zenon
by COPA-DATA

zenon manual

Industrial Maintenance Manager (IMM)

v.8.10

Contents

1 Welcome to COPA-DATA help

ZENON VIDEO-TUTORIALS

You can find practical examples for project configuration with zenon in our YouTube channel (https://www.copadata.com/tutorial_menu). 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

If you cannot find any information you require in this help chapter or can think of anything that you would like added, please send an email to documentation@copadata.com.

PROJECT SUPPORT

You can receive support for any real project you may have from our Support Team, who you can contact via email at support@copadata.com.

LICENSES AND MODULES

If you find that you need other modules or licenses, our staff will be happy to help you. Email sales@copadata.com.

2 Industrial Maintenance Manager (IMM)

The Industrial Maintenance Manager (IMM) administers machine and maintenance data. Service intervals can comfortably be planned and administered. You can see at a glance which device, item of equipment, machine, etc. has to be maintained today / this week / next month etc. Additionally service work done in the past is logged.

3 Functionalities

- Devices can be copied and pasted; a consecutive number is added to the device name.
- The list view can be adjusted in the screen filter. Column selection, column width, column name and their order can be modified.
- Every list view can be displayed and printed as an HTML format via Stylesheet.
- The equipment identifier can only be created via the context menu in the tree.
- Multi-hierarchic equipment identifiers
- Devices can be created via the context menu in the tree or in the list, provided that an equipment was selected in the tree. This equipment is then automatically inserted in the device as equipment identifier.
- By clicking on the column button, the elements are sorted alphabetically.
- Multi-project capable
- Server-Client
- Deleting devices is subject to a userlevel, which allows to ways of deleting. On the one hand, deleting in the sense that data is retained in the database and history entries are not lost. For this method, the flag ACTIVE in the database is set to 0. Alternatively, a complete and final deletion: all data from the database, including the maintenance tasks and the history, are deleted.
- The checkboxes in the tree view for the equipment identifiers are a filter. If they are set, only devices, history entries and maintenance tasks belonging to this equipment identifier are displayed.

4 Limitations

The module stores all data in a Microsoft SQL Server database (SQL Server 2000 and higher). The MS SQL Server is not included in zenon. However, you can use the SQL Server Express Edition which is installed with the zenon Editor.

Other SQL servers like Oracle are not supported.

5 Preparatory works

5.1 Database

You need the **SQL Server Management Studio (SSMS)** to create a database.

Installation of SQL Server Management Studio

1. Download the most recent version from the Microsoft homepage.
2. Select the English-language setup for the download, because the following steps relate to the English version.
3. Carry out the setup.

Creation of the database

1. Start **SQL Server Management Studio**.
2. Establish a connection to the desired server.
3. In the **Object Explorer**, right-click on **Databases**.
4. Select the **New Database...** entry in the context menu.

   The dialog for configuration is opened
5. Enter the desired name.
6. Configure further options if required.
7. Close the dialog by clicking on **OK**.

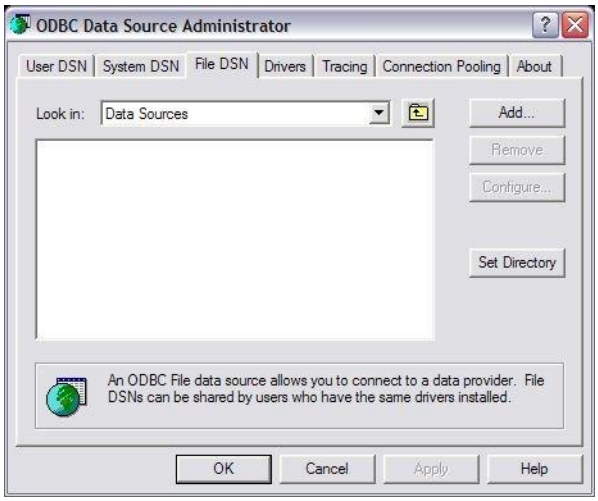
5.2 Engineering

Four tables are created in the database. The names of the tables are issued and fixed and correspond to the names that are used in the Measuring Point Administration:

- **Table for devices**: *Devices*
- **Table for maint. works**: *MaintenanceWorks*
- **Table for history**: *MaintenanceHistory*
- **Table for files**: *Documents*

DATABASE CONNECTION

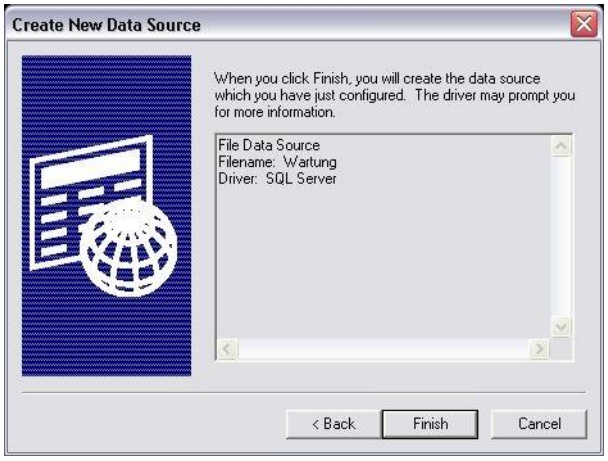
In the project properties, the ODBC string can be manually edited in the **Industrial Maintenance Manager** node by means of the **Database** property. Click on the **...** button to open the configuration dialog.



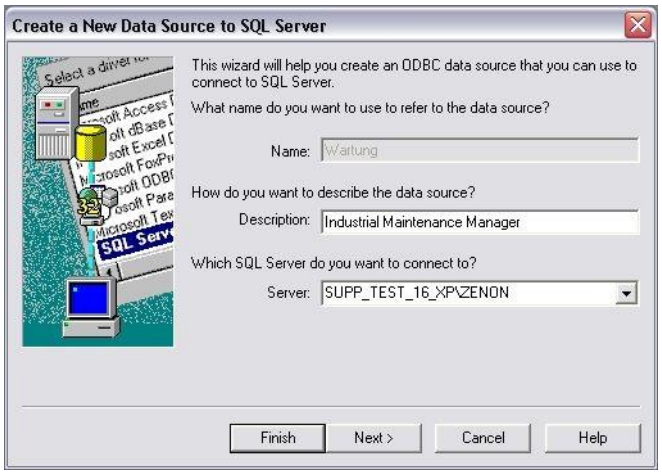
New...	Click on this button to add a new file data source.

In the **Create New Data Source** dialog, select the **SQL Server** driver and click on **Next** to state the name or the save location of the new dataset name (DSN).

Again, click on **Next**'to display a summary of the new information.

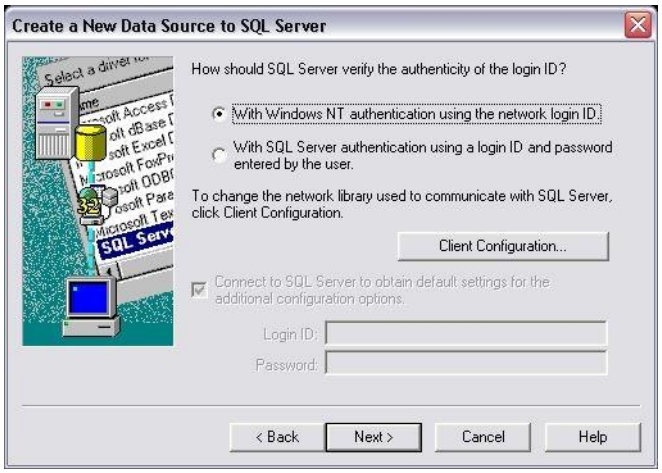


Click on **Finish** to open the driver specific setup dialog.

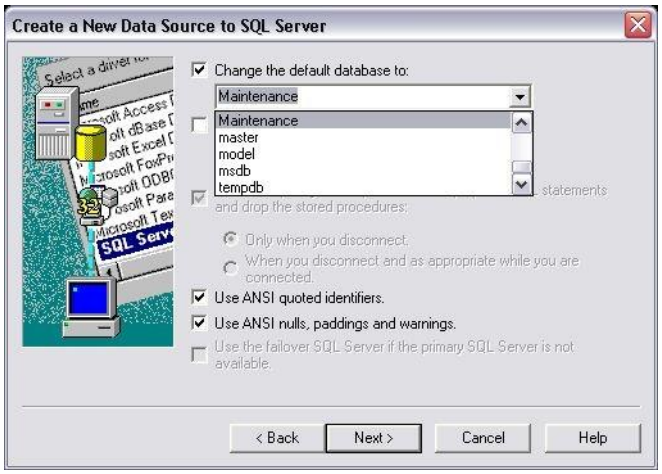


If you select a server name from the list, no further configuration settings are necessary.

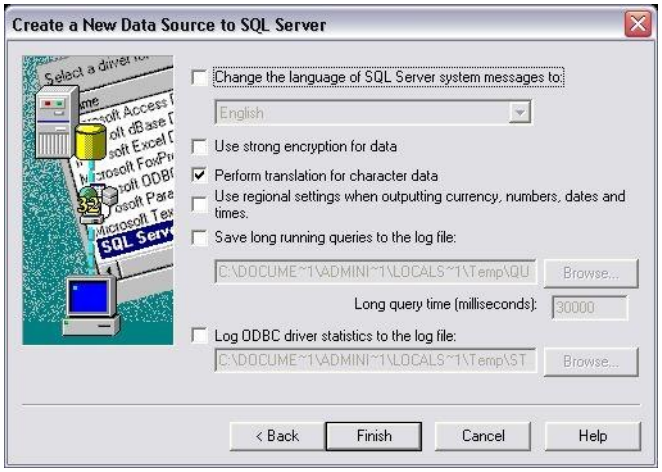
Again click on **Next**.



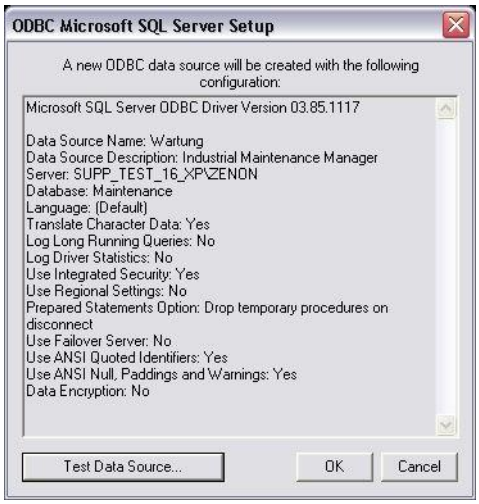
Again click on **Next**.



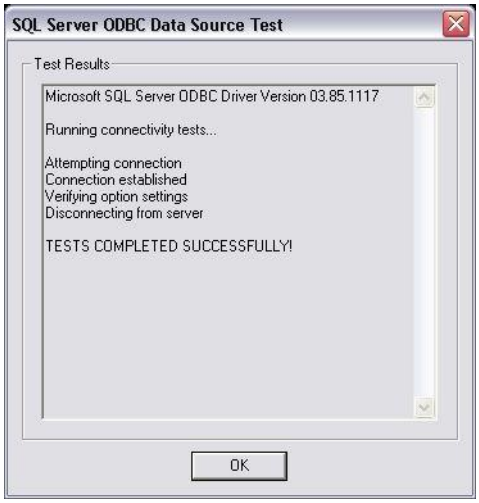
Now you can select the previously created database.

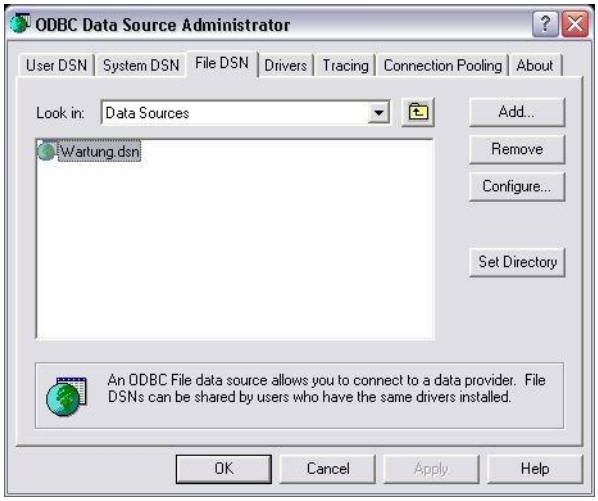


Click on **Finish**.



Now you can test the selected connection.





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;...**

6 Creating a screen of the type IMM

ENGINEERING

Two procedures are available to create a screen:

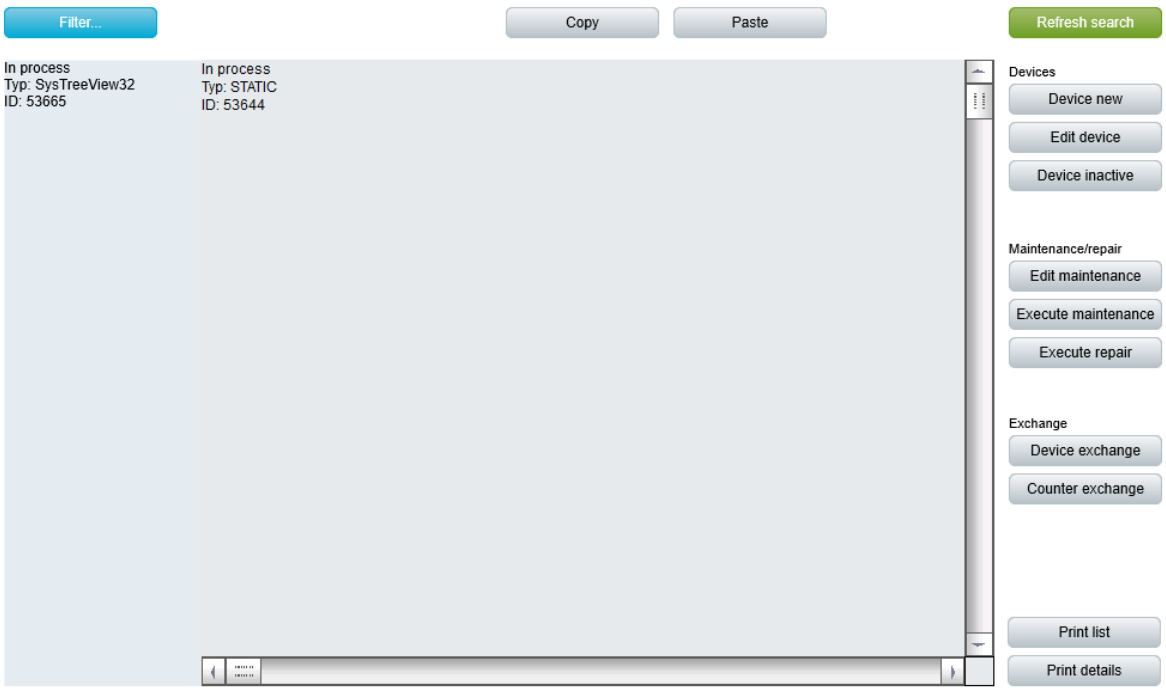
- The use of the screen creation dialog
- The creation of a screen using the properties

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 *IMM* in the **Screen type** property.
   c) Select the desired frame in the **Frame** property.
3. Configure the content of the screen:
   a) Select the **Elements (screen type)** menu item 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.

IMM screen:



Parameter	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.
List	List (on page 40) of processes which are displayed in the Runtime.
List functions	Control elements to control the list.
Filter	Applies filter.
New equipment identifier	Creates a new equipment identifier.
Delete equipment identifier	Deletes selected equipment identifier.
Device	Control elements for devices.

Parameter	Description
▸ **New**	Adds a new device.
▸ **Edit**	Makes it possible to edit the selected device.
▸ **Delete**	Deletes device.
▸ **Mark as inactive**	Switches device to inactive.
▸ **Replace**	Carries out device exchange.
Copy	Copies selected element to the clipboard.
Paste	Pastes the selected element from the clipboard.
Change counter	Carries out counter exchange.
Edit maintenance	Makes it possible to edit a maintenance.
Execute maintenance	Switches to carry out maintenance.
Execute repair	Switches to carry out repair.
Print list	Prints out list.
Print details	Prints out details.
Refresh	Refreshes view.
Filter profiles	Buttons for filter settings in the Runtime.
Profile selection	Select profile from list.
Save	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	Deletes selected profile.
Import	Imports filter profiles from export file.
Export	Exports filter profiles in the file.

7 zenon functions

7.1 IMM screen switching

In order to call up a screen of type Industrial Maintenance Manager in the Runtime:

1. Configure an *Industrial Maintenance Manager* screen.
2. Create a function **Screen switch** for this screen.
3. Define the desired content for the view in Runtime.

CREATE A SCREEN SWITCH FUNCTION

A **Screen switch** function is for calling up screens in the Runtime.

For screen switching to an *Industrial Maintenance Manager* screen, you can also configure the structure for devices, maintenance work and history with configurable lists (on page 24).

ENGINEERING IN THE EDITOR

Steps to create the function:

1. Create a new function:

   In the toolbar or in the context menu of the Functions node, select **New function**.
   The dialog to select a function is opened.
2. Navigate to the node **Favorites**.
3. Select the **Screen switch** function.

   The dialog for selecting a screen is opened.
4. Select the desired screen.
   Note: If you select a screen from another project, ensure that the project is running in the Runtime.
5. Configure the filter.
6. Name the function in the **Name** property.

TREE AND LIST VIEW IN THE EDITOR

The **tree** and **list** elements, familiar from Runtime, can also be configured individually in the Editor:

1. Open the IMM screen in which you want to add control elements.
2. Click on **Elements (Industrial Maintenance Manager)** to open the drop-down list to select the control element.

3. Select the desired control element.
4. Add the desired control element by dragging it into the screen with the left mouse button.

Note: If there is already a control element present, it is shown as grayed out in the selection dialog.

7.1.1 Filter dialog...

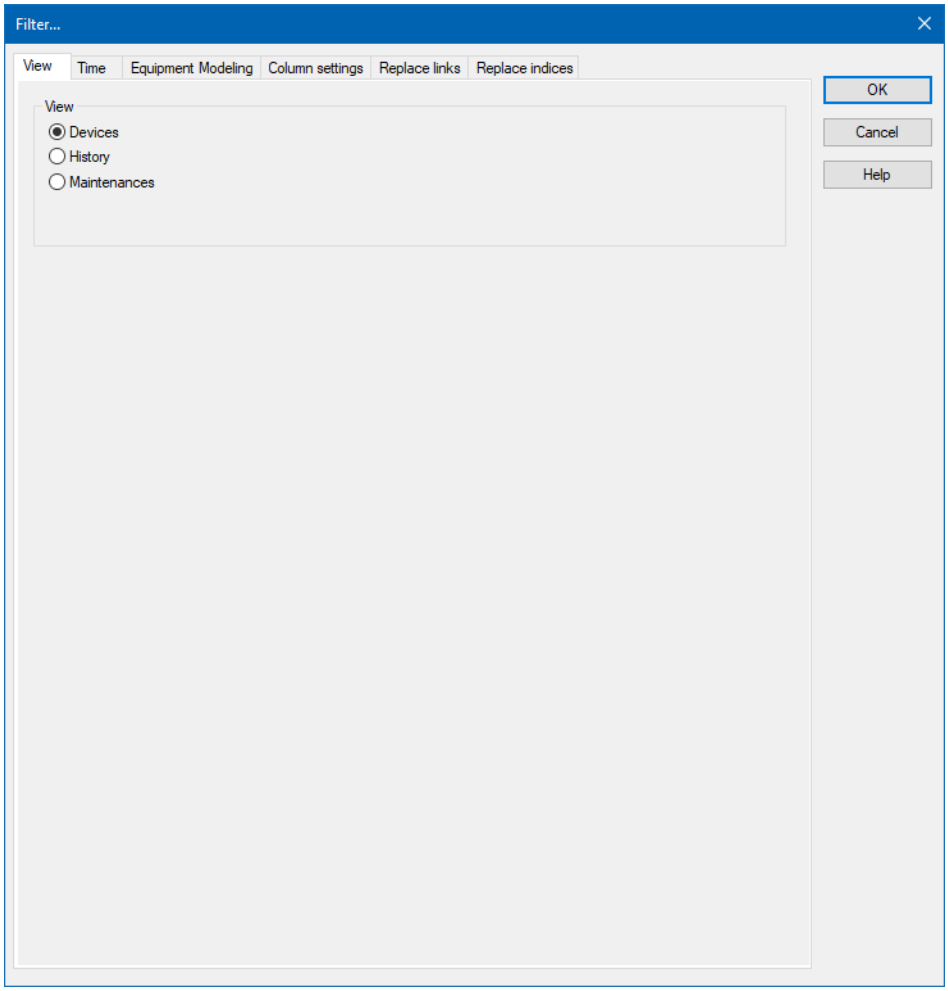
In the **Filter...** Dialog of screen switching, the following tabs are available to configure the filter:

- **View** (on page 17)
- **Time** (on page 18)
- **Equipment Modeling** (on page 22)
- **Column settings** (on page 24)

The **View** tab is opened initially.

7.1.2 View

You can select the initial view of the IMM in Runtime in the **View** tab.



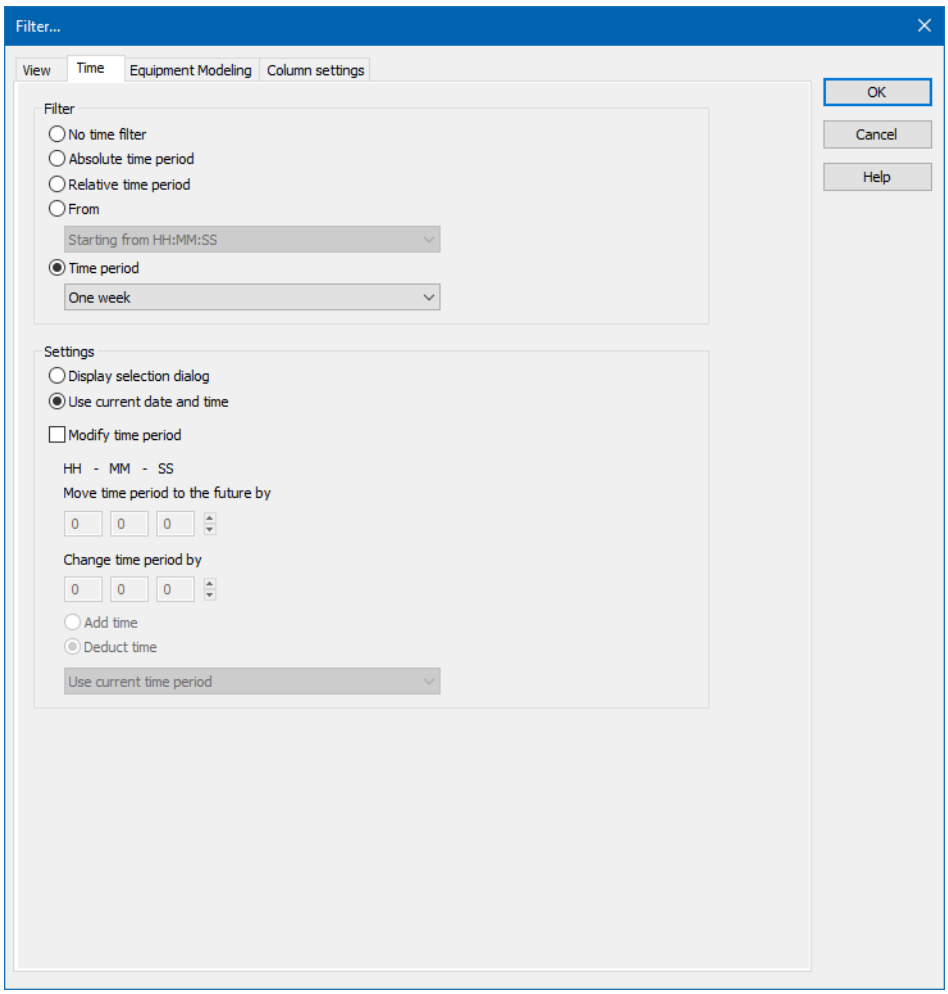
Options	Description
View	Setting of the initial view of the IMM in Runtime in accordance with the selected filtering. The corresponding node is pre-selected in Runtime. The IMM list also works if there is no tree structure present in Runtime. The buttons and context menus for printing and copying are grayed out however.
Devices	Opens the view in Runtime with device view initially.
History	Opens the view in Runtime with the view of historic maintenance initially.
Maintenances	Opens the view in Runtime with the view of pending maintenance initially.

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.

7.1.3 Time

In the **Time** tab, there are possibilities for setting the parameters of the time filter under **Filter** and **Settings**.



Parameter	Description
No time filter	*Active*: No time filter is used. **Note:** In the Runtime, all entries since 1. 1. 1990 are displayed. The use

Parameter	Description
	of this filter setting: ▸ Is not supported by Extended Trend. ▸ Corresponds to the default when converting older zenon versions to newer versions in Industrial Maintenance Manager screens. The **History** view in Runtime does not then have any entries. All entries are visible in the **Maintenance** view and can also be edited there.
Absolute time period	*Active*: A fixed period of time is entered in the editor. When the function is executed, the defined absolute time period is exactly used. In the settings section, the corresponding options can be shown and configured there. **Note:** Time is saved in UTC. For details see chapter Handling of date and time in chapter Runtime.
Relative time period	*Active*: A relative time period is entered. In the settings section, the corresponding options can be shown and configured there. **Attention:** this filter is constantly updated.
From	*Active*: A time from which the filter is effective is stated. If the time is not reached on the current day, filtering takes place from the corresponding time the previous day. Selection of the area mode from drop-down list: ▸ Starting from HH:MM:SS ▸ Starting from day at HH:MM:SS ▸ Starting from day, month - HH:MM:SS am/pm In the settings section, the corresponding options can be shown and configured there. **Attention:** The start point of this filter is not updated automatically. Only the existing times are used when shown. The end time point is not defined with this filter, it is carried over.

Option	Description
Time period	Selection of a time range from a drop-down list. In Runtime this time range is filtered. The filter relates to the

Parameter	Description
	time of screen switching. For example: The value *60 minutes* shows all archives of the last hour. If this dialog is also offered in the Runtime, the start time of the time range can be selected. The following possibilities for selection are activated: ▸ **Offer selection dialog** ▸ **Use current date/time** The **Modify time period** property can be activated. The time period can be moved to the future. The time period can be amended.
Settings	Optional setting for the time range.
Offer selection dialog	The selection dialog for the start time of the filter is offered in the Runtime.
Use current date/time	The current date/time is set for the filter.
Modify time period	Allows amendments to cycles, postponements and extensions of time periods. *Active*: Evaluation is carried out in accordance with the following rules: ▸ First, the **Use last finished time period** option is evaluated. ▸ After this, **Change time period by** is used. ▸ **Move time period to the future by** is then applied. *Inactive*: No changes to the time period are made. **Attention:** As of version 7.10, filter actions on the basis of this function lead to different results than in prior versions.
Move time period to the future by	*Active*: The time period defined in the filter is postponed to the future. The start and end time are moved by the set time span. Given in *hours - minutes - seconds*.

Parameter	Description
	If a postponement that is the same or greater than the selected **time period** is set, a note to check the configuration is displayed. **Note:** The default value for **HH** is *1*. If, for example, an evaluation of the last month is to be undertaken, this value must be set to *0*.
Change time period to	*Active*: The time period defined in the filter is modified. The end time is moved by the set time span. The start time remains unchanged. Given in *hours - minutes - seconds*. The time range can be added or deducted. Selection by means of radio buttons: ▸ **Add time:** The time stated in **Change time period by** is added to the time defined in the **Time range** option. ▸ **Deduct time:** The time stated in **Change time period by** is deducted from the time defined in the **Time range** option. The following options are available when activating **Add time** or **Deduct time**: ▸ *Use current time period* ▸ *Use last finished time period* ▸ *Use next completed time period* **Example**: If the *Use last finished time period* option is selected and *one dat* has been selected for the **time range**, filtering in the time filter is for "Yesterday" because this is the last fully-completed day. If a change and a postponement that are the same or greater than the selected **time period** is set, a note to check the configuration is displayed next to the control element for time configuration.

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.

7.1.4 Equipment Modeling

You can create equipment models and equipment groups and filter them according to equipment groups in the **equipment modeling** tab.

The following can be filtered:

- **Hierarchically**:

  Checkbox of the **hierarchical filter** property: *Active*

  The selected groups are, in the tree view in Runtime:

  - Displayed with the node to which the group belongs up to the last hierarchy level
  - Checked and their components are displayed in the list.

- **Not hierarchical**:

  Checkbox of the **hierarchical filter** property: *Inactive*

  The selected groups are, in the tree view in Runtime:

  - Displayed with the node to which the group belongs, without entries in the same hierarchy level or below.
  - Checked and their components are displayed in the list.

PROCEDURE WHEN FILTERING

To filter according to equipment groups:

1. Select, in the filter dialog in the **Equipment modeling** tab, whether you want to filter **hierarchically** or **non hierarchically**. To do this, activate or deactivate the checkbox of the **hierarchical filter** property.

   Default: *active*

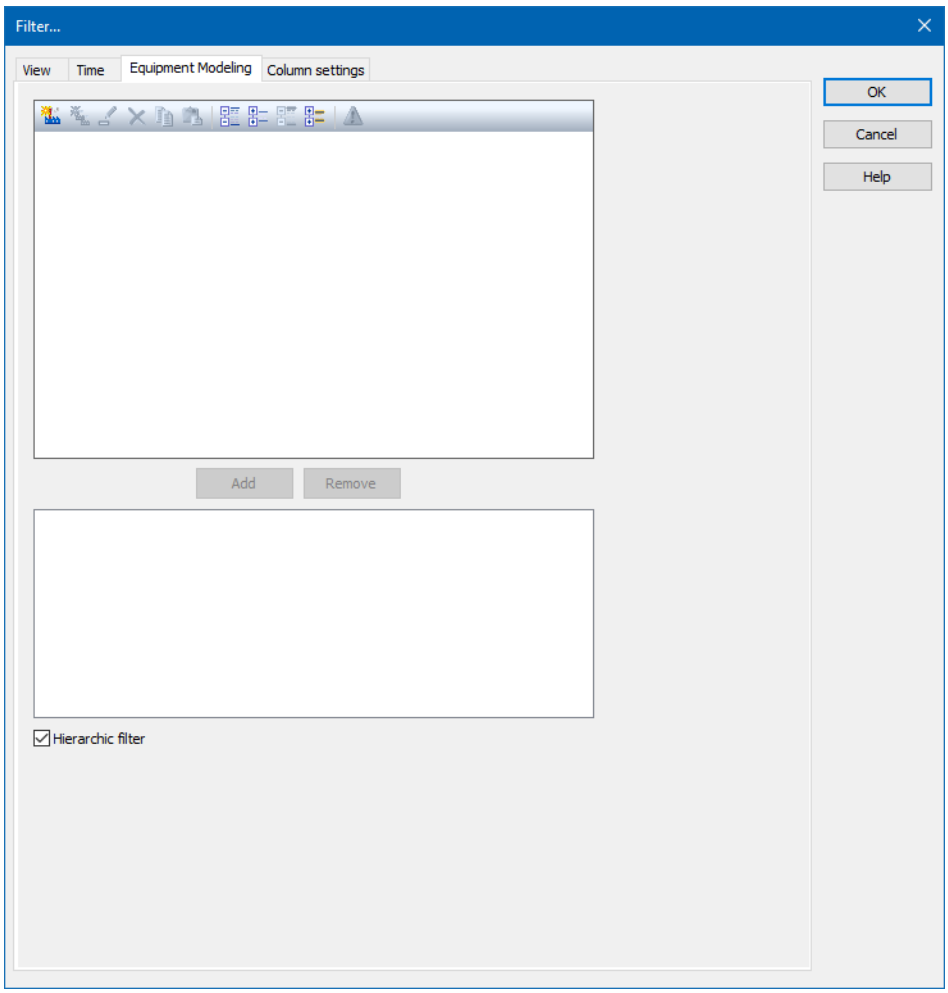
2. Click on the Plus with the left mouse button to open the node items of the listed equipment models.
3. Highlight the desired equipment group by clicking on the left mouse button.

The **Add** button is activated.

4. Click on the Add button.

   The selected group is listed in the lower window of the dialog.

5. Repeat the processes until you have selected the desired groups.



Option	Description
Toolbar	Symbols to: ▸ Edit local equipment models ▸ Expand or collapse the display ▸ Display of information
List of equipment models	provides models and groups for selection The list separates the display into equipment models from the global project and from local projects. Local equipment models can be created, edited or deleted.

Option	Description
	Note: Equipment models from the global project cannot be displayed if there are models with the same name from the local project. Affected models are displayed by clicking on the warning symbol (triangle with exclamation mark). For details, see the **Equipment modeling** manual, **Editing local equipment models** chapter.
Add	Adds the selected groups to the filter list.
Remove	Removes all selected groups from the filter list.
Filter list	Shows all equipment groups that are to be filtered.
Hierarchic filter	Checkbox for the activation of the hierarchical filtering of the equipment model ▸ *active*: Variables that are linked to a subhierarchy of the selected equipment group are taken into account when filtering and are contained in the display in the Runtime. ▸ *Inactive*: When filtering, only variables that are linked to the selected equipment group are taken into account. Default: *active*

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.

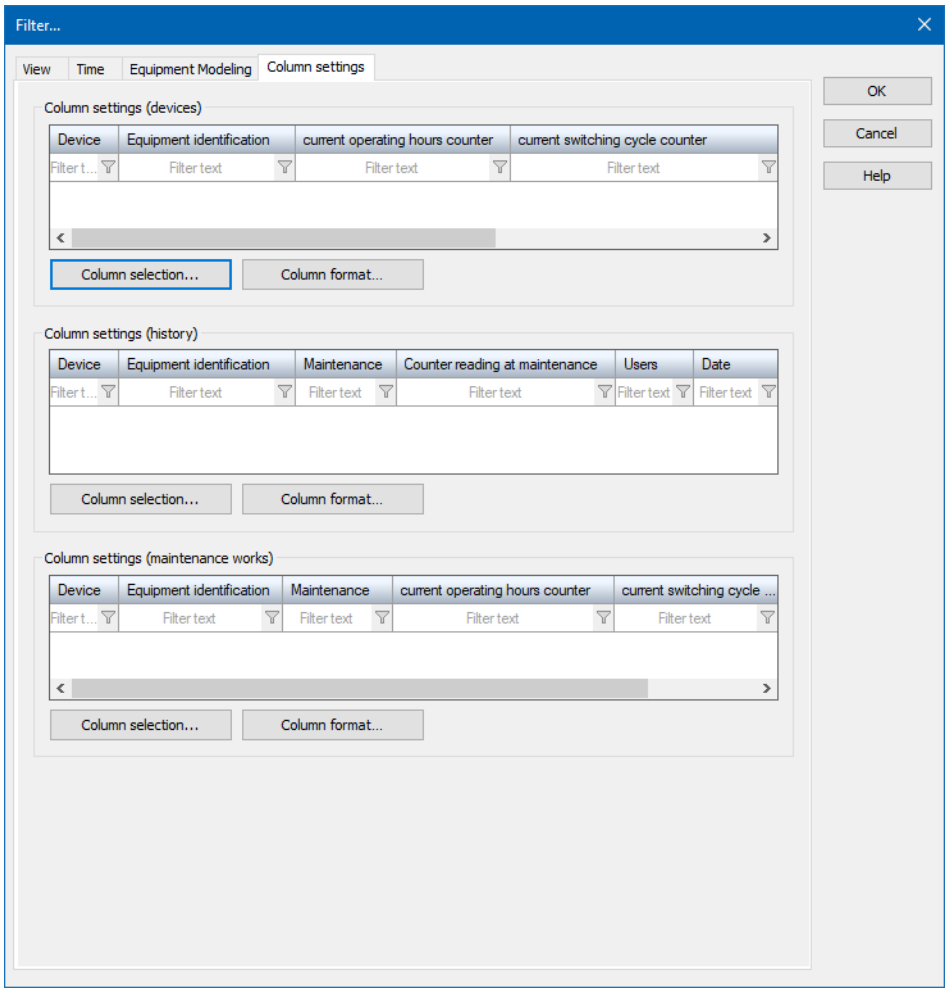
7.1.5 Column settings

You can configure the view of the columns in the **Column Settings** tab.

This happens using the following dialogs:

- **Column selection...** (on page 28)

- **Column format...** (on page 29)



Parameter	Description
Column settings (devices)	Configurable list for the columns of the devices and device data shown in Runtime. Available columns: ▸ Device (*default*) ▸ Equipment identification (*default*) ▸ Current operating hours counter (*default*) ▸ Current switching cycle counter (*default*) ▸ Time period since last maintenance (*default*) ▸ Identification ▸ Brand ▸ Date of putting into operation

Parameter	Description
	▸ Serial number ▸ Status ▸ Type Configuration of the information to be displayed by clicking on the **Column selection...** button.
Column settings (maintenance work)	Configurable list for the columns of the maintenance work shown in Runtime. Available columns: ▸ Device (*default*) ▸ Equipment identification (*default*) ▸ Maintenance work (*default*) ▸ Current operating hours counter (*default*) ▸ Current switching cycle counter (*default*) ▸ Time period since last maintenance (*default*) ▸ Due date *default*) ▸ Identification ▸ Internal - external ▸ Comment ▸ Status Configuration of the information to be displayed by clicking on the **Column selection...** button.
Column settings (history)	Configurable list for the columns of the history shown in Runtime. Available columns: ▸ Device (*default*) ▸ Equipment identification (*default*) ▸ Maintenance work (*default*) ▸ Counter reading when maintenance is carried out (*default*) ▸ User (*default*)

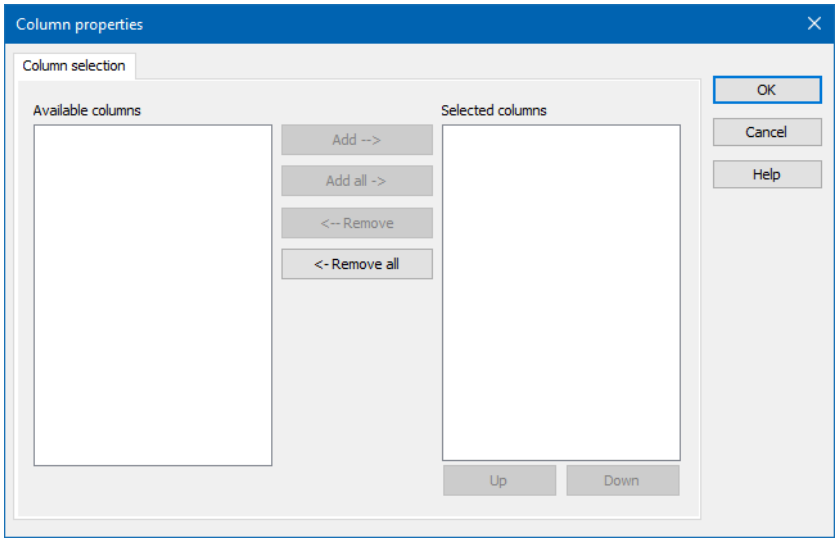
Parameter	Description
	▸ Date (*default*) ▸ Identification ▸ Comment Configuration of the information to be displayed by clicking on the **Column selection...** button.
Option	**Description**
Column selection...	Selection of the columns for display in Runtime. Clicking on the button opens the **column properties** dialog.
Column format...	Amendment of the display in Runtime. Clicking on the button opens the **column properties** dialog to configure the view.

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.

7.1.5.1 Column selection

Selection and sequence of the columns.



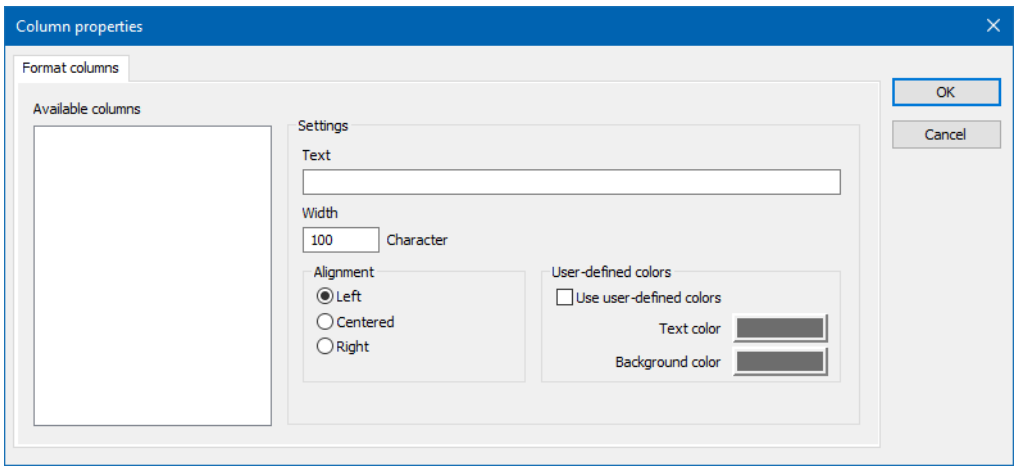
Option	Function
Available columns	List of columns that can be displayed in the table.
Selected columns	Columns that are displayed in the table.
Add ->	Moves the selected column from the available ones to the selected items. After you confirm the dialog with OK, they are shown in the detail view.
Add all ->	Moves all available columns to the selected columns.
<- Remove	Removes the marked columns from the selected items and shows them in the list of available columns. After you confirm the dialog with OK, they are removed from the detail view.
<- Remove all	All columns are removed from the list of the selected columns.
Up	Moves the selected entry upward. This function is only available for unique entries, multiple selection is not possible.
Down	Moves the selected entry downward. This function is only available for unique entries, multiple selection is not possible.

CLOSE DIALOG

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

7.1.5.2 Column Format

Configuration of the properties of the columns for configurable lists. The settings have an effect on the respective list in the Editor or - when configuring screen switching - in Runtime.



AVAILABLE COLUMNS

Option	Description
Available columns	List of the available columns via **Column selection**. The highlighted column is configured via the options in the **Settings** area.

SETTINGS

Option	Description
Settings	Settings for selected column.
Labeling	Name for column title. The column title is online language switchable. To do this, the **@** character must be entered in front of the name.

Option	Description
Width	Width of the column in characters. Calculation: Number time average character width of the selected font.
Alignment	Alignment. Selection by means of radio buttons. Possible settings: ▸ **Left**: Text is justified on the left edge of the column. ▸ **Centered**: Text is displayed centered in the column. ▸ **Right**: Text is justified on the right edge of the column.
User-defined colors	Properties in order to define user-defined colors for text and background. The settings have an effect on the Editor and Runtime. **Note:** ▸ These settings are only available for configurable lists. ▸ In addition, the respective focus in the list can be signalized in the Runtime by means of different text and background colors. These are configured using the project properties.
User defined colors	*Active*: User-defined colors are used.
Text color	Color for text display. Clicking on the color opens the color palette to select a color.
Background color	Color for the display of the cell background. Clicking on the color opens the color palette to select a color.
Lock column filter in the Runtime	▸ *Active*: The filter for this column cannot be changed in the Runtime. **Note:** Only available for: ▸ Batch Control ▸ Extended Trend ▸ Filter screens ▸ Message Control

Option	Description
	▸ Recipegroup Manager ▸ Shift Management ▸ Context List

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.

7.2 IMM in screen container faceplate

An **IMM** screen can also be added to the screen container of a **Faceplate** screen. The IMM screen-specific filters, views and columns can be added to a screen switch to a **faceplate** screen. The IMM screen-specific filters can be configured.

7.3 Determine open maintenances

Function **Determine open maintenances** fetches the list of all pending maintenances from the IMM for a certain period of time. These are used to determine the equipment-specific status values as configured.

When carrying out the function:

- numeric values are written to the corresponding status variables; these values match the total number of pending maintenances in the equipment. For this the following preparations must be made:
  - **Equipment modeling**: The status variables must be linked in the project directly for the relevant equipment group. Define one variable each for **Number of pending maintenances** and **Total number of pending maintenances**.
    In the tab **Equipment modeling**, the equipment groups for which the maintenance should be determined must be defined.
  - **Master data**: In the **Status variables** tab, the equipment identifiers must be assigned to the status variables.
    This option is only available to ensure compatibility and is not recommended.
- The status variables configured on the device and maintenance are updated as well.

Engineering:

1. In the project tree, highlight the **Functions** node by clicking on the left mouse button.
2. Create a new function:

   In the toolbar or in the context menu of the Functions node, select **New function**.
   The dialog to select a function is opened.
3. Select the **Determine open maintenance** function under the **Application** node item.
4. Confirm the selection by clicking on **OK**.

   The filter dialog is opened.
5. Configure the function in the individual tabs:
   - **Time period** (on page 33)
   - **Status variables** (on page 34)
   - **Equipment Modeling** (on page 35)
6. Confirm the inputs by clicking on OK.

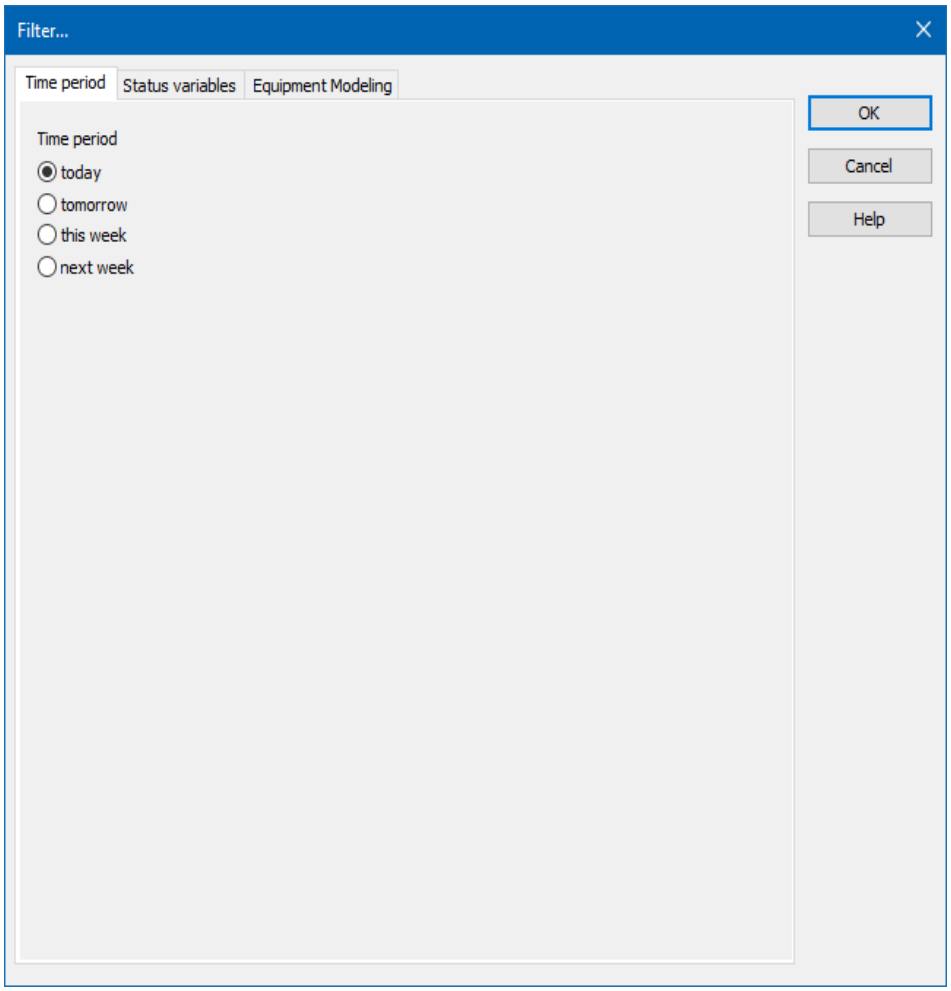
   The function is now available.

Information

In network operation, the function is always executed on the server.

7.3.1 Period

In the **Time Period** tab, you can configure the time period in which the pending maintenance is to be determined.



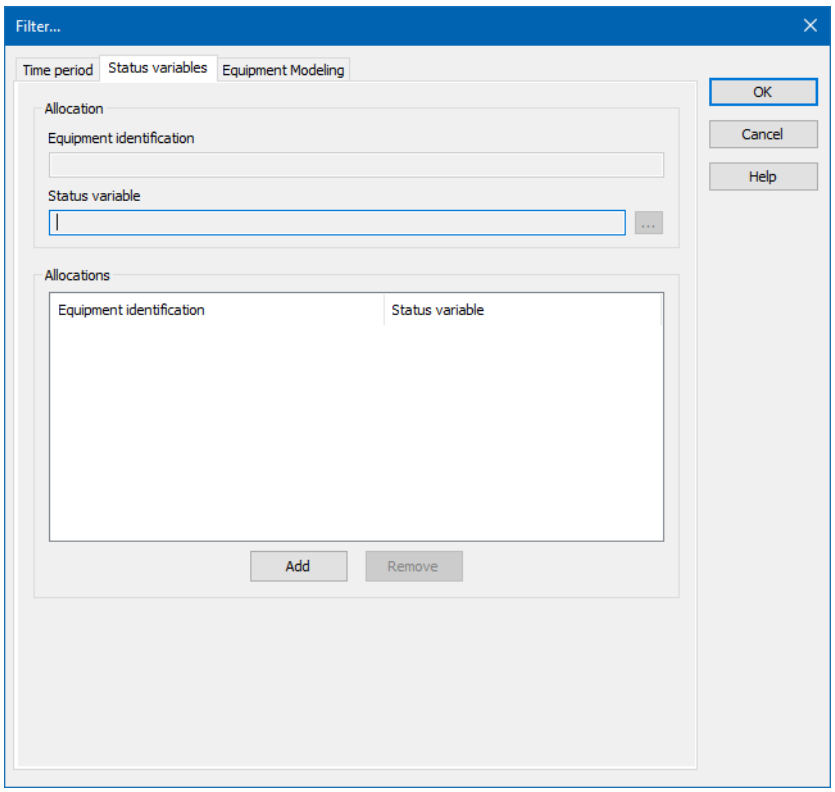
Parameter	Description
Period	Period of time for which the pending maintenance was determined The following options can be selected: ▸ *Today* ▸ *tomorrow* ▸ *this week* ▸ *next week* **Note:** Time is saved as local time. For details see chapter Handling of date and time in chapter Runtime.

CLOSE DIALOG

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

7.3.2 Status variables

In the **Status Variables** tab, you can assign a **status variable** to an **equipment identifier**.



Parameter	Description
Allocation	Allows the allocation of a status variable for a certain item of equipment.
Equipment identifier	Enter the equipment identifier that is to be allocated to a status variable. **Note:** Equipment identifiers are separated by comma and entered as lists. Equipment identifiers can also contain wildcards. (Wildcards

Parameter	Description
	are only allowed as prefix or suffix; e.g. *xxx or xxx*.)
Status variable	A numerical variable that contains the number of open maintenances of the equipment entered under **Equipment identifier** as a set value. Click on the **...** button to open the selection dialog.
Allocations	List of allocations of equipment labels to status variables.
Add	Adds a new line for an allocation.
Remove area	Deletes the selected allocation.

CLOSE DIALOG

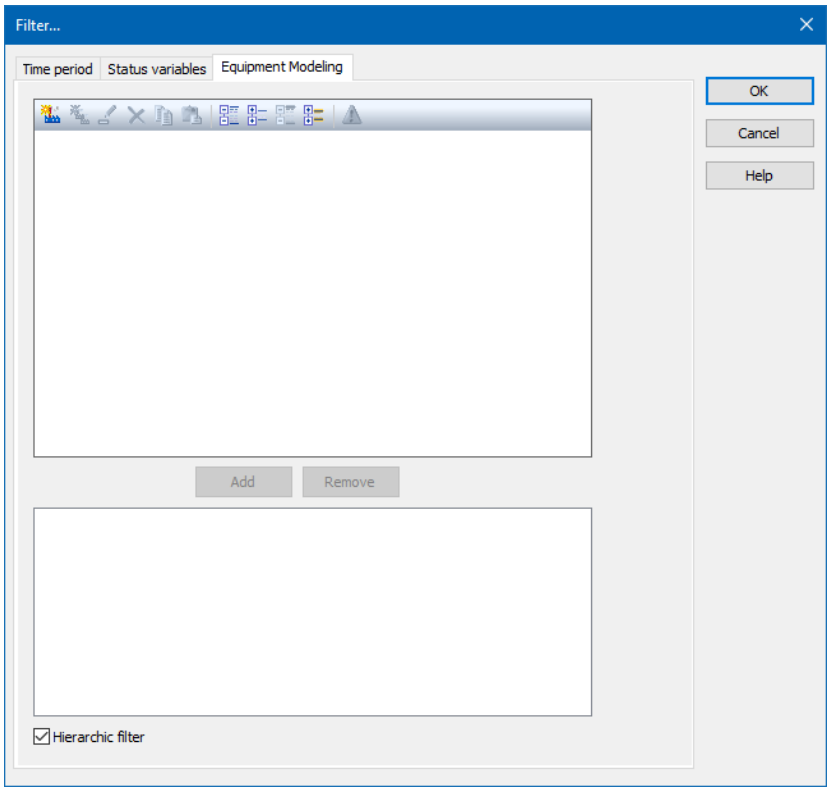
Options	Description
OK	**Applies settings and closes the dialog.**
Cancel	Discards all changes and closes the dialog.
Help	Opens online help.

7.3.3 Equipment Modeling

You can do the following in the Equipment Modeling tab:

- Create new equipment models and equipment groups

- Select equipment groups and link them to the filter via the **Add** button



Option	Description
Toolbar	Symbols to: - Edit local equipment models - Expand or collapse the display - Display of information
List of equipment models	provides models and groups for selection The list separates the display into equipment models from the global project and from local projects. Local equipment models can be created, edited or deleted. **Note:** Equipment models from the global project cannot be displayed if there are models with the same name from the local project. Affected models are displayed by clicking on the warning symbol (triangle with exclamation mark). For details, see the **Equipment modeling** manual, **Editing local equipment models** chapter.
Add	Adds the selected groups to the filter list.
Remove	Removes all selected groups from the filter list.

Option	Description
Filter list	Shows all equipment groups that are to be filtered.
Hierarchic filter	Checkbox for the activation of the hierarchical filtering of the equipment model ▸ *active*: Variables that are linked to a subhierarchy of the selected equipment group are taken into account when filtering and are contained in the display in the Runtime. ▸ *Inactive*: When filtering, only variables that are linked to the selected equipment group are taken into account. Default: *active*

CLOSE DIALOG

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

8 Maintenance task

The calculation of pending maintenance is the main task of IMM. Maintenance tasks can have three different maintenance intervals:

- a time span in days

- an hours counter or

- an operations counter.

The due date of the maintenances is calculated from these intervals.

If a maintenance comes into the warning zone, it shows up in the list for due maintenances, including a notice that it has reached the warning level . If it reaches the maintenance intervall, the maintenance is set to due, which also shows up in the list of maintenances.

THE FUNCTION 'DETERMINE MAINTENANCES'

With the function *Determine maintenances*, the list of all due maintenances in the selected time span is retrieved from the IMM. These due maintenances are then used to determine the equipment-specific status values as configured.

Numerical set values equalling the total number of due maintenances for equipment matching the selected filter criteria are sent to the according status variables.

If you create a new function *Determine maintenances* in the Editor, the following configuration dialog appears:

Period	**Here you can select the period for which you want to determine due maintenances (see IMM).**

8.1 Period

When entering the maintenance work data, a time interval in days can be entered.

An advance notice period can also be given. This means: The maintenance work should be considered pending maintenance work this many days before expiry of the time period interval. (message 'Maintenance due in xx days'.)

If the period of time or the counter value of the maintenance interval is reached, the maintenance is entered with the text 'Maintenance interval exceeded'.

The date of the last maintenance is updated for each execution.

On creating the maintenance task this date is set to the current date.

8.2 Hours and operations counter

To calculate pending maintenance, the difference between the current counter status and the counter status of the last maintenance is determined.

If this difference is greater than the configured limit value, the maintenance is shown as due.

9 Data input

The variable values are only entered in the maintenance data, if the maintenance task is newly created. Otherwise the old values stay.

If a device is created and no variables are linked, the initial value stays in the maintenance task. Also in this constellation the variable values in the maintenance task are not overwritten, if the variable is entered later. A message is displayed, if the variable needed for the maintenance calculation still has the

initial value. The variable value only can be changed by executing a repair, a device exchange or a maintenance task.

10 Integration into the process

- Notification of the success of the maintenance work: The device can be assigned an integer variable. Furthermore, the response value of this variable must be defined in the maintenance work. If no distinction between the individual maintenance work is desired, the same value can always be entered here. If no value is given, no value is written to the variable.
- Response in the process: At each time of maintenance work, a variable that contains the status of the maintenance can be linked. (status OK 0 and Status Due 1)

11 Operation in Runtime

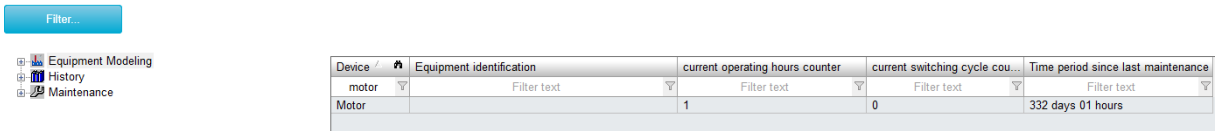
The following functions are available:

- **New device**: Create a new device. An equipment identifier has to be selected.
- **Edit device**: Edit a device. A device has to be selected.
- **Device inactive**: Switch a device to inactive, i.e. data is no longer displayed but remains in the database.
- **Execute maintenance**: A maintenance must be selected to perform this.
- **Refresh**: The data from the database and the variables are refreshed.
- **Filter**: Loads the screen filter dialog to modify columns.
- **Print**: Generates an HTML file with the desired list view. The current view is captured as it is. The history and the upcoming maintenances can be printed.
- **Print details**: The details of maintenance task can be considered as an HTML file. A maintenance task must of course be selected for this.

Note: In addition, devices with drag&drop can be moved (on page 40).

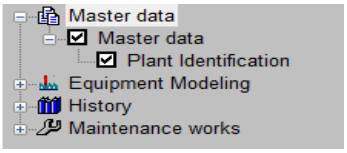
12 View in Runtime

If the IMM screen (on page 12) is called up in Runtime, it is displayed divided in two areas:



Note: The master data node item is only displayed if there is the corresponding data.

12.1 Left side: tree



Parameter	Description
Master data	The equipment identifications are used as nodes. These nodes have a checkbox to limit the selection. This selection defines the output in the list. In the master data, the maintenance tasks and the history only data belonging to the selected equipments are displayed. **Note:** Devices from the list can be moved to equipment groups by means of drag&drop. Multiple selection is possible. The assignment is automatically amended after devices are moved. **Note:** The Master Data node is not shown if there are no entries in it. In the IMM, the zenon equipment model should be used to avoid duplicated maintenance of the model.
Equipment modeling	Equipment models and equipment groups are displayed here. **Note:** The equipment models must be configured in the Editor and cannot be changed in Runtime. New devices can only be created for equipment groups. You can create new devices via: ▸ The **New device** button ▸ The context menu of the list ▸ The nodal point context menu **Equipment group** on the left side of the IMM screen **Note:** Devices from the list can be moved by dragging&dropping

Parameter	Description
	between the equipment groups or in the **Master data** node. The complete hierarchical name of the equipment group is shown in the **Equipment identifier** list column. Filtering in Runtime using checkboxes (on page 58) also works for the equipment models.
History	Here the history data is filtered on periods of time. With **free filter** a dialog for the selection of any period of time is opened.
Maintenance works	Here the 'current' maintenance tasks are filtered on periods of time. With **free filter** a dialog for the selection of any period of time is opened.

12.1.1 New master data / edit master data dialog

The dialog is available under the **Master Data** node item (if present) and **Equipment Modeling** of the tree view.

The naming of the dialog depends on the respective application:

- **New master data**: if a new device is set up
- **Edit master data**: if changes will be made to a pre-existing device

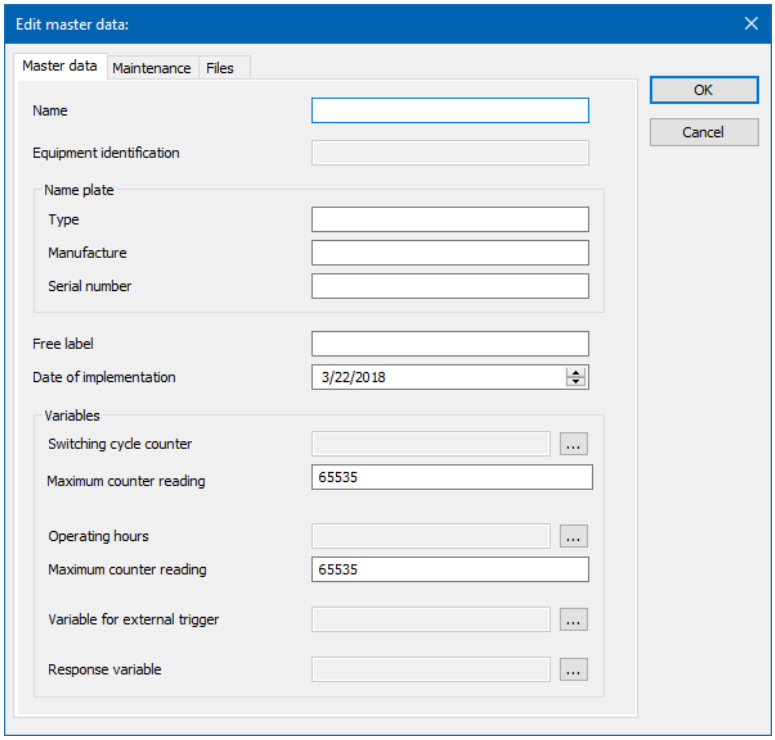
The following tabs are available in the dialog:

- **Master data** (on page 42)
- **Maintenance** (on page 44)
- **Files** (on page 49)

The tabs are described in the corresponding chapters.

12.1.2 Master data

You can create and configure new devices in the **Master Data** tab.



Option	Description
Name	Naming of the device
Equipment identification	States the hierarchical ordering of the device. Is already defined when the device is set up.
Name plate	Provides information about the device from the device manufacturer.
Type	Device type
Manufacture	Information about a certain type issued by the device manufacturer.
Serial number	Number issued by the device manufacturer to identify the device.
Free description	Freely-describable naming of the device
Date of initial operation	Date of first operation in the plant. Can be set using the cursor keys in the text field or the keyboard.

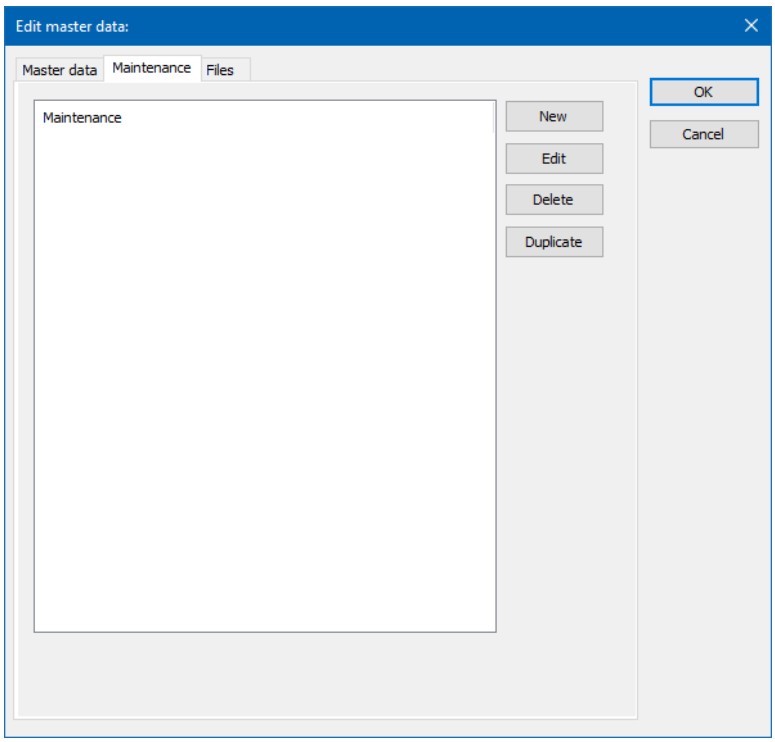
Option	Description
Variables	Offers the possibility to select variables for different requirements.
Switching cycle counter	Allows the selection of a variable to record the switching cycles. Click on the **...** button to open the selection dialog.
Maximum counter reading	Setting possibility to configure the maximum permitted counter status. Default: *65535*
Operating hours	Allows the selection of a variable to record the operating hours. Click on the **...** button to open the selection dialog.
Maximum counter reading	Setting possibility to configure the maximum permitted counter status. Default: *65535*
Variable for external trigger	Allows the selection of a variable for the external triggering of a device. Click on the **...** button to open the selection dialog. **Note:** Only active if you define a trigger value (on page 45) in the **new maintenance** dialog. **Note**: If you configure an additional variable in the **new maintenance** dialog for external triggering of the maintenance, the trigger value is only applicable for the additional variable. The additional variable then replaces the external trigger variable set in the **master data** dialog.
Response variable	Allows the selection of a response variable. Click on the **...** button to open the selection dialog. The execution of the respective maintenance can be tracked through the **response value** in the **new maintenance** dialog (on page 45).

12.1.3 Maintenance

You can create and edit new devices in the **Maintenance** tab.

To do this, in addition to the buttons, the following keys on the keyboard are available if you highlight a list entry with the left mouse button under Maintenance:

- **Ins:** Opens the **new maintenance** dialog.
- **Del:** Deletes highlighted entry from the list.
- **F2:** Opens the **edit maintenance** dialog.



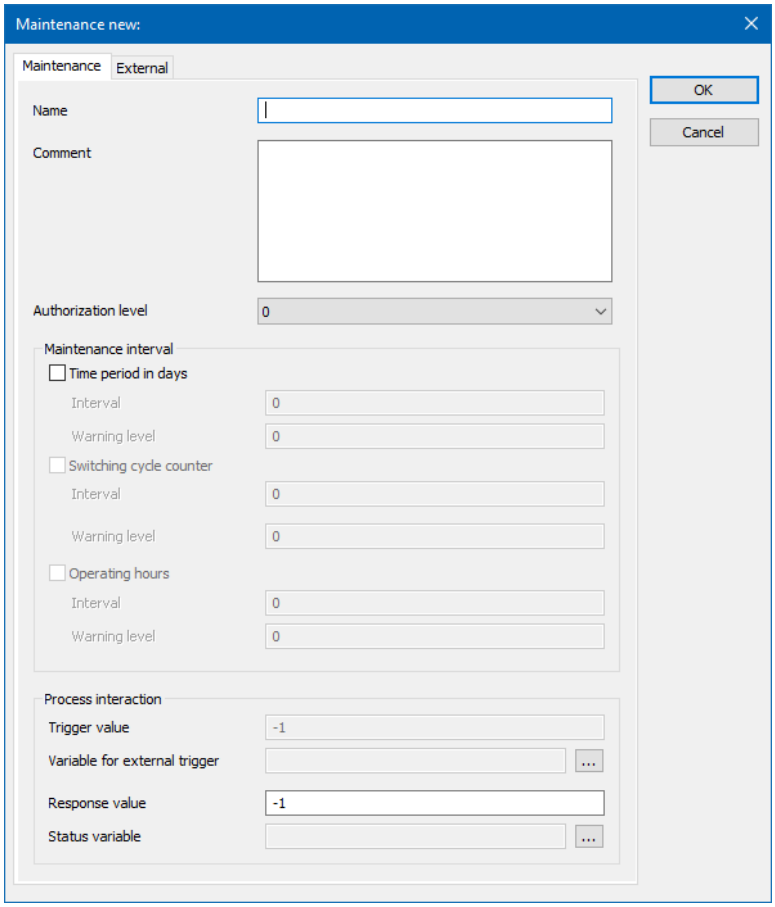
Click in the line of a list entry to select it.

Option	Description
New	Opens the **new maintenance** dialog.
Edit	Opens the **edit maintenance** dialog. Grayed out if not available.
Delete	Deletes highlighted entry from the list. Grayed out if not available.
Duplicate	Duplicates highlighted entry in the list. Multiple selection is not possible. Grayed out if not available.

OK	Applies settings and closes the dialog.
Cancel	Discards all changes and closes the dialog.

12.1.3.1 New maintenance dialog

You can undertake maintenance-related configurations in the **Maintenance** tab.



Option	Description
Name	Naming of the maintenance
Comment	Text field to enter additional information
Authorization level	Select the authorization level,needed to perform maintenance from the drop-down list.
Maintenance interval	Adjustment possibility for the type of determination for the maintenance interval. This can be determined according to: ▸ **Time period in days**

Option	Description
	▸ **Switching cycle counter** ▸ **Operating hours**
Time period in days	Maintenance interval according to time period and is defined via the number of days. Activating the checkbox activates **interval** and **warning level** **Note:** Only active if a variable has been linked in the master data.
Interval	Possibility to set the time duration in days
Warning level	Possibility to set the degree of the warning level
Switching cycle counter	Maintenance interval according to switching cycles and is defined via the number of days. Activating the checkbox activates **interval** and **warning level** **Note:** Only active if a variable has been linked in the master data. Only the **switching cycle counter** option or the **operating hours** option can be selected.
Interval	Possibility to set the time duration according to switching cycles
Warning level	Possibility to set the degree of the warning level
Operating hours	Maintenance interval according to time period and is defined via the number of operating hours. Activating the checkbox activates **interval** and **warning level** **Note:** Only active if a variable has been linked in the master data. Only the **switching cycle counter** option or the **operating hours** option can be selected.
Interval	Possibility to set the time duration in hours
Warning level	Possibility to set the degree of the warning level
Trigger value	Triggers an entry with time stamp in the server data base each time a variable changes to the set value. This is applicable for

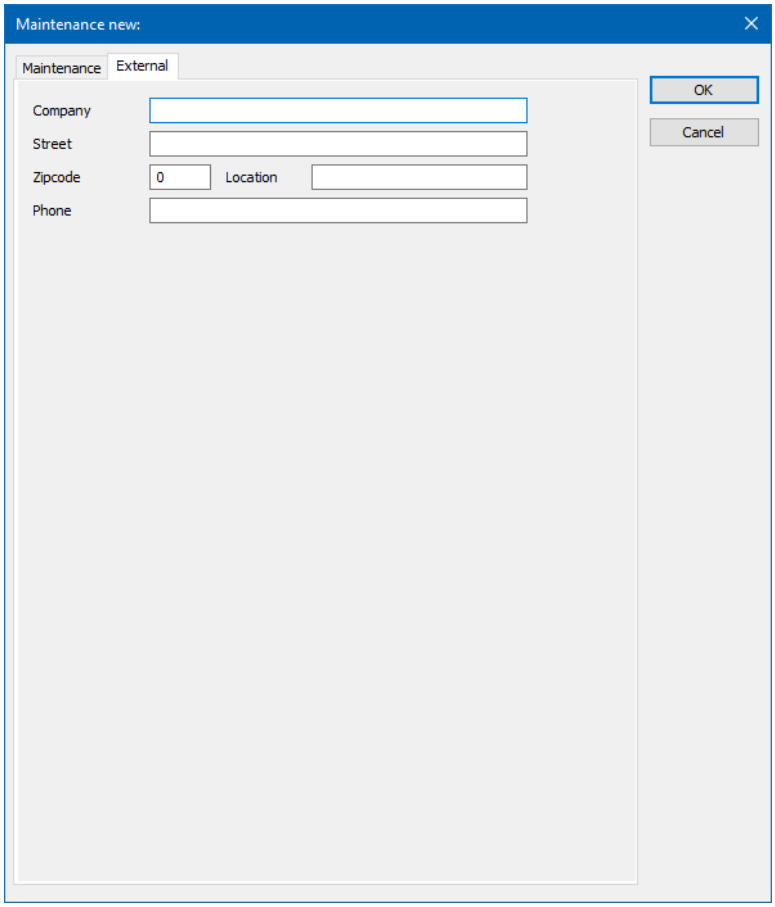
Option	Description
	every maintenance that is linked to this variable and the corresponds to the new value. If one of these maintenance tasks is checked during a function call or a screen switch, it is detected that this must still be carried out. The cause external trigger and the date of the trigger event is shown in the **Due Date** column. **Example:** Maintenance was triggered yesterday (10.04.2018 08:28:06) If several trigger events occur before the maintenance, only the last trigger event is displayed. Only active if a variable has been selected in the **Variable for external trigger** property. Defined value must be *>0*. Default:*-1*
Variable for external trigger	Allows the selection of a variable for external triggering. Click on the **...** button to open the selection dialog.
Return value	Allows the assignment of a value in order to be able to track the execution of the respective maintenance. The defined response value is triggered if the maintenance has been carried out. Defined value must be *>0*. Default:*-1*
Status variable	Allows the selection of a variable for status notification. Click on the **...** button to open the selection dialog.

CLOSE DIALOG

Option	Description
OK	**Applies settings and closes the dialog.**
Cancel	Discards all changes and closes the dialog.

12.1.3.2 External

You can add data about the manufacturing company in the **External** tab.



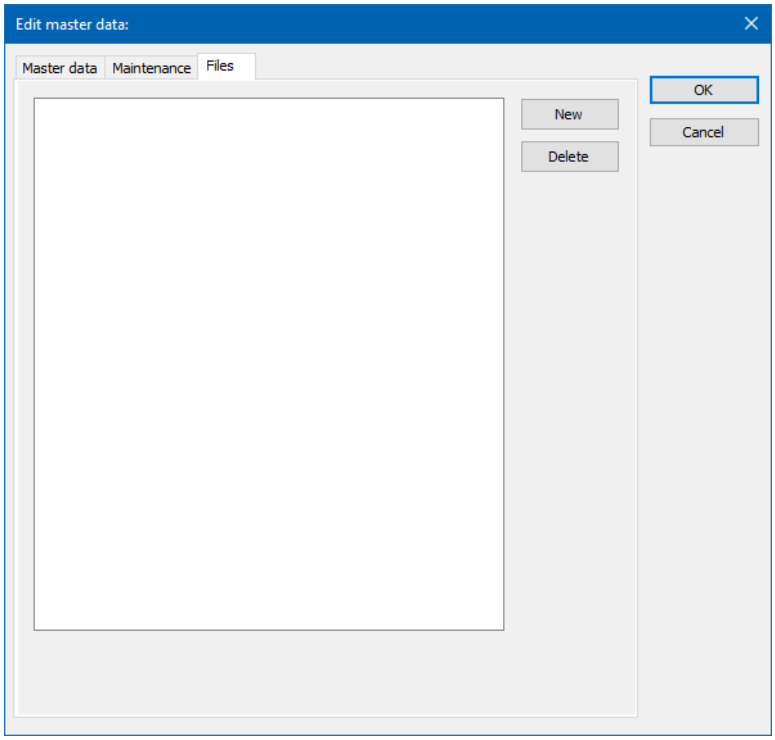
Option	Description
Company	Entry of the company name
Street	Entry of the street of the company address
Zipcode	Entry of the post code of the company address
Location	Entry of the town/city of the company address
Telephone number	Telephone contact details of the company

CLOSE DIALOG

Option	Description
OK	**Applies settings and closes the dialog.**
Cancel	Discards all changes and closes the dialog.

12.1.4 Files

You can import files in the **Files** tab.



Option	Description
New	Opens the dialog to import files.
Delete	Deletes entries from the list view.
OK	**Applies settings and closes the dialog.**
Cancel	Discards all changes and closes the dialog.

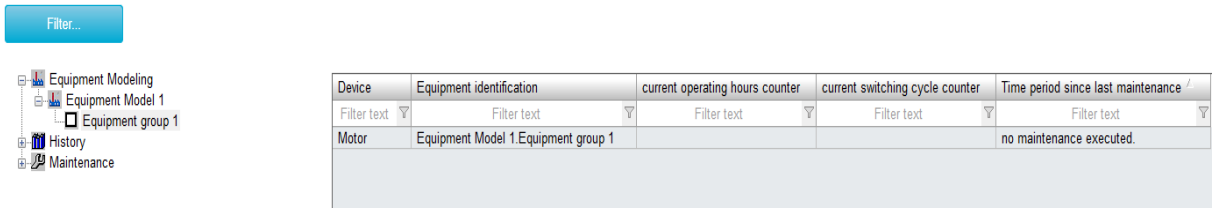
12.2 Right side: List

Here the selection from the tree view is displayed as a list. The list can be sorted ascending or descending on any column. In addition, there is a context menu in this view, which offers different functions depending on the selection in the tree view.

SELECTION MASTER DATA

The context menu has the following entries:

- **Device new**
- **Edit device**
- **Device exchange**
- **Counter exchange**
- **Device inactive**
- **Delete device**
- **Copy**
- **Insert**
- **Refresh**



To create a new device:

1. Right-click on an equipment group to create a new device.

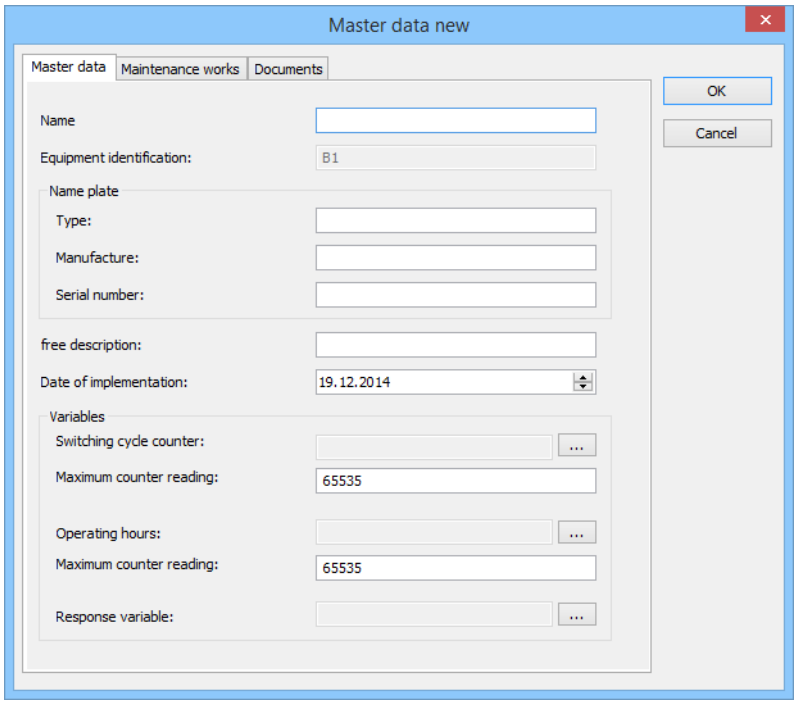
   Alternatively, you can also right-click on an existing list entry to the right of the tree structure to open the context menu.

2. Follow the instructions of the description in the master data (on page 42) chapter.

Command	Description
Device new	Under **New device** new master data can be created. The definition is done in a dialog with three tabs. On the first page the data for the device is entered. On the page '**Maintenance tasks**' any number of maintenance tasks for this device can be created. For an overview the titles of the maintenance tasks are displayed in a list on this page. On the last page any number of documents can be assigned to the device. For an overview these are displayed in a list similar to the maintenance tasks. When double-clicking on a document, the corresponding document is opened, if the attendant

Command	Description
	program is installed. **Note:** Devices can be moved to other equipment in the master data by means of Drag&Drop.
Edit device	Similar to 'New device' with the only difference, that the fields are filled with the existing data. A device has to be selected.
Device exchange	The variables for operations and hours counters are changed here! The calculation for scheduling maintenances is based on these variables. If a device exchange is performed, a history entry is made. Additionally, the maintenance interval is reset and the new variable values are used as the initial values for the calculation of maintenances. The device data stays the same, only the linked variables are exchanged. These have to be entered in a dialog. If the variable does not exist, a warning is displayed, that in the moment no valid variables are linked with the device.
Counter exchange	If a counter is exchanged, the variable stays the same, but the counter reading (variable value) is changed. If a counter is exchanged, a history entry is made. You can choose whether the maintenance interval should be reset or not. A new start value for the exchanged device can be entered.
Delete device	The selected device can be deleted. All associated data (maintenance tasks, history data and documents) are deleted. For security reasons the user is asked again, if the data should really be deleted.

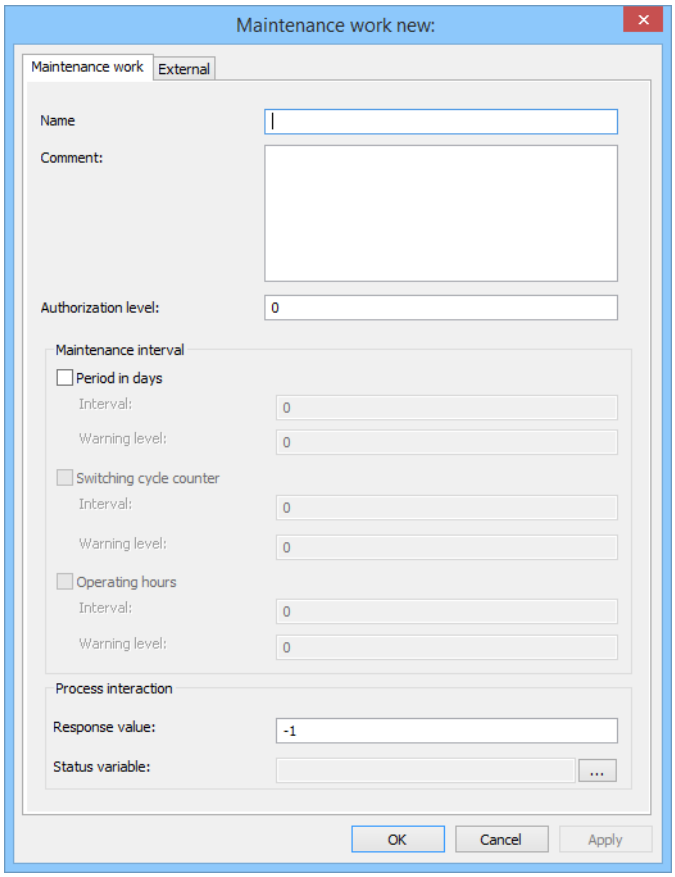
ENTER MASTER DATA



Parameter	Description
Name	Name of the device.
Equipment identification	Display of equipment identification.
Name plate	Name plate data: ▸ **Type** ▸ **Manufacture** ▸ **Serial number**
Free description:	Input field for free description.
Date of initial operation	Entry of the date of putting into operation.
Variables	Configuration of the variables.
Switching cycle counter	Selection of the variables for the switching cycle counter. Click on button **...** in order to open the dialog for selecting a variable. **Attention:** The counting range must be selected as large enough so that in operation between the current counter status and the counter status of the last maintenance, always less than half the counter end value elapses.

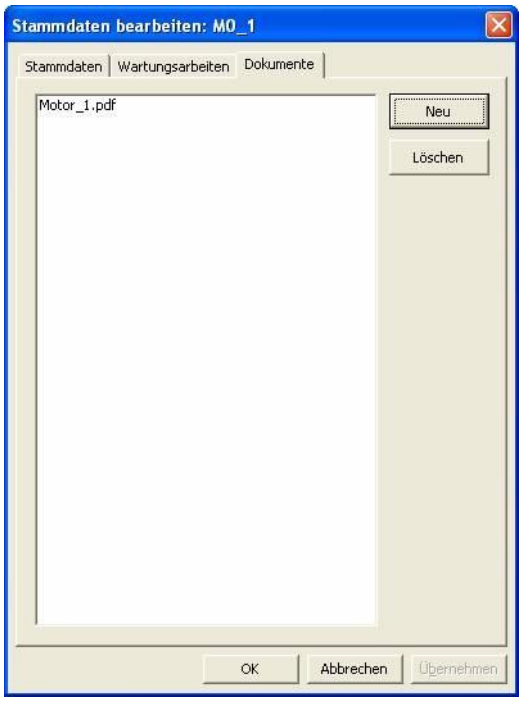
Parameter	Description
Max. counter content	Maximum permitted counter status.
Operating hours	Assignment of the variables for the operating hours. Click on button **...** in order to open the dialog for selecting a variable. **Attention:** The counting range must be selected as large enough so that in operation between the current counter status and the counter status of the last maintenance, always less than half the counter end value elapses.
Max. counter content	Maximum permitted counter status.
Response variable	After maintenance work has been carried out, the value defined here is written to the linked variable. Click on button **...** in order to open the dialog for selecting a variable.

CONFIGURE MAINTENANCE WORK



Parameter	Description
Name	Name for job.
Comment	Comments about the job. **Note:** You can create a line break via shortcut **Ctrl+Return**.
Authorization level	Entry of the authorization levels that are required for execution.
Maintenance interval	Configuration of the maintenance interval for: ▸ **Period in days** ▸ **Switching cycle counter** ▸ **Operating hours**
Process interaction	Properties for interaction.
Return value	Value that is written after maintenance work has been carried out on the device linked to the response variable.
Status variable	Variable that displays the status of the maintenance work. ▸ *0*: Maintenance not due ▸ *1*: Maintenance due Click on button **...** in order to open the dialog for selecting a variable. The variable is written when updating the IMM screen as well as when executing the **Determine open maintenances** function.

EDIT DATA



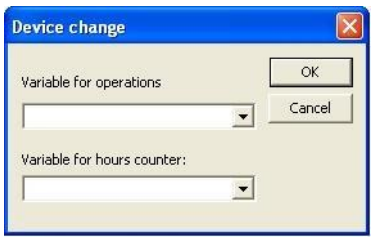
The following access to files is supported:

Local drives	Local harddisk
UNC path	e. g. *Server name**release name*
Connected drives	Released harddrive of a network computer

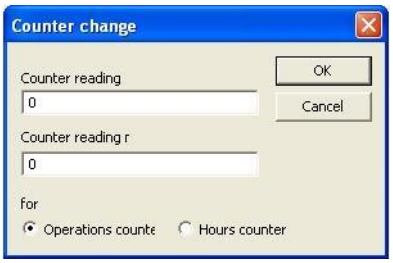
Attention

Prerequisite: To be able to display the documents, you must install an apropriated viewer. e.g. Adobe Acrobat Reader for .pdf files.

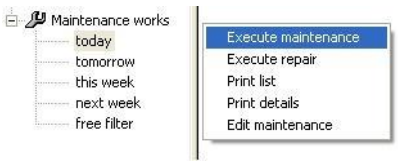
Device exchange:



Counter exchange:



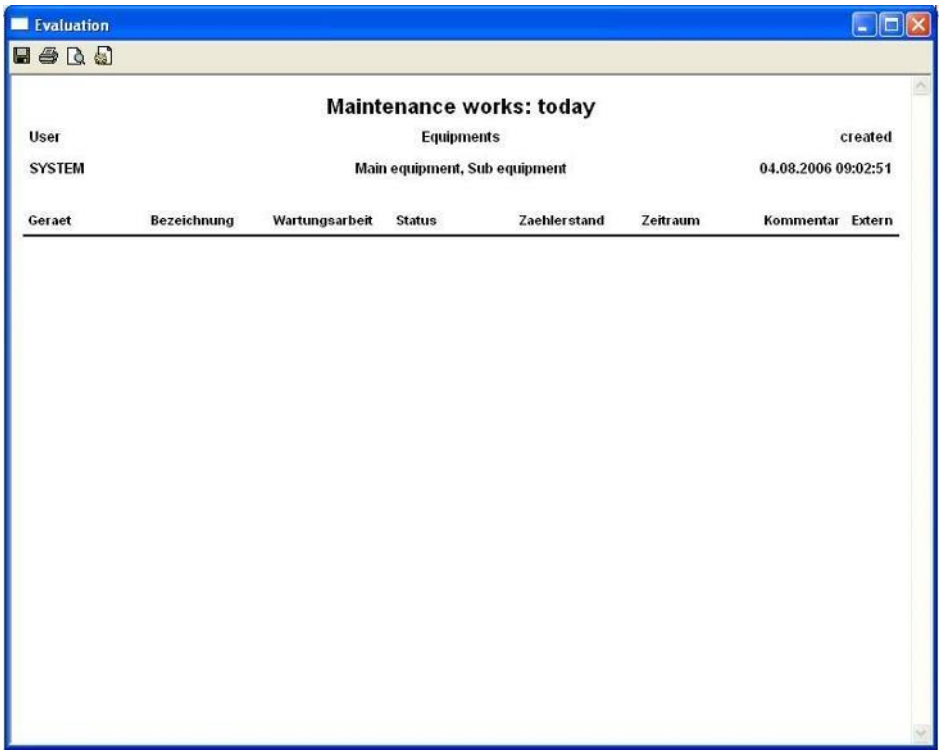
Selection maintenance tasks



The data for a maintenance task is displayed by double-clicking on a maintenance task. But the data cannot be changed.

Execute repair	If a repair is performed, a history entry is made first and the maintenance task is seen as not(!) completed for this interval and remains in the queue. An entry in the history is created. Similar to 'Execute maintenance' with the only difference, that the counter can be updated.

PRINT LIST AS REPORT



The displayed list is written one-to-one to an XML file and displayed in a HTML browser with a stylesheet. This HTML file can be saved or directly printed.

Options:

Option	Description
Print details	The data for the selected maintenance task is output.
Edit maintenance	Here, the data of the selected maintenance task can be edited.
Execute maintenance	If a maintenance is executed, the counters are updated and a history entry is generated. Additionally, the maintenance task is considered as done for this interval, and so it is removed from the queue. Under 'Documents' the linked documents are displayed in a list. Double-clicking on a file opens it if a corresponding program is installed.

Option	Description
Selection history	Here there is only one menu entry **Print list**. Same procedure as under maintenance task - **Print list**.

TEMPLATES FOR CREATING REPORTS

For designing the report, one of the supplied XSL files can be used.
You can find this in the following folder: *%ProgramData%\COPA-DATA\810\IMM*

In order to use a design template:

1. Navigate with the file browser to the *%ProgramData%\COPA-DATA\810\IMM* folder.
2. Open the desired XSL file
3. Adjust the file if required.

13 IMM in Faceplate in Runtime

The **Faceplate** screen can display an **IMM** screen in a screen container.

The simultaneous display of several **IMM** screens is not possible in a **faceplate** screen.

The filter settings of the **IMM** are taken into account.

Updates to the faceplate filter can be undertaken using the screen switch function of the faceplate screen.

Note: If you activate the checkbox of the **Show this dialog in the Runtime (activated filters can be edited in the Runtime)** property, the time setting for *tomorrow* or *next week* does not work. You can however select the next day or the next week. The filter dialog is opened when the respective faceplate screen is opened in Runtime and can be edited.

14 Filtering using checkboxes

You can also carry out filtering for the equipment models in Runtime using the checkboxes in the tree view. Filtering is carried out regardless of the filtering carried out in the **Master data** node.

Note: If you highlight an equipment group, the device therein is shown in a list. This function is also present if the checkbox is not activated.

TO DISPLAY ALL DEVICES IN THE EQUIPMENT MODELING

Engineering:

1. Ensure that the checkboxes are deactivated for all equipment groups.
2. Click on the **Equipment modeling** node item.

   All devices in the list are shown.

   Note: If a checkbox is activated, the content of the respective equipment group is shown when clicking on the equipment model or the equipment modeling.

TO DISPLAY THE DEVICES IN EQUIPMENT MODELS OR IN AN EQUIPMENT GROUP

Engineering:

1. Activate the checkbox of the equipment group in the desired equipment model.

   Note: Multiple selection is possible. However, only the devices of the highlighted equipment group are currently shown in the list.
2. Click on the entry of the higher-level **equipment model**.

   The devices of the selected equipment groups are now displayed in the list.