



COPADATA
do it your way

zenon manual

Scheduler

v.7.60





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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 (<mailto:documentation@copadata.com>).

PROJECT SUPPORT

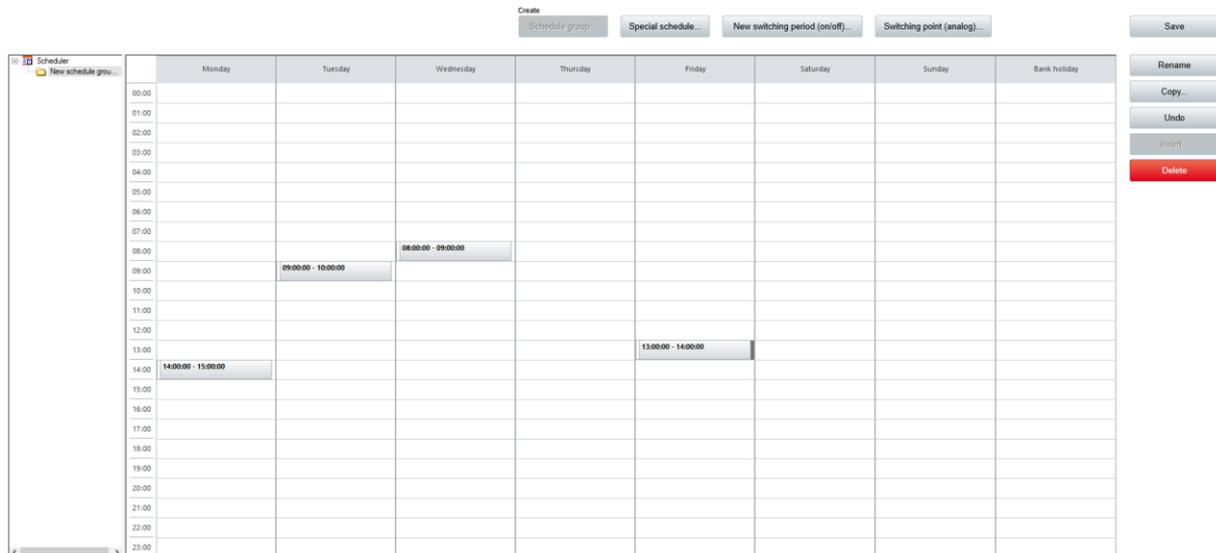
You can receive support for any real project you may have from our Support Team, who you can contact via email at support@copadata.com (<mailto:support@copadata.com>).

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. Scheduler

The Scheduler allows the execution of actions at a defined time or in a defined time pattern. For example: Changing the set value of a variable to a certain time or the execution of a function at a certain interval.



The Scheduler and the PFS (Production and Facility Scheduler) offer similar functions. They cannot be used in a project at the same time. If the PFS has been licensed, the Scheduler is not available.



License information

Part of the standard license of the Editor and Runtime.

USAGE

The Scheduler is generally configured in Runtime (on page 17). However, in the Editor (on page 6), schedule groups with switching points and switching periods (on page 18) can also be created. When creating the Runtime files, configurations in the Editor are not transferred by default. When importing Runtime files, the configurations from Runtime are applied in the the Editor by default. Attention: Data is not compiled during transfer, but the transferred data overwrites the existing configuration.

SCHEDULER AND PFS

The purpose of the scheduler is the same as the PFS. However, its functionality is limited.

Important difference: The Scheduler works in schedules with absolute times. Therefore, the following functions are not available in the Scheduler:

- ▶ Relative Times, e.g. Shift start, shift end,...
- ▶ User-defined events

Switch from Scheduler to PFS:

- ▶ Switching from the Scheduler to the PFS is possible at any time by licensing the module. The schedule data is compatible with one another and can be transferred.

Switch from PFS to Scheduler:

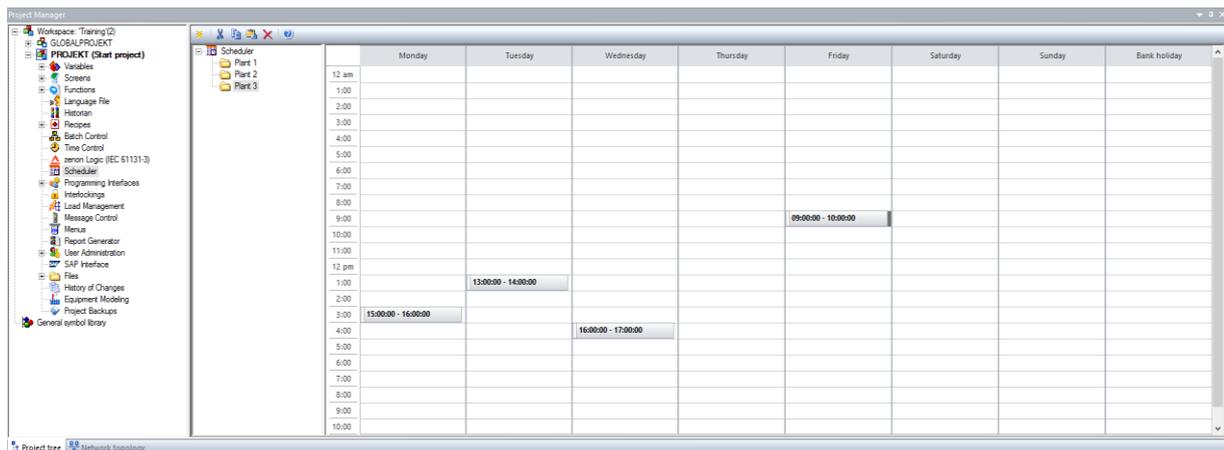
- ▶ Data that has been created in the PFS cannot be used in the Scheduler!

3. Engineering in the Editor

To use the Scheduler in Runtime, you need the following in the Editor:

- ▶ A Scheduler screen (on page 14)
- ▶ Screen switching (on page 17) on this screen

You can also preconfigure schedule groups and schedules as an option.



Schedule groups and schedules are configured in the Editor and Runtime in the same way. The configurations can also be transferred from the Editor to Runtime and back. The procedure for project configuration is described for both cases in the **Create and administer schedules** (on page 18) section.

3.1 Toolbar and context menu

In the detail view of the Editor, the Scheduler can be configured using tool bar commands or the context menu.

TOOLBAR



Parameter	Description
New schedule group...	Depend on the selected element, a new element is created and the respective dialog is opened.
Cut	Cuts the selected element.
Copy	Copies selected element.
Paste	Pastes the element from the clipboard.
Delete	Deletes selected element
Help	Opens online help.

SCHEDULER CONTEXT MENU

Menu item	Action
New schedule group...	Depend on the selected element, a new element is created and the respective dialog is opened.
Paste	Pastes the element from the clipboard.
Save	Saves all changes made in the Scheduler.
Undo	Cancel the action and discards the changes.
Settings...	Opens dialog with options for settings.
Help	Opens online help.

SCHEDULE GROUP CONTEXT MENU

Parameter	Description
Copy	Copies the selected schedule group to the clipboard.
Rename	Makes it possible to rename the schedule group.
Delete	Deletes the selected schedule group.
Help	Opens online help.

3.2 Settings for the Scheduler

You can set several pre-settings for the Scheduler.
To configure the settings:

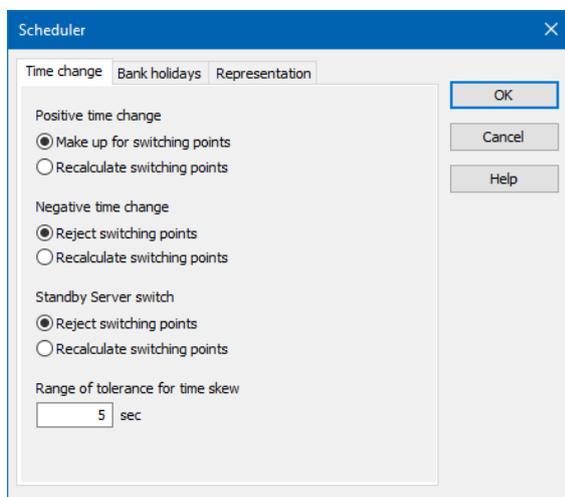
1. Right-click on **Scheduler** in the detail view.
2. Select **Settings** in the context menu

The dialog to configure the settings is opened with these tabs:

- Time change (on page 9): Action when switching from daylight saving time and standard time
- Bank holidays (on page 10): Selection of the country-specific national holidays
- Representation (on page 12): Selection of the type of calendar display:

3.2.1 Time change

In this tab, you define how events that occur in the time period of a time switch are handled.



Parameter	Description
Positive time change	The time is set ahead, the Systemtime is set into the future (e.g. summer time).
Make up for switching points	Actions between the current time and the newly set time, are executed directly after the time setting.
Recalculate switching points	Actions between the current time and the newly set time, are ignored and not executed. Switching points are recalculated.
Negative time change	The time is set back, the system time is set to the past (e.g. winter time).
Reject switching points	Switching points are recalculated. Switching points are calculated when the original time is reached.
Recalculate switching points	Action, between the current time and the newly set time, are

	recalculated. (That means that when the defined time is reached, they are executed.) This causes a double execution of switching points in the corrected time period.
Standby Server switch	Standby Server switch, valid for timeout during redundance switch.
Reject switching points	The execution of switching points starts according to the current position of the Standby. Switching points in the switching period might not be executed.
Recalculate switching points	The switching points are recalculated from the current time minus 30 seconds and executed. This ensures that no switching point execution is missed, but can lead to double execution of switching points.
Range of tolerance for time skew	Time span of how far the system time can be changed, without causing a recalculation of switching points according to the criteria described above.



Attention

Always carry out a switch to daylight saving time/standard time with the automatic Windows time switching. Never change the time manually, because this could lead to errors with times that are relevant to zenon.

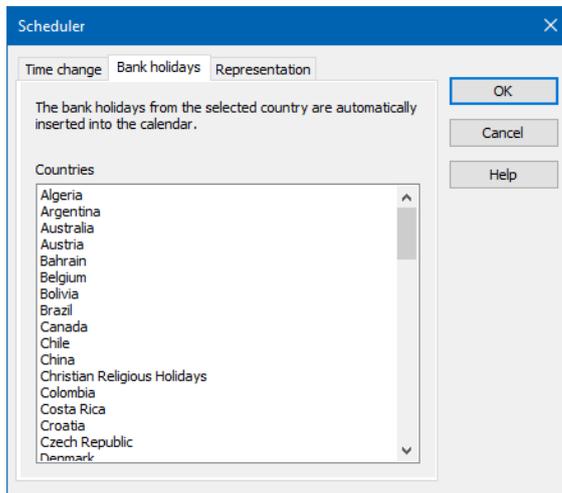
3.2.2 Bank holidays

Country-dependent national holidays can be taken into account automatically.

To pre-select national holidays:

1. Open the **Settings**.

2. Open the **National holidays** tab.



3. Select the desired country from the drop-down list.
4. Click on OK.

The national holidays are automatically taken into account as a special day in Runtime. Entries can be edited in Runtime by double-clicking on the plan.

MANUAL EDITING

National holidays can be edited and supplemented. To do this, the **Feiertage.txt** file must be edited. You can find this text file in the following folder: %ProgramData%\COPA-DATA\zenon7.60

To create or edit national holidays for a country:

1. Open **Feiertage.txt** with a text editor.
2. Go to the desired entry or create a new one.
3. Change the entries in accordance with the syntax.
4. Save the file.

Attention: The correct definition is essential for identifying the model to be used.

SYNTAX

Each entry for a country:

- ▶ Starts with the name of the country enclosed in square brackets
- ▶ Contains a national holiday in each of the following lines, shown by:
 - Name
 - Comma

- Date in the form YYYY/MM/DD

Note: Countries that have already been entered into the file also include an identifier in addition to the country name. This is not currently evaluated and need not be entered.

EXAMPLE

Austria, for example:

[Austria] 45

Allerheiligen,2017/11/1

Allerheiligen,2018/11/1

Allerheiligen,2019/11/1

Allerheiligen,2020/11/1

Allerheiligen,2021/11/1

Allerheiligen,2022/11/1

Allerheiligen,2023/11/1

Allerheiligen,2024/11/1

Allerheiligen,2025/11/1

Allerheiligen,2026/11/1

Allerheiligen,2027/11/1

Allerheiligen,2028/11/1

Christi Himmelfahrt,2017/5/25

Christi Himmelfahrt,2018/5/10

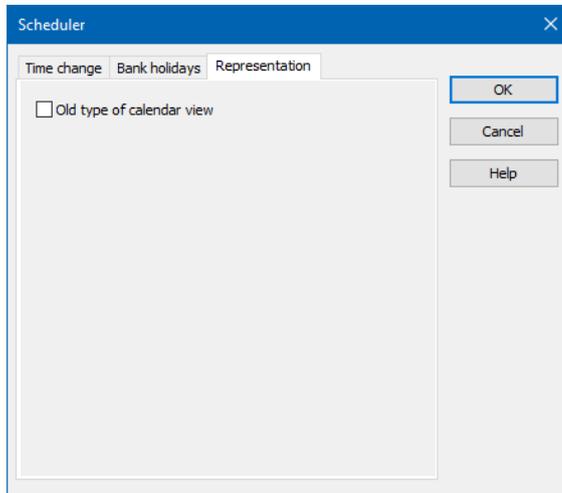
...

3.2.3 Display

In the Editor, there is the possibility to select between the old and the new display type in the detail view of the scheduler.

To switch the view:

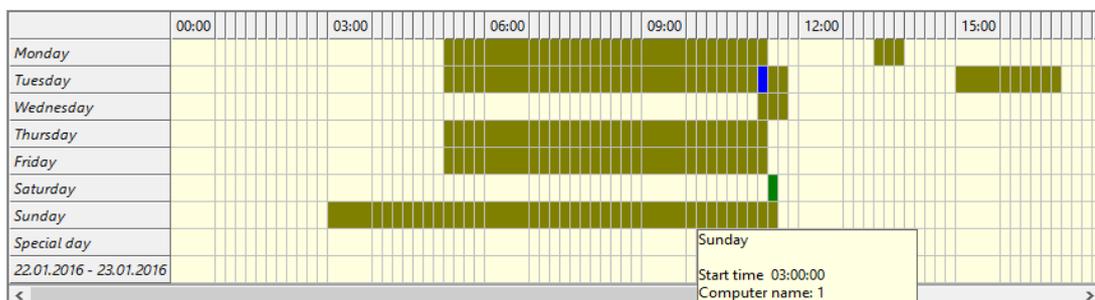
1. Click on `Settings` in the context menu of the Scheduler in the detail view.
A new dialog opens.
2. Click on the `Display` tab.



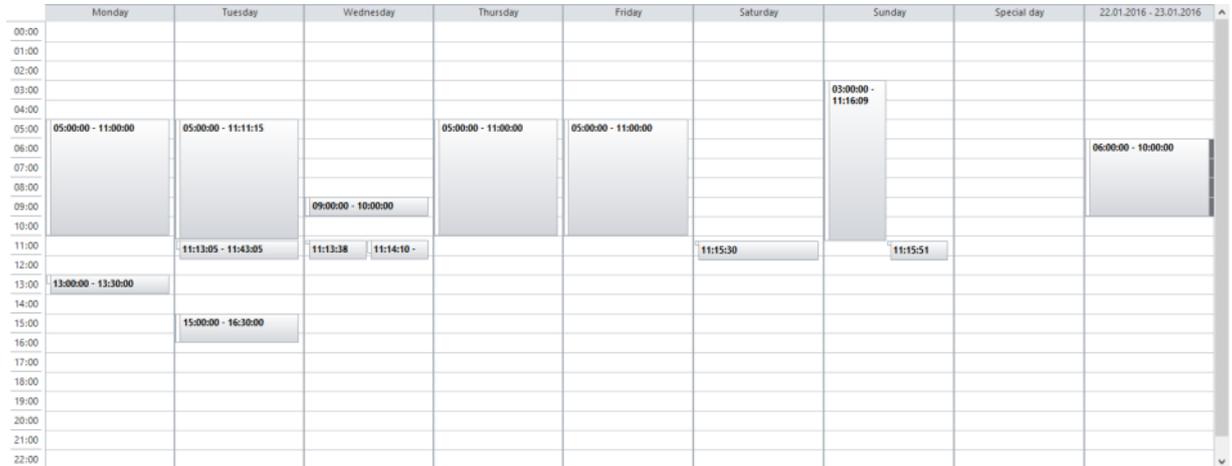
3. Activate the `Old type of calendar view` option if you want to work with the old display type.
Deactivate the `Old type of calendar view` option if you want to work with the new display type.

Note: This option is not activated by default for newly-created projects. This means that the calendar is displayed in the new display type.

OLD DISPLAY TYPE:



NEW DISPLAY TYPE:



Note: This option is not activated by default for newly-created projects in zenon version 7.50. This means that the new calendar display type is offered by default.

3.3 Import Runtime files into the Editor

Schedules that have been created in Runtime can be imported into the Editor. During the import, all existing schedules are deleted and replaced with the imported ones. There is no compilation of different data.

To import data from Runtime:

1. Ensure that, in the **Runtime changeable data** project property, the **Scheduler** option is deactivated for **Do not decompile**. (checkbox not ticked)
2. In the **Runtime files** tool bar, click on the **Import Runtime files** symbol.

The configuration in the Editor is replaced by the configuration of Runtime.

3.4 Creating a Scheduler screen

The **Scheduler** screen shows a calendar in Runtime. This can be configured with events that are to be automated.

ENGINEERING

Steps to create the screen:

1. Create a new screen:

In the tool bar or the context menu of the **Screens**node, select the **New screen** command.
An empty *Standard* screen is created.

2. Change the properties of the screen:

- a) Name the screen in the **Name** property.
- b) Select *Scheduler* in the **Screen type** property.
- c) Select the desired frame in the **Frame** property.

3. Configure the content of the screen:

- a) select menu item **Control elements** from the menu bar
- b) Select *Insert template* in the drop-down list.
The dialog to select pre-defined layouts is opened. Certain control elements are inserted into the screen at predefined positions.
- c) Remove elements that are not required from the screen.
- d) If necessary, select additional elements in the **Elements** drop-down list. Place these at the desired position in the screen.

4. Create a screen switch function.



CONTROL ELEMENTS

INSERT TEMPLATE

Control element	Description
Insert template	<p>Opens the dialog for selecting a template for the screen type.</p> <p>Templates are shipped together with zenon and can also be created by the user.</p> <p>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.</p>

WINDOWS AND BUTTONS

Control element	Description
Scheduler window	Shows the scheduler for the schedule groups in Runtime.
General	Drop-down list with general buttons.
Save	Saves the configuration.
Cancel	Discards changes and closes the configuration.
Schedule group	Elements for the schedule group.
New schedule group	Creates a new schedule group.
Copy	Copies the selected element to the clipboard.
Paste	Pastes an element saved on the clipboard as a copy.
Rename	Makes it possible to rename the selected element.
Delete	Deletes selected element after confirmation message.
New special schedule	Creates a new special schedule.
New switching period (on/off)	Creates a new switching period.
New switching point (numeric)	Creates a new switching point.

3.5 Configure screen switching

With a screen switch to the Scheduler screen, you ensure that the Scheduler is available in Runtime for project configuration and administration.

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 node **Screens**

3. Select the **Screen switch** function.

The dialog for selecting a screen is opened.

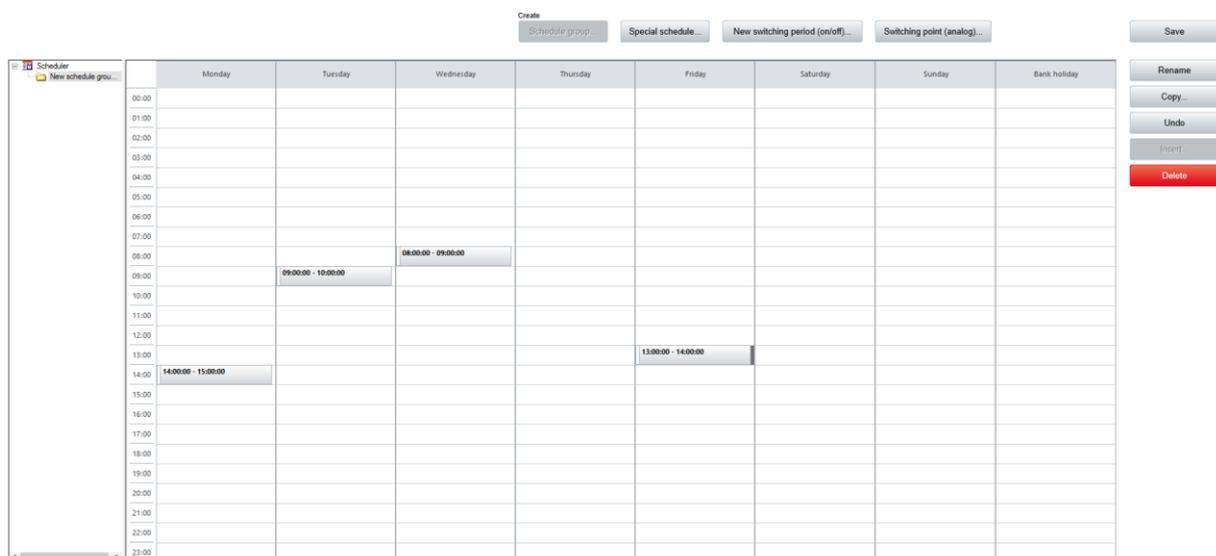
4. Select the `Scheduler` screen.

5. Name the function in the **Name** property.

6. Assign the function to a button in order to be able to call up the screen in Runtime.

4. Configuration and application in Runtime

In the Scheduler, schedules can be created in Runtime and pre-existing or imported schedules can be edited.



Schedule groups and schedules are configured in the Editor and Runtime in the same way. The configurations can also be transferred from the Editor to Runtime and back. The procedure for project configuration is described for both cases in the **Create and administer schedules** (on page 18) section.

4.1 Transfer Runtime files

Schedules that have been created in the Editor can be transferred to Runtime. During the import, all existing schedules are deleted and replaced with the imported ones. There is no compilation of different data.

To transfer data from the Editor to Runtime:

1. Ensure that, in the **Runtime changeable data** project property, the **Scheduler** option is deactivated for **Do not generate and transfer**. (checkbox not ticked)
2. Click, in the **Runtime files** tool bar, on the **Create changed Runtime files** or **Create Runtime files**.

The configuration in the Editor is transferred to Runtime.
Pre-existing schedules are deleted.

5. Create and administer schedules

The description for the creation of schedules is orientated to the process in Runtime. The configuration in the Editor is carried out along the same lines in principle, but can be different.

5.1 Context Menus

You have the following context menus available in the Editor and in Runtime:

- ▶ **Scheduler** module in the project tree
- ▶ Schedule group
- ▶ Empty cell in the calendar
- ▶ Entry in the calendar

EDITOR CONTEXT MENU

Scheduler module in the project tree:

Parameter	Description
New schedule group...	Creates a new schedule group.
Editor profiles	Opens the drop-down list with predefined editor profiles.
Help	Opens online help.

EDITOR AND RUNTIME CONTEXT MENUS

Scheduler detail view:

Parameter	Description
New schedule group...	Creates a new schedule group.
Paste	Pastes a schedule group that has been saved to the clipboard.
Save	Saves all changes.
Undo	After you have confirmed your choice, all changes you have made will be irrevocably discarded.
Settings	Calls up the settings pages for the Scheduler properties.
Help	Opens online help. Only available in the Editor.

Schedule group:

Parameter	Description
Copy	Copies the selected schedule group to the clipboard.
Rename	Allows the entry of a new name for the selected schedule group.
Delete	Deletes the selected schedule group after requesting confirmation.
Help	Opens online help. Only available in the Editor.

Empty cell in the calendar:

Parameter	Description
Create switching period (on/off)	Opens the dialog for creating a switching period.
Create switching point (numeric)	Opens the dialog for creating an switching point.
Paste	Pastes an entry that has been saved to the clipboard.
Create special schedule	Opens the dialog for creating a special schedule.
Delete special schedule	Deletes the selected special schedule.
Help	Opens online help. Only available in the Editor.

Entry in the calendar:

Parameter	Description
Copy	Copies the selected entry to the clipboard.
Edit switching point/switching period	Opens the dialog to edit a switching point or a switching period.
Delete switching point/switching period	Deletes the selected entry after requesting confirmation.
Help	Opens online help. Only available in the Editor.

5.2 Schedule Groups and Schedules

Schedule groups contain schedules for weekdays and special days, as well as special schedules. As many schedule groups as desired can be created in the Scheduler. This is how different schedules can be created for individual machines or departments.

RUNTIME

To create a new schedule group in Runtime:

1. Click on the **Schedule group** button.
A new schedule group is created with the standard names.
2. Right-click on the new group and select **Rename** in the context menu.
Give it the desired name.
3. Create schedules for the group.

To create a new schedule in Runtime:

1. Click in the calendar of the desired schedule group.
2. Select the desired day and time.
3. Select the desired action in the context menu or with the button.
4. Configure the action.
5. End configuration by clicking on **OK**.

EDITOR

To create a new schedule group in the Editor:

1. Select **New schedule group** in the context menu for the Scheduler in the detail view.
A new schedule group is created with the standard names.
2. Right click on the new group and select Rename in the context menu.
3. Create schedules for the group.

To create a new schedule in the Editor:

1. Click in the calendar of the desired schedule group.
2. Select the desired day and time.
3. Select the desired action in the context menu.
4. Configure the action.
5. End configuration by clicking on **OK**.

5.3 Switching points and Switching periods

Switching points make it possible to write a set value to a numeric variable at a certain time. In switching periods, functions are used to set a binary variable to 1 or to 0 over a certain time period.



Information

Per default switching points are always created as inactive in the Runtime and must be activated decidedly in order for them to work. Per default switching point are created as active in the Editor.

5.3.1 Switching points (numeric)

A numeric switching point is for setting the value of a numeric variable once at a certain time.

To create a numerical switching point:

1. Right-click on an empty cell in the calendar.
2. Select **Create switching point (numerical)**.
(you can also highlight the cell in Runtime and click on the **Switching point (analog)** button.)

Note: The time must be unique and can only be used for a switching period or a switching point.

The dialog for configuring the switching point is opened.

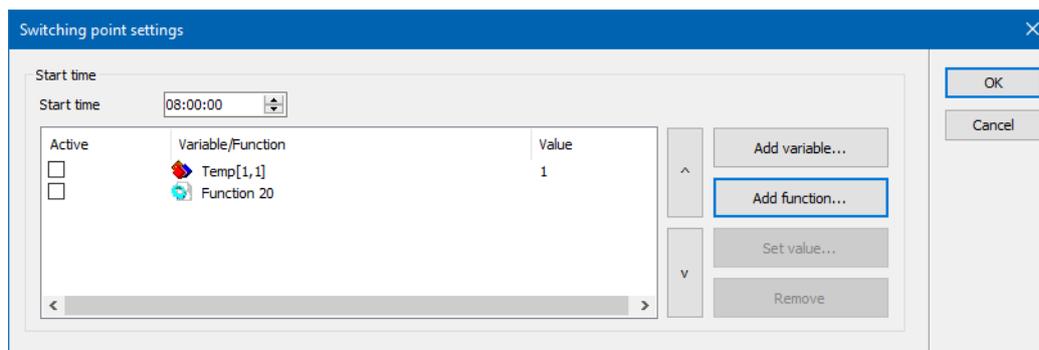
3. Configure the switching point with:
 - Selection of the time.
 - Selection of the required variables and/or functions.
 - Configuration of the set values for the variables.
 - Active setting of the variables and functions.
4. Close the dialog by clicking on **OK**.
The switching point is shown with the time in the Runtime calendar. When moving the mouse over the switching point, detailed information on the linked variables and functions is shown.

Attention

Note the following when creating a switching point:

- ▶ Permitted time range: 00:00:00 - 23:59:59.
- ▶ Each switching point must be unique.

CREATE SWITCHING POINT DIALOG



Option	Description
Start time	Point in time when the switching point (numerical) is to be executed.
List of variables and functions	List with all linked variables and functions.
Add variable	Opens the dialog to add a variable.
Add function	Opens the dialog to add a function. Functions can also be linked throughout projects. In doing so, it must be ensured that the source projects are available in Runtime. The Execute VBA macro function can also be used to execute VBA macros at the switching points.
Set value	Opens the dialog to stipulate the set value of the variable selected in the list.
Remove	Removes the selected variables or functions from the list without requesting confirmation.

5.3.2 Switching periods (on/off)

A switching period makes it possible to set a binary variable to 1 or 0 over a certain time period.

*At the start of a switching period, the variable is automatically set to `True` (1) and to `False` (0) at the end. This sequence can be changed using the **Set value** option.*

To create a switching period:

1. Right-click on an empty cell in the calendar.
2. Select **Switching period (on/off)**.
(you can also highlight the cell in Runtime and click on the **New Switching period (on/off)** button.)

Note: The time must be unique and can only be used for a switching period or a switching point.

The dialog for configuring the switching period is opened.

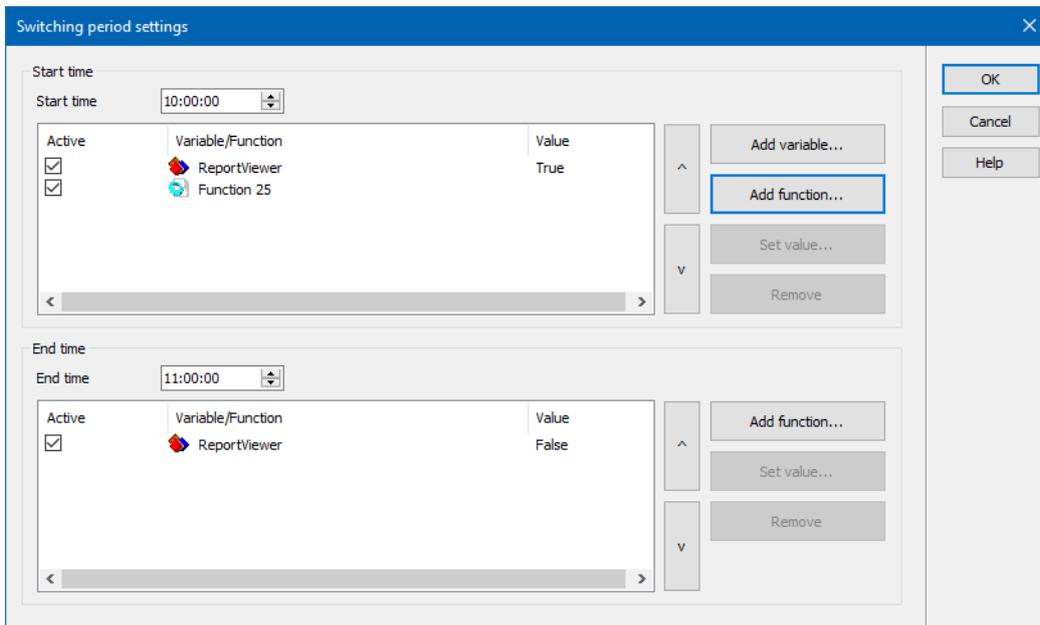
3. Configure the switching period with:
 - Selection of the times for start and end.
 - Selection of the required variables and/or functions.
 - Configuration of the set values for the variables.
 - Active setting of the variables and functions.
4. Close the dialog by clicking on **OK**.
The switching period is shown with the time in the Runtime calendar. When moving the mouse over the switching period, detailed information on linked variables and functions is shown.

 **Attention**

Note the following when creating a switching period:

- ▶ Start time and end time should not be equal.
- ▶ The end time has to be later than the start time.
- ▶ Permitted time range: 00:00:00 - 23:59:59.
- ▶ Each switching period must be unique.

SWITCHING PERIOD DIALOG



The dialog box, titled "Switching period settings", is divided into two main sections: "Start time" and "End time".

Start time section:

- Start time: 10:00:00
- Table of active variables/functions:

Active	Variable/Function	Value
<input checked="" type="checkbox"/>	ReportViewer	True
<input checked="" type="checkbox"/>	Function 25	
- Buttons: Add variable..., Add function... (highlighted), Set value..., Remove

End time section:

- End time: 11:00:00
- Table of active variables/functions:

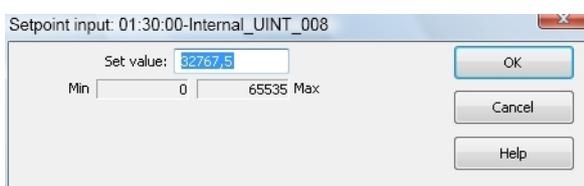
Active	Variable/Function	Value
<input checked="" type="checkbox"/>	ReportViewer	False
- Buttons: Add function..., Set value..., Remove

On the right side of the dialog, there are three buttons: OK, Cancel, and Help.

Option	Description
Start time	Time at which the variable is switched for the first time or when the function is to be executed.
List of variables and functions	List with all linked variables and functions.
Add variable	Opens the dialog to add a variable. Note: Only binary variables can be selected.
Add function	Opens the dialog to add a function. Functions can also be linked throughout projects. In doing so, it must be ensured that the source projects are available in Runtime. The Execute VBA macro function can also be used to execute VBA macros at the switching points.
Set value	Opens the dialog to stipulate the set value of the variable selected in the list.
Remove	Removes the selected variables or functions from the list without requesting confirmation.
End time	Time at which the variable is switched for the second time or when the function is to be executed.
List of variables and functions	List with all linked variables and functions.
Add function	Opens the dialog to add a function. Functions can also be linked throughout projects. In doing so, it must be ensured that the source projects are available in Runtime. The Execute VBA macro function can also be used to execute VBA macros at the switching points.
Set value	Opens the dialog to stipulate the set value of the variable selected in the list.
Remove	Removes the selected variables or functions from the list without requesting confirmation.

Stipulate set value

The set value for the variables can be freely defined within the variable limits.



Option	Description
Set value	Entry of the set value that is to be written. This must be within the limits of the Min. and Max. options.
Min.	Shows possible minimum value.
Max	Shows possible maximum value.

CLOSE DIALOG

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

5.3.3 Edit Switching points and Switching periods

You can do the following with all switching points and periods entered in the calendar:

- ▶ edit
- ▶ delete
- ▶ use several times

EDIT

To edit switching points or switching periods:

- ▶ Double-click on the switching point or switching period
or
- ▶ Select `Edit switching point/switching period` in the context menu.

The respective dialog is opened.

DELETE

To delete switching points or switching periods:

1. Click on the existing switching point or switching period.
2. Click on `Delete switching point/switching period` in the context menu.

3. Confirm this when requested to do so.

USE SEVERAL TIMES

Switching points and switching periods can also be executed on several days.

To do this:

1. Select **Copy** in the context menu of the element to be copied.
2. Highlight the cell of the day on which the element is to be inserted.
The cell with the start time must be empty.
3. Select **Settings** in the context menu
The element is inserted on the target day with the same start and end time as the source time.
The element cannot be inserted if one of these times is already occupied.

5.3.4 Tooltips

Tool tips in the Scheduler visualize the respective status of a calendar entry and provide further information about the respective status.

DISPLAY OF THE TOOL TIP:

To have a tooltip displayed, go to a switching point or switching period in the calendar display. The tool tip appears automatically when the mouse is positioned over the switching point or the switching period.

STRUCTURE:

The tool tip consists of:

Switching period

- ▶ Start time
 - Linked variables
 - Values
 - Functions
- ▶ End time
 - Linked variables
 - Values
 - Functions

Switching point

- ▶ Start time
 - Linked variables
 - Values
 - Functions

5.4 Special schedules

As many user-defined special schedules as desired can be created (e.g. company holidays). A special schedule always replaced the switching time points of the standard schedule.

To create a special schedule:

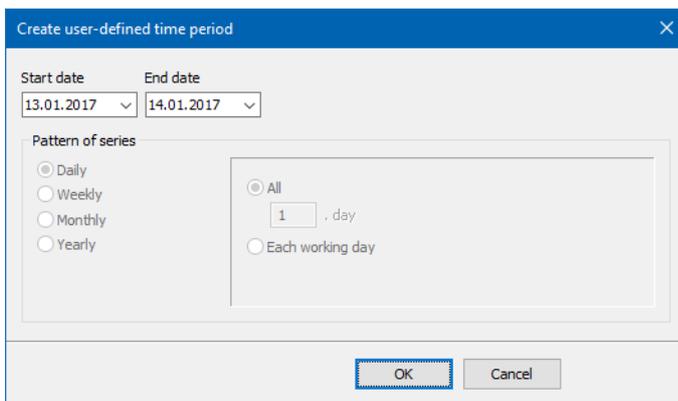
1. Click on any desired cell in the schedule.
2. Select **Create special schedule** in the context menu.
The dialog for configuring a special schedule is opened.
3. Configure the time period for the special schedule.
4. End configuration by clicking on **OK**.

The special day is entered in the calendar as an additional column to the week days.

Attention

*It is not possible to execute several special schedules at the same time.
This means: In a period in which a special day has already been configured, another one cannot be configured.*

SPECIAL SCHEDULE DIALOG



Option	Description
Starts on	Selection of the start date.
Ends on	Selection of the end date.
Serial pattern	Not available for the Scheduler module. Use the Production & Facility Scheduler module.
OK	Applies settings and closes the dialog.
Cancel	Discards all changes and closes the dialog.

DELETE SPECIAL SCHEDULE

To delete a special schedule:

1. Click on the existing schedules.
2. Select **Delete special schedule** in the context menu.
3. Confirm this when requested to do so.

5.5 Schedules for integration projects

If a scheduler is to be called up with data from a subproject, the corresponding function of the subproject is to be called up.

The data for the scheduler always comes from the project where the screen switching function is.