zenon manual

Industrial Performance Analyzer (IPA)

v.7.00

COPA-DATA
do it your way

Contents

1. Welcome to COPA-DATA help

GENERAL HELP

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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.

License information

Must be licensed for Editor and Runtime (single-user, Server, Standby and Client).

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.

> ### 💡 Info
>
> *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. Basic functionality

All alarm data which were engineered correspondingly (see also Variables (on page 15)) are stored in a SQL database. The IPA supports ODBC-able databases such as Oracle SQL server, Microsoft SQL server, Microsoft MSDE, MySQL server etc. These servers can either be on your local computer or somewhere in the network.

In the Runtime the corresponding alarm data are saved in a buffer und from there written to the database cyclically. The cycle time is defined in the Editor (see also General settings (on page 7)).

It is possible that various Runtime projects write in the same database.

By using a central storage for the alarm data, a high data security and a high availability of the alarm data is ensured.

In the zenon Runtime the display and evaluation of the alarm data is implemented in the screen Industrial Performance Analyzer.

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

In the project properties you can find the area Industrial Performance Analyzer. There you define settings for the IPA which concern the whole project.
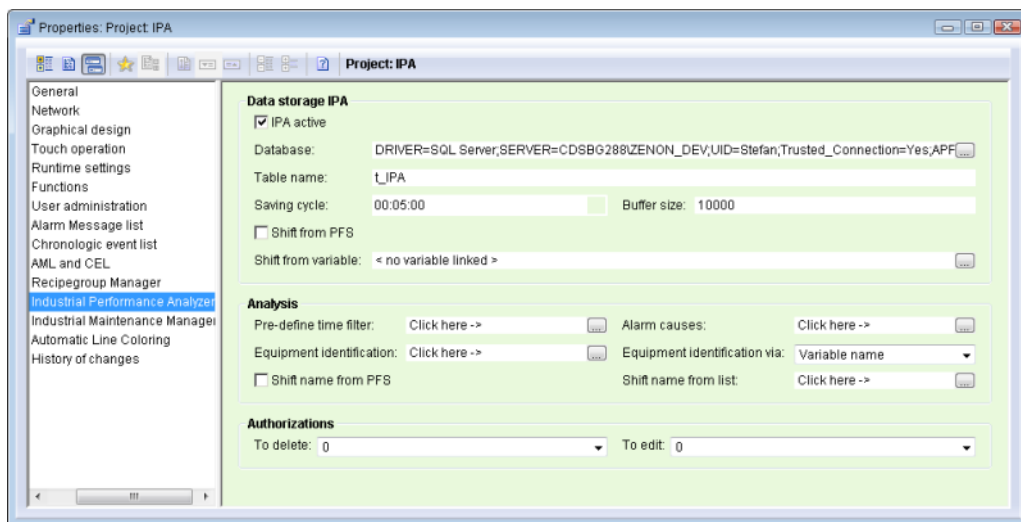
The following properties are available:

| Parameters	Description
IPA active	Select this property in order to activate the IPA.
Database	Define the database in which the IPA should write the alarm data (see also Database (on page 9))
Table name	Enter a freely definable name for the database table for your IPA data. A table with this name is automatically created in the database when the Runtime connects to the database for the first time.
Adding the values of selected process variables depending on the saving cycle.	Define the interval in which the alarm data is written from the buffer to the database. In practice values are between 2 and 5 minutes.
Puffer size	Define how many alarms the buffer should be able to save. At the end of each interval the contents of the buffer is written to the database. After that the buffer is empty. If there are more alarms than the number you have entered within the interval, the oldest alarms will be lost at 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 a variable of type INT. Together with the property shift name from list, you can assign numbers to shift names.
Pre-defined time filter	Define different time filters which you can access in the Runtime.
Alarm reason	Define different time filters which you can access in the Runtime.
Equipment identification	Define different equipment identifiers which you can access in the Runtime.
Equipment identification via	You can decide whether you want to use the beginning of a variable identification or the beginning of a 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 shift names to values. Via the value of the variable which you entered under Shift name from variable the defined shift name is displayed for the corresponding alarm in the Runtime.
For deletion	Via the drop-down list select the user authorization which a user

	must have in order to delete database entries of the Industrial Performance Analyzer.
For editing	Via the drop-down list select the user authorization which a user must have in order to edit database entries of 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.
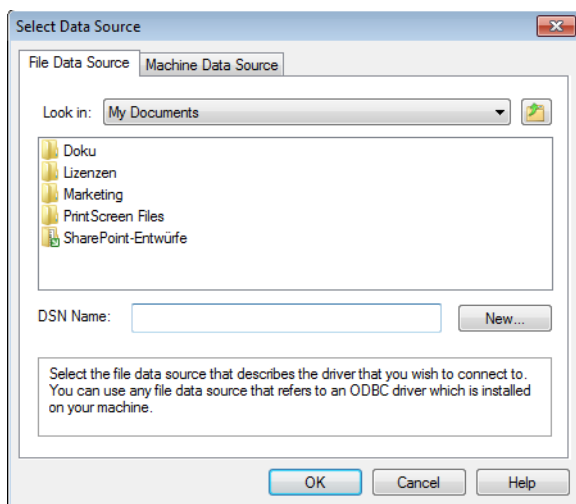

1. In order to create a DSN file you click `New...`.

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 next dialog shows you your setting in overview. You can test the data source there. Confirm this and the following dialog with `OK`.

4.1.2 Pre-define time filter

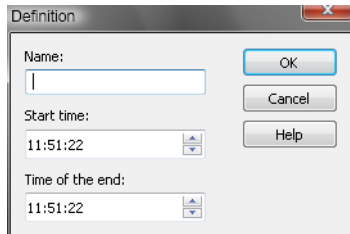When you select this setting, the following dialog will be dislpayed.
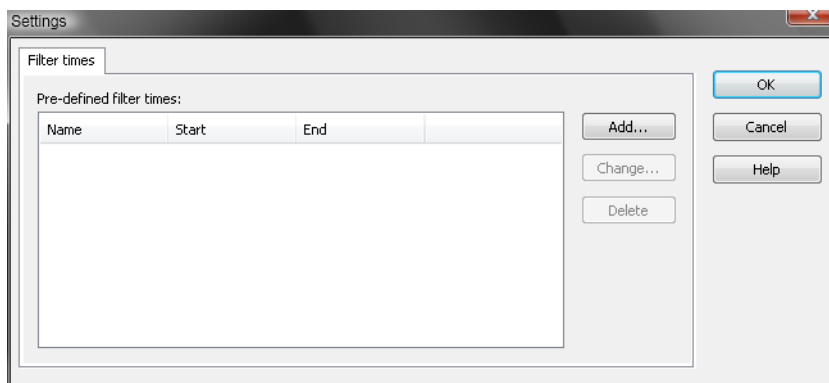
Parameters	Description
Add...	Add a new filter time. Enter a distinct name and set a start and end time in the appearing dialog.
Change...	Only active when you have selected an existing entry. You can change the name, the start time and the end time in the appearing dialog.
Delete	Only active when you have selected one or more existing entries. Deletes the selected time filters.

The time filters you define here are available in the Runtime. For example you can define the times of the shifts (early shift, late shift etc.) here once and then in the screen Industrial Performance Analyzer you can access these times when filtering.

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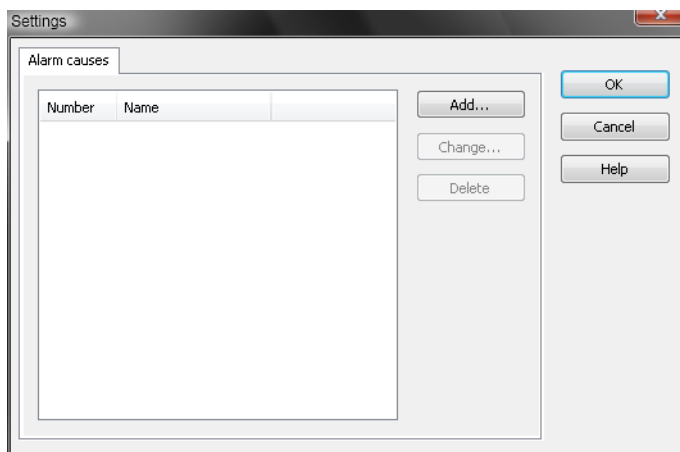
Add predefined time filter

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.
End time	Time at which the time filter ends.

4.1.3   Alarm reasons

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 when you have selected an existing entry. You can change the number and the name in the appearing dialog.
Delete	Only active when you have selected one or more existing entries. Deletes the selected alarm reasons.

The alarm reasons you define here are available in the Runtime. In the screen Industrial Performance Analyzer you can assign an alarm reason to each alarm. You select the alarm reason from a list which you administrate here.
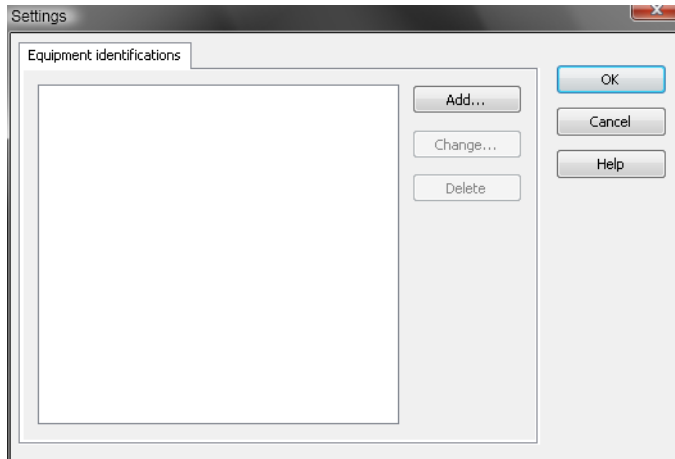
Add alarm cause

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.

Parameters	Description
Add...	Add a new equipment identification. Enter a name for the equipment identification in the appearing dialog.
Change...	Only active when you have selected an existing entry. You can change the name of the equipment identification in the appearing dialog.
Delete	Only active when you have selected one or more existing entries. Deletes the selected equipment identification.

The equipment identification you define here are available in the Runtime. The equipment identification can appear as prefix in the name or in the identification of the variable (see also property Equipment identification via in General properties (on page 7)). The prefix is ended by an underscore '_'. An allocation to an equipment identification only takes place if a created equipment identification exactly matches the prefix.

> **Example**
>
> *Equipment identification:*
>
> ▸ Equipment11
>
> *Variable name or variable identification:*
>
> ▸ Equipment1_Variable1
>
> ▸ Equipment11_Variable1

Only variable Equipment11_Variable1 is allocated to the created equipment identification Equipment11.

With the help of the equipment identification, you can filter for the desired pieces of equipment.
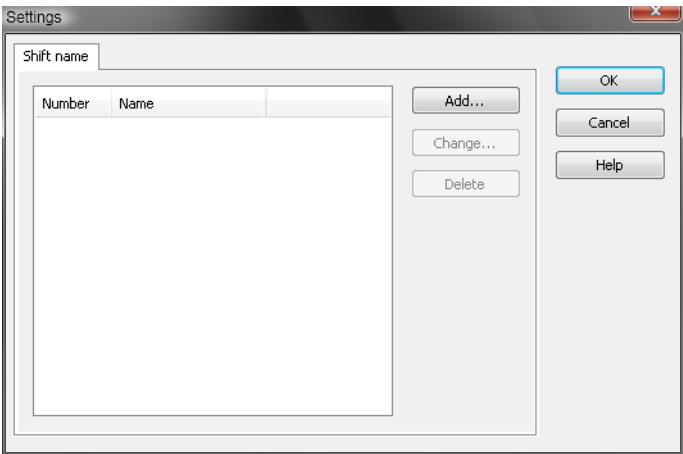
Add equipment identification

Via dialog `Equipment identification` you can add new equipment identifications or edit existing ones.
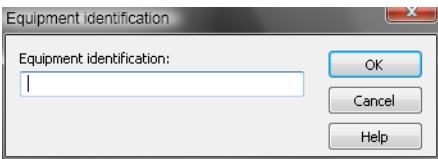
Parameters	Description
Equipment identification	Name for the equipment identification.

4.1.5   Shift name from list

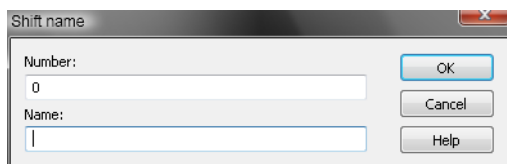When you select this setting, the following dialog will be dislpayed.

Parameters	Description
Add...	Add a new shift name. Assign a distinct name and number in the appearing dialog.
Change...	Only active when you have selected an existing entry. You can change the number and the name in the appearing dialog.
Delete	Only active when you have selected one or more existing entries. Deletes the selected shift names.

The shift names you define here are available in the Runtime. They help you when filtering. Only those alarms are displayed which occurred in the corresponding 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

In the Industrial Performance Analyzer the language switch is available for the following areas:

▶ Alarm/event group and alarm/event classes

▶ Equipment identification

Note: As character '@' is not allowed in variable names, language switch for equipment identification is only available if you select Equipment identification via via *Variable identification*.

▶ Alarm reason

▶ Shift name

Note: As character '@' is not allowed in the Production & Facility Scheduler, language switch for shift names is not available if you selected 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

In order to display and to evaluate the alarm data, which the Industrial Performance Analyzer stores in the database, in the Runtime, you need the screen Industrial Performance Analyzer.

Create a new screen (see also Screens) and select as Screen type *Industrial Performance Analyzer*. Via the menu `Control elements` you can add the standard elements for the screen Industrial Performance Analyzer by selecting menu entry `Add template`. As an alternative, you can add the necessary control elements individually via menu `Control elements`.

The following control elements are available:

| Control element	Description
Add 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 locations 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 dragged onto the screen. Elements can be moved on the screen and arranged individually.
List	Tabular display of the alarm data. The information is read from the table in the database and are than displayed here.
Update database	Reads again the data from the database.
Filter...	Opens the filter dialog.
Filter back	Loads the last filter setting. The ten last filter settings are being saved.
Reset filter	Deactivates all filter settings.
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.
Current view	Text filed which displays the selected list type.
Status Line	Text filed which displays the selected filter settings.
Filter profiles	Save filters and views defined online as profile.
Save profile	Saves an online setting in a profile.
Delete profile	Deletes selected profile.
Profile selection	Activates profile from list.

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 20).

4.6 Function Create/print IPA document

With this function, you can automatically create an IPA report and save it as an HTML document or print it out on the Windows standard printer. You can find the function in the group `AML and CEL`.

The can use the same filter options in the same way as when using the screen switch function to the screen Industrial Performance Analyzer. On tab `Target document` you select whether the report should be printed on the Windows standard printer or saved as a file in the export folder.
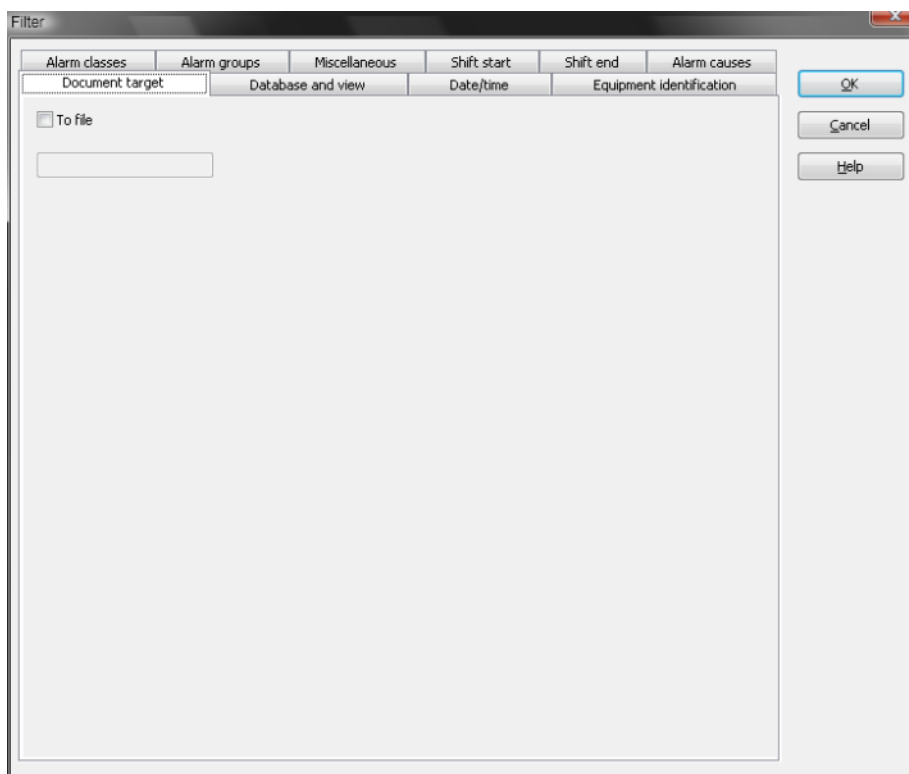
If you want to save the report to a file, activate checkbox To file and enter a name for the file.

> ⚠️ **Attention**
>
> *Take care that you enter the file name including .html in order for your computer to recognize the file without a problem and to open it with an appropriated software program.*
>
> *Example for file name:*
>
> *IPA_010109.html*

If you do not activate the checkbox, the report will be printed.

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.
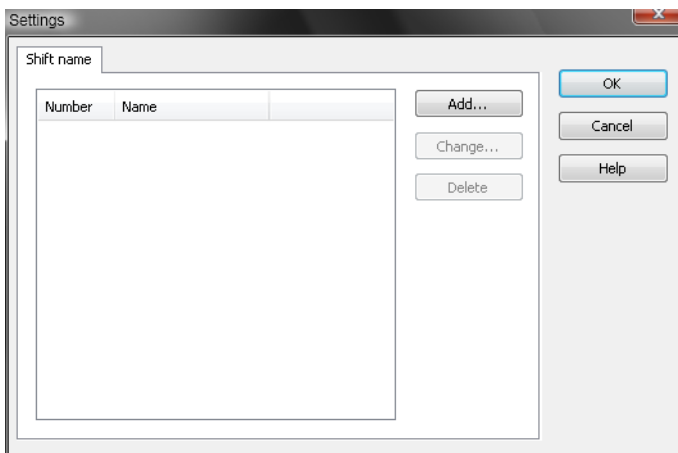
Each display has its own default sorting of the columns (see chapter Filter (on page 20)). You can also sort the display yourself using each available column. Click on the header of the desired column and the display is sorted after this column. If you want to use more than one column just press and hold `Ctrl` 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. Select menu item `delete selected line from the database` in the context menu. 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 commentary to an alarm, you have two possibilities. Double click the desired line. In the appearing dialog you can select an alarm reason from the dropdown list `Alarm reason` and you can enter a commentary in the text field `Commentary`.
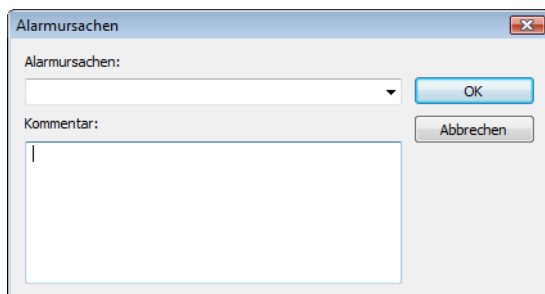
You can also reach the dialog by right-clicking the desired line and selecting menu item `Edit alarm reason` from the context menu.

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.

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 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 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 text, Equipment, Project, Alarm cause, Commentary**	Column: **Number**, starting with the largest number
n longest alarms	**Status, Variable, Variable identification, Begin, Duration, Duration gross,**	Column: **Duration**, starting with the longest alarm

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	`Alarm/event class,` `Alarm/event group,` `Limit text,` `Shift start,` `Shift end,` `Equipment,` `Project,` `Alarm cause,` `Commentary`	
n last alarms	`Status,` `Variable,` `Variable identification,` `Begin,` `Duration,` `Duration gross,` `Alarm/event class,` `Alarm/event group,` `Limit text,` `Shift start,` `Shift end,` `Equipment,` `Project,` `Alarm cause,` `Commentary`	Column: `Duration`, starting with the 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 text,` `Shift start,` `Shift end,` `Equipment,` `Project,` `Alarm cause,` `Commentary`	Column: `Duration`, starting with the oldest alarm

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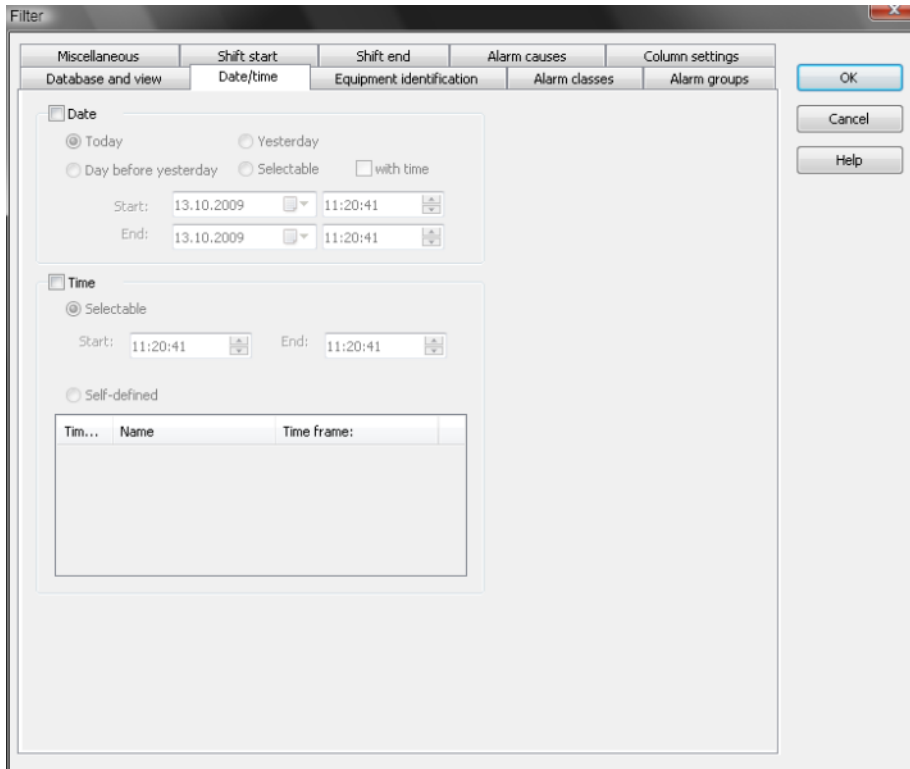
Select the desired view under View.
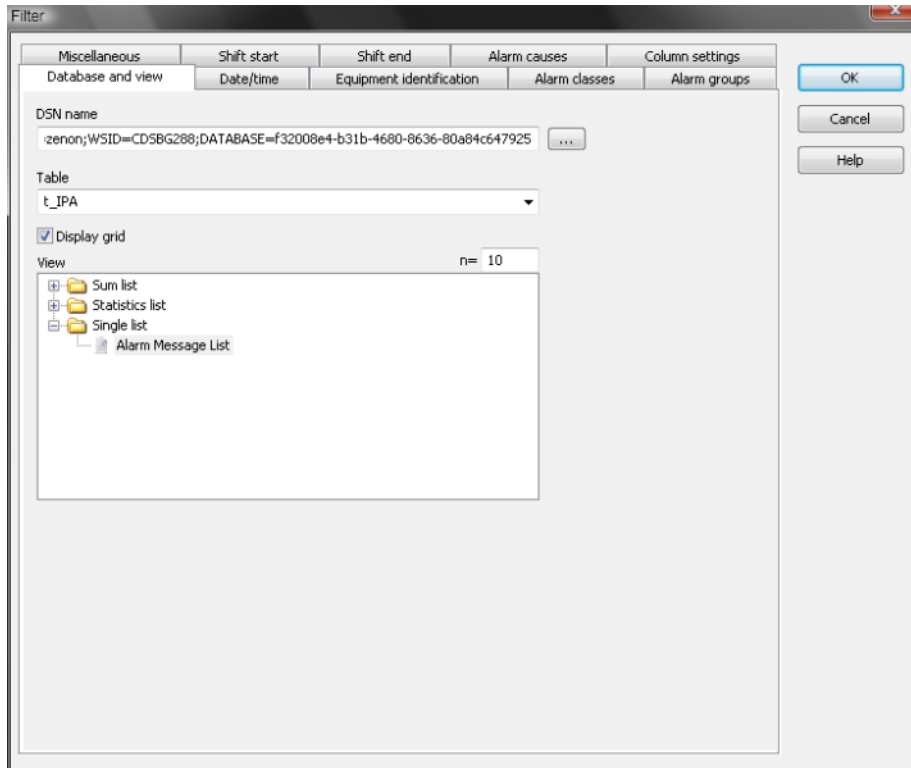
The fields DSN name and Table show the connection to the SQL server and the name of the table in which the IPA writes the alarm data. These fields are purely informative. You cannot make any changes (see also Database (on page 9)). You can make setting using these properties:

Parameters	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

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.

Select Today, Yesterday, Day before yesterday or Selectable in the date filter. If you select Selectable, enter a freely defined date range. If you activate with time, enter the desired time for the start and end date. If you do not activate with time, the time range is from 0 a.m. on the start date to 12 p.m. on the end date.

Select Selectable or Self-defined in the time filter. If you select Selectable, enter a freely defined time range. If you select Self-defined, choose a time range which you have created in the Editor beforehand. See also chapter Pre-define time filter (on page 10).

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

> **Info**
>
> *The time range under Time is valid for each day which has been selected under Date. If you select Selectable under Date, 01.10.2008 under* `Start` *and 05.10.2008 under* `End`*, the time range, which you have selected under Time, is valid for each of the five days starting October 1st and ending October 5th. October.*

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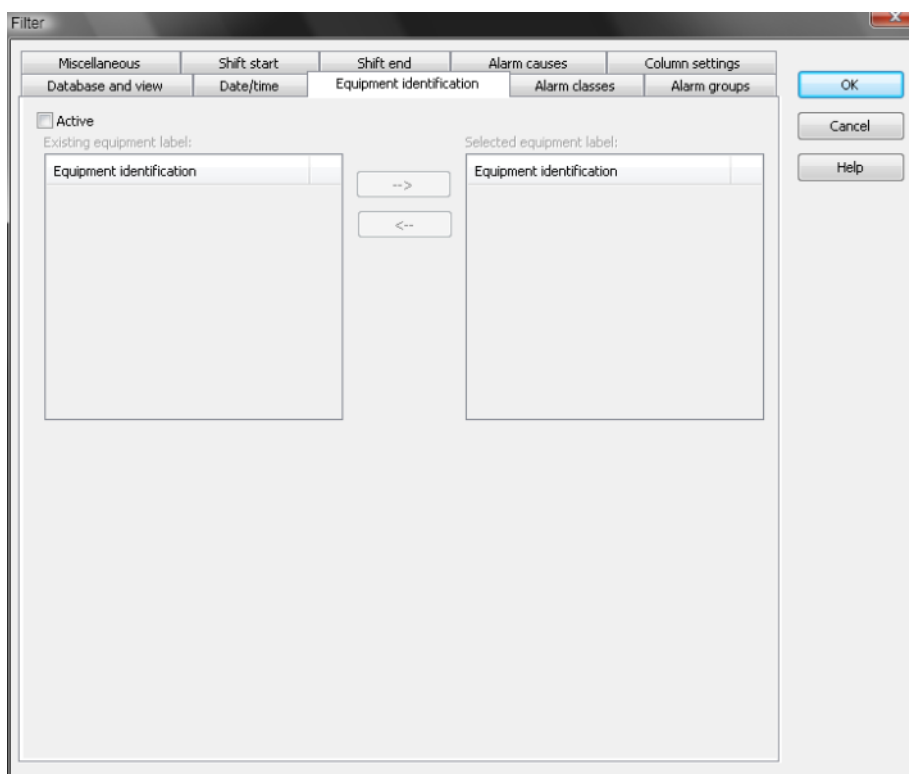
In the filter of the equipment identification one or more pieces of equipment can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

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 13).

> **Info**
>
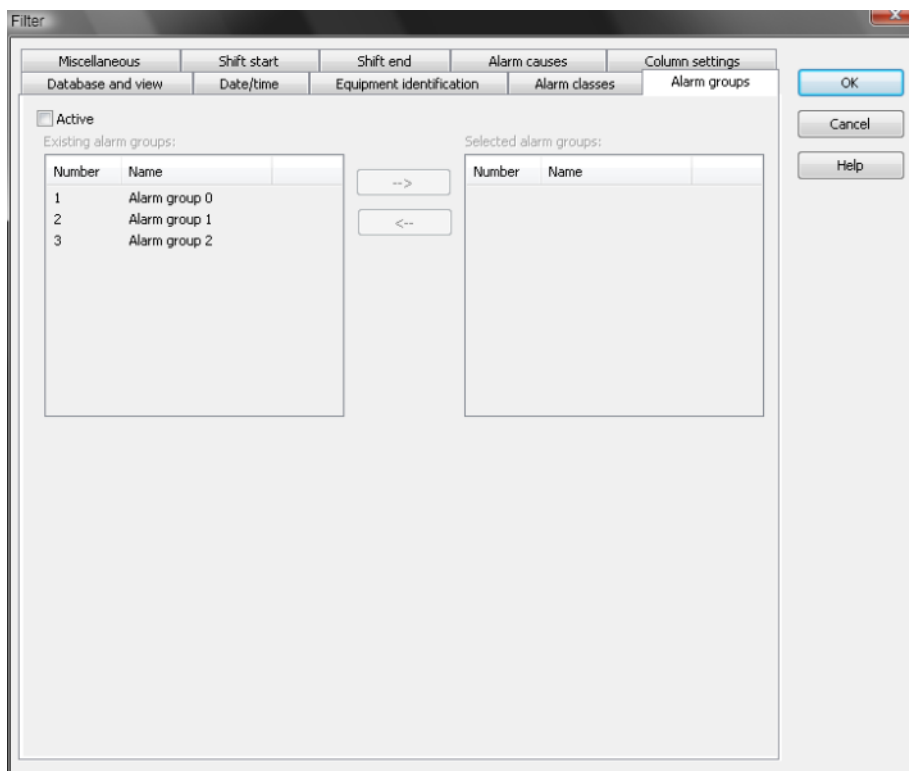> *At filtering more than one entry can be selected at a time. You can select more than one entry by pressing and holding* Ctrl *or* Shift.*By pressing and holding* Ctrl *you can select a number of entries. By pressing and holding* Shift *you select all entries which lie between the two selected entries. 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.
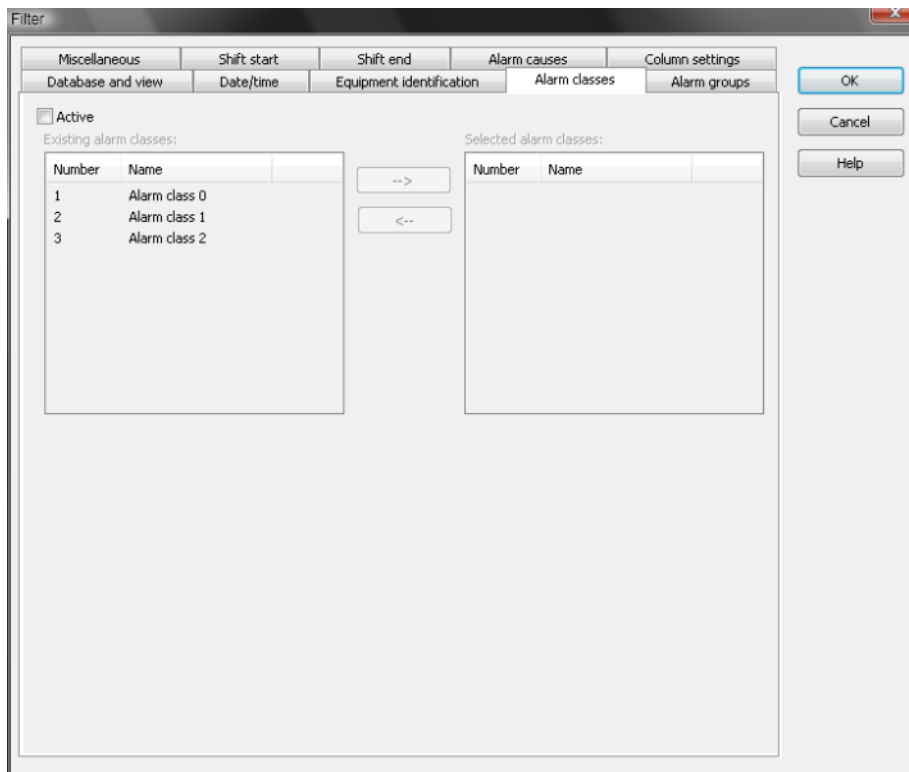
In the filter of the alarm/event classes one or more alarm/event classes can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

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

💡 **Info**

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**
>
> *At filtering more than one entry can be selected at a time. You can select more than one entry by pressing and holding* Ctrl *or* Shift.*By pressing and holding* Ctrl *you can select a number of entries. 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.

> **Info**
>
> *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.*
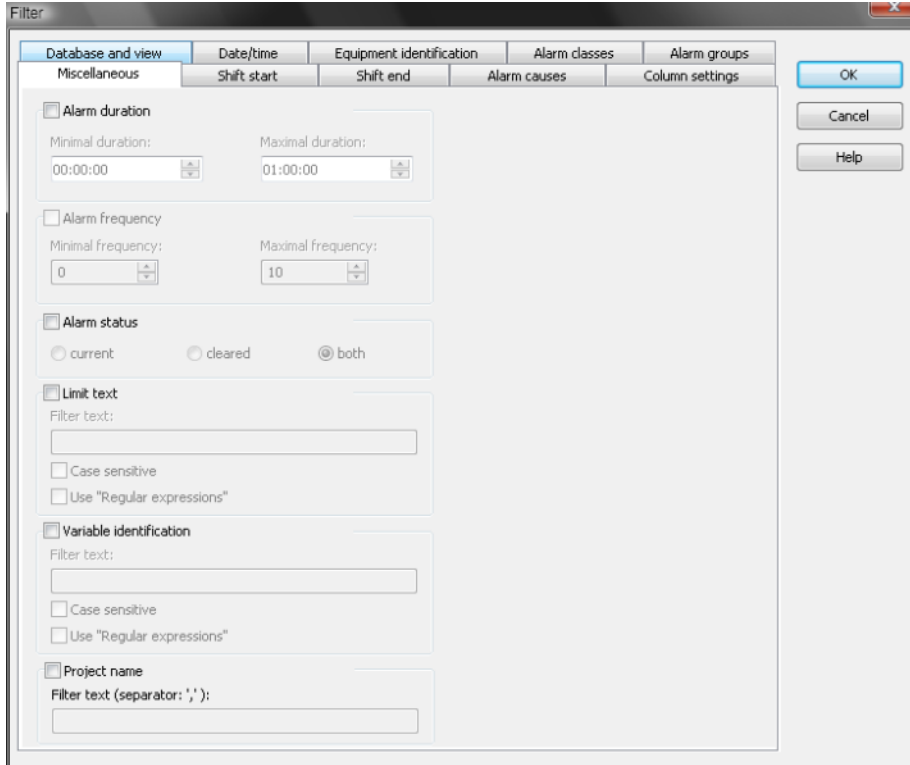
> **Info**
>
> *At filtering more than one entry can be selected at a time. You can select more than one entry by pressing and holding* Ctrl *or* Shift.*By pressing and holding* Ctrl *you can select a number of entries. By pressing and holding* Shift *you select all entries which lie between the two 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 Other

On this tab a few additional filter functions are available.

Parameters	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: active, cleared or both.
Limit text filter	Filtering alarm data on the limit 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 31).
Variable identification text filter	Filtering alarm data on the identification text of the alarm. Either on text or with Regular expressions (on page 31).
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.

> 🔆 **Info**
>
> *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 constists 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`.
{n}	n is a nonnegative integer. Matches exactly n-times. For example `o{2}` does not match the `o` in `Bob` but matches the two `o`s in `food`.
{n,}	n is a nonnegative integer. Matches at least n-times. For example `o{2,}` does not match the `o` in `Bob` but matches all `o`s in `foooood`. `o{1,}` is equivalent to mit `o+`. `o{0,}` is equivalent to `o*`.
{n,m}	m and n are nonnegative integers, where n <= m. Matches at least n and at most m times. For example `o{1,3}` matches the first three `o`s in `fooooood`. `o{0,1}` is equivalent to `o?`. Note: You must not put a space between the comma and the numbers.
?	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.
.	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 `\(` or `\)`.
(?:pattern)	A subexpression that matches pattern but does not capture the match, that is, it is a non-capturing match that is not stored for possible later use. is useful for combining parts of a pattern with the "or" character (`|`). For example `industr(?:y|ies)` is a more conomical expression than `industry|industries`.

(?=pattern)	A subexpression that performs a positive lookahead search, which matches the string at any point where a string matching pattern begins. This is a non-capturing match, that is, the match is not captured for possible later use. For example `Windows (?=XP|VISTA)` matches `Windows` in `Windows XP` but not `Windows` in `Windows 7`. Lookaheads do not consume characters, that is, after a match occurs, the search for the next match begins immediately following the last match, not after the characters that comprised the lookahead.
(?!pattern)	A subexpression that performs a negative lookahead search, which matches the search string at any point where a string not matching pattern begins. This is a non-capturing match, that is, the match is not captured for possible later use. For example `Windows (?!=XP|VISTA)` matches `Windows` in `Windows 7` but not `Windows` in `Windows XP`. Lookaheads do not consume characters, that is, after a match occurs, the search for the next match begins immediately following the last match, not after the characters that comprised the lookahead.
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`.
\b	Matches a word boundary, that is, the position between a word and a space. Example: For example `er\b` matches the `er` in `never` but not the `er` in `verb`.
\B	Matches a nonword boundary. Example: For example `er\B` matches the `er` in `verb` but not the `er` in `never`.
\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.
\d	Matches a digit character. Equivalent to `[0-9]`.
\D	Matches a nondigit character. Equivalent to `[^0-9]`.
\f	Matches a form-feed character. Equivalent to `\x0c` and `\cL`.
\n	Matches a newline character. Equivalent to `\x0a` and `\cJ`.
\r	Matches a carriage return character. Equivalent to `\x0d` and `\cM`.

\s	Matches any white space character including space, tab, form-feed, and so on. Equivalent to `[ \f\n\r\t\v]`.
\S	Matches any non-white space character. Equivalent to `[^ \f\n\r\t\v]`.
\t	Matches a tab character. Equivalent to `\x09` and `\cI`.
\v	Matches a vertical tab character. Equivalent to `\x0b` and `\cK`.
\w	Matches any word character including underscore. Equivalent to `[A-Za-z0-9_]`.
\W	Matches any nonword character. Equivalent to `[^A-Za-z0-9_]`.
\xn	Matches n, where n is a hexadecimal escape value. Hexadecimal escape values must be exactly two digits long. Example: For example `\x41` matches `A`. `\x041` is equivalent to `\x04 & 1`. Allows ASCII codes to be used in regular expressions.
\num	Matches num, where num is a positive integer. A reference back to captured matches. Example: For example `(.)\1` matches two consecutive identical characters.
\n	Identifies either an octal escape value or a backreference. If `\n` is preceded by at least n captured subexpressions, n is a backreference. Otherwise, n is an octal escape value if n is an octal digit (0-7).
\nm	Identifies either an octal escape value or a backreference. If `\nm` is preceded by at least nm captured subexpressions, nm is a backreference. If `\nm` is preceded by at least n captured subexpressions, n is a backreference followed by literal m. If neither of the preceding conditions exists, `\nm` matches octal escape value nm when n and m are octal digits (0-7).
\nml	Matches octal escape value nml when `n` is an octal digit (0-3) and `m` und `1` are octal digits (0-7).
\un	Matches n, where n is a Unicode character expressed as four hexadecimal digits. Example: `\u00A9` matches the copyright symbol `(©)`.

5.1.7 Start of shift

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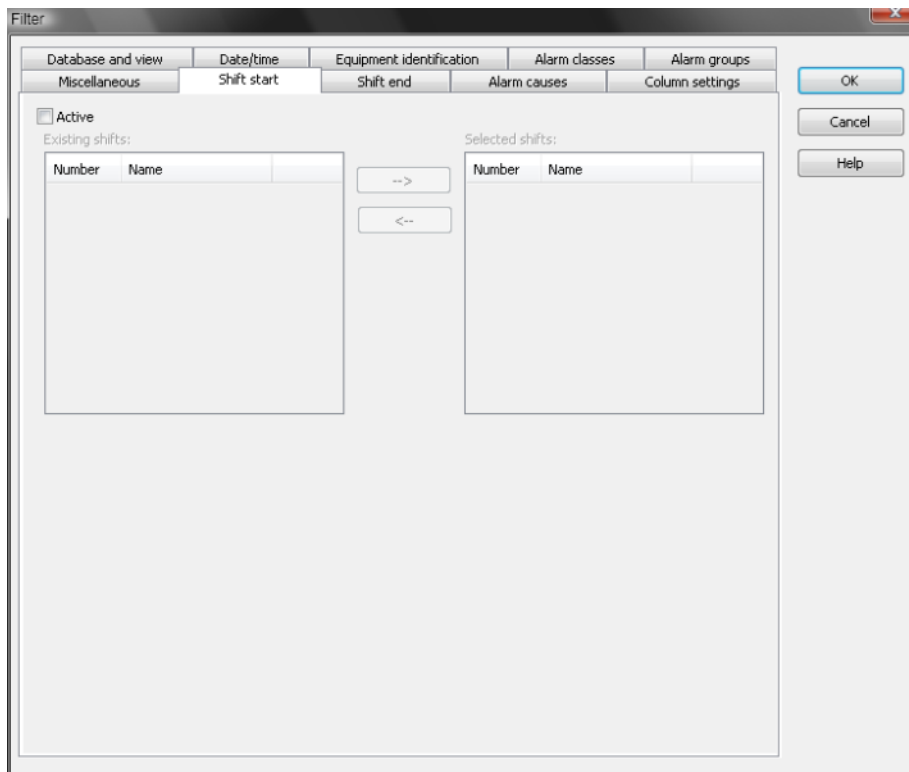
In the filter Shift begin one or more shifts can be activated. You can select the entries in the left list and move them to the right list with the help of the arrow key.

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).
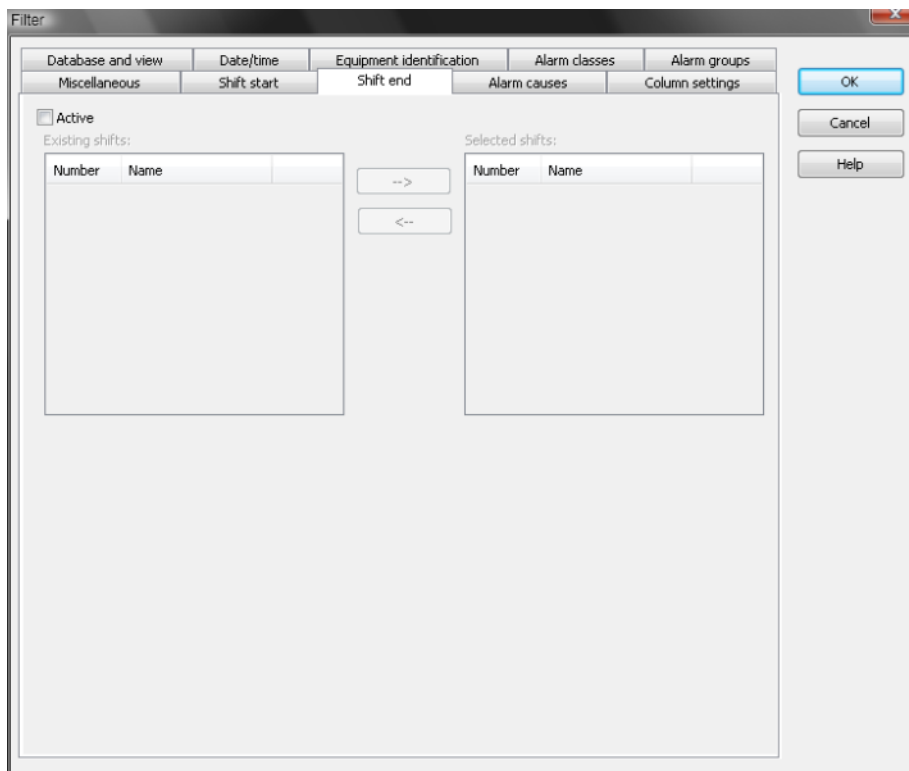
> 💡 **Info**
>
> *At filtering more than one entry can be selected at a time. You can select more than one entry by pressing and holding `Ctrl` or `Shift`.By pressing and holding `Ctrl` you can select a number of entries. By pressing and holding `Shift` you select all entries which lie between the two 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   End of shift

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).
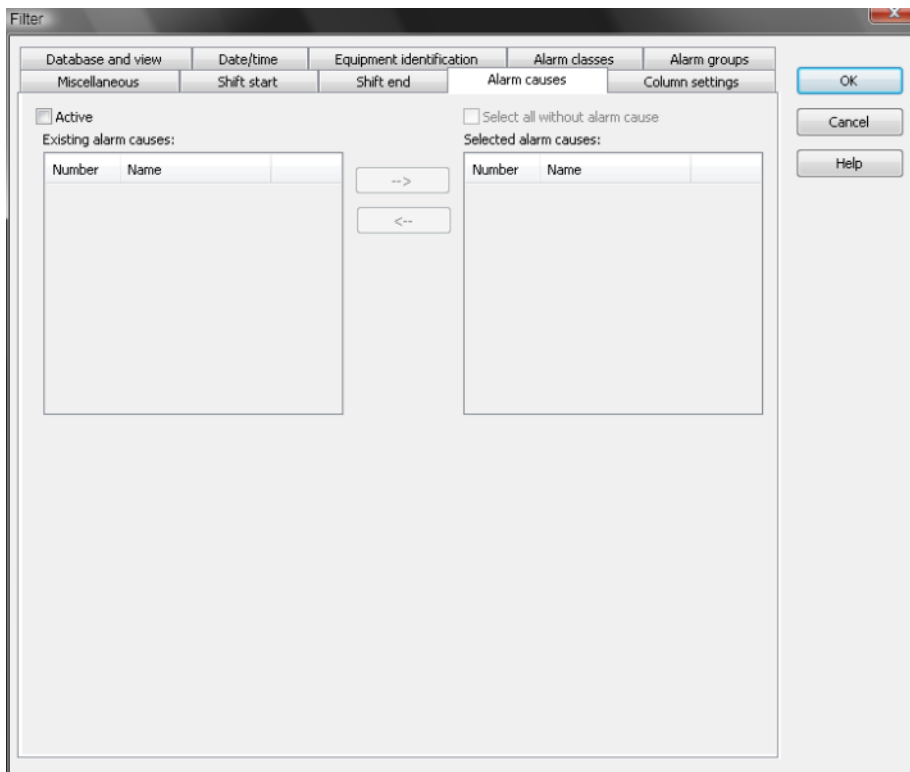
> **💡 Info**
>
> *At filtering more than one entry can be selected at a time. You can select more than one entry by pressing and holding* Ctrl *or* Shift*.By pressing and holding* Ctrl *you can select a number of entries. By pressing and holding* Shift *you select all entries which lie between the two 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 reason

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**
>
> *At filtering more than one entry can be selected at a time. You can select more than one entry by pressing and holding* `Ctrl` *or* `Shift`*.By pressing and holding* `Ctrl` *you can select a number of entries. 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
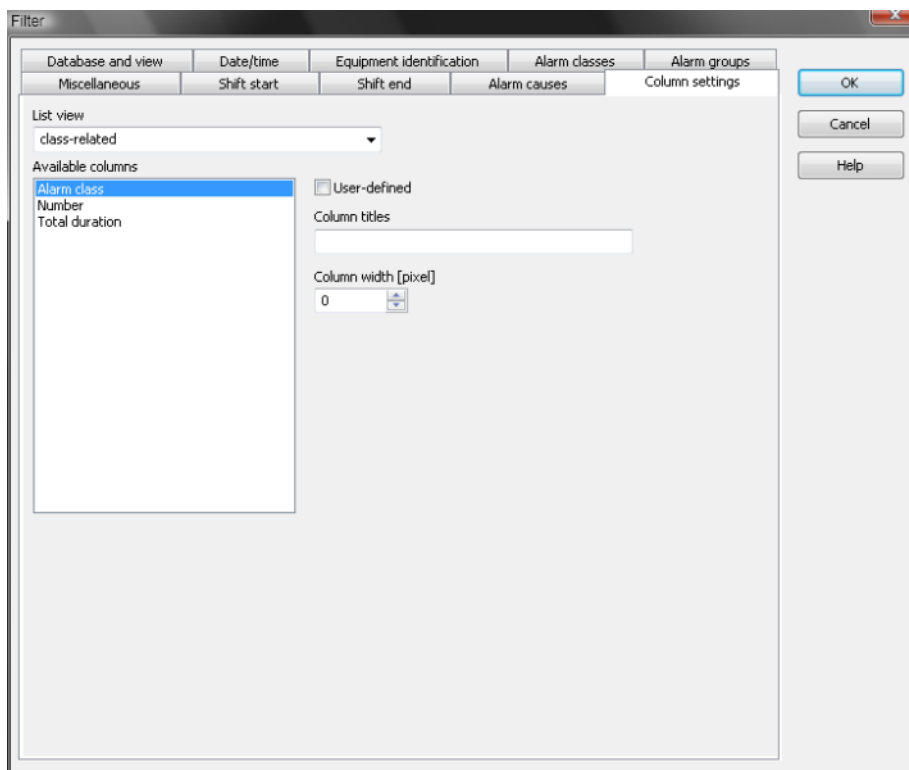
On this tab you customized the preset columns.

Parameters	Description
List view	Select the desired list from the dropdown list.
Columns	In this list all columns are displayed which are available for the selected list view.
Custom	Activate this checkbox in order to customize the preset value for column title and column width.
Column headers	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 following pre-defined files are available:

XSL-Datei	Description
Single_list.xsl	single alarm display
Statistical_duration.xsl	statistic display of the total down time of an equipment
Statistical_frequency.xsl	statistic 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

These style sheets are in the respective folders for:

- ► Windows XP: `C:\Documents and Settings\All Users\Application Data\COPA-DATA\zenon\ipa`

- ► Windows Vista\Windows 7: `C:\ProgramData\COPA-DATA\zenon650\IPA\`

If several stylesheet files are one folder, a dialog asks for the stylesheet to be used.
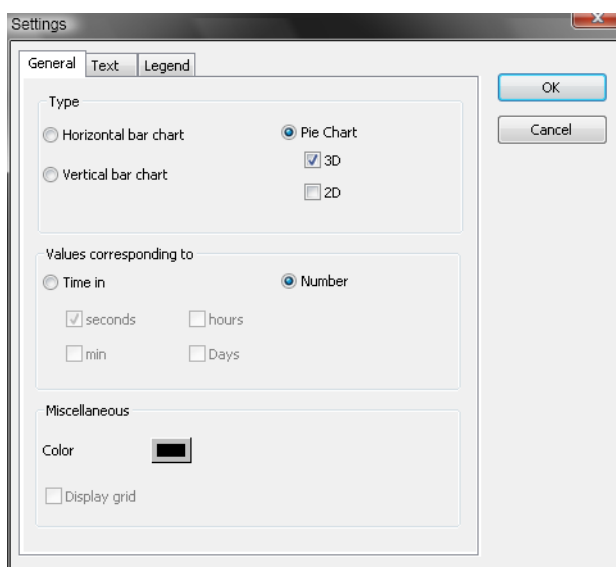
5.3 Diagram

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 diagram	Bar diagram is displayed horizontally.
Vertical bar diagram	Bar diagram is displayed vertically.
Pie diagram	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.
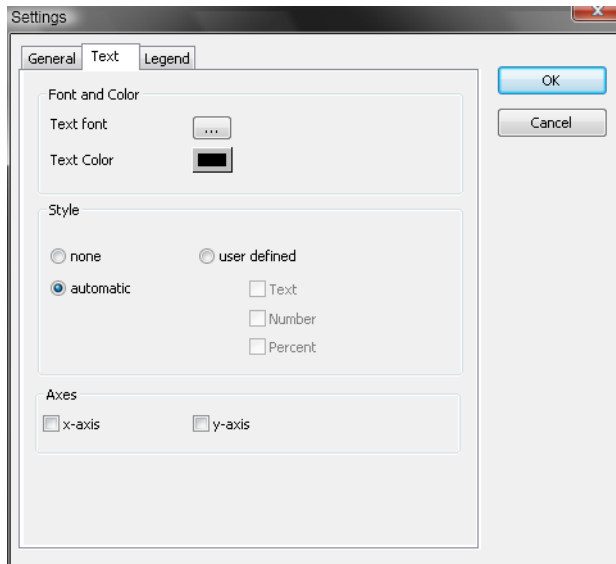
On the tab `Key` you select the font and color of the key script. Here you also define, how the key should be displayed and where it should appear.