COPA-DATA
do it your way

zenon manual

Industrial Performance Analyzer (IPA)

v.8.00

Contents

1. Welcome to COPA-DATA help

ZENON VIDEO-TUTORIALS

You can find practical examples for project configuration with zenon in our YouTube channel. The tutorials are grouped according to topics and give an initial insight into working with different zenon modules. All tutorials are available in English.

GENERAL HELP

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LICENSES AND MODULES

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2. Industrial Performance Analyzer

The Industrial Performance Analyzer (IPA) is designed in order to display and evaluate alarm data and associated downtimes in different list views. The IPA accesses a SQL database in which alarms - if they are engineered appropriately - are stored.

By its different filter settings, the IPA offers maximal flexibility. So for example you can filter on individual areas of your equipment and thus only those alarms are displayed which occurred in these areas. The IPA makes it also possible to detect and trace weak spots of your equipment. This is especially

helpful during the implementation of new equipment in order to get to the root of initial difficulties and to fix them. Together with the module Production & Facility Scheduler (PFS) the IPA makes it possible to display downtimes with the break times already subtracted. It automatically subtracts the break time which it receives from the PFS from the actual downtime. There you can see the net downtime of your equipment. In addition the IPA can take shift time and shift names from the PFS. This facilitates the engineering and you save time. And you must maintain the shift times and shift names only once. Furthermore it is assured that PFS and IPA use the same data.

Information

The industrial performance analyzer is designed for running on a PC. Therefore it is operated with keyboard and mouse. The complete operability with a touch screen is not guaranteed.

3. How it works - basic principles

All alarm data that has been configured accordingly (see Variables (on page 15)) is saved in an SQL database. The following are supported: Microsoft SQL Server and Oracle SQL Server. These can be available both locally as well as in a network.

In Runtime, the corresponding alarm data is saved in a buffer and cyclically written to the given database from there. The cycle time is determined during configuration in the Editor (see General settings) (on page 7).

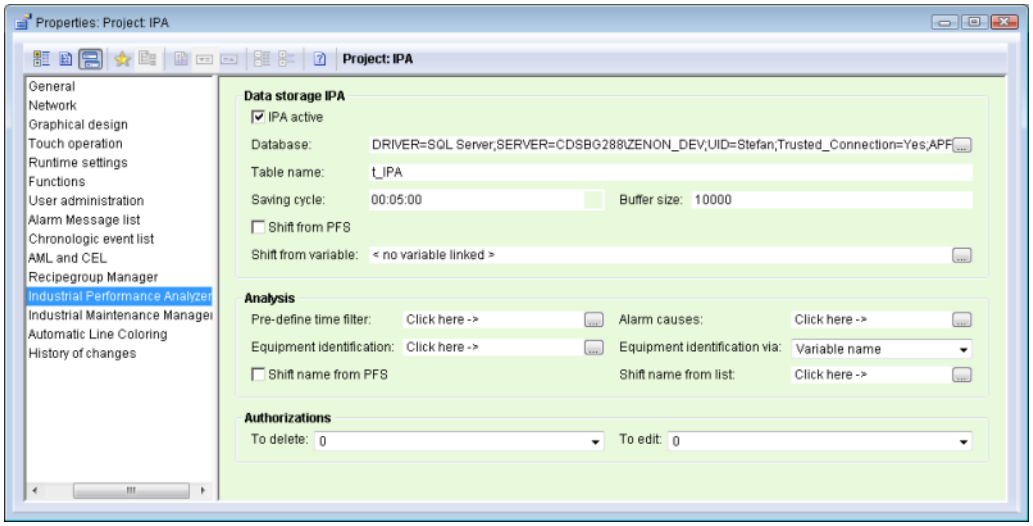
Several Runtime projects can write to the same database. The central saving of the alarm data ensures high security of data and high availability of the alarm data.
The evaluation is displayed in Runtime using an `Industrial Performance Analyzer` screen.

4. Engineering in the Editor

You must make the following settings in order to display and to evaluate alarm data in the Runtime.

4.1 General settings

You can find the Industrial Performance Analyzer area in the project properties. Here, you define the settings for the IPA, which relate to your complete project.



The following properties are available:

Property	Description
IPA active	Select this property to switch on the IPA.
Database	Define the database in which the IPA is to store the alarm data (see Database (on page 9))
Table name	Enter a free name for the table of your IPA data. A table with this name is automatically created in the database the first time the database is accessed.
Saving cycle	Define the interval in which the alarm data is to be written from the buffer to the database. Values are, in practice, between 2 and 5 minutes.
Buffer size	State how many alarms are to be saved in the buffer. The content of the buffer is saved to the database at the end of each cycle. The buffer is empty again after that. If, within a cycle, more than just the given number of alarms occurs, the oldest alarms are lost first.
Shift from PFS	Select this property in order to apply the times for the shifts from the Production & Facility Scheduler. If you activate this property, you can display downtimes with breaks already subtracted during the evaluation of the alarms.
Shift from variable	Select an INT variable. Together with the property shift name from list, you can assign numbers to shift names.
Pre-defined time filter	Define the different time filters that you can use in Runtime.
Alarm cause	Define the different alarm causes that you can use in Runtime.
Equipment identification	Define the different equipment identifications that you can use in Runtime.
Equipment identification via	Decide whether you want to use the start of the identification of a variable or the start of the variable name as part of the equipment identification.
Shift name from PFS	Select this property in order to apply the shift names for the defined shifts from the Production & Facility Scheduler.
Shift name from list	Define the shift names to numeric values. Using the numeric value of the variables that you have created under shift name from variable, the shift name defined here is displayed in Runtime for the respective alarm.
To delete	In the drop-down list, select the authorization level that a user must have in order to delete database entries from the Industrial Performance Analyzer.
To edit	In the drop-down list, select the authorization level that a user must have in order to edit database entries from the Industrial Performance Analyzer.

4.1.1 Database

At property **Database** you click on the button with the three dots in order to reach the dialog for selecting the file data source.

Engineering:

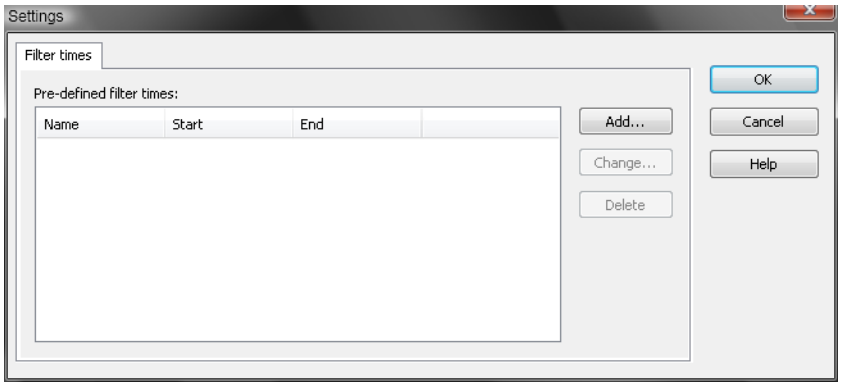
1. In order to create a DSN file you click **New...**.
2. Select entry **SQL server** in the following dialog and click **Next**.
3. Enter a new for the data source and again click **Next**.
4. Click **Finish** in order to exit the dialog.
5. Select the corresponding SQL server under **Server** and click **Next**.
6. You do not have to change anything in the appearing dialog. Click on **Next**.
7. Activate check box **change standard database to:** and select the desired database. Click **Continue**.
8. Again you do not have to change anything in this dialog. Click **Finish** in order to exit the dialog.

The final dialog shows you your settings once again. You can test the data source there. Confirm this and the following dialog with **OK**.

> **Attention**
>
> When using **Native Client 10** and **11**, the password is not automatically carried over to the provider string. It must be entered manually
>
> e.g.: ...;**User ID=sqlExampleUser1;Password=secretPassword;...**

4.1.2 Pre-define time filter

When you select this setting, the following dialog will be dislpayed.



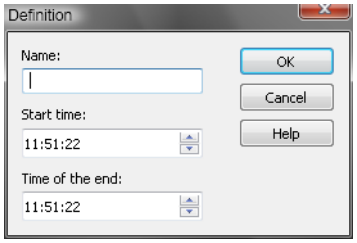
Parameters	Description
Add...	Add a new filter time. Enter a distinct name and set a start and end time in the appearing dialog.
Change...	Only active if you have selected an existing dialog. You can change the name, the start time and the end time in the appearing dialog.
Delete	Only active if you have selected one or more existing dialogs. Deletes the selected time filters without requesting confirmation.

The time filters you define here are available in the Runtime. You can, for example, define the times of your shifts (early shift, late shift, etc.) here once and can then use these tine periods in an Industrial Performance Analyzer screen when filtering.

Note: Time is saved as local time. For details see chapter Handling of date and time in chapter Runtime.

Add predefined time filter

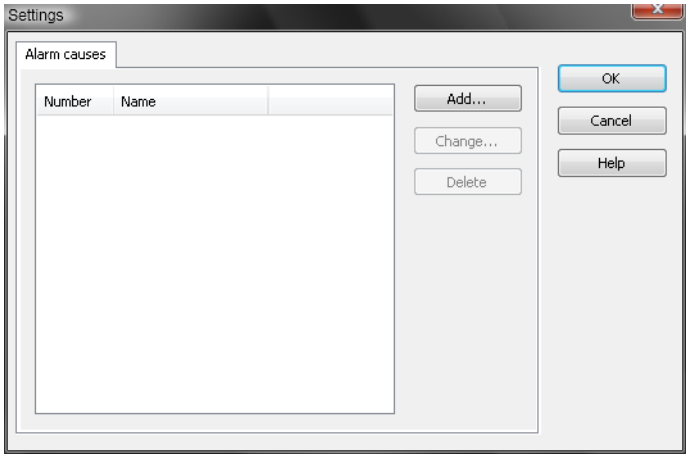
Via dialog **Definition** you can add new time filter or edit existing ones.



Parameters	Description
Name	Unique name of the time filter.
Time of begin	Time from which on the time filter is valid.
Time of the end	Time at which the time filter ends.

4.1.3 Alarm causes

When you select this setting, the following dialog will be dislpayed.

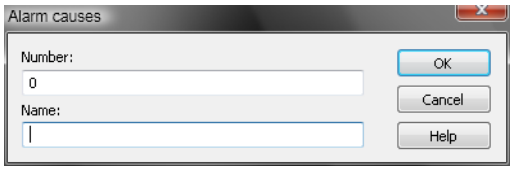


Parameters	Description
Add...	Add a new alarm reason. Assign a distinct name and number in the appearing dialog.
Change...	Only active if you have selected an existing dialog. You can change the number and the name in the dialog that appears.
Delete	Only active if you have selected one or more existing dialogs. Deletes the selected alarm causes without requesting confirmation.

The alarm causes you define here are available in the Runtime. You can assign an alarm cause to each alarm in the Industrial Performance Analyzer screen. You select the alarm causes from a list that you administer here.

Add alarm cause

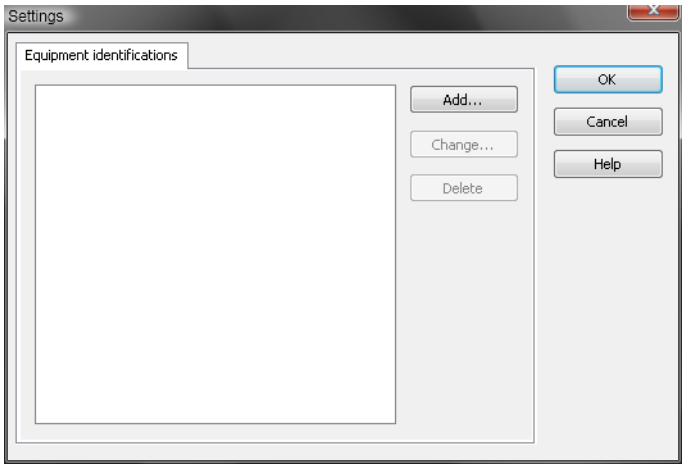
Via dialog Alarm cause you can add new causes or edit existing ones.



Parameters	Description
Number	Unique number of the alarm cause.
Name	Unique cause.

4.1.4 Equipment identification

When you select this setting, the following dialog will be dislpayed.



Parameter	Description
Add...	Add a new equipment identification. Enter a name for the equipment identification in the appearing dialog.
Change...	Only active if you have selected an existing dialog. You can change the name of the equipment identification in the dialog that appears.
Delete	Only active if you have selected one or more existing dialogs. Deletes the selected equipment identification without requesting confirmation.

The equipment identifications defined here are available to you in Runtime. The equipment identification can appear as a prefix in the name of the variables or in the identification of the variables (see **Equipment identification via** property in General settings (on page 7)). The prefix is ended with the _ character. Assignment to an equipment identification is only carried out if an equipment identification created corresponds to the prefix exactly.

Example

Equipment identification:

- `facility11`

Variable name or variable identification:

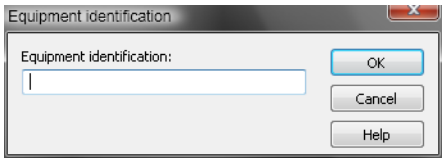
- `facility_Variable1`
- `facility11_Variable1`

Only the variable `facility11_Variable1` is assigned the created equipment identification `facility11`.

The equipment identification helps you to filter for the desired equipment.

Adding equipment identification

You can add new equipment identifications or change existing ones using the **Equipment identification** dialog.



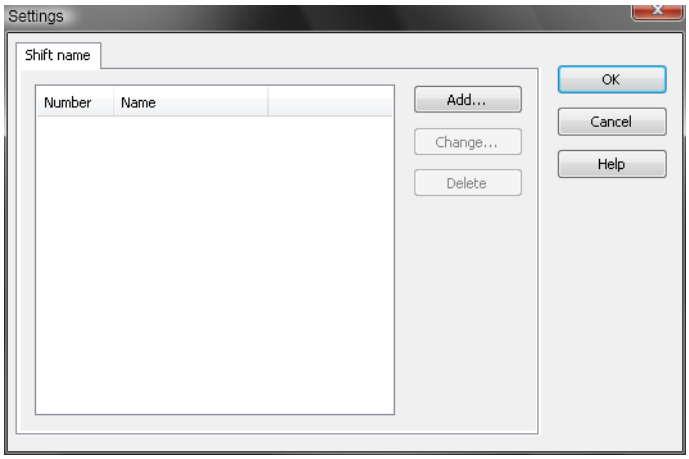
Parameters	Description
Equipment identification	Name for the equipment identification.

CLOSE DIALOG

Options	Description
OK	Applies settings and closes the dialog.
Cancel	Discards all changes and closes the dialog.
Help	Opens online help.

4.1.5 Shift name from list

The following dialog will be displayed when you select this setting.

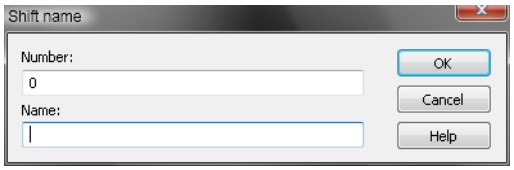


Parameters	Description
Add...	Add a new shift name. Assign a distinct name and number in the appearing dialog.
Change...	Only active if you have selected an existing dialog. You can change the number and the name in the dialog that appears.
Delete	Only active if you have selected one or more existing dialogs. Deletes the selected shift name without requesting confirmation.

The shift name you define here are available in the Runtime. They help you when filtering, in order to only show the alarms that have occurred in the respective shift.

Add shift name from list

Via dialog **Shift name** you can add new shifts or edit existing ones.



Parameters	Description
Number	Unique number of the shift.
Name	Unique name of the shift.

4.2 Variables

In order to save alarms in the IPA database, you must activate checkbox **Save in IPA database** for each corresponding variable. Only alarms from variables for which this property has been activated are stored in the database and can then be displayed and evaluated in screen Industrial Performance Analyzer.

Attention

In the limit text of the variable and in the variable identification only characters are allowed which may be used in SQL statements.

4.3 Language switch

Language switching is available for the following areas in the Industrial Performance Analyzer:

- Alarm/event group and alarm/event classes
- Equipment identification

  Note: Because the use of '@' is not permitted for variable names, language switching for equipment identification is only available if you have selected **Equipment identification via variable identification**.
- Alarm cause
- Shift name.

  Note: As the character '@' is not allowed in the Production & Facility Scheduler, language switch for shift names is only available if you have engineered the respective entries for **Shift name from list**.

You must tag the terms for which language switch should be used with character '@'. In addition you must make sure that corresponding entries are available in the language file.

4.4 Screen Industrial Performance Analyzer

CREATE INDUSTRIAL PERFORMANCE ANALYZER SCREEN

The `Industrial Performance Analyzer` screen is for displaying and evaluating the alarm data that the Industrial Performance Analyzer saves in the database in Runtime.

ENGINEERING

There are two procedures for the creation of a screen from zenon version 8.00:

- The use of the screen creation dialog
- The creation of a screen using the properties

Steps to create the screen using the properties if the screen creation dialog has been deactivated in the menu bar under **Tools**, **Settings** and **Use assistant**:

1. Create a new screen.

   To do this, select the **New screen** command in the tool bar or in the context menu of the **Screens** node.
2. Change the properties of the screen:

   a) Name the screen in the **Name** property.

b) Select `Industrial Performance Analyzer` in the **Screen type** property.

c) Select the desired frame in the **Frame** property.

3. Configure the content of the screen:

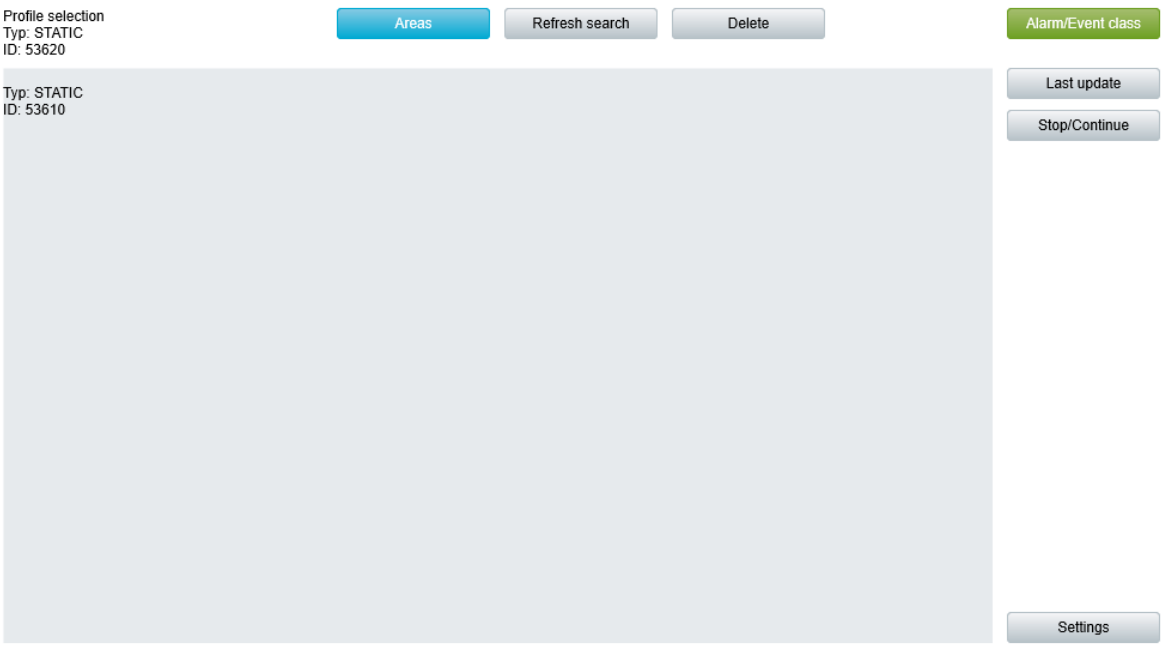
a) select menu item **Control elements** from the menu bar

b) Select `Insert template` in the drop-down list.
The dialog to select pre-defined layouts is opened. Certain control elements are inserted into the screen at predefined positions.

c) Remove elements that are not required from the screen.

d) If necessary, select additional elements in the **Elements** drop-down list. Place these at the desired position in the screen.

4. Create a screen switch function.



CONTROL ELEMENTS

Control element	Description
Insert template	Opens the dialog for selecting a template for the screen type. Templates are shipped together with zenon and can also be created by the user. Templates add pre-defined control elements to pre-defined position in the screen. Elements that are not necessary can also be removed individually once they have been created. Additional elements are selected from the drop-down list and placed in the zenon screen. Elements can be moved on the screen and arranged individually.

WINDOW

Control elements for windows.

Control element	Description
List	Tabular display of the alarm data. The information is read from the table in the database and are than displayed here.
List type	Text filed that displays the selected list type.
Set filter	Display of the set filter. Note: Element of the type `Dynamic text`. Functionality is assigned using the **Screen type specific action** property.

LIST FUNCTIONS

Control elements to control the list.

Control element	Description
Filter...	Opens the filter dialog.
Filter back	Loads the last filter setting. The ten last filter settings are being saved.
Filter reset	Deactivates all filter settings.
Update database	Reads again the data from the database.
Create document	Creates a document with the selected data and opens the document. The data are displayed in form of a table.
Create diagram	Displays the selected data in a diagram.
Diagram settings	Definition of the layout for the diagram; e.g. bar or pie diagram.

COMPATIBLE ELEMENTS

Control elements that are replaced or removed by newer versions and continue to be available for compatibility reasons. These elements are not taken into account with automatic insertion of templates.

Control element	Description
Set filter	Display of the set filter. Static Win32 control element. Was replaced by a `dynamic text` field. For the description, see current element.

FILTER PROFILES

Buttons for filter settings in Runtime.

Control element	Description
Profile selection	Select profile from list.
Save profile	Saves current setting as a profile. Note: The name can be a maximum of 31 characters long and must only contain valid characters. Prohibited are: **! \ / : * ? < > | ""**
Delete profile	Deletes selected profile.
Import	Imports filter profiles from export file.
Export	Exports filter profiles in the file.

4.5 Function Screen switch

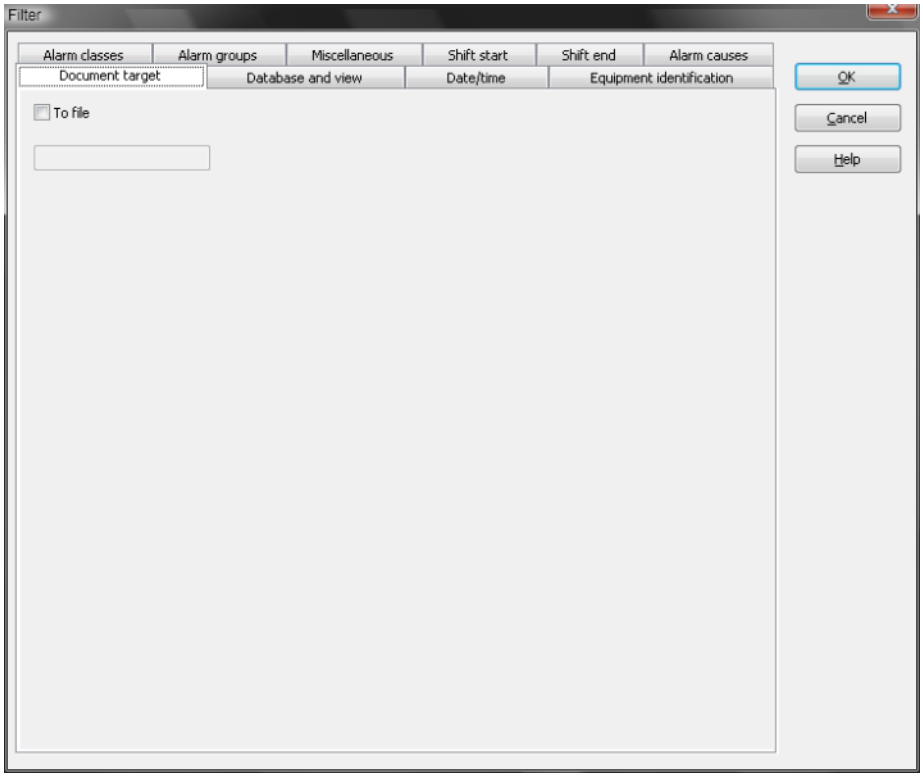
If you create a function screen switch (see also Functions) to screen Industrial Performance Analyzer, the IPA filter dialog is displayed. There you can set filters and make settings which are taken into account when the Runtime switches to the screen Industrial Performance Analyzer.

You can find more information about the settings of the filter dialog in chapter Filter (on page 22).

4.6 Function: Create/print IPA document

With this function, you can automatically create an IPA evaluation and save it as an HTML document or print it out on a Windows standard printer. You can find the function under the **AML and CEL** grouping.

The filter possibilities and the filter configuration correspond to the screen switching function on the Industrial Performance Analyzer screen. On the **Target document** tab, you select whether the evaluation is to be output on the Windows standard printer or to a file in the export directory.



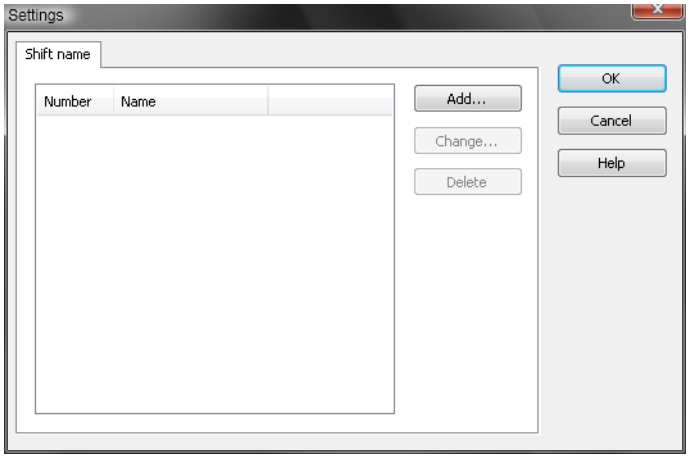
If you want to save the evaluation to a file, activate the **To file** checkbox and enter a name.

> **Attention**
>
> *You must state the file name, including .html, so that your system recognizes the file created without problems and you can open it immediately with a suitable program.*
>
> *Example of file name:*
>
> *IPA_010109.html*

The evaluation is suppressed if you do not activate the checkbox.

5. Operation in the Runtime

You operate the IPA in the Runtime with the help of the screen `Industrial Performance Analyzer`. The screen is opened with the filter settings and parameters which were defined in the Editor. You will receive the display which you defined in the Editor.



Each display has its own default sorting of the columns (see chapter Filter (on page 22)). You can also sort the display yourself using each available column. Click on the header of the desired column and the display is sorted after this column. If you want to use more than one column just press and hold the `Ctrl key` and then click the desired columns on after the other. Thus you receive a cascaded sorting. If you no longer use the default sorting, an arrow next to a column header indicates that the display is sorted by this column. You can sort either ascending or descending. If you left-click on a column once, the entries are sorted in descending order. Another left-click switches between the sorting directions.

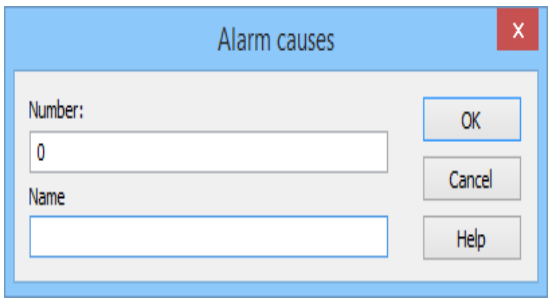
For the operation of the Industrial Performance Analyzer and the display of the alarm data the control elements engineered in the Editor are available (see also Screen Industrial Performance Analyzer (on page 16)).

DELETE ENTRIES

You can only delete entries from the database using the internal Industrial Performance Analyzer. In order to delete an entry right-click the desired entry. In the context menu that appears, select the **Delete selected line from database** entry. If you have the necessary authorization, the entry is deleted (see also General settings (on page 7)).

ALARM REASON AND COMMENTARY

If you want to add an alarm cause and/or a comment to an alarm, you have two possibilities. Double click the desired line. In the following dialog, you can select an alarm reason from the **Alarm reason** drop-down list and you can enter a comment in the **Comment** text field.



You can also reach the dialog by right-clicking on the desired line and selecting **Edit alarm reason** from the context menu.

5.1 Filter

With the help of the filter dialog you define the look of screen Industrial Performance Analyzer. You decide which alarms are displayed and by which criteria they are sorted.

Each list type displays determined columns and has its own default sorting. There are three list types sum lists, statistics list and single list.

Note: Alarm groups and alarm classes are sorted according to **ID** and not according to text.

SUM LIST

List name	available columns	default sorting
class related	**Alarm/event class**, **Number**, **Total duration**	Column: **Number**, starting with the largest number
Single breakdown related	**Variable**, **Variable identification**, **Number**, **Total duration**, **Total duration gross**, **Limit value text**, **Alarm/event classes**, **Alarm/event groups**, **Equipment**, **Project**	Column: **Number**, starting with the largest number
group related	**Alarm/Event class**, **Number**, **Total duration**	Column: **Number**, starting with the largest number
Equipment related	**Equipment**, **Number**, **Total duration**	Column: **Number**, starting with the largest number

STATISTICS LIST

List name	available columns	default sorting
Total downtime of an equipment	**Equipment**, **Total duration**	Column: **Total duration**, starting with the longest alarm
n shortest alarms	**Status**, **Variable**, **Variable identification**, **Begin**, **Duration**, **Duration gross**, **Alarm/event class**, **Alarm/event group**, **Limit value text**, **Shift start**, **Shift end**, **Equipment**, **Project**, **Alarm cause**, **Commentary**	Column: **Duration**, starting with the shortest alarm
n most frequent alarms	**Number**, **Variable**, **Variable identification**, **Begin**, **Total duration**, **Total duration gross**, **Alarm/event class**, **Alarm/event group**, **Limit value text**, **Equipment**, **Project**, **Alarm cause**, **Commentary**	Column: **Number**, starting with the largest number
n longest alarms	**Status**, **Variable**, **Variable identification**, **Begin**, **Duration**, **Duration gross**, **Alarm/event class**, **Alarm/event group**, **Limit value text**, **Shift start**, **Shift end**, **Equipment**, **Project**, **Alarm cause**, **Commentary**	Column: **Duration**, starting with the longest alarm
n last alarms	**Status**, **Variable**, **Variable**	Column: **Duration**, starting with the

	identification, **Begin**, **Duration**, **Duration gross**, **Alarm/event class**, **Alarm/event group**, **Limit value text**, **Shift start**, **Shift end**, **Equipment**, **Project**, **Alarm cause**, **Commentary**	oldest alarm

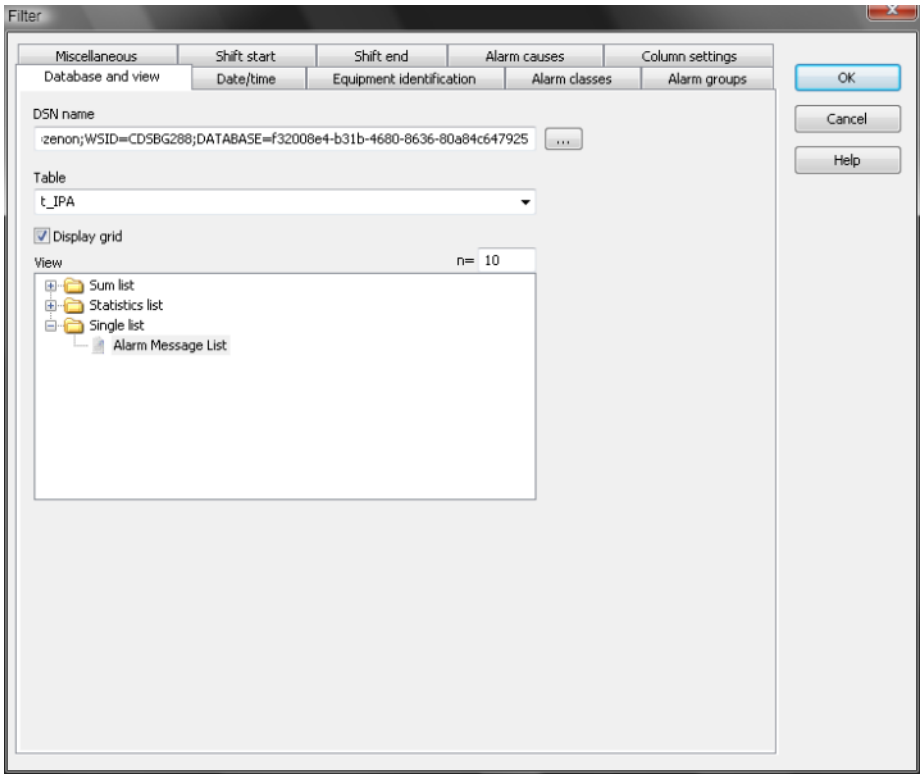
Enter the desired number n in the field **n**=.

SINGLE LIST

List name	available columns	default sorting
Alarm Message List	**Status**, **Variable**, **Variable identification**, **Begin**, **Duration**, **Duration gross**, **Alarm/event class**, **Alarm/event group**, **Limit value text**, **Shift start**, **Shift end**, **Equipment**, **Project**, **Alarm cause**, **Commentary**	Column: **Duration**, starting with the oldest alarm

5.1.1 Database and view

Select the desired view under **View**.

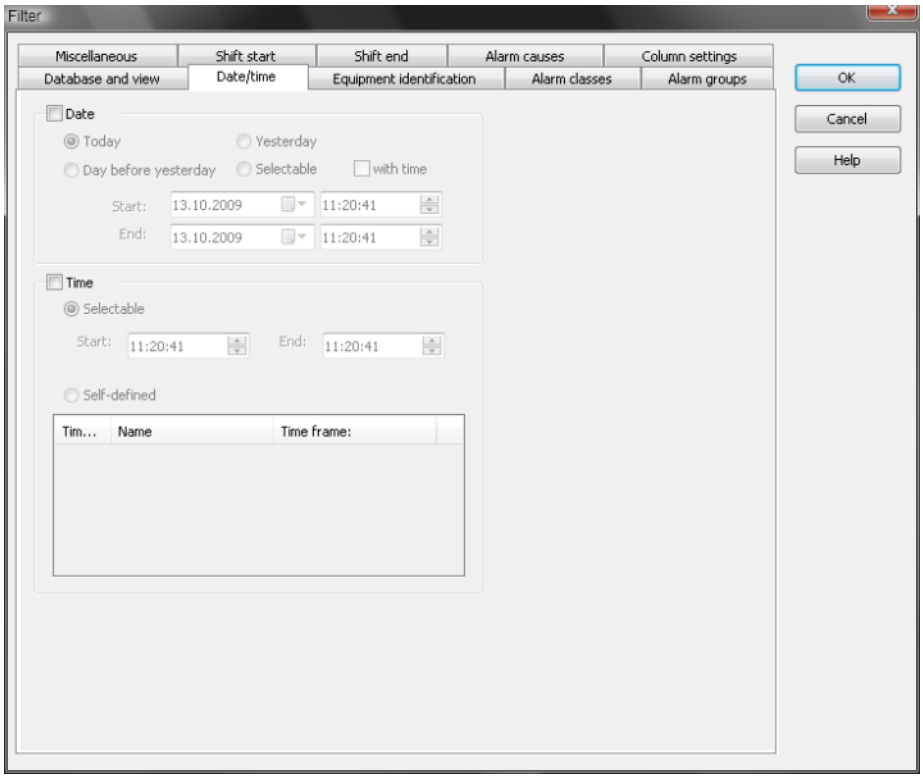


The fields DSN name and Table show the connection to the SQL server and the name of the table in which the IPA writes the alarm data. These fields are purely informative. You cannot make any changes (see also Database (on page 9)). You can make setting using these properties:

Parameter	Description
Display grid	Shows a raster when displaying the alarm data.
n=	Define how many entries the views n shortest alarms, n most frequent alarms, n longest alarms and n last alarms should contain.

5.1.2 Date/time

You define the date and time in this tab.



DATE

Settings for the date.

Options	Description
Date	▸ `Active`: Settings for the date can be made.
Today	The filter is applicable for the current day.
Yesterday	The filter is applicable for yesterday.
Day before yesterday	The filter is applicable for the day before yesterday.
Selectable	▸ Active: Entry of a freely-definable date range.
with time	▸ `Active`: A respective time can be defined for the start date and end date. ▸ `Inactive`: The time range starts on the start date at 00:00 and ends on the end date at 24:00. Only available if the **Selectable** option has been activated.
Start	Entry of the start date and start time.
End	Entry of the end date and end time.

TIME

Settings for the time.

Options	Description
Time	▸ `Active`: Settings for the time can be made. The time ranges are day-related. They relate to each day that was selected under **Date**. Example: If **Selectable** is selected under Date, **01.10.2017** under `Start` and **05.10.2017** under `End`, the time range that you have selected under Time is valid for each of the five days starting October 1st and ending October 5th. October.
Selectable	▸ `Active`: Entry of a time period.
Start	Entry of the start time.
End	Entry of the end time.
Self-defined	Selection of self-defined time ranges. These must be created in the Editor beforehand. For details, see the **Predefine time filter** (on page 10) chapter.

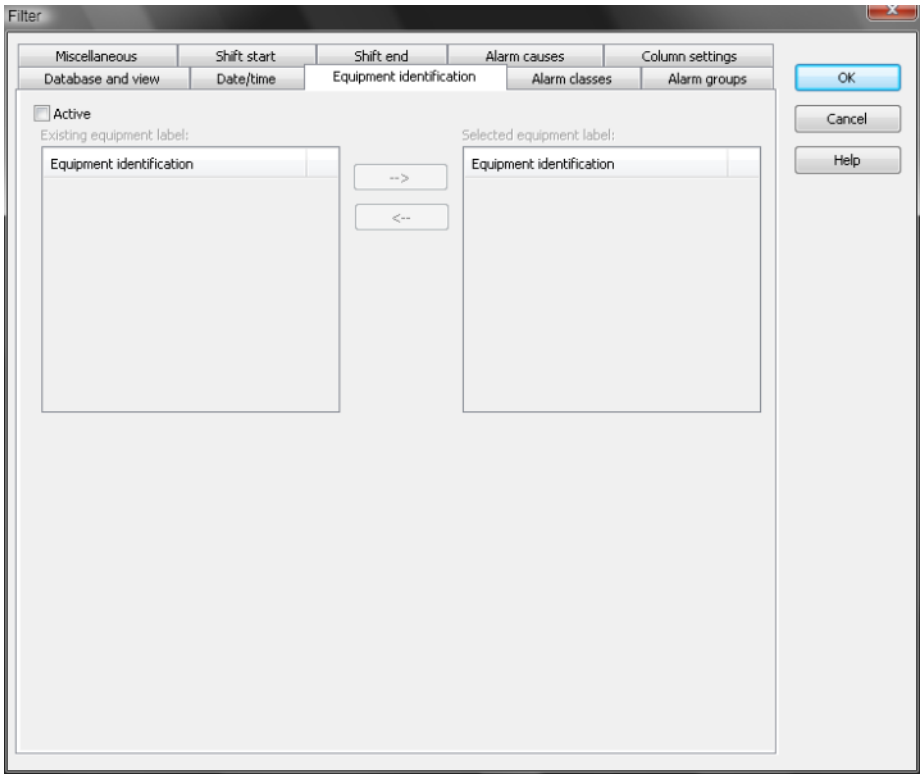
Note: Time is saved as local time. For details see chapter Handling of date and time in chapter Runtime.

CLOSE DIALOG

Option	Description
OK	Applies all changes in all tabs and closes the dialog.
Cancel	Discards all changes in all tabs and closes the dialog.
Help	Opens online help.

5.1.3 Equipment identification

To use this filter, activate the checkbox **Active**. If you close the dialog via **OK**, your settings are used on the display. If you deactivate checkbox **Active**, the settings are retained. They are however not used on the display.



In the filter of the equipment identification one or more pieces of equipment can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

The alarms of the pieces of equipment of the right-hand list will be displayed.

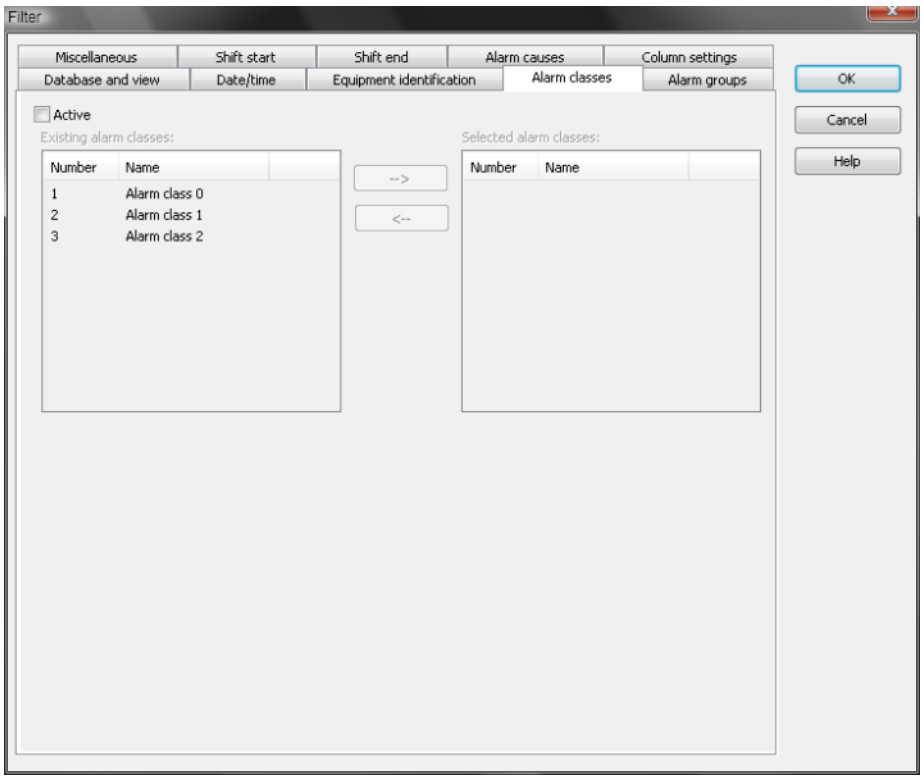
The equipment identification is carried out using the prefix of the variable name or the variable identification depending on your project setting (see also General settings (on page 7)). You administrate the list for the equipment identification in the Editor under Equipment identification (on page 12).

Info

Several entries can be selected when filtering. You can select more than one entry by pressing and holding the `Ctrl` or the `Shift` key. You can select a number of entries by pressing and holding the `Ctrl key`. By pressing and holding `Shift` you select all entries which lie between the two selected entries. By pressing and holding both `Ctrl` and `Shift` all entries which lie between the selected entries are selected. The entries which were selected beforehand remain selected.

5.1.4 Alarm/Event Classes

To use this filter, activate the checkbox **Active**. If you close the dialog via **OK**, your settings are used on the display. If you deactivate checkbox **Active**, the settings are retained. They are however not used on the display.



In the filter of the alarm/event classes one or more alarm/event classes can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

The alarms of the groups in the right list will be displayed.

Information

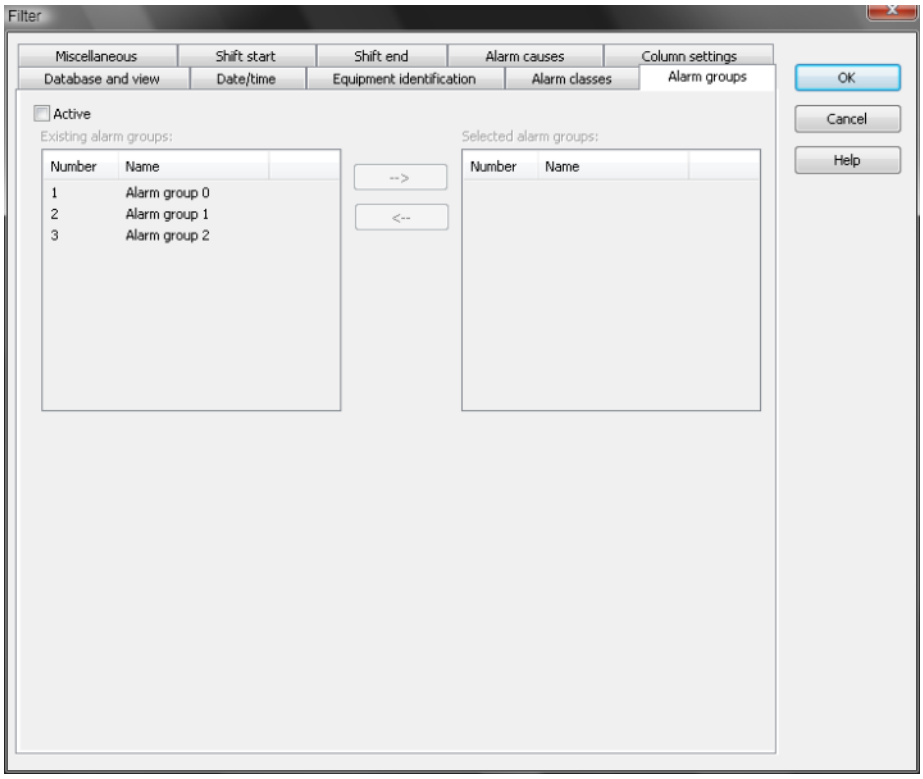
In the Runtime, only the name of the alarm/event class is displayed. Thus a better sorting of the entries is achieved. The number of the alarm/event class is not displayed.

Info

Several entries can be selected when filtering. You can select more than one entry by pressing and holding the `Ctrl` or the `Shift` key. You can select a number of entries by pressing and holding the `Ctrl key`. By pressing and holding `Shift` you select all entries which lie between the two selected entries. By pressing and holding both `Ctrl` and `Shift` all entries which lie between the selected entries are selected. The entries which were selected beforehand remain selected.

5.1.5 Alarm groups

To use this filter, activate the checkbox **Active**. If you close the dialog via **OK**, your settings are used on the display. If you deactivate checkbox **Active**, the settings are retained. They are however not used on the display.



In the filter of the alarm/event group one or more alarm/event groups can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

The alarms of the groups in the right list will be displayed.

Information

In the Runtime only the name of the alarm/event group is displayed. Thus a better sorting of the entries is achieved. The number of the alarm/event group is not displayed.

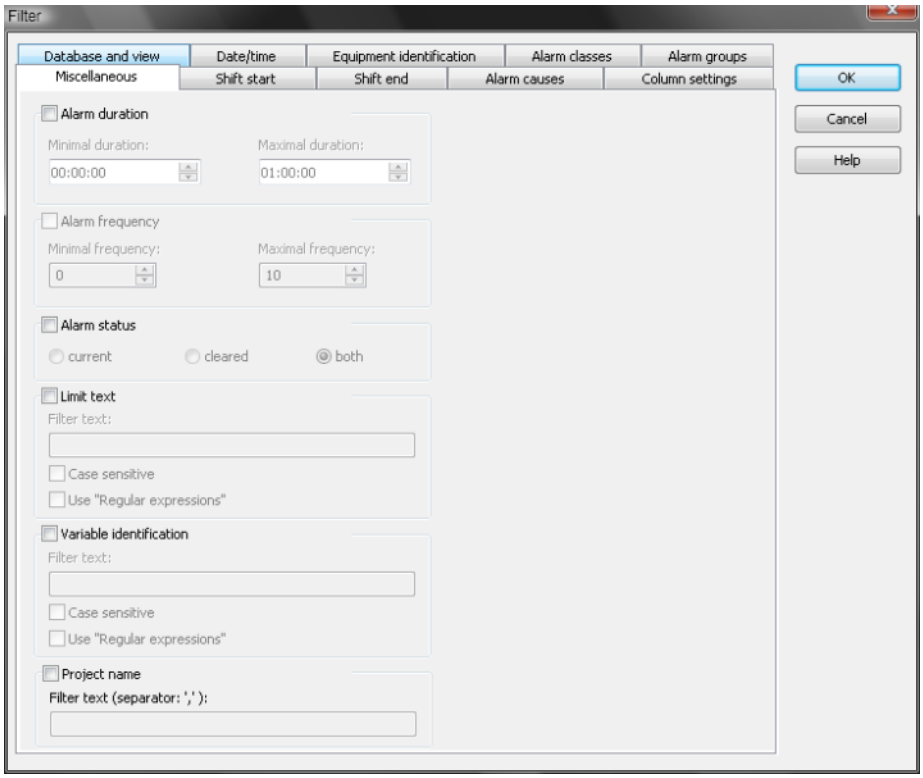
In doing so, sorting is not alphabetical, but always according to he index.

Info

Several entries can be selected when filtering. You can select more than one entry by pressing and holding the `Ctrl` or the `Shift` key. You can select a number of entries by pressing and holding the `Ctrl key`. By pressing and holding `Shift` you select all entries which lie between the two selected entries. By pressing and holding both `Ctrl` and `Shift` all entries which lie between the selected entries are selected. The entries which were selected beforehand remain selected.

5.1.6 Miscellaneous

On this tab a few additional filter functions are available.



Parameter	Description
Alarm duration	Filtering on alarm duration. Only alarms whose duration is within this time frame will be considered.
Alarm frequency	Filtering alarm data on alarm frequency. Only alarms whose frequency is within this frame will be considered. This filter can only be activated if the `n most frequent alarms` has been selected in the list view.
Alarm status	Filtering by alarm status. Choose from one of these possibilities: current, cleared or both.
Limit value text filter	Filtering alarm data on the limit value text of the alarm. Either on the text – e.g. 'Test' lists all alarms with the word 'Test' in the alarm text - (case sensitive or not) or with Regular expressions (on page 33).
Variable identification text filter	Filtering alarm data on the identification text of the alarm. Either on text or with Regular expressions (on page 33).
Project filter	Filtering on the project, from which the alarm has been written to the database. When filtering on several projects, they have to be separated with the character ','.

Regular expressions

Regular expressions indicate a string pattern which consists of normal characters (e.g. letters, digits etc.) and special characters which are referred to as meta characters. When filtering or searching in texts you can define a particular character string.

Information

*Do not confuse regular expressions with wildcards - e.g. * equals any string. Regular expressions are way more efficient and make it possible to define your search very precise.*

The following list consists of all meta characters and how they are used as regular expressions:

Meta character	Description
\	Marks the next character as a special character, a literal, a backreference, or an octal escape. For example **n** matches the character **n**. **\n** matches a newline character. The sequence \\ matches \ and **\(** matches **(**.
^	Matches the position at the beginning of the input string.
$	Matches the position at the end of the input string.
*	Matches the preceding character or subexpression zero or more times. For example **zo*** matches "**z**, **zo**, **zoo** etc.
+	Matches the preceding character or subexpression one or more times. For example **zo+** matches **zo**, **zoo** etc. but not **z**.
?	Matches the preceding character or subexpression zero- or one time. For example **do(es)?** matches the **do** in **do** or **does**.
.	Matches any single character except **\n**. To match any character including the **\n** use a pattern such as **[\s\S]**.
(Pattern)	A subexpression that matches pattern and captures the match. To match parentheses characters ( ), use **\(** or **\)**.
x|y	Matches either **x** or **y**. For example **z|food** matches **z** or **food**. **(z|f)ood** matches **zood** or **food**.
[xyz]	A character set. Matches any one of the enclosed characters. Example: **[abc]** matches the **a** in **plain**.
[^xyz]	A negative character set. Matches any character not enclosed. Example: **[^abc]** matches the **p** in **plain**.
[a-z]	A range of characters. Matches any character in the specified range. Example: For example **[a-z]** matches any lowercase alphabetic character in the range **a** through **z**.
[^a-z]	A negative range of characters. Matches any character not in the specified range. Example: For example **[^a-z]** matches any character not in the range **a** through **z**.

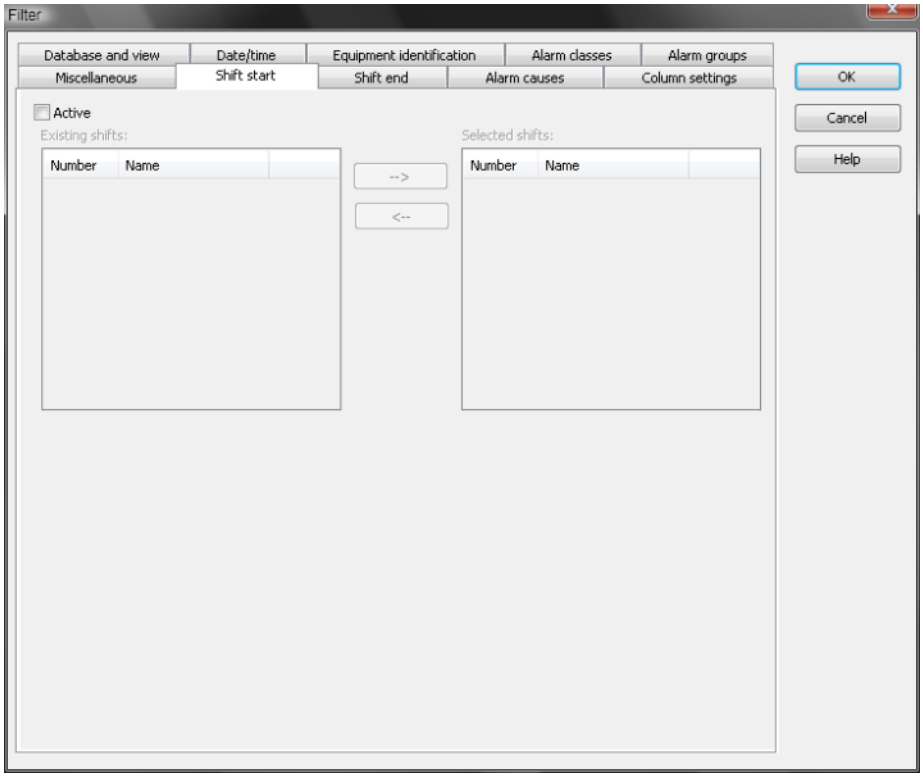
The following regular expressions are used by the IPA exclusively:

Meta character	Description
?	When this character immediately follows any of the other quantifiers (*****, **+**, **?**, **{n}**, **{n,}**, **{n,m}**) the matching pattern is non-greedy. A non-greedy pattern matches as little of the searched string as possible, whereas the default greedy pattern matches as much of the searched string as possible. For example in the string **oooo**, **o+?** matches a single **o** while **o+** matches all **o**s.
\cx	Matches the control character indicated by **x**. For example **\cM**matches a `Ctrl+M` or a carriage return character. The value of **x** must be in the range of **A** to **Z** or **a** to **z**. If not, **c** is assumed to be a literal **c**-character.
\f	Matches a form-feed character. Equivalent to **\x0c** and **\cL**.
\t	Matches a tab character. Equivalent to **\x09** and **\cI**.
\v	Matches a vertical tab character. Equivalent to **\x0b** and **\cK**.

\num	Matches num, where num is a positive integer. A reference back to captured matches. Example: For example **(.)\1** matches two consecutive identical characters.

5.1.7 Shift start

To use this filter, activate the checkbox **Active**. If you close the dialog via **OK**, your settings are used on the display. If you deactivate checkbox **Active**, the settings are retained. They are however not used on the display.



In the filter Shift begin one or more shifts can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

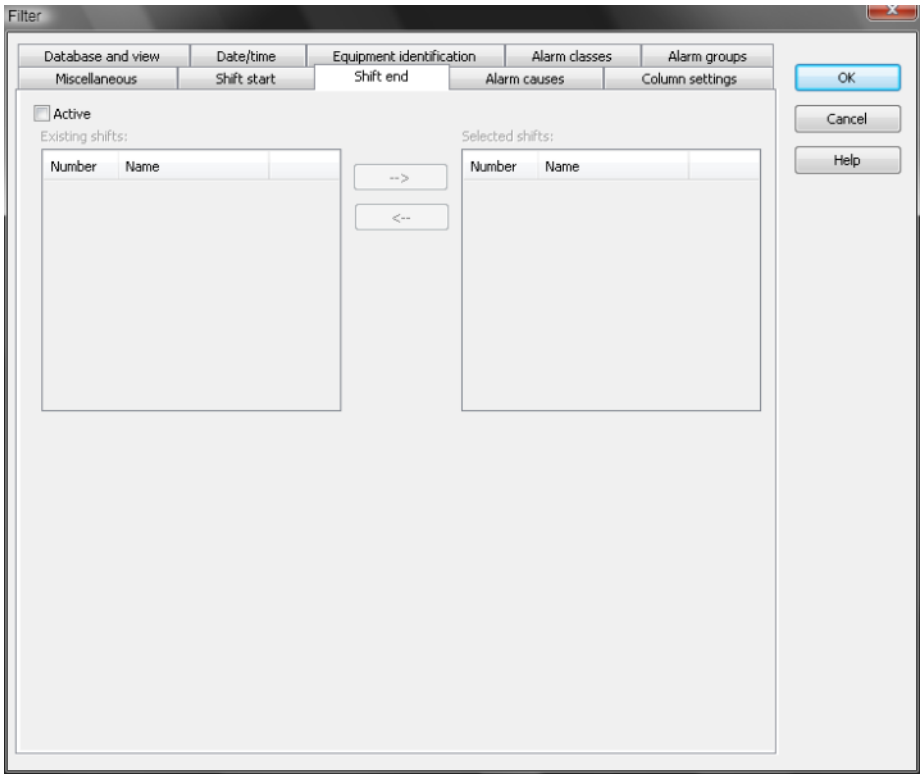
The filter Shift begin refers to the shift which has been active at the time when **Alarm received** was active. You can administrate the list with the shift names in the Editor under Schift name from list (on page 14).

Info

Several entries can be selected when filtering. You can select more than one entry by pressing and holding the `Ctrl` or the `Shift` key. You can select a number of entries by pressing and holding the `Ctrl key`. By pressing and holding `Shift` you select all entries which lie between the two selected entries. By pressing and holding both `Ctrl` and `Shift` all entries which lie between the selected entries are selected. The entries which were selected beforehand remain selected.

5.1.8 Shift end

To use this filter, activate the checkbox **Active**. If you close the dialog via **OK**, your settings are used on the display. If you deactivate checkbox **Active**, the settings are retained. They are however not used on the display.



In the filter Shift end one or more shifts can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

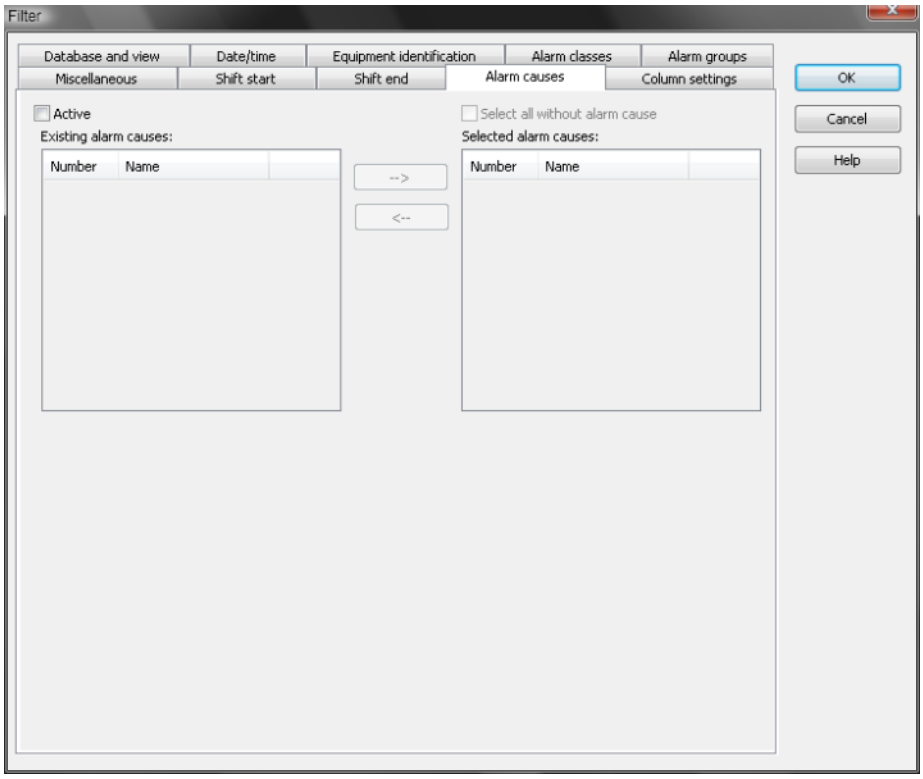
The filter Shift end refers to the shift which has been being active at the time when **Alarm received** was active. The alarms and shifts of the right listbox will be displayed. You can administrate the list with the shift names in the Editor under Schift name from list (on page 14).

Info

Several entries can be selected when filtering. You can select more than one entry by pressing and holding the `Ctrl` or the `Shift` key. You can select a number of entries by pressing and holding the `Ctrl key`. By pressing and holding `Shift` you select all entries which lie between the two selected entries. By pressing and holding both `Ctrl` and `Shift` all entries which lie between the selected entries are selected. The entries which were selected beforehand remain selected.

5.1.9 Alarm cause

To use this filter, activate the checkbox **Active**. If you close the dialog via **OK**, your settings are used on the display. If you deactivate checkbox **Active**, the settings are retained. They are however not used on the display.

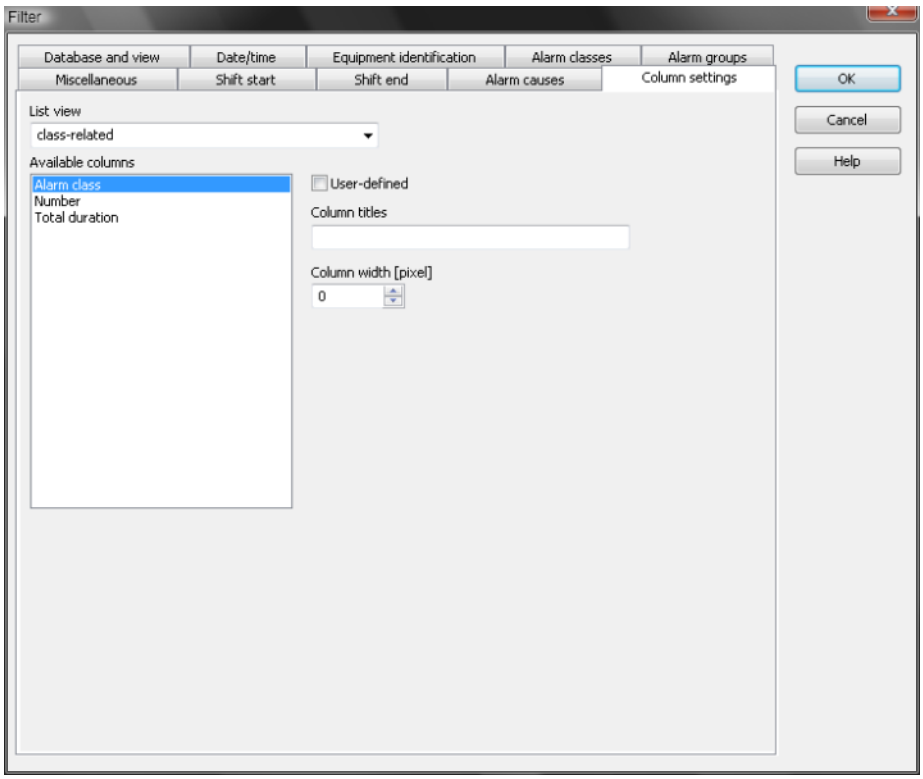


In the filter alarm reasons one or more alarm reasons can be activated. You can administrate the alarm reasons in the Editor in the area Alarm reasons (on page 11).

Info

Several entries can be selected when filtering. You can select more than one entry by pressing and holding the `Ctrl` or the `Shift` key. You can select a number of entries by pressing and holding the `Ctrl key`. By pressing and holding `Shift` you select all entries which lie between the two selected entries. By pressing and holding both `Ctrl` and `Shift` all entries which lie between the selected entries are selected. The entries which were selected beforehand remain selected.

5.1.10 Column definition



On this tab you customized the preset columns.

Parameter	Description
List view	Select the desired list from the drop-down list.
Columns	In this list all columns are displayed which are available for the selected list view.
User-defined	Activate this checkbox in order to customize the preset value for column title and column width.
Column titles	Enter new title for selected column.
Column width	Define the width for the selected column in pixel. If you enter `0`, the column is not displayed.

5.2 Create document

Additional to the display of the alarm data a document in HTML format can be created. These documents con be printed or saved. After you have set all desired filters and sort options, you can generate the document by clicking **Create document**.

The layout of the document is defined with a XSL file (stylesheet).
The files are in the following folder: `%ProgramData%\COPA-DATA\zenon8.00\IPA\.`
The style sheets contain a reference to a **Logo.gif** file. This serves as a placeholder for an individual logo. The path to this logo must be configured in the style sheet.

The following pre-defined files are available:

XSL file	Description
Single_list.xsl	single alarm display
Statistical_duration.xsl	statistic display of the total down time of an equipment
Statistical_frequency.xsl	Statistical display of the n most frequent, n shortest, n longest, n last alarms
Sum_list_equipment.xsl	Equipment-related sum list
Sum_list_single_alarm.xsl	Single alarm-related sum list
Sum_list_group.xsl	Group-related sum list
Sum_list_class.xsl	Class-related sum list

For several stylesheet, a dialog asks for the stylesheet to be used.

KEYWORDS

The style sheets can be amended individually. Use the following key words for this:

Keyword	Meaning
Alarmcause	Alarm cause
Brutto_duration	Gross total duration
Class	Alarm class
Comment	Comment
Duration	Duration
Equipment	Equipment Group
Group	Alarm group
Identification	Identification
Limit_text	Limit value text
Number	Number
Project	Project
Shift_end	Time of shift end
Shift_start	Time of shift start
Start	Time of begin
Status	Status

5.3 Diagram

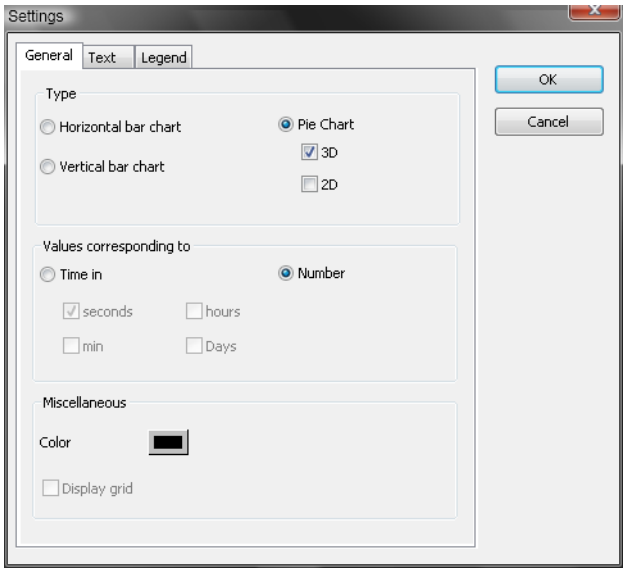
For the sum lists and the statistics list **n most frequent alarms** a diagram can be created in addition to the document.

With the settings of the diagram, its layout is defined.

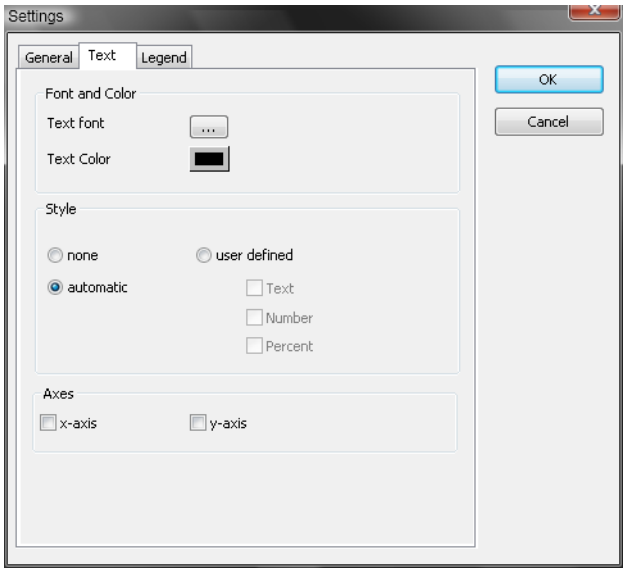
On the tab **Diagram general** one of the following diagrams can be selected:

Diagram type	Description
Horizontal bar chart	Bar diagram is displayed horizontally.
Vertical bar chart	Bar diagram is displayed vertically.
Pie Chart	For the pie diagram 3D or 2D can be selected.

The summed alarms are displayed based on the time or the number. In the entry **Miscellaneous** the color of the bars are defined. Additionally the display of a grid is activated here.



On the tab **Labeling** you select the font and the color of the diagram labeling. The **Style** defines the text to be displayed.



The font and font color are selected in the **Key** tab. Here you also define, how the key should be displayed and where it should appear.