![COPADATA logo — do it your way]

zenon manual

Equipment Modeling

v.7.20
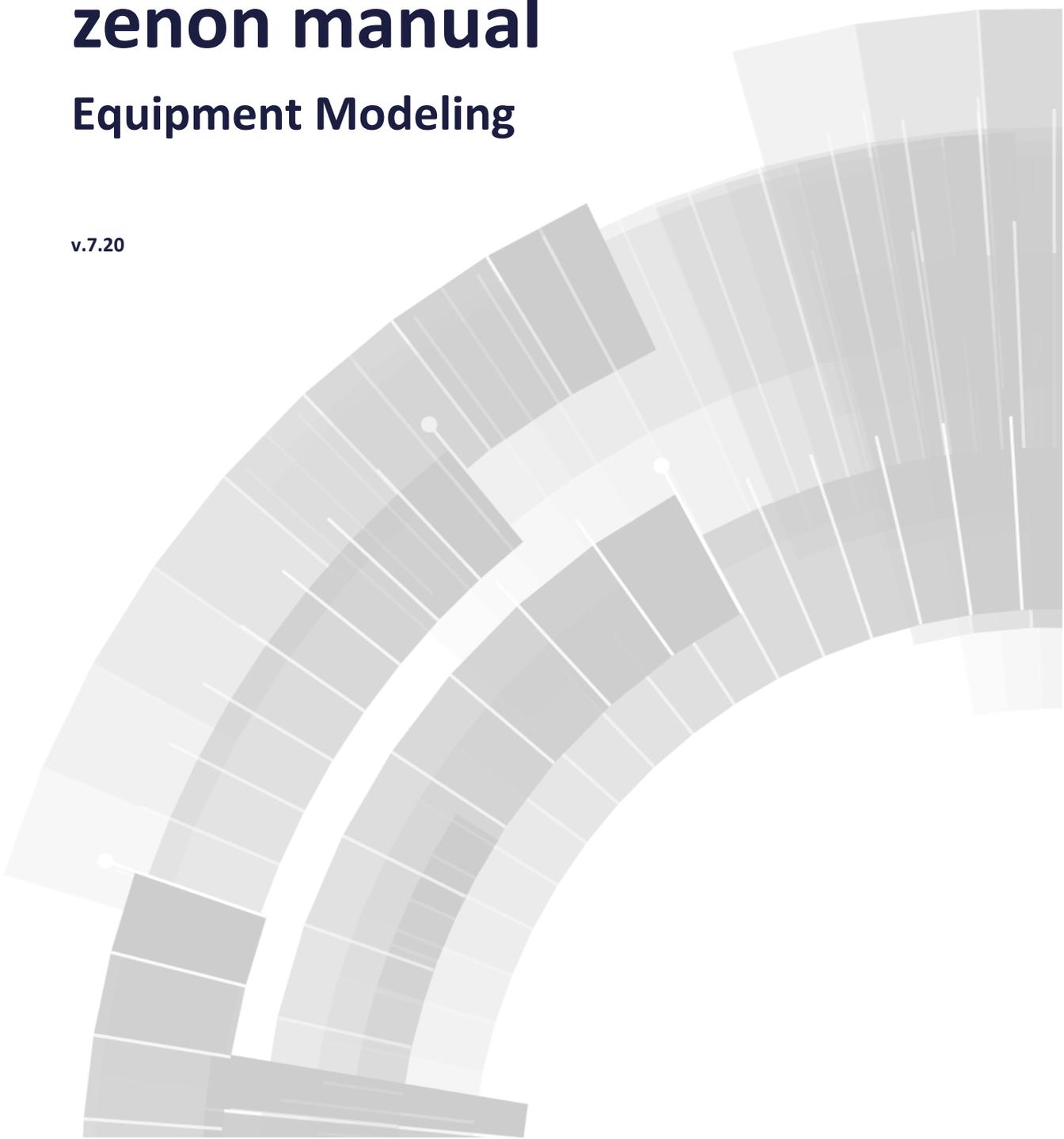
COPADATA
do it your way

Contents

1. Welcome to COPA-DATA help

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 (mailto: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 (mailto: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 (mailto:sales@copadata.com).

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:
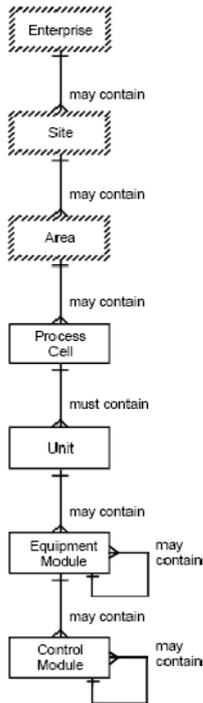
The upper levels enable details from the lower levels to be classified correctly and to be linked with each other. The lower levels refer to specific equipment which is compiled for process control and process monitoring.

> **License information**
>
> *Part of the standard license of the Editor and Runtime.*

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 during run time and in the editor. Equipment models can also be displayed as a separate screen (on page 22) in Runtime and used as a filter for other switched screens.

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

> ### Information
>
> *The language of equipment modeling cannot be switched.*

EQUIPMENT MODELING WINDOW

The equipment models can be opened in a window of their own:
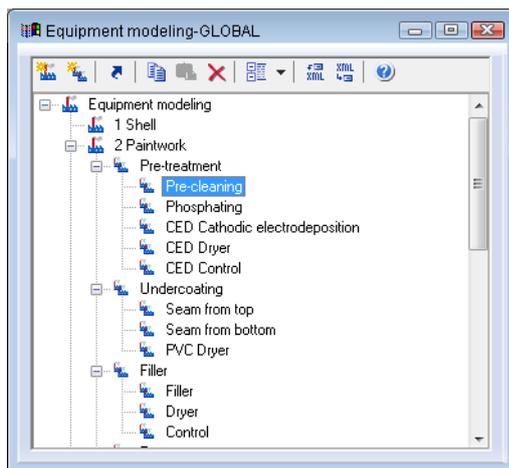
- ▸ To do this, select the `Open new window ...` command in the equipment modeling context menu in the project manager
- ▸ a new window with the equipment models is opened by default in the lower area of the editor
- ▸ Like all windows, you can place this window where you like in the editor
- ▸ If you 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

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

TO CREATE A NEW MODEL:

- ▸ Decide whether you want to create a local or a global equipment model
- ▸ in the context menu of node `Equipment modeling` select command `New equipment model`

  or, in the Tool bar, reselect 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)

▶ change the name to suit your requirements. To do this, press the `F2` key on the name when highlighted or triple-click on the name field

> 💡 **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. And you can easily identify the origin of the displayed equipment model in selection lists.*

TO CREATE A NEW GROUP:

▶ In the context menu of a model or an upper-level grouping, select the `New equipment group` command

or press the `'insert'` key

or, in the Toolbar, select 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)

▶ adapt the name to your needs: The name field is already in edit mode straight after being created. You can subsequently press the `F2` key with the name highlighted or click on the name field three times

▶ you can have as many groups and sub-groups as you like

3.1   Edit equipment model

Groups can be resorted, copied, moved and deleted within a model and throughout all models:

SELECTION

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

▶ on the same level

▶ within the same model

▶ and within the same superior group

.

The selection is carried out with `Ctrl+left mouse button` clicked:

Note: With `Shift+mouse click` you can make a selection of several elements on different levels. The editing possibilities in the context menu and in the tool bar are however deactivated.

DELETE

- ▶ highlight the desired node
- ▶ 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

- ▶ highlight the desired node
- ▶ hold down the left mouse button
- ▶ move the node to the desired area and release the mouse button

SORT VIA DRAG&DROP

- ▶ highlight the desired node
- ▶ hold down the `control` key and move the node to the desired position with the left mouse button
- ▶ a horizontal line shows the area whrere you can insert the node

COPY AND PASTE

- ▶ highlight the desired node
- ▶ select **Copy** in the context menu or in the toolbar, or press `control and C` together
- ▶ highlight the desired target-node
- ▶ select **Insert** in the context menu or in the toolbar, or press `control and V` together
- ▶ the node being copied is inserted
  - • sub-nodes are not copied together with the node
  - • 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/group

2. press key F2 or perform a triple click on the model/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 Context menu Project manager

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 XML all	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 to select a pre-defined Editor profile.
Help	Opens online help.

3.3 Detail view of toolbar and context menu

TOOL BAR

Symbol	Function
`New equipment model`	creates a new equipment model with a default name, `Equipmentmodel 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
`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
`Expand/` `collapse node`	Opens the drop-down list list to expand or reduce nodes.
▸ `Expand all`	Expands all nodes.
▸ `Reduce all`	Reduces all nodes.
▸ `Expand selected`	Expands the highlighted nodes.
▸ `Reduce selected`	Reduces the highlighted nodes.
`Export selected 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.

▸ **Reduce all**	Reduces all nodes.
▸ **Expand selected**	Expands the highlighted nodes.
▸ **Reduce selected**	Reduces the highlighted nodes.
Export XML all	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)
Linked elements	Opens the dialog to display linked elements. (is only displayed if there are linked elements)
Copy	copies the selected group togehter 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
Expand/ collapse node	Opens the drop-down list list to expand or reduce nodes.
▸ **Expand all**	Expands all nodes.
▸ **Reduce all**	Reduces all nodes.
▸ **Expand selected**	Expands the highlighted nodes.
▸ **Reduce selected**	Reduces the highlighted nodes.
Export XML all	Exports all entries as an XML file.
Export selected 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
3. the Dialog to allocate elements to equipment groups (on page 15) opens
4. allocate the desired equipment groups (for details, see the sub-chapter on Equipment modeling dialog (on page 15))

> 💡 **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` keys)

DRAG&DROP OF THE EQUIPMENT GROUP

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

1. select the equipment groups

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**
>
> *At 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 select, in the properties of an element in the **General** node, the **Equipment groups** property:
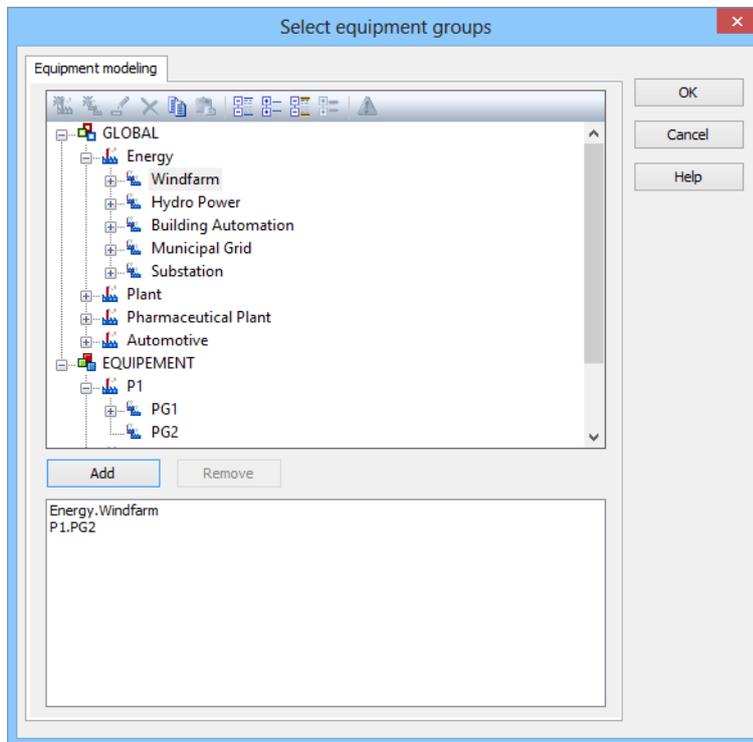
Property	Description
`Toolbar`	Symbols (on page 17) to: ▸ Edit local equipment models ▸ Expand or collapse the display ▸ Display of information
`List of equipment models`	provides models and groups for selection The list separates the display into equipment models from the global project and from local projects. Local equipment models can be created, edited or deleted (on page 18).
`Add`	Adds the selected group to the filter list.
`Remove`	Removes all selected groups from the filter list.
`Filter list`	Shows all equipment groups that are to be filtered.
`OK`	Applies settings and closes the dialog.
`Cancel`	Discards the selection and closes the dialog. Attention: Any changes (on page 18) that have been made to the structure of local equipment models are retained.
`Help`	Opens online help.

ADD GROUPS

▸ 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 tool bar.

▸ Select an equipment group or level.

▸ Add the new group to the list with the `Add` button in the lower area of the dialog

▸ Subgroups are not automatically added.

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

DELETE GROUPS

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

▸ 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 or RGM and at function `Suppress groups/classes/areas/equipment` (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

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:
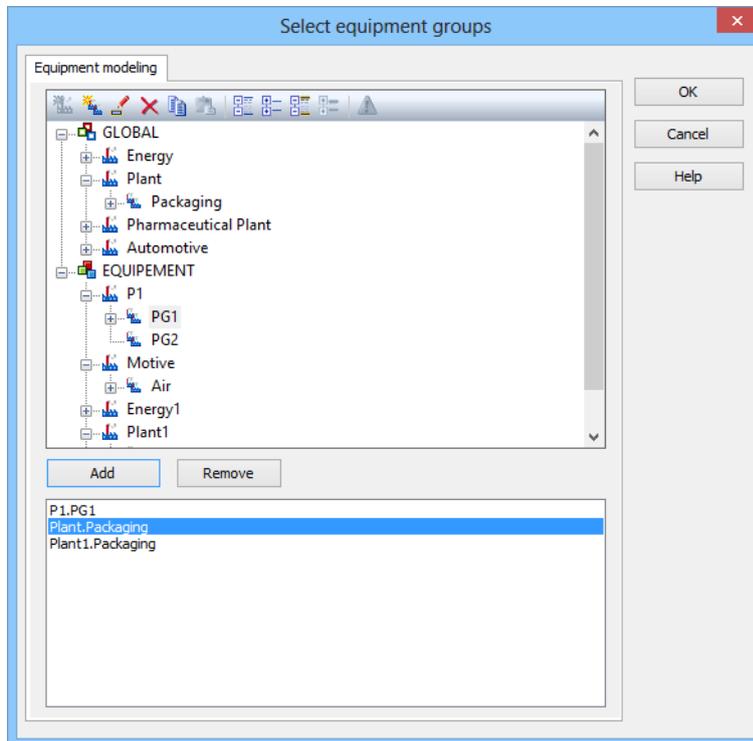
Symbol	Description
New equipment model	Creates a new Equipment model.
	(for local equipment models only)
New group	Creates a new equipment group below the highlighted entry.
	(for local equipment models only)
Edit	Makes it possible to edit the name.
	(for local equipment models only)
Delete	Deletes the 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 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.
Expansion of the selection	The selected node is expanded.
Collapse of the 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 7) in the equipment modeling node. Elements are only edited using the toolbar (on page 17).

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

Possible actions are:

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   List of linked elements

All elements that are linked to the equipment group can be displayed as a list for each equipment group. You can go directly to the linked element via the context menu.

1. In the equipment group desired, select

2. in the context menu, select the command `Linked elements...`

    (For details, see the sub-chapter on Linked elements context menu (on page 21))

3. the list of linked elements is opened
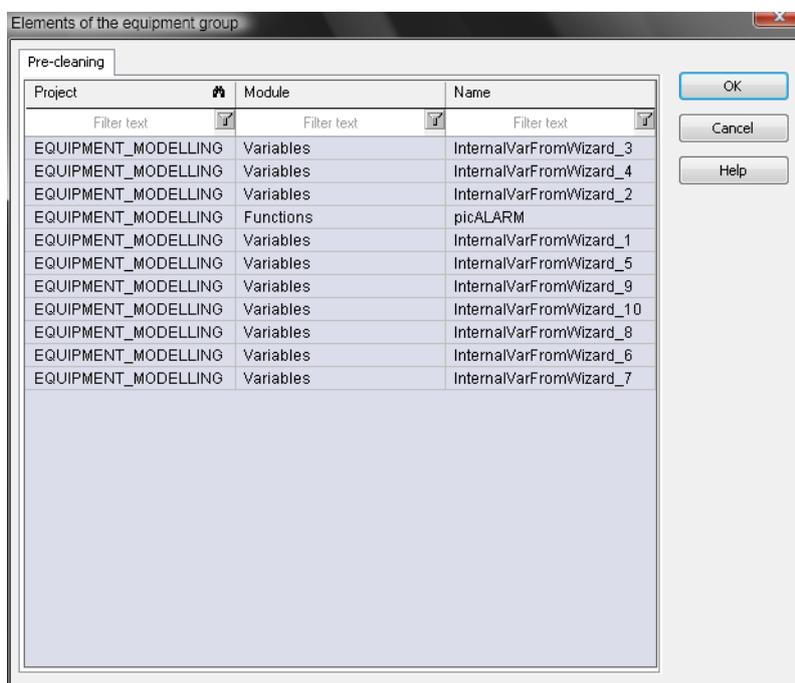
In the context menu, you can

- ▶ go directly to the element

- ▶ delete the element from the list; the element then loses its link to this equipment group

4.2.1 Elements linked to the context menu

In the dialog for linked elements, individual elements can be opened or deleted from the list in the editor by means of the context menu:

Command	Description
`Jump to linked element`	goes to the element in the editor, the list remains open
`Remove selected elements`	deletes the selected element from the list, the connection to this equipment group is broken
`Help`	Opens online help.

5. 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, in the context menu or in the tool bar, `Export XMl`.
   Alternatively, select `Export all XMLs` 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 and possible errors are displayed in the output window.

IMPORT

To import models:

1.   select **Import XML...**   in the context menu or in the tool bar

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`

6.   Screen of type Equipment model

With an equipment model screen, the following is possible in 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.
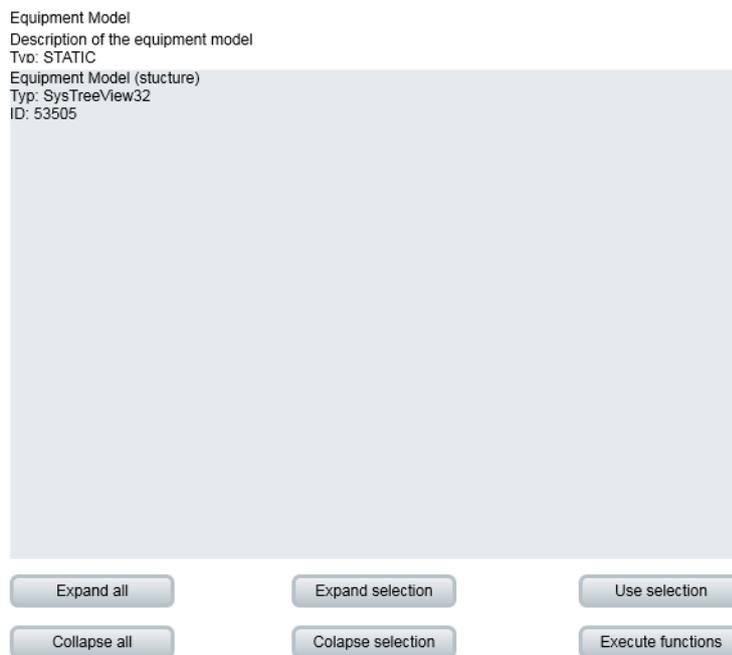
> 💡 **Information**
>
> *Screens that display data from the AML, CEL or RGM can be filtered. In principle, all screen types can be selected. However if these do not contain any data from the AML, CEL or RGM, they are ignored in Runtime.*

6.1   Creating a screen of the type Equipment model

To create an `equipment model` screen:

1.   create a new screen

2. select `Equipment model` as screen type

3. an empty screen is created

4. Click on **Add template** in the drop-down list

5. The dialog for selecting a template is opened

6. select the desired template

7. Change the control elements to what you want
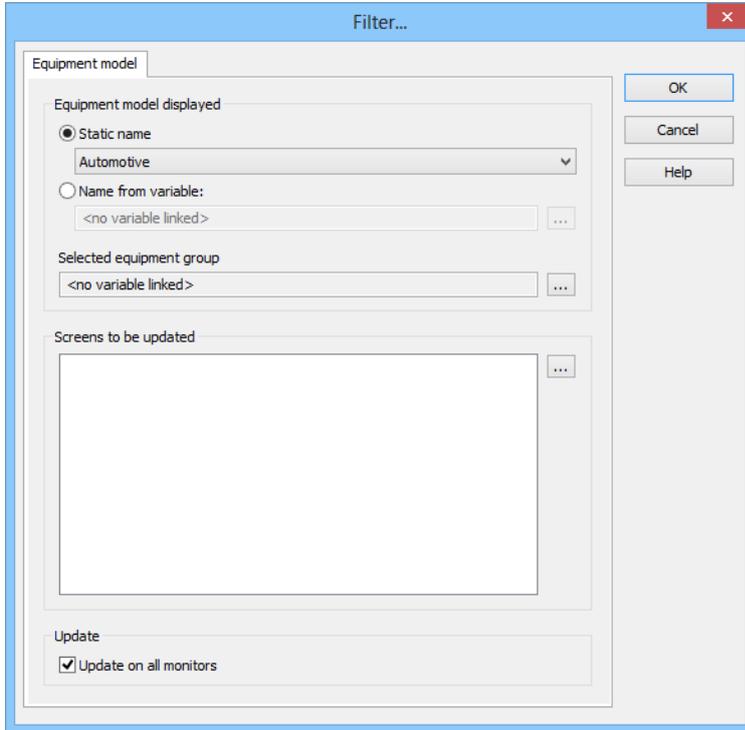
Equipment Model
Description of the equipment model
Typ: STATIC
Equipment Model (stucture)
Typ: SysTreeView32
ID: 53505

| 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 locations in the screen. Elements that are not necessary can also be removed individually once they have been created. Additional elements are selected from the drop-down list and palced in the screen. Elements can be moved in the screen and placed individually.
`Equipment model (label)`	Text field to display the name of the equipment model shown in the screen.
`Equipment model (structure)`	Tree element that display the group structure of the selected equipment model.
`Buttons`	
`Apply selection`	The group selected in the tree is used as a filter (on page 30) for the screens selected in the screen switching. The screen must already be open for the filter to work.
`Execute functions`	All functions of the local project that are currently linked (on page 13) to the group selected in the tree are executed. The order of execution is not determined.
`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.

6.2   Screen switch to a screen of type Equipment model

To create a function to switch to an `equipment model` screen:

1. Select **`New function`**

2. select **`Screen switching`**

3. Select the `equipment model` screen

4. The dialog for configuration is opened

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

6. Confirm the configuration by clicking on the oĸ button

EQUIPMENT MODEL DISPLAYED

Parameters	Description
`Equipment Model displayed`	Selection of the equipment model to be displayed in Runtime.
Static name	Selection of a model 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 switched 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 Runtime, the name remains empty. No equipment model is displayed
Selected equipment group	Selection of a variable to which the selected equipment group in the screen is written in Runtime.
	Clicking on the `...` button opens the dialog to select a string variable.

SCREENS TO BE UPDATED

Parameters	Description
Screens to be updated	Selection of the screens that can be filtered for equipment models with the equipment model screen in Runtime.
	Screens that display data from the AML, CEL or RGM can be filtered. In principle, all screen types can be selected. However if these do not contain any data from the AML, CEL or RGM, they are ignored in Runtime.

UPDATE

Parameters	Description
`Update`	Update mode.
Update on all monitors	`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.
`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 Runtime any more.

7. 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 15) 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 15) for equipment groups is opened

▶ remove the filter criteria from the list

8. Filtering in the Runtime

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

▶ Define filter when screen switching (on page 28): Create function screen switch (on page 28) to the desired screen and define the filter in tab `Equipment modeling`. In the Runtime the data is displayed in accordance with the defined filter. The `Filter` button must be present to change the filter in Runtime.

▶ Screen of type Equipment model (on page 30): Create an equipment model screen and allocate it an equipment model when screen switching. You can select equipment groups in 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.

8.1   Filtering with screen switching

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

▶ AML and CEL:

- Alarms: delete

- Alarms: Acknowledge

- Export AML

▶ Screen switching to:

- 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.

- Recipegroup Manager: Recipegroups are only offered in the drop-down list if they are included in the filter. If new recipegroups are created, these can be conncted 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.

▶ Message Control:

- Suppress groups/classes/areas/equipment

CREATING A FILTER

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

1. create a picture switch function.

2. select the desired picture

3. click on the equipment modeling tab in the dialog filter

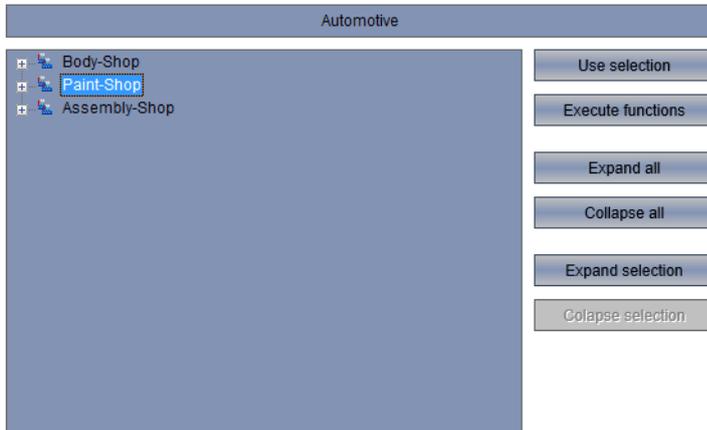4. select the model and equipment group

5. confirm this with **ok**.
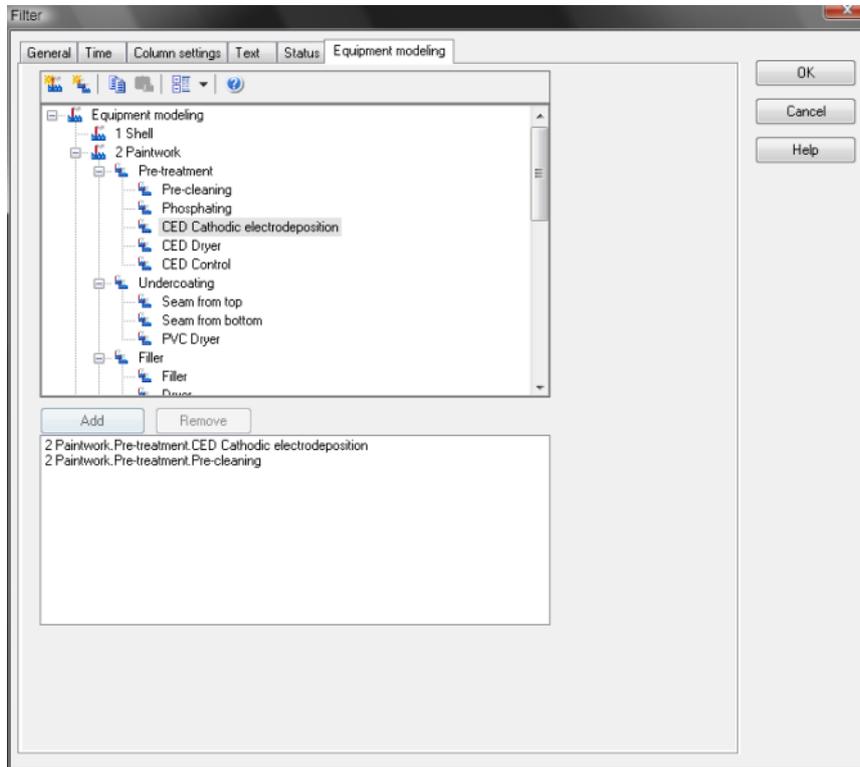
Element	Description
List of equipment models	provides models and groups for selection
Add	Adds selected groups to the filter list
Delete	removes selected groups from the filter list
Filter list	Shows all equipment groups that are to be filtered.
OK	Applies all changes in all tabs and closes the dialog.
Cancel	Discards all changes in all tabs and closes the dialog.
Help	Opens online help.

8.2   Using an equipment model screen in Runtime

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

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 locations in the screen. Elements that are not necessary can also be removed individually once they have been created. Additional elements are selected from the drop-down list and palced in the screen. Elements can be moved in the screen and placed individually.
`Equipment model (label)`	Text field to display the name of the equipment model shown in the screen.
`Equipment model (structure)`	Tree element that display the group structure of the selected equipment model.
`Buttons`	
`Apply selection`	The group selected in the tree is used as a filter (on page 30) for the screens selected in the screen switching. The screen must already be open for the filter to work.
`Execute functions`	All functions of the local project that are currently linked (on page 13) to the group selected in the tree are executed. The order of execution is not determined.
`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.

EXAMPLE

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

Configuration:

▸ 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 as hall 3

▶   The **Apply selection** button is pressed

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