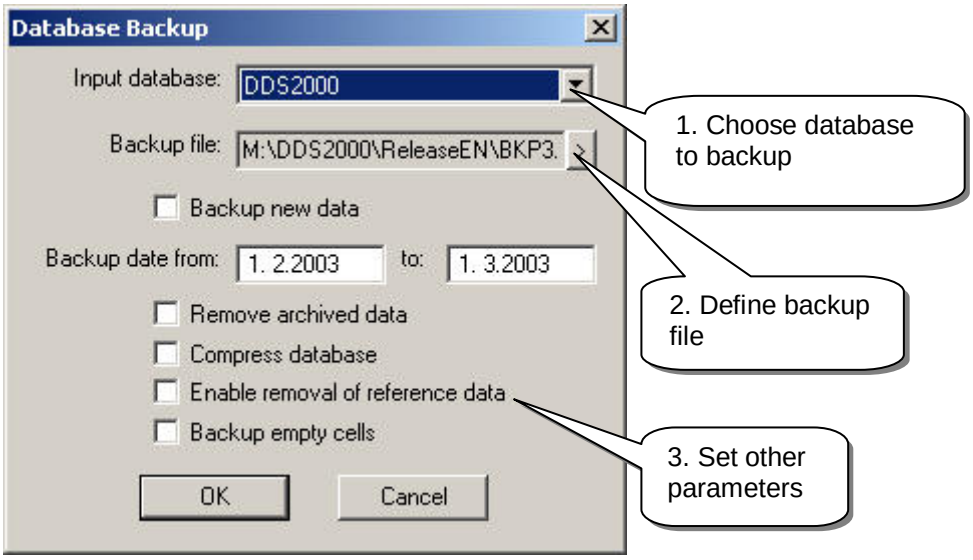
This choice enables export of selected time-interval data from current to new database. Choice is available via menu item ***Database – Time interval export***.
User sets time interval of data, which are exported. The name of destination database file is generated automatically, however user can change it.
When you choose ***Remove exported data from database*** button, exported data will be deleted in the source (current) database.
Destination database is the ODBC source name, which will be used by the exported database.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Database backup

The database backup can be performed to a backup medium or to a backup directory in hard disc, from which the backup data are stored to a backup medium with compression by any compression program (ARJ, ZIP, RAR and so on).
For backup, the main menu item ***Database - Backup*** is used***.*** After selecting this item the next dialog window appears, in which next backup properties should be defined.



Input database - database that will be archived.
Backup file - destination archive file definition.
Backup date from ... to - time interval selection in which the data will be archive. This interval is valid only if the ***Backup new data*** check box is not marked***.*** In larger databases the backup operation can take tens minutes.
Backup new data - when this checkbox is marked, only new data (added after previous new data backup) will be archived.
Backup only tree - sometimes structure of a tree without measured data is necessary to backup (e.g.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

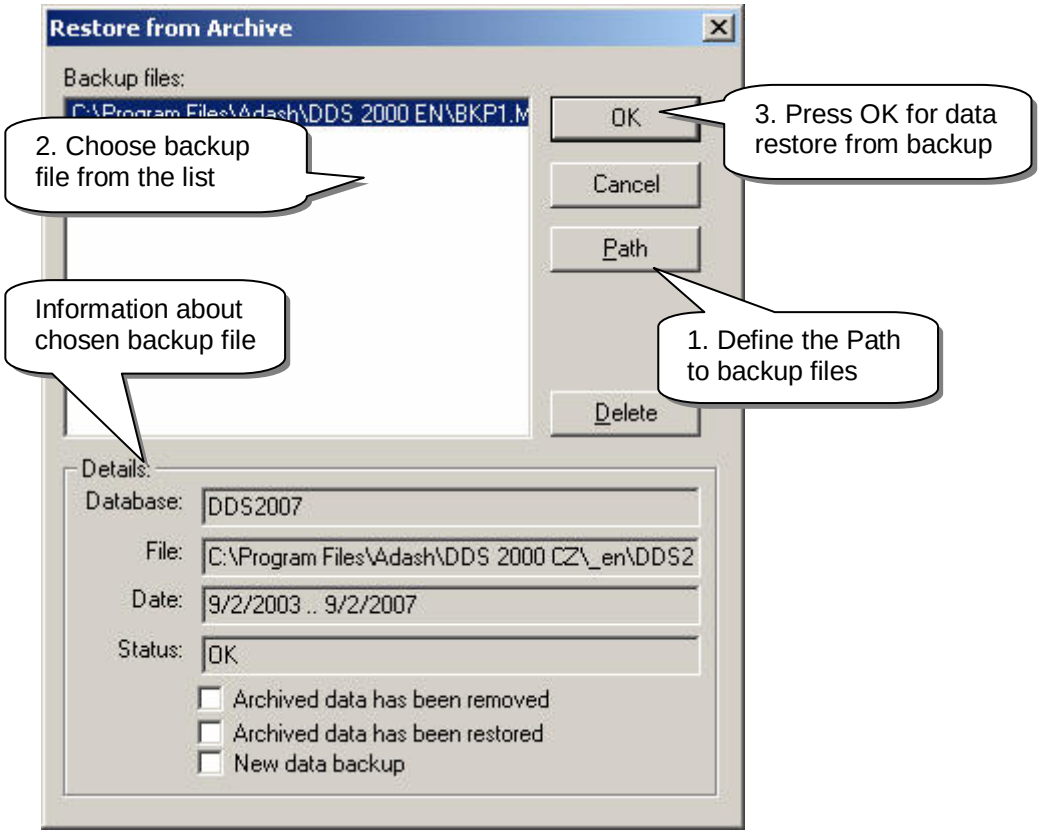
in MMS 6850 the Normal template is created in this way)
Remove archived data - clears archived data from the input database.
Compress database - all data marked as deleted will be excluded from input database. This compress procedure does not provide compress function similar to programs ARJ, ZIP etc.
Enable removal of reference data - reference data will be deleted if delete is checked and if they belong into the interval selected
Backup empty cells - complete tree structure will be preserved in the resulted backup whether the tree contains data or not

During backup procedure a new database file with the extension .MDB is created, which contains archived data selected according to criteria above and corresponding reference data and data structured necessary to data approach. Thus the database can be treated as ordinary DDS database file.
In the same directory a record in the text file BACKUP.INI is created, which contains fundamental information describing archived data for restoring from archive. Information describing backup file location is stored in program configuration file (DDS 2010.INI) so that user in the next backup or restore could start with previous backup settings and should not set everything again.
All procedures connected with backup/ restore are "File Safe", i.e. procedures are executed to temporary file, which is in case of successful finishing copied or renamed to the original files and no data are lost even in case of power break or operating system crash.
The ***SQL Server*** database can be backed up in this way, but the result file is always in ***MS Access*** (.MDB) format, so that it is recommended to use it for partial backup only. A better way for complete backup of ***SQL Server*** database is to use the ***Enterprise manager***.

Restore from backup (archive)

This operation is opposite to backup operation. After main menu item ***Database - Restore*** following dialog window with information about archives appears:

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Nový obrázek

Restoring procedure is following:
Path - selection file path to a medium with archive files.
Backup files - list of archive files on selected medium.
Delete - possibility to remove selected archive file including corresponding record in BACKUP.INI.
Details - information about database logical name, database file name, time interval, status. Displayed information is loaded from the BACKUP.INI file and defines the database that has been backed up, backup criteria, whether the archived data has been removed from then original database and whether the archived data has been restored
OK - after archive selection in list above and pressing this button the program will restore data from selected archive to original database.

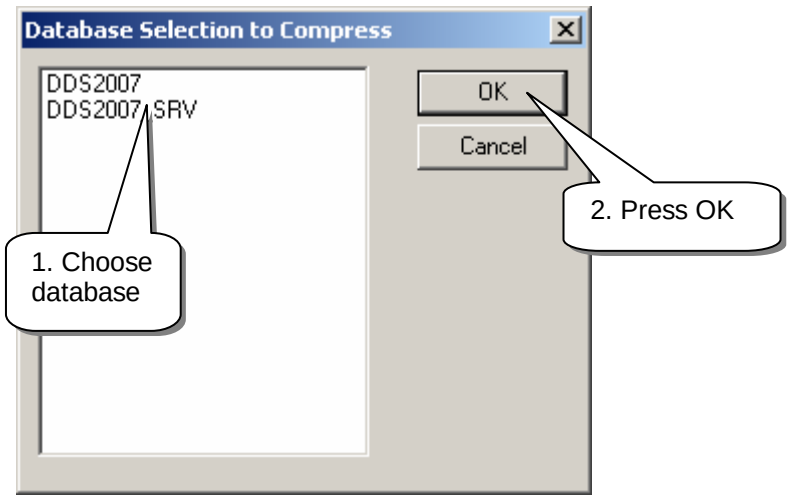
The **logical database name** (ODBC registration) is essential for restoring data. User should be careful in logical names changing: When the logical name will be changed, the archived data will not be restorable or will be restored to an incorrect database.
All operations connected with Data Restoring are "File Safe".

Database compression

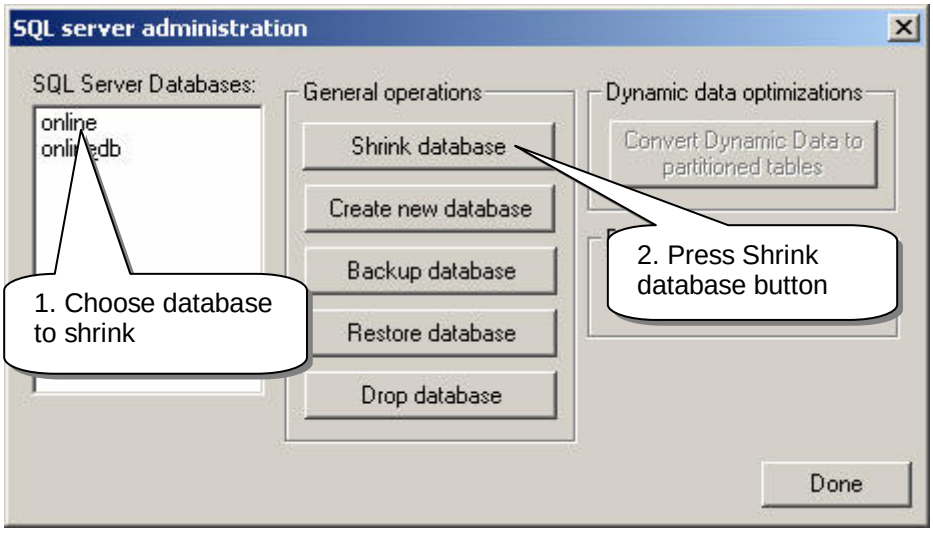
During deleting items in database MS Access service modules only mark items as deleted, but actually deleted items remain in database file and file size does not change. Consequently the database file is significantly larger then corresponds to relevant data contained. Database compression consists in creating an empty new database file (by copying DDSEMPTY.MDB) and copying of all data from original database file. The procedure is "File-Safe" (nothing can be lost). The

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

procedure can take several minutes and cannot be interrupted.



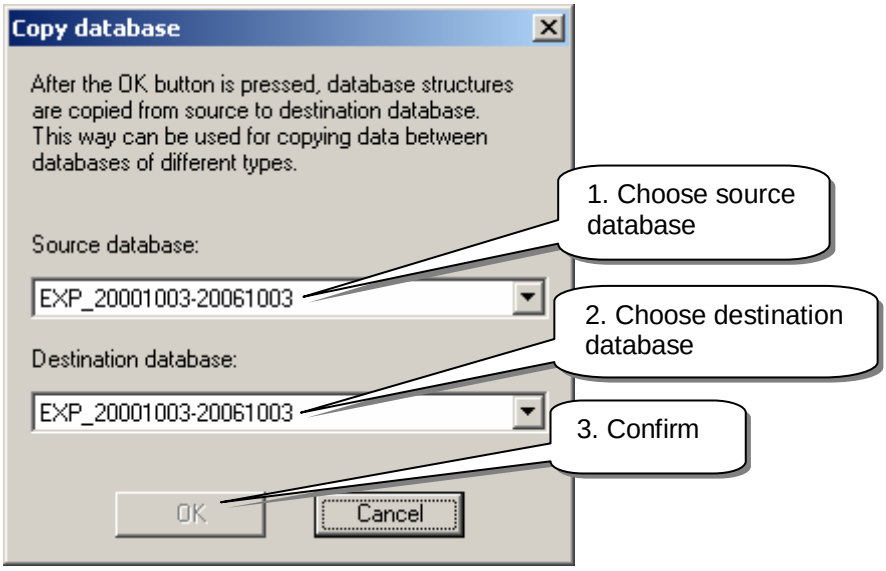
The ***SQL Server*** database cannot be compressed via this method. To compress SQL database use ***Enterprise manager*** or ***DDS SQL Administration***.
Database – SQL Server administration: in box ***SQL server administration*** select database, which you want to shrink. Then press ***Shrink database***.



Copying Database

The ***Copy Database*** command allows creating a copy of structures from source to destination database. It enables also converting data between ***MS Access*** database to ***SQL Server*** database. When you ***copy*** database, you erase content of destination database and replace it with new data. If you want to store old data in the destination database, use ***Synchronization***.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

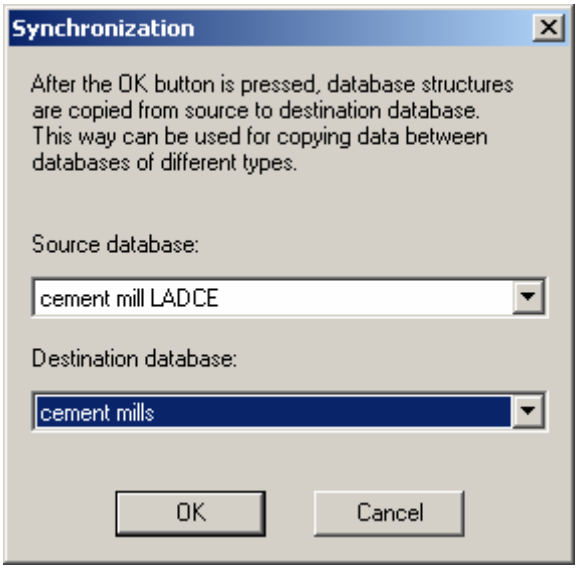


Database synchronization

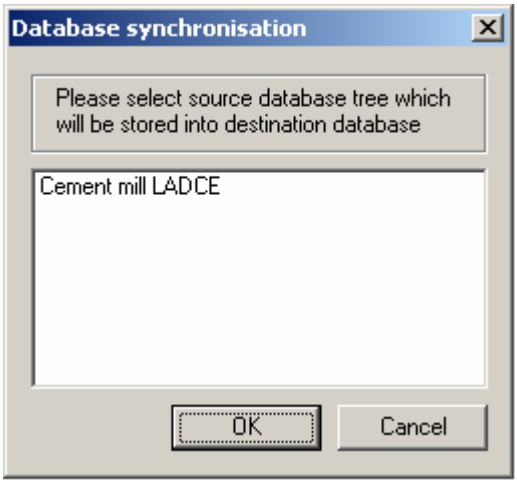
Function "***Synchronize Databases***" enables data synchronization from more databases into the central one.
Unlike copying (when all trees are copied but existing data cells are not connected), synchronization does not create any new tree or data cell, but new data from source (current) database are added into destination database.
Synchronization needs identical structure of database and same ID number of tree member. The base principle is data synchronization from copied database (actual) to central database (primal).
Synchronization description: After setting source and objective database, setting trees and cells entering the synchronization, DDS 2010 program searches all data cells with the same ID, type, name and location. Then it compares pairs of data cells. If source - database cell contains new data, this data are copied into central (primal) database. If it does not, another pair of data cells is compared.
Synchronization is possible for whole database, separate tree or individual data cells. Synchronization is available via ***Database - Synchronize Databases.***

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

In synchronization menu you can find two items: source and destination database. We determine, which database will be synchronized (source database) and where synchronization result will appear (destination).

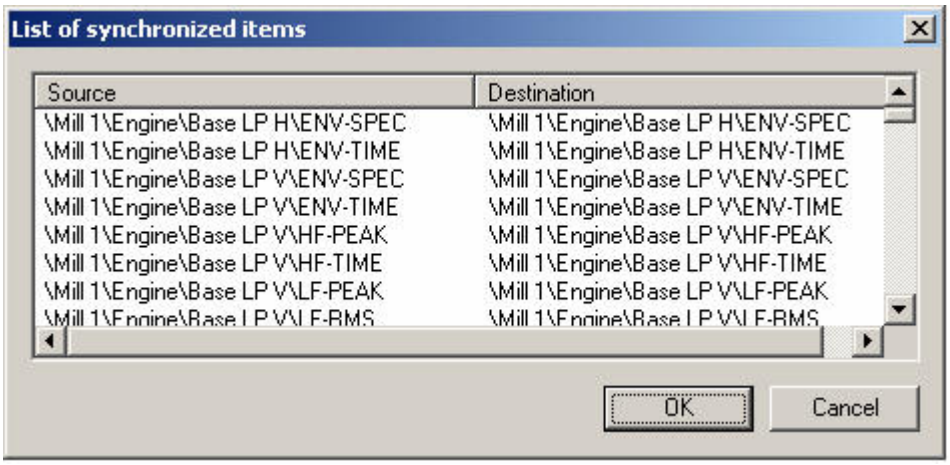


In the next window choose trees, which you want to synchronize.

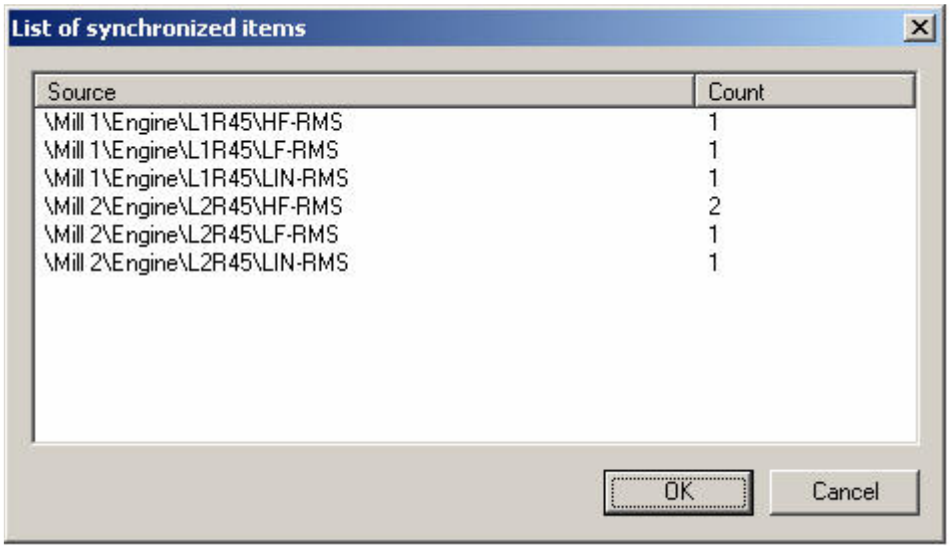


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

There are all data cells displayed of databases with the same ID, type, name and location in the next window.



Synchronized data cells are displayed in the last window.



Other backup tools

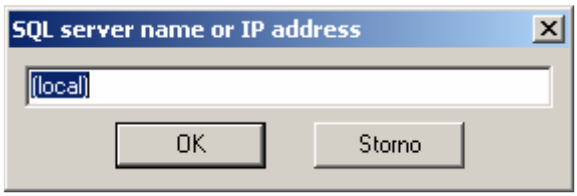
Database can be archived by standard MS-Windows tools (Backup) or by programs used for backup purposes by user (WinZip e.t.c.). Only database file (extension .MDB), which contains data, should be backed up. Placement of this file can be found by ***Database - Data sources manager*** command. In ***Data Sources*** window activate required database and press the ***Setup…*** key. Full data path to the .MDB file is in the ***Database***

In case of ***SQL Server*** database you should prefer using the ***Enterprise Manager***.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

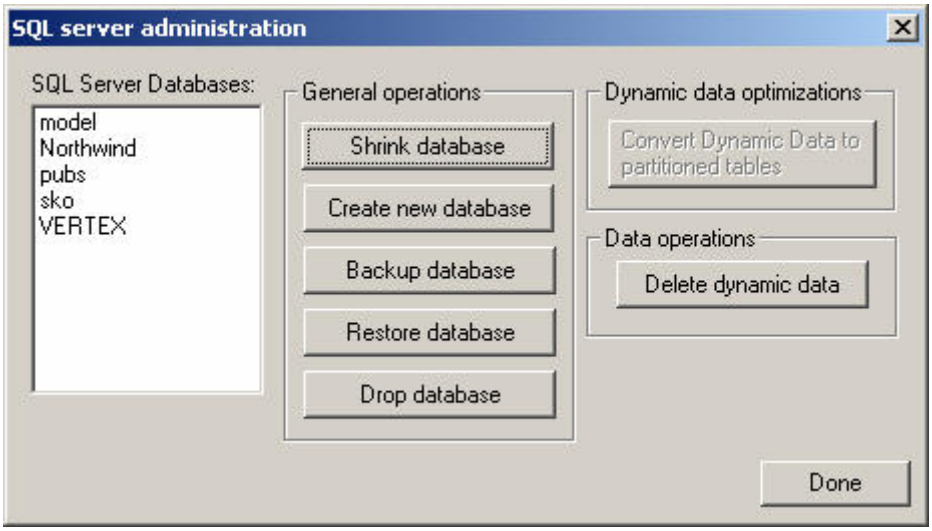
Administration of the SQL Server from DDS

If you have installed only the ***SQL EXPRESS*** (***MSDE***) version of the Microsoft SQL server or if you do not have installed all the components for the administration of the SQL server ***(Enterprise Manager e.t.c.)***, use the embedded administration of the SQL server by selecting ***Database- SQL Server Administration***.
Prior to activating the dialogue, enter the IP address of the SQL server if it does not run on your local PC (otherwise keep "***(local)***" for ***MSDE*** and "***(local)/SQLEXPRESS***" for ***SQL EXPRESS***).



Should any error message and the ***SQL Server Log In*** appear, unmark ***Use Trusted Connection*** and enter ***User ID "sa"*** and password that has been set up for this account on the SQL server (defaultly the password is empty).

If no error message is displayed, the ***SQL Server Administration*** dialogue appears that enables to perform basic operations of administrative character on the SQL server. You can create, delete (drop), backup and restore databases or shrink them (erase useless space in database).



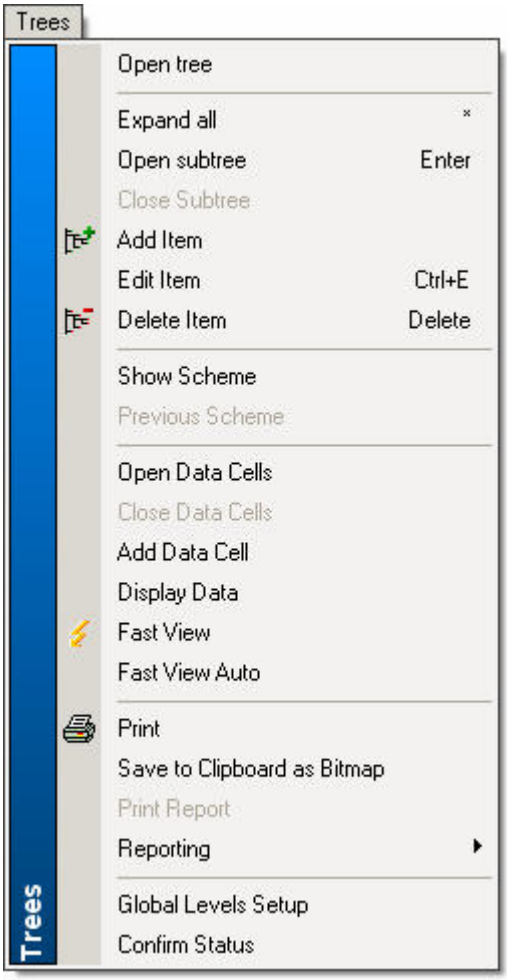
Note. The ***Transfer Dynamic Data to Independent DB Files*** button is intended for the optimization of access to the database for ***online*** systems. If you do not use the MMS6000 system, this option will not be available. If you use MMS6000, consult the ***Online DataManager*** product manual**.**

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Basic commands for trees

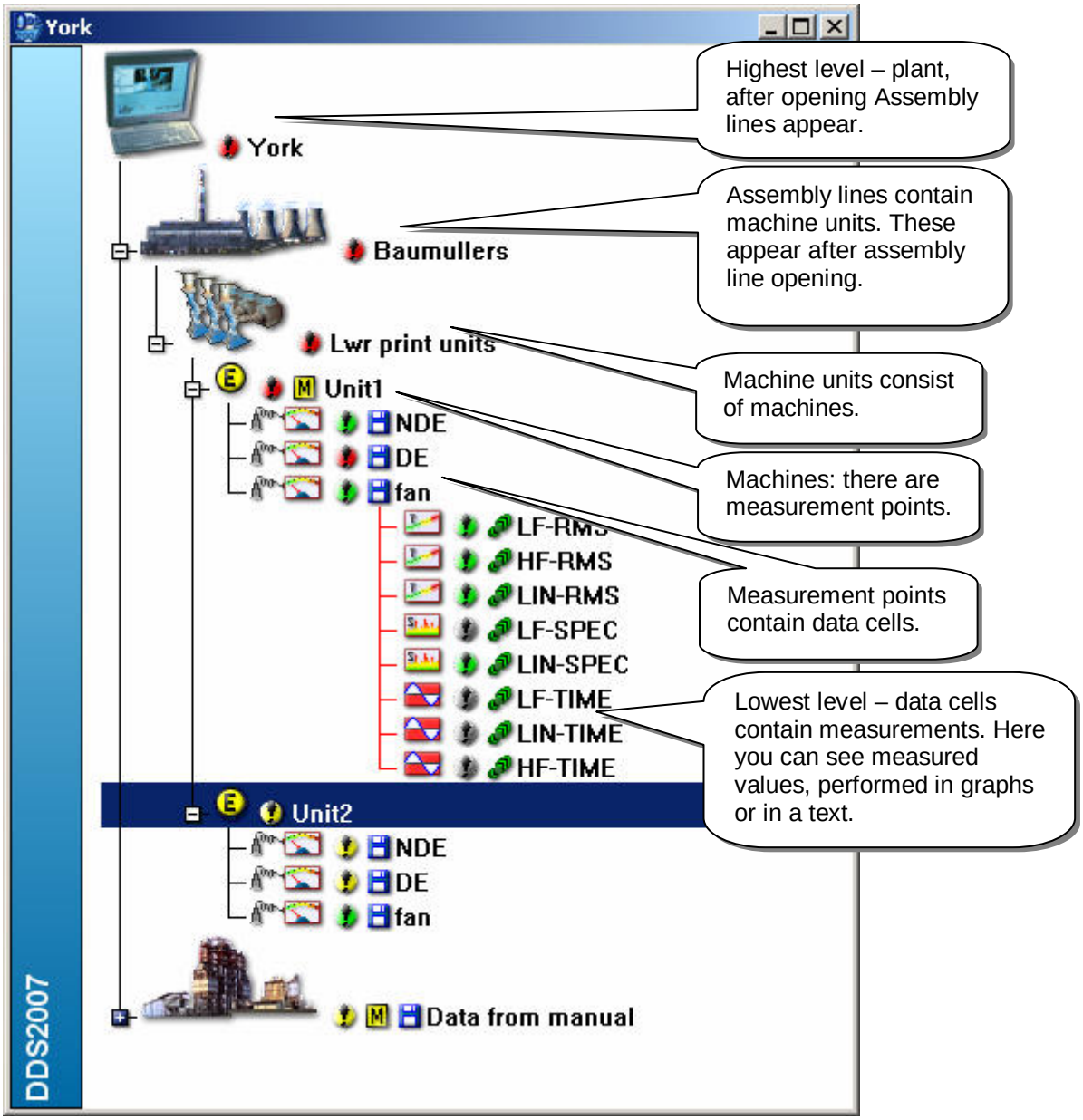
The tree is the fundamental structure that serves to store data. Each database can contain universally any number of trees. Each tree branches out to next levels describing measured machines organization. Older systems usually worked with four levels - plant, machine group, machine and measure place. DDS system does not limit you in level number. Every branch of tree can have any number of levels up to 32. Create such structures that allow effective data collection and comfortable results evaluation. Real data (measured values) are stored to ***data cells,*** which represent the lowest items of every tree branch.
The basic property of each tree item in ***DDS 2010*** is, that it can be branched and contain data cells. Notice, that the possibility to have data cells is not limited to branch termination tree items. That allows to store not even data for simple measurement places but in common for the all machine (for example rotations, operational pressure e.t.c.). In evaluation the data are automatically inherited to lower tree items. ***Data cells*** can be connected to tree items at any tree level.

When working with trees, you use menu Trees and Local menu, which you run by right -mouse button clicking at Tree element. Local menu using is a basic character of DDS operating. In local menu is always list of commands and functions that can be used. Local menu can be used both in basic and graphic mode.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

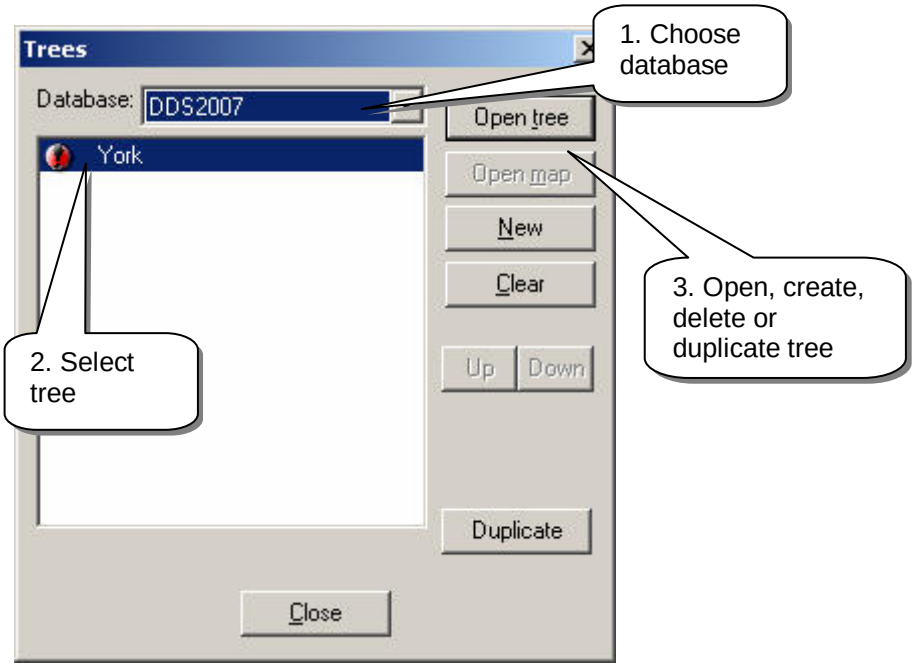
Tree



Open tree

By main menu item ***Trees - Open tree*** the ***Trees*** dialog window will be displayed. Select required database and tree. Press the ***Open tree*** button. The selected tree will be displayed in basic display mode. If the tree can be open in graphic mode (contains scheme), you can use the ***Open map*** button. With New button you can create a new tree, with ***Clear*** button erase highlighted one. Duplicate button creates copy of highlighted tree.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Other menu item

Open Subtree and ***Close Subtree*** - tree structure of stored data allows very easy evaluation. After opening a tree its highest level is displayed. By consecutive opening of particular branches we reach to the lowest level (data cells). The first method to open tree is using command ***Open Subtree*** and ***Close Subtree*** in local menu. The best way to open a branch is to do it by mouse. You can open next tree level by mouse left button double click on active tree item. If the tree item is already open, the same action causes its closing. It is possible to use keyboard instead of the mouse. By up/down arrows select required tree item and then press ***Enter***. Required tree branch will be opened (or closed) as well.
Acceleration if this procedure can be done by using key combination ***Ctrl+Enter***, which causes opening a large tree part in one time. If it is used at the tree level higher then ***Machine*** level, all tree branches will be opened up to trees with ***Machine*** flag active. Its using at ***Machine*** or lower levels causes opening all child items including data cells.

Add Item, Edit Item, Delete item - commands to define tree items. These commands are described in chapter ***Editing DDS trees***.

Show scheme - if the active tree item has its graphic representation, this command opens it as a picture.

Open Data Cells and ***Close Data Cells*** - commands similar to open tree. If the tree item contains data cells (diskette icon), this command opens them without opening the subtree.

Add Data Cell - creating a new data cell (see chapter ***Data cells***).

Draw Data - command to draw data from active data cell (see chapter ***Data cells***).

Edit data - data creating or changing (see chapter ***Data cells***).

Fast View - an effective method of data display (see chapter ***Data cells***).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Fast View Auto - same as Fast view, displays tree elements automatically

Print - standard tree print on the printer.

Save to Clipboard as Bitmap - it is possible to save tree structure to the clipboard as a bitmap for using in other applications.

Print Report - the DDS system allows very effective print of measurements. It is possible to define templates for different report types and then select them simply and fill them in with data and required texts. Detailed description is in next paragraph and in chapter ***Sources - Reports.***

Reporting - this command creates reports about database condition for the DDS user (Report described above is designated for machine maintenance). It provides print sets with information about measurements, results, alarm lists, missing measurements e.t.c. Detailed description can be found in separate paragraph in this chapter.

Global Setup of Levels - collective setup of critical values for more data cells. Detailed description is in chapter ***Data cells***.

Confirm Status - collective status confirmation for a lot of data cells. This is done usually for complete machine after reparation or removing high vibrations source (causing critical values exceeding). It is necessary to enter operator name before the status confirmation. Detailed description is in chapter ***Data cells***.

Global route setups - collective setup of parameters for measurement frequency and transfer to route. Detailed description is in chapter ***Data cells***.

Compose cell - creates new static cell from two existing static cells. For example: measuring of machine coast down contains 2 data types - values of rotation and vibration depending on time. We would like to see diagram of vibration depending on rotation. This is possible by function **Compose cell** (right click over any item of tree (except data cell) and select **Compose cell** item). New data cell will be created and data from both cells will be saved into single measurement as real (axis X) and as imaginary (axis Y) unit. Standard window for data cells selection appears, use **Ctrl** key for two cells selection and press **OK**. A new window appears where measurement time toleration has to be entered. This is because there can be difference a few seconds or minutes between two measurements although they are measured in the same conditions. Selected will be only those pairs of measurements, which time measurement difference is lower than value of toleration. Name of the new cell is combination of the original names. Button **Swap** allows to shift order of cells and **Runup** (RPM vs ...) enables to create special **Runup** data cell format.. Work with created diagram is exactly the same as with any other polar diagram.

Icons in front of tree items

In front of each tree item some icons can be displayed. These icons inform of tree properties. Differentiate icons from type bitmaps (see Resources/ Type bitmaps). Using icons can be set up by main menu command ***Options - Tree Mode.***

 - operation condition (semaphore), possible colors: grey, green, yellow, red,

 - tree item has a graphic schema connected,

 - tree item has flag ***machine***.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

yellow = running machine, grey = not running machine.

- tree item contains data cells,

- data cell is designated to store to routes,

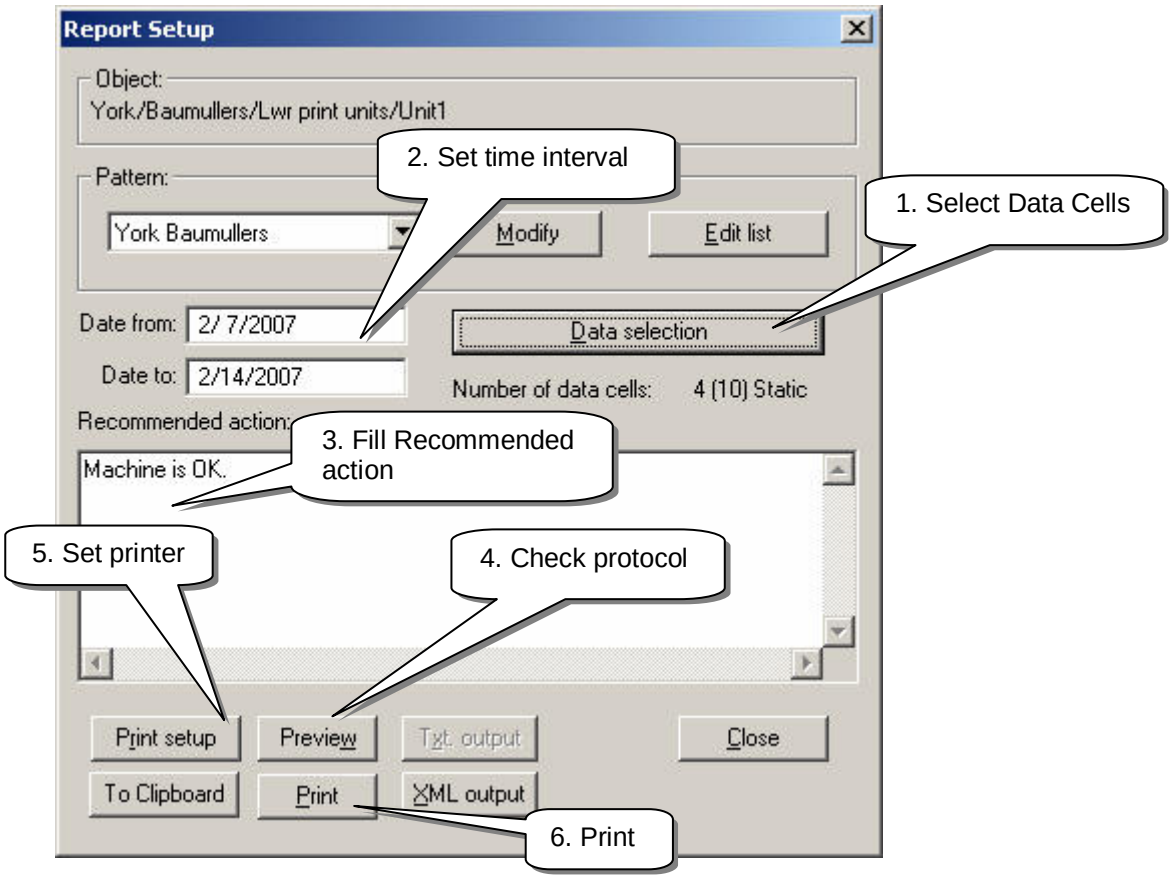
- missing measurement time,

- tree item is open,

- tree item has closed branches

Print report

It the active tree, item is defined as a machine, the command ***Print Report*** is active in the local menu



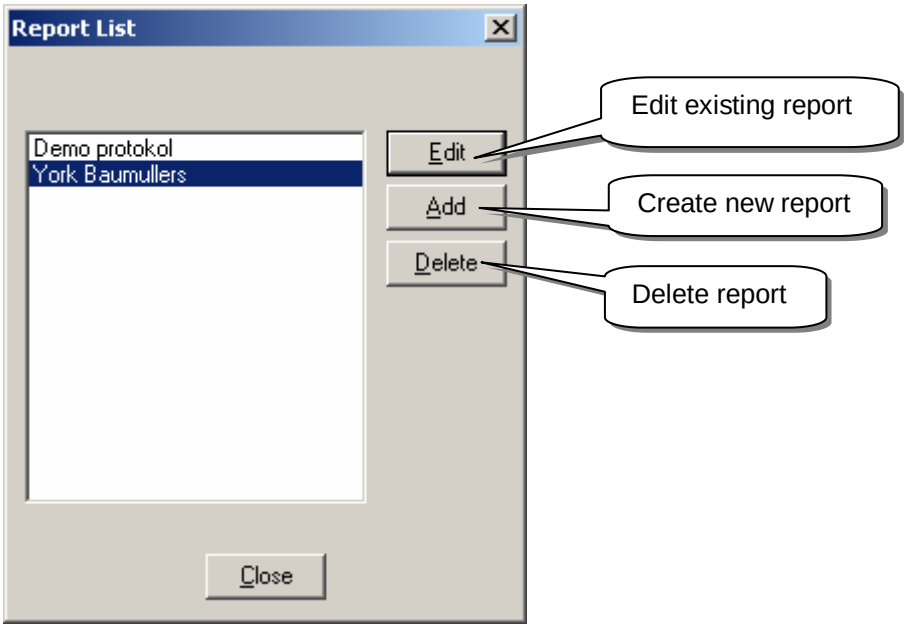
First select data cells by pressing the ***Data selection*** button. Data from selected data cells will be used in report. The ***Date to*** is date of the report, newer data are ignored in report. In case of trend report, ***Date from*** and ***Date to*** define the draw interval. Enter a new text to the ***Recommended action*** memo field. Check report face by the ***Preview*** button, if it is not completely satisfying, modify

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

temporarily the pattern by the ***Modify*** button. For permanent pattern modification you can use the ***Edit list*** button that allows to create a new pattern by copying an old one (the ***Add*** command) and modify it according to your requirements.

Print setup - standard printer setup.
Txt.output - protocol may be saved also as a text file.
To Clipboard – similar as ***Sample***, however bitmap size in pixels may be set up and the bitmap is saved to the clipboard.

If template characters are not fully satisfying, use ***Edit list*** button for changes in template setting. With Report List command you can edit, delete or create new report templates.



Report editing

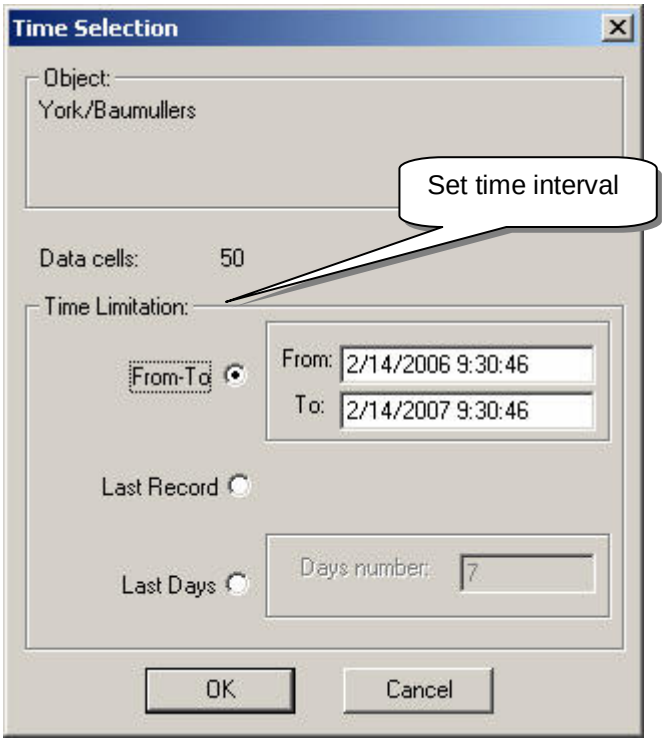
You may not be satisfied with the standard report and you may like to change it. Open Report box by pressing ***Modify*** button in ***Report Setup*** box. Report editing is described in Chapter ***Resources – Reports***.

Reporting

Reporting is designated to DDS users for easy determining of database and measurements condition. This command opens the next menu for selection one from five reporting types.

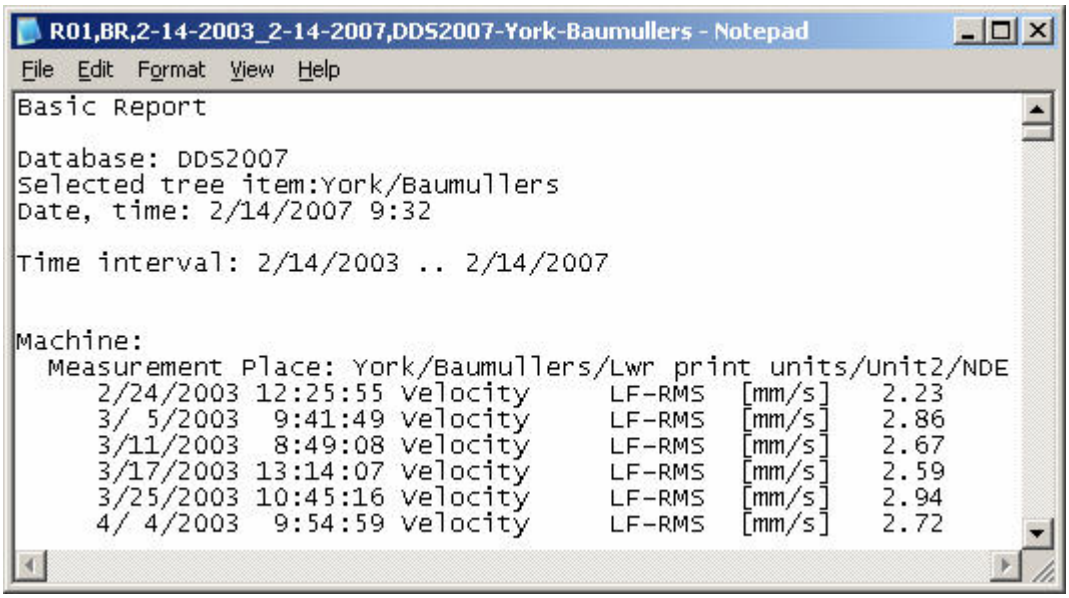
Basic Report - serves for summary of measurements on all data cells in all branches of active tree item. If this item is selected, the ***Time Selection*** dialog window appears for report properties set up.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Object - active tree item name including parent tree items
Data cells - number of data cells evaluated.
Time limitation - set up of time interval for reporting information selection.

After completion setting up, press the ***OK*** button. The file ***Report.txt*** will be created, stored to subdirectory REPORT (usually ***Documents\DDS 2010\REPORT***) and displayed by application defined in operating system for opening .TXT files.



Parametric report - modification of the basic report with the possibility to enter measured parameter subtype.

Danger list - creates list of all data cells with Danger status (i.e. red semaphore of operational condition).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Missed measurements- it is possible to set up required measurement time interval in data cell properties definition. This report contains the list of all data cells, which measurement interval has been missed.

Last measured machines list - report contains the list of last measurements date and time on all machines connected to the active tree item. The list serves to have a quick look at machine measurements as the entire machine is usually measured at the same time.

Abbreviated Last Measurement Summary - report contains the last measured static values in table organized by Machine, Measurement point and Data subtype.

Brief Overview of the Last Measurements – an overview of the last measured values of static quantities, listed according to the points and types of measurement.

Statistics – basic – list of statistic parameters of all chosen data cells. File contains following stats:

- MAX	- maximum measured value
- MIN	- minimum measured value
- AVG	- average of values
- Count	- amount of measurements
- Median	- AVG alternative, its advantage is elimination of extremes
- Chronolog. average	- similar to AVG, it takes into account measurement intervals
- Relative variation average	- responds to dispersion of values in data cell, always lies between 0-100. 0 – all values equal, 100 indefinitely high differences

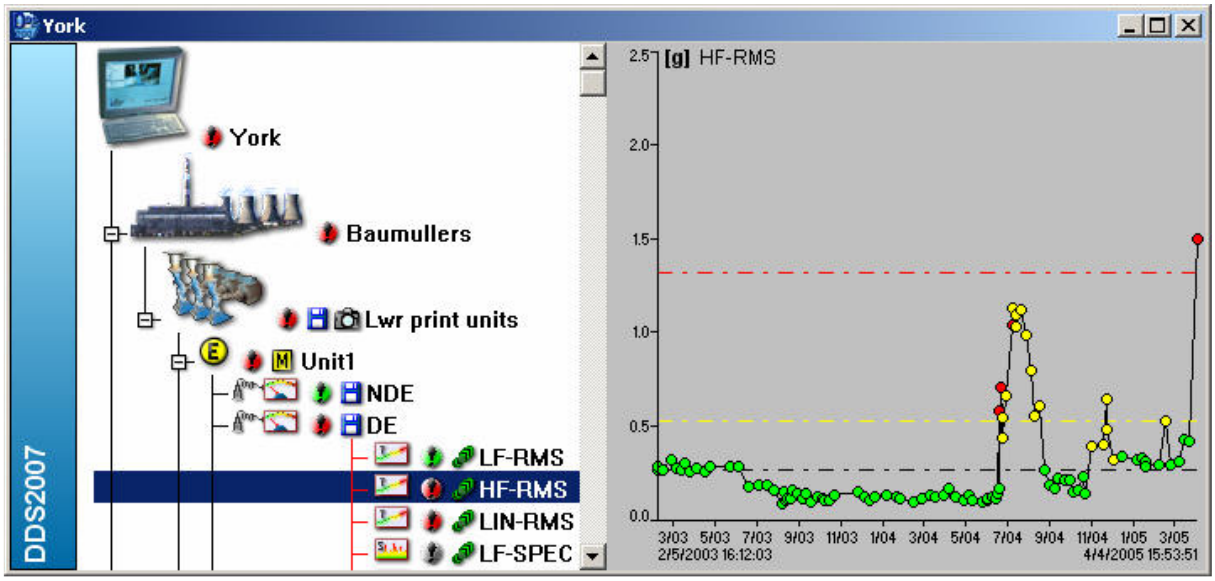
Static function system is part of ***FASIT*** (Fault Source Identification Tools). It serves to setting and tuning the diagnostic system.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Editing of DDS tree

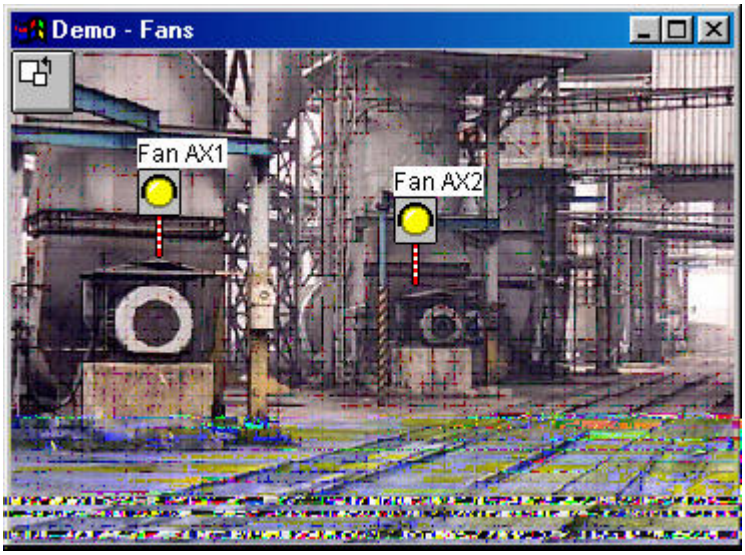
The tree can be displayed both in basic and graphic format. Every tree item can have a schema (picture) connected. Orientation in tree is much easier then as the user does not move in confusing group of names and abbreviations but in graphic environment corresponding to reality.
When the schema are defined, select the ***Show Scheme*** command in local menu. Switching between separate items is possible by ***Identifiers,*** which means to next, more detailed scheme. The back button in upper-left window corner ensures back switch.

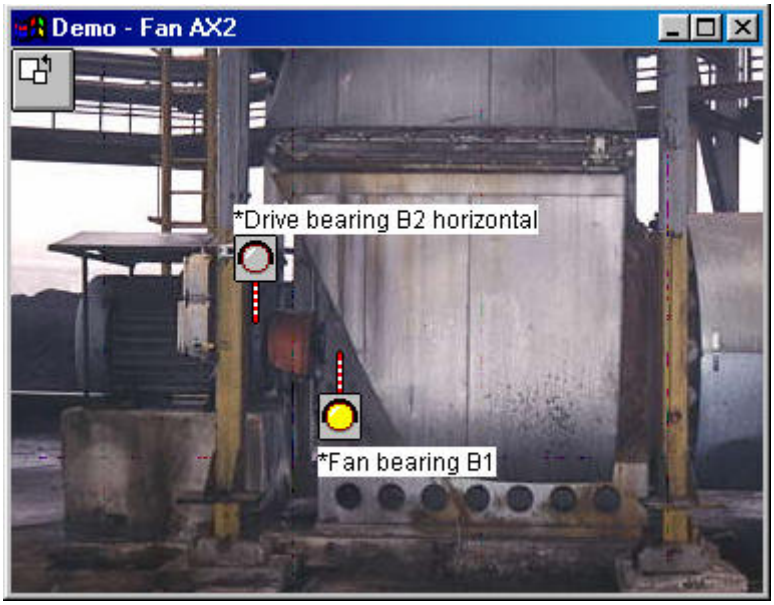
View of tree, ***fast view*** function is ON.



Following example shows moving in graphic environment of discrete schema.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

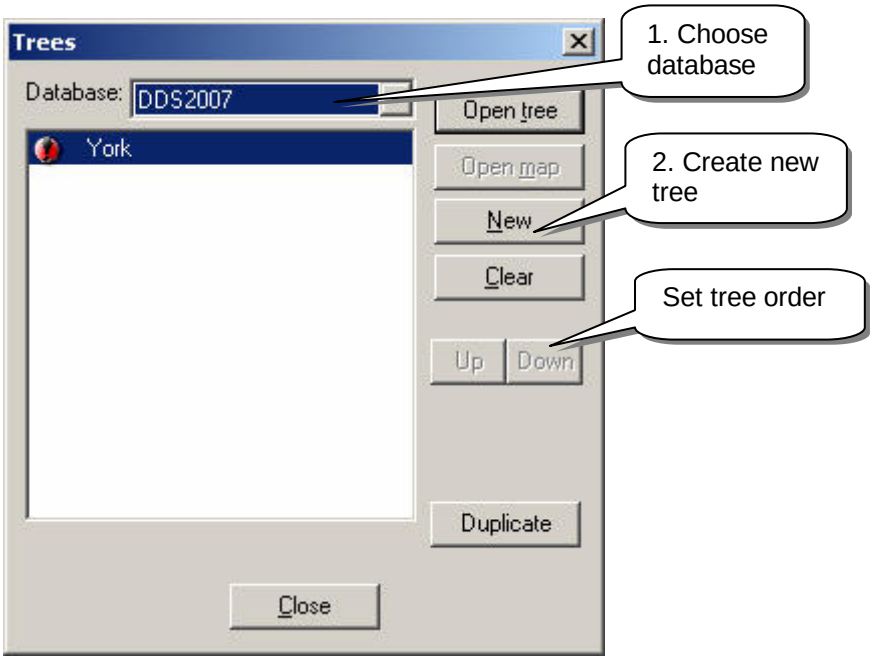




Creating of a new tree

When the main menu item ***Trees - Open Tree*** is selected, the ***Trees*** dialog window appears. The ***New*** buttons serves to create a new tree.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



After creating a new tree item the ***Tree Item*** dialog window is displayed. The ***Extended***… button expands all reachable settings.

Type the name of the root tree item to then ***Name*** field. Maximum name length is 64 characters. Select its graphic representation in the field ***Type bmp***. Define ***Note*** if necessary.
The tree structure can have two faces: Basic (text) and graphic, which allows movement in tree structure as if you are in manufacturing place. Working with the program becomes very intuitive and can be mastered easily even by an unskilled user. The fields ***Scheme*** and ***Identification in Scheme***s are designated to connect graphic scheme. Work with schemes will be described later in this chapter. Also items ***Bearing*** and ***Options*** have no meaning in new tree item creating and will be described later.

Tree organization in database

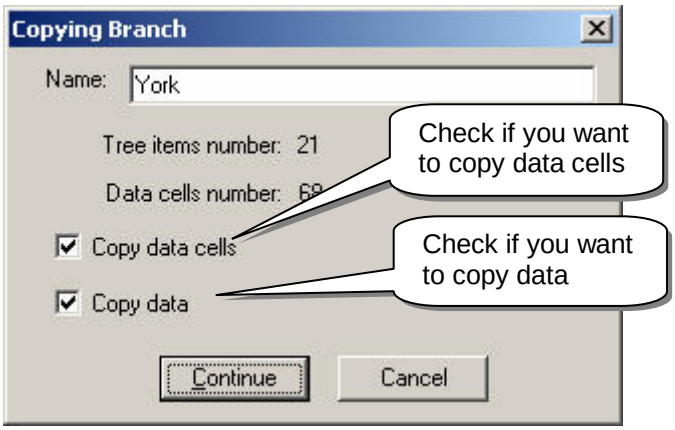
When the ***Trees - Open tree*** main menu item is selected, in the ***Trees*** window the list of all trees in open database appears. If there is more than one database open, it is possible to switch between active databases, the tree list of actually selected database is always displayed. As particular trees represent real plant structures, order of them may be important. By the ***Up*** and ***Down*** buttons you can arrange the tree list order. The ***Clear*** button causes deletion of the tree from database.

Copying trees

Copying trees is one of fundamental methods of effective database creation. Create tree for one structure and then copy it according to your need. There are two ways to copy the tree: to the same database or to different database. Select the tree in the tree list and then press the ***Duplicate*** button. If there is more than one database open, the list of open databases appears and you have to select destination database. Then the ***Copying Branch*** dialog window appears where you should mark,

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

whether the selected tree will be copied in common with data cells and data or whether only tree structure will be copied.



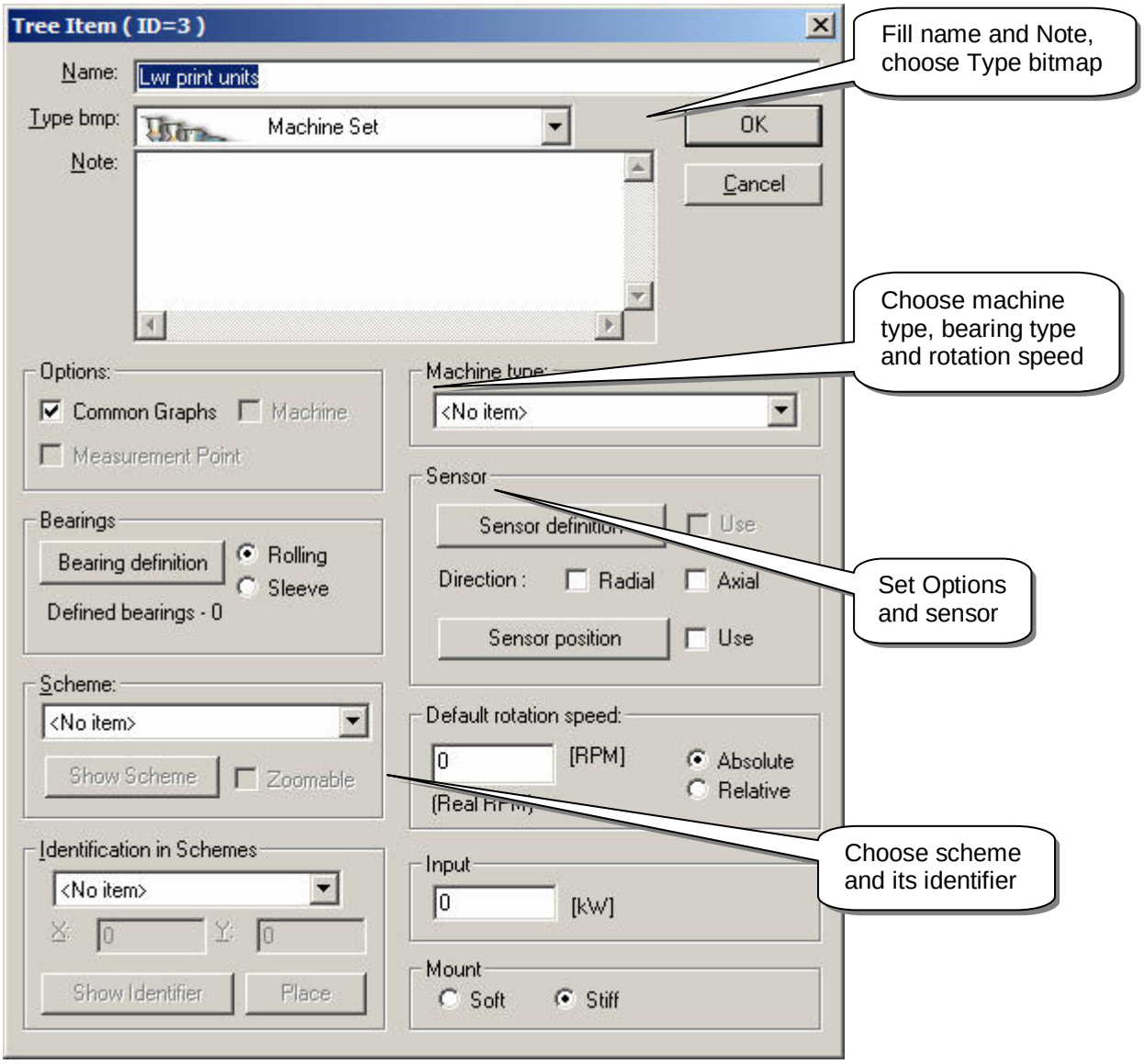
Universal tree item and data cell

Now you have created a new tree and you can continue in its building. By adding new items you will create new branches and levels.
Two tree element types are defined: Descriptive elements that serve to build tree structure (plant, machine, measurement place …) and data cells, that contain data. In next manual part we discuss tree elements, it means all tree elements with no reference to the type. If somewhere the ***data cell*** term appears, it means data elements only. This is very important to distinguish the difference between both element types.
The DDS system does not require the data cells to be placed on branch terminals only. A data cell can be connected to any tree item that is not a data cell. This property multiplies possibilities of database data storing organization.

Creating a new tree item

Each newly created tree item must have its parent on which it is created. The basic tree item is root item. Root item creating has been described in the ***Creating of a new tree*** chapter***.*** Trees with common predecessor are trees of the same level.
Tree can be opened by ***Trees - Open tree*** main menu command and by tree selection from the list. Its structure is displayed in a window. In case of a newly created tree the root tree element is displayed only.
Newly created tree element is always created on the tree that is active. A new tree element can be created by the ***Trees - Add Item*** main menu command, by the ***Add Item*** local menu command or by the ***Insert*** key. The ***Tree Item*** dialog window appears. In the ***Name*** field enter the name of the new item. Maximum name length is 64 characters. You can select graphic representation of the tree item from the ***Type bmp*** field and type a text to the ***Note*** field.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Options

The special properties include flags ***Common graphs***, ***Machine*** and ***Measurement point*** activation of these flags has sense in data transfer to measurement instrument, in data evaluation and reports printing.

Common graphs - this character is intended for collective data drawing in selected tree branch. It is used to common trend drawing of a whole machine. If you want to use this character, you should activate this flag on required element. If you execute the ***Draw data*** local menu command, the selection of all data cells in the branch will be available.

Machine - this flags serves to identify a Machine element. It is useful to set a Machine element in all tree branches for example for route creation (route is a machine list). The condition reports are usually related to Machine tree elements. The Machine specification represents basic concept vibration diagnosis.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

The ***Measurement Point*** flag has close relation to the ***Machine*** flag. It has sense in route creating and report printing. This concept represents the fact, that the machine usually has a set of measurement places. In DDS may be several additional levels between ***Machine*** element and ***Measurement Point*** elements.

Connecting scheme and identifier to a tree item

A graphic scheme can be connected to any tree item. The scheme can be a machine photo, engineering drawing, block diagram e.t.c. The DDS system can use most of graphic formats commonly used. The not packed format (BMP) allows fast approach, but the database file size rapidly increases. When packed format (JPG) is used, the resulting database file size is smaller, but the time to open schemes is significantly longer.
First create picture and schemes you want to use in programs you usually use (Windows® MsPaint, Corel®…). To enable using pictures in DDS program it is necessary to store it to DDS4_SRV database, which serves to store system information necessary for DDS operation. This operation is provided by the ***Resources - Schemes*** main menu command. Complete description can be found in the ***Resources*** chapter.
In the extended part of the ***Tree Item*** dialog (the ***Edit Item*** local menu command) you can connect the graphic scheme to selected tree element. The group ***Scheme and Identification*** in schemes serves to this purpose.
If a set of schemes is created by the ***Resources - Schemes*** main menu command, it is possible to select required scheme from the list. Default state for each element is ***<No item>***. The ***Show Scheme*** button allows selection checking. If the ***Zoomable*** flag is activated, the scheme size will be automatically accommodated to the show window size, but some pictures may be distorted. If a tree element has a scheme connected, the camera symbol will appear .
In each scheme identifiers can be placed, that allow switching to next scheme. To connect an identifier, select an appropriate identifier in ***Identification in schemes*** group. Identifier shapes differ in the direction they point to. To check the selected identifier, use the ***Show Identifier*** button.
Now press the ***Place in Scheme*** button. The parent tree element scheme appears and there you can place the identifier by mouse drag and drop. You can enter the identifier coordinates manually as well. If you want to change identifier shape during its placement in scheme, press the right mouse button on the identifier and select a new shape.
The perpendicular dashed line with two arrows serves to set the pointers direction in report. Detailed explanation can be found in part concerning the report printing.

Default rotation speed

The ***Default rotation speed*** group serves to set up the machine rotations if its rotations can be considered as constant. These rotations can be used in spectra analyses (supposed the rotation speed is not redefined in data cell or spectrum record. More detailed information can be found in the ***Spectra*** chapter. Rotations can be defined as absolute or relative. Absolute rotations are defined in RPM, relative rotations are represented by proportional number that defines the relations to rotations defined in parent tree item. If the rotation speed value is zero, the parent tree item rotation will be used.

The rotation is displayed after X-axis unit in format [unit], [value unit]. The revolution unit is the same as the X-axis unit.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

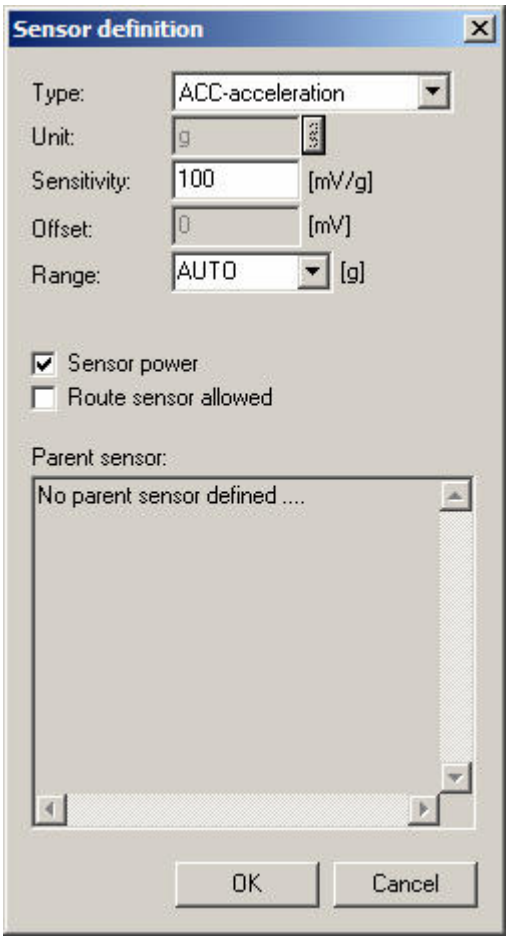
Bearings

The ***Bearings*** group serves to assign a bearing from the predefined table (see also the **Resources - Bearings** chapter). Each bearing type has its own characteristic frequencies (defined as machine rotations multiple). During spectra analysis these frequencies can be marked and corresponding bearing defect can be detected this way.

Note. If you haven't bearing license, then the Bearings group is disabled.

Sensors

Sensor definition



Combo box **Type** is enabled only if there are no data in data cells under this tree item. Once user load data into data cells under this tree item, then it is impossible to change sensor type.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

When User is creating new tree item, default sensor for this item is **"Not defined"** sensor. This sensor is impossible to use, that's why the **Use** checbox on tree item is disabled.

Each sensor type has defined group of units, which are compatible with instrument. So we can select unit only from this group.

VA3 route sensor allowed - we check this box, if we want to use VA3 route sensor. This sensor is defined in instrument. When we allow to use it, then the sensitivity of sensor is not exactly required (e.g. we can have defined the 100mV/g in DDS and the VA3 uses the 50mV/g sensor, then the VA3 automatically will use current sensor and will not remind to user the change of sensor).

Parent sensor info - if there is a sensor at the higher level with **Use** flag set to ON, then setting of that sensor is shown in info window, otherwise "Not defined" message appears.

Direction

Indication of sensor sensor direction. This information is being used in SAB machine fault detection.

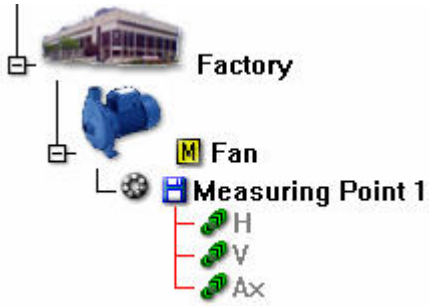
Sensor position

See chapter “Processing of Data from MMS 6850”.

A4400 – VA4Pro and triaxial sensors

If you are using sensors that measure signal in more axes, create the measurement point and set the sensor definition only once (like on usual sensor). Add three data cells with the same setup and in measurement conditions of these data cells set the channel from 1 to 3. So tri-axial measuring is equivalent to measuring three independent signals under one measuring point only from different channels.

Example :



Machine type

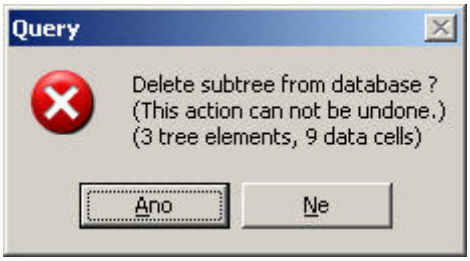
The ***Machine type*** group serves to assign a certain machine from predefined table to a tree item (seed the **Resources - Machine types** chapter). Each machine type has its own characteristic frequencies (defined as a multiple of basic machine rotation speed). The knowledge of relations

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

between machine rotation speed and characteristic frequencies makes the machine diagnostics easy. For more information see the ***Spectra*** chapter.

Tree element deletion

If you delete any tree item, you will delete all of its descendants - all its branches. Data cells placed to deleted branches will be also deleted.
Select the ***Trees - Delete Item*** main menu command or the ***Delete Item*** local menu command or press the ***Delete*** key. The ***Query*** message box will be shown to confirm the deletion.



Editing of tree element

The name and properties of an existing tree element can be changed. This operation is useful after using the copy operation, when copying existing tree branches creates new tree branches.
Select the ***Trees - Edit Item*** main menu command or ***Edit Item*** local menu command or press the ***Ctrl+E*** key combination. The ***Tree Item*** dialog window appears. You can find detailed description of this window in paragraphs above (***Creating a new tree item*** and following).

Copying and moving tree items

You can copy or move tree items between simple trees or in a single tree. Copying is possible to the same or different tree level.
To copy and move the tree items the mouse and the ***Drag and Drop*** method is used in the ***DDS 2010*** system. Grasp required tree item by mouse (the left mouse button pressed) and drag it to required tree place. According to the actual mouse position the cursor shape changes that points to possible action:

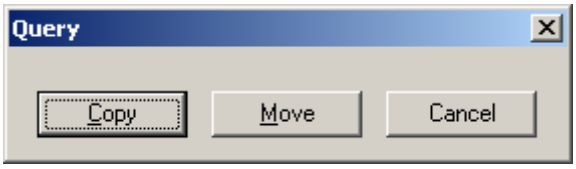
 Suppressed action

 Movement only (placement change inside one tree level)

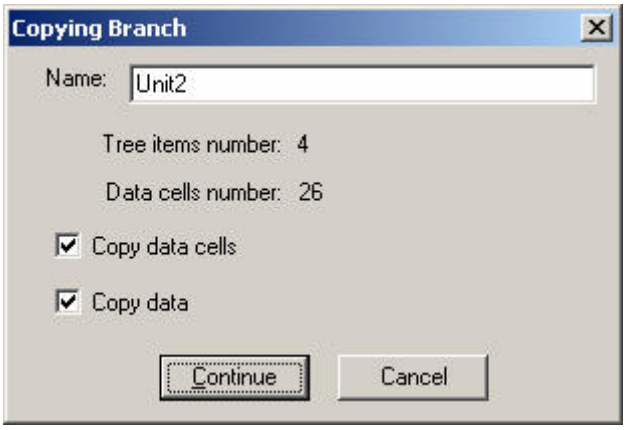
 Copying

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

If movement only is allowed the action is done immediately. If the moved branch contains data cells and data, the data cells and data will be automatically moved as well.
If copying is allowed, you can require both movement and copying. In the ***Query*** message box press the ***Move*** or ***Copy*** button.



If the Copy operation has been selected and selected tree branch contains data cells, the ***Copying Branch*** dialog window appears.



If you do not want to copy data cells, do not activate any check box. If you want to copy data cells without data, activate ***Copy data cells*** check box and do not activate ***Copy data*** check box. If you want to copy data cells with data activate both check boxes. In the ***Name*** edit box you can enter the name of first item of the newly created tree branch.

Multiselection in data tree

In data tree you can select multiple random elements. On these selected elements you can perform various multiple actions and thus speed up your work with tree. Multiselection can be done with standard keys-and-mouse combination or via menu. Multiselection works with open branches of tree = just with those that are rolled out.

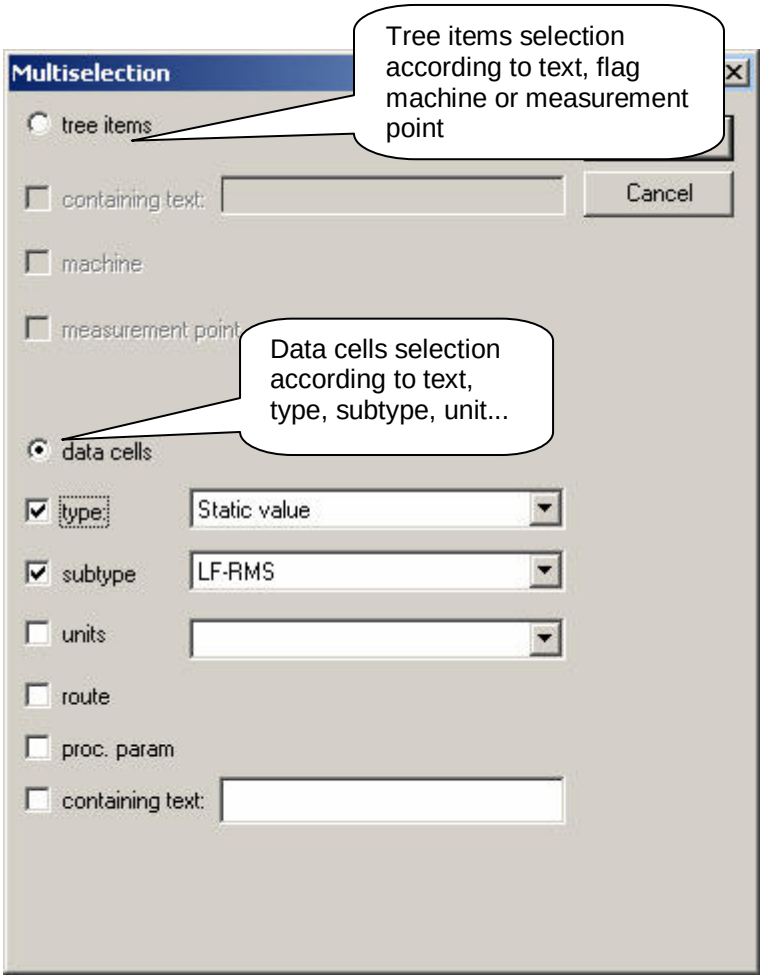
Keyboard+menu:

- Shift+left mouse button:	all elements (between those you click on) are selected
- Ctrl+left mouse button:	only elements, on that you click, are selected
- Shift+(cursor arrows) up/down:	elements which you pass through are selected gradually

Menu:
Click on any item of the tree (except data cells) with right mouse button and thus open tree menu. ***Multiselection*** is carried out only on highlighted branch. Choose Multiselection from menu. ***Multiselection*** box opens where you define conditions for data cells or tree items selection. When

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

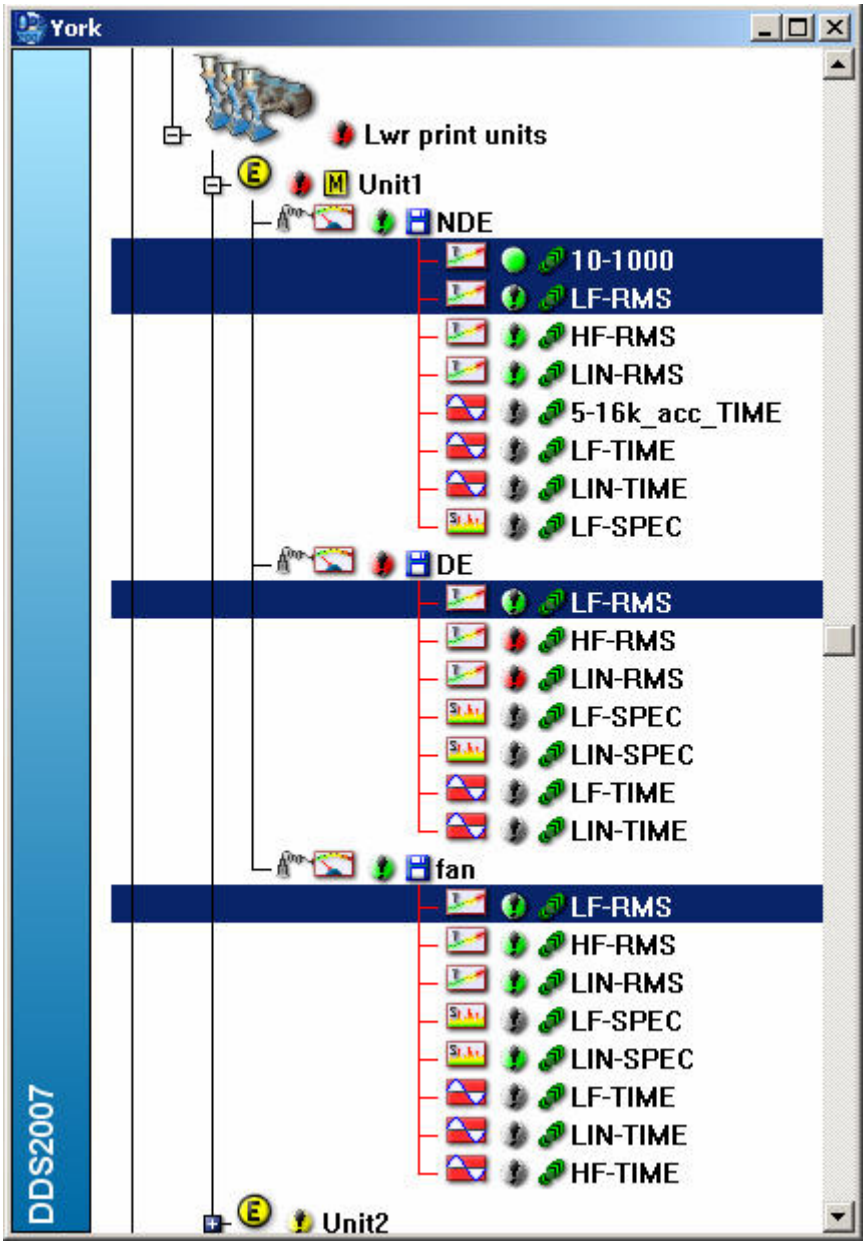
conditions are defined, press ***OK*** button.



All items/data cells, fulfilling conditions of selection, are highlighted in tree. Operations can be performed on them.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Static data-cell multiselection of subtype LF-RMS is performed on tree item ***Unit1***.



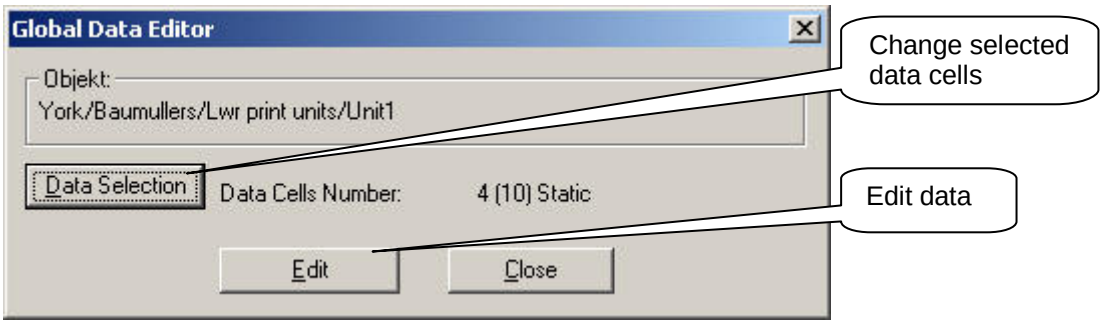
On data cells selections you can perform:
- global draw data
- global data edit
- global route setup
- global setup of levels

All operations are available via tree elements´ local menu. After operation is selected, window with confirmation of selected data cells appears. Here you can modify the selection or confirm the operation.

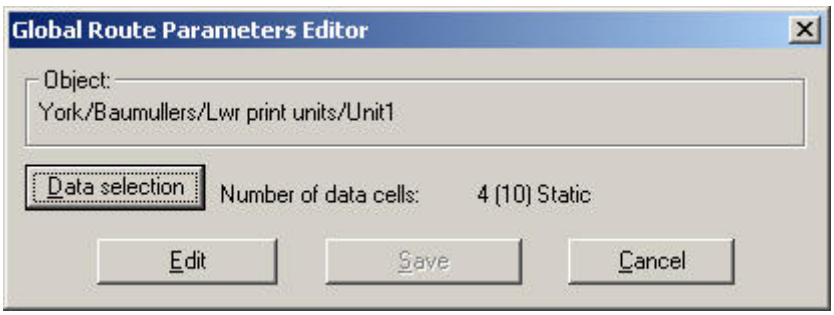
Global draw data: choose ***Draw data*** from local menu. Selected data cells graphs are projected into multiple graph according to data cell type.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

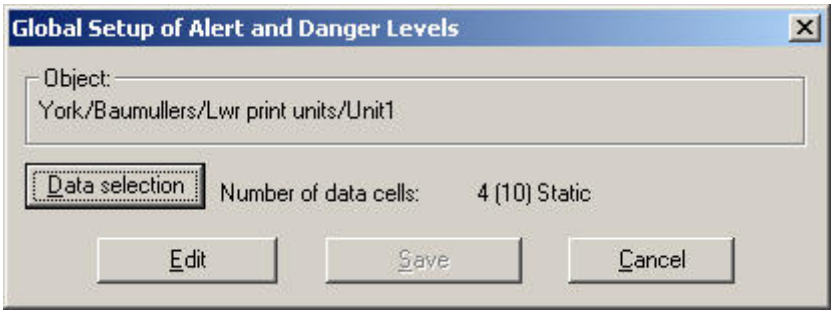
Global data editing: in Editor window press ***Data Selection*** to change the selection. Or by pressing ***Edit*** you can edit selected cells.



Global route setup: select Global Route setup from local menu. Next steps are the same as with editing.

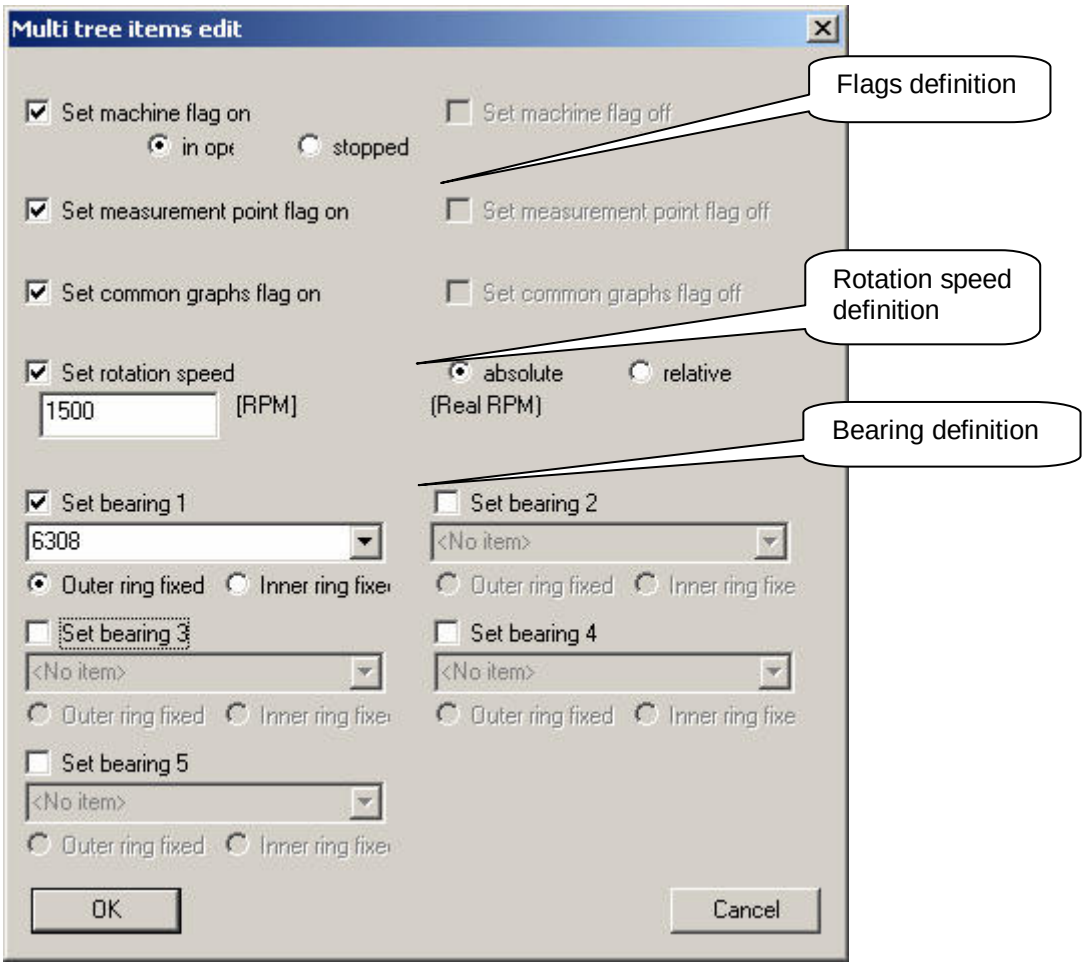


Global setup of levels: select Alert and Danger Levels. Next steps are the same as with editing.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Multi tree items editing can be cast over tree element. You can set flags, define rotation speed or bearings.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Data cells

Data cells are an important part of the ***DDS 2010*** system. Data cells serve to store values. Each data cell has its specific properties, which must be defined: Name of the data cell, type of data stored (static values, spectra…), units e.t.c.

Static and dynamic data

There are two fundamental data types in the DDS system. The first type is static data, that is represented by single value (real or complex), for example wide band vibration measurement. The next type is dynamic data, represented by array of values. The typical example is a spectrum or a time waveform.

Process data

Information that have relation to machine operation condition in the time of measurements are marked as process data. These data are always static. We can mention for example temperature, rotations, pressure e.t.c. If the process data vary in time and have effect upon the measured vibrations level, there is always necessary to evaluate the vibration data in common with the process data. The data cells marked as process data will be shown automatically when the data of selected tree part will be evaluated. This simple approach is the reason of this special marking. The selected subtype always consists of the word PROC with the abbreviation of measurement type (TEMP - temperature, PRES - pressure, ROT - rotations, POWR - power). If you measure an other process quantity, use the ***Unspecified*** subtype.

Image data cell

Data cell ***Image*** is used for storing pictures directly to database tree. As other cell types, they can be located in any branch of tree. This data cell type is meant for pictures of machines, measurement and measurement points location. Each ***Image*** data cell can contain any amount of pictures. DDS supports bmp, png, jpg. A picture can be inserted by clicking button Edit Data.

Storing to a data cell

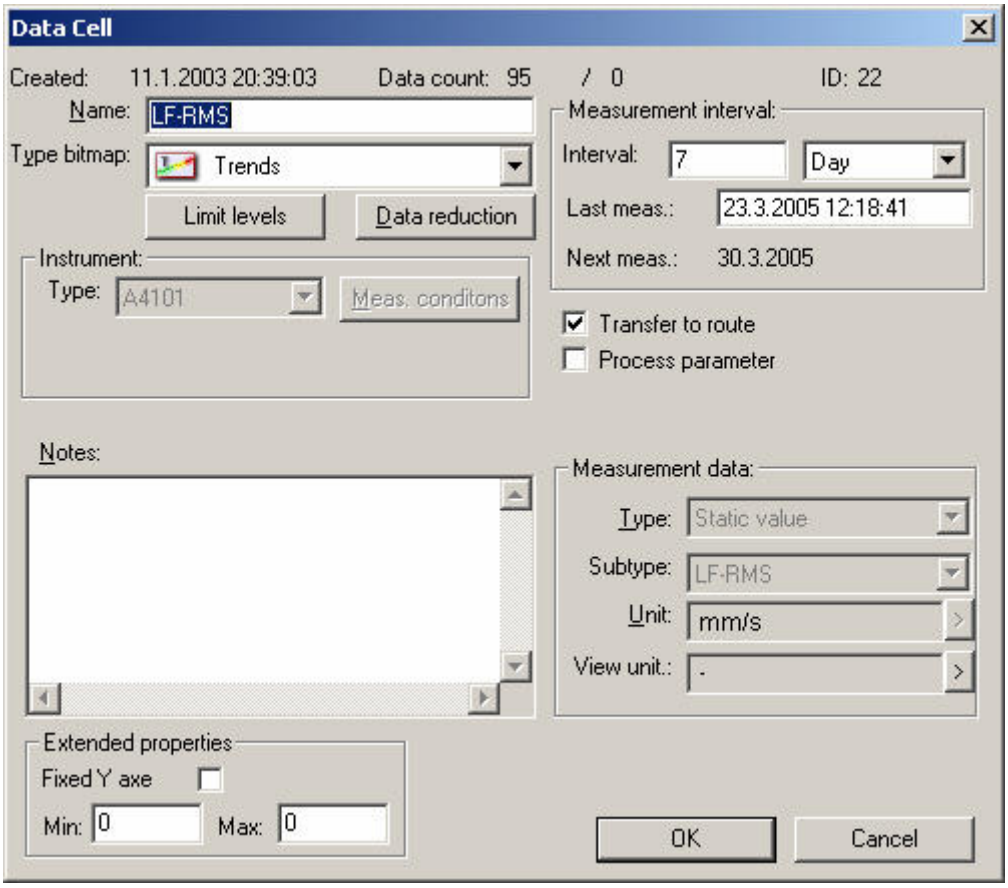
The data in data cells can be stored manually (static data only) or by loading from measurement instrument memory. The advantage of the DDS 2010 system is its modular construction, where the system core is separated from measurement instruments interfaces ensuring data transfer. The data

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

from different instruments can be transferred to the same database, you can use any instrument which interface has been installed. List of all installed instrument interfaces can be seen by the main menu command ***Tools - Connect Instrument***.

Creating of a data cell

A data cell can be created in an existing tree item only. Open the tree up to the required tree element in which you want to create the new data cell. Now select the main menu item ***Trees - Add Data Cell*** or the local menu item ***Add Data Cell***.



First we will describe settings common for all measurement types.

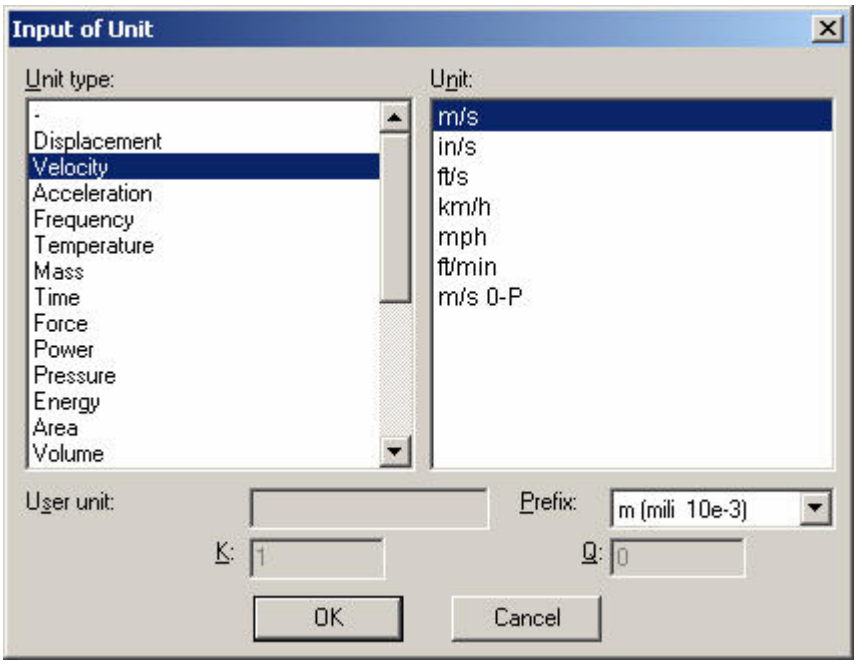
System group:
Name - enter required data cell name. Maximum length is 64 characters.
Type bitmap - select appropriate graphic symbol.
Instrument - select the instrument by which data will be measured for this data cell. In some instrument the ***Meas. conditions*** button is activated to set instrument specific measurement conditions (see attached instrument manuals).
Notes - text note in data cell.
Transfer to route - activate this flag, if you want the data cell to be measured within a route.
Process parameter - some measured data have relation to the whole machine (temperature, pressure, rotations…). These data are called process parameters. If the data cell has this flag active, its data will be shown automatically in common with any other data cell in the same tree branch (usually machine). This possibility is important for evaluation, because it enables to show process data

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

in the same window, for example vibration level and corresponding machine velocity for each measurement.

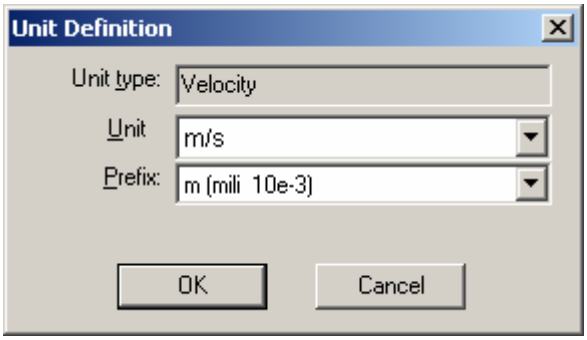
Measurement interval group:
Interval - define required time interval between two measurements. Definition of this statement gives possibility of automatic watching of measurement in defined regular time intervals.
Last measurement - date and time of the last measurement.
Next measurement - assumed date of the next measurement.

Data group:
Type - measured data type selection (Static value, Spectrum, Time waveform, Order analysis). The offer depends on selected instrument
Subtype - each data type usually contains several subsequent subtypes. The offer also depends on selected instrument.
Unit - if selected instrument allows defining measurement unit, it is possible to define required unit type (e.g. acceleration) and the unit itself (e.g. m/s^2 or g). For velocity measurement the obvious unit is mm/s. This option is possible by selection of the unit m/s with fixed ***Prefix*** mili. In this way you can reach any possible setting. ***Prefix*** can be set as Auto, which means, that the most appropriate prefix is set up automatically during drawing or evaluation the data.
If it is necessary to create an unit out of list, write its name to the ***User unit*** edit box and define conversion constants K and Q representing linear conversion Y=K*X+Q. For example: instrument takes measurements in Volts and there is necessity to convert it to m/s^2, when the sensor sensitivity is $10mV/m/s^2$. Constants required are K=100 a Q=0.



If the unit selection is not available (button is grayed), the ***instrument***, ***type*** and ***subtype*** allows taking measurements in units defined automatically in the ***Unit*** array.
View unit - if you want to view data in a unit different from the measured unit, define it in this field.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

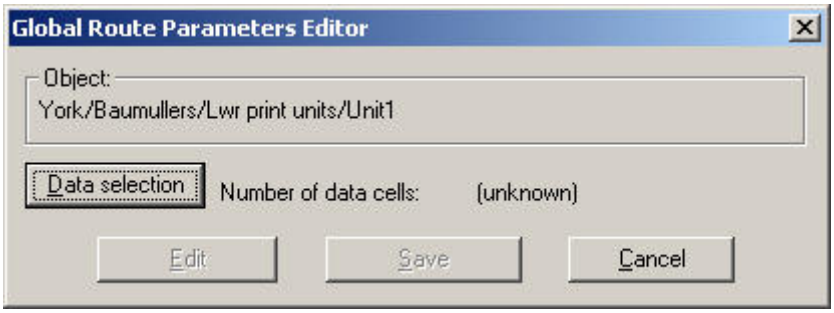


Additional Characteristics – **fixed Y-axis -** a fixed range of Y-axis may be set

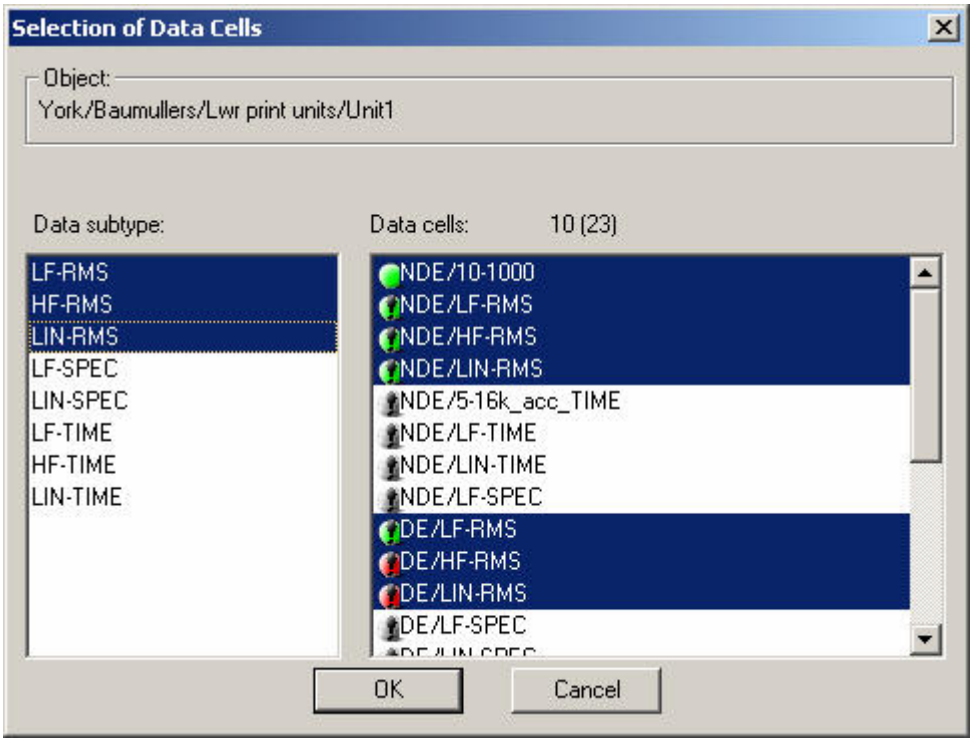
Global route setup

The settings of ***Measurement interval*** and the ***Transfer to route*** flag can be set up as described above, or collectively for a data cell group (e.g. for the whole machine).

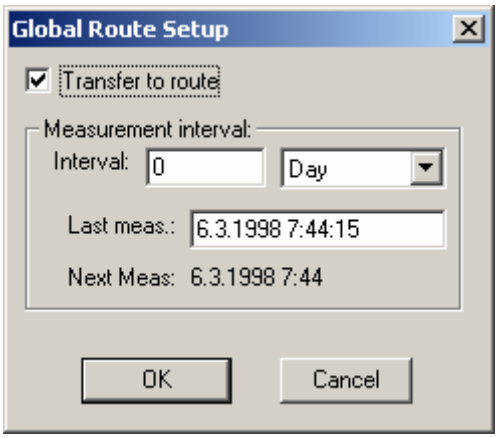
Select tree item on which you want to do collective route setup. Select the ***Global route setup*** local menu item. If data cells are selected by ***Multiselection***, press ***Edit button*** and ***Global route setup*** box opens. If you want to select data cells first, press ***Data selection***.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Two lists are in the ***Selection of Data Cells*** window. The left list contains all Data subtypes existing in the selected tree branch (see the ***Edit data cell*** local menu item and following window). The right list contains all data cells. Select required data subtype and/or concrete data cells and press the ***OK*** button.
You are back in the ***Global Route Parameters Editor*** window. Press the ***Edit*** button and enter required time interval and/or the ***Transfer to route flag***. Confirm by the ***OK*** button.



After return to the ***Global Route Parameters Editor*** window store changes by the ***Save*** button and then close the window.

Status - operational condition semaphore

Status is the indicator of actual operational condition of each tree item. Status evaluation is based on critical values definition in data cells. It is possible to set up limits for each data cell, which exceeding

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

is signalized by so-called operational conditions semaphores. The color of the semaphore corresponds to the actual operational condition of the item:

Green - the OK condition. Measured values (or their changes) do not exceed defined Alert or Danger level.
Yellow - alert level exceeding.
Red - danger level exceeding.
Grey - appears only with exclamation mark – expired measurement interval in case data cells have no defined alert and danger levels

The operational condition information is in each tree branch inherited from a corresponding data cell up to the root tree item. In this way there is evident on the first sight, that there was the critical value exceeded somewhere in tree. By subsequent opening the branches with the exceeding indication you can step up to the data cell causing this condition.

Critical values

Critical values represent important limits for each data cell. There are several operations done when a limit is exceeded. The ***Status*** of the data cell is changed. Consequently the ***Status*** of all tree items between the data cell and the root tree item is changed as well. According to the actual value of the ***item status*** the ***semaphore*** is highlighted with the corresponding color. The exceeding information is written to the ***Report Boo***k (see ***Tools - Report Book*** main menu item).
It is possible to set up for each data cell two levels of values - ***Alert*** and ***Danger***. The alert condition precedes to the danger level exceeding.

Absolute critical values - are represented by measurement quantity e.g. 7.5 mm/s, when this value is exceeded, the Status is changed.
Relative critical values - are designated for watching relative or auto-relative changes of measurement values and are defined in per cent. For example when the alert level is defined 200% the Status will be changed when the first measurement had the value of 3 mm/s and the second more than 6 mm/s.

Critical values low and high - if we are interested in values increasing only, we define high limits only. In case of value decreasing we define low limits. For example in case of shaft vibration the required value is 10um. The decrease bellow 5um or increase above 15um is dangerous. In this case we set the low critical level to 5um and the high critical level to 15um.

Reference values -it is appropriate to set the reference value for the relative changes watching. The change is then evaluated with relation to the reference value. This value can be any of already measured values, or last (read it as “previous to currently evaluated”) value, or the worst of last (previous) several values.

Critical values are defined in different ways for different data types. In data cells containing wide band vibration data the critical values are defined as numbers represented limit value, in spectra the limit levels are defined by band graphs.

Status confirmation

Let us imagine the situation, when the machine operation condition deteriorates and vibration values

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

increase. Critical levels in data cells are subsequently exceeded and the status changes. Operational condition semaphore colors steps from green to red. The machine is switched off and repaired. The new vibration values are low and do not exceed any critical value. Nevertheless the semaphores lights red, as they represent the worst status in data cells. If the critical level has been exceeded in measured data, the exceeding condition is signalized even if the values have returned to the safe level.
The function ***Confirm status*** is prepared for these cases. Each data record in data cells has its own ***Status confirmed*** flag prepared. If the flag is activated, the particular data record status will not be included to the cell status evaluation. In this way we are able to indicate required machine condition again.
By selection the ***Confirm status*** local menu item we can confirm status for single data cell of for all data cells in selected subtree.

Critical values for static data

Press the ***Limit levels*** button in the ***Data Cell*** window (after the ***Edit data cell*** command). In the ***Limit Levels*** window define required items. The meaning of most items has been explained in paragraphs above.

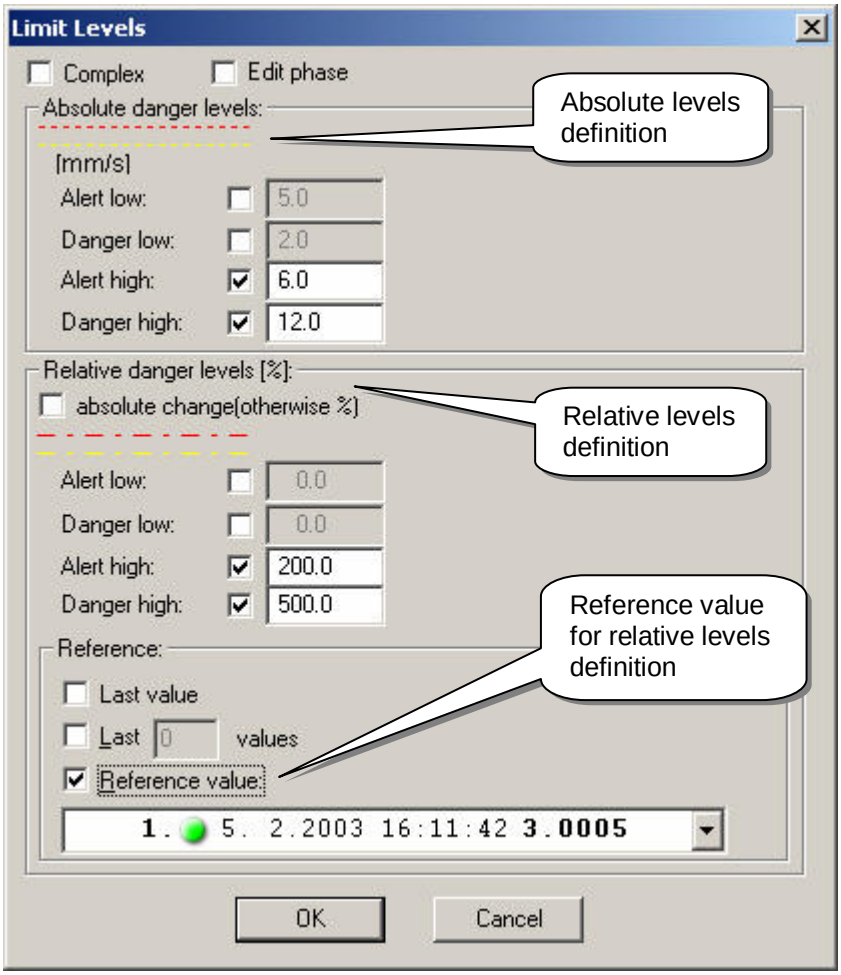
Complex - if you measure complex value, you can define also complex critical values. After activation of this flag the edit boxes for complex number appear.

Last value – last measured value will be reference value

Last X values - is the number of previous measurements on which the relative changes evaluation will be applied. The worst case of last X values is considered to be the reference value.

Reference value - value to which the relative change is calculated. By opening this array you can select any former value.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



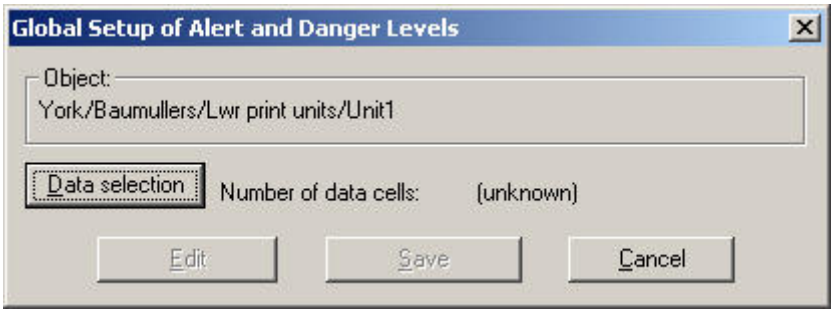
Dashed and dash-dotted lines are used in graphs for representation of actual critical levels (relative critical levels vary according to measured data).

By selecting ***Abs. Change (Otherwise %)***, the setting of relative critical values in % may be maintained; or by selecting a numerical value, the change against a referential value may be maintained.

Multi critical levels setup

From the machine level we can select the ***Global Setup of Levels*** local menu item. The standard selection dialog for multi data processing will be displayed. If data cells are selected by ***Multiselection***, press ***Edit button***. If you want to select data cells first, press ***Data selection***.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Press the Data selection button. Two lists are in the ***Selection of Data Cells*** window. The left list contains all Data subtypes existing in the selected tree branch (see the ***Edit data cell*** local menu item and following window). The right list contains all data cells. Select required data subtype and/or concrete data cells and press the ***OK*** button.
In the ***Global Setup of Alert and Danger Levels*** window the ***Edit*** button can be pressed now. After pressing it the standard window for critical level definition appears (see paragraph above). Define required values and confirm by the ***OK*** button. After return to the ***Global Setup of Alert and Danger Levels*** window press the ***Save*** button to save changes and close the window.

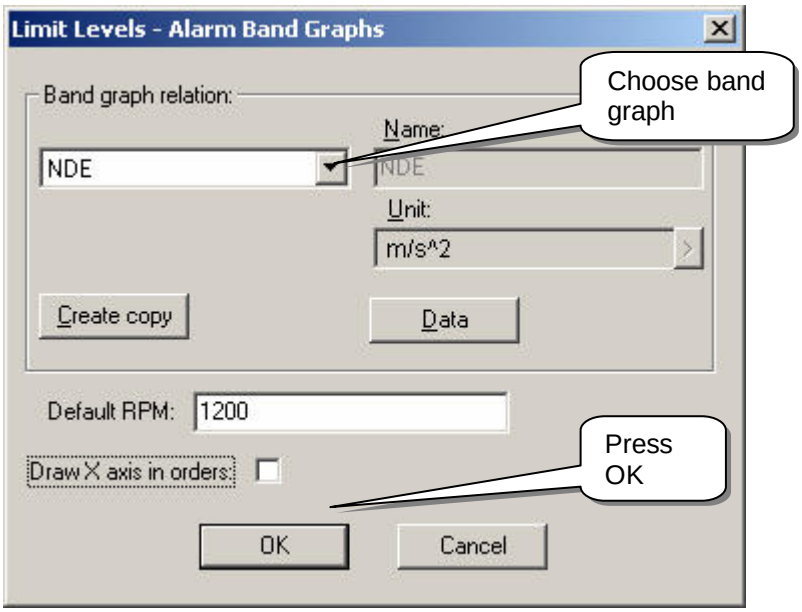
Critical values for spectra

In spectra there is not possible to define critical values by a single number. There are a lot of spectrum status evaluation methods. Some users to visual check the spectra development in time. Other users define the reference spectrum and watch, whether some spectrum lines exceed reference mask. For automatic spectra processing in up-to-date systems the band graphs are used.
If we evaluate spectra from single measurement place, we always know what we can expect in measured spectra. We are usually interested in rotation frequency and its nearest harmonic multiples. Next we are interested in special frequencies depended on measured machine type (gear, fan, pump) or bearing frequencies in envelope analysis e.t.c. It is thus possible to mark frequency intervals in spectrum, in which we can expect change of operational condition. If we measure a wide band value instead of a spectrum, we can determine a change of operational status when the value changes, but we cannot determine by which the change has been caused. If we measure spectrum, we can in separate bands expect a concrete cause of this change. For example in increasing unbalance the amplitude on rotation frequency f_{1xRPM} will increase. If we define the band from $0.95*f_{1xRPM}$ to $1.05*f_{1xRPM}$ we can catch exactly unbalancing changes in this close band. The band definitions can be derived by different methods, description of which is not content of this manual. Please refer the literature concerning vibration diagnosis.
In this paragraph we assume the band graphs representing reference pattern are already created. Its creating is in the chapter ***Tools - Band graphs***

After pressing the ***Limit levels*** button in the ***Data Cell*** window the joining window for band graph appears. In the ***Band graph relation*** group we join the required band graph from the library. After opening the window the list of all reachable band graphs appears. Select required type. If the library contains a band graph type which is very similar to required and it is necessary to do only small changes, copy the selected band graph to the library by the ***Create copy*** button with different name. Now press the ***Data*** button and define required changes.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Default RPM - if the machine rotations are constant, it is possible to define its value. The measurement is simplified then, because it is not necessary to use rotation probe in each measurement.
Draw X axis in orders - if you want to draw spectrum with band graph in rotations (instead of Hz) by default, activate this flag. The information about rotations must be reachable.

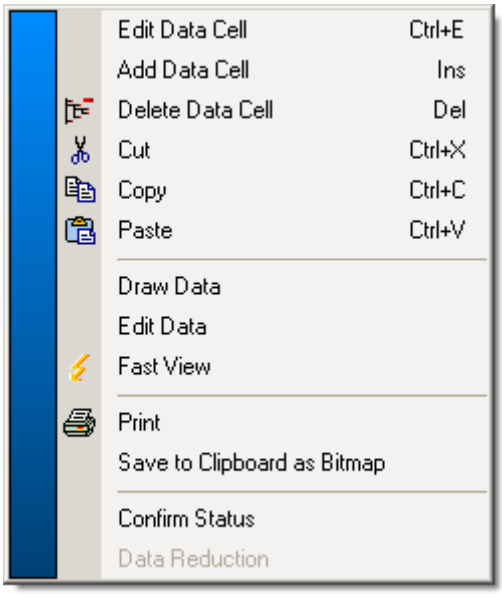


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Static data

The simple data type is the static data represented by one value (real or complex), for example wide band vibration measurement (e.g. ISO 2372).
Static data can be in ***DDS 2010*** system stored manually or loaded from measurement instrument memory. To load the data from instrument you need an appropriate interface. The list of all installed interfaces in your system can be seen by the ***Tools - Connect instrument*** main menu command.
Static data are stored in data cells that can be connected to any tree item. Creating and configuring data cells is described in the ***Data Cells*** chapter.

Static data cell local menu

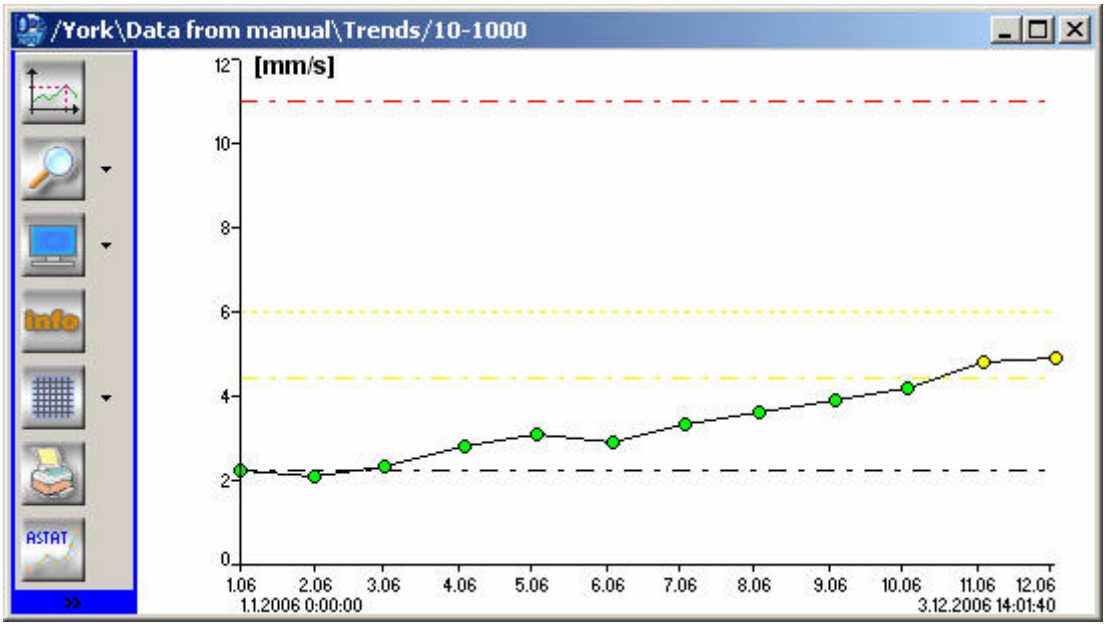


After data cell activation and pressing the right mouse button the local menu appears. Content of the first group (first 6 commands) has been described in the Data Cells chapter. The remaining commands will be described in this chapter.

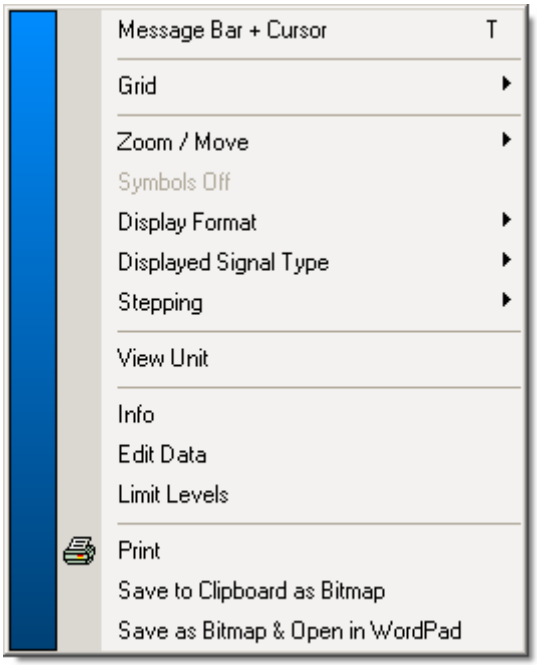
Drawing of static data graph

If the data cell contains data, the data can be drawn. This can be done by left mouse double-click or by activation the data cell and the ***Draw Data*** local menu command.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



The yellow and red lines represent critical values. Also simple values are colored according to their status (green, yellow, red).
If you are collecting data with online system, there may be collected new data after the graph was opened. The refresh of data in the graph can be forced by pressing the **F6** key.
Now press the right mouse button anywhere in the drawing window. The static graph local menu appears with following commands:



Message Bar + Cursor - switches on/off the cursor for scanning data values from graph. Moving the cursor is provided by mouse (drag and drop) or by left/right arrows. In top of the window the message bar is displayed with time, status and value. Cursor can be switched on/off also by the ***T*** key.
Grid - switch on/off grid.
Zoom/ Move - parts of graph can be zoomed. By the Dialog command new limits for both X and Y-axes can be defined. By the ***Mouse-Zoom*** command the zoom can be defined by mouse rectangle. ***Mouse-Move*** command provides shift zoomed drawing in X direction. The ***Previous*** command allows

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

return to previously defined zoom. Commands Auto-X, Auto-Y and Auto-XY provide return to full axes range. When the cursor is switched off, it is possible to do mouse zoom directly without using the local menu.
Symbols off- there can be symbols placed those marks important values by mouse double-click on selected graph location. If the symbol already exists on selected location, the symbol is deleted by mouse double-click. By the local menu command all defined symbols are deleted.
Display Format - it determines the way of data drawing in multi selection case, it will be discussed later in this chapter.
Display Signal Type - in case of complex static trends you can draw different trends in various combinations: Amplitude and Phase trend, Real and Imaginary trend or Polar trend.
Stepping - enables switching between data in multi selection case.
View Unit – enables displaying the static trend in any compatible unit.
Info - the Data Cell window for information about these cell settings.
Edit data - will be described later in this chapter.

Limit Levels - fast approach to critical values definition (in opposite to Data Cell Editor) - the same sense as ***Edit Data Cell/ Limit Levels*** in tree local menu.

Print - standard output to a printer.

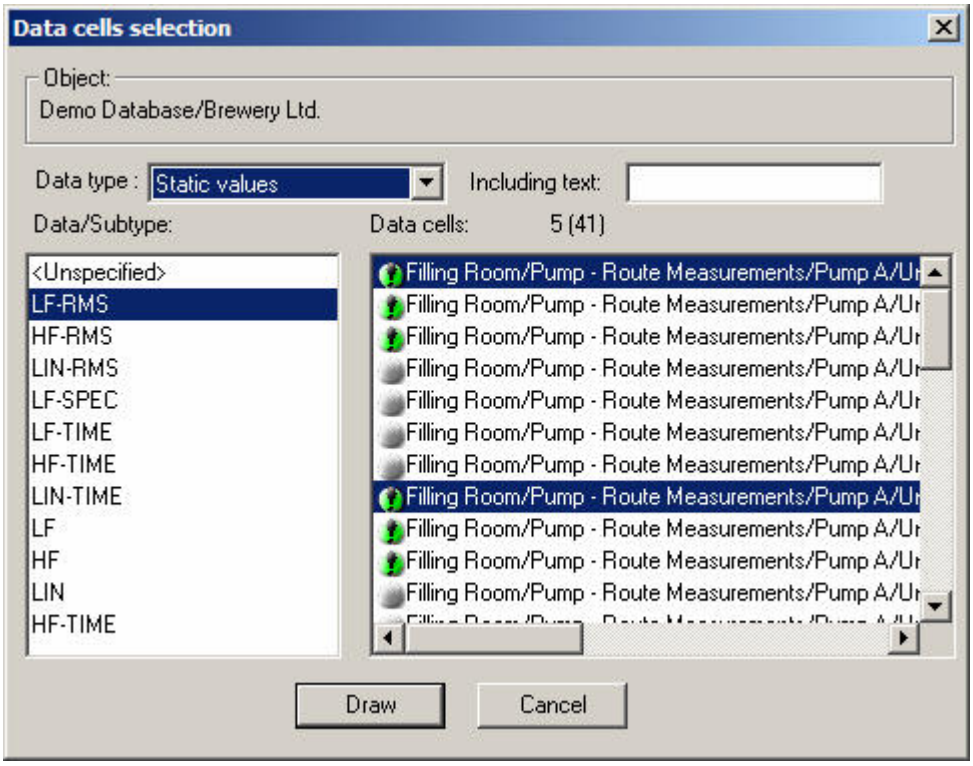
Save to Clipboard as Bitmap - stores the drawing to clipboard for using in other programs (e.g. MS Word)

Multi Data Drawing

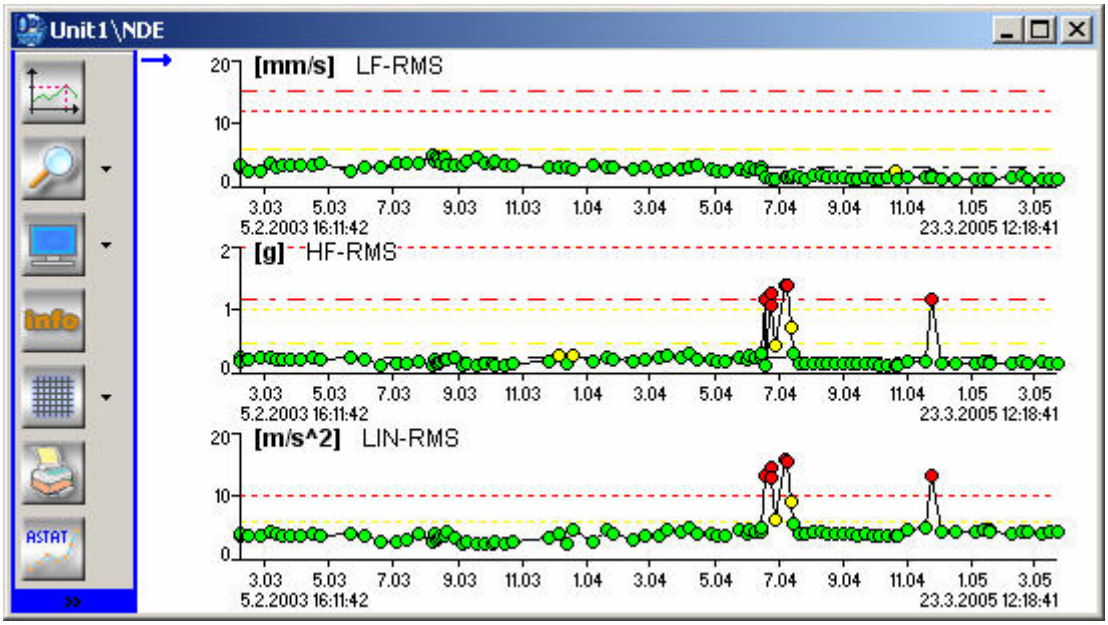
The DDS 2010 program allows also drawing data from more data cells at a time. Mostly it means a global view on data on selected machine. It simplifies the evaluation of the machine operational condition. Multi data drawing is similar to single cell data drawing.
If we want to draw data from a tree branch, the tree element should have the ***Common Graphs*** flag active. This flag can be activated in extended part of the ***Edit Item*** dialog.
Activate selected tree element (machine) and select the ***Draw data*** local menu command.
Multi data drawing can be done by Multiselection or via command ***Draw data*** from Tree local menu. In first case, select data cells which you want to show and from data cell local menu select ***Draw data***. Several windows open – in each window are located graphs of different data type (trends in one window, spectra in another).
If you want to use the other way, highlight selected tree element (machine) and choose command ***Draw data*** in its local menu.

Following window two with lists appear. The left list contains all Data subtypes reachable in selected tree branch (see the ***Edit Data Cell*** local menu command and following window). The right list contains all reachable data cells

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Search and select data cells which you want to evaluate by typing into the ***including text*** or by ***data subtypes*** or activate data cells by CTRL + left-click. Confirm by the ***OK*** button.
After return to previous window the ***Draw*** button is active. By pressing the ***Draw*** button start the data drawing. The ***Multiple Charts Drawing*** window remains active for next data selection.



In one drawing window maximum of 8 graphs can be displayed simultaneously. If you have selected more data cells it is necessary to change the window content by ***PgUp***, ***PgDn***, ***Home*** and ***End*** keys. This is similar to browse in book pages.
One graph is marked with a blue arrow. This arrow points to the active graph. Activation can be changed by mouse (left button click on required graph) or by ***Tab*** and ***Shift+Tab*** keys.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

If you press the right mouse button, the local menu appears. The commands in this menu are the same as in single chart drawing local menu. Only these functions will be described, which behavior differs in multiple charts drawing.

Message Bar + Cursor - switches on/off cursor for values scanning in graphs. On the top of the window the message bar appears with time, status and values scanned from actually displayed graphs. Notice that the cursor moves in all graphs simultaneously, in this way reliable values scanning is ensured.

Display Format - ***Tile*** by default, graph arrangement can be changed to ***Simple*** (active graph only) or ***Over*** (graphs are drawn in single axes system, simple graphs are distinguished by colors, the color definition appears when cursor is switched on)

Stepping - the same functions as ***PgUp***, ***PgDn***, ***Home*** and ***End***.

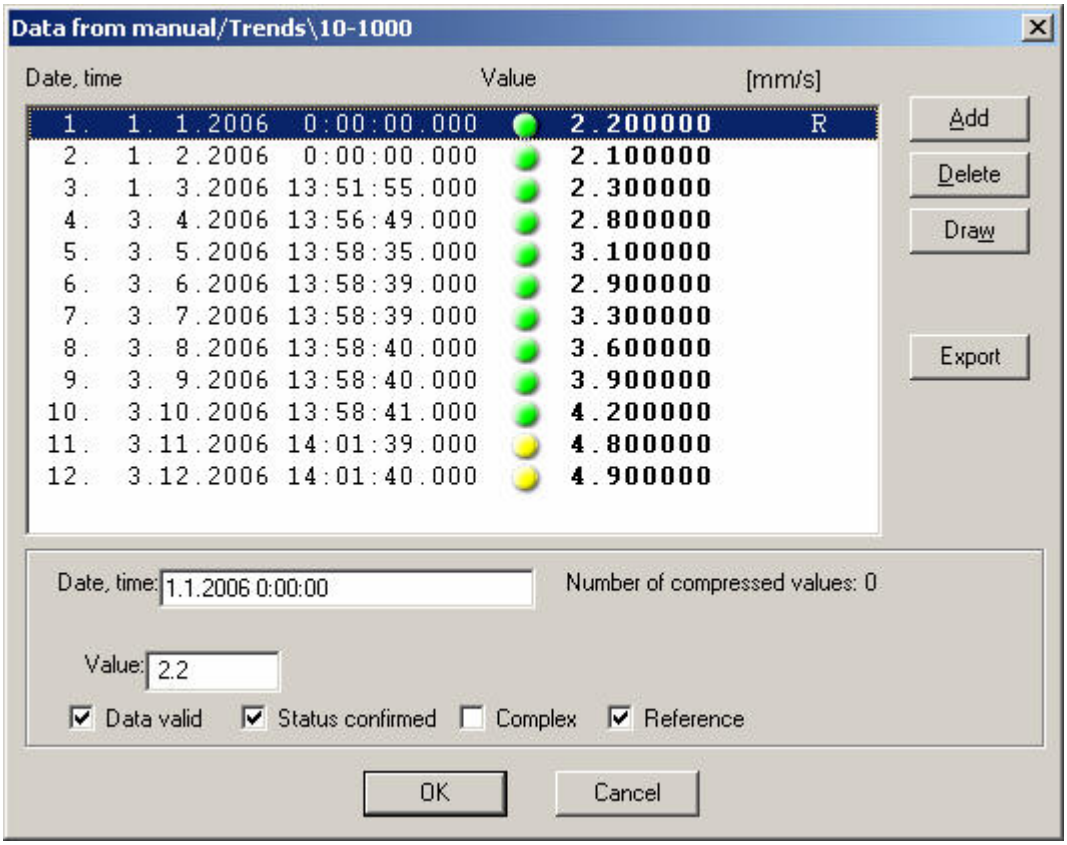
Edit data - allows editing active data cell (graph).
Limit levels - critical level definition for active data cell.

Editing static data

Data can be stored to a data cell from measurement instrument or written manually. General description of data loading from an instrument is described in the ***Tools - Connect instrument*** chapter. The interfaces of concrete instruments can be found in special manuals - see ***APPENDIX A***.

Now we describe manual data editing. If we have data cell already created, we can edit its data. It means adding new values, changing values of already existing records and deleting values. Activate selected data cell and select the ***Edit Data*** local menu item.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



By the ***Add*** button you can add a new measured record. By the ***Delete*** button you delete activated record (this function is irreversible). Values of actually active record can be changed by definition of new values in fields ***Date, time*** or ***Value***. The ***Draw*** button provides chart drawing.

Export button is used for export of data that are stored in a data cell. Select data that you plan to export and press the button. Information box is displayed that shows number of exported reports and time interval of export. Press ***OK***.

Then standard dialogue box for saving files appears. Enter the name and location of exported file and confirm. Data is exported into standard ****.csv*** file.

Data valid - if the data value is measured incorrectly or there is any other reasons not to draw them do not activate this flag. It is safer method than the data deletion, because once deleted record cannot be restored.

Status confirmed - may be presented also as Cause removed. Imagine yourself following situation. By measurement have been found out increased vibration values that gradually exceeded alert and danger level. Operational condition semaphore has changed up to red color. Then the machine has been repaired and vibration decreases under alert level. The semaphore anyway lights red, because it

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

responds to the worst cell status before repair. If we confirm the red status by the ***Status Confirmed*** flag, the semaphore will not respond to it and will be respond to next later measurements. Immediately after confirmation the semaphore remains red, it awaits for next measurement.

Complex - for the complex value case.

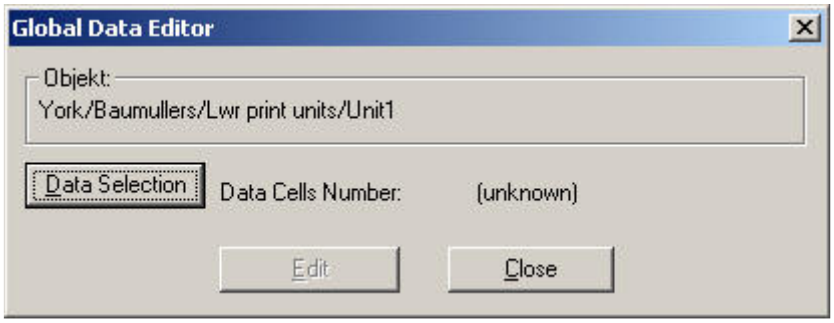
Reference - marked record is assumed to be reference for relative status evaluation.

Import - data can be obtained from text files exported by the DDS 3.00 version.

Number of compressed value - for databases with data reduction. Each data record may contain several measurements which values differ less then is defined as valuable change ratio (see ***Options - Data reduction*** main menu command).

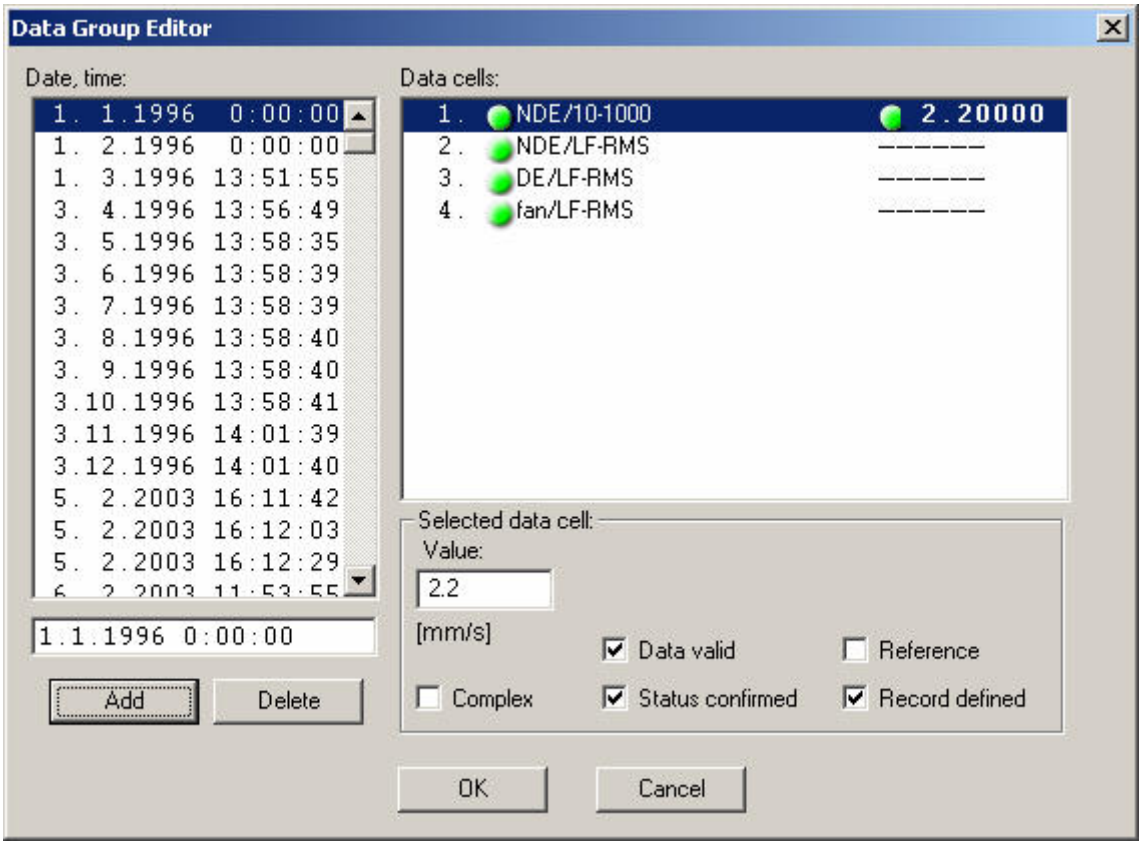
Multi data editing

The DDS 2010 program allows also editing of data from more data cells at once.
Activate selected tree item (e.g. machine) and then select the ***Edit Data*** local menu command. The ***Global Data Editor*** window appears to select data for editing. If data cells are selected by ***Multiselection***, press ***Draw*** button. If you want to select data cells first, press the ***Data selection*** button.



Press the Data selection button. In following window two lists appear. The left list contains all Data subtypes reachable in selected tree branch (see the ***Edit Data Cell*** local menu command and following window). The right list contains all reachable data cells
Select data subtypes you want to edit and activate data cells you want to edit. Confirm by the ***OK*** button.
After return to previous window the ***Edit*** button is active. Press the ***Edit*** button.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



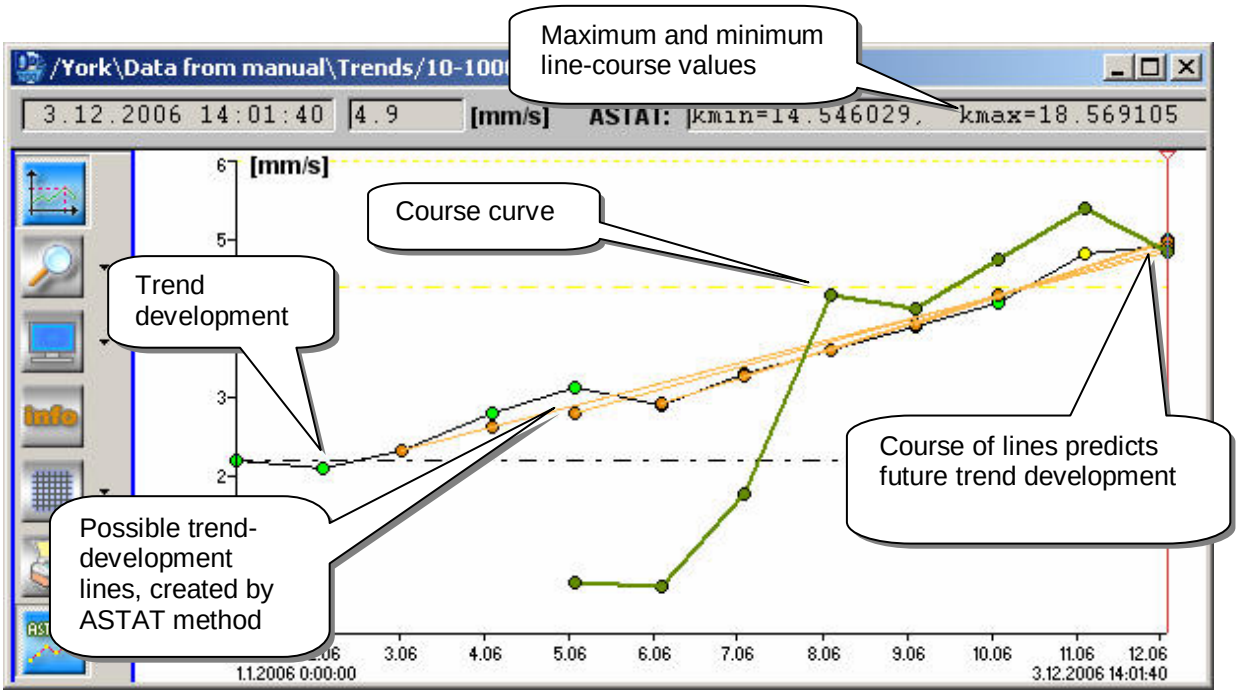
There are two lists in the ***Data Group Editor*** window. The left list contains integration of all measured times of static data in selected data cells list which is in the right side of the window. Now you can by successive activation of items in both lists show data values, edit their flags and provide changes. It is also possible to add new measurements. Flags have been discussed in the paragraph concerning data editing.

!!! Collective data editing is a tool designated for very experienced users only. It is necessary to exactly know what changes you want to reach and realize all consequences.

ASTAT – prognosis of machine condition development

ASTAT method belongs to FASIT (Fault Source Identification Tools) tool group. They are aides for detection stage and failure-identification stage. ASTAT is a statistic method, which can detect current trend development (even from uncertain data) and predict possible development of vibrations trend. ASTAT interposes eight lines whose course (rise, decline) refers to possible trend development. Each line uses different number of values for statistic calculation. The longest line uses ten last trend values, the shortest line uses three values. More lines enable to „see“ future trend with reference to specifics of various measurement points. Besides lines, a curve is cast. Curve points refer to courses (angles, rakes) of lines. Line that refers to the highest curve point is the steepest, line that refers to the lowest curve point is the least steep. If cursor is used with ASTAT method, the cursor position is taken as the last value for calculation. In cursor bar appear maximum and minimum line-course values $\mathbf{k_{max}}$ and $\mathbf{k_{min}}$. These values refer to angle between lines and X axis in grades in current graph representation. They do not refer to real course (which is dependent on measurement intervals and vibration level changes and thus very small).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



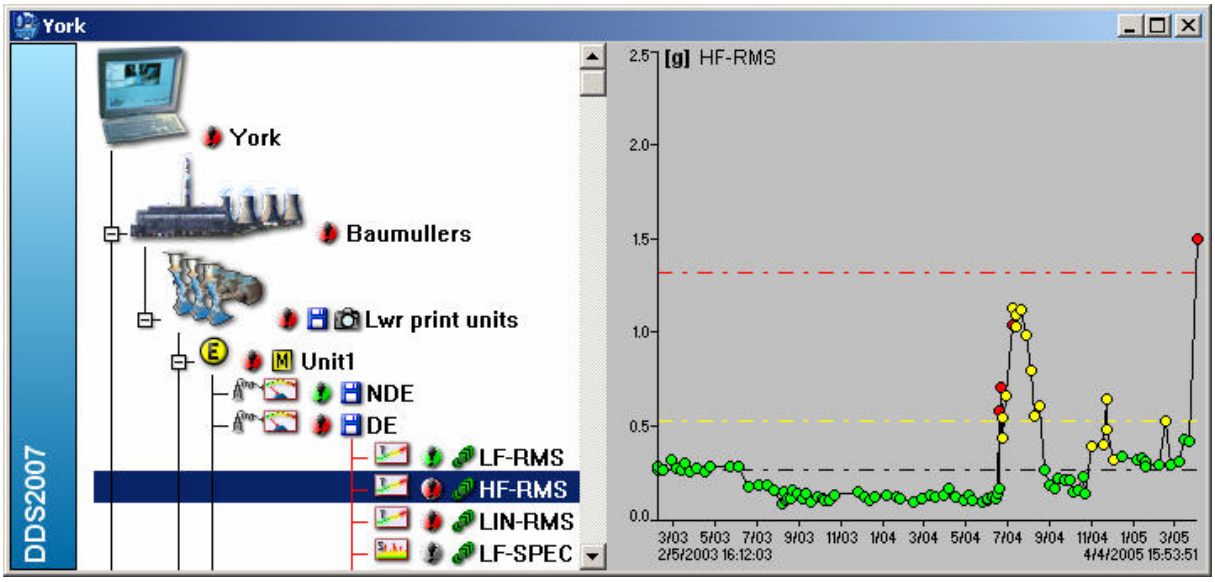
If line-course value is positive, the line is rising and rising trend can be expected. Expected trend-rise refers to rising of line. If line course value is negative, the line is descending. If line descends, the machine has probably been repaired recently or it has been oiled. But the permanent improvement of machine cannot be expected.

Short lines: are more sensitive to unexpected vibrations changes but their accuracy is lower in trends with relative high change of vibrations values.
Long lines: are less sensitive to unexpected vibrations changes but their accuracy is higher in trends with relative high change of vibrations values.

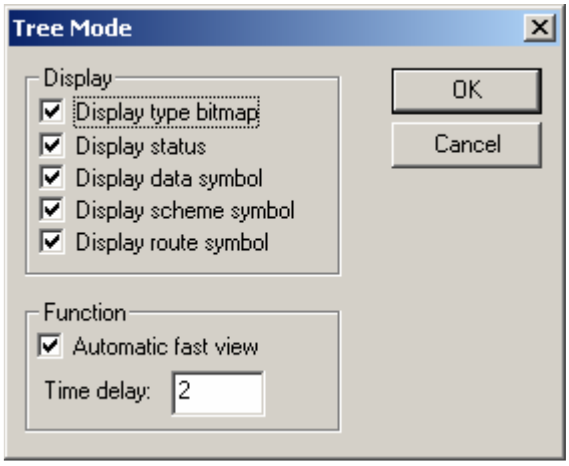
Fast view

This local menu item enables fast data viewing that we can use e.g. after measurement by a route to have a fast look in changed trends after storing new data. The command may also be activated from the local menu, toolbar or by pressing the spacebar. When the command is selected, in the left part of the tree window the tree remains and in the right part appears space for data or schemes. Now you can activate tree elements by mouse or arrows and trend charts appear immediately. Opening and closing tree branches are provided by universal methods (left mouse double-click, Enter, Ctrl+Enter, local menu commands). If selected data cell has no data the ***Data cell has no data*** text is displayed. If the tree item has no scheme connected, the ***Tree item has no scheme*** text will be displayed.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Switch the fast view off is provided the same ***Fast View*** local menu command as the switch on.



Print

It is standard output of tree window to the printer.

Save to Clipboard as Bitmap

The tree view will be stored to clipboard as a bitmap for using in other programs (e.g. MS Word).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

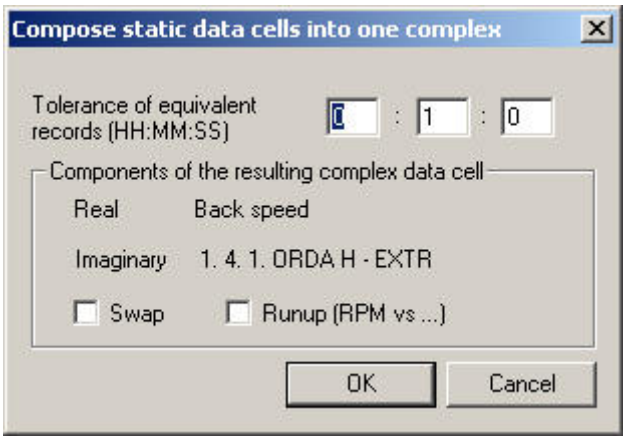
Confirm status

The ***Confirm Status*** local menu will confirm the status of all data cells in selected subtree. Description can be found in the ***Data Cells*** chapter.

New Data Cell Composition

After selecting ***Compose Cell*** from the local menu of the tree, the user can select two data cells (hereinafter referred to as A and B) with the identical or a compatible physical unit. These two data cells will then be considered real trends from which, by their combining (allocating, for instance, A to a real folder and B to an imaginary folder), a new data cell is created containing a ***complex trend***.
After selecting two source data cells, the user is queried for ***time tolerance*** between individual signals, which determines how close in time the A and B signals must be to be saved to the final trend.
In the ***Data Cell Composition*** dialogue the user may also change the allocation of an individual data cell to real or imaginary folders.
After pressing ***OK*** a new data cell is created with a name composed of the original names (for instance, "A+B").
The final location and unit of the data cell are identical as with the data cell allocated to a real folder. If the unit of the data cell allocated to an imaginary unit is derived, it is recalculated according to the existing relation between the A and B cell units.

If ***Runup*** is checked or unit of the real part is ***RPM (Hz)*** the runup data cell will be created instead of static data cell.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

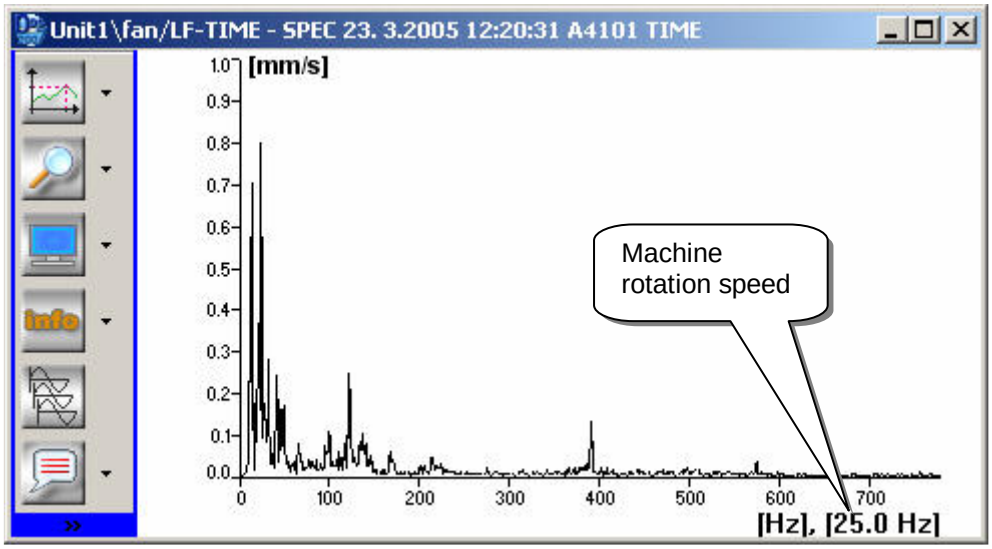
Spectra

Spectra represent a complex look at information contained in vibration signal. To measure spectra you need a spectral analyzer with the possibility of storing spectra in memory and transferring them to a computer. You need also an appropriate interface. The list of all installed instruments interfaces in your system you can view by the ***Tool - Connect Instrument*** main menu command.
Spectra are stored in data cells of corresponding type that can be connected to any tree item. Creating and configuration of data cells is described in the ***Data Cells*** chapter.

Viewing of spectra

Open a DDS tree up to the level containing a spectrum data cell. Now you have three possibilities to view spectra in the data cell.
- by left mouse double-click on selected data cell,
- by activating the data cell and pressing the ***Enter*** key,
- by activating the data cell and by using the ***Draw Data*** local menu command (right mouse button).

Now the last spectrum from this data cell appears on the screen.



This is the way to simply obtain the graph of the last measured spectra that we are usually interested in. In the data cell, the spectra from the whole history are stored and they can be displayed as well. The procedure of graph drawing can be divided into two phases. In first phase you have to mark data cell record you want to work with. This operation can be executed after displaying record (usually the last) in the window. First the automatic selection of predefined records number is provided (see the ***Options - Dynamic Data Drawing*** main menu command, the ***Initial record number item***). In most cases this is the needed alternative so that this is provided automatically by default. User defined selection can be done by the ***Records Selection*** local menu command. The second phase is selecting a method of drawing selected records. It is possible to look at selected records one by one or to display more of them in one time (the ***View Format*** local menu command). Each record can be displayed by various methods (the ***Displayed Signal Type*** local menu command).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Display of Revolutions in Spectra

If the spectrum has defined revolutions, their value is displayed in square brackets of the X-axis unit description either in CPM or RPM (or Hz) according to global options which can be overloaded by the selected X-axis unit.

Revolutions may be defined in several ways:

1. Directly in the spectrum signal – this manner is used if revolutions are measured simultaneously with the spectrum.
2. In the data cell header – if revolutions may be considered constant for a particular data cell.
3. In the tree element – if constant revolutions are defined for the machine as a whole. If the machine includes converters that change revolutions in a constant ratio, this fact may be described by so-called relative revolutions (defined on some of the child elements of the tree with set absolute revolutions).

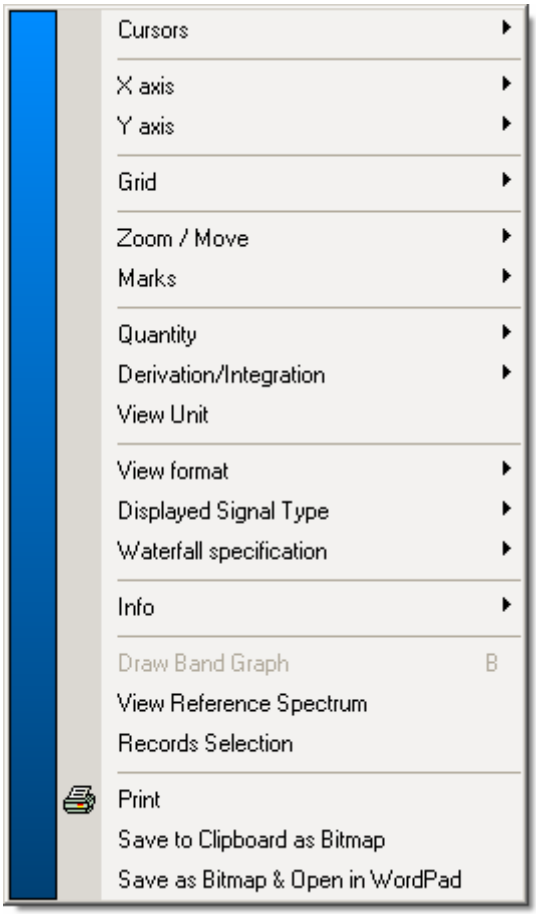
The program, when displaying revolutions, first analyses the value of revolutions in the spectrum signal: if this equals zero, it analyses the value of initial revolutions in the data cell; if this value equals zero, it analyses the tree towards the root until it reaches a non-zero value of absolute revolutions, which might be multiplied by non-zero coefficients of relative revolutions encountered on the way.

The revolution is displayed after X-axis unit in format [unit], [revolution_value unit]. The revolution unit is the same as the X-axis unit.

Local menu

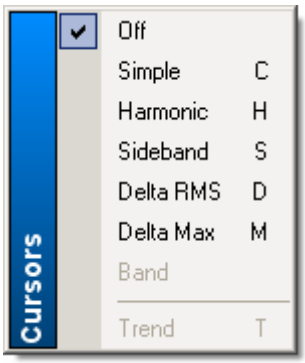
When you press the right mouse button in the window with displayed spectrum, the local menu appears with various operations on spectra. In the local menu only those commands are active, which are executable in given time. Some menu items contain additional submenus. These items are marked with an arrow. The submenu itself will be open when you place the mouse cursor on its item.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Cursors

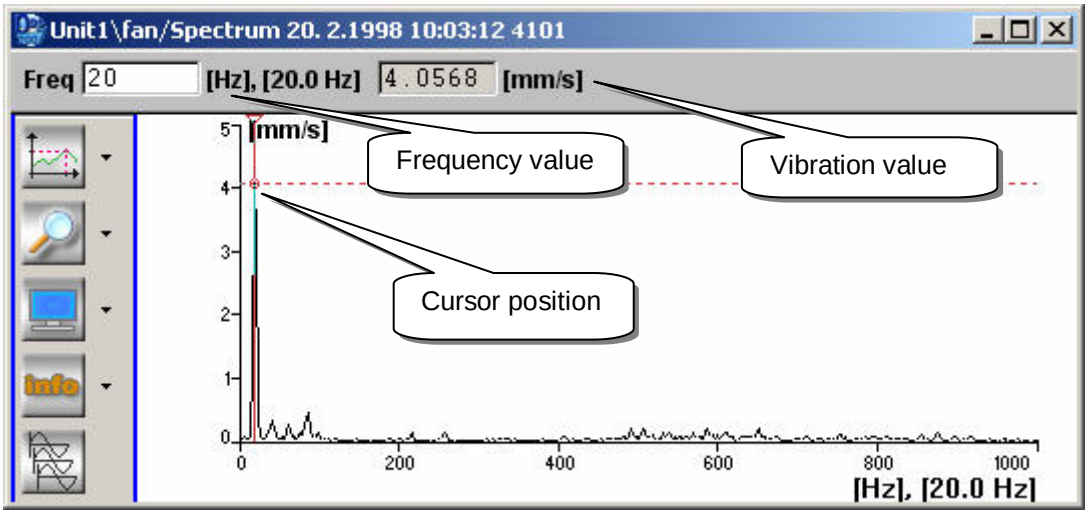
The Cursors command has the additional submenu the commands of which serves to switch on or off required cursor type.



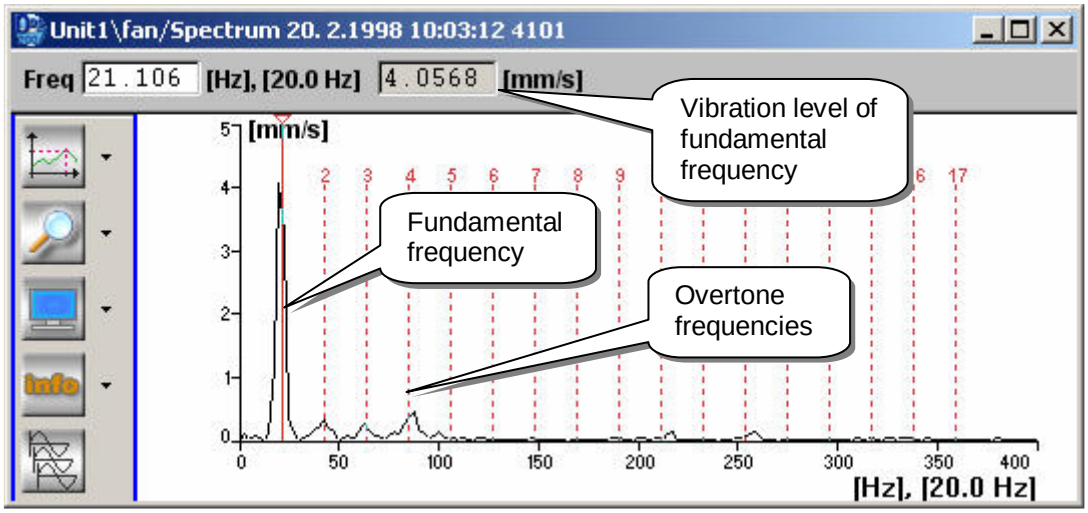
Off - switch off all cursor types.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Simple - the standard cursor is displayed, movement is possible by mouse drag and drop, by arrows or by typing required frequency in the ***Freq.*** field. To display this cursor on the graph you can use also the ***C*** key. Pressing of this key switches the cursor off.



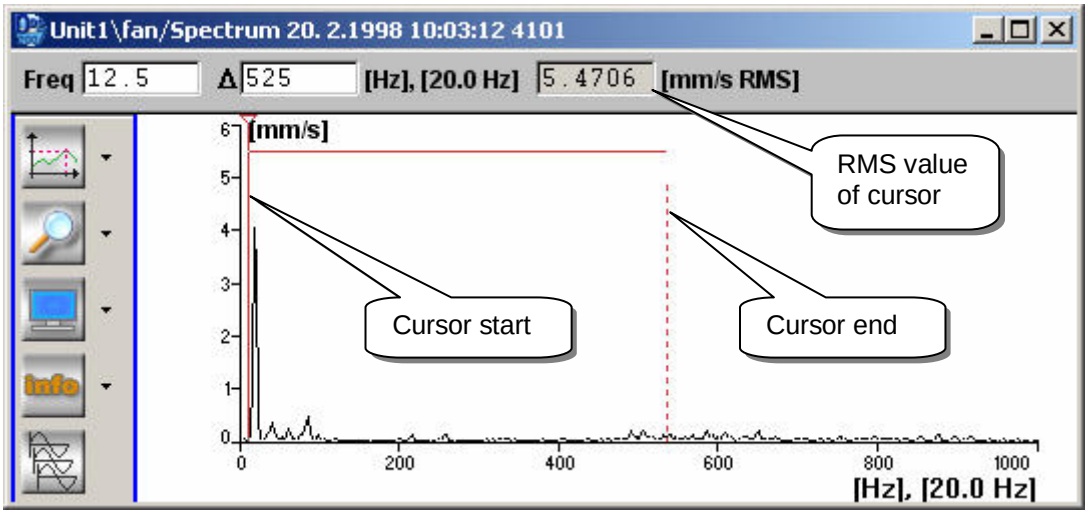
Harmonic cursor - serves to scan amplitudes on the main frequency and on its multiples (harmonic components), which is marked with a number. Cursor movement is done the same way as the simple cursor, but with possibility of fine movement. The description of fine movement is in separate paragraph of the ***Spectra*** chapter. To switch the harmonic cursor on or off also the ***H*** key can be used.



Sideband cursor - allows the main cursor definition (i.e. the central frequency) and side bands. The main cursor position can be modified the same way as the simple cursor. The fine main cursor movement is possible as well. Distances of side cursor can be changed by mouse (by grasping any of them) or directly in the ***delta (Δ)*** field. In the amplitude field the amplitude value at main cursor position is displayed. To switch the cursor on or off you can use the ***S*** key.

Delta cursor - is a band cursor scanning RMS wide band value with possibilities to define its position and width. The position can be defined the same way as in case of the simple cursor. The bandwidth can be defined by mouse or directly in the ***Δ*** *field.* In the amplitude field the RMS wide band value is displayed. The ***D*** key can be used to switch the cursor on or off.

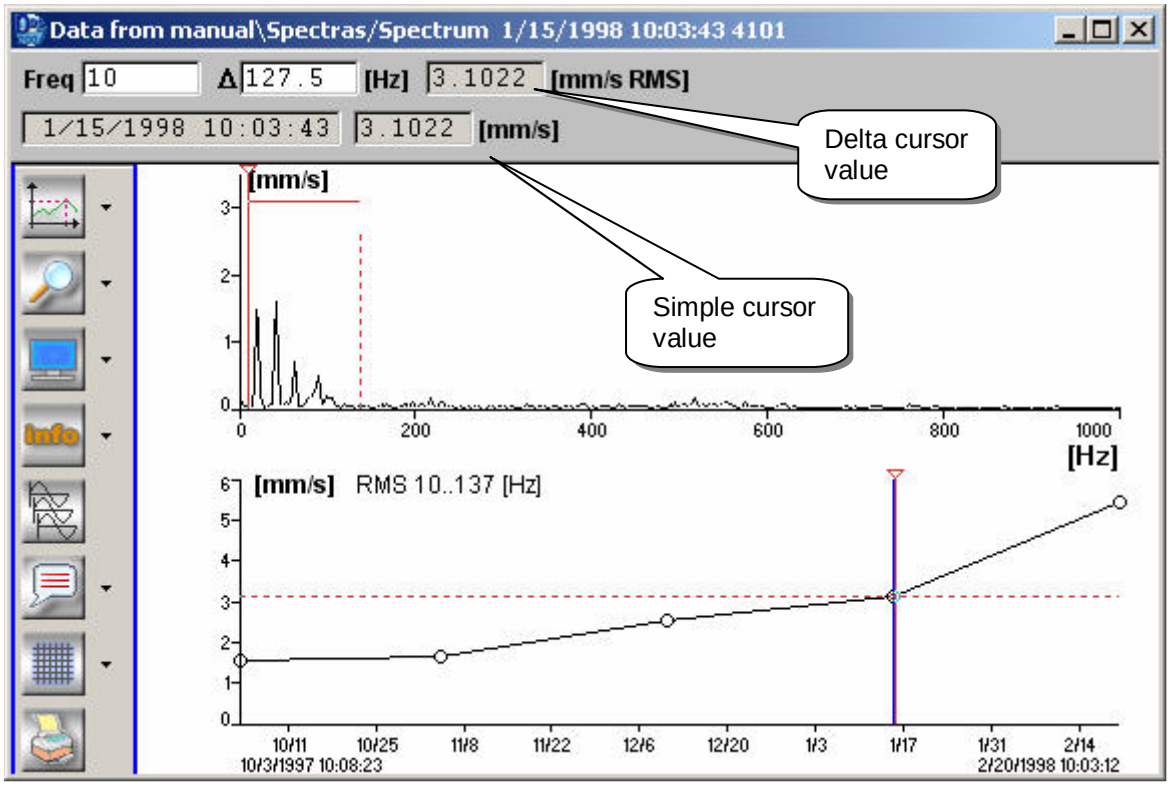
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Delta Max cursor - is a band cursor scanning the maximum value in the band. Its control is similar to the previous case. To switch it on or off the ***M*** key can be used.

Band cursor - if there are band graphs defined and actually displayed in the graph the cursor for band graphs can be selected. This cursor displays the value of the band on which the cursor is currently placed on. The cursor position can be changed the same way as the single cursor.

Trend cursor - this cursor is enabled in case of Trend display (Trend, Amplitude+Trend, Cascade+Trend …). In case of combination there are two subgraphs. On the lower subgraph the trend cursor is situated, by moving of which you define actual measurement of the upper subgraph value of which is displayed in trend. To switch it on or off the ***T*** key can be used. In upper part, delta cursor is applied on spectrum, under delta cursor lies trend representation of all cell spectra. Spectra-trend values are calculated with ***delta cursor***. If you are not friendly with trend drawings, study it first (separate paragraph in this part).



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Fine cursor movement

In case of harmonic cursor or sideband cursor usage, often the situation happens that the main cursor movement according to existing spectrum lines is a restricting factor. If the real rotation frequency is placed between two frequency lines we cannot achieve correct harmonic components placement. The higher multiple the harmonic component is, the higher the difference from the real value is. The DDS program solves this situation by the main menu movement between existing frequency lines.
The first method is positioning the cursor by arrows. If you use right/left arrows only, the cursor moves with corresponding measurement step. When you use these arrows having pressed the ***Shift*** key the cursor movement is 10x 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 compounds to specified spectrum position, grasp it by the mouse and place it. The main cursor position is also changed, but with proportionate part only. The same way you can work with the side band cursor.

X axis

The command serves to set up required ***X***-axis properties.

Linear - the basic ***X***-axis display.
Logarithmic - **X**-axis display in logarithmic scale.
OKT/1 - recalculation and ***X***-axis display in octal division.
OKT/3 - recalculation and ***X***-axis display in third-octal division.

Hz - basic ***X***-axis unit setting to Hz.
RPM - ***X***-axis unit setting to rotates per minute i.e. 60x value in Hz.
Rotations - ***X***-axis unit setting in rotation multiples (orders). The rotational value must be measured directly or taken as a default value (***Edit Data Cell - Limit Levels - Default RPM***).

If an additional numeric statement appears with the X axis unit description, this is the actual rotational value for this record.

Y axis

This command serves to set up ***Y***-axis properties.

Linear - the basic ***Y*** axis setting
Logarithmic [dB] - logarithmic ***Y***-axis display in dB. Reference value for used unit is placed after the ***dB*** word.

Separate for Each Spectrum - in case of multiple graph (more graphs in one window) there is possible to set different ***Y*** axis properties for each subgraph.
Common for All Spectra - in case of multiple graphs Y-axes all graphs have the same properties.

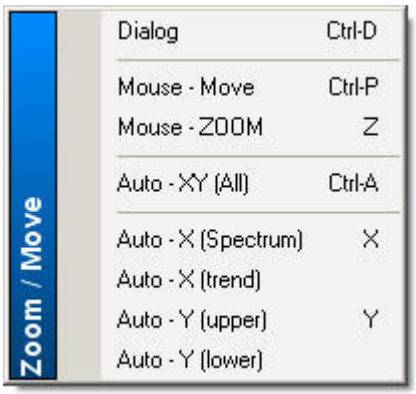
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Grid

The command serves to switch grid displaying on or off. You can select grids for both axes separately.

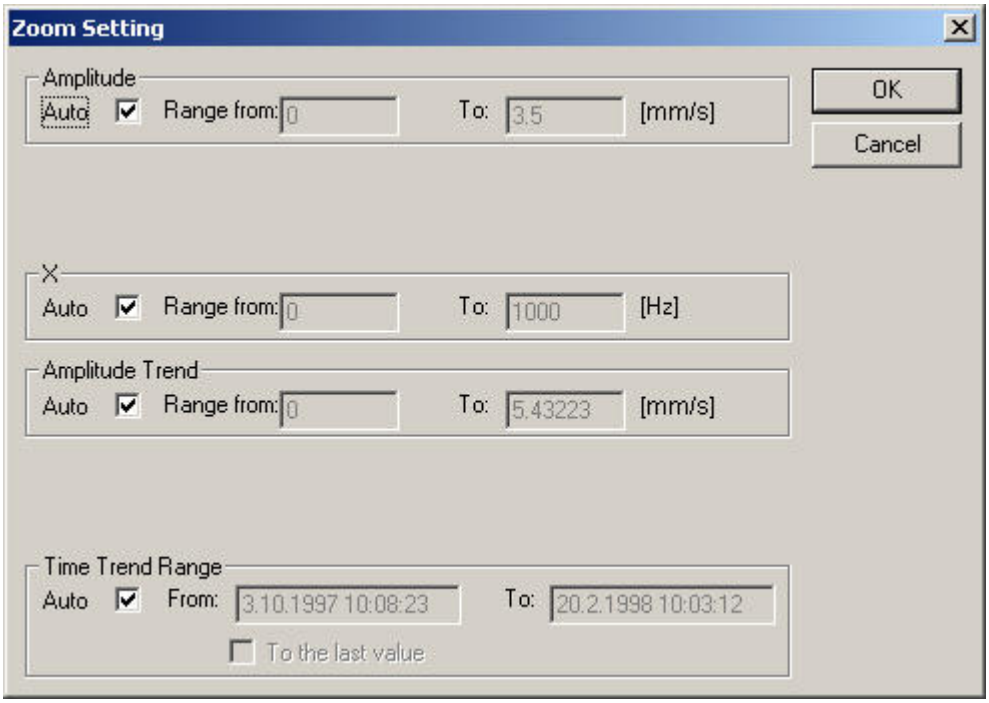
Zoom / Move

The ***Zoom - Move*** command which serves to set required axes scale has its own extended submenu.



Dialog - is the most frequently used method to exactly set ranges of all axes in the graph. That can be called also by the ***Ctrl D*** key combination. The command allows defining required scale in X and Y axes by the ***Zoom Setting*** window. You can insert required values for all axes existing in actually displayed graph. As there are various possibilities of displaying, the window can have various shapes. The method of single axes is the same anyway. On the left side is the ***Auto*** check box that when is checked it means that the automatic scaling is provided. If the ***Auto*** check box is not checked there is possible to define minimum and maximum value to ***Range from … to fields***. The unit used is defined according to the axis type.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

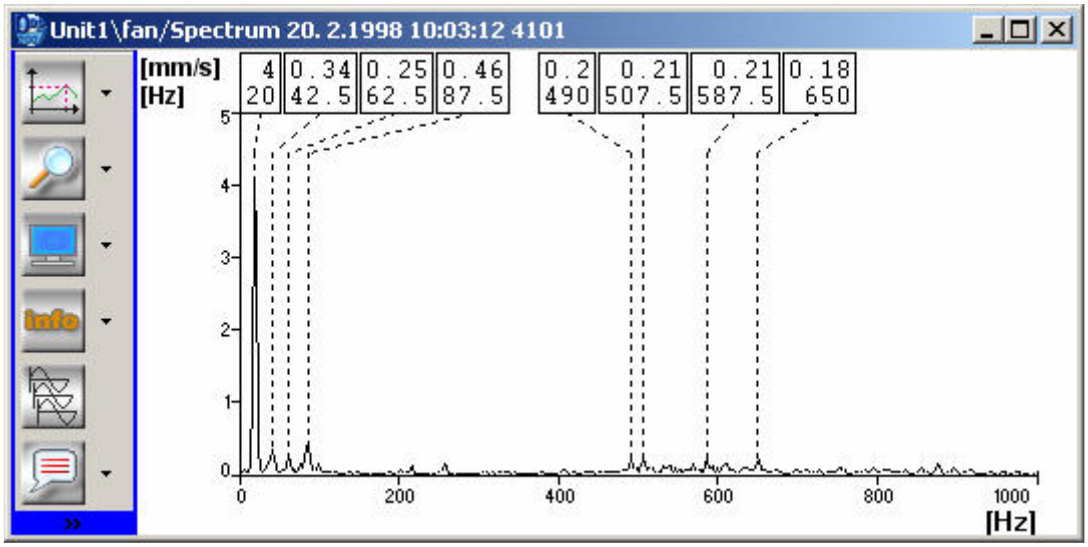


Mouse - Move - if the graph is zoomed, the zoom can be moved simply in graph in the X direction by mouse. The abbreviated selection is by ***Ctrl P***.
Mouse - ZOOM - is the faster method of zoom defining than by the ***Dialog*** command. By the mouse you can define the rectangle of the new zoom in the graph. The procedure is following: Place the cursor on any point of required rectangle, press the left mouse button and by mouse drawing define the opposite rectangle point. You can define zoom this way without using the local menu command by using the ***Z*** key or directly by pressing left mouse key (if no cursor is activated).
Auto XY, X, Y - all commands serve for automatic scaling.
The ***To the last value*** flag causes that the trend graph displays always on the right side the last value from database independing on the value defined in the **To** edit box. The **From** and **To** edit boxes serve for time interval definition, not for absolute date/time limits setting.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Marks

The ***Marks*** item serves to position descriptive marks (frequency+amplitude) on the signal. It is possible to mark local maximums or to describe values for the currently used type of cursor. If your DDS system includes a bearing library, then also bearing frequencies may be marked on the spectrum (provided the type of bearing has been allocated and the value of revolutions has been defined). Similarly, also the characteristic frequencies of the machine may be marked if machine type analysis is implemented in the DDS system and the type of machine has been defined with the tree element to which the data cell (or one of its parents) is connected. Using of ***Bearing frequencies*** and ***Type analysis*** – see chapter ***Resources***.



Quantity

The ***Quantity*** statement serves for the switching of signal display in basic types, i.e. in acceleration, speed and shift (if this operation is available).

Derivation / Integral

Statement performs derivation or integration of the signal (compare to the Quantity statement). Based on the type of the original signal, individual operations are enabled.

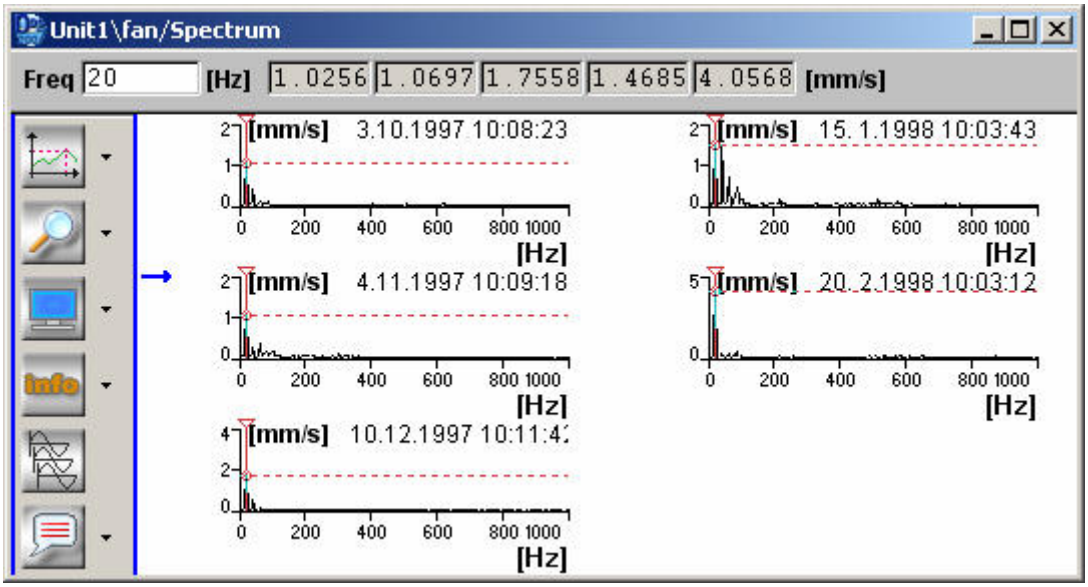
Display Unit

For simple access, the definition of display unit is available also in the graph local menu. The setting procedure is described in detail in the Data Cell chapter.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

View format

By this command it is possible to switch format of displaying selected records. When ***Simple*** is selected only the active record is displayed and Up/Down arrows can provide switch in previously selected set of records.
Tile displays all selected records at one time. In one window maximum of 8 records can be displayed simultaneously. If there are more records selected, it is possible to browse in record set by ***PgUp, PgDn*** keys. One record is marked with a blue arrow. This record is so-called active and all operations provided on it are automatically provided on all other records (e.g. zoom, axes changes, cursors e.t.c.). Pointing by mouse at the newly required record can provide change of the activation. The advantage of the tile arrangement is also the possibility of collective cursor values scanning from all displayed records



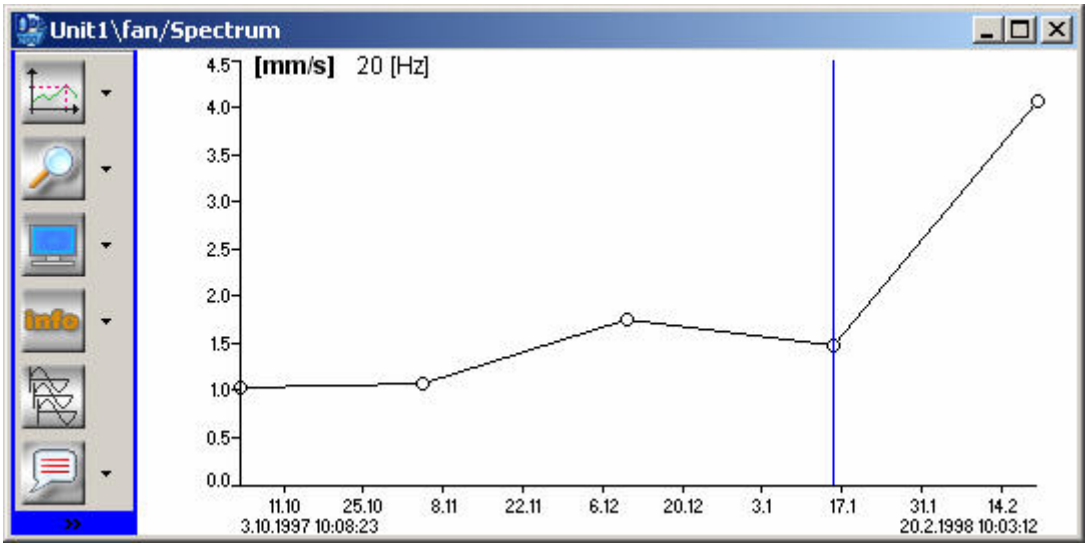
Displayed signal type

Selection of displayed signal type represents an important tool for effective data evaluation.
For each data type possibilities of its displaying are defined. In case of spectra displaying is the widest offer. Now we describe single types.

Amplitude- is the simplest displaying of one spectrum in the window. When this alternative is selected the amplitude spectrum of the selected record is displayed.
Amplitude + phase - if the spectrum is stored as complex, it is possible to display amplitude and phase.
Real + imaginary - displaying of real and imaginary component of the spectrum.

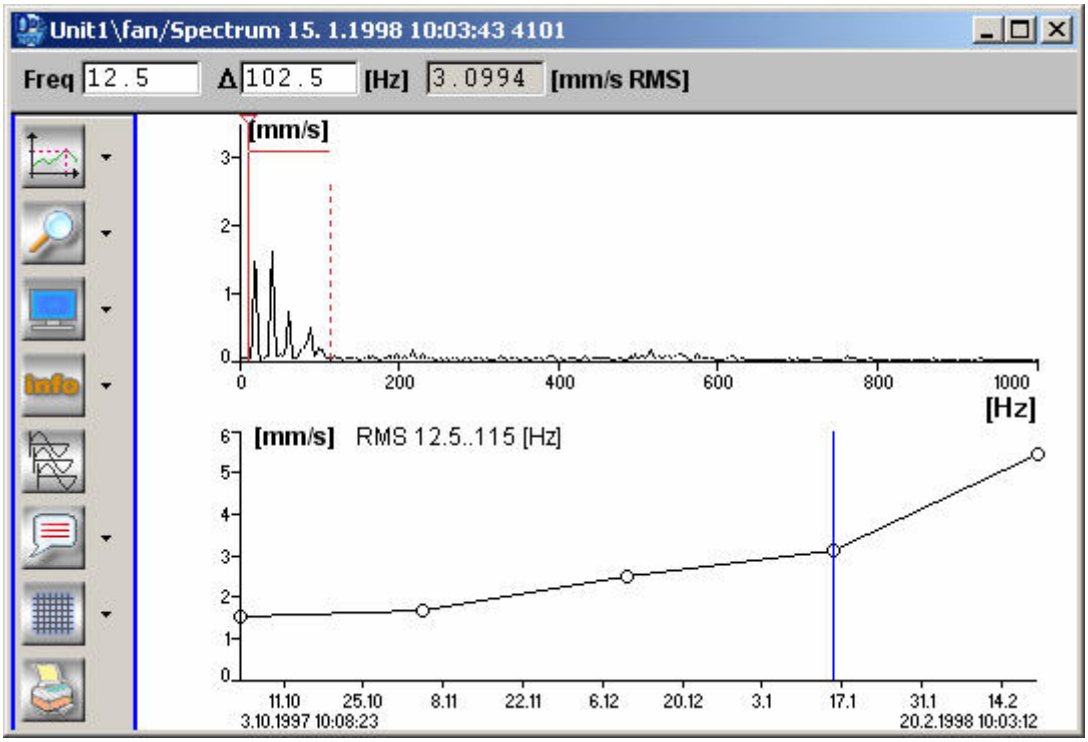
Trend - look at the time trend from selected spectra records. If there is no cursor activated, having selected this mode the wide band trend from all selected spectra is displayed. If the spectrum is measured in velocity the trend is created from values of vibration in the band ISO 10-1000Hz (if the spectrum is of required extent). The trend cursor is set to the value calculated from the active spectrum.
Very useful is the trend command in relation with cursor setting. After selecting the cursor and its positioning the trend contains values of amplitude on the cursor frequency from all selected spectra records.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

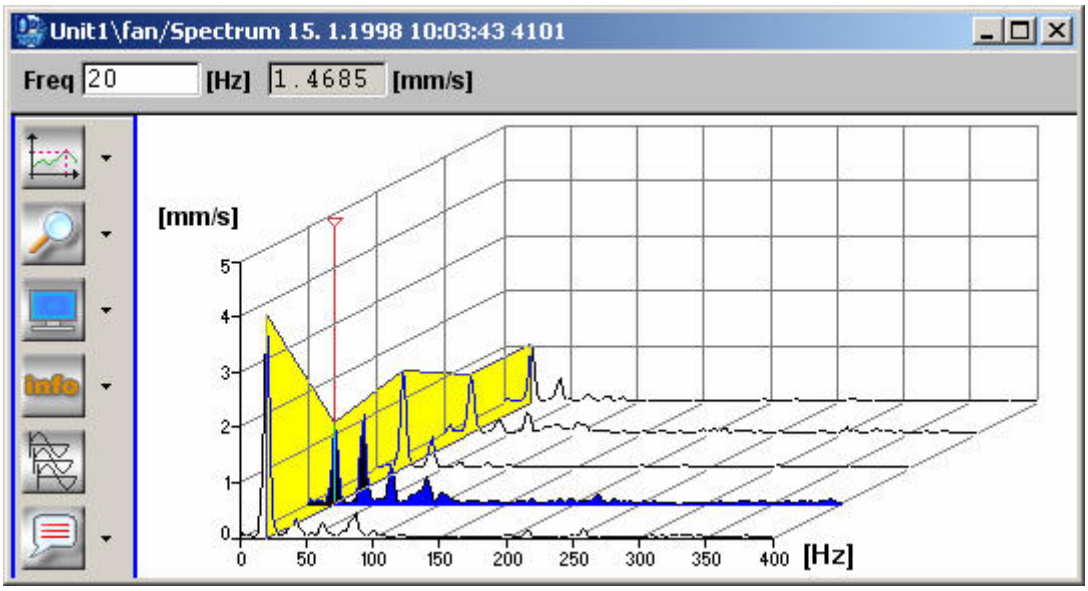


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Amplitude + trend - is similar to the Trend but there the active spectrum is displayed simultaneously. That enables interactive cursor adjustment directly in the spectrum with immediate updating corresponding trend.



Cascade - offers even more complex look then previous methods. Along with it all previous possibilities of cursor management remain.



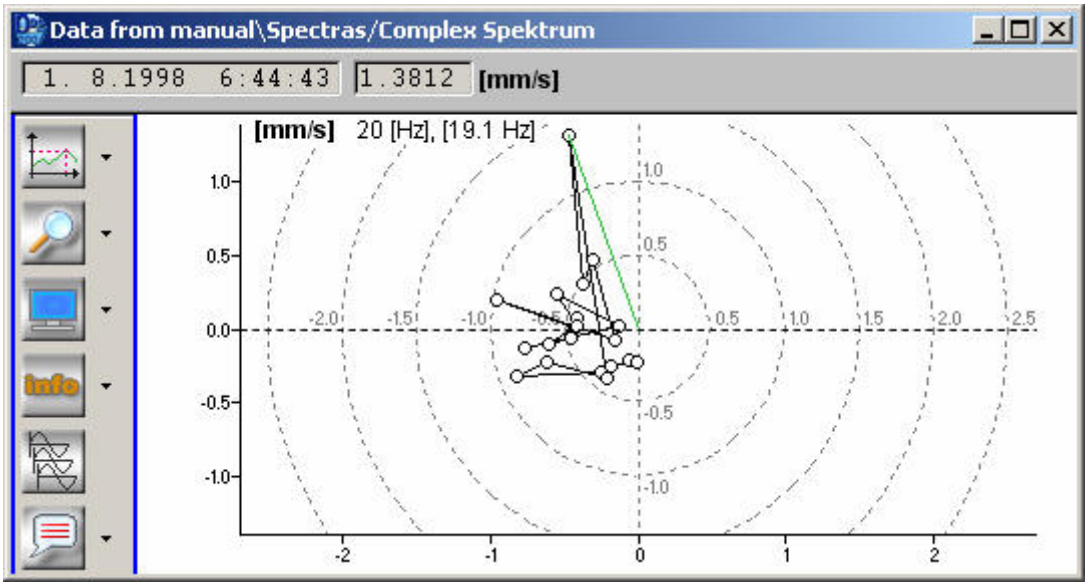
Cascade + trend - differs from the previous mode in simultaneous displaying with time trend of selected cursor.

Static- some frequency analyzers measure also wide band vibration value with the spectrum simultaneously. This command provides drawing the trend of these values according to selected spectra.

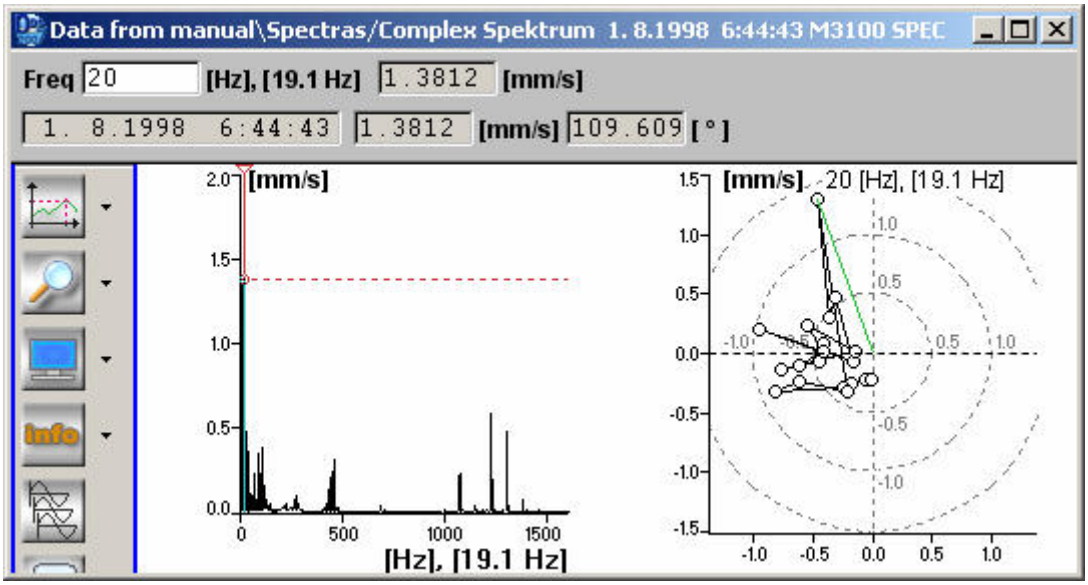
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Amplitude + static - as above, static trend simultaneously with the active spectrum.
Cascade + static - static trend displayed in common with cascade view of selected spectra.

Polar trend - if the spectrum is complex the polar trend derived from values scanned by previously set cursor. Polar trends displaying will be useful only in case of measurement synchronization by activating mark or probe.



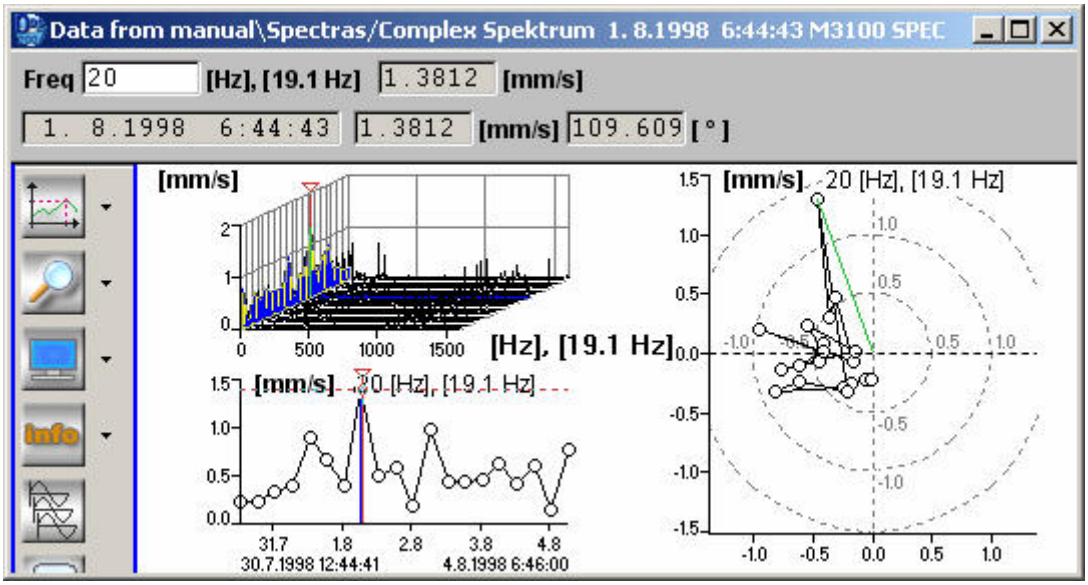
Amplitude + polar trend - common display for better orientation and possible cursor changes.



Cascade + polar trend - next display modification.
Amplitude + trend + polar trend – next display modification.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Cascade + trend + polar trend - very complex look at data.



Cascade specification

The command serves to switch between signals drawing in cascade view.

Inclined view / Frontal view - two modes of viewing the cascade.
Last in front / First in front- time order of records displayed.
Time proportional scale / Regular scale - method of viewing in ***Z*** axis.

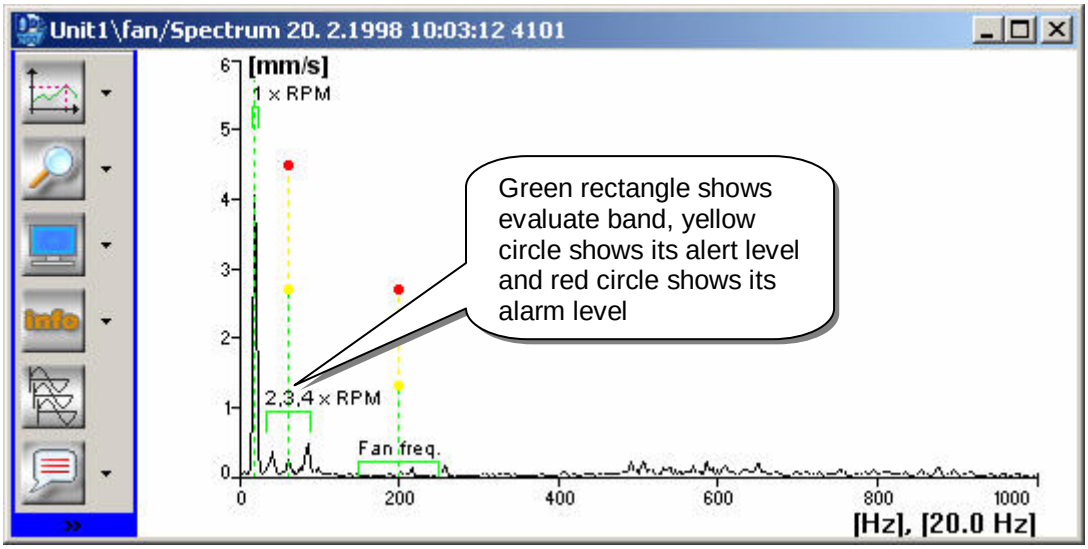
Info

By this command the fast approach is enabled to basic editing of data cell, spectrum or band graph (if connected).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

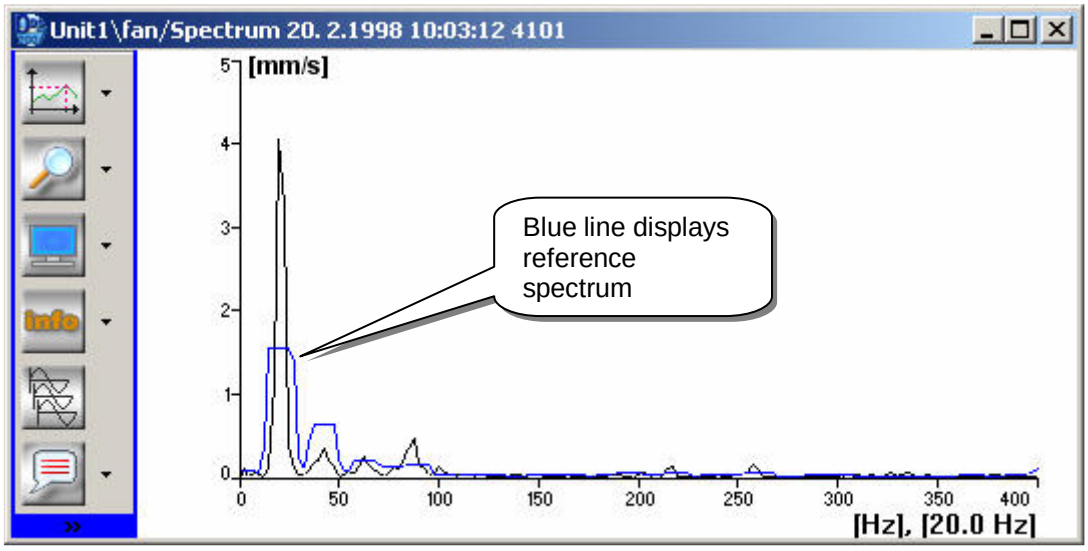
Draw Band Graph

If a band graph is connected to the spectrum (see the ***Band Graphs*** chapter) this command switches on or off the band graph displaying in the spectrum. If the band graph is defined in different unit, the spectrum is automatically recalculated to required unit including possible derivation or integration.



View reference spectrum

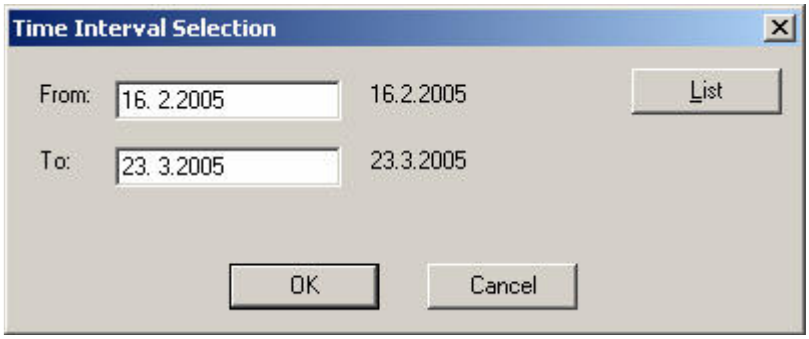
This command displays the reference spectrum on selected data cell if the reference is defined. The description of the reference definition is in the ***Edit Data*** paragraph



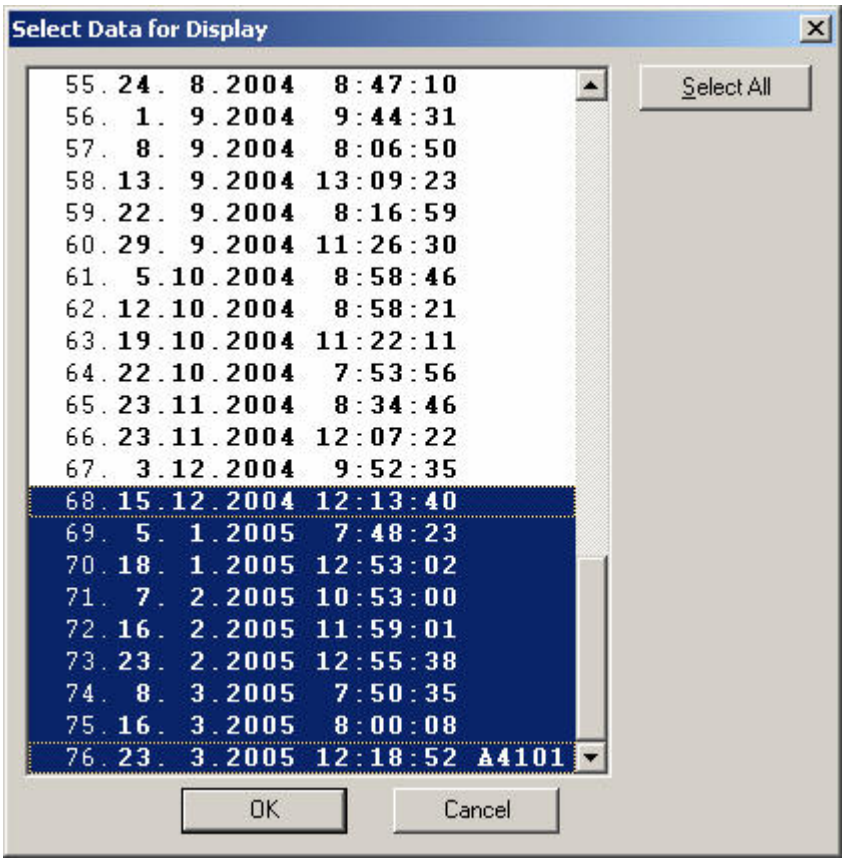
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Records selection

Each data cell can contain a large data amount. When displaying of all the data is required, the system is too overloaded and drawing takes too much time. As a result, following way has been developed. From all data records selection of predefined number of records is provided (***Options - Dynamic Data Drawing - Initial record number***) and on this subset all drawing functions are provided. If there is necessity to evaluate any other spectra, it is necessary to provide a new selection by the ***Records selection*** command. After selecting the ***Record selection*** command the time interval can be defined. After confirmation by the ***OK*** button all spectra in this time interval will be selected.



If you want to do more detailed selection, press the ***List*** button. The following window contains the list of all data records stored in the data cell. Provide required data record selection and confirm it. Use standard Windows multiselection operations (arrows, PgUp, PgDn, Home, End, left mouse button with combination with ***Ctrl*** or ***Shift*** keys).



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Print

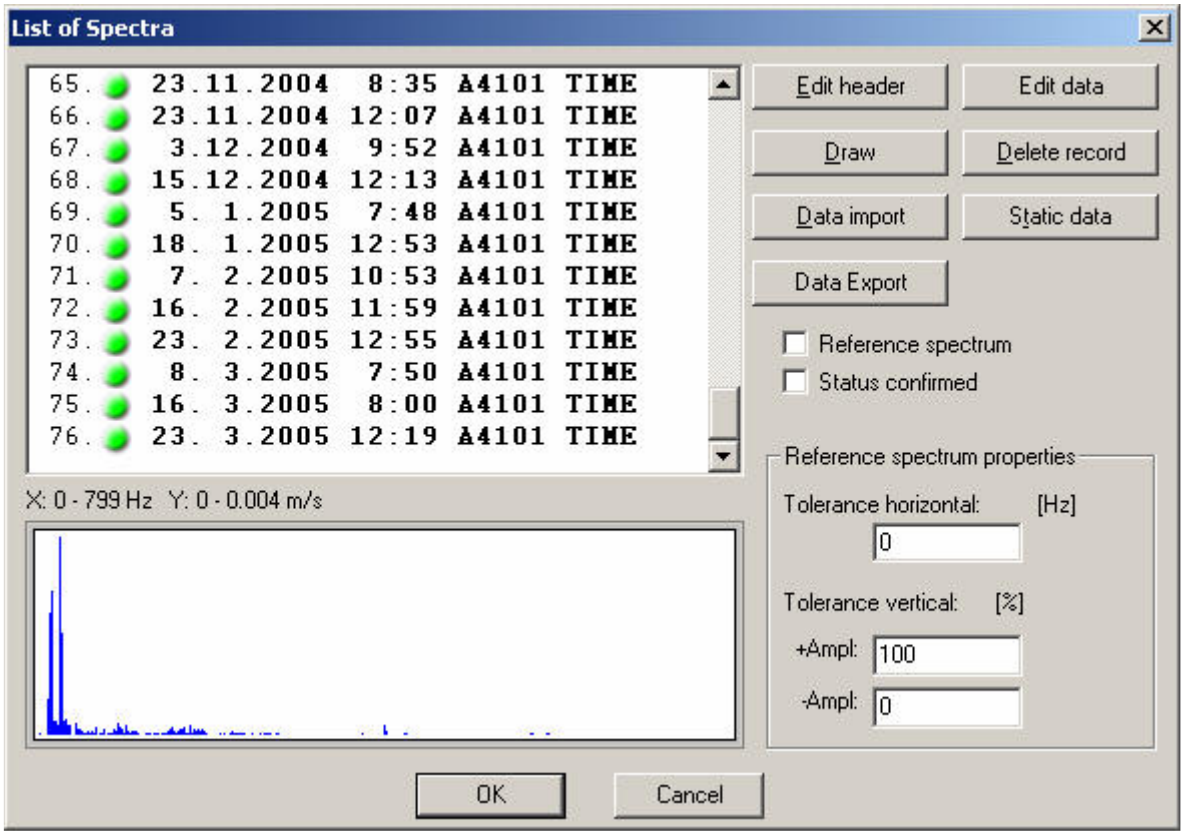
Command to print graphs to the printer. Having selected this command the standard window for printer output appears.

Save to Clipboard as Bitmap

Content of the current window is stored to Windows system clipboard for using in other programs (e.g. MS-Word).

Edit data of spectrum record

If the user needs to modify some data in record the Edit Data function is prepared for this purpose. It is necessary to activate selected data cell and then open the local menu by the right mouse button.



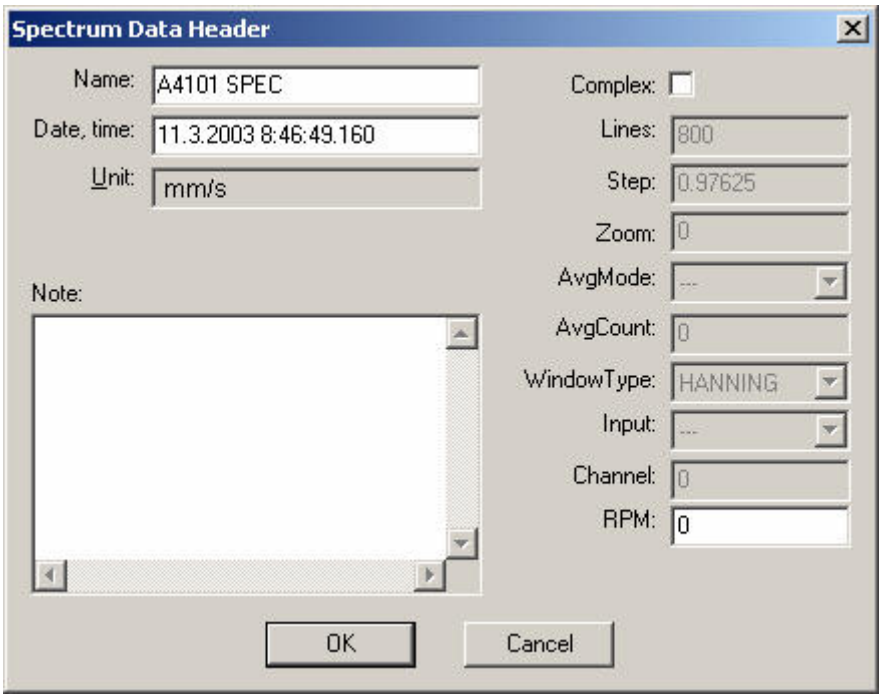
Reference spectrum - one record can be defined as the reference spectrum. By comparing with its shape other records are evaluated.
Reference spectrum properties - for better comparing, it is possible to visually modify the reference spectrum. ***Tolerance horizontal*** means extending each spectral peak by defined value. ***Tolerance vertical*** means increasing the reference value to value required (e.g. 200% means twice-higher

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

amplitude). By vertical tolerance the lower limit ***-Ampl*** can be defined that creates a tolerance field. We recommend trying the method of reference definition practically for correct comprehension of all possibilities.

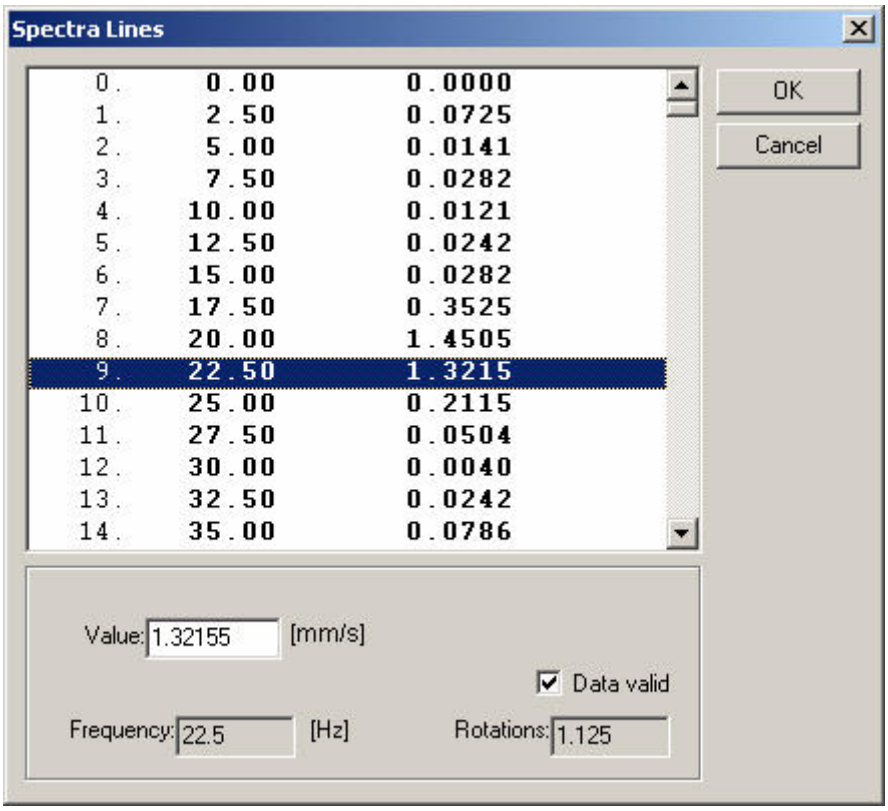
Status confirmed - status confirmation for band graphs. If there have been provided provisions to removing alert or danger condition, the status of the band graph can be confirmed. The future status will be evaluated from not confirmed records only.

Edit header- basic record information. User can change some of then only.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Edit data –direct access to values of single samples. Values of spectra lines can be changed here or their displaying in graph can be forbidden – by uncheck ***Data valid***.



Data import - for users of older systems this function allows data conversion to DDS 2010.

Static data - if there are wide vibration values stored in common with spectra (e.g. ISO2372), it is possible to modify them by this command. Static data have their own status with independent confirmation.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

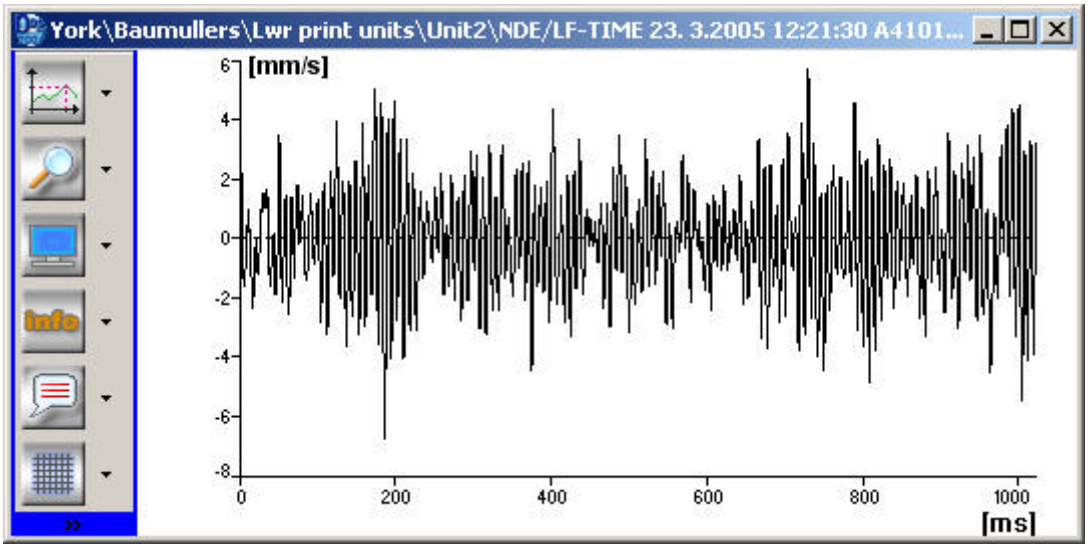
Time waveforms

For time waveform measurement a measurement instrument is necessary with possibility to store signals to memory and transfer them to the computer. For data transfer an appropriate interface is necessary. The list of all installed interfaces in your system can be looked over by the ***Tools - Connect Instrument*** main menu command.
Time waveforms are stored in data cells of corresponding type, which can be connected to any tree element. Creating and configuring of a data cell is described in the ***Data Cells*** chapter.
DDS enables running time records on sound card and FFT calculation from this record.

Viewing of time waveforms

Open a DDS tree up to the level containing a time waveform data cell. Now you have three possibilities to view signal in the data cell.
- by left mouse double-click on selected data cell,
- by activating the data cell and pressing the ***Enter*** key,
- by activating the data cell and using the ***Draw Data*** local menu command (right mouse button).

Now the last time waveform record from this data cell appears on the screen.

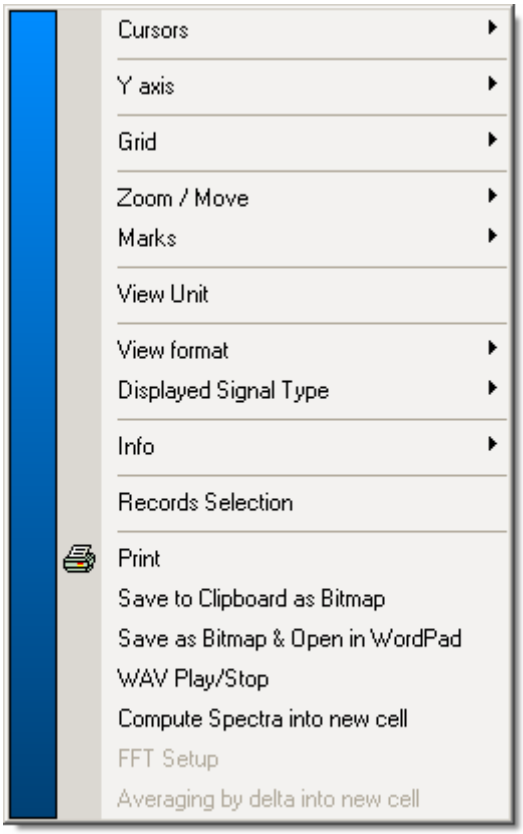


This way we simply obtain the graph of the last measured time waveform that we are usually interested in. In the data cell the time waveforms from the whole history are stored and they can be displayed as well. The procedure of graph drawing can be divided into two phases. In first phase you have to mark data cell record you want to work with. This operation can be executed after displaying record (usually the last) in the window. First the automatic selection of predefined records number is provided (see the ***Options/ Dynamic Data Drawing*** main menu command, the ***Initial record number item***). In most cases this is the needed alternative so that this is provided automatically by default. User defined selection can be done by the ***Records Selection*** local menu command. The second phase is selecting drawing method of selected records. It is possible to look at selected records one by one or to display more of them in one time (the ***View Format*** local menu command). Each record can be displayed by various methods (the ***Displayed Signal Type*** local menu command).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Local menu

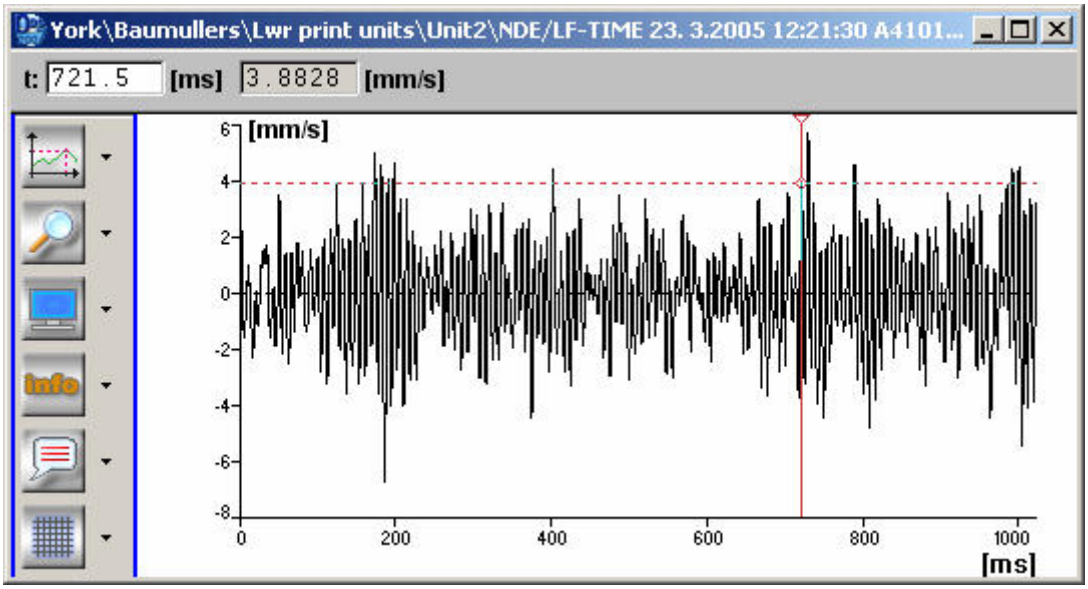
If you press the right mouse button in the window with time waveforms, the local menu appears. In the local menu only these commands are enabled that are executable in the current time. Some menu items contain further submenu. These items are marked with arrow. The submenu itself is open if you place the mouse cursor on it. The local menu is available in the first subgraph. The most important functions are in toolbar as well.



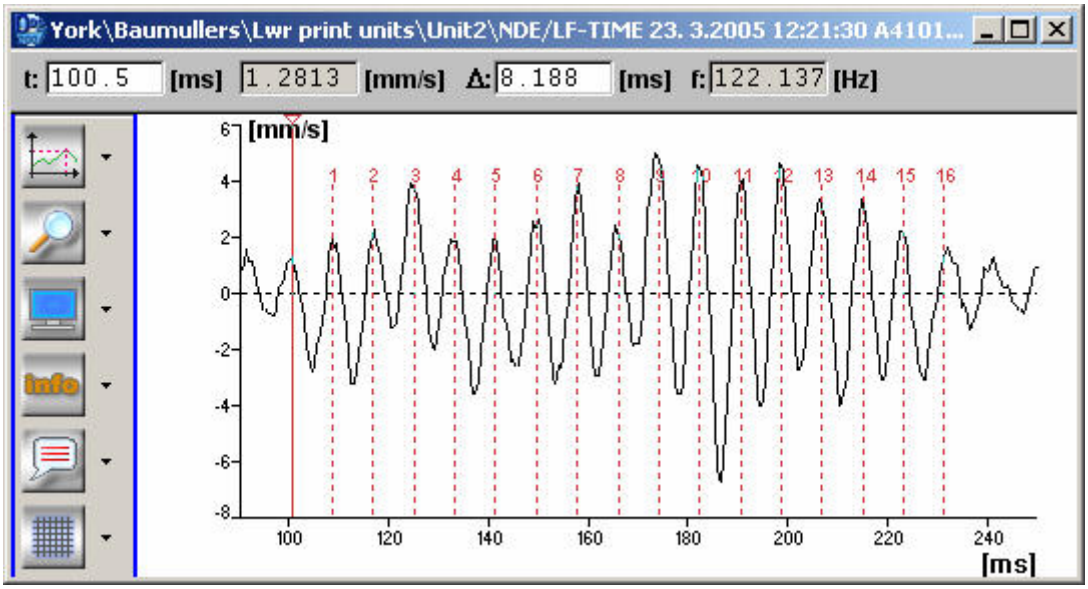
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Cursors

Simple cursor - when the simple cursor is switched on there is possible to scan time and amplitude values of separate record samples.

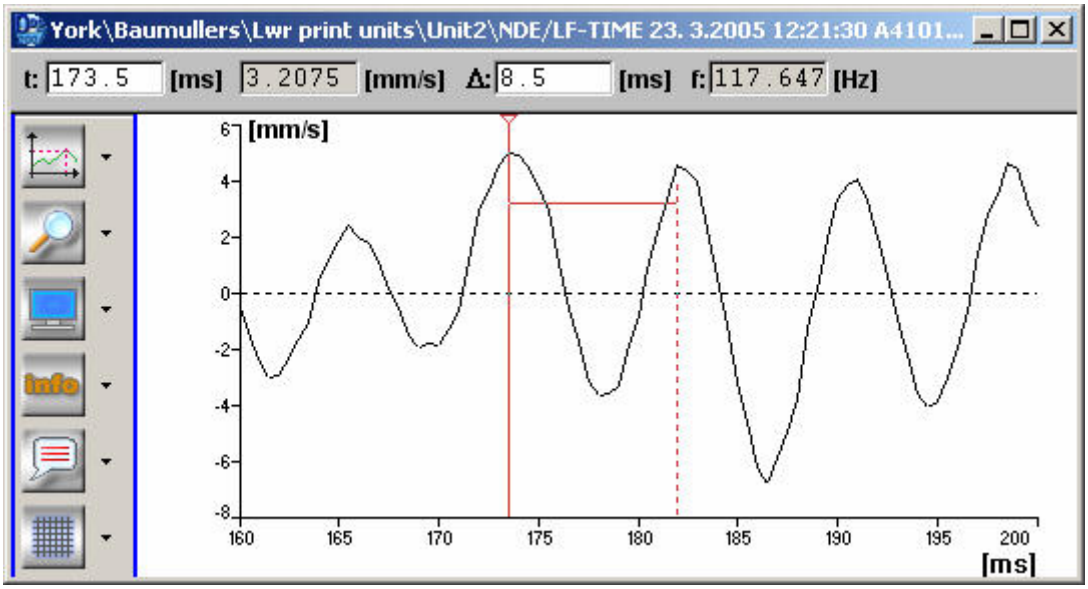


Periodical cursor - enables period time (delta) and frequency (f) of repeating processes (e.g. beats from a gear cogs).



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Delta cursor - serves to simply scan time interval between samples. Vibration level refers to RMS value in delta-cursor interval. If the ***Display signal type*** is ***Amplitude + Spectrum***, then spectrum refers to FFT computed in delta-cursor interval.



Y axis

This command serves to set up ***Y-axis*** properties.

Separate for Each record - in case of multiple display (more graphs in one window) different ***Y***-axes properties can be set for each graph.
Common for All records - in case of multiple display all ***Y***-axes have the same properties. This option is enabled only if the physical unit is the same for all records.

Grid

The command serves to show (hide) the grid in the graph. Can be selected separately for both axes.

Zoom / Move

The ***Zoom / Move*** command, that serves to set required axes scale, has its own extended submenu. See ***Spectra – Zoom / Move***

Dialog - is the most frequently used method to exactly set ranges of all axes in the graph. That can be called also by the ***Ctrl D*** key combination. The command allows defining required scale in X and Y-

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

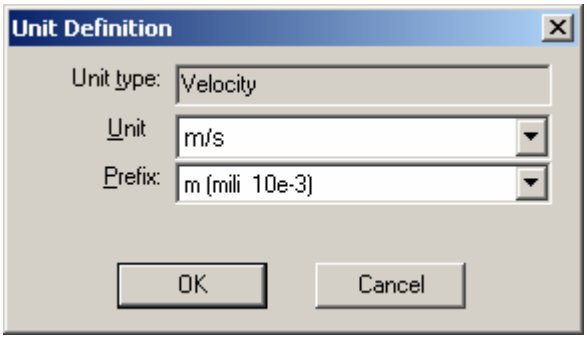
axes by the ***Zoom Setting*** window.

Mouse - Move - if the graph is zoomed, the zoom can be moved simply in graph in the X direction by mouse. The abbreviated selection is by ***Ctrl+P***.
Mouse - ZOOM - is faster method of zoom defining than by the ***Dialog*** command. By the mouse you can define the rectangle of the new zoom in the graph. The procedure is following: Place the cursor on any point of required rectangle, press the left mouse button and by mouse drawing define the opposite rectangle point. You can define zoom this way without using the local menu command by the ***Z*** key or directly by pressing left mouse key (if no cursor is activated).
Auto XY, X, Y - all commands serve for automatic scaling.

Marks

Item ***Marks*** is used for placement of description marks (frequency+amplitude) on signal. By left-mouse button double-click on a chosen signal spot, descriptive mark appears. It is also possible to mark local maximum automatically. If periodic cursor is used, all periodic components´ locations can be marked.

View unit



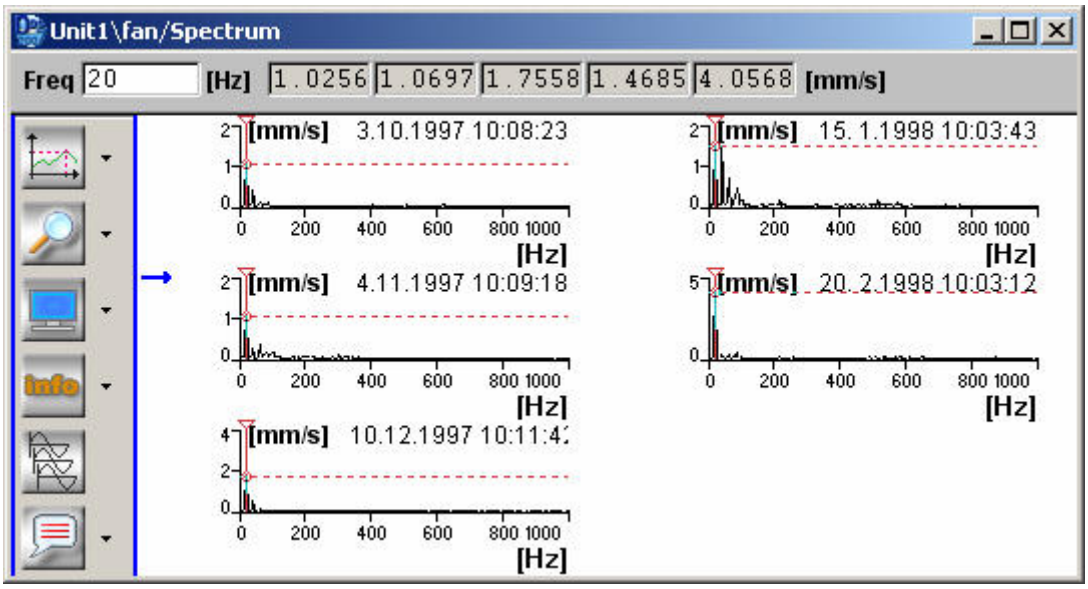
View unit is used in case of displaying signal in different physical unit from the measurement unit.

View format

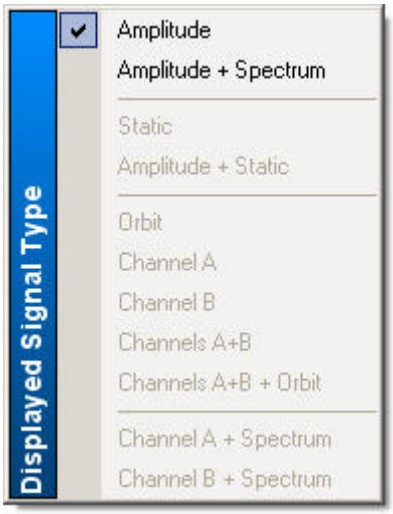
By this command it is possible to switch format of displaying selected records.
When ***Simple*** is selected the active record is displayed only and ***Up/Down*** arrows can provide switch in previously selected set of records.
Tile displays all selected records at one time. In one window maximum of 8 records can be displayed simultaneously. If more records are selected, it is possible to browse in record set by ***PgUp, PgDn*** keys. One record is marked with a blue arrow. This record is so-called active and all operations provided on it are automatically provided on all other records (e.g. zoom, axes changes, cursors e.t.c.). Pointing by mouse at the newly required record can provide change of the activation. The advantage of the tile arrangement is also in possibility of collective cursor values scanning from all

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

displayed records.
The Tile menu item is enabled only when the simple Amplitude graph is displayed.

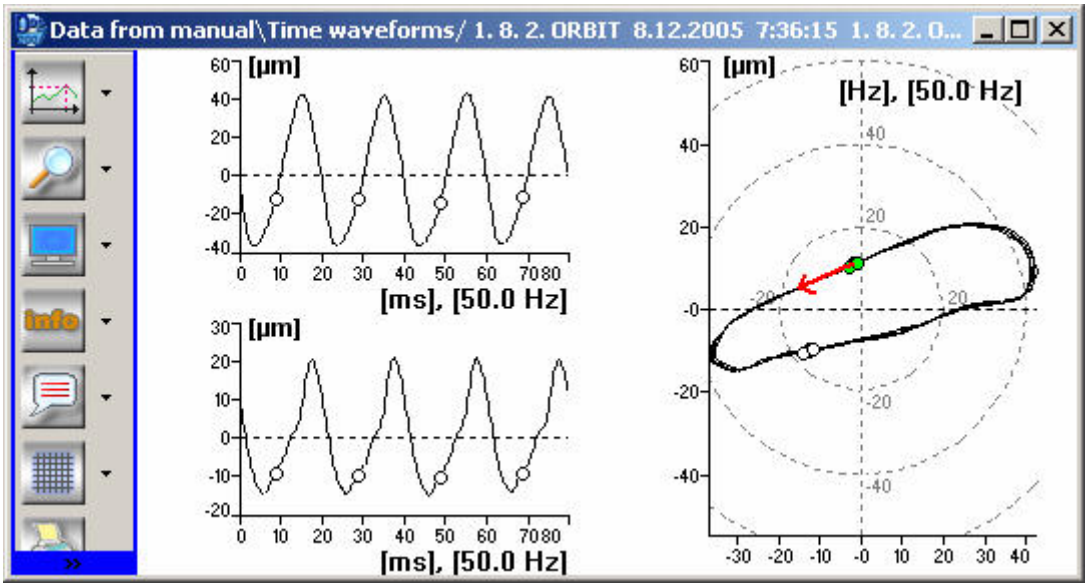


Type of the Displayed Process



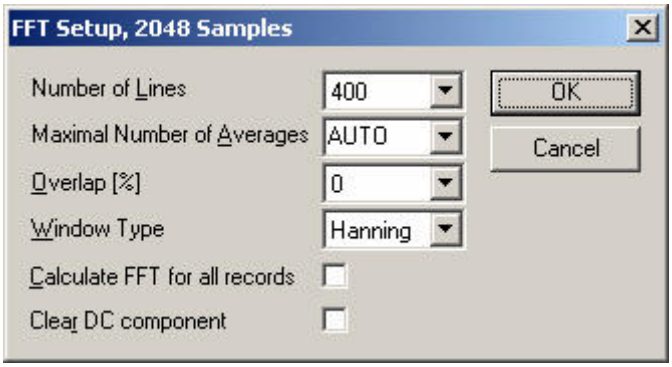
The ***Static*** and ***Amplitude + static*** types of display are only available if also static trend is saved in the data cell along with time signals.
The ***Amplitude + Spectrum*** type of display enables to display the calculated spectrum amplitude graph (FFT) from the relative time signal.
The ***Orbit***, ***Channels A+B***, ***Channels A+B + Orbit*** types of display come into consideration in case of two-channel measurements.
The ***Channel A+ Spectrum*** and ***Channel B + Spectrum*** types of display enable to display the calculated spectrum amplitude graph (FFT) from the relative channel of two-channel measurement.
When the graph is displayed in the tile mode, only Amplitude item is available, others are disabled.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

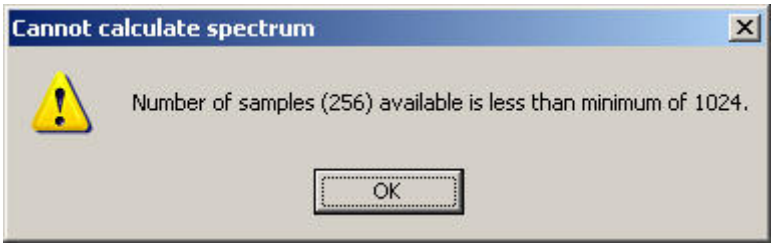


Notice circles on the signal, which represent time marks.

Whenever the item ***Amplitude*** or ***Channel A*** or ***B + Spectrum*** is selected, the ***FFT Setup*** dialog appears.



Now it is possible to select parameters of the Fourier transformation (FFT). See also the ***Compute Spectra into new cell*** section below for more detailed description of FFT Setup dialog and possible FFT settings. After clicking OK, new spectrum subgraph appears (the spectrum calculation is a time consuming process - depending on the selected parameters). When it is impossible to calculate spectrum of selected criteria, warning text is displayed instead of spectrum graph.



The spectrum changes (is recalculated) according to delta cursor change. It is also possible to recalculate spectrum again with changed FFT calculation parameters by selecting ***FFT Setup*** item from time graph local menu.

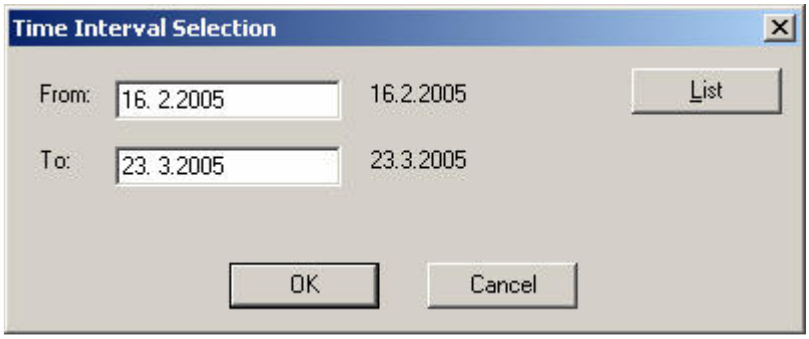
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Info

By this command, fast approach to basic editing of data cell or record is enabled.

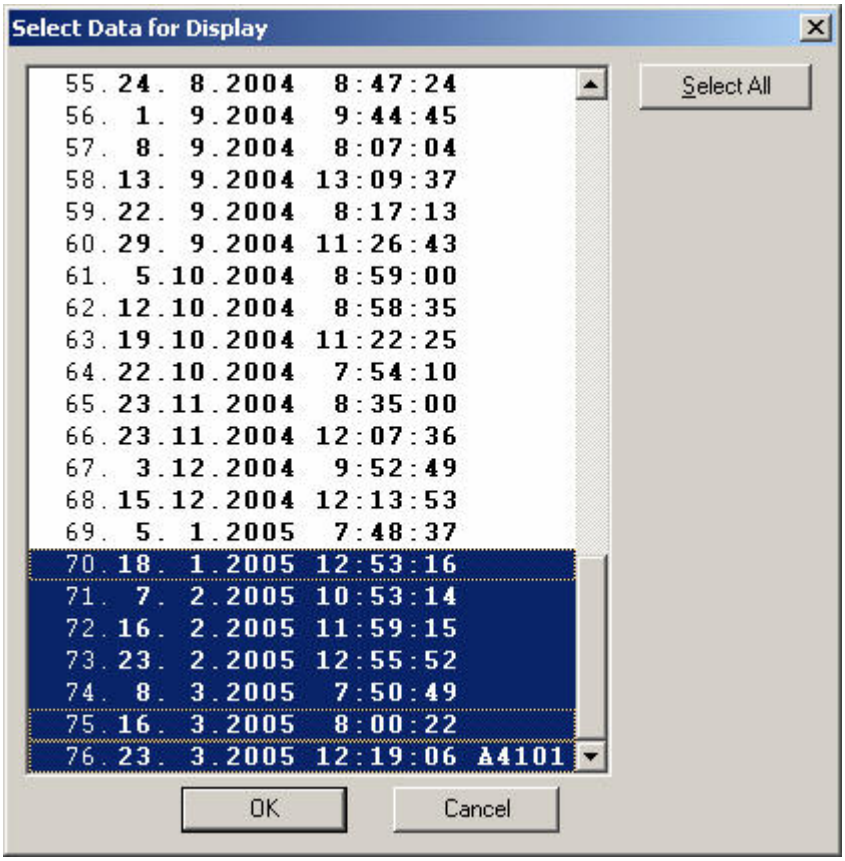
Records selection

Each data cell can contain a large data amount. When displaying of all the data is required, the system is too overloaded and drawing takes too much time. As a result, following way has been developed. From all data records selection of predefined number of records is provided (***Options - Dynamic Data Drawing - Initial record number***) and on this subset all drawing functions are provided. If there is necessity to evaluate any other records, it is necessary to provide a new selection by the ***Records selection*** command. After selecting the ***Record selection*** command the time interval can be defined. After confirmation by the ***OK*** button all spectra in this time interval will be selected.



If you want to do more detailed selection, press the ***List*** button. The following window contains the list of all data records stored in the data cell. Provide required data records selection and confirm it. Use standard Windows multiselection operations (arrows, PgUp, PgDn, Home, End, left mouse button with combination with ***Ctrl*** or ***Shift*** keys).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Print

Command to print graphs to the printer. Having selected this command the standard window for printer output appears.

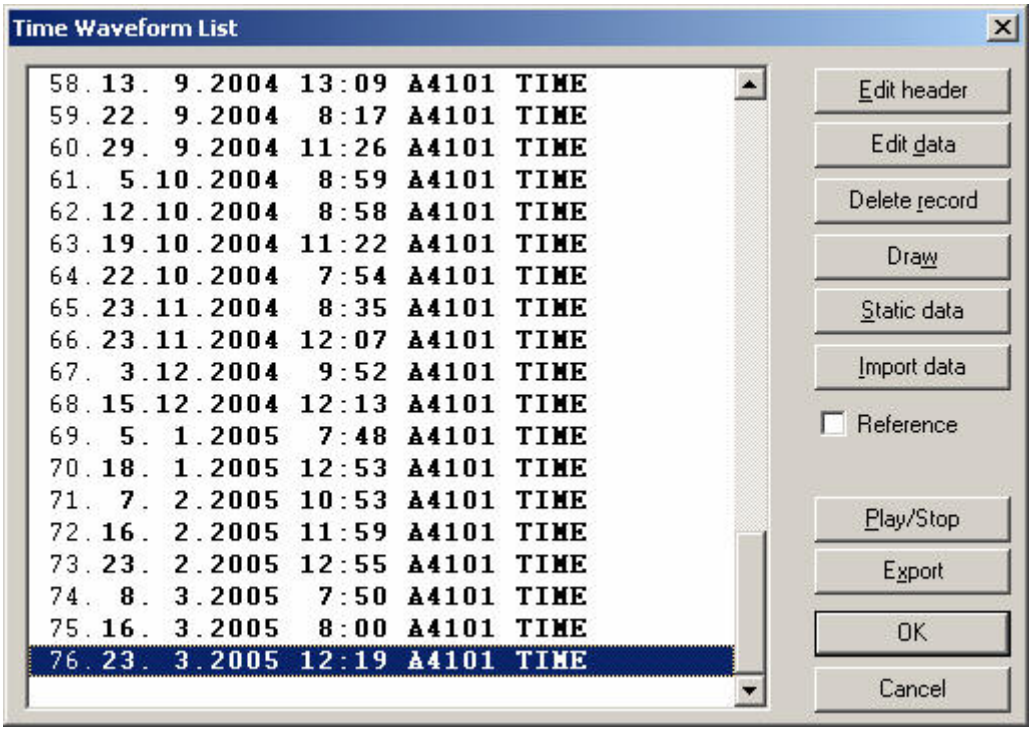
Save to Clipboard as Bitmap

Content of the current window is stored to Windows system clipboard for using in other programs (e.g. MS-Word).

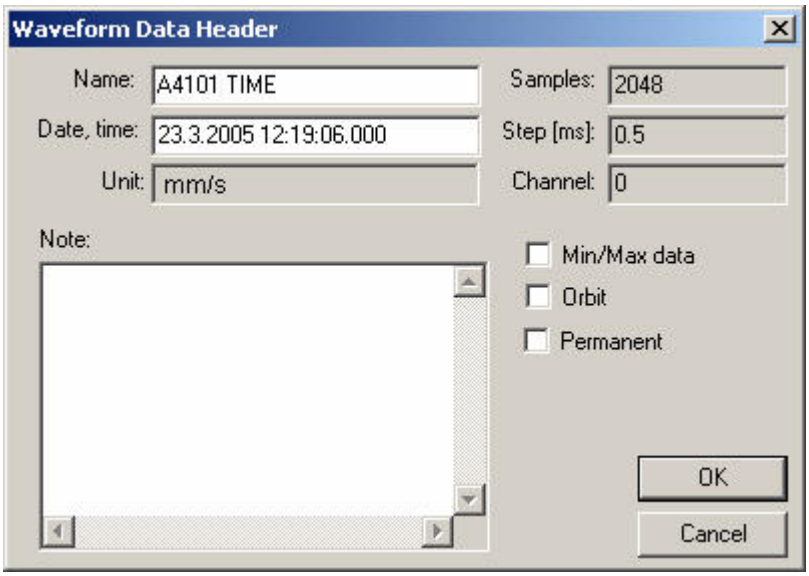
Editing of time waveform data

If the user needs to modify some data in record, the Edit Data function is prepared for this purpose. It is necessary to activate selected data cell and then open the local menu by the right mouse button.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

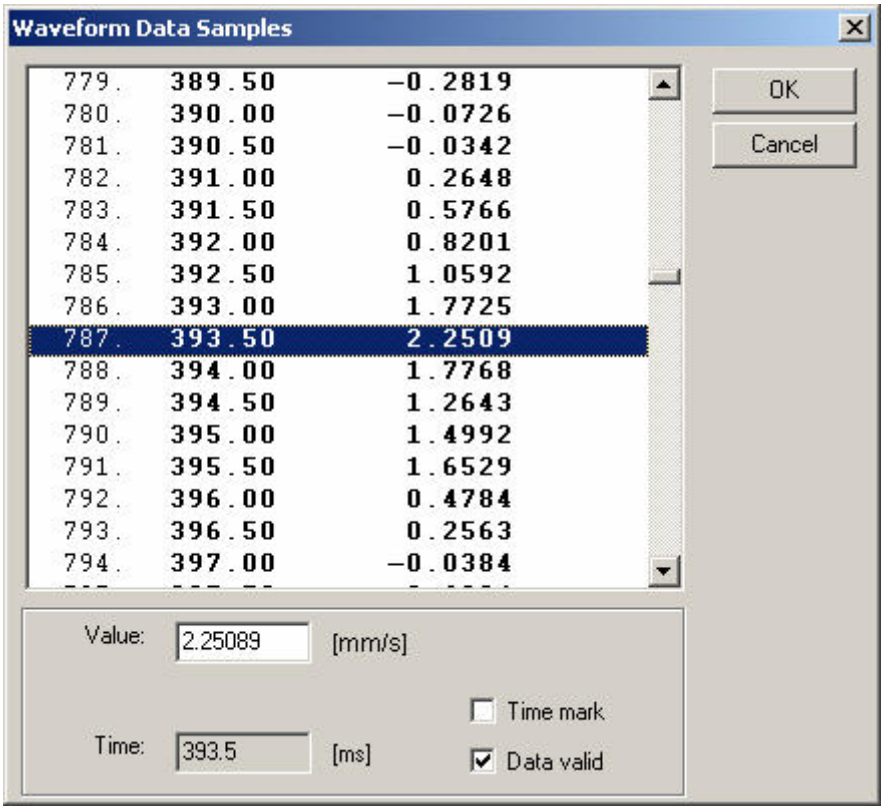


Edit header - you can change main description data of the records, some items are read only and cannot be changed.



Edit data - changes of separate samples can be provided here. By clearing the ***Data valid*** flag it is possible to mark such items that will not be drawn (it is not necessary to overwrite them).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Delete record - removing the record from the data cell.
Static data - for instruments that measure automatically a static value in common with each record.
Import data - import data from external files (typically from older versions, enables import of wav and csv files).
Reference - marking of reference signal for storing to a route.

Import, Export and Playing of Time Signals

Playing of Time Signals as Sounds

If the user has a sound card, time signal may be played as sound. This option is available either from the context menu of the time signal graph as the **WAV Play/Stop** option, or from Time Waveform List dialog after selecting a particular time signal (the dialog is available from tree – right click on time waveform cell, select Edit Data command). It is possible to cancel playing a waveform by pressing key Esc on the keyboard.

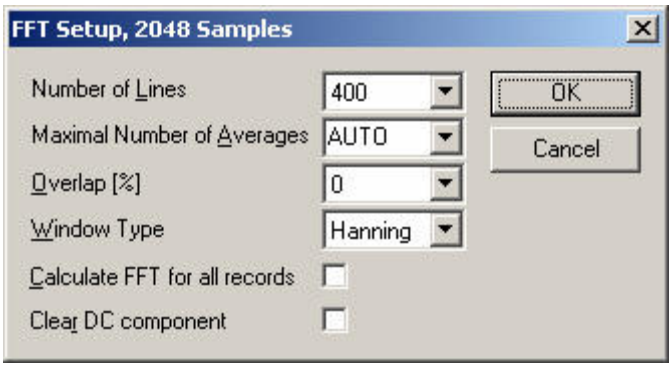
Import and Export of Time Signals Using WAV Files

The user may import or export data to/from the data cells of time signals from the audio files of WAV type. Using the **"Data Import" or "Export into .WAV" buttons** in the time signal list dialogue (***local menu of time data cell – Edit data***) standard Windows box can be open where user can select sound file name and then import/export data.
If an audio file is imported in the stereo format, two time signals are created, one for each channel. In the import/export sample frequency is maintained.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Computing Spectra and Saving them into New Cell

When activating the local menu in the time signal graph, the ***Compute Spectra into new cell*** option is available. When user selects this option, the ***FFT Setup*** dialog appears. The dialog allows setting of basic parameters of Fourier transformation (FFT) as well as the possibility to calculate spectrum for each time record of the data cell.



The dialog caption shows number of samples available for FFT calculation. The number can be reduced by delta cursor before selecting the spectra calculation. In this case the delta time is appended to the dialog caption.

Number of Lines – indicates how many lines the calculated spectrum should contain.
Maximal Number of Averages – allows selecting the number of averages while calculating spectra. The FFT calculation will not use higher number than selected/entered. When AUTO is selected, FFT calculation will use as many averages as possible.
Overlap [%] – overlap between neighbor sample intervals used for calculation of particular averages.
Window Type – type of the window used for FFT calculation (Hanning or rectangular).
Calculate FFT for all records – when checked, new data cell will contain an extra spectrum for each time wave record. When unchecked, new data cell will contain only one spectrum related to the currently displayed time record

After clicking ***OK***, the calculated results are saved into a ***new*** data cell having the name of the original time cell with the "-SPEC" appendix (for instance, from time signal of the "LV1" data cell, a data cell of "LV1-SPEC" spectrum type is created). New spectrum graph appears on top. The user has a complete spectrum from original time signal available and can work with new data cell as with any other.

Note. It is impossible to calculate spectrum when there is less than 1024 samples available (either due to short delta cursor or due to overall short time interval). The user is warned by message box and FFT Setup dialog is not displayed. The user is also warned when he/she selects the invalid FFT Setup options for current time record, e.g. when selected Number of Lines requires more samples than currently available.

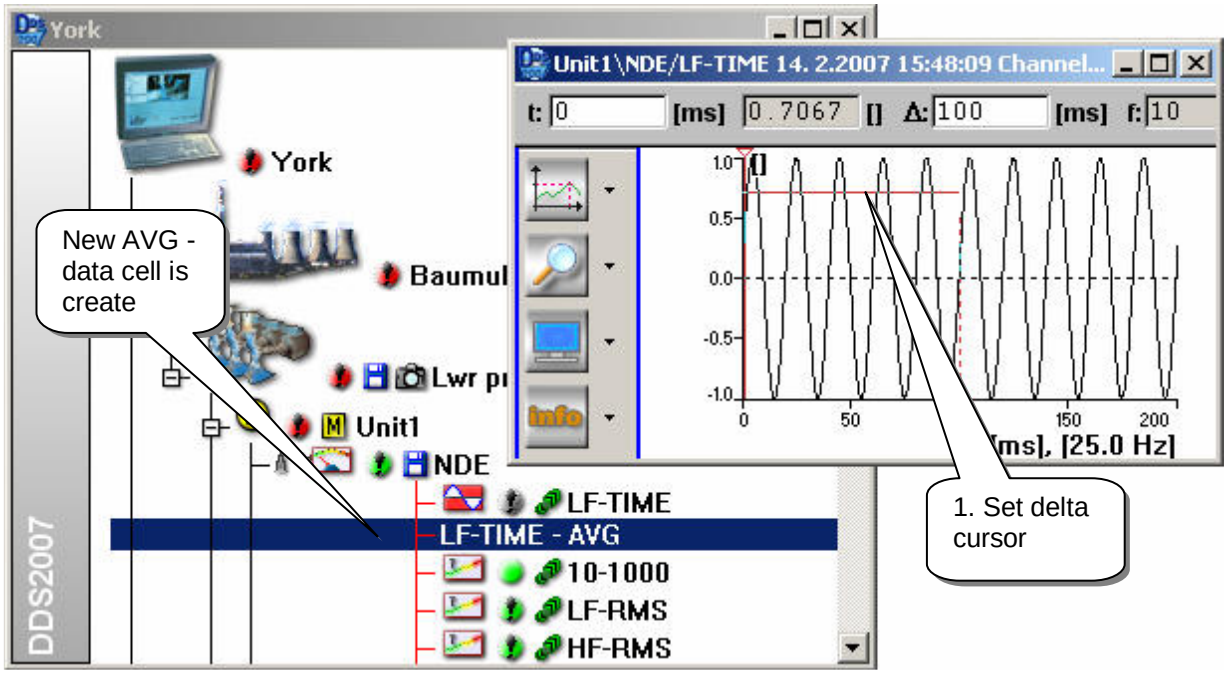
Averaging Time Waveform into New Cell

It is possible to compute averaged time signal into new data cell when the ***delta*** or ***periodical cursor*** is active. In this case, the cursor delta (the difference) determines the period for averaging. Averaging starts at the cursor position, not at the beginning of the graph. The length of period for averaging is the same as the length of delta cursor or as the length of the first period in periodical cursor. The first period plays the same role as delta here. The operation can be used for simple cutout of the data when there is not enough data for averaging after delta or first period cursor line (both have dashed

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

line).

To compute averaged time signal into new data cell, set either ***delta*** or ***periodical cursor***. Then right click in the time graph and in the ***context popup menu***, choose ***Averaging by delta into new cell***. It will get active record and compute averaged signal into the data cell with the name "***old_cell_name–AVG***". The target cell is automatically created if it does not exist yet. The averaged signal is stored into target cell with same timestamp as the source record. DDS asks the user if he/she wishes to overwrite record with the same timestamp in the target cell. It may happen when user repeat averaging on the same record.



Before start of calculation, DDS checks correctness of the cursor position and delta. It will inform user that it is necessary to reposition cursor when it is impossible to perform averaging.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Order analysis

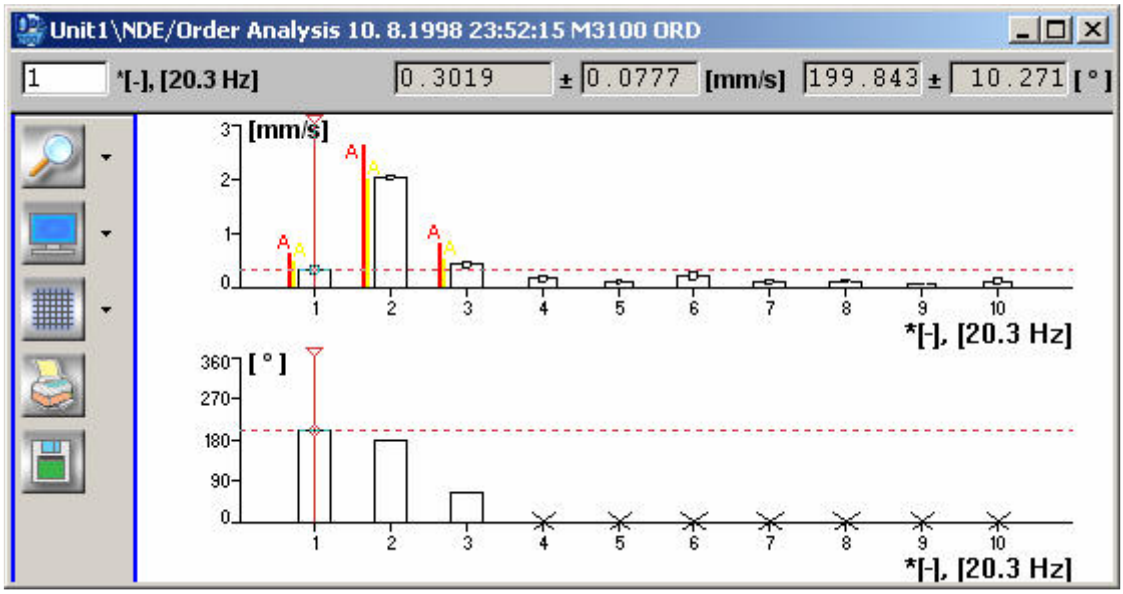
Vibrations evaluation by order analysis is partly similar to frequency spectrum calculation. The FFT method is used in fact. The important difference is time waveform preparation, where important differences are in opposite to classic spectrum.
If we evaluate order analysis, we calculate FFT of the spectrum only for rotational frequency and its multiples. The precondition of measurement is using a probe from shaft marks. By this method only it is possible to ensure stable phase ratio. The next precondition is binding of sampling frequency and rotational frequency. If the instrument has order analysis measurement implemented, the result is approximately ten complex values that indicate values of amplitude and phase at rotational frequency and given number of multiples (i.e. harmonic frequencies).
To transfer data from measurement instrument there a DDS interface is necessary. The list of all installed interfaces in your system can be looked over by the ***Tools - Connect Instrument main*** menu command.
Records of order analysis are stored in data cells of corresponding type, which can be connected to any tree item. Creating and configuring of a data cell is described in the ***Data Cells*** chapter.

Viewing order analysis records

Open a DDS tree up to the level containing an order analysis data cell. Now you have three possibilities to view signal in the data cell.

- by left mouse double-click on selected data cell,
- by activating the data cell and pressing the ***Enter*** key,
- by activating the data cell and using the ***Draw Data*** local menu command (right mouse button).

Now the last order analysis record from this data cell appears on the screen.



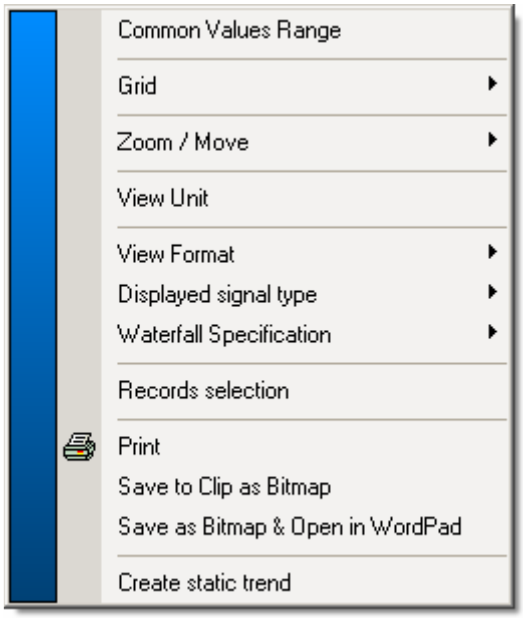
In two graphs values of amplitude and phase for rotational frequency (1) and its multiples (2,… 10) are situated. The ***X*** axis description is created by actual rotational values. The cursor is always displayed for order analysis. If data has been created by averaging of more measurements (standard case),

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

there are not only averages but also dispersions (values marked with +/-). If phase values are not displayed, the measurement instrument evaluated phase as unstable and has not accomplished the calculation. Yellow and red intervals define alert and danger levels adjustment. The ***A*** or ***R*** indication explains whether the interval represents absolute or relative critical values.

Local menu

If you press the right mouse button in the window with order analysis, the local menu appears. In the local menu only these commands are enabled that are executable in current time. Some menu items contain further submenu. These items are marked with arrow. The submenu itself is open if you place the mouse cursor on it. The most important Menu orders can be handled via Graph toolbar.



Common values range

In case of tile records arrangement it is possible to switch Y axes ranges either to independent values for each record or to one range according to the record with the highest amplitude.

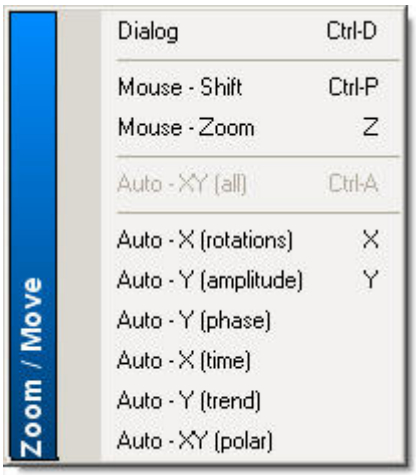
Grid

The command serves to show (hide) the grid in the graph. It can be selected separately for both axes.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Zoom / Move

The ***Zoom / Move*** command, that serves to set required axes scale, has its own extended submenu.



Dialog - is the most frequently used method to exactly set ranges of all axes in the graph. That can be called also by the ***Ctrl+D*** key combination. The command allows to define required scale in X and Y axes by the ***Zoom Setting*** window.
Mouse - Move - if the graph is zoomed, the zoom can be moved simply in graph in the X direction by mouse. The abbreviated selection is by ***Ctrl+P***.
Mouse - ZOOM - is faster method of zoom defining than by the ***Dialog*** command. By the mouse you can define the rectangle of the new zoom in the graph. The procedure is following: Place the cursor on any point of required rectangle, press the left mouse button and by mouse moving define the opposite rectangle point. You can define zoom this way without using the local menu command by the ***Z*** key.
Auto XY, X, Y - all commands serve for automatic scaling.

View format

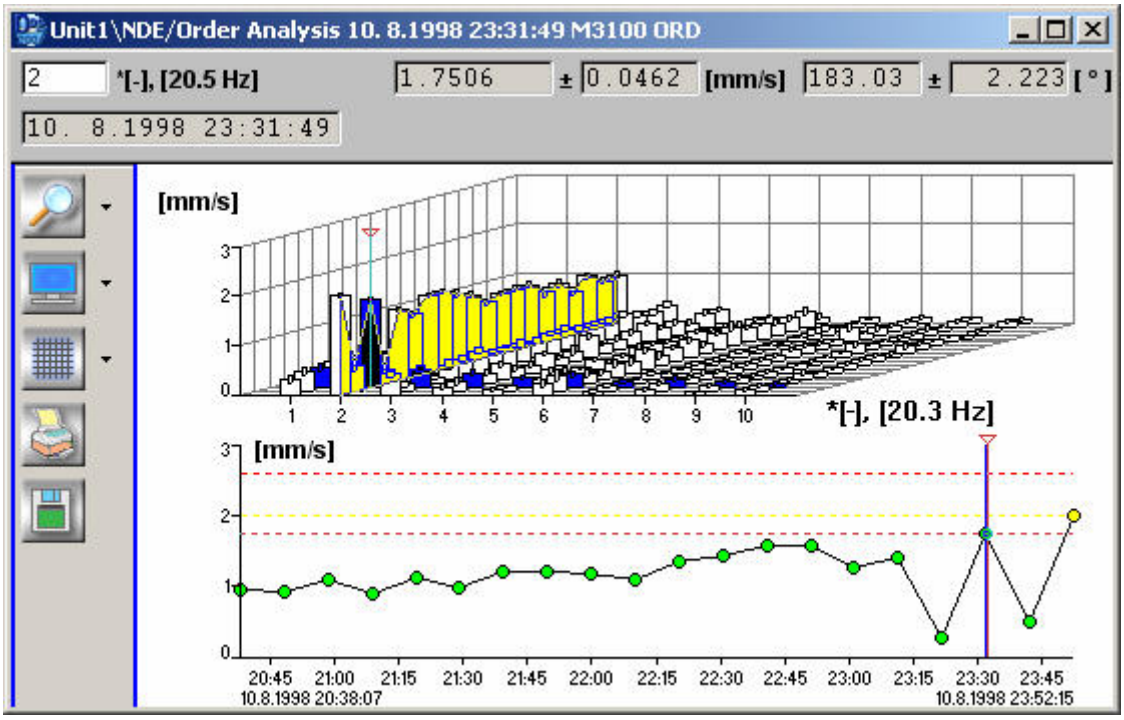
By this command, it is possible to switch format of displaying selected records. When ***Simple*** is selected only the active record is displayed and ***Up/Down*** arrows can provide switch in previously selected set of records.
Tile displays all selected records at one time. In one window maximum of 8 records can be simultaneously displayed. If there is more records selected, it is possible to browse in record set by ***PgUp, PgDn*** keys. One record is marked with a blue arrow. This record is so-called active and all operations provided on it are automatically provided on all other records (e.g. zoom, axes changes, cursors e.t.c.). Pointing by mouse at the newly required record can provide change of the activation. The advantage of the tile arrangement is also in possibility of collective cursor values scanning from all displayed records

Displayed signal type

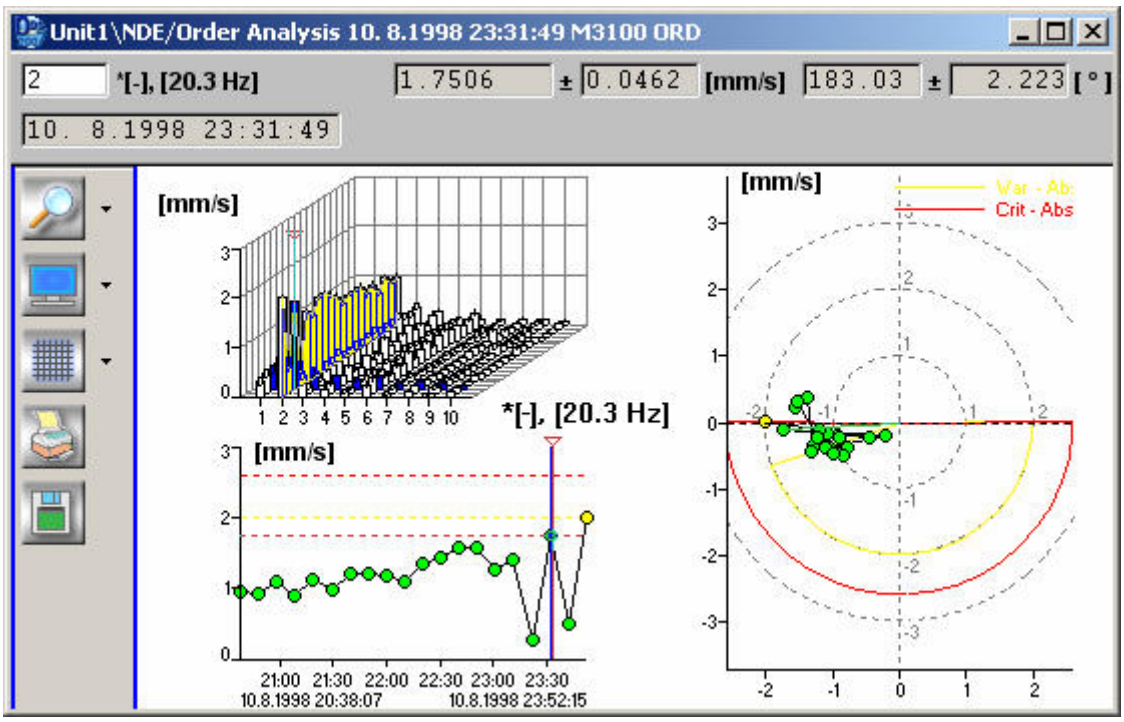
Similarly to spectra, it is possible in order analysis to use wide offer of various looks at data. As the offer is very similar to the spectra we refer to explanation in the ***Spectra*** chapter. Only some examples

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

of displaying are placed here.

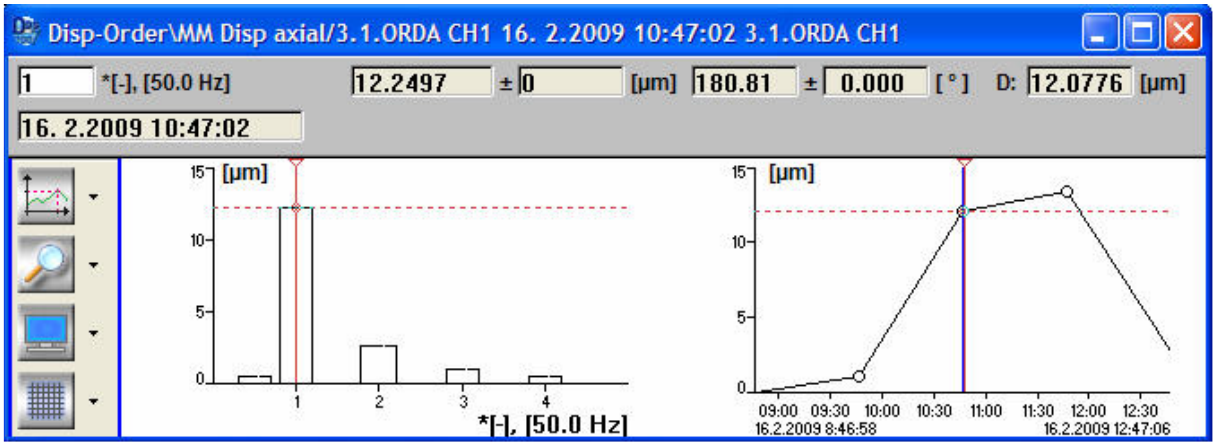


Information about rotation in cascade graph is always related to the active (blue colored) record.

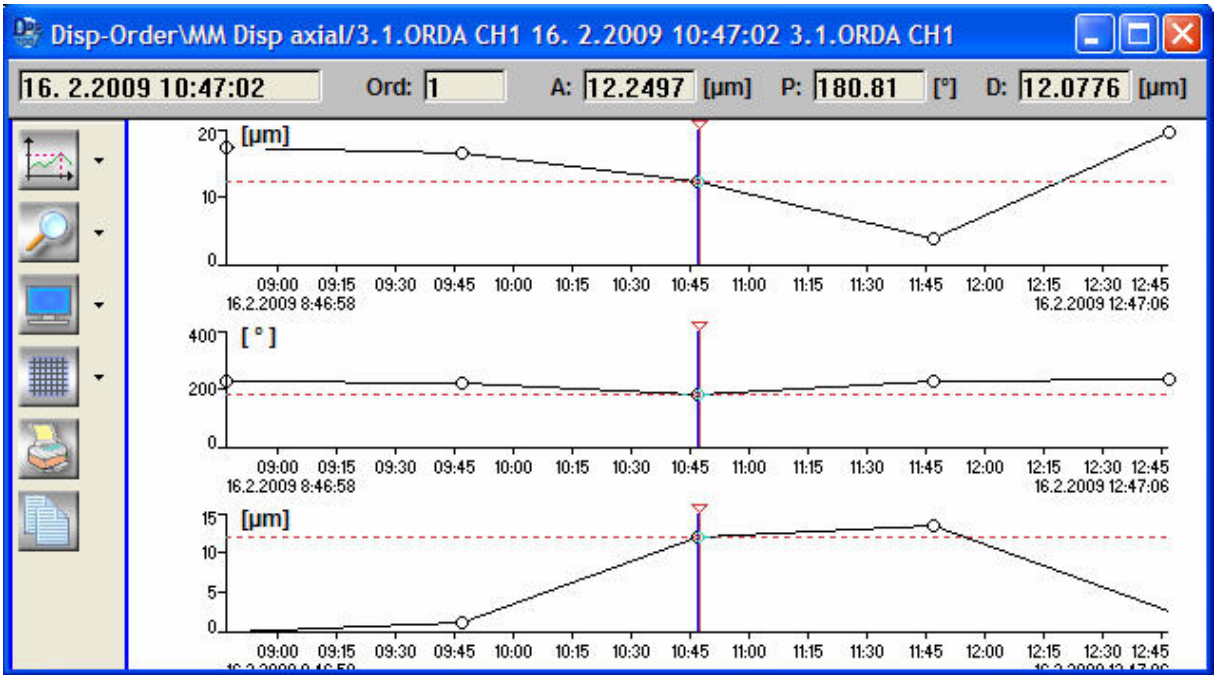


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Type Amplitude + Difference and type Trend Amplitude +Phase + Difference
Difference is distance from a point to reference point. In this case it indicates how the selected order divaricates from the value marked as reference (Edit data and check the value as “Reference”).
If simple cursor is not enabled graph uses Order 1. Value of difference is shown in the box named as D.



Amplitude + difference



Trend of Amplitude + Phase + Difference

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

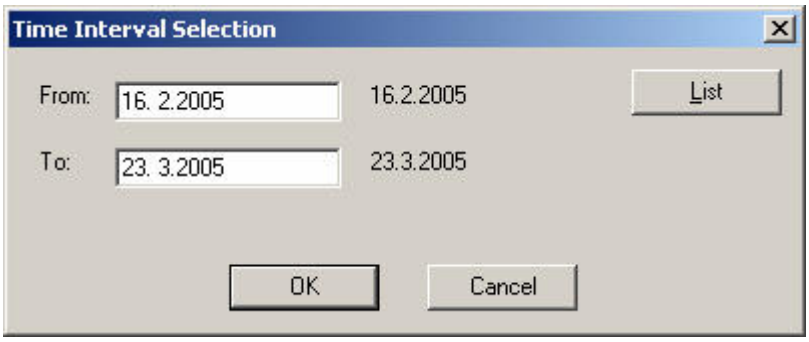
Cascade specification

The command serves to switch between signals drawing in cascade view.

Inclined view / Frontal view - two modes of viewing the cascade.
Last in front / First in front- order of records displayed.
Time proportional scale / Regular scale - method of viewing in ***Z-axis***.

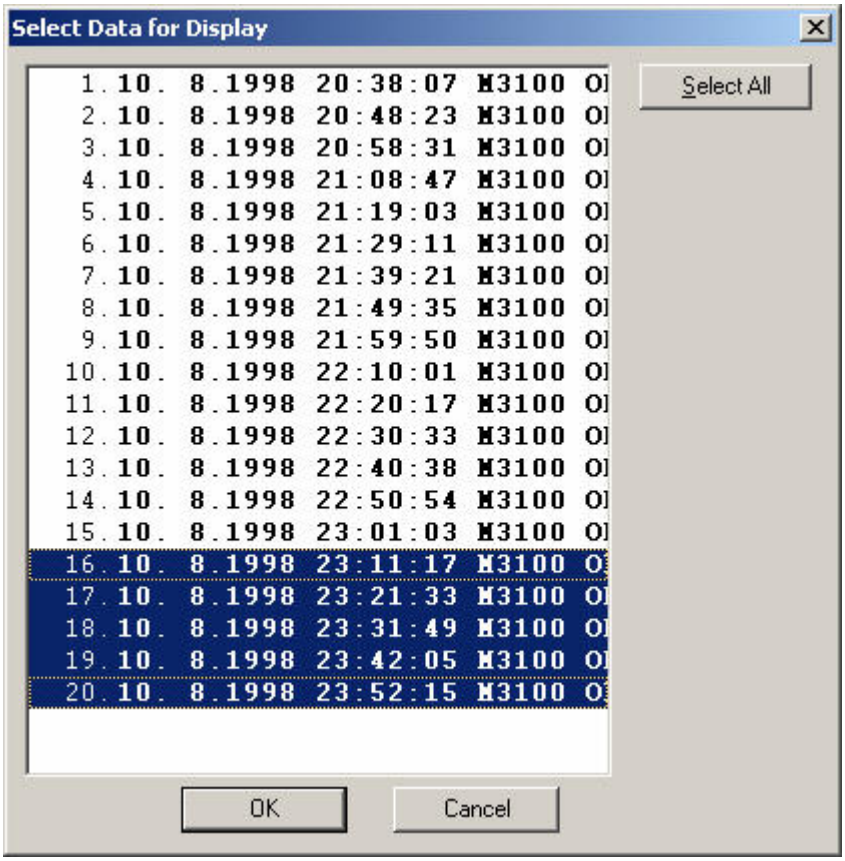
Records selection

Each data cell can contain a large data amount. When displaying of all the data is required, the system is too overloaded and drawing takes too much time. As a result, following way has been developed. From all data records selection of predefined number of records is provided (***Options - Dynamic Data Drawing - Initial record number***) and on this subset all drawing functions are provided. If there is necessity to evaluate any other records, it is necessary to provide a new selection by the ***Records selection*** command. After selecting the ***Record selection*** command the time interval can be defined. After confirmation by the ***OK*** button all records in this time interval will be selected.



If you want to do more detailed selection, press the ***List*** button. The following window contains the list of all data records stored in the data cell. Provide required data record selection and confirm it. Use standard Windows multiselection operations (arrows, PgUp, PgDn, Home, End, left mouse button with combination with ***Ctrl*** or ***Shift*** keys).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Print

Command to print graphs to the printer. Having selected this command the standard window for printer output appears.

Save to Clipboard as Bitmap

Content of the current window is stored to Windows system clipboard for using in other programs (e.g. MS-Word).

Editing order analysis data

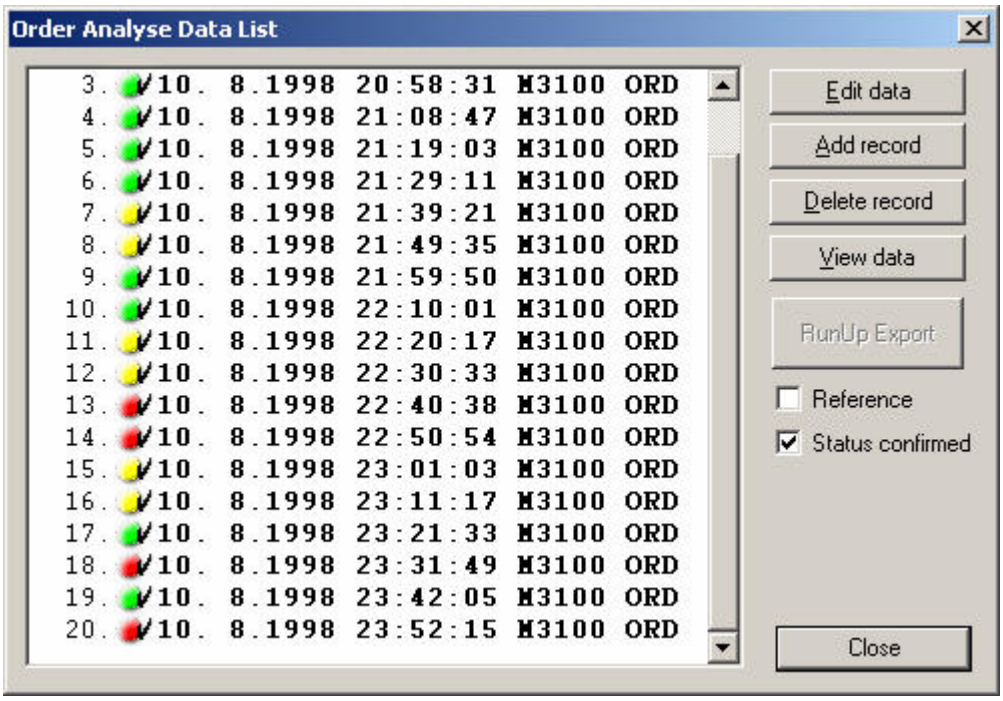
If the user needs to modify some data in record the Edit Data function there is prepared for this purpose. It is necessary to activate selected data cell and then open the local menu by the right mouse button.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Reference spectrum - one record can be defined as the reference record. By comparing with its shape the others records are evaluated.

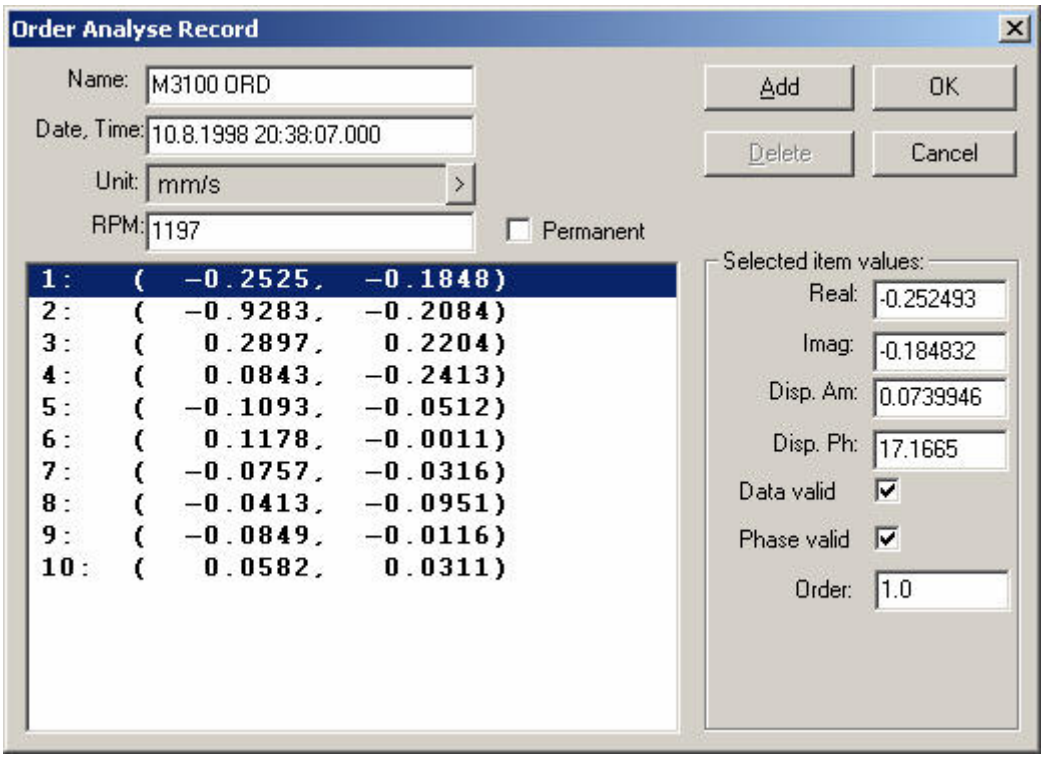
Status confirmed - if there have been provided provisions to removing alert or danger condition, the status can be confirmed. The future status will be evaluated from not confirmed records only.

Edit data - direct access to single sample values. By clearing the ***Data valid*** flag it is possible to mark such items that will not be drawn (it is not necessary to overwrite them). The measurement instrument generates the ***Phase valid*** flag when the phase calculation is statistically stable. It is usually not true for higher orders.
Add - a new record values of this should be filled in manually.
Delete - removing the record(s) from data cell.
View data - starting the view procedure.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

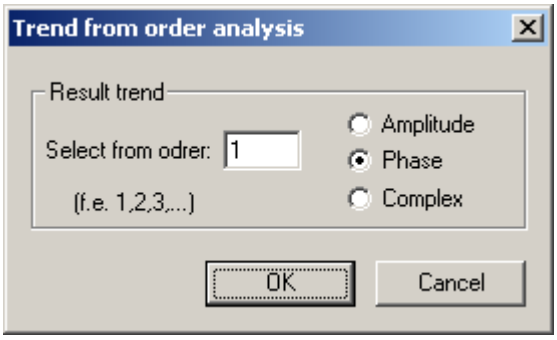
In the ***Selected item values*** field single data can be changed. By the ***Add*** button you can create a next order. By the ***Delete*** button you can delete the last order.



Creating Static Trend

Under menu item ***Create static trend*** it is possible to select order from which it is desired to separate amplitude, phase or both. This feature is useful when the dependencies of type rotation vs. order amplitude are needed. One can then use connecting cells to get this type of relation.

After selecting the menu item the dialog is showed where parameters (order and which component to extract) can be specified. After pressing OK the static data cell with name composed from original name and string ***" - EXTR"*** is created on the same tree level.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Frequency response

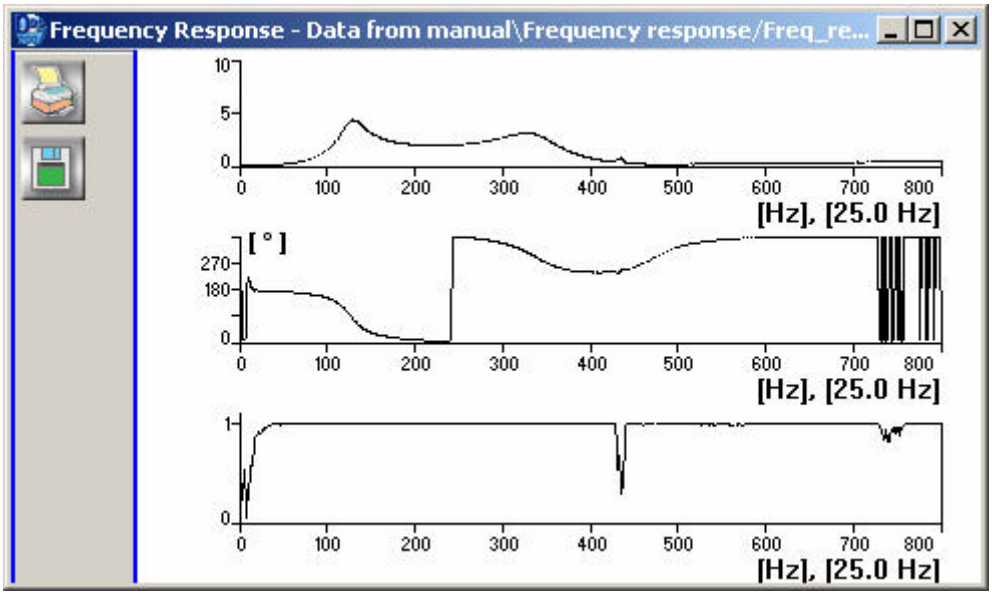
For frequency response measurement a measurement instrument is necessary with possibility to store signals to memory and to transfer them to the computer. For data transfer an appropriate interface is necessary. The list of all installed interfaces in your system can be looked over by the ***Tools - Connect Instrument*** main menu command.
Frequency response is stored in data cell of corresponding type, which can be connected to any tree element. Creating and configuring of a data cell is described in the ***Data Cells*** chapter.

Viewing of frequency response

Open a DDS tree up to the level containing a frequency response data cell. Now you have three possibilities to view signal in the data cell.
- by left mouse double-click on selected data cell,
- by activating the data cell and pressing the ***Enter*** key,
- by activating the data cell and using the ***Draw Data*** local menu command (right mouse button).

Now the frequency response record from this data cell appears on the screen.

This way we simply obtain the graph of the last measured frequency response that we are usually interested in. Each record can be displayed by various methods (the ***Displayed Signal Type*** local menu command).

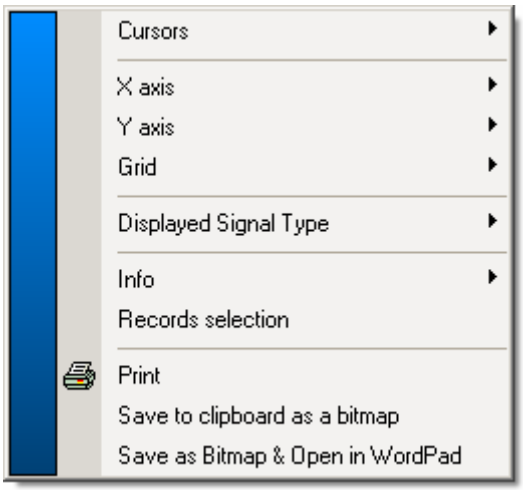


Local menu

If you press the right mouse button in the window with frequency response, the local menu command appears. In the local menu only these commands are enabled that are executable in the current time.

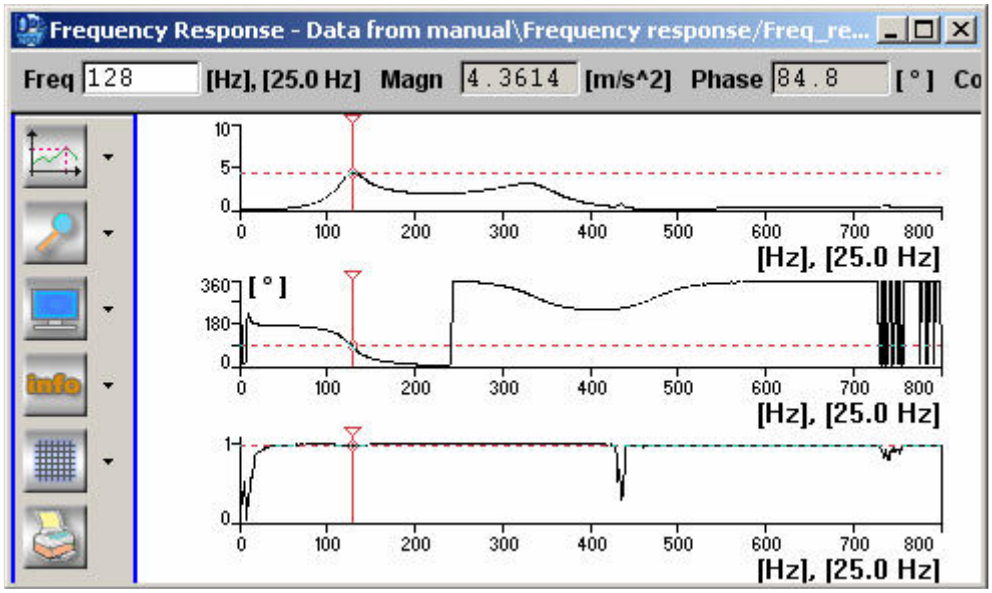
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Some menu items contain further submenu. These items are marked with arrow. The submenu itself is open if you place the mouse cursor on it. The local menu is available in the first subgraph.



Cursors

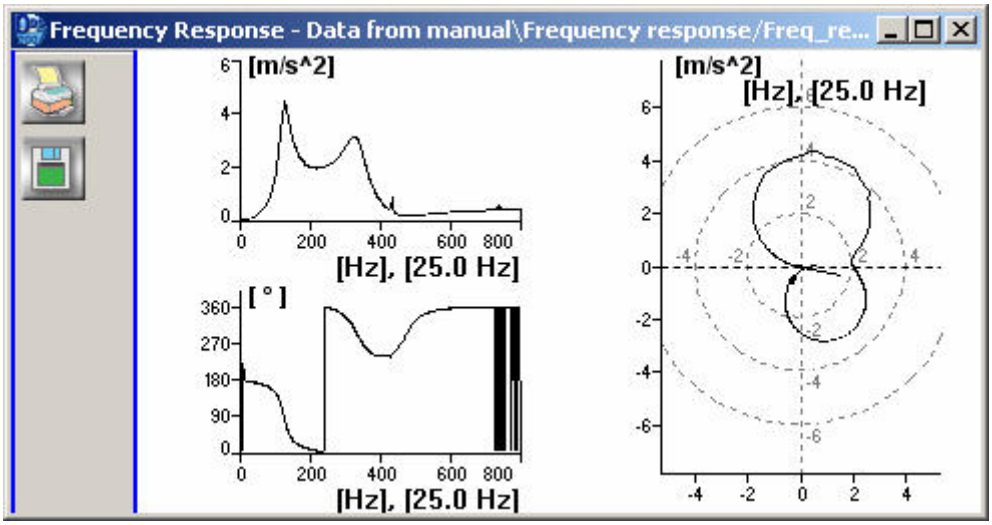
Simple cursor - when the simple cursor is switched on, it is possible to scan real, imaginary, magnitude, phase and coherence values of separate record samples, depending on displayed signal type.



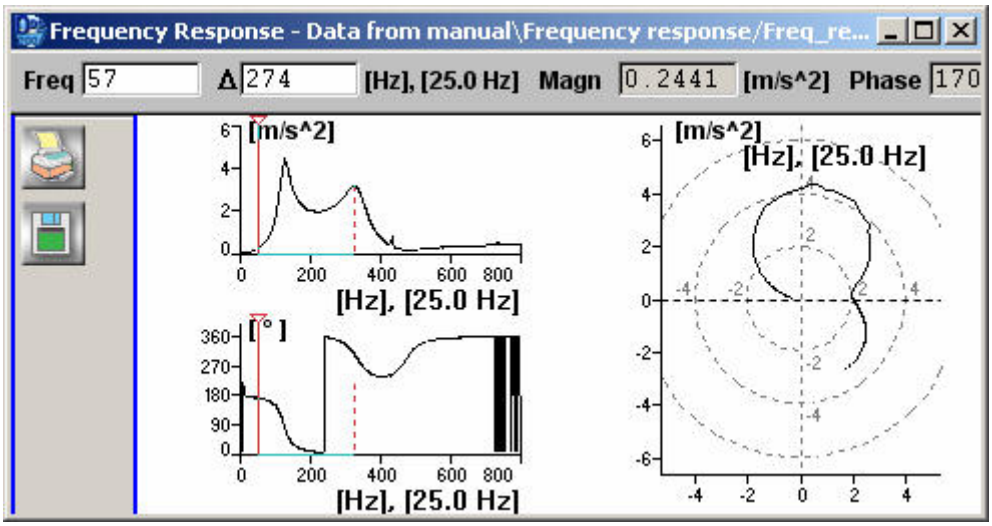
Delta cursor – this type of cursor has sense only for Nyquist displayed signal type. It determines range of displayed data in Nyquist graph.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Nyquist graph with delta cursor OFF



Nyquist graph with delta cursor ON



Y axis

This command serves to set up ***Y-axis*** properties.

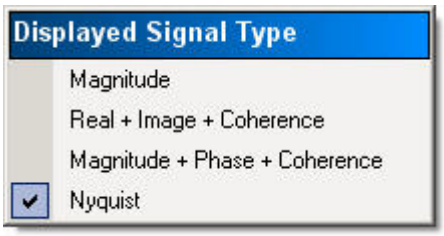
Separate for Each record - in case of multiple display (more graphs in one window) different ***Y***-axes properties can be set for each graph.
Common for All records - in case of multiple display all ***Y***-axes have the same properties. This option is enabled only if the physical unit is the same for all records.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Grid

The command serves to show (hide) the grid in the graph. It can be selected separately for both axes.

Type of the Displayed Process



The ***Magnitude*** type of display enables to display magnitude of frequency response.
The ***Magnitude + Phase + Coherence*** type of display enables to display these three parts in one graph.
The ***Real + Image + Coherence*** type of display enables to display these three parts in one graph.
The ***Nyquist*** type of display enables to display magnitude and phase including Nyquist graph in complex plane. This display type supports delta cursor, from which range the Nyquist graph is drawn.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

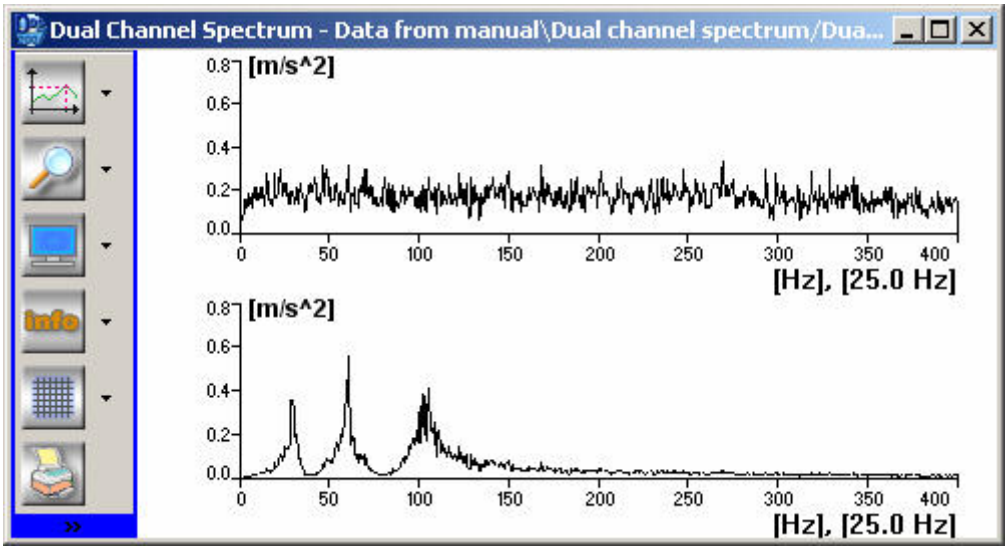
Dual channel spectrum

For dual channel spectrum measurement a measurement instrument is necessary with possibility to store signals to memory and to transfer them to the computer. For data transfer an appropriate interface is necessary. The list of all installed interfaces in your system can be looked over by the ***Tools - Connect Instrument*** main menu command.
Dual channel spectrum is stored in data cell of corresponding type, which can be connected to any tree element. Creating and configuring of a data cell is described in the ***Data Cells*** chapter.

Viewing of dual channel spectrum

Open a DDS tree up to the level containing a dual channel spectrum data cell. Now you have three possibilities to view signal in the data cell.
- by left mouse double-click on selected data cell,
- by activating the data cell and pressing the ***Enter*** key,
- by activating the data cell and using the ***Draw Data*** local menu command (right mouse button).

Now the dual channel spectrum record from this data cell appears on the screen.

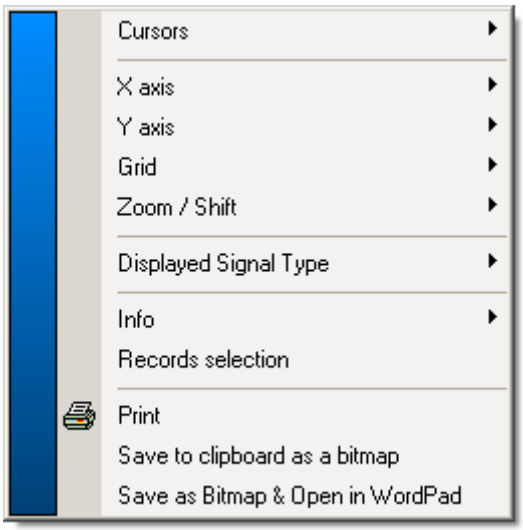


This way we simply obtain the graph of the dual channel spectrum that we are interested in.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

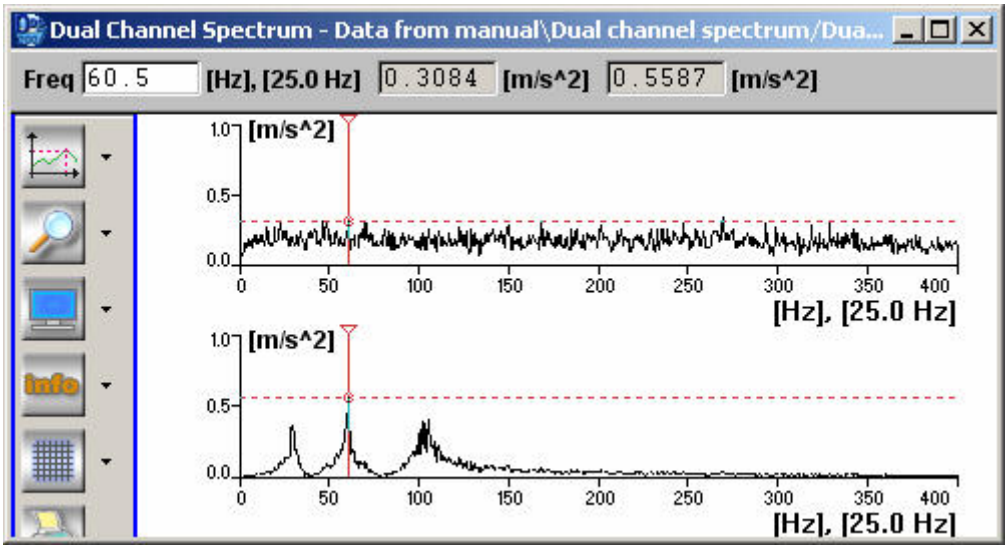
Local menu

If you press the right mouse button in the window with dual channel spectrum, the local menu appears. In the local menu only these commands are enabled that are executable in the current time. Some menu items contain further submenu. These items are marked with arrow. The submenu itself is open if you place the mouse cursor on it. The local menu is available in the first subgraph.



Cursors

Simple cursor - when the simple cursor is switched on, it is possible to scan real, imaginary, magnitude, phase and coherence values of separate record samples, depending on displayed signal type.



Harmonic cursor - serves to scan magnitudes on the main frequency and on its multiples (harmonic components), which are marked with a number. Cursor movement is done the same way as the simple cursor, but with possibility of fine movement. The description of fine movement is in separate

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

paragraph of the ***Spectra*** chapter. To switch the harmonic cursor on or off also the ***H*** key can be used.

Sideband cursor - allows the main cursor definition (i.e. the central frequency) and side bands. The main cursor position can be modified the same way as the simple cursor. The fine main cursor movement is possible as well. Distances of side cursor can be changed by mouse (by grasping any of them) or directly in the ***delta (Δ)*** field. In the magnitude fields, the amplitude value at main cursor position is displayed. To switch the cursor on or off you can use the ***S*** key.

Delta cursor - is a band cursor scanning RMS wide band value with possibilities to define its position and width. The position can be defined the same way as in case of the simple cursor. The bandwidth can be defined by mouse or directly in the ***Δ*** *field.* In the magnitude fields the RMS wide band value is displayed. The ***D*** key can be used to switch the cursor on or off.

Delta Max cursor - is a band cursor scanning the maximum value in the band. Its control is similar to the previous case. To switch it on or off the ***M*** key can be used.

Y axis

This command serves to set up ***Y-axis*** properties.

Separate for Each record - in case of multiple display (more graphs in one window) different ***Y***-axes properties can be set for each graph.
Common for All records - in case of multiple display all ***Y***-axes have the same properties. This option is enabled only if the physical unit is the same for all records.

Grid

The command serves to show (hide) the grid in the graph. It can be selected separately for both axes.

Type of the Displayed Process

The ***Magnitude*** type of display enables to display magnitude of frequency response.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

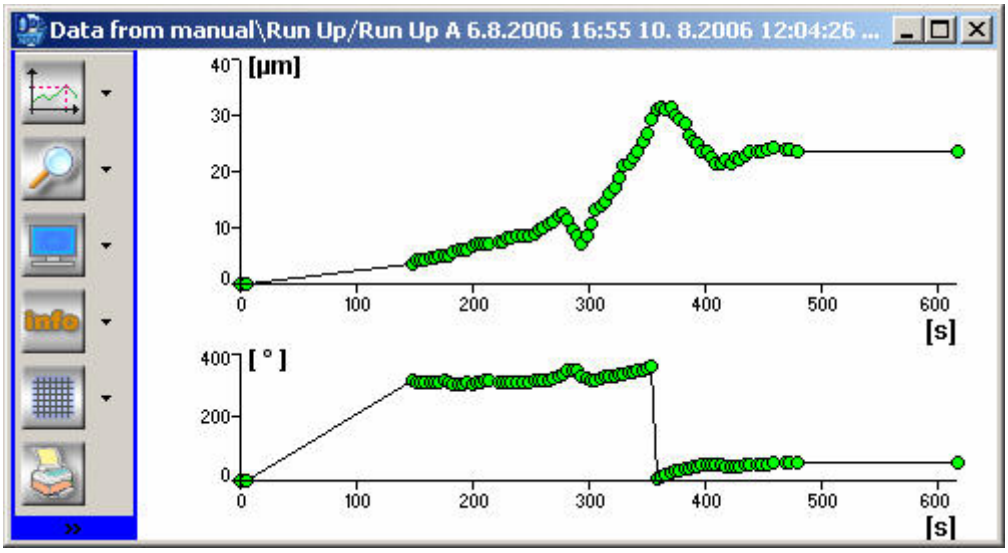
Run-up

For run-up measurement a measurement instrument is necessary with possibility to store signals to memory and to transfer them to the computer. For data transfer an appropriate interface is necessary. The list of all installed interfaces in your system can be looked over by the ***Tools - Connect Instrument*** main menu command.
Run-up is stored in data cell of corresponding type, which can be connected to any tree element. Creating and configuring of a data cell is described in the ***Data Cells*** chapter.

Viewing of run-up

Open a DDS tree up to the level containing a runup data cell. Now you have three possibilities to view signal in the data cell.
- by left mouse double-click on selected data cell,
- by activating the data cell and pressing the ***Enter*** key,
- by activating the data cell and using the ***Draw Data*** local menu command (right mouse button).

Now the run-up record from this data cell appears on the screen.

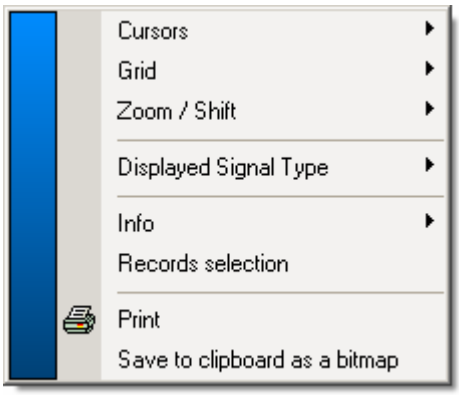


This way we simply obtain the graph of the last measured run-up that we are usually interested in. Each record can be displayed by various methods (the ***Displayed Signal Type*** local menu command).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

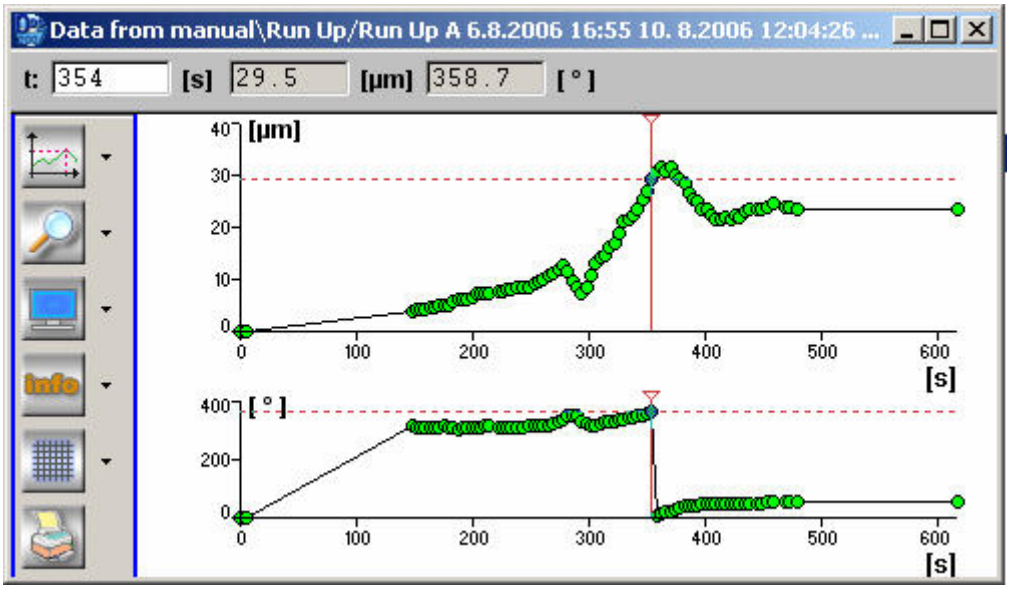
Local menu

If you press the right mouse button in the window with run-up, the local menu appears. In the local menu only these commands are enabled that are executable in current time. Some menu items contain further submenu. These items are marked with arrow. The submenu itself is open if you place the mouse cursor on it. The local menu is available in the first subgraph.



Cursors

Simple cursor - when the simple cursor is switched on it is possible to scan amplitude and phase values of separate record samples, depending on displayed signal type.

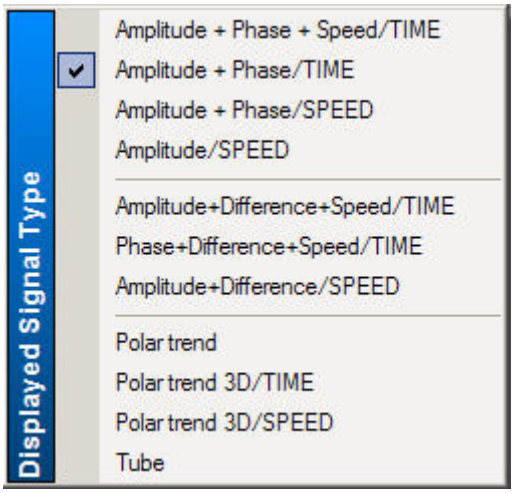


Grid

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

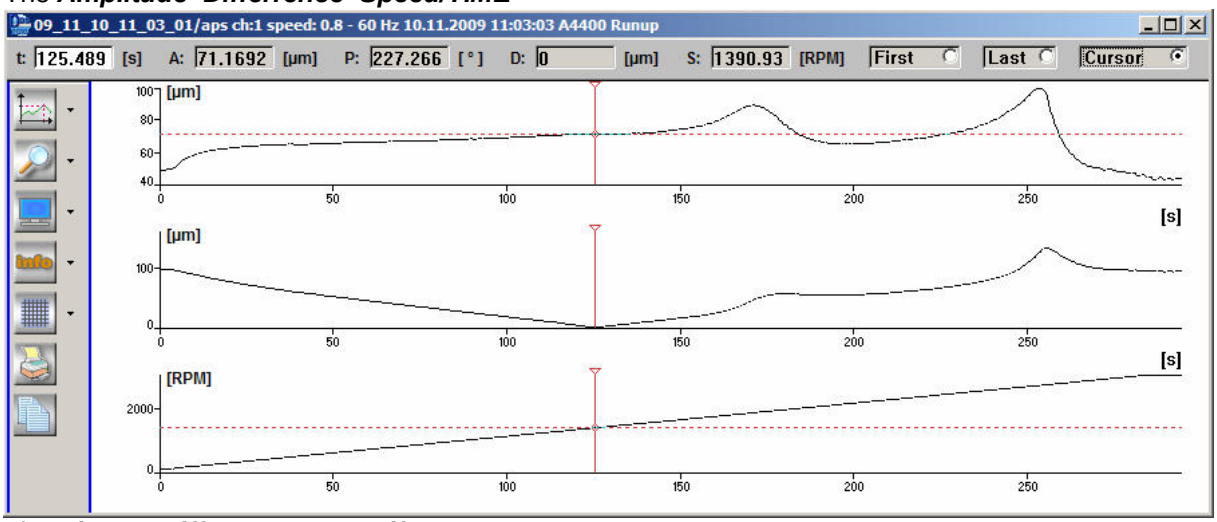
The command serves to show (hide) the grid in the graph. It can be selected separately for both axes.

Type of the Displayed Process



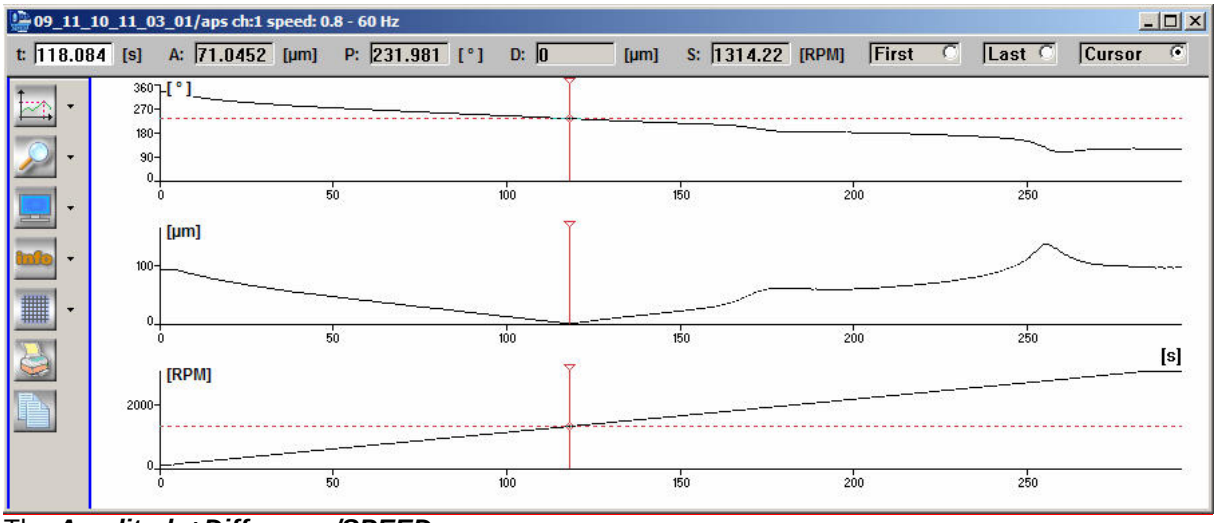
The ***Amplitude+Phase+Speed /TIME*** displays phase, amplitude and run-up rotation speed on X axis.
The ***Amplitude + Phase/TIME*** type of display enables to display magnitude and phase with time on axe X.
The ***Amplitude + Phase/SPEED*** type of display enables to display magnitude and phase with speed on axe X.
The ***Amplitude/SPEED*** type of display enables to display amplitude of run-up.

The ***Amplitude+Differrence+Speed/TIME***



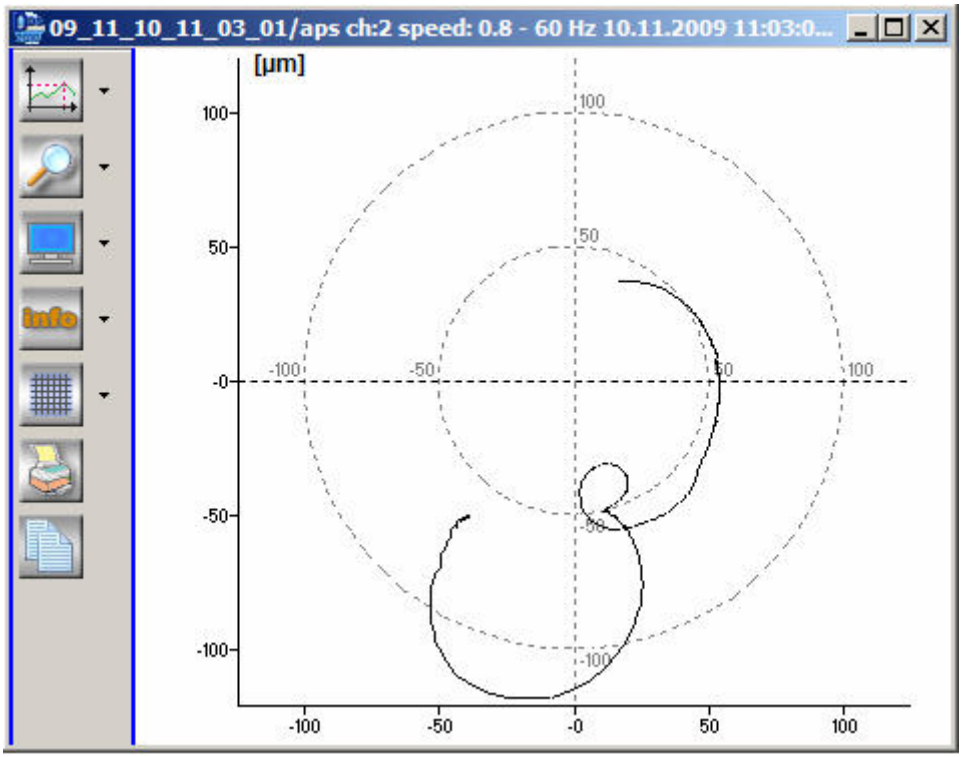
The ***Phase+ Differrence+Speed/TIME***

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



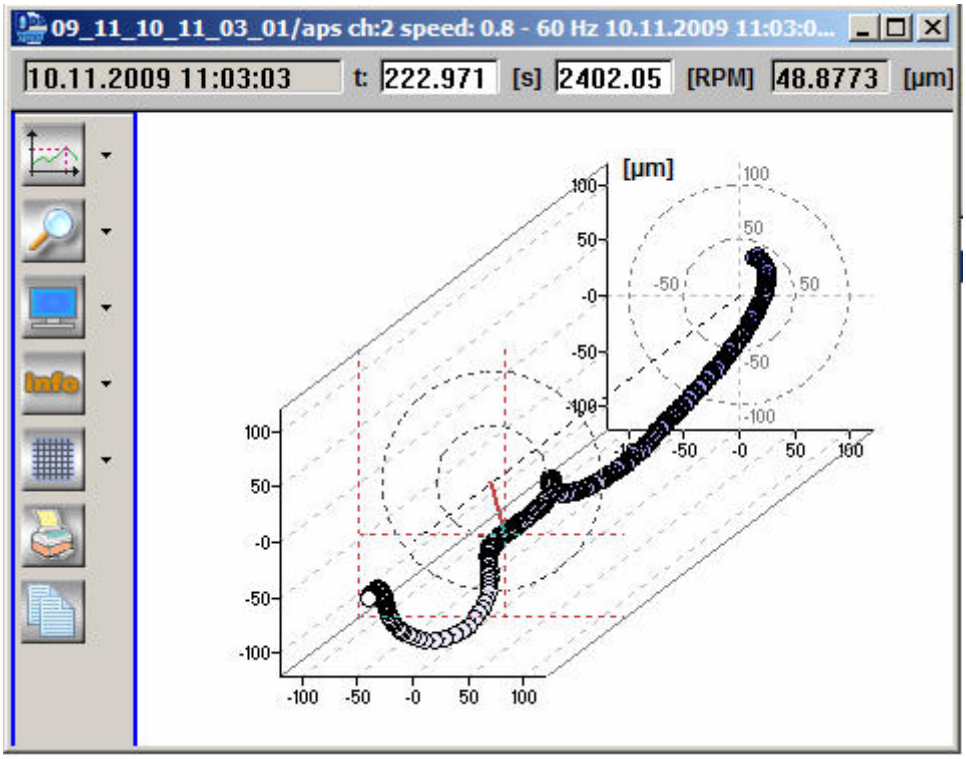
The ***Amplitude+Difference/SPEED***

The ***Polar Trend***

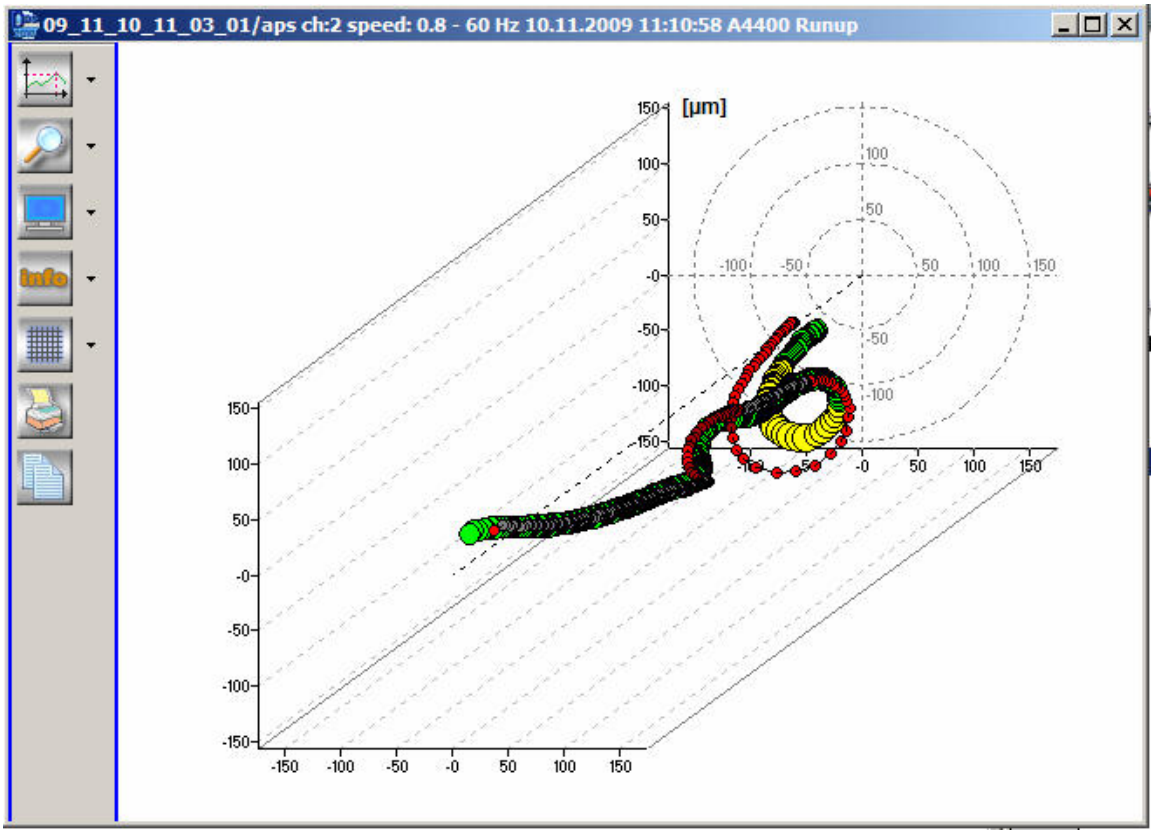


The ***Polar Trend 3D/TIME***
The ***Polar Trend 3D/SPEED***

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



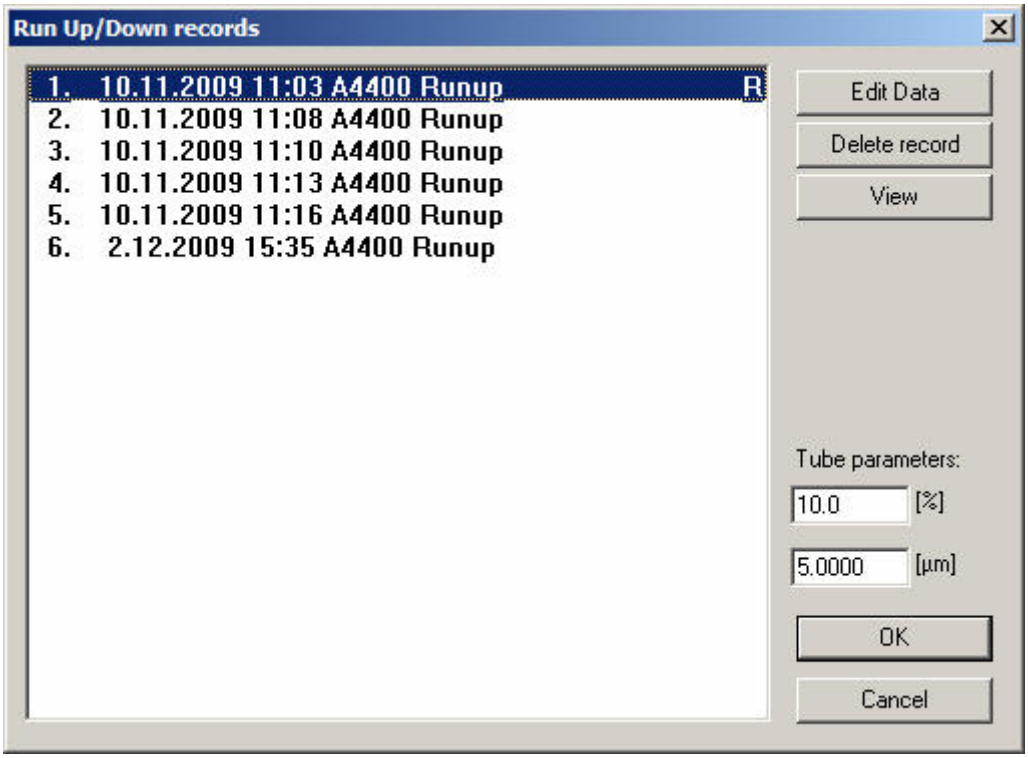
The ***Tube***



Tube – Green (ABS) / Yellow(REL)
Descr – Gray (inside of tube), Red (outside of tube -> Light = Viewable, Dark = Behind the tube)

Setting the tube parameters is available in “Edit data” menu on the data cell.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Processing of Data from MMS 6850

The protection system EPRO MMS 6000 can be used for monitoring and diagnostic purposes. Measured data are processed by the MMS 6850 monitoring system. This system consists of several programs. One of them is MMS 6850 DS, which is identical to the DDS 2010 program, whose manual you are now reading. There are several special types of measurements that were not described in the manual yet to monitor turbine generators. Their explanations are contained in this chapter.

MMS 6000 System Modules

The MMS 6000 system consists of individual measurement cards of different types:

Most cards enable to read time records from both channels.

MMS 6110 Two channel monitor of relative shaft displacement. It can work in the regime of two independent (separate) measurement channels (S_{0P} or S_{PP}), or it can evaluate one characteristic value (S_{max} or $S_{PP\ max}$) from both channels together. It measures displacement, the measurement units are µm.

MMS 6120 Two channel monitor of absolute bearing vibration. It always works in the regime of two independent (separate) measurement channels (V_{RMS} or S_{0P} or S_{PP}). It can measure displacement (S_{0P} or S_{PP}), the measurement units are µm, or speed (V_{RMS}), the measurement units are mm/s.

MMS 6125 Two channel monitor of absolute bearing vibrations for piezoelectric acceleration or velocity sensors. It always works in the regime of two independent (separate) measurement channels. With the acceleration sensor you can measure acceleration (a_{eff} or a_{0P}), the measurement unit is g, or velocity (V_{eff} or V_{0P}), the measurement units are mm/s. With the velocity sensor you can measure displacement (S_{eff} or S_{PP}), the measurement units are µm, or velocity (V_{eff} or V_{0P}), the measurement units are mm/s.

MMS 6140 Two channel rotor vibration monitor to determine absolute vibration of the rotor. While the first card channel connects to a standard contactless vibration displacement sensor, which measures relative displacement of a rotor, the second card channel usually connects to a piezoelectric vibration velocity sensor that measures absolute bearing stand vibration. The card calculates differences between both channel signals (the second channel signal is integrated first) and based on the difference the absolute rotor vibration is determined. It measures displacement (S_{0P} or S_{PP}), the measurement units are µm.

MMS 6210 Two channel monitor of static displacements for position measurements. It measures displacement, the measurement units are mm.

MMS 6220 The channel monitor of motor eccentricity. It measures displacement (S_{0P} or S_{PP}), the measurement units are µm.

Remark Unless specified otherwise, vibration or position sensors on principle eddy current are connected to the card.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Types of Measurements Offered by MMS 6000

Individual cards of the MMS 6000 system provide several measurements. The most common types are specified in the following list. Not all measurements are available on all cards. Their availability depends on the card type, its setting and even on a state of monitored equipment (for example on its actual revolutions).

Time Time signal, its unit is the same as for the **Value** measurement.

Value Static value, its unit is given by a type of measured value (displacement in µm or mm, velocity in mm/s and acceleration in g). According to the card setting two values are available (one per channel 1 and 2), or one value **Smax** (see the description further).

Speed Measurement of revolutions, whose units are RPM (revolutions/min). This measurement is not available on all cards.

Gap Unidirectional component of measured signal, its unit is the same as for the **Value** measurement. The measured value represents a medium average position of an object (e.g. shaft) in relation to a vibration sensor. This measurement is not available on all cards.

Nx Amplitude Group of measurements **Na** to **Ne Amplitude** represents amplitudes on selected orders, the unit is the same as for the **Value** measurement. Assignment of orders to the **Na** to **Ne** measurements is done during a card setting.

Nx Phase Group of measurements **Na** to **Ne Phase** represents phases on selected orders, units are angular degrees. Assignment of orders to the **Na** to **Ne** measurements is done during a card setting.

Remark The Speed, Value, Gap measurements and the individual Na to Ne Amplitude / Phase measurements are included under the common name **Stat** static measurements.

Derived Types of Measurements
The MMS 6850 monitoring system can put together the following types of measurements from the above shown types of measurements provided by the MMS 6000 system.

Orbit Two channel time recording – orbit. A condition for creation of this type of measurement on a selected card is that the card must offer two **Time** signals, one from the channel 1, one from the channel two, and then it must also offer the **Speed** measurement of revolutions.

Orda Order analysis. A condition for creation of this type of measurement on a selected card is that the card offers **Na** to **Ne Amplitude** / **Phase** groups of measurements on a selected channel, and then it must offer the **Speed** measurement of revolutions.

Aps Measurements of amplitudes and phases for a selected order. Usually this is a measurement on a revolution frequency, i.e. for the order 1. A condition for creation of this type of measurement on a selected card is that the card offers **Na** to **Ne Amplitude** / **Phase** groups of measurements on a selected channel, and then it must offer the **Speed** measurement of revolutions.

Centre Line This is a measurement of shaft position in a bearing during start up and stopping of a monitored machine. A condition for creation of this type of measurement on a selected card is that the card offers **Gap** measurement on both channels, and then it must offer the **Speed** measurement of revolutions.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Two Channel Measurements and Their Interpretation

Graphs **Orbit** and **Centre Line** require synchronous measurements from two sensors (on two channels). The result of the two channel measurement can be either oscillation of a shaft around the centre position in the **x-y** plane (Orbit measurement), or central position of the shaft in the **x-y** plane (Centre Line measurement).
In the following text we will describe, how:

- an **x-y** coordinate system is defined for the graph display of a two channel measurement,
- how to define the position of couple of sensors **A** and **B** in relation to this coordinate system,
- and how to recalculate measured values from the **A** and **B** sensors to the **x-y** coordinate system.

X-Y Coordinate system for Graphical Display

1. The result of a two channel measurement is a graph in an **x-y rectangular coordinate system**.
2. The orientation of **x** and **y** axes of the coordinate system is firmly determined and is constant.
3. All results of two channel measurements are shown in this coordinate system without regard to placement of **A** and **B** sensors.
4. Values measured by the **A** and **B** sensors must be recalculated to the **x-y** graph coordinate system before display.

For the graph display we have selected the standard x-y rectangular system, with positive x axis on the right and positive y axis in the up direction.

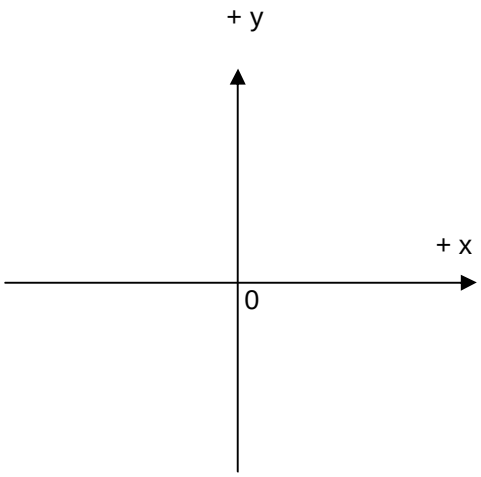


Fig. : **x-y** coordinate system for graphical display

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Definitions of Sensor Placement

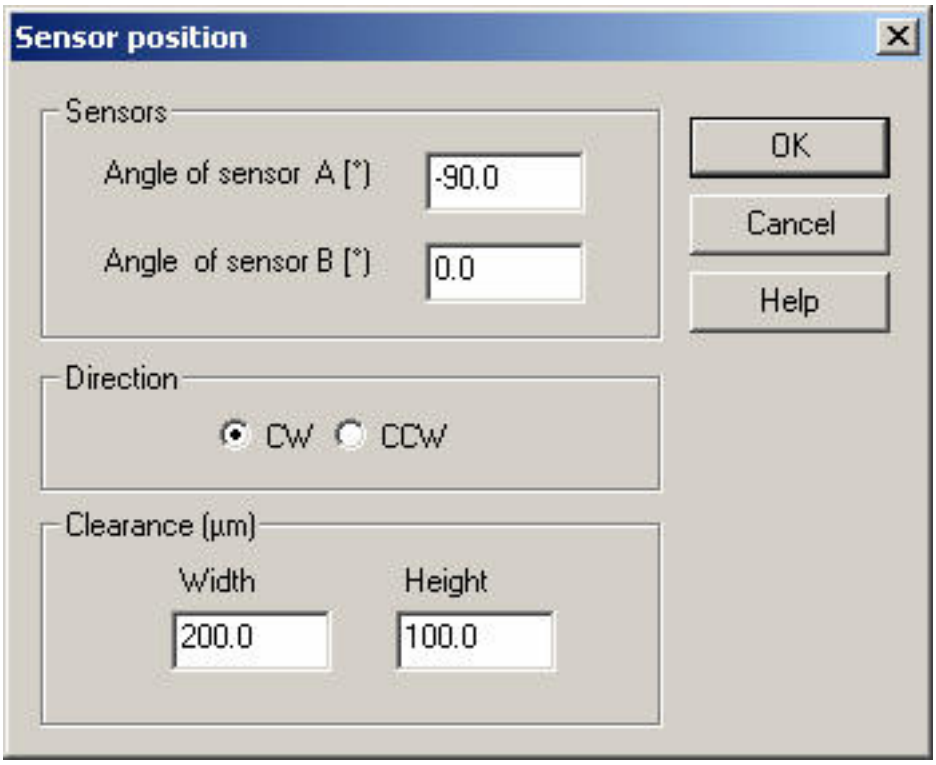
In order to display two channel (therefore two axis) data measurements, usage of two sensors, which we will mark **A** and **B**, is required. The markings **A** and **B** better correspond to connection to MMS 6000 cards, since consequent measured values are marked this way. Marking X and Y is sometimes used in other systems or standards (which is also confusing and misleading from the point of view of the axes of the displayed graph that are also marked **x-y**).

Displaying of the two channel measurement results is done quite generally, which means that:
- Order of **A** and **B** sensors in relation to a shaft turning direction is not important!
- A 90° angle between the **A** and **B** sensors is not strictly required in MMS 6850 DS !

The definition of each sensor position is independent for the other one's position, therefore the definition of each sensor is done only in relation to the **x-y** coordinate system.

In order to graphically process measured data it is also useful to know a direction of shaft rotation. Then it is possible to draw a direction of **Orbit** graph development. This direction is defined in our databases as **CW** (Clockwise) or **CCW** (Counter Clockwise).

The definition is usually done at a **Measurement Point** item (this ensures inheriting of this information). First activate a selected item, invoke a menu by the right mouse button, select **Edit item** and press **Sensor position**. The following window will appear:



Fill in requested information and press **OK**. After return to the **Tree Item** window do not forget to check the field **Use** next to the **Sensor Position** button.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Sensor Position Definition Convention

We need to keep the following conventions for the sensor position definition in relation to the **x-y** coordinate system:

1. We use displacement sensors that measure a distance of a measured object (e.g. shaft surface) from their surface, so the sensor surface represents the measured value of 0, and only positive distances can be measured (i.e. before the sensor surface, we cannot measure behind the sensor). Then the sensor placed in a positive x or y axis returns positive distances, which, however, represent negative values in the x or y coordinate and vice versa – see Fig. (thick arrow shows a positive direction of by sensor measured distance).
   In other words - we use contactless sensors that measure a distance of a monitored object (in this case a shaft). A larger value always means the larger distance between the sensor and the shaft without regard to the sensor position in thy x-y coordinate system.
2. The sensor position is unambiguously determined by its angle of turn in relation to the **x-y** coordinate system (sensor axis points to the **x-y** coordinate system origin).
3. A sensor with zero turn is placed on a positive axis **y**.
4. The positive direction of measuring of the sensor turn angle is in the clockwise direction.
5. The **φ** sensor turn angle must lie in the interval (-180°;+180°>, so φ > -180° and at the same time φ ≤ +180°.
6. The positive and negative sensor angle directions depend on the direction of view of a shaft. The convention is that **we always look from a high pressure part to a generator**. This means that the generator is the most distant.
7. The sensors cannot have the same turn angle.
8. The sensors must not be placed opposite to each other.

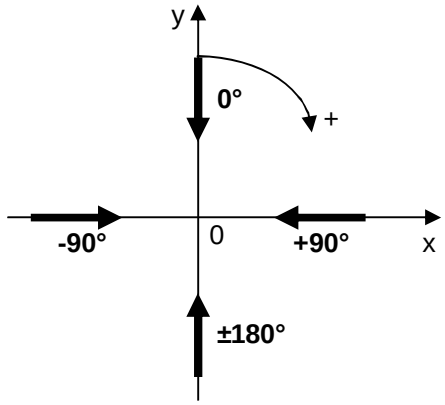
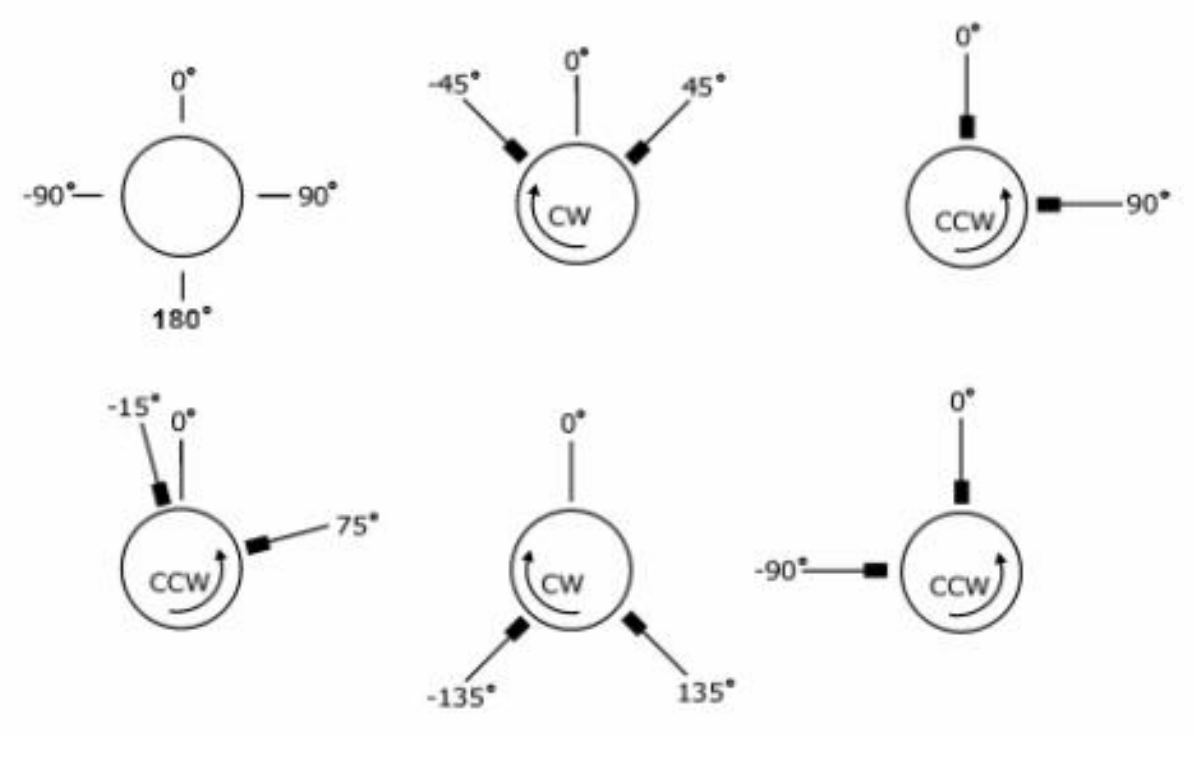


Fig. : Determination of sensor turn angle

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

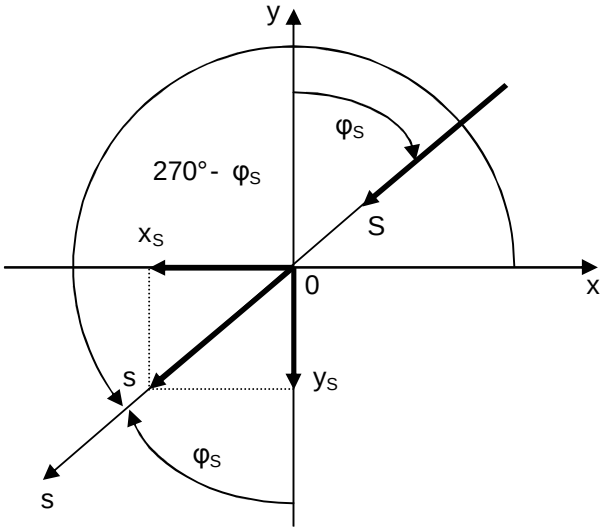
Examples of Sensor Placement



The picture shows examples of possible sensor placements. Practical and methodical conditions are not considered.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Recalculation of Sensor Value



The sensor **S** is placed in the I. quadrant of the **x-y** coordination system and it is turned by the angle **+φ_S**, which, in the sense of the above mentioned conventions, defines the axis **s** of the sensor. The value **s** measured by the sensor is broken down to axes **x** and **y** directions.

$$x_S = -s \cdot \sin \varphi_S$$

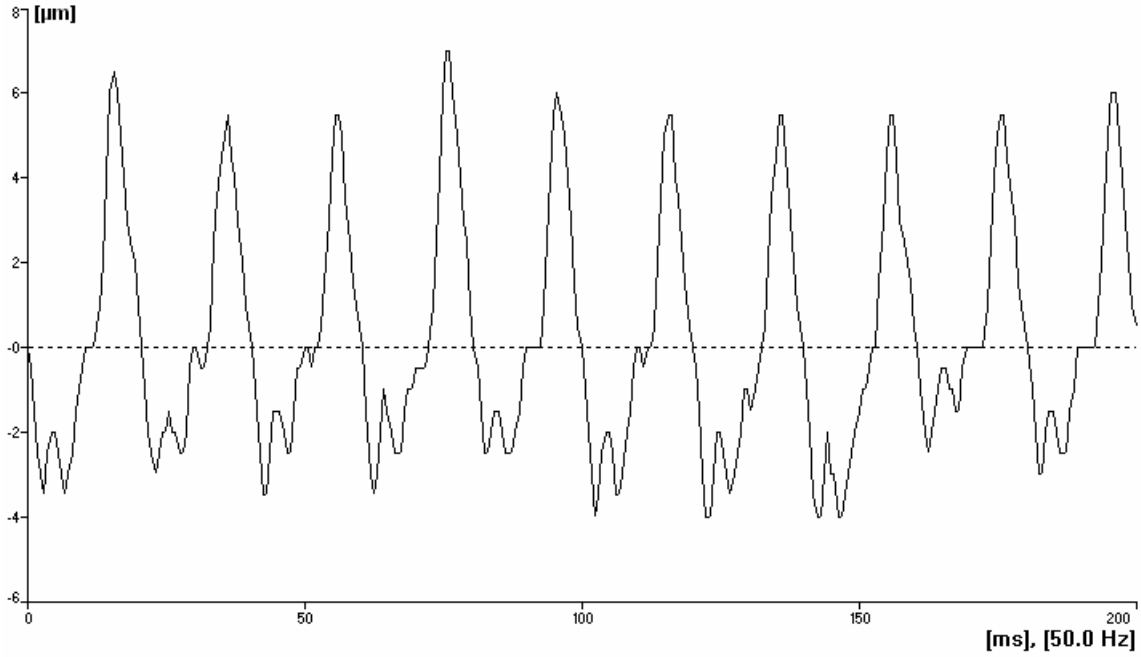
$$y_S = -s \cdot \cos \varphi_S$$

Fig. 3 Recalculation of sensor value

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Time Signal - Basis of All Measurement Types

Measured vibration signals are obtained from different types of vibration sensors. We primarily measure relative oscillations using contactless position sensors (in µm) and absolute oscillations (in mm/s). The sensors transfer the oscillating mechanical movement to alternating electrical current, which is measured and further processed by MMS 6000 measuring system cards. Each sensor has to have its sensitivity stated. For example the sensitivity of 8 mV/µm means that the displacement of 1 µm results in the change of the sensor output voltage of 8 mV. To measure absolute oscillations we usually use acceleration sensors with the sensitivity of 100 mV/g or 500 mV/g (g=9,81m/s^2). An input signal at an MMS 6000 measurement card is integrated in order to obtain speed signal in mm/s.



The picture shows the time signal from a contactless displacement sensor that represents a relative oscillation of a shaft at operational revolutions (3000 RPM = 50 Hz).
The description of work with time signals in shown in detail in the chapter **Time Records**.

Value

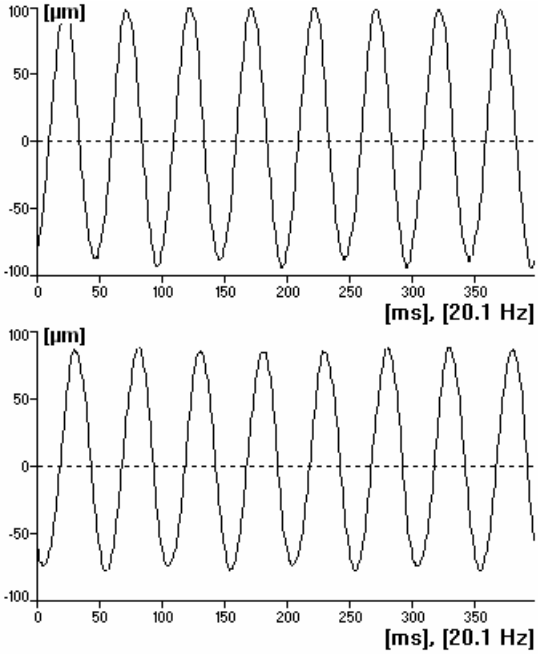
A time signal is used to calculate **Value** values, commonly marked **VAL A** and **VAL B** (A and B are input channels of MMS 6000 measurement card with connected sensors A and B). The cards, depending on their setting. enable calculation of different types of **Value** values.
In case of measurement of relative oscillation from two independent channels the **Value** equals either to $\mathbf{S_{0\text{-}P}}$ (0-Peak), or $\mathbf{S_{P\text{-}P}}$ (Peak-Peak). If only a single result from both channels represents **Smax** (see the chapter **Display of Orbit and Determination of $\mathbf{S_{max}}$** below), then it is either $\mathbf{Smax_{0\text{-}P}}$ (0-Peak), or $\mathbf{Smax_{P\text{-}P}}$ (Peak-Peak).
In case of measurement of absolute oscillations the **Value** can be either equal to $\mathbf{A_{RMS}}$ or $\mathbf{A_{0\text{-}P}}$ (RMS or peak values of oscillation acceleration), or $\mathbf{V_{RMS}}$ or $\mathbf{V_{0\text{-}P}}$ (RMS or peak values of oscillation velocity).

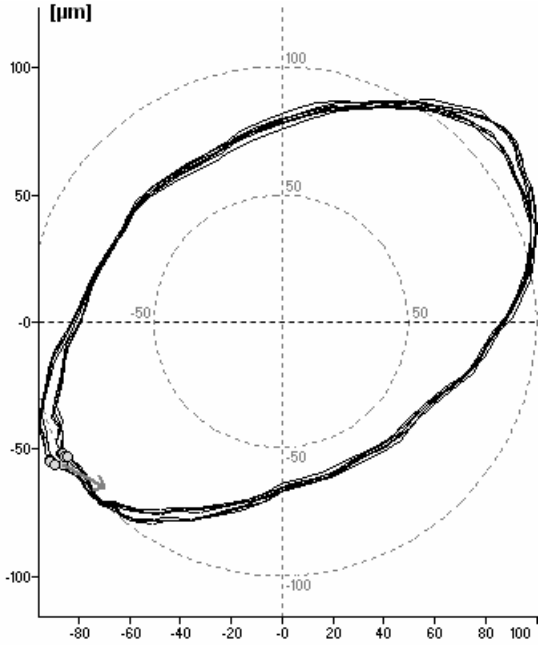
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

The Value oscillation parameter belongs to static data. Work with static data is described in the chapter **Static Data** in detail.

Displaying of Orbit and Determination of Smax

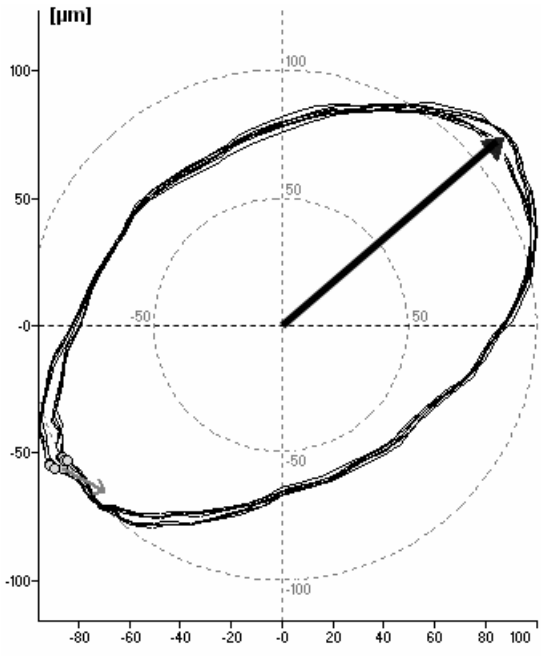
When we measure relative oscillation of a shaft, we measure signals from two sensors, which are at the right angle to each other - see the above chapter **Two Channel Measurements and Their Interpretation**. By compounding them together we can draw so called **Orbit** that can be interpreted as a movement of the shaft centre in a radial plane.



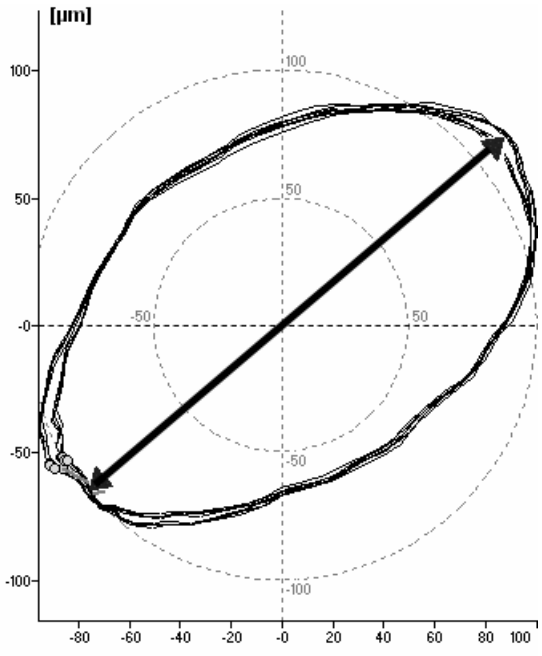


The **Smax** (see the above chapter **Value**) values are defined as the highest oscillations reached in a graph.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Smax 0-P



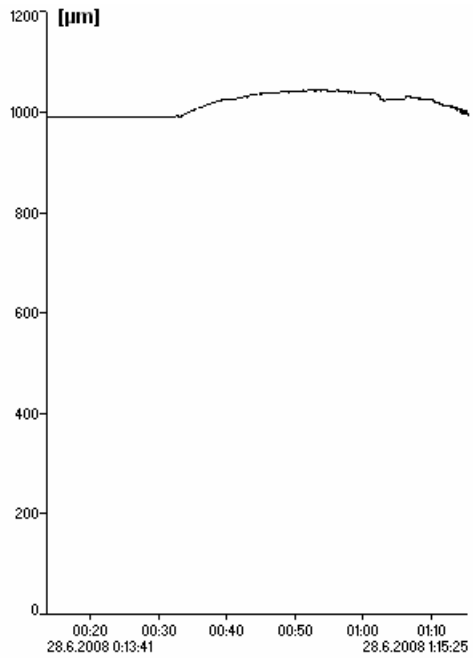
Smax P-P

The description of work with the orbit is shown in detail in the chapter **Time Records**.

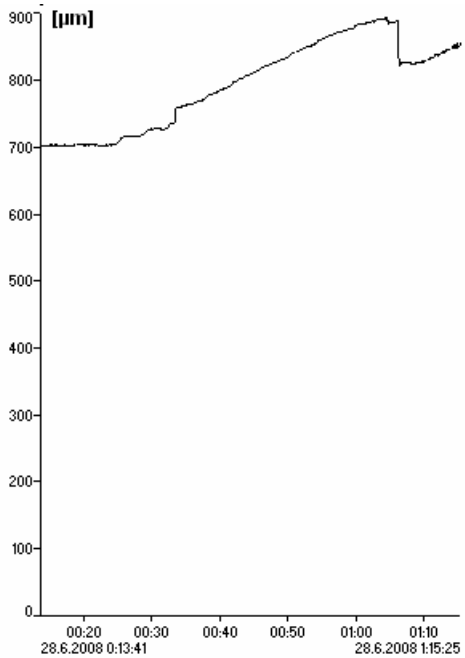
Gap

If you look again to the **Orbit** graphs, you will find out that a relative shaft movement is always drawn around the intersection of the axes (i.e. around the 0,0 coordinate). This apparent intersection has real coordinates inside of a bearing. It is useful for diagnostics if we know an actual bearing plane point, around which the shaft oscillates (i.e. creates an orbit). Since the displacement sensors are firmly connected to the bearing body, the actual position of the shaft in relation to the bearing can be found. It is handled by removing of the oscillating, i.e. alternating component from the time signal. What we have left is the actual stable stationary position of the shaft in the bearing (the shaft is oscillating around it). From the point of view of signal processing this is acquisition of a signal discrete component. The values usually marked **Gap A** and **Gap B** then represent stationary distances of the shaft from the sensors **A** and **B**.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

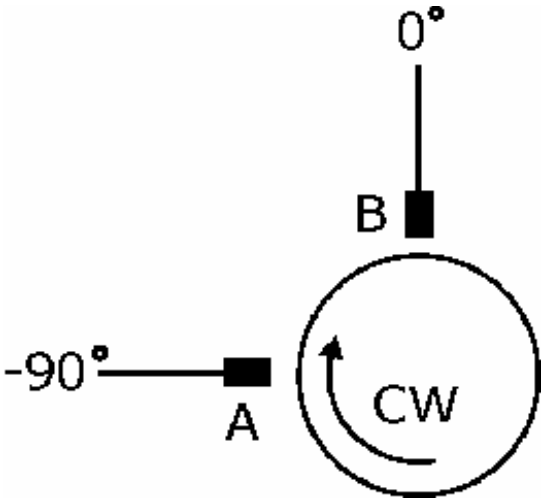


GAP A



GAP B

Data in the graph has been obtained during turbine coast down. The A and B sensors were installed thus:



During the coast down the distance from the sensor **A** remains relatively constant, while the distance from the sensor **B** increases with decreasing revolutions. This is a consequence of gradual sinking of the shaft in the bearing. (Note that the value Gap B that increases in the graph means that the shaft is becoming more distant from the B sensor, therefore in agreement with the picture sinks down.)

The **Gap** oscillation parameter belongs to static data. Work with static data is described in the chapter **Static Data** in detail.

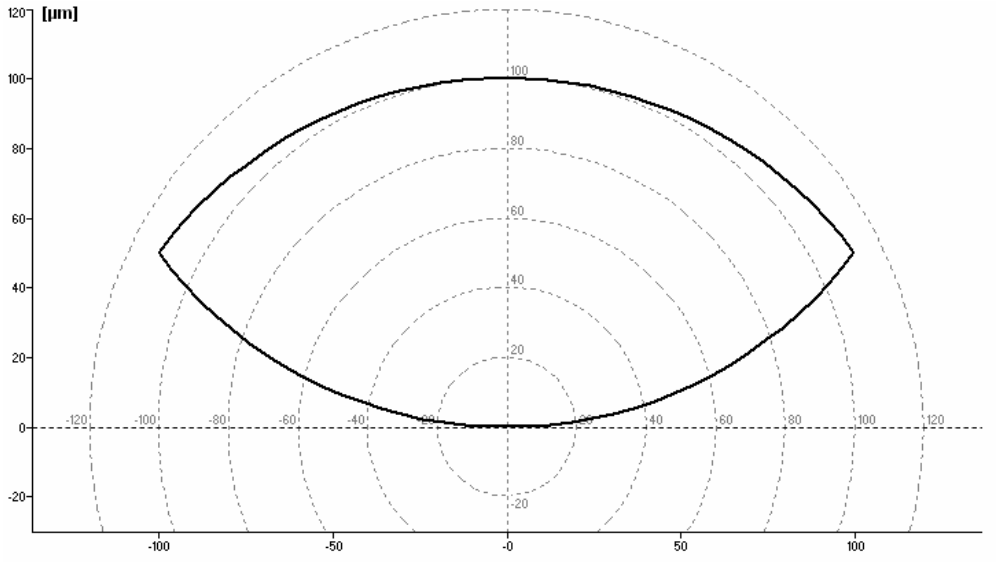
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Centre Line

The **Centre Line** graph represents the drawing of **Gap A** and **Gap B** values together into one graph. This displays a movement of the actual shaft position in the radial bearing plane. It is possible to display the simplified drawing of bearing itself in the graph for better clarity.

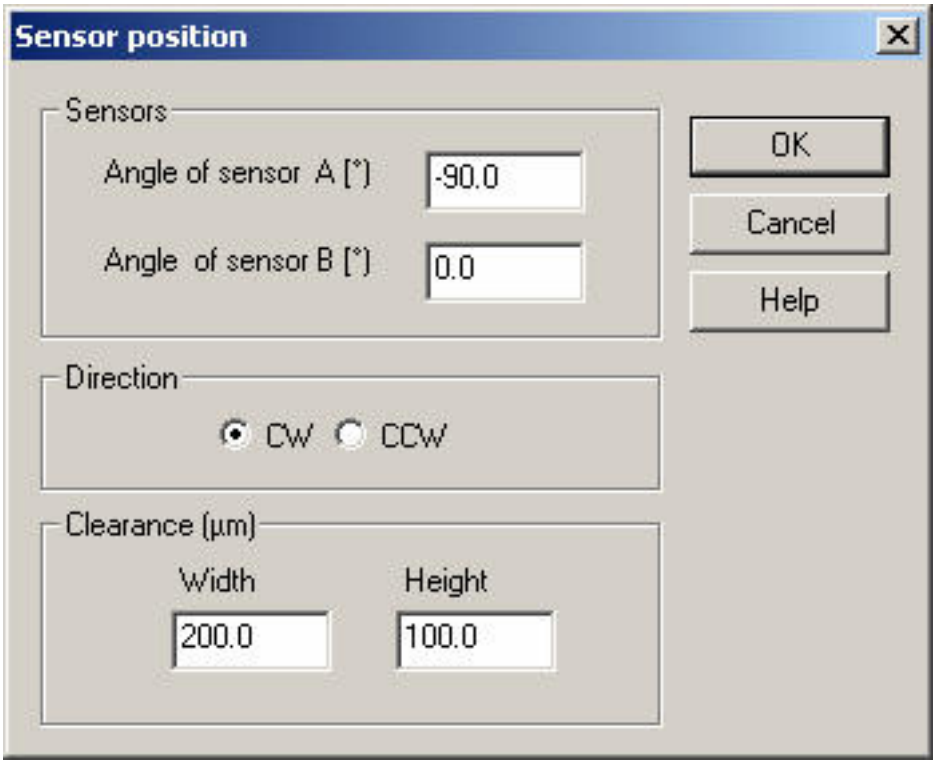
The graphical setting for correct explanation is done using:
- sensor direction definitions (described above in the chapter **Sensor Placement Definitions**),
- definition of apparent bearing size,
- definition of so called **Gap Refer** value.

Definition of Apparent Bearing Size



For clearer representation of the shaft position in the bearing we can place a mask of a bearing cylindrical shape in the graph. A user will define **Width** and **Height** of the cylinder surface. The setting is done in the same window as the setting of directions of sensor placements.

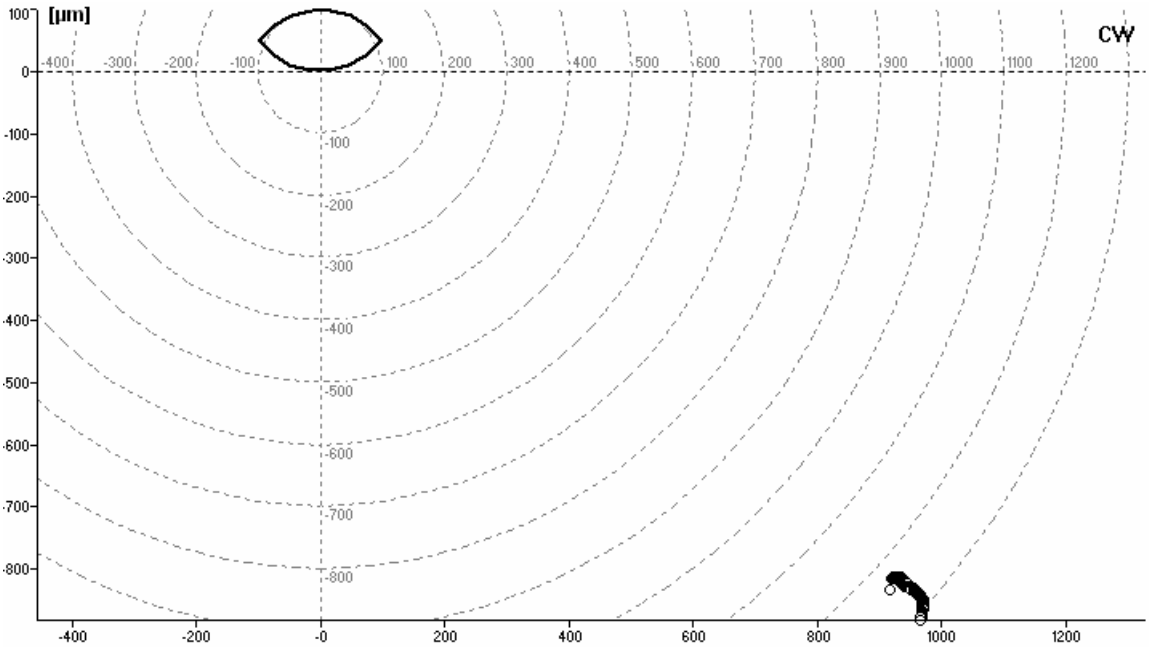
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



The values are set so, for example, during stopping of a turbine the shaft would sink from the cylinder centre to its bottom edge, in other words the set values Width and Height are related to the measurement values **Gap A** and **B**.

Definition of Gap Refer Position

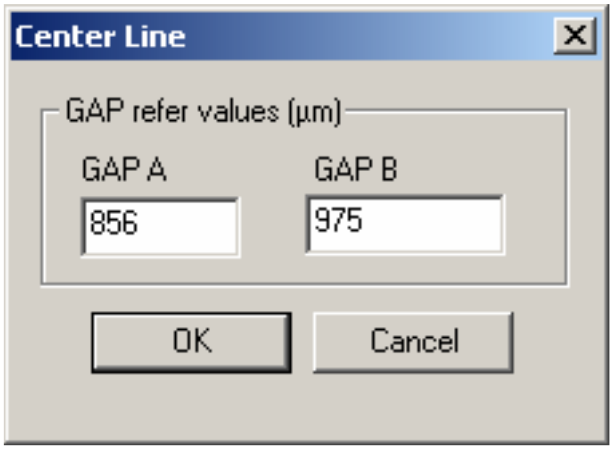
If we have, for example, measured coast down of a turbine, then the **Centre Line** graph looks like this.



In the position [0,0] is shown the shape of a bearing and at the bottom right the movement of the shaft

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

centre during stopping. This creates a justified request for shaft positions to be drawn inside of the bearing. The measured position values then need to be moved, which is done using **Gap Refer** values. We usually require that the position of shaft after coast down (exactly during maintenance revolutions of approx. 4 Hz) was drawn in the lowest bearing point. This position we will call the **Gap Refer Position**.
A depiction of this position is derived from the **Gap A** and **B** values. The **Gap Refer Position** is defined by the corresponding values **Gap A** and **B**, which are entered in the **Meas. Conditions** window of the **Centre Line** data cell.

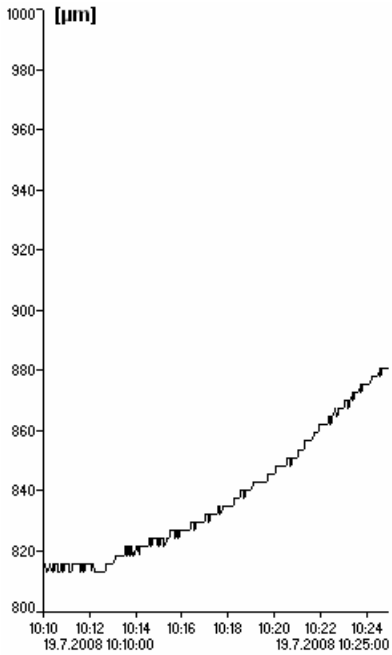


We will obtain this window by activation of the data cell, will invoke the Menu by the right mouse button and select the item **Edit**. An editing window will appear, in which we will press the button **Meas. Conditions.**

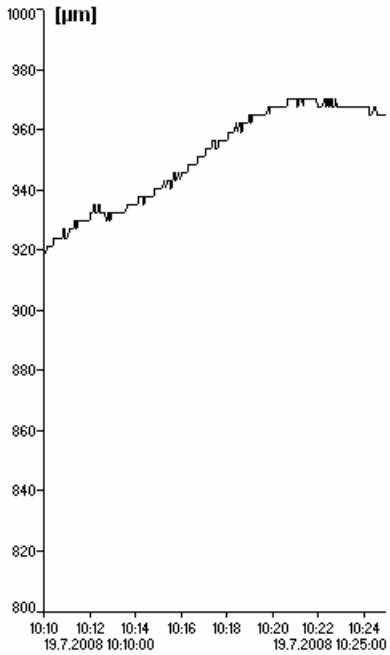
If values are not defined (i.e. are equal to 0), we will get the above shown picture, where the measured curve is beyond the bearing.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

How to get the **Gap Refer** values? Simply from the **Gap A** and **B** graphs. They look like this for the used example of machine stopping:



GAP A

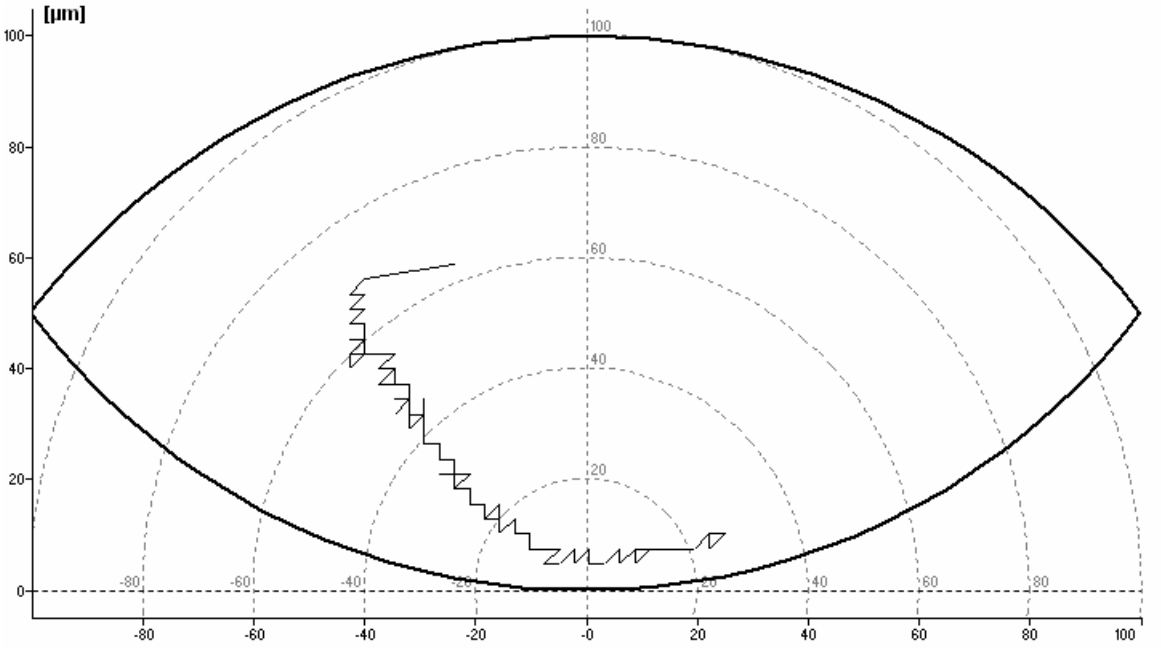


GAP B

The sensor directions are the same as in the previous chapter (A/-90, B/0).
We will find the highest value of **Gap B** (i.e. the lowest place of the measured shaft centre position) by using cursor and the **Gap A** value related to it by time. The same can be done directly in the **Centre Line** graph, of course.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

The Centre Line graph looks like this after suitable Gap Refer values are entered.

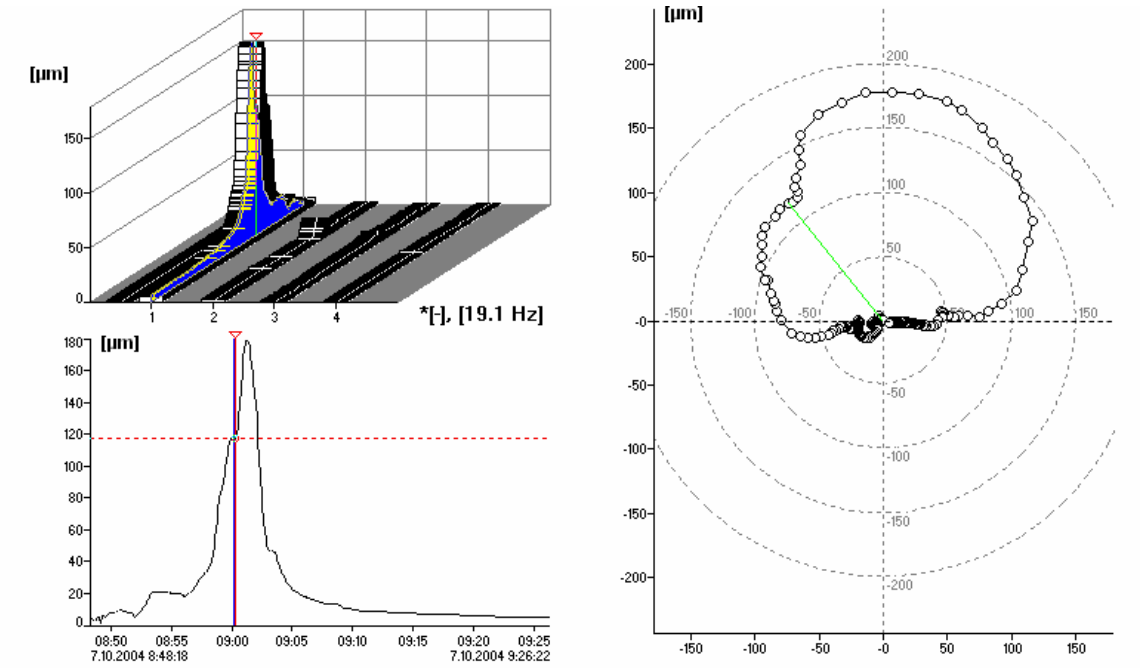


By using cursor (button **T** or menu of the right mouse button + **Cursor**) we can read the individual positions of the shaft centre position during stopping from the **Centre Line** graph.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Orda

This is a graph of a order analysis. The MMS 6000 cards offer measuring of amplitudes and phases on multiples (1 to 10) or a division (½) of revolutions. We can display the maximum of five of these components in the **Orda** graph (Na, Nb, Nc, Nd and Ne measurements). Settings, which from the offered orders of ½, 1, 2, ... 10, can be assigned to the Na to Ne measurements is done on the card. All set components are stored to a database and they are displayed at the same time. The usual markings are **Orda A** and **Orda B,** according to the channel. We also must measure speed beyond a vibration signal within **Orda**. The order 1 represents measuring of an amplitude and a phase at a speed frequency.



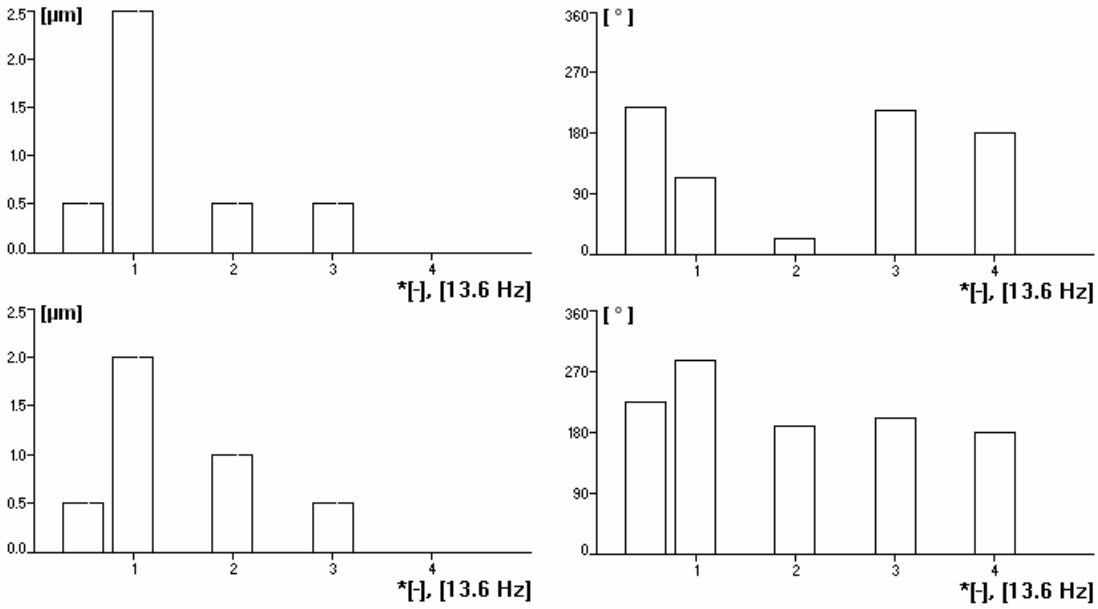
Example of the order analysis display during turbine coast down.

The description of work with series analysis data is shown in the chapter **Series Analysis** in detail.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Filtered Orbit

We have described work with the **Orbit** graph in case of its creation from two time records. The **Orbit** graph can be also created otherwise, namely from results of **Orda** two channel series analysis. This shows the amplitude and the phase for each separate multiple (order) of the speed frequency.

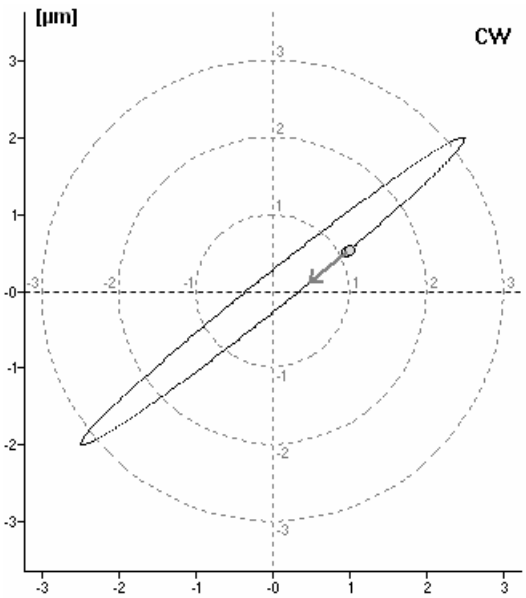


The picture shows the example of amplitudes and phases for the orders 0.5, 1 (i.e. speed frequency = 13.6 Hz), 2, 3 and 4. The channel **A** is shown at the top, the channel **B** under it. Let us imagine that we would only want to see the shaft oscillation at the speed frequency only. If we wanted to use a measurement and standard display of orbit, then we would need to introduce a narrow band filter into the signal path that would only let pass the speed frequency. Luckily we can solve this request by a order analysis. We will use amplitude and phase values for both channels and we can easily obtain the resulting orbit. We will call it the **Filtered Orbit**. We can display the **Filtered Orbit** for any other order of the **Series Analysis**, which we have available.

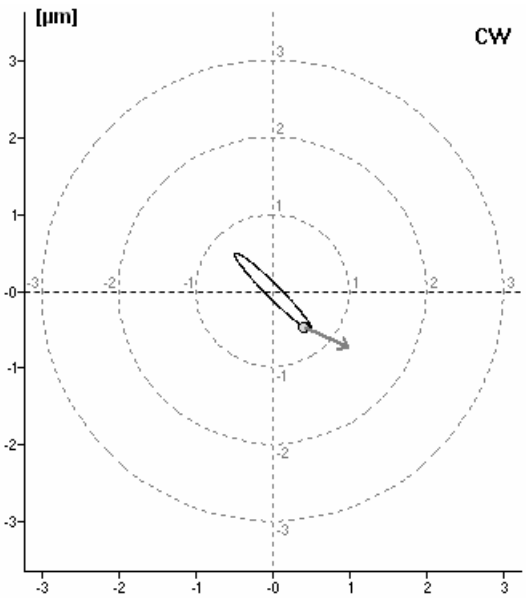
The main attraction of the **Filtered Orbit** measurement is, however, that we can select more orders than just one. The displayed **Filtered Orbit** then approaches the actual measured orbit created from time records more and more. The selection of displayed orders of the **Filtered Orbit** is done by checking fields under the **Filtered Orbit** graph upper edge – see the picture below; so after the graph is opened, we can gradually display measured data with different order selections. The different orders are marked **Ord**.

The data cell **Filtered Orbit** does not contain the measured data, however, only links to two **Orda** data cells. The measured sources are stored there. Selection of these cells is defined in the **Measurement Conditions** of the **Filtered Orbit** data cell.

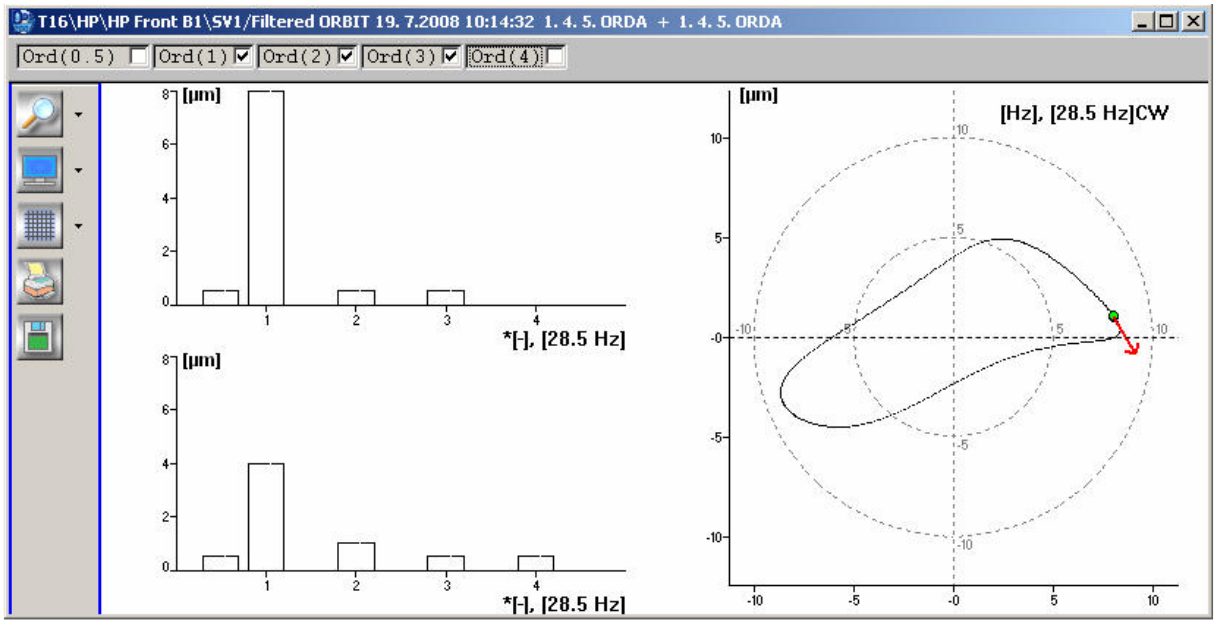
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



1. order (i.e. revolution frequency)



3. order (3 x revolution frequency)

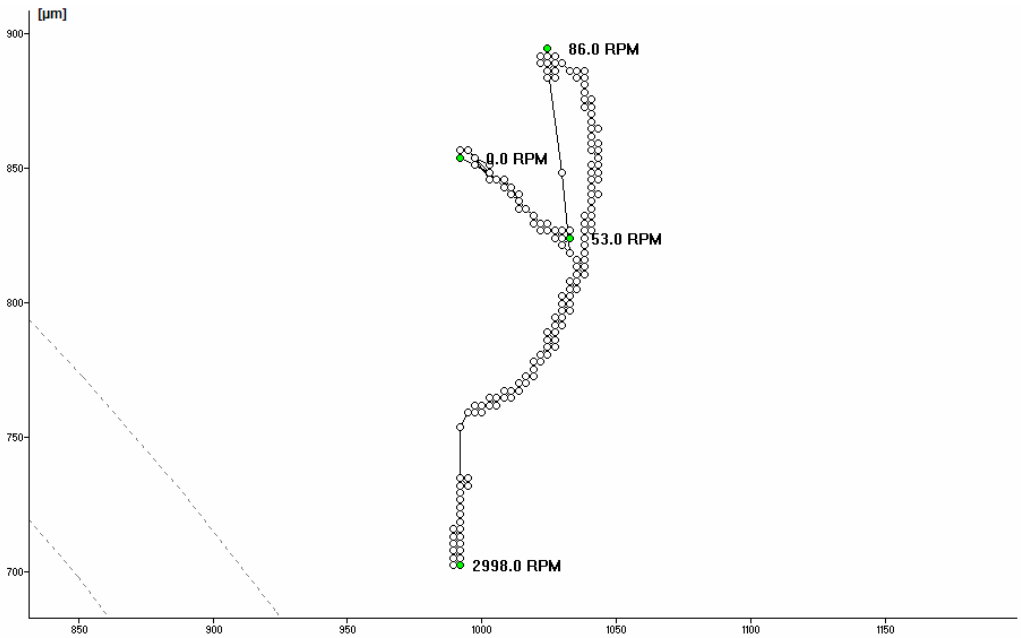


ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Aps

This measurement is similar to the **Orda** analysis, but only an amplitude and phase of one selected order, together with the actual speed value is stored. The values are displayed in the form of a polar graph.
Remark. The name Aps is an abbreviation of Amplitude - Phase - Speed.

Work with Aps data is the same as with one order in the order analysis and is described in detail in the chapter **Order Analysis**.

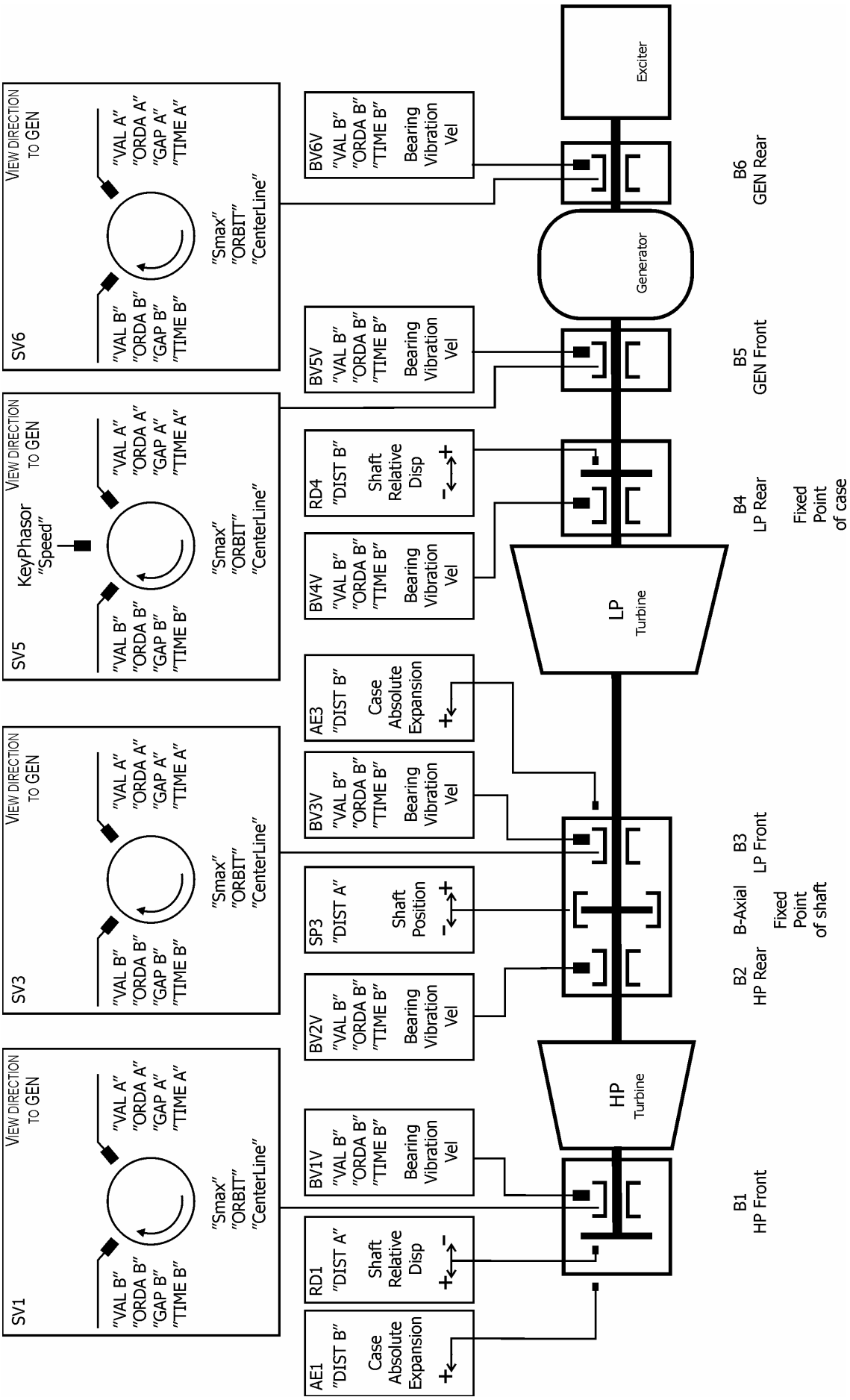


Demo Database of Turbo Aggregate

The **Turbine** demo database is automatically installed during installation of MMS 6850. It has practical examples of measurements in it.

Let us look at the turbine in detail. It consists of the high pressure part (HP), low pressure part (LP) and generator (G). Individual rectangular frames represent individual MMS 6000 cards. Each frame has a name inside, which can be found at the **Turbine** database. The Turbine database also has a list of measurements, which were transferred from the card and stored. Designations correspond to the above described terminology.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz


SV1
VIEW DIRECTION TO GEN
"VAL B" "ORDA B" "GAP B" "TIME B"
"VAL A" "ORDA A" "GAP A" "TIME A"
"Smax" "ORBIT" "CenterLine"
SV3
VIEW DIRECTION TO GEN
"VAL B" "ORDA B" "GAP B" "TIME B"
"VAL A" "ORDA A" "GAP A" "TIME A"
"Smax" "ORBIT" "CenterLine"
SV5
KeyPhasor "Speed"
VIEW DIRECTION TO GEN
"VAL B" "ORDA B" "GAP B" "TIME B"
"VAL A" "ORDA A" "GAP A" "TIME A"
"Smax" "ORBIT" "CenterLine"
SV6
VIEW DIRECTION TO GEN
"VAL B" "ORDA B" "GAP B" "TIME B"
"VAL A" "ORDA A" "GAP A" "TIME A"
"Smax" "ORBIT" "CenterLine"
AE1 "DIST B" Case Absolute Expansion
RD1 "DIST A" Shaft Relative Disp
BV1V "VAL B" "ORDA B" "TIME B" Bearing Vibration Vel
BV2V "VAL B" "ORDA B" "TIME B" Bearing Vibration Vel
SP3 "DIST A" Shaft Position
BV3V "VAL B" "ORDA B" "TIME B" Bearing Vibration Vel
AE3 "DIST B" Case Absolute Expansion
BV4V "VAL B" "ORDA B" "TIME B" Bearing Vibration Vel
RD4 "DIST B" Shaft Relative Disp
BV5V "VAL B" "ORDA B" "TIME B" Bearing Vibration Vel
BV6V "VAL B" "ORDA B" "TIME B" Bearing Vibration Vel
HP Turbine
LP Turbine
Generator
Exciter
B1 HP Front
B2 HP Rear
B-Axial
Fixed Point of shaft
B3 LP Front
B4 LP Rear
Fixed Point of case
B5 GEN Front
B6 GEN Rear

How to Simply Start Working with the Database

Start the MMS 6850 DS program by **Programs** or any other way you are used to. Do not forget to insert a hardware HASP key to a computer (see the chapter **Program Installation**).

The **Turbine** database and its tree **Turbine** will automatically open.

The individual tree items can be expanded by double click.

Data is stored at the end of individual tree branches. A double click on a data item will open a graph window.

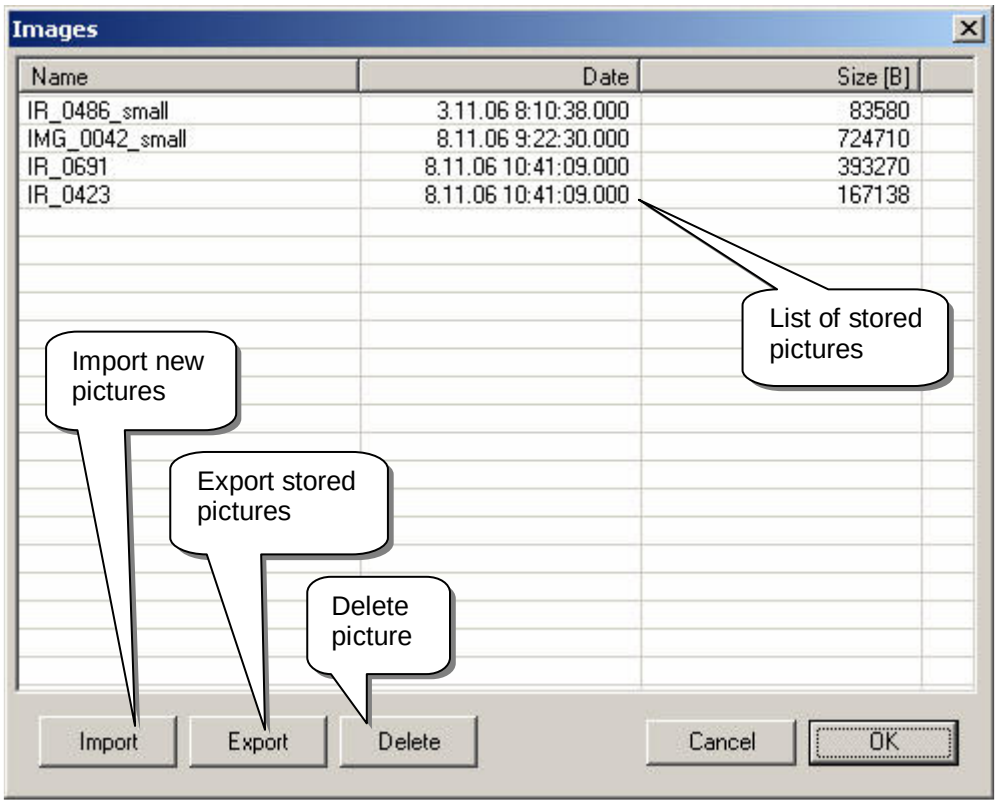
If you press the right mouse button over the graph, a menu with other functions, for example, **Cursor**, will appear.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Image

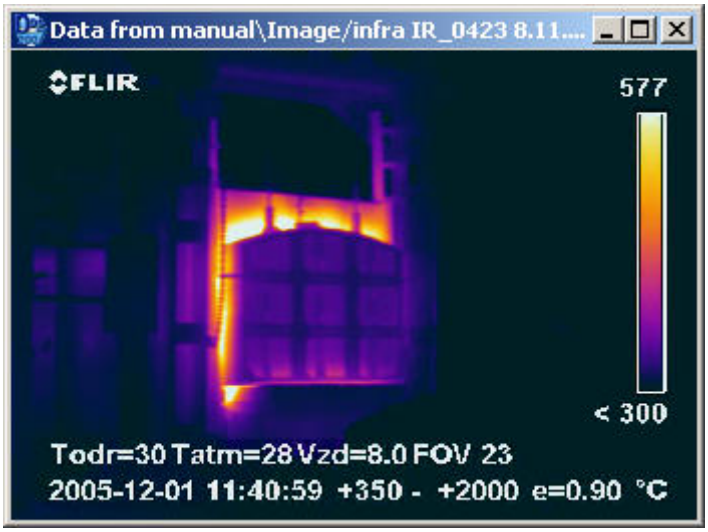
Image data cell is set for picture storage directly to tree. It is defined for infra pictures in particular, but any other supported picture can be stored there.
Image data cell supports:
-png
-bmp
-jpg

Each ***image*** data cell can contain any amount of pictures of any size and type. ***Image*** data cell can be created in a standard way, in ***Type*** just select ***Image***. Pictures are imported by ***Edit data***. ***Edit data*** function is available by data cell local menu. Here you can add, delete or export images easily.



After pressing ***Import***/***Export*** button, standard Windows box shows up. Select file for import here or select location of exported picture. Image data cell can be open in the same way as any other data cell. Then picture appears in original size and proportion. Box with picture can be increased or decreased. Pictures stored in data cell can be displayed by arrows Up and Down.

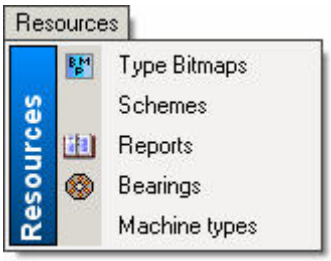
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

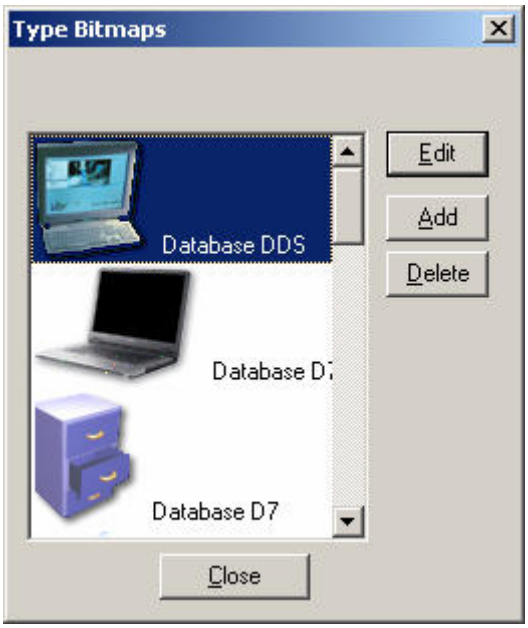
Resources

The ***Resources*** main menu item is intended for creating and editing of the ***DDS 2010*** resources. Those are type bitmaps (icons representing tree elements), schemes (graphic display of tree elements - simple drawings, photos, AutoCAD drawings e.t.c.), report resources and bearing database (if installed).



Type bitmaps

After selection the ***Resources - Type Bitmaps*** command the ***Type Bitmaps*** window appears with the list of all type bitmaps installed.



Edit - it is possible to change name, load a new file from disk or change the ***Initialization level***. The ***Initialization level*** field contains the tree level number. On this tree level the type bitmap will be offered by default.
Add - this command allows adding a next bitmap to the list. First it is possible to prepare it and store to disk as a BMP file and then to load it to DDS. Before storing to the list type, fill the record name.
Delete - serves to remove selected type bitmap from the DDS system.

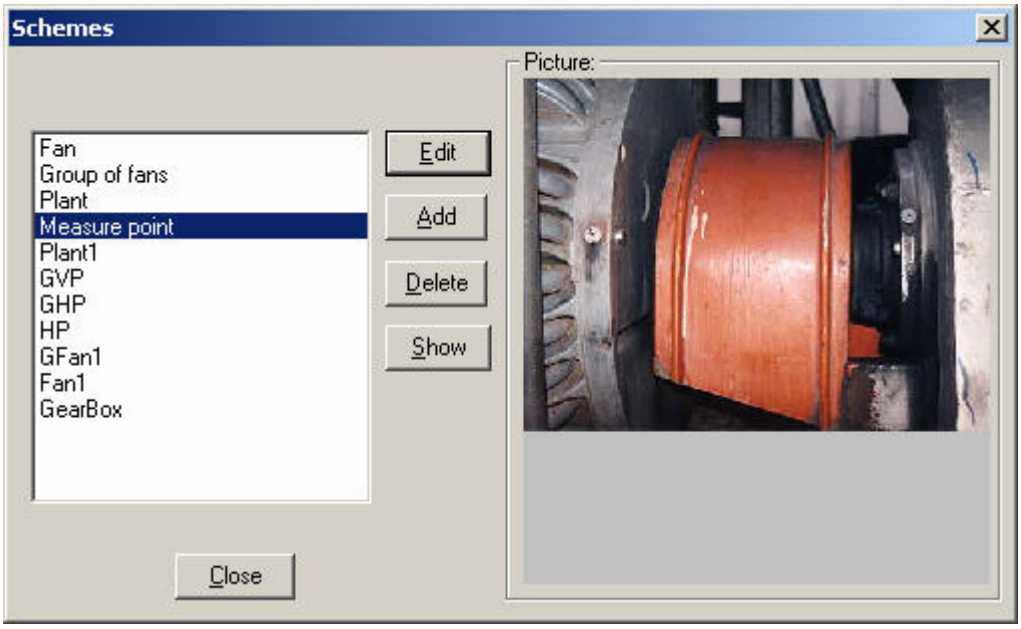
When creating the bitmap itself you have to keep certain rules. To ensure transparency of your symbol

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

in tree displaying you have to create couple of bitmaps. In the left-hand side fill in the transparent points with white color, in the right-hand side fill them with black color. Maximum size of the bitmap file is *32768 bytes*.

Schemes

When the ***Resources - Schemes*** main menu command is selected the ***Schemes*** window appears for maintaining simple schemes which are graphic representation of any tree elements. In the DDS system the list of all schemes, that can be used, is stored. Thus simple bitmaps are not related from the environment out of DDS. This ensures independence of program running on data changes at your disc provided out of DDS directories. First it is necessary to copy bitmap to DDS database and then it can be used in tree. Enabled graphic formats are BMP, WMF a JPG. If you need to use picture in different format, you should copy it to clipboard and then insert it to DDS (***Shift+Ins***.)

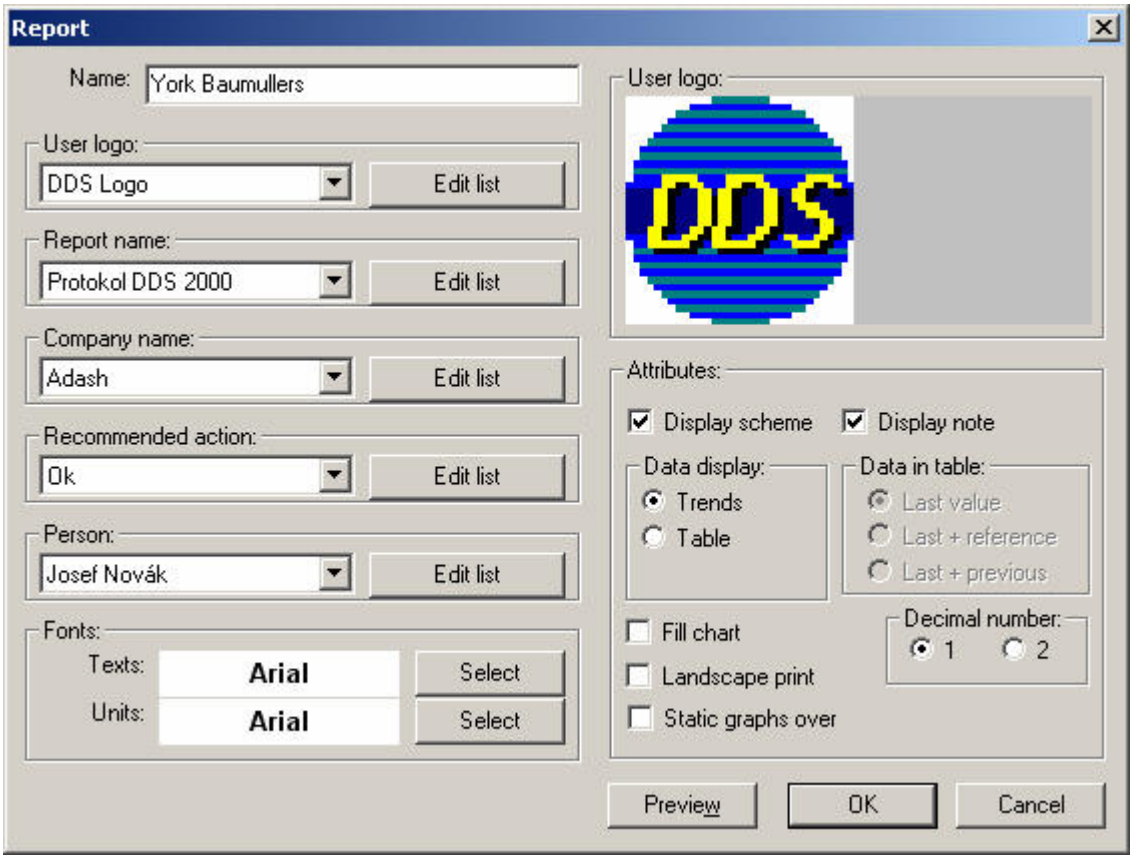


Add - adding a new bitmap to the list. Select resource in disc in possible format and type the name for using in DDS.
Delete - serves to delete selected scheme.
Show - drawing the picture.
Edit - in existing schemes you can change its name or import a new resource file. The clipboard content can be inserted directly by the ***SHIFT+INS*** keys combination.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Reports

After selection the ***Resources - Reports*** command the ***Report List*** window appears with the list of all report resources.
Edit - by this command you can define properties of active report resource.



Edit list- means to modify and add to single lists.
Name - name of the resource.
User logo - symbol, that is printed in the upper left corner of the report.
Report name - the name that is printed as the report title. It is different from the name of the resource.
Company name - name in the report header.
Recommended action - is a part of the report. In each company some typical provisions are defined that frequently repeat. In such cases it is not necessary to write the text in all times but the text can be selected from the list.
Person - name of the author.
Fonts - fonts definition for texts and physical units.

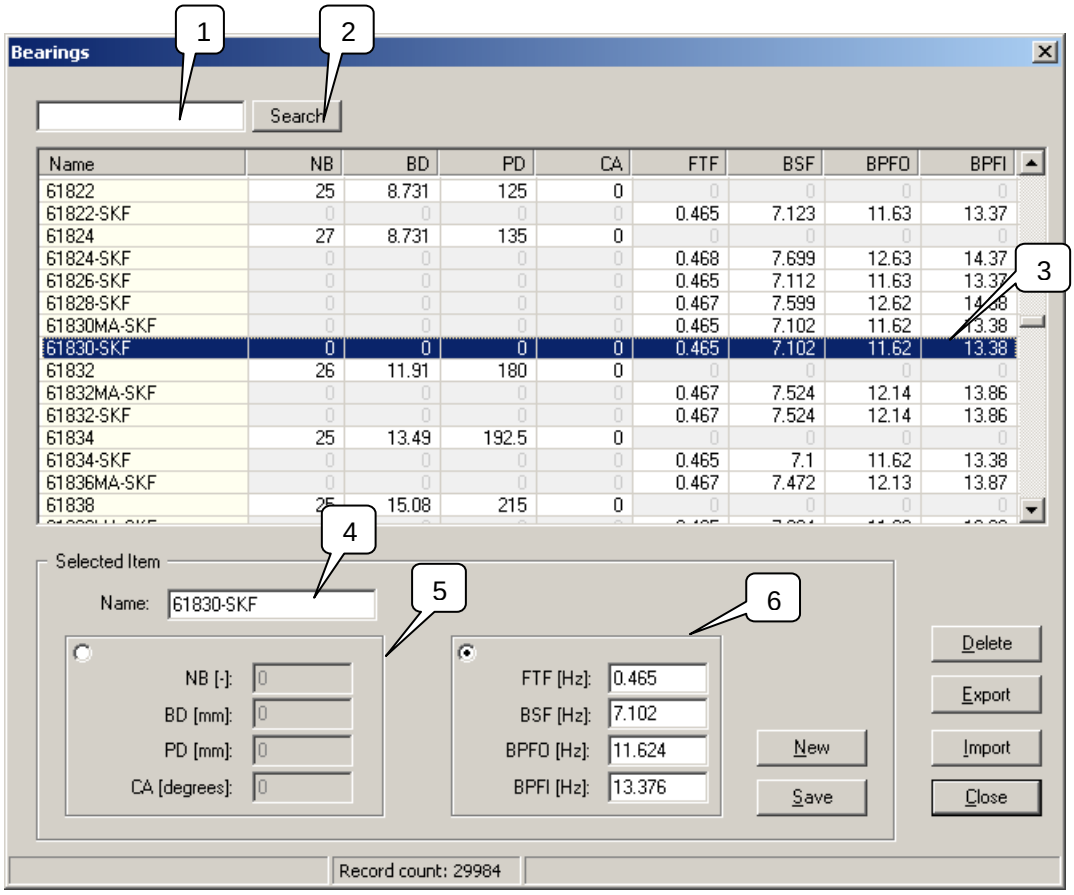
The ***Attributes*** field provides displaying data setup.
Display scheme - if the tree has scheme connected, its printing can be required.
Display note - if there is a note defined on the tree level (see the ***Edit Item*** window) this note can be printed within the report. This property is valid only between limitation keywords **PROT NOTE START** and **PROT NOTE STOP** in note.
Data display - selected data can be displayed either as a ***Table*** or as ***Trend graphs***. In case of table printing also values that should be printed can be defined (***Last value***, ***Last + reference***, ***Last + previous***).
Fill chart - in case of graph printing the color filling in graphs can be defined for accentuation.
Landscape print - landscape printing.
Decimal number - can be defined in case of table printing.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Preview - when the resource is set the preview can be displayed. Attention: as you have no tree element selected there are no measured values defined. Thus only some features of the report resource can be checked. For better orientation in the report resource definition, better method is to connect it to an existing tree element and try effects of changing simple settings. Because you have data, the report with all features is displayed. When you have made your requirements clear, you should complete the definition by the ***Resources - Reports*** main menu command (on tree the resource changes are not stored).

Bearings

By this command you can browse the bearing database and make user defined changes.



Name	NB	BD	PD	CA	FTF	BSF	BPFO	BPFI
61822	25	8.731	125	0	0	0	0	0
61822-SKF	0	0	0	0	0.465	7.123	11.63	13.37
61824	27	8.731	135	0	0	0	0	0
61824-SKF	0	0	0	0	0.468	7.699	12.63	14.37
61826-SKF	0	0	0	0	0.465	7.112	11.63	13.37
61828-SKF	0	0	0	0	0.467	7.599	12.62	14.38
61830MA-SKF	0	0	0	0	0.465	7.102	11.62	13.38
61830-SKF	0	0	0	0	0.465	7.102	11.62	13.38
61832	26	11.91	180	0	0	0	0	0
61832MA-SKF	0	0	0	0	0.467	7.524	12.14	13.86
61832-SKF	0	0	0	0	0.467	7.524	12.14	13.86
61834	25	13.49	192.5	0	0	0	0	0
61834-SKF	0	0	0	0	0.465	7.1	11.62	13.38
61836MA-SKF	0	0	0	0	0.467	7.472	12.13	13.87
61838	25	15.08	215	0	0	0	0	0

In the upper half of dialog list of all bearings is placed. List consists of nine columns, which are sorted by bearing names and they are colored. The first column is the name of bearing, next four columns define sizes and parameters of the bearing relevant for envelope analyze and last four columns define frequencies of the bearing.
Rolling element bearing defect frequencies:

FTF: defect on the cage
BSF: defect on the ball (or roller)
BPFO: defect on the outer race
BPFI: defect on the inner race

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

In the lower half of dialog we can edit actual record (3) either by parameters (5) or by frequencies (6). After saving record the columns of list are colored. In the edit box Name (4) we edit name of bearing (max. length is 20 characters). There is no duplicity allowed.
To simplify process of finding bearing we can use edit box (1) with button (2) to find bearing.

New - create new record for editing.
Save - save edited record of bearing into database.
Delete - delete actual record from database.

List of all bearings from database is placed on the left. In the right part of the window there are sizes and parameters of the bearing relevant for envelope analyze are shown.

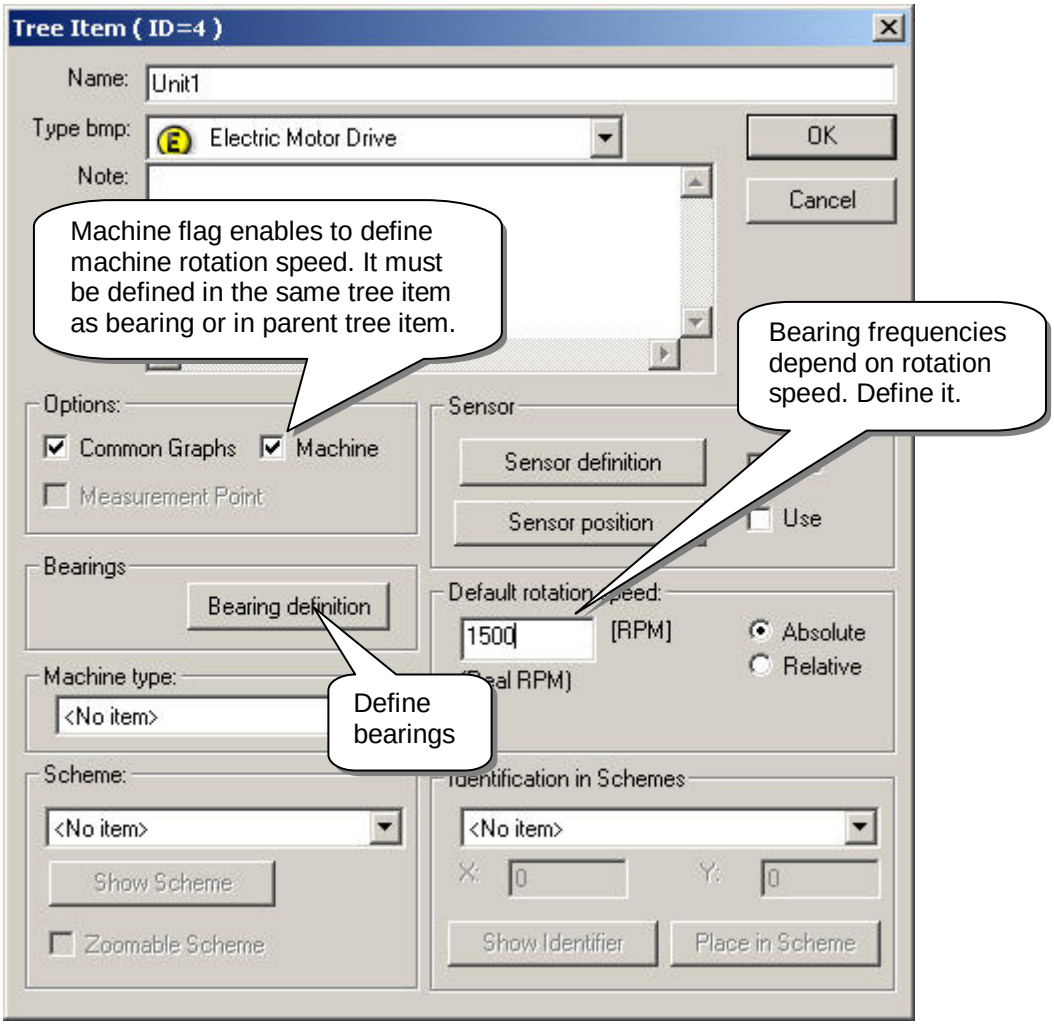
Edit - changing parameters of an existing bearing.
Add - new bearing definition.
Export - export selected records to .abf file.
Import - import new records from .abf file into bearing database. No duplicity of bearing name is allowed. Info about imported and non imported records is shown after import

MBFA (Multipe Bearings Faults Analysis)

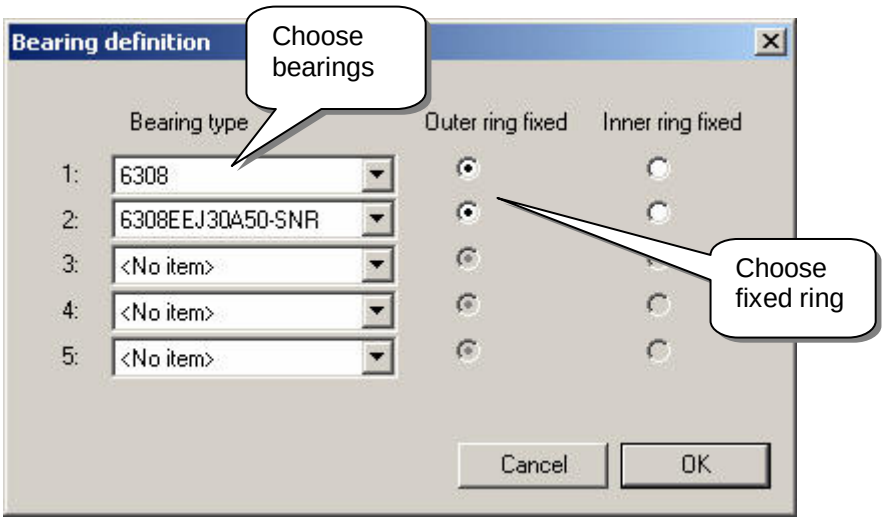
MBFA is news for rolling bearing analysis. It allows detection of bearing frequencies of measured bearing and additional four neighboring bearings. It is useful for measurement on places where is vibration signal mixed from several bearings. MBFA is part of ***FASIT*** (Fault Source Identification Tools).

1. In the window ***Tree item*** (right-click on the tree item and from menu select ***Edit item***) select type of bearing. Up to five different bearings can be defined on one measurement point (if bearings are not in the list, they can be imported or created – see previous text).
Open box Edit tree, enter ***rotation speed*** of machine (rotation speed can be defined only when this element or tree element above has the flag ***machine***) and press ***Bearing definition*** button.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



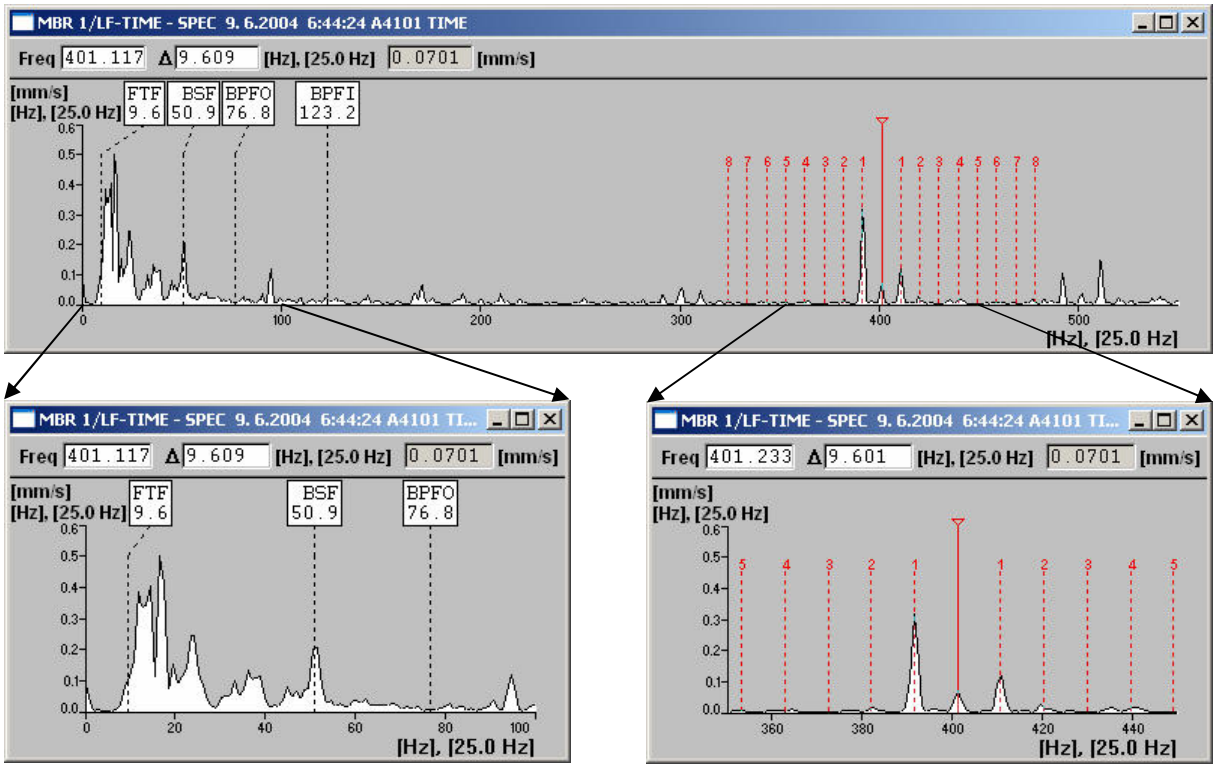
In the ***Bearing definition*** window choose bearings, which frequencies can be in the measured spectrum.



2. Choose ***fixed ring***.
3. Define rotation speed of bearing (type of tree item must be ***machine***), click on ***OK***.
4. Now, in the spectrum can be displayed ***rolling element bearing defect frequencies*** (right-click on the spectrum and choose ***Marks - Bearings frequencies***).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

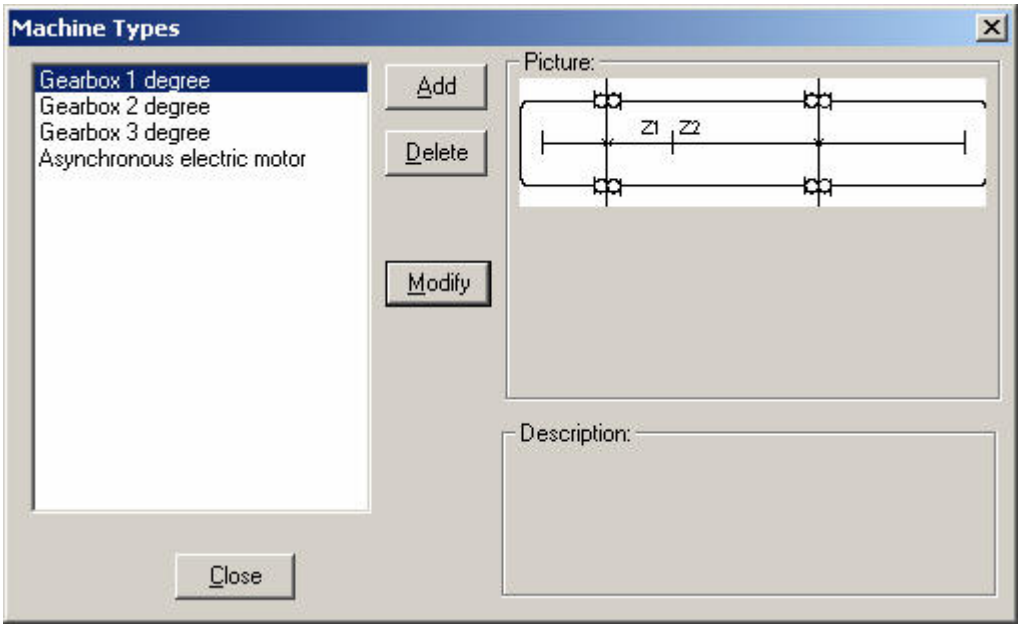
On the picture below is spectrum of the bearing (type 6308), which outer ring is fixed. Rotation speed of the inner ring is 1500RPM. In the spectrum are displayed all ***rolling element bearing defect frequencies***. Defect on the ball is indicated on the frequency 50,9Hz (BSF). Defect on the cage is indicated on the side frequencies, which are modulated on other frequencies. Other defect does not exist.



Machine types

The ***Machine types*** item of the ***Resources*** menu is intended to define and modify machine types.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Each type of machine has its own characteristic frequencies derived from the basic machine speed rotations. These frequencies depend on a machine type and its parameters can be used in diagnostics of machine defects.
These frequencies can be displayed in spectra as marks (see the ***Spectra*** chapter).

DDS 2010 contain definition of four machine types:
- Gearbox (1 degree, 2 degree or 3 degree)
- Asynchronous electric motor

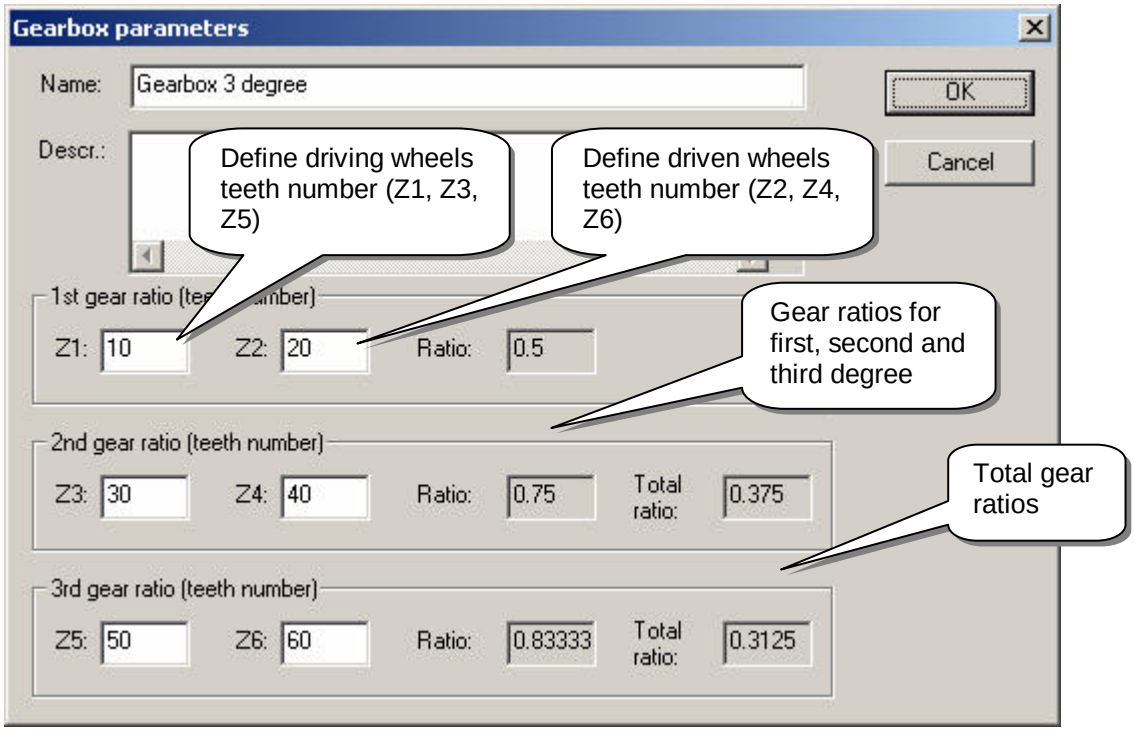
You can edit these machines, or create new machine base on the predefined type.

Gearbox

These machine types contain definitions of number of teeth for each degree. Total gear ratio and gear ratios of each degree are computed from number of teeth. Defect frequencies are computed from gear ratios, number of teeth and from the rotation speed of the traction wheel (is defined in the ***tree item*** edit window). These frequencies are indicated by marks in spectrum (see capitol ***Spectrum - Marks***).

Creation of a new gearbox, relation with spectrum data cell:
1. In the menu ***Resources - Machine types*** choose ***ADD***.
2. Choose desired type of the gearbox (1 degree, 2 degree or 3 degree) and click-on OK.
3. Define parameters of the gearbox (name, number of tooth and description), and click-on OK. The new gearbox is defined and now you must relate it to tree item.
4. Create or edit a tree item, which represents measured gearbox.
5. Select gearbox type and define its rotation speed in the edit window of ***tree item*** (tree item must be ***machine***).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Defect frequencies of machine can be displayed in the spectrum of the gearbox (right-click on the graph and choose ***Marks - Type analysis***).

Defect frequencies of a gearbox:
RPM: rotation speed of the traction wheel
RPM1, RPM2, RPM3: rotation speeds of gear wheels
GMF1, GMF2, GMF3: defect frequencies of teeth

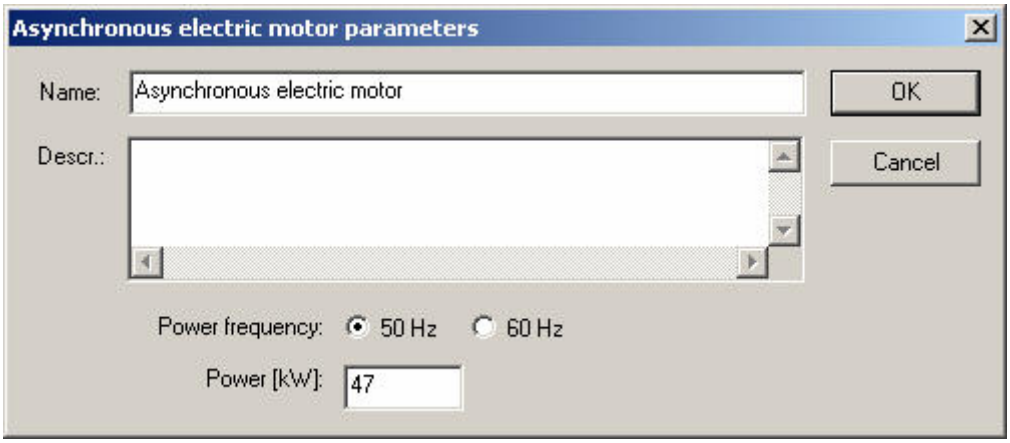
Asynchronous electric motor

This machine type contains definitions of engine power and frequency of the supply network (50Hz/60Hz). Defect frequencies are computed from the frequency of the supply network and from the rotation speed of the asynchronous electric motor (is defined in the ***tree item*** edit window). These frequencies are indicated by marks in the spectrum (see capitol ***Spectrum - Marks***).

Creation of a new asynchronous electric motor, relation with spectrum data cell:

1. In the menu ***Resources - Machine types*** choose ***ADD***.
2. Choose asynchronous electric motor, click-on OK.
3. Define parameters of the asynchronous electric motor (name, power, supply network frequency and description), click-on OK. The new gearbox is defined and now you must relate it to tree item.
4. Create or edit a tree item, which represents measured asynchronous electric motor.
5. Select asynchronous electric motor and define its rotation speed in the edit window of ***tree item*** (tree item must be ***machine***).

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



Defect frequencies of machine can be displayed in the spectrum of the asynchronous electric motor (right-click on the graph and choose ***Marks - Type analysis***).

Defect frequencies of the asynchronous electric motor:
fP: frequency of the supply network.
fS: slip frequency (must be measured together with spectrum, because slip frequency changes during measuring).
fP+fS, fP-fS: side-band frequency (indicate interrupted rotor rod).
fSE: static eccentricity of an electromagnetic field.
fSE+, fSE-: there is indicated static eccentricity.
fDE+, fSE-: there is indicated dynamic eccentricity.

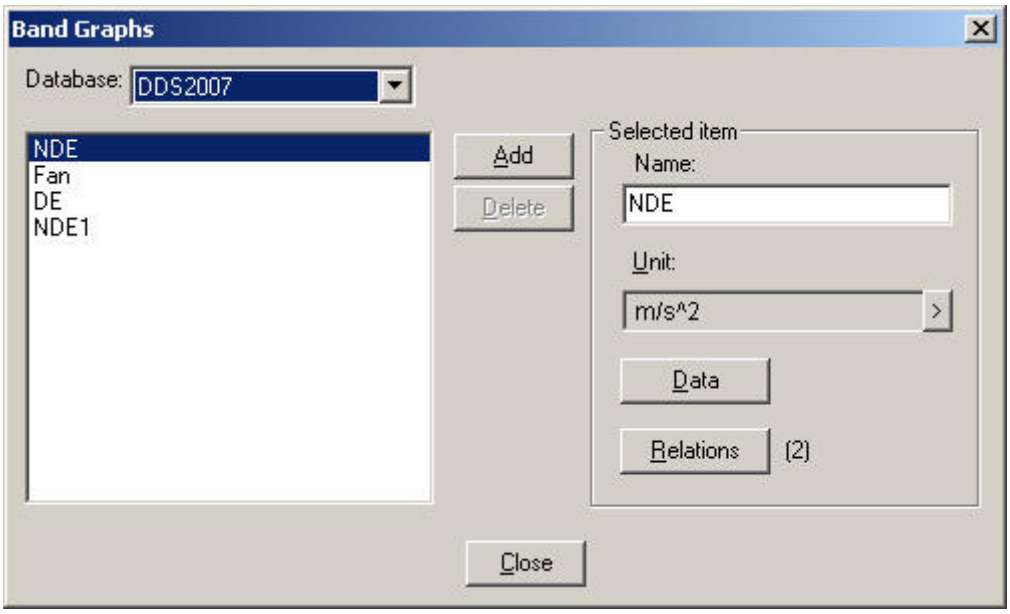
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Tools

The ***Tools*** main menu item contains commands and functions for band graphs definition, working with the report book and, above all, commands for measurement instruments connecting and data transfer.

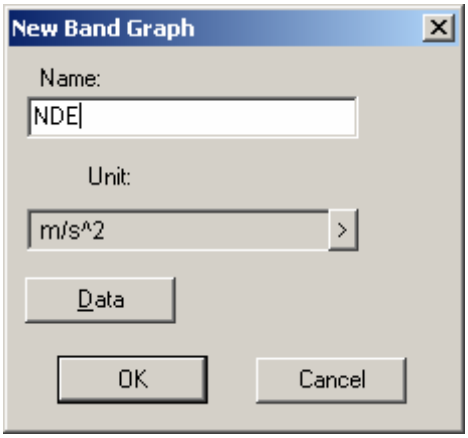
Band graphs

Band graphs represent an outstanding tool for automatic spectra evaluation. Band graphs enable definition of frequency intervals in which a defect of certain type can appear. If in such interval the energy of vibrations appears, the defect is automatically detected. Alert and danger levels can be defined for each frequency interval separately similarly as for static data. In this way existence of the defect is signalized by operational condition semaphore.

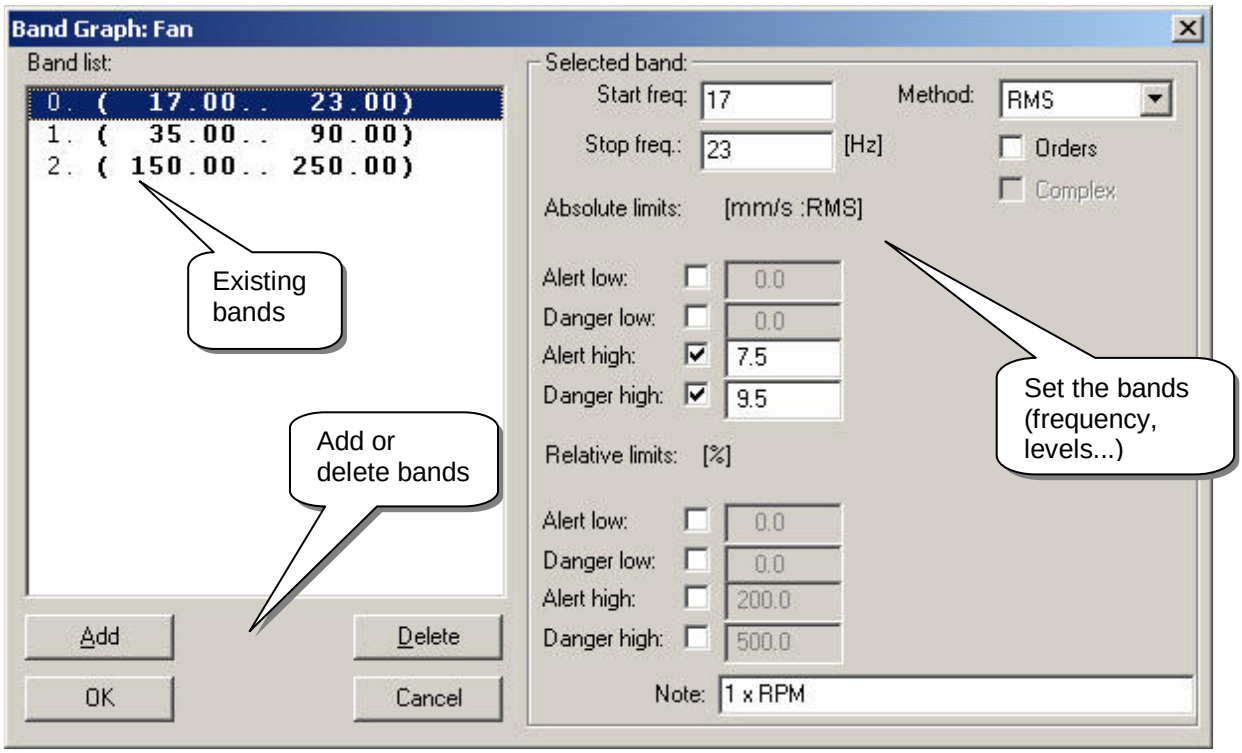


In the left list all band graphs are displayed that are defined in the database above to the list. In the ***Name*** field the name of the band graph can be defined and the ***Unit*** can be also changed.
Now we describe the definition procedure of a new band graph. Press the ***Add*** button.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



There is always assumed that the new band graph is created by derivation from an existing one. Thus the currently active graph in the list is offered as a source. Type new ***Name*** and choose new ***Unit*** and press the ***Data*** button.



Now the definition window of the band graph is displayed on the screen. Simple intervals are in the ***Band list***. ***Add*** and ***Delete*** buttons can modify the list. In the right part of the window the properties of the active band are situated.

Start freq, Stop freq - definitional frequencies of the interval.
Orders - the interval can be defined in Hz or in orders.
Method - defined frequency interval can be evaluated by two methods, either to calculate the effective value in band ***RMS*** of find the sample with the highest amplitude ***MAX***.
Complex - if the ***MAX*** method is selected, the complex alert and danger levels can be defined.

Alert and ***Danger*** values define minimal and maximal value for ***Selected band***. They can be defined as ***Absolute limits*** or ***Relative limits***. ***Relative limits*** are relative changes of the amplitude in percent and ***Absolute limits*** are defined as an absolute value of the vibration unit. All limits are defined as ***RMS*** in the selected vibration unit.

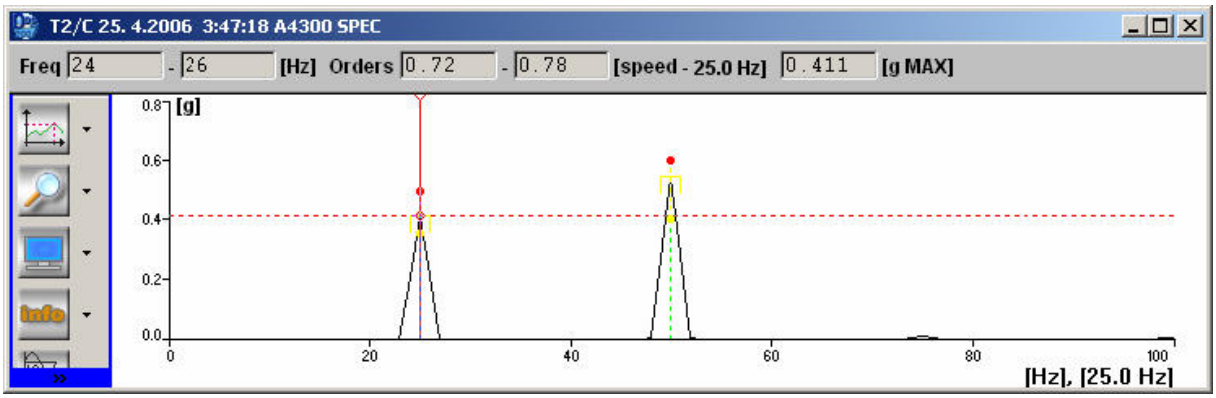
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

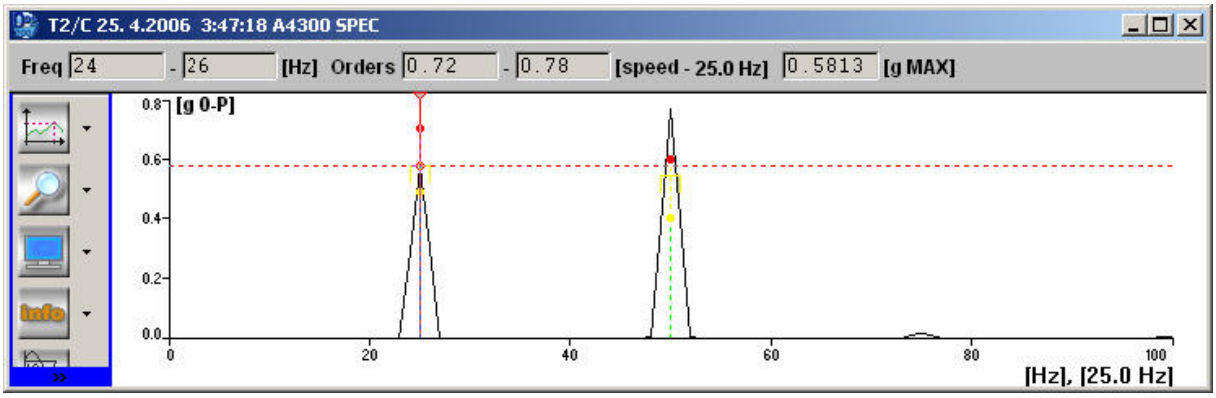
By consecutive confirming by ***OK*** buttons we return to the basic window. If there is necessity to modify an existing band graph, activate its name and press the ***Data*** button.

The ***Relations*** button can display the list of all data cells in which the active band graph is used. Number of usage is placed in bracket behind the button.

Created band graph must be related to the ***spectrum data cell*** - see the capitol ***Data cells - Critical values for spectra***. View unit and the unit of the band graph must be the same. In the graph of the spectra data cell are displayed all bands and all limits from the band graph, which is related to this data cell.

If ***RMS*** method is used for a band, then limits of this band are independent of view method of the graph (RMS, 0-P).
If ***MAX*** method is used for a band, then limits of this band correspond to the RMS view method of the graph. If other view method is used (P-P, 0-P), then MAX limits are recomputed to this view method.





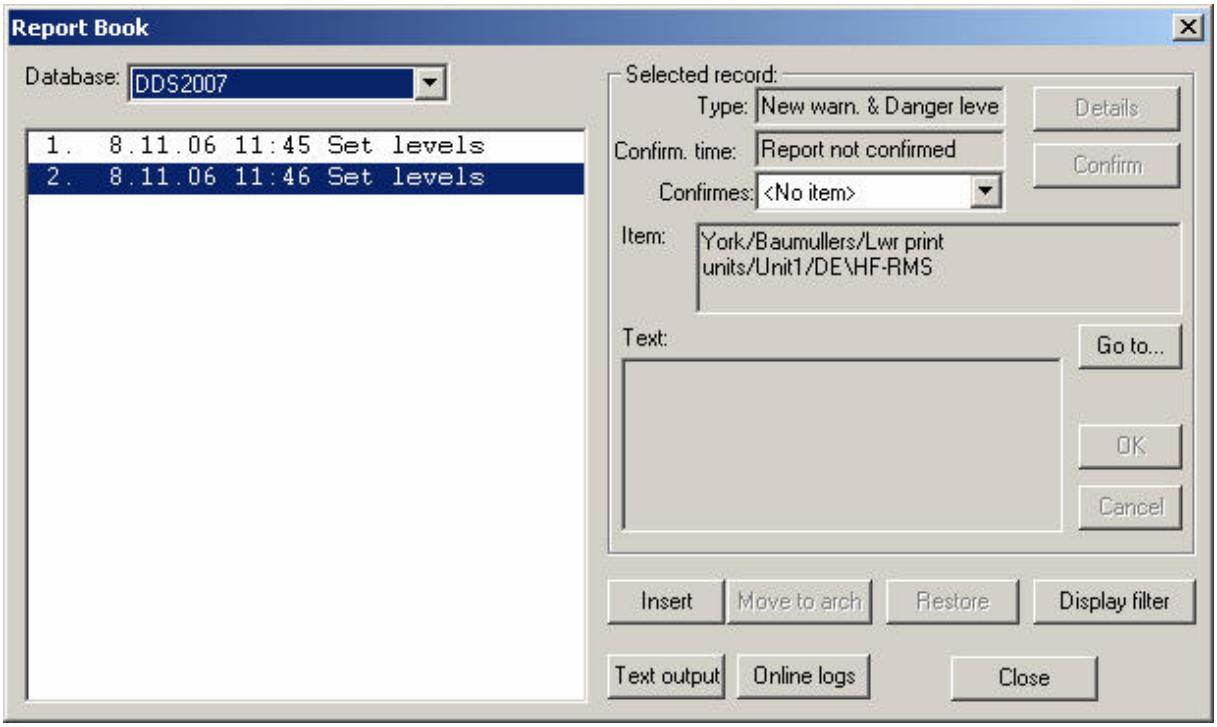
The same spectrum is displayed on these two graphs. With this spectrum is related a ***Band graph***, which contain two bands. The first band is defined as ***MAX*** band between the 24-26Hz (with cursor). The second band is defined as ***RMS*** band between 49-51Hz. On the first graph, spectrum is displayed as ***RMS*** and on the second graph, spectrum is displayed as ***0-P*** (amplitude of peaks are greater). All limits are defined as ***RMS*** for the selected vibration unit (g-RMS) and they correspond to the first graph. On the second graph, limits of first band (method ***MAX***) are recomputed to the 0-P (view method is 0-P), but limits of the second band (method ***RMS***) are the same. The limits of the ***RMS*** method are not recomputed and they are compared with the RMS amplitude of this spectrum.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Report book

The report book serves to catch all events that appear in the DDS system or measurement instrument. This document enables looking back into the history of measurement and work with the DDS program. An important feature of the event list is confirmation of events by a responsible worker. Thus the possibility is created to determine the current responsibility of provided or not provided intervention (either service or informational charge). Record of each event contains its date and time. If the event is related to a tree element, its name is also stored.
When the evaluating worker having returned from the route and having stored data, detects exceeding a critical value, he should either print report with attention or directly call the service action. The message about critical value exceeding is automatically stored in the report book. The worker should confirm the record (i.e. accept it) and provide e.g. message report of the action he has done as a reaction of the exceeding.
Records in report book cannot be deleted but put of to the archive only. Messages can be modified in very limited way that means rather completion of the record. If the worker creates an incorrect message, he should confirm it and type in text that it has been his mistake, the message cannot be deleted.

Archived event types are:
User notes - information about e.g. repairement, revision e.t.c.
Alert or danger level exceeding - fundamental record requiring confirmation.
Report printing - a message that in stored time a report has been printed.
Critical levels modifications - this change significantly affects the system performance and thus must be written.
Measurement instruments messages - messages informing about operational state in measurement time can be loaded from route measurement instruments (machine not working, leakage, high temperature e.t.c.), on-line stations generates messages about data transfer, station restarts, configuration modifications e.t.c.



After the command selection the basic window ***Report Book*** appears. In the left part there is the list of all reports of the book of selected database, which name is selected in the ***Database*** field. For the selected record its ***Type***, ***Confirm time***, ***Confirmed by*** is displayed. While confirming the Name should be selected and the ***Confirm*** button should be pressed. If the message is related to a concrete

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

tree element, name of the element is in the ***Item*** field. In the ***Text*** field further information are displayed (either as a part of the event or added by the user).

Details - in case of Collective editing event the list of all affected items appears.
Go to… opens tree with the active item related with the report.
Insert - creating the ***User note*** message into the ***Text*** field. The ***OK*** button provides confirmation.
Move to arch - all active confirmed reports are put off to the archive.
Restore - restoring records from archive to the report book. To select from archive a time interval can be defined, it is not necessary to restore the whole archive.
Display filter - to display report book messages a query can be defined, that defines time intervals and types of required messages.
Text output - output to a text file is provided, the created text file is immediately open by the editor predefined in operating system for ***.TXT*** files.

Responsible persons

For report book confirmation and report printing it is necessary to create a list of persons. After selecting this command, the window with the list of the persons appears with possibilities of typing a new name, changing or deleting a name.

Connect instrument

If you have bought the DDS system, you have some measurement instruments, which data you want to archive and evaluate. According to your specification there are installed instrument interfaces for your instruments. Data cannot be transferred without these interfaces. Appearance and function of single interfaces depends on instrument type.
After selecting the ***Connect Instrument*** command the list of instruments is displayed that can be connected to the database. By selection of an instrument from the list a next window is displayed for communication between the instrument and the database. Descriptions of concrete instruments are in appendices of the manual.

Automatic Downloading from the Database

It enables to automatically download data from static trends at an interval entered in ***Setting - Online Options***. It reads only data from static trends, after each reading also the status in the tree is redrawn. It DOES NOT READ data of time signals and spectra.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Authentication

If the DDS authentication library is installed (DDSAuth.Dll, from version 2.1.on), this option enables to set authorized users of the DDS system (The user editing dialogue is activated). These have to log in with their user ID and password, which also determines their authorization, prior to starting the DDS system.
There are 4 levels of users that have different possibilities in the tree and data editing:

1. **Administrator –** has rights to change anything in the system and DDS database, including the modification of all users.
2. **Power User** – has rights to change anything in the system and DDS database, save for hardware connection projects (it concerns the A3100, A3200, MMS6000 stations), such user can modify users of the *Power User* groups and lower.
3. **Route User** – does not have rights to edit either the tree or data, such user can store and record routes from route devices.
4. **Passive User** – can only view data.

After exiting authentication, user is asked if authentication information should be stored to database (it is store locally every time). This allows user to centralize authentication scheme across computers in the network, since it is not needed to redefine authentication scheme every time new installation on different computer is performed when the authentication is stored in database.
The database is protected from unwanted intervention also

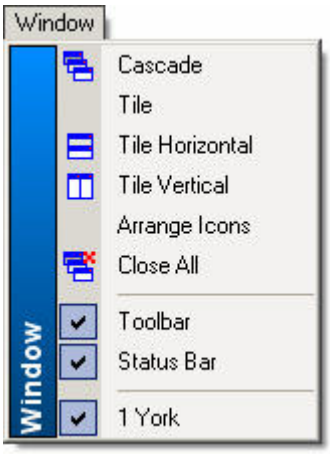
Log In as another User

This enables another user to log in without having to close the application or to reopen the database.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Windows

This command contains standard menu to arrange windows in the screen.



In the second group the toolbar displaying can be switched on. The toolbar enables fast approach to frequently used functions and commands. The ***status bar*** in the bottom of the application window actually informs user about currently provided activity, toolbar represents a bar of quick buttons located under main menu. Tools configuration option opens box, where toolbar can be defined by user, see chapter ***Toolbar***.

The last group is the list of currently open windows with possibility of fast switching among them.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Toolbar

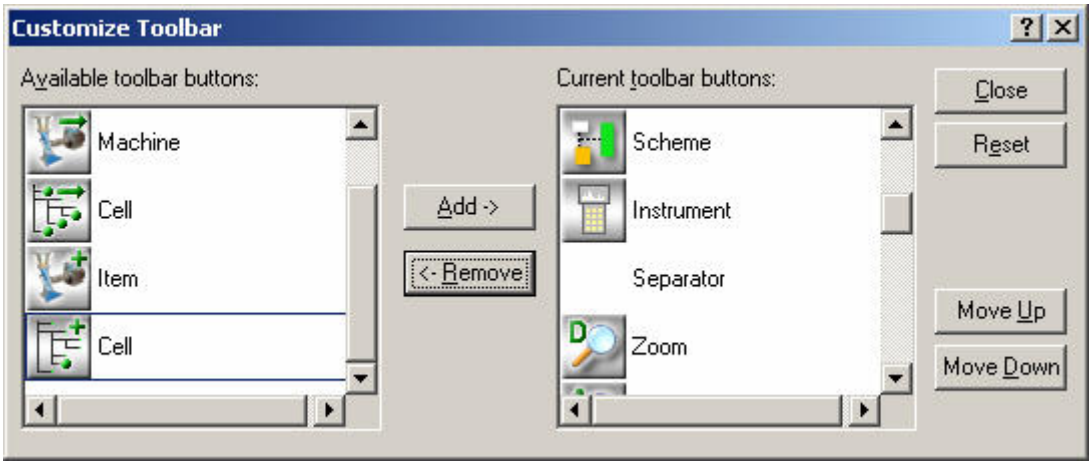
Toolbar enables fast approach to frequently used menu items. Toolbar signs can be displayed in three modes

Button cannot be used

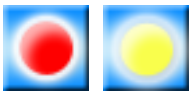
Button can be used but cursor is not placed on it

Button can be used and cursor is placed on it

Window - tool configuration opens window, where toolbar can be defined by user. On the left-hand side, there are ***Available buttons*** that can be added to toolbar. On the right-hand side, there are ***toolbar buttons***. With ***Add*** button and ***remove*** button you can ***add*** or ***remove*** a button to the toolbar. New button is placed into highlighted place in right window. Buttons can be moved with mouse too. Their functions are described later. ***Reset*** button restores original toolbar setup.



Main toolbar:



Amount of data cells with alert or danger status

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz


Open data cells


Add data cell


Add tree element


Open tree to machines (or fully if cursor is placed behind machine flag)


Fast view on/off


Show scheme


Connect instrument


Zoom dialogue


Auto zoom


Band graph display on/off


Reference graph spectra on/off


Switch between Amplitude <-> Cascade displayed process type


Open viewscreen


Write e-mail


Internet update

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Graph toolbar

Some buttons have the same function as in Main toolbar. We describe only new buttons:

ASTAT method on/off

Measurement (data cell) info

Cursor on/off

Selection of bearing whose failure frequencies are displayed in spectrum

Grid display on/off

Print graph

Graph display type

Save graph as bitmap

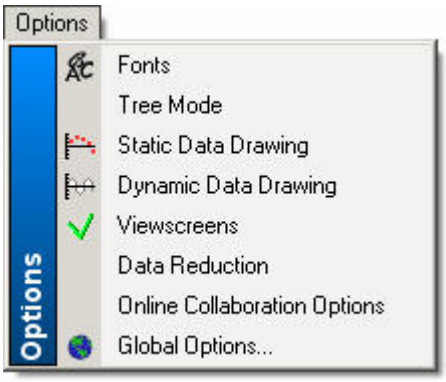
Selection of marks displayed in graph

Zoom

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

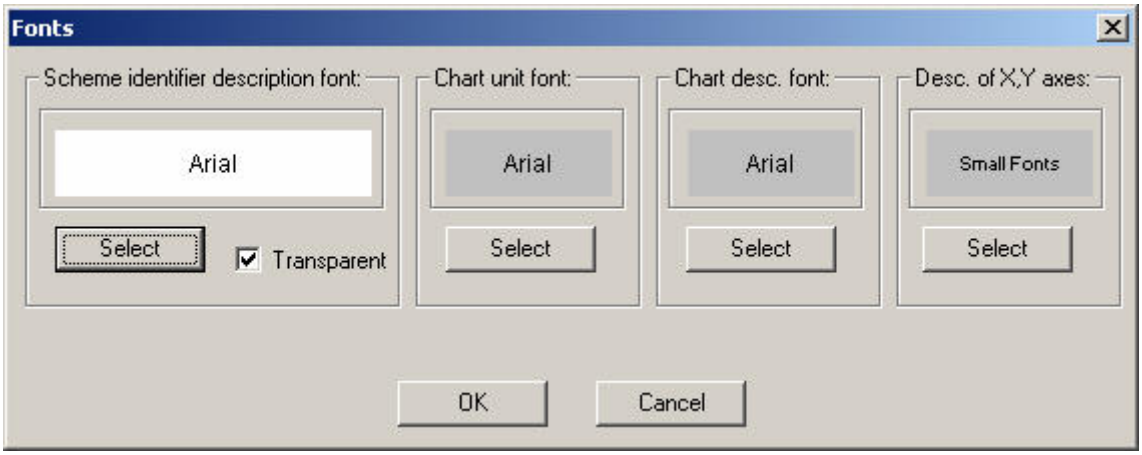
Options

The ***Options*** menu item is designated to set up basic features of the ***DDS 2010*** program.



Fonts

After selecting the Fonts item the window appears to select and adjust fonts for single types of displayed objects.



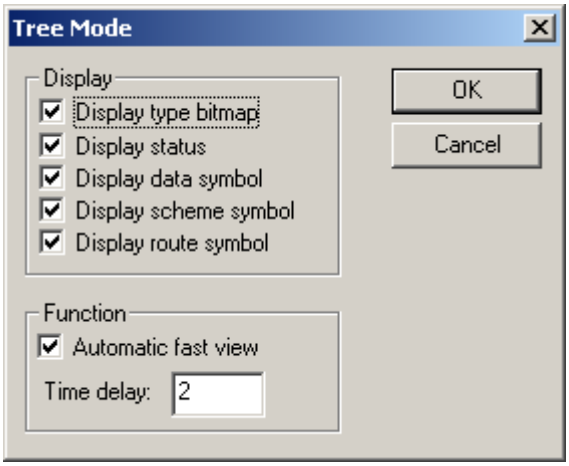
By ***Select*** buttons define required fonts. The ***Transparent*** flag means that the text rectangle is transparent in identifier descriptions in schemes (try it).

Tree mode

The ***Tree Mode*** dialog window allows setting up features of tree displaying. In front of each tree element icons can be displayed that inform of tree element properties. Displaying of these icons can be adjusted. Separate symbols are described in the ***Tree*** chapter.

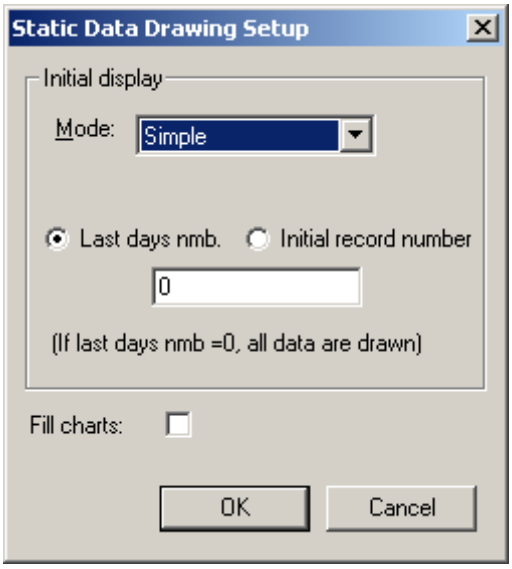
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

In this dialogue window, also an automatic fast view may be enabled and a view time interval may be specified.



Static data drawing

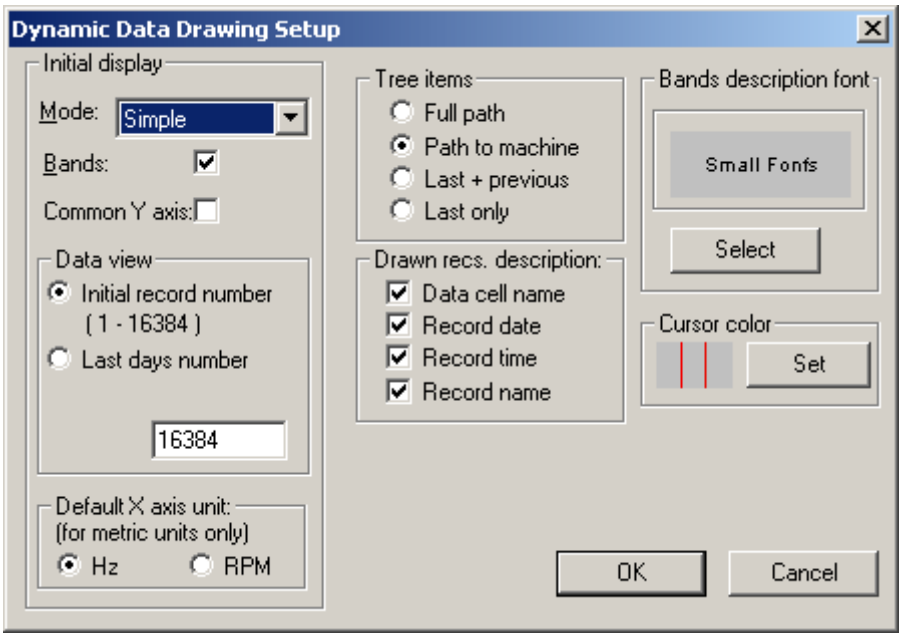
It serves to set up features of static data displaying. In the ***Mode*** field the initial ***View format*** can be selected. The same options can be selected as in static data drawing local menu. The ***Fill charts*** flag enables to set up drawing graphs with color filling. By setting the nonzero value into the ***Last days nmb.*** field results in drawing lastly measured data only by default (Zero value causes drawing all measured data).We can also set the number of viewed static by checking ***Initial record number*** radio button and setting this number. *Please, take also a notice of the Common X-axis setting in next chapter. Although its primary target is the dynamic data graph it will affect the Y-axis in static graphs, too.*



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Dynamic data drawing

It serves to set up features of dynamic data drawing.



Definition of ***Initial display*** contains:
Mode - initial ***View format*** for multiple charts drawing,
Bands - automatic displaying of band graph in spectra view (if exists),
Common Y axis - in multiple charts all Y axes will have the same range, in the opposite case automatic extent calculation will be provided for each subgraph separately. *BEWARE: This option also takes effect in static data graphs,*
Initial record number - it is not a good idea to select all dynamic data by default in data cell. If you are usually interested in a certain time interval up to the last measurement, define such a number of records that corresponds to this interval. By the ***Select records*** local menu command it is possible to define an other selection.
Last days number – when we check this radio button, then value in edit box below, represents time interval of displayed spectra.

Cursor color - setting up the cursor color. The second color demonstrates the cursor appearance on light gray background (This can differ from the selected color when any other graphic mode than TrueColor is selected as cursor is displayed using bitwise XOR operation).

Drawn recs. description - select combination of information that will be displayed in window and signal description when a record is drawn.

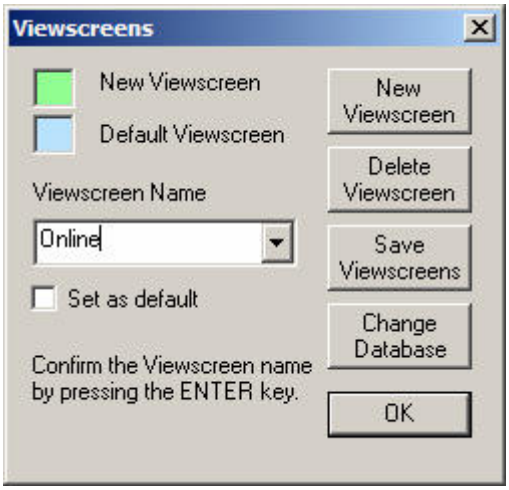
Viewscreen

An actual setting of opened database and windows can be saved by function ***viewscreen***. Saved viewscreens can be opened by toolbar. A viewscreen contain information, which database and windows (graphs, trees) were opened. A viewscreen save position of windows too.

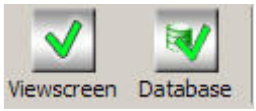
Saving and loading of a ***viewscreen***:
Open the database, tree and windows, which will be saved to a viewscreen. Open the menu ***Options-***

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

viewscreen. Click on the ***New viewscreen*** and write name of the new viewscreen into the combo-box. If you select ***Set as default***, then this viewscreen will be loaded at the start of DDS 2010. Save the new viewscreen by click on the ***Save viewscreen***. The ***new viewscreen*** is highlighting with green color and the ***default viewscreen*** is highlighting with blue color.
Viewscreens can be deleted by pressing button ***Delete viewscreen***. If the new viewscreen is saved, then click on the ***OK***.



A list of viewscreens is displayed in the toolbar. Select a viewscreen from the toolbar and click on the button ***Load viewscreen***. The DDS 2010 loads the database and windows which are saved in selected viewscreen.

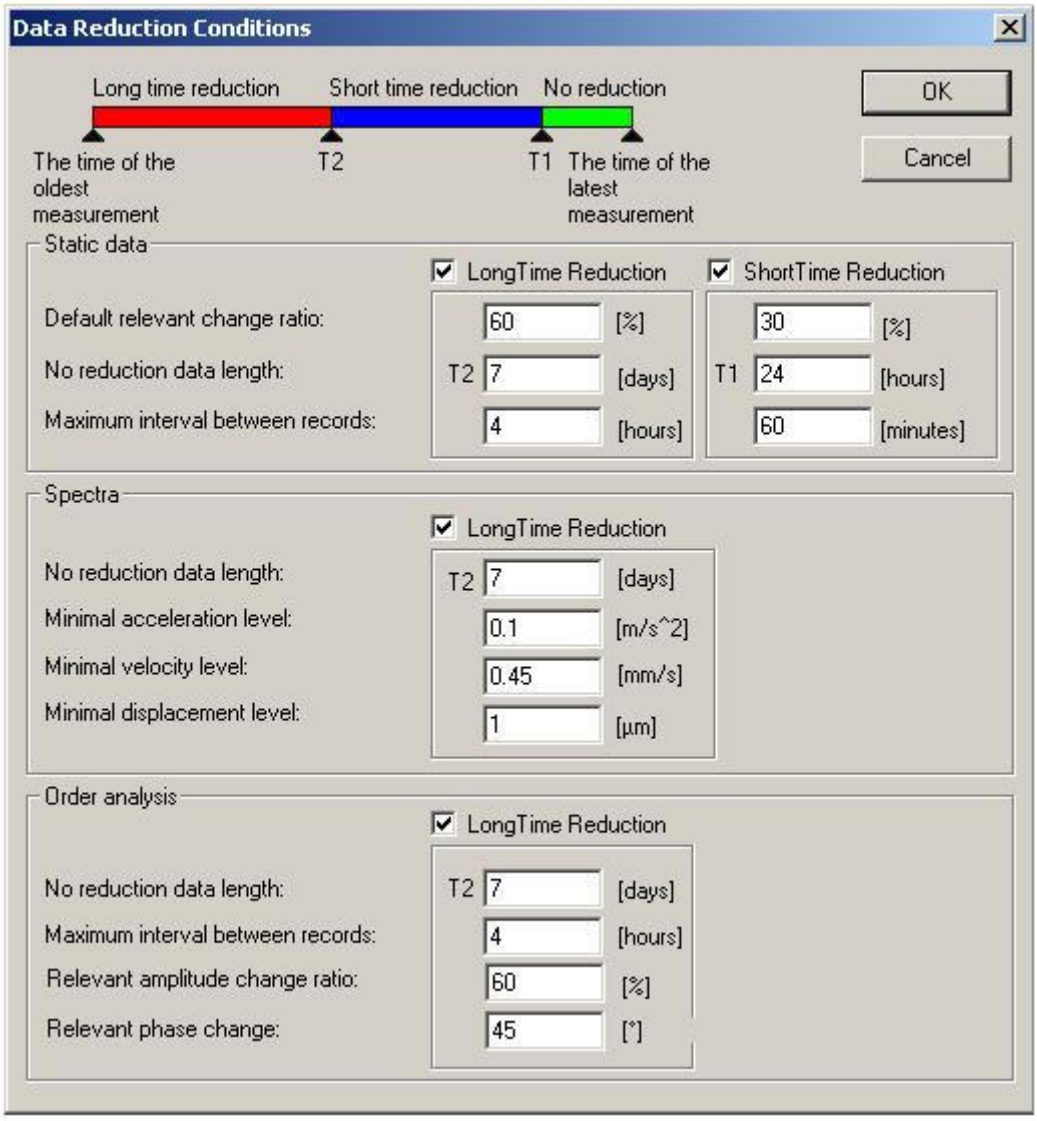


Button “Database” next to the viewscreen is new feature in DDS2010. If you are using the online system like MMS6850 it is creating more databases(Normal/Abnormal/Template) with the same structure as the original one. You don’t need to create the same viewscreen for each databáze, but you can use viewscreen created on one database on other databases with the same structure. Just select which viewscreen to use and press “Database”. It searches the SQL server for the similar databases and gives the list.

Data Reduction

During the DDS system use, a considerable amount of data accumulates in the database. Each user usually works only with recent data and only seldom returns to the old data. Nevertheless, old data may not be erased since their future use cannot be excluded.
Before Data reduction, it is necessary to unlock this function in ***Options - Global options-data reduction allowed.***
Data reduction global conditions are entered from the main menu by selecting ***Options - Data Reduction***.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz



An important element for reduction setting of static data is the ***Default relevant charge ratio*** in %. Thus, the user says that if consecutive measurements differ less, then they can be considered the identical value. As a result, every measurement does not need to be saved in the full format but reference to the previous measurement is possible. This manner is sometimes called dynamic storage or storage based on an important change.
The DDS system also offers the possibility of defining the ***No reduction data length***. Now you have all data in the full format available (i.e. with the original measured precision), data reduction is applied only to older data.
The last definition is the ***Maximum interval between records***, for instance, 8 hours when after this time the full signal will be saved, regardless of the change value.

Reduction setting of spectra and order is simple too.

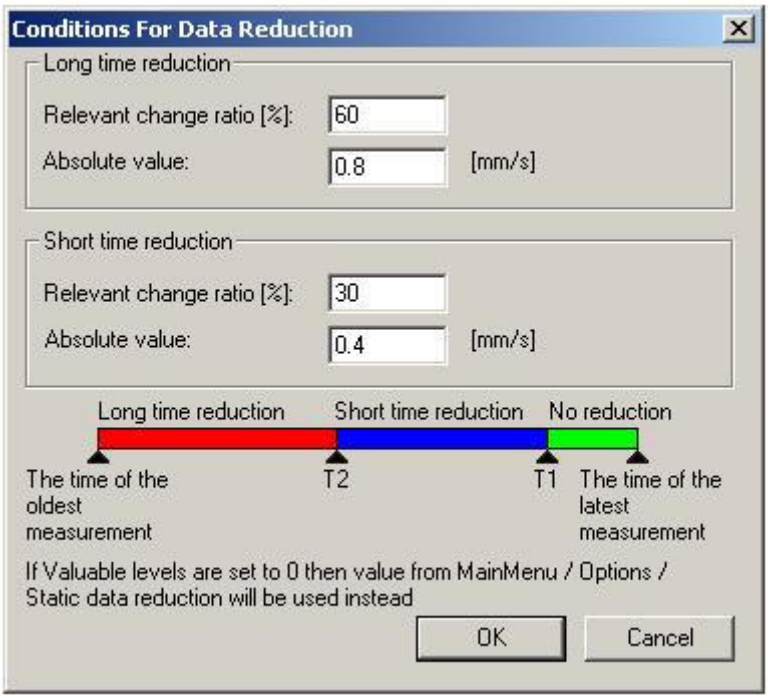
In static data, the ***No reduction data length*** and ***Maximum interval between records*** are defined here as well.
In spectra there are defined ***Initial acceleration, velocity and displacement level*** to settings minimum signal value reduction.
In order analysis there are defined ***Relevant amplitude change ratio*** (%) and ***Relevant phase change*** (°). They are analogous to ***default valuable change ratio*** in static data.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

For static data there are forms of short-term and long-term reductions, which enable to define a total of three reduction bands (no reduction, soft reduction and hard reduction). For spectra and order analysis is available long-term reduction.

The initial reductions are long-term, short-term reductions are not available in the initial setting (only 0 in parameters).
It applies to both the types of measurement that always data remain where the status of the operating condition changed.

This data reduction setting for a static data cell may be individually specified in the ***Edit Data Cell*** window (***local menu - Edit Data Cell - Data reduction***). Local setting has priority to global setting. That is defined ***Absolute value*** to set the fixity of reduction. ***Relevant change ratio*** is analogous with global menu.



The reduction is accessible from ***tree local menu - data reduction*** anywhere in tree. This function allows multiple data cells reduction.

Online Options

These are options used if the system works with the OnlineDataManager (ODM) application. See also the ODM manual.

Online Exports

Database Export Enabled – this enables database export for data storage from ODM to the Access type database if the *limit database size* is exceeded.
Database Limit Size – database size for data storage from ODM when old data are exported and erased from the database.
Keep x Hours after Data Export – this determines how old data will be exported

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Start Export Control at – exports are started once a day at this particular hour
Route to Exported Files – this determines the location where exports will be stored

Static Trend Redrawing – an interval after the expiration of which the displayed static trends are redrawn. This applies only in case of operator's inactivity, otherwise user interface (mouse, keyboard) is applied, redrawing being continuously postponed. Manualy it can be triggered by pressing the F6 key. Opened graphs of dynamic data can be reloaded by pressing F7(this may take a while).

Automatic Window Closing – if for this period of time operator's work with user interface (mouse, keyboard) is not registered, all windows are closed.

Global Options

This dialogue ensures the setting of new global options.

5-day week – this option says how to evaluate the expired term of measurement in the route terms control – "on" means a week without Saturdays and Sundays, "off" means that measurements are carried out all the week long, including Saturdays and Sundays. For example if the date of route is set for three days and last route is on Thursday, then:
- if this option is activated, DDS program will not report expired measurement interval on Monday
- if this option is not activated, DDS program will report expired measurement interval on Monday

Export of static data from an A4101 enabled

Data reduction allowed - allows data reduction of static data and spectra.

Number of repeats when playing sound in the loop – sets how many times sound record will be played. Repeats follow without interruption. This function is suitable especially for very short records.

Integrity test upon database open - the database static data cells are checked against real length during database open, which avoids loss of data in case of the database or application failure.

Rectangular window for FFT - if set rectangular window is used during all FFT calculations performed in the application

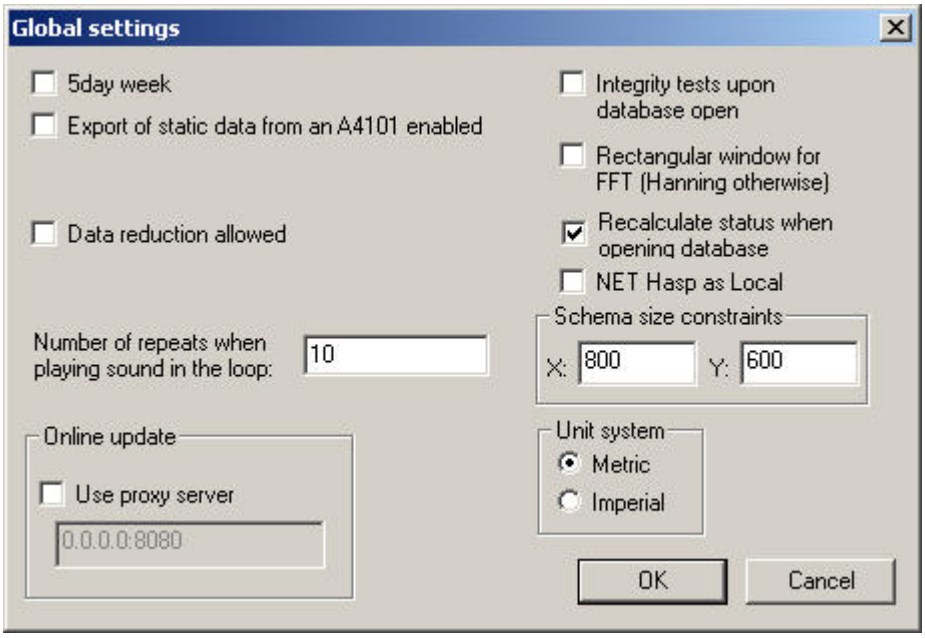
ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz

Recalculate status when opening database

Scheme size constraints – sets maximum scheme size for display

Unit system – selects units system between Imperial and Metric system. Only pre-defined units will change. User-defined units will no change (e.g. when you create a data cell).

NET Hasp as Local – makes searching for NET HASP faster. You could check this box if NET HASP is connected to your local computer and searching for it takes a long time.



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For next technical and contact information visit www.adash.net, www.adash.cz