zenon manual
Equipment Modeling

v.8.20

COPADATA

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

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2 Equipment Modeling

The Equipment modeling recreates the structure of equipment in the editor. According to standard ISA S88 and S95, you can depict all levels of a company with zenon:
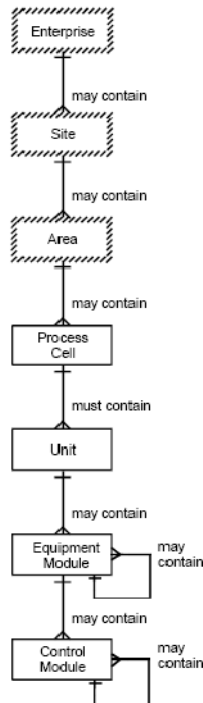
The upper levels enable details from the lower levels to be classified correctly and to be linked with each other. The lower levels refer to specific equipment which is compiled for process control and process monitoring.

EQUIPMENT MODELING IN ZENON

With zenon, you can display the overall model and create any desired machines, buildings or processes. Data can be grouped and filtered in the Runtime and in the Editor. Equipment models can also be displayed as a separate screen (on page 30) in the Runtime and used as a filter for other switched screens. Hierarchical filtering is also supported from zenon 7.60. This means: A variable need only be assigned to one level and it is then automatically incorporated into a filter for higher levels.

Equipment models can be created for all projects in the global project or in individual projects.

Usage:

▶ Editor:
Equipment models are used for filtering (on page 38) in the Editor. It is possible to limit (on page 15) things to certain items of equipment when configuring a project. This has no effect in the Runtime. Separate respective property groups (on page 6) are available for the configuration of equipment models and equipment groups.

▸   Runtime:
In the Runtime, the linking is carried out with equipment models when executing functions (on page 39), in order to receive information on certain equipment and to filter online.

Example:Variables: Alarms for certain equipment is filtered out when configuring a project in the Editor. In the Runtime, alarms for certain variables are compiled using equipment filters.

☀ Information

The language of equipment modeling cannot be switched.

EQUIPMENT MODELING WINDOW

The equipment models can be opened in a window of their own:
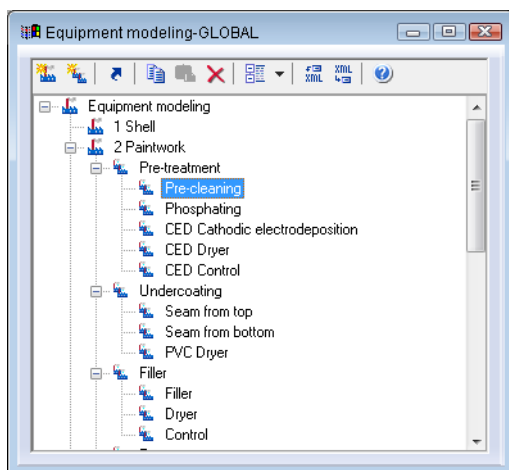
▸   To do this, select the **Open new window ...** command in the equipment modeling context menu in the project manager .

▸   A new window with the equipment models is opened by default in the lower area of the editor

▸   Like all windows, you can place this window where you like in the Editor.

▸   If you also keep the detailed equipment modeling view open, the contents of both windows are synchronized, so that you can make changes in both.

3 Create equipment model and equipment group

You can create as many equipment models as you want and group these according to certain criteria. First you create the model, then you create groups.

TO CREATE A NEW MODEL:

1. Decide whether you want to create a local or a global equipment model.

2. Select the **New equipment modeling** entry in the context menu of the **Equipment modeling** node

3. or, in the toolbar, click the symbol for **New equipment model**

   In the detail view, a new node with the default name **Equipment model X** is created
   X stands for the serial numbering.

4. Amend the name to your needs.
   To do this, press the **F2** key with the name highlighted or click in the name field three times.

💡 Information

There are equipment models from global projects and local projects available. In the event of naming conflicts, local equipment projects are preferred.

Hint: Ensure that you use clear names when configuring equipment models. For example, give global equipment models a corresponding prefix or suffix. This way you avoid having the same names in local and global equipment models. As a result, you can easily identify the origin of the displayed equipment models in selection lists.

The following properties are available for equipment models:

Properties	Description
General	Group contains properties for general contents of the equipment model.
Name	Name of the equipment model. **Note:** Prohibited as a character in the name **.** (Period)
Description	Text field to enter additional information
Equipment model relevant for operating authorization	Allows the activation of the equipment model for the operating authorization by means of the equipment model: *active:* Equipment model is used for operating authorization via the equipment model. As a result of activation, the selected equipment model is offered in the dialog of the operating authorization in the network function. *inactive:* Equipment model is not used for operating authorization via the equipment model.

Properties	Description
	Default: *inactive*

TO CREATE A NEW EQUIPMENT GROUP:

1. In the context menu of the model or a subgroup, select the **New equipment group** command or press the **Insert key**

    or, in the Toolbar, click the symbol for **New equipment group**.

    In the model structure, a new group with the default name **Equipment group X** is created. **X** stands for the serial numbering.

2. Amend the name to your requirements: The name field is already in edit mode straight after creation. Later, press the **F2 key** with the name highlighted or click in the name field three times.

    You can have as many groups and sub-groups as you like.

The following properties are available for equipment groups:

Properties	Description
General	Group contains properties for general contents of the equipment group
Name	Name of the equipment group. **Note:** Prohibited as a character in the name **.** (Period)
Description	Text field to enter additional information
Aggregated alarms	Group contains properties for the display of aggregated alarms in the equipment model.
Status variable	Variable to stipulate whether there are alarms present in the alarm area. ▸ The first bit of this byte variable shows whether there are any active alarms in this alarm area. ▸ The second bit of this byte variable shows whether there are any unacknowledged alarms in this alarm area. Click on **...** to open the variable selection dialog.
Number of active alarms	Variable that contains the number of active alarms in this alarm area as a value. Clicking on **...** opens the dialog to select variables.

Properties	Description
Number of unacknowledged alarms	Variable that contains the number of unacknowledged alarms in this alarm area as a value. Clicking on **...** opens the dialog to select variables.
Class linking	Group contains properties for linking variables with the different properties.
{New class link}	Allows the linking of variables to properties. Clicking on the **...** button opens the **class linking [1]** dialog with the following properties: ▸ **Alarm/event class** ▸ **{Delete class linking}** ▸ **Status variable** ▸ **Number of active alarms** ▸ **Number of unacknowledged alarms**
Operating authorization	Group contains properties for operating authorization.
Available at this computer	Variable for the display of the computer to be called up for this equipment group by means of the corresponding operating authorization. Click on button **...** in order to open the dialog for selecting variables. Only variables from the local project and of the *BOOL* data type can be selected for linking. It is recommended that these linked variables are created for the **internal driver**. Configure the **Calculation** property for this variable too, in the **Internal Variable** variable properties group with the value *local*. **Note:** Only available if **Equipment model relevant for operating authorization** has been activated in the **Allgemein** properties group of the equipment model.
Operating authorization at computer	Click on button **...** in order to open the dialog for selecting variables. Only variables from the local project and of the *STRING* data type can be selected for linking. It is recommended that these linked variables are created for the **internal driver**. Configure the **Calculation** property for this variable too, in the **Internal Variable** variable properties group with the value *network*.

Properties	Description
	Note: Only available if **Equipment model relevant for operating authorization** has been activated in the **Allgemein** properties group of the equipment model.
Industrial Maintenance Manager	Group contains properties for determining open maintenance. **Note:** The Industrial Maintenance Manager node is only available with the corresponding license.
Number of pending maintenances	Denotes the number of open maintenance tasks in the respective equipment model. Open maintenance of equipment groups is not taken into account. Determines the open maintenance of the devices linked to the equipment model. **Note:** The value is only filled through the execution of the **Determine Open Maintenance** function.
Total number of pending maintenances	Denotes the number of open maintenance tasks for the respective equipment model and the attendant equipment group. The open maintenance of all devices linked to this equipment model including all subnodes. **Note:** The value is only filled through the execution of the **Determine Open Maintenance** function.

3.1   Edit equipment model

Groups can be re-sorted, copied, moved and deleted within a model and throughout all models:

SELECTION

Equipment models and equipment groups can also be selected using multi-select if the elements are:

- on the same level
- within the same model
- and within the same superior group

.

DELETE

1. Highlight the desired node.

2. Select **Delete** in the context menu or in the toolbar, or press the **DEL** key

   The node and all its sub-groups are deleted.

MOVE VIA DRAG&DROP

1. Highlight the desired node.

2. Hold down the left mouse button.

3. Move the node to the desired area and release the mouse button

SORT VIA DRAG&DROP

1. Highlight the desired node.

2. Press the **Control** key and move the node to the desired position with the left mouse button.

COPY AND PASTE

1. Highlight the desired node.

2. Select **Copy** in the context menu or in the toolbar, or press **control and C** together

3. Highlight the desired target-node

4. Select **Paste** in the context menu or in the toolbar, or press **control and V** together

   The node being copied is inserted. If there is already an element with the same name, **Copy of** is placed in front of the inserted element.

RENAME

To rename models or groups:

1. Highlight the model or the group.

2. Press key **F2** or perform a triple click on the model or the group.

After a renaming:

▶ the models are sorted alphabetical again

▶ groups remain in the created structure

> **⚠Attention**
>
> The actions **delete**, **resort**, **move**, **rename** and **insert** cannot be undone.

3.2 Project manager context menu

Command	Function
New equipment model	creates a new equipment model with the default name, **equipment model X** (X stands for a serial number)
Open in new window	opens a new window in the editor that contains the equipment model
Export all as XML	Exports all entries as an XML file.
Import XML	Imports elements from an XML file. In doing so, the following rules apply: ▸ Models/groups that are to be imported that do not yet exist are inserted. ▸ Existing models/groups that are not included in the import file are retained. ▸ Pre-existing models/groups are replaced by those to be imported.
Editor profile	Opens the drop-down list with predefined editor profiles.
Help	Opens online help.

3.3 Toolbar and context menu detail view

TOOLBAR

Symbol	Function
New equipment model	creates a new equipment model with a default name, **Equipment model X** (X stands for a serial number)
New Equipment Group	creates a new equipment model group with the default name, **Equipmentgroup X** (X stands for a serial number)
Linked elements	Opens the dialog to display linked elements.
Copy	copies the selected group together with the sub-groups

Symbol	Function
Paste	Pastes the copied group from the clipboard into another group or another model. If a group with the same name already exists, the inserted group receives the prefix *Copy of*
Delete	deletes the selected group with all sub-groups
Expand/ collapse node	Opens the drop-down list list to expand or reduce nodes.
▶ Expand all	Expands all nodes.
▶ Collapse all	Reduces all nodes.
▶ Expand selection	Expands the highlighted nodes.
▶ Collapse selection	Reduces the highlighted nodes.
Export selected as XML...	Exports the selected entries as an XML file.
Import XML	Imports elements from an XML file. In doing so, the following rules apply: ▶ Models/groups that are to be imported that do not yet exist are inserted. ▶ Existing models/groups that are not included in the import file are retained. ▶ Pre-existing models/groups are replaced by those to be imported.
Help	Opens online help.

CONTEXT MENU EQUIPMENT MODELING

Symbol	Function
New Equipment Model	creates a new equipment model with a default name, **Equipment model X** (X stands for a serial number)
Paste	inserts the copied groups in another group or another model. If a group with the same name already exists, the inserted group receives the prefix *Copy of*
Expand/ collapse node	Opens the drop-down list list to expand or reduce nodes.
▶ Expand all	Expands all nodes.

Symbol	Function
▸ **Collapse all**	Reduces all nodes.
▸ **Expand selection**	Expands the highlighted nodes.
▸ **Collapse selection**	Reduces the highlighted nodes.
Export all as XML	Exports all entries as an XML file.
Import XML	Imports elements from an XML file. In doing so, the following rules apply: ▸ Models/groups that are to be imported that do not yet exist are inserted. ▸ Existing models/groups that are not included in the import file are retained. ▸ Pre-existing models/groups are replaced by those to be imported.
Help	Opens online help.

EQUIPMENT MODELS AND EQUIPMENT GROUPS CONTEXT MENU

Symbol	Function
New Equipment Group	creates a new equipment model group with the default name, **Equipment Group X** (X stands for a serial number)
Create smart object	Creates a smart object template from all the elements linked with this equipment group. You can find further information on this in the Smart Objects manual.
Linked elements	Opens the dialog to display linked elements. (is only displayed if there are linked elements)
Copy	copies the selected group together with the sub-groups
Paste	inserts the copied groups in another group or another model. If a group with the same name already exists, the inserted group receives the prefix *Copy of*
Delete	deletes the selected group with all sub-groups

Symbol	Function
Expand/ **collapse node**	Opens the drop-down list list to expand or collapse nodes.
▸ **Expand all**	Expands all nodes.
▸ **Collapse all**	Reduces all nodes.
▸ **Expand selection**	Expands the highlighted nodes.
▸ **Collapse selection**	Reduces the highlighted nodes.
Export all as XML	Exports all entries as an XML file.
Export selected as XML...	Exports all entries as an XML file.
Import XML	Imports elements from an XML file. In doing so, the following rules apply: ▸ Models/groups that are to be imported that do not yet exist are inserted. ▸ Existing models/groups that are not included in the import file are retained. ▸ Pre-existing models/groups are replaced by those to be imported.
Help	Opens online help.

4 Link models with elements and objects

Each equipment group can be linked to any desired zenon elements or objects. You have several options for linking a group with an element:

▸ Via the element's **Equipment Groups** property

▸ Copy and paste the element into the desired group of the model.

▸ Drag&drop the equipment group to the element's property **Equipment Groups**.

▸ Drag&drop the element to the equipment group.

EQUIPMENT GROUPS PROPERTY

To link by means of an element's property:

1. Select the element

2. In the **General** node, click on the **Equipment Groups** property.

   The dialog to allocate elements to equipment groups (on page 18) is opened.

3. Allocate the desired equipment groups (for details, see the sub-chapter on Equipment modeling dialog (on page 18)).

> ### 💡 Information
>
> No inheritance
>
> If equipment models are selected or created for the configuration of data types, drivers, functions, variables etc. using the **Equipment Groups** property, they are only used for filtering and are not inherited.
>
> For example: An equipment model selected in a data type is not inherited to variables based on this data type.

COPY AND PASTE

To link using copy and paste:

1. Select the element

2. Copy the element (shortcut **Copy** or press the **ctrl+C** keys)

3. Highlight the equipment group you wish to change.

4. Paste the element (shortcut **Paste** command or press the **ctrl+V** key)

DRAG&DROP OF THE EQUIPMENT GROUP

To link the equipment group to the element with drag&drop:

1. Select the equipment group.

2. With the left mouse button pressed, drag this to the property **Equipment Groups** in the element's node **General**

DRAG&DROP OF THE ELEMENT

To link the element to the equipment group by drag&drop:

1. Select the element in the project manager detail view.

2. With the left mouse button pressed, drag it to the desired equipment group
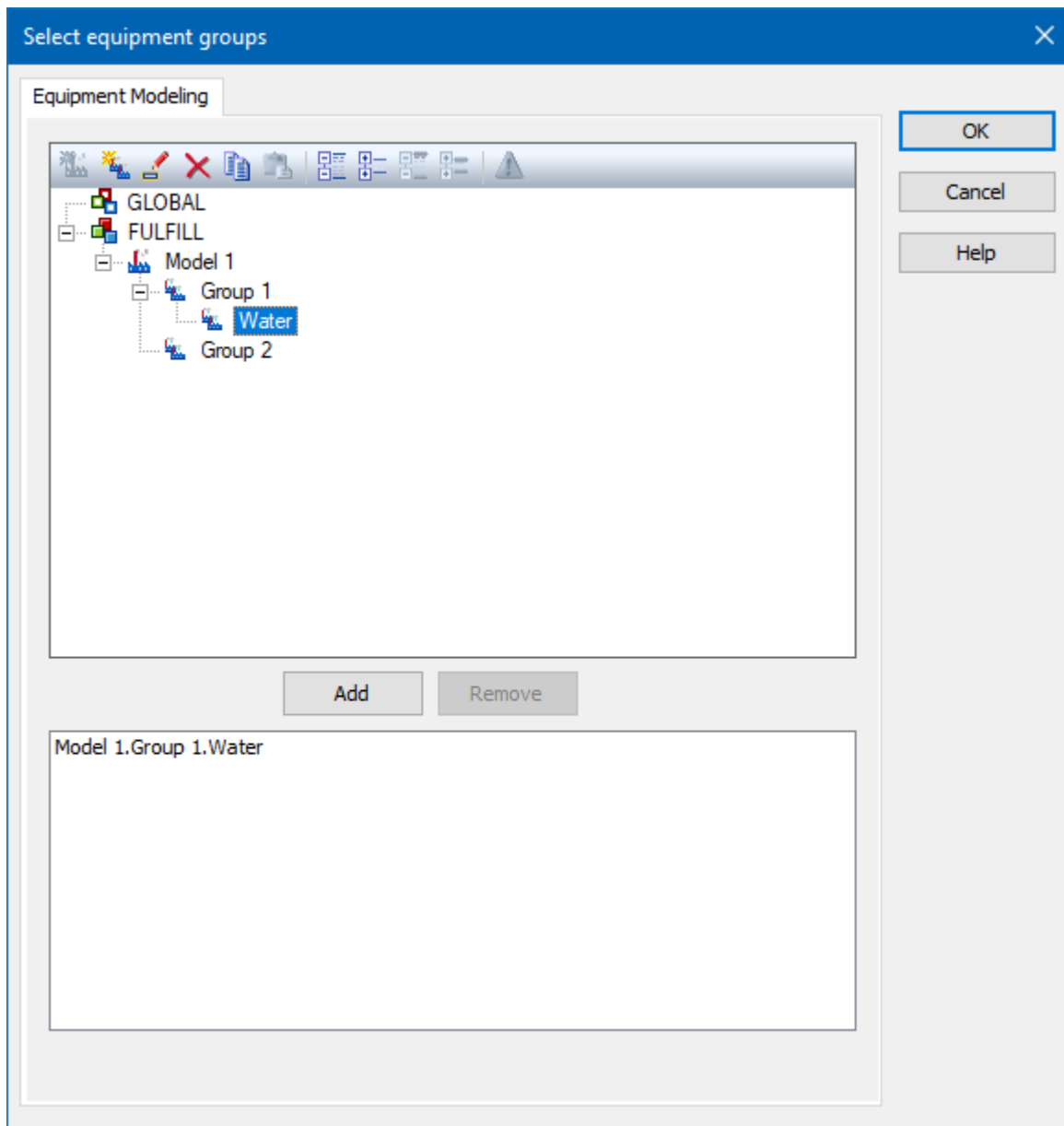
💡 Information

With the drag&drop of structure variables, only activated variables are taken into account. Inactive elements are not linked. For closed structure trees check whether all desired variables are active.

4.1 Equipment modeling dialog

In the dialog, you can also allocate an element to a desired equipment group. The dialog opens if you click on the **...** Button in the properties of a screen in the **General** node and the **Equipment Groups** property.

Option	Description
Toolbar	Symbols (on page 21) to:
	‣ Edit local equipment models
	‣ Expand or collapse the display
	‣ Display of information

Option	Description
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 (on page 22).
	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** (on page 5) manual, **Editing local equipment models** (on page 22) 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 settings and closes the dialog.
Cancel	Discards the selection and closes the dialog.
	Attention: Any changes (on page 22) that have been made to the structure of local equipment models are retained.
Help	Opens online help.

CONFIGURATION

New models and groups can be created for the active project and existing ones can be deleted.

ADD MODEL TO PROJECT

To add a new model:

1. Click on the project.

2. In the toolbar select **New Equipment model**

REMOVE   MODEL

To remove an existing model:

1. Click on the model.

2. Select **Remove** in the toolbar.

ADD GROUPS TO THE MODEL

To add a group to a model:

1. select the desired equipment model
   Attention: If there are naming conflicts between global and local equipment models, the local equipment models are displayed and the global ones are ignored. You can get information on possible conflicts by clicking on the corresponding symbol (triangle with exclamation mark) in the toolbar.

2. Select an equipment group or level.

3. Add the new group to the list in the lower area of the dialog with the **Add** button.

   Note:

   ‣ Subgroups are not automatically added.

   ‣ it is possible to link as many groups as you want.

REMOVE GROUP FROM THE MODEL

To delete a group from a model:

1. Select the desired elements in the list in the lower area of the dialog (multiple selection is possible).

2. Click the **Delete** button

Note: Changes in a tree element remain preserved independent of clicking button **Cancel**. **Cancel** only means that no element was selected.

FILTER FOR EQUIPMENT GROUPS IN SCREEN SWITCHING

At the screen switch to a screen of type AML, CEL, RGM or Shift management and at function **Group/class/area/equipment suppressed** (Function group **Message Control**) you can filter for

equipment groups in the filter dialog. You can find instructions at the description of the corresponding dialogs:

- ▶ AML Equipment modeling
- ▶ CEL Equipment modeling
- ▶ RGM Equipment modeling
- ▶ Message Control suppress groups/classes/areas/equipment
- ▶ Shift Management

4.1.1 Selecting the equipment groups toolbar

Actions in the window of the existing equipment model can be controlled using the toolbar. Description of the symbols, starting from the left:

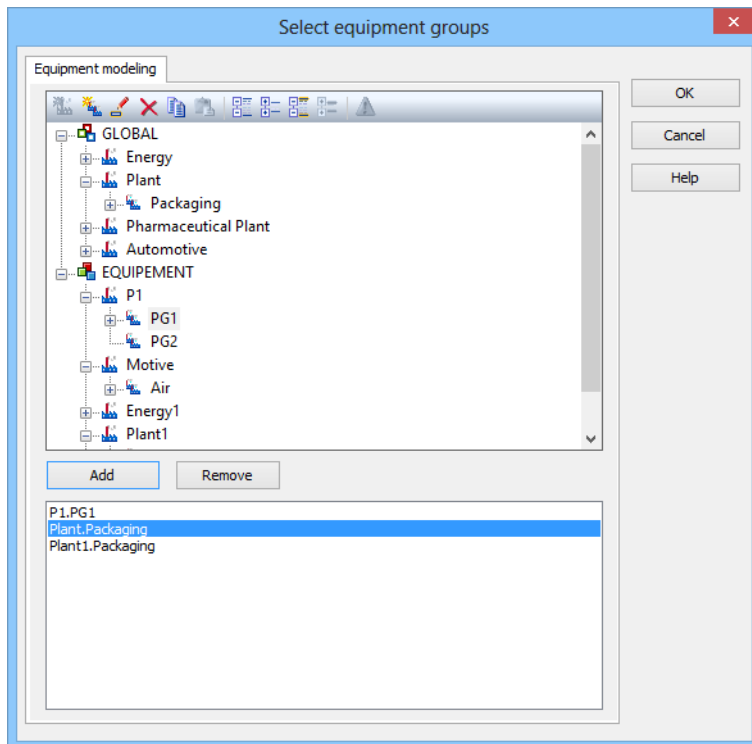| Symbol	Description
New Equipment Model	Creates a new Equipment model. (for local equipment models only)
New group	Creates a new equipment group below the highlighted entry. (for local equipment models only)
Edit	Makes it possible to edit the name. (for local equipment models only)
Delete	Deletes the selected entry. (for local equipment models only)
Copy	Copies the selected entry.
Paste	Pastes copied entries from the clipboard below the highlighted entry. If a group with the same name already exists, the inserted group receives the prefix **Copy of** (for local equipment models only) **Attention:** If equipment models are copied from the global project to the local project and not renamed, there are two models with the same names. Both can be

Symbol	Description
	selected, however no linking is created on confirmation. **Hint:** Always rename models copied from the global project to the local project.
Expand all	All nodes are expanded.
Collapse all	All nodes are collapsed.
Expand selection	The selected node is expanded.
Collapse selection	The selected entry is collapsed.
Warnings	Displays warnings. For example, equipment models from the global project that are not displayed because models with the same name from the local project are preferred.

4.1.2 Editing local equipment models

Equipment models and equipment groups from local projects can also be edited in the linking dialog. Equipment groups from the global project can only be selected and copied.

The possible actions and editing methods are limited, in contrast to the **editing of equipmet models** (on page 10) in the equipment modeling node. Elements are only edited using the toolbar (on page 21).

Attention: Changes to the structure of local equipment model are retained, regardless of whether the dialog is left with OK or Cancel.

The following actions are possible:

Action	Global project	Local project
Create new Equipment model	-	X
Create new Equipment group	-	X
Change name	-	X
delete	-	X
Copy **Attention:** If equipment models are copied from the global project to the local project and not renamed, there are two models with the same names. Both can be selected, however no linking is created on confirmation. **Hint:** Always rename models copied from the global project to the local project.	X	X
Paste	-	X
Add to filter list	X	X

Key:

▶   -: not possible

▶   X: possible

4.2   Linking of elements to equipment groups

You can link elements to equipment groups in the zenon Editor.

All elements that you have linked to equipment groups can be displayed as a list for each equipment group.

Example: Linking a variable to an equipment group and displaying the linking.

Engineering:

1. In the project tree, go to **Variables** and highlight the desired variable with a mouse click.
    The properties window of the variable is opened.

2. In variable properties, go to the **Equipment Groups** the property in the **General** group.

3. Click on the **...** button.
    The **Select Equipment Groups** button is opened.

4. Go to the desired equipment model and highlight the desired equipment group with a mouse click.

5. Click on **Add**.
    The equipment group is added in the lower dialog window.

6. Repeat the process until all desired equipment groups have been added.

7. Close the dialog by clicking on **OK**.

8. Go to **Equipment modeling** in the project tree.

9. Right-click on the desired equipment model.
    The context menu is opened.

10. Click on **Linked elements...**.
    The linked element will be displayed in the **project analysis** window.

11. Click with the right mouse button on a linked element in order to open the context menu.

12. Click on **Jump to linked element**.
    The location of the linked element will open.

5 Alarming via equipment groups

5.1   Display of the active alarms

The number of active alarms can be visualized in the **Equipment Modeling** module.
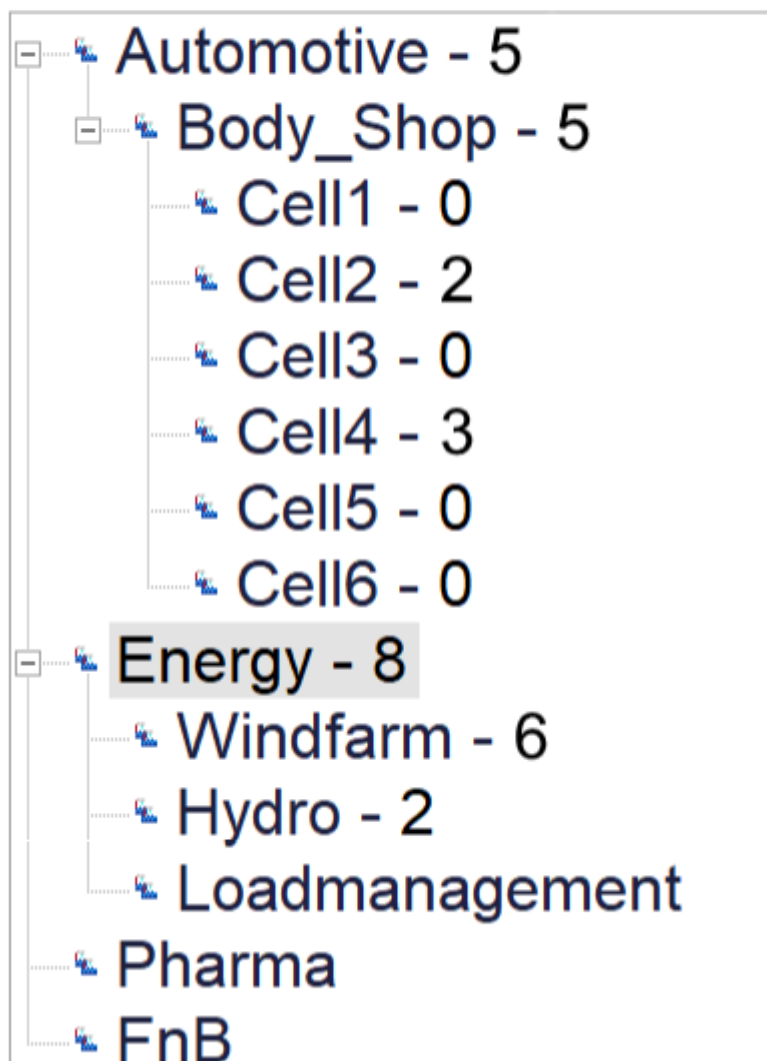
The sum of the alarms is determined directly via the equipment model:

▸   The configuration for an alarm group is made via the properties of the group**Aggregated alarms**.

▶ The display in Runtime is configured by screen switching to an zenon screen type *Equipment Model*.
To do this, select the desired rendering for the **Alarm display** option in the **Equipment Model** tab.

▶ The display in the equipment tree can be configured in Runtime as a number or with a linked graphic.
This is configured in screen switch via the **Alarm display** option.

▶ The number of active alarms can be displayed with an active status variable.

5.1.1 Engineering in the Editor

Carry out the following project configuration steps if you want to display the number of alarms in an equipment model screen in the Runtime.

1. Model your equipment model in the **equipment modeling** node.

2. Create corresponding variables for

   a) Alarm status

   b) Number of active alarms

   c) Number of unacknowledged alarms

   Note: Use the variables for the internal driver for this.

3. Link the variables with the corresponding equipment groups.
   You can configure this link with the variable in the properties group **General** in the property **Equipment Groups**.

4. Configure alarm/event classes.
   Create these in the **Variable** node in the **Alarm** subnode in **Alarm/event classes**.

5. Set the parameters for the **alarm/event class** with the corresponding properties.

6. Create a corresponding **Class linking** in the equipment model:

   a) Select the desired equipment group in the tree of your equipment model.

   b) Create a new class in the **Class linking** properties group

   c) Set the parameters for this by linking the properties contained therein to an existing project configuration (alarm/event class and status variables).

7. Create an *equipment model* screen.

8. Create a screen switch function.
   In the screen switch dialog, select the desired rendering in the drop-down list from the **alarm display** option.

6 Operating authorization via Equipment model

In the zenon network, operating authorizations can also be configured by means of the equipment model.

As a result, it is possible to give appropriate authorizations to different parts of a plant for different clients.

For this, the following applies:

▶ The limitation of operation is implemented by means of linking of variables to the equipment model.

▶ Only the variables that are assigned to an equipment model need operating authorizations for operation.

▶ Variables that are not linked to an equipment model can always be operated.

> 💡 **Information**
>
> You can also find further information on operating authorizations in the Operating authorizations in the network chapter in the Network manual.

6.1 Configuration in the Editor

Carry out the following project configuration in order to use operating authorizations via equipment model:

1. Model your equipment model.

2. Activate the **Equipment model relevant for operating authorization** property.
   Note: You can find this linking in the **General** property group of the equipment model. This property is only available in the uppermost level of an equipment model.

3. Link the configured variables to the respective equipment group.
   The linking is carried out in the **General** variable properties group with the **Equipment Groups** property.
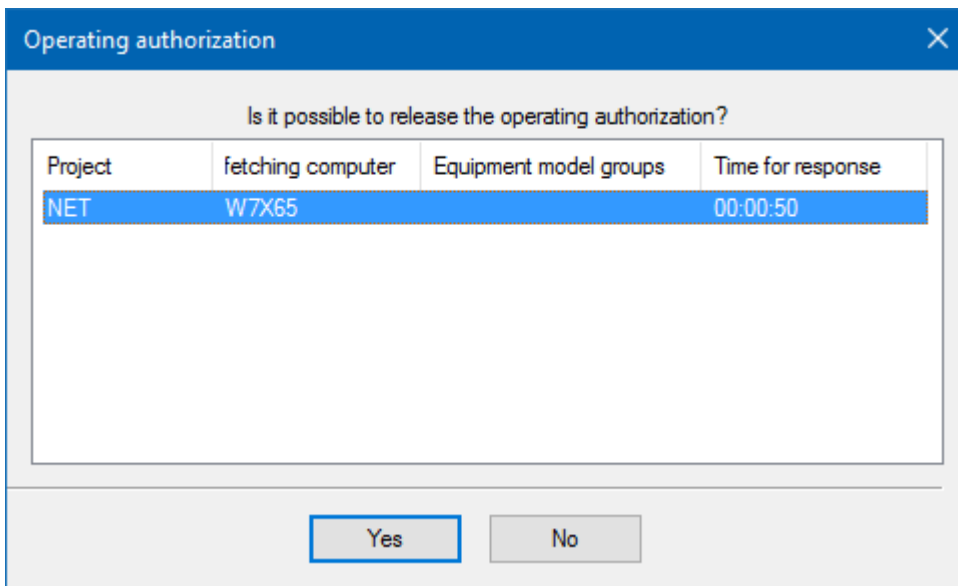
Optional:

1. Configure the variables for the visualization of information in Runtime:
   a) **Available at this computer**
   a) **Operating authorization at computer**

2. Link the variables in the **Operating authorization** properties group to the respective equipment group.

6.2 Behavior in the Runtime

The following is applicable in zenon Runtime for *operating authorizations via equipment model*:

▸ If no operating authorizations have been configured for the requested item of equipment, operation is possible without restrictions.

▸ When requesting an operating authorization that has not been issued, the operating authorization is granted automatically.

▸ If the item of equipment is occupied, it is automatically requested on the corresponding client via the network.
A corresponding dialog is shown in the Runtime that currently has operating authorizations.

▸ If several parts of an equipment model are occupied by a client, this is shown on the client that currently has operating authorizations, summarized in a dialog.

▸ If the operating authorization has been requested for an area and part of it is already occupied, this is automatically requested from the corresponding client via the network. If this is not approved, no authorization is issued, even for areas that would be available.

▸ Queries to several clients are carried out at the same time.

DIALOG - TRANSFER OPERATING AUTHORIZATION

Parameter	Description
Yes	The authorization is passed to the client making the request.
No	The operating authorization remains on the current client. The querying client cannot execute the desired action.

7 Export and import models

Equipment models and equipment groups can be imported by means of XML as well as via the API.

> **⚠Attention**
>
> The complete equipment model is overwritten on import. Existing equipment models and equipment groups with the same name as imported objects are overwritten on import. Objects that are not contained in the import file are deleted.

XML

EXPORT

To export models:

1. Mark the desired equipment model.

2. Select **Export selected as XML...** in the context menu or tool bar.
    Alternatively, select **Export all as XML** in the context menu.

3. The dialog for selecting a save path is opened

4. Select the save location and name.

5. The selected models or all models are exported by clicking on **OK**.

6. The success of the export or possible errors are displayed in the output window.

IMPORT

To import models:

1. select **Import XML...**   in the context menu or in the toolbar

2. The dialog to open an XML export file is opened.

3. Select the desired XML file.

4. Clicking on **OK** imports the models and groups contained in the XML file.

5. The success of the export and possible errors are displayed in the output window.

API

The following methods are used for import and export via VBA/VSTA:

- ▶ Export: `SystemModelManager.Export`
- ▶ Import: `SystemModelManager.Import`

8 Screen of type Equipment model

With an **Equipment Model** screen, the following is possible in the Runtime:

> ▸ Other, already-open screens can be filtered for certain equipment groups.

> ▸ All functions linked to a certain equipment group are automatically listed consecutively.

Filtering for an equipment group always has an effect on the screens that have already been opened. If screens are called up again or reloaded, they are displayed again without the equipment model screen filter.

Note: With the **hierarchical filter** option, it is sufficient if a variable is linked to a level of the equipment model. This variable is automatically taken into account when filtering at superordinate levels.

💡 **Information**

Screens that display data from the AML, CEL, RGM or Shift management can be filtered.
Faceplate screens can also be selected. However if these do not contain any data from the AML, CEL, RGM or Shift management, they are ignored in the Runtime.

8.1 Creating a screen of the type Equipment model
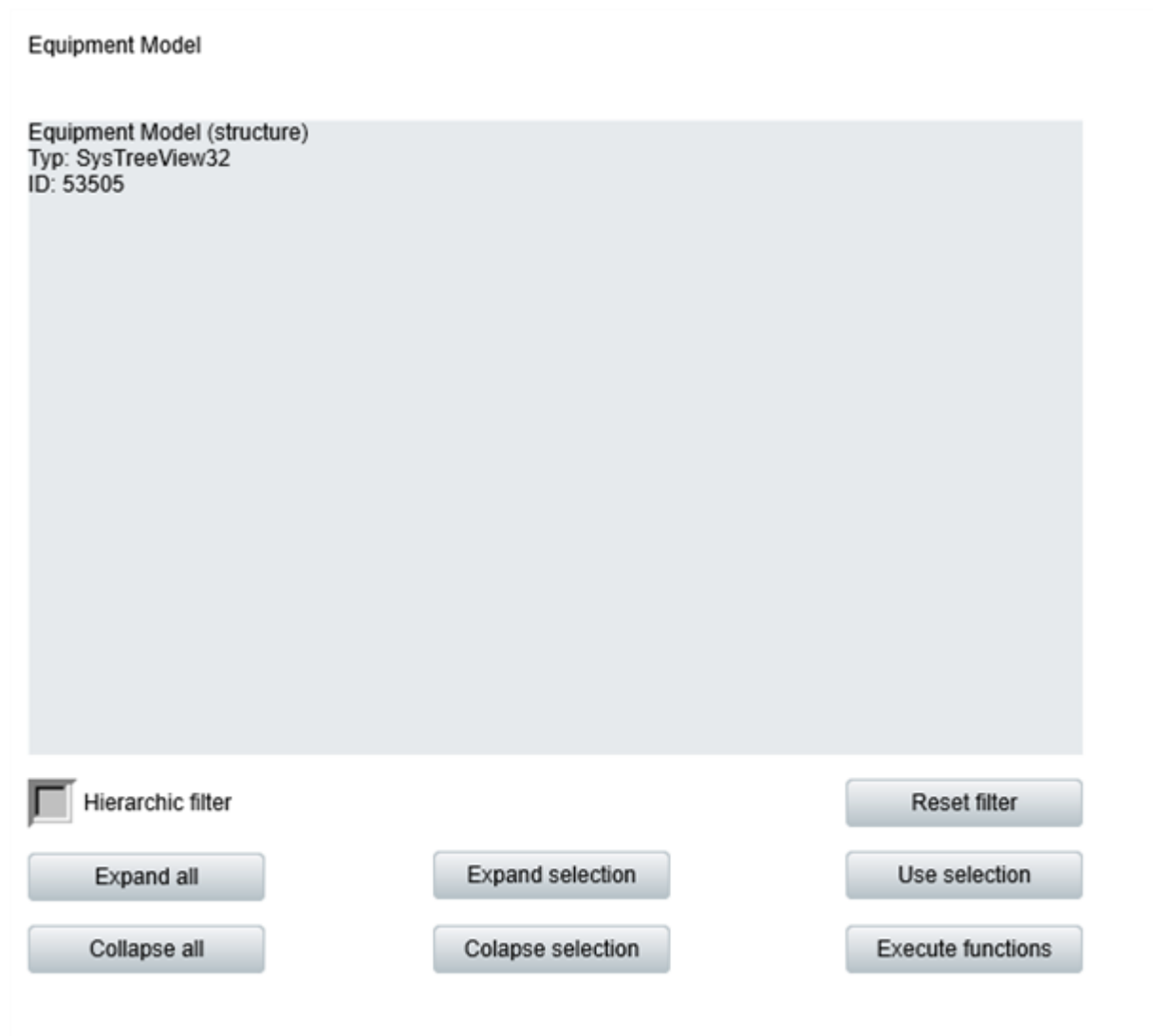
ENGINEERING

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 *Equipment Model* 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.

Equipment Model

Equipment Model (structure)
Typ: SysTreeView32
ID: 53505

Hierarchic filter		Reset filter
Expand all	Expand selection	Use selection
Collapse all	Colapse selection	Execute functions

Control elements	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.

CONTROL ELEMENTS

Control element	Description
Equipment Model (label)	Text field to display the name of the equipment model shown in the screen.
	Note: Element of the type *Dynamic text*. Functionality is assigned using the **Screen type specific action** property.
Equipment model (structure)	Tree element that display the group structure of the selected equipment model. Multiple selection is possible in the Runtime.

SELECTION

Buttons for the selection of the display in the Runtime.

Control element	Description
Apply selection	The groups selected in the tree are used as a filter (on page 43) for the screens selected in the screen switching. The screen must already be open for the filter to work.
Reset equipment filter	The selected filters are reset and the filtered screens are shown unfiltered again.
Expand all	All nodes of the tree are expanded and all subgroups are displayed.
Collapse all	All expanded nodes are collapsed. Only the main groups of the tree are displayed.
Expand selection	The selected node of the tree is expanded.

Control element	Description
Collapse selection	The selected node of the tree is collapsed.
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.
Execute functions	All functions of the local project that are currently linked (on page 15) to the group selected in the tree are executed. The order of execution is not determined. **Note:** The configuration of the **hierarchical filter** option has no effect on the execution of the function.

COMPATIBLE ELEMENTS

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

Control element	Description
Equipment Model (label)	Static Win32 control element. Was replaced by a *dynamic text* field. For the description, see current element.

8.2 Screen switch to a screen of type Equipment model

CREATE A SCREEN SWITCH FUNCTION

A *screen switching* function is for calling up screens in Runtime.

ENGINEERING

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.
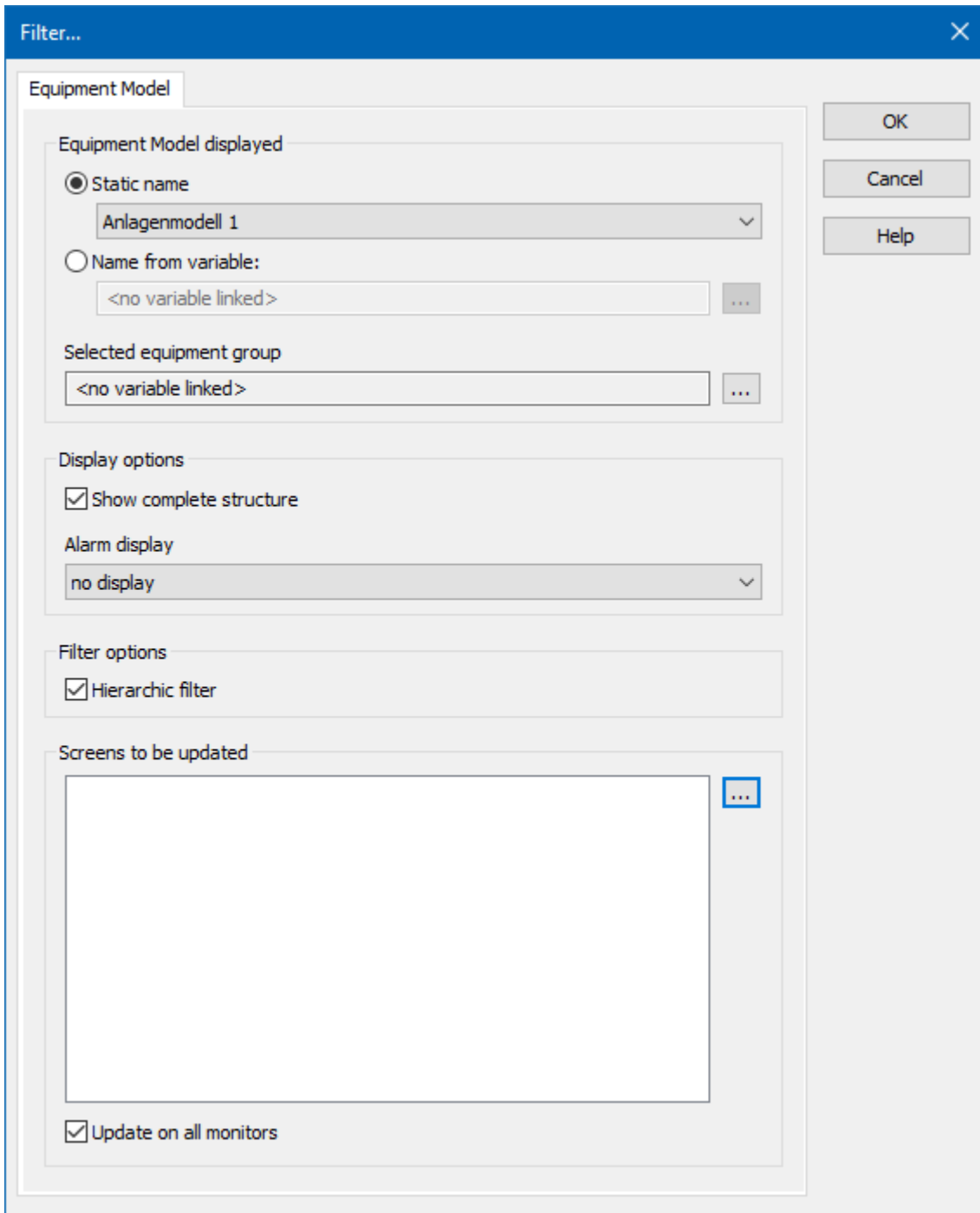
4. Select the desired screen.
   Note: If you select a screen from another project, ensure that the project is running in the Runtime.

5. Configure the filter.

6. Configure the equipment model to be displayed and the screen that can be updated with it.

7. Confirm the configuration by clicking on the **OK** button.

8. Name the function in the **Name** property.

EQUIPMENT MODEL DISPLAYED

Option	Description
Equipment Model displayed	Selection of the equipment model to be displayed in the Runtime.

Option	Description
Static name	Name of the model for display in the Runtime. Selection from a drop-down list. The list contains all equipment models contained in the local project and in the global project. In the event of naming conflicts (the same name for a local and a global equipment model) the local equipment model is displayed. All local equipment models and all global equipment models with unique names are always offered.
Name from variable	The model is read when a screen is called up from the string variables stated here. Clicking on the **...** button opens the dialog to select a string variable. If the variable cannot be read in the Runtime, the name remains empty. No equipment model is displayed Default: *inactive*
Selected equipment group	Selection of a variable to which the equipment group selected in the screen is written in the Runtime. Clicking on the **...** button opens the dialog to select a string variable. Default: *<No variable linked>*

DISPLAY OPTIONS

Option	Description
Show complete structure	Configuration, whether the complete path for the selected equipment group or only the name of the selected equipment group is written to the linked variable: ▸ *Active*: Complete path of the object is used. ▸ *Inactive*: Only the name of the selected object is used. Default: *active*
Alarm display	Type of display of the number for the active alarms.

Option	Description
	Select from drop-down list:
	▶ *No display* The number of active alarms is not displayed. Note: This is also the behavior for projects that are compiled for a version prior to 8.00.
	▶ *Text* Number of alarms is shown as a figure. **Note:** The coloring of the text display corresponds to the configured color of the alarm class in the **Color** alarm class property.
	▶ *Graphical* With one or several alarms, this is visualized with graphics. The graphics file that has been linked in the **Graphics File** property is used for the display. **Note:** The height of the graphics is automatically scaled to the height of the text for display.
	Default: *Graphical*

FILTER OPTIONS

Option	Description
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* **Note:** this checkbox is always activated for new projects. For projects that have been created before zenon 7.60 and converted up to the current version, this option is inactive.

SCREENS TO BE UPDATED

Update mode.

Option	Description
Screens to be updated	Selection of the screens that can be filtered for equipment models with the equipment model screen in the Runtime. Screens that display data from the AML, CEL, RGM or Shift management can be filtered. **Faceplate** screens can also be selected. However if these do not contain any data from the AML, CEL, RGM or Shift management, they are ignored in the Runtime.
Update on all monitors	Place of execution for the **screens to be updated** option: ▸ *Active*: The screens listed in the Screens to be Updated list are searched for on all monitors. ▸ *Inactive*: The screens listed in the Screens to be Updated list are only searched for on the calling monitor.

CLOSE DIALOG

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

Note: This filter can only be configured in the Editor, not in the Runtime any more.

9 Filter in detail view

It is possible to filter according to equipment groups in Project manager detail view. If these are not yet displayed, select **Filter selection** in the context menu and add **Equipment Groups**.

To filter:

▸ Click on the filter symbol in the **Equipment groups** column header.

▸ The Selection dialog (on page 18) for equipment groups is opened

▸ Add the desired filter criteria to the list.

▶ Only elements linked to the selected equipment groups are displayed in the detail view.

To reset the filter:

▶ Click on the filter symbol in the **Equipment groups** column header.

▶ The Selection dialog (on page 18) for equipment groups is opened

▶ Remove the filter criteria from the list.

10 Filtering in Runtime

To filter for equipment groups in the Runtime, you have the following possibilities:

▶ Define filter when screen switching (on page 39):
Create a screen switch function (on page 39) to the desired screen and define the filter in the **Equipment Modeling** tab. In the Runtime the data is displayed in accordance with the defined filter. The **Filter** button must be present to change the filter in the Runtime.

▶ Screen of type Equipment model (on page 43):
Create an equipment model screen and allocate it an equipment model when screen switching. You can select equipment groups in the Runtime and apply it as a filter to screens that have already been opened. Furthermore, all functions linked to an equipment group can be executed one after the other at the press of a button.

> ❡ **Information**
>
> If you activate the **hierarchical filter** option, all subordinate levels of the equipment model are taken into account when filtering.

10.1 Filter when screen switching and executing a function

It is possible to filter equipment groups in the runtime for the following functions:

▶ AML and CEL:

   ▶ Confirm alarm acknowledgement

   ▶ Acknowledge alarms

   ▶ Export AML

▶ Message Control:

   ▶ Group/class/area/equipment suppressed

    ▶   Shift Management

    ▶   Recipegroup Manager

FILTERING

For the filtering via the **Screen switch** function, the result of the filtering the equipment model can depend on the screen type.

    ▶   Screen switching to a screen of the following type:

        ▶   AML:
            Alarms are only displayed if their variables are linked to the equipment groups.

        ▶   CEL:
            Entries are only displayed if their variables are linked to the equipment groups.

        ▶   Recipe Group Manager
            Recipe groups are only offered in the drop-down list if they are included in the filter. If new recipe groups are created, these can be connected to existing equipment groups. This newly-created data can be restored again from the runtime files in the editor. In doing so, the linked equipment groups are also restored.

        ▶   Shift management:
            Only shifts that are linked to the equipment groups are displayed.

> 💡 **Information**
>
> If you activate the **hierarchical filter** option, all subordinate levels of the equipment model are taken into account when filtering.

10.2 Creating a filter

To create function screen switch and to filter on equipment groups:

1.   Create a **Screen switch** function.

2.   Select the desired screen.

3.   Click on the **Equipment modeling** tab in the dialog **Filter**.

4.   Select models and equipment groups

5.   Confirm with **OK**.

DIALOG

Note: The respective tabs shown depend on the module in whose context the equipment modeling has been configured.
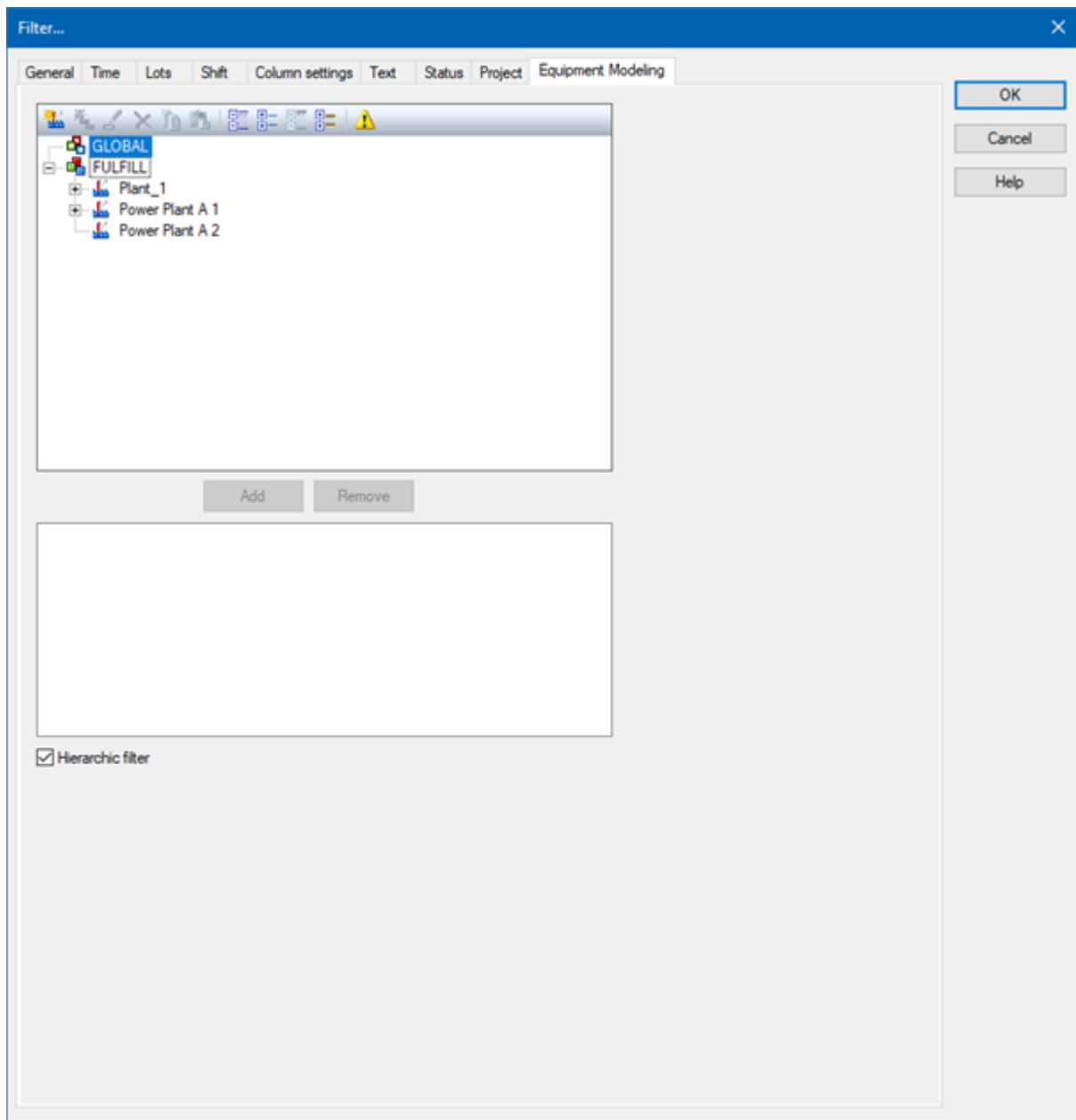
EQUIPMENT MODELING

Option	Description
Toolbar	Symbols (on page 21) to: ‣ Edit local equipment models

Option	Description
	▸ 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 (on page 22). **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** (on page 5) manual, **Editing local equipment models** (on page 22) 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.

10.3 Using an equipment model screen in the Runtime

In the Runtime, other previously-switched screens that contain data from AML or CEL can be filtered for equipment groups.

To select equipment groups as a filter:

1. Select the desired equipment group.
   Multiple-selection is possible using the key combination **Ctrl+mouse click** or **shift+mouse click**.
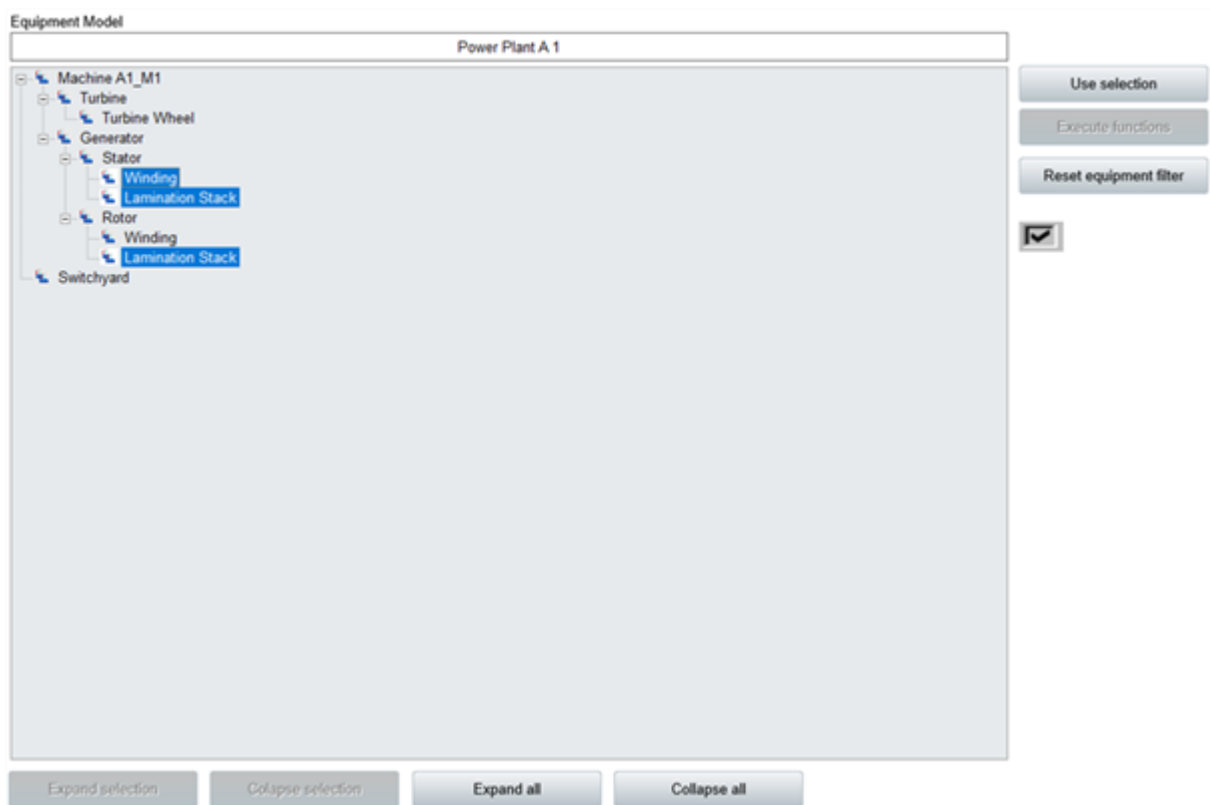
2. Click on the **Apply selection** button.

   ### Note:

   ▶ If you select more than one equipment group, the **Execute Function** button is deactivated.

   ▶ The target screen must already be open for the filter to work.

   ▶ The output variable of the selection lists all selected elements.
     Separator: Semicolon (**;**)

To reset the filter:

1. Click on the **Reset Equipment Filter** button.

SELECTION OF EQUIPMENT GROUPS

CONTROL ELEMENTS

Control element	Description
Equipment Model (label)	Text field to display the name of the equipment model shown in the screen. **Note:** Element of the type *Dynamic text*. Functionality is assigned using the **Screen type specific action** property.
Equipment model (structure)	Tree element that display the group structure of the selected equipment model. Multiple selection is possible in the Runtime.

SELECTION

Buttons for the selection of the display in the Runtime.

Control element	Description
Apply selection	The groups selected in the tree are used as a filter (on page 43) for the screens selected in the screen switching. The screen must already be open for the filter to work.

Control element	Description
Reset equipment filter	The selected filters are reset and the filtered screens are shown unfiltered again.
Expand all	All nodes of the tree are expanded and all subgroups are displayed.
Collapse all	All expanded nodes are collapsed. Only the main groups of the tree are displayed.
Expand selection	The selected node of the tree is expanded.
Collapse selection	The selected node of the tree is collapsed.
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.
Execute functions	All functions of the local project that are currently linked (on page 15) to the group selected in the tree are executed. The order of execution is not determined. **Note:** The configuration of the **hierarchical filter** option has no effect on the execution of the function.

COMPATIBLE ELEMENTS

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

Control element	Description
Equipment Model (label)	Static Win32 control element. Was replaced by a *dynamic text* field. For the description, see current element.

EXAMPLE

The alarms of hall 3 in a factory are to be displayed.

Engineering:

▸   Hall 3 is defined as its own equipment group in the equipment model.

▸   When switching screens to an *equipment model screen*, the following happens:

▸   The equipment model that contains hall 3 is selected

▸   The *AML* screen is selected as the **screen to be updated**

The following happens in Runtime:

▸   the Alarm Message List is called up

▸   the equipment model is called up

▸   the equipment model is selected with hall 3

▸   the **Apply selection** button is pressed

the switched AML screen now only shows the alarms that relate to hall 3