User manual

SKF @ptitude Observer

User Manual Part No. 32170900-EN
Revision L
Observer 10.1

WARNING! Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual can result in serious injury, damage to the product, or incorrect readings. Keep this manual in a safe location for future reference.

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1
Introduction

@ptitude Observer is a core platform in a family of reliability software applications that work together as SKF @ptitude Monitoring Suite. It is for data management and analysis of measurement data for condition monitoring, internationally acknowledged for its versatility, performance and user friendliness.

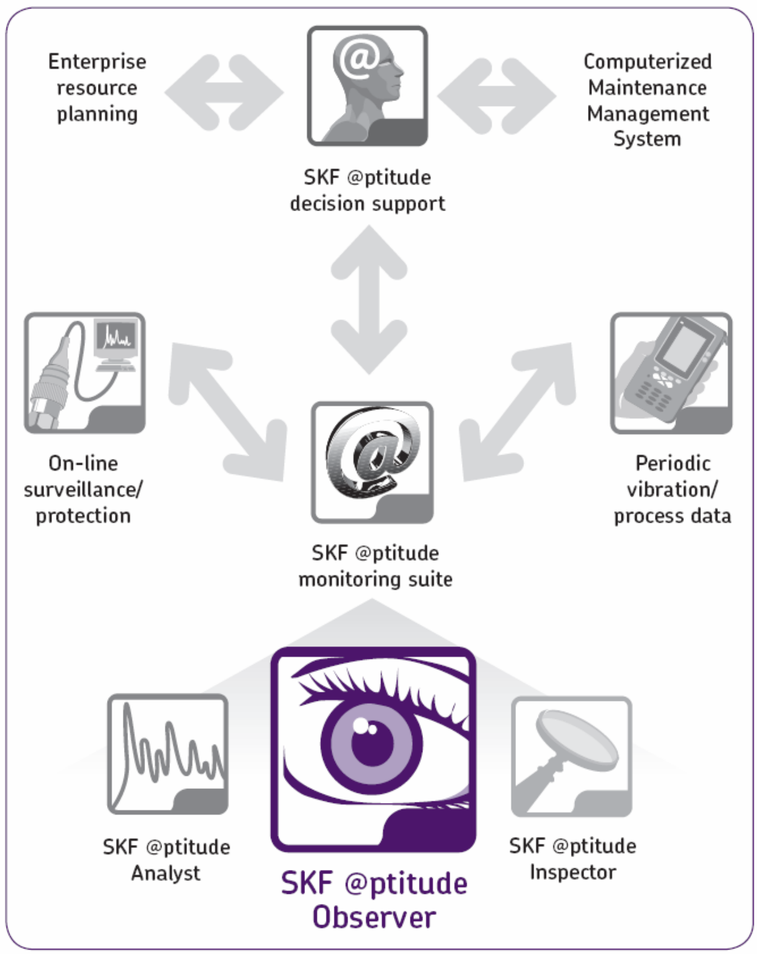


Figure 1 - 1.
SKF @ptitude Monitoring Suite.

@ptitude Observer is Microsoft Windows® -based and supports most of the Windows based systems.

@ptitude Observer supports the following data acquisition devices (DADs):

- MasCon16
- MasCon16R
- MasCon48
- MasCon48P
- IMx-B
- IMx-C
- IMx-M
- IMx-P
- IMx-R
- IMx-S
- IMx-T
- IMx-W, WindCon
- Microlog CMVA series
- Microlog CMXA 50
- Microlog AX
- Microlog GX
- RB06

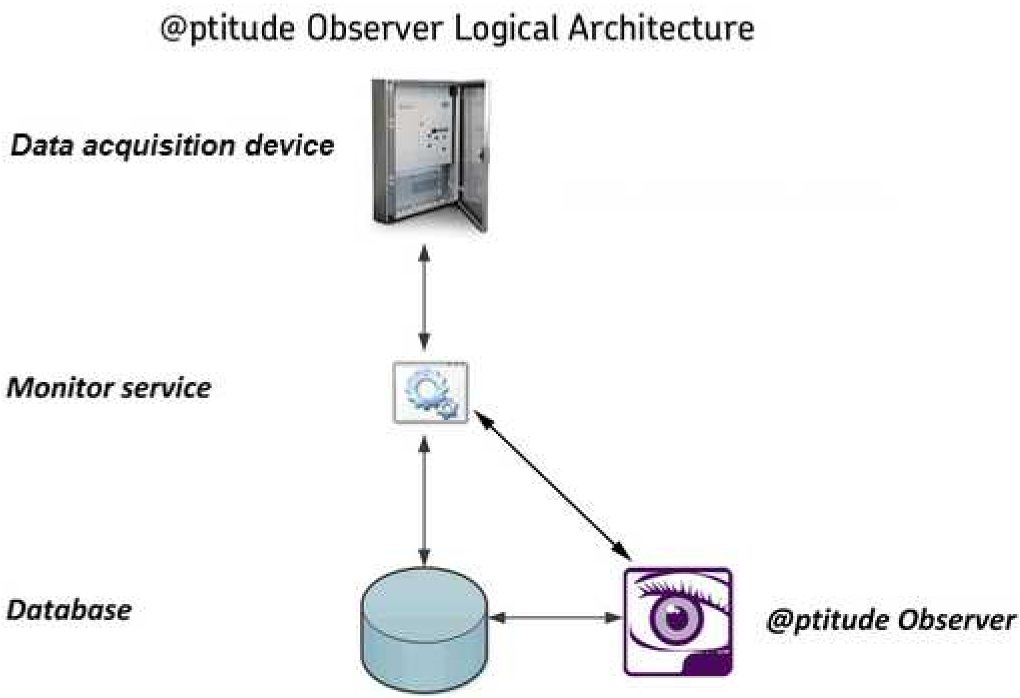


Figure 1 - 2.
SKF @ptitude Observer Logical Architecture.

The operator interface is predominantly based on graphical communication. Operator input like mechanical machine characteristics are also set up graphically and all disturbance frequencies are obtained automatically. The system also has tools for machine diagnostics.

Communication Possibilities

The communication possibilities are almost unlimited. Standard TCP/IP interface allows easily adopted communication through TP cable, fiber optics, two-lead copper wire, wireless LAN, GPRS, ISDN, etc. The system works in a separate network as well as in an existing factory network. Internet can also be a link between IMx/MasCon devices and the @ptitude Observer Monitor as well as between the @ptitude Observer Monitor and @ptitude Observer clients.

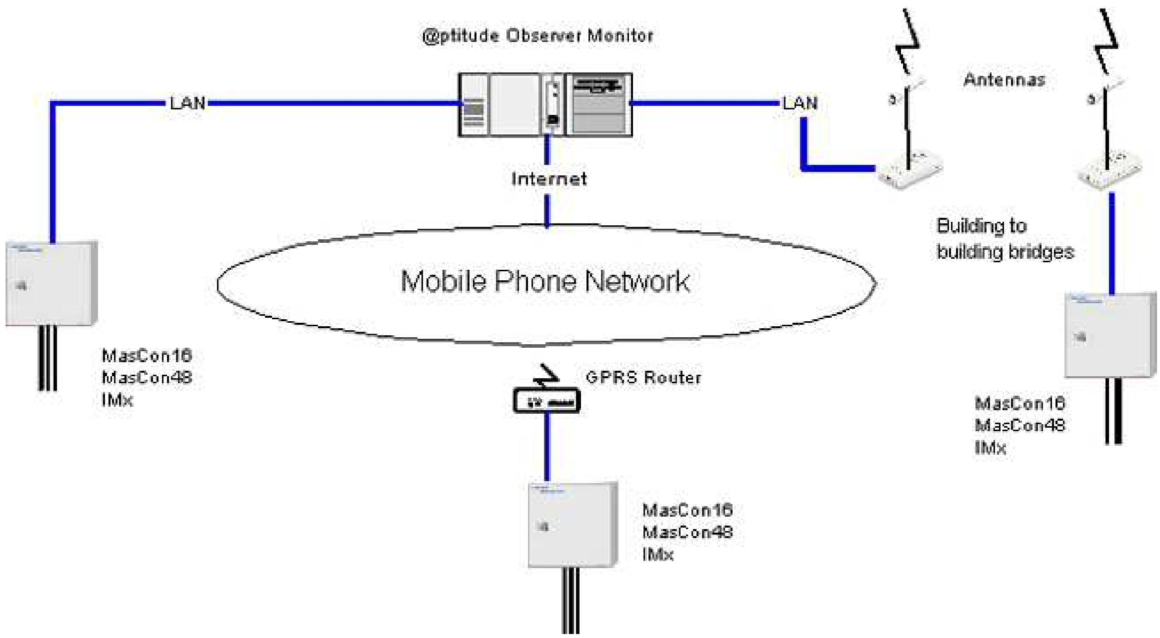


Figure 1 - 3.
SKF @ptitude Observer Communication Possibilities.

Remote Monitoring Possibilities

With @ptitude Observer Monitor and an Internet connection, it is possible to set up @ptitude Observer clients anywhere in the world.

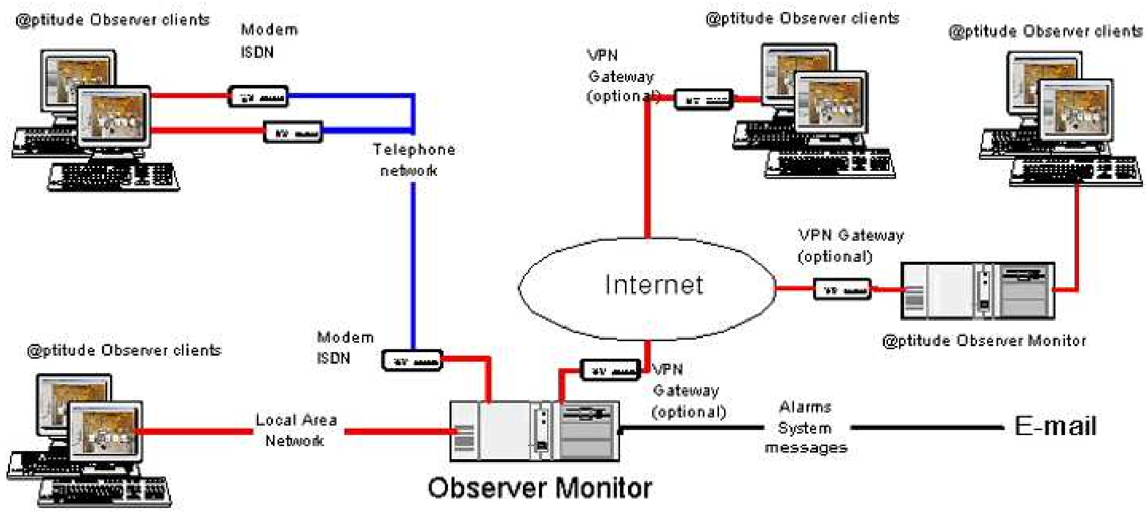


Figure 1 - 4.
SKF @ptitude Observer Remote Monitoring Possibilities.

IMx/MasCon devices are linked to a network which is connected via a modem or LAN to an @ptitude Observer Monitor connected to an SQL database. The @ptitude Observer Monitor in turn can be connected to a LAN network, for example. Several @ptitude Observer clients may be linked to this network. The @ptitude Observer can also be installed on the same computer as the @ptitude Observer Monitor service.

Through a general interface such as OPC, it is possible to link the @ptitude Observer Monitor to an existing control or processing system. The @ptitude Observer Monitor, @ptitude Observer clients and the database can be separated physically from each other as long as they are on the same network where ODBC (open database connectivity) calls can travel freely.

Network Connectivity Requirements

- Each IMx/MasCon device needs a communication path to the @ptitude Observer Monitor which must be TCP/IP compatible.
- The following connection technologies are some of the examples that can be used:
  - Fiber optics
  - Pair copper wire (<1 Km)
  - ADSL (asymmetric digital subscriber line)
  - DSL (digital subscriber line)
  - Internet
  - 128K ISDN (integrated services digital network) dial-up connection
  - GPRS (general pocket radio services)
  - Standard Ethernet network

Important - An on-line condition monitoring system like IMx/MasCon together with @ptitude Observer can be successfully operated only on an installed and tested network infrastructure. Even though the IMx/MasCon devices as well as the @ptitude Observer Monitor are equipped with several fault tolerant routines and procedures, they can ultimately be only as reliable and effective as the network to which they are connected.

2
Technical Specification

Hardware Connectivity

IMx is a series of on-line monitoring systems with dynamic/static inputs, digital inputs and digital outputs with simultaneous measurement on all channels up to 40 kHz in one 19", 6 U rack. The available number of inputs and outputs varies depending on the type of the data acquisition device.

MasCon16 is an on-line monitoring system with 16 dynamic/static inputs, 2 digital inputs, 4 digital outputs.

MasCon48 is an on-line monitoring system with 48 channels and 4 configurable interface cards, also available as a portable device.

SKF Microlog is a portable data collector for single or multi channel measurements.

Data Processing

- On-line data acquisition from IMx/MasCon (Ethernet, TCP/IP).
- On-line process data through OPC (object linking and embedding for process control).

Configuration Features

- **Hardware interface settings** for each IMx/MasCon device are configured by means of alarm hysteresis and types of interface cards. Each channel of the hardware is configured by the type of signal, gain, BIAS voltage limits, and correction factors for run-out and linearity.
- **Measurement points**. The following are the measurement point types that can be configured.

  Dynamic based measurement points

  – Dynamic

  – Dynamic, AEE

  – Dynamic, Envelope

  – Dynamic, Process

  – Harmonic

  – SEE® (spectral emitted energy)

  – Time Waveform Analysis

- Time Waveform Analysis, AEE

Trend based measurement points

- Counter
- Counter rate
- Data tagging
- Derived
- Derived point
- Digital
- Gear inspector
- HFD (high frequency domain)
- OPC (object linking and embedding for process control)
- Process
- Running hours
- Shaft centerline
- Speed
- Speed from spectra
- Time difference
- Torsion

Analysis Features

FFT (fast Fourier transform) analysis is the classic way of analyzing vibration data where the vibration signal is shown as a function of frequency. Frequency ranges from 0 to 10 Hz up to 0 to 40 kHz and resolutions from 100 to 6 400 lines can be used.

DPE (digital peak enveloping) analysis is an excellent method to detect small impulses such as bearing defect in a noisy environment.

Bearing database stores geometrical data from approximately 20 000 different bearings from several different manufactures. It is used for automatic defect frequency calculation.

Machine diagnostics expert system uses a rule based diagnostic system for automatic frequency analysis which gives clear text messages regarding fault type.

Graphic tool for machine data setup is used to define all mechanical data for defect frequency calculation as well as machine diagnostics. The whole drive chain is set up graphically by using drag and drop from a machine component toolbox.

Run-up/Coast down occurs when a machine is started or stopped. At such occurrences the system can be configured to store transient data according to the user defined conditions, like speed variations, set for the actual measurement group. During transients separate alarm conditions can be applied.

Time waveform analysis is a smart detection of time waveform signature pattern in order to identify and prevent errors that would normally not be detected by FFT analysis. The algorithms included are crest factor, kurtosis and skewness. Advanced analysis can be performed with the event capture capability of continuous pre and post data capture. The captured time waveforms enable detailed analysis of both very low (mechanical) and very high (electrical or generator related) oscillations.

Balancing is the on-line balancing of machines especially designed for turbines with 15 planes and 5 states with a maximum of 40 measurement points simultaneously.

Order tracking analysis is an efficient way to analyze machines with variable speed. Order tracking analyzes the speed measured on each shaft revolution as a means of adjusting the number of samples taken for that revolution. This process keeps the number of samples per revolution identical regardless of shaft speed.

User Interfaces

Hierarchy view shows machines and their measurement points in a tree structured hierarchy with corresponding status for each object. The hierarchy can display data from several databases at the same time.

System view shows the status from a hardware point of view which is based on IMx/MasCon devices, sensors and measurement points. It also shows communication status.

Workspace is a hierarchy view of user selected machine(s). It is an individual work space to keep track of only the machines for which the user is responsible. A workspace can span only one single database.

Diagram view saves all the settings of a graphic diagram including selection of measurement points as well as buffer settings. This is to be able to have predefined views of the data.

Protection view presents an overview of all the Protection devices and their status. It is also possible to synchronize the settings with the Protection device.

Graphic Displays

Any graphic display can be set in live mode and be updated whenever possible. The update rate is determined by the setup and time involved in capturing the actual data.

- **Spectra** shows the vibration amplitude as a function of frequency.
- **Time waveform** shows the vibration magnitude as a function of time and gives you the possibility to listen to the signal if a sound card has been installed in the computer.
- **Phase** displays the binary representation of phase data for the time waveform from -180 to 180 degrees.
- **History** displays historical data in a combined plot for spectra, time waveform and phase.

- **3D Plot** illustrates vibration spectra or envelopes as a function of time, shaft speed, power, temperature, torque or any other DC parameter.
- **Topology** illustrates frequency spectra versus speed or time by using color separation.
- **Orbit** displays the shaft orbital movement by using signals from two perpendicularly mounted transducers.
- **Profile** uses triggered acceleration time signal data to represent an un-roundness of any circular object.
- **Gear inspector** is used to visualize the impact energy as a function of shaft/gear revolutions.
- **Trend** shows vibration amplitude/phase or process data as a function of time, speed or other process data.
- **Bode plot** shows any type of data such as vibration amplitude/phase or process data as a function of speed.
- **Trend list** shows vibration amplitude/phase or process data as a function of time, speed or other process data as Trend but in a list.
- **Multi trend** overlays data from several measurement sources in a combined trend and bar graph. It is also possible to view data as a function of any of the other selected points.
- **Diagnosis** shows the built-in prognostic and historic fault detection algorithm calculations.
- **Polar** shows the vibration signal at 1, 2, 3 and 4 times the shaft speed in the complex domain.
- **Shaft centerline** displays shaft movement inside a bearing.
- **Combination plots** facilitates the analysis by combining displays into one graph showing related data.
- **Event Capture** is a measurement of a limited time waveform that can be used for continuous pre and post data capture.

Alarm

There are a variety of alarm features such as level alarm, trend alarm, vector alarm, diagnostics alarm, and circle alarm. Upon alarm, notifications can be automatically sent to the designated user(s) by e-mail or SMS (short message service).

- **Speed dependent alarm conditions** can be up to 15 primary alarms for each measurement point. These alarms can be at a fixed frequency, fixed frequency range, speed dependent frequency or speed dependent frequency range.
- **Speed or load dependent alarm level** can be fixed or set as a function of shaft speed or any DC measurement point for each alarm level. For each alarm condition there are two alarm levels for vibration measurement points and four alarm levels for DC measurement points.

- **Class dependent alarms** (for Dynamic and Dynamic Envelope points only) can be enabled as alarms dependent on the two Multiple Gating Point operating classes. This disables other alarms. Refer to **Enable class dependent alarms** for details.
- **Alarm group** can be created if a user wishes to collect data from other measurement points. When an alarm is raised the measurement data at that measurement point is saved in the database. If one of the measurement points in the alarm group generates an alarm, data on all the measurement points in that alarm group will be saved.

Report

PDF-based and Word reports containing alarm lists, notes, manual conclusions, trend data, diagnosis reports and condition monitoring statistics can be produced by Report Wizard.

System Integrity

- System alarms via e-mail or SMS messages.
- User defined system privileges and preferences for each individual user.
- Database management tool for database backup and database replication.
- Automatic hardware serial number verification.
- Error logs.
- Tracking of TCP/IP communication package errors.
- Hardware sequence number tracking.
- Missing data alarm

3
Getting Started

To start @ptitude Observer, first select a language at "Select language" screen.

If you have not registered your copy of @ptitude Observer yet, the "Unregistered version of Observer" screen will appear for you to take a necessary action.

If you click the **Enter license key** button the **License Key** screen appears for you to enter the license key. You may continue the session by clicking the **Continue unregistered** button. However, you will be prompted by the **Enter license key** screen from time to time throughout the session until you register the product.

Note that once you have selected a language and entered the license key, the selected language and the license key are saved and you will not be required to enter them again. The next time you start @ptitude Observer you will be prompted to select a database to be connected.

Database Connection

In order to run @ptitude Observer, a database must be connected. Refer to Manage Databases under File in Menu Items section.

Logon

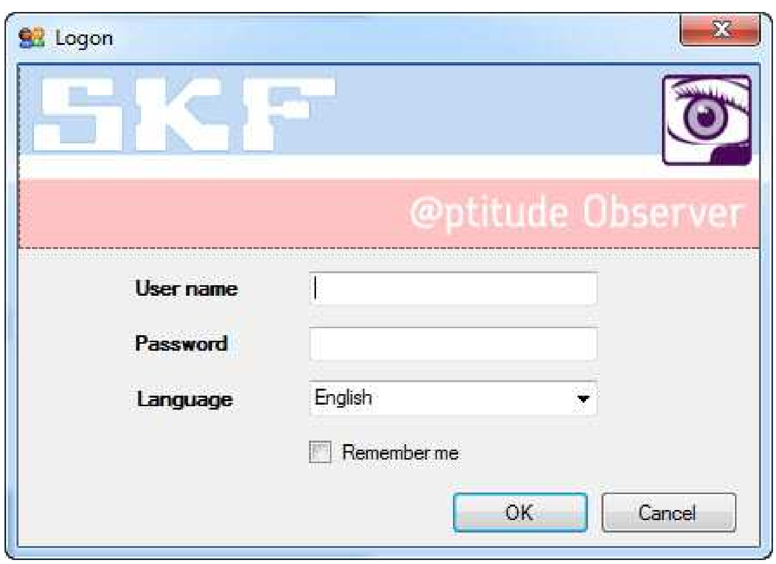


Figure 3 - 1.
Observer Logon.

A default user (User name/Password: “admin”/”admin”) can be used to start the system. However, it is strongly recommended to create individual user accounts for those who have the access to the system. It is necessary to have individual user accounts and rights in order to keep track of configuration changes.

The system will remember the user name and the password if the **Remember me** checkbox is marked.

Change Language Feature

You have the option to change the language of the application before it starts. After you enter your **User name** and **Password**, select your desired language from the **Language** list, and then click **OK**. The Observer application will initialize in the selected language.

- The language can be changed only upon starting up. When you terminate a session or log off without exiting, the **Language** list is disabled.

Figure 3 - 2.
Language Selection Capability.

Switching User Type at Logon

You can switch your user type at logon without exiting the application. For example, you may have logged on as a process user and then found you needed to make a change requiring administrator privileges.

To do this, you can log out as usual by going to **File** > **Logout . Or, from the** Process overview workspace. right-click and select **Log off** from the menu. You are prompted to confirm that you are logging off. Click **Yes**.

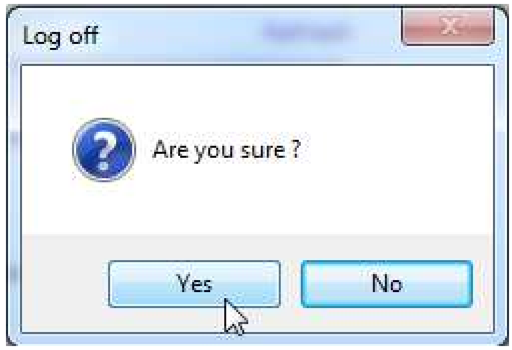


Figure 3 - 3.
Log off confirmation.

You are then logged off and the **Logon** dialog opens automatically. Log on as a different type of user, such as Admin, to perform your tasks.

DASHBOARD

After a successful logon, the "DASHBOARD" screen will provide Notifications, News Feed and Message Center interfaces.

Refer to Dashboard under Show in Menu Items section.

4
System Configuration

This chapter describes the configuration of @ptitude Observer, how to get the analysis work started quickly and how @ptitude Observer works as a condition monitoring system.

The configuration of @ptitude Observer is usually performed when the system is installed, however changes can be easily made.

Prior to analyzing measurement data, @ptitude Observer must be configured according to the particular plant and its machinery. It is important that all machine parts as well as measurement points are located at the correct positions.

Recommended System Configurations

To get a system up and running properly the following system configurations should be covered.

- **Build a hierarchy view** by creating necessary plants, mills and machines in order to organize your condition monitoring system.
- **Define hardware devices** such as input boards, sensors, signal characteristics, etc. for each device and channel.
- **Define machine parts** by defining the drive line for each machine. All shafts, bearings, gear wheels, drive belts, impellers along with other machine parts, are connected to a drive line. Based on these inputs the system can calculate all defect frequencies within the whole machine.
- **Set up measurement points and alarms** in order to get the data into the system. For on-line systems such as MasCon, you can define multiple measurement points per channel if needed.
- **Build a process overview** on on-line condition monitoring systems which can allow you to view live data as they are coming in. IMx/MasCon devices allow you to measure and send data faster than other on-line data acquisition devices. @ptitude Observer enables the creation of user defined displays with measurement points and links to other displays on top of graphic pictures like drawings, digital photos, etc.

Building a Hierarchy View

The idea behind the hierarchy view is to achieve a logical grouping of all the measurements and their positions related to one another.

The hierarchy view consists of the following attributes:

- Database
- Node
- Machine

- Sub machine
- Meas. point

Event capture groups also display in the hierarchy view. The event capture group supports limited time waveform points and continuous pre and post data capture. Each IMx unit can have only one event capture group, which will display before other points in the machine's hierarchy. Event capture measurement points display as children of the event capture group. Refer to **Measurement Groups** for information about the creation and configuration of event capture groups.

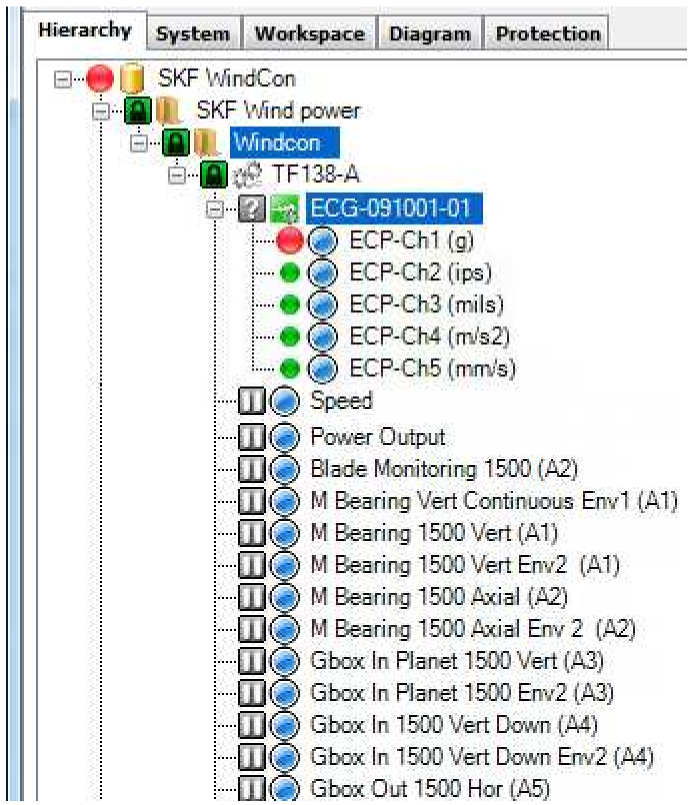


Figure 4 - 1.
Example of the Hierarchy View.

Database

Database is the logical top level of the hierarchy view with nodes, machines, sub machines, measurement points, machine parts and machine properties underneath.

The main database gets added to the hierarchy view as a top level when a database is selected from the list of registered database connection on local computer via Connections interface under Manage databases in File menu item.

External databases can be added to the hierarchy view as a top level via Add external database interface in File menu item.

Node

Node is a logical grouping of machines which can be a top node or located within any other nodes. The number and level of nodes are unlimited.

To create a Node:

- First select a node or a database in which a node is to be added in the hierarchy view.
- Click on the right mouse button, select **Add**, then **Node**.
- On the properties screen, enter the name of the node and its description.

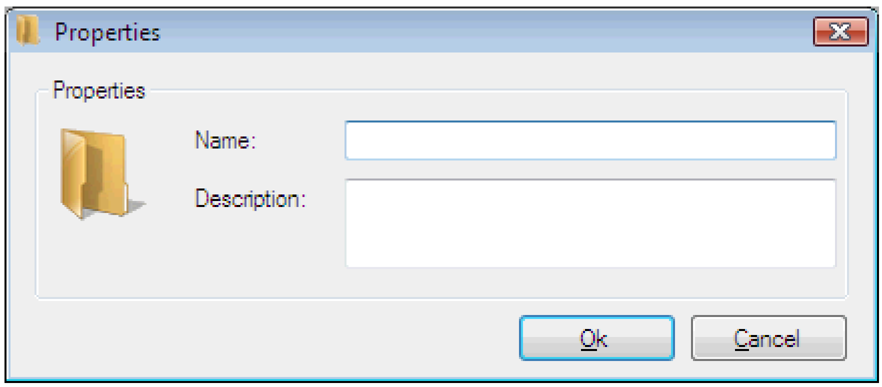


Figure 4 - 2.
Create a Node.

Machine

Machine is located in a particular node, for example, Fan 2, Pump 3a, etc.

To create a Machine:

There are different ways to create a machine.

1. First select a node or a database in which a machine is to be added.
2. Click on the right mouse button, select **Add**, then **Machine**.

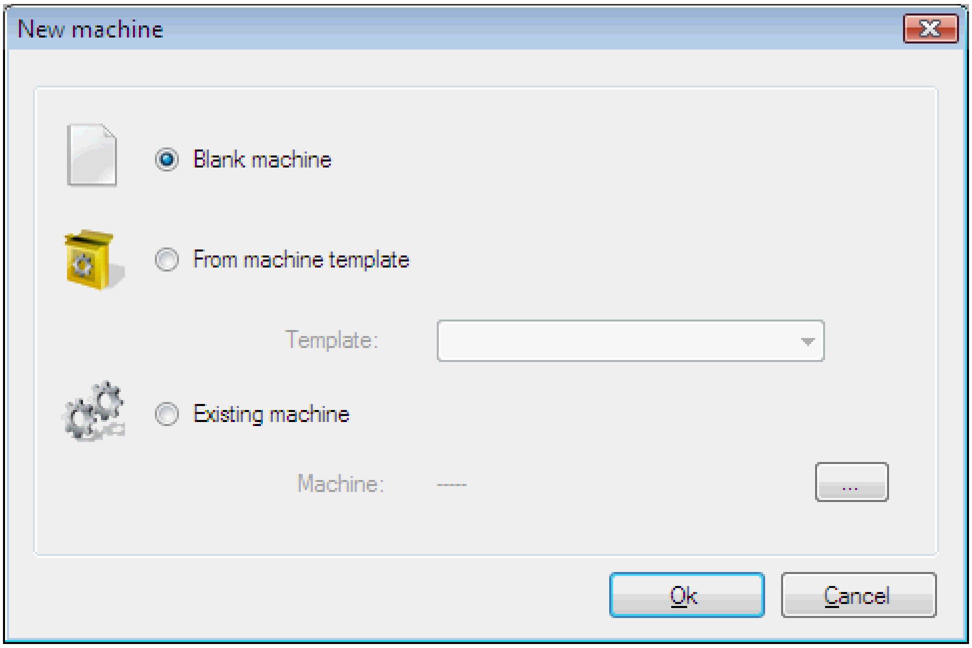


Figure 4 - 3.
Create a Machine.

- Creating a machine from scratch.
  - Select **Blank machine**, then click **Ok**.
  - Enter the machine properties in General and Extended Information screens. Refer to Machine Properties under Creating IMx/MasCon Devices and Channels in System Configuration.
- Creating a machine from a template.
  - Select **From machine template**.
  - Choose a **Template** from the drop-down list.
  - Click **Ok to** launch the Machine Copy Wizard to help you with the process of copying a machine to a new location. Refer to Machine Copy Wizard in System Configuration.
- Creating a machine by copying an existing machine.
  - Select **Existing machine**.
  - Click the ellipses button and then select a machine from the displayed hierarchy view.
  - Follow the instructions in the Machine Copy Wizard section in System Configuration.

Sub Machine

A sub machine is a sub section of a machine.

To create a sub machine:

- First, select a machine in which a sub machine is to be added in the hierarchy view.
- Click on the right mouse button, select **Add**, then **Sub machine**.

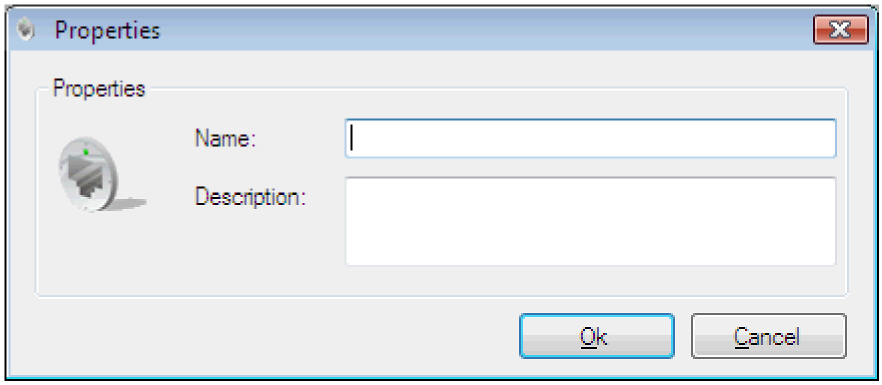


Figure 4 - 4.
Create a Sub Machine.

- On the properties screen, enter the name of the sub machine and its description.

Measurement Point

Measurement point is a measurement that should be captured on a machine. Here a type of sensor, position of sensor, resolution, frequency range, etc. are specified.

Creating Measurement Points

Refer to Setting up Measurement Points and Alarms in System Configuration.

Creating IMx/MasCon Devices and Channels

This section shows you how to set up and edit IMx/MasCon devices and their corresponding channel layouts for the selected database.

Channels must be initiated before they can be assigned with measurement points.

The number of channels is dependent of the device type. (This applies to a Slot of an IMx-M device)

- Each WindCon or MasCon16 device has 16 channels of the vibration/analogue type and 2 channels of the speed/digital type.
- An IMx device typically has 16 dynamic/analogue channels and 8 digital channels.
- An IMx-M protection device consists of 4 modules. Each module has 16 analogue channels and 8 digital channels.
- Each fully equipped MasCon48 device has 32 channels of the vibration/analogue type and 16 channels of the speed/digital type.

To get to IMx/MasCon devices screen:

- First, click **On-line** on the toolbar.
- Select **IMx/MasCon devices**.

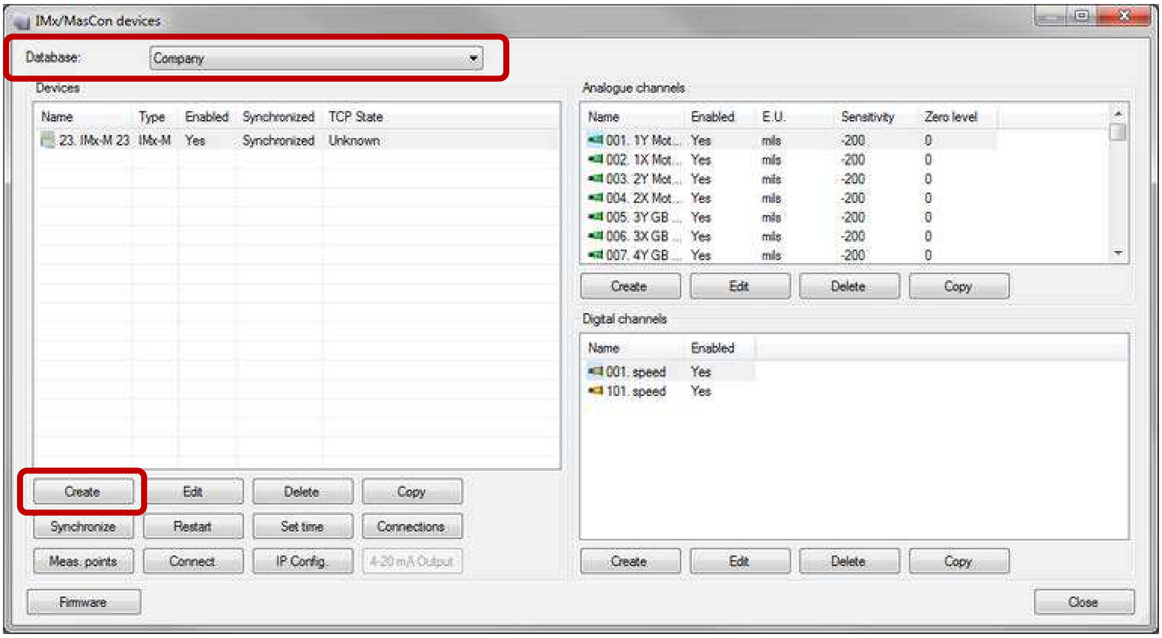


Figure 4 - 5.
Example of IMx/MasCon Devices.

- Select a database.

Create Device

Click the **Create** button below the **Devices** table to create a new device for the selected database. On the **New device** dialog, select the **Type** of device you intend to create. A screen for creating the new device appears.

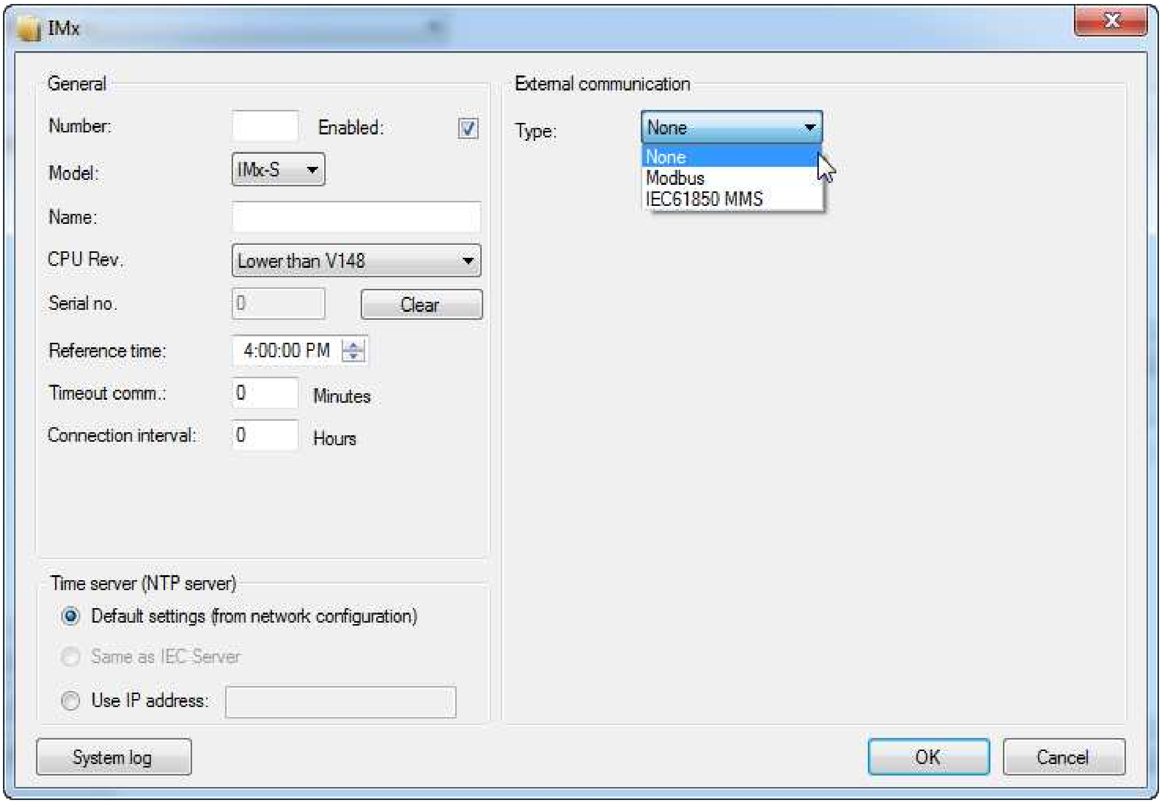


Figure 4 - 6.
Example of Create IMx Screen.

The following attributes are available for creating a device. Note that different attributes are available depending on the type and model of the device you have selected.

Number is a unique number of the device.

Enabled indicates the status of the device; whether it is enabled (if checked) or disabled.

Model is the model of IMx device you are configuring.

Name is a free text name that can be used to identify the device.

CPU Rev. specifies the IMx memory card size. Select *Lower than V148* for a 32MB card or *Higher than V148* for a 64MB card.

Serial no. (available for IMx/MasCon16 only) displays the serial number that this device should have. This is to enforce data integrity.

When a device is set up it will get the serial number "0".

When a device connects for the first time, the serial number of that device will be stored automatically in the database.

The next time any device connects with the specific device number the device is challenged for a serial number match. If serial numbers mismatch the device is not allowed to connect to the monitor service and a system alarm will be generated to the user.

If the device is replaced or the CPU board of the device is replaced it is necessary that the serial number is reset by clicking the reset button.

Reference time is a parameter that can be used to spread out workload in @ptitude Observer environment by setting the execution time of daily-based work.

Timeout comm. (communication) is an interval of time in minutes used to generate a system alarm if there was no communication between the device and the @ptitude Observer Monitor for the duration of the given interval of time.

Connection interval is an interval of time in hours when a connection should be established between a IMx/MasCon16 device and @ptitude Observer Monitor. It is used, for example when using ISDN (integrated services digital network) routers.

External communication is available for MasCon16 and IMx devices. It is used to configure the functionality of the selected external communication type on the device.

When @ptitude Observer has the license module “IEC 61850” installed, the option of configuring External communication as IEC 61850 MMS is enabled. The following IMx models allow the External communication **Type** to be **IEC61850 MMS**: IMx-W, IMx-C, IMx-S, IMx-T and IMx-B.

- IEC 61850 is a standard for the design of electrical substation automation. IEC 61850 is a part of the International Electrotechnical Commission's (IEC) Technical Committee 57 (TC57) reference architecture for electric power systems.

If you try to select **IEC61850 MMS** as the **Type** but do not have the appropriate device model or license key, a message will state: To use this feature an extension of your license key is required.

Type can be *None*, *Modbus*, *Modbus/RTU*, *MVB*, *TSI*, *Protection* or *IEC61850 MMS*. The available types vary depending on the type and model of the selected device. Note that if type is set to Protection, then the virtual channel functionality will not be available.

Bps defines the speed of Modbus.

Parity provides Modbus data validation which can be set to *No Parity*, *Odd Parity* or *Even Parity*.

Stop bits defines the number of stop bits in use for Modbus. It can be *1* or *2*.

Mode is either *Modbus Slave* or *Modbus Master*.

Slave address is the Modbus slave address with which the Modbus master communicates.

Parameter is application specific and is required only for MVB, TSI and Protection types.

Interface card is a hardware configuration card which is required for MasCon48 only. Four different cards can be selected and each card has 8 channels.

AC/DC 25 V: for analogue inputs, for example when a device is equipped with Bentley probes.

AC/DC 15 V: for analogue inputs, for example when a device is equipped with accelerometers.

DC: for a device with temperature and pressure sensors.

DC Isol (isolated): for a device with an external signal such as an input motor load.

Time server (NTP server) enables you to configure the Time server (NTP server) for an IMx device. NTP stands for Network Time Protocol, which is an Internet protocol used to synchronize computer clocks to a specified time service. (See figure below.)

Default settings (from network configuration) uses the NTP Server parameters specified in the network configuration file downloaded through the serial interface. See **time synchronization thresholds** for details about setting up threshold alarms.

Same as IEC Server If you select this option, you must identify the IEC server you want to use. In the External communication section, select the **Type** as **IEC61850 MMS**. Next, check **Client Enabled**. Enter the **Server address**, which is the IP address of the IEC Server.

Use IP address enables you to configure the IMx device's NTP IP address to use the same NTP service as the machines (turbines) it is monitoring.
For example, IMx A is monitoring Machine 1. Machine 1 is an NTP client of an external NTP service. If you enter the NTP server address of IMx A to point to the same NTP service as Machine 1, the timestamps from Machine 1 and IMx A will be aligned. See **time synchronization thresholds** for details about setting up threshold alarms.

System log is a record containing all the historical configuration changes made to the device.

Edit TSI Config is available for IMx-R devices only. It allows you to configure IMx-R TSI part and MVB. For more information, refer to "IMx-R User Manual."

Configuring IEC External Communication

When @ptitude Observer has the license module "IEC 61850" installed, the option of configuring External communication as IEC 61850 MMS is enabled. The following IMx models allow the External communication **Type** to be **IEC61850 MMS**: IMx-W, IMx-C, IMx-S, IMx-T and IMx-B.

When IEC61850 MMS is enabled, you must configure additional **External communication** settings.

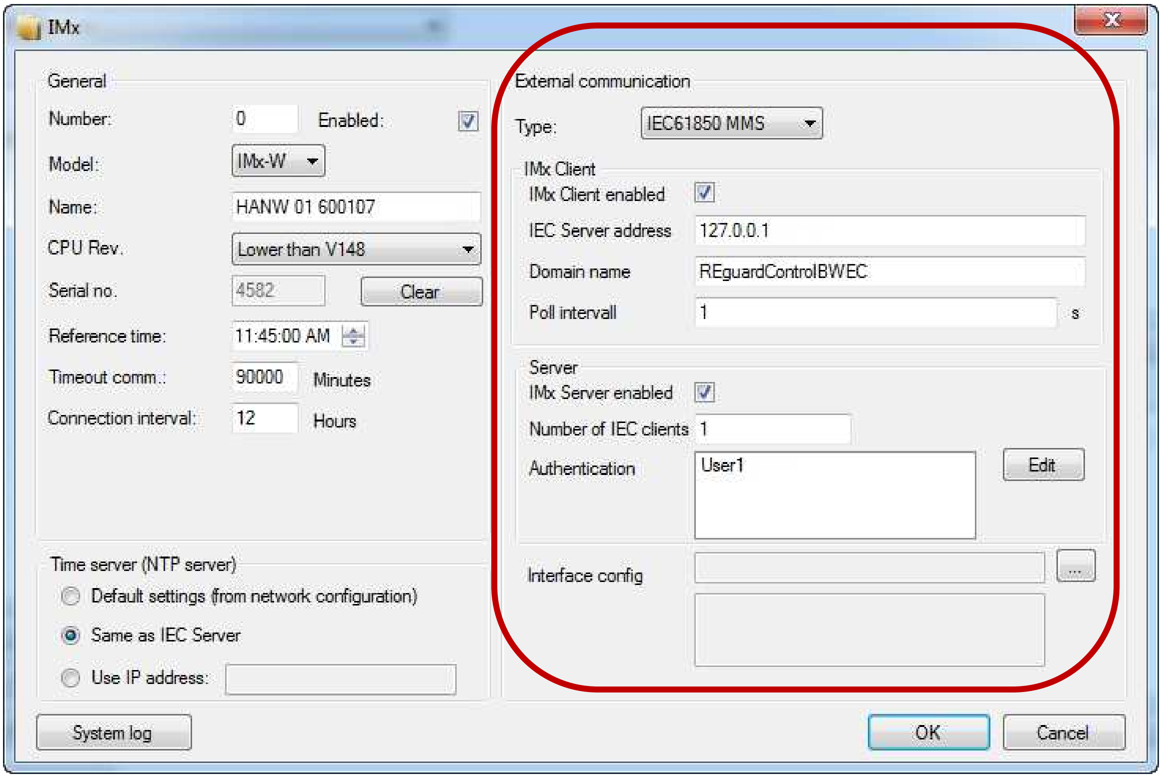


Figure 4 - 7.
Example of Create IMx Screen with IEC61850 MMS Enabled.

- Set up the IMx to communicate as a **Client**, requesting data from the IEC controller server:
  - Select (check) the **IMx Client enabled** checkbox to enable the IMx to communicate with the applicable IEC controller as a client.
  - Enter the IEC controller IP address in the **IEC Server address** text box.
  - Enter the IEC controller **Domain name**.
  - Enter the frequency, in seconds, with which the IMx will ask for data from the IEC controller in the **Poll interval** text box.
- Set up the IMx to communicate as a **Server**, providing data to the IEC controller server:
  - Select (check) the **IMx Server enabled** checkbox to enable the IMx to communicate with the applicable IEC controller as a server.
  - Enter the number of clients (up to three) that will connect to the IMx in the **Number of IEC clients** text box.
  - Click the **Edit** button next to the **Authentication** text box to access a **Password list** dialog, where you can add and manage up to three usernames and passwords for access to the applicable clients.

Figure 4 - 8.
Example of Password List Dialog.

- Click the browse (ellipsis) button next to the **Interface config** text box to locate and attach the appropriate parameters (.iec) file. This special file contains coded parameters that the IMx will require in order to successfully read and understand data from the server.

Once the IEC is configured, you can proceed with configuration of the appropriate virtual channels.

> ➢ The appropriate license key is required to make any change to the IEC external communication configuration. If the IMx device is already configured for IEC external communication but you do not have the appropriate license key, the external communication fields shown in the figure below will be read only.

Edit

Edit function allows you to change settings of an existing device of the selected database. The definitions of attributes are the same as in Create Device. You may edit any settings except **Number** field.

The following attribute is available only for Edit function:

Convert to IMx converts an existing MaxCon16 to an IMx device.

> ➢ Note that after the conversion, the device type cannot be reversed.

Delete

Delete function allows you to delete an existing device of the selected database. However, before a device can be deleted, all the attached measurement points and channels to the device must be deleted first.

Copy

Copy function enables you to copy all the settings of an existing device to a new device. However, you must select a unique device number for the new device from the list of system generated numbers.

Synchronize

Synchronize function enables you to synchronize the IMx/MasCon device of the selected database by sending a newly generated, complete setup file from the local database where setup changes are stored to a remote device such as a remote controlled IMx/MasCon16 device. The transmission is done by the @ptitude Observer Monitor service. If this fails because of an error or a lack of time, then the IMx/MasCon device will be indicated as not synchronized**.** Not synchronized means that the system is yet to download the newer setup to the device.

Restart

Restart function forces the device to execute a self diagnostics boot-up stage and reinitialize all the channels and setup information.

Set Time

Set time function sets up a time on a IMx/MasCon16 device of the selected database and adjust any incorrect date and time. Since IMx/MasCon16 devices do not use local computer time, this function is the way to synchronize devices' time to that of the computer from where the function was executed.

Connections

Connections function produces a log of connection histories of the device. The log can be used to solve intermediate connection problems for an IMx/MasCon device.

There are different types of messages:

- **Error**: indicates that a communication error exists. It can be that the communication between the device and the @ptitude Observer Monitor is not stable or is unreliable.
- **Unknown**: indicates that the @ptitude Observer Monitor service has been closed down unexpectedly, for example because of a power loss of the @ptitude Observer Monitor.
- **Monitor restart**: indicates that the @ptitude Observer Monitor service has been closed normally.
- **Normal**: indicates that the IMx/MasCon device has been restarted normally.

Measurement Points

Measurement points function enables you to change the enabled status of measurement points from the list of all measurement points available on the selected device. This is a useful function especially for MasCon48 Portable system to be able to change the status of measurement points using the same channels.

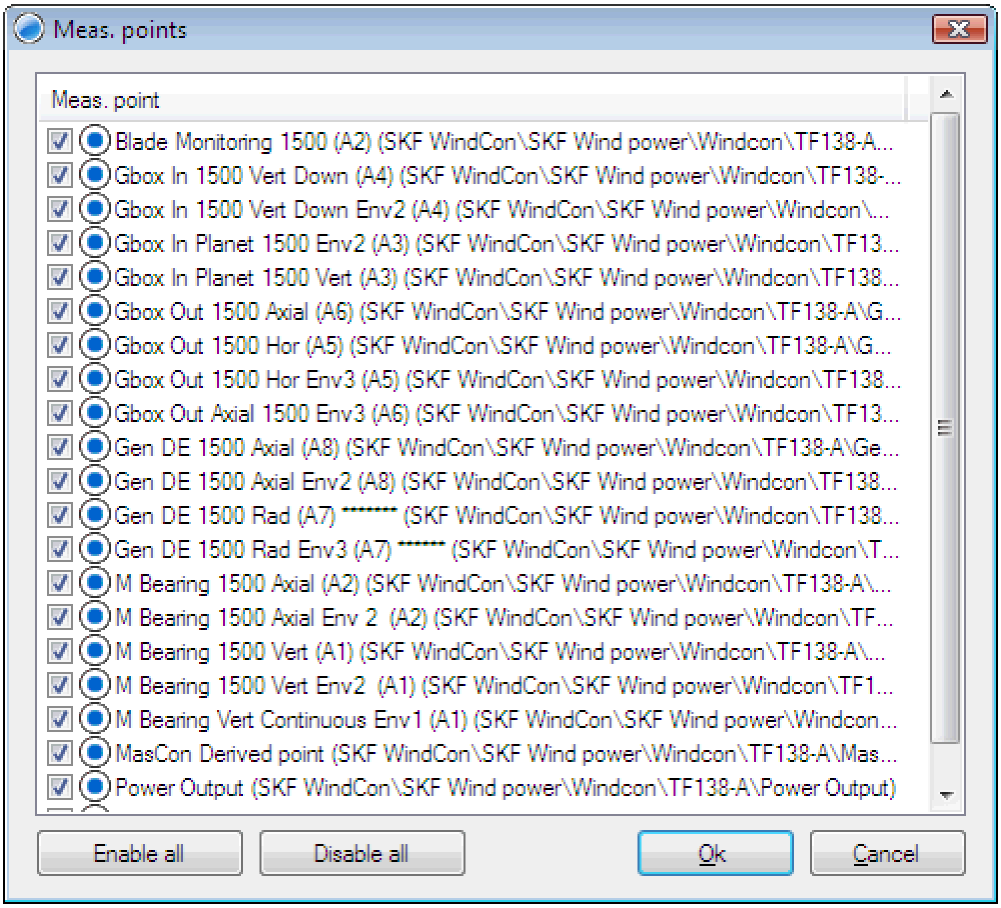


Figure 4 - 9.
Example of Measurement Points Status.

You can enable or disable individual measurement point by checking or un-checking each box. You can also change the status of all the measurement points at once by using the **Enable all** or **Disable all** buttons.

- Note that each type of device has individual limitations for the number of active points and the number of active vibration points. For more details see the manual for the specific device type.

Connect

Connect function is used to connect an IMx/MasCon16 device to the @ptitude Observer Monitor within the assigned duration of time (in minutes). The "Connect" function can be used when devices have been configured to only connect once a day to the Monitor service (by configuring the "Connection Interval" parameter). This can be useful when you would like to change the configuration or check vibration data of the device before the next scheduled connection time.

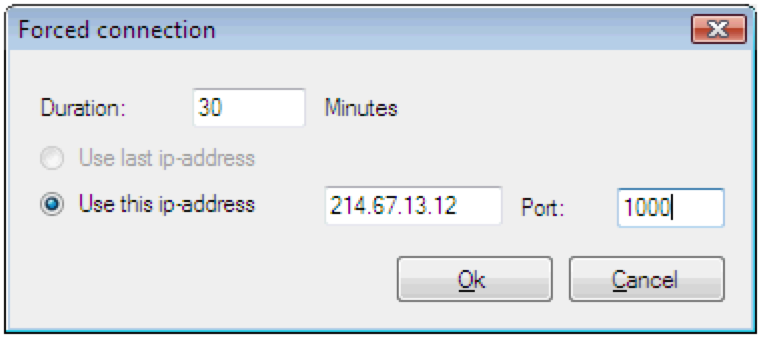


Figure 4 - 10.
Example of Forced Connection.

To communicate with the device between scheduled connections, the connection must be established manually from the server side through @ptitude Observer.

IMx/MasCon16 devices initiate communication to @ptitude Observer Monitor on TCP port 1000 which is the default port. However, do not confuse this with the @ptitude Observer Monitor port (configured through Observer On-line Device Configurator).

For example, use port forwarding to access devices behind a router;

- 11.22.33.44 port 1001 ---> 10.0.0.101 port 1000 for IMx #1
- 11.22.33.44 port 1002 ---> 10.0.0.102 port 1000 for IMx #2
- 11.22.33.44 port 1003 ---> 10.0.0.103 port 1000 for IMx #3

IP Configuration

IP Config. function sends a network configuration file to the selected IMx/MasCon16 device. To create an IP configuration that can be sent to a DAD (data acquisition device), the tool called On-line Device Configurator should be used. It is available in the Observer installation package and can be started from the start menu if it is installed. For more information, refer to "On-line Device Configurator User Manual".

4-20 mA Output

4-20 mA output can be configured for IMx-T. Channels can be initiated or edited with corresponding values of 4 to 20 mA along with an existing measurement point.

➢ More information can be found in "IMx-T User Manual".

Firmware

Firmware function opens up the firmware interface for the database where it is possible to add and update firmware for the different types of data acquisition devices available in @ptitude Observer such as IMx, MasCon16 and MasCon48.

The firmware is automatically sent to the DAD when the DAD connects to the @ptitude Observer Monitor service next time. This means that it is not necessary to go through every DAD and upgrade it manually. If you want to force all DAD to upgrade the firmware immediately, simply restart the @ptitude Observer Monitor service and force a restart of DAD by clicking on **Restart** as described in Restart in Creating IMx/MasCon Devices and Channels.

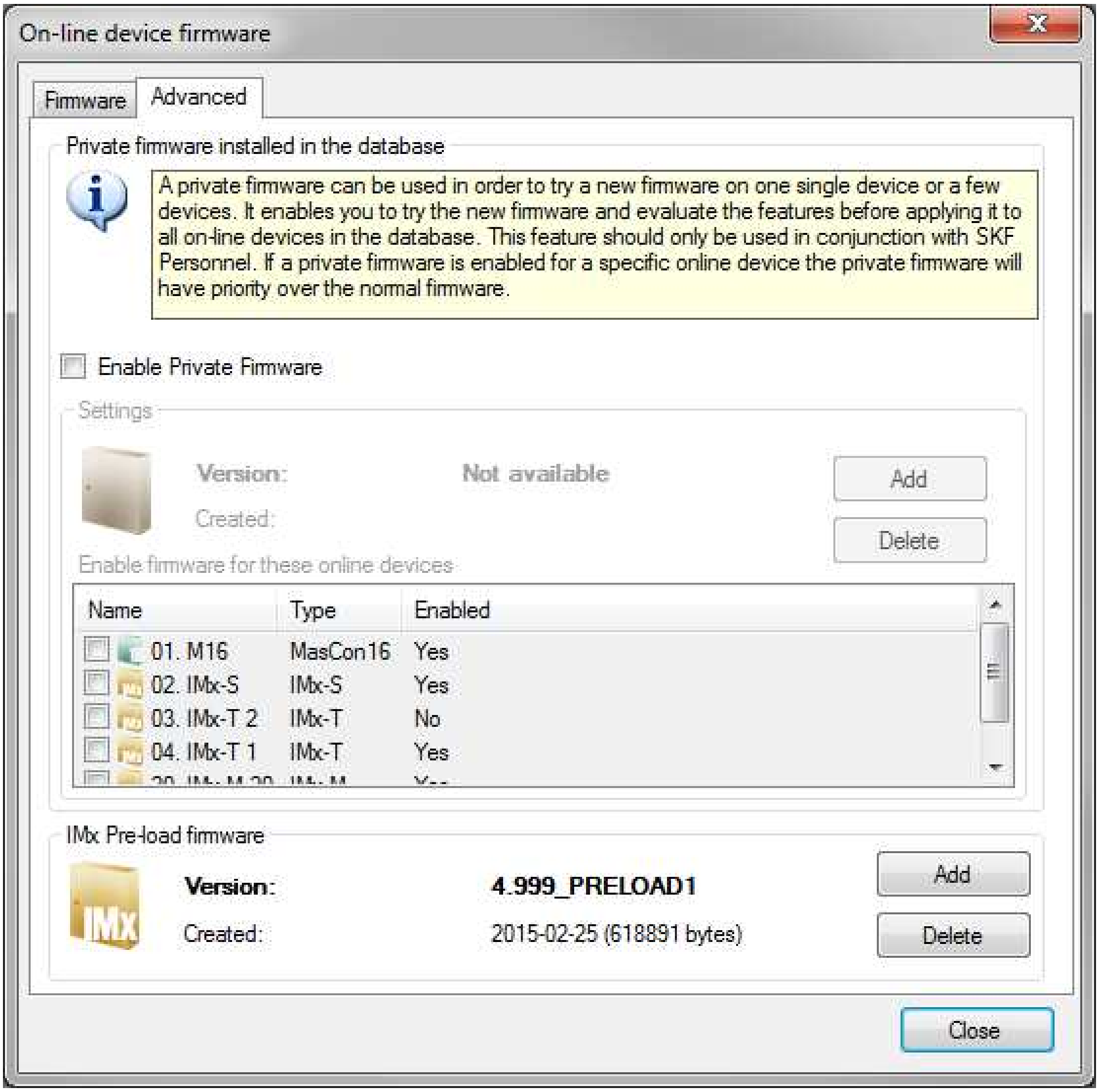


Figure 4 - 11.
Example of Private Firmware.

Private firmware can be used in order to try a new firmware on a single device or a few devices. It is mostly used to try out new firmware progressively before applying the firmware across all devices or to try features specifically designed for specific application.

- Private firmware overrides normal firmware.

In order to utilize this interface, **Enable Private Firmware** box has to be checked. Once the box is checked, private firmware settings can be added or deleted for the selected online devices.

Analogue Channels

Analogue channels interface provides a list of all the initiated analogue channels of the selected device along with their settings. It also allows you to initiate new analogue channels and edit, copy and delete any existing analogue channel from the list.

A channel is equal to a sensor input. In order to be able to initiate or edit a channel, the device to which the channel will belong must be created and configured first.

To create an Analogue Channel:

- Select a device from the list of IMx/MasCon devices, and then click **Create** below the **Analogue Channels** list.

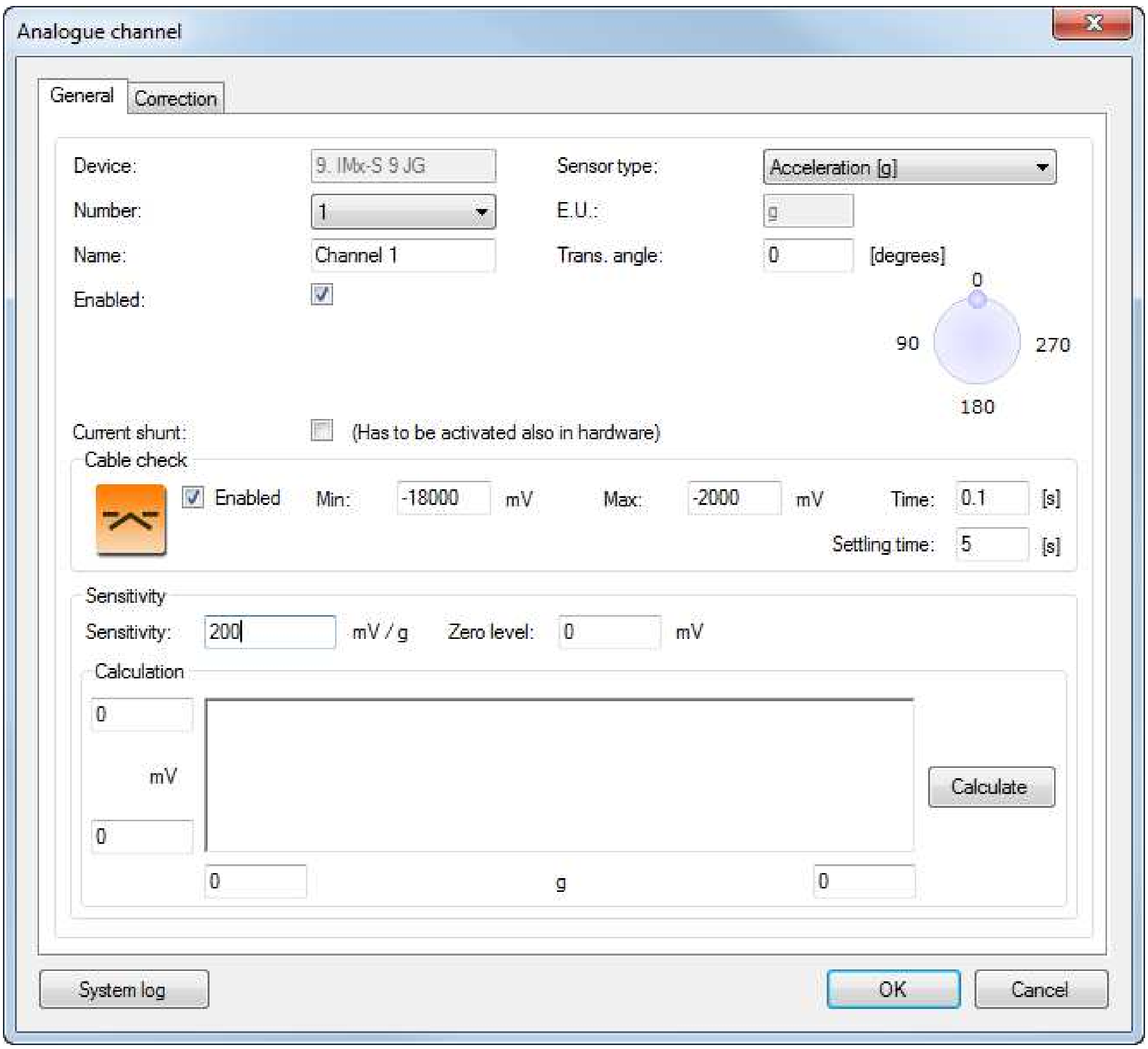


Figure 4 - 12.
Example of Create Analogue Channel Screen.

General Tab

Device is the name of the selected device (not editable).

Number is a unique number for the physical input channel or virtual channel on the device you would like to configure.

Virtual channels are 3-digit numbers. The correspondence between virtual channel numbers and data can be found in the following:

- For IMx /MasCon16 Modbus virtual channels, refer to "Modbus with IMx/MasCon16 User Manual".
- For IMx-R CM virtual channels, refer to CM Virtual Channels in "IMx-R User Manual".
- For IMx-M CM virtual channels when transferring data from Protection part to CM part, see the table below. Note that if this device's External communication type was set to Protection when creating the device, then this functionality is not available.

IMx-M Protection Part Channel	Analog Virtual Channel Number
Analog channel 1	101
↓	↓
Analog channel 16	116
Analog channel 1 - DC GAP	117
↓	↓
Analog channel 16 - DC GAP	132

Table 4-1.
Mapping of IMx-M CM Virtual Channels.

➢ The parameter values of **E.U.** and minimum and maximum scale values of **Calculation** have to reflect the parameter values of the corresponding protection channel. This Protection part channel must have been configured already through IMx-M Manager.

Important - The minimum and maximum scale values of Calculation in CM part must always be symmetrical.

➢ Even if an asymmetrical scale was set up for a Protection part channel, the corresponding virtual channel in CM part must have a symmetrical scale. In such case, CM part should use the greater value of the two absolute values (absolute value of minimum and maximum) to set the symmetrical scale value.

Example 1:

Protection part channel has the scale min and max set up as -100 and 200.

The corresponding virtual channel in CM part must have the scale min and max set up as -200 and 200.

Example 2:

Protection part channel has the scale min and max set up as -300 and 100.

The corresponding virtual channel in CM part must have the scale min and max set up as -300 and 300.

In order to set up an IMx- M CM analogue virtual channel DC GAP, set **E.U.** to mV and **Sensitivity** to 1.

Name of the channel can be used as a reference by the software.

Enabled indicates the status of the channel whether it is enabled or disabled.

IEC Long Name is where you enter the channel's data source reference excluding domain name for IEC-enabled devices.

Isolated is used for external signals such as measuring process parameters for MasCon16 device's channels 15 and 16.

ICP Current feed indicates whether you would like the IMx-W / IMx-T device to drive the probe or not (normally on accelerometers only). For MasCon48 devices, this is done by dip switches on each channel on the vibration/analogue card.

Sensor type is a sensor signal type which can be selected from the drop-down list.

E.U. (Engineering Unit) is a measurement unit which can be set only if sensor signal is set to *Other*, for example, a pressure sensor.

Trans. angle is the angle of the sensor mounted on a device, relative to twelve o'clock.

Current shunt is available for IMx-W device's channel 15 and 16, IMx-T, IMx-S, and IMx-M. If a resistor of 220 ohm is added to a channel input, check this field in order to display the correct input device of a particular channel.

Cable check will raise a system alarm from a cable fault if the signal goes outside of the range.

Enabled: Check the box to allow the system to perform a cable check on the channel before a measurement is taken.

Min: The minimum output range of the sensor.

Max: The maximum output range of the sensor.

Time: The duration of the cable check measurement.

Settling time: Upon detecting a sensor bias output voltage (BOV) out of range and entering a cable fault alarm status, the duration for which the IMx will remain in this status once sensor power is restored. A configured Settling time can prevent false alarms in case the sensor's actual settling time extends beyond the measurement time and alarm hysteresis. The Settling time feature also helps IMx ignore drifting signals from broken sensors that may erroneously enter the proper BOV range.

- The *Settling time* value must be between “0” and “60” seconds.
  The default is 1 second.

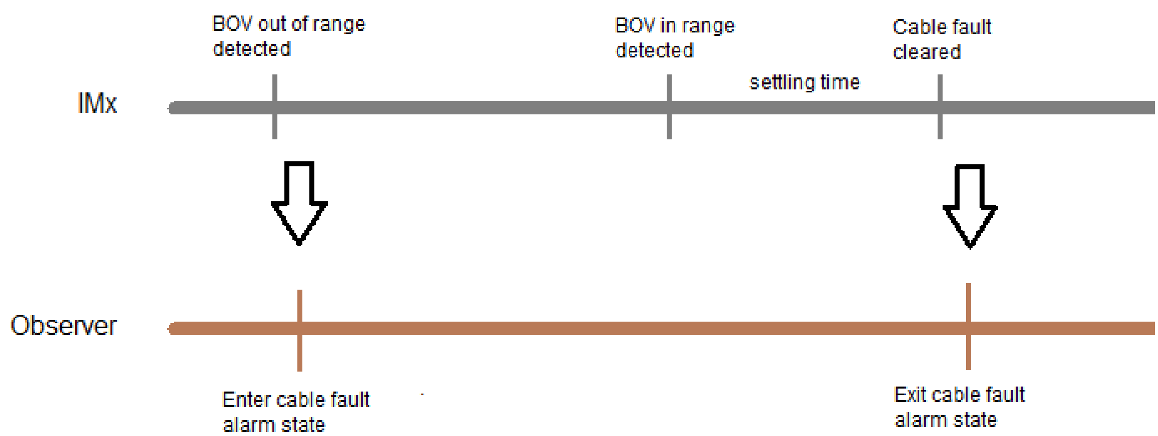


Figure 4 - 13.
Settling Time Diagram.

Sensitivity and Zero level are properties of the sensor which also can be calculated by filling in the lower part of the screen and pressing the **Calculate** button.

Sensitivity: Specifies the volt or amp ratio to the measurement unit.

Zero level: Which value in volt or amp should be equal to zero in the measurement unit.

Correction Tab

You have the option to compensate the sensor faults with four different frequencies under transaction correction. This function is used mostly for MasCon48 turbine monitoring.

Frequency: Four frequencies needed for correction.

Phase: Phase value for each frequency.

Amplitude: Amplitude for each frequency.

To edit an Analogue Channel:

- Select a device from the list of IMx/MasCon devices to get the list of all the corresponding analogue channels.
- Select a channel to edit, then click **Edit**.

All the fields in edit mode are the same as in **Initiating an Analogue Channel**, described above.

➢ You may edit any setting except **MasCon**, **Number**, **Sensor type** and **E.U.** attributes.

To delete an Analogue Channel:

- Select a device from the list of IMx/MasCon devices to get the list of all the corresponding analogue channels.
- Select a channel to delete, and then click **Delete**.
    - Note that a channel cannot be deleted if it is in use by measurement point(s).

To copy an Analogue Channel:

- First select a device from the list of IMx/MasCon devices to get the list of all the corresponding analogue channels.
- Select a channel to copy to a new channel, then click **Copy**.
- Choose a channel number for the new channel from the drop-down list, then click **Ok**.

Digital Channels

Digital channels interface provides a list of all the configured digital channels of the selected device along with their settings. It also enables you to initiate new digital channels and edit, copy and delete any existing digital channel from the list.

To create a Digital Channel:

- Select a device from the list of IMx/MasCon devices, and then click **Create** in the digital channels window.

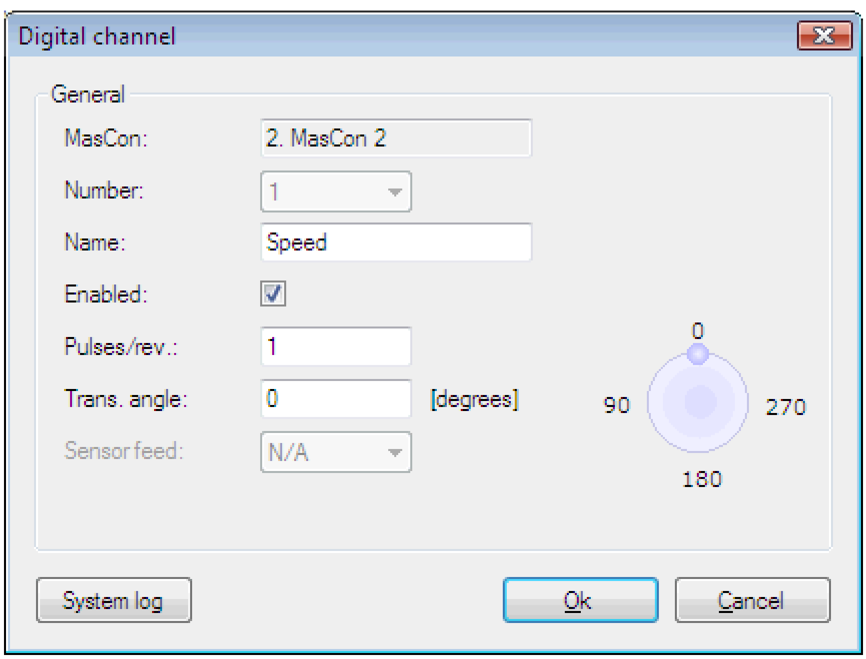


Figure 4 - 14.
Example of Initiate a Digital Channel.

MasCon is the name of the selected IMx/MasCon device (not editable).

Number is a unique number for the physical input channel or virtual channel on the device you would like to configure. Virtual channels are 3-digit numbers.

- ➢ The correspondence between MasCon16 Modbus virtual channel numbers and data can be found in "Modbus with IMx/MasCon16 User Manual".
- ➢ The correspondence between IMx-M virtual channel numbers and data is as the following table. Note that if this device's External communication type was set to Protection whenCreate DeviceCreate Device initiating the device, then this functionality is not available.

Protection Part Channel	Digital Virtual Channel Number
Digital channel 1	101
↓	↓
Digital channel 8	108

Table 4-2:
Mapping of IMx-M Protection Part Channels to Digital Virtual Channels.

Name is the name of the channel which the software can use as a reference.

Enabled indicates the status of the channel whether it is enabled or disabled. Enabled status activates the channel for measurement points.

Pulses/rev. is the number of pulses this sensor receives per shaft revolution.

Trans. angle is the angle of the sensor mounted, relative to twelve o'clock.

Sensor feed indicates whether to do a sensor feed or not.

To edit a Digital Channel:

- First select a device from the list of IMx/MasCon devices to get the list of all the corresponding digital channels.
- Select a channel to edit, and then click **Edit**.

All the fields in edit mode are the same as in **Initiating a Digital Channel**, described above.

- ➢ You may edit any setting except **MasCon** and **Number** attributes.

To delete a Digital Channel:

- First select a device from the list of IMx/MasCon devices to get the list of all the corresponding digital channels.
- Select a channel to delete, then click **Delete**.

- ➢ Note that a channel cannot be deleted if it is in use by measurement point(s).

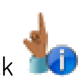
To copy a Digital Channel:

- Select a device from the list of IMx/MasCon devices to get the list of all the corresponding digital channels.
- Select an existing channel to copy to a new channel, then click **Copy**.
- Choose a channel number for the new channel from the drop-down list, then click **Ok**.

Machine Properties

Setting up machine data can be done at the machine properties screen. This information is only text based and is not used by analysis tools in @ptitude Observer. However, this information can be included in reports and other printouts.

To get to machine properties screen, perform one of the following options:

- Create a machine from scratch. Refer to Machine under Building a Hierarchy View in System Configuration.
- Click the right mouse button on a machine in the hierarchy view, then select **Properties**.
- Select a machine in the hierarchy view first, click **Edit** on the toolbar, then select **Properties**.
- Select a machine in the hierarchy view first, then click  **Properties** icon on the toolbar.

General Tab

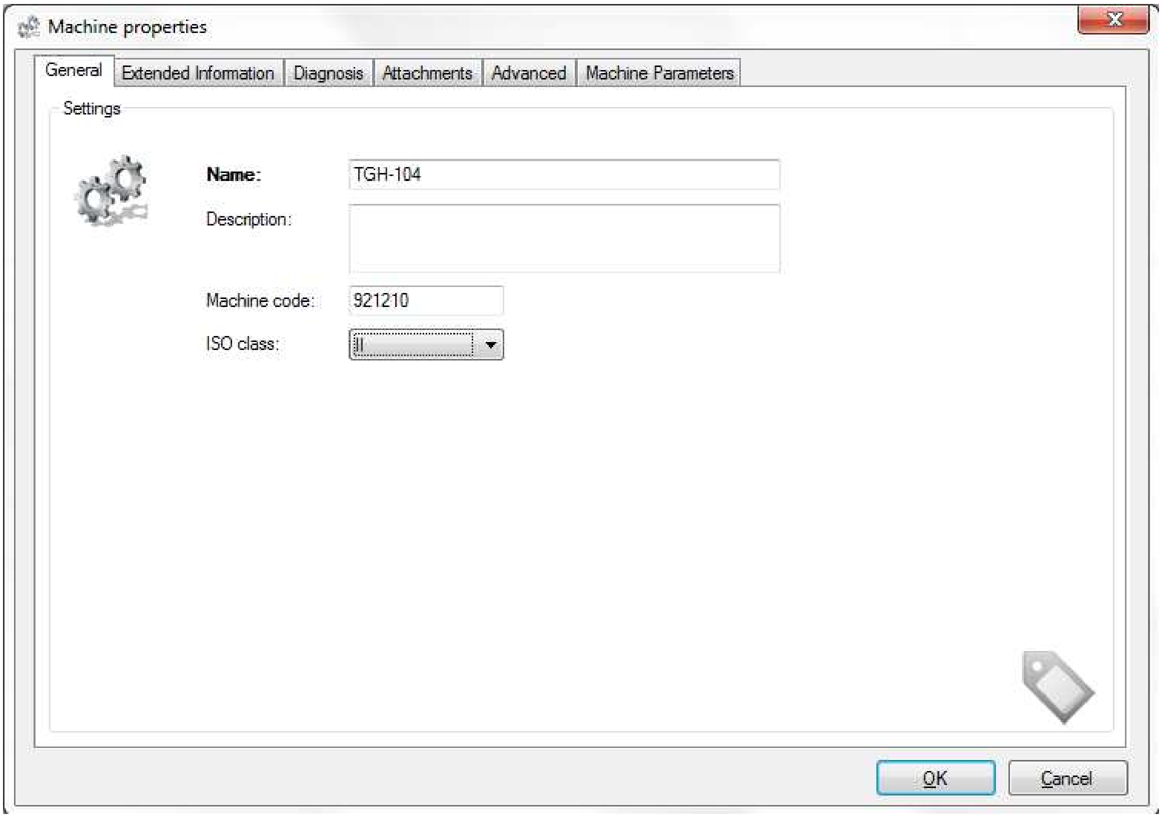


Figure 4 - 15.
Example of General Machine Properties.

- Enter **Name**, **Description**, **Machine code** and **ISO** (International Organization for Standardization) **class**.
    - ➢ The ISO classes are based on SS-ISO 2372 (Vibration and shock - Basis for specifying evaluation of vibration).

Extended Information Tab

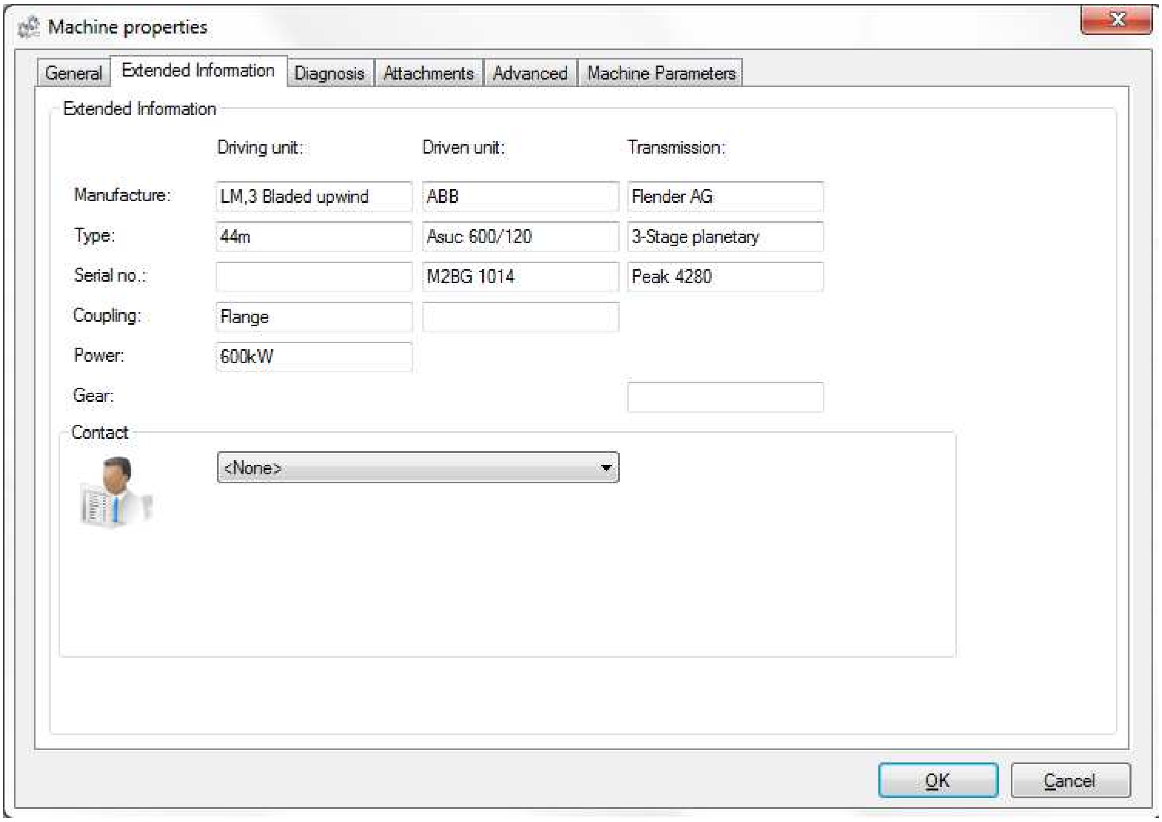


Figure 4 - 16.
Example of Extended Machine Properties.

- Enter **Manufacture** information, type and serial number of each driving device, driven device and transmission.
- Enter **Coupling** information of each driving device and driven device.
- Enter **Power** information on driving device.
- Enter **Gear** information on transmission.
- **Contact** can be used to set a contact or receiver for this particular machine. The contact can be used for general information, who to contact when there is a problem with the machine. It can also be used in Event Cases reports.

The contact information is selected from the receiver library. For more information refer to Receivers under Libraries within Database menu item.

Diagnosis Tab

Diagnosis tab setting enables you to assign any diagnosis you want to use for the selected machine. Diagnoses are attached to machines by pre-defined diagnosis rules. To find out how to create diagnosis rules, refer to Diagnosis Rules under Database in Menu Items.

Each machine diagnosis that has been attached to a machine uses one or more measurement points as data input.

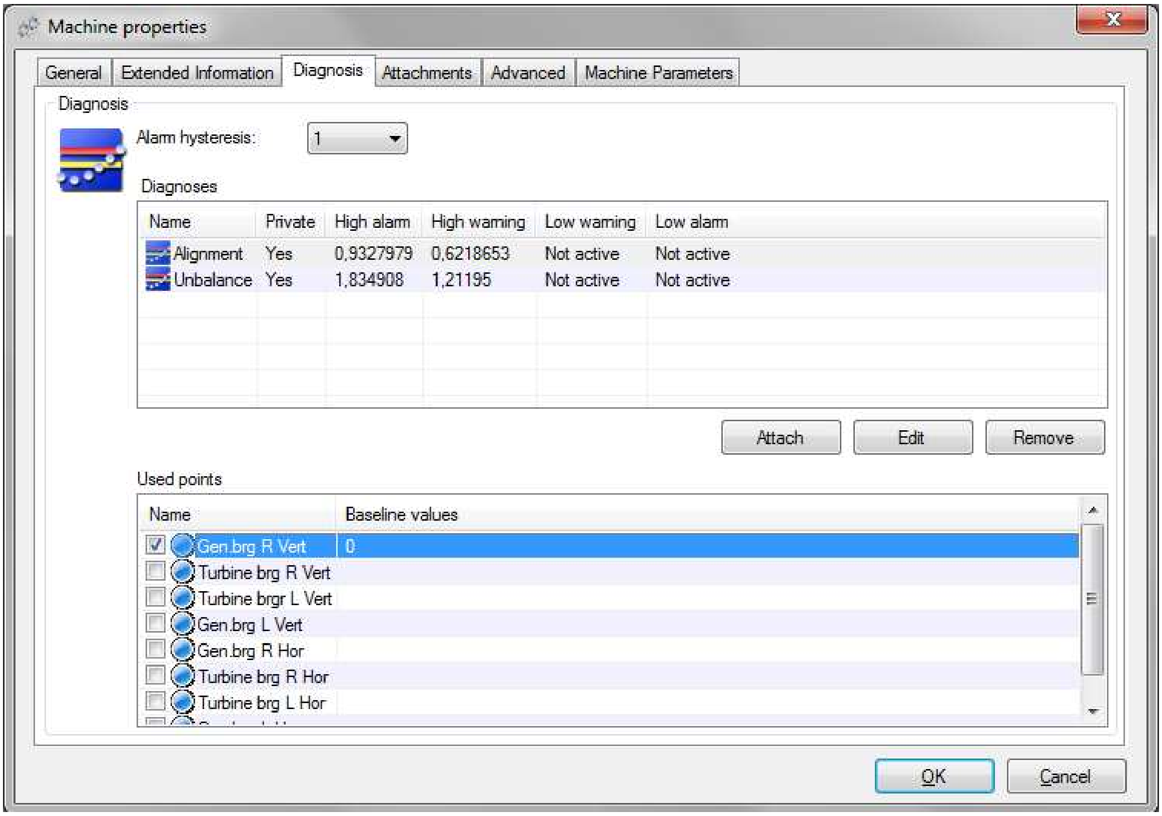


Figure 4 - 17.
Example of Diagnoses Settings.

Name identifies each diagnosis.

Private Privately attached diagnoses do not have a link to any diagnosis rules.

High alarm / High warning / Low warning / Low alarm are the alarm/warning level set in the diagnosis rules when configuring a diagnosis. Refer to Diagnosis Rules under Database in Menu Items

Edit enables you to edit settings of the selected diagnosis. Refer to Diagnosis Rules under Database in Menu Items section for the description of settings.

Remove deletes the selected diagnosis from the list of diagnoses.

Attach attaches a diagnosis from a list of diagnoses.

Only one MGP (multiple gating point) can be added to any diagnoses set. If adding a second MGP is attempted, the following Input Error message displays. The message identifies the problem, one diagnosis at a time.

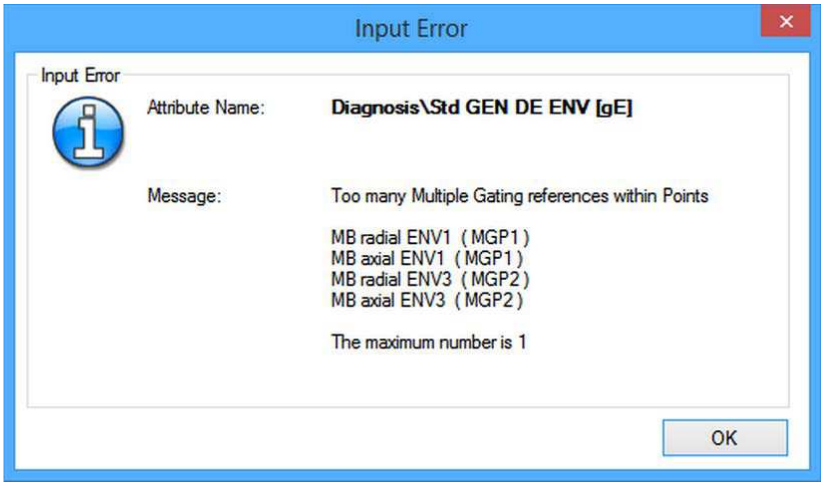


Figure 4 - 18.
Diagnosis Input Error, Too Many Multiple Gating References.

Attachments Tab

Attachments are simply files that can be attached and stored with the selected machine. An attachment can be a .PDF file, Word report, or even an MP3 file.

Advanced Tab

Conditional activation can be used to activate or deactivate measurements on the machine depending on a conditional input. The type of conditional input is an OPC Data tagging measurement point. This is particularly useful in test-bench monitoring where machine individuals and/or machine types (that is, gearbox individuals or gearbox types) needs to be tracked in a test-bench environment.

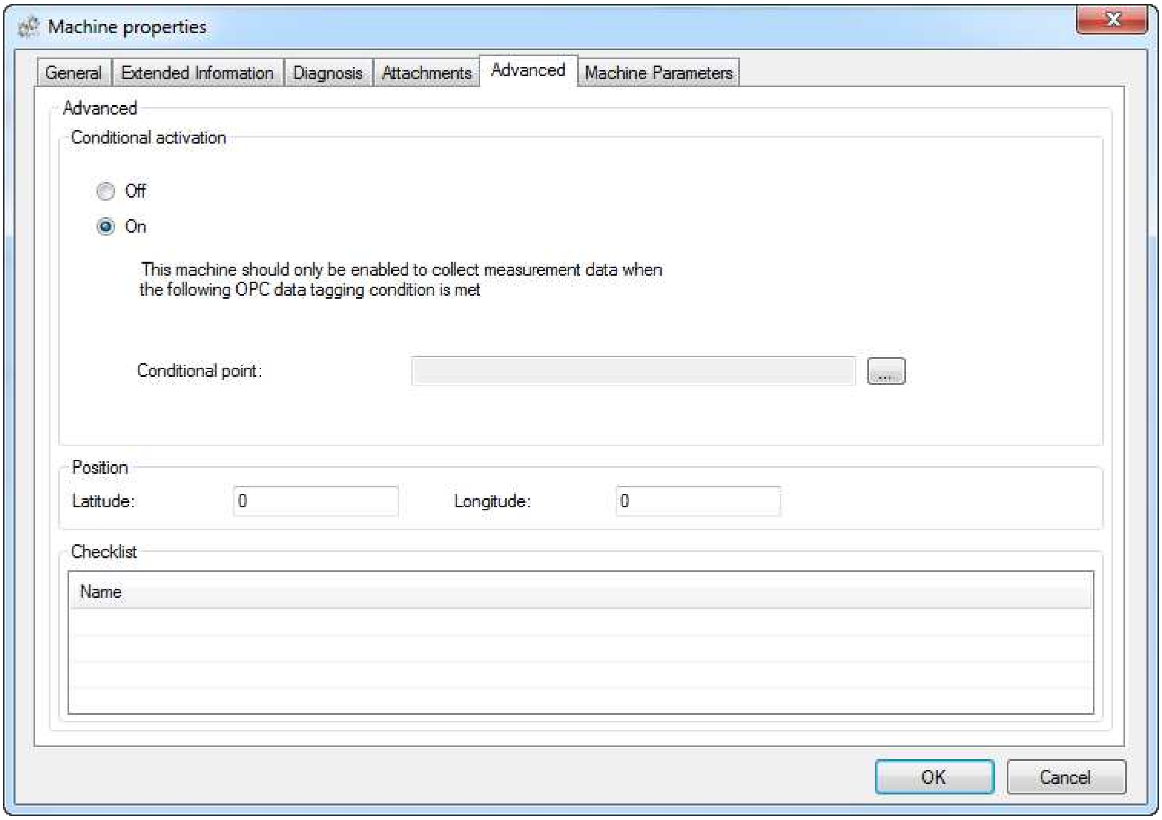


Figure 4 - 19.
Example of Advanced Settings.

To use the conditional activation, an OPC data tagging measurement point needs to be created and collect data from a specific OPC tag from an OPC Server.

When conditional activation is used on a machine and the tag value changes, it can take up to 30 seconds until the machine has been activated or deactivated.

Machine Parameters Tab

Machine Parameters are machine data that can be captured when using the IMx data acquisition device. The parameter data will be stored together with each dynamic measurement (FFT, Time waveform data) that is captured by the IMx.

For each IMx, up to 29 points can be used as machine parameters. These must be process parameter type points, not vibration points. They are selected by using a list in the **Machine Parameters** configuration window. They can be ordered in a user-defined list.

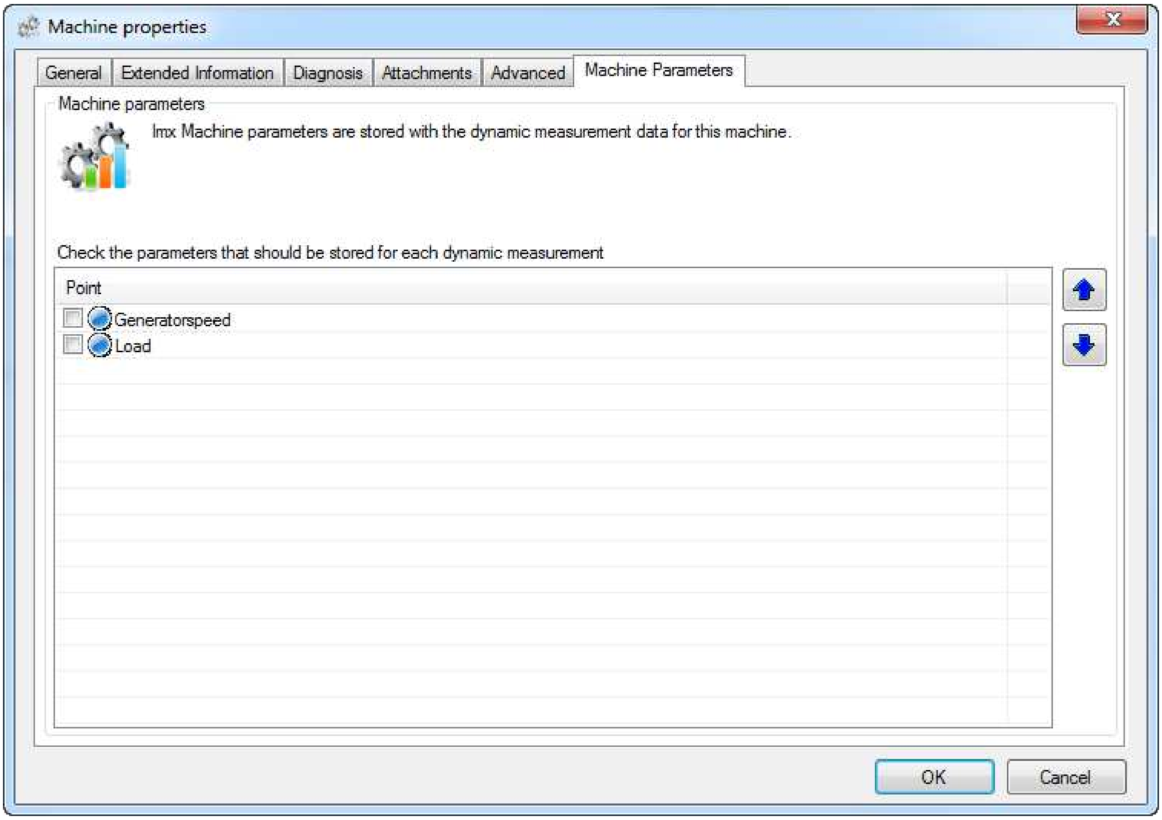


Figure 4 - 20.
Example of Machine Parameters Settings.

All machine parameters are:

- Displayed in the Measurement Date window (for each stored spectra/time waveform).
- Displayable in a trend plot like the existing three simultaneous parameters.
- Displayed in a separate list for the current cursor position in the trend plot (because of the large number of parameters, they cannot be displayed in the legend of each trend when displaying multiple vibration points in the same window).
- Selectable as the X-axis in a trend plot.
- Selectable for filtering in the buffer settings, one parameter at a time.

Creating OPC Server and OPC Channels

OPC stands for object linking and embedding (OLE) for process control. It is an open, flexible, and plug-and-play software communication standard for modular software inter-operability in the automation industry. OPC is a specification that has been developed by a team of more than 120 different companies to produce an efficient specification for data/information standardization.

OPC server enables the software such as @ptitude Observer, to route its data to OPC server. In return, OPC server stores and shares data that are from all the OPC clients.

Generally there are two different generations of OPC, OPC (which is generally referred to as Standard OPC) and OPC UA.

There are two ways of working with OPC in conjunction with SKF @ptitude Observer.

- Using the Internal Built-in OPC Server. .In the @ptitude Observer Monitoring Suite, there is a built-in OPC UA Server in the monitor service component. It can, if enabled, automatically publish all data that @ptitude Observer system captures.
- Using External OPC Servers

To be able to use OPC servers in the @ptitude Observer, you need to set up a configuration for the available OPC servers in the @ptitude Observer, so that the @ptitude Observer Monitor service can recognize the OPC servers.

Not only can the @ptitude Observer Monitor handle IMx/MasCon devices, but it can also be the logical data gatherer/distributor for OPC. Therefore, you do not have to have the @ptitude Observer running in order to use OPC in your application. However, you do need to set up OPC servers and OPC channels in the @ptitude Observer while the @ptitude Observer Monitor is connected to the @ptitude Observer.

The following steps are an overview of the procedure using external OPC servers:

1. Install your OPC server and set up tags correctly according to your OPC manual.
2. In @ptitude Observer, create a connection to OPC server by adding OPC server as shown in Adding an OPC Server, below.
3. In @ptitude Observer, create OPC channels to the OPC server you created in step 2 by adding OPC channels as shown in Creating OPC Channels, below.

Warning: When using DBCS (double byte character set) operating systems, both the OPC server and the @ptitude Observer Monitor computer have to use DBCS. DBCS is the character set used by Korean, Chinese, Japanese Windows, etc.

Internal OPC Server

To configure the built-in OPC Server in Observer:

- Click **On-line** on the toolbar, then select **OPC Servers** and select to configure **Internal OPC Server**.

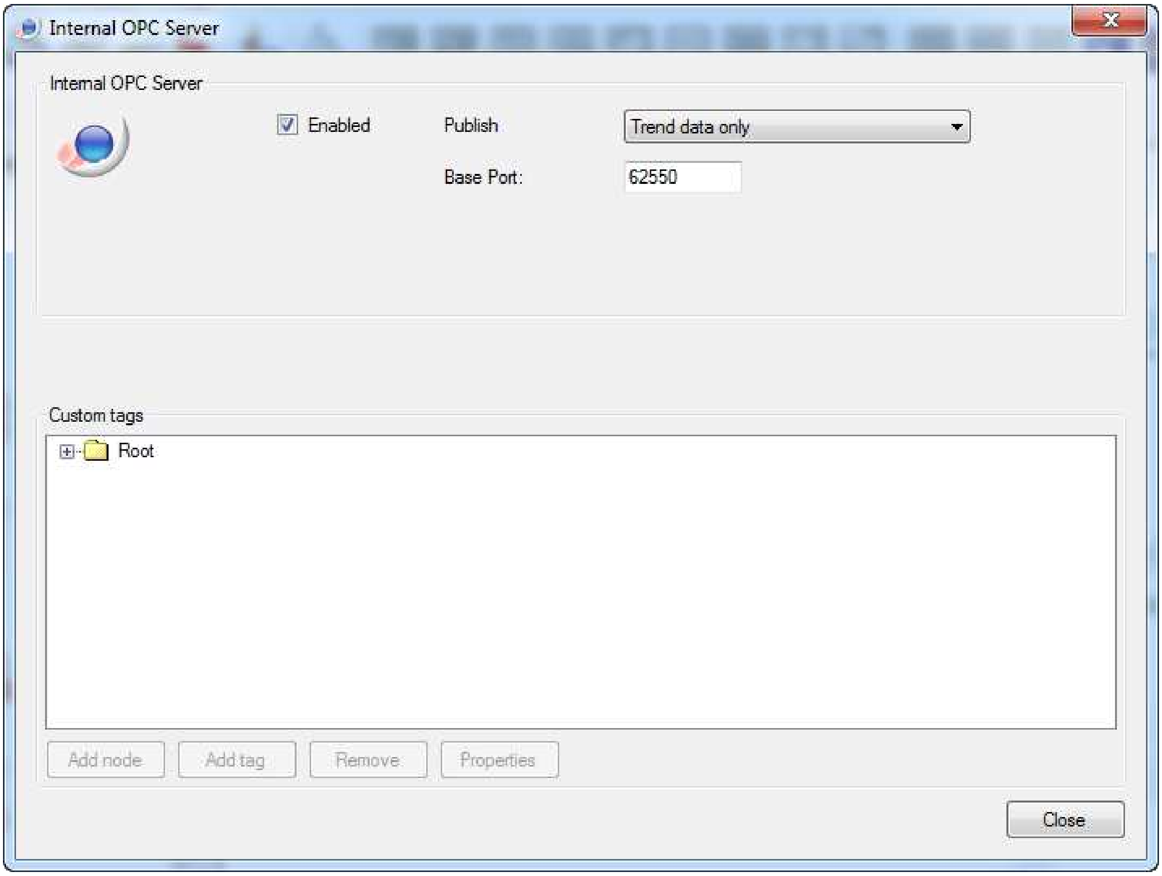


Figure 4 - 21.
Example of Internal OPC Server.

When enabled, the Internal OPC Server will automatically publish the latest measurement for all measurement points that have been captured with the @ptitude Observer system, in addition it is also possible to configure custom tags that can be used. The custom tags can be used by other OPC Clients to communicate data to and from the server but the Observer system will not modify or use the data of these tags.

Enabled indicates the status of the OPC server whether it is enabled or disabled.

Publish selects which type of data that should be published. The option is to publish trend data or trend data and dynamic data. Dynamic data are FFT, Time waveform etc.

Base port defines the base communication port for the internal OPC Server.

The default setting is 62 550. If it is set to the default it will use the base port and the base port plus 1 when the Internal OPC Server starts. Which means that the Internal OPC Server will communicate on port 62 550 and 62 551.

Usually the base port does not need to be changed. However, in the scenario of when 62 550 or 62 551 is used by another application on the same computer or in the scenario of running several monitor services on the same computer with the OPC Server enabled, the base port needs to be changed.

Add node adds a folder to the custom tag hierarchy.

Add tag adds a custom tag to the custom tag hierarchy.

Remove removes the custom selected tag or the selected folder.

Properties brings up the configuration for the custom selected tag or the selected folder

External OPC Servers

To configure external OPC Servers in Observer:

- Click **On-line** on the toolbar, then select **OPC Servers** and select to configure **External OPC Servers**.

To add an OPC Server:

- Click **Add** in the OPC Servers window.

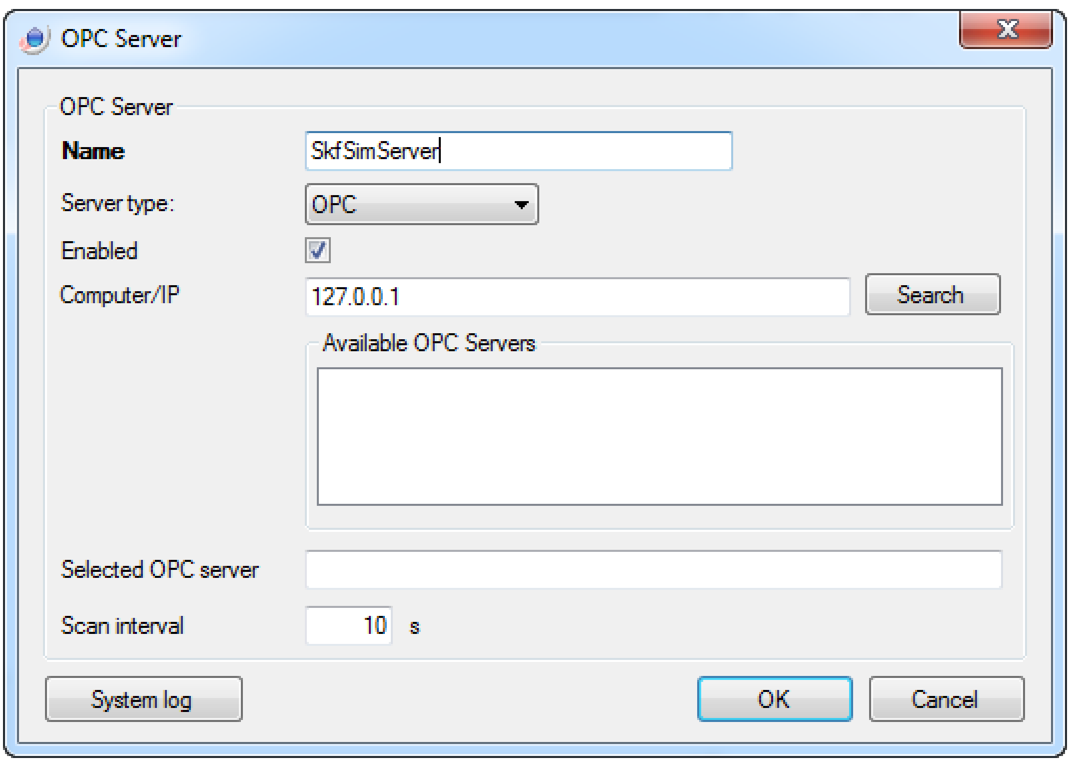


Figure 4 - 22.
Example of Add an OPC Server.

Name is the name you want to use for this OPC server registration.

Server type specifies whether this server is an OPC or OPC UA server.

Enabled indicates the status of the OPC server whether it is enabled or disabled.

Computer/IP is the computer name or IP number for which the OPC server is located.

Search gets a list of OPC servers on a specified computer for the @ptitude Observer Monitor.

Available OPC Servers lists the OPC Servers found when clicking the "Search" button.

Selected OPC server is the pre-defined name of the OPC server that you are using which is not editable.

Scan interval is the scan time interval in seconds. The @ptitude Observer Monitor uses it to scan the OPC server for current values. Default is 10 seconds which means that the @ptitude Observer Monitor checks for the current values of the OPC server every ten seconds.

System log is a configuration log containing all the setup activities which can be useful when investigating or tracking changes made during the setup.

To edit an OPC Server:

- Click **Edit** in the OPC servers window. The settings available for editing an OPC server are the same as in Adding an OPC Server from above.

To remove an OPC Server:

- Select an OPC server from the list of OPC servers
- Click **Remove** in the OPC servers window to remove the OPC server from the list.

To create OPC Channels:

- Select an OPC server you wish to use from the list of OPC servers.
- Click **Add** in OPC channels window.

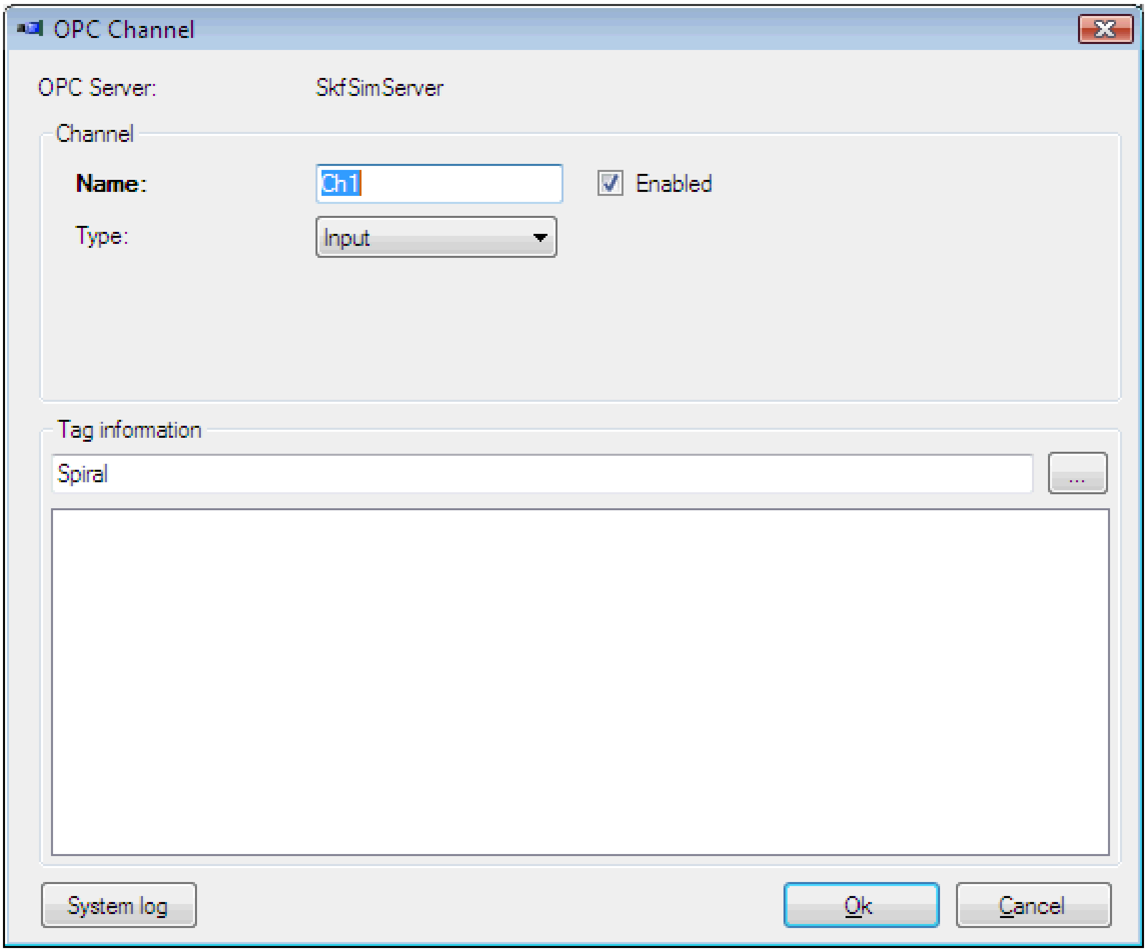


Figure 4 - 23.
Example of Create an OPC Channel.

OPC Server is the name of OPC server you selected in the previous screen. This value is not editable.

Channel name is the name you want to use for this OPC channel.

Enabled indicates the status of the channel whether it is enabled or disabled.

Type

Input: a channel that sends data from an OPC server to @ptitude Observer.

Output: a channel that sends data from the @ptitude Observer to an OPC server and subsequently to another system.

Source specifies which measurement point to retrieve data values from @ptitude Observer and send data to the OPC server. It is available only when the type is set to *Output*.

Data type is available only when the type is set to *Output*.

Overall: sends the overall value to the OPC tag on the OPC server.

Status: (advanced) sends the bitwise internal status of the measurement point to the OPC tag on the OPC server.

Tag is the unique tag name specified by the OPC server vendor that you wish to use. Note that tags have to be created in the OPC server itself. For further information on how to create tags in OPC server, refer to your OPC server's manual.

Once OPC input channels have been created, the next step is to create OPC measurement points for them. To do this, refer to Setting up Measurement Points and Alarms in System Configuration.

The most common problem when troubleshooting connections to OPC servers is the security. OPC makes use of DCOM which can be quite difficult to configure if you are not familiar with it. Ask your IT-personnel to assist you when setting up the OPC configuration.

OPC Server Status Tag Value

Each OPC server status tag displays its status icon along with its numeric value.

When multiple states exist on a measurement point at the same time, the icon of the most priority will be displayed. The priority list of status for measurement points is listed in Priority List of Status under Tree View in System Operation chapter.

As an example, if you have Vector Alarm and Trend Alarm at the same time, then the Alarm icon, , will be showing along with the numeric value of **8449**.

8449 = 1 (Ok) + 256 (Trend Alarm) + 8192 (Vector Alarm)

Icon	Numeric Value	Description
	0	**Unknown.** Refer to **Unknown** in Status in the Hierarchy View section
	1	**Ok.** Refer to **Ok** in Status in the Hierarchy View section
	2	**Not measured.** Refer to **Not measured** in Status in the Hierarchy View section
	64	**Low Warning active.** Refer to **Warning** in Status in the Hierarchy View section
	128	**High Warning active.** Refer to **Warning** in Status in the Hierarchy View section
	256	**High Alarm active.** Refer to **Alarm** in Status in the Hierarchy View section
	512	**Low Alarm active.** Refer to **Alarm** in Status in the Hierarchy View section
	1024	**Outside measurement range.** Refer to **Outside measurement range** in Status in the Hierarchy View section
	2048	**Cable fault.** Refer to **Cable fault** in Status in the Hierarchy View section
	4096	**Not active.** Refer to **Not active** in Status in the Hierarchy View section
	8192	**Vector Alarm active.** Refer to **Alarm** in Status in the Hierarchy View section
	16384	**Vector Warning active.** Refer to **Warning** in Status in the Hierarchy View section
	262133	**Pre/Post data capture in progress**
	1048576	**Trip in progress**
	8388608	**Relation Alarm active.** Refer to **Alarm** in Status in the Hierarchy View section
	33554432	**Diagnosis warning.** Refer to **Diagnosis warning** in Status in the Hierarchy View section

Icon	Numeric Value	Description
	67108864	**Diagnosis alarm.** Refer to **Diagnosis alarm** in Status in the Hierarchy View section
	134217728	**No Trend Alarm levels set.** Refer to **No alarm levels set** in Status in the Hierarchy View section
	268435456	**Outside active range unstable.** Refer to **Outside active range unstable** in Status in the Hierarchy View section
	536870912	**Transient.** Refer to **Transient** in Status in the Hierarchy View section
	1073741824	**Outside active range.** Refer to **Outside measurement range** in Status in the Hierarchy View section

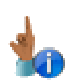
Setting up Measurement Points and Alarms

The system lets you add new measurement points, and edit or delete existing measurement points on machines and sub machines.

To add a measurement point:

- First, select a machine or a sub machine to which a measurement point is to be added in the hierarchy view.
- Click on the right mouse button, select **Add**, then select **Meas. point**.

To edit a measurement point:

- First select a measurement point to be edited in the hierarchy view.
- Perform one of the following options.
  - Click on the right mouse button, and then select **Properties**.
  - Double click on the measurement point.
  - Click on **Edit** on the toolbar, and then select **Properties**.
  - Click on  Properties icon on the toolbar.

To delete a measurement point:

- First, select a measurement point to be deleted from the hierarchy view.
- Click on the right mouse button, then select **Delete**.

➢ If the point you are deleting is referenced by a Multiple Gating Point, the system will remove that reference.

You can also use one of the following wizards to help you with add and edit measurement point processes:

Machine copy wizard. Refer to Machine Copy Wizard in System Configuration.

Multiple point update wizard. Refer to Multiple Point Update Wizard in System Configuration.

Measurement Points

Different types of measurement points are available depending on the selected device. The following figure is an example of measurement points available for an IMx device in @ptitude Observer.

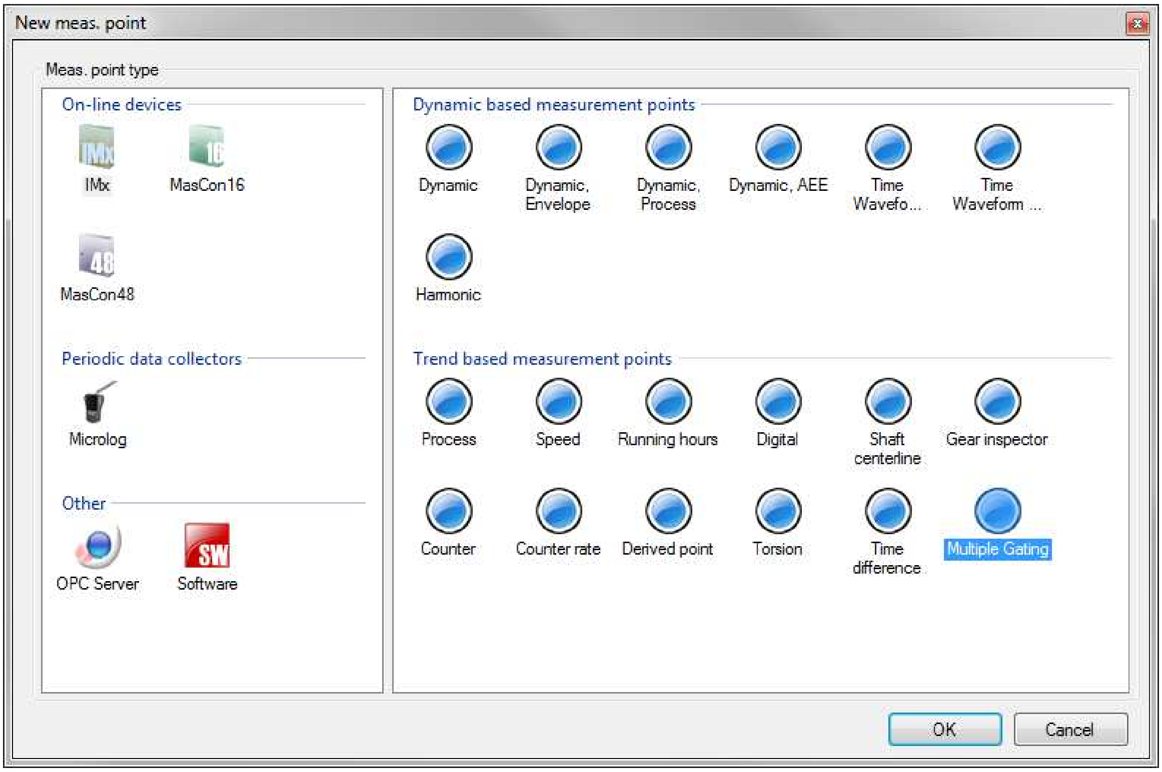


Figure 4 - 24.
Example of New Measurement Point Types.

Dynamic based measurement points – Select one of the following measurement point types to create a measurement point that will ultimately produce spectrum and/or time waveform graphs.

Dynamic is a measurement of a dynamic signal such as vibration sensors, AC current, or any other dynamic signal that could change at a frequency faster than 0,1 Hz.

Dynamic, Envelope is a measurement of repetitive frequencies. It is used to detect and monitor repetitive frequencies, such as bearing failure detection and monitoring.

Dynamic, Process is a measurement similar to the Dynamic measurement point, but instead of a vibration signal, it uses an analogue sensor for the measurement. For example, it can be used for motor current analysis.

Dynamic, AEE is a measurement of an acoustic emission signal.

Time Waveform Analysis is a measurement of the time waveform and applies algorithms such as crest, kurtosis, and skewness in order to detect failures

Time Waveform Analysis, AEE is same as Time Waveform Analysis but used for acoustic emission signal.

Harmonic is a measurement of a dynamic signal with vibration sensors or Eddy Current Probes such as vibration monitoring on turbines.

SEE® (spectral emitted energy) is designed especially for measuring high frequencies for Microlog CMVA series only. It requires a special sensor kit.

Trend based measurement points – Select one of the following measurement point types to create a measurement point that will ultimately produce trend graphs.

Process is a measurement of a static/process signal such as load sensors, temperature sensors, pressure, flow or any other static signal.

Speed is a measurement of the rotational speed of a shaft. It is used to measure rotational speed of a shaft with a speed sensor.

Running hours is a measurement point for IMx/MasCon devices. It provides an effective usage for Observer's Maintenance Planner feature. It keeps track of running hours of a machine.

Digital is a measurement of an input that reacts like a digital signal for IMx/MasCon48 devices. This means that the input signal basically has only two states: a digital 1 and a digital 0 or relay closed and relay opened. A digital measurement point can be used to control when to take trend vibration data and when to take spectrum data.

Shaft centerline is a measurement that uses information from two radial displacement sensors located in the same axial position 60 to 120 degrees from each other in IMx devices.

Gear inspector is useful when analyzing impact energy as a function of shaft/gear revolutions in wind turbines.

Counter is a measurement that counts digital pulse changes which produces a value with the total amount of digital value changes. It can be reset and the value will start from zero again. It is currently available for IMx/MasCon16devices only.

Counter rate creates a new measurement that counts pulses per second, minute, hour, day or week on a digital channel. This measurement point can be used to measure a particle counter.

Derived point is a calculation measurement point which does not use any sensor in IMx/MasCon16 devices. Instead, it takes other measurement points to calculate the result to trend.

Torsion is a measurement of the torsion of a shaft using two digital channels for IMx/MasCon48 devices.

Time difference is a measurement of the time difference between two digital pulses of IMx/MasCon48 devices.

Multiple Gating, Process is a measurement that references values from up to five other points and then performs a logical evaluation on the current measurements to determine if the IMx should take measurements. Each reference point has two distinct gating conditions, Operating Class 1 or Operating Class 2, with the point output determined by which set of the two gating conditions is set to TRUE. These reference measurements can include process, speed, and digital measurements.

HFD (high frequency domain) is a vibration type of measurement that is similar to envelope measurement but produces only an overall value for Microlog only.

OPC is a measurement that is used when the system requires data from an external system with help of an OPC Server.

- Before you start configuring OPC measurement point, make sure that you have completed the setup for OPC server and OPC channels. If not, refer to Creating OPC Server and OPC Channels in System Configuration.

Data tagging is used to track down material related or characteristic related data. You can mark measurements with a specific tag such as paper quality, motor brand, revision number or any other property of a machine. Data can be tagged manually with Software data tagging point or automatically by OPC data tagging points.

Speed from spectra is a manual speed measurement point with static value.

Derived is a general measurement point that is also called @ptitude Observer derived measurement point. A derived measurement is a calculation point that uses other measurement points to calculate what to trend. For example, you can trend the sum of all vibrations of a machine or the average efficiency of four different turbines. The @ptitude Observer derived measurement can take data from IMx/MasCon and OPC measurement points. The measurement value is calculated in the @ptitude Observer Monitor every 10 seconds.

Protection is a measurement point displaying data from the IMx-M Protection Module. These points can't be created manually in Observer but are created in the IMx-M Manager software. These point types can however be edited in Observer with the limitation that only a few of the parameters on the point properties can be changed. Most of the properties cannot be changed. The Protection points are connected to virtual channels for the IMx-M and are created in the Observer Hierarchy when the user clicks on the "Create PrM Measurements" button in the Protection view. These points are clearly visible in the Hierarchy tree as they will appear as pink "shield" icons, , indicating protection system, instead of the normal blue icon. Protection points are not able to display any dynamic data such as FFT or Time waveform, but only Trend-based data is available.

General Tab

On the **General** tab, you can configure the general attributes required to create various measurement points. Different settings are available for different device types, and different attributes are available for different measurement point types. The following is an example of the **General** tab as it appears for an IMx dynamic vibration measurement point.

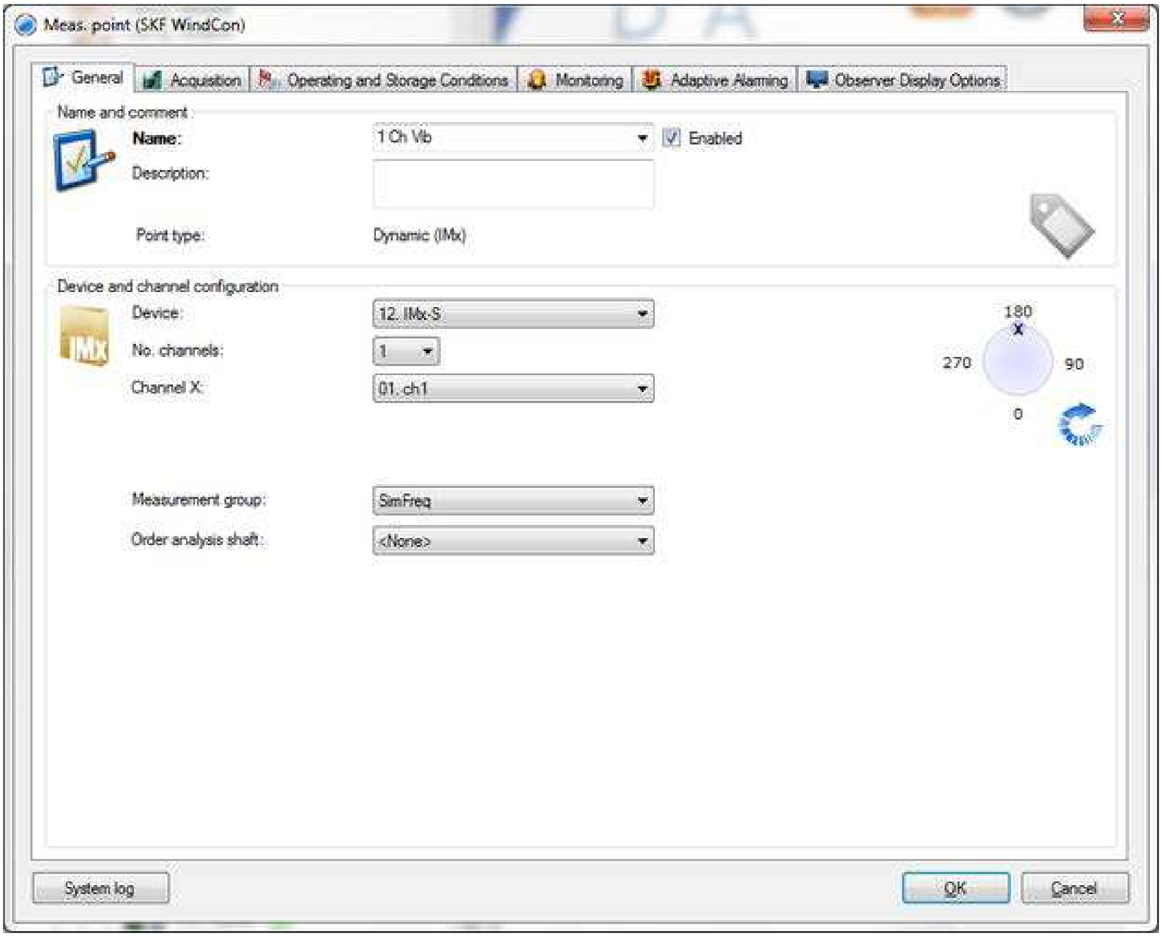


Figure 4 - 25.
Example of Dynamic Measurement Point General Settings.

The **General** tab can contain any of the following elements, depending on the device type and measurement point type you are configuring:

Name and comment area

Name is a short description of the measurement point. All names are saved and can be used by other measurement points if desired.

Enabled indicates the status of the measurement point whether it is enabled or disabled.

- The maximum active measurement points per 16 channel device (also apply to an IMx-M Slot) is 100 points.

> ➢ The maximum active vibration measurement points per 16 channel device (also apply to an IMx-M Slot) is 80 points.

Description is any additional comments for the current measurement point.

Point Type is the measurement point selected along with the device type.

MPA code is for Microlog USB and 1-channel communication only. It is used to group measurement points together.

Sensor type is for Microlog only. It can be *accelerometer*, *displacement probe*, or *velocity sensor*. Note that once the sensor type has been set, it cannot be changed.

No. of directions is for Microlog only.

– *Use TriAx sensor* allows the use of a tri-axial sensor when measuring single axis measurement points. Select which axis to use for the point.

Orientation is a suitable sensor orientation.

Meas. interval is for Microlog only. It is the measurement interval that the point should be measured by personnel. If this time is exceeded the system will generate an alarm.

Evaluation time tells the tolerance time when calculating a value depending on parameters. An evaluation time of *5* minutes means that the parameter values collected from IMx/MasCon or OPC should be maximum *5* minutes old.

Device and channel configuration area

Device is an IMx/MasCon device in which the measurement point can be set up.

MasCon/IMx unit (for Multiple Gating Points only) is the MasCon/IMx unit a Multiple Gating Point will reference.

No. channels is used by the selected measurement point, for example, for vibration, envelope, harmonic, process FFT, process and speed measurement points.

> ➢ You cannot use Multiple Gating Points (related to Dynamic and Dynamic Envelope points only) with multiple channel points.

Channel (Channel X / Channel Y / Channel 1) is the channel in which the measurement point should be performed. Multiple channels can be selected. However, for shaft centerline, torsion, and time difference measurement points, two different channels must be selected. Note that speed channels must be configured in IMx/MasCon units before you are able to select one here.

Trigg channel is the trigger channel which can be used for speed and torsion measurement points. This can be used if channels have more than one pulse per revolution in order to start the measurements at the same position every time. Note that a trigger channel must be selected for condition monitoring on turbines.

Measurement group is a logical grouping of measurement points that should collect data at the same time and synchronously on a specific IMx/MasCon device. Setting up measurement groups is described in Measurement Groups under Database in Menu Items

Order analysis shaft is the shaft on the machine that should be used for order analysis in the spectrum, history and 3D plot.

Rotation direction indicates the rotational direction for vibration measurement points, *clockwise*, *counter- clockwise*, or *both*.

Cable check is an alternate source for the cable check since the channel of this measurement point does not have the option to verify a status of the bias.

OPC Server and channel settings area (for OPC measurement points only)

Note that in order to send data from the @ptitude Observer to an OPC server, a setup of an OPC measurement point is not required. Instead, this is completed through OPC channel setup.

OPC server is a pre-configured OPC server which you wish to use for this measurement point.

OPC channel is a channel in which you wish to be connected.

DAD is required for OPC server.

Channel is a channel in which you wish to be connected.

Data tagging group enables you to select a data tagging group from the drop down list. Data tagging group is created through Data tagging group interface under Library\Database in Menu Items.

Source area (for Software, Data tagging measurement points only)

Data tagging group enables you to select a data tagging group from the drop down list. Data tagging group is created through Data tagging group interface under Library\Database in Menu Items.

System log is a configuration log of all the changes made to the measurement point.

Acquisition Tab

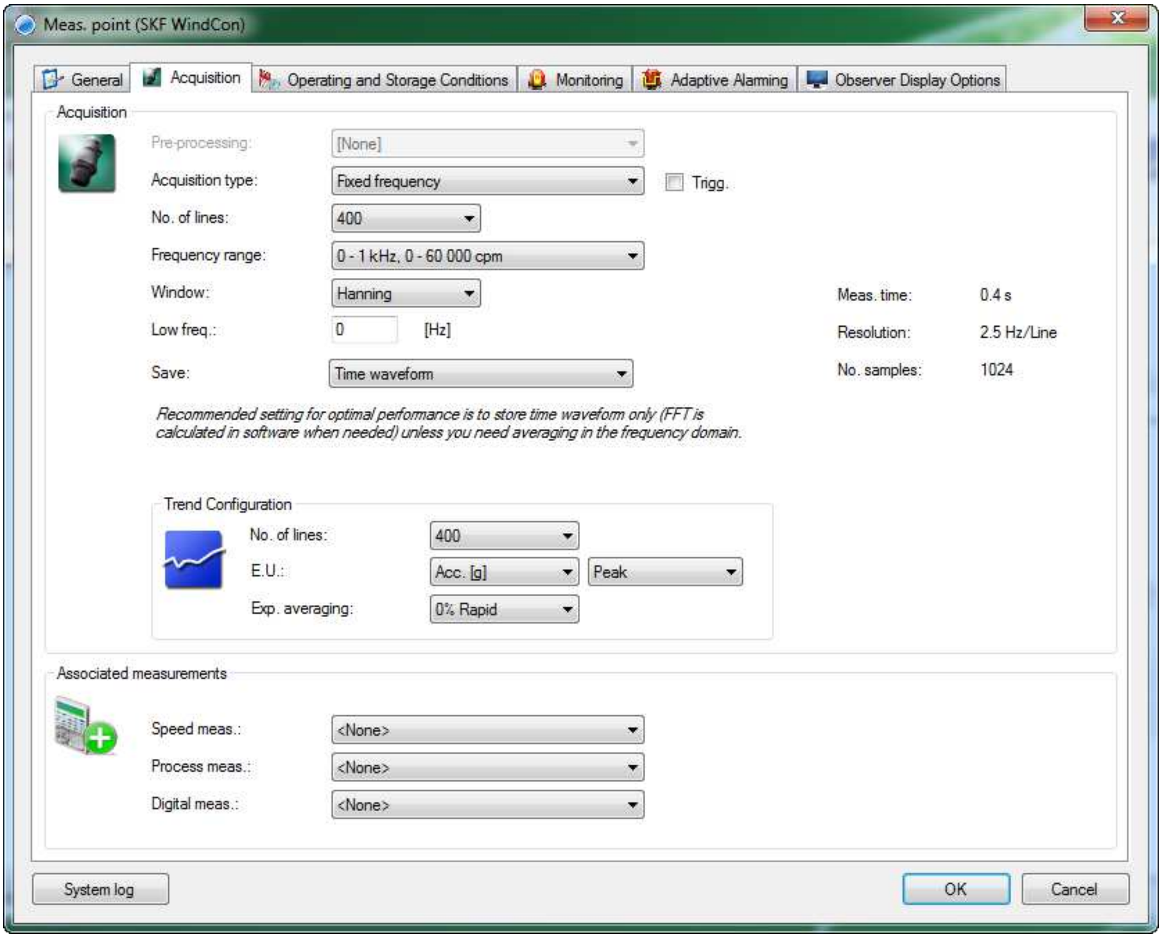


Figure 4 - 26.
Example of Dynamic Measurement Point Acquisition Settings.

The **Acquisition** tab can contain any of the following elements:

Acquisition area

Pre-processing is a pre-processing type, such as *Envelope*.

Acquisition type can be *Fixed frequency* or *Order Tracking*.

Fixed frequency: Sets acquisition to take the point's measurements on a fixed frequency machine.

Order Tracking: Sets acquisition to utilize order tracking while taking the point's measurements on a variable frequency machine. When selected, information appears on the right of the screen indicating the order analysis shaft, as selected on the **Common** tab, and its order of running speed, as determined from the gear ratios calculated in the Machine Parts view.

Trigg indicates if the selected speed measurement should be used as the trigger for the measurement point. If trigger is set, then the phase information will be available for the measurement.

No. of lines is the number of lines needed to construct the FFT (Fast Fourier Transform).

Frequency range is the maximum frequency for the FFT or time waveform. You may select a frequency range from the drop-down list or select *Custom* option to enter the end frequency in Hz. The end frequency can be between 5 and 40 000 Hz in integer numbers only.

Window is the window type for the FFT which can be Hanning or Uniform.

Low freq is the low frequency cutoff which can be used as a filter to limit unwanted peaks or "ski slopes" at the start of the FFT. For example, setting this value to *5* will zero out all values between 0 and 5 Hz in the FFT.

Save determines which format of the captured data should be stored in the system. Storing time waveform only is the recommended setting. Observer will on the fly calculate and display the FFT based on the time waveform when clicking the spectra button.

Meas. time describes the current measurement time calculated with the currently selected number of lines and frequency range.

Resolution describes the current resolution calculated with the currently selected frequency range and number of lines.

No. samples is the number of samples needed to construct the time waveform.

Shaft 1 shows the calculated orders of running speed compared to the designated order analysis shaft.

Sampling revolutions indicate how many revolutions the trend value should be based on for shaft centerline measurements only.

Max time is the time allowed for measuring a trend value for shaft centerline measurements only. If it takes longer time than the specified time to measure the desired sampling revolutions, the trend value will still be calculated and stored.

Formula area

Parameters are used by the formula for derived point measurements. There are two types of parameters, *Constant* and *Trend*.

Constant: this value never changes. It can be custom created here by assigning parameter's name, setting the type to constant and assigning any numeric value.

Trend: another measurement point value in the system. It can also be custom created here by assigning parameter's name, setting the type to trend, and selecting a measurement point from the system as the source. The source selected here must be from the same IMx/MasCon device.

Formula is the calculation formula using the assigned parameters from above for derived point measurement. The normal calculation methods (+ , - ,* ,/ ,^ ,(,)) and mathematical functions are available to build a formula.

Check verifies if @ptitude Observer and @ptitude Observer Monitor can understand the formula entered. This is also done automatically when you click **Ok** as well.

Trend Configuration area

No. of lines is the number of lines needed to construct the FFT (Fast Fourier Transform).

E.U. (Engineering Unit) is the engineering unit in which this measurement is to be displayed. If the scale factor is set to *1*, then E.U. will be set to *degrees*. However, if the measurement point is a counter rate, this acts as a user editable text field. See **Time Unit**, below.

Scale factor is used if you want to have a different scale factor than the engineering unit (E.U.) of degrees. The default is *1*.

Time unit is available for counter rate measurement points only. It can be pulses of seconds, minutes, hours, days or weeks. Note that for counter rate measurement points, **E.U.** is a user entered text that will be displayed on graph only. Which means that it will not effect the measurement at all. The text should reflect the selected time unit, for example if time unit is selected as Seconds, E.U. should be changed to Pulses/second.

Resettable sets whether or not the measurement point's value can be set to zero or not. It is available for count measurement points only.

Unit is the unit on which the trend measurement should be performed.

Scaling defines how the trend values should be calculated and stored in the database.

Counter type sets the calculation method that should be used for this counter measurement point.

Pulses: The value collected is added to the previous value. This is a normal counter.

Stops: Each time a value is collected, the previous value is incremented by one (1).

Pulses between stops: The value collected is the value used. This can be used, for example measuring the distance between two train stations if an IMx has been fitted on a train.

Exp.averaging (exponential averaging) is a setting to perform an automatic trend curve smoothing or to stop the system from giving alarms when intermittent disturbances occur.
The function applies the following formula:
new calculated = measured * (1 - exp value) + last calculated * exp value

Compensate for speed is available for "running hours" measurement points only. It compensates the running speed of a machine by comparing the active speed of the machine against a nominal speed of the machine. The **Nominal speed** of the machine is entered by the user.
For example, if the active speed of the machine is 1 000 cpm and the nominal speed is set to 2 000 cpm, then after the machine has been run for two hours, because of the difference between the active speed and the nominal speed, the running hours value will be one hour instead of two hours.

Compensate for load is available for "Running hours" measurement points only. It enables a compensation for the active load or any other process signal compared to a **Nominal load** value entered by the user. Compensate for load works the same way as Compensate for speed.

Spectra source is the measurement point where that maximum amplitude is being searched to get the speed reading.

Min. speed / Max. speed is the start and stop search range of the spectra source.

Machine part can be a gear or a shaft that helps to get more precise speed reading by using its fault frequency.

Speed is the running speed in rpm (revolution per minute).

Deviation is the percentage the speed can vary during the measurement of the machine. This is used in the diagnosis calculation when obtaining the fault frequencies. It sets the search range of frequencies for the diagnosis calculation.

Deviation time tells the tolerance time when calculating a value depending on parameters. A deviation time of 5 minutes means that the parameter values collected from IMx/MasCon or OPC should be a maximum of 5 minutes old.

Associated Measurements area

Speed meas. is a speed measurement point to which the currently selected measurement point should be connected/linked. The selected speed measurement point will be taken with the current measurement point's data.

Speed controlled sampling indicates whether to use speed controlled sampling or not. If it is checked, then all the samples during one revolution of the shaft will be used to calculate the average position of the shaft. If unchecked, then the samples during 0,1 second will be used to calculate the average position of the shaft. It is used to get a better reading of the shaft position. Therefore, for measuring the shaft position it is strongly recommended to enable this field.

Process meas. is a process measurement point to which the current measurement point should be connected/linked. The selected process measurement point will be taken with the current measurement point's data.

Digital meas. is a digital or Multiple Gating measurement point to which the current measurement point should be connected/linked. The selected digital or Multiple Gating measurement point will be taken with the current measurement point's data.

If the current measurement point is a Dynamic or Dynamic Envelope point, then all Multiple Gating Points assigned to the same IMx as the current point appear in the **Digital meas.** drop-down list.

- To successfully set up the current measurement point to be referenced by a Multiple Gating Point, the **No. channels** value on the **General** tab must equal ***1***.

Settings area (for Micrcomplete only)

E.U. is the engineering unit in which this measurement is to be displayed.

Scaling is used to change the display scaling (detection) of the measurement.

Pulses/rev. is the number of pulses the device receives per shaft revolution.

Full scale is used to scale the values.

Full scale, Env. is used to scale the values for Envelope.

Full scale, Veloc. is used to scale the values for Velocity.

Full scale, Temp. is used to scale the values for Temperature.

Zero level is the value that should be equal to zero in the measurement unit.

Sensitivity specifies the sensor sensitivity.

Envelope filter is a pre-processing type such as Envelope, for an example.

ICP current feed indicates whether the sensor is fed with current or not.

Frequency type can be Fixed freq. range or Order tracking.

No. of lines is for the FFT taken for extracting trend values.

Save specifies what kind of data that should be collected and stored. Choose between *FFT*, *Time waveform* or both. Data called *FFT and Phase* are also available for order tracking.

Window can be *Uniform*, *Hanning* or *Flattop*.

Speed sets a static speed value that will be stored with the measurement.

End freq. is the highest frequency that should be measured.

Low freq. is the lowest frequency that should be measured.

No. of averages is the number of measurements the Microlog should measure in order to get the average reading by combining all measurements. However, this number is ignored if the averaging is *Off*.

Averaging is a type of averaging method which the system has to perform on the data before it is stored to the database.

Speed meas. point allows you to select a speed measurement point which will be measured and the value will be stored as the speed for this measurement point. This overrides the static speed setting.

Order analysis shaft is the shaft on the machine that should be used for order analysis in the spectrum, history and 3D plot.

General Settings area (for Multiple Gating Points only)

Use – Select whether the MGP will base its evaluation on one or two operating classifications (classes). When *Both Classes* is selected, you can set two different gate ranges for each of the five reference points (on the **Class 1 gating** and **Class 2 gating** sub-tabs). When *Single Class* is selected, you can set a single gate range for each of the five reference points (on the **Class 1 gating** sub-tab).

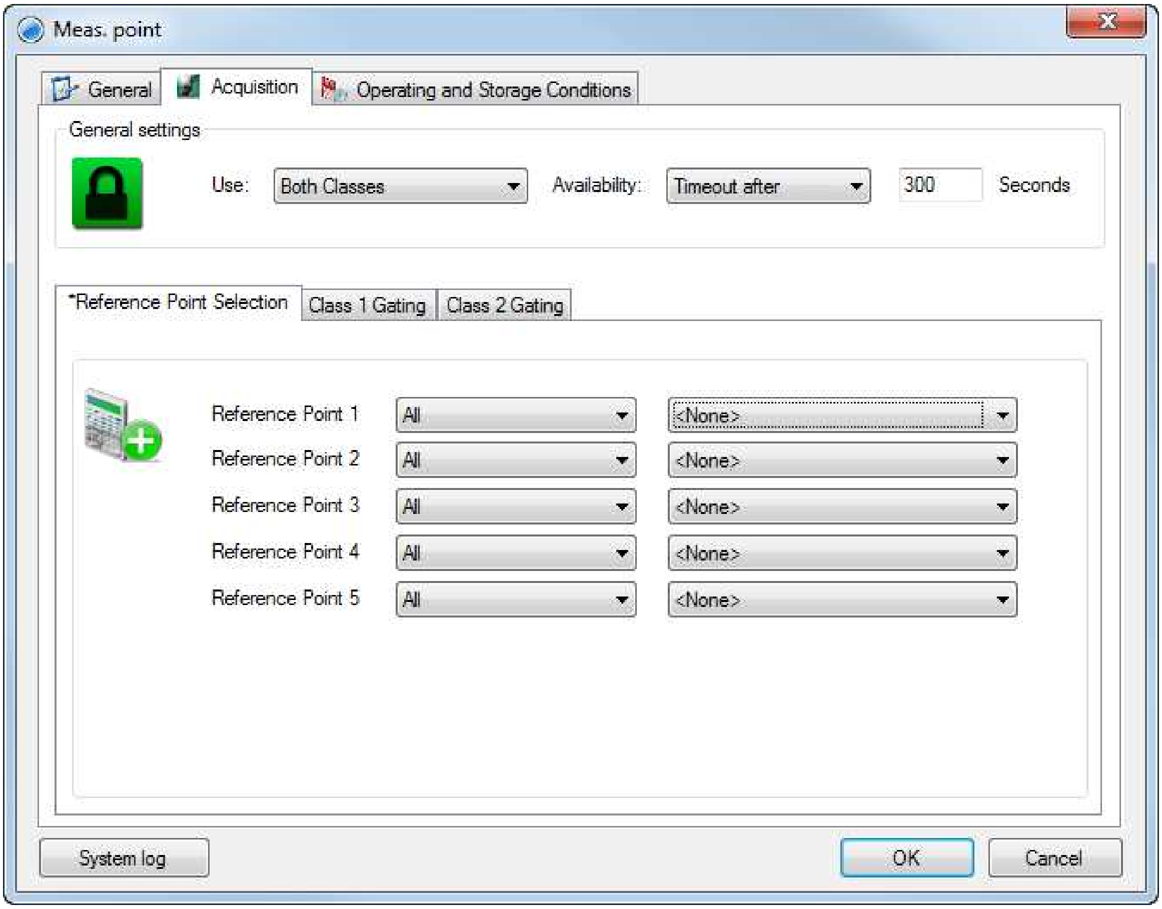


Figure 4 - 27.
Example of Multiple Gating Point, Reference Point Selection.

Availability – Select if and how gating should be suspended if one of the required reference points becomes unavailable:

Timeout after: Select to have the system suspend gating until a specified period of time has elapsed. Enter that period of time (in seconds). The default is 300 seconds.

Timeout disabled: Select to have the system continue gating.

On next evaluation: Select to have the system suspend gating until the next measurement.

Reference Point Selection sub-tab (for Multiple Gating Points only)

Reference Point 1 through **5**: Select up to five points from the selected IMx unit for the Multiple Gating Point to reference.

From each left drop-down list button, select a point type you wish to reference from the IMx: *All*, *Process*, *Digital*, or *Speed*

From the right drop-down list button in the same row, select a measurement point you wish to reference from the IMx. Options in this drop-down are filtered based on the target point type selected.

Class 1 gating and **Class 2 gating** sub-tabs (for Multiple Gating Points only) are enabled for each operating classification set up on the Options dialog's Data tab (one or two classes only).

Settling Time – Enter the number of seconds, upon entering a cable fault alarm status, for which Observer will remain in this status once sensor power is restored, given the applicable operating class. The class's gating output is enabled only when all required conditions have been met for this period. The default is 1 second.

Reference Point 1 through **5** sub-tabs display the measurements selected (on the Reference Point Selection sub-tab) for each reference point. These sub-tabs are enabled for assigned reference points only.

Absolute condition: The gating parameter range. Select (check) the **Min** checkbox and then enter a value to set a minimum **Absolute condition**. Select (check) the **Max** checkbox and then enter a value to set a maximum **Absolute condition**.

Delta condition: The accepted range, during measurement, of gating parameter change. Use this setting to force the system to take data when the operating mode of the machine is stable, thus ensuring capture of accurate and trustworthy data. Select (check) the **Min** checkbox and then enter a value to set a minimum **Delta condition** (permitted change). Select (check) the **Max** checkbox and then enter a value to set a maximum **Delta condition** (permitted change).

Period: Amount of time, in seconds (up to 60), for which the system must check the **Delta Condition** thresholds.

Important - One or more of the reference point gating ranges (conditions) must be different between two classes.

System log is a configuration log of all the changes made to the measurement point.

Operating and Storage Conditions Tab

On the **Operating and Storage Conditions** tab, you can configure when the measurement should be taken.

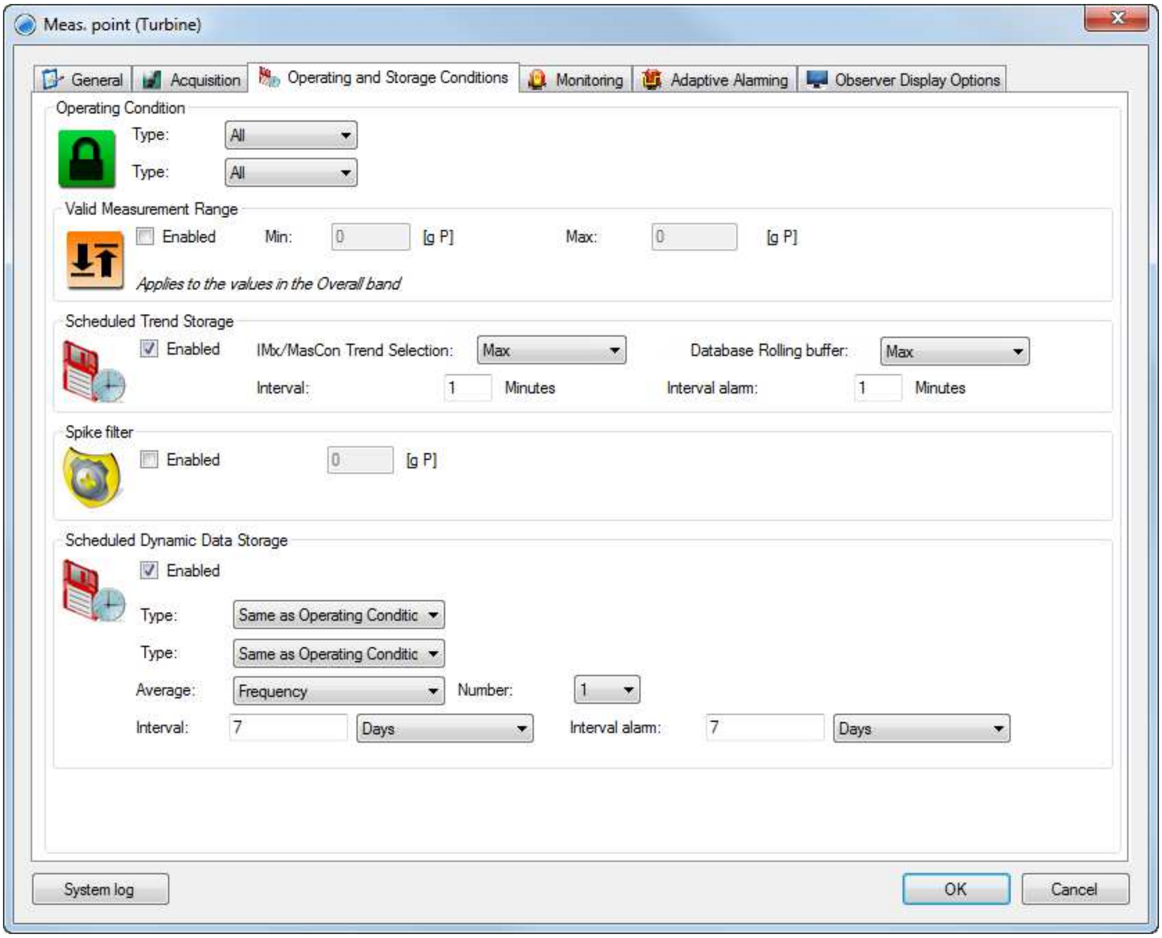


Figure 4 - 28.
Example of Dynamic Measurement Point Operating and Storage Condition Settings.

The **Operating and Storage Conditions** tab can contain any of the following elements:

Operating Conditions area

Operating condition is calculated with the help of the measurement points specified in the **Associated Measurements** of the **Acquisition** tab settings. For example, if you select *speed* as an active range type, a speed measurement point must be selected in the Associated measurements section as well.

Important - The specified conditions must be met in order for the measurement point to collect and store data in the database. The assigned conditions must be met before the system raises any alarms. If both conditions are specified, both conditions must be met before system raises any alarms.

Type is the type of gating which can be set to one of the following values:

All: means that the active range check is disabled. In other words, the active range that the measurement point is using is all values.

Speed: means that the active range check is determined by the speed measurement point readings selected in the **Associated Measurements** of the **Acquisition** tab settings.

Process: means that the active range check is determined by the process measurement point readings selected in the **Associated Measurements** of the **Acquisition** tab settings.

Digital: means that the active range check is determined by the digital measurement point readings selected in the **Associated Measurements** of the **Acquisition** tab settings.

Condition is the gating parameter range with minimum and maximum values.

- (For Dynamic and Dynamic Envelope points only) If the **Type** selected is *Digital* and the **Digital Measurement** selected on the **Acquisition** tab is a Multiple Gating Point, then this drop-down list box will allow you to select one or both of the operating classes established for that Multiple Gating Point. Once you have selected one or both of the operating classes, the **Enable class dependent alarms** checkbox on the **Monitoring** tab becomes enabled but remains deselected (unchecked) by default.

Max allowed delta is maximum accepted change of the gating parameter during the measurement. Use this setting to force the system to take data when the operating mode of the machine is stable which may be the only way to capture the accurate and trustworthy data.

This is an important setting when performing a process measurement point on variable speed machines. This is not important for a speed measurement point. It depends on your application. For example, for measuring bearing temperature, this function can be deactivated by setting it to 0.

Valid Measurement Range area

You can force the system to take data only when the amplitude reading is at a certain level by assigning a minimum and a maximum value of the measurement range. If the measured value is outside the measurement range, then the system alarm will be generated instead of an alarm on the measurement point.

System alarms are displayed in the *system view*, or *system alarm* window from the icon bar, instead of in the *alarm list*. For example, if the range is set to 0 to 300 °C and the temperature sensor output is above 300 °C, then this value will be treated as an unrealistic value and the IMx/MasCon system will generate a system alarm in the *system alarm list* instead of in the *alarm list*. The cause of this alarm could be a bad earth connection or surrounding interference that disturbs the output signal from the sensor.

Enabled is the status of this measurement range, enabled or disabled.

Min. is the minimum value of the measurement range.

Max. is the maximum value of the measurement range.

Scheduled Trend Storage area

Enabled box allows you to enable or disable the Scheduled Trend Storage function.

IMx/MasCon Trend Selection defines which measured values to keep during the storage **Interval** (as the device is constantly measuring during the time period set for the interval).

Max: Keeps the maximum value for the entire storage interval period.

Min: Keeps the minimum value for the entire storage interval period.

First: Keeps the first value measured in the storage interval period.

Average: (IMx only) Keeps the calculated average value for the storage interval period.

Database Rolling buffer determines which trend value to keep as data is being thinned out by the rolling buffer feature in the monitor service.

Max: Keeps the maximum value for the time period.

Min: Keeps the minimum value for the time period.

First: Keeps the first value for the time period.

Interval is the desired interval for data capturing which depends on the application.

The selection made here affects how fast data has to be moved from short term buffers to long term buffers in the database.

There are four different buffers in the @ptitude Observer database, a minute buffer, an hour buffer, a day buffer and a week buffer.

In each buffer 3 000 values can be stored as default. For example, if the measurement interval is set to 1 minute, the length of the minute buffer will be 3 000 minutes (50 hours). As more data comes in, values are move to the hour buffer. For a specific hour, all values in the minute buffer are analyzed and the system will move one of the values during this time period to the hour buffer. This logic works same for the hour to day buffer, and so on. The default of 3 000 values for each buffer can be configured in the @ptitude Observer Monitor service.

The type of the value to be moved from one buffer to the next is determined by the **Database Rolling buffer** field in the Scheduled Trend Storage, above.

Interval alarm is the desired interval for data capturing when the level is in warning or alarm condition.

Exception based storage is a setting of what to store if the trended values changes.

Save determines which format of the captured data should be stored in the system.

Store (Delta) checkbox – Select (check) to set the system to capture and store measurement trend data whenever there is a change in condition.

- To disable interval based trend storage, enter a zero in the **Interval** text box.

Spike filter area

Enabled box allows you to to enable or disable the Spike filter function.

The spike filter is useful to avoid alarming on high peak readings that could be picked up by the sensors caused by other sources rather than the machine itself. These measurements are not the ones that should raise alarms and should not be stored in the database either. For example, setting this value to 20 m/s^2 will set the system to ignore any measurements above this level completely. However, when the system detects high peak reading, the measurement will display the status of "Outside measurement range"  **,** indicating that the values coming from this measurement point are outside of the acceptance range.

Scheduled Dynamic Data Storage area

Enabled box allows you to enable or disable the Scheduled Dynamic Data Storage function.

Dynamic Data Storage is calculated with the help of the measurement points specified in the **Associated Measurements** of the **Acquisition** tab settings. For example, if you select *speed* as an active range type, a speed measurement point must be selected in the Associated measurements section as well.

Important - The following specified conditions must be met in order for the measurement point to collect and store data in the database. The assigned conditions have to be met before the system raises any alarms. If both conditions are specified, both conditions must be met before system raises any alarms.

Type is the type of gating which can be set to one of the following values:

Same as Operating Condition: configures the dynamic data storage range to be same as the Operating Condition range.

Speed: means that the dynamic data storage range check is determined by the speed measurement point readings selected in the **Associated Measurements** of the **Acquisition** tab settings.

Process: means that the dynamic data storage range check is determined by the process measurement point readings selected in the **Associated Measurements** of the **Acquisition** tab settings.

Digital: means that the dynamic data storage range check is determined by the digital measurement point readings selected in the **Associated Measurements** of the **Acquisition** tab settings.

- (For Dynamic and Dynamic Envelope points only) If the **Digital measurement** point selected in the Associated measurements section of the Acquisition tab is a Multiple Gating Point, these **Type** menus will not contain a *Digital* option. Multiple gating is only performed on overall (static), process, speed, or digital measurements, and it cannot affect gating of dynamic measurements.

Condition is the gating parameter range with minimum and maximum values.

Max allowed delta is maximum accepted change of the gating parameter during the measurement. Use this setting to force the system to take data when the operating mode of the machine is stable which may be the only way to capture the accurate and trustworthy data.
This is an important setting when performing a process measurement point on variable speed machines. This is not important for a speed measurement point.
It depends on your application. For example, for measuring bearing temperature, this function can be deactivated by setting it to 0.

Average is a type of averaging which the system has to perform on the data before they are stored to the database.
For example, for FFT if you select *frequency* for the average and 4 for the number, the MasCon/WinCon device will take 4 FFT's, average them and store the averaged FFT in the database. If you select *time synchronous* for average, the device will filter out vibrations that are not synchronous to the speed of the shaft where vibration data are taken. Note that the trigger speed measurement indication, **Trigg.** has to be set in the **Associated Measurements** of the **Acquisition** tab settings.

Number is the number of averages that should be taken for the specified average type selected from the above.

Interval is the desired interval for data capturing. It depends on the application.

Interval alarm is the desired interval for data capturing when the level is in warning or alarm condition.

System log is a configuration log of all the changes made to the measurement point.

Shaft Properties Tab

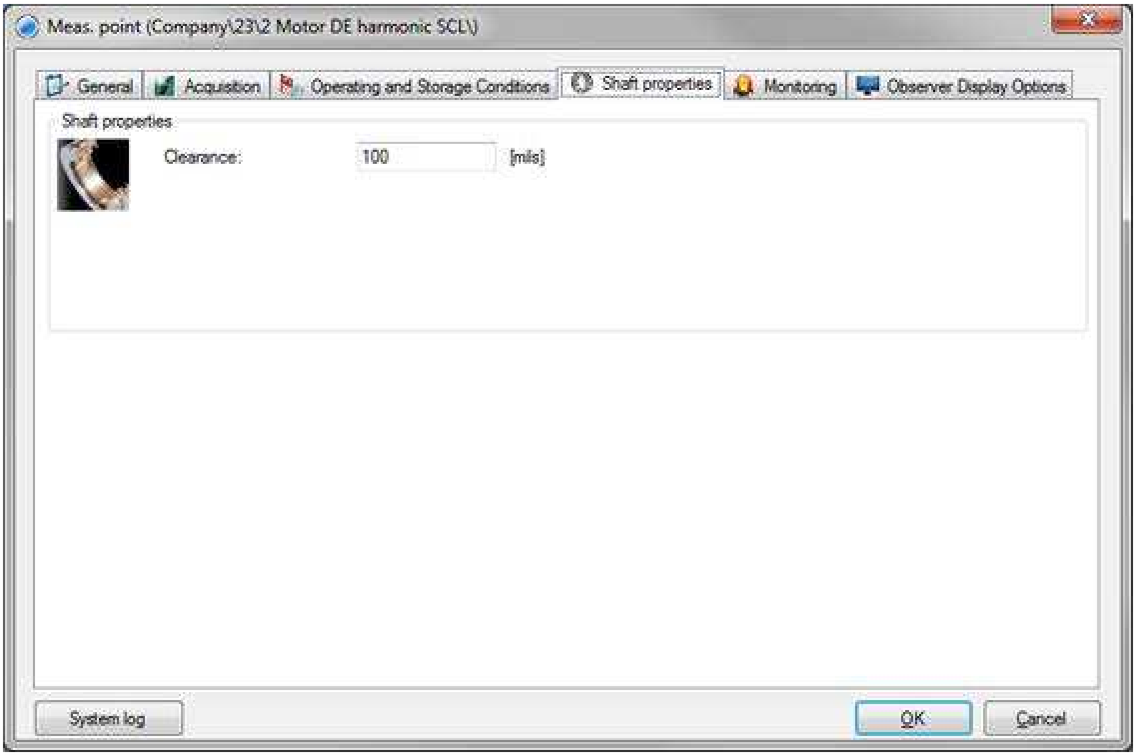


Figure 4 - 29.
Example of Shaft Centerline Measurement Point Shaft Properties Settings.

Shaft properties area

Clearance is the total bearing clearance divided by 2. If the clearance was measured when the shaft was in the middle of the bearing, the measured clearance should be entered. If the clearance was measured when the shaft was in the top, left, right or bottom position, the measured clearance divided by 2 should be entered.

System log is a configuration log of all the changes made to the measurement point.

Monitoring Tab

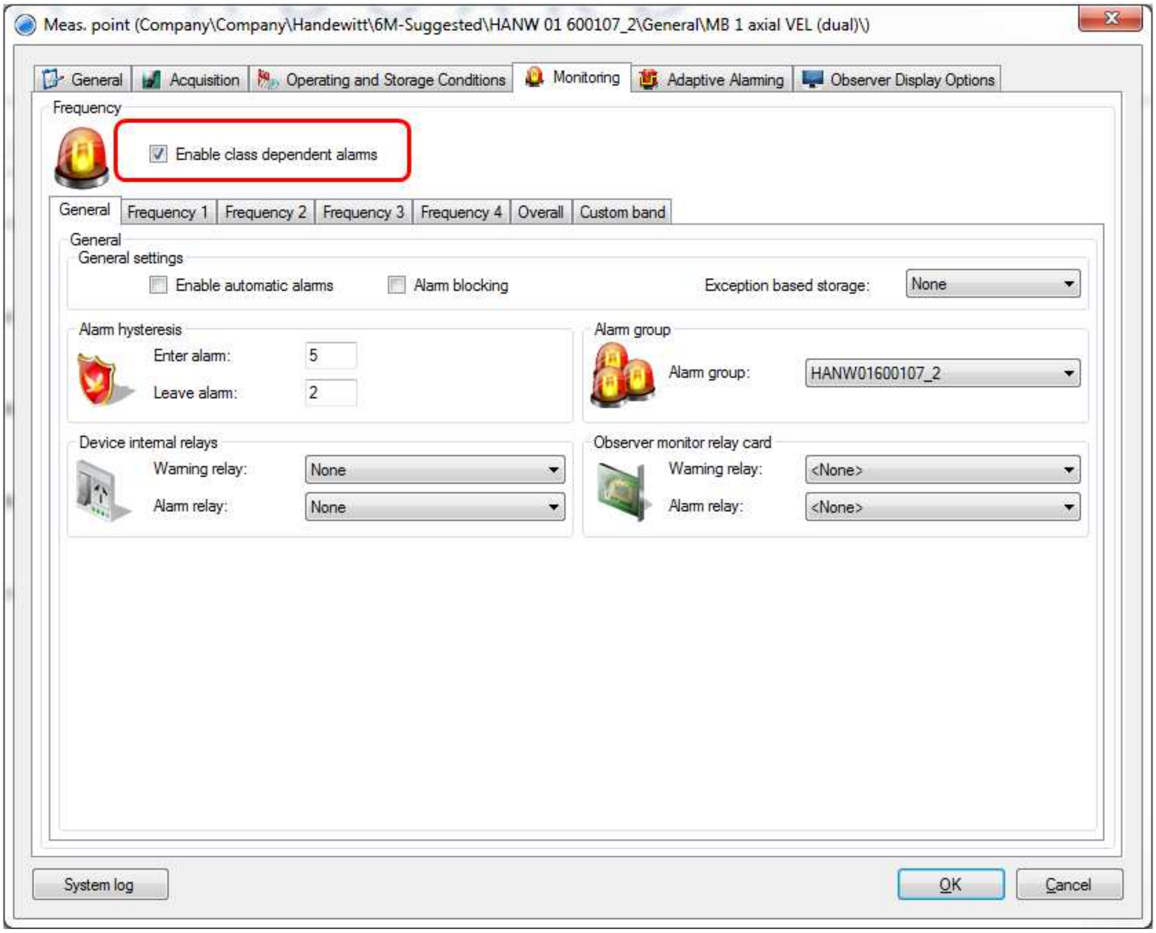


Figure 4 - 30.
Example of Dynamic Measurement Point Monitoring Settings.

Frequency area

Enable class dependent alarms box (for Dynamic and Dynamic Envelope points only), when selected (checked), enables extra alarms dependent on the two Multiple Gating Point operating classes and disables other alarms. If disabled, alarms and diagnoses are calculated for all classes.

When a Multiple Gating Point has been selected as the digital gating Condition on the Operating and Storage Conditions tab, this box become enabled but remains deselected (unchecked) by default.

When this checkbox is selected (checked), the system performs the following actions:

– Disables the Adaptive Alarming area on the **Adaptive Alarming** tab.

– Displays two alarm levels on each of the **Monitoring** tab's **Frequency #** sub-tabs and **Overall** sub-tab corresponding to the two Multiple Gating Point operating classes.

- Disables the **Level ctrl** checkbox on each of the **Monitoring** tab's **Frequency #** sub-tabs and **Overall** sub-tab.
- Disables the **Store Delta** text box on each of the **Monitoring** tab's **Frequency #** sub-tabs and **Overall** sub-tab.
- Disables the **Monitoring** tab's **Custom Bands** sub-tab.

General sub-tab, **General settings** area

Enable automatic alarms checkbox enables the automatic alarm functionality when checked.

Automatic alarm enables the measurement point to use automatic levels for the selected active trend alarms. The system will automatically calculate the alarm and warning level after a minimum specific number of historical values have been stored in the database.

For Microlog measurement points, the minimum number of trend values to calculate the automatic alarm levels is five and it will be based on a maximum of 40 measurements. For IMx/MasCon measurement points, the minimum number of trend values to calculate the automatic alarm levels is 20 and it will be based on a maximum of 100 measurements.

The calculation algorithm uses a specific number of standard deviations from the average level to determine the warning level. The number of standard deviations is determined by **Auto alarm** setting on the **Thresholds** tab for Options under Database in Menu Items. To determine the alarm level the system uses twice as many standard deviations as for the calculation for the warning level.

When a new trend value is stored in the database, the system always checks if new automatic alarm levels should be set for the measurement point. Once they are set, they will not be recalculated again unless the user specifically resets the automatic alarm levels by editing the measurement point properties or by right-clicking in the hierarchy and selecting **Reset the automatic alarm levels**.

When the system has calculated the warning and alarm levels for the active alarms on a measurement point, the measurement point properties will be updated with the new levels, and the system log for the measurement point will be updated as well.

When a new measurement point is created by copying an existing measurement point with the automatic alarm enabled, the alarm level of the new measurement point will be set to 0. The automatic alarm for the new measurement point will be calculated when enough data have been stored for the new measurement point.

Automatic alarm cannot be combined with adaptive alarm.

Alarm blocking is a setting that makes it possible to temporarily disable the alarm check.

Store delta makes the system to store data if the change of the trended value (since the last store) exceeds the Store delta value.

Exception based storage is a setting of what to store if the trended values changes.

General sub-tab, **Alarm** area

This section is to set up the alarm levels for the measurement. Individual alarms can be disabled as applicable.

High alarm is the status of high alarm which can be enabled or disabled.

High warning is the status of high warning which can be enabled or disabled.

Low warning is the status of low warning which can be enabled or disabled.

Low alarm is the status of low alarm which can be enabled or disabled

Condition triggers the alarm to be raised. The options are *none*, *opened* and *closed*.

General sub-tab, **Alarm hysteresis** area

This section controls how many times a value can be over and under the alarm limits before @ptitude Observer goes into or releases the alarm state.

Enter alarm is the number of consecutive measurements that have to be over the alarm level before an alarm is reported. Default is set to 2.

Leave alarm is the number of times that a value has to be under the alarm level before @ptitude Observer releases the alarm state. Default is set to 5.

General sub-tab, **Alarm group** area

It is a setting that makes the system to store data for all the members in the group if one of the member triggers alarm.

General sub-tab, **Device internal relays** area

Warning relay on the WindCon/IMx/MasCon device is used when a warning level is reached. It can be used to trip the machine upon warning.

Alarm relay on the WindCon/IMx/MasCon device is used when an alarm level is reached. It can be used to trip the machine upon alarm.

General sub-tab, **Vector alarming** area

Type is a selection of alarm type in the complex plane. This setting can be either Circular or Sector.

Frequency # sub-tab

Type is the type of frequency band or time waveform component to monitor.

For frequency:

Fixed frequency: monitors a specific frequency with a search area around in order to trend.

Speed following: monitors specific frequencies related to the speed of the machine when machine speed varies. It is possible to set up to monitor a specific gear on the selected machine part by choosing a machine part from the drop down list.

 # x N sub-tab

Level ctrl. triggers the alarm levels to be automatically adjusted according to the settings and curve information provided in Adaptive Alarming Tab in Setting up Measurement Points and Alarms.

Channel X Enabled enables the Channel X.

Channel X Warning level / Alarm level sets up normal level alarm *warning* and *alarm* for trends 1 x N, 2 x N, 3 x N and 4 x N.

Overall sub-tab

This section is used for an overall measurement by setting up the system to display/calculate the value.

Type specifies the method to use to calculate the overall.

Frequency band means that the overall will be calculated from a defined band on the frequency domain.

From time waveform means that the overall will be calculated from the time waveform (true peak-peak) and then scaled to RMS, peak or peak-peak (=no scaling) according to the Trend Configuration settings in the Acquisition tab.

None means the overall is not calculated.

Name is the name of the alarm for the measurement point.

Start is the start frequency of the frequency band to monitor.

Stop is the end frequency of the frequency band to monitor.

Level ctrl. triggers the alarm levels to be automatically adjusted according to the settings and curve information provided in Adaptive Alarming Tab under Setting up Measurement Points and Alarms in System Configuration.

Relation indicates a percentage, which means that the system will trigger an alarm if the ratio exceeds the number set in this field. The ratio is calculated by *(Total - 1 x N - 2 x N - 3 x N - 4 x N) / Total*. Relation alarm monitors the frequencies in between the frequencies: 1 ´ N, 2 ´ N, 3 ´ N and 4 ´ N, for example, sub harmonics.

Alarm - Warning level/Alarm level is the warning level/alarm level of the Channel X alarm.

Custom band sub-tab

Band is the band number.

Name is the name of the band.

Type is the type of frequency or time waveform component to monitor:

Fixed frequency monitors a specific frequency with a search area around in order to trend.

Frequency band means that the overall will be calculated from a defined band on the frequency domain.

Speed following monitors specific frequencies related to the speed of the machine when machine speed varies. You can set up to monitor a specific gear on the selected machine part by choosing a machine part from the drop down list.

From time waveform means that the overall will be calculated from the time waveform (true peak-peak) and then scaled to RMS, peak or peak-peak (no scaling) according to the Trend Configuration settings in the Acquisition tab.

None means custom band is not being used.

Source is the selection of sensor multi-channel points.

HW is the high warning level.

HA is the high alarm level.

Additional configuration levels are available when you select a custom band on this list and click **Edit**.

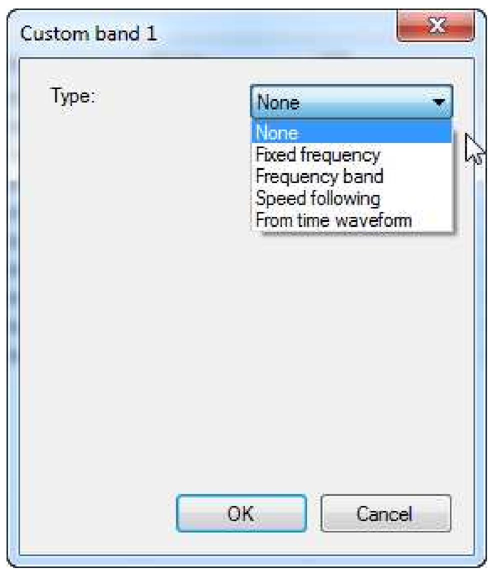


Figure 4 - 31.
Example of Edit Custom Band Dialog, Type.

In the **Custom band x** dialog, the **Type** options match those just described above. When you select the **Type**, additional fields display. The examples below show the available options for *Fixed Frequency* and for *Speed Following*.

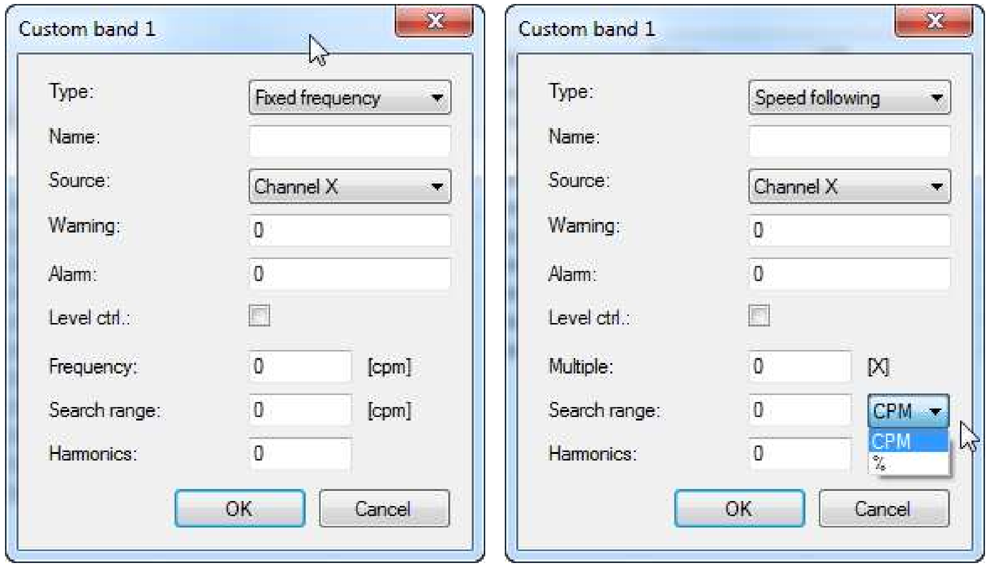


Figure 4 - 32.
Examples of Edit Custom Band Dialog with Different Types.

Source is the selection of sensor multi-channel points.

Alarm - Warning level/Alarm level is the warning level/alarm level of the Channel X alarm.

Level ctrl. triggers the alarm levels to be automatically adjusted according to the settings and curve information provided in Adaptive Alarming Tab in Setting up Measurement Points and Alarms.

Search range performs a search for maximum amplitudes within this range.

Harmonics specifies the number of harmonics that should be included in the calculation.

Adaptive Alarming Tab

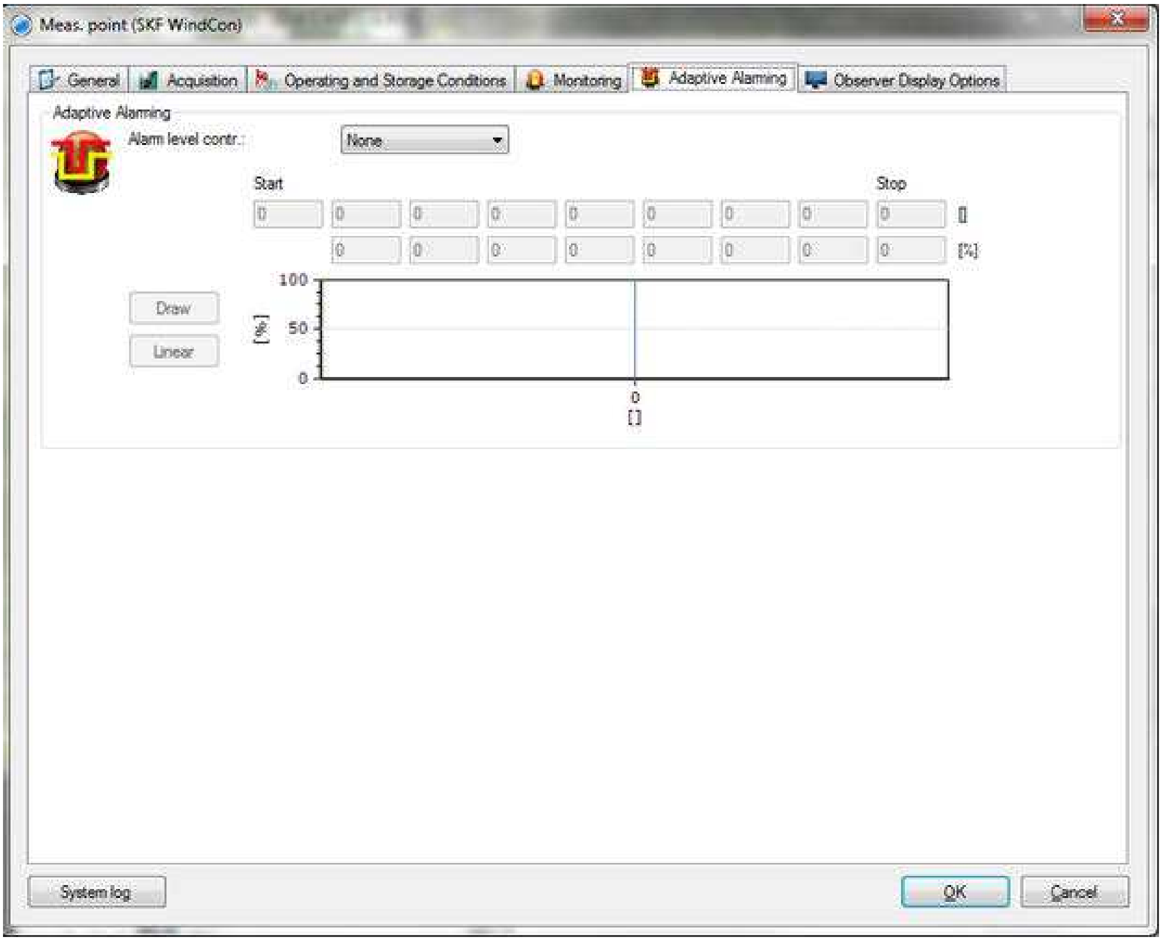


Figure 4 - 33.
Example of Dynamic Measurement Point Adaptive Alarming Settings.

Adaptive Alarming area

- If the **Enable class dependent alarms** box (for Dynamic and Dynamic Envelope points only), on the **Monitoring** tab is selected (checked), then all controls on this tab are disabled.

Note that in order to activate advanced settings for each trend, you must set Level ctrl in Monitoring Tab under Setting up Measurement Points and Alarms in System Configuration.

Alarm level contr. controls the alarm levels; for example, for rotational speed or a process value such as motor load. Use the graph and its settings to construct the curve to be used for altering the alarm levels during measurement.

Start / Stop defines the range in which the control is to take place. The boxes above the graph are used to specify the alarm values in % of the alarm levels which is set in Monitoring Tab.

System log is a configuration log of all the changes made to the measurement point.

Transient Tab

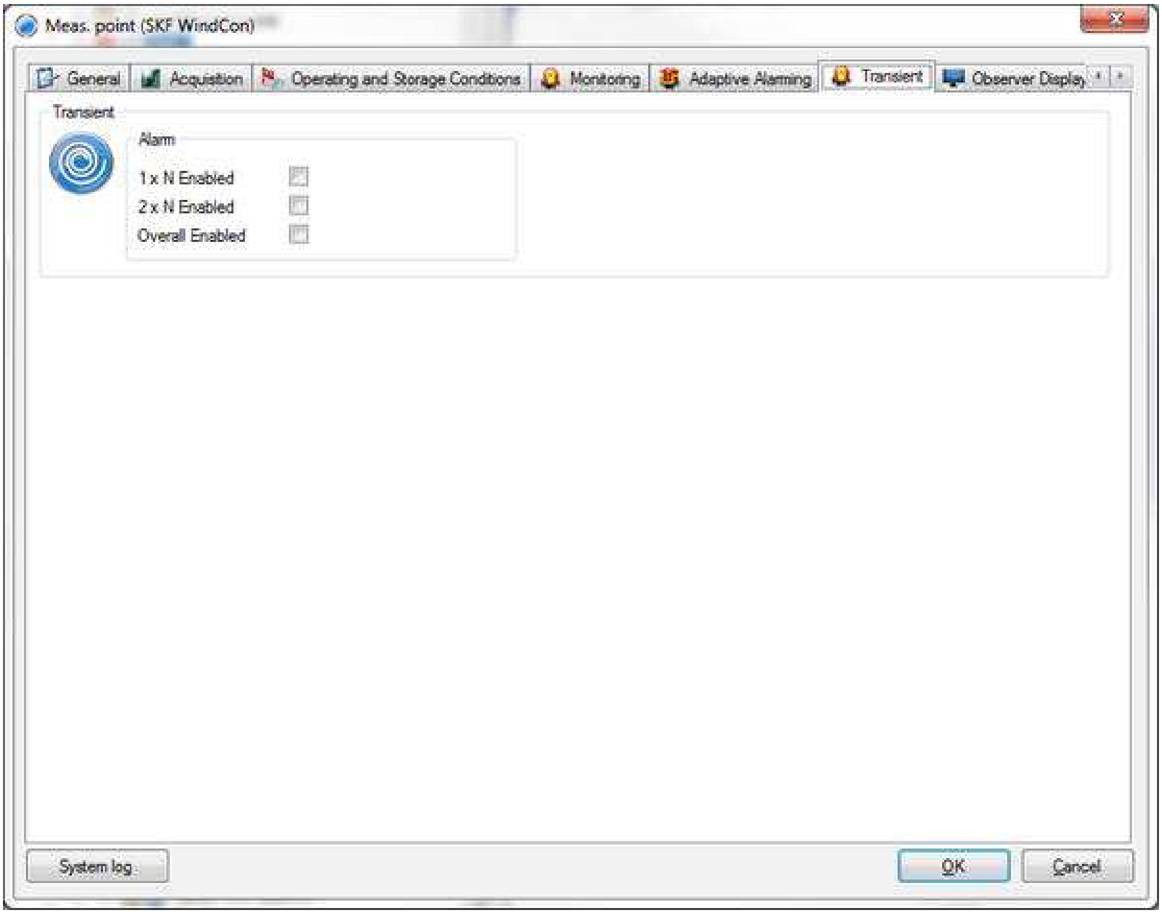


Figure 4 - 34.
Example of Harmonic Measurement Point Transient Settings.

Transient area

Alarm indicates whether to enable or disable alarms in transient ranges such as 1 x N, 2 x N, and Overall in the measurement group.

System log is a configuration log of all the changes made to the measurement point.

Observer Display Options Tab

This setting contains information related to the display of information to the user but which has nothing to do with the measurement itself.

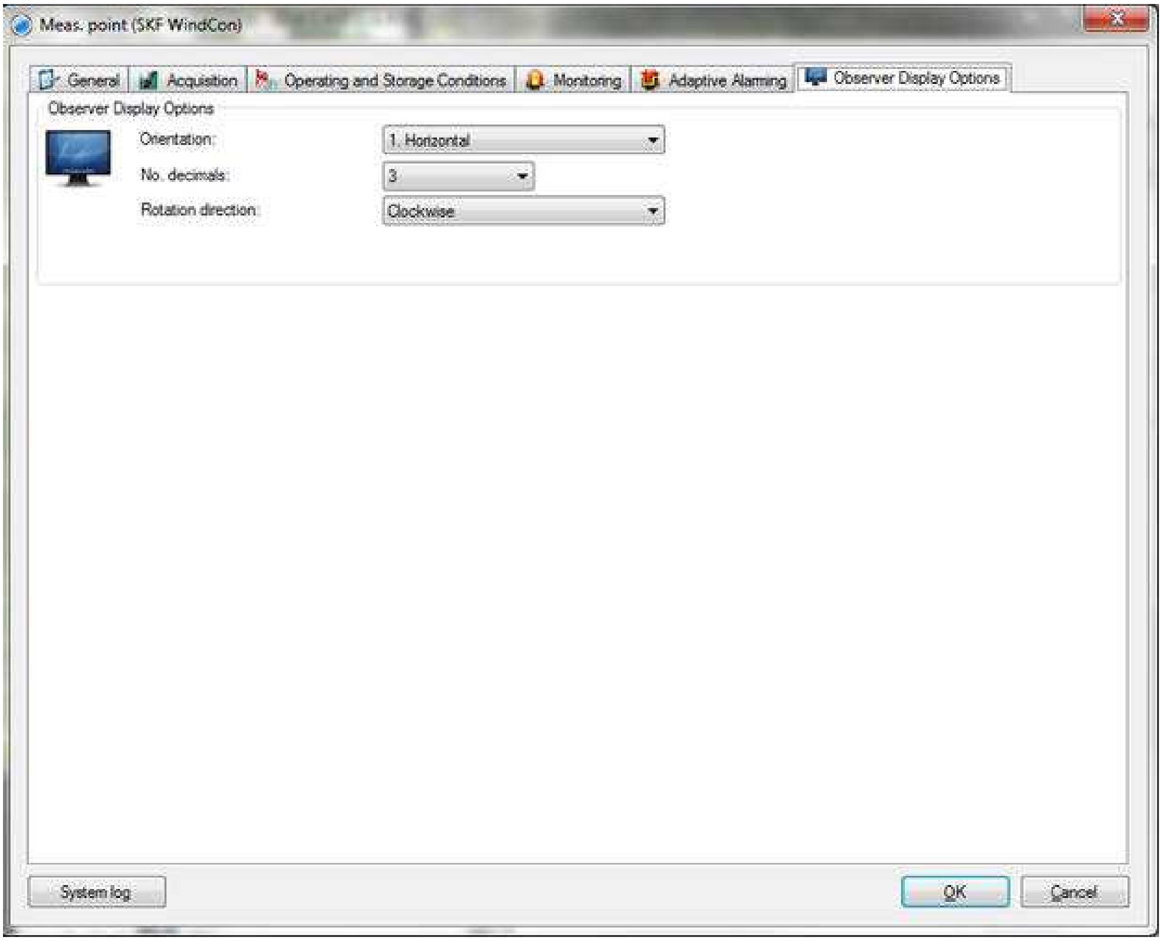


Figure 4 - 35.
Example of Dynamic Measurement Point Observer Display Options Settings.

Observer Display Options area

Orientation is a suitable sensor orientation which can be 1. Horizontal, 2. Axial, 3. Vertical, 4. Tangential, 5. Radial, or 6. Axial/Vertical.

No. decimals is used when displaying the measurement in order to control the accuracy of the measurement.

Rotation direction indicates the rotational direction which can be clockwise or counter-clockwise.

Order analysis shaft is the shaft on the machine that should be used for order analysis in the spectrum, history and 3D plot.

System log is a configuration log of all the changes made to the measurement point.

About Multiple Gating Points

A Multiple Gating Point (MGP) is an @ptitude Observer measurement that references values from up to five other points and then performs a logical evaluation on the current measurements to determine if the IMx should take measurements. Each reference point has two distinct gating conditions, Operating Class 1 or Operating Class 2, with the point output determined by which set of the two gating conditions is set to TRUE. These reference measurements can include process, speed, and digital measurements.

The display name of the operating classes can be edited on **Database > Options, Data** tab.

To create an MGP:

- Within the Hierarchy view, right-click on the machine or sub machine to which you intend to add the MGP and select **Add > Meas. point** from the resulting context menu. The **New meas. point** screen appears.
- Click on the **IMx** device option on the left side of the screen.
    - ➢ The measurement point type options available vary depending on the device selected.
- Click on the **Multiple Gating, Process** measurement point option and click **OK** (or double-click on the **Multiple Gating, Process** option). A new **Meas. point** screen appears with the **General** tab displayed.

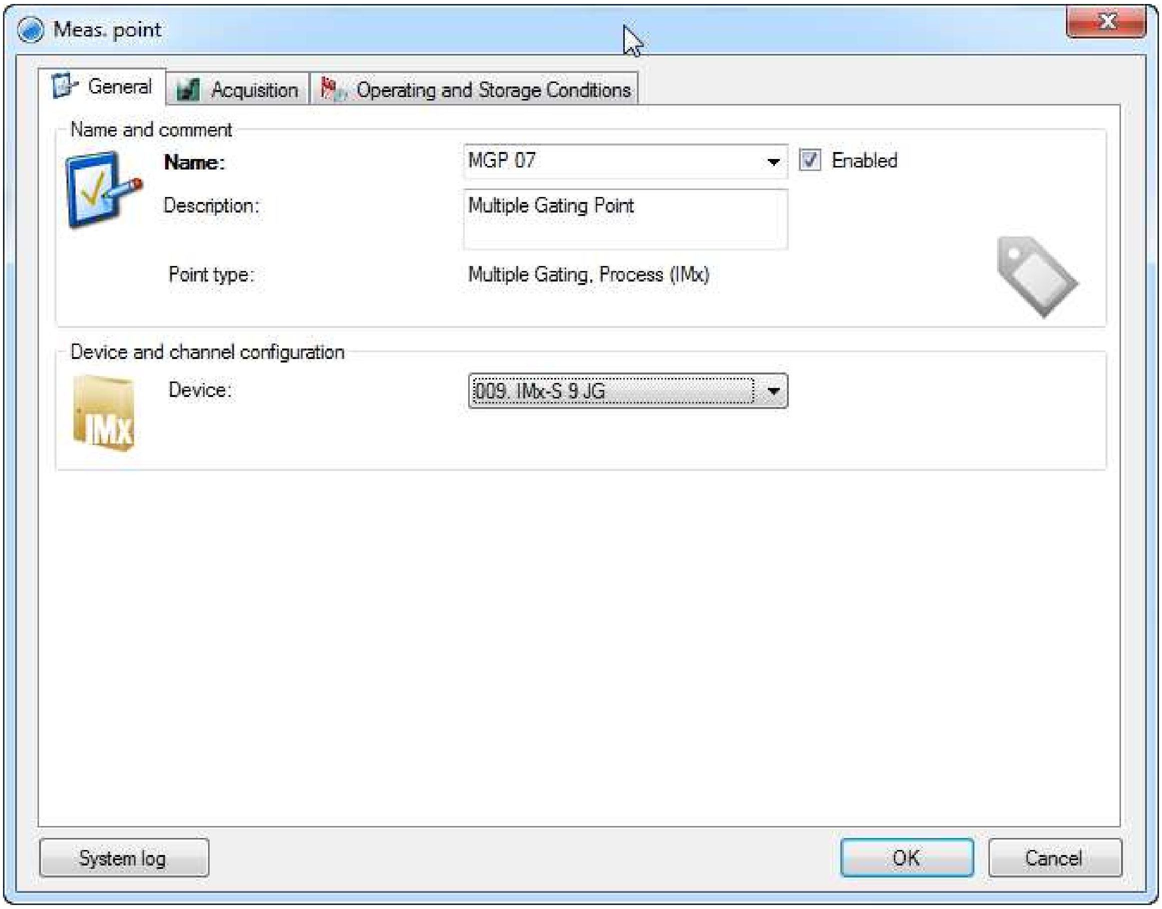


Figure 4 - 36.
Meas. Point Screen's General Tab for New MGP.

- Enter a **Name** and **Description** for the new MGP.
- Select the IMx you are using to collect measurement data from the **Device** drop-down list button.
- Click on the **Acquisition** tab.

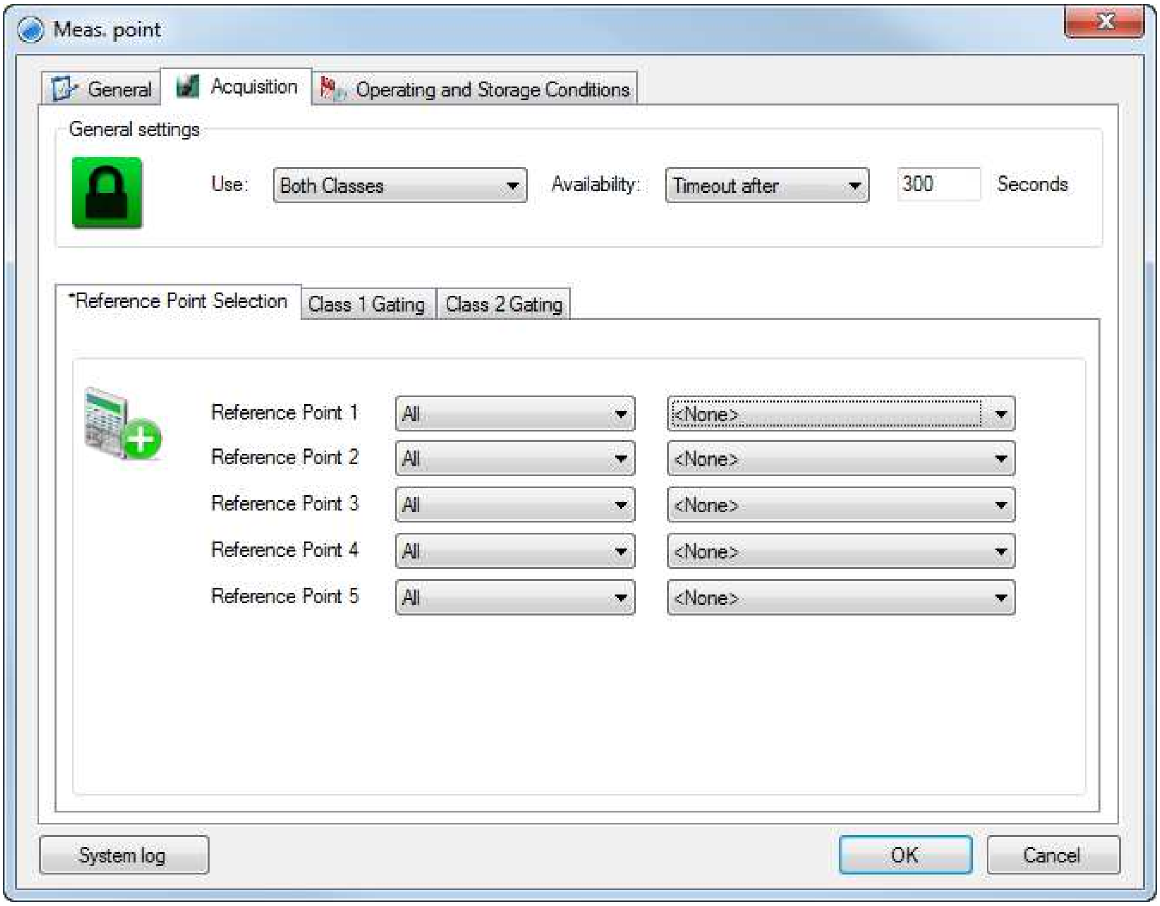


Figure 4 - 37.
Meas. Point Screen's Acquisition Tab (Reference Point Selection Sub-Tab) for New MGP.

- From the **Use** drop-down list button, select whether the MGP will base its evaluation on a *Single Class* or *Both Classes*. When *Single Class* is selected, you can set a single gate range for each of the five reference points (on the **Class 1 gating** sub-tab). When *Both Classes* is selected, you can set two different gate ranges for each of the five reference points (on the **Class 1 gating** and **Class 2 gating** sub-tabs).
- From the **Availability** drop-down list button, select if and how gating should be suspended if one of the required reference points becomes unavailable:

  Timeout after: Select to have the system suspend gating until a specified period of time has elapsed. Enter that period of time (in seconds). The default is 300 seconds.

  Timeout disabled: Select to have the system continue gating.

  On next evaluation: Select to have the system suspend gating until the next measurement.
- On the **Reference Point Selection** sub-tab, select up to five points from the selected IMx unit for the Multiple Gating Point to reference. From each left drop-down list button, select a point type you wish to reference from the IMx: *All*, *Process*, *Digital*, or *Speed*.

From the right drop-down list button in the same row, select a measurement point you wish to reference from the IMx. Options in this drop-down are filtered based on the target point type selected.

- If you selected *All* from the left drop-down list button, that point type will update according to the measurement point you select from the right drop-down list button.
- You can reset a measurement point reference list at any time by selecting *All* from the point type list.

- Click on the **Class 1 Gating** sub-tab.

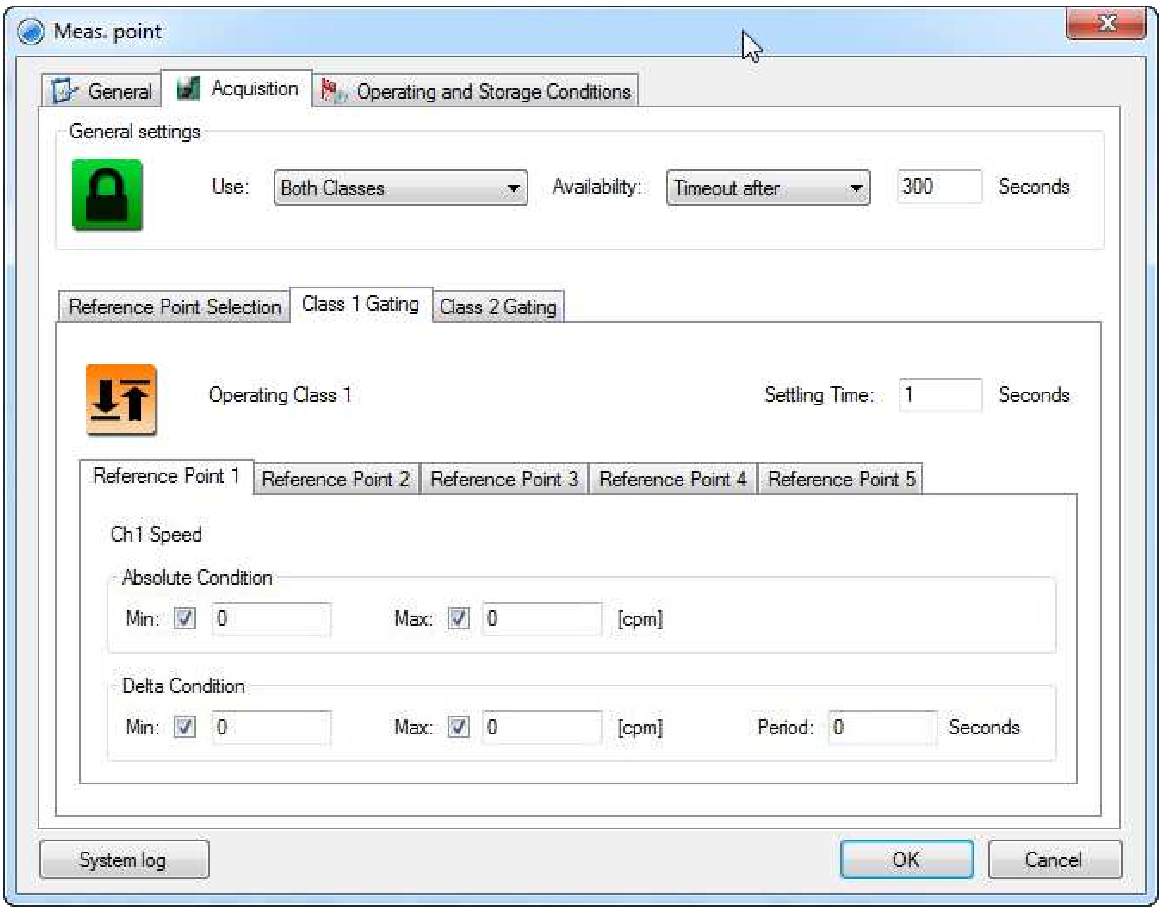


Figure 4 - 38.
Meas. Point Screen's Acquisition Tab (Class 1 Gating Sub-Tab) for New MGP.

- The class name that appears at the top of this sub-tab is a global property set from the **Database > Options** screen's **Data** tab.

- In the **Settling Time** text box, enter the number of seconds, upon entering a cable fault alarm status, for which Observer will remain in this status once sensor power is restored, given the applicable operating class. The default is 1 second.

- On the **Reference Point 1** sub-tab, select the gating conditions for that reference point:
  - Select (check) the **Min** and/or **Max** checkbox(es) and then enter a value or values to set an **Absolute condition** gating parameter range.
    - If either value must be a negative number, include a minus sign (-) before the number.
    - If both **Min** and **Max** are selected, the gating parameter range falls between the two. If either is not selected, the range extends infinitely in that direction.
  - Select (check) the **Min** and/or **Max** checkbox(es) and then enter a value or values to set a **Delta condition** permitted parameter change range.
    - If either value must be a negative number, include a minus sign (-) before the number.
    - If both **Min** and **Max** are selected, the accepted gating parameter change range falls between the two. If either is not selected, the range extends infinitely in that direction. If neither is selected, there is no accepted gating parameter change range.
  - Enter the **Period**, in seconds (up to 60), for which the system must check the **Delta Condition** thresholds.
    - **Delta Condition Period** is disabled if both the **Min** and **Max** checkboxes are deselected (unchecked).
- Continue selecting gating conditions for the other reference points on their respective tabs, as appropriate.
    - These sub-tabs are enabled for assigned reference points only.
- If appropriate, click on the **Class 2 Gating** tab to assign a **Settling Time** and select gating conditions for the reference points, for that class.

> ***Important - One or more of the reference point gating ranges (conditions) must be different between two classes.***

Digital point example, Acquisition tab

You may want to have digital point gating in one class but not in the other class. A **Condition** checkbox is provided for each **Reference Point** sub-tab on the **Class 1 Gating** and **Class 2 Gating** tabs.

When the **Condition** checkbox is not selected, the condition is excluded from the MGP evaluation without de-referencing the digital point in the Reference Point Selection tab.

When the **Condition** checkbox is selected, a drop down combo box displays to its right, with the options *Open* or *Closed* for the digital parameter.

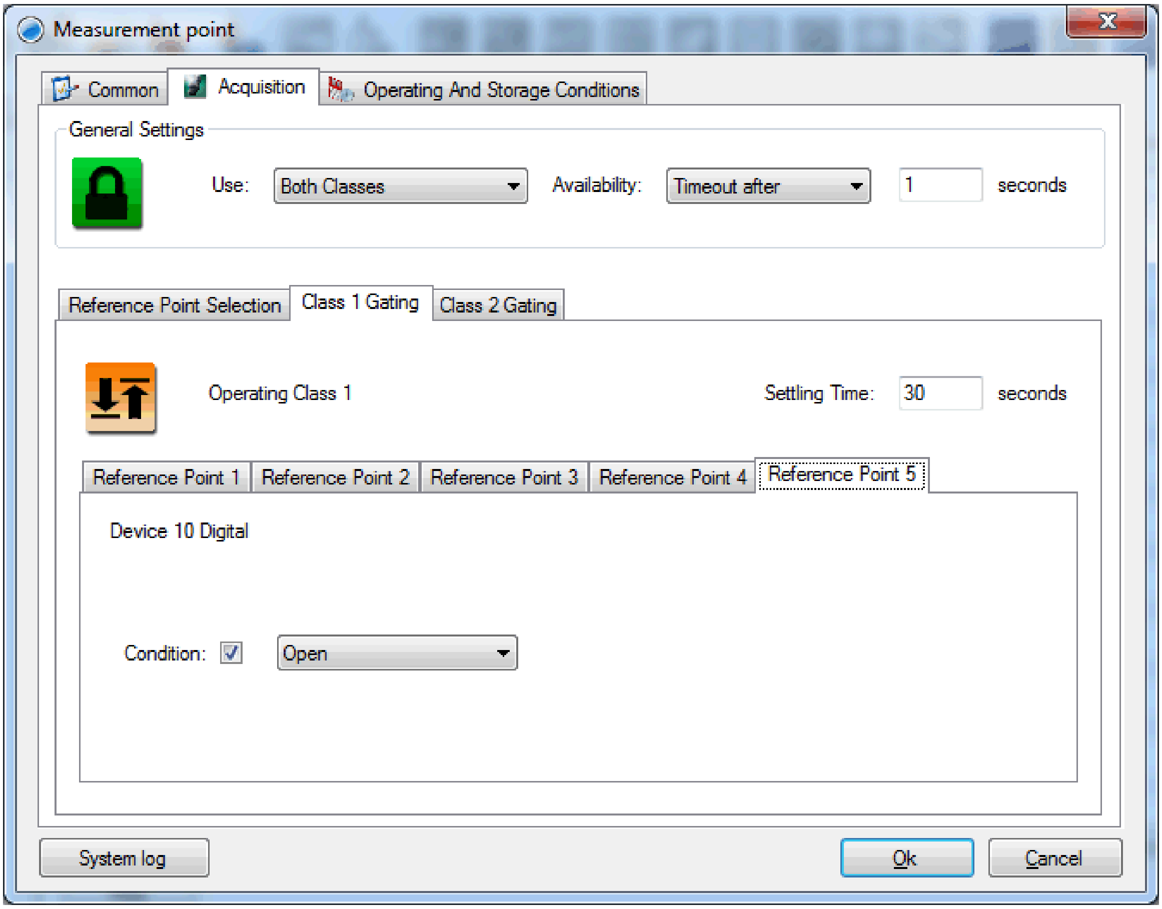


Figure 4 - 39.
Meas. Point Screen's Acquisition Tab, Reference Sub-Tab for a Digital Point.

- Click on the **Operating and Storage Conditions** tab.

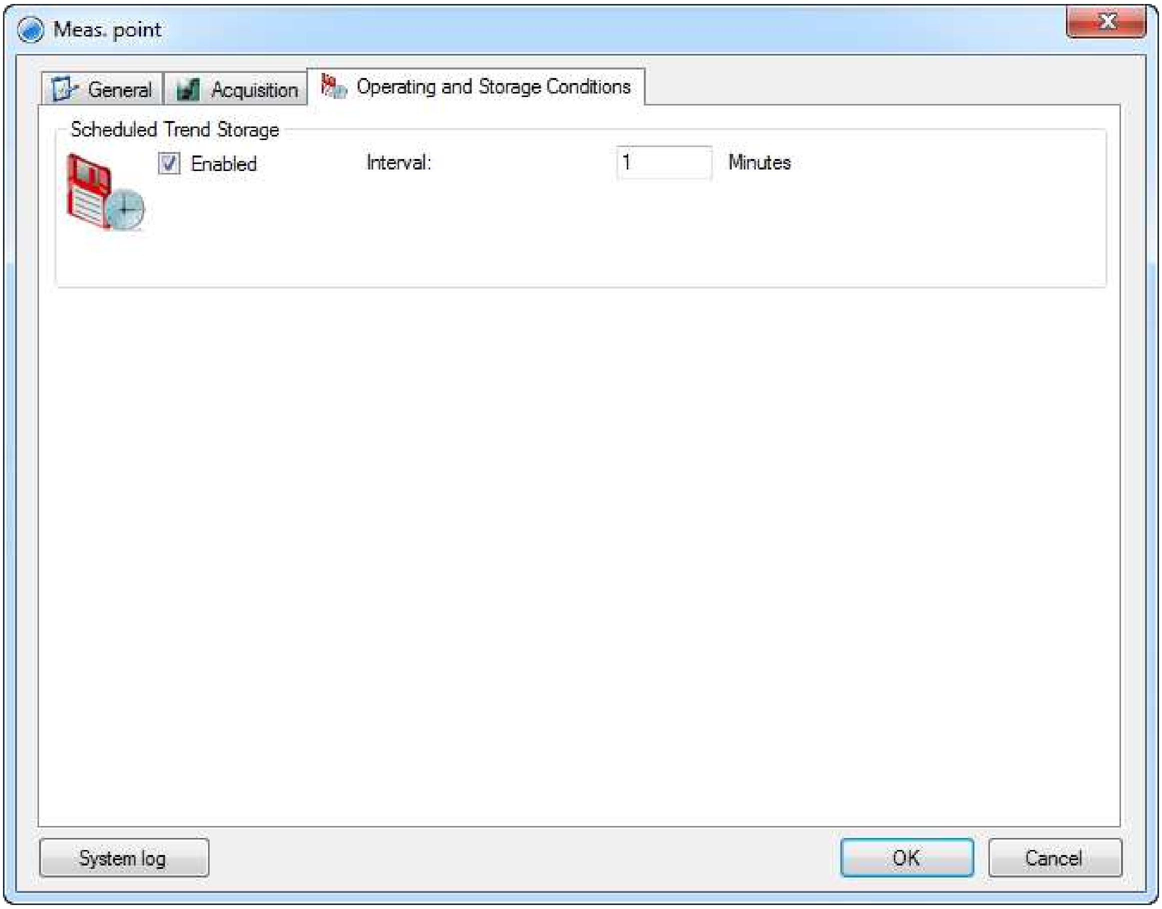


Figure 4 - 40.
Meas. Point Screen's Operating and Storage Conditions Tab for New MGP.

- Keep the **Enabled** box selected (checked) if you wish to have the **Scheduled Trend Storage** function enabled.
- Enter the desired **Interval** for data capturing.
- Keep the **Exception based storage** box selected (checked) if you wish to store trend values only for those measurements that reflect trend value changes.
- Click **OK** to finish creating and save the new MGP.

To set an existing (or newly-created) Dynamic or Dynamic Envelope point to be referenced by the Multiple Gating Point:

- Create a new Dynamic or Dynamic Envelope type IMx measurement point. The new measurement point screen opens with the **General** tab displayed.

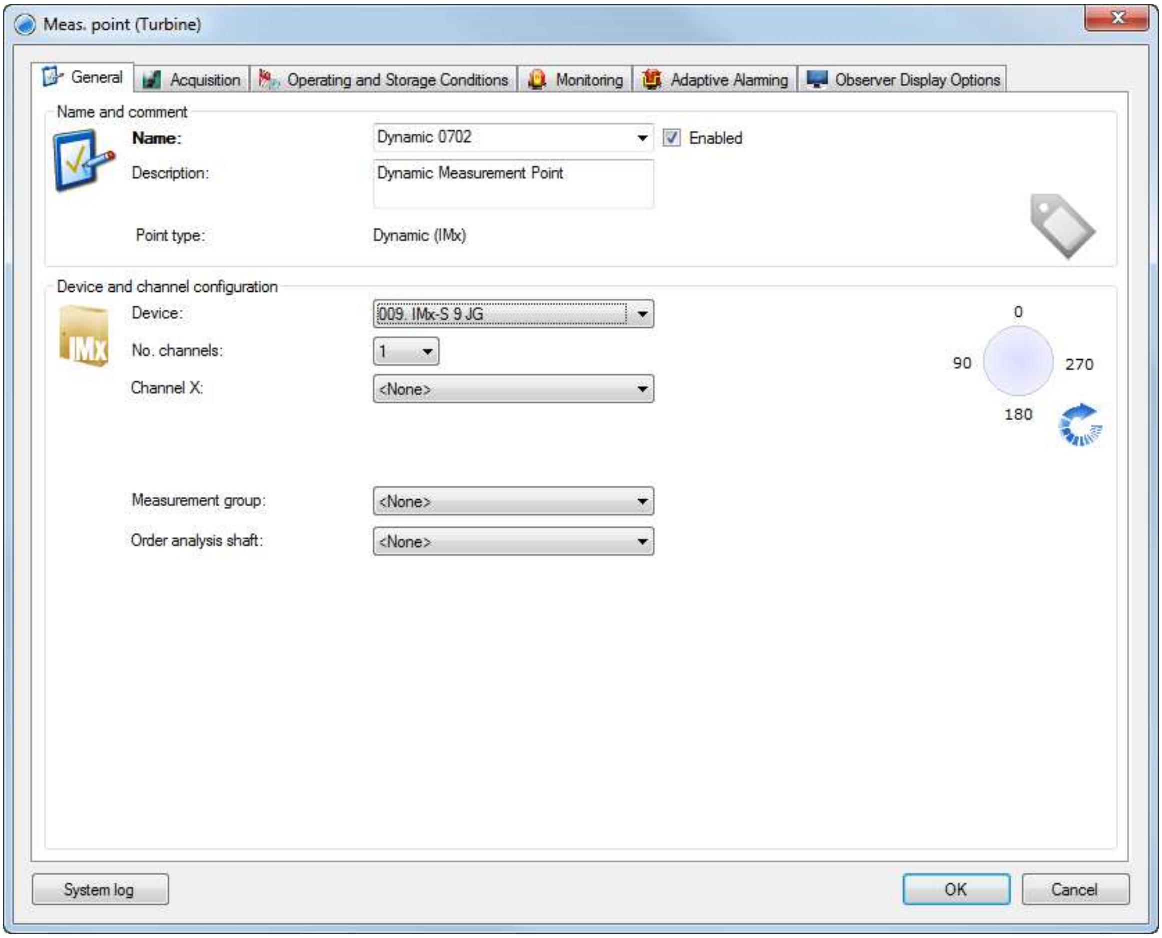


Figure 4 - 41.
Associating a Dynamic Measurement Point with a Multiple Gating Point – General Tab.

- Enter a **Name** and **Description** for the point.
- Select the desired IMx.
- Select *1* from the **No. channels** drop-down list. Multiple Gating Points can reference only single channel points.
- Complete other **Device and channel configuration** information as appropriate.
- Click on the **Acquisition** tab.

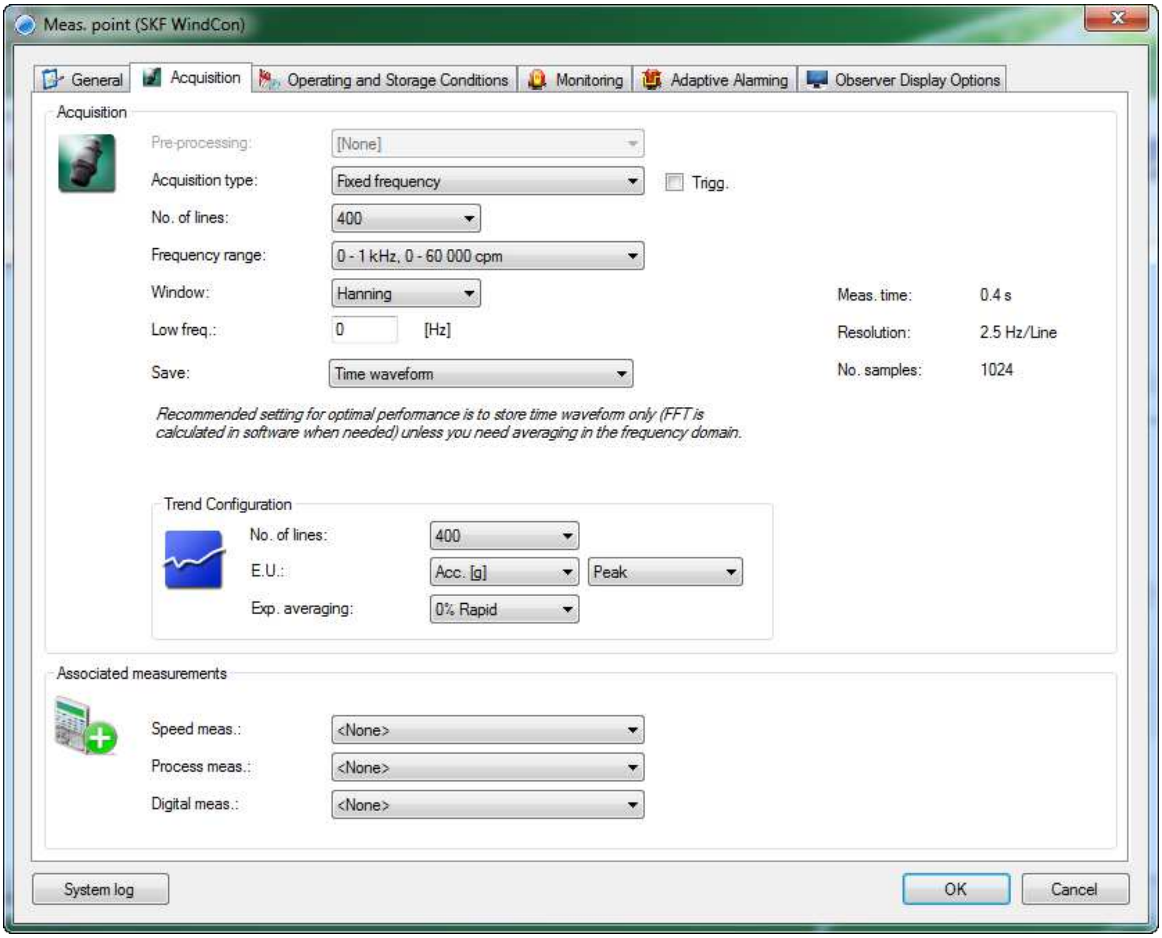


Figure 4 – 42.
Associating a Dynamic Measurement Point with a Multiple Gating Point – Acquisition Tab.

- Complete **Acquisition** information as appropriate.
- Select the desired Multiple Gating Point from the **Associated measurements** area's **Digital meas.** drop-down list box.
- Click on the **Operating And Storage Conditions** tab.

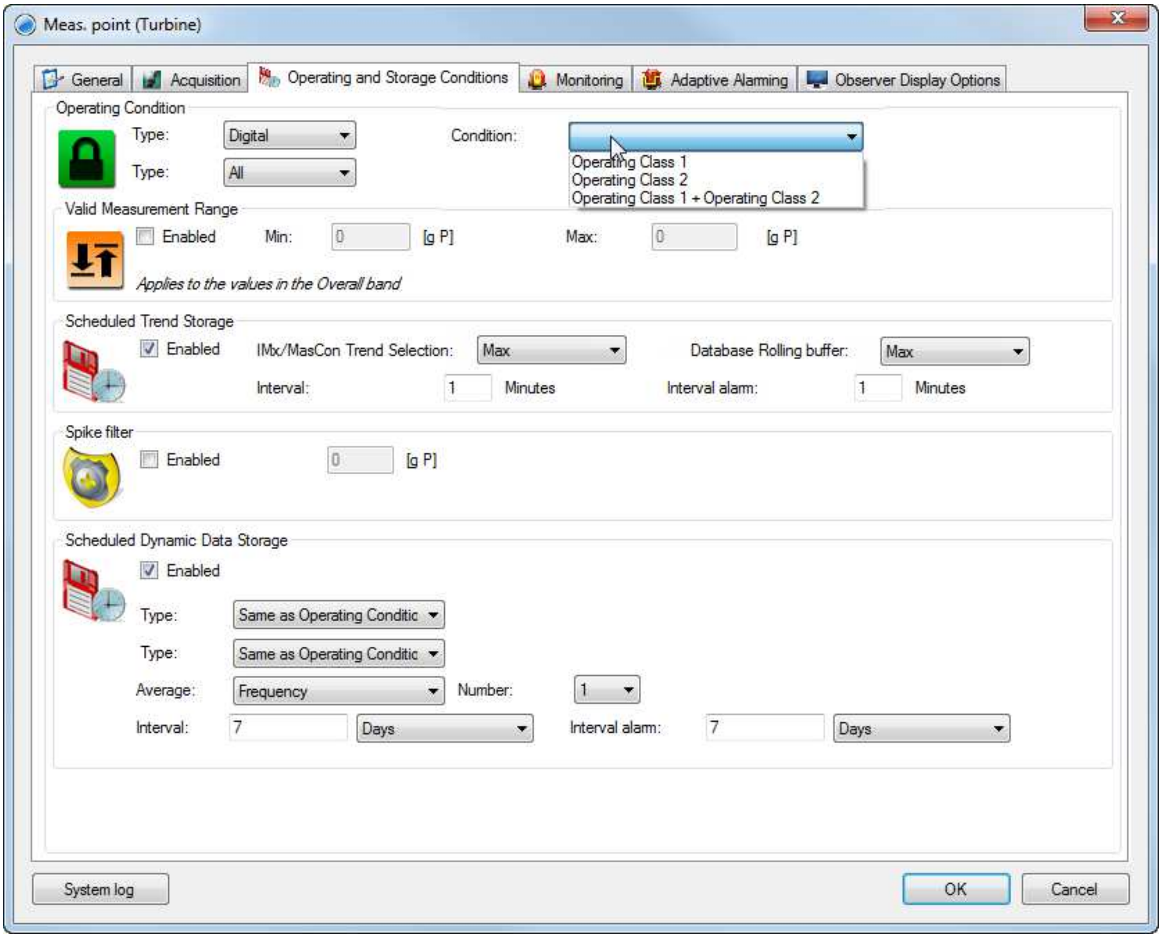


Figure 4 - 43.
Associating a Dynamic Measurement Point with a Multiple Gating Point – Operating and Storage Conditions Tab.

- Select *Digital* from either of the **Operating conditions** area's **Type** drop-down list boxes. The **Condition** drop-down list box appears.
- Select one or both Multiple Gating Point operating classes from the **Condition** drop-down list box.
- Click on the **Monitoring** tab.

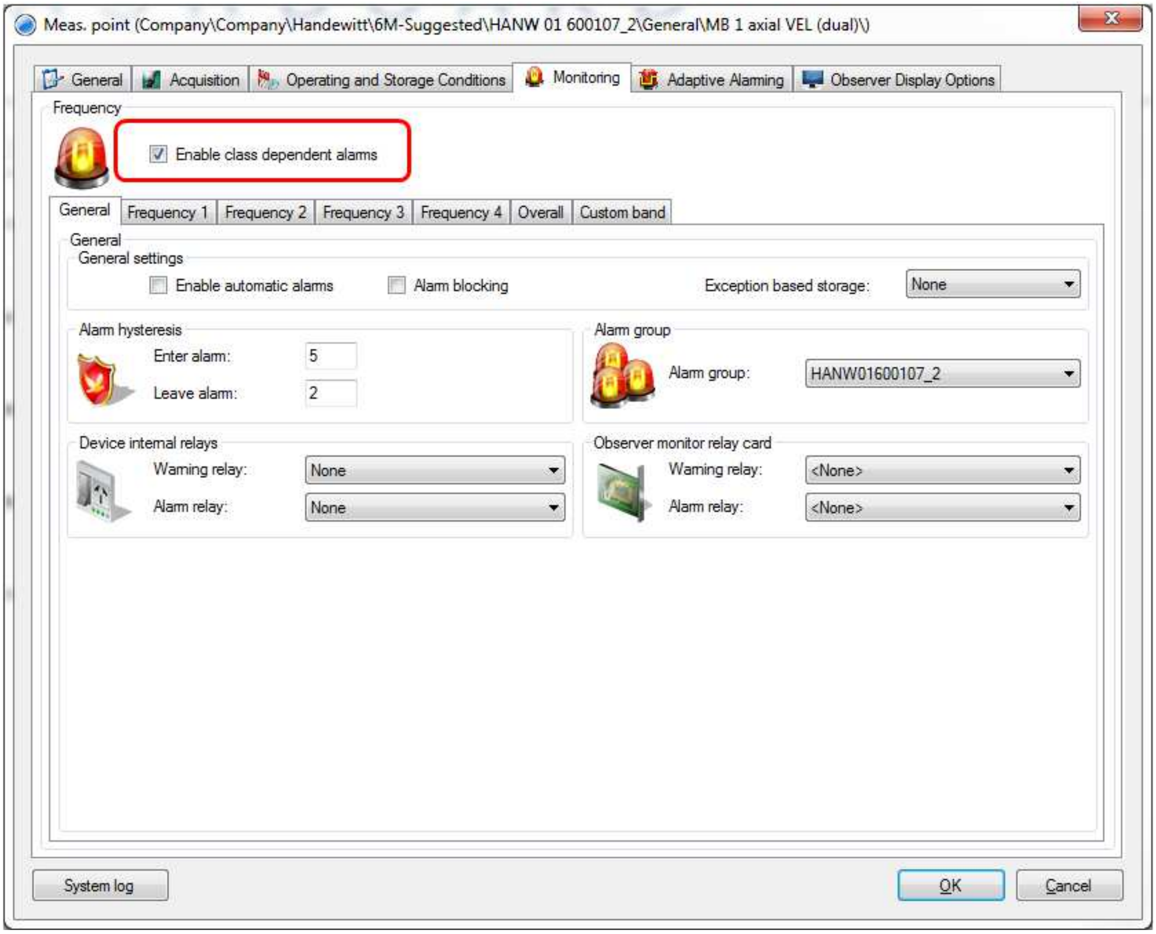


Figure 4 - 44.
Associating a Dynamic Measurement Point with a Multiple Gating Point – Monitoring Tab.

- If desired, select (check) **Enable class dependent alarms**.

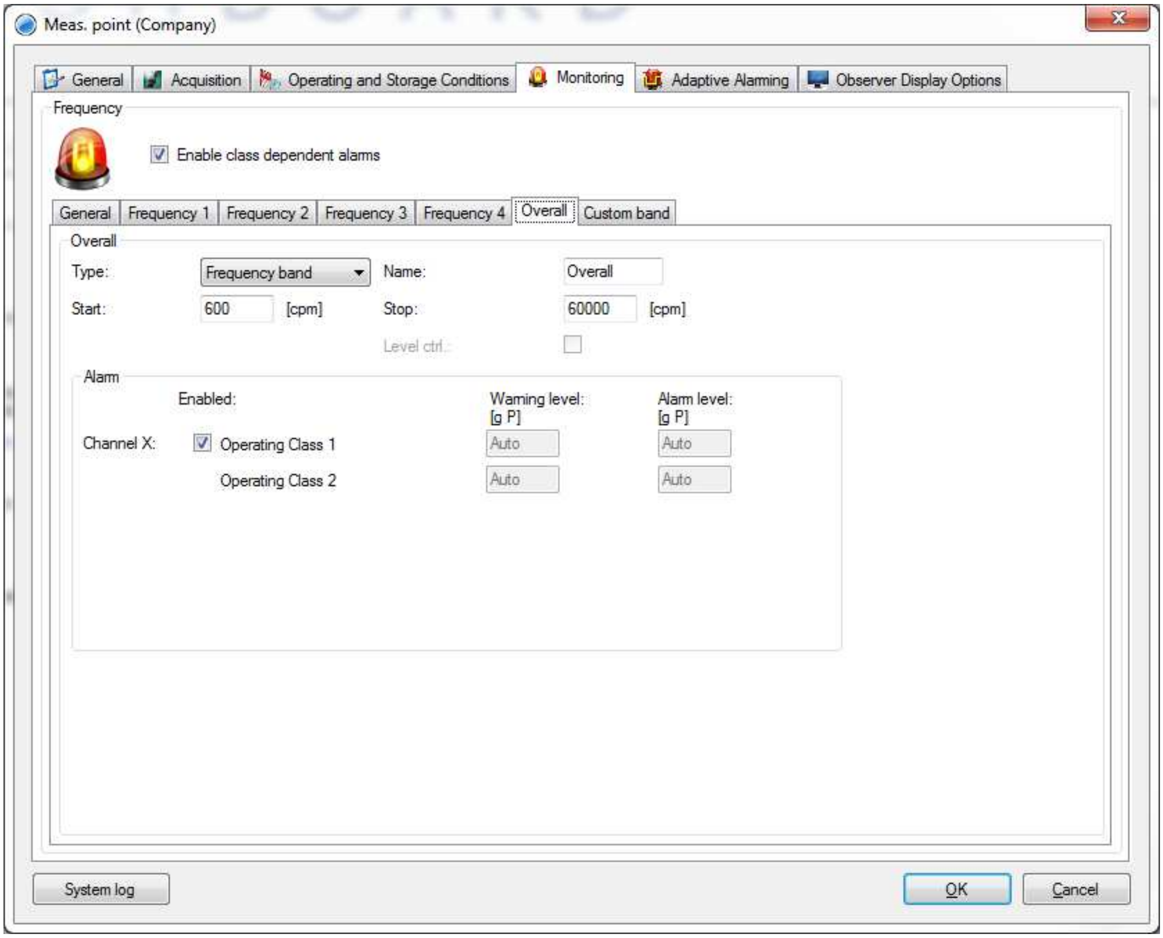


Figure 4 - 45.
Class Dependent Alarms.

When **Enable class dependent alarms** is checked, the following changes occur:

– The Adaptive Alarming area on the **Adaptive Alarming** tab becomes disabled.

– Two alarm levels display on each of the Monitoring tab's Frequency # sub-tabs and Overall sub-tab corresponding to the two Multiple Gating Point operating classes. You can set separate alarm levels for the two classes.

– The **Level ctrl** checkbox on each of the Monitoring tab's Frequency # sub-tabs and Overall sub-tab becomes disabled.

– The **Store Delta** text box on each of the Monitoring tab's Frequency # sub-tabs and Overall sub-tab becomes disabled.

– The **Monitoring** tab's **Custom Bands** sub-tab becomes disabled.

➢ If you deselect (uncheck) **Enable class dependent alarms**, all controls revert to their normal state.

Configuring Runout Compensation

Runout compensation is configured to remove the problem that un-round shafts can cause. Runout Compensation settings are available for harmonic measurement points only.

To set the compensation, the shaft is rotated at low speed and sensor values are collected during the slow roll speed range (see transient group configuration).

In order to start capturing data when in slow roll, right-click on the machine and select "Runout compensation".

Runout compensated data is possible to view in the trend plot and in the polar plot for harmonic measurement points.

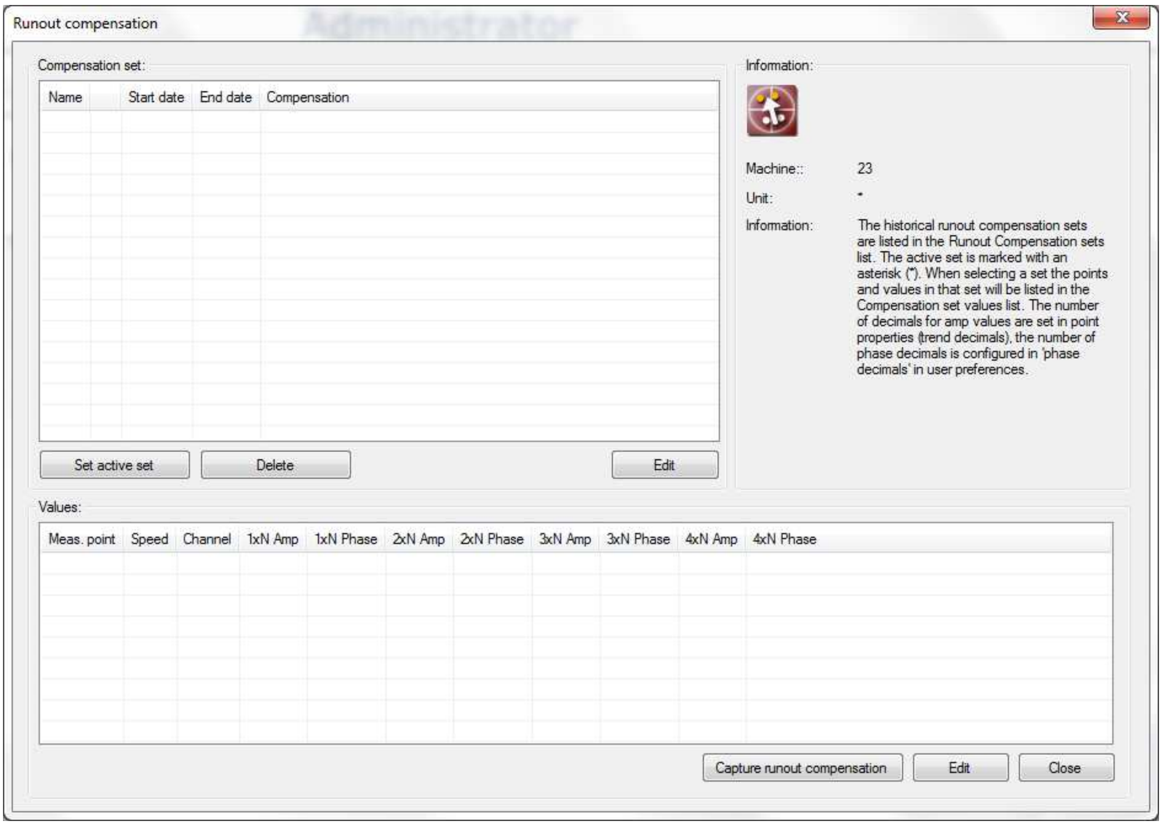


Figure 4 - 46.
Example of Runout Compensation.

Set active set if there are several different sets captured for the machine. The active set that should be used can be set by clicking this button.

Delete deletes the compensation set and its data from the database.

Edit allows the user to edit the properties of captured runout compensation data.

Capture runout compensation opens up a new window to capture live data to store in a new runout compensation set.

Edit allows the manual edition of the runout compensation data for a selected measurement point in a set.

Close closes the window.

Editing a runout compensation set

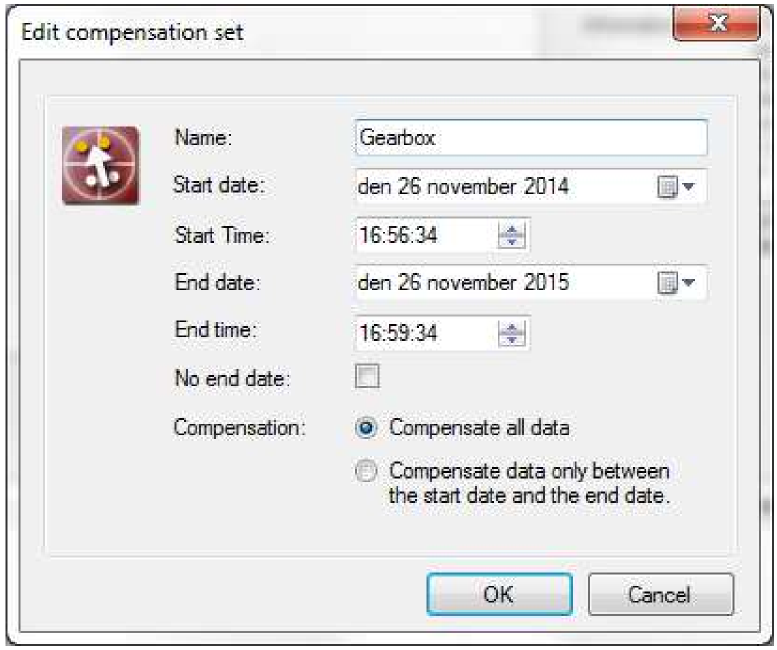


Figure 4 - 47.
Example of Editing Compensation Set.

Name sets a custom name for the set

Start date and Start time sets the start of the set

End date and End time sets the end of the set

No end date box checked indicates that the compensation set will compensate data between the start and the future.

Compensation allows the user to select whether data should be compensated between the start and the end or whether all data should be compensated when using this compensation set in the graphs to display data.

Calibrating Shaft Centerline Graph

In order to calibrate the shaft centerline graph, right-click in the hierarchy on any of the node types, machine, sub machine or measurement point, and select the menu option "calibrate shaft centerline graph".

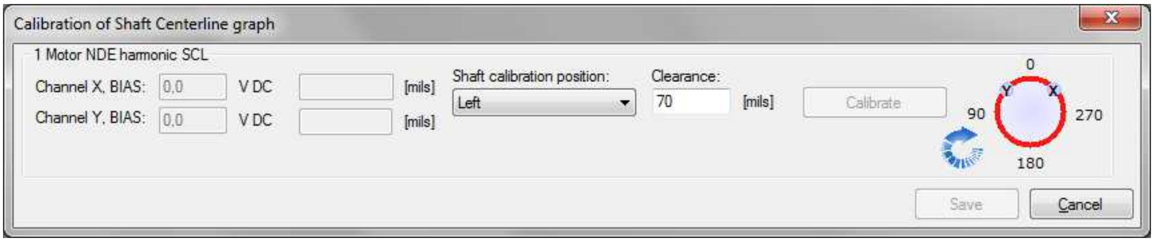


Figure 4 - 48.
Example of Calibration of Shaft Centerline Graph.

Before starting the calibration process make sure that the device is connected and the Monitor service is running. This feature will automatically connect to the IMx device and retrieve live values for the shaft centerline measurement point and get data of the current location of the shaft.

Shaft calibration position allows the current position of the shaft to be selected and where the shaft should be located after the calibration of the shaft centerline graph has been completed.

Clearance of the bearing should be measured and entered in this dialog box.

Calibrate sets the new calibration parameters for the sensor once live values has been captured and the shaft calibration position and the clearance have been set.

Save click this button to save the changes to the database. Please note that in order to see the new calibration position live in the SCL graph, please allow for up to 30 seconds (until the device reboots with the new calibration factors)

Machine Parts

Different machine parts compose a machine or a sub machine. With the help of Machine parts tool, models of machines can be created including shafts, gear boxes, engines, fan casings, blades, generators, etc. The machine parts tool is used to calculate the disturbance frequencies specific to a particular machine, such as gear and bearing frequencies, etc., by using the defined machine data. In this way, the task of finding out which machine component is generating a certain anomaly in the frequency spectra is facilitated. It is possible to go back to the machine parts and edit as often as changes are needed.

Important - Speed measurement point must be configured first before you can use the running speed.

To get to machine parts screen, perform one of the following options:

- Select a machine from the hierarchy view, then click the right mouse button and choose **Machine parts**.
- Select a machine from the hierarchy view, then click  **Machine parts** icon, on the toolbar.

Creating a Model with Machine Parts

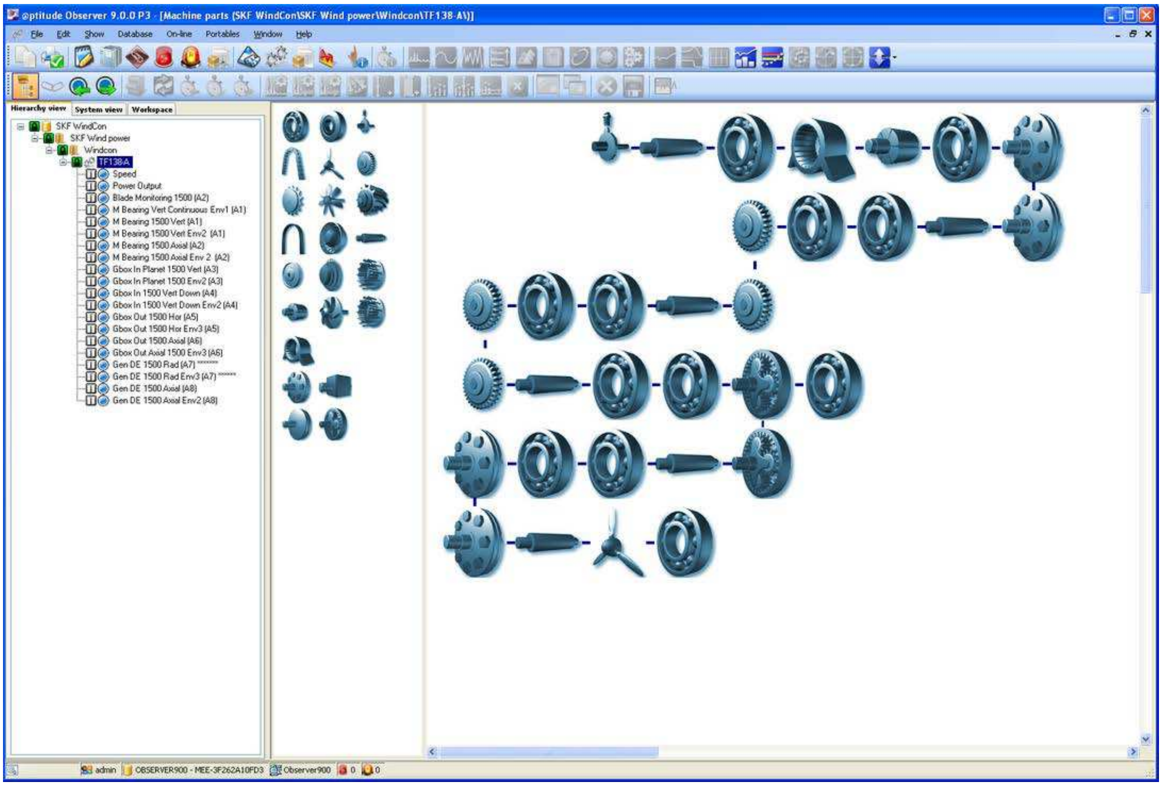


Figure 4 - 49.
Example of Create a Model with Machine Parts.

To create machine parts, perform one of the following options:

- Copying machine parts from another machine is possible. Click on the right mouse button on the blank area of Machine parts' working screen and select **Copy from existing machine**. This will override existing machine parts with the copied machine parts.
- Simply drag and drop the desired parts from the parts toolbox window to the working area on the right. Dragging and dropping parts close to each other will create a link between them. For example, to link one gear wheel to another, simply drag and drop a wheel on top of the other.

It is important that the first part should always be a ***shaft*** to which the remaining parts are connected.

To link the model to the pre-selected machine, drag ***speed*** from the Parts toolbox window. This speed is used to calculate the defect frequencies for bearings, gears and other parts. In addition, it is also possible to link diagnosis and vibration spectra to the model.

By using ***bearing*** from the parts toolbox window, you can obtain bearings from the bearing library. In total a bearing database can hold approximately 20 000 bearings from SKF and a number of other vendors. It is also possible to add new bearings if bearing pitch diameter, roller diameter, number of rollers and contact angle are known.

To add a new bearing to the current machine in the machine parts view:

- Drag the bearing part from the parts toolbox window and drop it into the working area next to the appropriate part of the current machine. This action creates a link between the added bearing and the appropriate machine part. A **Machine parameters** dialog appears.

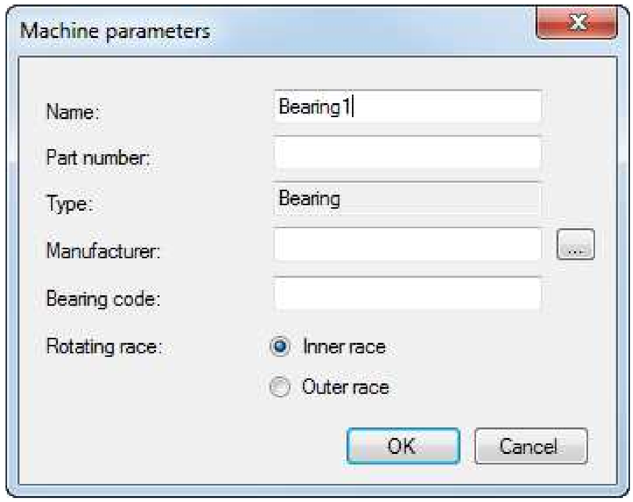


Figure 4 - 50.
Machine Parameters Dialog.

- Enter a unique identifying **Name** for the bearing or keep the default provided.
- Enter a **Part Number** for the bearing.
- Click the browse (ellipsis) button to access the bearing library, where you can locate and select the **Manufacturer** and manufacturer's **Bearing code** for the bearing. For more information, see Bearing Library.
- Select whether the **Inner race** or the **Outer race** is the **Rotating race** in this application of the bearing.
    - ➢ A bearing returns a different cage fault frequency depending on whether the outer race is fixed while the inner race rotates or the inner race is fixed while the outer race rotates. For example, if you display fault frequencies in a spectra or full spectra diagram, the fault frequency displayed for a bearing's rotating inner race is different from the fault frequency displayed for that bearing's rotating outer race.

The model of the machine created in this way is a schematic illustration and should not be seen as a scaled CAD (computer aided design) drawing.

Right-clicking on a machine part in the working area provides the following options:

- **Calculate gear** calculates the speed of the selected machine part. This is also done automatically when closing the machine parts window.
- **Delete** deletes the selected machine part.
- **Bring to front** brings the selected machine part to the front of the others when machine parts are staggered on top of each other.

- **Send to back** puts the selected machine part to the back of the others when machine parts are staggered on top of each other.
- **Properties** brings up the properties of the selected machine part and let you configure the characteristics of the machine part.

Right-clicking on the working area provides the following options:

- **Calculate gear** calculates the speed of all the machine parts. This is also done automatically when closing the machine parts window.
- **Copy from existing machine** overrides existing machine parts, if any, with the selected machine parts or creates machine parts with the selected existing machine.
- **Copy from existing machine** copies the selected machine part.
- **100%**, **75%**, **50%**, **25%** allows zooming of the machine parts window by the selected scale.

Setting up Process Overview

Process overview is a human machine interface (HMI) tool that can be configured to create an easy to use and understand display for control rooms and operators. This display illustrates the current status of the machine through bars and process values.

The process overview is directly linked to the hierarchy, which means that upon opening a machine, all the measurement points on the machine are automatically added for you. On the top of process overview screen, you can see a header displaying the total status of the process overview.

To get to process overview screen, perform one of the following options:

- Select a node, machine or sub machine from the hierarchy view, then click  **Process overview** icon on the toolbar.
- Or, click the right mouse button on a node in the hierarchy view, and then select **Process overview**.

Configuration of the Process Overview

To be able to configure the process overview, first set the process overview in edit mode. This is done by right-clicking in the working area and selecting **Edit mode**, or clicking on  **Edit mode** button on the right hand corner of the process overview screen. In order to get the following configuration options, right-click in the working area or click a button on the right hand corner of the process overview screen.

 **Enterprise Process Overview** is the main process overview of the top level of the hierarchy view which includes all databases.

 **Refresh** updates the process overview screen.

Print active window prints the currently opened window.

 **Back** brings back the previous screen.

 **Up** brings to one level up on the hierarchy view.

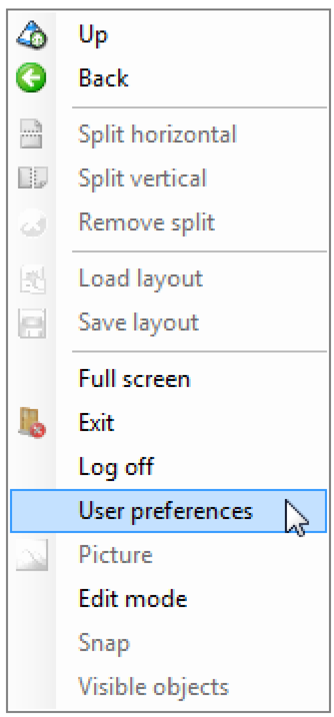


Figure 4 - 51.
Right-click Context Menu.

Split horizontal/Split vertical splits the working area horizontally or vertically. The working area can be split into several different sections. This can be efficient when you have several machines under a specific node and would like to browse through them simultaneously. Each time the working area is split, the child or children of the first item of the screen in where the split command was issued appear in the newly opened screen.

Remove split removes split screen(s).

Load layout loads a layout from the layout list.

Save layout enables you to save, delete or rename an item from the layout list.

 **Full screen** toggles between full screen mode and partial screen mode.

Exit ends process view.

Log off enables you to switch your user type at logon without exiting the application. You can log off and the **Logon** dialog opens automatically. Log on as a different type of user, such as Admin, to perform your tasks.

User preferences opens the User Preferences interface where you can edit the Process Overview features to show large icon sizes and change the background and foreground (text) colors.

Picture exports picture(s) from the pictures list.

 **Edit** mode toggles back and forth between edit mode and non-edit mode.

Snap snaps items to a hidden grid when dragging them.

Visible objects determines which points to display.

Editing a Measurement Point in the Working Area

You can also manipulate the items in the process overview working area during the edit mode by clicking right mouse button on an item.

Diagram enables you to choose an associated diagram to plot.

Properties configures how the measurement point is displayed by editing the following fields.

> **Name** is name of the selected measurement point which is displayed when choosing Name as Text.
>
> **Short name** is the user configured name which is displayed when choosing Short name as Text.
>
> **Type** is the display type that determines which type to represent the data. The options vary depending on the type of measurement point.
>
> **Text** determines how the text of the item in the process overview will be displayed.
>
> > *Name:* displays the full length of the measurement point.
> >
> > *Short name:* displays the customized short name for the measurement point.
> >
> > *None:* displays no name. Instead, it displays the icon.
>
> **Width** enables you to enter the value of width manually, instead of changing it with the mouse.

Height enables you to enter the value of height manually, instead of changing it with the mouse.

Show values determines which components of the measurement point should be displayed in graph.

Visible is used to display the selected measurement point or not to display.

Event Log opens up a window with the event log for the selected measurement point.

Machine Copy Wizard

The machine copy wizard is a guide that helps you to copy a machine with all the machine information from an existing machine to a new machine.

Note that the wizard cannot overwrite already existing channel settings on an existing device. It can however, create a new IMx/MasCon device for you. Therefore, you do not need to create an IMx/MasCon device before you launch the wizard.

The following data can be copied:

- Machine specific information
- Machine parts
- IMx/MasCon devices
- Channel configuration
- Online measurement points
- Offline measurement points
- Diagnosis
- Process overview information
- Measurement group

To open the machine copy wizard, perform one of the following options:

- Click the right mouse button on a node in the hierarchy view and select **Add**, **Machine**, then select **From machine template**.
- Click the right mouse button on a node in the hierarchy view and select **Add**, **Machine**, then select **Existing machine**.
- Select a machine in the hierarchy view first, then click **Edit** on the toolbar and select **Copy node**.

Using the Machine Copy Wizard

Screen 1 is Selecting data to copy.

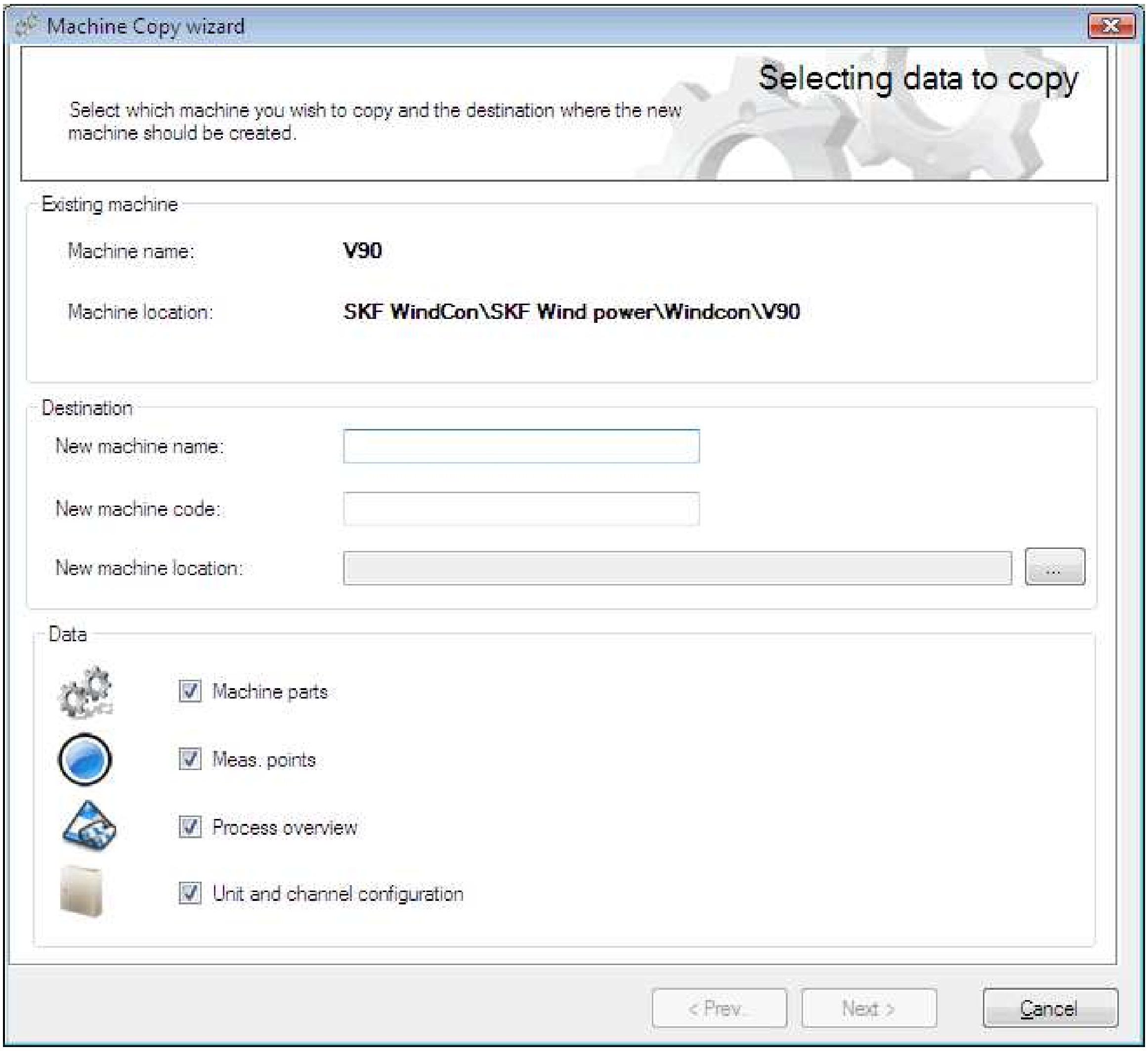


Figure 4 - 52.
Example of Data to Copy.

Existing Machine name displays the machine name selected in the Hierarchy view.

Existing Machine location displays the machine location selected in the Hierarchy view.

<u>**Destination**</u>

New machine name specifies the name for the new machine to be.

New machine code enables you to enter the specific machine code if you keep track of many machines in your machine park with a certain tag or ID number (optional).

New machine location provides a selection list from the list of nodes in the hierarchy view.

__Data__

Machine parts check to copy over all the machine parts.

Measurement points check to copy over all the measurement points.

Process overview check to copy over all the data from process overview.

Unit and channel configuration check to copy over all the device and channel configuration data.

Screen 2 is Measurement points

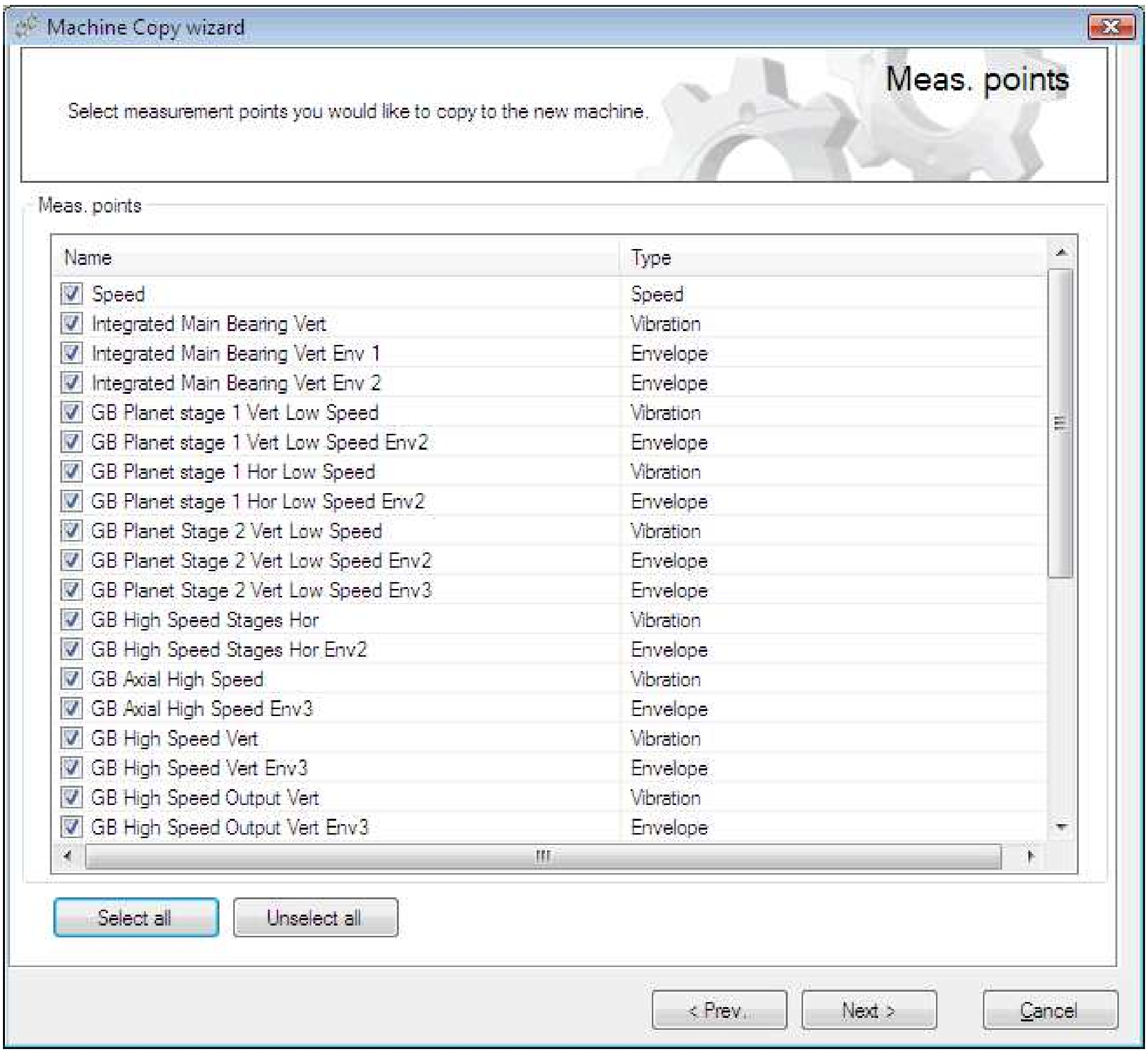


Figure 4 - 53.
Example of Measurement Points to Copy.

The measurement points window shows a list of all the measurement points on the source machine. Select the ones you would like to copy over to the new machine. If a measurement point is checked, it will be included in the copy process. Otherwise, it will be excluded from the copy process.

Name displays the name and unique ID of measurement points.

Type displays the type of measurement points.

Select all selects all measurement points in the list.

Unselect all unselects all measurement points in the list.

Screen 3 is Units and channels

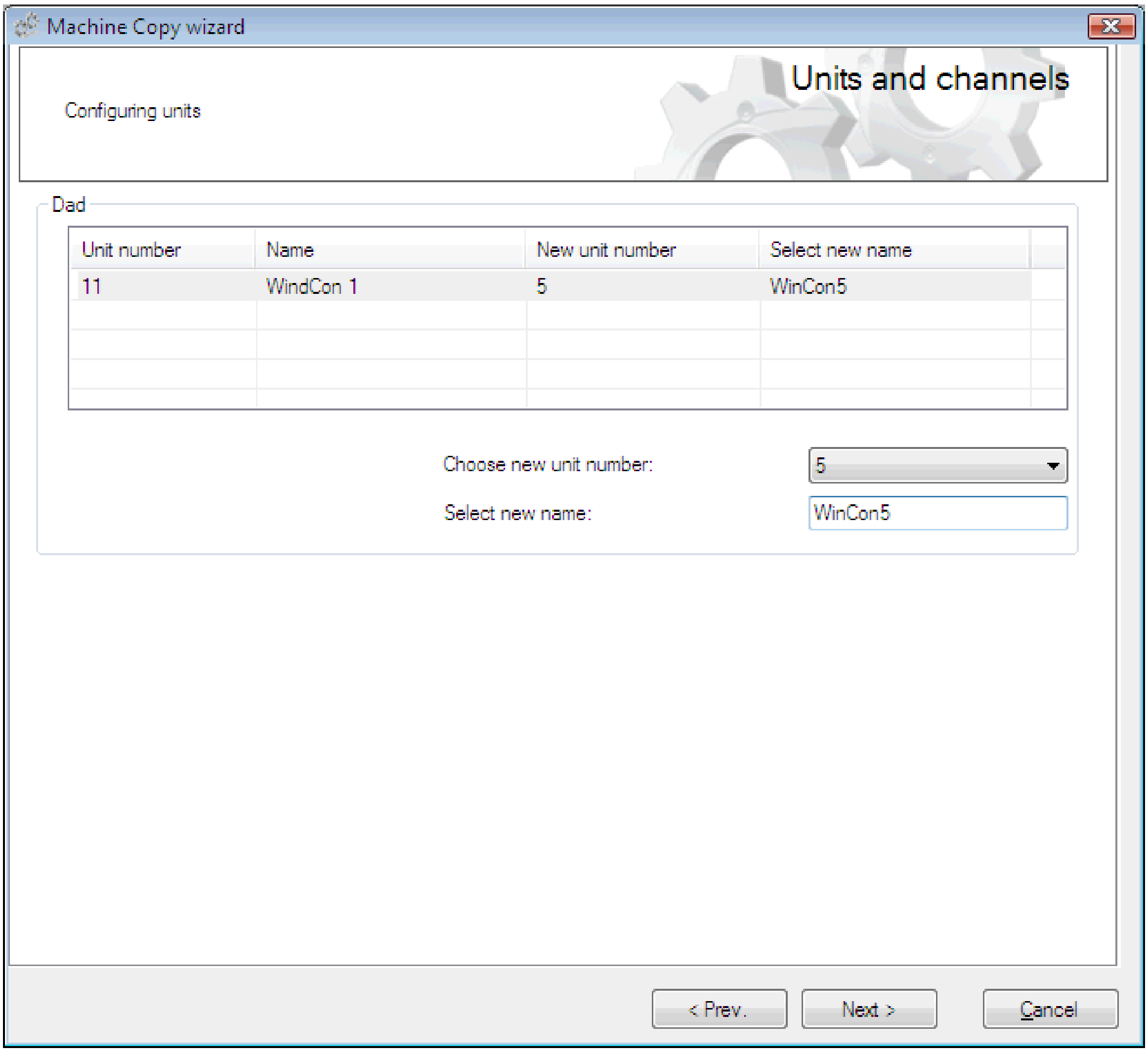


Figure 4 - 54.
Example of Configuring Devices for Machine Copy Wizard.

Based upon the measurement points selected from the previous screen, the wizard gathers all the corresponding information from the IMx/MasCon device and channels.

Unit number displays the unique device number of the selected existing machine.

Name displays the name of the selected machine.

New device number is the number assigned in the choose new device number field from below.

Select new name determines the new name generated by the system. You may change it if desired.

Choose new device number select a unique device number from the list.

Screen 4 is Finish. Click **Finish** to save the changes made.

Screen 5 is Summary. It displays the details, and enables you to print the summary.

Example Scenario

You have a wind turbine with one IMx/MasCon system with measuring data. If you would like to add a second wind turbine to your @ptitude Observer database, you can copy the entire setup of your existing wind turbine to the new one by using the machine copy wizard. The only thing you need to do is to choose a new device number and name for the new IMx/MasCon device which will be asked by the wizard.

Multiple Point Update Wizard

The multiple point update wizard is a tool for updating several measurement points with one or several properties. It can be anything from a simple edit such as changing an active status on a few measurement points in a machine, to more complex edits such as updating a frequency range and number of lines on all IMx/MasCon vibration measurement points in the entire database. You can filter out specific measurement point types based on the selection of your choice.

To open the multiple point update wizard:

- To update a certain set of measurement points:
  1. First select a database, a node, a machine or a sub machine in which these points reside in the hierarchy view.
  2. Click on **Edit** on the toolbar, then select **Multiple point update wizard**.
- To update all the measurement points in all the databases:
  - There is no need to select any node. Click on **Edit** on the toolbar, then select **Multiple point update wizard**. In the Wizard, select **All measurement point in all databases**.

Using the Multiple Point Update Wizard

Screen 1 is Selecting data to modify.

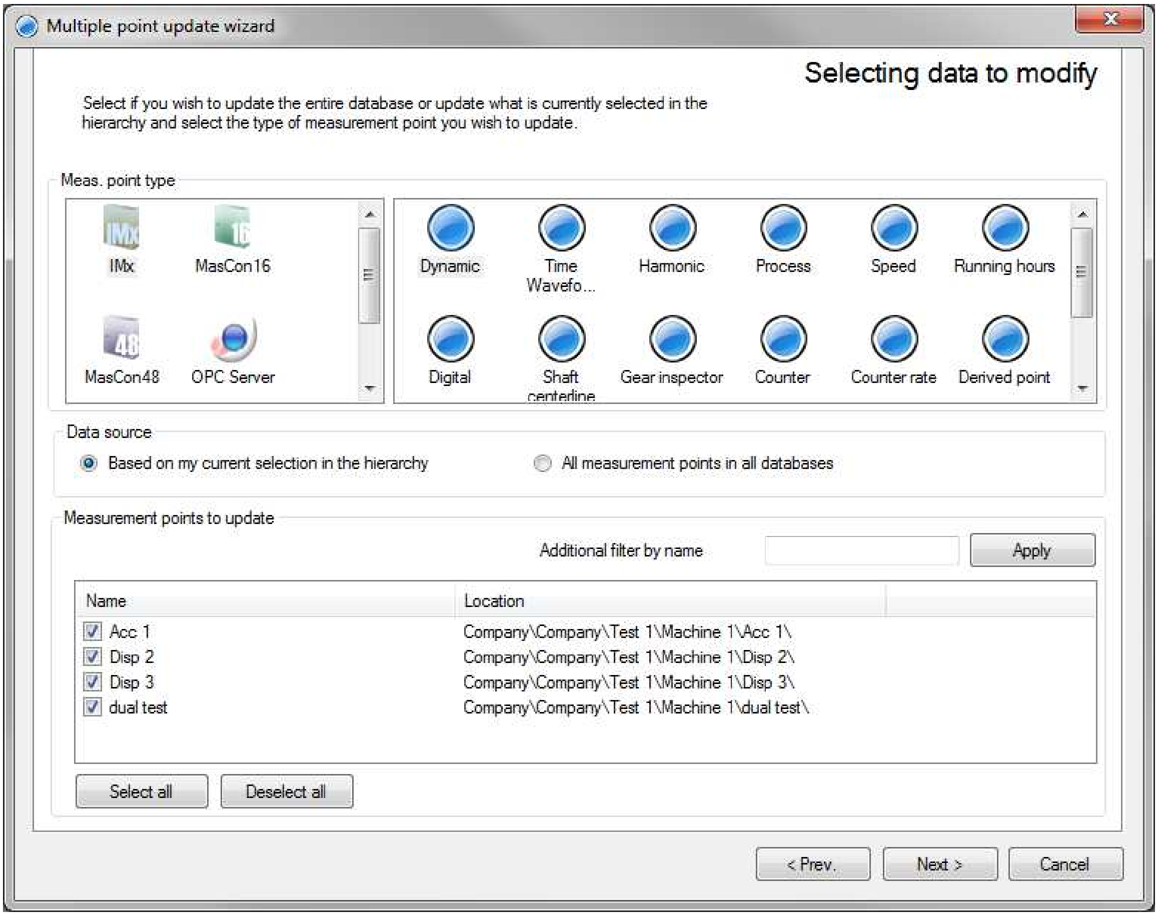


Figure 4 - 55.
Example of Selecting Data for Multiple Point Update Wizard.

Measurement point type enables you to select a type of hardware and a type of measurement point to be updated. Only one type of measurement point can be updated at a time.

Data source enables you to select a measurement point in the database that should be updated.

> *Based on my current selection in the hierarchy:* a list of measurement points that you selected in the hierarchy view before you entered the Multiple point update wizard screen.
>
> *All measurement points in all databases:* a list of all the measurement points in all the databases.

Measurement points to update are all the measurement points which can be updated by the wizard. You can uncheck certain measurement points to exclude.

Additional filter by name enables you to select a certain name to filter the list of measurement points.

Apply enables the filtering by the entered name.

- For example, if you enter "NDE" in the *Additional filter by name* field and click **Apply** button, you will get the list of the measurement points with name containing the text "NDE".

Select all selects all measurement points in the list.

Unselect all unselects all measurement points in the list.

Screen 2 is Attribute selection.

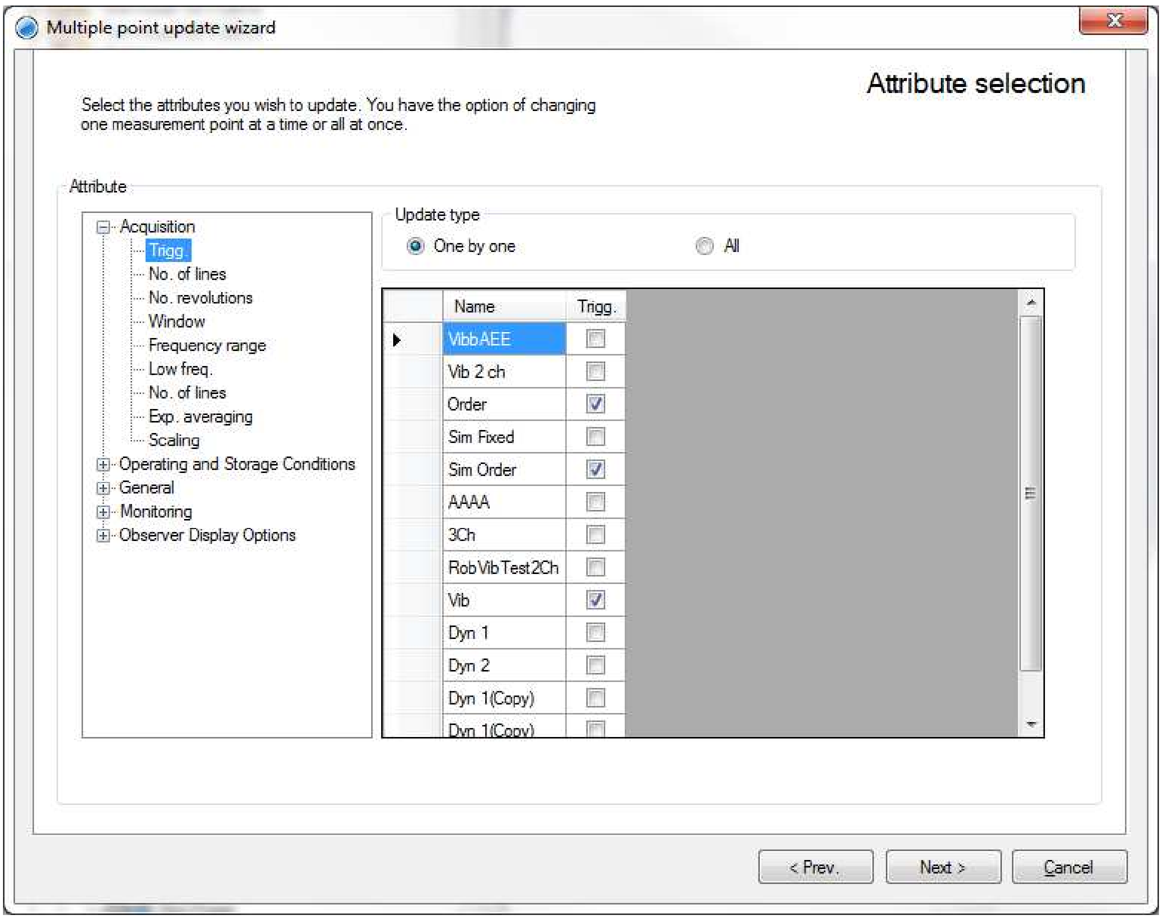


Figure 4 - 56.
Example of Attribute Selection for Multiple Point Update Wizard.

Attribute uses a tree view to select an attribute to update. A list of all the selected measurement points with the current value of the selected attribute is shown on the right side of the screen. You are now able to change the value of the attribute directly on the list one at a time, or all at once.

One by one updates only the current measurement point that you are editing.

All updates all the measurement points with the edited value.

Screen 3 is Finish. This is the final confirmation to proceed with updating measurement points.

When you click **Finish,** the wizard starts saving the configuration and you cannot undo any changes made.

Screen 4 is Summary. Summary gives you the list of how many measurement points were updated and how many measurement points could not be updated. If there were any measurement points could not be updated, the reasons are stated in the *Details* section.

5
System Operation

Startup View

@ptitude Observer remembers each user's departure view and brings you back to where you have left from the previous session. However, if you are a new user, after a successful logon the @ptitude Observer will start with the hierarchy view in the tree view window as the default view.

Tree View

Tree view window consists of the following types of user interfaces.

Hierarchy View shows machines and their measurement points in a tree structured hierarchy with the corresponding status for each object. The hierarchy can display data from several databases at the same time.

System View shows the status from a hardware point of view which is based on IMx/MasCon devices, sensors and measurement points. It shows the communication status as well.

Workspace is the hierarchy view of user selected machine(s). It is an individual work space to keep track of only the machines for which the user is responsible. A workspace can only span over one single database.

Diagram View is the hierarchy view of all the saved settings of graphic diagrams including selection of measurement points as well as buffer settings. This is to be able to have predefined views of the data.

Protection view is the hierarchy view of all the Protection devices and their status. It is also possible to synchronize the settings with the Protection device.

Hierarchy View

To get to the hierarchy view screen:

- Click **Show** on the toolbar, and then select **Tree view** to open up the tree view window.
- Select **Hierarchy view**.
    - ➢ If the tree view window has been opened already, select **Hierarchy view** directly from the tree view window.

The hierarchy view displays each object's status with small icons. Status indication/level is inherited upwards in the hierarchy view. For example, if a measurement point on a machine has an alarm status, all the levels above this machine will also be upgraded to an alarm status. The status in the hierarchy view is updated each time a trend is stored in the database by @ptitude Observer Monitor service.

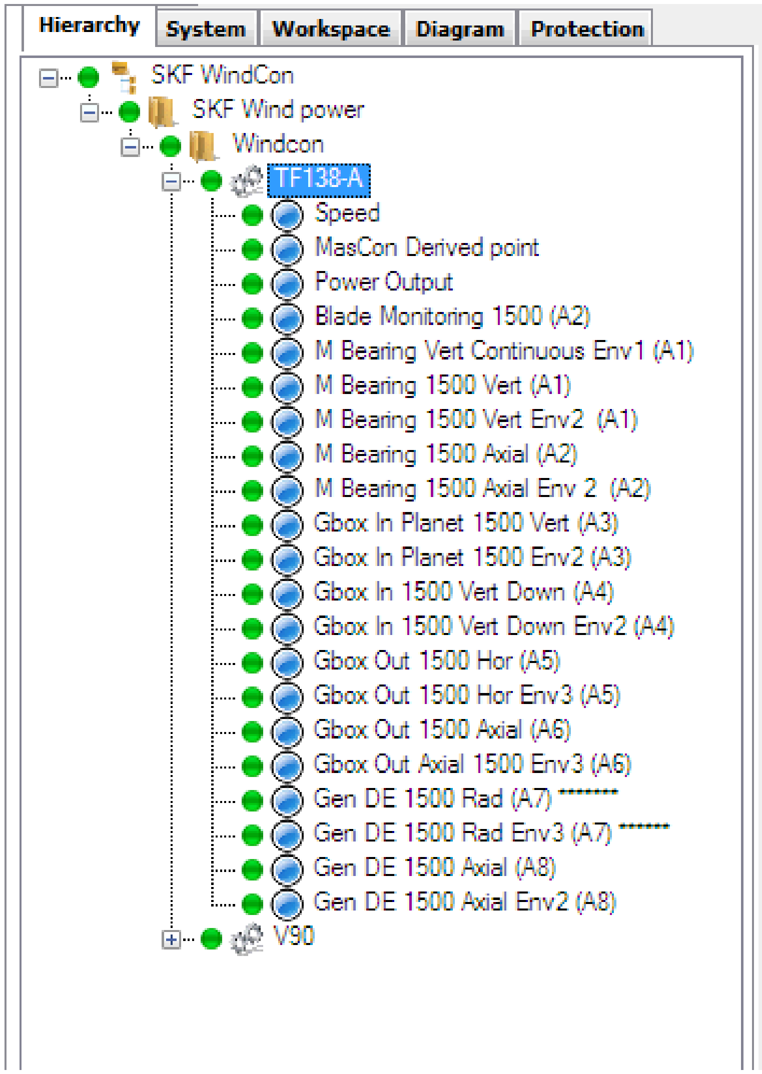
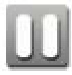


Figure 5 - 1.
Example of @ptitude Observer hierarchy view.

Status in the Hierarchy View

**Unknown** indicates that the measurement data are missing for the measurement point and the system is unable to determine the condition of the machine. This is the default status for new measurement points.

**Not active** indicates that the measurement point is disabled and is on hold. No data will be collected for this measurement point.

**Cable fault** indicates that the IMx/MasCon device has detected a cable fault on the channel of which this measurement point uses. The detection is done by bias ranges which are set in the *cable check* field under the setting analogue channels section for IMx/MasCon devices.

**Outside measurement range** indicates that the values coming from this measurement point are outside of the acceptance range. The bias on the channel is Ok but the produced values are too high or too low. The measurement range is set in the active range *condition* field with minimum and maximum values of the trend settings of measurement points.

**Alarm** indicates that this measurement point has received values that triggered an alarm. The values can be *High alarms*, *Low alarms*, *Relation alarms*, or *Vector alarms*. The alarm status can be confirmed by acknowledging the alarm from the alarm list (refer to Alarm list under Show in Menu Items section). After the alarm has been acknowledged and new data have been stored in the database, the measurement point will release the alarm status.

**Diagnosis alarm** indicates that an alarm has been raised by the built-in intelligent machine diagnostics of the system. The rules and logic of the diagnosis alarm can be defined in the diagnosis settings section of setting up measurement points and alarms. Alarm levels for the diagnosis are easily set in the diagnosis trend plot (refer to Diagnosis under Graphic Displays and Tools in System Operation)

**Diagnosis warning** indicates that a warning has been raised by the built-in intelligent machine diagnostics of the system. The rules and logic of the diagnosis warning can be defined in the diagnosis settings section of setting up measurement points and alarms. Warning levels for the diagnosis are easily set in the diagnosis trend plot (refer to Diagnosis under Graphic Displays and Tools in System Operation).

**Warning** indicates that this measurement point has received values that triggered a warning. A warning is a pre-state prior to alarm which can be *High warnings*, *Low warnings* or *Vector warnings*. The warning status can be confirmed by acknowledging the warning in the alarm list (refer to Alarm list under Show in Menu

Items). After the warning has been acknowledged and new data have been stored in the database, the measurement point will release the warning status.

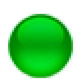
**Not measured** indicates that the expected data has not been measured and stored for the particular measurement in the time frame the system expected it to be. The time frame is typically double the storage interval for trend. The system is unable to determine the condition of the machine.

**Outside active range** indicates that the conditions specified by active ranges on the measurement point are not met by the system. One or more active ranges can be configured on measurement points in the spectra settings and trend settings.

**Outside active range unstable** indicates that not only the conditions specified by active ranges on the measurement point are not met by the system but the measurement is varying too much and triggers the maximum allowed delta value of the active range making it unstable.

**Transient** indicates that the measurement point is in transient mode which means that a run-up or coast-down is currently occurring. Once the run-up or coast-down of the machine is completed the machine will release the transient status.

**No alarm levels set** indicates that the measurement point is active and measurement data are coming in but there is no configured alarm levels for the system. The system cannot determine whether the status of measurement point is acceptable or not.

**Ok** indicates that the measurement point has no known problems. Data coming in are valid and reside within the specified active range and measurement range. Alarm levels are specified for the measurement point and the data are within the specified alarm and warning levels.

Priority List of Status

An object in the hierarchy view can have several different states. In such case, the status with the highest priority is shown in the hierarchy view.

The following is the list of **Priority Order for measurement points**:

1. Not active
2. Cable fault
3. Outside measurement range
4. Alarm
5. Diagnosis alarm
6. Warning
7. Diagnosis warning
8. Not measured
9. Outside active range unstable

10. Outside active range
11. Transient
12. No alarm levels set
13. Ok

The following is the list of **Priority Order for all the others such as a database, node, machine and sub machine:**

1. Alarm
2. Diagnosis alarm
3. Warning
4. Diagnosis warning
5. Cable fault
6. Outside measurement range
7. Not measured
8. Transient
9. Outside active range unstable
10. Outside active range
11. OK
12. No alarm levels set
13. Not active

Configuration Mode Indicators

The nodes in the database can have different configuration mode indicators set depending on the validity of the current node or if the configuration of the specific node or measurement point is not configured within the @ptitude Observer software. If there is a configuration mode indicator set for a node or measurement point the normal icon displayed for the node will be replaced by one of the following icons:

**Obsolete** indicates that this node or measurement point is obsolete and is no longer valid for capturing data. The Observer system can set nodes to this status when nodes needs to be retained in the system because they contain measurement data that can be analyzed but the conditions of the system has changed in such a way that the specific node is no longer valid to capture data with. If an Obsoleted node is no longer needed, the user can choose to delete the node and its data permanently.

**Protection** indicates that this node or measurement point is configured by the external software IMx-M Manager. Only minor changes to the point or node properties can be done within Observer. Changing the configuration for this particular node is needs to be done in IMx-M Manager and be re-imported to Observer through the Protection View.

Interfaces Available on Database Level

These functions are accessible by right-clicking on a database.

Add enables you to add a node or a machine. Refer to Node or Machine under Building a Hierarchy View in System Configuration section.

Process overview enables you to create user defined mimic displays with measurement points and links to other displays on top of graphic pictures like drawings, digital photos, etc. Refer to Process Overview in System Configuration section.

Report generates documents that contain text based information as well as diagrams and pictures of selected data. Refer to Report under File in Menu Items.

Event log displays all the events of IMx-M and IMx-R devices of the specified database. Refer to Event Log under On-line in Menu Items.

Configure enables you to configure the following functions for the selected database.

Reset automatic alarm levels for trend

Reset automatic alarm levels for diagnosis

Recalculate diagnoses

Disable all measurement points

Enable all measurement points

Block alarm on all measurement points

Remove alarm blocking on all measurement points

Tools enables you to configure the following settings.

Update graph settings of many measurement points at the same time for the database.

Refresh updates the current hierarchy view with the new status, if any.

Properties enables you to edit the properties of the selected database.

Interfaces Available on Node Level

These are accessible by right-clicking on a node.

Add enables you to add a node or a machine. Refer to Node or Machine under Building a Hierarchy View in System Configuration section.

Process overview enables you to create user defined mimic displays with measurement points and links to other displays on top of graphic pictures like drawings, digital photos, etc. Refer to Process Overview in System Configuration section.

Report generates documents that contain text based information as well as diagrams and pictures of selected data. Refer to Report under File in Menu Items.

Event log displays all the events of the selected node of IMx-M or IMx-R device. Refer to Event Log under On-line in Menu Items.

Delete deletes the selected node.

Configure enables you to configure the following functions for the selected node.

Reset automatic alarm levels for trend

Reset automatic alarm levels for diagnosis

Recalculate diagnoses

Disable all measurement points

Enable all measurement points

Block alarm on all measurement points

Remove alarm blocking on all measurement points

Tools enables you to configure the following settings.

Update graph settings of many measurement points at the same time for the current selection in the hierarchy.

Refresh updates the current hierarchy view with the new status, if any.

Properties enables you to edit the properties of the selected node.

Interfaces Available on Machine Level

These are accessible by right-clicking on a machine.

Add enables you to add a measurement point, a sub machine or an event capture group. Refer to Meas. Points or Sub Machine under Building a Hierarchy View in the System Configuration section. Refer to Configuring an Event Capture Group under Database > **Measurement Groups** in the Menu Items section.

Process overview enables you to create user defined mimic displays with measurement points and links to other displays on top of graphic pictures like drawings, digital photos, etc. Refer to Process Overview in System Configuration section.

Machine parts enables you to compose the selected machine using different machine parts. Refer to Defining Machine Parts in System Configuration.

Report generates documents that contain text based information as well as diagrams and pictures of selected data. Refer to Report under File in Menu Items section.

Runout Compensation captures runout compensation data for the specific machine. Refer to Runout Compensation under Setting up Measurement Points and Alarms in System Configuration section.

Event log displays all the events of the selected machine of IMx-M or IMx-R device. Refer to Event Log under On-line in Menu Items.

Maintenance planner keeps track of maintenance tasks. Refer to Maintenance Planner in System Operation section.

Copy enables you to copy the selected machine to a new location. Refer to Machine Copy Wizard in System Configuration section.

Paste pastes the sub machine or a measurement point that you just copied in the selected machine.

Delete deletes the selected machine.

- If the machine you are deleting includes points referenced by a Multiple Gating Point, the system will remove those references.
- If the machine you are deleting includes an event capture group, the system will remove the group and its related measurement points.

Tools enables you to configure the following settings.

Update graph settings of many measurement points at the same time based on the current selection in the hierarchy or for the database.

Generate machine template opens a dialog for generating a Machine template of the selected machine.

Configure enables you to configure the following functions for the selected machine.

Reset automatic alarm levels for trend

Reset automatic alarm levels for diagnosis

Recalculate diagnoses

Disable all measurement points

Enable all measurement points

Block alarm on all measurement points

Remove alarm blocking on all measurement points

Add note adds a note for the selected machine or sub machine. Refer to Notes in System Operation section.

Calibrate shaft centerline graph connects to the IMx device and retrieves live values for the shaft centerline measurement point and gets data of the current location of the shaft. Refer to Calibrating Shaft Centerline Graph in System Configuration section.

Add event case adds a document report, information and history regarding a specific event tied to the selected machine. Refer to Event Cases in System Operation section.

Add attachment attaches any file to the selected machine. Refer to Machine Properties under Creating IMx/MasCon Devices and Channels.

Tag categorizes the selected machine with a specifically defined tag from the Tag Library.

Refresh updates the current hierarchy view with the new status, if any.

Properties enables you to edit the properties of the selected machine.

Interfaces Available on Sub Machine Level

These are accessible by right-clicking on a sub machine.

Add enables you to add a measurement point. Refer to Meas. Points under Building a Hierarchy View in System Configuration section.

Process overview enables you to create user defined mimic displays with measurement points and links to other displays on top of graphic pictures like drawings, digital photos, etc. Refer to Process Overview in System Configuration section.

Report generates documents that contain text based information as well as diagrams and pictures of selected data. Refer to Report under File in Menu Items section.

Event log displays all the events of the selected sub machine of IMx-M or IMx-R device. Refer to Event Log under On-line in Menu Items.

Copy enables you to copy the selected sub machine to a new location directly.

Paste pastes a measurement point that you just copied in the selected sub machine.

Delete deletes the selected sub machine.

- If the sub machine you are deleting includes points referenced by a Multiple Gating Point, the system will remove those references.

Trend automatic alarm levels for the selected sub machine.

Diagnose automatic alarm levels for the selected sub machine.

Recalculate diagnoses for the selected sub machine.

Update graph settings of many measurement points at the same time for the selected sub machine.

Add note adds a note for the selected machine or sub machine. Refer to Notes in System Operation section.

Calibrate shaft centerline graph connects to the IMx device and retrieves live values for the shaft centerline measurement point and gets data of the current location of the shaft. Refer to Calibrating Shaft Centerline Graph in System Configuration section.

Tag categorizes the selected sub machine with a specifically defined tag from the Tag Library

Refresh updates the current hierarchy view with the new status, if any.

Properties enables you to edit the properties of the selected sub machine.

Interfaces Available on Meas. Point level

These are accessible by right-clicking on a measurement point.

Diagram enables you to select and access to a graph display of the measurement point.

Report generates documents that contain text based information as well as diagrams and pictures of selected data. Refer to Report under File in Menu Items section.

Event log displays all the events of the selected measurement point of IMx-M or IMx-R device. Refer to Event Log under On-line in Menu Items.

Copy the selected measurement point.

Paste the copied measurement point to a new location.

Delete the selected measurement point.

- If the point you are deleting is referenced by a Multiple Gating Point, the system will remove that reference.

Reset automatic alarm levels for trend for the selected measurement point.

Reset automatic alarm levels for diagnosis for the selected measurement point.

Recalculate diagnoses of the selected measurement point.

Add note for the selected measurement point. Refer to Notes in System Operation section.

Tag enables you to categorize the selected measurement point with a specifically defined tag from the Tag Library

Refresh the current hierarchy view with the new status, if any.

Properties enables you to edit the properties the selected measurement point.

System View

The System view shows the database from the system point of view with IMx/MasCon devices, sensors/channels and measurement points.

To access the system view screen:

- Click **Show** on the toolbar, and then select **System**.
- If the tree view window has been opened already, select **System** directly from the tree view window.

Below is an example of a system view.

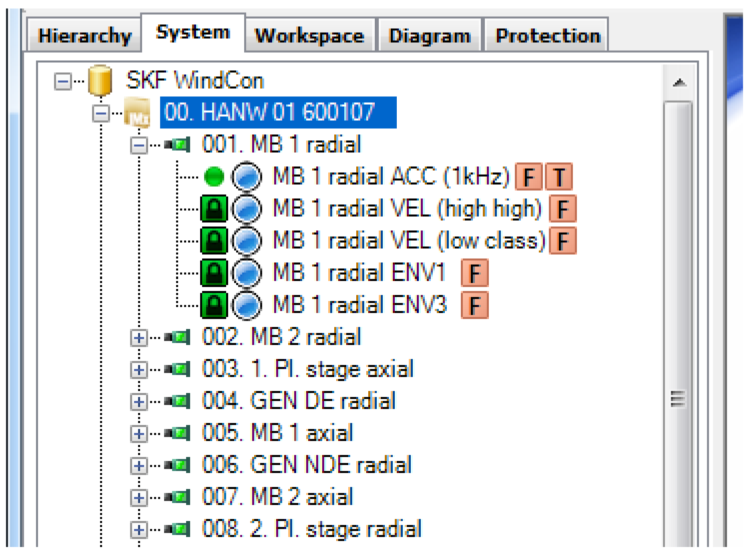


Figure 5 - 2.
Example of System View.

By right-clicking on a database, node, machine, channel and measurement point, you may choose to **Refresh** data or open the **Property** settings of the selected node and edit.

By right-clicking on a measurement point, you may also choose to open a graphic display **Diagram** to edit, **Delete** the selected measurement point or set a **Tag** on the measurement point.

Workspace

The Workspace is an individual work space consisting of user selected machines' hierarchy view. It is used to keep track of only machines for which the user is responsible. Note that a workspace cannot span several databases.

To open Workspace screen:

- Click **Show** on the toolbar, and then select **Workspace**.
- If the tree view window has been opened already, select **Workspace** directly from the tree view window.

Below is an example of a Workspace.

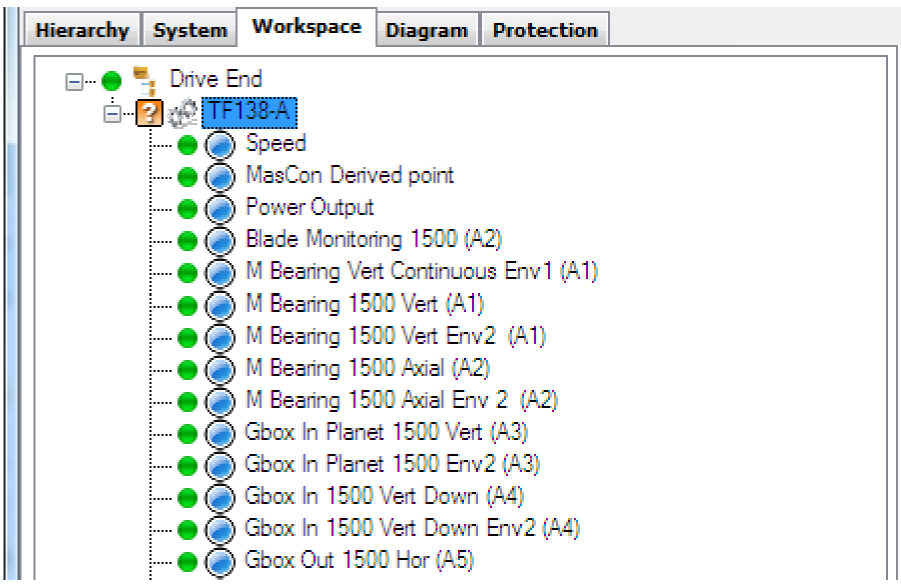


Figure 5 - 3.
Example of Workspace.

The configuration of workspace can be done by selecting **Workspace** from **Edit** menu. Refer to Workspace under Edit in Menu Items section.

Diagram View

The Diagram view is a list of saved diagram boxes. Diagram boxes are predefined views of the data which contain specified graphic settings including selection of measurement points as well as buffer settings.

To open Diagram screen:

- Click **Show** on the toolbar, and then select **Diagram view**.
- If the tree view window has been opened already, select **Diagram** directly from the tree view window.

Below is an example of a Diagram view.

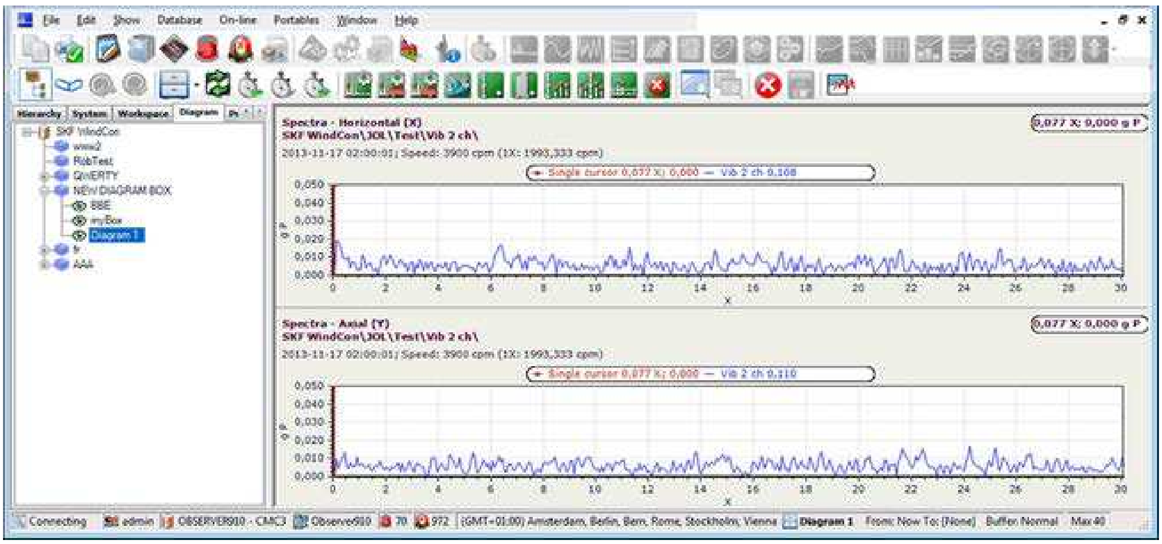


Figure 5 - 4.
Example of Diagram View.

In order to bring up the graphic display with the saved settings, double click on a selected diagram box.

Protection View

The Protection view is for IMx-M devices only. Protection view manages the handling of Protection module configurations created with the external tool "IMx-M Manager".

In order to operate the protection view the user needs to have the user access right "edit protection".

To open Protection view screen:

- Click **Show** on the toolbar, and then select **Protection view**.
- If the tree view window has been opened already, select **Protection** directly from the tree view window.

Below is an example of a Protection view.

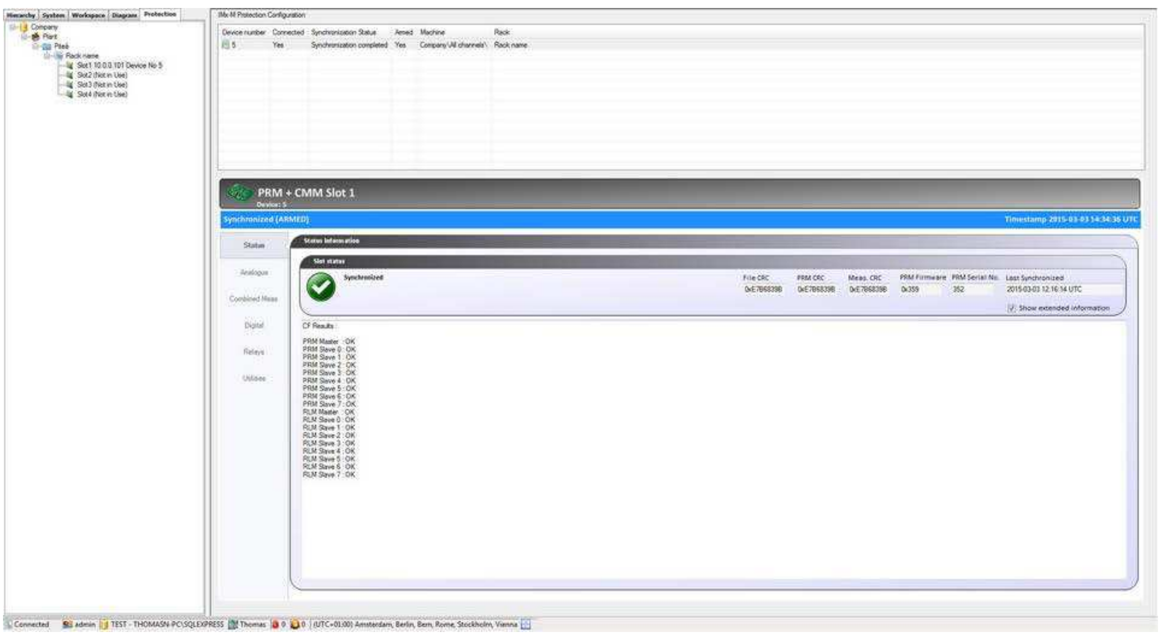


Figure 5 - 5.
Example of Protection View.

Importing IMx-M Configuration File to Observer Database

Importing IMx-M configuration file is done on the database level which means that only IMx-M Master Project files (*.mhf) can be imported. It is not possible to import individual Slot configuration files.

Right-click on the database of the Protection view and select Import. Select a IMx-M Master Project file stored in the hardware drive.

Creating Protection Measurement Points

Creating Protection measurement points are done on Slot level.

Select a Slot from the Protection view, then click the **Create PrM Measurements** button. The @ptitude Observer system will create corresponding protection measurement points for the selected Slot based on the IMx-M Configuration file. This is accomplished by the APC Wizard.

Synchronizing/Downloading Protection Configuration File

In order to download the configuration file from the Observer database to the IMx-M Rack, make sure a device is selected in the list and click the **Synchronize** button on the utilities tab. Alternatively, if the link "synchronize" is displayed on the status tab, click the link to start the synchronization process. The following screen will be shown:

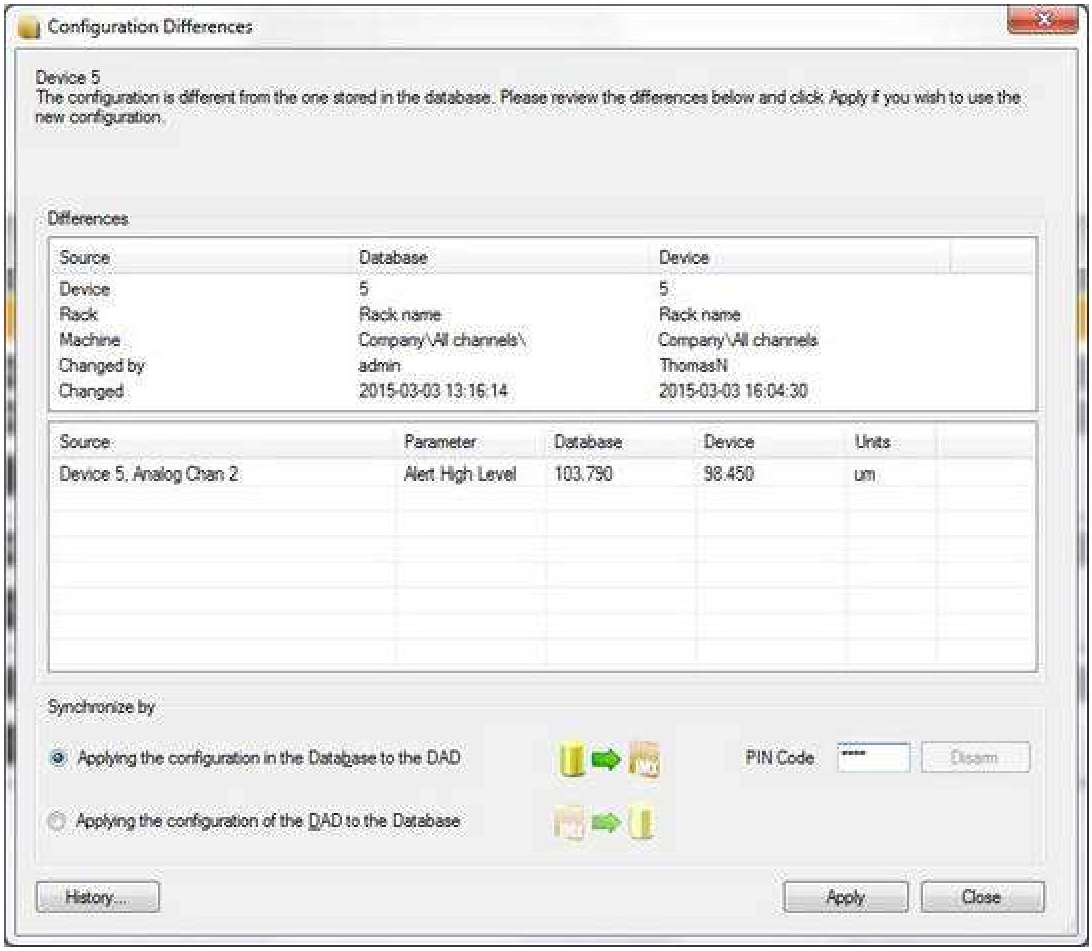


Figure 5 - 6.
Configuration Differences between the Device and the Database.

Here the difference between the configuration in the device and the configuration in the database for the specific device is displayed.

Select between the two options of synchronizing by either 1) downloading the configuration from the database to the device or 2) uploading the configuration which currently resides in the device and store that to the database.

Important - System must be in disarm mode before Protection configuration can be downloaded to the device. Ensure to read "Protection Configuration Update" chapter in IMx-M User Manual thoroughly and understand it.

If the option of changing the configuration in the device is selected and the synchronization is successful, the IMx-M Rack will restart with the new IMx-M Protection configuration file. Ensure that there are no circuit faults before the IMx-M

Rack can be armed again. Wait at least 30 seconds before the IMx-M Rack is armed again.

Utilities tab

On the Utilities tab for a selected module in the protection view various functionalities can be found.

ARM slot is used to arm the IMx-M Slot.

DISARM slot is used to disarm the IMx-M Slot.

Reset latched resets latching alarms for the slot.

Reset Peak speed resets the peak speed for the slot.

Synchronize see Synchronizing/Downloading Protection Configuration File

Create Meas see Creating Protection Measurement Points

Select Machine sets the machine in the Observer hierarchy that should contain the measurements. Click this button to select an existing machine from the Observer hierarchy before any measurements are created or the device is synchronized.

Important - In order to execute the various commands that affect the slot in any way, the user will need to specify the PIN code which is currently in the slot configuration in the Slot. The default PIN code is 0000.

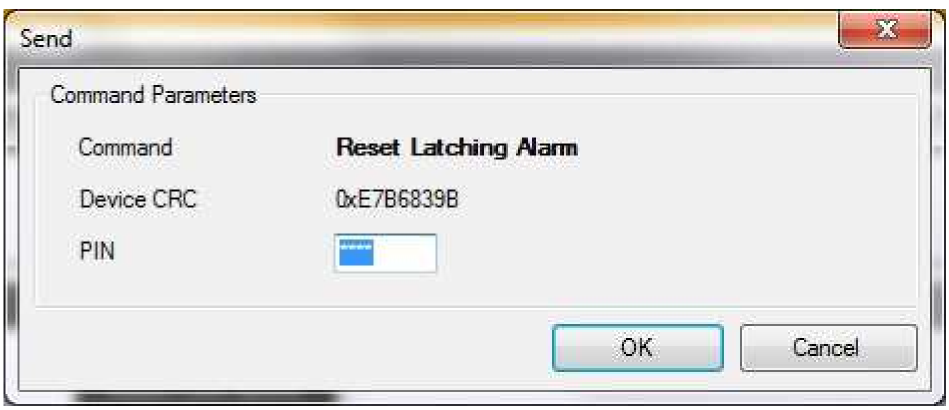


Figure 5 - 7.
PIN code specification when executing the command Reset Latching Alarm.

Automatic Point Creation Wizard

After importing MHF files (created by IMx-M Manager) into the Observer Protection view, the Automatic Point Creation Wizard (APC Wizard) allows users to create the corresponding CM and PM points. The wizard can create PM speed, CM harmonic, process points, shaft centerline and speed points. The user can create dual-channel CM points and configure the channel pairs as well as transient groups.

Displaying the Wizard

The Wizard is displayed when the user clicks on the **Create Meas**. button on the **Protection** tab of Observer.

- The Create Meas. button is disabled if:
  A device is not selected in the IMx-M Protection Configuration list.
  The selected device has not responded with its device CRC to the protection tab.

Screen 1, The Welcome page, is the first page the user sees.

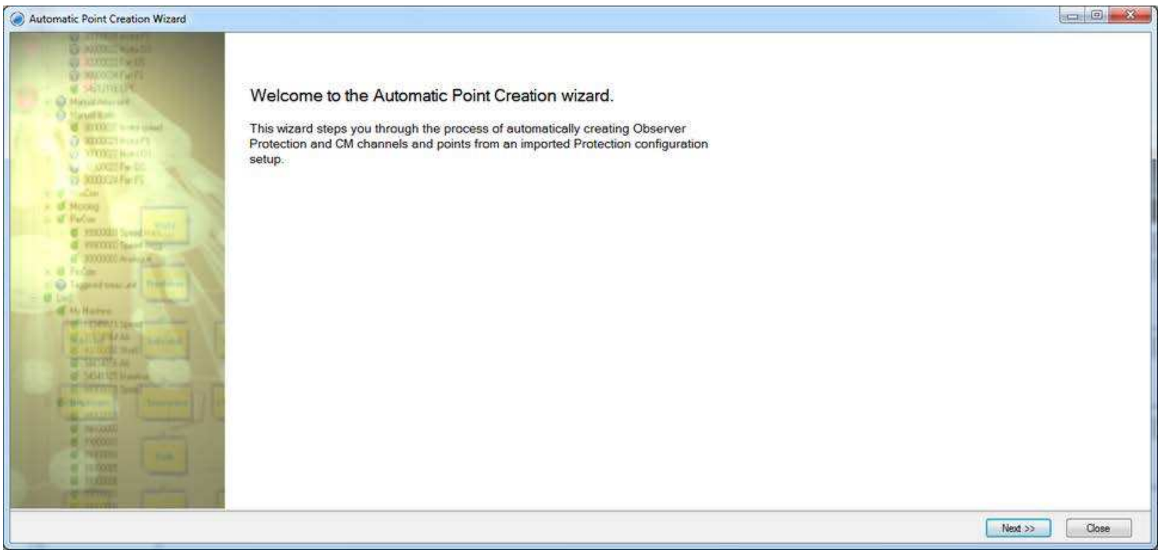


Figure 5 - 8.
Example of Welcome Page for Automatic Point Creation Wizard.

Next scans for any conflicts in the configuration. If there are no conflicts, the next page will be the Channel Settings page. If conflicts are found, the next page is the Resolve Protection Conflicts page.

Close closes the wizard without making any changes.

Screen 2 is Configuration Conflicts. The Configuration Conflicts page compares the PM configuration from the imported PM configuration (.MHF) file and the current CM point configurations found in the Observer database. If it identifies any CM point conflicts between the imported PM configuration settings and the database, the Conflicts is shown. If there are no conflicts, the Conflicts page is not shown and the Channel Settings page is displayed instead.

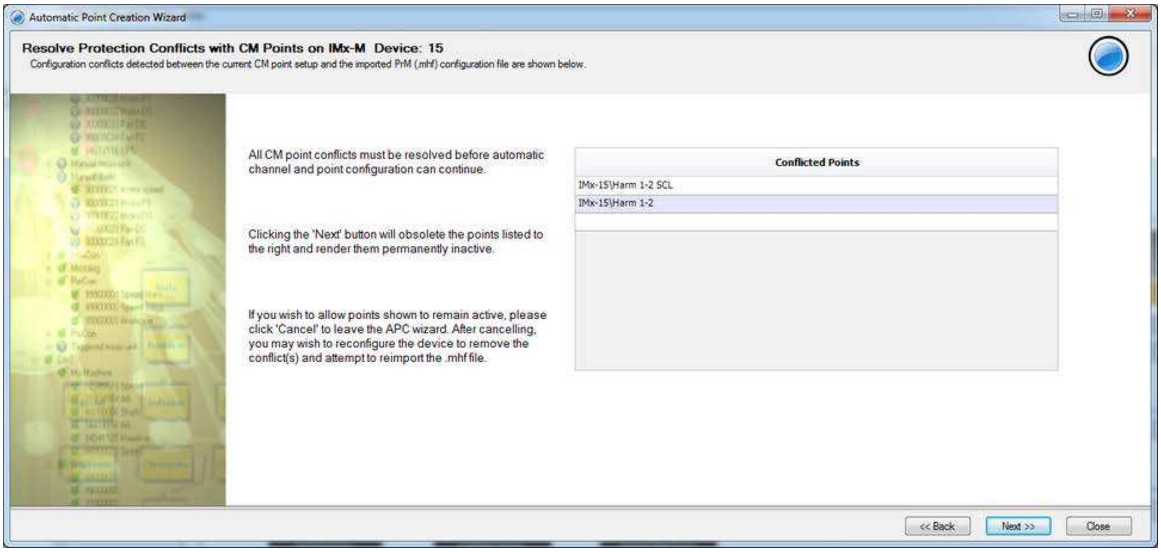


Figure 5 - 9.
Example of Resolving Protection Conflicts for Automatic Point Creation Wizard.

Before the Page is Displayed:

1. Get PM configuration from imported .MHF file.
2. Get all CM points associated with all corresponding device/channel configurations in imported PM setup.
3. Check each existing CM point for conflicts with the imported device/channel configurations.
4. If no conflicts are found, the wizard moves to the next page (the Channel Settings page) without displaying this page.
5. If any conflicts are found, this page is displayed with the conflicting channels listed.

Back moves back to the Welcome page. No changes are made to the configuration.

Next marks all conflicting points as obsolete, and then the Channel Settings page is displayed.

Close closes the wizard without making any changes.

Channel Settings

The Channel Settings page is used to edit channel names and specify transducer mounting angles. Transducer angles are required for some calculations used by points, in particular Shaft Centerline points. When Next is clicked, the protection points are created for the listed Analog channels.

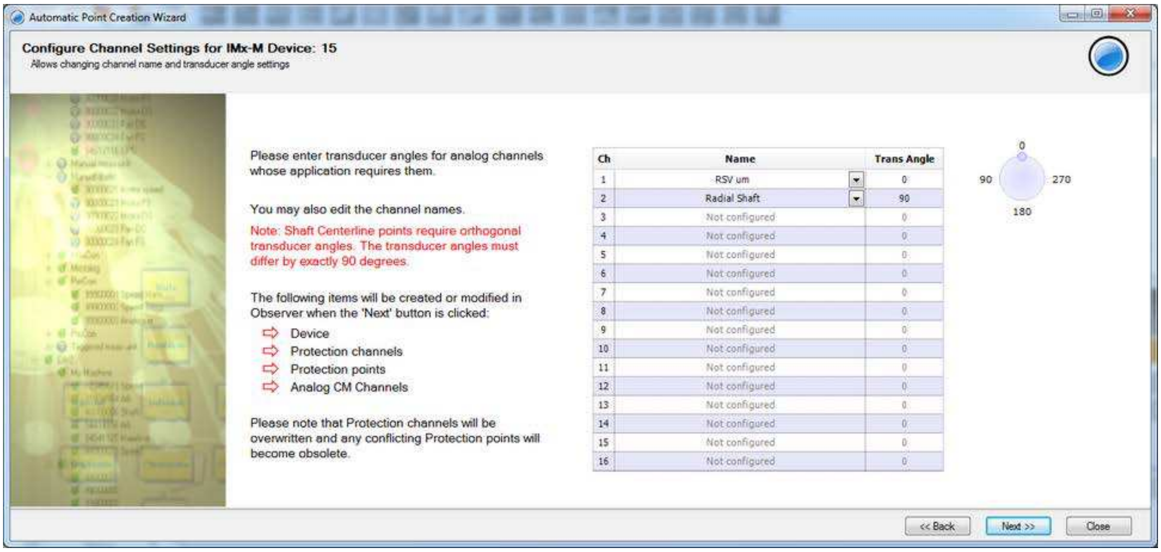


Figure 5 - 10.
Example of Configuring Channel Settings for Automatic Point Creation Wizard.

Back Button is disabled if the Protection Conflicts page was displayed. Otherwise it is enabled and pressing Back takes you back to the Welcome page.

Next Button creates all the protection channels and then display the Speed Points page.

Close Button closes the dialog without creating any channels. However, if the conflicts page displayed the conflicting CM points they will be marked as obsolete.

Channel Grid Control (Analog Channels)

The Grid control displays the current settings for the Analog Channels from the Synchronized IMx-M Config file. The Channel Grid control contains 3 columns and up to 16 Rows corresponding to the physical analog channels of an IMx-M (see below).

Ch	Name	Trans Angle
1	Channel 1	0
2	Channel 2	0
3	Channel 3	0
4	Channel 4	0
5	Channel 5	0
6	Channel 6	0
7	Channel 7	0
8	Channel 8	0
9	Channel 9	0
10	Channel 10	0
11	Channel 11	0
12	Channel 12	0
13	Channel 13	0
14	Channel 14	0
15	Channel 15	0
16	Channel 16	0

Figure 5 - 11.
Example of Channel Grid Control for Automatic Point Creation Wizard

Name displays the current channel name (up to 20 characters). By default this name comes from the IMx Manager MHF/Bin file. This control is editable and can rename the channel name. This action will not affect the IMx Manager MHF/Bin. It will affect the channel names of the Channels that are Auto Created.

Trans Angle allows the user to set the Transducer angles according to the physical placement of probes on the machine. This is required to get accurate measurements from the Harmonic point and required (to be 90 degrees) to enable creation of Shaft Centerline points.

Ch	Name	Trans Angle
1	Radial Shaft Vib.	0
2	Casing Vib.	0
3	Position	0
4	Comp. Diff. Exp.	0

Figure 5 - 12.
Example of Setting Transducer Angles for Automatic Point Creation Wizard.

The indicator is sensitive to the **User preferences** > **Diagram** > **Angular rotation** setting.

The Additional Information and Warnings are one or more strings that tell the user what to expect from the interaction with the Channel Grid Control and what happens after they click the Next button.

Back will be disabled if the Conflicts page was shown and the points have already been marked as obsolete. If the conflicts page was not shown, clicking Back goes back to the Welcome page.

Next moves forward to the next Wizard Page and commits the following changes to the database:

- Creates the IMx-M device (DAD) (If it didn't already exist.)
- Creates a Protection folder in the hierarchy where the protection channels are created.
- Creates the protection points.

Close aborts any changes on the current page, does not commit any changes to the database on this page, and closes the Wizard.

Speed Points

The control enables you to create, update, or ignore digital Speed points for a given channel. When the page is accepted, by clicking Next, Digital Condition Monitoring points will be created in the hierarchy.

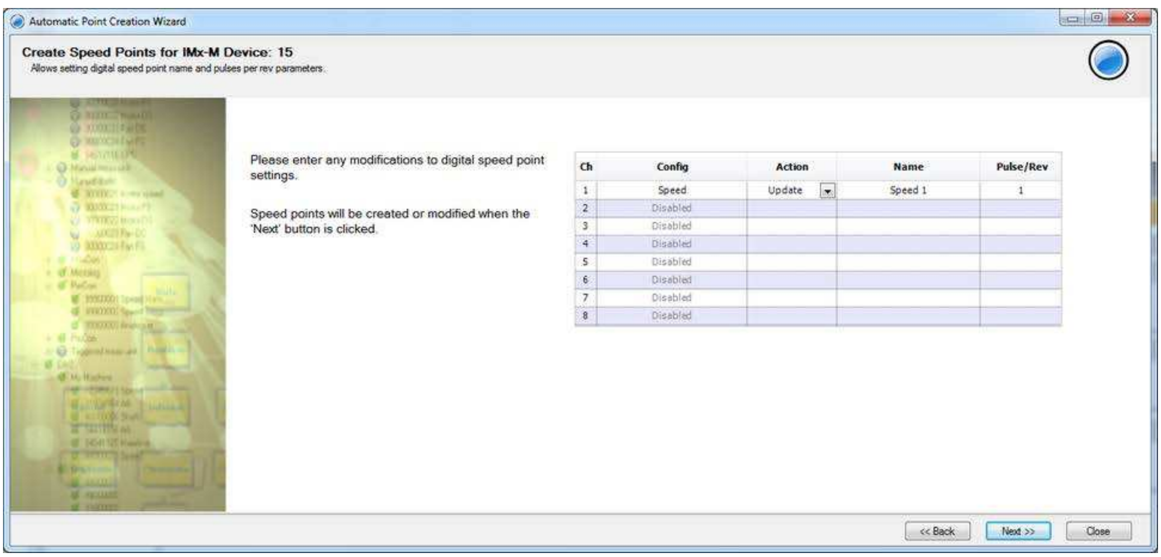


Figure 5 - 13.
Example of Creating Speed Points for Automatic Point Creation Wizard.

Digital Speed Point Grid Control

The Grid control displays the current settings for the Digital Speed points defined by the synchronized IMx-M Config file. The Digital Speed Point Grid control contains 5 columns and up to 8 Rows, corresponding to the physical digital channels of an IMx-M. If Digital channels defined in the Config file are not designated as Speeds points, they will not be editable in the Grid Control.

Action displays actions that will be carried out when the user clicks the Next button. The options are:

Create displays when there is no existing digital configuration for this channel.

Ignore is selectable in place of Create. Causes no change on the channel specified (no point is updated).

Update displays when there is an existing Speed point on the channel.

Name displays what will become the Speed Point name. By default this is the Channel name from the IMx Manager MHF/Bin file. The user can edit the Point name. This action will not affect the IMx Manager MHF/Bin. It will affect the names of the Points that are Auto Created.

Pulses/Rev shows the number of pulses per revolution. It is filled in from the MHF file.

Back moves back to the previous page. Any changes made to this page are NOT preserved.

Next creates the specified speed points and the Measurement Groups page is shown. Changes are committed to the database.

Close closes the Wizard without updating any speed points. Note that any changes to the configuration made by the previous pages are still in effect.

Measurement Groups

This page allows the user the option of launching the existing Observer Measurement Groups dialog (Database/Measurement Groups). The user then interacts with the Measurement Group dialog until closed.

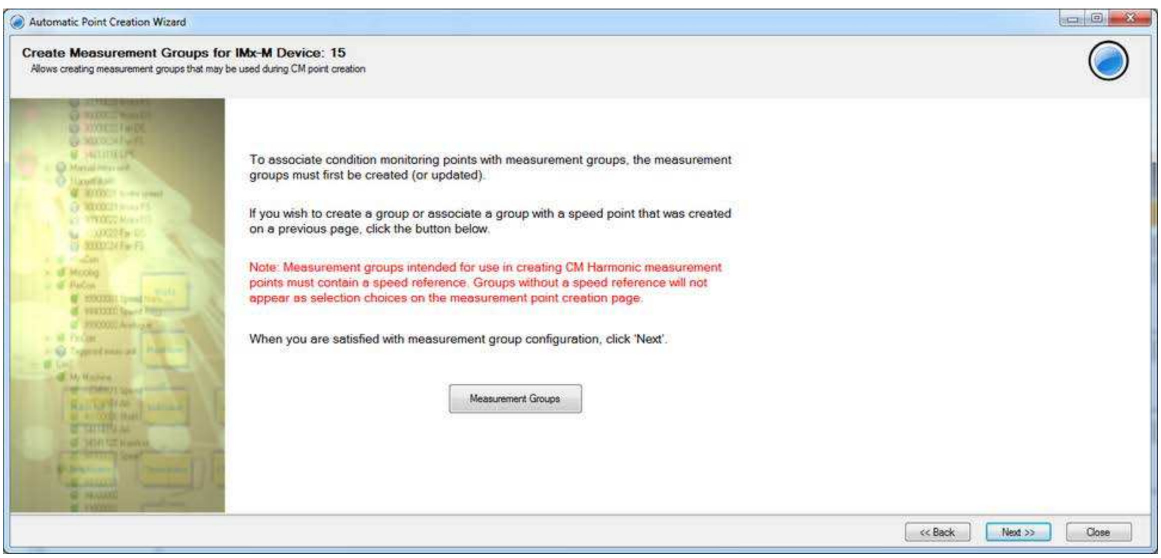


Figure 5 - 14.
Example of Creating Measurement Groups for Automatic Point Creation Wizard.

Measurement Groups button launches the Measurement Group dialog (shown below). While the Measurement Group dialog is open, the Measurement Group Wizard page is disabled. When the user completes the Measurement Group creation and dismisses the dialog, the State of the Measurement Group Wizard page returns to its initial, active state.

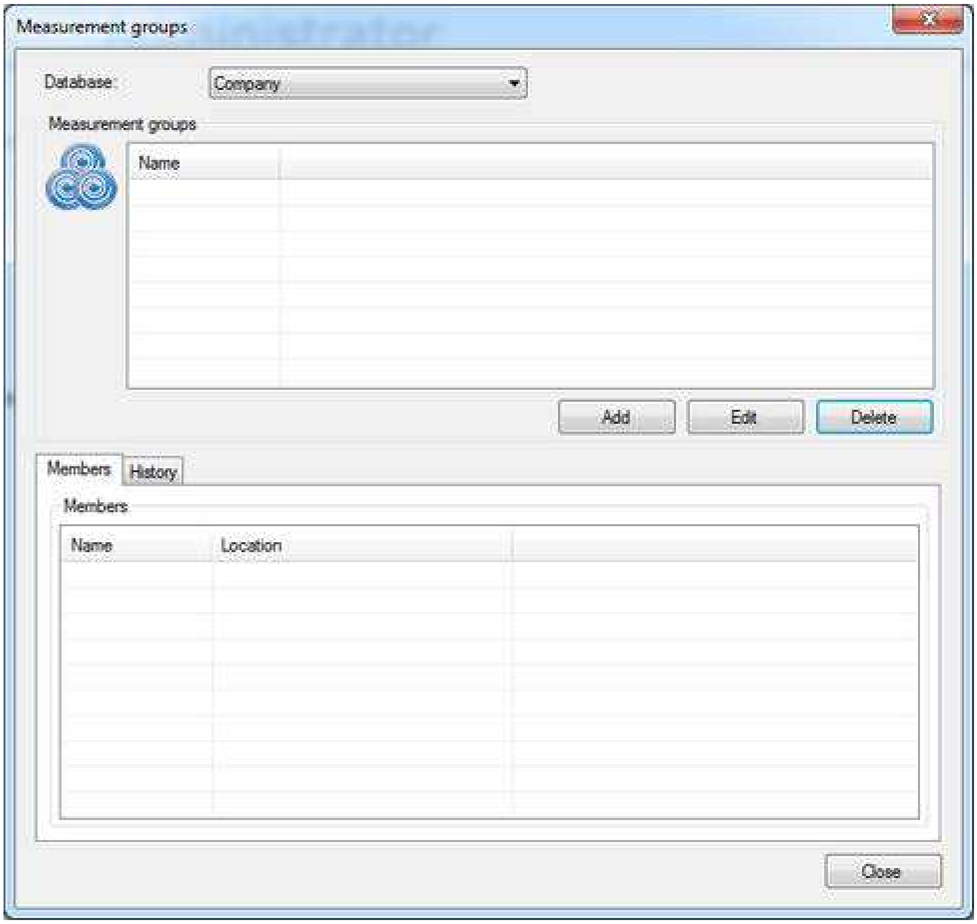


Figure 5 - 15.
Example of Measurement Groups.

Back moves back to 'Create Speed Points for IMx-M Device' page.

Next moves forward to 'Create Measurement Points' page.

Close closes the Wizard. Note that any changes made to measurement groups are keep, any other changes made by previous pages are still in effect.

Create Measurement Points

This page contains a single grid control. The user can configure each analog channel to create harmonic and SCL points. The Ch and Sensor Type columns are set from the .MHF file and are read only.

The following notes apply:

- The grid always contains 16 rows corresponding to the 16 analog channels available.
- For channels that are not configured in the IMx configuration file, the corresponding rows are read-only, only the 'Ch' and 'Sensor Type' are set. All remaining columns are set to '--'.

- For channels that currently have points assigned to them, the following rules apply:
  - If there is a dual-channel measurement currently associated with the device then the two channels are shown as paired to each other. (Following the rules for paired channels.)
  - If an existing single-channel point is associated with a channel that also has an associated dual-channel point, then the single-channel point (settings) shall be ignored by the wizard and the dual-channel point (settings) shall be displayed.

The following descriptions describe the behavior for each column when the channel(s) are configured.

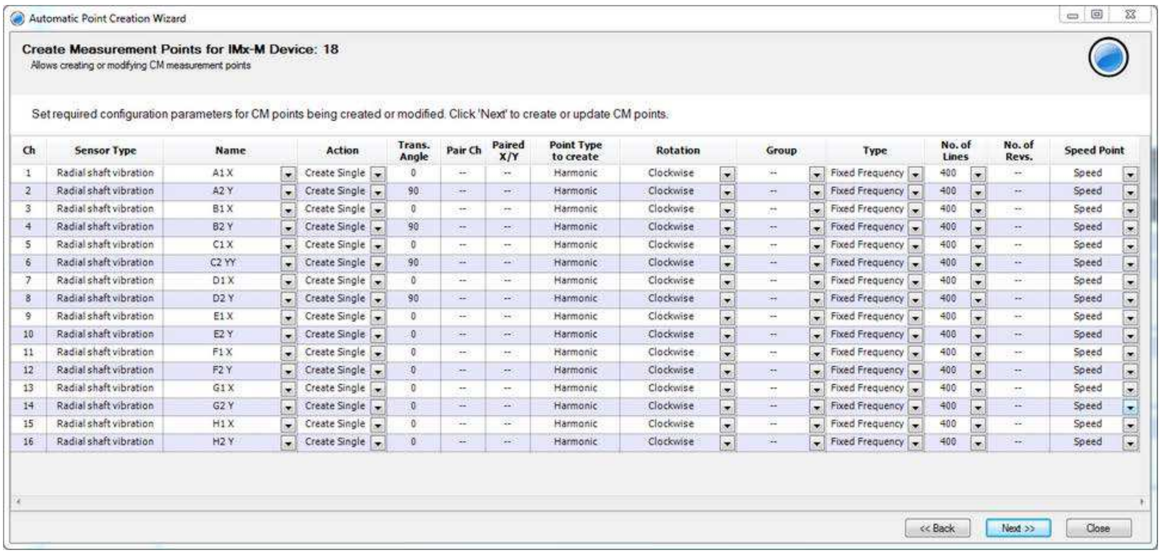


Figure 5 - 16.
Example of Creating Measurement Points for Automatic Point Creation Wizard.

Ch Column

Display only

Sensor Type Column

Display only – Possible values are:

Casing vibration

Radial shaft vibration

Position

Complementary Differential Expansion

Piston Rod Drop (Average Mode)

Piston Rod Drop (Triggered Mode)

Eccentricity

Temperature (Ch 9-16 only)

Other

If sensor type is not Casing Vibration or Radial shaft vibration:

- All columns except Sensor type and Action are dashed out
- All columns are disabled

Name Column

This column can be edited and also has a drop down menu that contains from 1 to 3 names. The names are:

The channel name from the Channel Settings page.

The channel name as defined in the database if the channel is being updated.

The channel name defined in the MHF file.

The control enables you to edit the name of the CM point. It is alpha-numeric with a max length of 45 chars.

Note: If ‘Point Type to create’ is ‘Harmonic+SCL’ the harmonic point name will be the same as the content of this cell. The SCL point name will be the contents of the cell + ‘-SCL’.

If no name is supplied in the MHF file, then the default channel name will be the ‘Sensor type’ value (‘Casing vibration’ or ‘Radial shaft vibration’

Action Column

If a CM point is defined on this channel, then the control will be read only and the label will be ‘Update’, otherwise ‘Create Single’

If a CM point is currently configured on this channel (or channel pair), then the control is read-only and the value will be ‘Update’. Otherwise the options are ‘Create Dual’, ‘Create Single’ and ‘Ignore’.

Note, if ‘Ignore’ is selected, when the cell loses focus and all the values for this row (except ‘Ch’ and ‘Action’) become ‘--‘. The only field that can be edited is ‘Action’. If ‘Create Dual’ is selected both ‘Pair Ch’ and ‘Paired X/Y’ columns will be editable. Otherwise, the columns are disabled.

Transducer Angle Column

Current transducer angle. Pulled from Channel Settings page.

Pair Channel Column

This defines the coupling between the channels. When a channel is selected, the corresponding row shall become read only and the ‘Action’ of the paired row shall become ‘--‘.

Conversely, if a row is de-selected in this control, its (formerly) paired channel shall become re-enabled with saved values.

Paired X/Y Column

This enables you to set which channel shall be the ‘X’ and which shall be the ‘Y’. See picture below.

Note: if 'X' is selected when the focus for this cell is lost, the 'Paired X/Y' value in the paired row shall change to 'Y'. If 'Y' is selected when the focus for this cell is lost, the 'Paired X/Y' value in the paired row (which shall be disabled) shall change to 'X'.

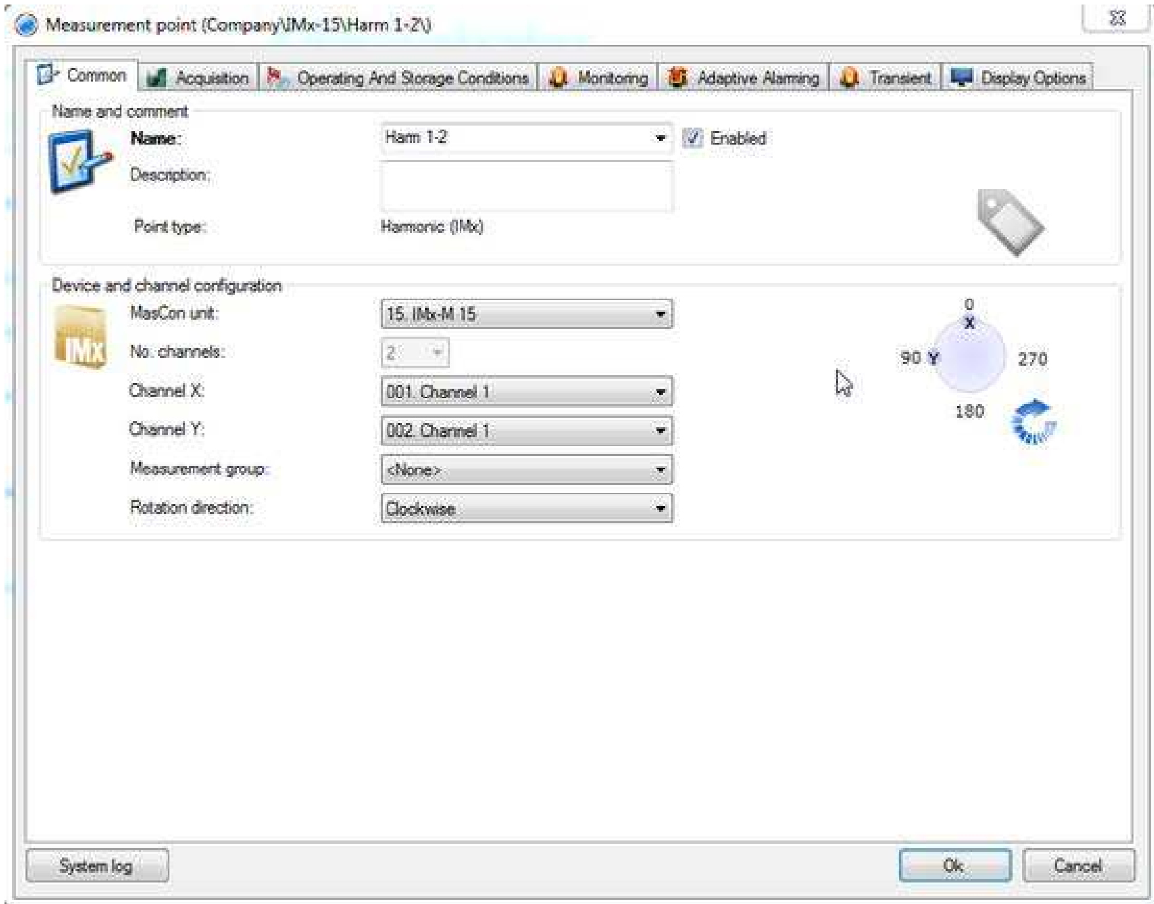


Figure 5 - 17.
Example of Measurement Point.

Point Type to create Column

Drop-list – Selection values are *Harmonic*, *SCL* and *Harmonic+SCL*.

If the channels are orthogonal (90°) and both channels are (Sensor Type) 'Radial shaft vibration', then all the selections shall be available, otherwise, only 'Harmonic' shall be available.

If **Action** is *Create Dual* and the selected value contains 'Harmonic', then a dual-channel harmonic point will be created. Otherwise, if **Action** is *Create Single*, then a single-channel harmonic will be created.

Rotation Column

Drop-list – Selections are *Clockwise* and *Counter-Clockwise*. Should reflect which way a shaft is turning.

Group Column

When the point is created, it shall be placed in the group selected. Note, when a group is selected and the cell loses focus, ‘Acq. Type’, ‘Speed Point’ and ‘No. of Lines’ shall reflect the group’s corresponding property values and become read-only. Conversely, if the user selects ‘-‘, the 3 columns shall become editable with each cell’s default value.

Type Column

Drop-list – Selections are *Fixed Frequency* and *Order Track*.

Editable if no group is selected. Otherwise, the group’s value shall be selected and this control shall be read-only until the **Group** value is (re)set to ‘-‘.

Number of Lines Column

The selected value shall become the Acquisition **No. of lines** value (on the Acquisition tab) for the CM point created from this row.

When a new Number of Lines is selected, the Number of Revs is changed if the existing value is not valid for the new number of lines.

Number of Revolutions Column

Allows the user to set the number of lines for ‘Order Track’ points.

Editable if no group is selected and ‘Acq. Type’ is ‘Order Track’. If Acq. Type is not Order Track, set to ‘--'.

Speed Point Column

Drop-list – Selections are all CM speed points available on this DAD, some of which may have been created on a previous page.

Editable if no group is selected. Otherwise, the group’s value shall be selected and this control shall be read-only until the **Group** value is (re)set to ‘-‘.

Updating Current Points

For any channel that is currently configured and is compatible, the **Action** field will be *Update* and the field will be read-only.

Dual Channel Points

If a dual channel point is currently configured and is compatible with the new configuration then the page will display the settings for the paired channels, regardless if there are other single channel points configured on the same channel.

The **Point Type** will be either *SCL* or *Harmonic*, if the point is an SCL or harmonic point. If there are multiple dual channel points configured (both SCL and Harmonic), the **Point Type** will be *Harmonic+SCL*.

Single Channel Points

If a single channel point is currently configured and is compatible with the new configuration then the page will display the settings for the single channel. If there is a dual channel point configured on the same channel, the dual channel point settings will be displayed.

Back moves back to **Create Measurement Groups** page.

Next creates the points and moves forward to the **Final Instructions** page.

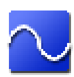
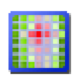
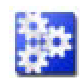
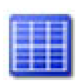
Close aborts any changes on the current page, does not commit any changes to the database from this page, and closes the Wizard.

Graphic Displays and Tools

There are a number of graphical displays available in @ptitude Observer to facilitate data analysis. The accessibility of graph display depends on the selected item.

To access a graphic display screen:

1. First select a measurement point, a sub machine or a machine in the hierarchy view, system view or workspace.
2. Select one of the following graphic display icons on the toolbar. Or if a measurement point has been selected, you may click the right mouse button on the measurement point then click **Diagram** and choose a graphic display.

 Spectra	 Time waveform	 Phase	 History	 3D plot
 Topology	 Orbit	 Profile	 Gear inspector	 Trend
 Bode plot	 Trend list	 Multi trend	 Diagnosis	 Polar
 Shaft centerline	 Combination plots	 Event Capture		

Graphic Features

Multi-point analysis is possible in most displays by dragging and dropping more measurement points onto the same graph. Holding **[ctrl key]** down while releasing a measurement point on a graph adds the measurement point on the display overlaying the data if the graph supports it.

Legend is included in all displays and gives information on selected values, cursor positions, type of data and more. Legend can be repositioned and enabled in all graphs. It can be enabled by checking the *Visible* field. It also has an option to have display positioned at *Top*, *Bottom*, *Left* or *Right* of a graph.

Buffer setting sets the depth and conditions on which data to retrieve and display in the graphs. The access to buffer setting can be done by clicking on the buffer icon on the toolbar after opening a graph. The graph will be updated with the new data from the buffer settings automatically. Refer to Buffer in System Operation.

Graph Settings

To access graphic settings:

- Click on the right mouse button on the graphic display screen, then select an option from the pop-up menu.
- It is also possible to update graphic settings of many measurement points at the same time by **right-clicking on a node or a machine** in the hierarchy view, then selecting **Tools**, and then **Update graph settings**.

Some edited graph settings can be saved on the measurement point while the others are only temporary changes. When you modify certain settings within any one of the following graph types for a single point, the system will automatically save your modifications as your preferred settings for that graph and point. The next time you access the same graph for the same point, the graph will retain any applicable preferences you have set.

Graph types that save your preferences/modifications include:

- Multi-Trend
- Orbit
- Shaft Centerline
- Spectra
- Time Waveform
- Trend

Graph settings that will be saved, where applicable, for the above graphs (specifically, graph type/point type pairs) include the following:

Direction	Legend Visible/Alignment	Show phase
Display style	Line style	Start/stop markers
Frequency unit	Mode	Title Checkboxes
Invert rotation direction	Set speed	X axis
Invert view position	Shaft cycle time	Y axis

3D settings enables you to edit zoom, rotation and elevation scales for 3D plots.

Add cursor adds available cursors (markers) one at a time in the graph temporarily. Descriptions of available cursors can be found in Tools for Graph Display section below.

Alarm circles hides/shows alarm circles for polar types of plots. One warning circle (yellow) and one alarm circle (red) is drawn.

Annotations can be added as temporary notes for the current graph. They can be useful for printouts of the current graph or screenshots. To add an annotation, right-click on the graph and select the menu item **Annotation/Add**. A text box appears on the top left corner. To edit the text in the text box, double click the text box. To end editing, click the ESC key on the keyboard. Click the mouse and drag the annotation where you want it to be placed.

Auto alarm is available for diagnosis display only. It is based on the data in the graph which configures the alarm settings for the built-in intelligent diagnostic system.

Copy is available on all graphs in @ptitude Observer. It creates a screenshot of the graph and puts it in the clipboard.

Correlation tolerance is available for the multi trend plot only. Correlation tolerance sets the tolerance how far apart correlated measurements can be in order for them to be drawn. Valid values can be set to Exact or ranging from 1 second up to 1 hour.

Curve fitting applies an approximation of a curve fit to the data currently displayed in the plot. Options are 1st Degree, 2nd Degree, 3rd Degree and None.

DiagX enables you select machine parts that have the selected frequency from a list. This edit is temporary. See **DiagX** in Tools for Graph Display below.

Exclude from diagnosis calculation excludes an FFT from diagnosis.

Export is available on all graphs in @ptitude Observer. It brings up an **Export** dialog where you can select data to export in several different formats, including Excel and text files.

Frequency unit switches the frequency unit between *Hz*, *cpm* and *Order*. The change made to frequency unit can be saved on the measurement point.

Fault frequencies brings up a dialog where the user can choose machine parts from the machine that the user is currently analyzing. When one or more machine parts are selected, the frequencies for them are drawn in the graph. In this way the user can clearly see if any of the machine parts are rendering high readings. The frequencies displayed for the machine parts are automatically calculated by the running speed.

Go to [Double click] for diagnosis display, toggle back and forth between the main diagnosis screen and the one graph selected. **Go to [Double click]** for history display to open up the selected history in full screen mode.

Inverted enables you to change the sign of all data in the plot.

Legend sets the preferred position of the legend. Refer to Graphic Features for detailed information. A general position of legend can be set for all graph displays at User Preferences under Edit in Main Item.

Line style specifies the style of line to graph temporarily. The available line styles are *Line, Point, and Line and point.*

Listen to time waveform lets you listen to time waveform if you have installed a sound card in your computer.

Markers enables you to add markers by **[shift+click]** or remove the nearest marker by **[ctrl+click]** temporarily.

Max scale provides a list of of pre-defined maximum scale settings to select temporarily. Selecting *auto* will cause the system to select the most appropriate maximum scale setting for the current data.

Min scale – provides a list of pre-defined minimum scale settings to select temporarily. Selecting *auto* will cause the system to select the most appropriate minimum scale setting for the current data.

Mode is available for history graphic display only. You can change the mode temporarily between spectra, time waveform, phase, spectra/time waveform, and spectra/time waveform/phase.

Noise reduction sets the noise reduction level in percentage.

Palette steps is available for gear inspector graphical display only. It indicates the total number of different colors used for the display.

Reference stores the current active measurement in the graph as reference data for the active measurement point, or clears the existing reference data. When setting a measurement as a reference, the measurement will automatically be set with the Keep forever flag. Keep forever flag can be edited in Meas. date interface. The reference data are shown in the background of this graph every time data are displayed for this measurement point.

Remove DC gives you the option to include the DC part as well as the AC part. Normally, you remove the DC part of the signal when showing time waveform data.

Runout compensation is used to remove the problem that un-round shafts register the shape of the shaft as vibration.

Save to Diagram Box saves the current graph settings under an assigned name. For detailed information refer to Diagram View under Tree View in System Operation.

Scale enables you to select a value from the list of pre-defined scale settings. Selecting *Auto* will cause the system to select the most appropriate scale setting for the currently displayed data. In most graphs, the mouse wheel can be used to increase or decrease the max scale. The change made to scale can be saved on the measurement point.

Scale type switches between *Lin (linear)* and *Log (logarithmic)* scale. If Log is selected, then the system will use the number of decades as the scale. Number of decades in logarithmic scale is set in User Preferences interface under Edit in Menu Items section. The change made to scale type can be saved on the measurement point.

Scaling changes how to display the scaling (detection) of the measurement temporarily. Scaling options are *peak*, *PtP (peak to peak)* or *Rms*. The scaling of the measurement point is set back to the original value when you are done with the particular graph.

Sectors is available for gear inspector graphical display only. It indicates the number of gear sectors. The default is 360 which means that there are 360 sectors of 1 degree wide each where as if 180 was chosen, there are 180 sectors of 2 degrees wide each.

Set Speed enables manual adjustment for the speed reading of the current measurement displayed in the Spectra plot.

Shaft is available for profile display only. It can be selected to determine for which shaft the profile should be calculated.

Shaft Cycle time is available for Orbit plot only. Select from *Tacho shaft*, *Order analysis shaft* or *custom speed*.

Show phase is available for trend graphic display only. It brings up the phase graphic display on a split screen.

Show pulses is set by default which displays pulses in the graph. It can be unset if needed.

Show values displays the values in 3D plots.

Start/stop markers hides/shows the start and stop markers for displays. The markers typically show the first and the last value drawn in the graph.

Type enables you to select a certain type of orbit graph to display.

Unit is the measurement unit of the data displayed which can be changed temporarily. Changes can be made between velocity, acceleration and displacement. The unit of the measurement point is set back to the original value when you are done with the particular graph.

X-axis changes the x-axis value to *date/time*, *speed*, *process*, or *values* temporarily. For multi trend plot, it is also possible to set the x-axis to another measurement point which will correlate the measurements of measurement points with each other.

Y-axis changes the y-axis value to *amplitude* or *percent* temporarily.

Z-axis is available for 3D plot only. Change the z-axis value to *date/time*, *speed*, *process*, or *even spreading* temporarily.

Zero padding allows you to use zero padding temporarily.

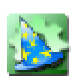
Tools for Graph Display

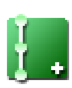
There are a vast number of tools available in the graphs to facilitate data analysis. The tools appear as green icons located on the toolbar.

 **Fault frequencies** brings up a dialog where a user can choose machine parts from the machine that the user is currently analyzing. When one or more machine parts are selected, the frequencies for them are drawn in the graph. In this way the user can clearly see if any of the machine parts are rendering high readings. The frequencies displayed for the machine parts are automatically calculated by the running speed.

 **Previous fault frequency** moves the active cursor to the previous machine part. **[ctrl+right arrow key]** also moves the active cursor to the previous machine part.

 **Next Fault frequency** moves the active cursor to the next machine part. **[ctrl+left arrow key]** also moves the active cursor to the next machine part.

 **DiagX** is an intelligent part of the system build-in diagnostic system. To use it, select a frequency in the graph that looks interesting and click **DiagX** button. A dialog will appear listing all the machine parts and the probability that the selected frequency including harmonics belong to a specific machine part. It is an easy way to find out which part of the machine causes a high peak at a specific frequency. DiagX feature also works for sideband and band cursors.

**Single cursor** adds a single cursor to the graph. Once a single cursor has been added, you can switch between cursors by clicking on them which makes cursors active. A single cursor can be moved with the **[left arrow key]** or **[right arrow key]**. **[shift+left arrow key]** or **[shift+right arrow key]** causes a cursor move in bigger steps.

**Band cursor** adds a band cursor to the graph. It allows, by dragging the handles of the band, to position and resize the band freely. A single band cursor can be moved

with **[left arrow key]** or **[right arrow key]. [shift+left arrow key]** or **[shift+right arrow key]** causes a cursor move in bigger steps.

A band cursor has three handles at the top of the band:

First handle: makes the band cursor bigger or smaller by clicking and dragging.

Third handle: makes the band cursor bigger or smaller by clicking and dragging.

Middle handle: repositions the band by clicking and dragging.

**Harmonics** produces a harmonic cursor of the currently selected frequency. This cursor can also be moved with **[shift key]** or **[ctrl key]** in combination with **[left arrow key]** and **[right arrow key]** or by clicking and dragging with the mouse. Harmonic cursors can be between 20 and 200 which can be set in User Preferences in Edit menu item.

**Sidebands** inserts a side band marker, marking 5 side bands below and 5 above a X marker. There are two modes of a side band marker:

First mode: is the default mode. X is selected. The arrow keys allow you to move the sideband marker but keep its size.

Second mode: is set by selecting -1 to -5 or 1 to 5. The arrow keys allow you to resize the side band cursor.

**Amplitude peaks** cursor displays the highest peaks in the graph. It consists of a horizontal line stretching across the graph. The horizontal line is movable in the vertical axis by clicking and dragging the line. Peaks found above this line are marked with a number.

 **Select measurement date** enables you to select a date to see the measurements from that date. Double clicking on a date refreshes the graph with the data from the selected date.

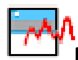
 **Clear** clears the graph of all tools, cursors and other custom markers that have been added.

 **Zoom** is available on almost all graphs. It zooms in only once at a time. Once the graph has been zoomed in, the graph is no longer in the zoom mode. You must re-instate zoom mode by clicking the zoom icon each time you want to zoom in. Click and drag the mouse button to the desired area. It is also possible to scroll the zoomed graph while pressing **[shift key]**, click and drag the mouse.

 **Zoom out** brings a graph back to its original size.

**Delete** deletes a measurement from the database. Spectra, time waveform and phase are considered as a single measurement, which means that deleting a spectra will also delete the corresponding time waveform and phase data, if there are any.

**Save** saves the current live measurement from the graph to the database. The measurement will be marked with the storage reason *manual* because it was manually saved and not by the time based schedule.

**Live** reads data immediately from the measurement point(s), and displays the data in the graph. In order to get live data, a connection to the @ptitude Observer Monitor computer has to be established. @ptitude Observer sends a request to @ptitude Observer Monitor which redirects the request to the correct IMx/MasCon device which then collects the data and sends it back through the reversed path.

Spectra

 Use this icon to generate spectra display of a selected measurement point. Spectra display show the vibration amplitude as a function of frequency. Regardless of the input signal type, the amplitude can be shown in acceleration (m/s^2 or g), velocity (mm/s or ips) or displacement (um or mils) using a linear or logarithmic amplitude scale. All defect frequencies for the whole machine are automatically calculated and can be easily displayed in a plot as vertical bars.

Harmonics according to defect frequencies or any other frequency can be displayed by an automatic fitting function. The spectra can be zoomed easily to any frequency range inside the original spectra. Auto scaling or fixed scales can be applied, and the frequency scale can be either Hz, cpm, or order.

In addition, spectra display supports the zero padding which can be used to more easily identify specific peaks in the FFT. With a simple right-click, it is possible to set the data currently displayed in this graph as reference data for the future.

Below is an example of spectra display of binary data type with overlay data and live data.

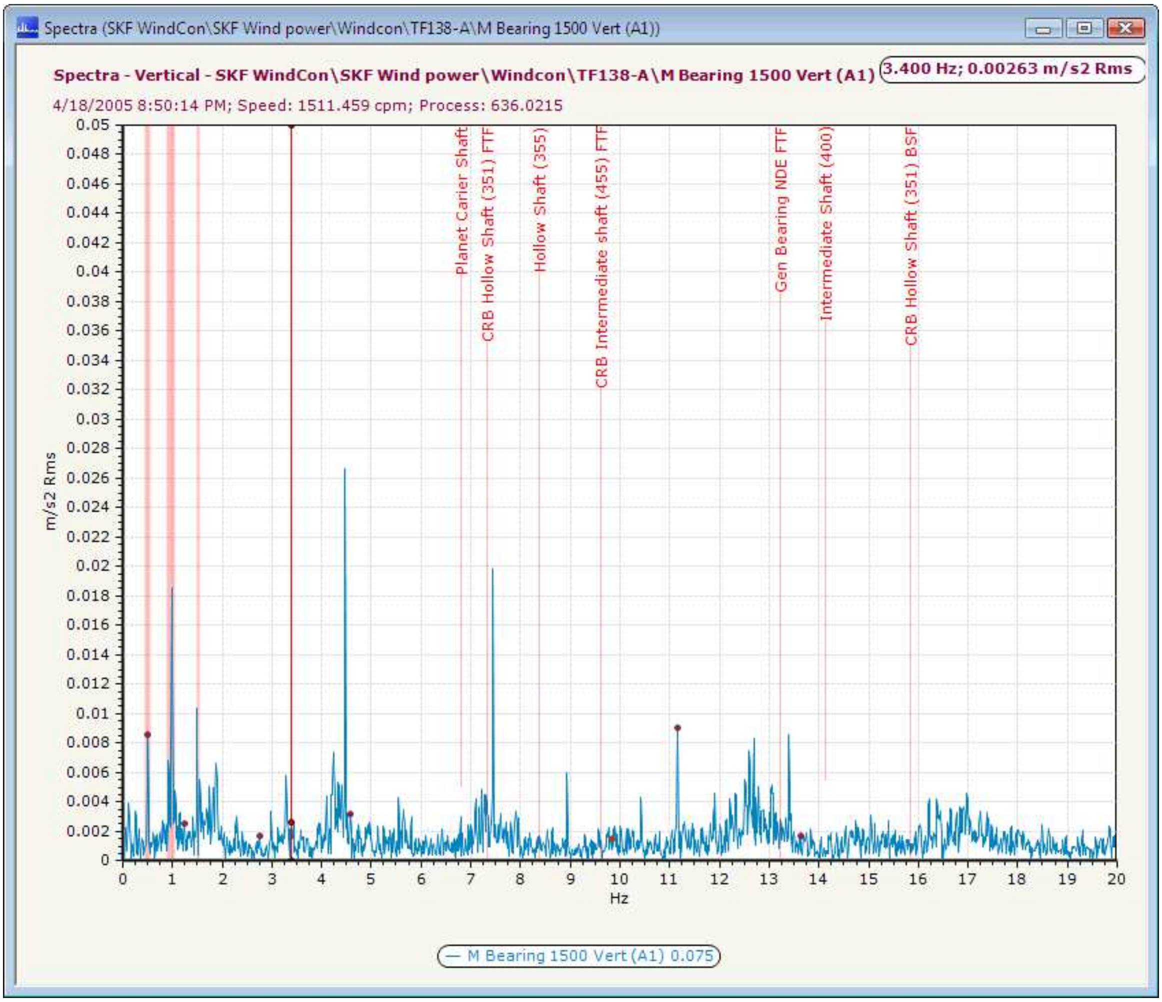


Figure 5 - 18.
Example of Spectra Display.

Full Spectrum Form

The Full Spectrum Form provides an enhanced view of the existing Spectrum Form. The Full Spectrum Form is used to display a graph of spectrum data collected from two, orthogonally mounted sensors in a dual channel point.

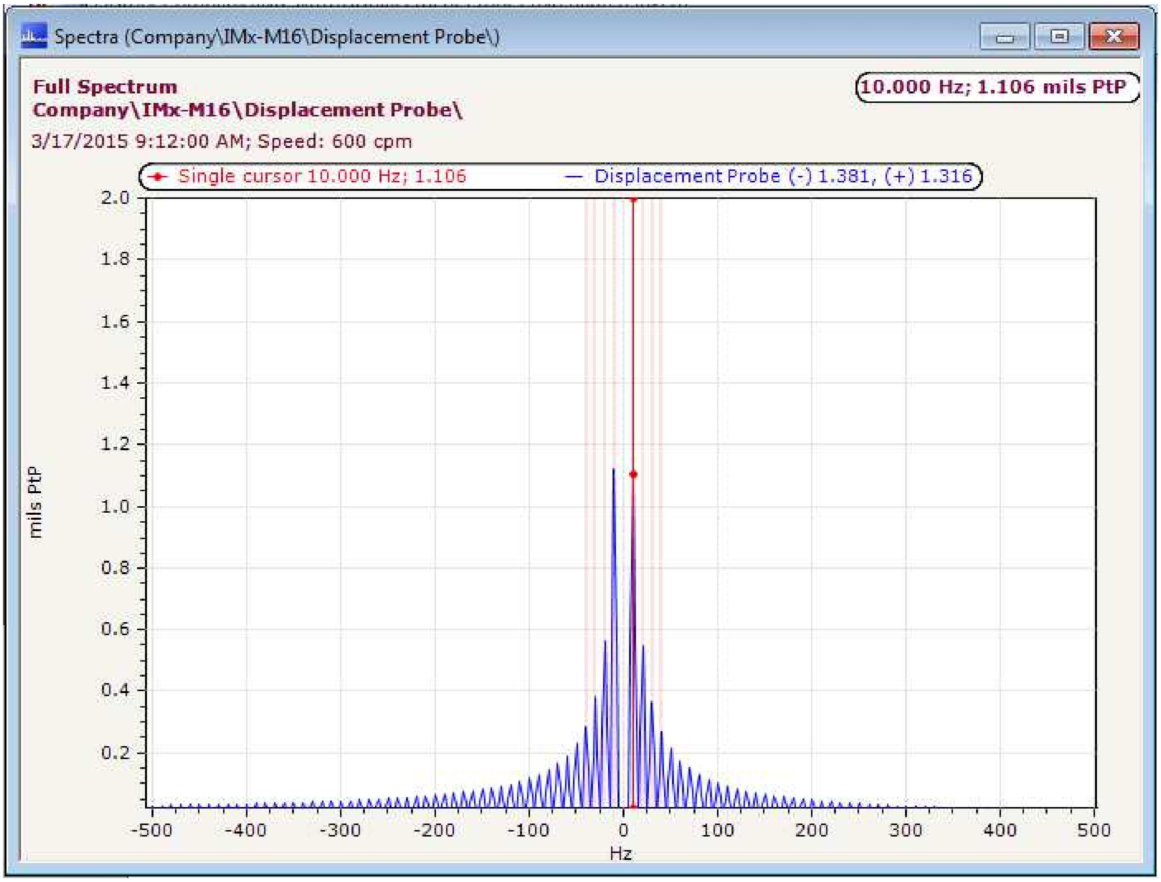


Figure 5 - 19.
Example of Full Spectrum Form.

Displaying the form

The **Full Spectrum** form is not the default diagram for spectral data. By default, the Spectrum form is the default form, which is displayed by first selecting a point that collects time-waveform data (either Dynamic or Harmonic), then selecting the **Spectra** menu button, or right-clicking the point and selecting **Diagram/Spectra**.

If the user enters the **Edit/User Preferences** menu and selects the *Full Spectrum = True* option, clicking on the **Spectra** menu button or right-clicking the point and selecting **Diagram/Spectra** will launch the Full Spectrum form assuming the following criteria are met:

- The point has 2 channels
- Time waveform data has been collected.

If these criteria are not met, the normal Spectrum form is displayed.

The user may also launch the Full Spectrum form from the Spectrum form by right-clicking the form and selecting Full Spectrum. Likewise the user may launch the Spectrum form from the Full Spectrum form.

Initial Plot description

The Horizontal axis represents frequency (in Hz, CPM, or Orders). A frequency of zero is centered in the plot. Negative values extend to the left and positive to the right. The first four orders of running speed are marked in both the positive and negative directions with light red vertical lines. A single cursor is displayed on the highest amplitude in the positive direction. Scaling is set to automatic.

Option Menu

The Option Menu is displayed when the user right-clicks on the Full Spectrum form. All relevant options supported by the Spectrum form will be supported for the Full Spectrum form.

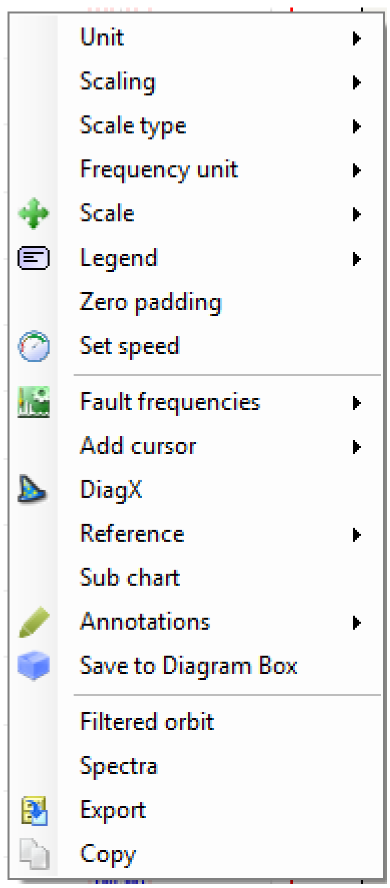
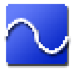


Figure 5 - 20.
Example of Full Spectrum Form Options Menu.

Time Waveform

 Use this icon to generate a time waveform display of a selected measurement. Time waveform display shows the vibration magnitude as a function of time. Regardless of the signal type the amplitude can be shown in acceleration (m/s2 or g), velocity (mm/s or ips) or displacement (µm or mils). If the measurement on display is triggered using a digital input, the tacho pulses are shown automatically making it easier to track each revolution.

The time waveform can be easily zoomed and the scaling can be done automatically or manually.

By a simple right-click on the mouse, the user can listen to the time waveform using the computer speakers and can detect, by listening to the sound of the machine, abnormal sounds. Listen function of time waveform is opened in an external window. Here, speed and length of the time waveform can be modified while listening. It can also be played back.

The figure below is an example of time waveform display of binary data type with overlay data and live data.

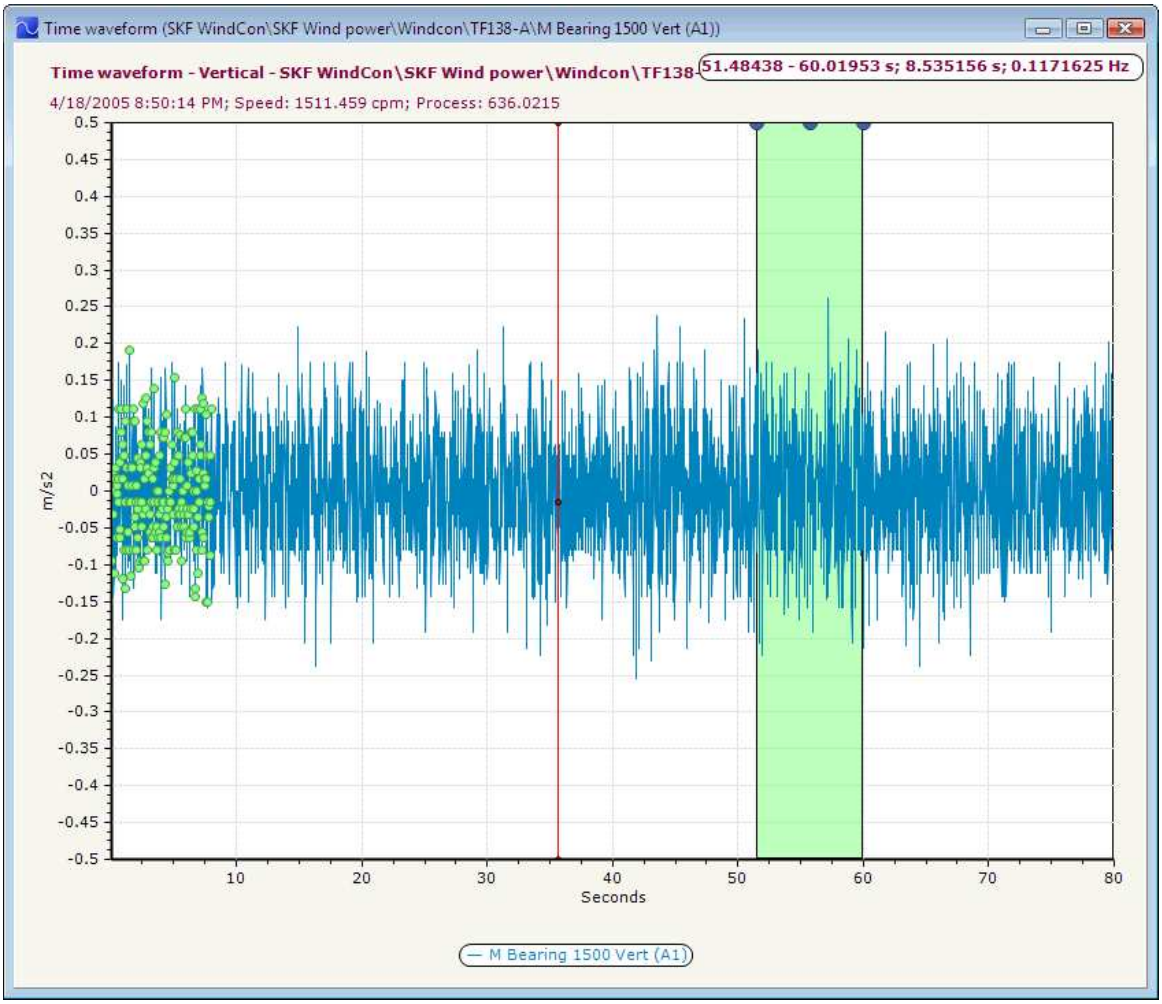


Figure 5 - 21.
Example of Time Waveform Display.

Phase

 Use this icon to generate a phase display of a selected measurement point. Phase spectrum shows the phase with respect to the frequency. Combined with the amplitude spectrum, it is easy to get the phase lag for any peak in the vibration spectrum. If multiple points are measured synchronously, it is possible to determine the phase relationship of any peak between two different points, especially if data from different measurement points are overlayed.

As in time waveform display and in spectrum display, the unit can be recalculated on the fly between acceleration, velocity and displacement and can show relative to the frequency in Hz, cpm or order.

The phase can be easily zoomed and the scaling ranges can be between -180 and 180 degrees.

The figure below is an example of phase display of binary data type with overlay data and live data.

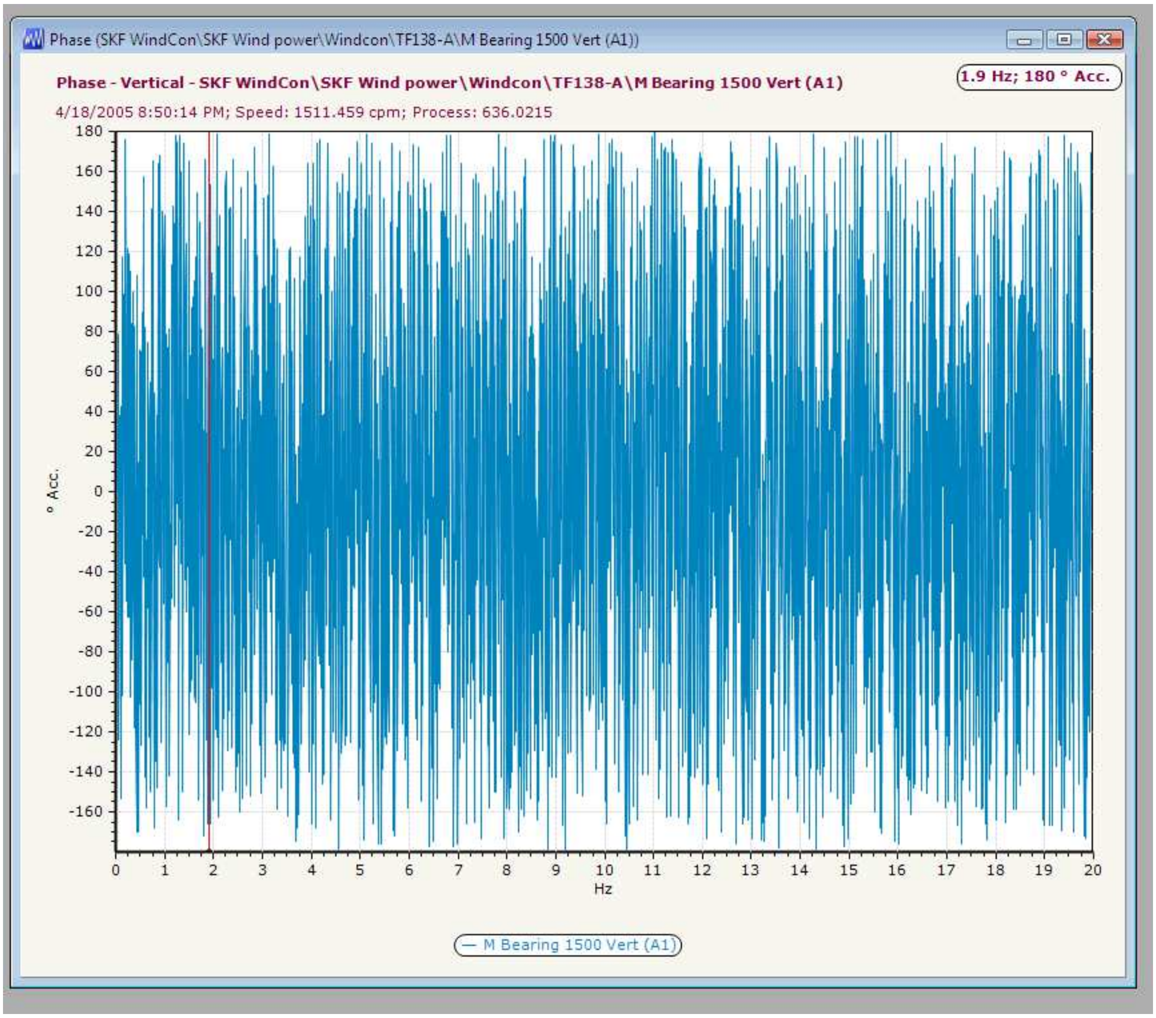


Figure 5 - 22.
Example of Phase Display.

Full Spectrum Phase Form

The Full Spectrum Phase Form provides an enhanced view of the existing Spectrum Form. The Full Spectrum Phase Form is used to display a graph of spectrum data collected from two, orthogonally mounted sensors in a dual channel point.

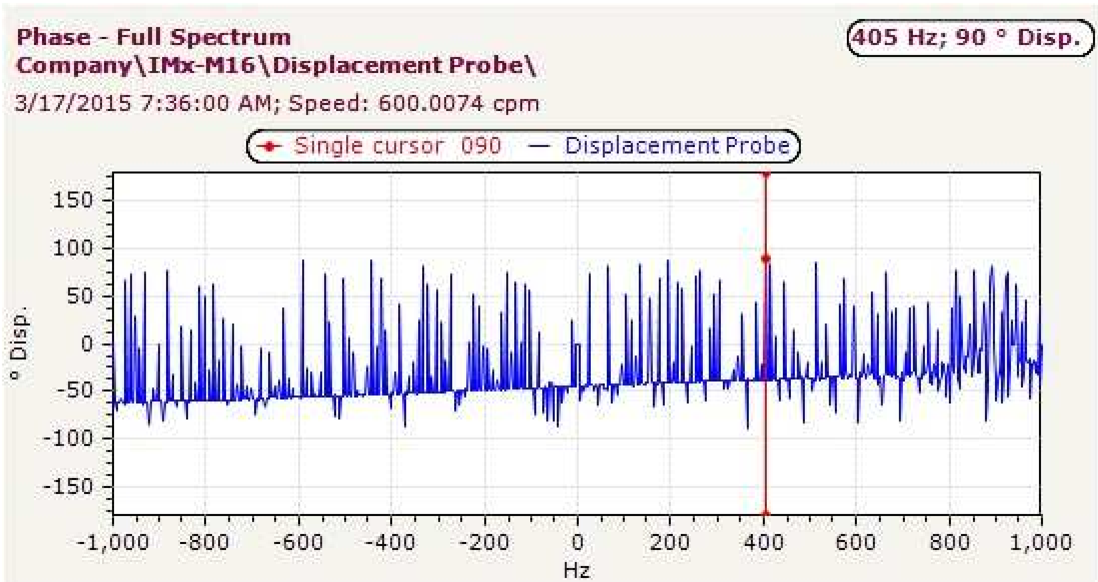


Figure 5 - 23.
Example of Full Spectrum Phase Form.

Displaying the form

The **Full Spectrum Phase** form is not the default diagram for spectral data. By default, the **Spectrum Phase** form is the default form, which is displayed by first selecting a point that collects time-waveform data (either Dynamic or Harmonic), then selecting the **Phase** menu button.

If the user enters the Edit/User Preferences menu and selects the *Full Spectrum = True* option, clicking on the Phase menu button or right-clicking the point and selecting **Diagram/Phase** will launch the **Full Spectrum Phase** form assuming the following criteria are met:

- The point has 2 channels
- Time waveform data has been collected.

If these criteria are not met, the normal Phase form is displayed.

Initial Plot description

The Horizontal axis represents frequency (in Hz, CPM, or Orders). A frequency of zero is centered in the plot. Negative values extend to the left and positive to the right. The first four orders of running speed are marked in both the positive and negative directions with light red vertical lines. A single cursor is displayed on the highest amplitude in the positive direction. Scaling is set to automatic.

Option Menu

The Option Menu is displayed when the user right-clicks on the Full Spectrum Phase form. All relevant options supported by the Phase form will be supported for the Full Spectrum Phase form.

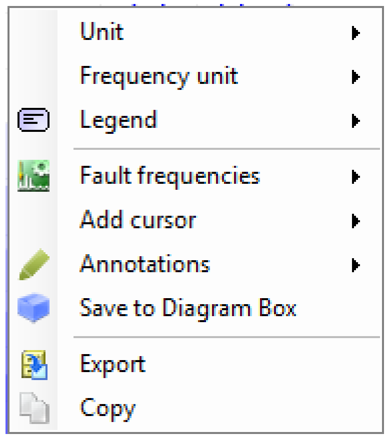


Figure 5 - 24.
Example of Full Spectrum Phase Form Options Menu.

History

 Use this icon to generate a history display of a selected measurement point. History display is used to visualize the variation in machine condition over time in order to identify impending machine faults. History display supports amplitude spectrum, phase spectrum and time waveform or any combination of those. By right-clicking a mouse, it is easy to change the type of data or mode parameter to be displayed. If the single cursor is moved to one of the graphs by the user, all other graphs with the same data type will also be updated to that position making it easier to follow specific frequencies over time. The type of data selected to be displayed with the mode parameter is remembered for this measurement point the next time the history display is opened.

Zooming in one graph also triggers a zoom in the other graphs with the same data type.

Double clicking on one graph opens up the plot in full size screen mode.

The figure below is an example of history display of binary data type with no overlay data and no live data.

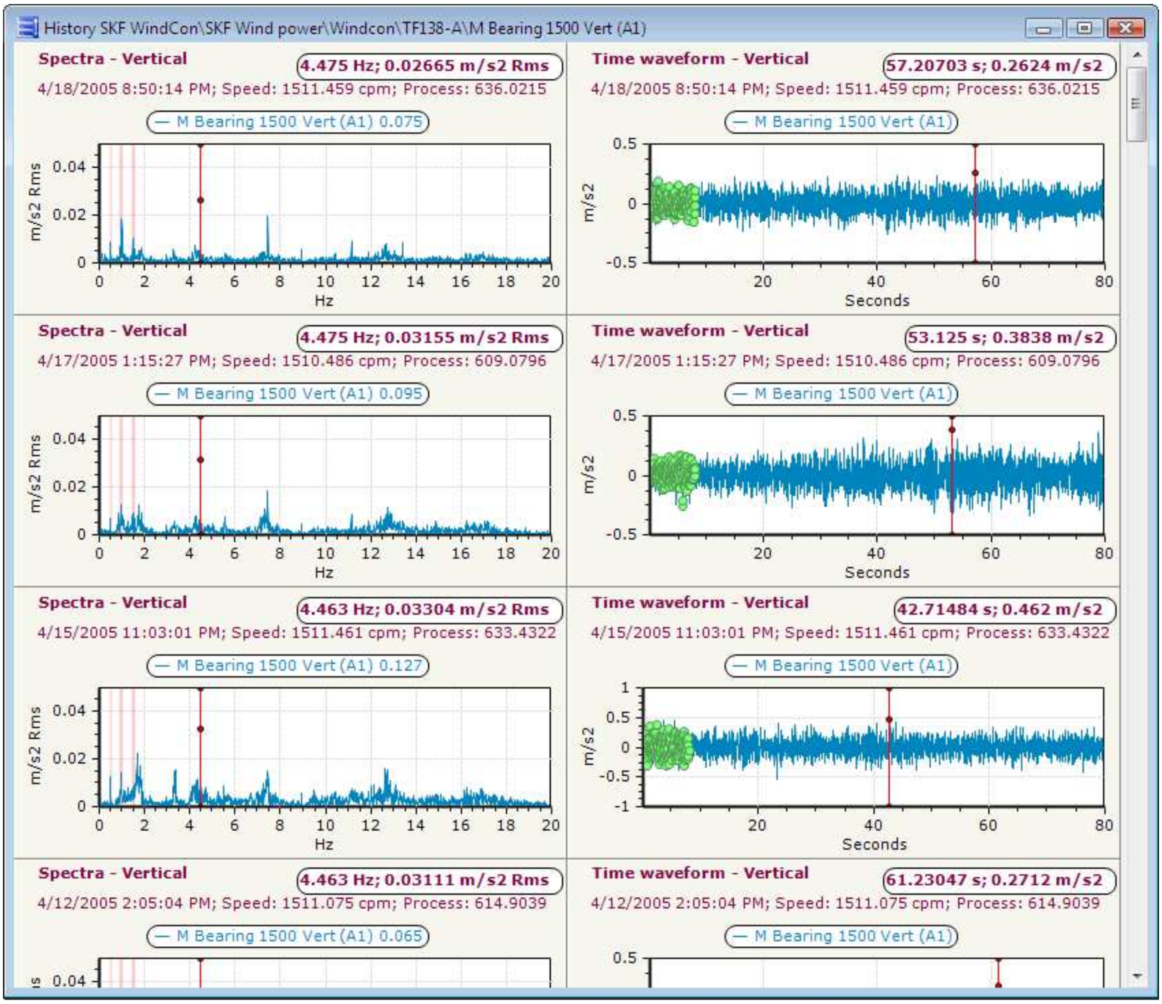


Figure 5 - 25.
Example of History display.

Full Spectrum History Form

The Full Spectrum History Form provides a history of the existing Full Spectrum Forms. A Full Spectrum Form is used to display a graph of spectrum data collected from two, orthogonally mounted sensors in a dual channel point.

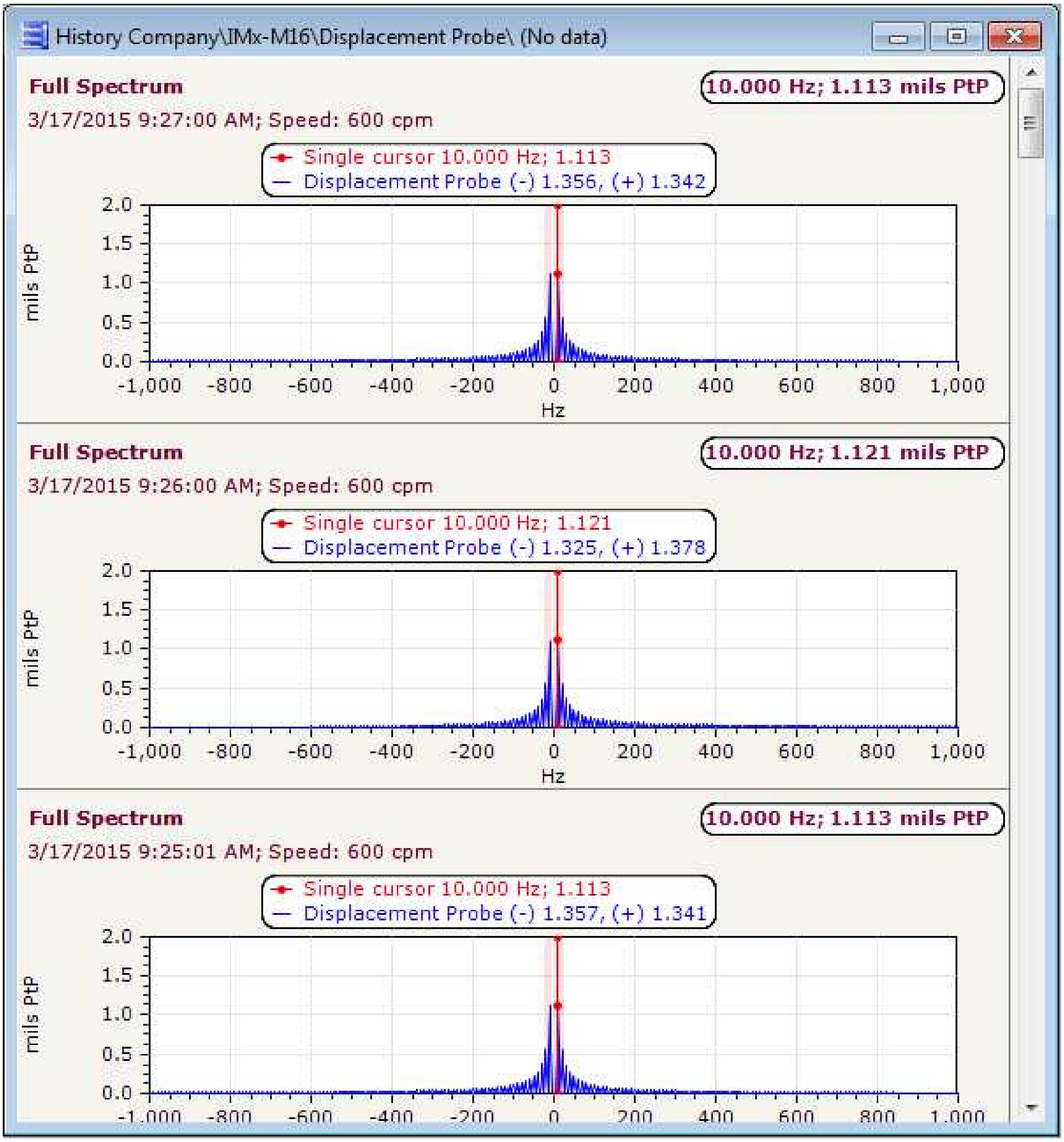


Figure 5 - 26.
Example of Full Spectrum History Form.

Displaying the form

The **Full Spectrum** form is not the default diagram for the **History plot**. By default, the Spectrum form is the default form, which is displayed by first selecting a point that collects time-waveform data (either Dynamic or Harmonic), then selecting the **History** menu button, or right-clicking the point and selecting **Diagram/History.** The history plot will then display a history of Spectrum measurement data for the point.

The user may launch the **Full Spectrum History** from the **Spectrum History** by right-clicking the form and selecting **Mode/Full Spectrum** if the following criteria are met:

- The point has 2 channels
- Time waveform data has been collected.

If these criteria are not met, the normal Spectrum History form is displayed.

Initial Plot description

Each Full Spectrum Form displayed by the History plot is a fixed-size version of the normal Full Spectrum Form with the most recent measurement at the top. A scroll bar is added to view older Full Spectrum measurements.

The Horizontal axis represents frequency (in Hz, CPM, or Orders). A frequency of zero is centered in the plot. Negative values extend to the left and positive to the right. The first four orders of running speed are marked in both the positive and negative directions with light red vertical lines. A single cursor is displayed on the highest amplitude in the positive direction. Scaling is set to automatic.

Option Menu

The Option Menu is displayed when the user right-clicks on the Full Spectrum History form. All relevant options supported by the Spectrum form will be supported for the Full Spectrum History form.

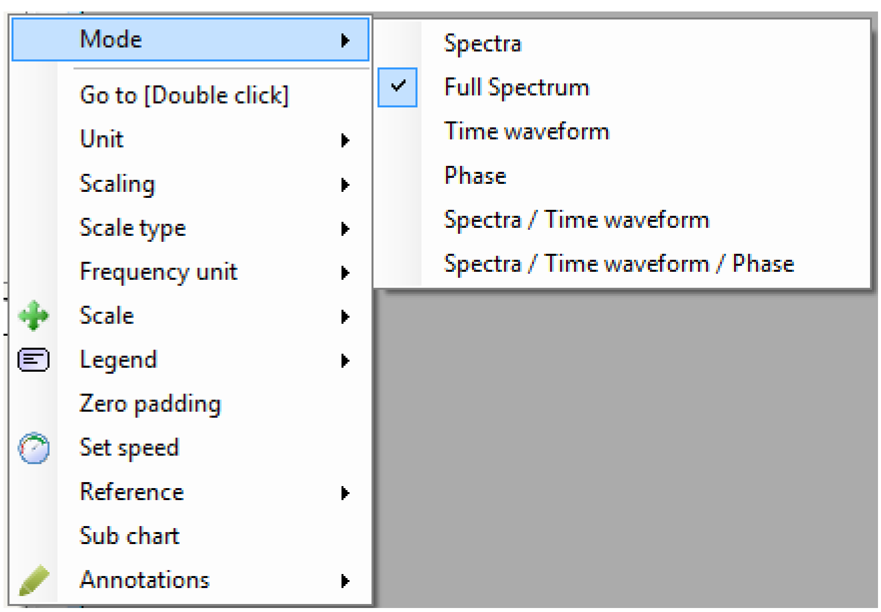


Figure 5 - 27.
Example of Full Spectrum History Form Options Menu.

3D Plot

Use this icon to generate a 3D/waterfall display of a selected measurement point or multiple selected points when available. 3D illustrates vibration spectra or envelopes as a function of time, shaft speed, power, temperature, torque or any other DC parameter. It is commonly used during run-up and coast-down, but can also be used for all types of data stored in the system. A 3D plot can be rotated and elevated freely by the user in order to increase visibility and the user can select to display 3D plot as transparent or filled by the user preferences settings.

As in time waveform display and spectrum display, the unit can be recalculated between acceleration, velocity and displacement. 3D plot can also have a z-axis, also known as depth axis, setting which displays it as a depth function of date/time, speed or process.

An option “even spreading” displays the FFT data with even spreading on the z-axis is also available.

The figure below is an example of 3D plot of binary data type with overlay data and live data.

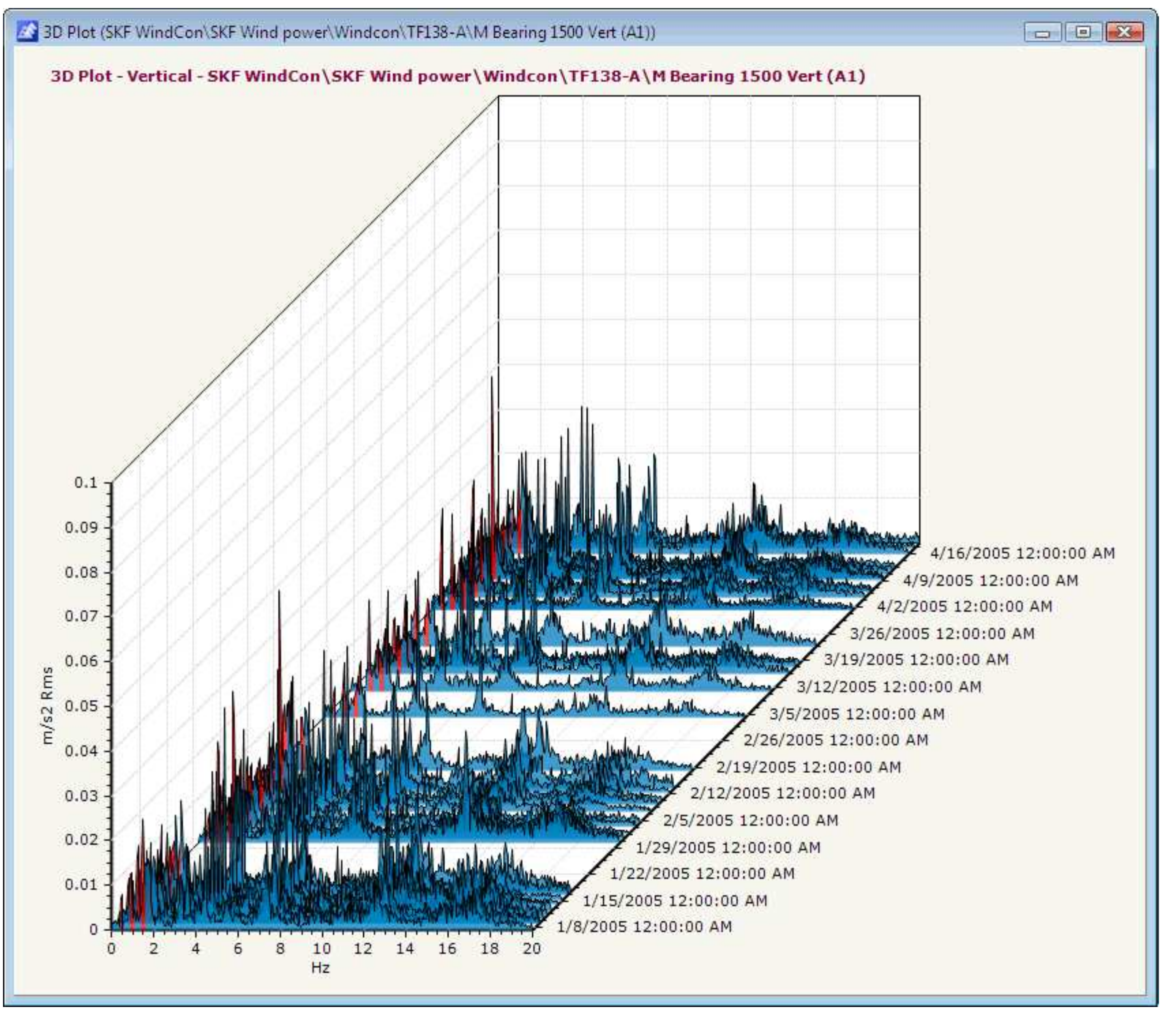


Figure 5 - 28.
Example of 3D Plot Display.

Full Spectrum 3D Plot

The Full Spectrum 3D Plot provides an enhanced view of the existing Spectrum 3D Plot. The Full Spectrum 3D Plot is used to display a graph of spectrum data collected from two, orthogonally mounted sensors in a dual channel point.

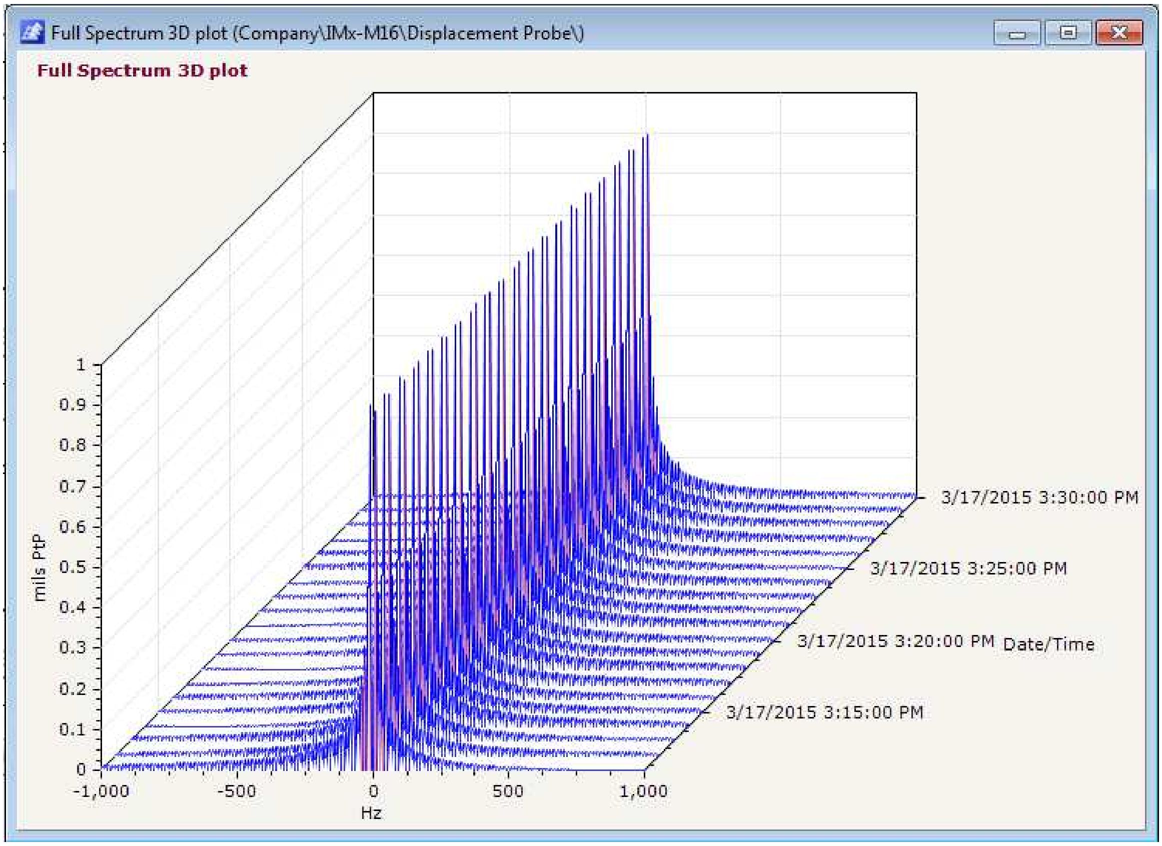


Figure 5 - 29.
Example of Full Spectrum 3D Plot.

Displaying the form

The **Full Spectrum 3D Plot** is not the default diagram for spectral data. By default, the **Spectrum 3D Plot** is the default form, which is displayed by first selecting a point that collects time-waveform data (either Dynamic or Harmonic), then selecting the **3D Plot** menu button, or right-clicking the point and selecting **Diagram/3D Plot**.

If the user enters the Edit/User Preferences menu and selects the *Full Spectrum = True* option, clicking on the Spectra menu button or right-clicking the point and selecting **Diagram/3D Plot** will launch the **Full Spectrum 3D Plot** assuming the following criteria are met:

- The point has 2 channels
- Time waveform data has been collected.

If these criteria are not met, the normal Spectrum 3D Plot is displayed.

The user may also launch the Full Spectrum 3D Plot from the Spectrum 3D Plot by right-clicking the form and selecting Full Spectrum. Likewise the user may launch the Spectrum 3D Plot from the Full Spectrum form.

Initial Plot description

The Horizontal axis represents frequency (in Hz, CPM, or Orders). A frequency of zero is centered in the plot. Negative values extend to the left and positive to the right. The first four orders of running speed are marked in both the positive and negative directions with light red vertical lines. A single cursor is displayed on the highest amplitude in the positive direction. Scaling is set to automatic.

Option Menu

The Option Menu is displayed when the user right-clicks on the Full Spectrum form. All relevant options supported by the Spectrum 3D Plot will be supported for the Full Spectrum form.

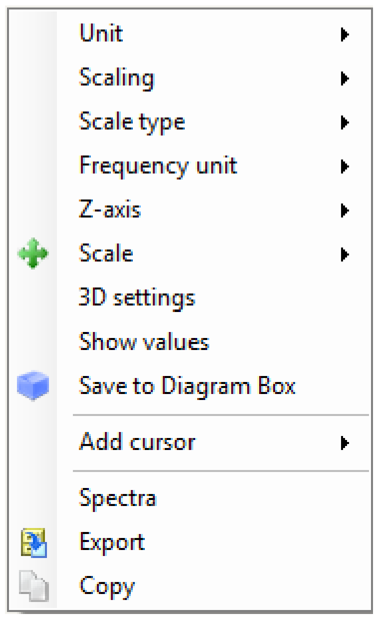
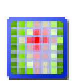


Figure 5 - 30.
Example of Full Spectrum 3D Plot Options Menu.

Topology

 Use this icon to generate a topology display of a selected measurement point. Topology shows the frequency versus the time or speed and the amplitude color coded. This is a useful display to study transient data like run-ups or coast-downs. A topology plot is similar to a 3D plot, but the user is looking at the data from above. With the color encoding, it is easier for the eye to identify patterns in the data.

As in other displays, the data can be recalculated on the fly to display data in acceleration, velocity or displacement, and in the depth of date/time, speed or process.

Just like in 3D plot, even spreading of date/time on the z-axis is also possible.

The figure below is an example of topology display of binary data type with no overlay data and no live data.

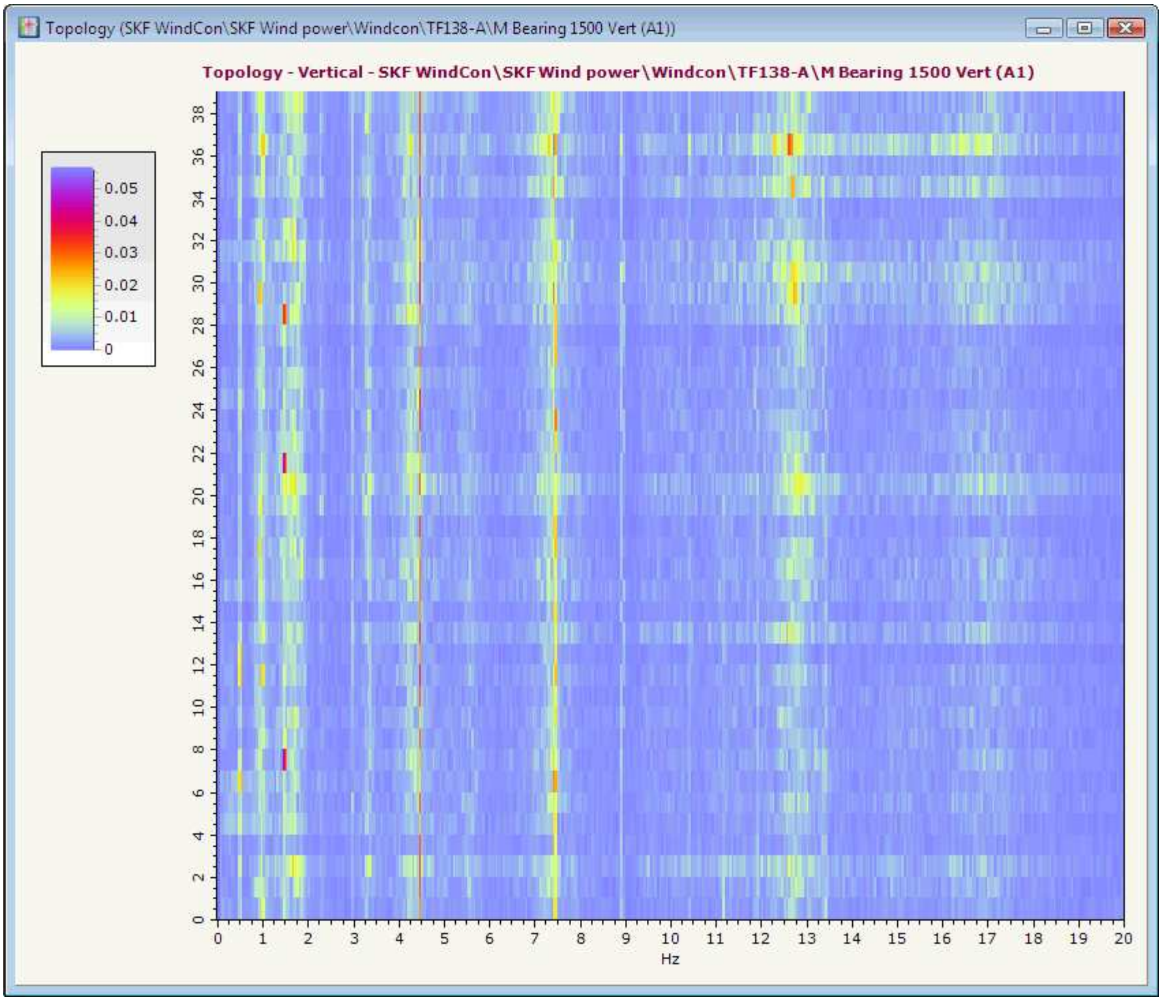


Figure 5 - 31.
Example of Topology Display.

Full Spectrum Topology Graph

The Full Spectrum Topology graph provides an enhanced view of the existing Spectrum Topology graph. The Full Spectrum Topology graph is used to display a graph of spectrum data collected from two, orthogonally mounted sensors in a dual channel point.

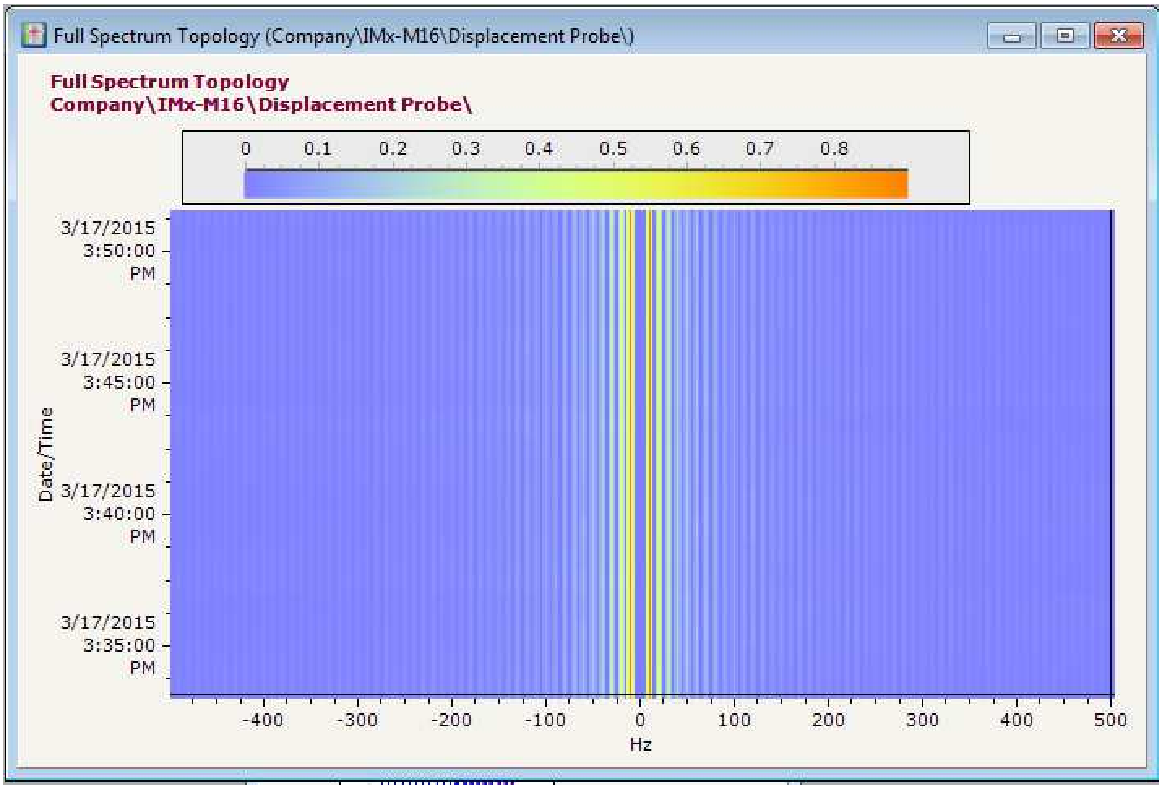


Figure 5 - 32.
Example of Full Spectrum Topology Graph.

Displaying the form

The **Full Spectrum Topology graph** is not the default diagram for spectral data. By default, the **Spectrum Topology graph** is the default form, which is displayed by first selecting a point that collects time-waveform data (either Dynamic or Harmonic), then selecting the **Topology graph** menu button, or right-clicking the point and selecting **Diagram/Topology graph**.

If the user enters the Edit/User Preferences menu and selects the *Full Spectrum = True* option, clicking on the Spectra menu button or right-clicking the point and selecting **Diagram/Topology graph** will launch the **Full Spectrum Topology graph** assuming the following criteria are met:

- The point has 2 channels
- Time waveform data has been collected.

If these criteria are not met, the normal Spectrum Topology graph is displayed.

The user may also launch the Full Spectrum Topology graph from the Spectrum Topology graph by right-clicking the form and selecting Full Spectrum. Likewise the user may launch the Spectrum Topology graph from the Full Spectrum form.

Initial Plot description

The Horizontal axis represents frequency (in Hz, CPM, or Orders). A frequency of zero is centered in the plot. Negative values extend to the left and positive to the right. The first four orders of running speed are marked in both the positive and negative directions with light red vertical lines. A single cursor is displayed on the highest amplitude in the positive direction. Scaling is set to automatic.

Option Menu

The Option Menu is displayed when the user right-clicks on the Full Spectrum form. All relevant options supported by the Spectrum Topology graph will be supported for the Full Spectrum form.

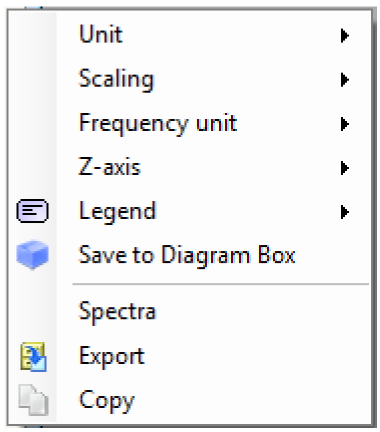


Figure 5 - 33.
Example of Full Spectrum Topology Graph Options Menu.

Orbit

 Use this icon to generate an orbit display of a selected measurement point or multiple selected points when available. An orbit display is one of the best ways to analyze shaft movement. By combining phase and amplitude data from two sensors and plotting them together, it is possible to determine unbalance and alignment problems.

@ptitude Observer uses two measurement points to generate an orbit display. For the best result, the measurement points must be measured simultaneously, or measured with a trigger pulse.

It is also important that the sensors are mounted at approximately 90 degrees from each other. For two or three axis sensors this is always the case. NOTE: This means if using separate sensors, they can be mounted at the exact same location.

Trigger pulses in the orbit window are shown if the orbit is made from time signals which have trigger pulse information stored. The trigger pulses are represented by small round circles.

The figure below is an example of orbit graphic display of binary data type with live data but no overlay data.

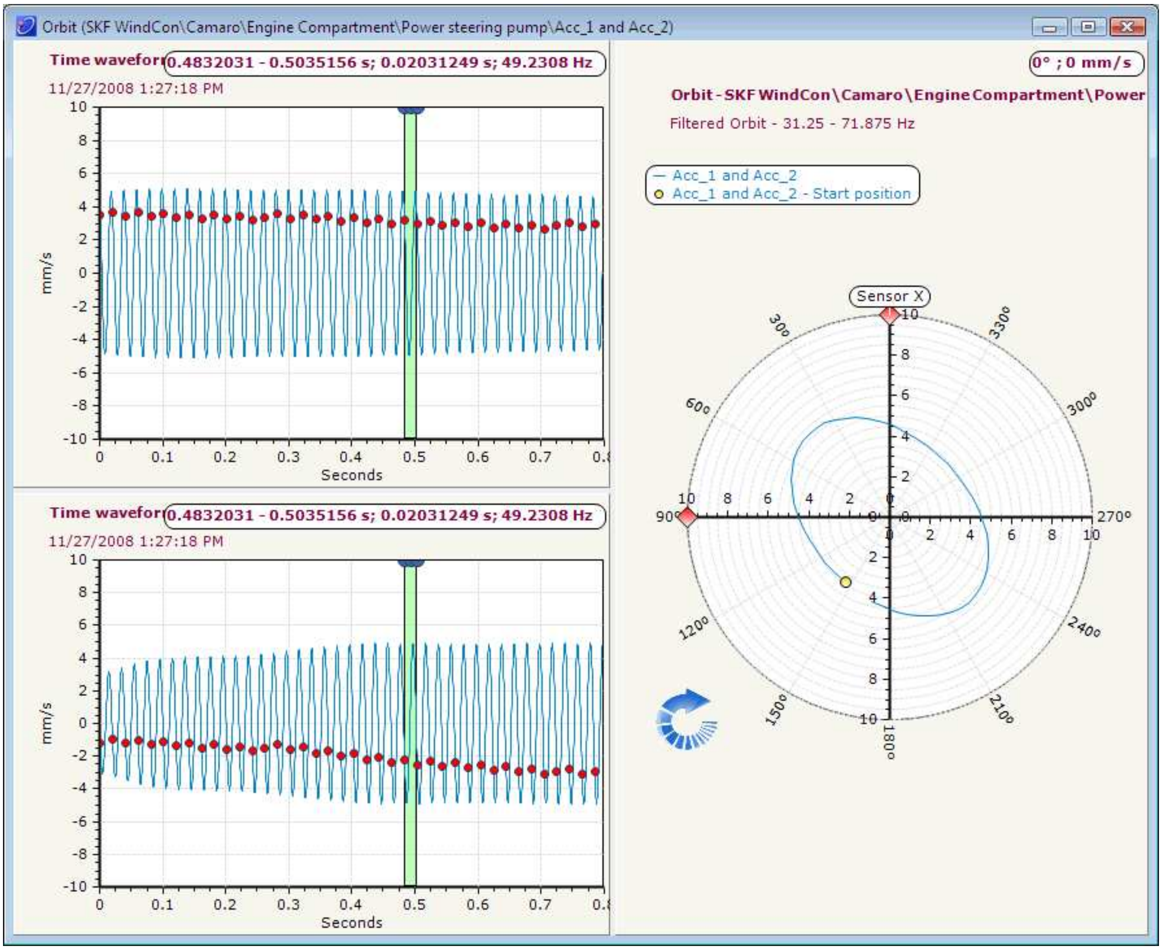


Figure 5 - 34.
Example of Orbit Display.

Profile

 Use this icon to generate a profile display of a selected measurement point. Profile is a powerful tool which uses triggered acceleration time signal data to represent an unroundness of any circular object. Examples of possible machines to use this feature are paper machine rollers and train wheels. The profile display uses displacement, acceleration, velocity or envelope as the measuring unit and the data are derived from acceleration time signal and smoothness over the round object. To get an accurate profile, it is necessary to make sure that the minimum number of revolutions which the time signal contains are at least 20 samples per revolution. However, for a good representation, it is recommended that there are at least 180 samples per revolution.

The figure below is an example of profile graphic display with two shafts.

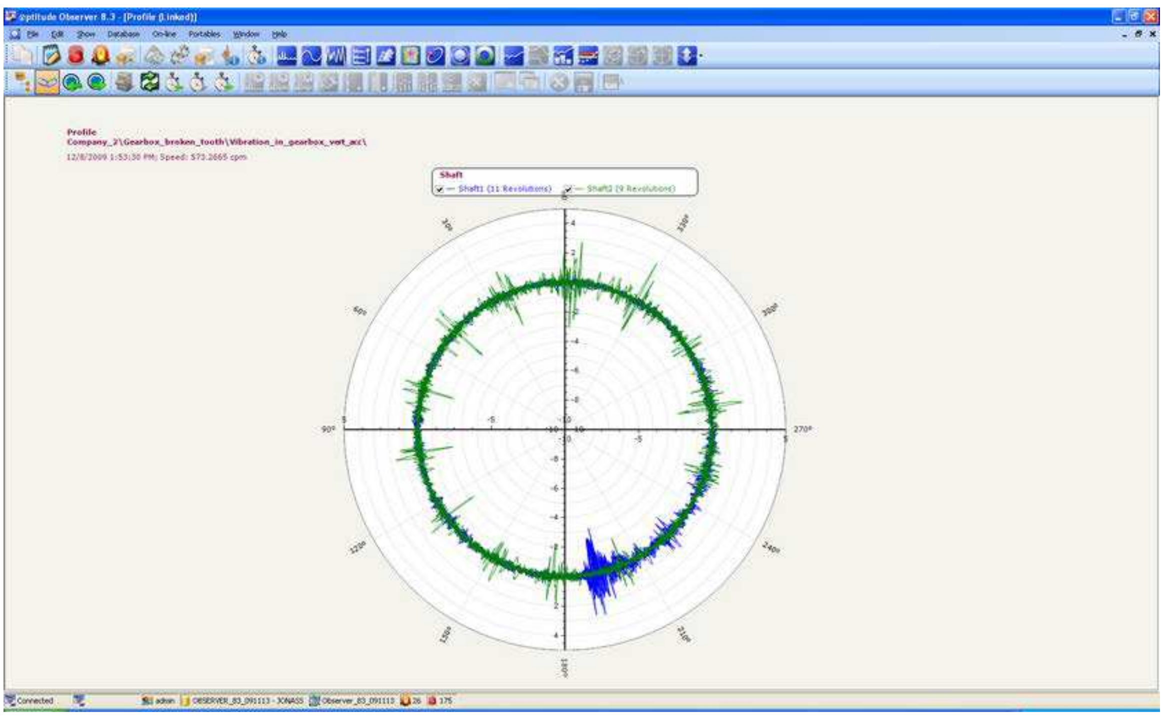
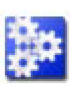


Figure 5 - 35.
Example of Profile Display.

Gear Inspector

Use this icon to generate a gear inspector display of a selected measurement point. Gear inspector is both a new graphical display and a new intuitive data gathering technique that helps detecting and visualizing the impact energy as a function of shaft/gear revolutions. It harnesses the best possible method of detecting this energy by using all channels in simulations data gathering mode. One graph for each shaft is plotted in a single view using the treated simultaneous gathered data. Impact energy is visualized by using a color pallet. Plots are auto-scale and speed deviation are

compensated automatically. Sensing channels can be freely configured using the measurement groups and sub machine setup.

This is useful in analyzing gearbox problems in constant variable speed and load application as well as steady state applications. It is effective in detecting broken or damaged gear teeth problems, loose or warn gears, shaft problems, oval gears and other cyclic related problems.

The figure below is an example of gear inspector display.

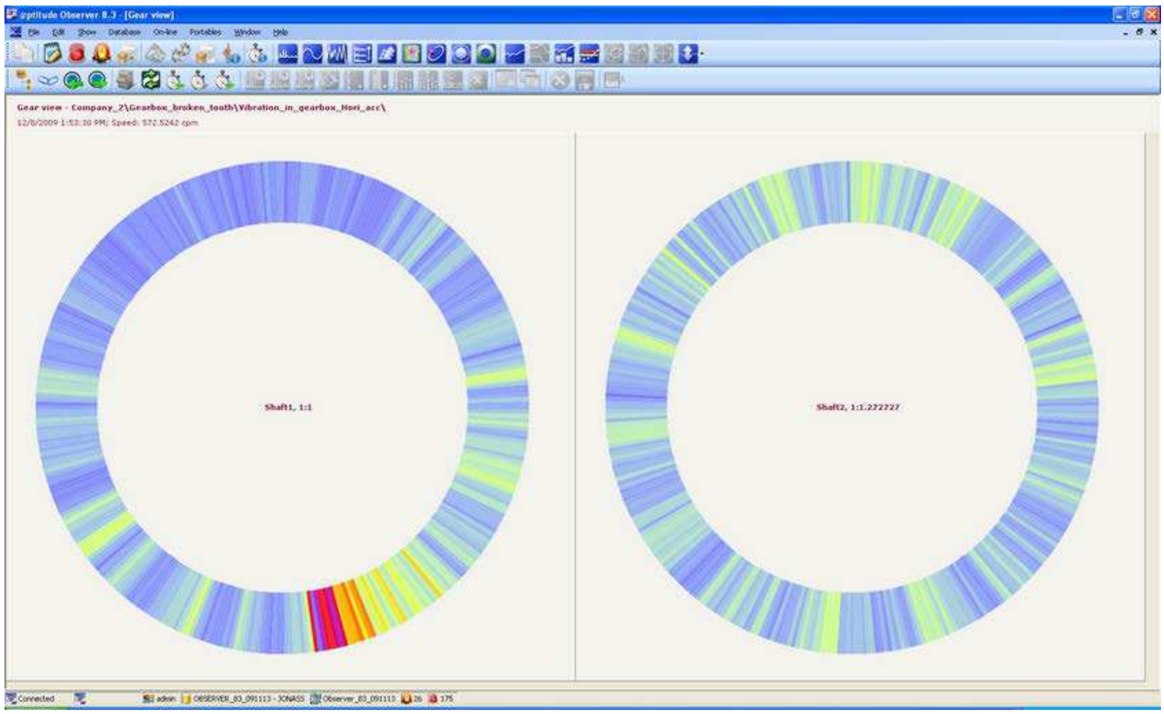


Figure 5 - 36.
Example of Gear Inspector Display.

Trend

 Use this icon to generate a trend display of a selected measurement point. Trend shows any type of data such as vibration amplitude/phase or process data as a function of time, speed or other process data. It is also possible to show the data as a function of nothing by simply selecting *x-axis* and *values* which will cause the graph to display the data in the order that values were taken. The x-axis setting is preferred when viewing live data. Not only can the graph display data as a function of speed and process data, but it can also display bias, process, phase, speed and digital data on extra axes.

In addition, trend displays spectra and notes flags in the plot shown as diamonds and circles, respectively. These flags can be set by clicking the mouse which then the corresponding spectra data and note information are displayed to the user making it easier to follow machine specific maintenance history.

In the legend section of the graph screen, there is an option to have system log displayed. System log displays all the configuration changes made by the user through the history. System log is marked with red squares.

When trending measurements from a Multiple Gating Point, the legend shows the name of the operating class active at the time of the measurement.

When trending measurements linked to an event capture group with stored events, you can click the event capture indicator to open a window for further analysis. The window displays the event captures for the point. The list view selection shows the event that was selected on the trend plot and a thumbnail display showing the same.

During run-up/down a reference measurement can be shown in the same display with actual values or a value calculated in % of alert level.

Below is an example of trend display of trend data type with live data but no overlay data.

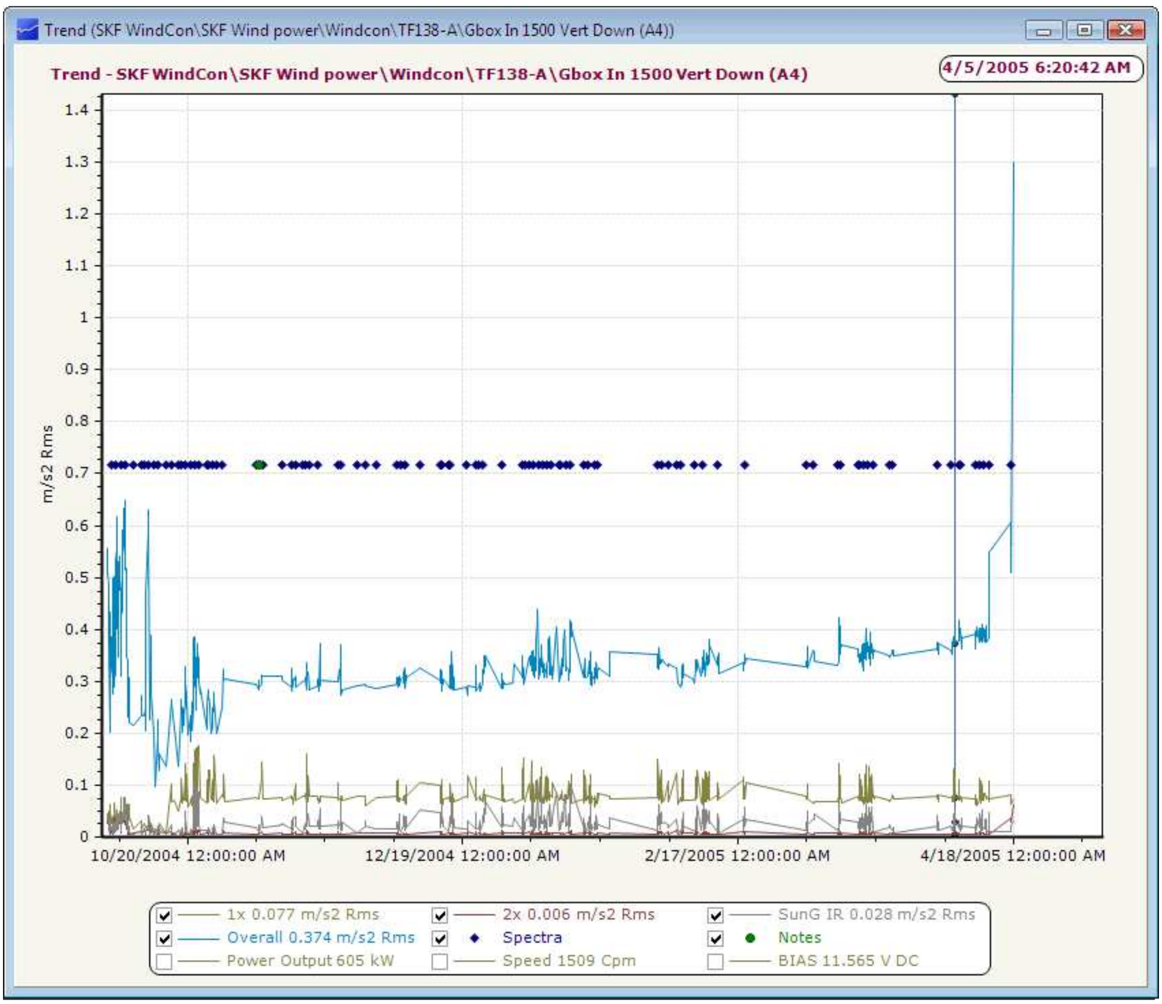
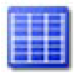


Figure 5 - 37.
Example of Trend Display.

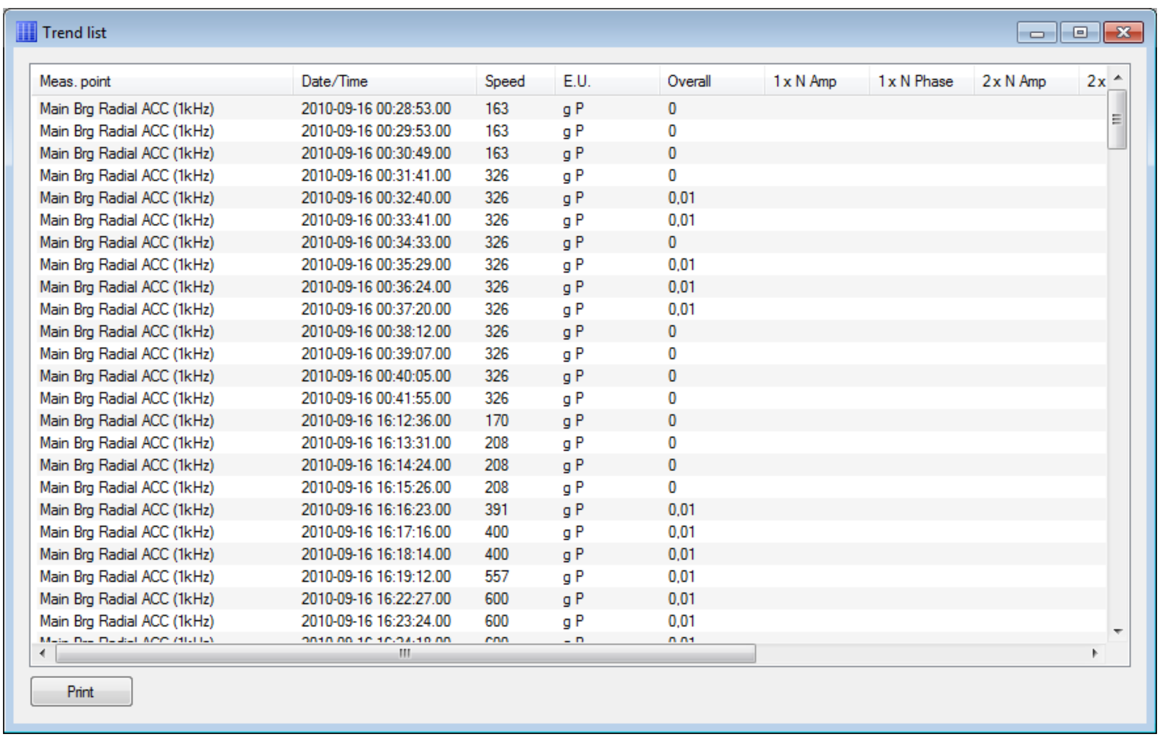
Bode

 Use this icon to generate a bode plot of a selected measurement point. Bode plot shows any type of data such as vibration amplitude/phase or process data as a function of speed. A Bode plot is identical to that of trend display with x-axis set to speed, and phase is always visible. For an example of bode plot, refer to Trend diagram.

Trend List

 Use this icon to generate a trend list display of a selected measurement point or measurement points which were selected in the hierarchy. Trend list shows the raw trend data values in a tabular format. The data can be sorted by clicking on a header of any column. The data can also be printed as a report.

When listing measurements from a Multiple Gating Point, the **Overall** column shows the name of the operating class active at the time of the measurement.


Trend list

Meas. point	Date/Time	Speed	E.U.	Overall	1 x N Amp	1 x N Phase	2 x N Amp	2 x
Main Brg Radial ACC (1kHz)	2010-09-16 00:28:53.00	163	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:29:53.00	163	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:30:49.00	163	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:31:41.00	326	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:32:40.00	326	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 00:33:41.00	326	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 00:34:33.00	326	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:35:29.00	326	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 00:36:24.00	326	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 00:37:20.00	326	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 00:38:12.00	326	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:39:07.00	326	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:40:05.00	326	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 00:41:55.00	326	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 16:12:36.00	170	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 16:13:31.00	208	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 16:14:24.00	208	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 16:15:26.00	208	g P	0				
Main Brg Radial ACC (1kHz)	2010-09-16 16:16:23.00	391	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 16:17:16.00	400	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 16:18:14.00	400	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 16:19:12.00	557	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 16:22:27.00	600	g P	0,01				
Main Brg Radial ACC (1kHz)	2010-09-16 16:23:24.00	600	g P	0,01				

Print

Figure 5 - 38.
Example of Trend List Display.

Multi trend

 Use this icon to generate a multi trend display of a selected measurement point or any other node type in the hierarchy view. Multi trend offers extended functionality to the normal trend plot as it is possible to overlay data from different measurement points or sources making it easier to compare data and distinguish if machines behave differently from each other. This display consists of two parts, one trend display and the other bar display. The trend display shows historical data in the unit that the measurements have, in percent of warning level or simply without any unit at all. The bar graph shows the current cursor value in the trend graph where it is easier to compare values against each other for the data selected. Clicking the cursor on any bar in the lower view will causes the associated trend in the upper view to become selected (no transparency and heavier line). Any previously selected trend will then become deselected (50% transparency and single point line width).

The legend here differs from the legend in other graphs because it is grouped by different types of measurement units available in all the measurements that are displayed, and un-checking any of the units will hide all the measurement points that use this specific measurement unit.

When multi-trending a group of measurements that includes one or more measurements from a Multiple Gating Point, the legend and the bar graph labels show the name of the operating class active for each applicable Multiple Gating Point at the time of the measurement.

The multi trend can have one active measurement point at a time. The trend graph line for the active measurement point is thicker and the text for the Y-scale that the active measurement point uses will be made bold. To switch active measurement point, use the TAB and the SHIFT+TAB keys. Once a measurement point is selected, the selected measurement point can be navigated with the arrow keys just like in the normal trend plot.

The multi trend plot has the ability to correlate measurement data between the measurement points in the graph by setting the x-axis scale to a specific measurement point, and setting a correlation tolerance in time unit.

The figure below is an example of multi trend display of trend data type with overlay data and live data.

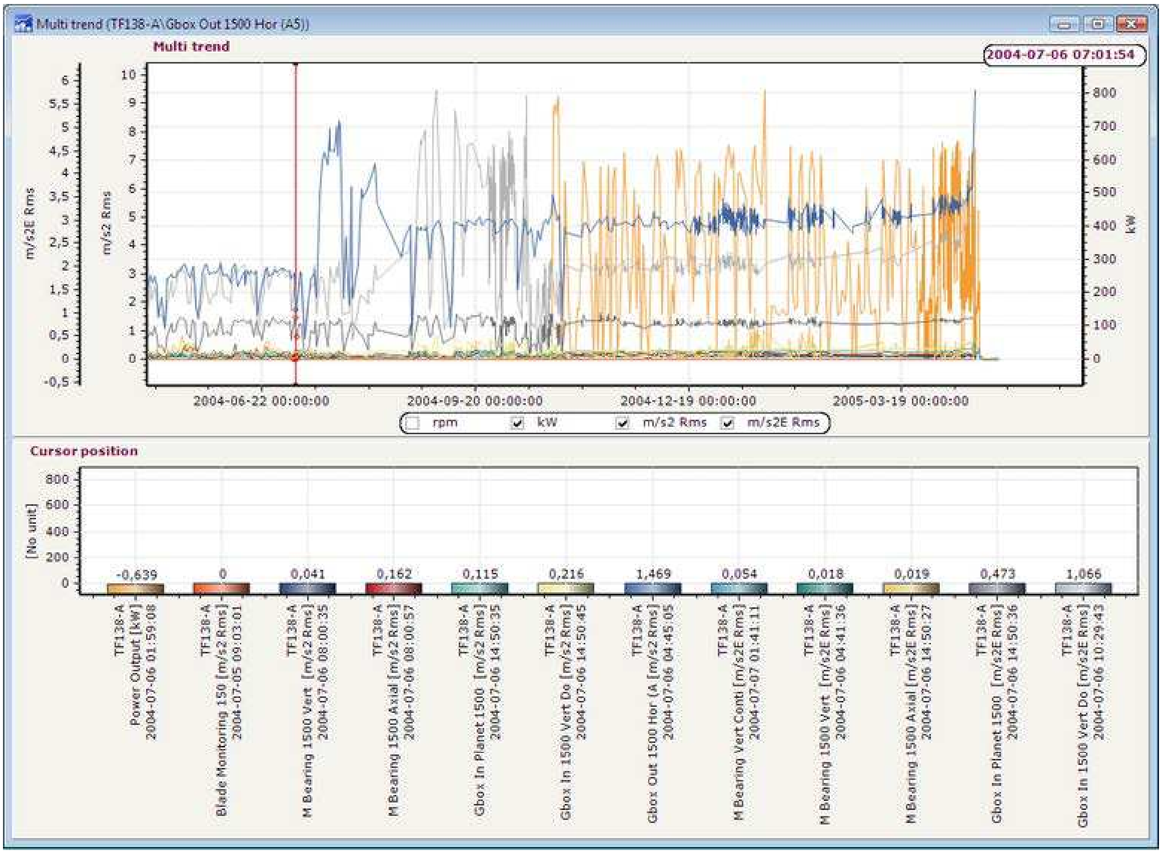


Figure 5 - 39.
Example of Multi Trend Display.

When viewing a multi trend plot, you may choose another component to be the active measurement instead of the Overall value. Dynamic points can have up to four extra measurement components.

➢ If a point doesn't have additional components, the Overall value is used.

To select another component:

- Right-click on the plot to open the context menu.

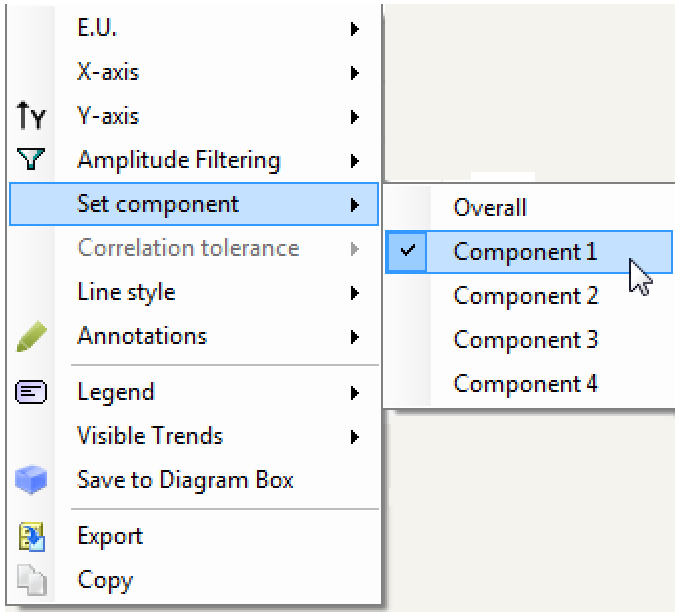


Figure 5 - 40.
Context Menu with Set Component Options.

- Click **Set component**, and then select the desired component from the available measurement components shown in the graph. The component selected is indicated with a check mark.

The selected component is added to the plot sub-header.

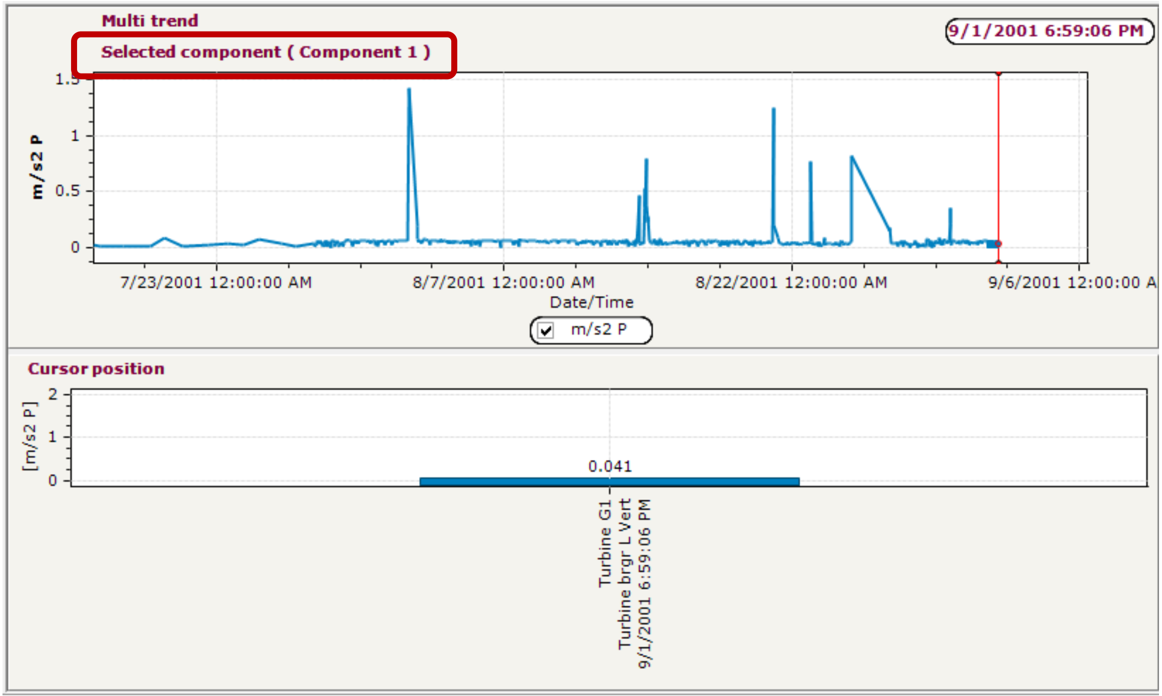


Figure 5 - 41.
Selected Component in Sub-header.

You can hide trends from the upper plot and the bar graphs display will remain visible. There are two methods to hide specific trends.

The first method is by using the legend. As described above, the legend here is grouped by the different types of measurement units available in all the measurements that are displayed. Unchecking a measurement unit will hide all the measurement points in the upper plot that use this specific measurement unit.

The other method is by using the **Visible Trends** menu item. Right-click the multi trend plot to open the context menu. Select **Visible Trends**. The options offered in the **Visible Trends** submenu are filtered by the checkboxes selected in the legend. For example, if **Cpm** is unchecked in the legend, then Cpm measurements are removed from the **Visible Trends** options.

In the figure below, all three trends that can be shown for the selected point types are displayed. The corresponding three bar graphs display below.

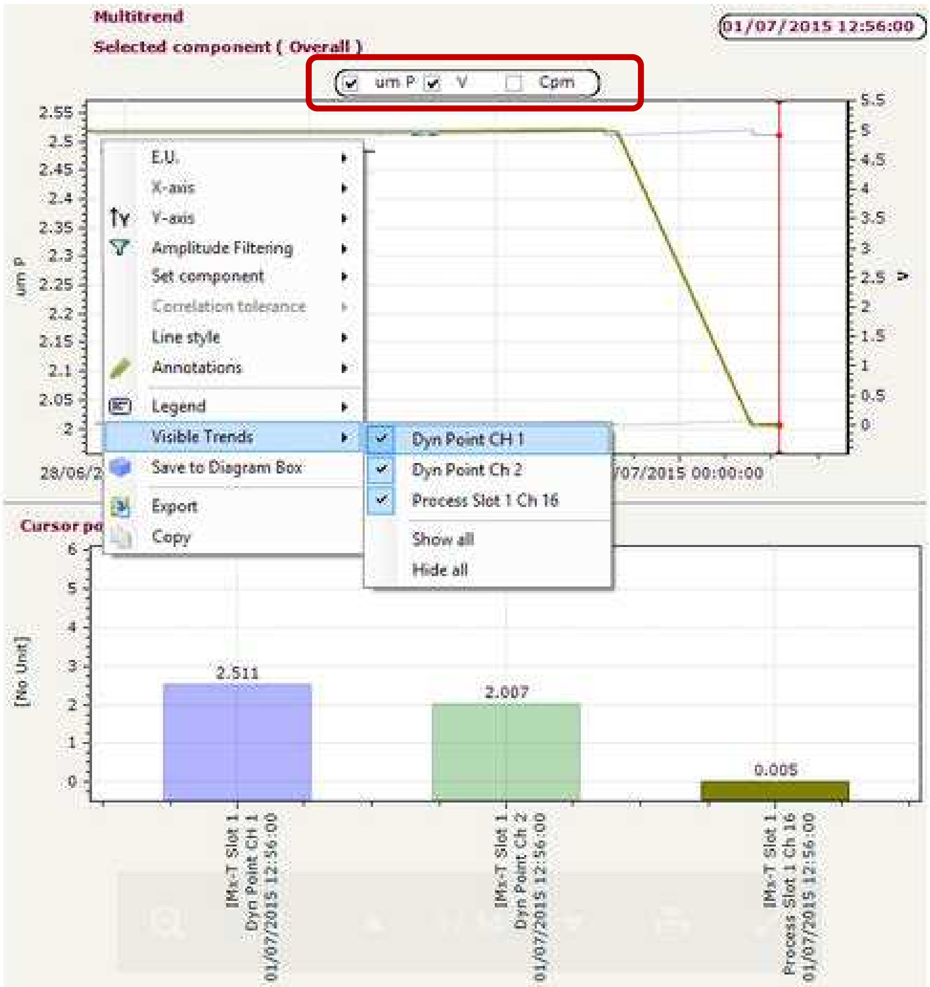


Figure 5 - 42.
Example of Multi Trend Display, Visible Trends Options.

- Right-click the plot and select **Visible Trends** from the menu. Each submenu item represents an available point based on the current units filter setting. All submenu items are checked by default, making them visible.
- You can uncheck a specific visible point to hide it from the trend view. Unchecking an item causes the named trend to be hidden and the associated cursor position bar to be unselectable even though still visible. Assuming the trend just hidden is the selected trend, then the next available (and visible) trend will be selected instead.
  - ➢ Although the individual trends are hidden, the (red spot) cursor positions remain unchanged.
  - ➢ Check the item again to reverse the process described above.
- Select the submenu item **Show all** to cause all unchecked submenu items to be immediately checked, and all hidden trends to become visible.
- Select the submenu item **Hide all** to cause all checked submenu items to be unchecked, and all visible trends to become hidden.

The example below shows one of the points (Dyn Point Ch2) as deselected (unchecked). Two trends are now displayed (and rescaled). However, the lower bar graph still shows all three points. The bar associated with the invisible trend is no longer selectable even though it is still visible.

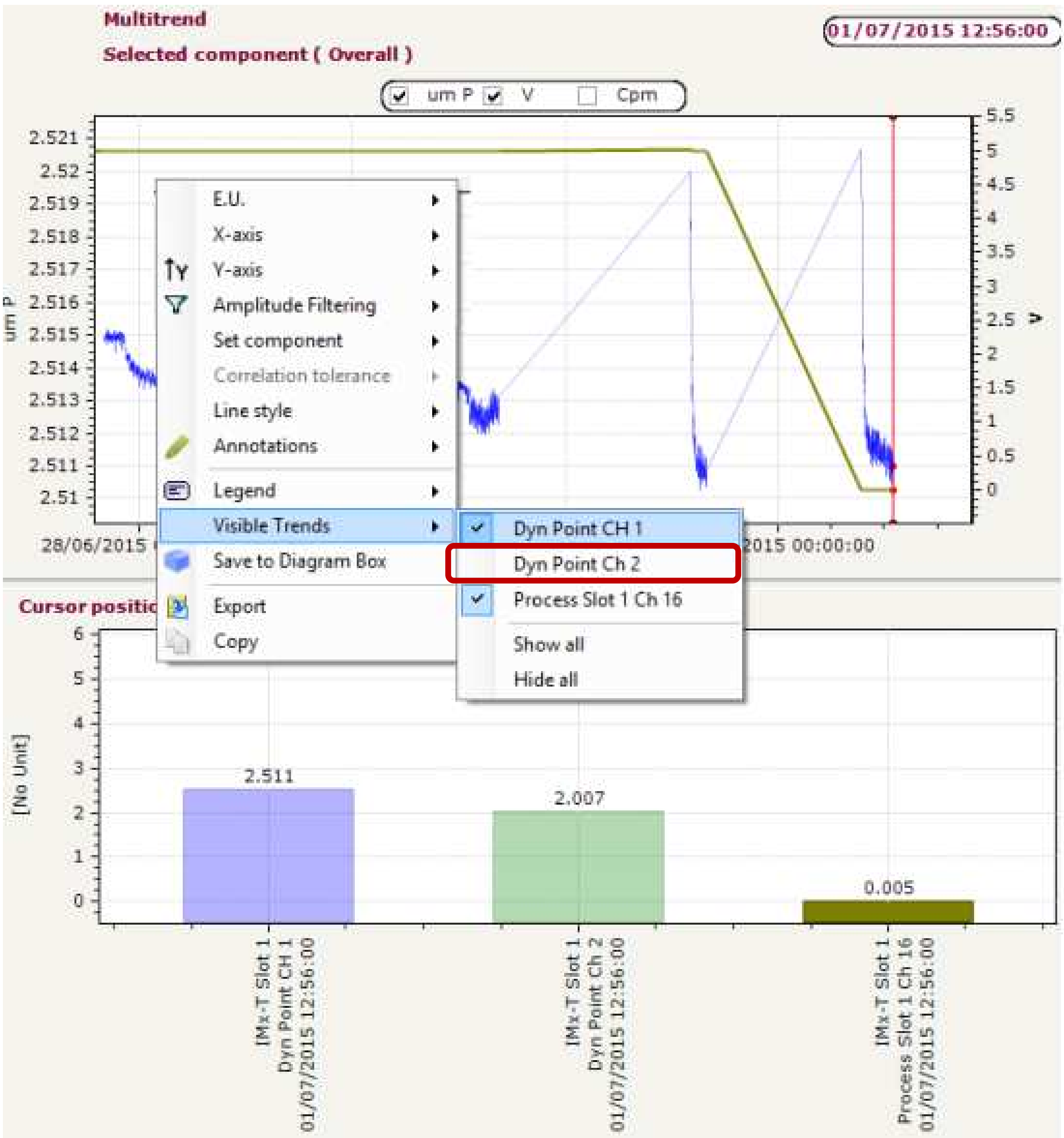


Figure 5 - 43.
Example of Multi Trend Display, Visible Trends Option Unchecked.

Amplitude Filtering on a Multi Trend Plot

The **Amplitude Filtering** option enables you to filter values from one measurement point in the multi-trend plot so that you can "fine tune" the display of machine characteristics. When a point is selected, measurements for the selected point that are outside the filter range are excluded from the trend.

Using the amplitude filter:

- With a multi trend plot open, right-click on the plot to open the context menu.
- Select the **Filter** option.
- A sub-menu opens that contains a list of all the points used for the multi trend, as well as an additional option, **Clear amplitude filtering**.

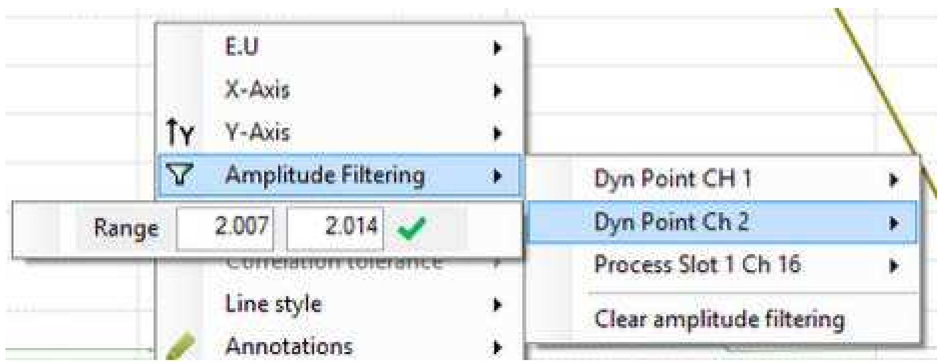


Figure 5 - 44.
Amplitude Filtering Menu and Range Values.

- Select a point. Note that filtering applies only to visible points and only one point at a time.
- Define the filter **Range** by entering both the minimum and maximum values.
    - ➢ If the entered range is invalid the green check mark will become a red cross and the values will not be accepted.
- Upon hitting Enter, the plot is redrawn using the new filter range. The range values remain available so you can adjust the filter setting to your satisfaction. The filtered plot is drawn as if the measurements filtered out did not exist, that is, they cannot affect the vertical or horizontal ranges of the plot and do not appear in cursor readouts.

The legend at the top of the plot indicates the filtering condition, for example, "Speed filtered within 2900 to 3200 rpm".

When this menu is brought up again after filtering has been applied to a point, the point selected is indicated with a small pencil icon on the menu. The submenu for this point presents the current filter values, which may be modified.

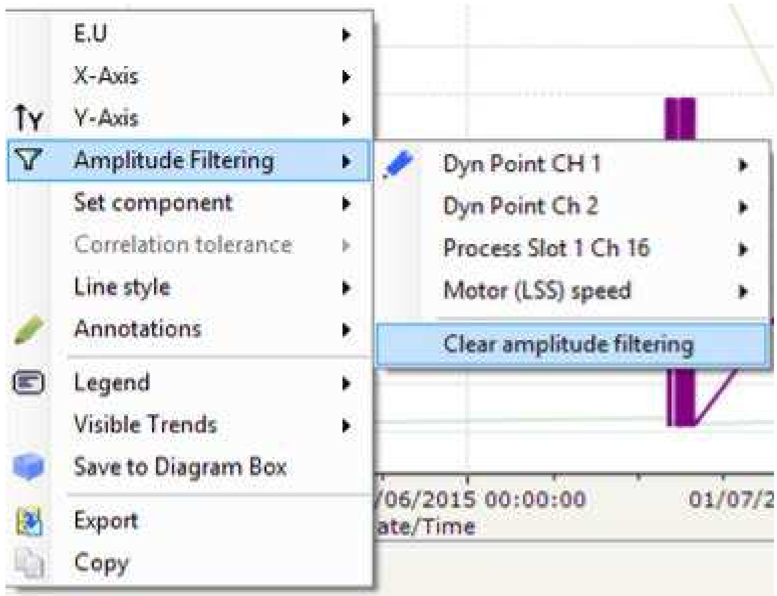


Figure 5 - 45.
Amplitude Filtering Applied to a Point.

If another point is selected, and values entered correctly for its filter range, the filtering selected for the previous point is discarded. The plot is filtered only on the new point's parameters.

Select **Clear amplitude filtering** from the submenu to clear the filtering and redraw the plot.

Diagnosis

 Use this icon to generate a diagnosis display of a selected measurement point. This will open the diagnosis display for the measurement point and will display all the attached diagnoses.

The @ptitude Observer Machine Diagnosis is a powerful tool to display and follow the progression of machine faults. Sophisticated diagnosis rules can be applied using defect frequencies of the whole machine with individual alarm level for each measurement point and for each type of fault. Diagnosis diagram shows calculated diagnosis parameters over time related to the alarm level. There are many types of built-in diagnoses available to the user in order to detect specific common machine faults like misalignment, cavitation, mechanical looseness, electrical faults and more.

In the diagnosis display, all the different diagnoses attached to a measurement point are shown in the trend-type of display, and calculated based on spectrum data stored in the database. This means that diagnosis can be attached and recalculated even after the measurements have been stored to the database.

The figure below is an example of diagnosis display of binary data type with no overlay data and no live data.

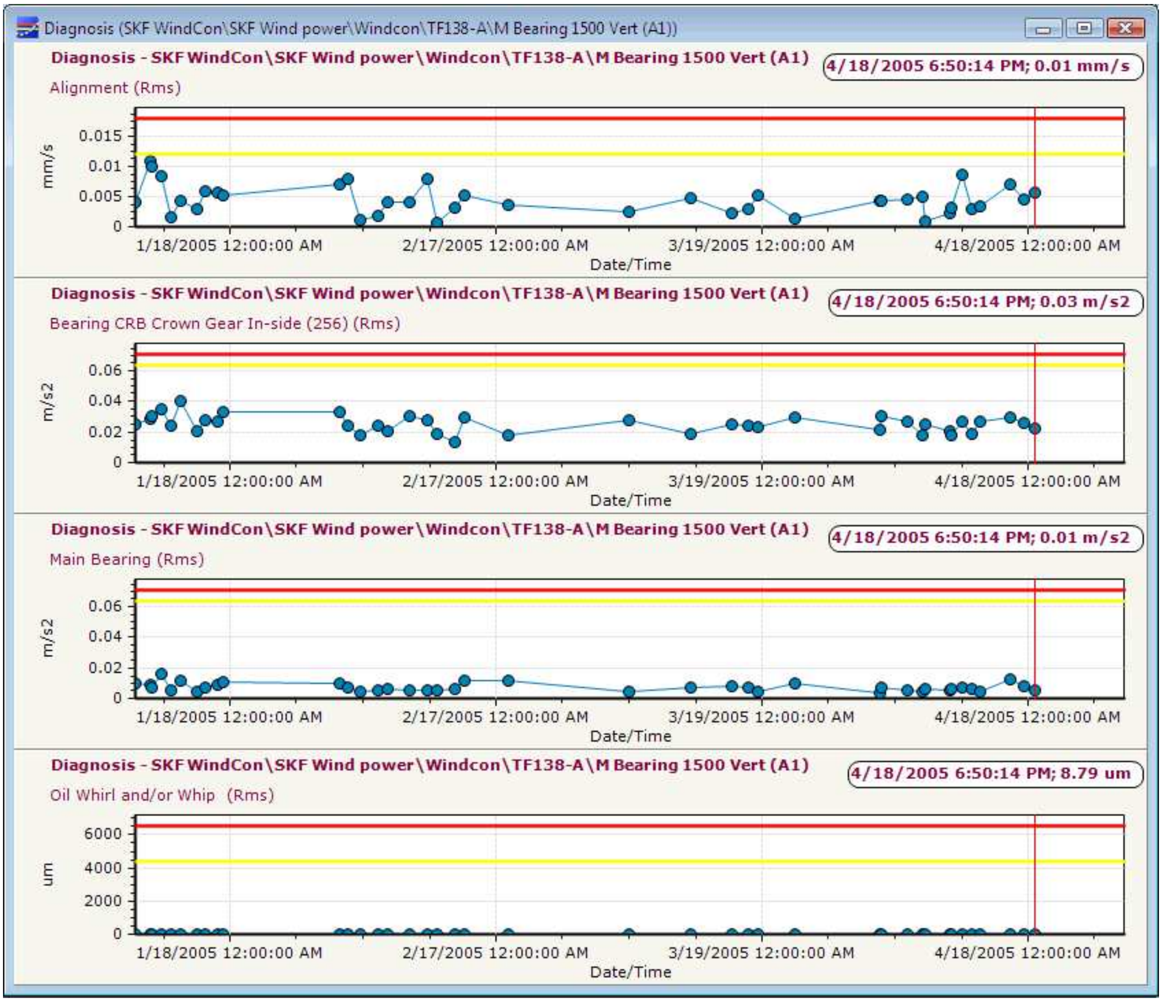


Figure 5 - 46.
Example of Diagnosis Display.

If a point is associated with an MGP as a digital measurement in the Associated measurements area (on the Acquisition tab), the actual running class type is indicated by the background color in the graph. Note: This occurs only if the x-axis is set to date/time. The background colors displayed are white for No operating class, light blue for Operating class 1 and light gray for Operating class 2.

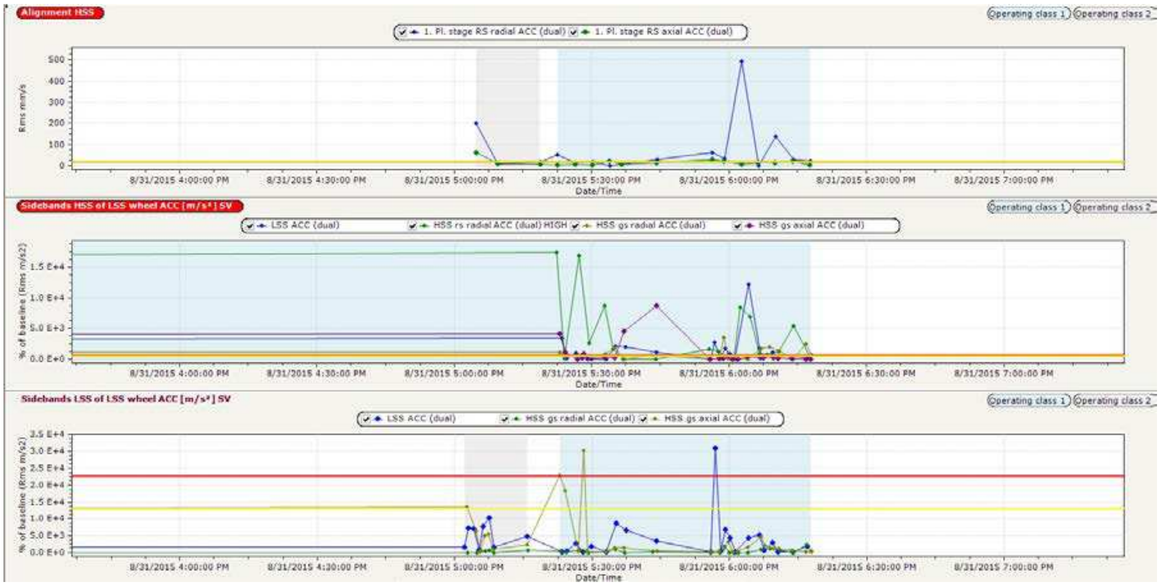


Figure 5 - 47.
Example of Diagnosis Display with Operating Class 1 and Class 2 Data.

You can use the Buffer to filter the data for a specific class by enabling the **Digital** condition and selecting the data class type. Only data for that class will display. When the **Digital** condition is disabled, all data class types are shown in the graph. Refer to **Buffer** in System Operation.

In the diagnosis display, you can configure the baselines for the different measurement points associated with the diagnoses. If the measurement point has dual class configuration, you can configure baselines for "No operating class", "Operating class 1" and "Operating class 2".

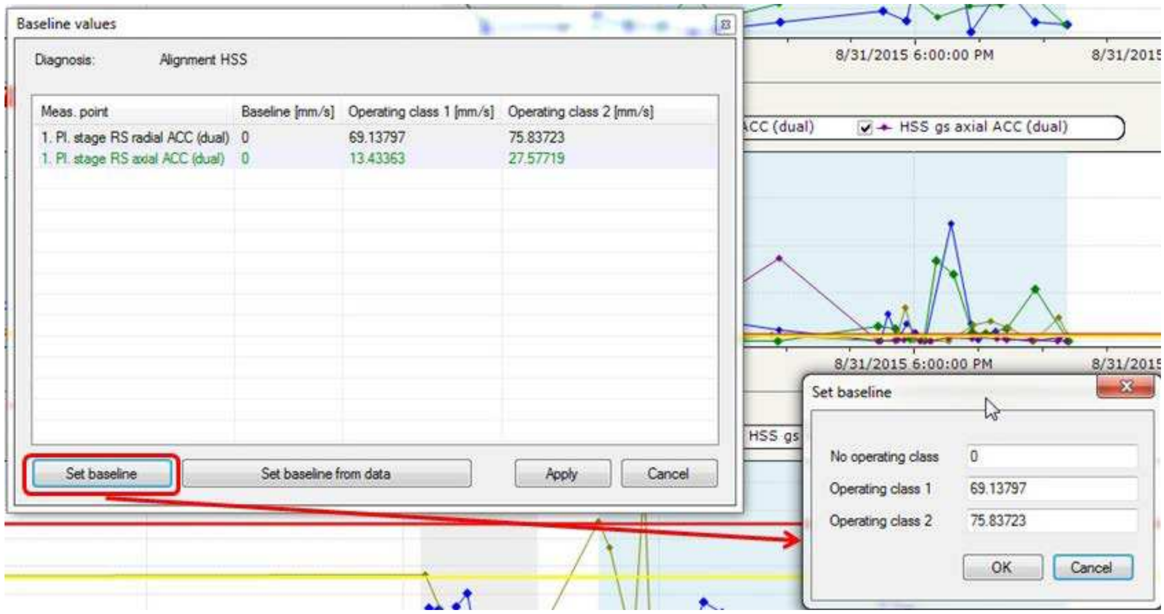


Figure 5 - 48.
Example of Baseline Values for Diagnosis Display.

Polar

 Use this icon to generate a polar display of a selected measurement point. Polar display shows the vibration signal at 1, 2, 3 and 4 times the shaft speed in the complex domain. The vector is described with amplitude and phase. Polar display is a strong tool for detecting changes in phase domain, and changes in amplitude or phase. It is often used to analyze run-ups and coast-downs, but is also useful in analyzing steady state conditions as well. It is possible to set alarm circle and warning circles facilitating the process of making sure that the system keeps track of the stable phase. It is also possible for the user to add custom markers to specific readings to highlight.

The figure below is an example of polar display of trend data type with live data but no overlay data.

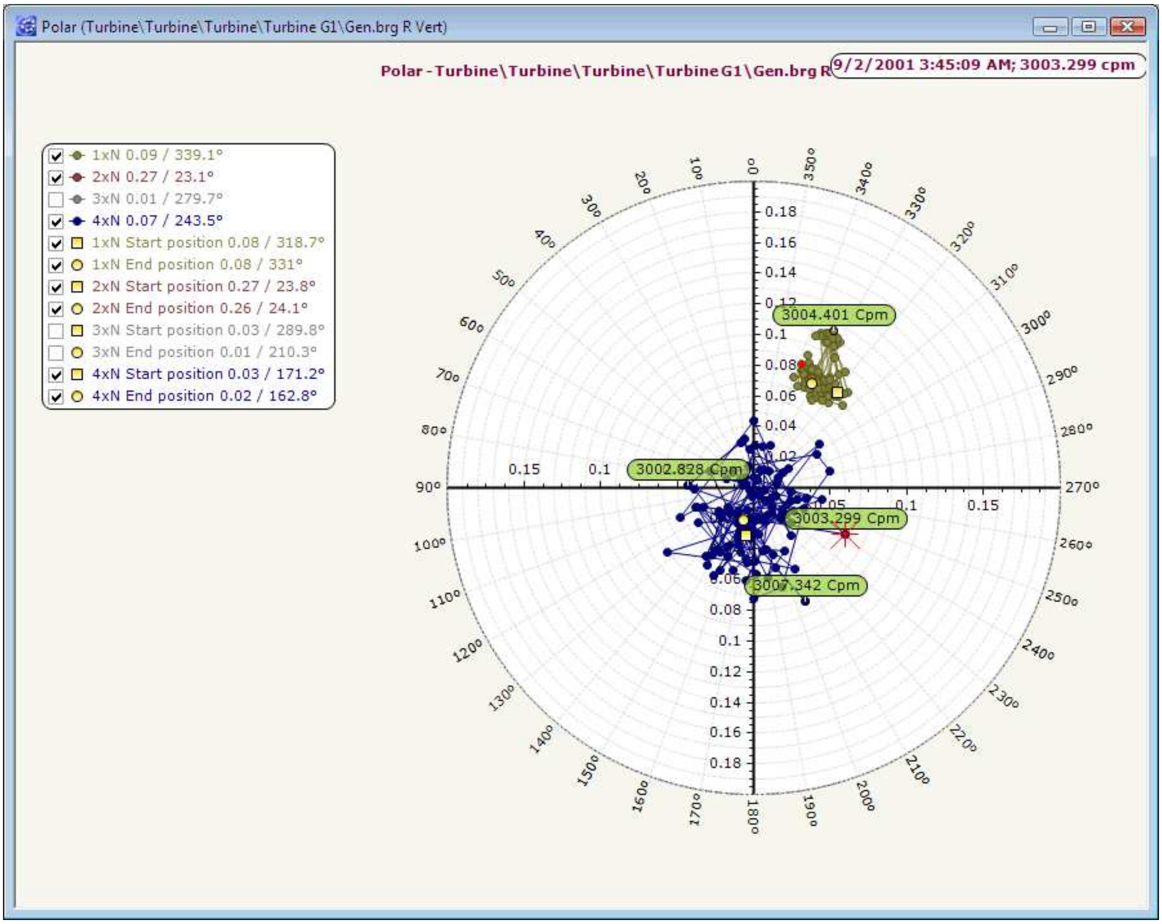


Figure 5 - 49.
Example of Polar Display.

Shaft Centerline

 Use this icon to generate a shaft centerline display of a selected measurement point. The shaft centerline display shows the rotor position dynamically and is useful at run-up. Before the machine starts rotating, the shaft centerline display shows the shaft position to ensure that the shaft has an appropriate clearance at each bearing. When the shaft starts to rotate, the shaft position can be watched as the speed increases. To display shaft centerline data, a shaft centerline measurement point with two channels need to be configured in @ptitude Observer. Setting the shaft centerline cold gap is done by right-clicking in the hierarchy and selecting the option "Calibrate shaft centerline graph"

The figure below is an example of shaft centerline display of trend data type and live data but no overlay data in a circular format.

Shaft centerline can also be displayed in a square format. The selection is set at the User Preferences setting.

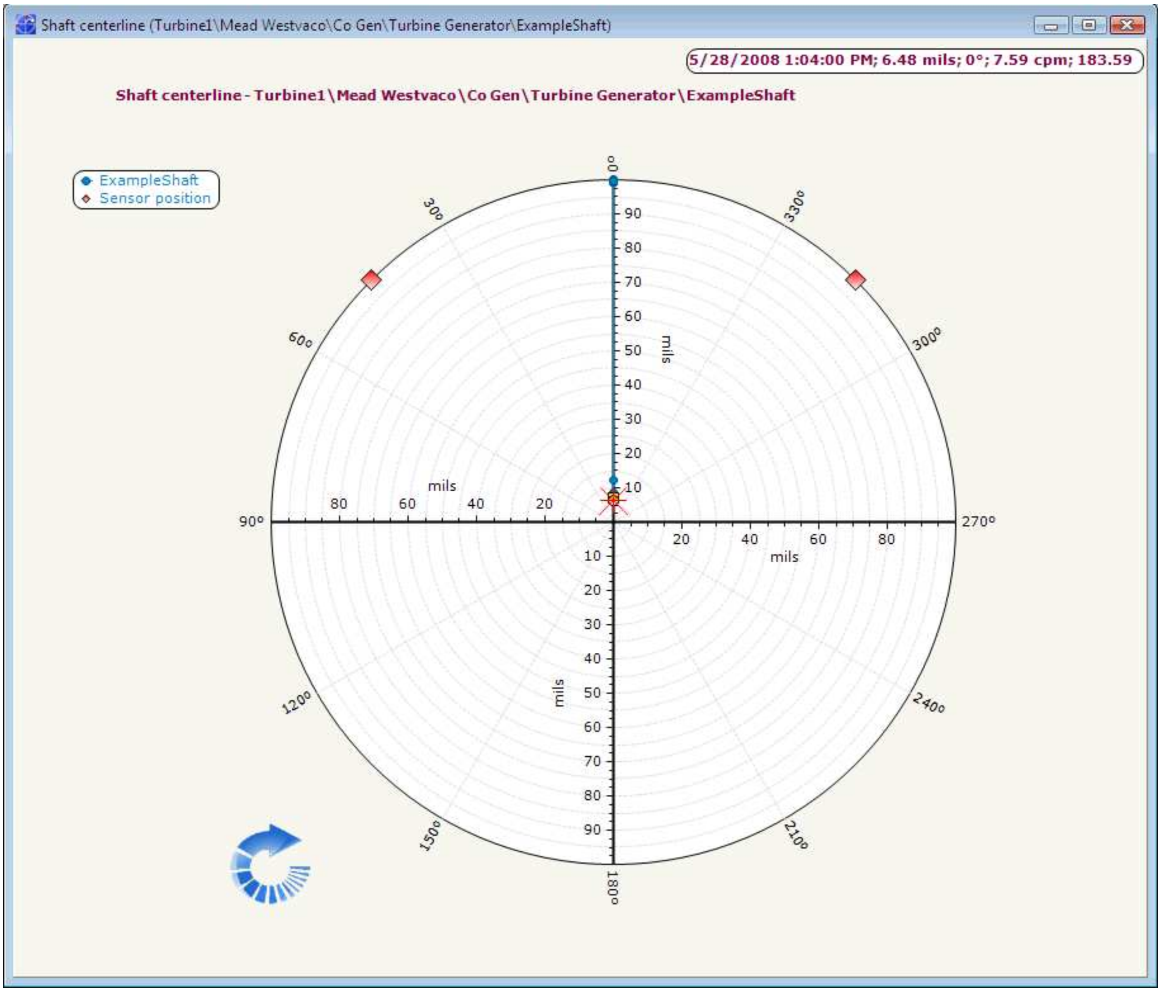


Figure 5 - 50.
Example of Shaft Centerline Display.

Combination Plots

 Use this icon to display a list of available combination plots in the system. Combination plots show two or more types of diagrams for the same measurement. The individual parts of the combination plot often works cooperatively so once one part is zoomed, the other is also zoomed making it easier to follow the same type of data from two or more types of displays.

The following combination plots are available.

- **Spectra/Time waveform**
- **Spectra/Phase**
- **Trend/Spectra**
- **Diagnosis/Spectra**
- **Trend/Spectra/Time waveform:** this plot follows the cursor on the trend plot and displays the closest FFT and time waveform.

- **Diagnosis/Spectra/Time waveform:** this plot follows the cursor on the diagnosis plot and displays the simultaneous FFT and time waveform.

The figure below is an example of spectra and time waveform combination plot.

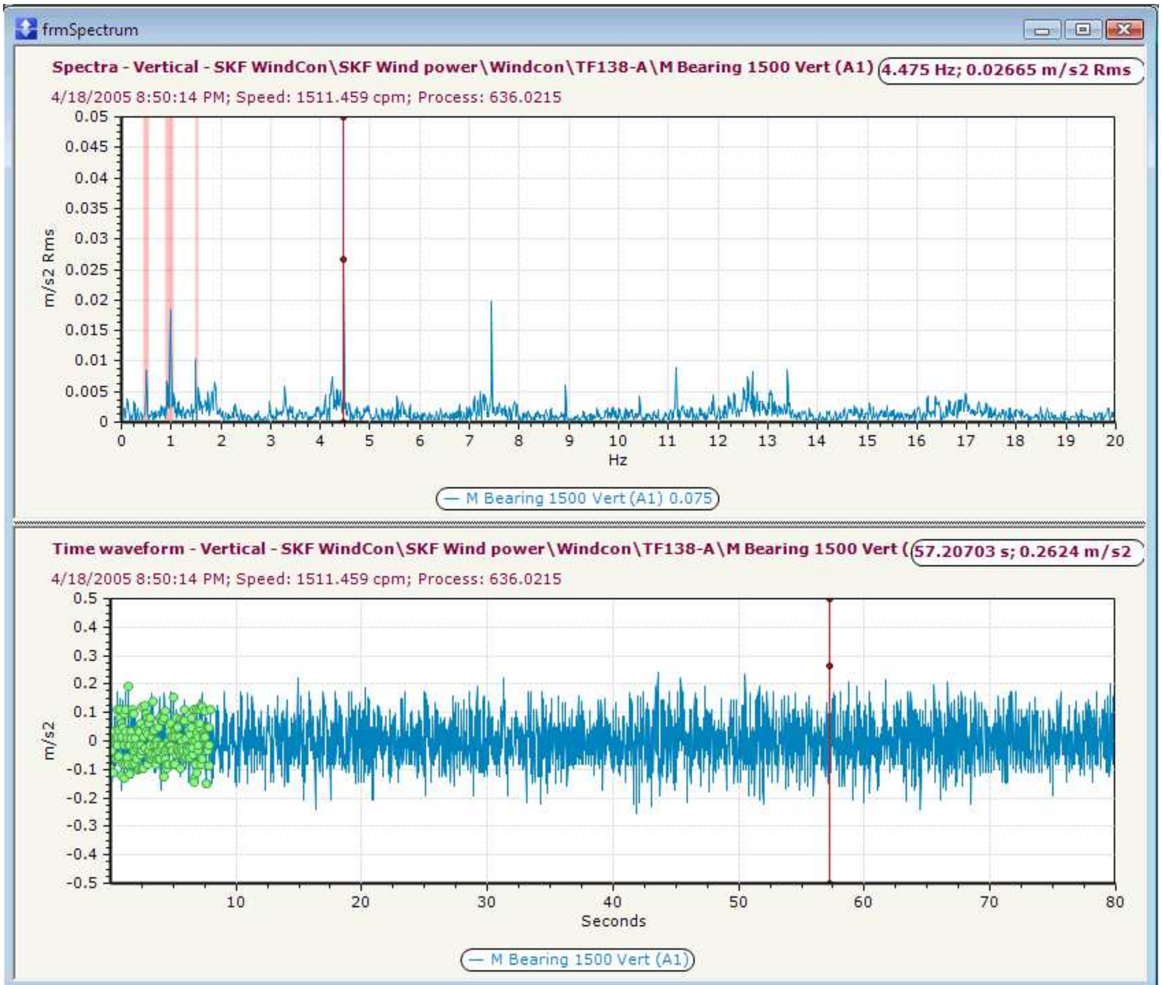


Figure 5 - 51.
Example of Spectra and Time Waveform Combination Display.

The figure below is an example of trend and spectra combination plot.

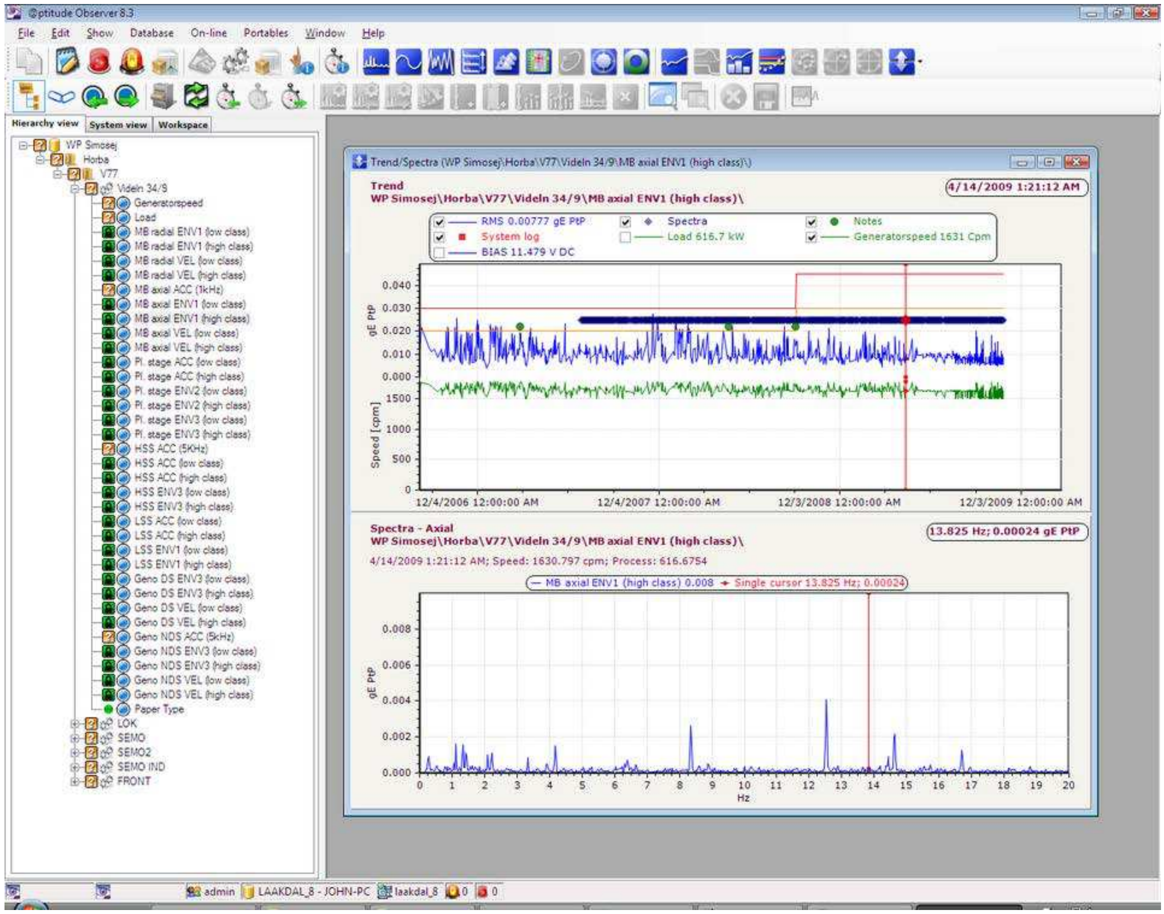


Figure 5 - 52.
Example of Trend and Spectra Combination Display.

Event Capture

 Event capture provides the capability to configure event capture groups with pre and post data capture. The captured time waveforms enable detailed analysis of both very low (mechanical) and very high (electrical or generator related) oscillations. Normal measurements taken at different sampling frequencies continue to operate as usual while a time waveform is collected.

Event captures can be triggered by the following:

- An alarm in the event capture group triggers event capture (for simple alarms).
- An alarm in the same alarm group as the event capture group triggers event capture (for complex alarms).
- Clicking the **Capture** button triggers a manual event capture.
- IEC status codes configured for event capture.

The following plots are available from the Event capture overview.

- **Event Capture TimeWaveform** - the true peak-peak is calculated from the time waveform.
- **Event Capture 3D** – shows spectrum graphs taken from successive measurement values in the selected continuous time waveform capture. The z-axis represents time intervals in the event capture from which spectrum graphs were generated.

The following section describes working with the event capture graph displays. For details about the behavior of the event capture function, refer to *Appendix A*, *What to Expect When Using Event Capture* in this user manual.

Displaying the form from the hierarchy

- From the hierarchy tree view, highlight an event capture group. The Event capture view tool  in the toolbar is enabled.
- Click the Event capture view tool to launch the Event capture view.

OR

- Right-click an event capture group, and then select **Diagram**.

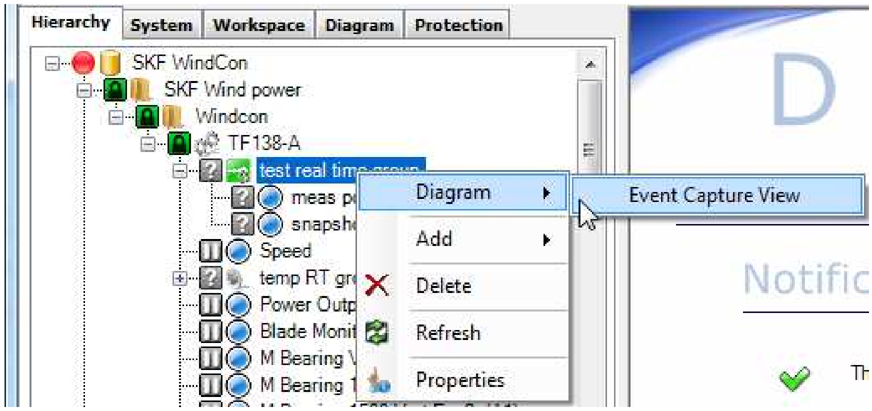


Figure 5 - 53.
Example of Diagram Options from an Event Capture Group.

- Select **Event Capture View**. The event capture view displays all points available in the capture. Each event capture point reflects a single channel.

From the hierarchy tree view, you can highlight an event capture point node and right-click to select **Diagram**.

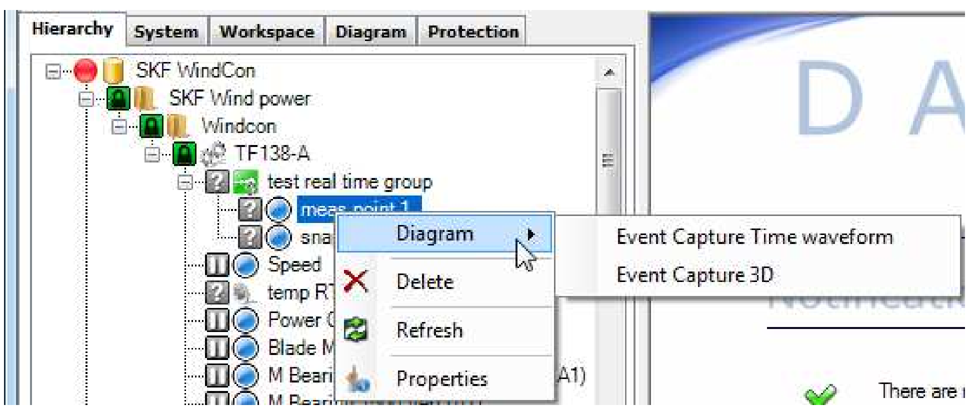


Figure 5 - 54.
Example of Diagram Options from an Event Capture Point.

- Select either **Event Capture TimeWaveform** or **Event Capture 3D**. The event capture window displays the new time waveform or 3D plot showing only the selected point, if capture data is available. The Overview tab displays an overview plot for only the selected point.

The Trend plot function is enabled for event capture measurement points which have alarms enabled. Select the event capture measurement point in the hierarchy view and then click Trend  to display the plot. The trend depicts event capture flags in the plot as gray diamonds. When you click an event capture indicator in the trend plot, a new window opens to display the corresponding event capture for further analysis. The list view selection shows the event that was selected on the trend plot and a thumbnail display of the same.

Initial event capture view description

The figure below is an example of the Event capture view.

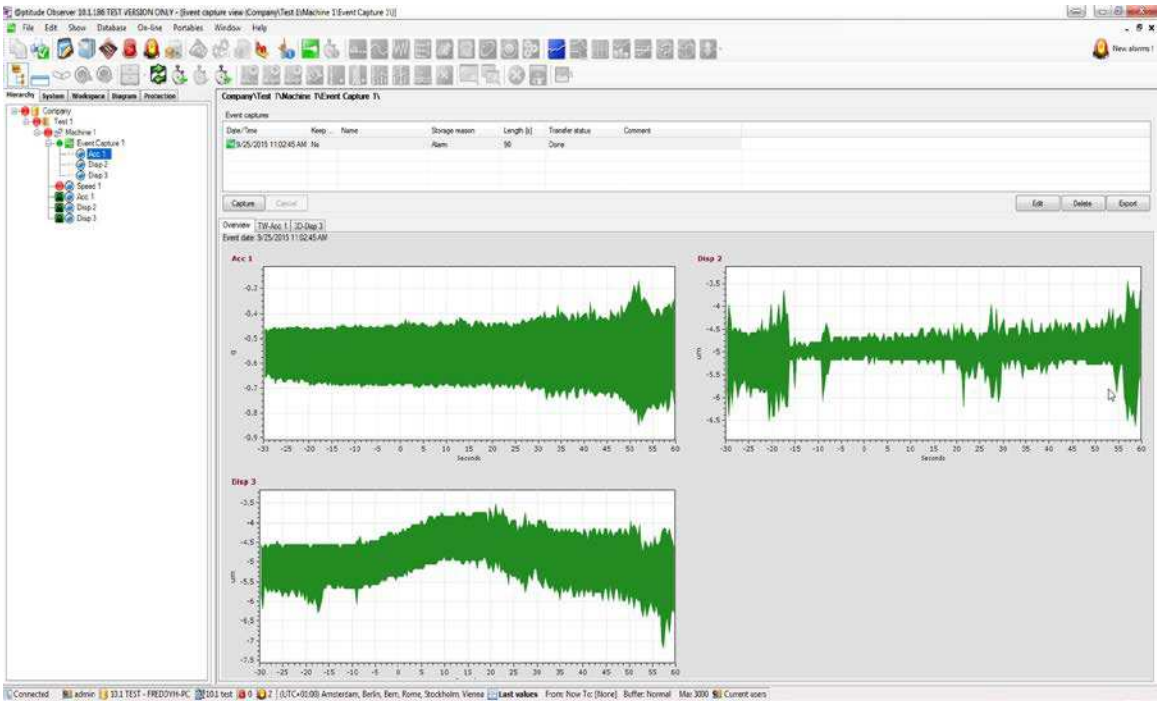
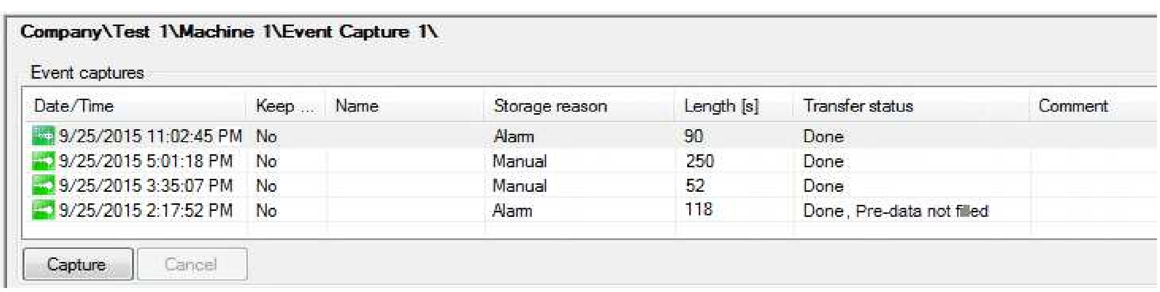


Figure 5 - 55.
Example of Event Capture View.

The work space contains a list of the event captures taken for the event capture measurement group plus the overview of the timesignal plots for the channels in the selected event group.

The Event captures list displays information for each event capture.



Company\Test 1\Machine 1\Event Capture 1\

Event captures

Date/Time	Keep ...	Name	Storage reason	Length [s]	Transfer status	Comment
9/25/2015 11:02:45 PM	No		Alarm	90	Done	
9/25/2015 5:01:18 PM	No		Manual	250	Done	
9/25/2015 3:35:07 PM	No		Manual	52	Done	
9/25/2015 2:17:52 PM	No		Alarm	118	Done , Pre-data not filled	

Capture Cancel

Figure 5 - 56.
Example of Event Captures List.

Date/Time when the event capture was triggered

Keep *Yes* or *No*

Name is the descriptive name given to the event capture

Storage reason can be *Alarm*, *Manual*, or *Unknown*

Alarm - The event capture was triggered by the IMx due to an alarm.

Manual – The user clicked the **Capture** button to request the event capture

Unknown - @ptitude Observer does not know yet if the incoming event capture is part of an alarm or a manual request

Length [s] The actual length in seconds of the captured time signal

Transfer status can be In Progress, *Done*, *Truncated*, *Cancelled by user* or *Done*, *Pre-data not filled*

In Progress – the event capture s being received from the IMx

Done – the event capture has received all expected data as configured on the measurement group

Truncated - the event capture was closed because it could not be completed. The event capture may not have received the expected ending packets for the each channel's long time waveform signal or it may have gotten out of sync for some unknown reason.

Cancelled by user - the user clicked the **Cancel** button. When @ptitude Observer is connected to the Monitor Service, clicking this button will cause the IMx to restart and cancel the ongoing event capture.

You cannot cancel an ongoing event capture if @ptitude Observer is not connected to Monitor.

Done, Pre-data not filled - the event capture did not receive all expected data as configured on the measurement group but it did received all the data the IMx has to send.

Right-click on a plot in the overview to open the context menu.

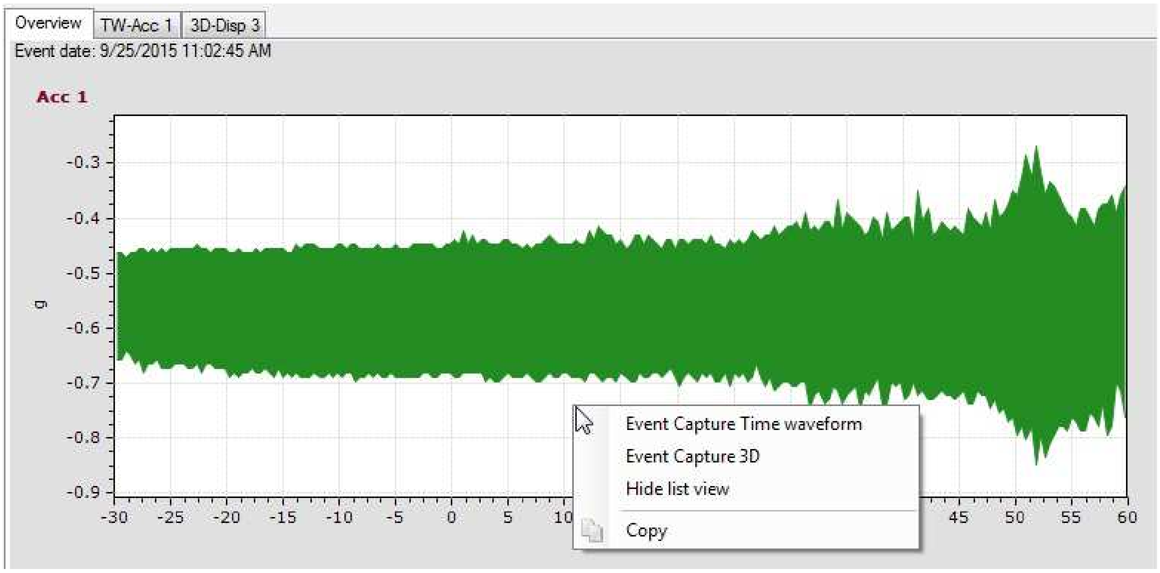


Figure 5 - 57.
Example of Event Capture Context Menu.

The menu options include:

Event Capture TimeWaveform displays a more detailed window with the waveform of the long timesignal.

Event Capture 3D displays a 3D plot spectrum for the entire time waveform, or a selection of it. You can analyze the complete event or any part of it.

Hide list view hides the Event captures list section at the top of the workspace to provide more viewing space.

Copy creates a screenshot of the graph and puts it in the clipboard.

The window for the event capture contains three parts, as shown below:

A. The complete, or long, event capture

B. A zoomed version

C. A spectrum part

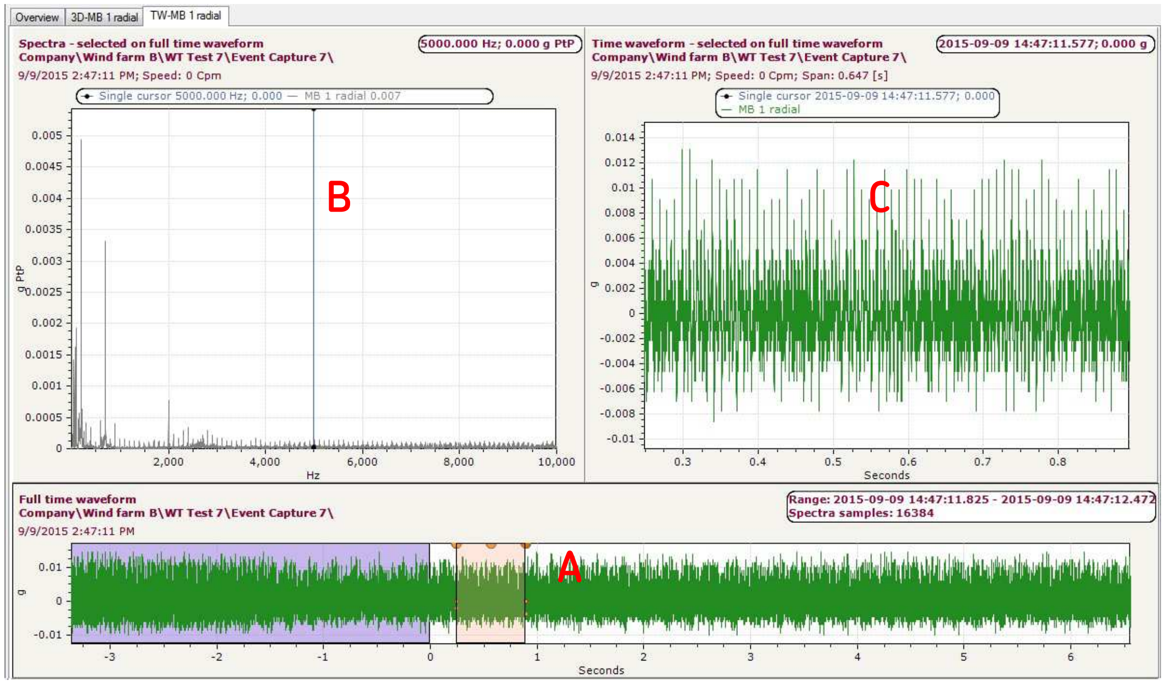


Figure 5 - 58.
Example of Event Capture Window.

The following rules apply to the complete, or long, event capture (A):

- The occurrence of the event capture could be an alarm or manual storage.
- The date list of the event captures shows the reason that storage took place- alarm or manual.
- One band marker is always visible and cannot be removed from the graph.
- The band marker controls both the length of the zoomed in time waveform and also which values the spectrum is going to be calculated on. The band in the full timewaveform display is located at “0”, which is the time the event occurred. The band can be be adjusted to change the zoomed timewaveform as the spectrum is recalculated.
- The X scale on the long timewave form has zero time at the occurrence of the event capture storage. All time values before that are negative and positive after. The graph displays a different back ground color for negative time and positive time.

The following rules apply to the spectrum (B):

- Single cursors can be added to the spectrum.
- The DiagX tool can be applied to the active single cursor.
- The spectrum shows the fault frequencies calculated from the machine parts.

The **Event capture 3D** plot window displays the 3D plot and an event capture time waveform plot. The 3D plot shows spectrum graphs taken from successive measurement values in the selected continuous time waveform capture. The z-axis represents time intervals in the event capture from which spectrum graphs were generated. The lower time waveform plot shows the time range over which the event data was captured, and indicates the range of data currently being displayed in the event capture 3D view.

The lower time waveform graph provides control points on a colorband cursor. Modifying the colorband cursor will cause the number of spectra being displayed to vary. You can use the control points to specify which part of the time waveform information displays its spectrum characteristics in the event capture 3D plot.

If you open an event capture 3D plot and move the selected area on the long time waveform all the way to the right, you may notice that there is some data beyond the selected area that cannot be selected (shown as a gray band). This occurs because a sequence of spectra is calculated from the long time waveform. Depending on the number of samples required per spectrum, there may not be enough data to fill exactly each spectrum all the way to the end of the data. The display presents the areas of the long time waveform that are actually being used for spectrum data. Any data leftover cannot be selected. See **Spectrum Settings** below for ways to expand the area of selectable data.

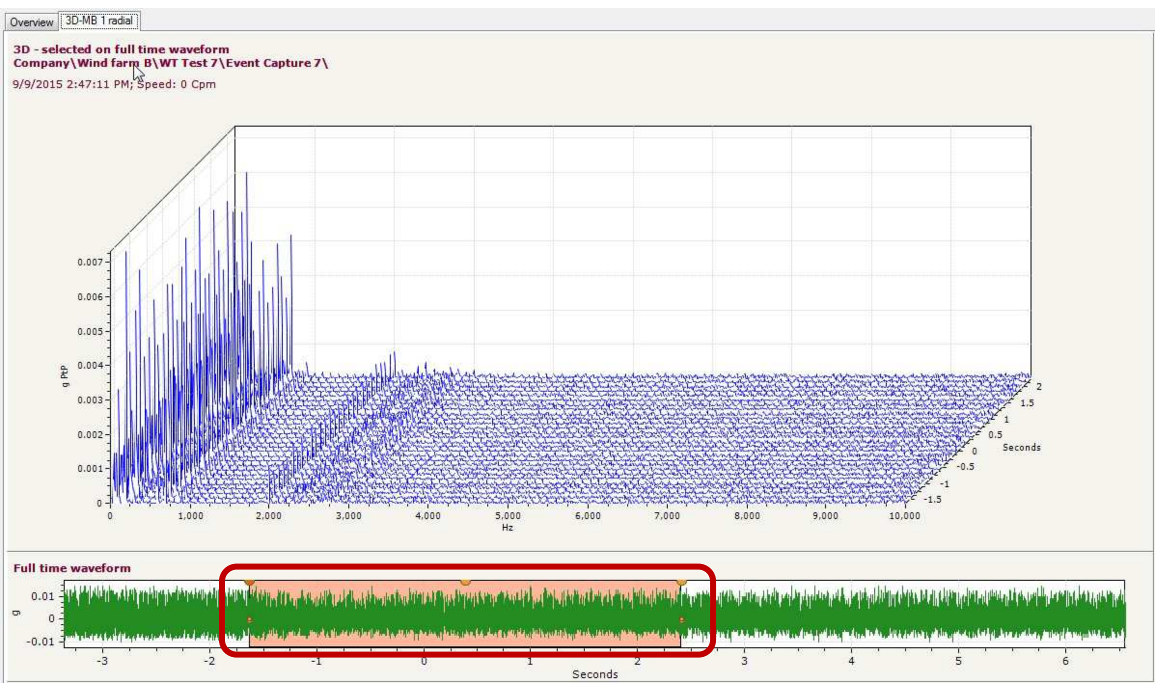


Figure 5 - 59.
Example of Event Capture 3D Plot.

Options Menu

The Option Menu is displayed when you right-click on the forms. Relevant options differ in the event capture 3D plot and the event capture time waveform plot.

Right-click on the event capture 3D plot to open the following context menu.

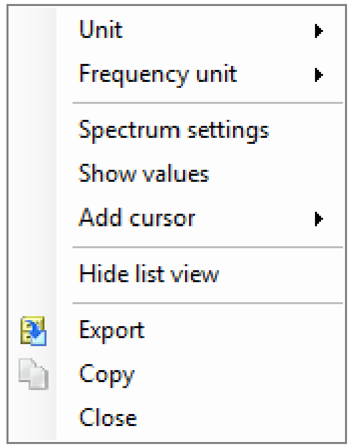


Figure 5 - 60.
Example of Event Capture 3D Plot Context Menu.

Unit is the measurement unit of the data displayed. Changes can be made between velocity, acceleration and displacement. The unit of the measurement point is set back to the original value when you are done with the particular graph.

Frequency unit switches the frequency unit between *Hz and cpm.*

Spectrum Settings opens a dialog that controls how the spectrum graphs are displayed in the event capture 3D plot.

You can change the **Fmax** adjustment factor by choosing from fixed Fmax settings. The Fmax can be modified only to a smaller or equal value to that originally taken in the event capture group. For example, if the event capture was measured with an Fmax of 1 KHz, the selection list will display only those choices that are 1 KHz or smaller.

You can change the number of **Lines** shown in the spectrum graphs by choosing from the fixed choices.

- This may affect the total number of spectra that are generated from the event data.

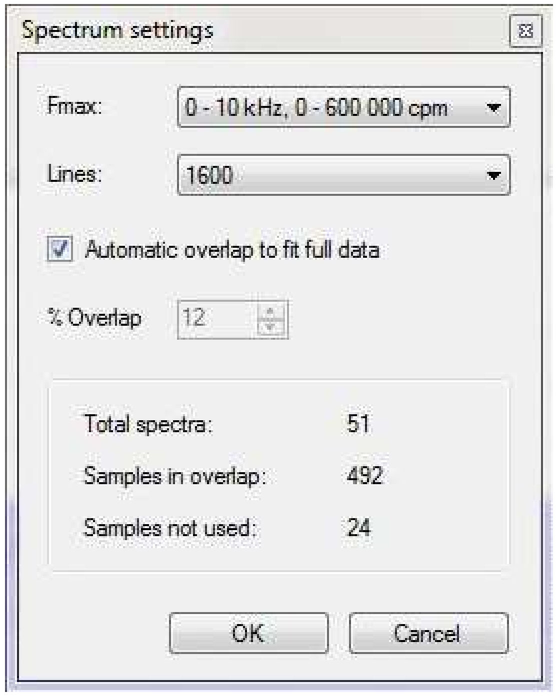


Figure 5 - 61.
Spectrum Settings Dialog.

The checkbox **Automatic overlap to fit full data**, is enabled by default. The system calculates the percentage of overlap that maximizes the selectable spectrum information. The results of the automatic calculation display below: **Total spectra**, **Samples in overlap**, **Samples not used**.

If you clear the checkbox **Automatic overlap to fit full data**, you can make manual adjustments to the **%Overlap** value. **Total spectra**, **Samples in overlap**, **Samples not used** are recalculated and updated accordingly.

If you make any changes, click **OK**. New spectrum information is generated and the plot is redrawn ~~displayed~~ to fit the new parameters.

Show values displays the values in 3D plots.

Add cursor adds available cursors (markers) one at a time in the graph temporarily.

Hide list view hides the Event captures list section at the top of the workspace to provide more viewing space.

Close To close a tab, right-click on the tab label and a small pop-up option to **Close** the tab displays. Or, use the context menu **Close** command.

Right-click on an event capture time waveform graph to open the following context menu.

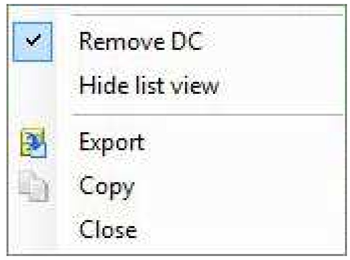


Figure 5 - 62.
Example of Event Capture Time Waveform Context Menu.

Remove DC gives you the option to include the DC part as well as the AC part. Normally, you remove the DC part of the signal when showing time waveform data.

To manually capture an event:

- Click **Capture** to initiate capturing an event. The event capture will display *In progress* as the **Transfer status**. While the capture is occurring, a message beneath the Event capture list states: Capture not allowed: capture is pending. When the capture completes, the status dynamically updates to **Done**. If the event capture cannot complete or no progress is detected for one minute, the capture attempt is ended and the status updates to *Truncated*.
    - ➢ The manual **Capture** function is not included in the count of maximum events stored per day. A manual event capture is stored even if the limit of event captures per day is reached.
    - ➢ The **Capture** function is unavailable when @ptitude Observer is not connected to a Monitor service or when the associated IMx unit is not available (connected). The following message is displayed to the right of the Capture button: Capture not allowed: Observer is not connected to the Monitor Service.
    - ➢ After the IMx has re-established communication with the Monitor service, there is a period of at least 60 seconds before re-enabling the **Capture** button is re-enabled. The following message is displayed: Capture not allowed: waiting [number of] seconds on ready for event capture.
    - ➢ If a sensor cable problem (cable fault) occurs during the event capture, the following message displays: All or partial data stored out of sensor OK range.
- You may continue with another event capture when the previous manual capture is *Done* or in any **Transfer status** except *In Progress*.
- You may click **Delete** to delete a selected event capture from the list as long as the **Transfer status** is not *In Progress*.

To edit an event capture:

- Select an event capture in the list and click **Edit** to open the **Edit event capture** dialog.

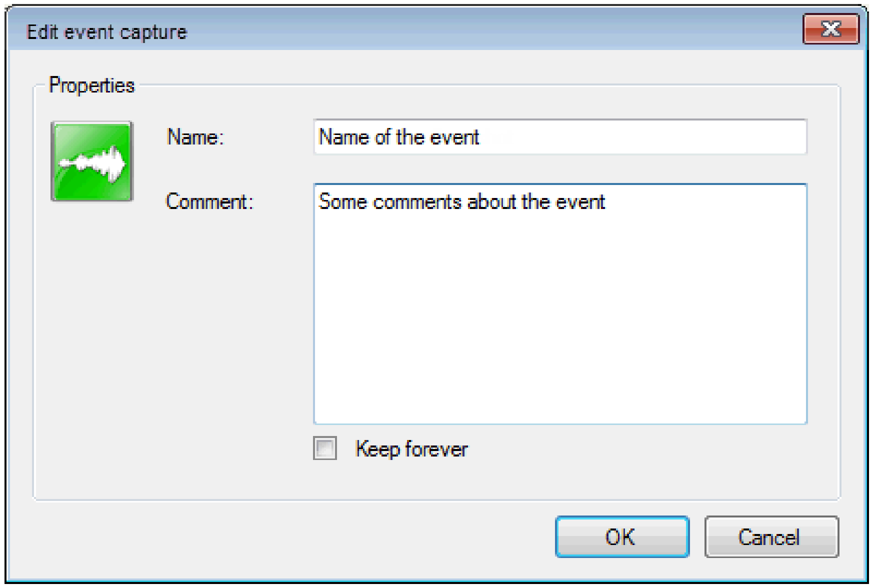


Figure 5 - 63.
Example of Edit Event Capture Dialog.

- Enter the **Name** of the event capture.
- Enter a **Comment**, if desired. The comment will display in the Events capture list.
- Select the **Keep forever** checkbox to save the event capture until the measurement group or measurement point is deleted. Event captures not marked as **Keep forever** can be deleted by the usual methods (the Delete Data form or setting up the Automatically delete old data option under Database > Options)
- Click **OK**.

To export to UFF (Universal File Format):

- Select an event capture (with **Transfer status** *Done* or *Truncated*) in the list, and then click **Export**. You can export only one event capture at a time.
- The **Export to UFF** dialog opens. The event capture **Group** name of the selected group is displayed. You can export specific-channels to a UFF (Universal File Format).

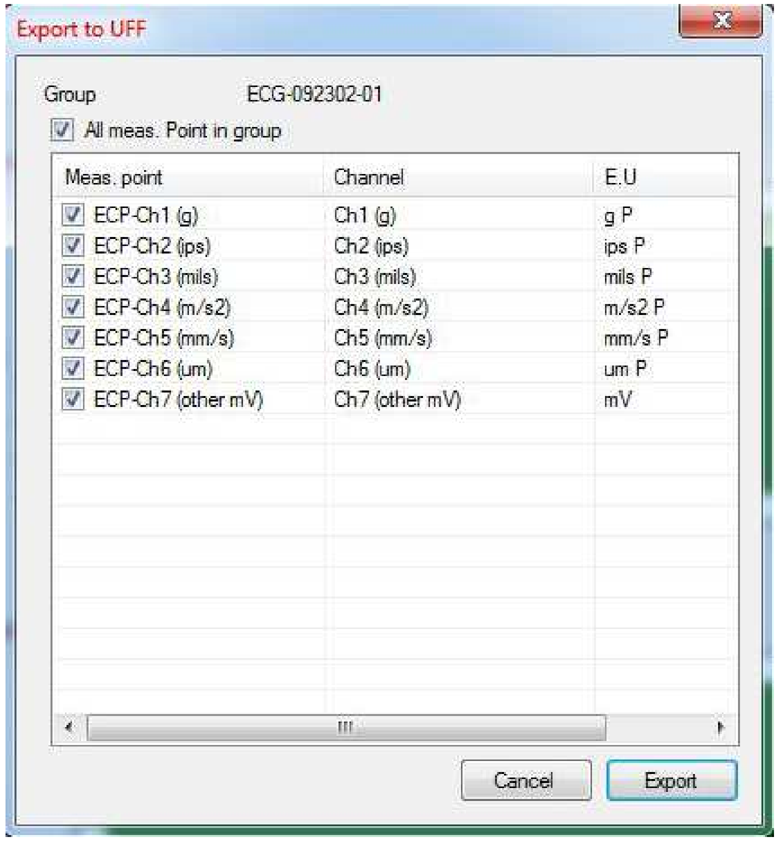


Figure 5 - 64.
Example of Export to UFF Dialog.

- The table contains the measurement points of the current selected group and measurement. You can check **All meas points in group** to enable export all the measurement points. Or you can check the desired points within the table and uncheck those you do not want to include.
- With your selections made, click **Export**. The UFF file is generated.

Buffer

 This is the toolbar icon for the buffer selection and settings. The buffer is used to control and filter which data should be retrieved from the database for analyzing. You can specify date ranges, filter parameters, and buffer types.

Usage

By opening the buffer setting and changing any of the parameters for the buffer will update the buffer for the active display only (the name of the buffer will change name to ‘custom’). If you wish to use this buffer settings in the future for opening graphs, please click the save button on the form. You will now be prompted for a custom name for this buffer and it will be stored into the database for future use and will now be available in the drop-down list of available buffers. Once selected, this buffer will be used for any subsequent data retrievals.

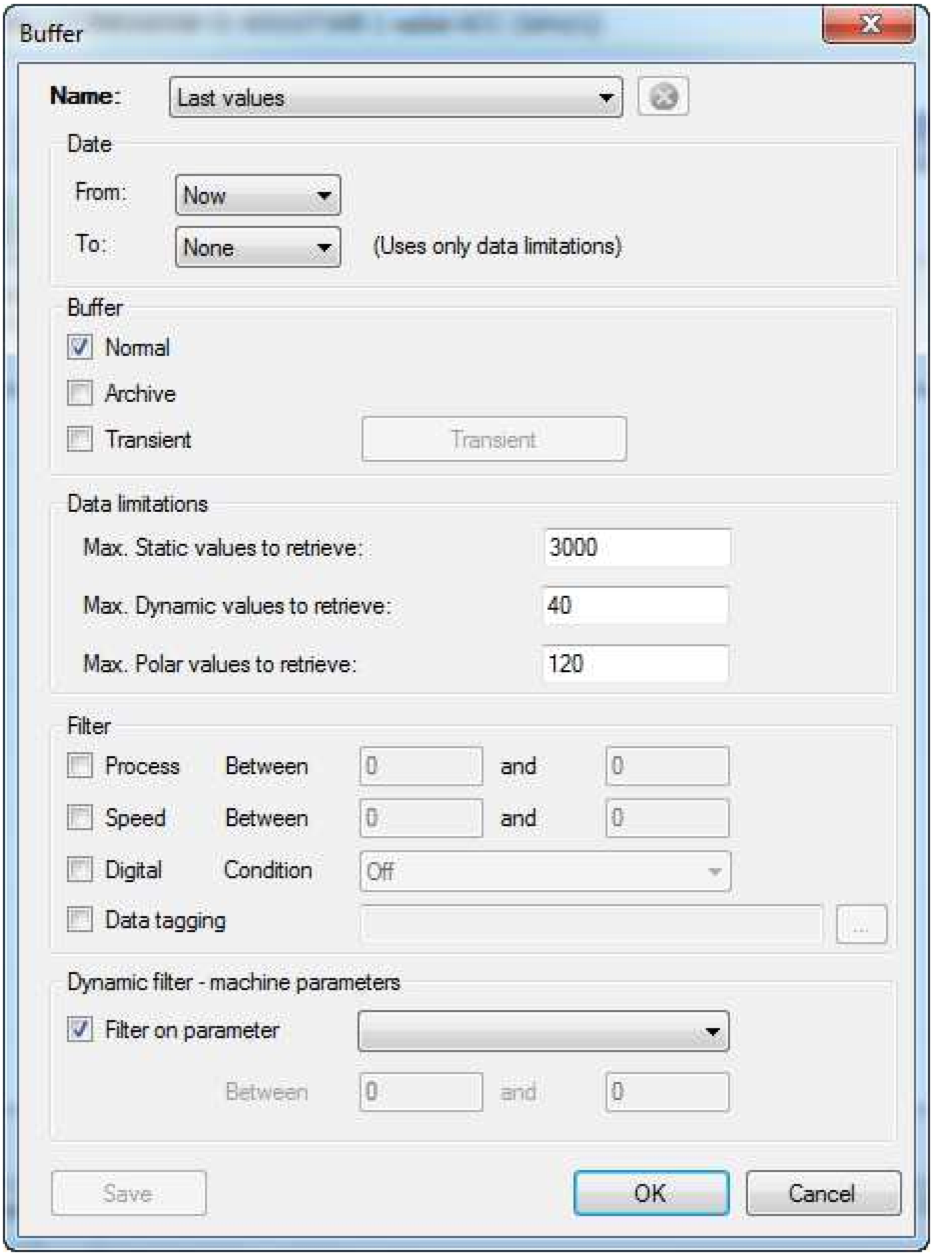


Figure 5 - 65.
Example of Buffer Settings.

Name identifies this particular setting of the buffer interface.

Date

Select a time or date from the pre-defined list to be used with *Backward* or *Forward* value for the end date range.

From specifies the start date and time.

To specifies the range of end date and time.

None

Now: specifies the current date and time for the end range.

Time: a specific time to define the end range.

Backward: specifies a date range backward in time relative to the start time. The pre-defined dates may be used for this option.

Forward: specifies a date range forward in time relative to the start time.

Buffer

It specifies from which buffer to collect the data.

Normal: refers to the data stored in the rolling buffer. The type of data and the storage interval are set in Operating and Storage Conditions Tab settings when creating a measurement point.

Archive: refers to the data stored in a special buffer called archive. This buffer stores one measurement data every 10 minutes. It can hold up to 80 000 measurement data which are equivalent to data collected in 1½years. The type of data and the storage interval are set in trend setting when creating a measurement point.

Transient: refers to the data captured during transient. Therefore, for this type of buffer, a specific transient of a measurement group must be selected.

Data limitations

Data limitations allow the user to enter the amount of maximum values (Static, Dynamic and Polar) that should be retrieved.

Filter

Process allows filtering of process readings such as temperature and load. This is applicable only if the measurement point had an associated process point configured.

Speed allows filtering of speed readings. This is applicable only if the measurement point had an associated speed point configured.

Digital allows filtering of digital input on or off and filtering by the operating classes. This is applicable if the measurement point had an associated digital point configured.

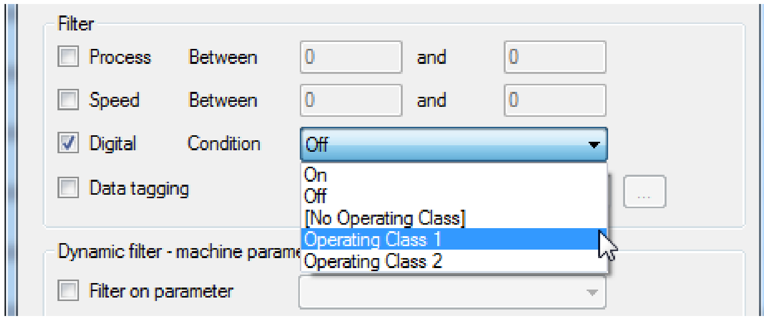


Figure 5 - 66.
Example of Buffer Settings for Digital Condition.

Data tagging allows the filtering of material or characteristic related data that are marked with a specific tag. Data can be tagged manually with Software data tagging point or automatically by OPC data tagging points.

Dynamic filter – machine parameters

Filter on parameter enables, when selected (checked), the filtering of dynamic measurements in all relevant plot types based on the range set for one selected machine parameter. Make a selection from the **Filter on parameter** list. The list contains the available machine parameters that are associated with the parent machine. Use **Between** ___ **and** to enter the minimum and maximum values for the filter. Either one or both must be entered. Upon hitting Enter, the plot will redraw using the new filter ranges specified by the parameters.

- If a box has no value, the filtering will have no limit in one direction. For example, if there is nothing in the minimum box then there is no lower limit on the filter.
- Unchecking the checkbox will clear the filtering and redraw the plot, but any values entered are still visible.

Notes

A note is defined as an observation or action taken, related to a machine. Typical notes are maintenance activities and visual observations.

To get to Notes screen, select a machine then perform one of the following options:

- Click on  **Notes** icon on the toolbar.
- Click **Edit** from the tool bar menu options, then select **Notes**.

The notes window displays the notes for the selected object in the hierarchy. Although a note is a machine-specific object, if an object of machine level or above is selected, then all notes under that object will be displayed.

It is possible to filter out specific notes based on date and title of notes. If a hyperlink is specified along with the note, then it can be opened by clicking the hyperlink for the selected note in the notes window. The notes window is automatically linked to the hierarchy. Therefore, selecting an item in the hierarchy updates the notes window automatically with the notes of the newly selected object. You can turn off the link by clicking  **link to hierarchy** icon on the toolbar.

Use **New**, **Edit** or **Delete** option to configure notes.

Configuring a Note

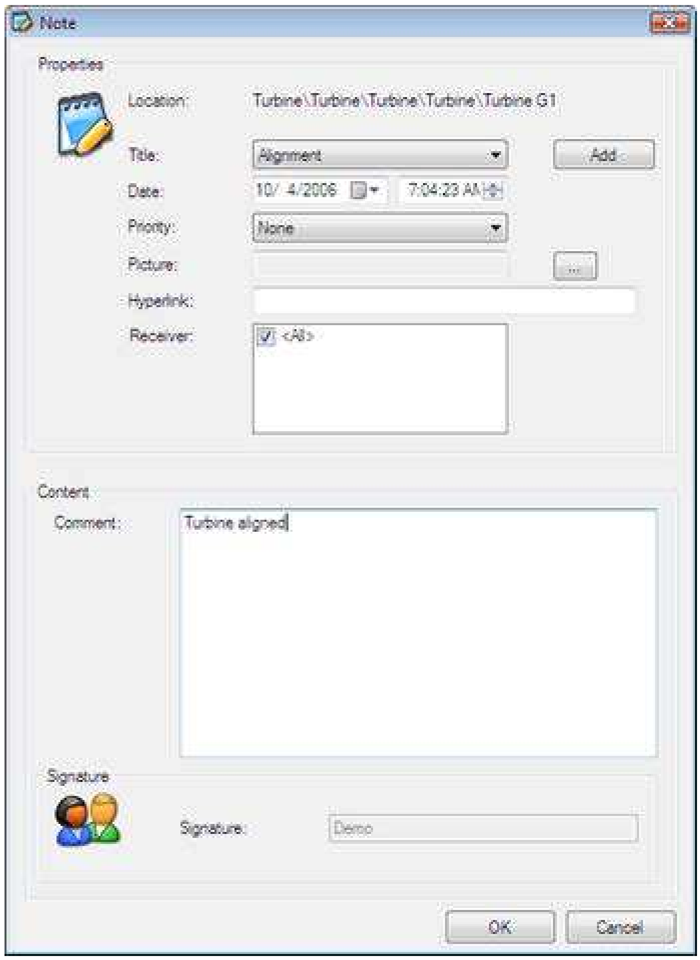


Figure 5 - 67.
Example of Notes Settings.

Location indicates for which machine or measurement point the note is being configured.

Title enables you to categorize the notes and select which type of note. To add a new title to the system click **Add** next to the title which brings up the new note title screen where you can enter a title.

Date sets the date and time for the note. When creating a new note, the current date and time is set as default. However, the date and time may be altered if you are registering an event from the past.

Priority specifies the severity level to categorize the notes.

Picture is a picture in the database associated with the note.

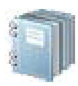
Hyperlink is a document or webpage associated with the note where more information regarding the note can be found. This document or hyperlink can be accessed from the notes list window by clicking the hyperlink of the selected note.

Receiver specifies which group of users to receive the note. Groups are created by Receivers interface in Libraries under Database.

Comment is the information text or content of the note.

Signature is the person who created the note.

Event Cases



Event cases can be created in the Observer system in order to keep track and document reports, information and history regarding a specific event tied to a specific machine.

New event cases can be created on machine level:

- Right-click on a machine from the hierarchy view then choose **Add Event case**.
- or select a machine, click the **Event cases** icon on the tool bar, then click the **New** button on the Event cases window.

The event cases window displays the event case reports for the selected object in the hierarchy. Although event cases are machine-specific, if an object of machine level or above is selected, then all event case reports under that object will be displayed.

Reports can be created to inform a customer or a department of actions that need to be taken care of regarding the event.

The reports are stored to the event case and can be reviewed and followed-up at a later time. The report is editable until the report is released by setting the status of the report to "released".

Each report in the event case can produce a document at any time in word or .pdf format which can automatically be sent as en email and/or stored as an attachment on the machine.

A report contains a number of **assessments** which typically are used to inform customers or internal departments of important information by the data analysts in Observer. An assessment consists of an assessment text and a recommendation how to handle the information detected in the assessment.

A severity level can be set in the form of a "classification level" and the assessment can be tied to a specific machine part if desired.

To the assessments, **pictures** can be added which will also be printed in the document that can be produced from a report. These pictures are typically screen shots of graphs in Observer indicating a defect or problem of some kind, but any picture can be added.

Event case report layouts define how the documents should look like. For more information, see Report Library.

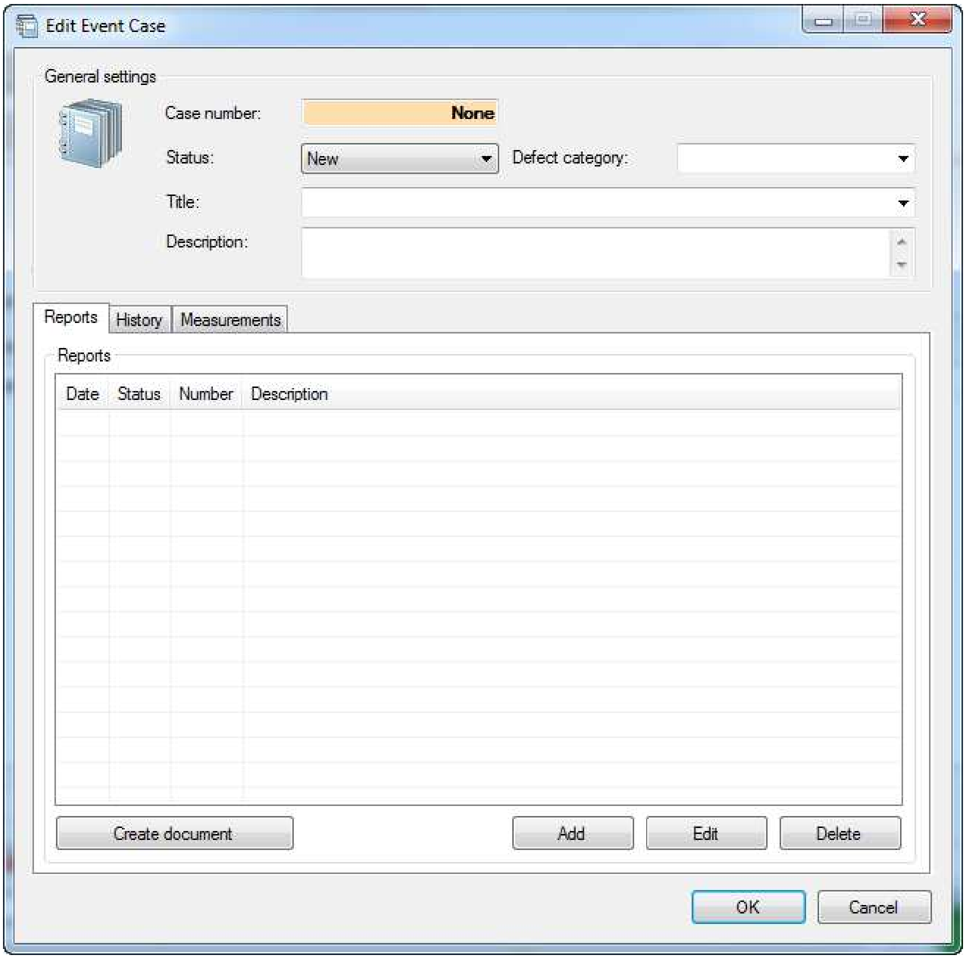


Figure 5 - 68.
Example of Event Cases.

Case number is a unique number that can be used to track this case. The case number consists of a counter and a prefix. The prefix can be set in the options form. The case number in combination with the report number can be printed on the event case report documents that can be generated.

Status of the report.

Defect category can be used to group this specific case to a specific type of defect.

Title can be used to group this specific case with a specific title.

Description is a custom description that can be entered for the case.

Of all the above information, only the case number will be printed on any document generated from an event case report.

Reports Tab

Existing report(s) can be added, edited or deleted. A document can be generated by selecting a report and click **Create document**.

History Tab

It lists all the related history of the selected event case report. New history can be added or existing history can be edited or deleted.

Measurements Tab

Any measurements which are related to the selected event case report can be added, edited or deleted.

Editing an Existing Event Case Report

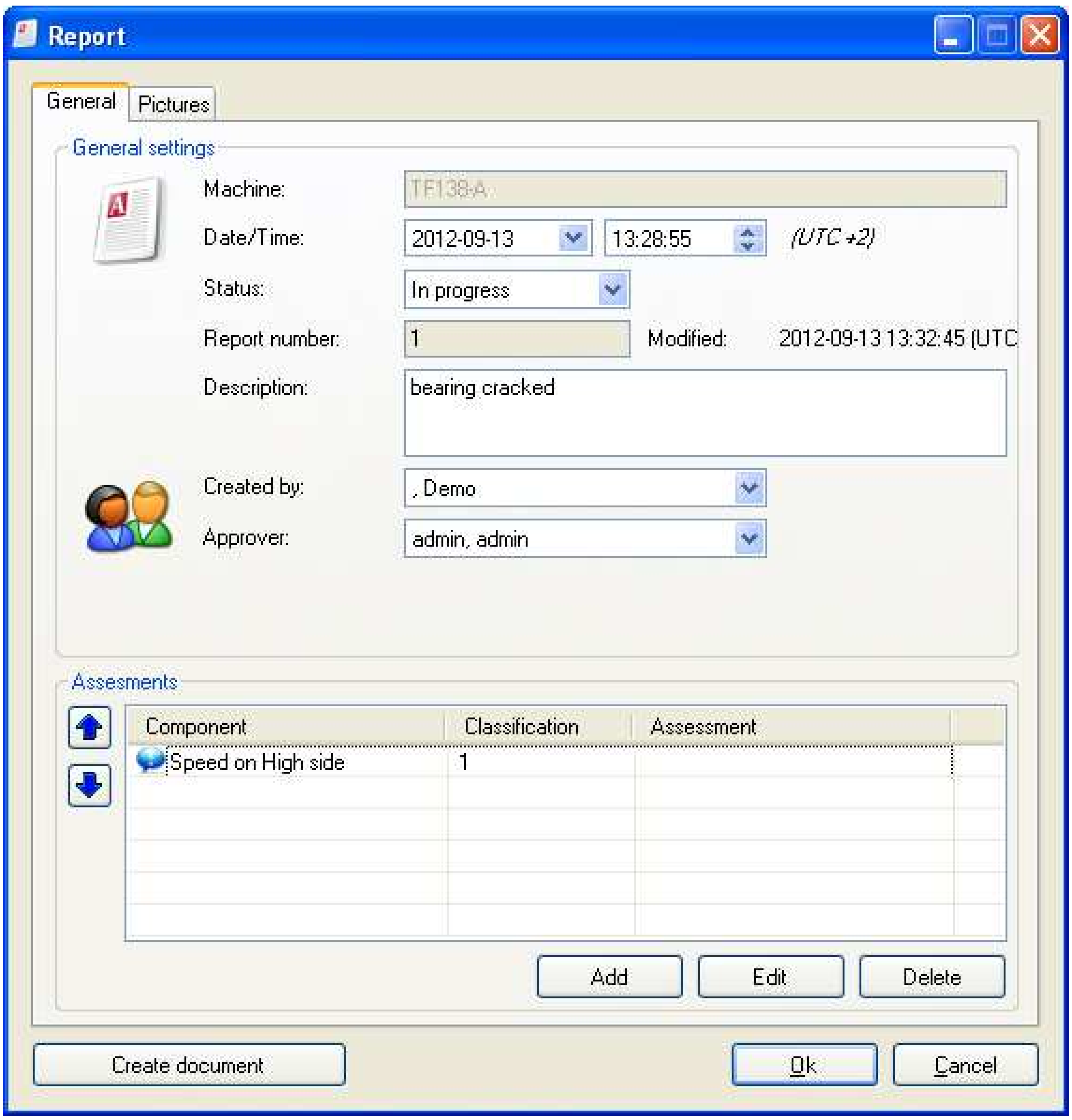


Figure 5 - 69.
Example of Report.

Machine displays the machine for which this event case report was created.

Date/Time sets the creation date and time of the report.

Status indicates the status of the report. Options are *In progress*, *To be approved*, *Rejected* and *Released*. When a report status is set to *Released*, the report can't be edited any more.

Report number is an automatic number incremented by 1 each time a new report is created for the specific event case.

Description is a custom description that can be entered for the report.

Assessments lists all assessments created for the report. A new assessment can be added. Existing assessments can be edited or deleted.

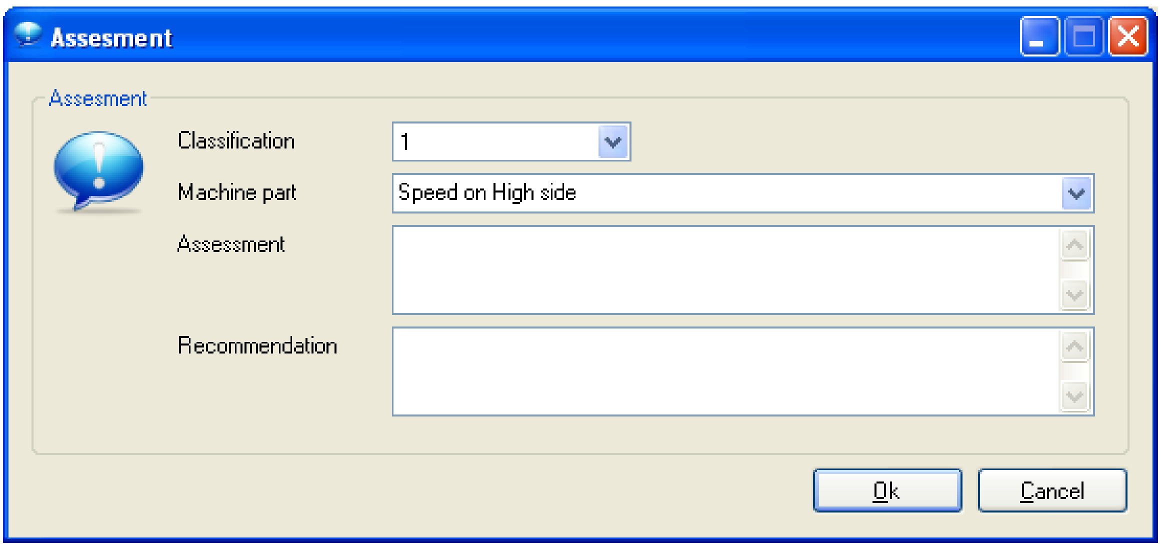


Figure 5 - 70.
Example of Assessment.

Classification is used to classify the severity assessment in a scale from one to ten.

Machine part can be selected from the existing machine parts of the machine if this assessment applies to a machine part. It is also possible to enter a free text machine part.

Assessment is the data analysis detected or description of the event.

Recommendation of actions that needs to be taken in response to the assessment.

Maintenance Planner

Maintenance planner interface enables you to configure maintenance tasks such as lubrication, replacements, maintenance schedule, etc. by keeping track of machine assets running hours or calendar time.

To get to Maintenance planner screen, perform one of the following options:

- Right-click on a machine from the hierarchy view or workspace then select **Maintenance planner**.
- Select a machine, then click  **Maintenance planner** icon on the toolbar.

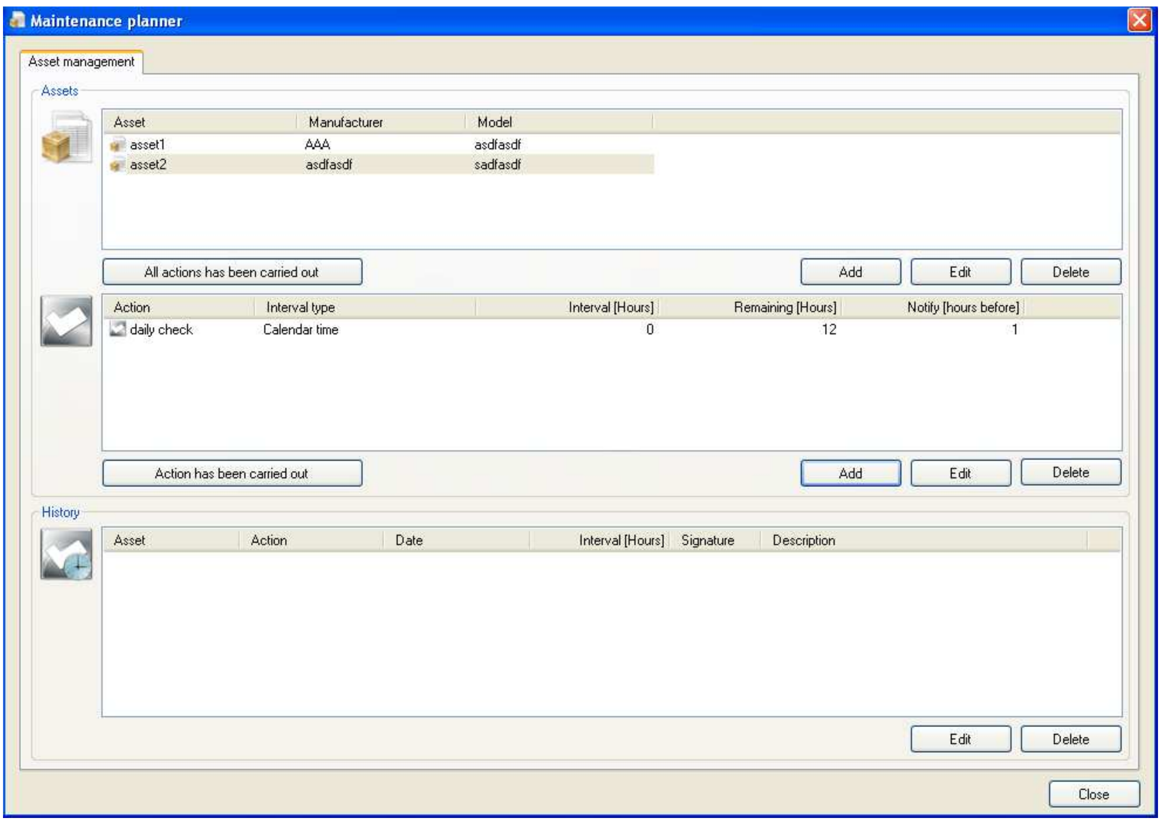


Figure 5 - 71.
Example of Maintenance Planner.

Asset management enables you to add, edit or delete assets along with assets maintenance task actions. Note that an asset has to be assigned first before a maintenance task action can be added, edited or deleted.

History displays the executed maintenance tasks of the selected asset. History items can be edited or deleted.

Measurement Date

 Measurement date interface lists the measurement date of the selected measurement point. It configures the storage information of the selected measurement data from the list.

Measurements list displays data information. Keep forever means that the selected measurement is set as a reference forever until it is edited otherwise.

Edit enables you to change the date, time, option to keep forever or not, option to exclude from diagnosis, speed, and process data.

Delete deletes the selected measurement data from the database.

Add enables you to add data tagging specific information for Software data tagging points only.

Export ODS data exports a selected measurement incident to a universal file format (UFF) which then can be imported into a software that can do machine movement animation such as ME' Scope.

To open the **Meas. Date** interface, select a machine > select a measurement point > then click the Meas. date tool in the toolbar.

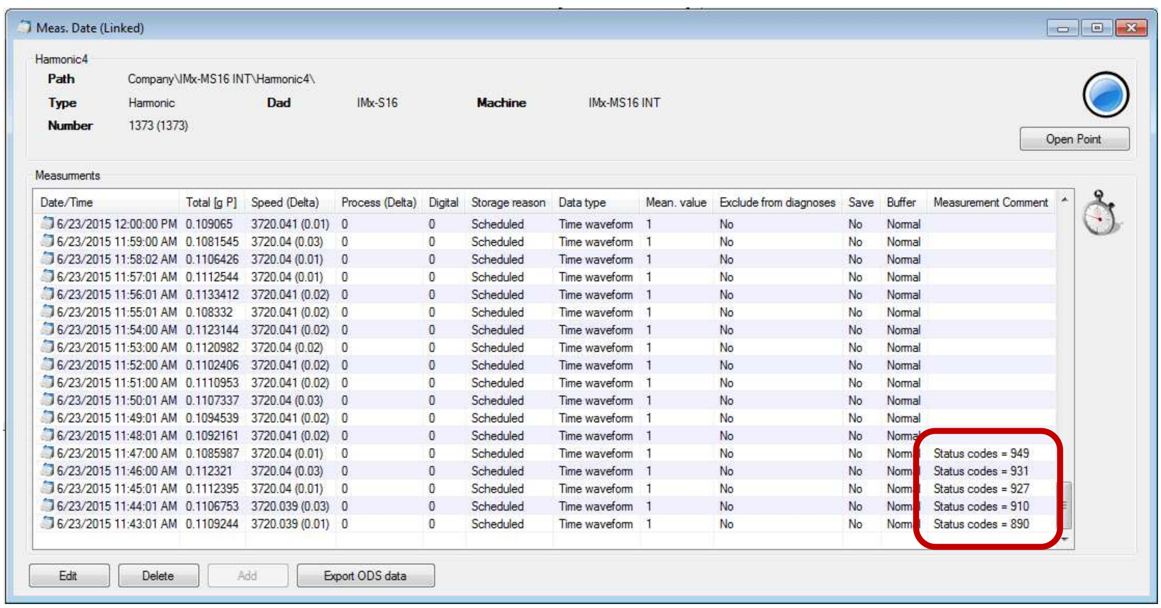


Figure 5 - 72.
Example of the Meas. Date Window with Measurement Comments.

- Note that you can use the Buffer to control and filter what data is retrieved from the database into the **Meas. Date** window

A Note about Measurement Comments and Status Codes

The final column is **Measurement Comment**. The comments displayed provide additional information to aid in analysis, for example, IEC status codes. These IEC status codes can be requested and stored if you have the the license module "IEC 61850" installed. This license module applies only to the following devices: IMx-W, IMx-C, IMx-S. IMx-T and IMx-B.

If a specific measurement shows IEC status codes in the **Measurement Comment** column, then the same status codes display when the measurement is opened in any graph. The status codes are also visible in printouts.

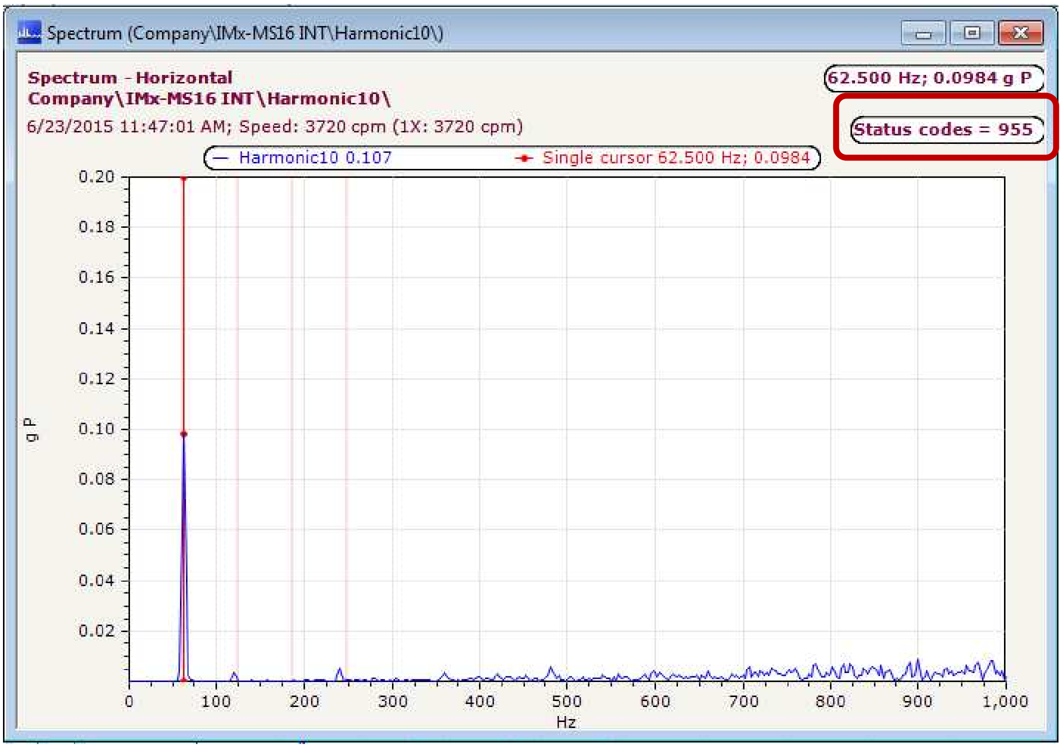


Figure 5 - 73.
Example of a Spectrum Plot with Status Codes Displayed.

6
Menu Items

The following are the menu items available in @ptitude Observer.

- File
- Edit
- Show
- Database
- On-line
- Portables
- Window
- Help

File

File menu provides the following interfaces.

- Manage databases
- Add external database
- Remove external database
- Report
- Log off
- Exit

Manage Databases

Manage databases interface provides the ability to connect to a database or jump from one database to another within @ptitude Observer without leaving the current log-on session. This is an important asset when you have to analyze data spread over several databases. You may add a new database and edit or remove an existing database.

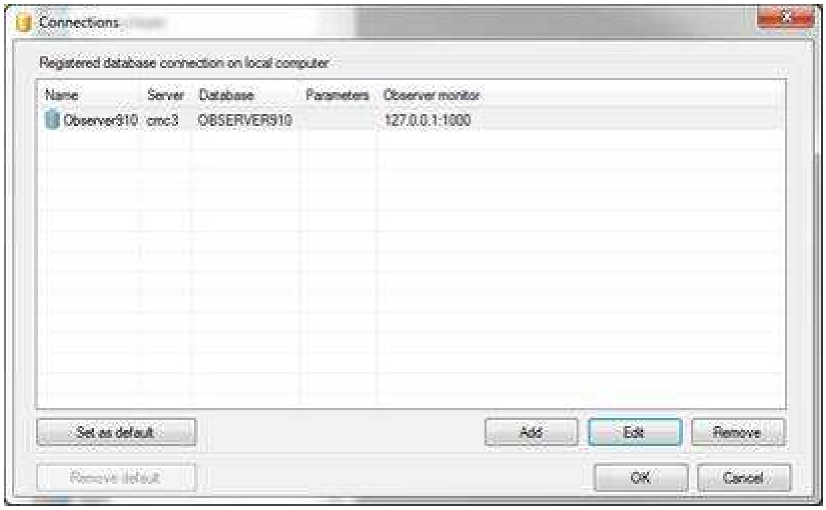


Figure 6 - 1.
Example of Database Connections.

Set as default sets a database as a default database with which the system starts.

Remove default removes the default database setting.

Adding/Editing a Database

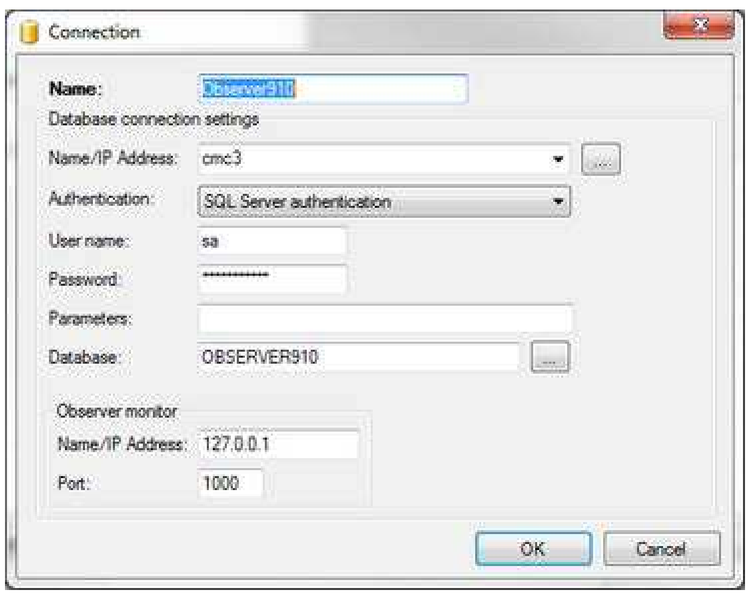


Figure 6 - 2.
Example of Database Connection Settings.

Name identifies the registered database connection on local computer.

Name/IP Address is the server name/IP address entered or selected from the list of detected servers. (local) refers to the computer on which @ptitude Observer is currently running.

Authentication is for SQL Server only. You can select between *Windows authentication* and *SQL Server authentication*.

Windows authentication is applicable if connecting to an SQL server in the same domain as your computer with a common domain controller, or if the SQL server is installed on the local computer.

SQL Server authentication should, and can be used in all other scenarios.

User name is the database user name.

Password is the password for the user.

Parameters enables you to enter any additional parameter to the database connection. For example, *Network=DBMSSOCN* means that the connection should be forced to use TCP/IP protocol. *Auto translate=false* can resolve DBCS character issues on systems with DBCS languages such as Korean, Japanese and Chinese.

Database specifies which database to use. You may select a database to connect from the drop-down list. The list includes all available @ptiude Observer databases on the specific database server.

Observer monitor settings are *Name/IP address* and *Port* of the @ptitude Observer Monitor that is serving the database server you are about to select. This setting assigns which port the monitor should use to communicate with @ptitude Observer and IMx devices. The port default value is 1000.

The port setting should be the same number as the monitor service has been registered to run with using the "@ptitude Observer Monitor service manager" software.

Add External Database

Add external database interface enables you to add an external database registration to the hierarchy. In an enterprise solution where it is common that you work in several databases, it is convenient to add the databases as external databases which then enables you to access all databases from the same hierarchy. The external database can be a database on the same database server or it can be on a different server.

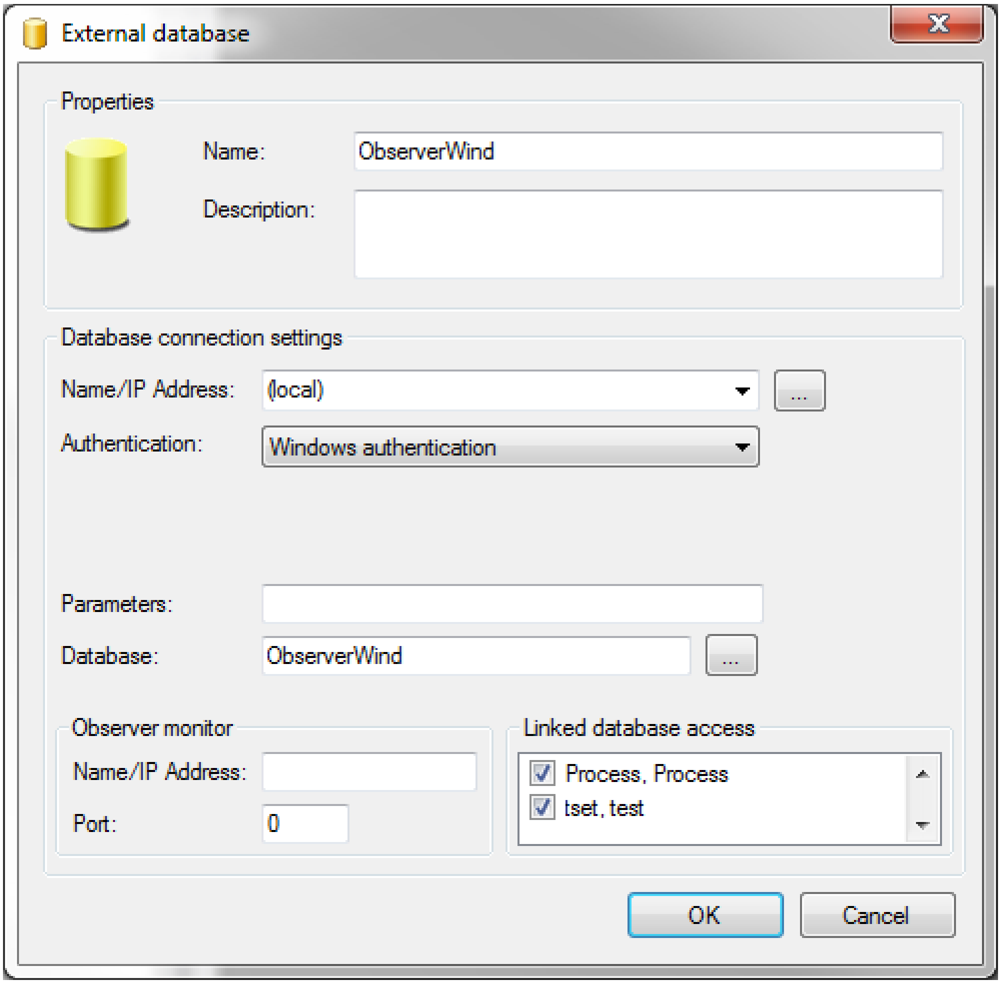


Figure 6 - 3.
Example of Add External Database.

Properties Name is what you would like to call the external database.

Properties Description is information about the external database.

The attributions of **Database connection settings** are same as in Connection interface of Add/Editing a Database under Manage Databases.

Linked database access grants user(s) access to the specified external database.

Remove External Database

Remove external database removes the selected external database from the hierarchy view. Note that It is not possible to remove the main database.

Report

Report interface enables you to generate documents that contain text based information as well as diagrams and pictures of selected data.

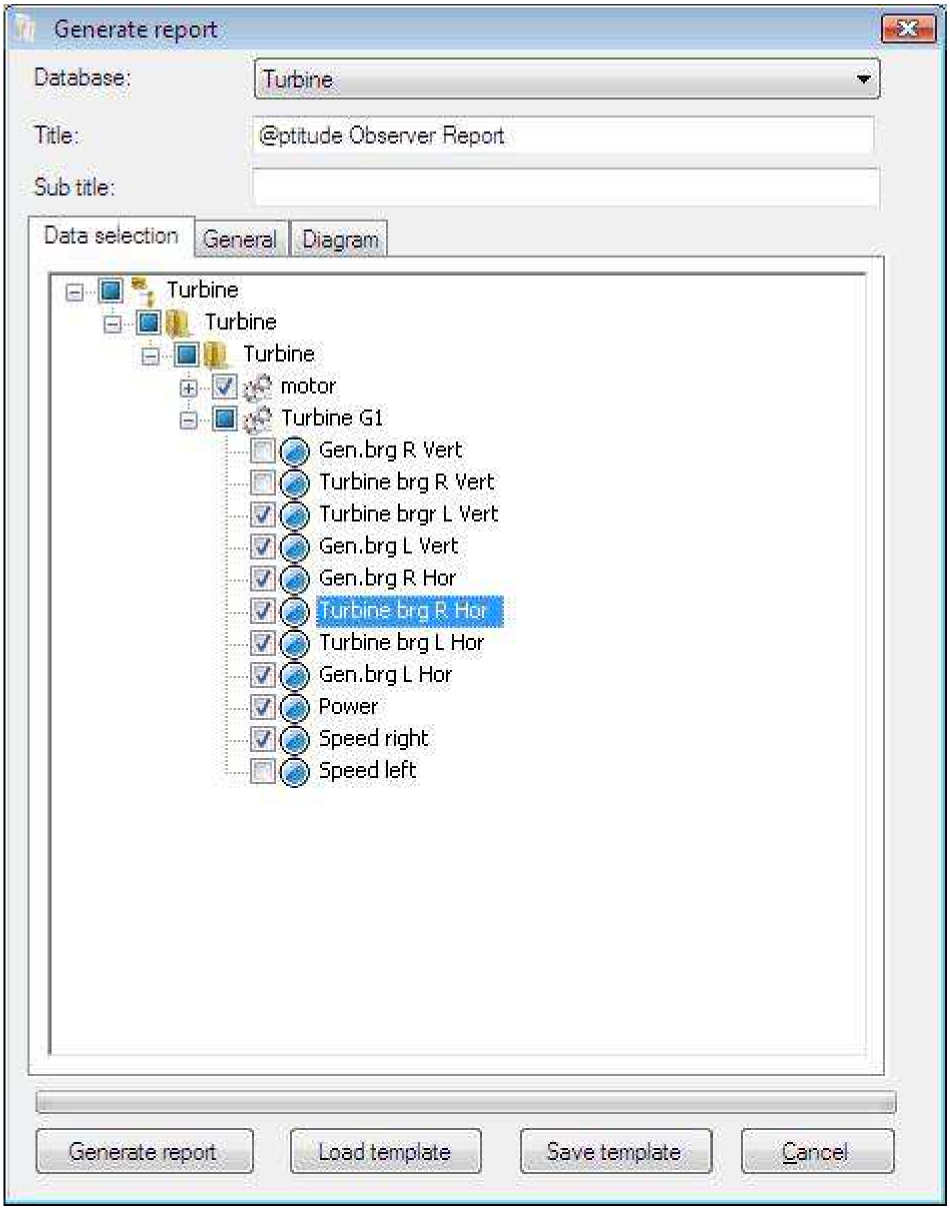


Figure 6 - 4.
Example of Select Data for Report.

Database is the database from which this report will be generated.

Title is an identifying name given to the report.

Subtitle is a secondary, usually explanatory title.

Data Selection Tab

Data selection enables you to select exactly which machines and measurement points to include in the report.

General Tab

General sets formatting rules for the report and to select types of machine information that should be included. Different types of lists, like alarm lists can also be included.

Content prints the "Table of contents" at the beginning of the report, if checked.

Machine data prints the extended machine information for each machine included in the report, if checked.

Notes includes all the notes related to the selected machines during the date/time range entered, if checked.

Overall level includes the overall value list related to the selected measurement points from the date/time entered, if checked.

Alarm list includes alarm information related to the selected measurement points during the date/time range entered according to the filtering option and status option, if checked.

Page break between machines forces a page break on the printout between machines, if checked.

Show report automatically when generating shows the report in the selected format after the creation of the report has been finished, if checked.

Send report to printer sends the report immediately to a printer after it has been created, if checked.

Keep temporary files keeps all the temporary files required for the creation of the report including pictures, if checked.

Diagram Tab

Diagram allows you to select desired graph settings to be included in the report along with date or value range.

Load template loads report settings.

Save template saves report settings you have created as a template.

Log Off

Log off logs the current user off and allows another user to log on to the system.

Exit

Exit stops the current system session.

Edit

Edit menu provides the following interfaces.

- Multiple point update wizard
- Workspace
- Copy node (Ctrl+C)

- Paste (Ctrl+V)
- Notes
- Event cases
- User preferences
- Properties

Multiple Point Update Wizard

Refer to Multiple Point Update Wizard in System Configuration.

Workspace

Workspace interface brings up the workspace manager screen. A workspace is a specific part of the hierarchy that should be grouped together. For example, a workspace can be grouped by a user's responsibility. The workspace manager keeps track of all the workspaces in a database and enables you to create new workspaces or edit already existing ones. For portable data collectors, a workspace can be used as a way to define certain machines of which the user needs to keep track.

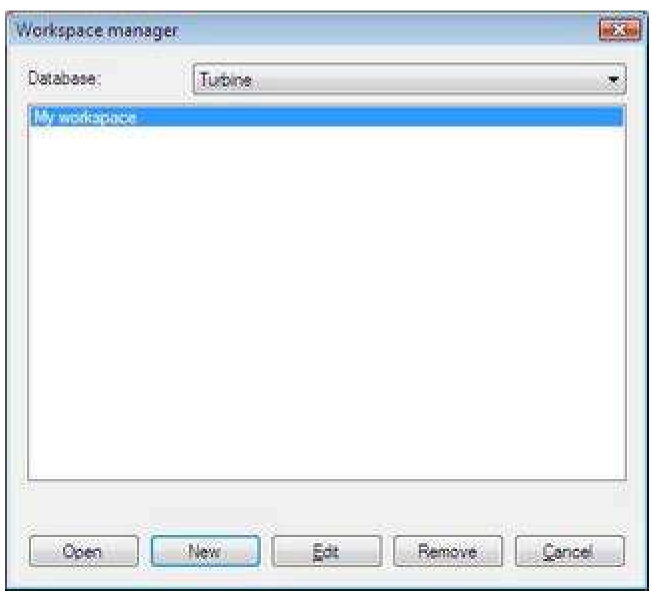


Figure 6 - 5.
Example of Workspace Manager.

Database is where the workspace you would be working with resides.

Open displays the selected workspace from the workspace manager screen in the workspace view of tree view window.

New enables you to create a new workspace.

Edit enables you to change the currently selected workspace.

Remove enables you to delete the workspace from the database.

Cancel closes the workspace manager window.

Editing a Workspace

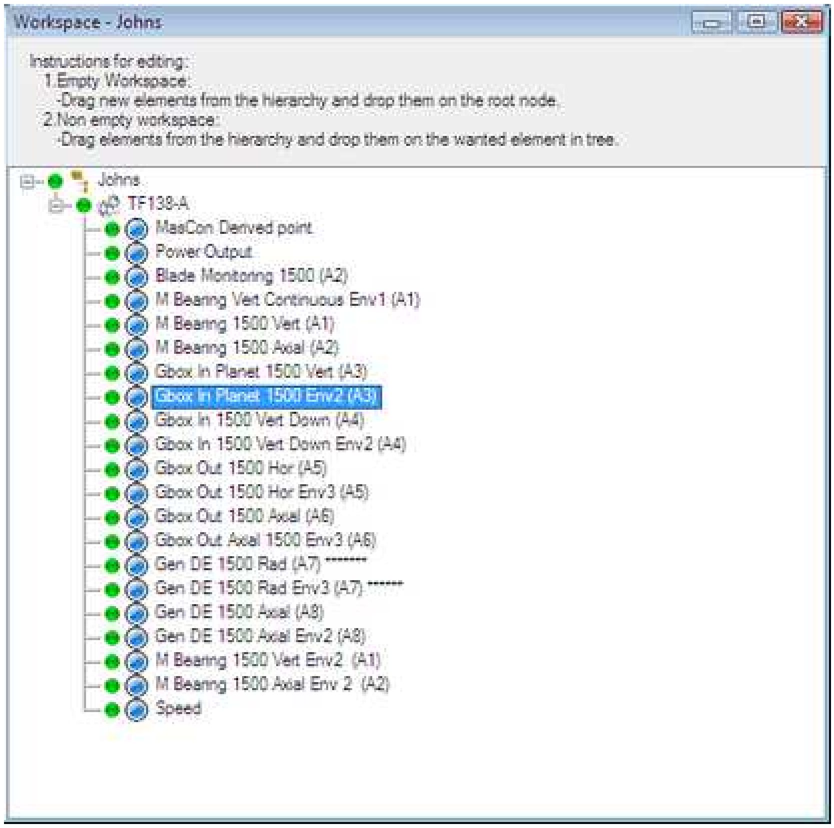


Figure 6 - 6.
Example of Workspace.

In order to configure the workspace contents, drag an element from the hierarchy view to the workspace on the location where the node should be positioned then drop it.

Available Interfaces for different level of nodes are the same as in Hierarchy View.

Copy Node

Copy node (Ctrl+C) interface enables copying a selected node in the hierarchy to memory. If a machine or a sub machine is selected, the machine copy wizard will start and guide you through the copy process. Refer to Machine Copy Wizard in System Configuration.

Paste

Paste (Ctrl+V) interface enables pasting the copied measurement point from the memory to the selected location in the hierarchy view.

Notes

This interface displays a list of notes for the selected object in the hierarchy. Refer to Notes in System Operation.

Event Cases

Event cases can be created in the Observer system in order to keep track and document reports, information and history regarding a specific event tied to a specific machine. Refer to Event Cases in System Operation section.

User Preferences

User preferences interface is where all the customized settings for the individual users are set.

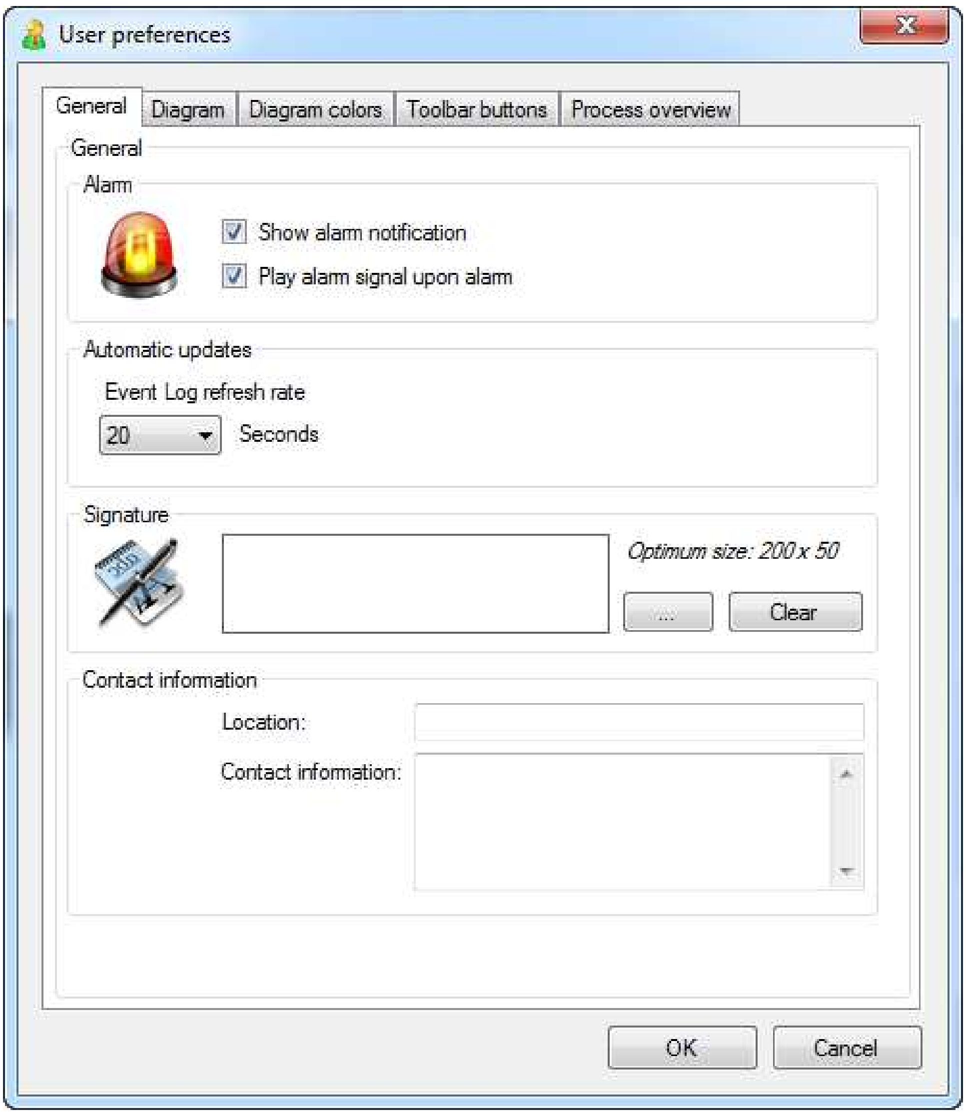


Figure 6 - 7.
Example of User Preferences Settings, General Tab.

General Tab

Show alarm notification displays a flashing alarm icon on the top right corner of Observer screen upon alarm, if this field is checked.

Play alarm signal upon alarm triggers the sound through the speakers of the computer upon alarm, if this field is checked.

Event Log refresh rate tells the software how often the Event Log window shall be refreshed if it is open and the Auto refresh is enabled. **NOTE**: If this setting is set too low, then it will cause tremendous stress to the application as well as database.

Signature enables you to insert your own handwritten signature. This signature can automatically be written to event case report printouts.

Contact information sets the contact information for the user.

Diagram Tab

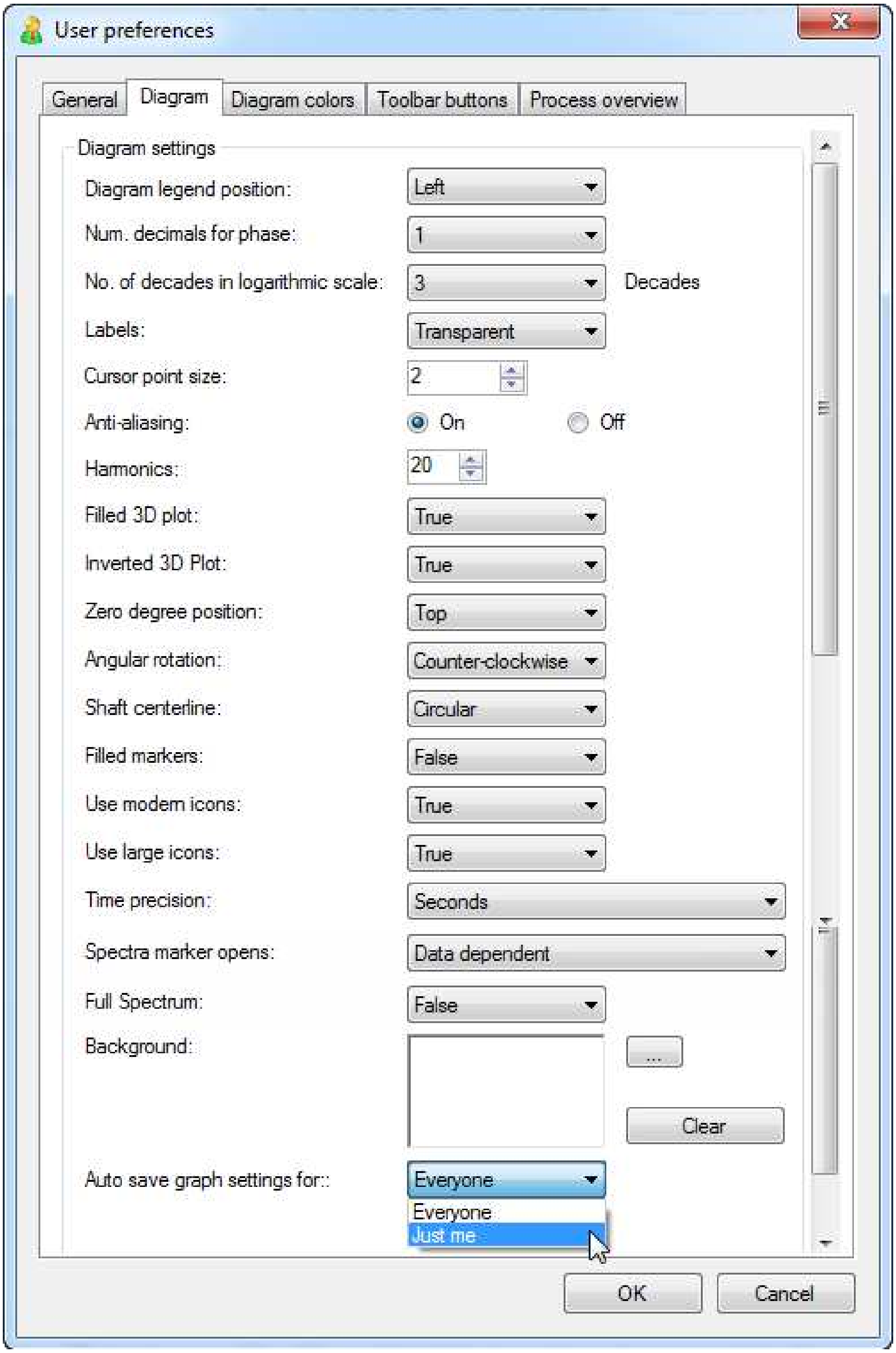


Figure 6 - 8.
User Preferences, Diagram Tab.

Diagram legend position sets the preferred position of the legend available in most graphs. Note that different legend positions are available for different types of graphs. If the specified position is not available for a specific graph, then the software will choose and appropriate position for you automatically.

Num. decimals for phase sets the number of decimals to display for phase in the Trend, Polar and Trend List graphic displays.

No. of decades in logarithmic scale changes the way the logarithmic scale works for graphs. It can be between 2 and 5 decades.

Labels determines how to display labels in graphs. Labels can be set to be displayed as transparent as well.

Cursor point size sets the size of the cursor points for single cursors and other tools mostly for the phase spectrum and time waveform graphs.

Anti-aliasing determines if graphs should be displayed with smoothing (anti-aliasing) *On* or *Off*. Some users prefer to display graphics in any application as anti-aliased. However, in order to analyze data sometimes it is easier to detect a problem with anti-aliasing off.

Harmonics sets the number of harmonics for the harmonic cursor. It can be between 10 and 200.

Filled 3D plot

True fills the spectrum area as shown in the 3D plot graph display.

False makes the areas transparent.

Inverted 3D Plot inverts the depth scale of the 3D plot.

Zero degree position is the position of 0° in Polar type plots.

Angular rotation determines which direction of the angle increase in Polar type plots.

Shaft centerline determines if the shaft centerline plot should be visualized in circular or square format.

Filled markers shows the point markers as filled or transparent in some diagrams

True shows the point markers as filled in some graphic displays.

False shows the point markers transparent in some graphic displays.

Use modern icons shows modern icons if checked True. Otherwise older versions of icons are displayed.

True displays modern icons.

False displays older version of icons.

Use large icons shows bigger icons if checked True. Otherwise, the system displays small icons.

Time precision sets the detailed level of the second fraction of the time in the plots.

Spectra marker opens sets which the preferred plot type to open when the user clicks the left mouse button a ‘diamond’ marker in the trend plot. If the specific measurement does not contain enough information to render the preferred plot, the software will automatically choose the most appropriate plot. Right-clicking on the 'diamond' spectra marker in a trend plot allows the user to pick from a selection of plots to open.

Full spectrum sets the preferred spectrum Mode to be opened when displaying spectra in the application. If set to 'true', the application will display the data opened in plots in Full Spectrum mode if the measurement and measurement point support it.

Background specifies the background image of graphs. The default is watermark image.

Auto save graph settings for sets the preferred scope of the graph setting changes. The default is *Everyone*, which shares the graph settings with all users. If set to *Just me*, then the graph settings are private and saved only for the current user.

Diagram colors Tab

Here are all the available options for different colors in the graph. You can change everything from the background color of the graph to the color of tools.

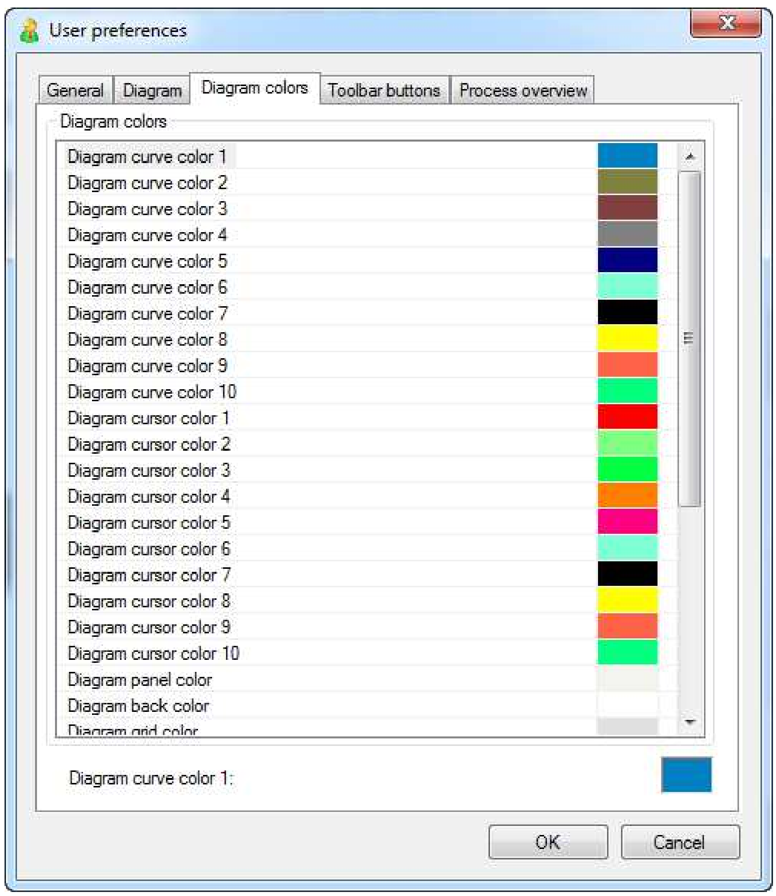


Figure 6 - 9.
User Preferences, Diagram Colors Tab.

Toolbar buttons Tab

Here you may choose only certain toolbar buttons to be displayed.

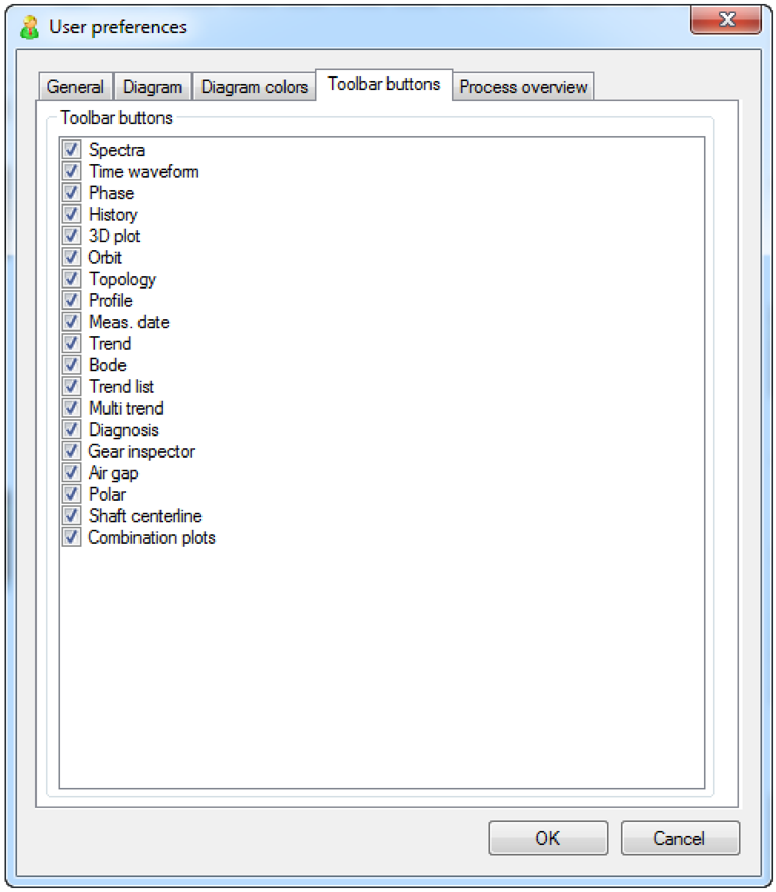


Figure 6 - 10.
User Preferences, Toolbar Buttons Tab.

<u>**Process overview Tab**</u>

You can configure some of the Process Overview user preference settings to enhance viewing the Process Overview. You can customize your view by selecting to enlarge the icons, setting the update rate and changing the colors of the background and text. You can access **User preferences** from either **Edit > User preferences** or by right-clicking in the Process overview and selecting **User preferences**.

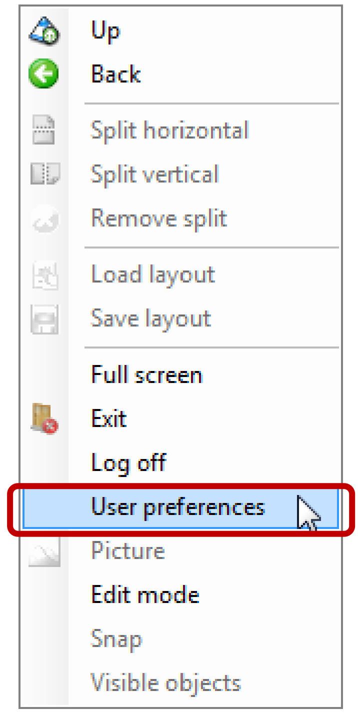


Figure 6 - 11.
Right-Click Context Menu, Edit Mode and User Preferences.

To customize the Process overview settings:

- In the **User preferences** dialog, click the **Process overview** tab to open it.

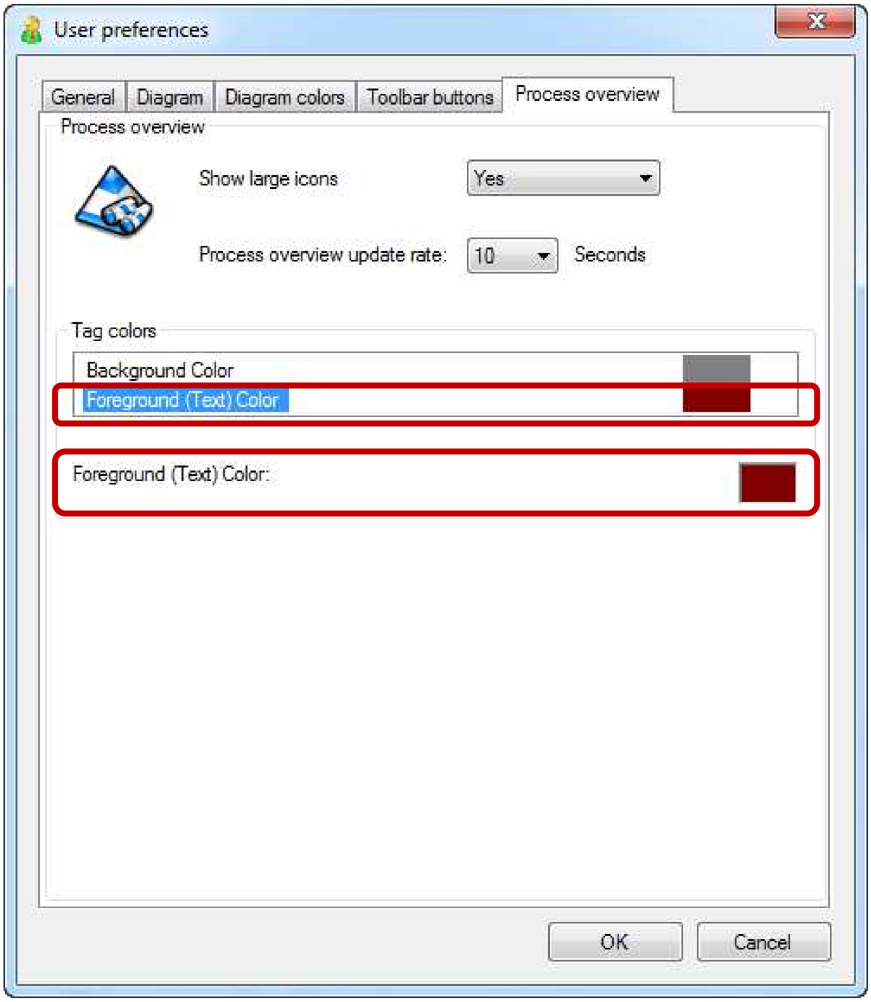


Figure 6 - 12.
User Preferences, Process Overview Tab.

- If you select **Yes** for **Show large Icons**, the status icons will be maximized. With this option, the status icons expand in size proportional to the overall size of the tag (details are presented below). If **No** is selected, the status icons remain normal size.
  - ➢ Note that the maximum size of a status icon is 100x100 pixels.
- **Process overview update rate** can be set between 1 and 30 seconds. This tells the software how often the process overview display should ask the @ptitude Observer Monitor computer for new values to display in the process overview.

WARNING! If this value is set too low, it will cause tremendous stress to the application as well as the database.

In the **Tag colors** section, you can change the background or foreground (text) color.

- Click on the text portion of the label **Background Color**. Notice that label below for the picture box also says **Background Color**.
- Click on the picture box to open the **color control dialog**.

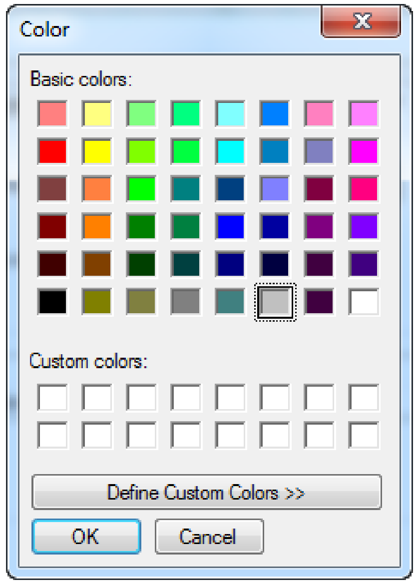


Figure 6 - 13.
Color Control Dialog.

- Select the desired background color and then click **OK** in the dialog. The color in the picture box and in the color box of the **Background Color** row update to the selected color.

Change the text color in the same way:

- Click on the text portion of the label **Foreground (Text) Color**. Notice that label below for the picture box also says **Foreground (Text) Color**.
- Click on the picture box to open the **color control dialog**.
- Select the desired text color and then click **OK** in the dialog. The color in the picture box and in the color box of the **Foreground (Text) Color** row update to the selected color.
- Click **OK** to save your **Process overview** user preferences.

Back in the workspace, the tags will reflect your new background and text color selections.

To manually enlarge the tags:

- If **Show large Icons** is set to **Yes**, select a tag and catch the corner(s) to manually enlarge it. You may catch the lower right corner (a diagonal arrow appears) to enlarge the tag both vertically and horizontally. When an arrow appears at the bottom edge, you can stretch the tag vertically only; when an arrow appears at the right edge, you can stretch the tag horizontally only.
    - ➢ The maximum size of a status icon is 100x100 pixels.

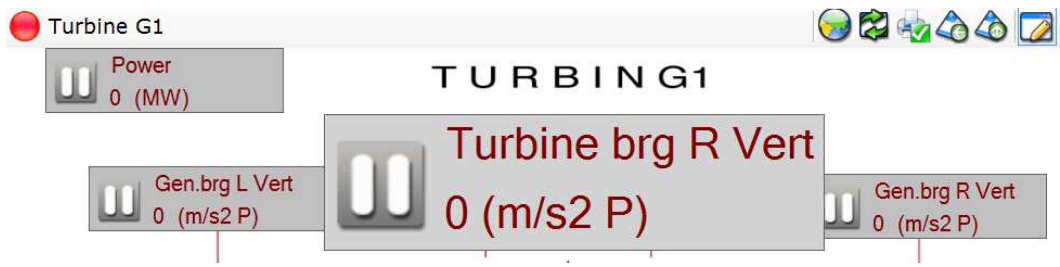


Figure 6 - 14.
Example of an Enlarged Process Overview Icon/Tag.

Properties

This interface provides properties of the selected item in the hierarchy view, system view or workspace view.

For measurement point properties refer to Setting up Measurement Points and Alarms in System Configuration.

For machine properties refer to Machine Properties under Creating IMx/MasCon Devices and Channels in System Configuration.

For node properties refer to Node under Building a Hierarchy View in System Configuration.

For database properties refer to Add External Database under File in Menu Items.

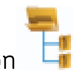
Show

Show menu provides the following interfaces.

- Tree view
- Filter
- Hierarchy
- System
- Workspace
- Diagram View
- Protection View
- Alarm list
- System alarm
- Maintenance Overview
- Message Center
- Refresh
- Dashboard

Tree View

Tree view shows or hides the tree view window containing the hierarchy view, system view, workspace view, Diagram view and Protection view. Refer to Tree View in System Operation. Hiding the tree view window provides more area available for graphs on the screen.

This interface can also be accessed by clicking on  **Show treeview** icon on the toolbar.

Filter

This interface filters the hierarchy view according to the set of rules specified by users.

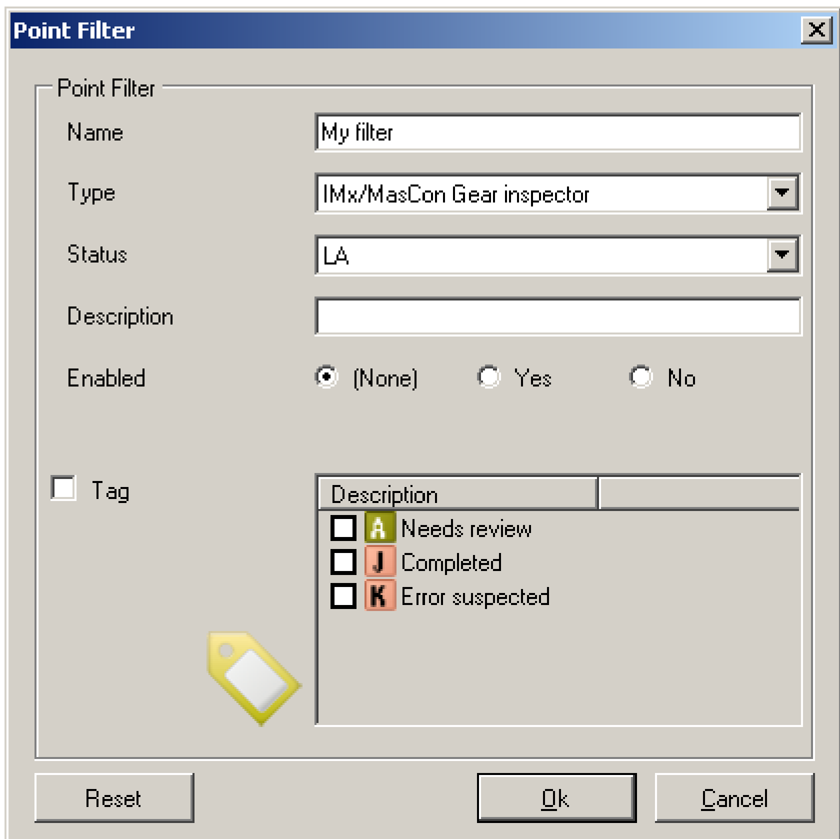


Figure 6 - 15.
Pointer Filter.

Name is the name of the filter to use.

Type is the type of points you would like to see which can be selected from the drop-down list.

Status is the status of points you would like to see which can be selected from the drop-down list.

Description is the description of the points you would like to see.

Enabled displays points according to the value you decided.

None displays all the points regardless of whether they are enabled or disabled.

Yes displays only the points which are enabled.

No displays only the points which are disabled.

Tag is used to filter by the selected tag(s).

Reset sets filter settings back to the system generated settings.

Hierarchy

Hierarchy view brings up the hierarchy view in the tree view window. Refer to Hierarchy ViewHierarchy ViewHierarchy View under Tree View in System Operation.

System

System brings up the system view in the tree view window. Refer to System View under Tree View in System Operation.

Workspace

Workspace brings up the workspace in the tree view window. Refer to Workspace under Tree View in System Operation.

Diagram View

Diagram View brings up the hierarchical view of saved diagram boxes in the tree view window. Refer to Diagram View under Tree View in System Operation.

Protection View

Protection View brings up the IMx-M Protection configuration hierarchy view in the tree view window. Refer to Protection View under Tree View in System Operation.

Alarm List

Alarm list interface brings up the alarm list for the selected item in the hierarchy view and displays all the alarms under this item and sub-items in the alarm list. The alarm list can also be opened by clicking on  **Alarm list** icon on the toolbar.

By default the alarm list is linked to the hierarchy view. Therefore, the alarm list gets refreshed every time a new node is selected in the hierarchy view. The link status is indicated by *[Alarm list(Linked)]* keyword on the top of the screen. The link can be turned off by clicking on  **link to hierarchy** icon on the toolbar.

Filter

Not acknowledged: the alarms that have not been recognized and not analyzed by any user yet.

Acknowledged: the alarms that have been acknowledged by any user.

None: all alarms regardless of the acknowledgement status.

Acknowledge all acknowledges all the alarms.

Acknowledge acknowledges only the selected alarm(s).

Refresh reloads the alarm list.

Print prints the alarm list.

Alarm list can be sorted by any column.

System Alarm

The System alarm interface shows measurements out of range and system related alarms such as defective sensors, cables, etc. In addition, the @ptitude Observer Monitor startups and a loss of contact between MasCon device and the @ptitude Observer Monitor are registered as well. This is a good place to start for troubleshooting a hardware error.

System alarms are categorized into 'Normal' system alarms and 'critical' system alarms. The critical system alarms are more severe and require more attention from the user than normal system alarms. If a critical system alarm is registered in the system, the system alarm icon in the toolbar will start blinking drawing the user's attention. Upon opening the system alarm list, and additional list will be displayed in the top listing the critical system alarm.

System alarm list can be sorted by any column. The attributes of the system alarm settings are the same as in Alarm List, above.

Maintenance Overview

 Maintenance overview interface enables review of the maintenance tasks scheduled in the future. You can review the maintenance tasks whether they have been notified but not yet executed, or they are overdue. The description on how to set maintenance tasks is found in Maintenance Planner under System Operation section.

Message Center

Message Center interface enables the user to send/receive messages to/from other users within Observer. This can be a helpful tool for those who work in the same database to notify and communicate with each other.

Refresh

This interface forces to refresh the hierarchy view, system view or workspace view.

Refresh can also be accessed by clicking on  **Refresh** icon on the toolbar.

DASHBOARD

"DASHBOARD" screen provides Notifications, News Feed and Message Center interfaces which can be navigated by clicking on icons on the upper right-hand corner of the dashboard screen.

Notifications displays if there are any notifications of which the user should be aware.

News Feed informs users of new features in the currently released version. It is also accessible via News in Observer under Help menu tab.

Message Center enables the user to send/receive messages to/from other users within Observer. It is also accessible via Message Center under Show menu tab.

First time access to Dashboard displays Notifications.

The subsequent access to Dashboard displays one of three above interfaces that has been accessed most recently.

Database

Database menu provides the following interfaces.

- Users
- Database information
- System log
- IMx-M sync history
- Pictures
- Diagnoses
- Libraries
- Export
- Import
- Alarm group
- Measurement groups
- Options
- Delete data
- Data miner

Users

This interface brings up the Users window which displays existing users. You can also view the session history for each user and see which users are currently logged in. If you have the right to configure users, it is possible to add new users, and edit or delete existing users.

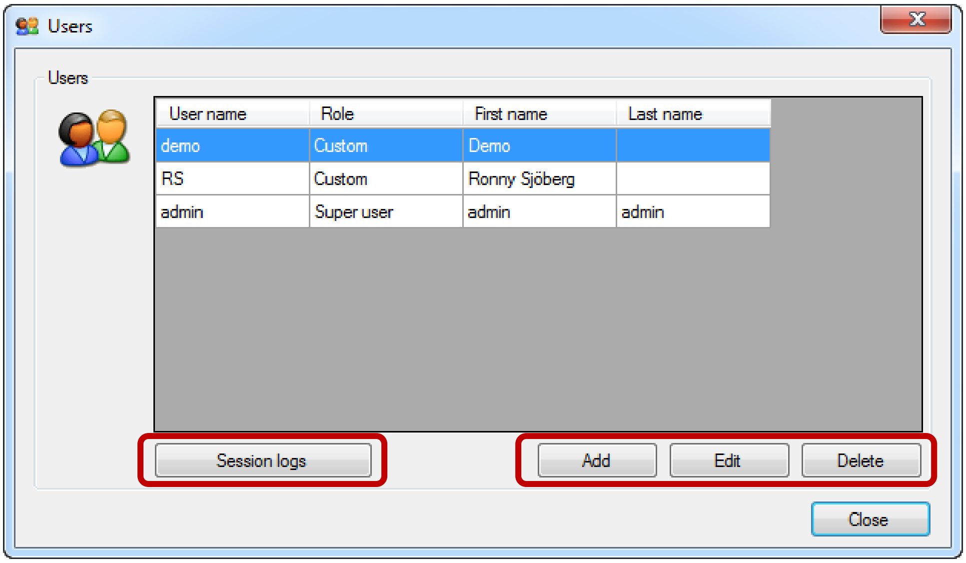


Figure 6 - 16.
Example of Users Dialog.

Viewing Session Logs and Current Users

Click the **Session logs** button to view the session history. This enables you to quickly see who was on the system and when.

- ➢ Only users of the default database are included; the users of external databases are not listed.

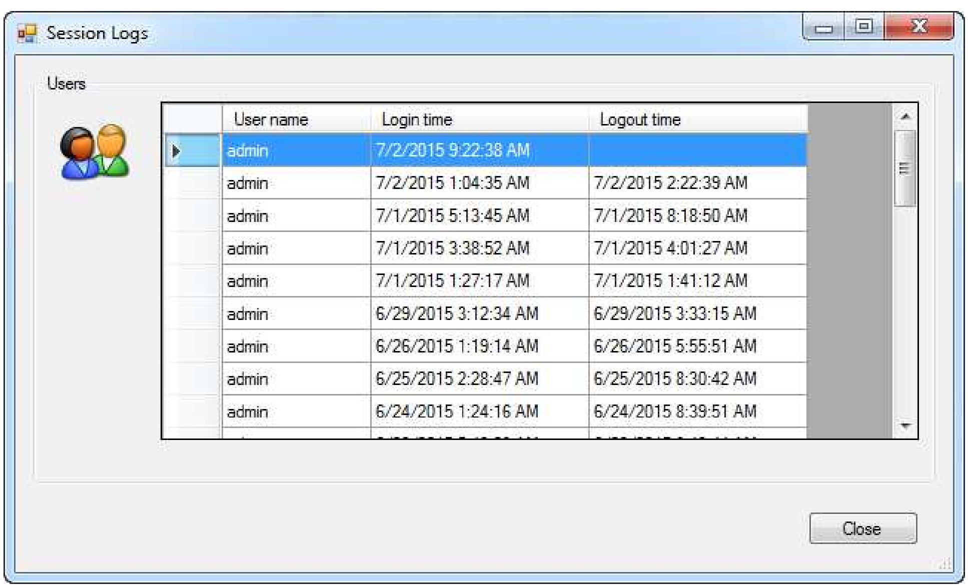


Figure 6 - 17.
Example of Session Logs Dialog.

The **Session Logs** dialog contains a read only list of all the sessions (User name, Login time, Logout time, if any) for all users of the default database - even users who may have been deleted. It is sorted by **User name** (ascending) and **Login time** (descending).

Please note that if the **Logout time i**s blank, then the user is considered to be logged in. If the user does not logout (via a session log out or normally exiting the program, the Logout time will be blank. This will occur if the application terminates abnormally.

When you want to see a list of users who are currently logged into the default database, click **Current users** on the lower right portion of the tool strip bar.

Figure 6 - 18.
Current Users on the Toolbar Strip.

The **Current users** dialog opens.

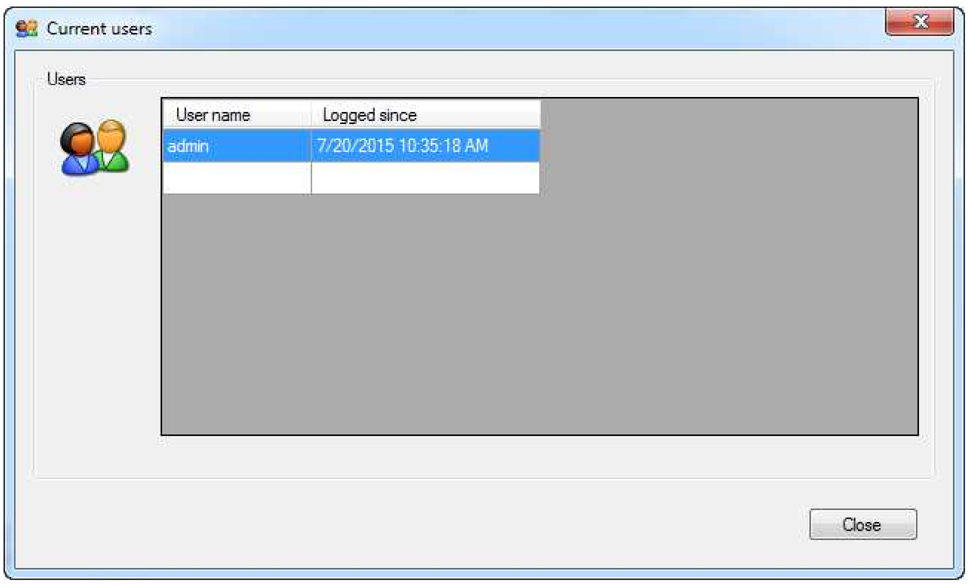


Figure 6 - 19.
Example of Current Users Dialog.

The **Current users** dialog displays a list of all the users who are currently logged in to the default database and when they logged in. You can use this list to help track who committed which changes. For example, if you know that a specific action (such as, created a machine, deleted data, etc.) was taken at certain time, you could use this dialog to determine who initiated the action.

Configuring a User

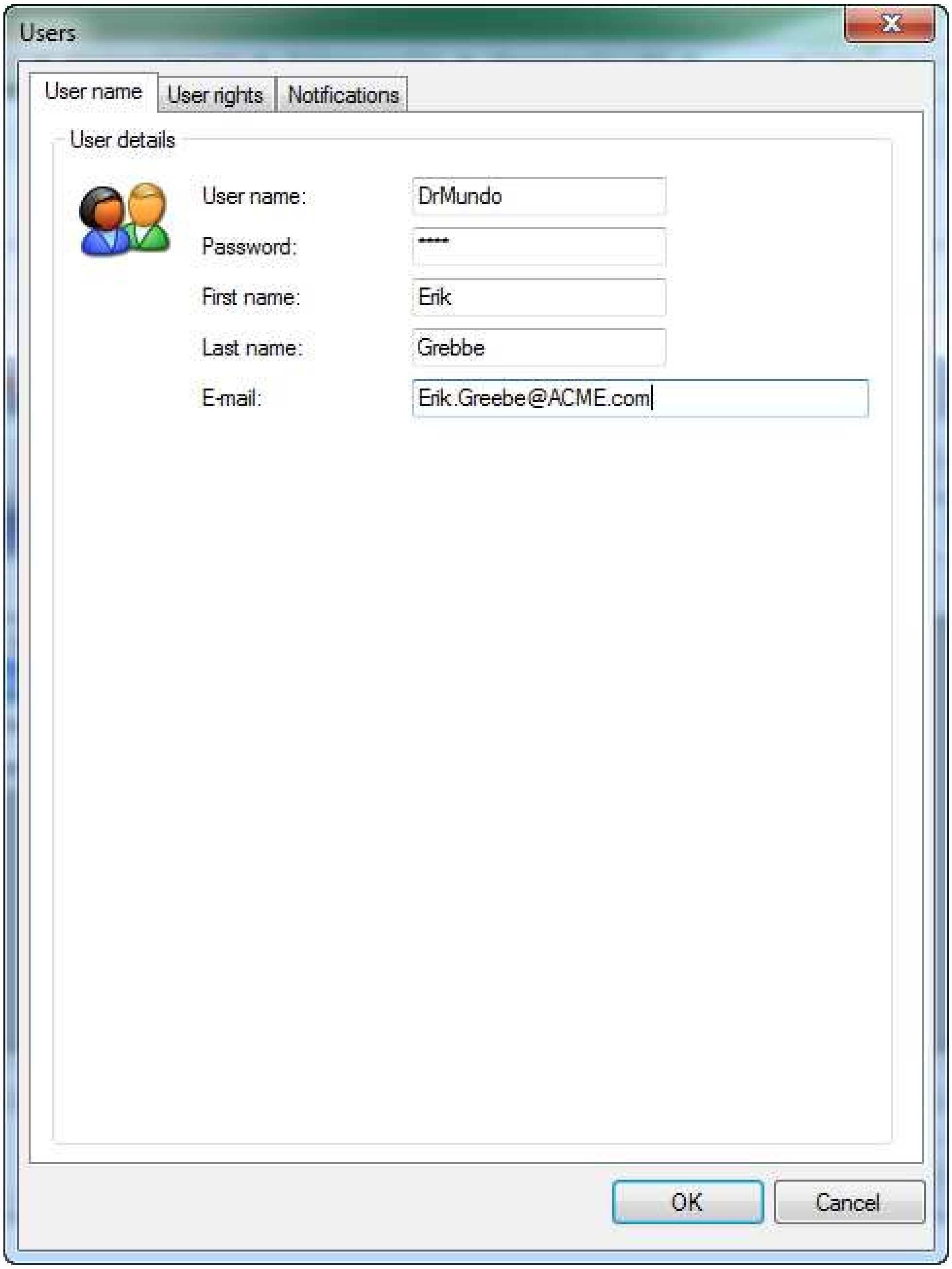


Figure 6 - 20.
Example of User Configuration.

User Details

User name is the login name of the user.

Password sets the password. User passwords are case sensitive.

First name is the user's real first name.

Last name is the user's real last name.

E-mail is the email address that will be used for notifications and/or status information selected.

User Rights Tab

Roles are pre-configured groupings of user rights.

Operator is designed for a typical system operator who does not analyze data but has the possibility to check and acknowledge incoming alarm and write new notes.

Analyst is designed for a typical analyst who has more user rights than an operator.

Super user has full access to @ptitude Observer and to all of its features.

Custom makes it possible to configure a user with the individual specific user rights.

Process viewer is designed for an operator who has the possibility to monitor and/or configure Process overview only.

User rights are privileges of the user. Privileges are assigned by the system according to the role. However, if the role is *Custom*, privileges can be hand selected.

– Acknowledge alarm allows the user to acknowledge alarms.
– Edit alarm conditions allows the user to edit alarm conditions.
– Configure system allows the user to configure how the system collects and stores data.
– Configure users allows the user to create new users and edit existing user privileges.
– Lock to process overview allows the user to only review and monitor Process overview.
– Configure process overview allows the user to review, monitor, and configure Process overview.
– Transfer measurement data allows the user to transfer measurement data as well as route lists.
– Edit Event Cases allows the user to edit event cases for machines.
– Config Attachment allows the user to add and edit attachments to machines.
– Config Node Tags allows the user to set and change tags in the hierarchy.
– Edit route list allows the user to create and edit route lists.
– Read Notes allows the user to view notes in the system.
– Edit notes allows the user to create and edit notes.
– Edit diagram boxes allows the user to create and edit the content in diagram boxes.
– Reset maintenance interval allows the user to reset the maintenance interval in the Maintenance Planner.

- MVB Configuration allows the user to be able to edit MVB Configuration which is available for IMx-R devices only.
- Read Event Cases allows the user to read event cases for machines.
- Read Attachments allows the user to open attachments saved on machines.
- Read Node Tags allows the user to see the node tags set in the hierarchy.
- Edit Protection allows the user to configure protection settings in the application including the protection explorer.

Linked Database Access grants access to the selected database(s).

Notifications Tab

Send Alarm notifications lets the user receive periodic emails about alarms whenever alarms are available at a system configurable interval. The alarm report interval is set at E-mail settings tab within Options interface under Database.

Send System alarm notifications lets the user receive periodic emails about system alarms whenever system alarms are available at a system configurable interval. The alarm report interval is set at E-mail settings tab within Options interface under Database.

Send Monitor service status information lets the user receive periodic emails about the condition and status of the monitor service in addition to database condition. The status report interval is set at E-mail settings tab within Options interface under Database.

Format offers three different types:

HTML can be used if your email provider supports displaying HTML emails.

Plain sends the email as plain text completely unformatted.

Truncated minimizes the size of the email which in turn contains less details in the email. This is especially useful if your emails are forwarded to a mobile phone as SMS.

Use Custom Topic is a specific topic which will be used whenever the system delivers the selected notification(s) to the user. This is useful when a user has en email provider who offers a phone number recognition as the topic, for example "+46 070 XXXX XXXX". In such case, if the use sets the Custom Topic to "+46 070 XXXX XXXX", the email notification(s) will be automatically forwarded to the specified number as SMS.

Database Information

Database information provides detail information on the SQL server database status.

To get to the database information screen:

- Click on **Database** on the toolbar, then select **Database information**.

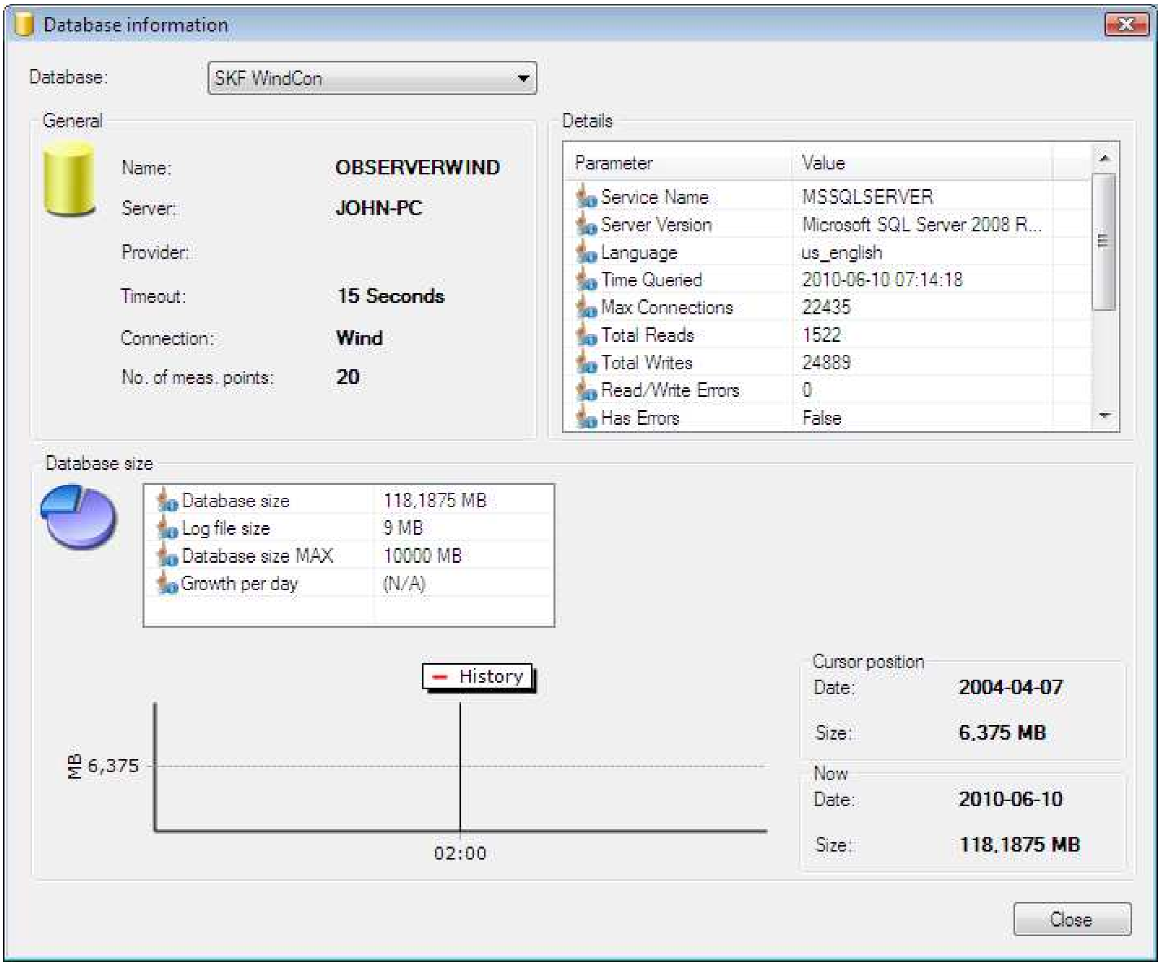


Figure 6 - 21.
Example of Database Information.

The database information displays the following:

- Current database situation of the selected database.
- Historical database growth trend with a predictive future trend if using on-line systems with @ptitude Observer Monitor.
- In-depth information about the SQL server operations.
- Memory information about the local computer.
- The total number of measurement points in the database

System Log

The system log is a list of the configuration changes made to the system.

This includes all types of measurement points, channel information and hardware configuration of IMx/MasCon devices.

However, if you want to see changes on a specific measurement point, channel or IMx/MasCon device, it can be done by clicking on **System log** at the measurement point screen, channel edit screen or IMx/MasCon edit screen respectively.

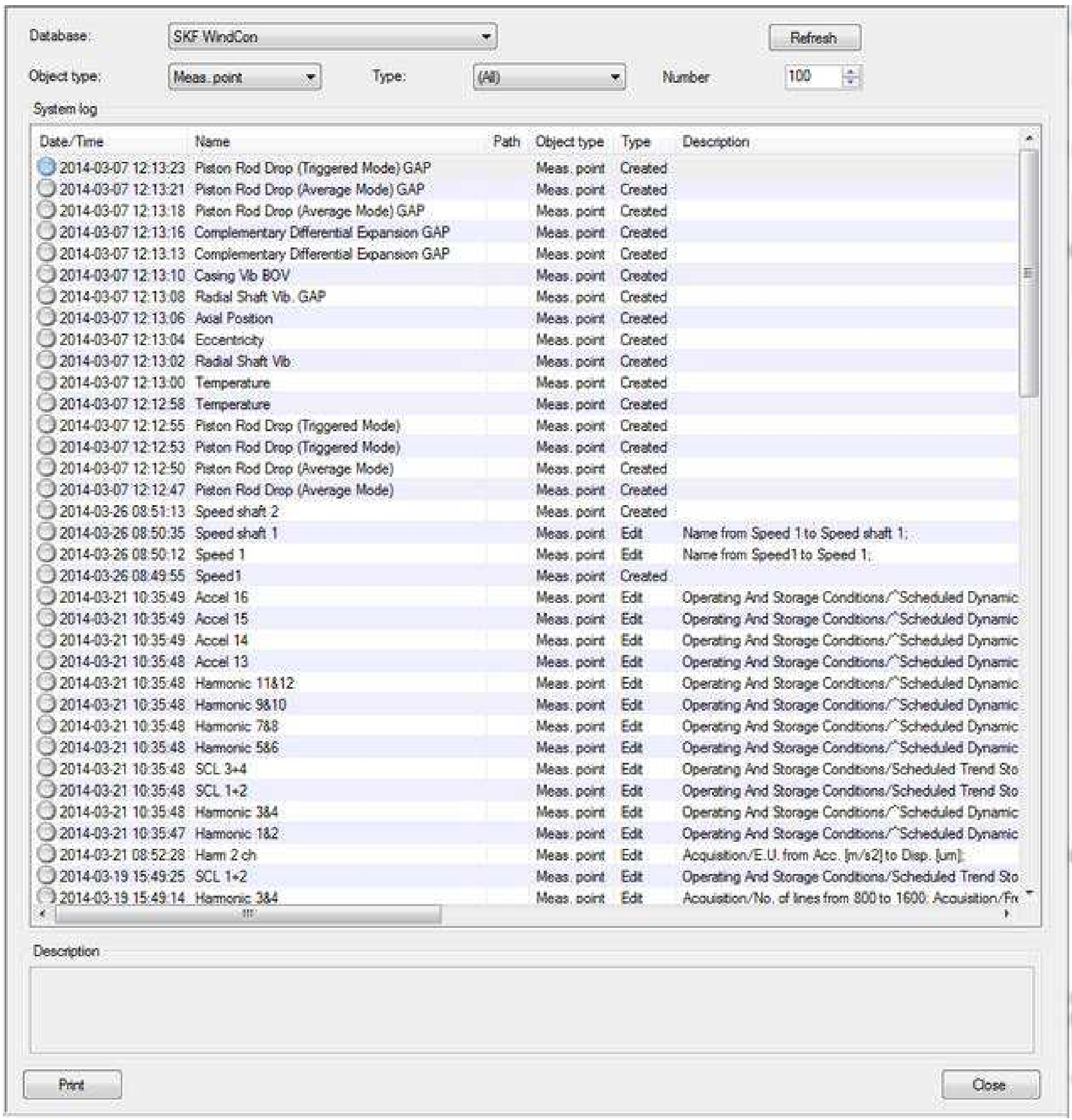


Figure 6 - 22.
Example of System Log.

The list can be filtered and grouped by database, object type, and type.

IMx-M Sync History

The IMx-M sync history shows a list of all successful synchronization between IMx-M devices and the system @ptitude Observer.

History Tab

In this tab the user can get an instant overview of of historical synchronization that has occurred for all IMx-M devices with its corresponding device number, CRC, sync date and other information. It is also possible to show history only for a selected device and compare information between devices. Note that an IMx-M protection device consists of 4 modules, where each module is considered as a single device.

Differences Tab

In this tab the user can see the configuration differences between the selected synchronization instances in the previous tab.

Pictures

Pictures interface gives you the capability to manage the pictures stored in the database. Pictures in the database can then be used to set up notes, process overview and graph display background of user preferences.

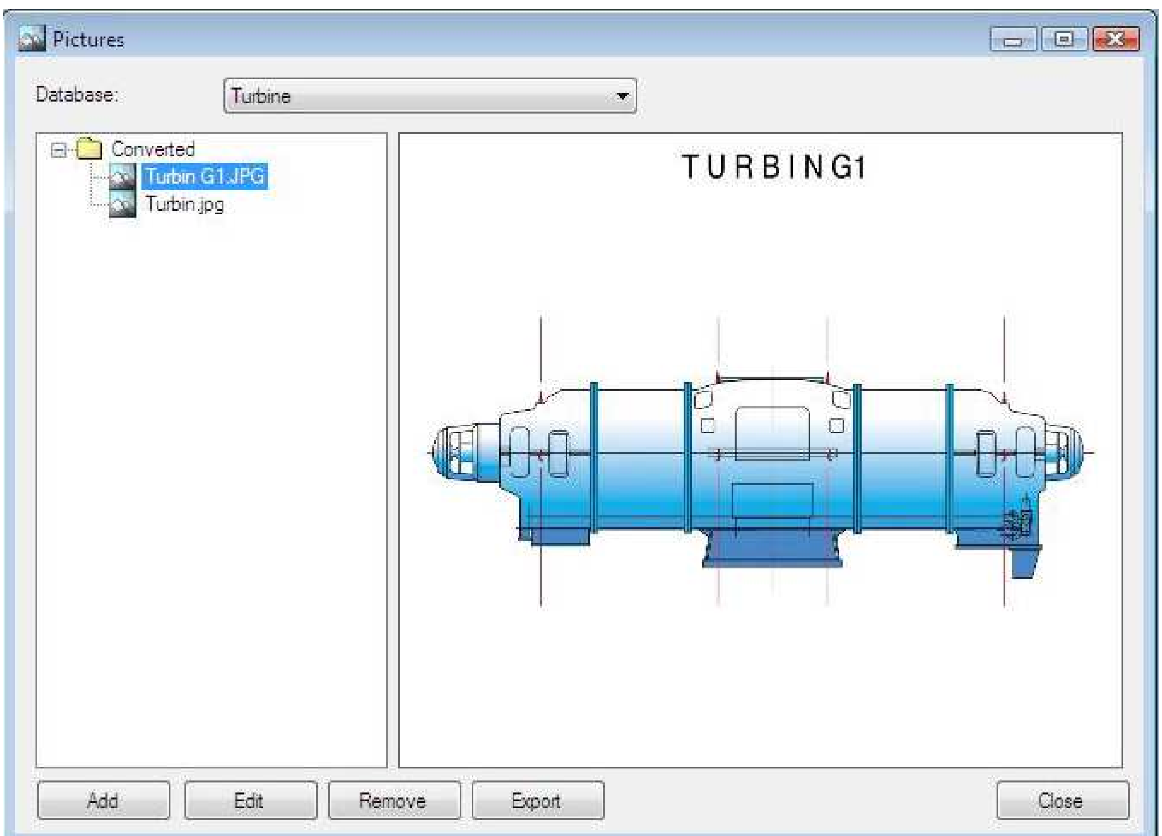


Figure 6 - 23.
Example of Pictures Interface.

Database is where the pictures you are to work with reside.

Add allows adding pictures to the database to be used for display purposes.

Edit replaces the current picture by another one.

Remove allows removing the selected picture from the database.

Export allows exporting the selected picture to a selected path. It can be used to transfer pictures between databases.

Diagnoses

Adding Diagnoses to a Machine

The diagnostics can distinguish between data captured in the different Operating Classes. When you are attaching a diagnosis, you can choose whether the diagnosis will use data captured in the different Operating Classes. This option is always editable, without regard to the particular diagnosis being a private diagnosis or not.

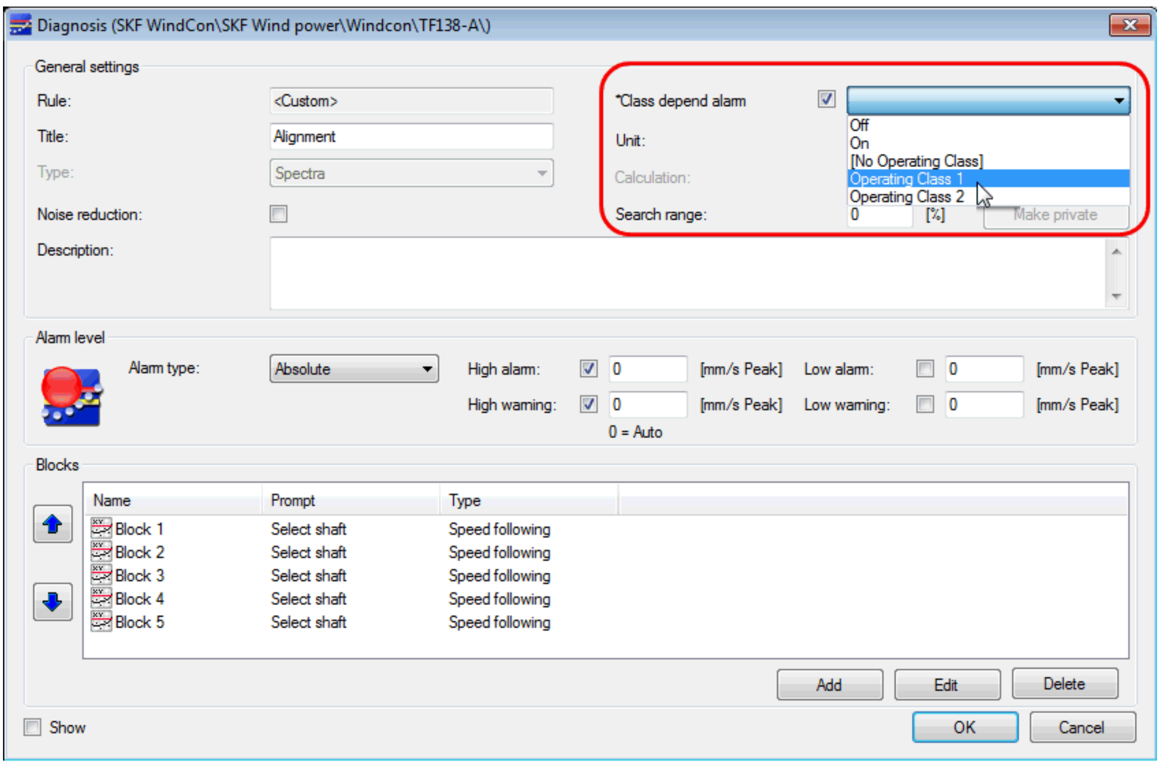


Figure 6 - 24.
Example of Diagnosis Dialog.

Select the **Class depend alarm** checkbox to enable the function. Then select the type of data to capture for the alarm:

Off (digital): operate in all conditions
On (digital): used with digital points, value true
No Operating Class: ignore the operating classes; use with multiple gating point (MGP)
Operating Class 1 [customized name]: use operating class 1 data only; use with multiple gating point (MGP)

Operating Class 2 [customized name]: use operating class 2 data only; use with multiple gating point (MGP)

The automatic alarms for the diagnosis will be calculated only in the specified operating class or digital state, and alarm only on the alarms in the specific class.

Diagnosis Rules

When viewing a frequency spectrum, it can be a difficult task to find out which machine part causes the particular frequency. To make this analysis easier, there are ready-made formulas which link frequencies and harmonics together with the correct machine part and correct cause of error. These formulas are called ***diagnosis*** in @ptitude Observer, and are an excellent tool to use which allows the system to automatically and intelligently diagnose machine and machine parts for possible fault modes.

The machine diagnostics are built from a specific set of rules which are called ***diagnostic rules***. There are two types of diagnostic rules, those defined by SKF are called ***Standard* diagnostic rules** and those defined by the user are called ***Custom* Diagnosis rules**.

To select which *diagnosis rule* to attach to a specific machine, refer to Machine Properties.

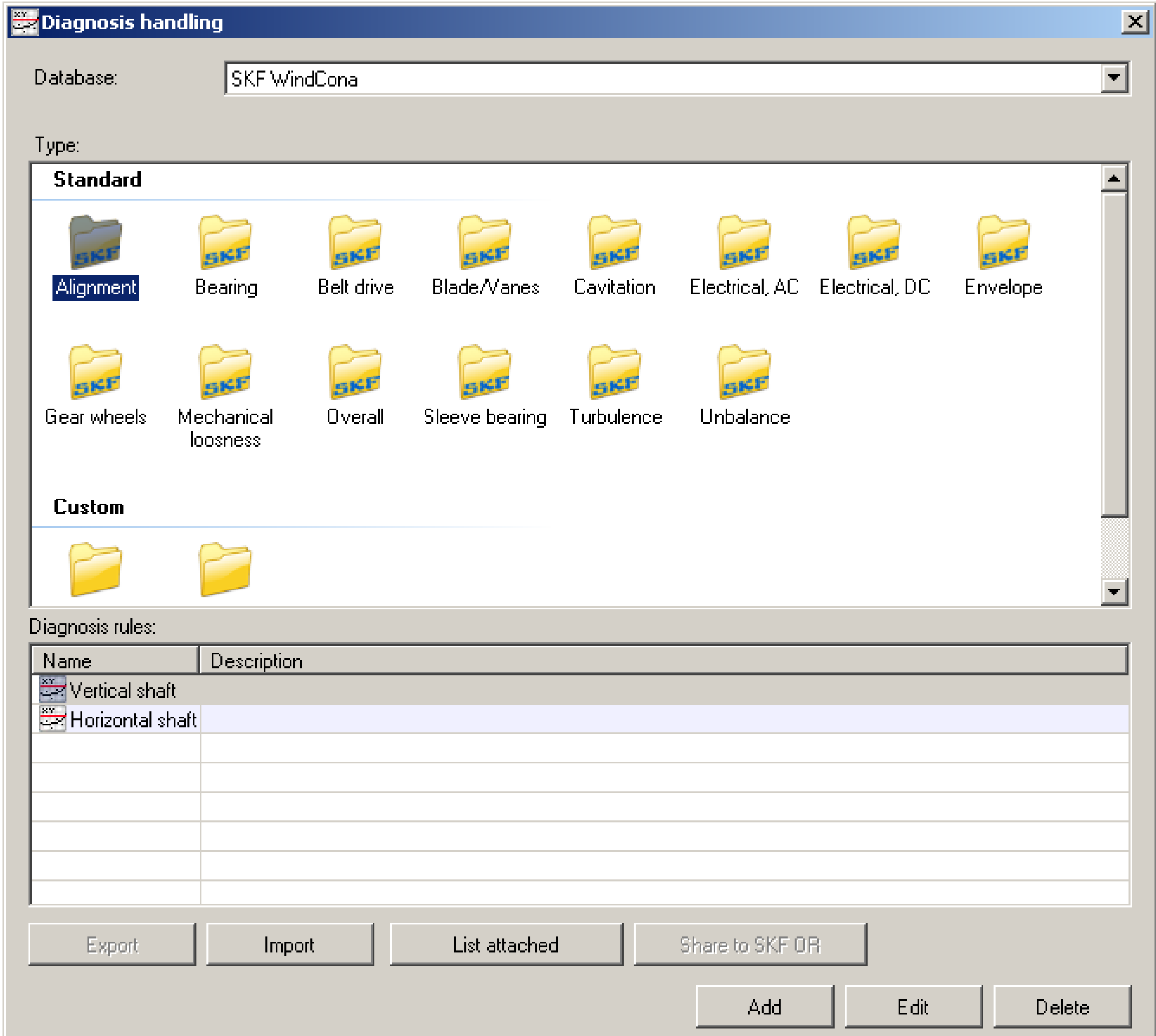


Figure 6 - 25.
Example of Diagnosis Handling Screen.

Export enables you to save the selected diagnosis to a local file.

Import allows import of a previously exported diagnostic rule.

List attached displays a list of any attached diagnosis in the system built from the selected diagnostic rule.

Add / Edit / Delete enables you to create/ change configuration / delete a diagnosis with user defined rules.

Creating a custom rule

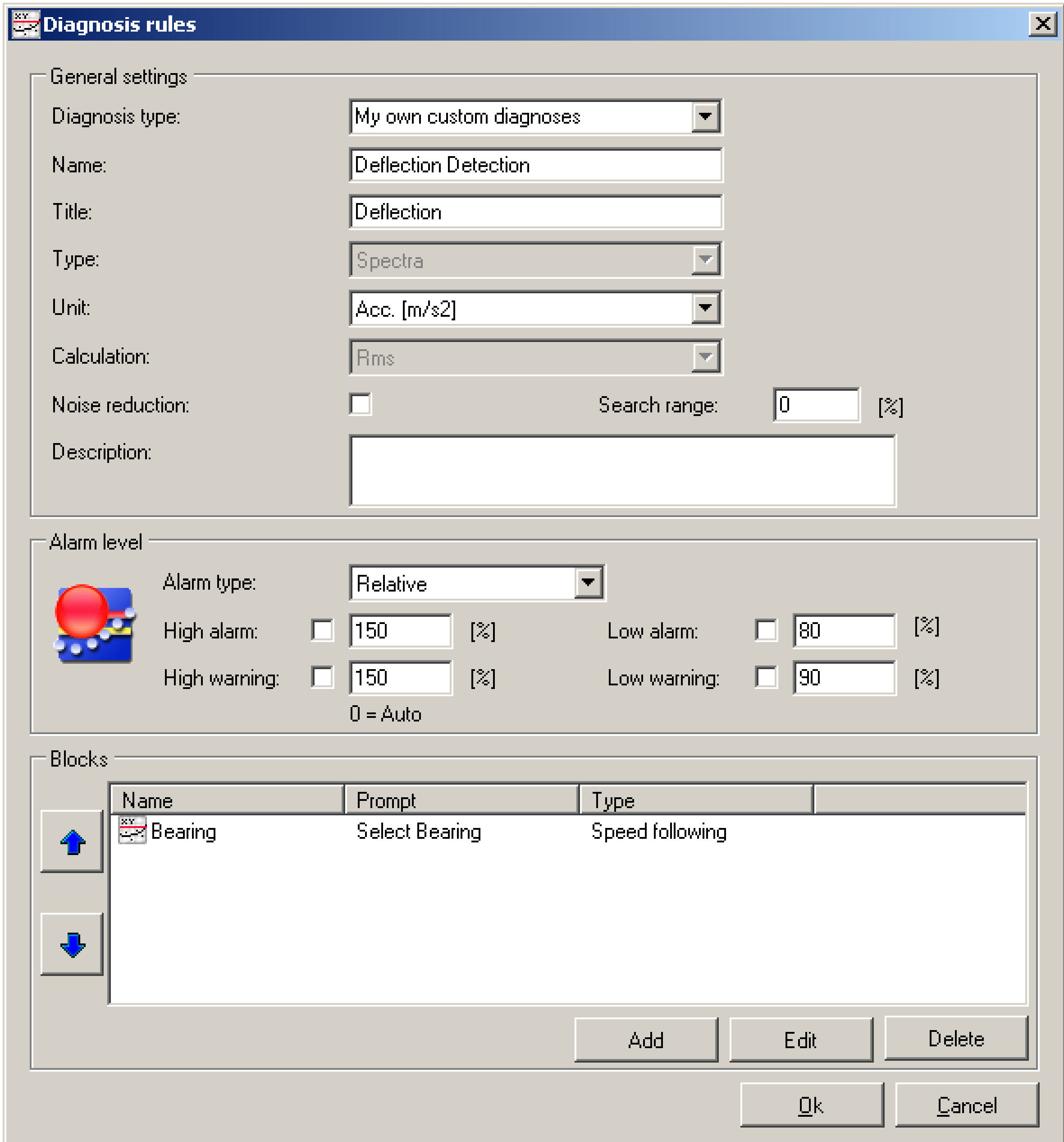


Figure 6 - 26.
Example of Creating Custom Diagnostic Rule.

Diagnosis type is the categorization type of this rule.

Name is a user defined name to use for this rule.

Title is displayed for all measurement points that implement this particular diagnosis.

Unit defines the unit in which this diagnosis should be trended.

Type selects a type of data upon which the calculation is based.

Calculation:

Rms calculates the Rms value for the selected frequencies.

Sum calculates the sum of the selected frequencies.

% of Overall calculates the Rms of the selected frequencies and divides it by the overall.

Peaks counts the number of peaks in the selected frequencies.

Frequency finder finds the highest peak and trends its frequency.

Noise reduction applies a filter that removes the noise from the spectra before the calculation begins, if checked.

Search range performs a search for maximum amplitudes within this range.

Description is a brief description describing the diagnosis. It is recommended but not necessary when creating customized diagnosis rules.

Alarm type sets the alarm for the diagnosis.

Absolute means that the alarm values are set in engineering units.

Relative means that the alarm levels are set in percent of a baseline level. The baseline level is calculated based on a number of historical values.

Alarm/Warning sets the default alarm/warning levels. Setting the alarm/warning levels to zero means that automatic alarm/warning settings and @ptitude Observer will adjust the alarm/warning levels when new data arrive. After five measurements have been taken, @ptitude Observer will save the alarm/warning levels.

Blocks are different types of frequencies used in the calculation. Use the arrow buttons on the left side to rearrange the order of the blocks. Block can be configured by adding, editing, or deleting.

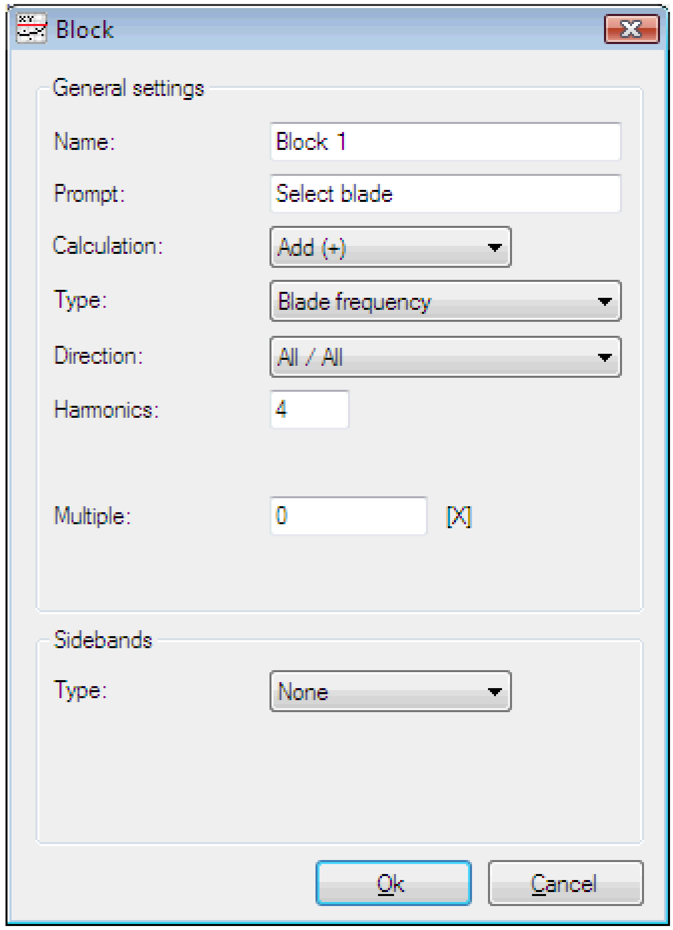


Figure 6 - 27.
Example of Diagnosis Block Settings.

Name is the name of the block.

Prompt is what to ask the user when attaching the diagnosis. If *prompt* is the same on the other blocks the user will be asked only once.

Calculation can add and subtract frequencies from the calculation, or zero out by setting the amplitude for the selected frequency to zero.

Type is the type of the frequency to use. Depending on your selection of type, different parameters appear.

Direction specifies in which direction the data should be calculated.

Harmonics specifies the number of harmonics that should be included in the calculation.

Multiple is the number to multiply the frequency. Default is 1.

Frequency specifies the frequency in cpm (cycle per minute) that should be monitored.

Sidebands Type selects the sidebands type.

List Diagnoses That Need Attention

This interface lists all attached diagnoses that are incorrectly configured for the entire database. There are a few reasons why this could happen and one of the most common reasons is that a machine part that a specific diagnostic are using for its calculation, has been deleted or replaced from the machine. The system does not know how to calculate the diagnostics and now it is flagged as a diagnosis that needs attention by the user. Click on the edit button to reconfigure any diagnosis that needs attention.

Libraries

Libraries interface has the following functions available.

- Bearing library
- Report library
- Receivers
- Tag library
- Data tagging group
- Machine template library
- Create machine template

Bearing Library

Bearing library allows you to edit an @ptitude Observer bearing database and find information on any of the listed bearings. When building machine parts, the system only allows for the selection of a bearing available within a database. However, you can add user defined bearings to the system.

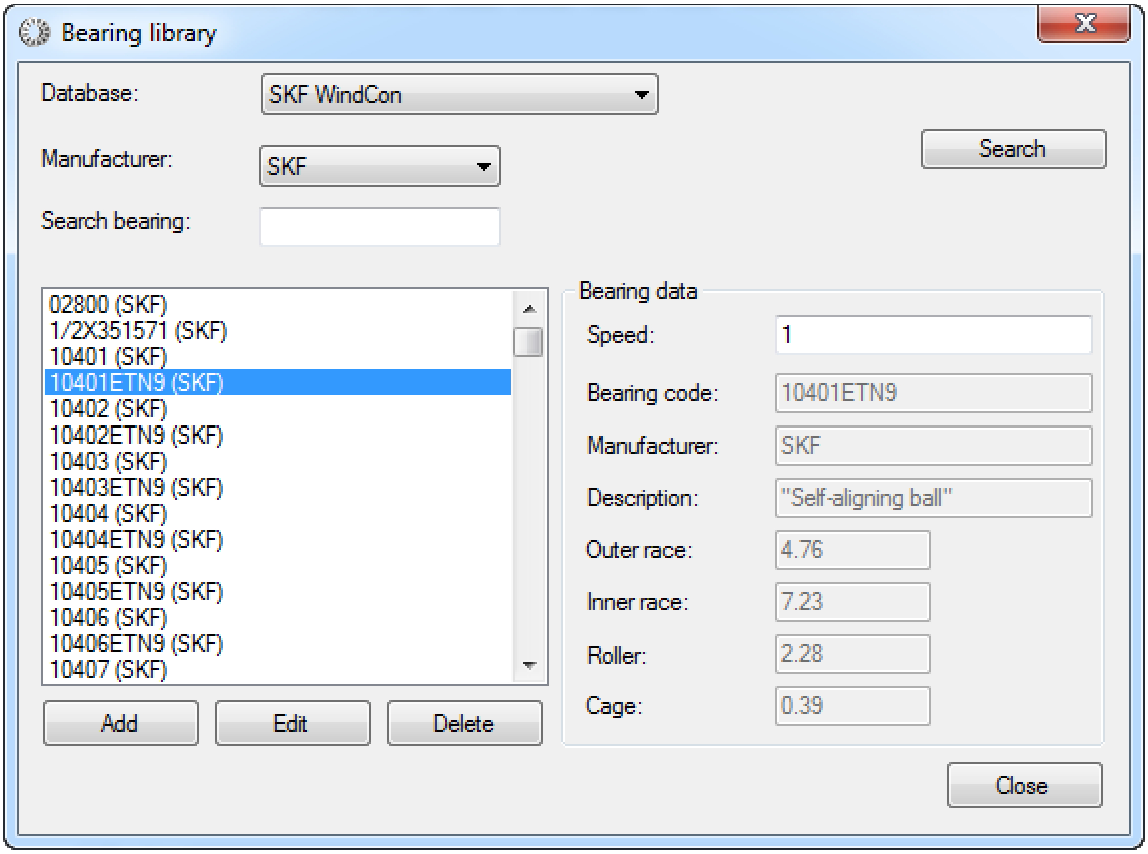


Figure 6 - 28.
Example of Bearing Library.

All bearing databases contain data for the bearings used in diagnosis and frequency calculations in @ptitude Observer. This makes it easy to identify and detect bearing defects and damages.

Report Library

The report library contains layouts for event case reports. The layouts are design files generated with crystal reports. If you wish to generate new layouts to use in the event case reporting interface these can be designed with crystal reports software which is available for purchase at many software vendors.

A new layout for event case report can be added. Existing layout for event case report can be edited or deleted as well.

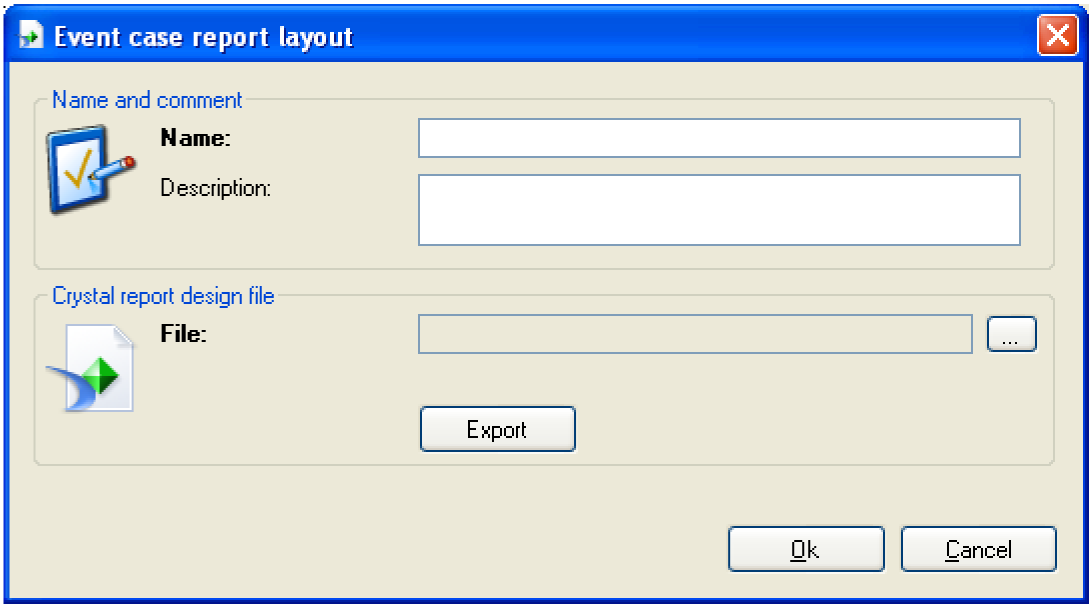


Figure 6 - 29.
Example of Event Case Report Layout.

Name for the layout.

Description for the layout.

File is the crystal report design file (.rpt) to use for the layout.

Receivers

Receivers interface enables you to create, edit or delete a group of receivers for the selected database. This group is used when selecting a receiver for notes. Refer to Notes in System Operation. By naming each group meaningfully, it can be served as a better distribution method of notes.

Tag Library

In Observer it is possible to “tag” measurement points or machines with specific customized tags. These tags are configured in the tag library. There can be several tags configured in the library, ranging from A to Z. When configuring a tag, you can select a letter (A to Z) that should be used as a graphical identifier of the icon and the color of the icon.

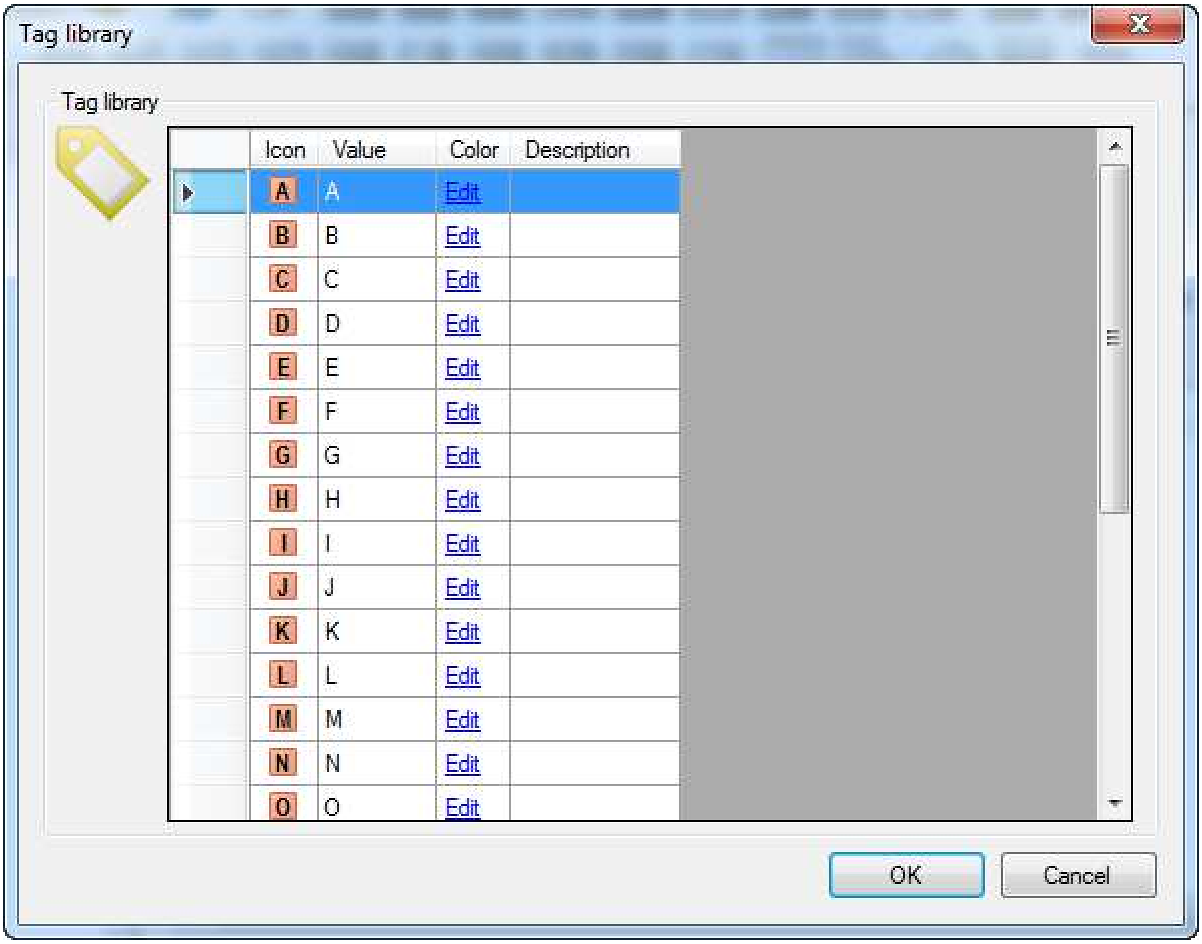


Figure 6 - 30.
Example of Tag Library.

Setting the color of the icon is done by clicking on the edit text in the Color column. Setting the description of the tag is done by clicking in the description column and entering the description of the tag.

Once a tag has been created in the library, the tag can be used to tag measurement points or machines. Tagged measurement points and machines will be marked with a tag after the name of the node as displayed in the following screenshot.

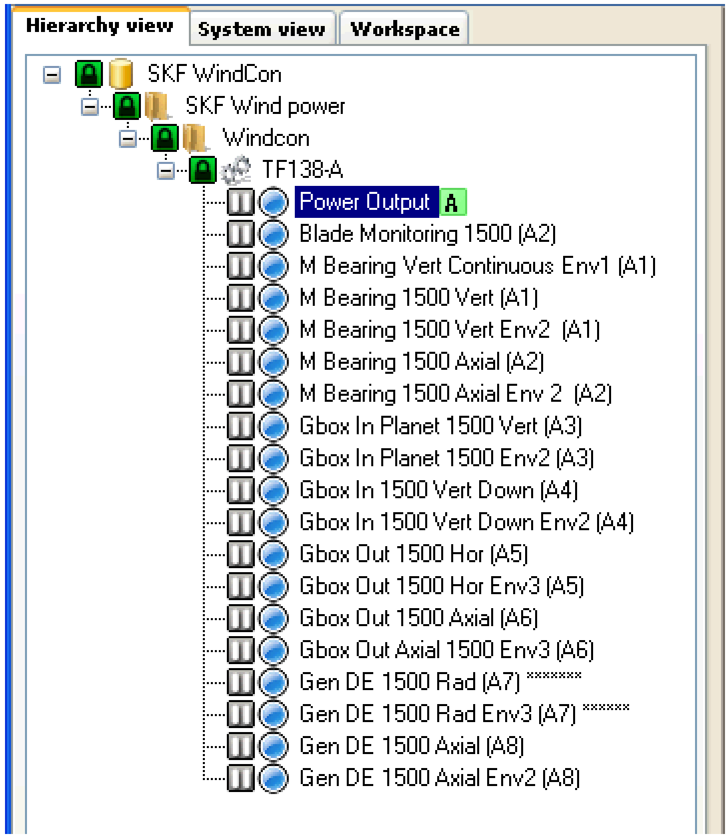


Figure 6 - 31.
Example of Hierarchy View with a Tag.

To tag a specific measurement point or machine, open the properties form and click the inactive tag icon.

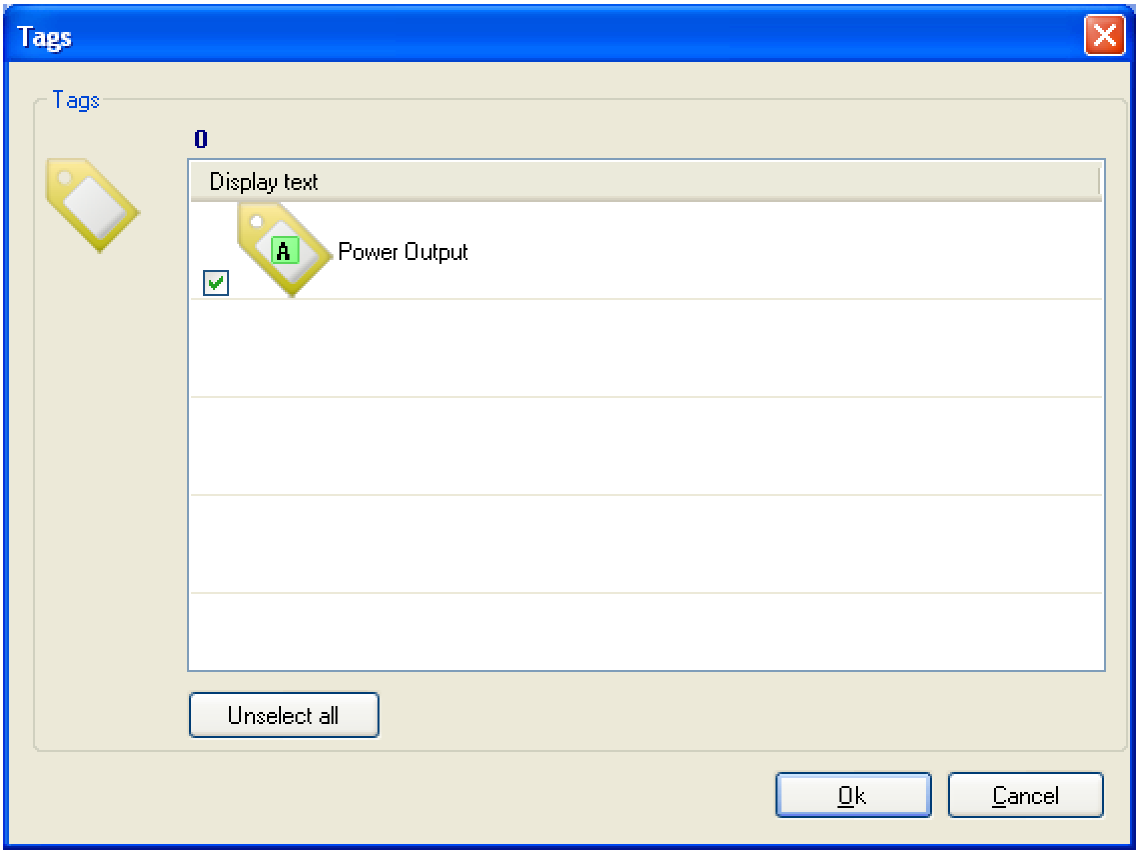


Figure 6 - 32.
Example of Setting a Tag.

Select a tag to set it on the selected measurement point or a machine.

Data Tagging Group

Enables you to create, edit or delete a data tagging group. Note that in order to be able to create a data tagging measurement point, there must be an existing data tagging group.

Machine Template Library

It displays machine templates and performs the following actions:

Delete deletes a template from the machine template library.

Export exports a machine template to a file with the file extension of *.omt*.

Import imports a machine template from a file into the machine template library.

Create Machine Template

You can create a machine template with the selected machine from the hierarchy view. It then will reside in the machine template library.

Note that in order to create a machine template of your own, first the machine has to be configured with all the properties and measurement points.

Export

Export interface exports structure/data from the database. Exported data are stored as .xml files.

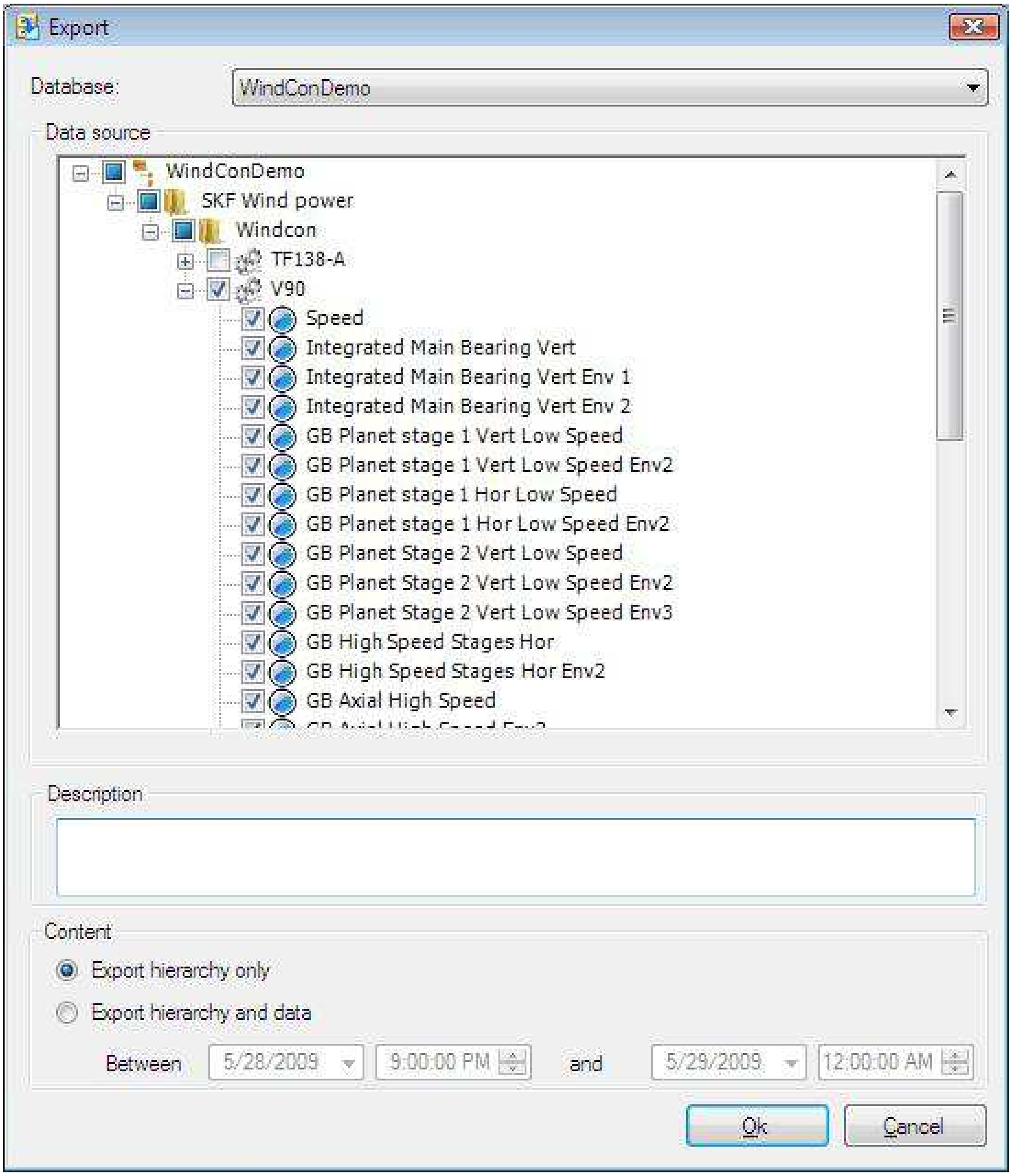


Figure 6 - 33.
Example of Export Structure/Data.

Database is where the structure/data which you are to export reside.

Data source is the node(s) that should be included in the export process.

Description is a custom description about the export file which will be displayed to the user when importing the data.

Content is the export content which can be only the structure of the hierarchy or the structure of the hierarchy along with measurement data from the specified date and time.

Import

Import interface enables the importing of .xml export files generated by @ptitude Observer.

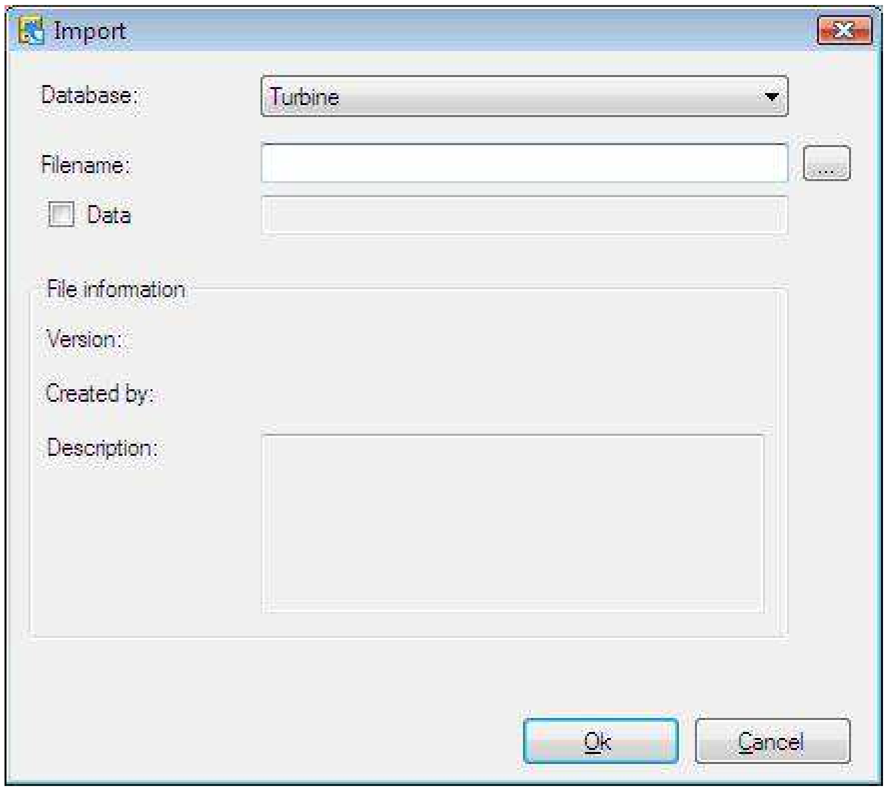


Figure 6 - 34.
Example of Import Data.

Filename can be selected from the drop-down list of all @ptitude Observer export files (*.xml). If the measurement data should be imported as well, then mark **Data**. If a machine included in the import file has been imported before, the system automatically merges the data into the existing hierarchy.

Important - The export and import interfaces should be used only to export or import minor parts of the database in order to get the same measurement hierarchy as in other database or to send small pieces of data for someone external to analyze them. It should not be used under any circumstances, to transfer data between databases.

Alarm Group

Alarm group is used as an identifier for measurements that have a strong relationship towards one another. For example, if you have created an alarm group with six measurement points, then any alarm on any one of the six measurement points can force the storage of data for all six measurement points of the alarm group.

The following display shows a created alarm group and the measurement points belonging to that group.

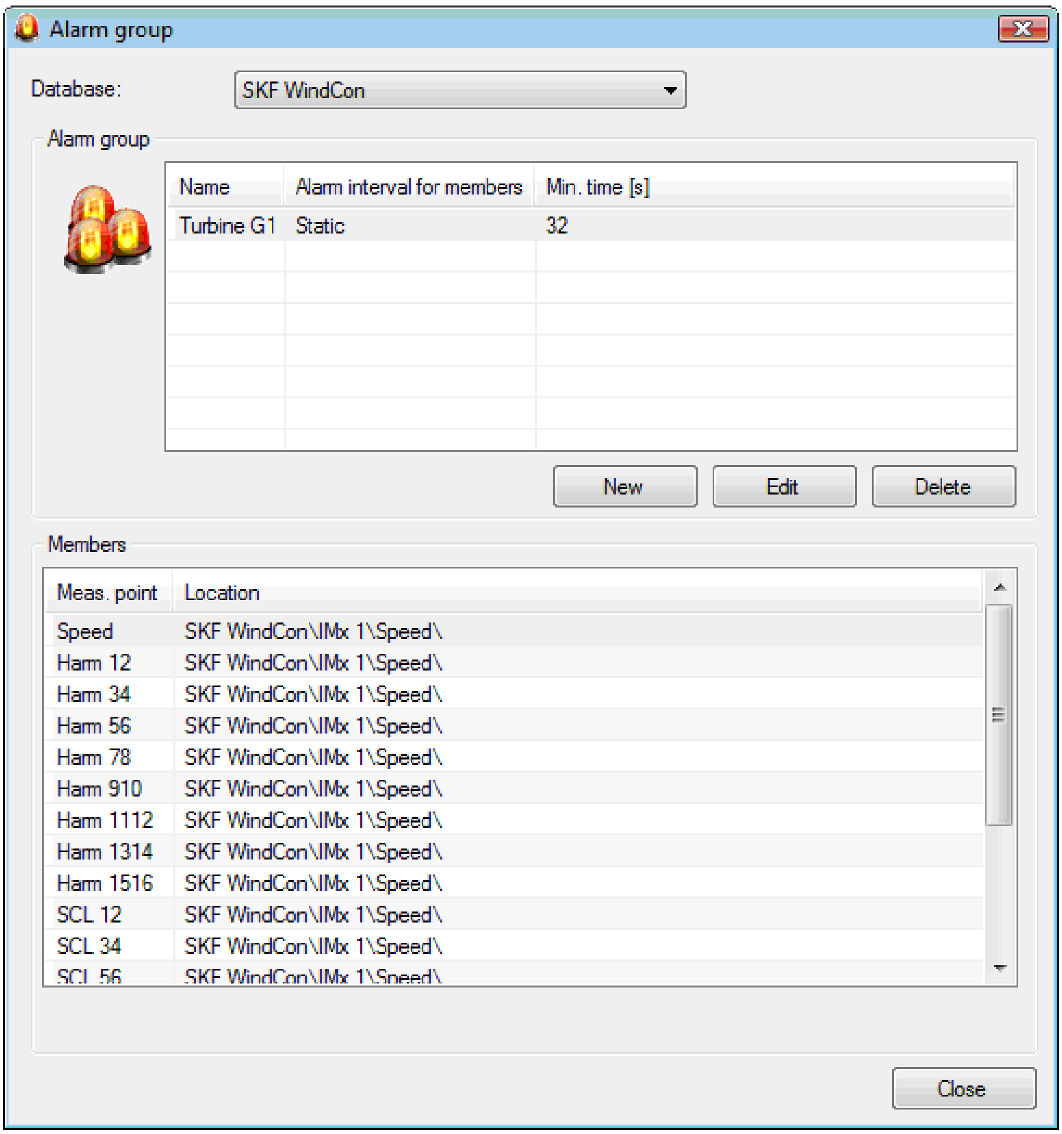


Figure 6 - 35.
Example of Alarm Group.

You can create a new alarm group, and edit or delete an existing alarm group. You can also add a new measurement point to the selected alarm group or remove an existing measurement point from the group.

Creating a New / Editing an Alarm Group

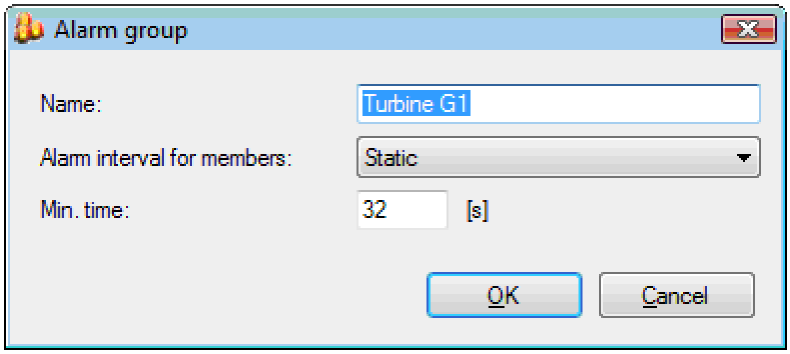


Figure 6 - 36.
Example of Alarm Group – Edit.

Name is the name of the Alarm group to be created or edited.

Alarm interval for members enables you to select a scheduled storage setting by Operating and Storage Conditions Tab under Setting up Measurement Points and Alarms in System Configuration.

None uses the normal scheduled storage setting on other measurement points.

Static uses the alarm scheduled storage setting on all measurement points in the group to store static values with alarm intervals.

Static and Dynamic uses the alarm scheduled storage setting on all measurement points in the group to store static and dynamic values with alarm intervals.

Min. time is the duration of time in seconds that has to pass without any alarm in order to store all measurement points' data of the specified alarm group. The recommended minimum time is 30 seconds.

Measurement Groups

A measurement group is a logical grouping of measurement points that will collect a specific type of data for a particular purpose; for example, at the same time and synchronously on a specific IMx/MasCon device.

Three types of measurement groups can be created: *simultaneous*, *transient* and *event capture*. Note that the type and frequency type of the measurement group cannot be changed after the group has been created.

Note: The maximum number of active measurement groups per IMx is five, including transients (T), simultaneous (S) and event capture (E) groups. The limit for event capture groups per IMx is one. For example, the maximum of five groups may consist of: 1E+2T+2S, or 1E+4T, or 5T or 5S, etc.). If an event capture group is active in the database, then the pre and post data function of any existing transient group cannot be used.

Go to **Database** > **Measurement groups** to open the dialog.

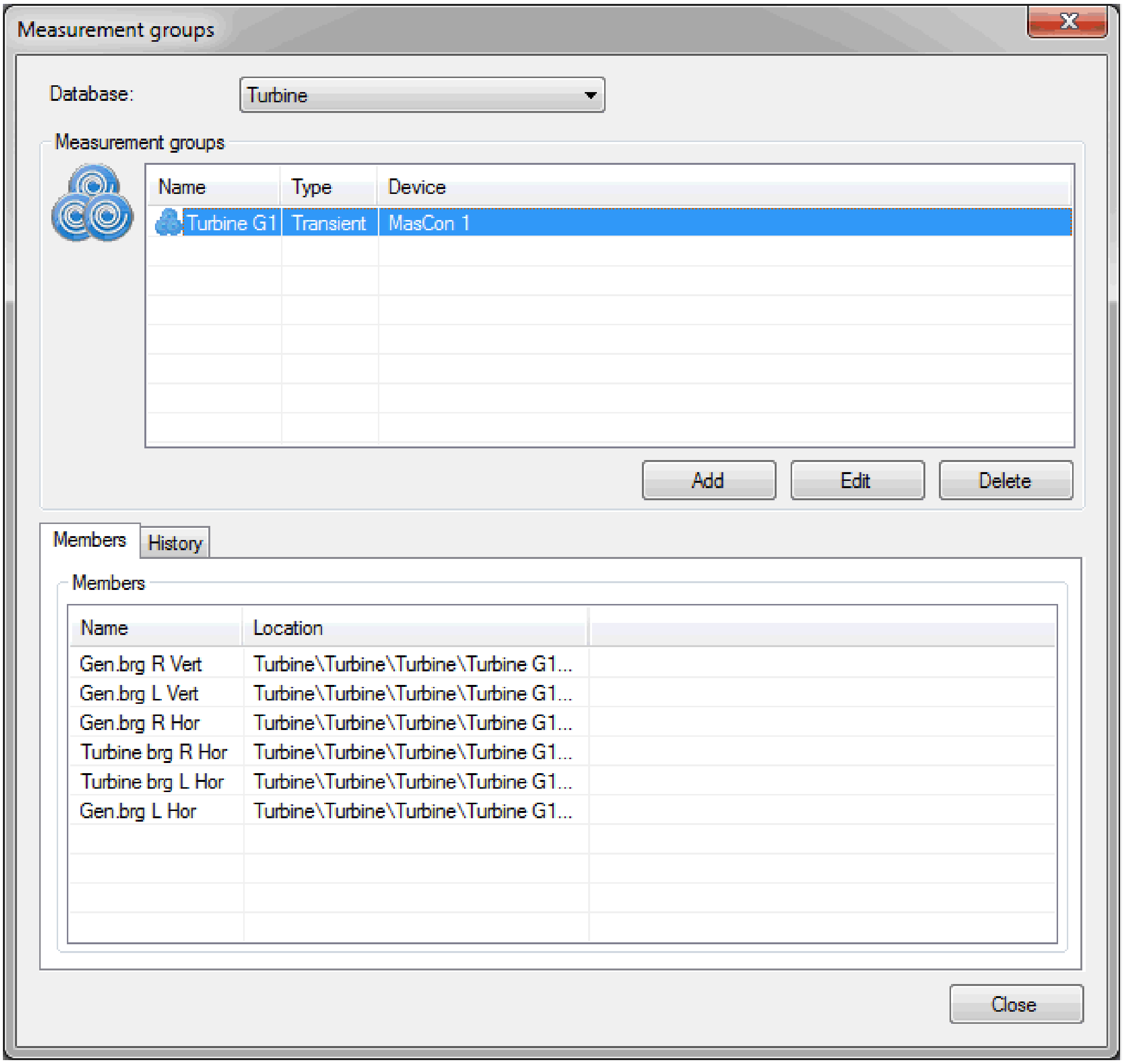


Figure 6 - 37.
Example of Measurement Groups Dialog with a Transient Group.

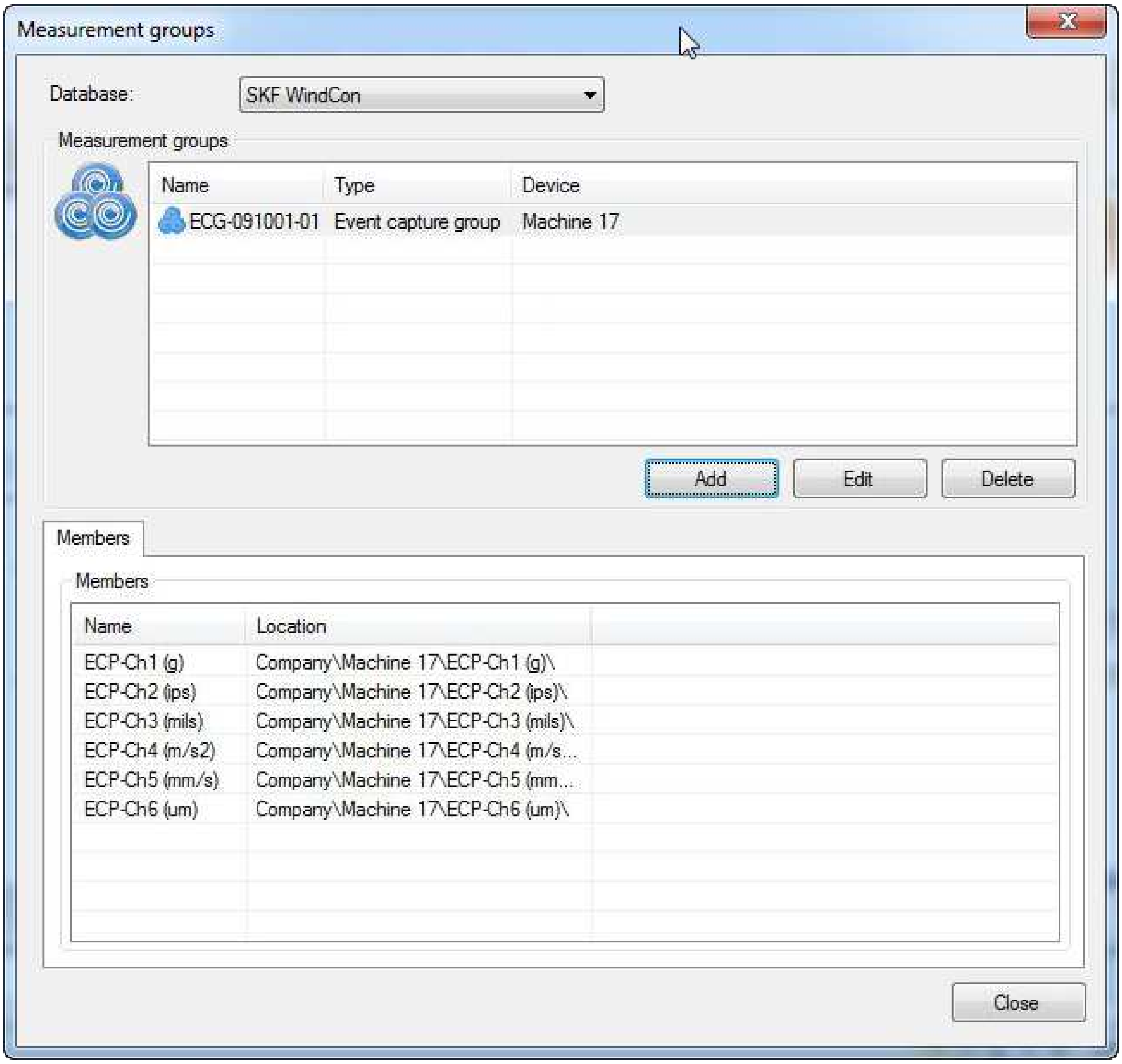


Figure 6 - 38.
Example of Measurement Groups Dialog with an Event Capture Group.

Measurement groups in the selected **Database** are listed. **Type** indicates the measurement group type and **Device** shows the data acquisition device (DAD) specified for the measurement group.

Members tab is a list of the measurement points assigned to the highlighted measurement group.

History tab is a list of the historical run-ups and coast-downs currently stored in the database for a transient measurement group. You can see all transients done for this group, which can be edited, deleted, or set reference for the transient. The list shows the **From** and **To** dates, **Type**, **Keep forever** status and **Comment**.

To add a Measurement Group:

Click **Database** > **Measurement groups** > **Add**.

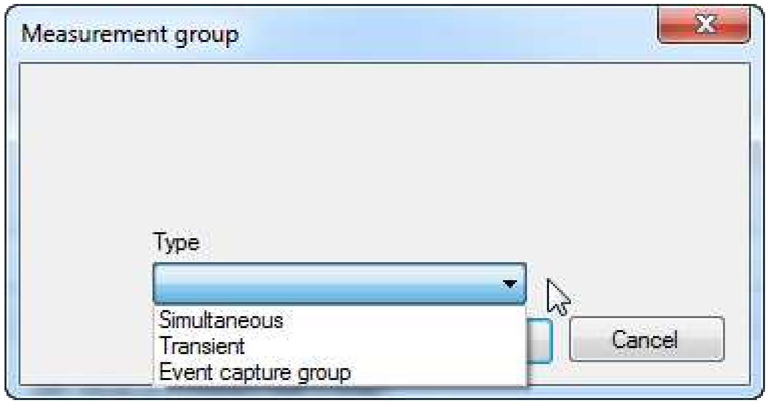


Figure 6 - 39.
Example of Measurement Group Types.

Type is the measurement group type.

Simultaneous: the single purpose of the simultaneous measurement group is to start measuring all the channels currently present in the measurement group at the exact same time. Note that a specific channel can be present only once in a measurement group.

Transient: the purpose of the transient group is to group measurement points that will collect data typically during a turbine run-up or coast-down. This was previously known as runup group or transient group in the earlier versions of @ptitude Observer. Useful for rapidly rotating machinery.

Event capture group supports the event capture feature of limited time waveform points and continuous pre and post data capture. The group has a fixed Fmax and no order tracking. The captured time waveforms enable detailed analysis of both very low (mechanical) and very high (electrical or generator related) oscillations. Useful for wind turbines and lower speed rotating machinery.

Configuring a Transient Measurement Group

Once a measurement point has been added to a measurement group, some point properties are not available on the measurement point screen and the input controls for them are disabled. These properties are now configured on the measurement group.

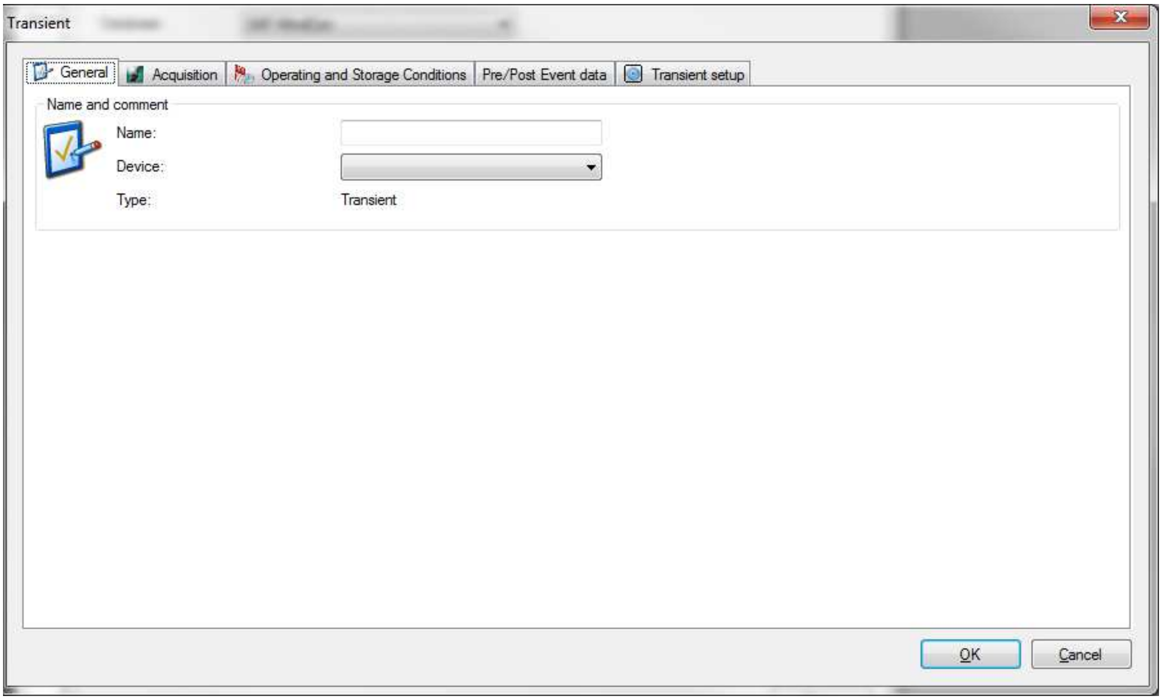


Figure 6 - 40.
Example of Measurement Group Configuration.

General Tab

The attributes are the same as in General Tab under Setting up Measurement Points and Alarms in System Configuration.

Acquisition Tab

The attributes are the same as in Acquisition Tab under Setting up Measurement Points and Alarms in System Configuration.

Operating and Storage Condition Tab

The attributes are the same as by Operating and Storage Conditions Tab under Setting up Measurement Points and Alarms in System Configuration.

Pre/Post Event Tab

It is used to control how data is stored before and after alarm event.

Transient Setup Tab - Simple configuration mode (available only when creating a new Transient Measurement Group)

> **Speed ranges** for the run-up can define different stages of the run-up/coast-down.

Static data storage

Delta CPM is the setting for maximum speed change before storing static values.

Delta time is the setting for maximum time before storing static values.

Dynamic data storage

Delta CPM is the setting for maximum speed change before storing dynamic values.

Delta time is the setting for maximum time before storing dynamic values.

Transient state timeout specifies how long the transient will remain in transient state for the specified timeout when moving from transient state to normal state.

Transient closure time is the time to remain in the transient after reaching primary steady state.

Transient Setup Tab - Advanced configuration mode (available only when creating a new Transient Measurement Group)

Transient state timeout specifies how long the transient will remain in transient state for the specified timeout when moving from transient state to normal state.

Transient closure time is the timeout used before closing the transient and set its final type.

Rpm min (cpm) indicates the lower rpm (revolution per minute) limit for each range.

Rpm max (cpm) indicates the higher rpm (revolution per minute) limit for each range.

State defines whether this is a constant state or a run-up/down state.

Delta Trend (cpm) indicates the number of cycles per minute between storage of trend values. If this parameter is not reached within one minute, a trend will be stored.

Mean harm. (No. revolutions) indicates the number of revolutions of the shaft on which the mean value of the presented trend is based on.

Max. time (s) is the maximum time between the storage of trend values.

Delta FFT (cpm) indicates the required change in speed between each spectra storage.

Max. time FFT (s) is the maximum time between the storage of FFT values.

Classification of Transients When Opening a Transient:

When transient data arrives at the monitor service, the monitor service will change if there is an active transient in progress for that measurement point. If not, a new transient is started and classified as following:

- If the speed reading is in a transient range that has no other ranges above it, it is classified as “Overspeed in progress”.

- If the reading is in another transient range and in the lower half of that range, it is classified as “Run-up in progress”.
- If the reading is in another transient range and in the higher half of that range, it is classified as “Coast-down in progress”.

Classification of Transients When Closing a Transient

After the “Transient closure time” has elapsed without new transient values the transient will be closed. The state of the transient is then changed as:

- If it was classified as “Overspeed in progress” and the last reading stored also was in the overspeed range the classification is changed to “Overspeed”.
- If it was classified as “Overspeed in progress” and the last reading stored was outside of the overspeed range the classification is changed to “Overspeed – Coast-down”.
- If it was classified as “Run-up in progress” and the last speed reading was in the upper half of its speed range it is classified as “Run-up”.
- If it was classified as “Run-up in progress” and the last speed reading was in the lower half of its speed range it is classified as “Run-up aborted”.
- If it was classified as “Coast-down in progress” and the last speed reading was in the upper half of its speed range it is classified as “Coast-down aborted”.
- If it was classified as “Coast-down in progress” and the last speed reading was in the lower half of its speed range it is classified as “Coast-down”.

To add a measurement point to a transient measurement group:

1. Select a measurement point in the hierarchy view.
2. Go to General tab settings screen of Measurement point via **Properties** command. If you need a help accessing the screen, refer to To edit a measurement point in Setting up Measurement Points and Alarms.
3. Select the **IMx/MasCon device** to which this point is assigned.
4. Select a **Measurement group** to use from the drop-down list of measurement groups.

Optimal Settings for Transient Group

The following recommendations are to optimize the performance of a transient group.

- Use only vibration measurement points of Harmonic type.
- Do not use other dynamic measurement points in the same IMx device regardless of whether they are on different channels or not. Unrelated "slow points" should be in a separate IMx (16-channel) device.
- In dynamic data setting, select Save Time waveform only. Spectra is calculated from the waveform automatically. The setting applies for all dynamic data (for example, alarm/delta) but is placed in the "scheduled dynamic data storage" box.
- When using order-tracking, keep number of revolutions and maximum frequency as low as required.

- With non order-tracked harmonic measurement points, the harmonic calculation in transient should be done using an average of 2 revolutions unless the speed is sufficiently high. For high speed, configure the number of revolutions to be approximately 0,1 seconds.
- With order-tracked harmonic measurement points in transient, 2 measurements/sec are expected with 16 channels (16 single channel points or 8 dual channel points) up to 25x and 8 revs average.
- Points used as simultaneous speed and process parameters should not be in the group. These parameters are stored anyway together with the points in the group. By keeping them outside they will be stored also when below the low speed cutoff. In case of missing data, it is useful to have something like speed always being stored to help us determine whether the IMx has been online without speed input or the data acquisition has been unavailable.

Note: There might be issues with using a laptop when testing, especially with a mechanical drive (not an SSD) getting enough SQL Server performance. Lots of small file access like running a backup software on the same disk should be avoided.

Configuring an Event Capture Group

Each IMx unit can have only one event capture group. The event capture group supports limited time waveform points and continuous pre and post data capture. The group has a fixed Fmax and no order tracking.

> ➢ If you try to add a second event capture group for an IMx, you will be unable to enter the **Device** and save the group.

Click the **Database** tool, and then select **Measurement groups**. In the **Measurement groups** dialog, click **Add**. Select the **Type** as *Event capture group*. The **Event capture group** dialog opens.

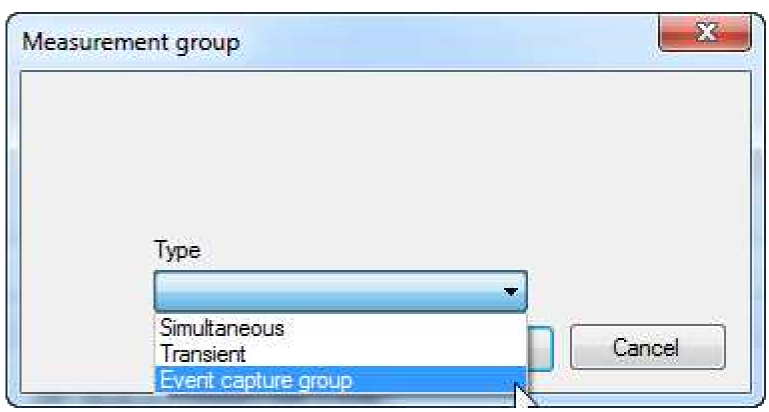


Figure 6 - 41.
Example of Measurement Group Type, Event Capture Group.

OR

In the hierarchy, right-click the machine to which you want to add the event capture group. Select **Add**, and then click **Event Capture group**.

Figure 6 - 42.
Example of Machine > Add > Event Capture Group.

The **Event capture group** dialog opens. In the **General** tab, **Type** defaults to *Event capture group*.

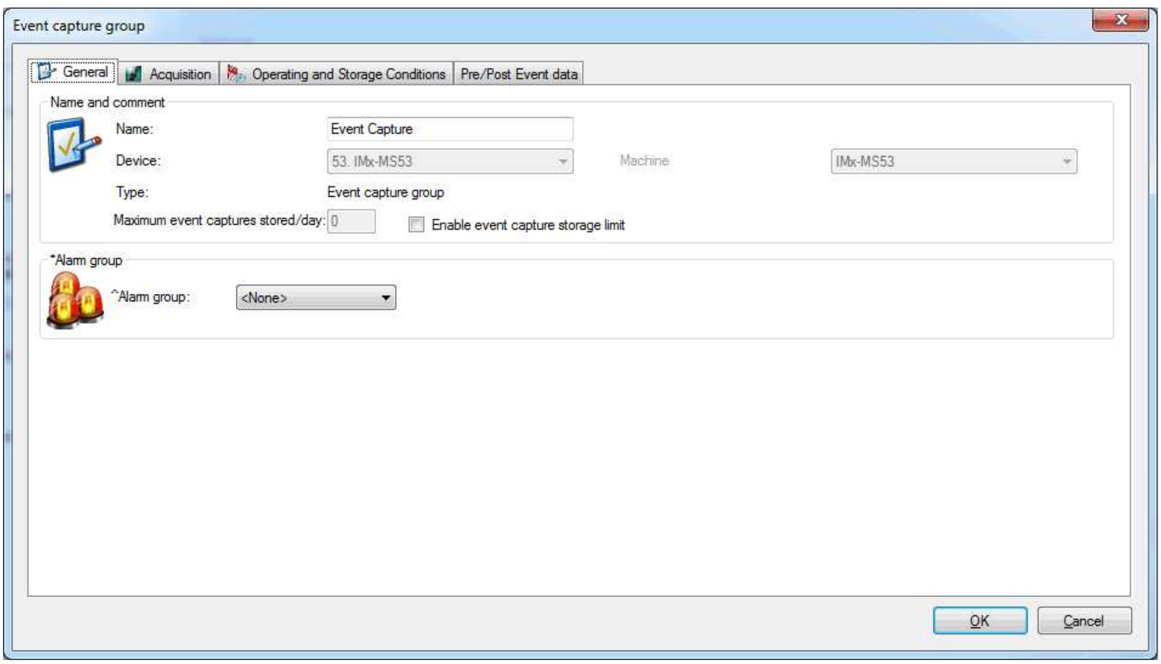


Figure 6 - 43.
Example of Event Capture Group Dialog, General Tab.

- Enter the group's **Name. Device** and **Machine** default values appear.
- **Maximum event captures stored/day** defaults to 0 (meaning unlimited) and unavailable. If you select the **Enable event capture storage limit** checkbox, the **Maximum event captures stored/day** counts all alarm-based event captures with status "Done". The value can be set up to 99999. When the maximum number of events stored per day is reached, an alarm will be generated each time the system tries to store another event capture.
  - ➢ It is always possible to store a manual capture, even after the maximum number of event captures has been reached. Storing

an event capture manually will not generate a system alarm even if the maximum number of captures per day has been reached.

- Open the **Acquisition** tab. **Acquisition Type** is locked to *Fixed Frequency*.

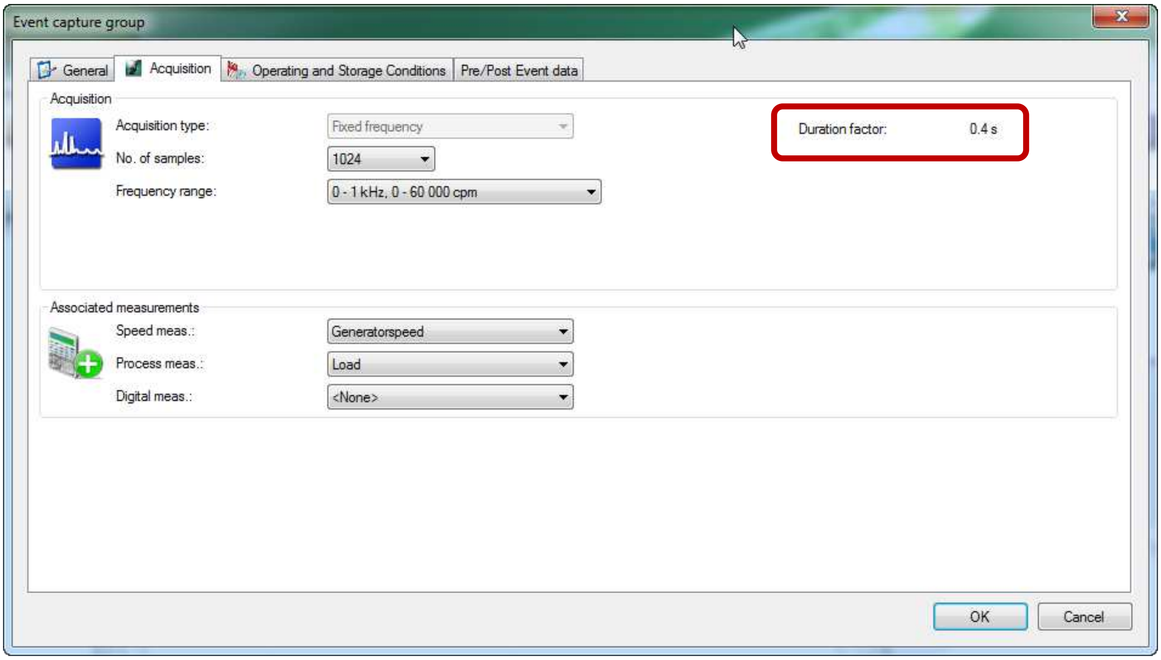


Figure 6 - 44.
Example of Event Capture Group Dialog, Acquisition Tab.

- Select the **No. of samples** in steps (1024, 2048, 4096...up to 16384).
- Select the **Frequency range**.

The duration factor is calculated as shown in the following table.

Fmax	Sample Rate	1024 Samples	2048 Samples	8192 Samples	16384 Samples
1000	2560	0.4 s	0.8 s	3.2 s	6.4 s
2000	5120	0.2 s	0.4 s	1.6 s	3.2 s
5000	12800	0.08 s	0.16 s	0.64 s	1.28 s
10000	256000	0.04 s	0.08 s	0.32 s	0.64 s

Table 6-1.
Duration Factor Calculations.

The calculated **Duration factor** must be more than 0.16 seconds. If the **Duration factor** is too small to capture an event, an error is displayed.

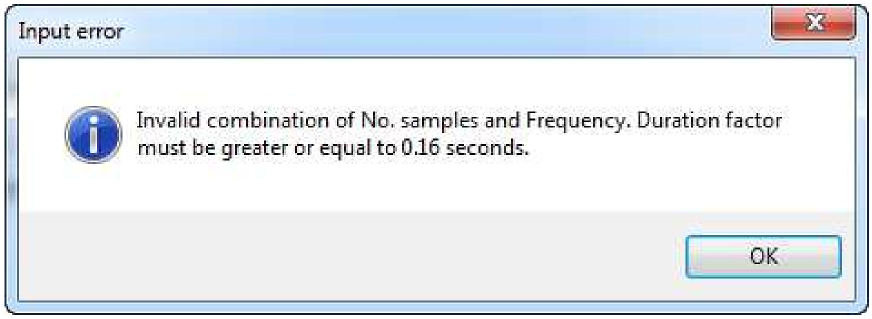


Figure 6 - 45.
Example of Input Error.

- Set up the desired associated measurements.
- Open the **Operating and Storage Conditions** tab.
- Select the desired Operating Condition **Type** values for the group to be stored. (This could be on speed, process or digital conditions.)

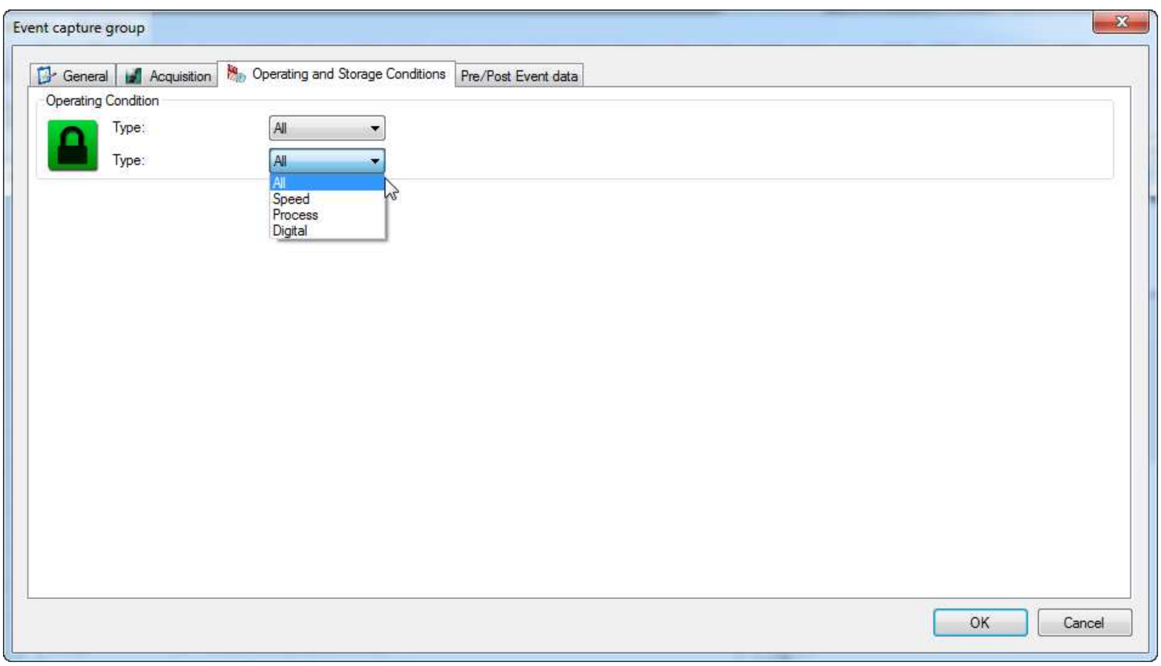


Figure 6 - 46.
Example of Event Capture Group Operating and Storage Tab.

- Open the **Pre/Post Event data** tab.

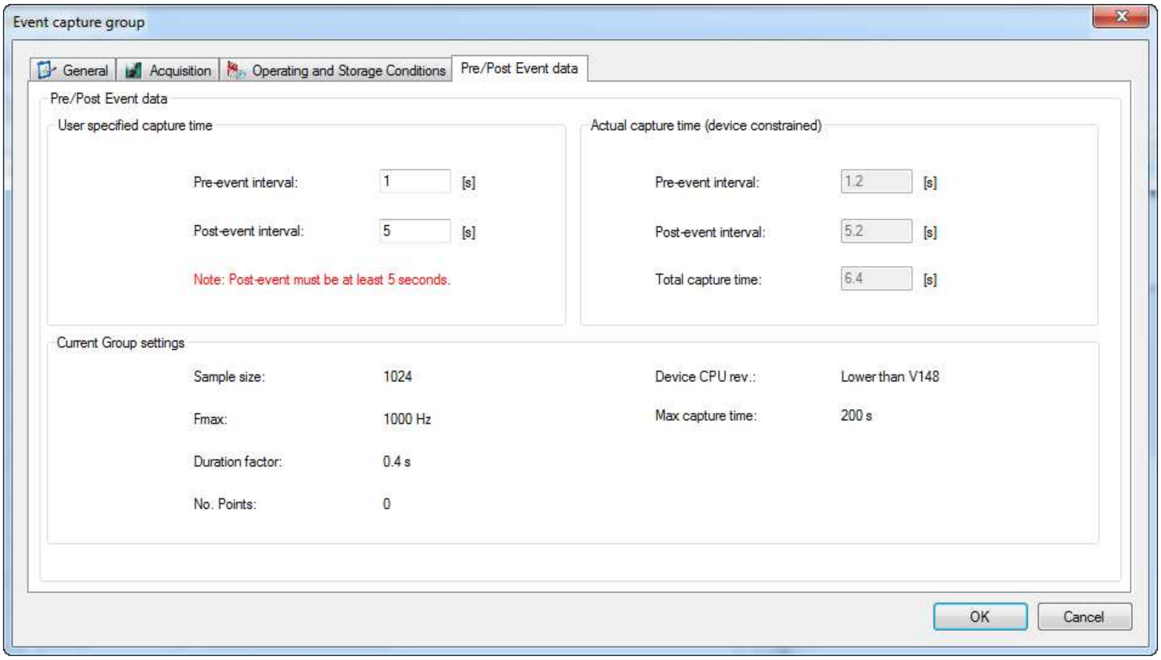


Figure 6 - 47.
Example of Event Capture Group Dialog, Pre/Post Event Data Tab.

- You may enter the number of seconds for the **Pre-event interval** and the **Post-event interval**. These intervals are included in the total measurement time calculated.

The following rules apply:

- Duration factor has a minimum of 0.16 seconds (to capture the event).
- Pre-event buffer has a minimum of 1x the duration factor.
- Post-event buffer has a minimum of 2x duration factor or at least 5 seconds.

The Actual capture time (device constrained) elements are displayed at the right.

> ➢ @ptitude Observer recalculates the total measurement time whenever you update the the number of seconds for the **Pre-event interval** or the **Post-event interval**.

Current Group settings are displayed in the lower section of the screen. **Device CPU rev** displays *Lower than V148* for a 32MB card or *Higher than V148* for a 64MB card. This CPU Rev setting is specified in the IMx device properties dialog.

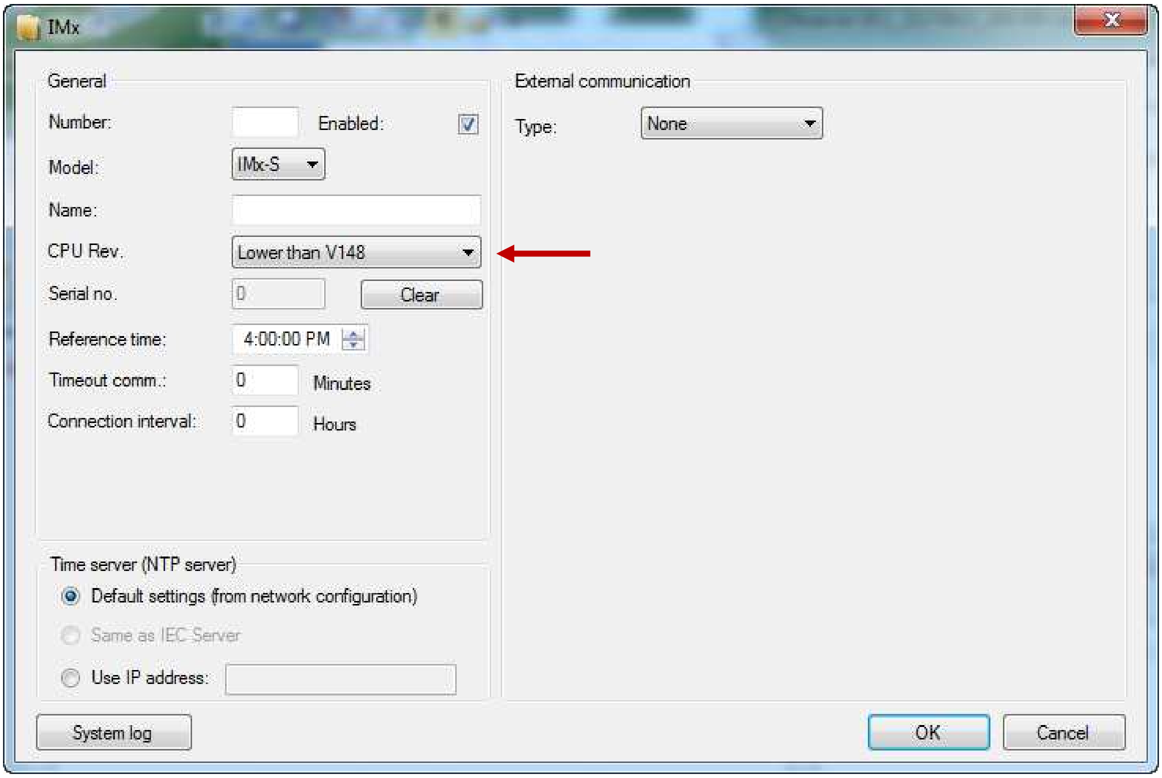


Figure 6 - 48.
Example of **CPU Rev** on the IMx dialog,

- Click **OK** to create and save the new event capture group. The event capture group will display as the first node beneath the machine. Drag and drop functionality allows the group to be moved only within the same machine. Event capture points may be re-ordered only within the group.

To add an event capture measurement point to an event capture group:

- Right-click the event capture group in the hierarchy and select **Add** > **Meas. point** from the resulting menu. The **Meas. point** dialog opens.

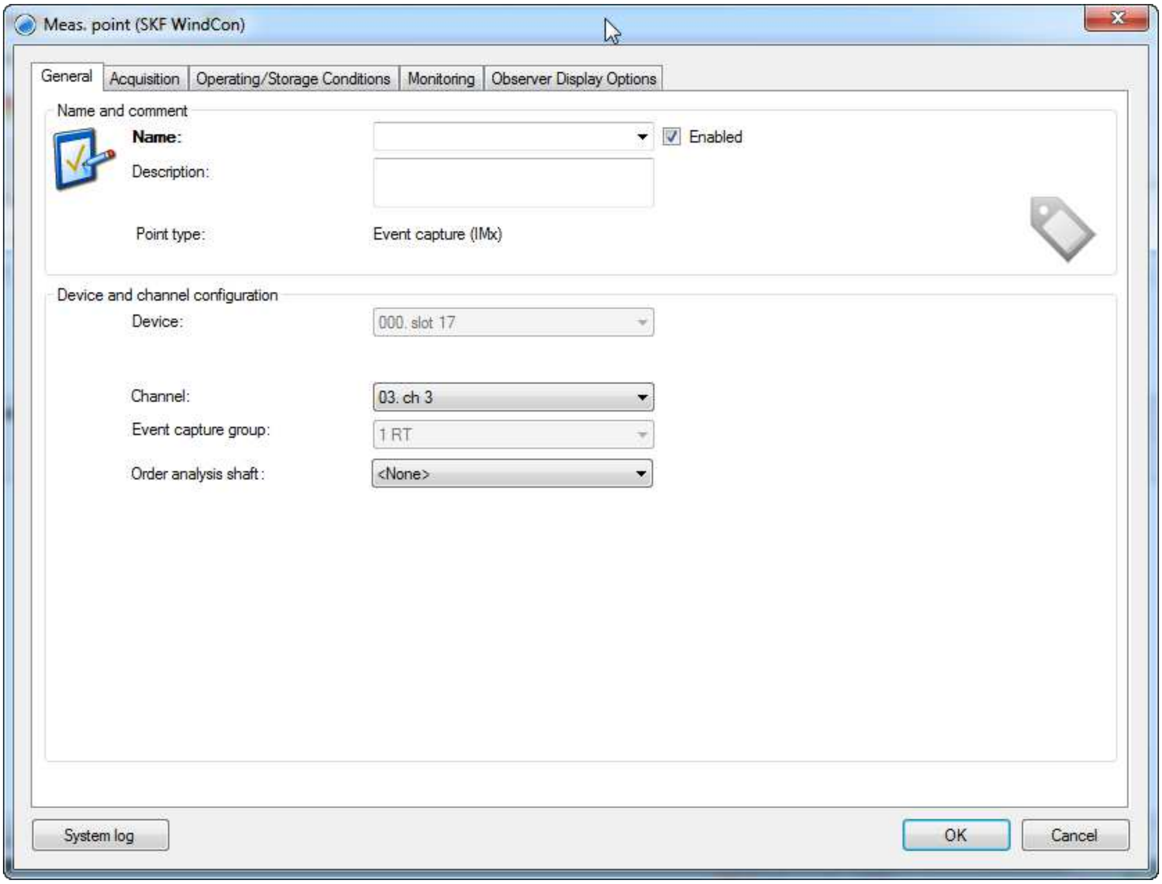


Figure 6 - 49.
Example of Event Capture Measurement Point, General Tab.

One point per channel can be added (up to the limit of 16 channels for the device). The maximum frequency per channel is 10 KHz up to 12 channels. If you have more than 12 channels, the limit is 5 KHz per channel.

- In the **General** tab you need to enter a **Name** for the point.
- Check the **Enabled** box to activate the event capture point.
- The **Device** and **Event capture group** are populated.
- Select a **Channel**.
- Select the **Order analysis shaft** if machine part shafts were specified. The order analysis shaft is the shaft on the machine that is the basis for analyzing the orders of running speed.
- Go to the **Acquisition** tab**.**

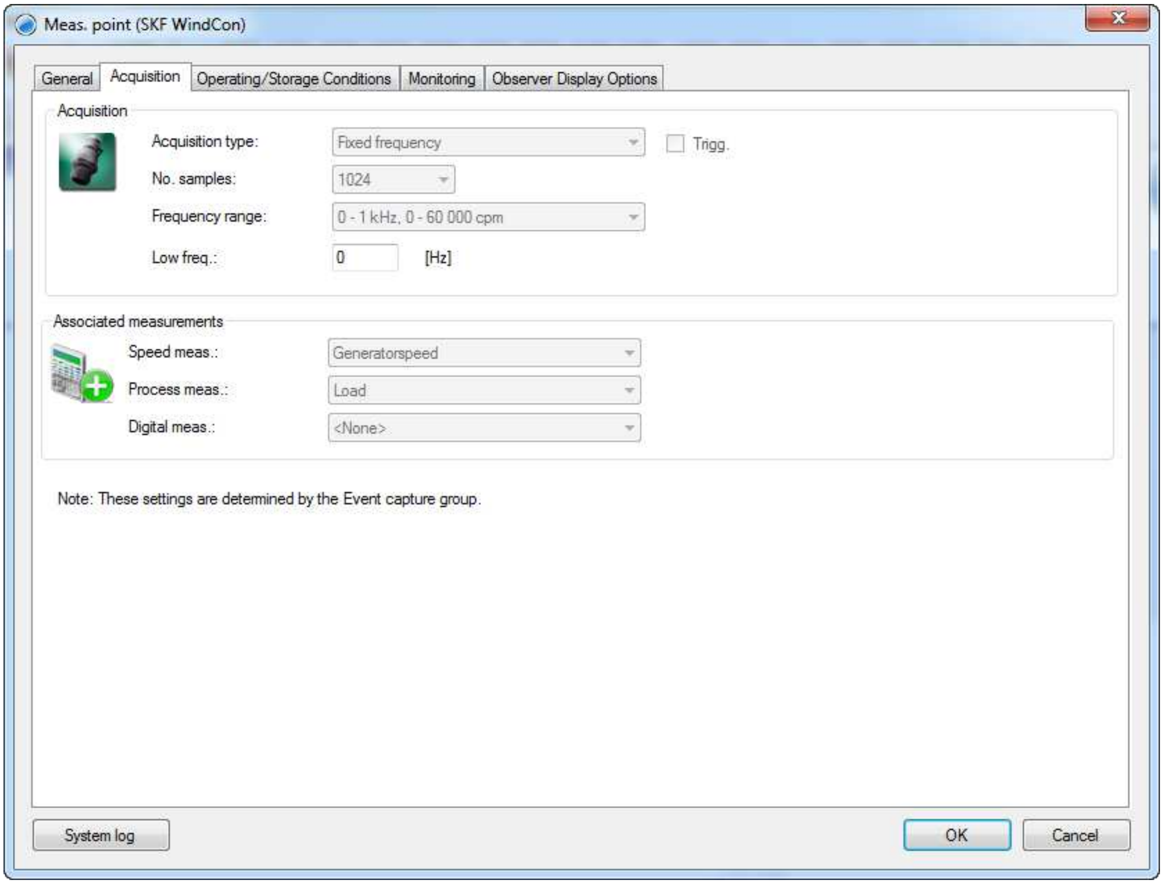


Figure 6 - 50.
Example of Event Capture Measurement Point, Acquisition Tab.

- Enter the **Low Freq.** value in Hz. The low frequency cutoff is used as a filter to limit unwanted peaks or "ski slopes" at the start of the FFT. For example, setting this value to 5 will zero out all values between 0 and 5 Hz in the FFT.
    - ➢ The other fields on the **Acquisition** tab are read only. The message explains: “Note: These settings are determined by the Event Capture group.”
    - ➢ The **Operating/Storage Conditions** tab settings are also determined by the event capture group.
- Go to the **Monitoring** tab.

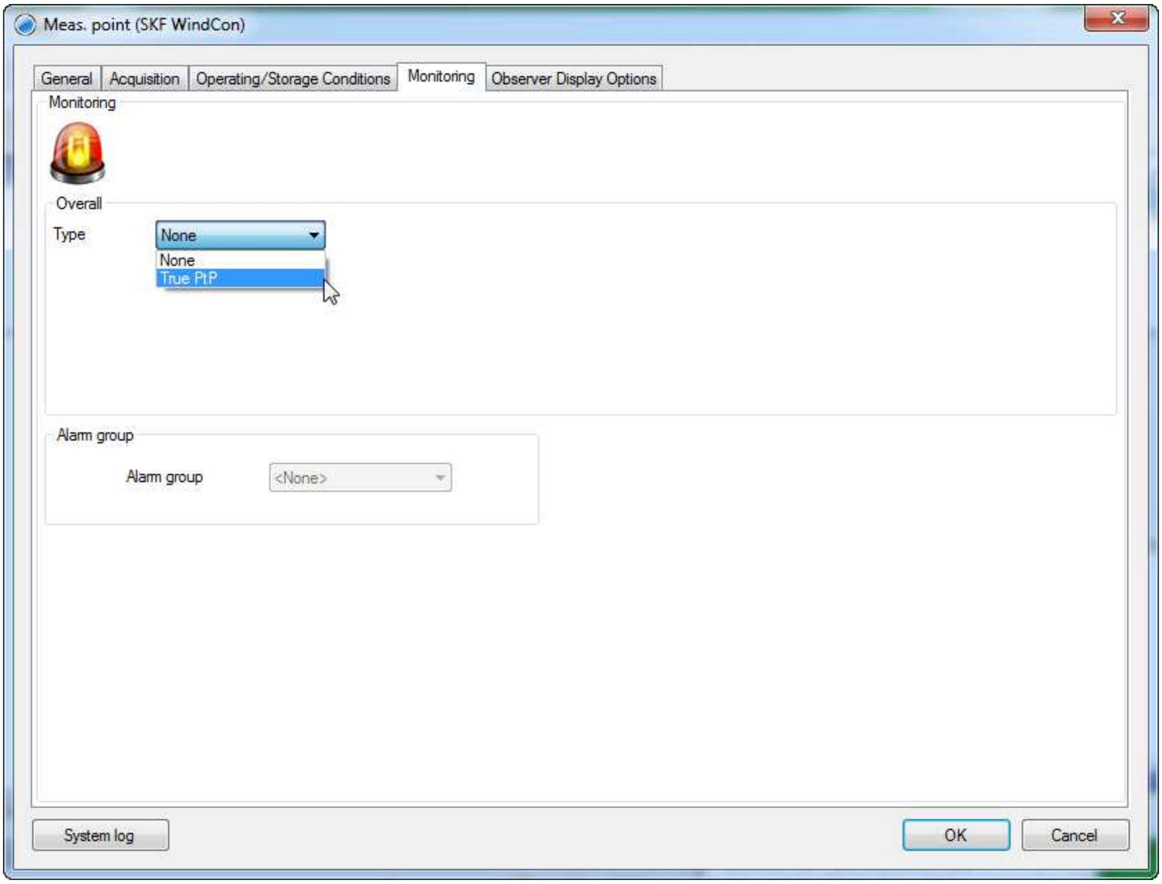


Figure 6 - 51.
Example of Event Capture Measurement Point, Monitoring Tab.

- One **Type**, *True Peak to Peak*, is supported. When *True Peak to Peak* is selected, additional fields appear in the Alarm section.

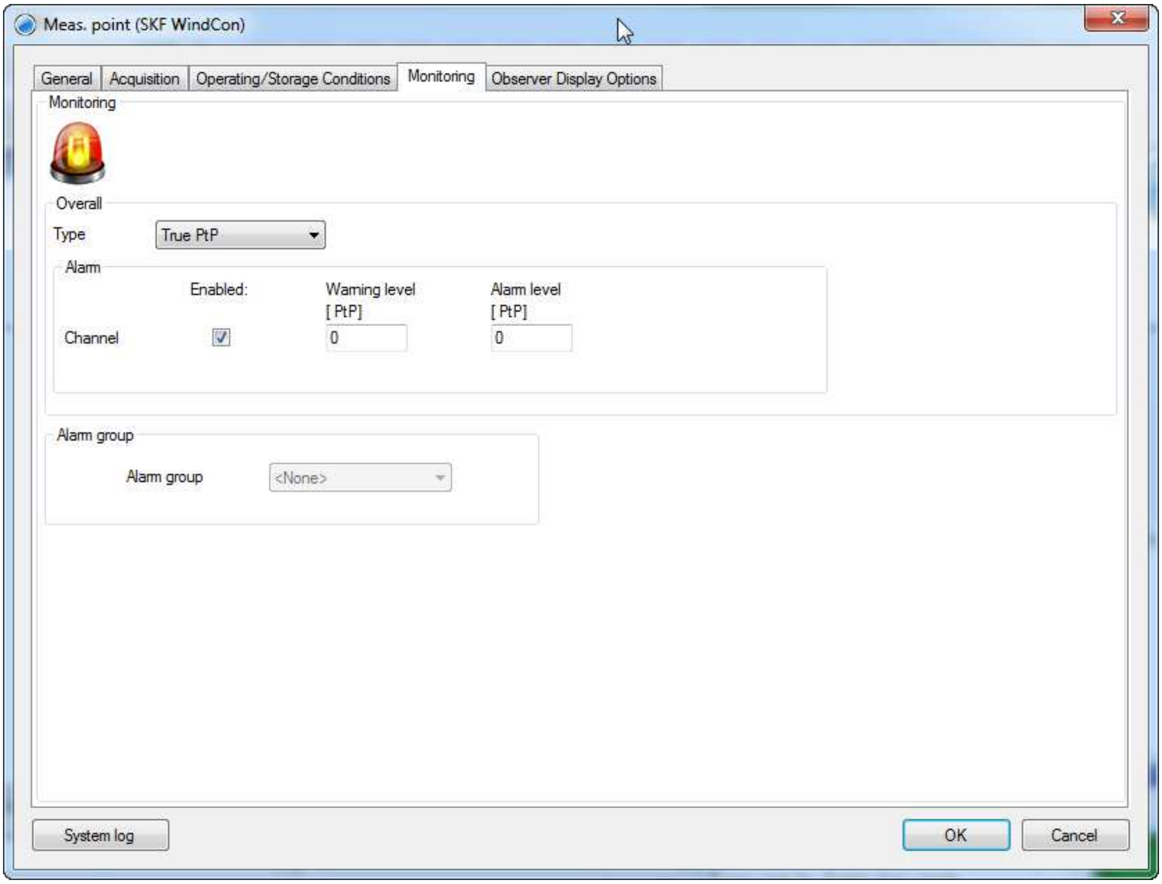


Figure 6 - 52.
Example of Event Capture Measurement Point, Monitoring Tab, Alarm Section.

- Check the **Enabled** checkbox to trigger storage of an event capture for the channels in the group.
- Set the **Alarm** level and **Warning** level. If the point is in an alarm, group event captures from all channels in the group will be taken upon alarm.
    - When the point's signal drops below the specified alarm threshold, there is a one minute delay before the event capture trigger is armed. This delay prevents the system from initiating a capture at every reboot when a point is above the alarm threshold.
- Select an **Alarm group**.
- Click **OK** to create the measurement point.

The Trend plot function is enabled for event capture measurement points which have alarms enabled. Select the event capture measurement point in the hierarchy view and then click Trend  to display the plot.

Options

Options interface offers different system settings for the @ptitude Observer application and database. These settings include everything from new measurement point settings to backup settings. The settings in the options interface are typically applied to all users in the database.

Database is the database to which the general settings of options are to be applied. Select a database from the drop-down list.

General Settings Tab

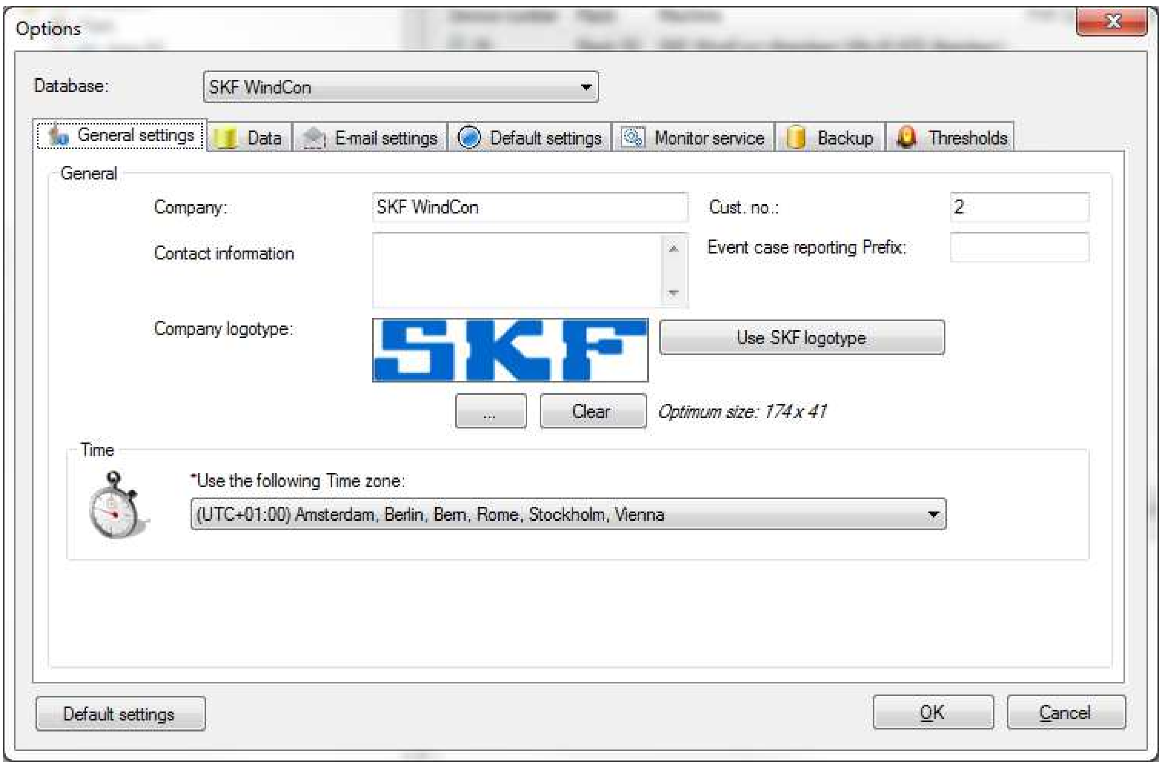


Figure 6 - 53.
Example of Options General Settings.

Company name to which the selected database belongs.

Contact information is for the company. It should normally contain the name and the address of the company.

Cust. no. is an optional text field where one can enter a customer number if desired.

Event case reporting Prefix is a prefix text that is applied to the case number when creating event cases and reports. If using multiple databases, the prefix should be different for each database in order to create completely unique event case numbers.

Company logo is used in event case reporting. You may use SKF logo, Observer logo or choose your own.

Time zone enables you to select a display of data customized to any time zone of the computer where the database is created. This can be changed if you have the system configuration user right.

All dates in the Observer application shall be shown in this time zone for the database.

Data Tab

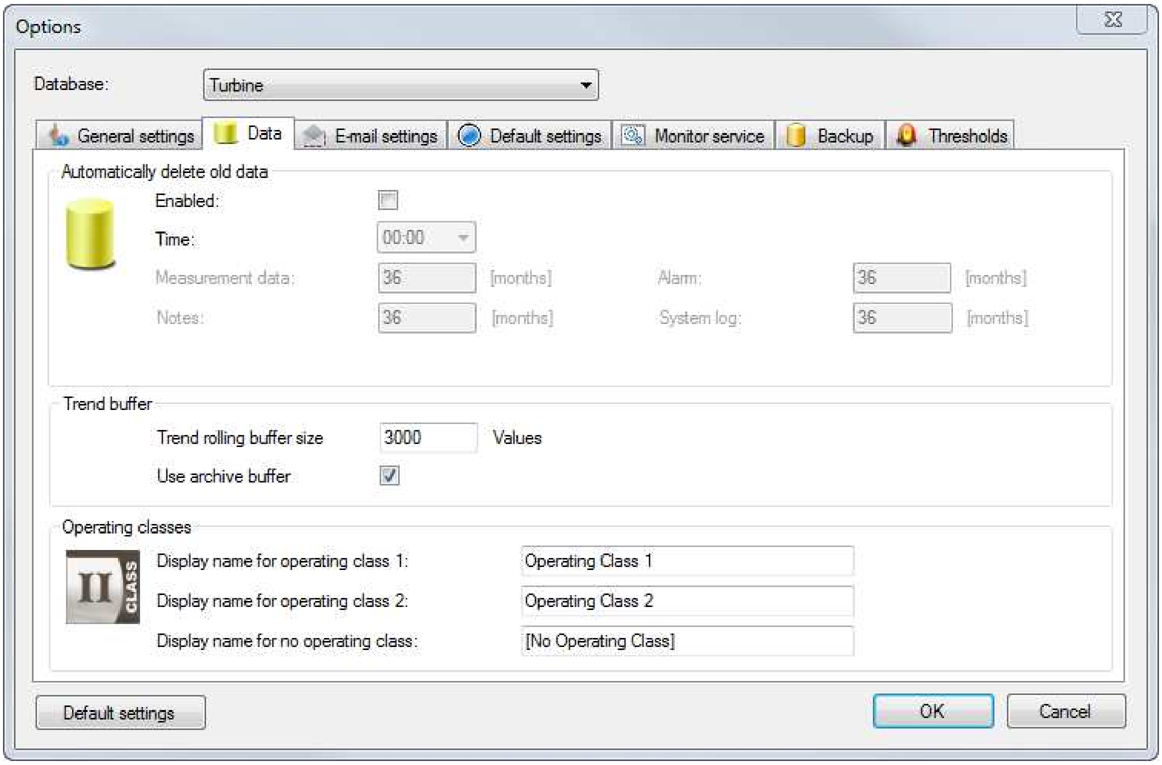


Figure 6 - 54.
Example of Options Data Settings.

Automatically delete old data will cause the monitor service to remove old data from the database once data is older than the specified range, if **Enabled** is checked. Specified ranges can differ for different types of data.

Time specifies at which time of the day the removal will take place. Removing a large amount of data from the database can be time consuming. In such case, it is recommended to set the time to a non-office hour.

Trend rolling buffer size determines the size (number of values) of the built-in trend rolling buffers. The default size is 3 000.

Use archive buffer turns the archive buffer on (if checked) or off (if not checked). The archive buffer can store up to 80 000 values for each measurement point.

Operating Classes are different operating conditions in which a machine normally operates. With the use of multiple gating measurement points, you can set different alarm levels depending on which operating class a machine is using. @ptitude Observer supports two operating classes for use with IMx devices.

Display name for operating class 1 and **2** – Enter the text to display in the user interface (for example in the Process Overview) when the machine is operating in either of the two operating classes.

Display name for no operating class – Enter the text to display when the machine is not operating in either of the two operating classes.

- Only individuals with "Config System" rights can change the operating class display names.

E-mail Settings Tab

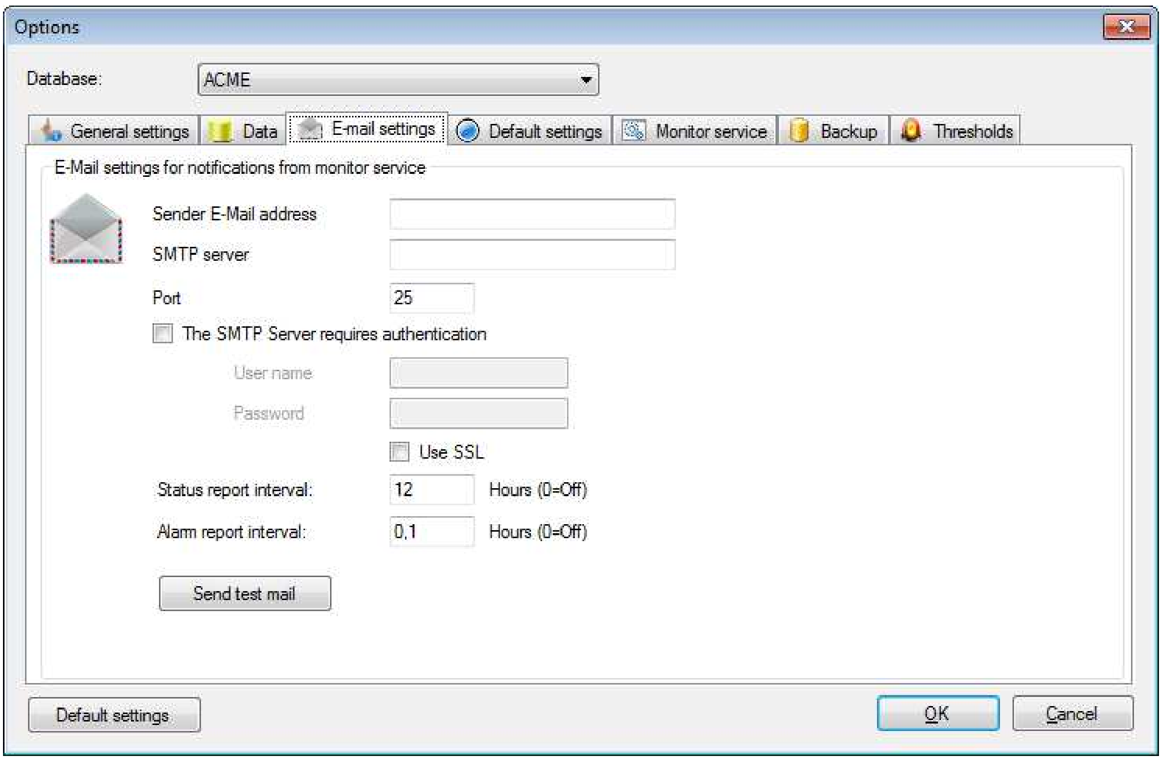


Figure 6 - 55.
Example of Options E-mail Settings.

Sender E-Mail address is the email address to which the monitor service will send notifications.

SMTP Server is the SMTP server that should be used for sending e-mail messages from the monitor service. If the SMTP server requires user name and password, enter them in the user name and password text boxes.

Port needs to be set to the port of the SMTP Server.

The STMP Server requires authentication must be checked if the SMTP Server requires that a user name and a password is supplied.

User name is the user name of the SMTP Server

Password is the password for the SMTP Server

Use SSL must be checked if the SMTP Server requires communication through SSL (Secure sockets layer)

Status report interval sets how often status reports from the monitor service should be sent by email. The status report of the monitor service contains a number of parameters about the system, including database size and condition.

Alarm report interval sets how often alarm reports from the monitor service should be sent by email. The alarm reports of the monitor service contains alarm information of the alarm that has occurred since the last alarm report.

Send test mail sends out a test mail which can be used to confirm that the email settings are correct.

Default Settings Tab

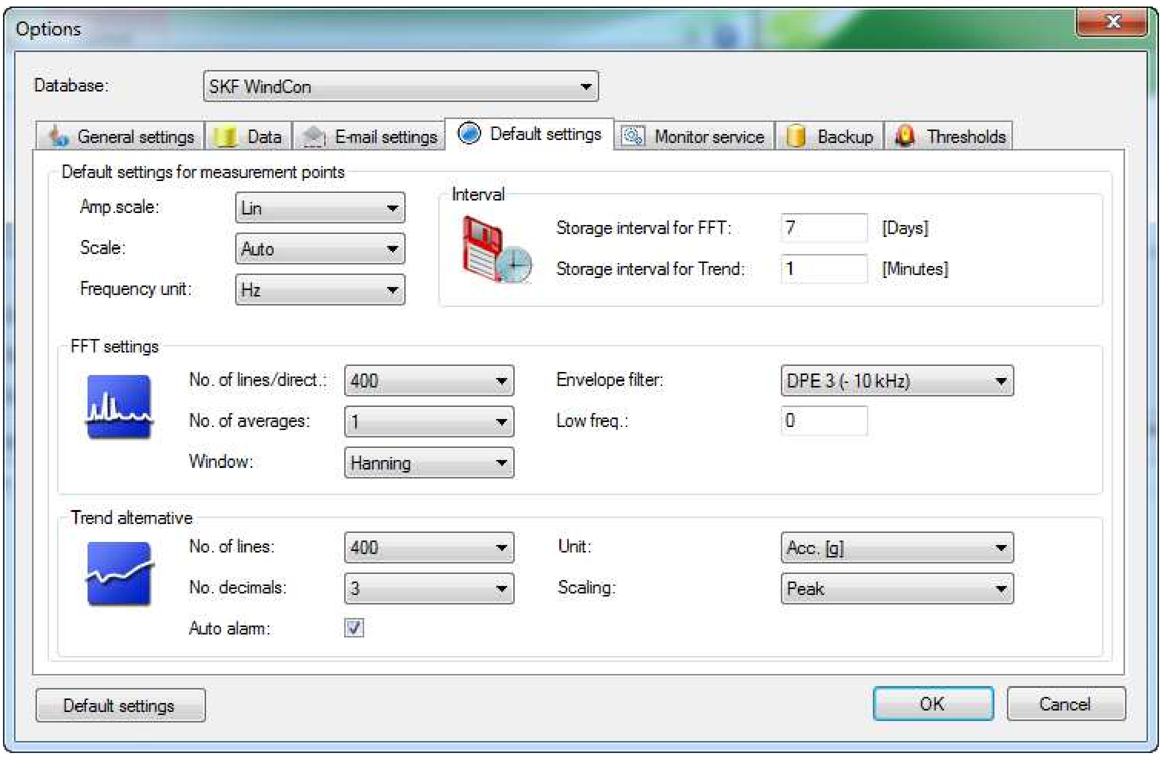


Figure 6 - 56.
Example of Options Default Settings.

Default settings allow you to configure settings for new measurement points of the selected database. When a new measurement point is created, these settings will be automatically selected for the new measurement point on the measurement point screen. For more information refer to Setting up Measurement Points and Alarms in System Configuration.

Monitor Service Tab

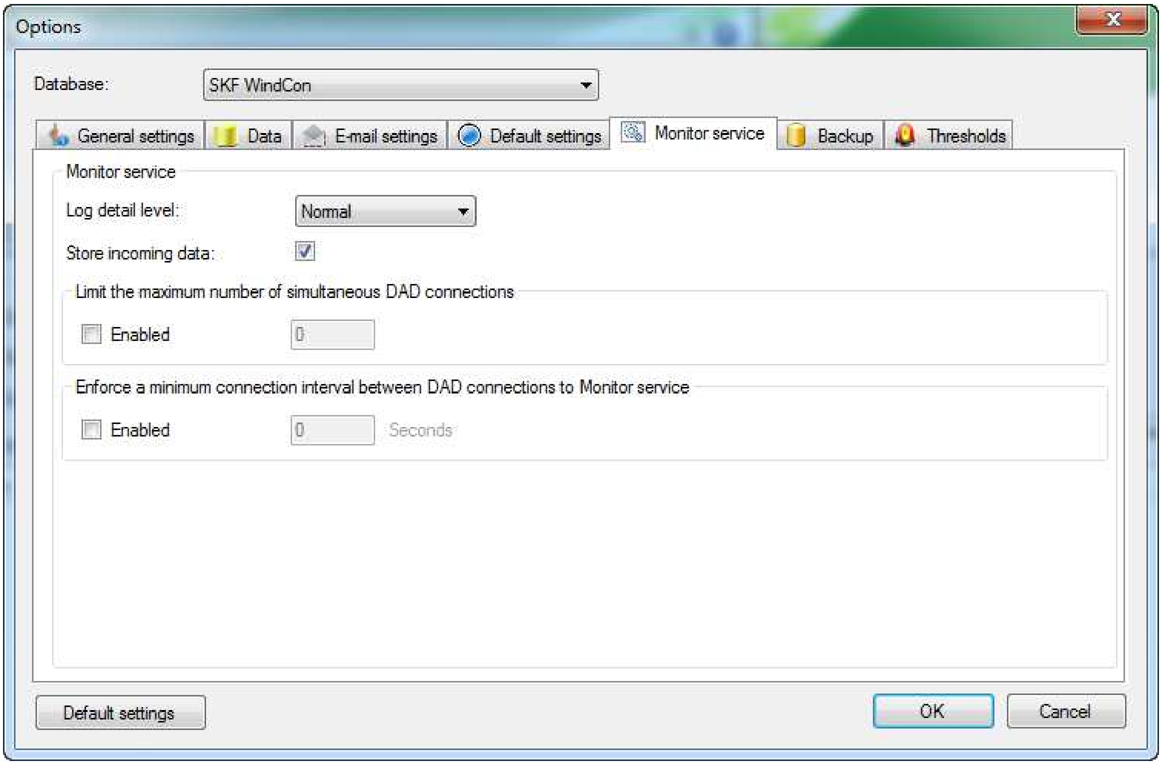


Figure 6 - 57.
Example of Options Monitor Service Settings.

Log detail level decides which type of event(s) can be stored in the monitor event log. There are five levels to choose from:

None: Nothing is logged in the event log.

Minimal: Only severe errors are logged.

Normal (default): Severe and minor errors are logged.

Detailed: Store events in addition to severe and minor errors are logged.

Full: All events that occur are logged. This setting can be used for error tracking.

Store incoming data can turn on and off the data storage in the database. This checkbox should normally always be checked. Under certain circumstances such as during service or during commissioning this can be unchecked in order not to store invalid data.

Limit the maximum number of simultaneous DAD connections can be used to prevent all DADs in the system from connecting at the very same time to upload the collected data to the database. This can be useful when having a system setup where the DADs connect on a regular interval, for example once per day and upload their data, and then disconnect again.

Enforce a minimum connection interval between DAD connections to monitor service can be used to spread out the workload of the monitor service on sensitive computers.

Backup Tab

Backup automates daily backups for SQL Server. The backups are done by the @ptitude Observer Monitor service at the specified interval. Therefore, @ptitude Observer Monitor has to be running for the backups to be created

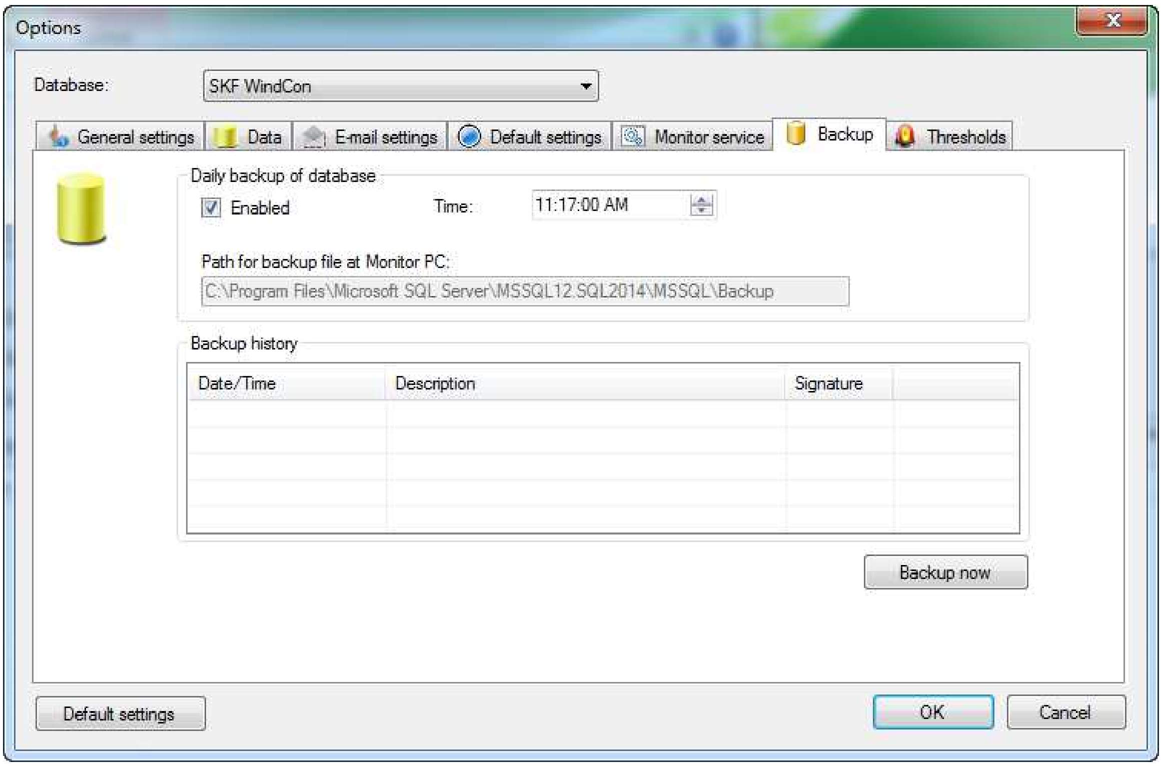


Figure 6 - 58.
Example of Options Backup Settings.

Database is the database to which backup options are to be applied.

Enabled causes daily backup of the database.

Time indicates when the backup job should be executed.

Path for backup at Monitor PC specifies the location where the backup files should be saved on the monitor computer.

Backup history displays the history of backups done.

Backup now causes an immediate backup. Backups are stored by @ptitude Observer SQL Server Database Administrator.

Note that with SQL Server Express, this is the only way to automate backups of @ptitude Observer databases.

With the full version of Microsoft SQL Server 2005, 2008, 2012 or 2014 it is still possible to configure the backups with @ptitude Observer SQL Server Database Administrator.

Thresholds Tab

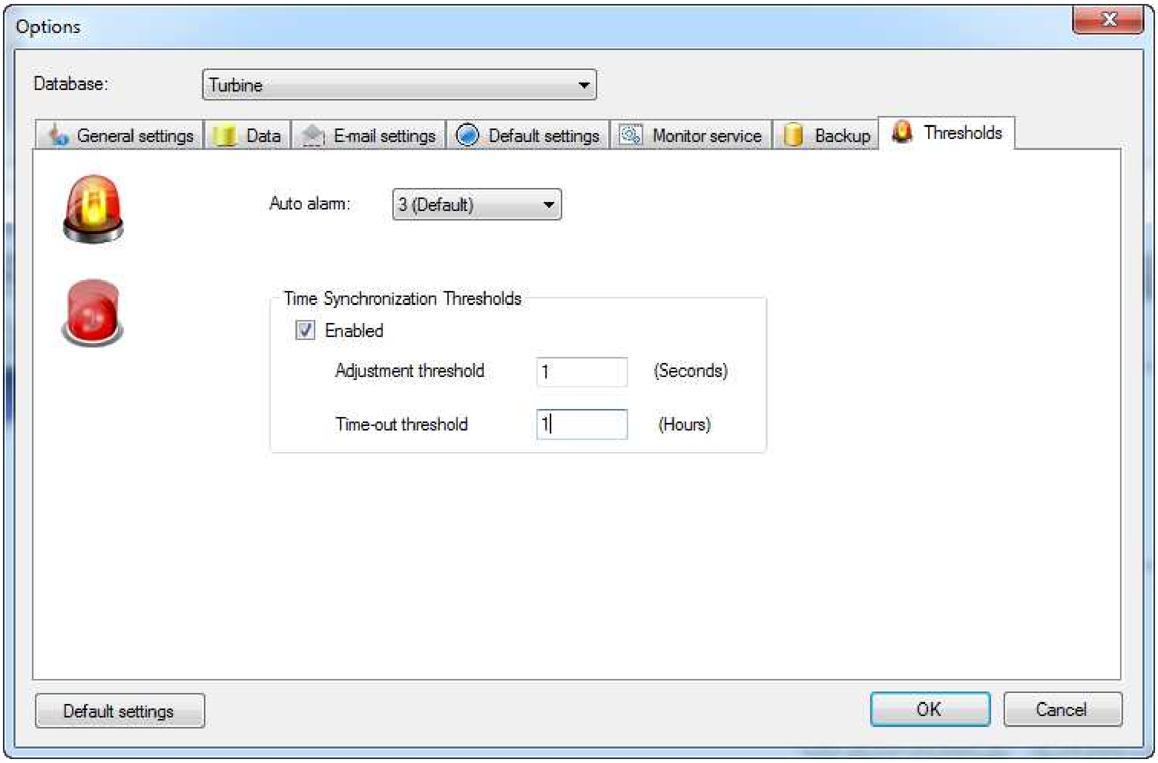


Figure 6 - 59.
Example of Time Synchronization Thresholds Settings.

Database is the database to which alarm and relays options are to be applied.

Auto alarm value is the setting for the diagnosis auto alarm. It sets the alarm level between 3 (default level) and 10 (conservative level) for the auto alarm in the diagnosis graph.

3 (Default) sets the auto alarm level fairly close to previous measurements.

10 (Conservative) sets the auto alarm level to high.

In the IMx screen, if you selected either **Default settings (from network configuration)** or **Use IP address** as the Time server (NTP server) option, you can configure time synchronization thresholds to generate critical system alarms.

To configure the time synchronization thresholds:

- Select the **Enabled** checkbox to enable threshold alarm generation.
- Enter the desired number of seconds for the **Adjustment threshold (seconds)**. The adjustment period is the difference between the time of the NTP client and the time of the NTP server. If the time difference exceeds the Adjustment threshold specified, an alarm is created. The alarm states: "The time difference between the device (IMx name) and the NTP server has exceeded the threshold."

- Enter the desired number of hours for the Time-out threshold (hours). The NTP client tries to communicate with the NTP server at specific intervals to get the current time. If the time period the NTP client cannot communicate with the NTP server exceeds the Time-out threshold specified, an alarm is created. The alarm states: "Device (IMx name) has not been able to synchronize with the NTP server."

Delete Data

Delete data interface allows you to delete measurement data based on certain criteria or filter settings for the selected database.

Data Miner

The data miner interface is a statistical producing facility that allows for complex data mining from the Observer database which can be shown in three different formats; table, trend and bar.

This interface makes it possible to compare measurement points, machines or even specific diagnosis between each other.

In order to create your own statistical views you need to have a very good understanding of the Observer database structure.

On-line

The On-line menu provides the following interfaces.

- IMx/MasCon Devices
- OPC servers
- Monitor Service Viewer
- Balancing
- Event log

IMx/MasCon Devices

This interface brings up the IMx/MasCon devices screen. Refer to Creating IMx/MasCon Devices and Channels in System Configuration.

OPC Servers

OPC Servers interface brings up the OPC Servers and channel settings screen. Refer to Creating OPC Servers and Channels in System Configuration.

Monitor Service Viewer

The monitor service viewer can be used to view the interface of the monitor service remotely from Observer. It is possible to view all events occurring in the service in addition to the database status, DAD status, OPC status and number of clients currently connected.

Balancing

On-line balancing is a tool for multiple plane balancing designed especially for turbines. However, it is just as efficient to use on smaller machineries. The on-line balancing in @ptitude Observer uses IMx, MasCon16/48 devices harmonic measurement points as the data collector because of its supreme simultaneous measurement capability. On-line balancing supports maximum of 15 planes over 5 states with up to 40 measurement points.

For a successful balancing, first the phase must be stable, and it should be possible to make changes on the actual speed range under run-up/down group. Polar plot can be used to determine if the phase is stable. If the phase is not stable, the problem is not only unbalance but also can be something else. Therefore, in such case further normal analysis of the machine is required. On a horizontal machine with laying shafts, the best balancing direction is the weakest direction.

In order to have an accurate balancing analysis of a machine, it should be certain that the problem lies within the unbalance characteristics. The following are some of the examples of unbalance characteristics.

- Bearing problems
- Bearing slip
- Misalignment
- Weak foundation

Balancing interface has the following functions.

- Balance
- ICM (influence coefficient matrix)

Balance

Follow the steps described below in order to have an accurate balancing analysis of a machine.

Step 1: Choose an ICM (influence coefficient matrix) of the selected database you would like to use. ICMs are created via ICM interface.

The list of ICMs are shown by names and dates created. ICM contains the necessary information about the machines behavior needed to eliminate unbalance which is stored in the database for new on-line balancing in the future.

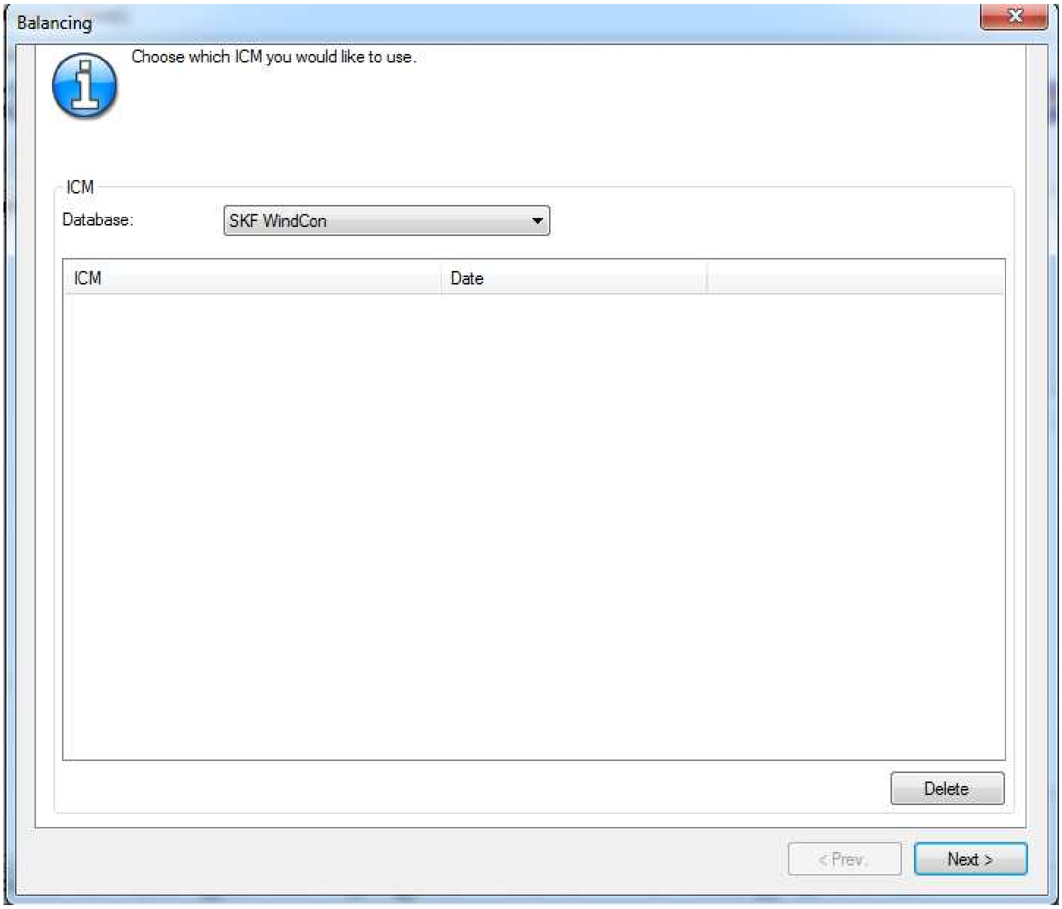


Figure 6 - 60.
Example of Select an ICM for Balancing Analysis.

Step 2: Choose which points, planes and states that this balance should use. For big machines such as a turbine, it is possible to balance a few of the planes. It is not necessary to do a balancing of all the planes all the time.

Step 3: Choose a measurement point to increase the factor in the calculation. The higher number yields the greater factor in the calculation.

Step 4: Choose data to use in order to eliminate unbalance.

Live data display all the measurement points with an amplitude, phase and number of means collected. A phase % is the difference between highest and lowest and calculated over 360 degrees. Between 0 and 5% is a normal range, whereas 5 to 10% is unstable and greater than 10% is a corrupt phase. If the phase is corrupted, the balancing is most likely going to fail. In such case, go back and perform a normal analysis of the machine and determine what the problem is and remove the problem first. A large number of test weight can also cause a corrupt phase.

Step 5: Now you get the balancing result after all the possible combinations have been calculated and optimized.

The improvement shows how much of the vibration has been eliminated. The biggest value is 100%.

In order to minimize the mounting weight, one of the combinations may have lesser weight than the others. It is also possible to input own weights to calculate expected deflection. This can be used if there is any plane that could not be mounted for some reason or maybe the weights mismatch the result.

After weights are mounted, it is strongly recommended to go back to the eliminating screen, step 4, and collect some new live data. It is most likely that the elimination of unbalance can continue until a very small unbalance is left.

ICM

ICM (influence coefficient matrix) interface enables you to create an ICM for the selected database. Created ICMs are used for further on-line balancing.

Follow the steps below in order to create an ICM.

Step 1: Choose sensors, number of planes and number of states from the machine of the selected database.

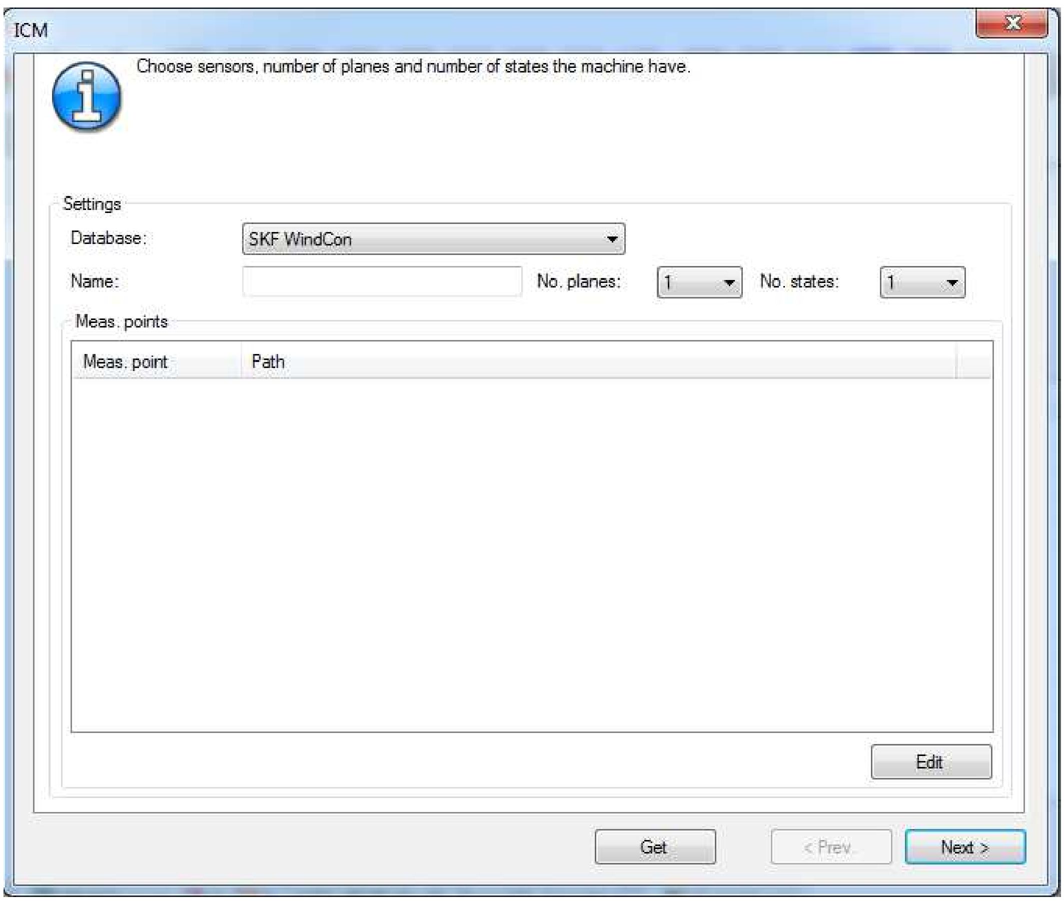


Figure 6 - 61.
Example of Create an ICM Settings.

Database is the database to which this ICM applies.

Name is the text reference to the ICM.

No. planes is the number of positions on which you can mount a weight.

No. states is the number of defined speed range in which a balancing is conducted. For large turbines, it could be more than one. Whereas for regular fans, it probably would be one.

Point is the selected harmonic measurement point.

Path is the particular harmonic measurement point's path.

Edit brings up the hierarchy view and for you to select a harmonic measurement point by checking a box of the desired point.

Get lists the existing ICMs of the selected database and enables you to select an ICM.

Next continues to the next screen where you can name the planes and states. It also enables defining the balancing speed range of center frequency with a plus or minus delta speed.

Step 2: Name the planes, states and define balancing speed range of center frequency with a plus/minus delta speed.

Step 3: Now it is time to select data. Data can be collected live as well as read from the database. It is important to input weight and phase of every test weight used.

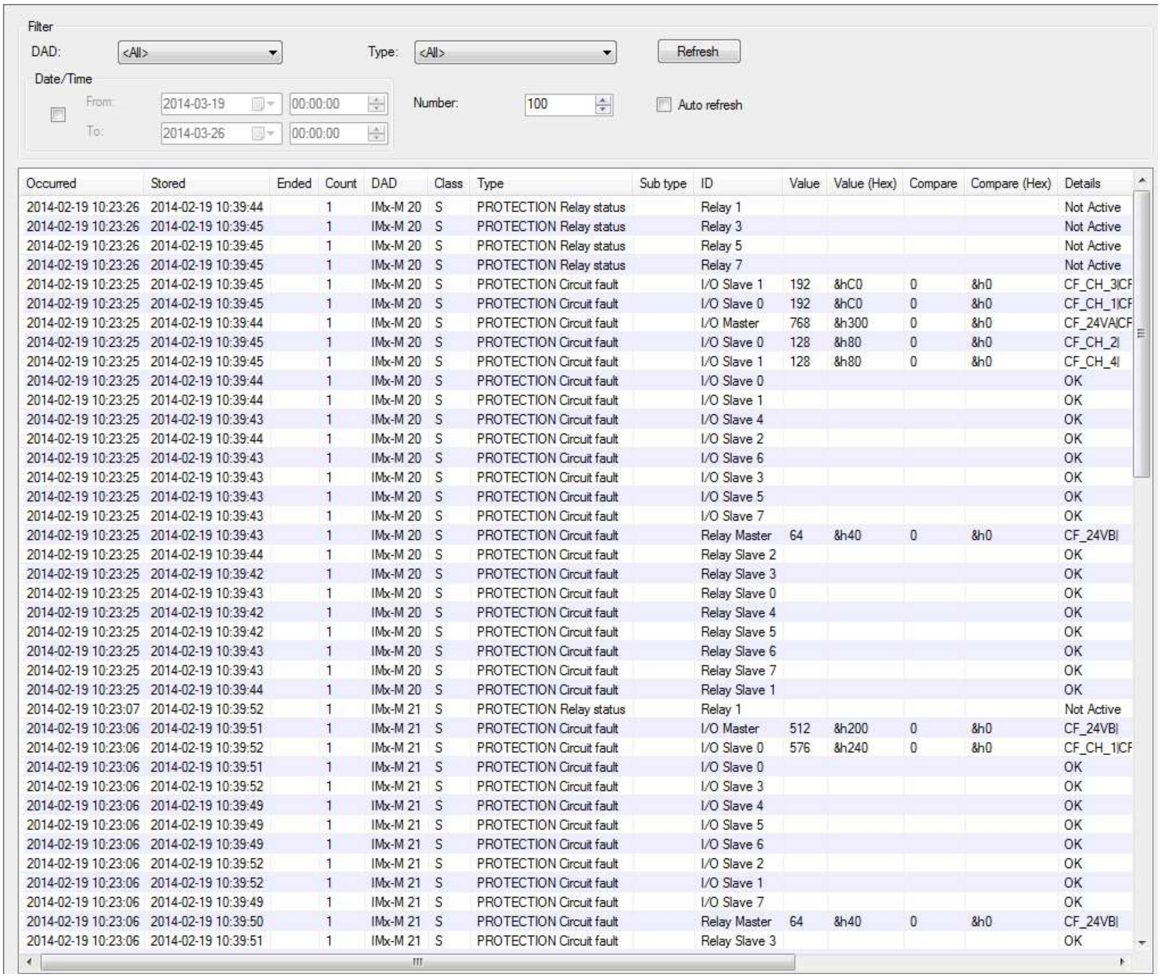
Step 4: At this stage, verify that the amplitudes or phase has changed between initial run and the test runs. It is possible to see the actual number of mean values collected. If the changes in amplitude and phase were too little, then you probably used test weights that were too small. This can cause an incorrect ICM which in turn is inappropriate to use for a good balancing.

Step 5: Presentation of the ICM matrix over every defined state is shown. Note that the matrix condition number should not be greater than 4.

Event Log

Event log is available for IMx-M and IMx-R devices only.

It displays all the events of the selected device type (DAD) of the specified database. For detailed information, refer to IMx-M User Manual for IMx-M devices and IMx-R User Manual for IMx-R devices.



Occurred	Stored	Ended	Count	DAD	Class	Type	Sub type	ID	Value	Value (Hex)	Compare	Compare (Hex)	Details
2014-02-19 10:23:26	2014-02-19 10:39:44		1	IMx-M 20	S	PROTECTION Relay status		Relay 1					Not Active
2014-02-19 10:23:26	2014-02-19 10:39:45		1	IMx-M 20	S	PROTECTION Relay status		Relay 3					Not Active
2014-02-19 10:23:26	2014-02-19 10:39:45		1	IMx-M 20	S	PROTECTION Relay status		Relay 5					Not Active
2014-02-19 10:23:26	2014-02-19 10:39:45		1	IMx-M 20	S	PROTECTION Relay status		Relay 7					Not Active
2014-02-19 10:23:25	2014-02-19 10:39:45		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 1	192	&hC0	0	&h0	CF_CH_3|CF
2014-02-19 10:23:25	2014-02-19 10:39:45		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 0	192	&hC0	0	&h0	CF_CH_1|CF
2014-02-19 10:23:25	2014-02-19 10:39:44		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Master	768	&h300	0	&h0	CF_24VA|CF
2014-02-19 10:23:25	2014-02-19 10:39:45		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 0	128	&h80	0	&h0	CF_CH_2|
2014-02-19 10:23:25	2014-02-19 10:39:45		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 1	128	&h80	0	&h0	CF_CH_4|
2014-02-19 10:23:25	2014-02-19 10:39:44		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 0					OK
2014-02-19 10:23:25	2014-02-19 10:39:44		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 1					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 4					OK
2014-02-19 10:23:25	2014-02-19 10:39:44		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 2					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 6					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 3					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 5					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		I/O Slave 7					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Master	64	&h40	0	&h0	CF_24VB|
2014-02-19 10:23:25	2014-02-19 10:39:44		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 2					OK
2014-02-19 10:23:25	2014-02-19 10:39:42		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 3					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 0					OK
2014-02-19 10:23:25	2014-02-19 10:39:42		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 4					OK
2014-02-19 10:23:25	2014-02-19 10:39:42		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 5					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 6					OK
2014-02-19 10:23:25	2014-02-19 10:39:43		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 7					OK
2014-02-19 10:23:25	2014-02-19 10:39:44		1	IMx-M 20	S	PROTECTION Circuit fault		Relay Slave 1					OK
2014-02-19 10:23:07	2014-02-19 10:39:52		1	IMx-M 21	S	PROTECTION Relay status		Relay 1					Not Active
2014-02-19 10:23:06	2014-02-19 10:39:51		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Master	512	&h200	0	&h0	CF_24VB|
2014-02-19 10:23:06	2014-02-19 10:39:52		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 0	576	&h240	0	&h0	CF_CH_1|CF
2014-02-19 10:23:06	2014-02-19 10:39:51		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 0					OK
2014-02-19 10:23:06	2014-02-19 10:39:52		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 3					OK
2014-02-19 10:23:06	2014-02-19 10:39:49		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 4					OK
2014-02-19 10:23:06	2014-02-19 10:39:49		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 5					OK
2014-02-19 10:23:06	2014-02-19 10:39:49		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 6					OK
2014-02-19 10:23:06	2014-02-19 10:39:52		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 2					OK
2014-02-19 10:23:06	2014-02-19 10:39:52		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 1					OK
2014-02-19 10:23:06	2014-02-19 10:39:49		1	IMx-M 21	S	PROTECTION Circuit fault		I/O Slave 7					OK
2014-02-19 10:23:06	2014-02-19 10:39:50		1	IMx-M 21	S	PROTECTION Circuit fault		Relay Master	64	&h40	0	&h0	CF_24VB|
2014-02-19 10:23:06	2014-02-19 10:39:51		1	IMx-M 21	S	PROTECTION Circuit fault		Relay Slave 3					OK

Figure 6 - 62.
Example of Event Log.

Class: S = CM system fault

A = alarm

If **Auto refresh** is enabled, the event log will be refreshed according to the value set for Event Log update rate in User Preferences.

Portables

Portables menu provides the following interfaces.

- Microlog
- Coded notes

Microlog

Interface for Microlog consists of four different settings where users can execute different actions. Upon opening Microlog screen, @ptitude Observer automatically tries to get the status of the connected Microlog.

Status

The status setting shows information retrieved from the Microlog such as firmware version, current date/time, total number of points stored currently, total amount of free memory, temperature inside the device and battery voltage.

Status retrieves the status from the connected Microlog.

Clear removes all routes and data from the memory of the connected Microlog.

Reset deletes all the data from the existing routes on the connected Microlog. For Microlog USB communication only, the clock is set to the PC internal clock.

Download

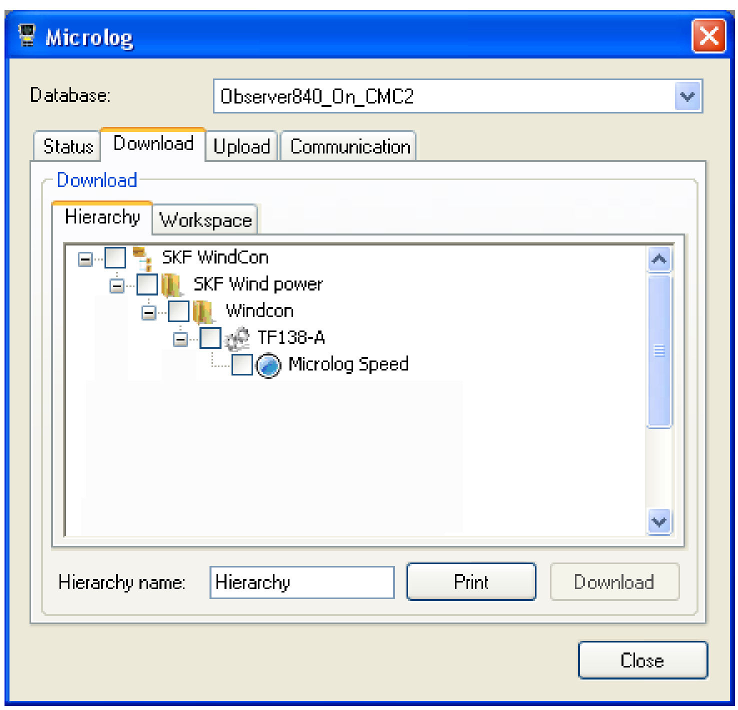


Figure 6 - 63.
Example of @ptitude Observer Download Routes to Microlog.

The download setting is used to download routes to the Microlog. It is possible to download a section of the hierarchy as a route or a workspace as a route.

Hierarchy name specifies a custom name for the route that will be assigned when the selected portion of the hierarchy is downloaded to the Microlog. It is available for the hierarchy setting only.

Print prints the selected hierarchy or workspace as a route list.

Download starts the download of the Microlog.

Upload

The upload setting is used to transfer the data collected by Microlog and save the data in the @ptitude Observer database.

Non route enables you to upload data that are not route-based. Non-route is also known as brute force.

Upload measurement history uploads the history of measurement points for USB communication only.

Reset deletes all data on the specified route, but keeps the route information so the route can be measured again.

Remove deletes the specified route and all data on the route. In order to measure the route again, the route has to be downloaded again to the Microlog.

Upload uploads the selected route and stored the data in the @ptitude Observer database.

Communication

The communication setting is used to change the settings as how to communicate with the Microlog. These settings will be saved until the next time you open the communication settings.

Type can be USB or Serial.

Port is required for the serial type only. It specifies which port to use for serial communication.

Baud rate is also required for the serial type only. It specifies which speed to use for serial communication. The default is 115200.

Coded Notes

Coded notes interface enables you to configure the coded notes that should be sent to the Microlog device when downloading routes. A coded note is a pre-configured comment to apply to a certain measurement.

Window

Window menu item provides the following interfaces.

- Cascade
- Tile Vertically
- Tile Horizontally
- Close all

Cascade

Cascade interface organizes all opened windows in a cascade.

Tile Vertically

Tile vertically interface arranges all opened windows vertically.

Tile Horizontally

Tile Horizontally interface arranges all opened windows horizontally.

Close All

Close closes all the opened windows.

Help

Help menu provides the following interfaces.

- Contents (F1)
- Search
- Enter new license key
- News in Observer
- SKF CMC Homepage
- SKF Reliability Forum
- About

Contents

Contents interface opens up the help file for @ptitude Observer.

Search

Search interface opens up the @ptitude Observer help file in search mode.

Enter New License Key

A new license key is required if a new upgrade to the @ptitude Observer service suite has been purchased. The software has to be restarted after the registration. Refer to Getting Started.

News in Observer

News in Observer contains information on the new features in the currently released version.

SKF CMC Homepage

This interface starts the default web browser on the local computer and navigates to SKF Condition Monitoring product information.

SKF Reliability Forum

This interface starts the default web browser on the local computer and navigates to SKF Reliability forum. You need a username and password to access the website.

About

This interface displays version information about the currently installed version of SKF @ptitude Observer.

About @ptitude Observer displays the **System Info** box which lists all the modules that are contained in your license key (that is, currently installed in the Observer application). Use the scroll bar to view the list.

Figure 6 - 64.
System Info and Copy Info.

You cannot edit this list but you can copy it.

- Click **Copy Info** to copy the contents of the System Info box to the clipboard.
- Paste the contents into an email or other document to keep a record of the modules you are allowed to use or to request additional modules.

The following modules are loaded by default:

- Portables (that is, Microlog and MARLIN)
- Alstom railway
- IMx Knorr Bremse
- IMx-P
- IMx-S
- IMx-T
- IMx-W
- IMx-M
- MasCon 16/48
- LCP

Appendix A
What to Expect When Using Event Capture

This appendix describes the behavior of the event capture function under various conditions.

> ➢ The manual capture function is not included in the count of maximum event captures stored per day. A manual event capture is stored even if the limit of event captures per day is reached.

Minimum Time Between IMx Reboot and Beginning an Event Capture

There is a minimum 60 second event capture disarm period between an IMx reboot and an event capture triggered by an event capture point in alarm or a manual event capture. During this startup period, alarm events will not initiate a new event capture. This disarm period is a firmware characteristic that allows the system to avoid unwanted captures at startup when being in alarm before reconfiguration.

- For example: If a new alarm occurs on an event capture point 30 seconds after an IMx reboot, an event capture will not start. There might, however, be an entry in the alarm list for this alarm.

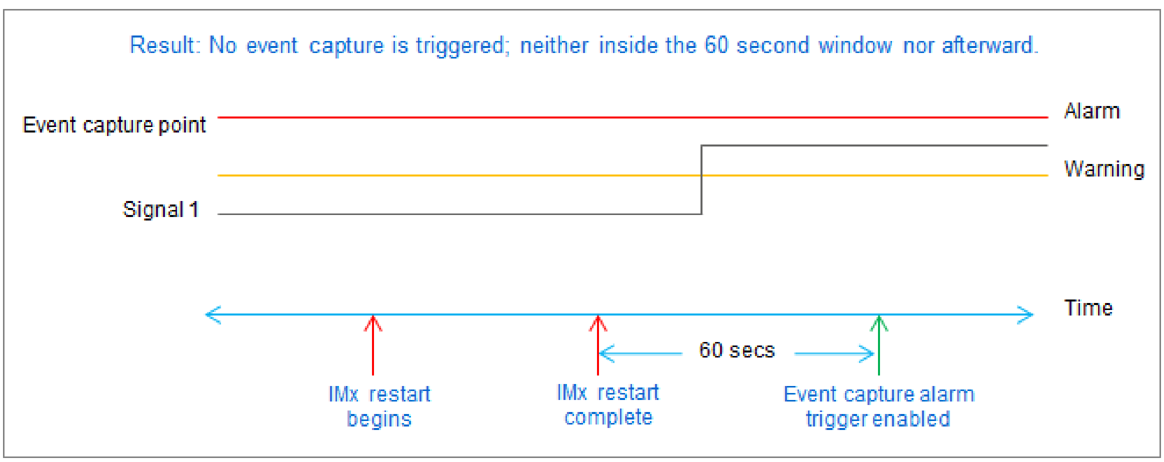


Figure A - 1.
No Event Capture Is Triggered.

- The pre-data buffer starts filling after the IMx device reboot process is complete.
- A manual capture can be triggered within the disarm time.

Depending on when the alarm is triggered and the time specified for pre data, you could end up with an event capture with only the alarm segment and less than expected pre data.

Next, we'll explore how pre data returned may be less than expected.

Incomplete Pre and Post Data

In normal operation, a completed event capture will have pre and post data lengths as specified in the event capture group properties. However, under some conditions the capture of pre data or post data may be incomplete.

Incomplete Pre Data

If the IMx device did not have sufficient time to fill the pre data buffer before the event capture is triggered, the captured pre data returned may have a length less than that specified in the event capture group.

Possible conditions where this might occur include:

- A manual capture is initiated in a time shorter than the pre data length after another event capture has been completely uploaded.

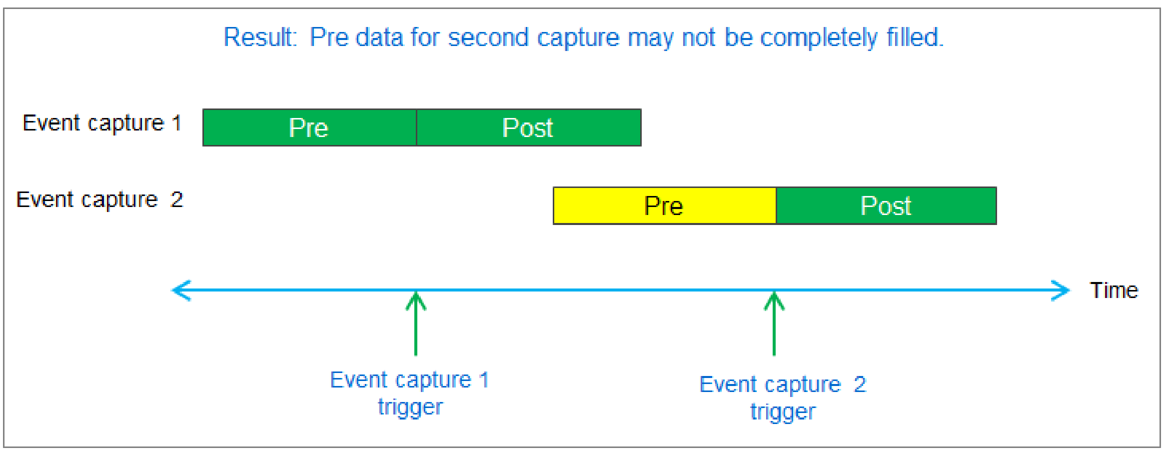


Figure A - 2.
Example of Incomplete Pre Data.

- An alarm driven capture is initiated within a time shorter than the pre data length after another event capture has been completed.
- An event capture is initiated after an IMx reboot within a shorter time than the pre data length.

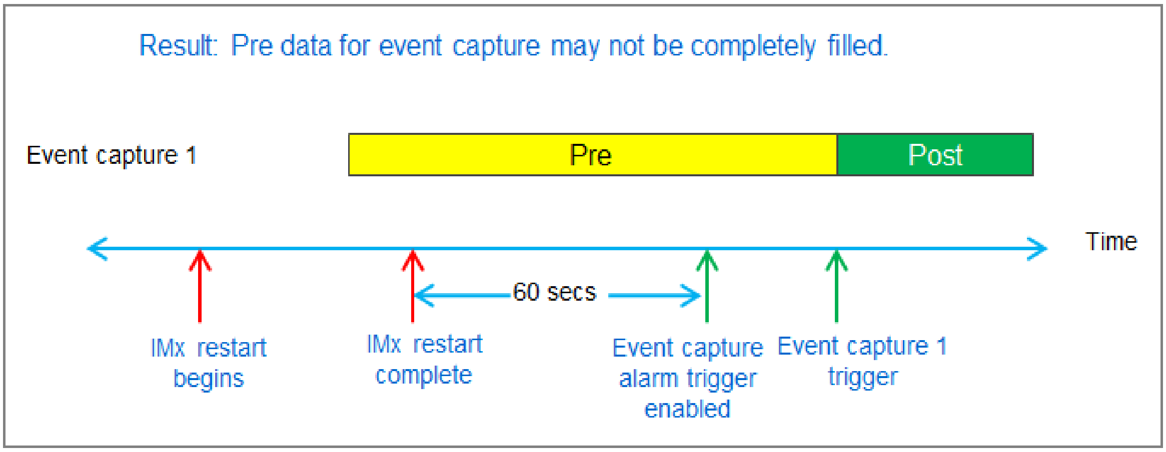


Figure A - 3.
Event Capture Triggered Within a Time Shorter than the Pre Data.

Incomplete Post Data

The captured post data returned may have a length less than that specified in the event capture group.

Reasons for the early termination of post data include the following:

- Loss of power to the IMx
- Manual reset by command (**Restart** on the **IMx/MasCon devices** configuration tool)
- Firmware update
- Watchdog reset due to firmware/hardware problem
- System config update (for example, changing device number or network settings)
- Large negative time adjustment (synchronization was not done for weeks or months)

Two results are possible when post data is incomplete.

Power was lost before the alarm containing the event trigger was saved to non-volatile memory.

The Monitor service will never see either the alarm or the end of the event capture, and therefore any captured data already received has little value. When closed, the incomplete event capture shows in the event capture list, but no plots are available.

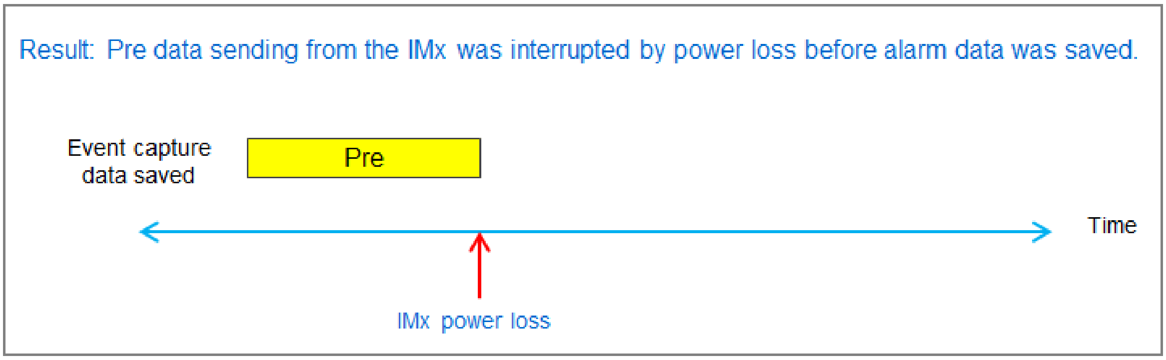


Figure A - 4.
Event Capture Interrupted Before the Alarm Is Saved.

- If all channels in the capture are missing the alarm data, then the incomplete event capture entry is displayed with the Transfer status *Truncated*, but no plots are available.
- If one or more event capture points received a captured alarm while other points in the group did not, you will see only limited, partial data. Because the display depends on the presence of the alarm to function correctly, many features of the event capture plots will not be fully functional.
  - Channels with alarms will display whatever data was provided from the capture process.
  - Channels without an alarm will not display captured data fully. There will be no band marker in the full time waveform plot, the zoomed time waveform plot will show only a big “X”, and the spectrum plot data will not cover the normal zoomed in region of the time waveform.

Power was lost after the alarm data was committed to non-volatile memory

The alarm data will be sent by the IMx once power is restored, but the end data was not saved and will never be received by the Monitor service. When closed, this incomplete event capture entry will be displayed, and it can be opened for display even though some post data will be missing.

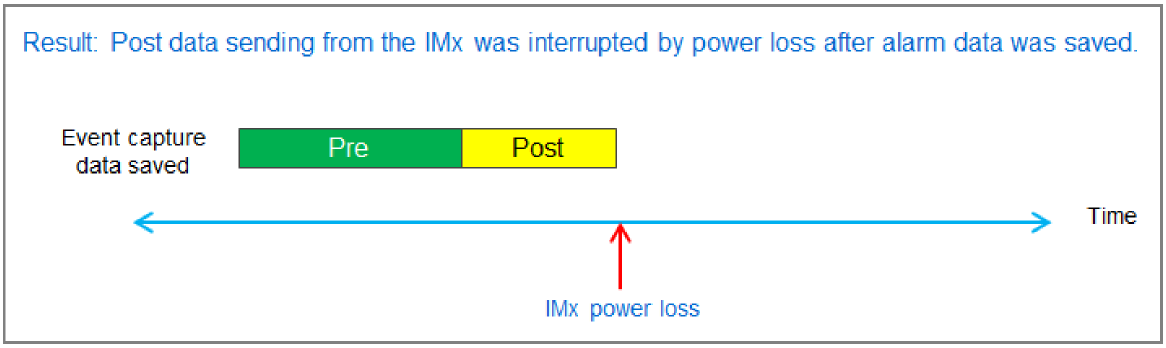


Figure A - 5.
Event Capture Interrupted After the Alarm Is Saved.

Active Range

If an event capture is started inside an active range and then goes outside the range while the event capture is ongoing, the data will be collected as usual.

If event capture points are in an alarm group and outside active range of the event capture group, and another member of the alarm group goes in alarm, the event capture is also stored.

If an IMx device restarts because of reconfiguration during an ongoing event capture, the IMx device will continue sending event capture data until the remaining data have been put in the non-volatile memory. Then, the device will reboot. After reboot, it will continue sending the remaining data from the interrupted event capture.

Network Interruptions During an Event Capture

If there is an interruption in network communication between the IMx device and the Monitor service during an ongoing event capture, the progress indicator in the Event Capture view window may stop updating and show no further progress.

The event capture will remain in a pending state until one of the following occurs:

- A new alarm-triggered event capture is received from the IMx device. In this case the pending event capture is closed and a new one is opened for the incoming alarm-based capture.
- Once the network problems are resolved, the previously interrupted event capture data transfer from the IMx is resumed and the event capture data transfer finishes normally.
- The pending event in the Event Capture view list is cancelled by the user.

  ➢ While an event capture remains in a pending state on an IMx, no further manual event captures can be initiated on that IMx device.

Signals Outside Cable Fault Detection Thresholds

Event capture signal levels that are detected to be outside cable fault threshold levels will continue to be collected and stored in the event capture data.

- ➢ The cable fault threshold values used for determining the presence of cable fault issues are those currently stored for the individual IMx channels.

When viewing data in either the event capture time waveform plot or event capture 3D plot, where any captured measurements have been found to be outside cable fault threshold limits, a warning message is displayed in the plot indicating a possible problem with the data.

Miscellaneous

If the pre data received is less than the total quantity of pre data expected, the Transfer status in the Event Capture list is *Done, Pre-data not filled*. This indicates that the Monitor has received all the data the IMx has to send, but the pre-buffer was not filled when the event capture was triggered due to one of the reasons stated above.

Stopping the Monitor service and restarting it while an event capture is ongoing does not affect the storage of event capture data. The IMx will pick up the data after the Monitor service and the IMx device have reconnected.

The date in the alarm list for the first event capture point in alarm matches the event capture date and also the 0 point in the event capture graph. If you have several event capture points, some might have a slightly later date/time.

When an IMx device restarts during an ongoing event capture

The IMx device will continue sending event capture data until the remaining data is put in the non-volatile memory, and then it will reboot. After reboot, the device will continue sending the remaining data from the interrupted event capture.

Alarm event capture triggered during a manual event capture

If a manual event capture is ongoing, the IMx event capture is locked, meaning that if you trigger an alarm on the event capture point it will continue sending the manual event capture data.

If a manual capture is in progress it will finish, and no other event capture is stored. However, if you have an alarm group in alarm, a second overlapped alarm event capture may be stored.

Changing alarm state during an alarm event capture

If an event capture starts with warning level and the amplitudes increase to alarm level while the event capture is ongoing, only one event capture is stored.

- ➢ The alarm list will display dual alarms for both warning and alarm states.

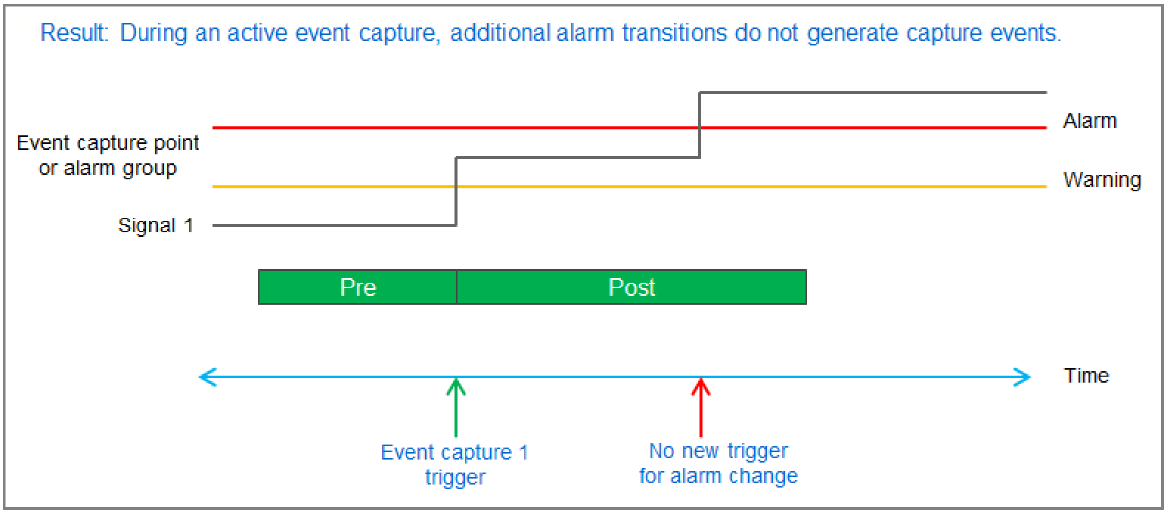


Figure A - 6.
Event Capture With Additional Alarm Transitions.

Cancel button

The **Cancel** button in the event capture window works as follows:

- Clicking the **Cancel** button stops the IMx device from sending event capture data by forcing a reset.
- Data received before the **Cancel** button is activated is retained.

Alarm leave time

The alarm leave time is calculated to satisfy both a minimum number of 10 measurements and a minimum time of approximately 60 seconds. This means that the IMx needs to see a minimum number of measurement values out of alarm state before enabling the setting of a new alarm state that corresponds to at least 60 seconds of time.

- A transition out of and back into warning state that happens in less time than the alarm leave time does not generate a new event capture.

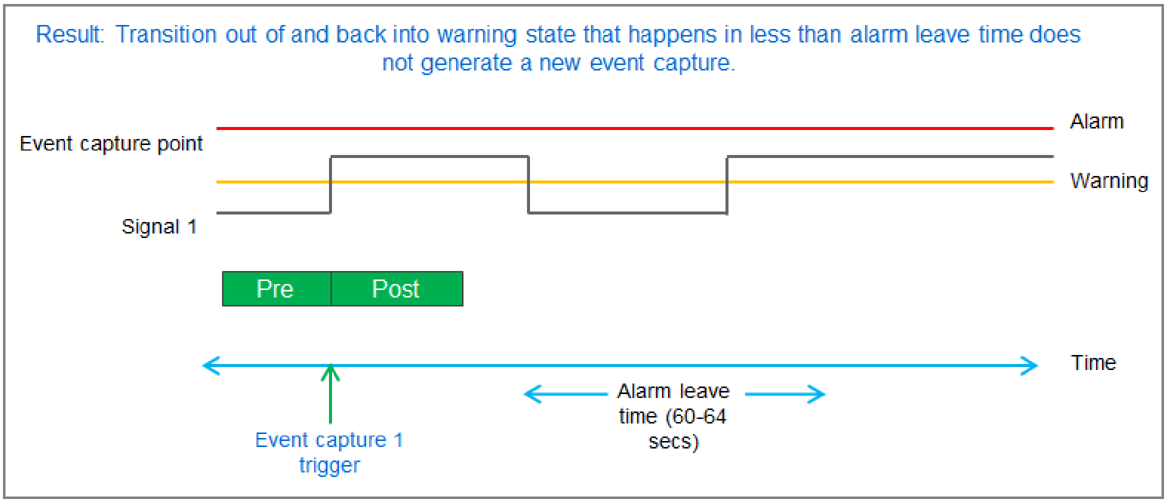


Figure A - 7.
Alarm Leave Time Shorter than Warning State Transition.

- A transition out of and back into warning state that happens in more time than the alarm leave time does generate a new event capture.

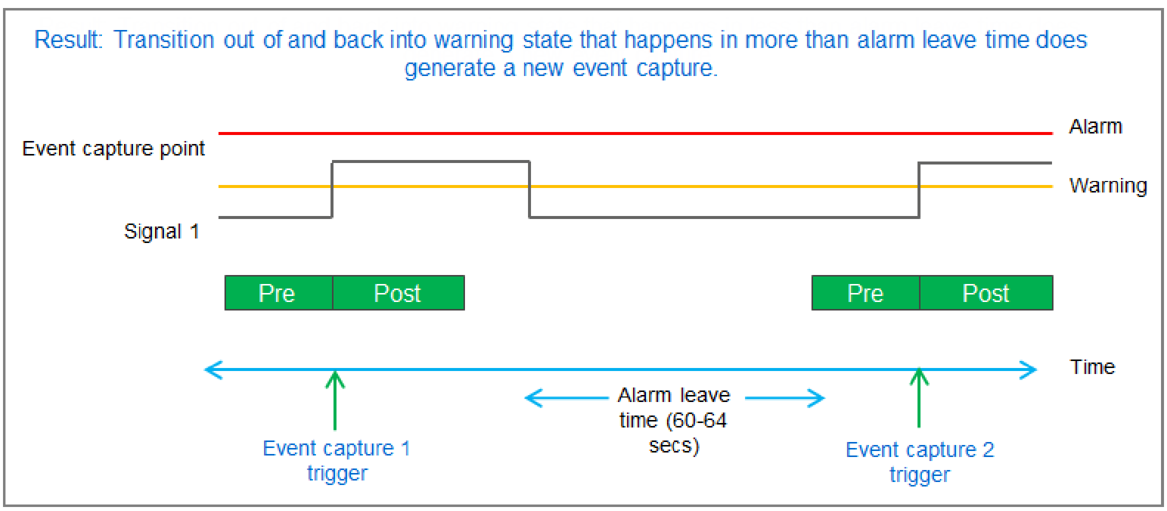


Figure A - 8.
Alarm Leave Time Longer than Warning State Transition.

No event capture is triggered when the alarm threshold is lowered to below the current vibration level.

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