SIEMENS

SIMIT Virtual Controller (VC) - Reference Manual

Reference Manual

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
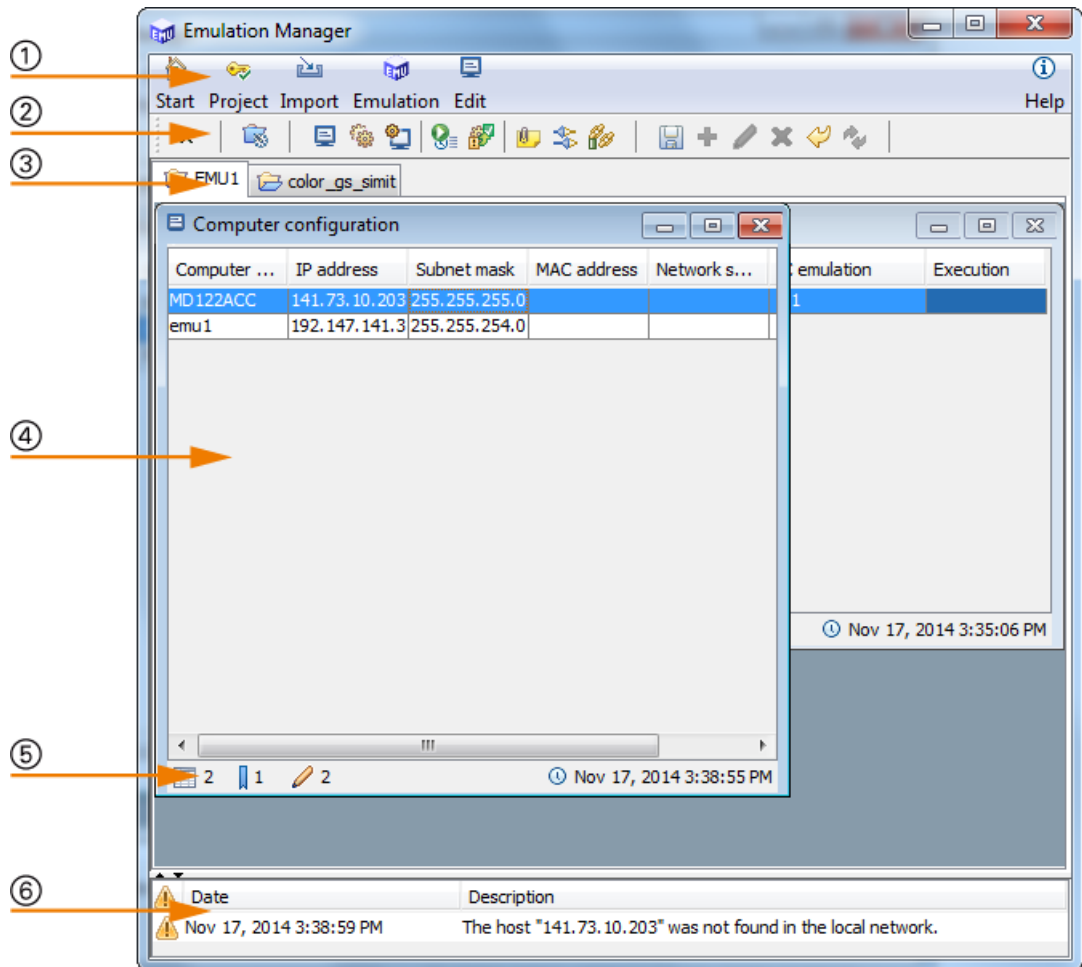
Table of contents

Introduction

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1.1   The user interface of SIMIT VC

The Emulation Manager opens when you start SIMIT VC. The operator control actions, dialog boxes and wizards are called and shown in the Emulation Manager.

(1) Menu bar

The menu bar provides access to actions and functions of SIMIT VC. The display of the menu bar is context-dependent. After starting SIMIT VC , for example, only the "Start" menu command is available here.

SIMIT VC has the following menus:

- **Start**

  You can find additional information on this in the section: "Start" menu (Page 19)

- **Project**

  You can find additional information on this in the section: "Project" menu (Page 33)

- **Import**

  You can find additional information on this in the section: "Import" menu (Page 71)

- **Emulation**

  You can find additional information on this in the section: "Emulation" menu (Page 85)

- **Edit**

  You can find additional information on this in the section: "Edit" menu (Page 93)

- **Help**

  You can find additional information on this in the section: "Help" menu (Page 95)

(2) Toolbar

You use the toolbar to directly select frequently used functions. The symbols available vary depending on which document or dialog box is active. You can also use these buttons to put open documents in the foreground. You will find an overview and a brief description of the symbols in section: Overview of symbols (Page 9).

(3) Tabs

Work areas such as projects or certain default setting documents are displayed in individual tabs. All project-related tabs have their own work area. The documents can be moved, minimized, maximized or resized.

(4) Active dialog box

The currently active dialog box is in the foreground. The menu bar and the toolbar match this dialog box.

(5) Document information

The following symbols followed by a corresponding number are used to display the document information:

▦	The total number of data records currently displayed in the document.
▯	The total number of data records currently selected in the document.
✎	The total number of directly changed data records in the document that have not yet been backed up.
◔	The last time and date on which the data records displayed in the document were updated.

(6) Message log

Context-dependent messages for executed actions are displayed in the message log. The messages are listed from bottom to top, the last (newest) message is displayed at the top. Each message has one of the following 3 symbols.

- ⊗ (error)

- ⚠ (warning)

- ⓘ (information)

Each message has a date and a description.

To clear the list, select a message and select the "Delete" command from the shortcut menu.

There is a dividing line above the message log (in the figure you can see two small arrows). You can adjust the size of the message log using this dividing line. Left-click on the dividing line and drag it to the required position.

1.2 Overview of symbols

The table below lists all the symbols that can be displayed in the toolbar. The symbols that are available at any given moment depends on the current dialog box or document.
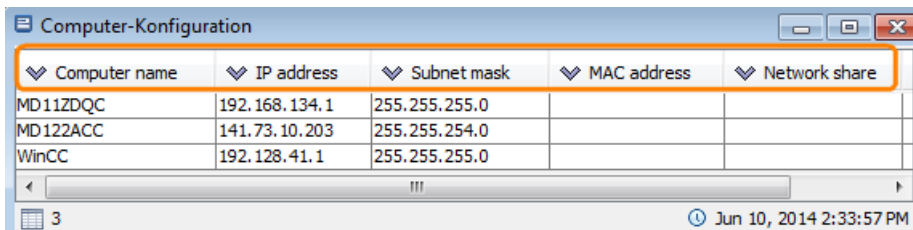
×	Closes the current tab
?.?	Opens the "Sensor types" tab. You can find additional information on this in the section: Sensor types (Page 25).
	Opens the "Module types" tab. You can find additional information on this in the section: Module types (Page 28).
	Opens the "CPU modules" tab. You can find additional information on this in the section: CPU modules (Page 30).
	Opens the "Project settings" dialog box. You can find additional information in: Project settings (Page 33).
	Opens the "Computer configuration" dialog box. You can find additional information in: Computer configuration (Page 34).
	Opens the "Resource configuration" dialog box. You can find additional information in: Resource configuration (Page 38).
	Opens the "Resource distribution" dialog box. You can find additional information in: Resource distribution (Page 45).
	Opens the "Resource timing behavior" dialog box. You can find additional information in: Resource timing behavior (Page 51).
	Opens the "HLL blocks" dialog box. You can find additional information in: HLL blocks (Page 59).
	Opens the "Signal list" dialog box. You can find additional information in: Signal list (Page 47).
	Opens the "Communication connections" dialog box. You can find additional information in: Communications connections (Page 62).

Opens the "Connections to auxiliary systems" dialog box. You can find additional information in: Connections to auxiliary systems (Page 66).

Executes a consistency check for the current project. You can find additional information in: Consistency check (Page 85).

Starts the wizard for generating the emulation environment. You can find additional information in: Creating an emulation environment (Page 89).

Starts the diagnostics for monitoring the emulation environment. You can find additional information in: Diagnostics (Page 86).

Opens the "Hardware configuration import" dialog box. Only available if one of the following dialog boxes is active:

- Resource timing behavior
- Resource configuration
- Signal list

You can find additional information on this in the section: Hardware configuration import (Page 71).

Opens the "Symbol import" dialog box. Only available if the "Signal list" dialog box is active. You can find additional information on this in the section: Symbol import (Page 72).

Opens the STL source import wizard. Only available if the "Signal list" dialog box is active. You can find additional information on this in the section: STL source import wizard (Page 73).

Saves a change in an active dialog box.

Imports the basic settings. Only available if one of the following dialog boxes is active:

- Sensor types
- CPU modules
- HLL blocks

You can find additional information on this in the section: Basic settings (Page 25).

Opens a dialog box for inserting a new object.

Opens the "Properties..." dialog box. Content and view depend on the dialog box from which the properties are accessed.

Deletes one or more selected objects. This action cannot be undone.

Undoes all changes that have not yet been saved.

Updates one or more selected objects.

Selects the "In use" checkbox for the selected object. Only available if the "HLL blocks" dialog box is active. You can find additional information on this in the section: HLL blocks (Page 59).

Selects the "NOP" checkbox for the selected object. Only available if the "HLL blocks" dialog box is active. You can find additional information on this in the section: HLL blocks (Page 59).

Sets the selected object to the default settings. Only available if the "HLL blocks" dialog box is active. You can find additional information on this in the section: HLL blocks (Page 59).

ⓘ   Opens the "Signal statistics" window. This window displays the number of binary and analog inputs and outputs in the signal list. Only available if the "Signal list" dialog box is active.

    Carries out memory reset for the selected resource. Only available if the "Resource configuration" dialog box is active.
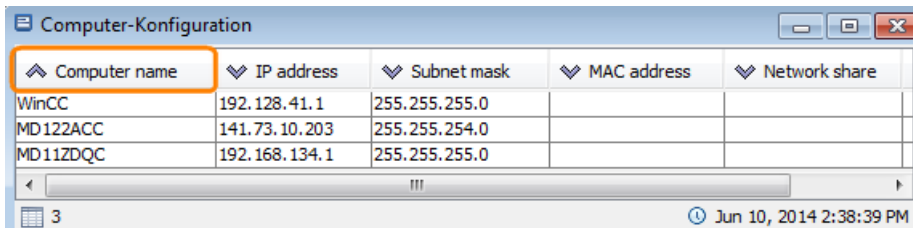
1.3 Sorting table contents

All documents and dialog boxes with a table view feature a sorting function. Click the table header to activate the sorting function. When the sorting function is activated for the first time, the table contents appear in ascending order and an arrow symbol appears before the column header:

Click the table header to change the order from ascending to descending and vice versa. The arrow symbol changes accordingly :

Right-click on the column header to open a window that lists the column names and in which you can change the current sorting and filtering rules:
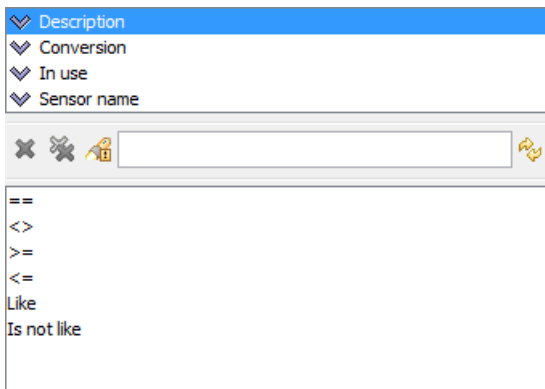
In the top part of the window, you select one or more columns and start the sorting processes.

In the bottom part of the window, you select the filter criteria for the selected columns. You can find additional information on filters in the section: Filtering table contents (Page 12).

The following functions are available for sorting:

- Exclude columns from sorting.
  Select at least one entry in the list and click "✖".

- Reset the sorting rule.
  Click "✖".

- Change sorting for each column from ascending order to descending order and vice versa
  by double-clicking the relevant column name.

- Change the priority of a column.
  Drag the column name in the list to a different position. The column at the very top has the highest priority.

- Apply sorting rules and close the window.
  Click "✎".

You cannot change the sorting rules if the document contains unsaved changes.

Sorting function symbols

The sorting function uses the following symbols to indicate the current status:

∨	This column is sorted in ascending order.
∧	This column is sorted in descending order.

1.4 Filtering table contents

A filter can also be applied to each column for which the sorting function is activated. You select the filter criteria in the same window.

In the top part of the window, you select one or more columns and start the filtering and sorting processes. You can find additional information on sorting in the section: Sorting table contents (Page 11).

In the bottom part of the window, you specify the filter criteria for the selected columns. The filter criteria that are displayed depend on the data type of the selected column. There are three value ranges:

- **Boolean values**

- **Numerical values**

- **Text**

The following filter processes can be executed directly:

- Exclude columns from sorting and filtering.
  Select at least one entry in the list and click "✖".

- Reset the sorting or filtering rule.
  Click "✖".

- Apply filtering and sorting rules and close the window.
  Click "🐾".

- Activate/deactivate current filter criteria.
  Click "🖊".

Note

Filter criteria can only be activated when a valid filter criterion has been specified.

Filter based on Boolean values

When filtering for Boolean values, a corresponding column must be selected and the check box must then be selected or cleared:
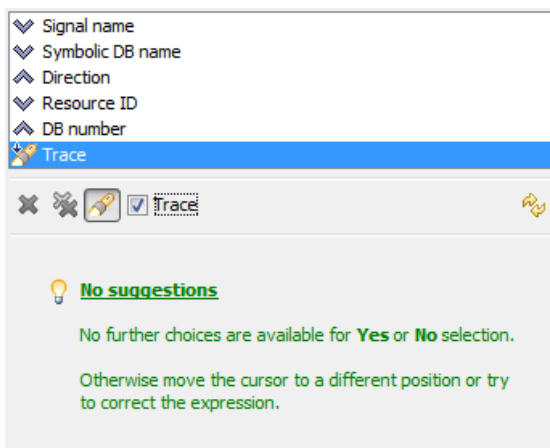
A check box with the column header is displayed for this filter instead of the text box.

The filter becomes active as soon as you select or clear the check box or when you click "🔎".

Filter based on numerical values

To apply a filter based on numerical values, you must select a valid column and then an operator. The available operators are shown in the lower window area:
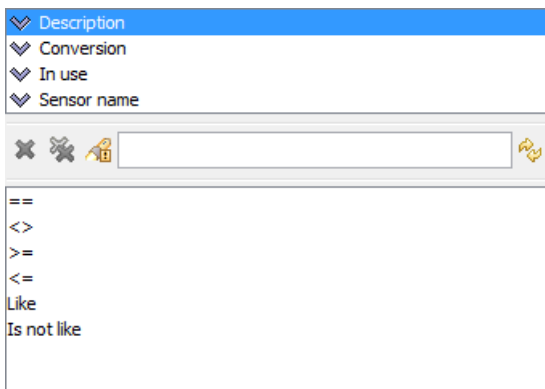
Select the required operator and drag it into the text box. Alternatively, double-click the operator:
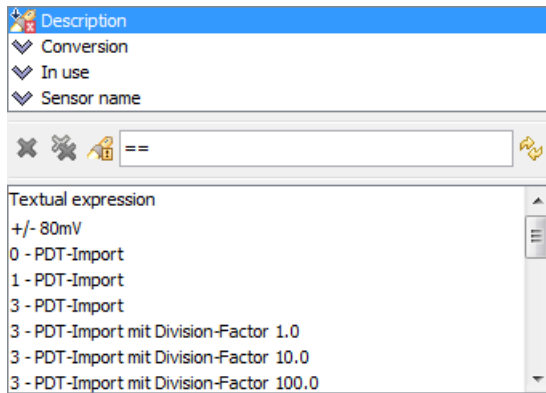
If the operator is in the text box, the cell contents of the selected column are now displayed in the lower window area. Select the required content and drag it into the text box as well. You can also double-click the content. The content in the text box is automatically set in single quotation marks:
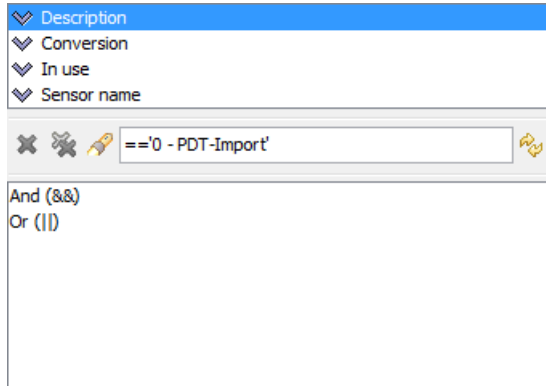
The filter is automatically activated when the filter criterion is complete and valid. You can link additional filter criteria with the current criterion by selecting the operators "And" ("**&&**") and "Or" ("**||**") and adding additional table contents.

Filtering based on text

You filter for text as you would for numerical values. Instead of the cell content, you select the value "Textual expression". Single quotation marks are then displayed in the text box into which you enter the required text.

You can also use placeholders when you filter based on text. The use of placeholders (%) is only possible in connection with the operators "like" and "not like". In connection with the other operators, the placeholder character is used as a normal character for filtering. The filter is automatically activated when the filter criterion is complete and valid.

Filter function symbols

The filter function uses the following symbols to indicate the current status of a filter criterion and the associated sorting:

The edited filter criterion is complete and valid. It can be activated or deactivated.

The modified filter criterion requires additional information to be activated. Enter filter criteria, or simply click on the toggle button to the left of the filter editor component to activate the filter.

The modified filter criterion is incomplete and therefore invalid. If you do not correct it, you cannot activate it.

For this column, a filter criterion was activated with additional, ascending sorting order of the columns.

For this column, a filter criterion was activated with additional, descending sorting order of the columns.

The filter criterion was assigned to a column but it is invalid and was deactivated. This column is sorted in ascending order, however.

The filter criterion was assigned to a column but it is invalid and was deactivated. This column is still sorted in descending order, however.

Once a filter has been successfully applied, the table header is highlighted to indicate that the table is now only showing filtered content:

Resource Type	AP Num...	Stati...	Entry Poi...	H-System	Redund...

1.5 Basic operator control actions

Some basic operator control actions are available in each document and in many dialog boxes; they also have the same functionality.

The following options are available for accessing a basic operator control action:

- Select from the shortcut menu
  Highlight a cell in the table and select the required operator control action from the shortcut menu.

- Select from the toolbar
  Click on the corresponding symbol in the toolbar.

- Select from the "Edit" menu command
  Click on "Edit" in the menu and select the required operator control action.

- Use keyboard shortcut
  You can find the keyboard shortcuts below in the description of the respective operator control action.

The basic operator control actions are described below. You can find the corresponding symbol from the toolbar and the keyboard shortcut for each description. Whether or not an operator control action can actually be executed depends on the context. Actions that cannot be executed are grayed out.

Save

💾 **Ctrl + S**

This operator control action saves all changes that you have made to the database.

If you try to close a document containing changes that have not yet been applied, a corresponding message is displayed.

Import

📥 **Ctrl + I**

This operator control action transfers application data to the project database.

A dialog box opens in which you enter the import settings. An import function is only available in the context of certain documents. You can find additional information on this in the section: "Import" menu (Page 71).

Add

➕ **Ctrl + N**

This operator control action creates a new entry based on the current dialog box or the current document. A dialog box opens in which you can enter data and view information about the new entry.

Undo

↩ **Ctrl + Z**

This operator control action undoes all changes that have not yet been saved.

Execution of this operator control action must be confirmed in a message window.

Properties

✏ **Enter key or double-click**

This operator control action opens a dialog box in which you can enter data and view information about the currently selected entry.

Note

If you have made changes directly in the table view, you must save before this operator control function can be called.

Delete

✖ **Del**

This operator control action deletes one or more entries. At least one entry must be selected.

Execution of this operator control action must be confirmed in a message window.

Note

"Delete" cannot be undone, nor can deleted entries be restored.

Update

🖉 **F5**

This operator control action refreshes the current view. All data is retrieved again from the database. This operator control action is only available if you have not made any changes directly to the document.

1.6 Wizards

Wizards guide you through a particular application scenario step-by-step. The individual steps are performed in turn using actions. Wizards provide a user interface that includes all property pages of the actions that have to be performed.

The wizard ensures that you execute the required steps completely and in the correct order.

Wizards can be stopped and continued at a later point without your losing information already entered.

1.7 Automatic check of entries

SIMIT VC checks some user entries in dialog boxes for plausibility. Input boxes with this functionality show missing or incorrect entries outlined in red or yellow:

| Subnet mask | |
| MAC address | |

If the entry is essential for correct functioning, it is outlined in red. Editing and saving are not possible.

If the entry is optional or the text box can be filled at a later point, it is outlined in yellow. Editing and saving are possible.

"Start" menu

2

2.1 Create new project

Symbol

🗀

Description

Use this menu command to create a new project. The following dialog box opens:
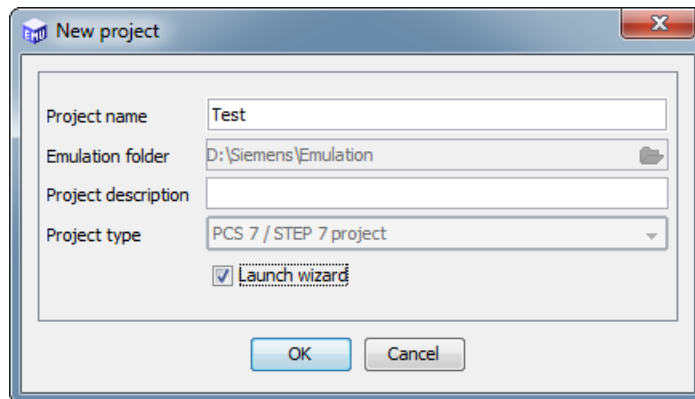
Enter the following data:

- **Project name**
  The name of the project as it appears in the storage path. The corresponding SIMIT project must be given the same name when you generate it.
  If the SIMIT project already exists and you later want to create an Emulation Manager project, you must enter the name previously specified for the SIMIT project.
  The name must not exceed a maximum length of 17 characters and must not contain any special characters.

- **Emulation folder**
  The path to the folder where you have installed SIMIT VC. The emulation project is stored in the subfolder "\plants\<project name>". This path cannot be changed.

- **Project description**
  A user-defined description of the project. This entry is optional.

- **Project type**
  The project type is preset to "PCS 7 / STEP 7 Project".

- **Launch wizard**
  Select this check box if you want to use the wizard for creating a new project. The wizard starts automatically as soon as you close the dialog box. You can find more information about the wizard in the section: Wizards (Page 17).

Click "OK" to create the new project and close the dialog box. The project opens automatically.

2.2 Open project

Symbol

Description

This menu command opens the following dialog box:
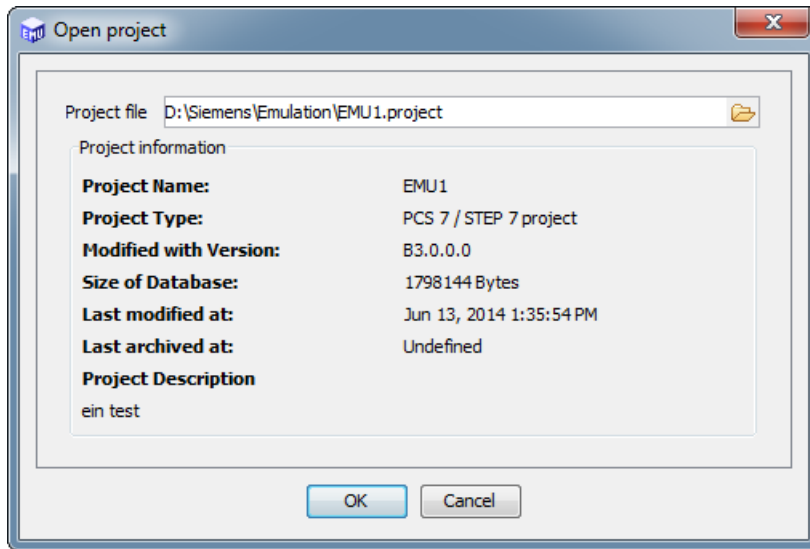
The following values and information are displayed:

- **Project file**
  This is where you specify the project file that you want to open. The project file must be in the emulation folder. Enter the full path directly or click " " to navigate to the emulation folder.

Project information

Some additional data for the project currently selected are displayed in this area:

- Project name:
  The name of the project.

- Project type:
  The project type is always "PCS 7 / STEP 7 Project".

- Modified with Version:
  The SIMIT VC version with which the project was created or last modified.

- Size of the database:
  The size of the project database in bytes.

- Last modified at:
  The date of the last modification.

- Last archived on:
  Date last archived.

- Project description
  All available descriptions for the project.

Project information cannot be changed here.

All project files are located in the directory which you specified as the "Emulation folder" when you created the project. You can find additional information in: Create new project (Page 19).

Click "OK" to open the desired project. When you open a project, it is displayed in its own tab. Several projects can be open at the same time. Each project is displayed in a separate tab.

The "Continue a canceled action" dialog box may appear. You can find additional information on this in the section: Continue action (Page 69).

2.3 Close view

Symbol

×

Description

Click this symbol to close the current tab. If a project is closed with this command, you will first see a message that you have to confirm. The command can only be executed when at least one tab is open.

2.4 Archive project

Symbol

Description

Use this menu command to archive an existing project. Use this function if you want to back up a project or transfer the project to a different location. This could be either a new file path or a different machine.

The following dialog box opens:
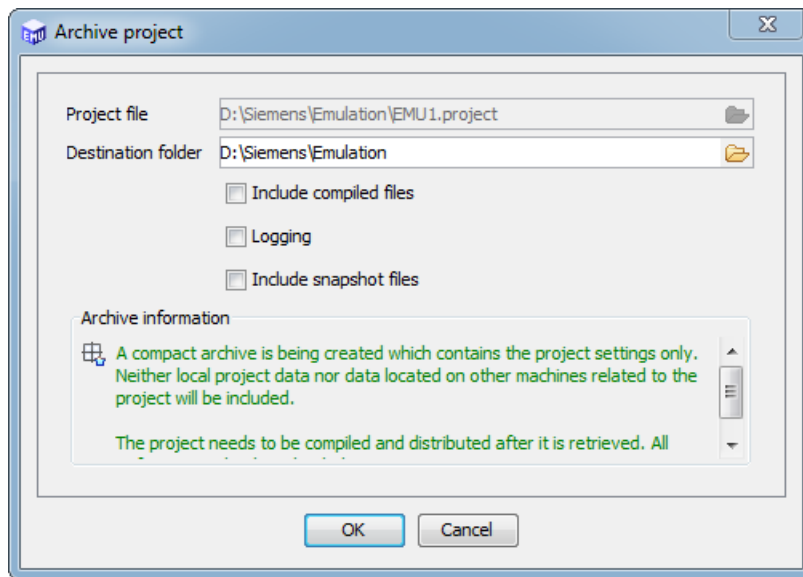
The following values and information are displayed:

- **Project file**
  Here, you have to specify the full path of the project file to be archived. Enter the full path directly or select the path to the project file using the " 🖿 " button. When you have a project open and the corresponding tab is selected, the project is automatically archived and there is no need to make a selection.

- **Destination folder**
  Here, you specify the destination directory in which the archived project is to be saved. Enter the path directly or select the destination directory using the " 🖿 " button.

- **Include compiled files**
  Select this check box if you want to integrate the following generated files in the archive:

  - Files that were created during generation

  - Default files

  - Files imported into the project

  - All other files in the directory of the project

- **Logging**
  Select this checkbox if you also want to archive the message log of the project.

- **Include snapshot files**
  Select this check box if you want to archive the snapshots of the project as well.

- **Archive information**
  Shows you some information about the archive you are about to create. The scope of the archive is also displayed depending on the selection of the "Include compiled files" option:

  - *Compact* contains only the project database. This needs the least space.

  - *Local* contains all local data. This option is only relevant when a non-open project is archived. In this case, cross-computer data is left out.

  - *Complete* includes additional data from other computers that are part of the project. This type requires the most disk space.

Click "OK" to apply the settings you have made. The selected project is archived.

Note

Do not execute any file operations with project files or project directories using operating system tools (e.g. Windows Explorer). This can damage the project. An SIMIT VC project can only be renamed or moved using archive and then retrieve.

2.5 Retrieve project

Symbol

Description

Use this menu command to retrieve a project from an archive.

The following dialog box opens:
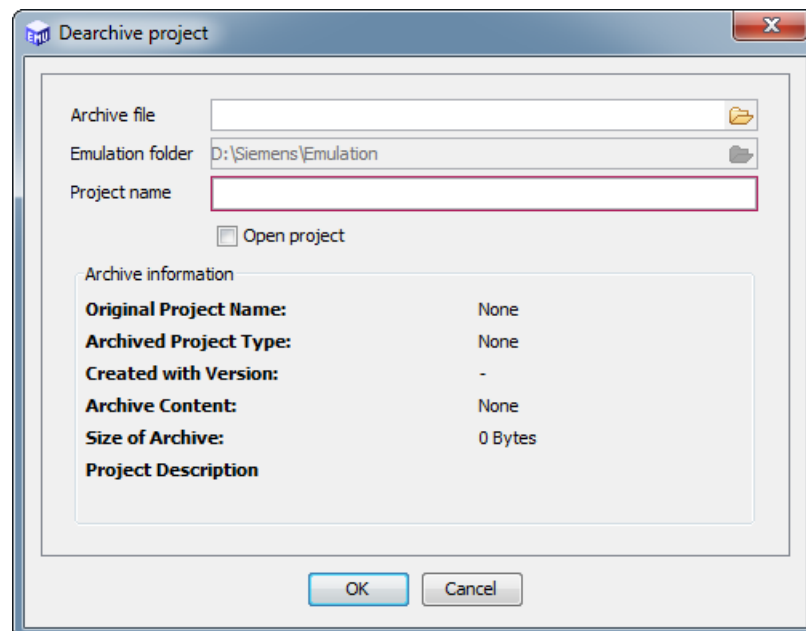
The following values and information are displayed:

- **Archive file**
  Here, you have to specify the full path of the file which is to be retrieved. Enter the full path directly or select the file using the " 📂 " button.

- **Emulation folder**
  This is the installation directory of SIMIT VC. This setting cannot be changed here.

- **Project name**
  The project name that the project is to receive after retrieval. Accept the default name or

enter a new one. If there is already a project with the same name, overwrite the existing project or cancel the retrieve process.

- **Open project**
  Select this check box if you want to immediately open the project after retrieving it.

- **Archive information**
  Displays certain information about the archive:

  - The original project name

  - The archived project type

  - The SIMIT VC version used to create the archive

  - Archive content

  - The size of the project database

  - Descriptions for the project

Click "OK" to apply the settings you have made and start the retrieve process.

2.6 Options

Symbol

Description

You can make general settings under "Options". The following dialog box opens:
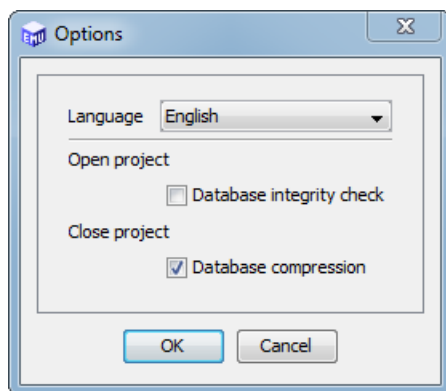
The following values and information are displayed:

- **Language**
  The available languages are "English" and "German". The interface of SIMIT VC is then displayed in this language.

- **Open project** - Database integrity check
  Select this check box if you want to perform an automatic integrity check every time you open a project.

- **Close project** - Database compression
  Select this checkbox if you want to compress the database every time you close a project. SIMIT VC will then compress the project data in order to reduce the storage space required.

Click "OK" to apply the changes you have made. The settings are active immediately.

2.7 Basic settings

2.7.1 Sensor types

2.7.1.1 Sensor types

Symbol

?-?

Description

This tab provides a table view of all sensor types that have already been preselected in SIMIT VC.

Sensor name	In use	Conversion	Description
-2.5…+2.5V	✓		
-500…+500mV	✓		
-10…+10 V	✓		
-80…+80mV	✓		+/- 80mV
0…10V	✓		
0…20 mA	✓		
1…5V	✓		
4…20 mA	✓		alternativ sensor type (4_TO_20_MA)
4…20 mA	✓		

Sensor types are bound to a signal to control its normalization and conversion. The sensor types included in these basic settings are only a predefined list. They can be used in any project.

The following data is displayed in the table view:

- **Sensor name**
  The name of the sensor type.

- **In use**
  Select this check box if you want to use this sensor type in your project.

- **Conversion**
  The type-specific conversion type for the sensor values. Valid values are:

  – INT (integer S7 representation)

  – EXP (exponential S7 representation)

  – FLOAT (IEEE 754 representation)

  If this box is empty, this corresponds to normalization depending on the sensor type configuration and conversion into integer S7 representation.

- **Description**
  A comment for the sensor type. This value can be changed directly in the table view.

Changes do not automatically affect the sensor types used in the projects. They must first be imported in the context of the project.

You can add, edit and delete entries in the table view. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

2.7.1.2 Sensor types - "Properties..." dialog box

When you select the "Add" or "Edit" command from the "Sensor types" table view, the following dialog box opens:
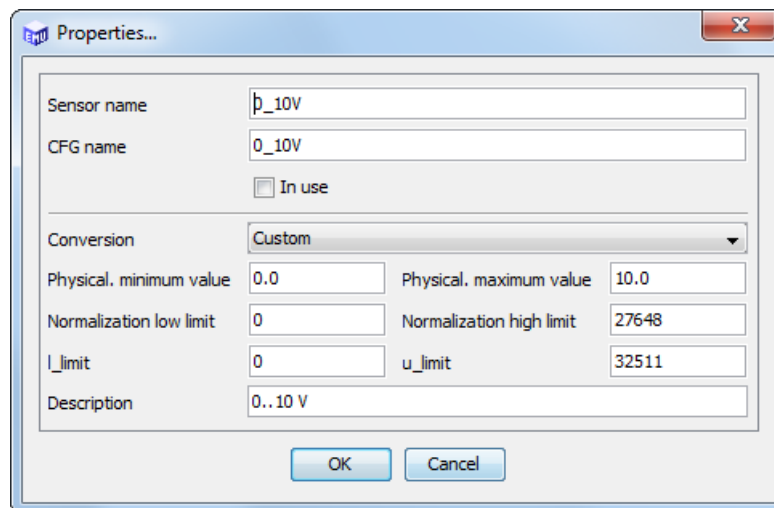
The dialog box shows the properties of the selected sensor type.

If you have selected the "Edit" action, the dialog box already includes data. If you have selected the "Add" action, the dialog box is empty.

The following values and information are displayed:

- **Sensor name**
  The name of the sensor type. Each name may only be assigned once.

- **CFG name**
  Enter the name of the sensor type as it is displayed in the CFG file (*.cfg) . This name can be used only once, because it is used during the import of the hardware configuration to identify the sensor type. Note that the specified name is case-sensitive.

- **In use**
  Select this check box if you want to use this type of sensor. If the check box is cleared, the sensor type is treated as undefined.

- **Conversion**
  Select the conversion type from the drop-down list. The following types are available:

  – S7 exponential display

  – IEEE-754 float display

  – S7 integer display

  – User-defined
    Linear mapping of the physical variables to the normalization values in the S7 integer display.

- **Physical minimum value**
  Enter the physical minimum value of the sensor type that corresponds to the low engineering value. Only floating point numbers are allowed here.

  Enter "0.0" as the default if no normalization is required.

- **Physical maximum value**
  Enter the physical maximum value of the sensor type that corresponds to the high engineering value. Only floating point numbers are allowed here.

  Enter "0.0" as the default if no normalization is required.

- **Normalization low limit**
  Enter the low limit for the normalization here. Only integers are allowed here.

  Enter "0" as the default if no normalization is required.

- **Normalization high limit**
  Enter the high limit for the normalization here. Only integers are allowed here.

  Enter "0" as the default if no normalization is required.

- **l_limit**
  Enter the low limit of the value range after normalization. All values below this are truncated. Only integers are allowed here.

  Enter "0" as the default if no normalization is required.

- **u_limit**

  Enter the high limit of the value range after normalization. All values above this are truncated. Only integers are allowed here.

  Enter "0" as the default if no normalization is required.

- **Description**

  Enter any comment on the sensor type or leave this box empty.

The normalization settings (physical minimum and maximum values, high and low limits of normalization, and high and low value range) are not important if you have specified a specific conversion type. In this case, all the boxes are grayed out (disabled).

2.7.2 Module types

2.7.2.1 Module types

Symbol

Description

This tab shows a table view of all known module types.

Order number	Type	In use	Description
_S7H_HSP_DP_INTEGR_417_4HT14_FW45_CT		☐	DP
_S7H_HSP_MPI_DP_417_4HT14_FW45_CT		☐	MPI/DP
_S7H_HSP_SUBMODUL_HART__TF01_CT		☐	HART field device
_S7H_SUBMODUL_HART_4GE00_CT		☐	HART-Feldgerät
--> 12 Byte In, 4 Byte Out, konsis		☐	163
--> 24 Byte in, 8 Byte out, consi		☐	183
--> AUMA 12 Byte IN, 4 Byte OUT		☐	163
--> Basic Type 2	DI	☑	8DI
--> Basic Type 3	DI	☑	8DI

The module types provide the PCS 7 hardware import with information about the different I/O devices. This information then determines the imported signal types. SIMIT VC has a predefined list of module types. This list may be extended by the PCS 7 hardware import if new unknown modules are identified. You can find additional information on this in the section: Hardware configuration import (Page 71)

The following values and information are displayed in the table view:

- **MLFB**

  A unique identification number of the modules as it is used in PCS 7.

- **Type**

  The type of the module. All modules with no type specification are treated as "other" modules.

- **In use**
  Select this check box if the module should be available for the PCS 7 hardware import.

- **Description**
  An optional description of the module. This value can be changed directly in the table view.

You can add, edit and delete entries in the table view. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

2.7.2.2 Module types - "Properties..." dialog box

When you select the "Add" or "Edit" command from the "Module types" table view, the following dialog box opens:
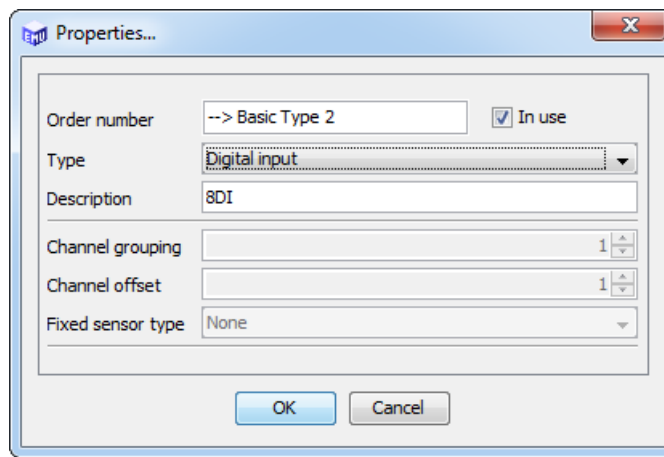
The dialog box shows the properties of the selected module type.

If you have selected the "Edit" action, the dialog box already includes data. If you have selected the "Add" action, the dialog box is empty.

The following values and information are displayed:

- **MLFB**
  The MLFB number (unique identification number) of the module.

- **In use**
  Select this check box if the module should be available for the PCS 7 hardware import. If this option is not activated, the module is treated as already known but is not included in the evaluations.

- **Type**
  Select a type from the drop-down list.

- **Description**
  Here you can enter any comment as a module description (optional).

- **Channel grouping**
  A channel grouping is a logical configuration unit. Here you specify how many channels are grouped in one channel grouping. This setting applies to all channels of this group. If the module does not have channel groupings, enter "1".

- **Channel offset**
  This setting specifies the offset of two channels in a channel grouping. This option is only available if the value of "Channel grouping" is above "1".

- **Fixed sensor type**
  Some modules have fixed sensor types for all channels. Enter the appropriate sensor type for the module or select "None" if no specified sensor type is available.

The options "Channel grouping", "Channel offset" and "Fixed sensor type" are only available for analog input and output modules.

2.7.3 CPU modules

2.7.3.1 CPU modules

Symbol

Description

This tab provides a table view of all predefined CPU modules that have already been selected in SIMIT VC.

Name	Order number	Firmware
CPU 315-2 DP	6ES7 315-2AF03-0AB0	
CPU 316-2 DP	6ES7 316-2AG00-0AB0	
CPU 318-2	6ES7 318-2AJ00-0AB0	
CPU 414	6ES7 414-4HJ00-0AB0	
CPU 414-3 DP	6ES7 414-3XJ00-0AB0	
CPU 416	6ES7 416-2XK02-0AB0	
CPU 417-4	6ES7 417-4HL01-0AB0	

Use this tab to define specific CPU modules.

The CPU modules contained in these basic settings are a predefined list of available modules that can be used in each project.

The following data is displayed in the table view.

- **Name**
  The name of the CPU module.

- **MLFB**
  The MLFB number (unique identification number) of the CPU module.

- **Firmware**
  The firmware version of the CPU module.

Changes do not automatically have an effect on the projects. The CPU modules first have to be imported into them. The settings from the "Project settings" have priority. You can find additional information on this in the section: Project settings (Page 33).

You can add, edit and delete entries in the table view. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

2.7.3.2 CPU modules - "Properties..." dialog box

When you select the "Add" or "Edit" command from the "CPU modules" table view, the following dialog box opens:
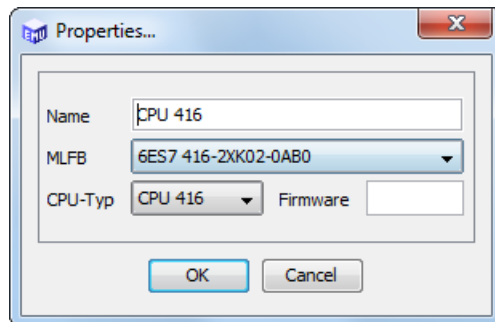
The dialog box shows the properties of the selected CPU module.

If you have selected the "Edit" action, the dialog box already includes data. If you have selected the "Add" action, the dialog box is empty.

The following values and information are displayed:

- **Name**
  Enter a name for the CPU module. The name must only be assigned once within the project.

- **MLFB**
  Select the MLFB number (unique identification number) of the CPU module here. The drop-down list contains all the known MLFB numbers from the "Module types" tab. You can find additional information on this in the section: Module types (Page 28).

- **CPU type**
  Select the CPU type of the CPU module here. The drop-down list contains all the known

CPU types from the "CPU modules" tab. You can find additional information on this in the section: CPU modules (Page 57).

- **Firmware**
  Enter the firmware version of the CPU module as a four-digit integer. Example: Firmware version "V3.1" becomes "3100".

2.8 Exit application

Symbol

✖

Description

This menu command closes the Emulation Manager and SIMIT VC . If a project is open, it, too, is closed.
This command must be confirmed in a message window.

"Project" menu

<div style="text-align: right">3</div>

3.1 Project settings

Symbol

Description

This dialog box allows you to change settings related to the project currently open.

Project settings

Project name	EMU1
Emulation folder	D:\Siemens\Emulation
Project description	ein test
Cycle time (ms)	100
Time	Universal time (GMT)
License	6512387

☐ No consistency check ☐ Restore consistency check

[OK] [Cancel]
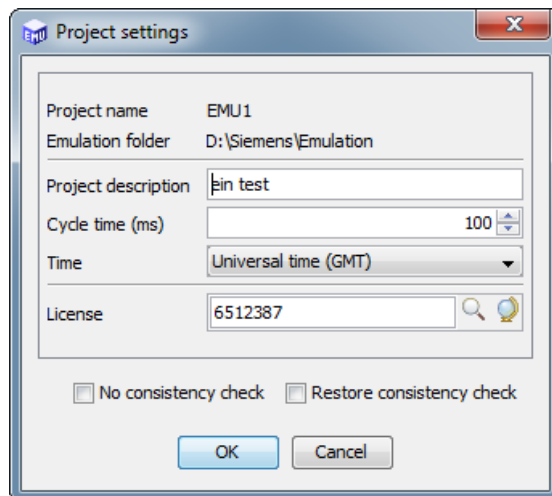
The following values and information are displayed:

- **Project name**
  The name of the currently open project. This value cannot be changed here.

- **Emulation folder**
  The installation directory of SIMIT VC. This value cannot be changed here.

- **Project description**
  Corresponds to the value that has been entered via the "Create new project" dialog box. This entry is optional.

  You can find additional information on this in the section: Create new project (Page 19).

- **Cycle time (ms)**

  This value defines the cycle time in milliseconds for emulation of the current project. The emulation cycles are started in this cycle. This setting should match the cycle time of these components in the SIMIT project, which is responsible for signal exchange between the SIMIT SF model and the emulation.

- **Time**
  The time base for the project. Select "System time (GMT)" or "Local time". The time is

communicated to the VCs at the start of simulation and serves as the basis for functions such as time stamps of the virtual controller.

- **License**

  The license associated with the project is displayed here. If this license is not available, the system searches for a suitable license in the network and then temporarily links it to the project.
  Click the magnifying glass icon to display the available licenses. You can search for licenses globally in the network or limit the search to the computer defined in the project. Select the required function with the 🔍 🌐 symbols.
  The available licenses are displayed in a dialog box. There you select the SIMIT SF-license for which one or more SIMIT VC-licenses are also installed and confirm the dialog box with "OK". The license is now linked to the project.

- **No consistency check** check box
  Select this check box to globally deactivate the consistency check.

- **Restore consistency check** check box
  Select this check box to reactivate the consistency checks that were deactivated in the individual configuration steps.

Click "OK" to confirm the changes you have made. The new properties are applied immediately.

3.2 Computer configuration
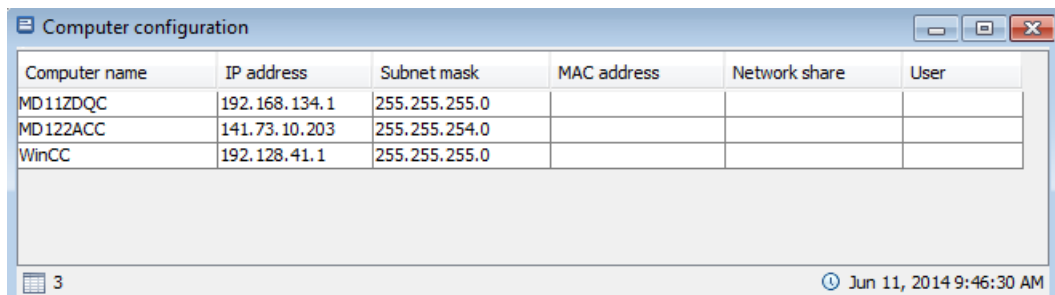
3.2.1 Computer configuration

Symbol

🖥️

Description

This dialog box provides a table view of all PCs in an emulation project.

Computer name	IP address	Subnet mask	MAC address	Network share	User
MD11ZDQC	192.168.134.1	255.255.255.0			
MD122ACC	141.73.10.203	255.255.254.0			
WinCC	192.128.41.1	255.255.255.0			

3   ⓘ Jun 11, 2014 9:46:30 AM

This dialog box allows you to add additional computers to the emulation project. All computers defined here are available for the resource distribution.

The following data is displayed in the table view:

- **Computer name**
  The name of the PC (hostname) as it appears in the network.

- **IP address**
  The IP address of the PC (main IP address).
  This IP address is entered for the network adapter used in Windows under the network connections in the properties for the "Internet Protocol version 4 (TCP/IPv4)". If you have entered additional IP addresses in the advanced properties of the network adapter for addressing VCs, these must be greater than the main IP address. You can find additional information in the manual "SIMIT Virtual Controller (VC) - User Manual > Creating a new emulation project > Computer configuration".

- **Subnet mask**
  The subnet mask of the interface.

- **MAC address**
  The MAC address (hardware address) of the network adapter installed in the PC.

- **Network share**
  The network share, if any.

- **User**
  The user name, if any, required for accessing a network share. This box can be changed directly in the table view.

You can add, edit and delete entries in the table view. You can find additional information on this in the section: Basic operator control actions (Page 15)

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

Note

Changes to the computer name or the IP address for PCs with resources already assigned may invalidate the resource distribution and the configuration of project AS already assigned. If you make such changes, check the resource distribution and the AS configuration for consistency afterwards.

3.2.2 "Properties..." dialog box

If you select an "Edit" or "Properties" action from the computer configuration, the following dialog box opens:
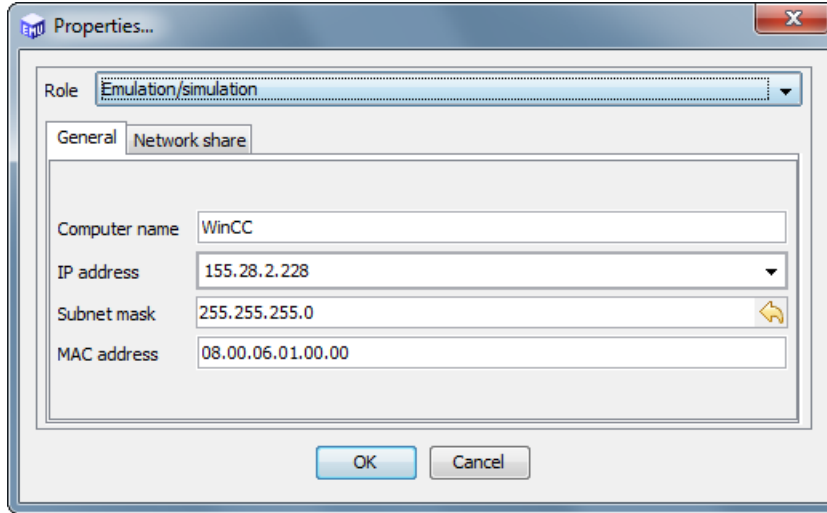
The following values and information are displayed:

- **Role**
  The assigned role of the computer: "Operator station (HMI)" or "Emulation/Simulation".

"General" tab

- **Computer name**

  Name of the PC (host name) as it appears in the network. Note that the specified name is case-sensitive.

- **IP address**
  Select the IP address either from the drop-down list or enter it directly in the text box.
  If no IP address could be determined automatically, a warning is displayed in the message log. This message can indicate one of the following errors:

  – The device name of the computer is incorrect.

  – The corresponding computer cannot be reached.

- **Subnet mask**
  The subnet mask of the interface.

Note

To enter the default (255.255.255.0), click the "⟲" button.

- **MAC address**
  The MAC address of the Ethernet adapter for this computer. Entered in regular format.

"Network share" tab

This tab is only relevant if the emulation platform consists of multiple computers. Otherwise, these text boxes can remain empty and the option deselected.
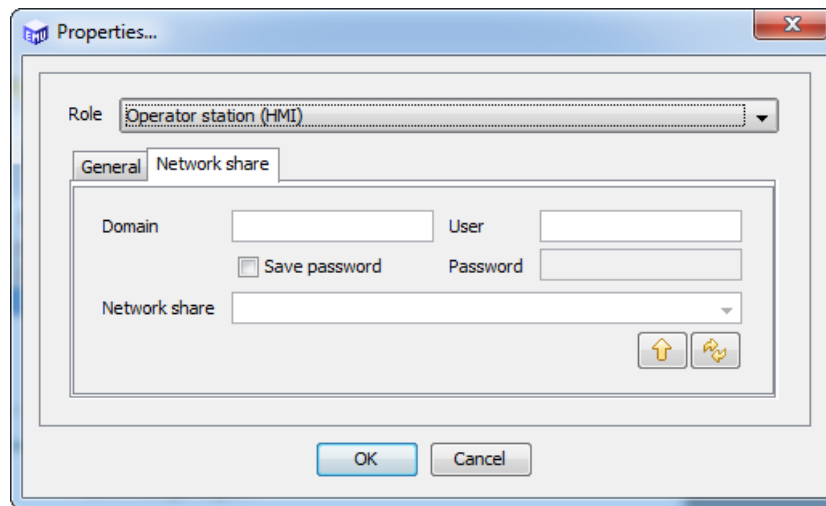
- **Domain**

  Name of the domain in which the computer is a member.

- **User**

  User name of the account on the computer accessed with network share properties.

- **Store password**

  Select this check box if a password is required for the account belonging to the given user name.

- **Password**

  Password for the account of the specified user name.

- **Network share**

  Network share which represents the root folder of SIMIT VC on the PC. If no network share properties can automatically be determined, enter them manually here. Network share properties are required if the emulation platform consists of multiple PCs.
  The drop-down list contains all subfolders of the most recently selected network share property. Navigate through the directory structure by selecting subfolders.
  Click "⚙" to list all subfolders of the currently selected folder.
  Click "⬆" to access the higher levels or delete the corresponding folder hierarchy directly in the editing box. Now press <ENTER>.
  If no share property can be determined automatically (this can take some time), a corresponding warning is displayed in the message log. This message can indicate one of the following errors:

  – The computer is member of a domain but no domain name was specified.

  – The specified user name is incorrect.

  – The account that belongs to the specified user name requires a password or the specified password is incorrect.

  – No network shares are available on the computer.

3.3 Configuring resources

3.3.1 Resource configuration

Symbol

Description

This dialog box provides an overview of the configured resources and the corresponding communication devices and communication interfaces.
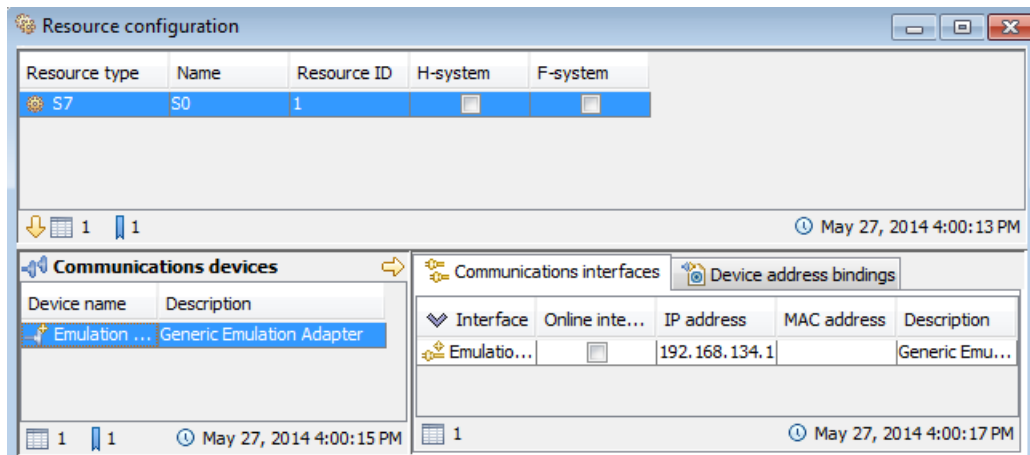
Resources

The configured resources are displayed in a table view.

"Communications devices" area

This area serves to represent the actually configured communication devices within an emulation. All communication devices of the actual control system that were determined by the hardware configuration are listed here.

- **Device name** column
  Name of the device, taken from the hardware configuration

- **Description** column
  General description of the device, taken from the hardware configuration.

"Communications interfaces" area

The communication interfaces of one or more communication devices are listed here. The display depends on the selection in the "Communications devices" section. The actually configured interfaces in networks and network cards within the emulation are displayed here. Only the interfaces for ISO communication and for UDP/TCP communication are displayed.

- **Interface** column
  Name of the interface, taken from the hardware configuration

- **PG interface** column
  Select this check box if the interface is to be used as PG interface.

- **IP address** column
  IP address of the interface. This information is relevant if the communication device is to be used for TCP or UDP communication. The IP address must be entered using the control panel on the computer on which a virtual controller is to run. It may be the primary IP address or a supplementary IP address.

- **MAC address** column
  The MAC address of the interface.

- **Description** column
  General description of the interface, taken from the hardware configuration.

"Device address link" area

The device addresses and the linked access points of one or multiple communications devices are listed here according to the selection in the "Communications devices" area. The actually configured device addresses on SIMATIC NET access points are displayed.

- **Logical device address (LADDR)** column
  Logical device address of the interface in accordance with the hardware configuration.

- **Access point** column
  Configurable access point for the emulation of the interface within the emulation environment.

- **Description** column
  General description of the interface, taken from the hardware configuration.

A generic emulation adapter, a corresponding communication interface and a device address binding are automatically created for each resource.

3.3.2 "Properties..." dialog box

If you select a resource in the "Resource configuration" dialog box and select the "Add" or "Edit" command, the following dialog box opens:
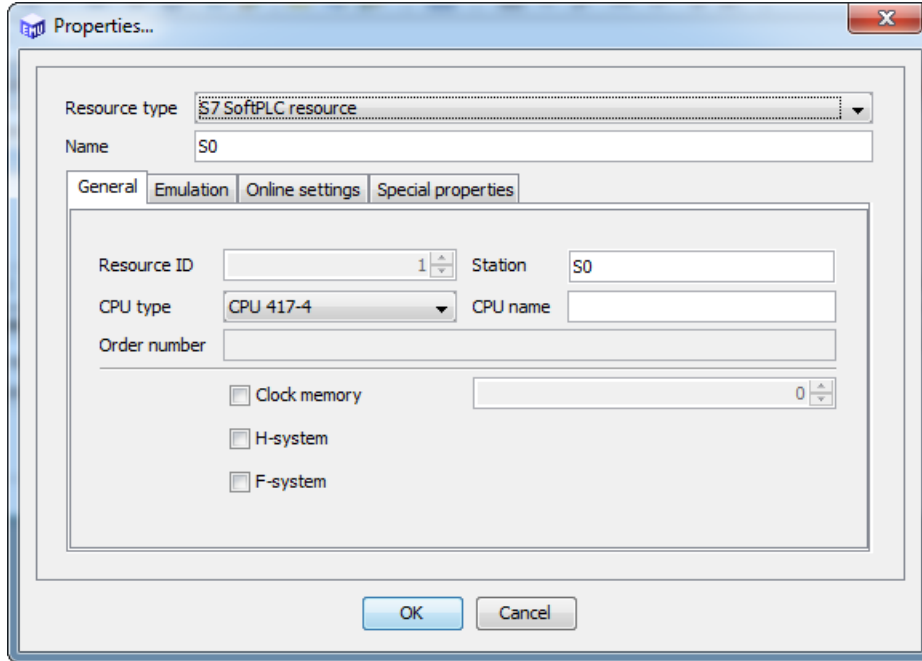
The following values and information are displayed:

- **Resource type**
  The resource type is specified here. The following settings are possible:

  – S7 SoftPLC resource (virtual controller)
  Emulation of a real controller.

  – Runtime component (RTM)
  Placeholder for a component or a system that is required during emulation runtime, for example HMI, PCS 7 OS/WinCC or another controller.

- **Name**
  The name of the resource, can be edited. Is taken from the hardware configuration and is used within the configuration to represent the resource.

"General" tab

- **Resource ID**
  The resource ID identifies the resource uniquely during configuration and runtime.

- **Station**
  The name of the station, taken from the hardware configuration.

- **CPU type**
  The type of the CPU. Taken from the hardware configuration on the basis of the MLFB number.

- **CPU**
  The name of the CPU, taken from the hardware configuration.

- **MLFB**
  The MLFB number is taken from the hardware configuration and cannot be changed. If an MLFB number was entered manually, this field remains empty.

- **Clock memory**
  Select this check box if you wish to use clock memories. When the check box is selected, a clock memory byte can be specified in the right input box. If the resource is created by importing a hardware configuration, these values are applied automatically.

- **H-system**
  Select this check box if you want to emulate the CPU as an H-system. Taken from the hardware configuration. Only one CPU is emulated, regardless of this setting.

- **F-system**
  Select this check box if you want to emulate the CPU as an F-system. Taken from the hardware configuration.

"Emulation" tab

- **Snapshot size**
  Expected size for snapshots; default is 5 MB. Values that are too small result in an error during storage and loading of snapshots.

"Online settings" tab

- **Activate engineering mode (online mode)**
  Select this check box if the online interface is to be permanently active.

  Note

  A permanently activated online interface increases the computing load and can reduce the performance of the system as a whole.

- **Security level**
  The security level of an F-CPU, taken from the hardware configuration. This value has to match the configuration.

"Special properties" tab

The special properties are internal SIMIT VC settings. These settings should only be changed in agreement with Product Support.

3.3.3 Communication devices - "Properties" dialog box

If you perform an "Add" or "Edit" action from the "Communication devices" area of the "Resource configuration" document, the following dialog box opens:
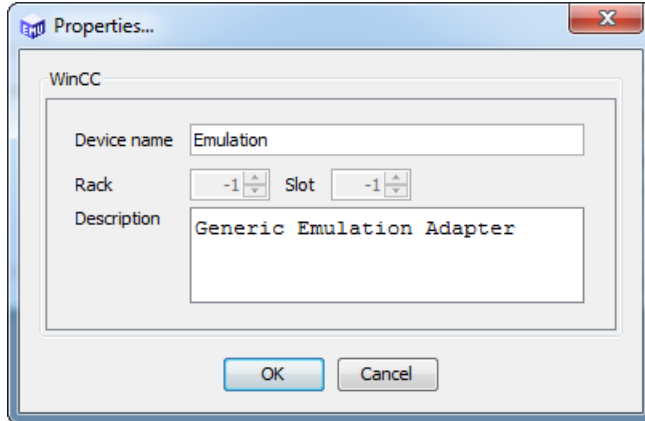
The values displayed here are taken from the hardware configuration.

The following values and information are displayed:

- **Device name**
  Name of the device, can be edited.

- **Rack**
  Rack number of the device, taken from the hardware configuration. A change in this value can result in the device not being recognized when a new hardware configuration is imported and thus not being updated. If a generic emulation adapter is used, this value cannot be changed.

- **Slot**
  Slot number of the device, taken from the hardware configuration. A change in this value can result in the device not being recognized when a new hardware configuration is imported and thus not being updated. If a generic emulation adapter is used, this value cannot be changed.

- **Description**
  Text that can be edited freely

3.3.4 Communication interfaces - "Properties" dialog box

If you perform an "Add..." or "Properties..." action from the shortcut menu of the "Communication interface" area of the "Resource configuration" document, the following dialog box opens:

The values displayed here are taken from the hardware configuration.

The following values and information are displayed:

- **Interface**
  The name of the interface, can be edited.

- **PG interface**
  Select this check box to use the interface as PG interface. Per resource, only one interface can be used as a PG interface. The generic emulation adapter must not be used as a PG interface unless only one VC is to run per computer.

- **Apply IP address of host computer**
  Select this check box if the IP address of the host computer is to be applied. This function is only available for the communication interface of the generic emulation adapter.

- **IP address**
  The IP address of the interface. The text box cannot be edited if the "Apply IP address of host computer" check box has been selected.

- **Subnet mask**
  The subnet mask of the interface.

- **Apply MAC address of host computer**
  Select this check box when the MAC address of the host computer is to be applied. This function is only available for the communication interface of the generic emulation adapter.

- **MAC address**
  The MAC address of the interface. The text box cannot be edited when the "Apply MAC address of host computer" check box has been selected.

- **Subslot**
  The subslot of the device. This selection is not available for the communication interface of the generic emulation adapter.

Note

If you change this value, the interface cannot be recognized during the import of a new hardware configuration and cannot be updated.

- **Description**
  Text that can be edited freely

3.3.5 Device address bindings - "Properties" dialog box

If you perform an "Add" or "Edit" action from the "Device address bindings" tab of the "Resource configuration" document, the following dialog box opens:
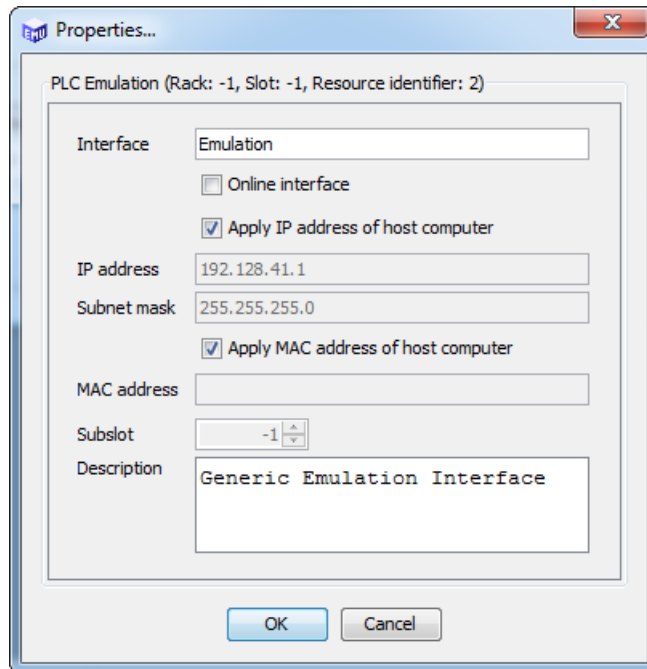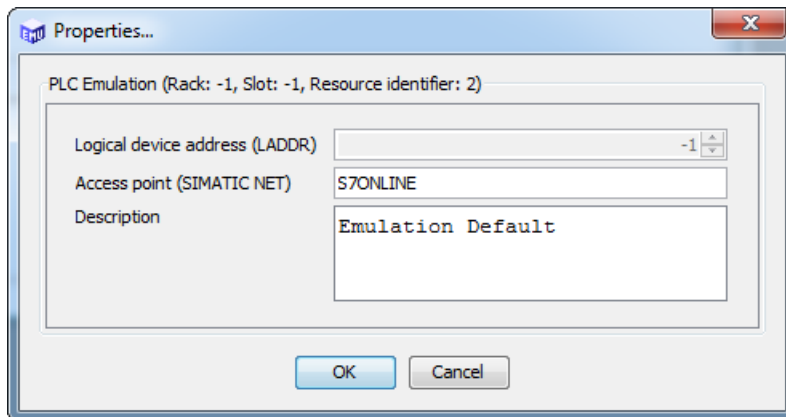

The values displayed here are taken from the hardware configuration.

The following values and information are displayed:

- **Logical device address (LADDR)**
  The logical device address of the interface in decimal representation

- **Access point (SIMATIC NET)**
  Binding of the device address with an access point in SIMATIC NET. The access point must be configured on the computer on which the resource is to run. This value is optional.

- **Description**
  Text that can be edited freely

3.4 Resource distribution

3.4.1 Resource distribution

Symbol

Description

This dialog box lists the resources that were configured for the project. To create a valid resource distribution, you must have added at least one computer to the computer configuration and one VC to the resource configuration of the project.
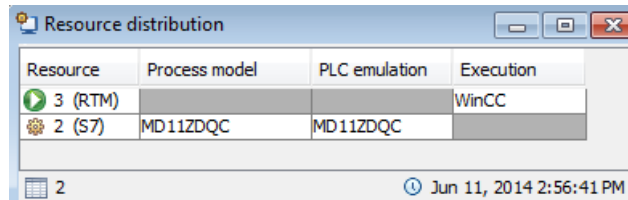
You use this dialog box to add or change the allocation of resources to PCs. Resources include all virtual controllers that are contained in the project, as well as some other components such as HMI systems and real AS/PLCs.

The following data can be displayed:

- **Resource**
  The name of a resource, a virtual controller or an HMI system.

- **Process or simulation model**
  The name of the PC on which the process model of the resource is run.

- **PLC emulation**
  The name of the PC on which the resource is emulated as virtual controller. Can be changed directly in the table.

- **Execution**
  The name of the PC on which the resource is executed. Can be changed directly in the table.

You can add, edit and delete entries in the table view. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

Note

Each emulation of a controller consists of two parts: The S7 program that is to be emulated and the corresponding part of the IO area, and in some cases also the process or simulation model that is to be simulated with SIMIT SF . Each of these parts must be assigned to a PC where **emulation** or **simulation** takes place. This can be the same PC.

All external resources such as HMI systems and real control systems are executed as they are. All these resources must be assigned to a PC where execution takes place.

3.4.2 "Properties..." dialog box

If you perform an "Add" or "Edit" action from the "Resource distribution" dialog box, the following dialog box opens:
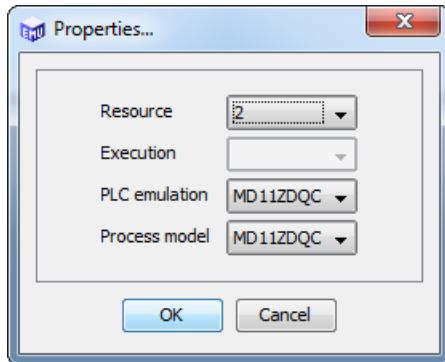
If you have selected the "Edit" action, the dialog box already includes data. If you have selected the "Add" action, the dialog box is empty.

The following values and information are displayed:

- **Resource**
  The resource number of the virtual controller; can be selected from the drop-down list.

- **Execution**
  From the drop-down list, select the name of the PC to which you want to assign an execution resource.

- **PLC emulation**
  From the drop-down list, select the name of the PC to which you want to assign an emulation resource (VC).

- **Process model**
  From the drop-down list, select the name of the PC to which you want to assign a process or simulation model resource.

The drop-down lists only contain those PCs that are included in the PC configuration of the project.

3.5 Signal list

3.5.1 Signal list

Symbol

Description

This dialog box provides a table view of all signals in the project.

The signal list is automatically filled by an import functions, but it can also be edited manually.

The following data is displayed in the table view:

- **Signal name**
  The symbolic name of the signal (tag name).

- **Symbolic DB name**
  The symbolic name of the data block.

- **Direction**
  The direction of the signal (from a VC point of view).

- **Resource ID**
  The resource ID of the controller to which the signal is assigned.

- **DB number**
  The number of the data block, if any; otherwise the number of the I/O or memory.

- **Address**
  The address of the signal (in the data block, I/O or memory).

- **Bit offset**
  The bit offset for binary signals.

- **Type**
  The specific data type for SIMIT VC .

- **Trace**

  Select this check box if you want to monitor the signal.

- **Hardwired**

  Shows whether or not the signal has a fixed connection.

- **Fixed**

  Select this check box if the signal is fixed.

- **Sensor type**

  The sensor type of the signal.

- **Physical minimum value**

  The minimum engineering value.

- **Physical maximum value**

  The maximum engineering value.

- **Normalization low limit**

  The low limit of normalization.

- **Normalization high limit**

  The high limit of normalization.

- **Description**

  The description of the signal.

You can add, edit and delete entries in the table view with the "Properties..." dialog box. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort in the table view. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

You can find information on connecting the signal interface in SIMIT SF and on using data block routing in the SIMIT SF help.

3.5.2 "Properties..." dialog box

If you select the "Add" or "Edit" actions from the signal list, the following dialog box opens:

If you have selected the "Edit" command, the dialog box contains the values of the selected sensor; if you have selected "Add", the dialog box is empty.

The following values and information are displayed:

- **Signal name**
  The name of the signal. The name must be unique within the whole project.

- **Direction**
  The direction of the signal (from a VC point of view).

- **Type**
  The data type of the signal specific to SIMIT VC . The following types are available:

  – DB input byte

  – DB input DWord

  – DB input word

  – PI byte

  – PI DWord

  – PI Word

  – DB output byte

  – DB output DWord

  – DB output word

  – PO byte

  – PO DWord

  – PO Word

  – Input bit

  – Output bit

- **Resource ID**
  The resource ID of the controller to which the signal is assigned.

- **DB no**
  The number of the data block that contains the signal. This value is "0" for an I/O signal. If the signal is in the memory, enter "-1".

- **Address**
  The address of the signal.

- **Bit offset**
  The bit offset of the signal. If this is an analog signal, the bit offset is "0".

- **Trace**
  Select the check box if you want to monitor the signal during the simulation.

"Sensor type" tab

- **Sensor type**
  The name of the sensor type that creates the signal. The value corresponds to the entry in the "Sensor name" column in the project-specific settings of the sensor types.

- **Physical minimum value**
  The minimum engineering value. This value is only relevant if you want to overwrite the default value for the sensor type; otherwise, the value here must be "0.0".

- **Physical maximum value**
  The maximum engineering value. This value is only relevant if you want to overwrite the default value for the sensor type; otherwise, the value here must be "0.0".

- **Normalization low limit**
  The low limit of normalization. An integer is required here.
  Enter "0" (zero) as default if no normalization is required.

- **Normalization high limit**
  The high limit of normalization. An integer is required here.
  Enter "0" (zero) as default if no normalization is required.

Note

The objects "Physical minimum", "Physical maximum", "Normalization low limit" and "Normalization high limit" map the physical values of the project to the value range of the PCS 7 project. If you set "Unspecified" as the sensor type for non-binary signals and the values for the physical limits and normalization are "0", the value "0" is sent to SIMIT SF.

"Fixed value" tab

- **Fixed**
  Select the check box if the signal is fixed. You will need to enter a fixed value in this case.

- **Fixed value**
  Specify the fixed value of the signal. This box is only available when the "Fixed" option is enabled.

- **Hardwired**
  Select the check box if the signal has a fixed connection. You will need to enter a remote signal name in this case.

- **Target signal**
  Select the name of the remote signal from the drop-down list. The list contains all possible signals according to direction and type.

"Description" tab

- **Description**
  A brief description of the signal.

3.6 Emulation

3.6.1 Resource timing behavior
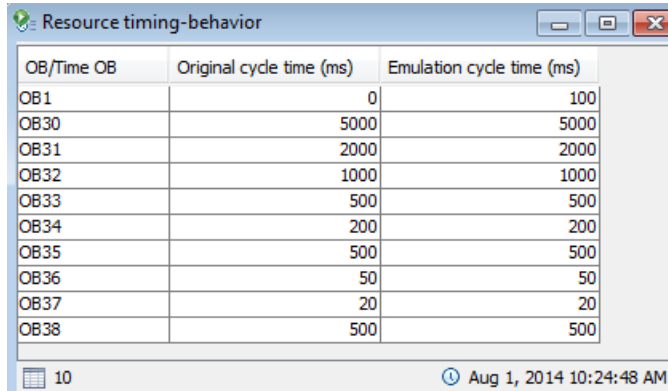
3.6.1.1 Resource timing behavior

Symbol

Description

This dialog box provides a table view of the time settings for a resource. Use the drop-down menu in the toolbar to switch to another resource.

OB/Time OB	Original cycle time (ms)	Emulation cycle time (ms)
OB1	0	100
OB30	5000	5000
OB31	2000	2000
OB32	1000	1000
OB33	500	500
OB34	200	200
OB35	500	500
OB36	50	50
OB37	20	20
OB38	500	500

Resource timing-behavior — 10 — Aug 1, 2014 10:24:48 AM

When the "Hardware configuration import" function was performed, the values were taken over in this table view.

The following values are displayed in the table view:

- **OB/Time OB**
  The names of the OBs.

- **Original cycle time (ms)**
  The original cycle time of the OBs as defined in the corresponding S7 project.

- **Cycle time emulation (ms)**
  The cycle time of the OBs set up for emulation. Can be changed directly in the table view.

You can add, edit and delete entries in the table view with the "Properties..." dialog box. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort in the table view. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

3.6.1.2 "Properties..." dialog box

If you select the "Add" or "Edit" actions from the resource timing behavior, the following dialog box opens:
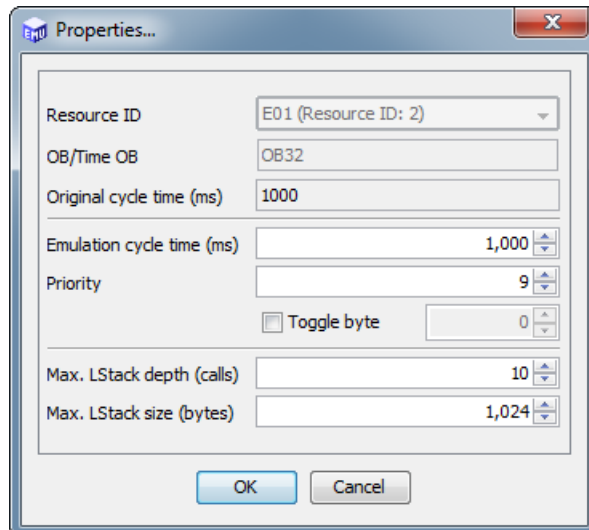
If you have selected the "Edit" command, the dialog box contains the values of the selected sensor; if you have selected "Add", the dialog box is empty.

When the "Hardware configuration import" function was performed, the values were taken over in the dialog box.

The following values and information are displayed:

- **Resource ID**
  The ID of the selected resource. This value can only be changed here for a new entry.

- **OB/Time OB**
  Name of the OB. This value can only be changed here for a new entry.

- **Original cycle time (ms)**
  The original cycle time of the OB. This value cannot be changed here.

- **Emulation cycle time (ms)**
  The cycle time of the OB used for emulation. The default is the original cycle time.

  Note

  Cycle times shorter than the preset simulation cycle create an unnecessary computing load. You should therefore select the smallest OB cycle greater than or equal to the cycle time set in the project.

- **Priority**
  The priority of the OB. You can find additional information in the PCS 7 help.

- **Toggle byte**
  Defines a memory byte to be inverted at the beginning of the OB call if the address is within a range of 0 to 16383.

- **Max. LStack depth (calls)**
  Specifies the maximum recursive depth of the L stack. The default value is "10".

- **Max. LStack size (bytes)**
  Specifies the maximum size of the L-Stack for FB/FC calls. The default value is "1024".

3.6.2   Sensor types
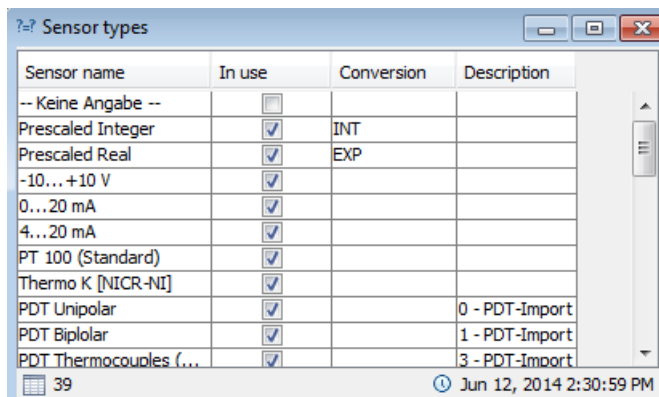
3.6.2.1   Sensor types

Symbol

?=?

Description

This dialog box provides a table view of all sensor types that are available in the current project.

Sensor name	In use	Conversion	Description
-- Keine Angabe --	☐		
Prescaled Integer	☑	INT	
Prescaled Real	☑	EXP	
-10…+10 V	☑		
0…20 mA	☑		
4…20 mA	☑		
PT 100 (Standard)	☑		
Thermo K [NICR-NI]	☑		
PDT Unipolar	☑		0 - PDT-Import
PDT Biplolar	☑		1 - PDT-Import
PDT Thermocouples (...	☑		3 - PDT-Import

39   Jun 12, 2014 2:30:59 PM

Sensor types are bound to a signal to control its normalization and conversion.

The following values are displayed in the table view:

- **Sensor name**
  The name of the sensor type.

- **In use**
  This check box indicates whether or not this sensor type is used. This value can be changed directly in the table view.

- **Conversion**

  The conversion type specific to the sensor type. Valid values are:

  – INT (integer S7 representation)

  – EXP (exponential S7 representation)

  – FLOAT (IEEE 754 representation)

  – "No value"
    Corresponds to normalization according to the sensor type configuration and conversion to an integer S7 display.

- **Description**

  An additional comment for the sensor type. This value can be changed directly in the table view.

You can add, edit and delete entries in the table view with the "Properties..." dialog box. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort in the table view. You can find additional information about this in the following sections:

- Sorting table contents (Page 11).

- Filtering table contents (Page 12)

In addition, you can import sensor types from the basic settings by clicking the "Import" button (). Already existing sensor types will not be overwritten. When you create a new project, this import is performed automatically.

3.6.2.2 "Properties..." dialog box

If you select the "Add" or "Edit" actions from the sensor types, the following dialog box opens:
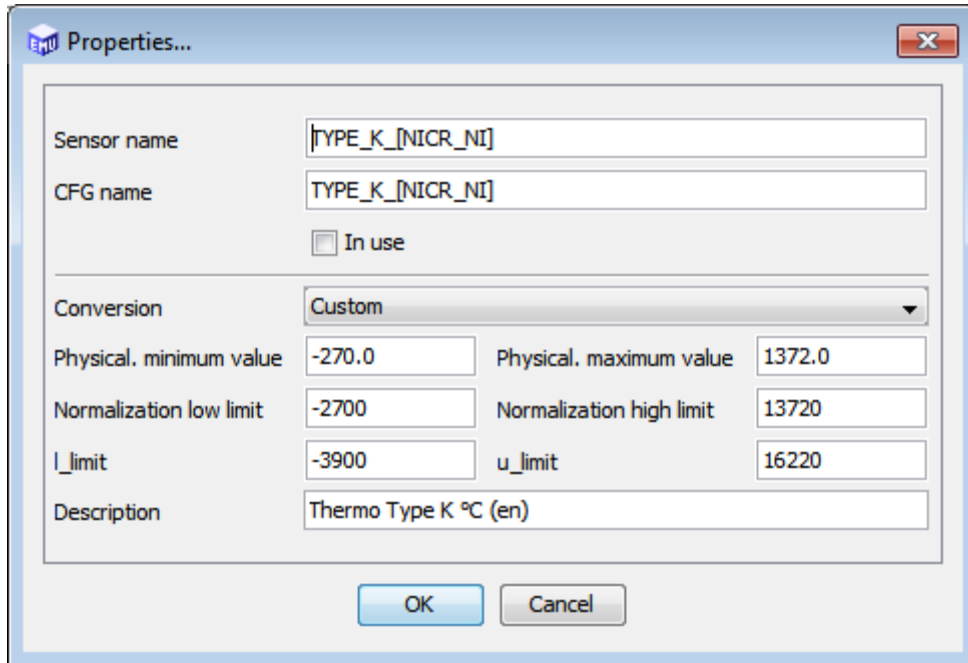
If you have selected the "Edit" command, the dialog box contains the values of the selected sensor type; if you have selected "Add", the dialog box is empty.

The following values and information are displayed:

- **Sensor name**
  The name of the sensor type.

- **CFG name**
  The name of the sensor type as it was imported from the HW configuration file from PCS 7.

- **In use**
  Select this check box if you want to use this sensor type in the current project.

- **Conversion**
  The conversion type specific to the sensor type. In the drop-down list, you can select the following settings:

  – S7 integer display

  – S7 exponential display

  – IEEE-754 float display

  – "Custom"
    Linear mapping of the physical variables to the normalization values in the S7 integer display occurs.

- **Physical minimum value**
  The minimum engineering value.

- **Physical maximum value**
  The maximum engineering value.

- **Normalization low limit**
  The low limit of normalization. This must be an integer.

- **Normalization high limit**
  The high limit of normalization. This must be an integer.

- **l_limit**
  This value sets the control low limit for the signal in SIMATIC representation (low limit). Limiting takes place starting at this value.

- **u_limit**
  This value sets the control high limit for the signal in SIMATIC representation (high limit). Limiting takes place starting at this value.

- **Description**
  A brief description for the sensor type.

3.6.3 CPU modules

3.6.3.1 CPU modules

Symbol

Description

This dialog box provides a table view of all CPU modules available for the project.

The CPU modules can be imported from the default settings. You can find additional information on this in the section: "Import" menu (Page 71).
Existing CPU modules are not overwritten by the import.

The following data is displayed in the table view:

- **Name**
  The name of the CPU module.

- **MLFB**
  The MLFB number (unique identification number) of the CPU module.

- **Firmware**
  The firmware version of the corresponding CPU module. This value can be changed directly in the table.

You can add, edit and delete entries in the table view with the "Properties..." dialog box. You can find additional information on this in the section: Basic operator control actions (Page 15).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

3.6.3.2 "Properties..." dialog box

If you select the "Add" or "Edit" actions from the CPU modules, the following dialog box opens:
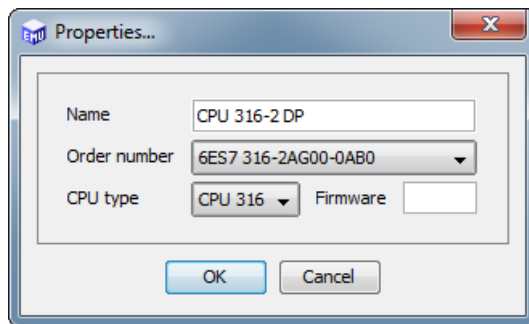
If you have selected the "Edit" command, the dialog box contains the values of the selected sensor type; if you have selected "Add", the dialog box is empty.

The following values and information are displayed:

- **Name**
  The name of the CPU.

- **MLFB**
  The MLFB number of the CPU. Selected from the drop-down list.

- **CPU type**
  Select a CPU type from the drop-down list.

- **Firmware**
  The firmware version of the selected CPU type.

3.7 High-level language functions

3.7.1 HLL blocks

Symbol

Description

This dialog box provides a table view of all HLL blocks configured for the project. Use the drop-down menu in the toolbar to switch to the HLL blocks of another resource.

HLL blocks are used to replace parts of the original STEP 7 software that require access to specific operating system or hardware resources that are not available in the VC.

The HLL blocks are displayed separately for each resource. The settings must be checked and modified for each individual VC.

The following data is displayed in the table view:

- **Name**
  Corresponds to the name of an HLL block in a replacement library.

- **Block name**
  The block name of the original function block which is to be replaced by a HLL block (see Name) from a replacement library. This could be any SFCs, SFBs, FCs or FBs.

- **Library**
  The replacement library in which the HLL block is contained.

- **In use**
  Select this check box if you want to replace the corresponding original function block. Can be changed directly in the table view.

- **NOP**
  Select this check box if you want to replace the respective original function block with a no-operation. Can be changed directly in the table view.

Note

Select either the "In use" option or the "NOP" option to replace an original block that cannot be emulated with an HLL block from a replacement library (In use) or with a no-operation (NOP). If neither of these options is active, the VC tries to interpret the code of the original block if it is an FC or FB. SFCs or SFBs that cannot be replaced with HLL blocks are interpreted as a no-operation by the VC.

A block must be explicitly replaced by a block with no-operation when

- The SIMATIC Manager cannot execute the download because the SFC does not exist
- A block cannot fulfill its function in the simulation environment because the components it requires (communications partner, I/O) do not exist

To create such a block, follow these steps:

1. Select the "Add" command.
   The "Add..." dialog box opens.
2. Under "Block type", select the corresponding type and under "Block number" enter the number of the block to be replaced.
3. Enter a name for the block under "Name" which indicates that the block has no function (for example, by using the prefix "dummy_").
4. Select the "SoftPlc7_SYF" entry under "Library".
5. Select the "NOP" check box.
6. Click "OK" to create the block and close the dialog box.

If blocks are replaced with a no-operation, those blocks which depend directly on the replaced blocks must be supplied with substitute values. One way of doing this is manually to transfer the relevant values in the data blocks to SIMIT SF and set them there. Use the options for inserting signals manually in the signal list or the STL import wizard.

Use the "⊡", "⊡" or "☐" symbols in the toolbar to mark all selected HLL blocks simultaneously as "In use" or "NOP" or to unselect them.

You can import an HLL default setting from the basic settings by clicking the "⌁" button. Existing HLL blocks are not overwritten.

You can add, edit and delete entries in the table view with the "Properties..." dialog box. You can find additional information on this in the section: "Properties..." dialog box (Page 61).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)
- Filtering table contents (Page 12)

3.7.2 "Properties..." dialog box

When you select an "Add" or "Properties" action from the HLL blocks, the following dialog box opens:
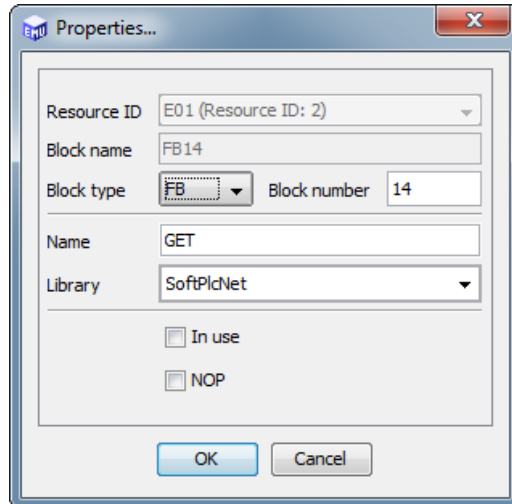
If you have selected the "Properties" command, the dialog box contains the values of the selected HLL block; if you have selected "Add", the dialog box is empty.

The following values and information are displayed:

- **Resource ID**
  The resource ID for which you are currently editing the HLL blocks. Can only be changed via the drop-down list in the toolbar.

- **Block name**
  The block name as a combination of block type and block number. This value cannot be changed here.

- **Block type**
  The type of block. Can be selected from the drop-down list. The following types are available:

  - DB

  - FB

  - FC

  - FX

  - OB

  - SFB

  - SFC

- **Block number**
  The number of the block. This must be an integer value.

- **Name**
  Enter the name of the function that emulates the functionality of the original block. This text is not case-sensitive.

- **Library**
  The library in which the HLL block is stored. Can be selected from the drop-down list.

- **In use**
  Select this checkbox if you want to replace the original block.

- **NOP**
  Select this checkbox if you want to replace the original block with a no-operation.

3.8 Communication

3.8.1 Communications connections

3.8.1.1 Communications connections

Symbol

Description

This dialog box provides a table view of all communications connections that have been configured within the project.

You can use this dialog box to establish communications connections between VCs and between VCs and external components such as HMI systems.

The following data is displayed in the table view:

- **Local resource**
  The name of the local resource.

- **Remote resource**
  The name of the external resource.

- **Local LAddr**
  The LAddr value of the connection as it appears in the S7 connection configuration (NetPro).

- **Remote LAddr**
  The LAddr value of the connection as it appears in the S7 connection configuration (NetPro) of the external resource.

- **Local ID**
  The local ID of the connection as it appears in the S7 connection configuration (NetPro).

- **Remote ID**
  The remote ID of the connection, if available, as it appears in the S7 connection configuration (NetPro).

- **Local TSAP/Port**
  The local TSAP (Transaction Service Access Point) of the connection, if available, as it appears in the S7 connection configuration (NetPro).

- **Remote TSAP/Port**
  The external TSAP (Transaction Service Access Point) of the connection, if available, as it appears in the S7 connection configuration (NetPro).

- **via TCP**
  This check box indicates whether the connection is made via the TCP protocol.

- **Establishing connection**
  Select the check box if you want to actively establish the connection.

- **Slow connection**
  Restricts the transmission speed for protocol-independent, emulation-internal connections.

You can add, edit and delete entries in the table view with the "Properties..." dialog box. You can find additional information on this in the section: "Properties..." dialog box (Page 64).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

The display of the communications connections can also be filtered by connection type. For this, select the desired connection type from the drop-down list in the toolbar. The following connections can be selected:

- **All connections**
  Displays all connections.

- **Protocol-independent, emulation-internal connections**
  Displays all AS-AS connections between VCs.

- **ISO transport connection**
  Displays all ISO transport connections to external partners such as HMI systems or real controllers.

- **ISO-on-TCP transport connection**
  Displays all ISO-on-TCP transport connections (based on RFC1006) to external partners such as HMI systems and real controllers.

- **UDP connection**
  Displays all UDP connections to external partners such as HMI systems.

- **S7 connection**
  Displays all S7 connections to external partners.

- **TCP connection**
  Displays all TCP connections.

3.8.1.2   "Properties..." dialog box

If you select the "Add" or "Edit" actions from the communication connections, the following dialog box opens:
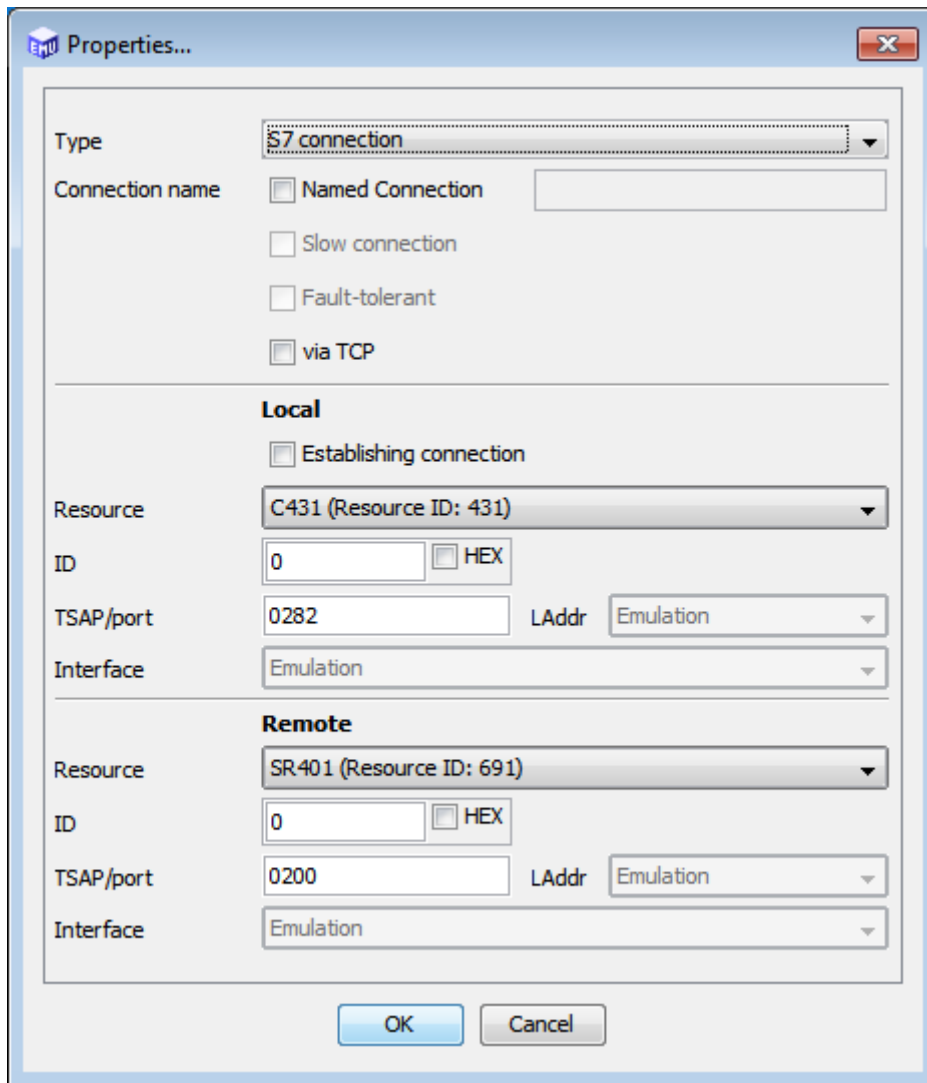
If you have selected the "Edit" action, the dialog box already includes data. If you have selected the "Add" action, the dialog box is empty.

The values that can be changed here depend on the selection of the connection type.

The following values and information are displayed:

- **Type**
  Select the connection type from the drop-down list.

- **Connection name**
  Select this check box to establish a named connection. This option can only be set in the "S7 connection" connection type. To create a *named connection*, you must enter a connection name in the text box.

- **Slow connection**
  This option can only be selected for protocol-independent, emulation-internal connections.

- **Fault-tolerant**
  Select this check box if you have created the AS-AS connection in the automation program as fault-tolerant connection.

- **via TCP**
  Select this check box if the connection is to be used with the TCP protocol.

- **Establishing connection (only in "Local" area)**
  Select this check box to make the currently emulated S7 automation controller the active connection partner. The active partner initiates establishing of the connection.

- **Resource**
  In the "Local" area, select the resource that represents the local communication partner. In the "Remote" area, select the resource that represents the external communication partner.

- **ID**
  In the "Local" area, enter the local connection ID from the connection properties in NetPro. Take into account the display for toggling between decimal and hexadecimal representation.
  In the "Remote" area, enter the remote coupling ID. You have to call the value from the connection properties of the external communication partner or directly from the connection table of NetPro.

  For connections to PCS 7 OS/WinCC, the value must be set to `"0"`.

- **TSAP/Port**
  In the "Local" area, enter the local TSAP as it is shown in the address details of the connections in NetPro. A special setup is required for connections to PCS 7 OS/WinCC; see below.
  In the "Remote" area, enter the external TSAP as it is shown in the address details of the connections in NetPro.
  For connections to PCS 7 OS/WinCC, set the value to `"0200"`.

  Note

  The values for the local *TSAP* have to be unique within the range of an emulation computer. You can find additional information on this in the "SIMIT Virtual Controller (VC) - User Manual " help.

- **LAddr**
  In the "Local" area, specify the LAddr value as it appears in NetPro. This box is not available for the connection type "S7 connection to external partner".

In the "Remote" area, specify the LAddr value as it appears in NetPro. This box is only available for the connection types "Protocol-independent, emulation-internal connection" and "TCP connection".

- **Interface**
  If you have specified a corresponding LAddr, the associated communication interface can be selected from the resource configuration.

3.8.2 Connections to auxiliary systems

3.8.2.1 Connections to auxiliary systems

Symbol

Description

This dialog box provides a table view of all connections to auxiliary systems that have been configured for the AS within the project. For example, DP cross-communication between 2 AS.

This dialog box is used to configure connections to auxiliary systems.

The following data is displayed in the table view:

- **Type**
  Indicates the type of data exchange as input or output.

- **Local resource ID**
  Shows the local resource ID.

- **Remote resource ID**
  Shows the external resource ID.

- **Local DB number**
  Shows the number of the local data block.

- **Remote DB number**
  Shows the number of the external data block.

- **Local address**
  Shows the address within the local data block.

- **Remote address**
  Shows the address within the external data block.

- **Length**
  Shows the length of the exchanged data.
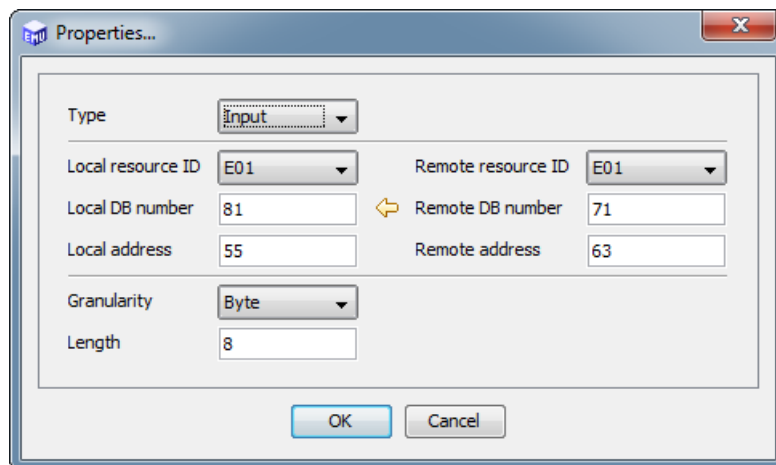
You can add, edit and delete entries in the table view with the "Properties..." dialog box. You can find additional information on this in the section: "Properties..." dialog box (Page 67).

You can filter and sort the table columns. You can find additional information about this in the following sections:

- Sorting table contents (Page 11)

- Filtering table contents (Page 12)

3.8.2.2 "Properties..." dialog box

If you select the "Add" or "Edit" actions from the communication connections to auxiliary systems, the following dialog box opens:

If you have selected the "Edit" action, the dialog box already includes data. If you have selected the "Add" action, the dialog box is empty.

The following values and information are displayed:

- **Type**
  The direction of the data exchange. You can use the drop-down list to select either "Input" or "Output".

- **Local resource ID**
  Shows the local resource ID.

- **Remote resource ID**
  Shows the external resource ID.

- **Local DB number**
  Shows the number of the local DB for data exchange.

- **Remote DB number**
  Shows the number of the external DB for data exchange.

- **Local address**

  Shows the start address within the local DB.

- **Remote address**

  Shows the start address within the external DB.

- **Granularity**

  Use the drop-down list to select the granularity for the data exchanged. The following values are available:

  – Bytes

  – Word

  – DWord

- **Length**

  Shows the length of the data to be exchanged. The length of the data to be exchanged must match the specified granularity.

3.9   CSV export

Symbol

Description

Project data can be exported from SIMIT VC using a CSV file. This export can then be imported to SIMIT SF , for example, although this requires corresponding preparation. You can find more information on this in the SIMIT SF help.
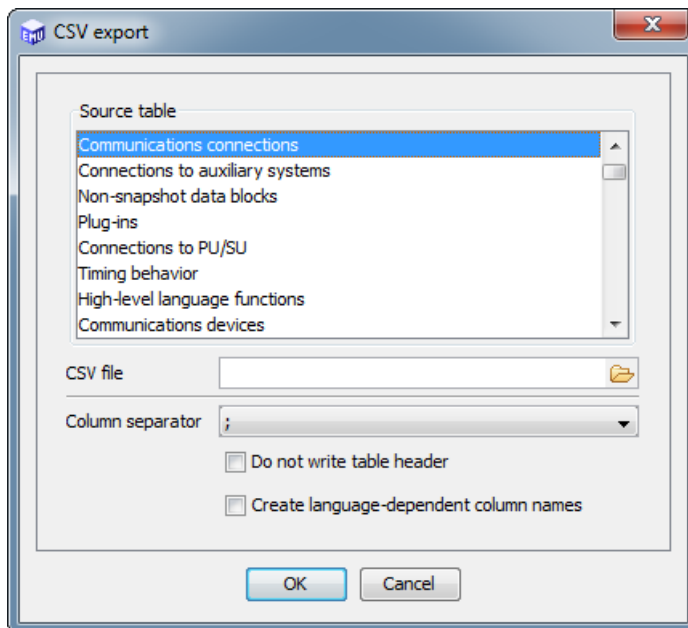
The following settings are available for the export:

- **Source table**
  Select a data source for export here. The available selections are always a portion of the project database of SIMIT VC. Only one source table can be selected.

- **CSV file**
  Select a destination path and enter a name for the CSV file.

- **Column separator**
  From the drop-down list, select a column separator with which the export data is to be separated.

- **Do not write table header**
  Select this checkbox if you do not want table headers in the CSV file.

- **Create language-dependent column names**
  Select this check box if the column names displayed in the interface should be included in the CSV file. If the check box is not selected, the column names are generated by SIMIT VC.

Click "OK" to start the CSV export and close the dialog box.

3.10 Continue action

The "Continue action..." menu command resumes the most recently cancelled wizard in the current project.

"Import" menu

<div style="text-align: right; font-size: 3em;">4</div>

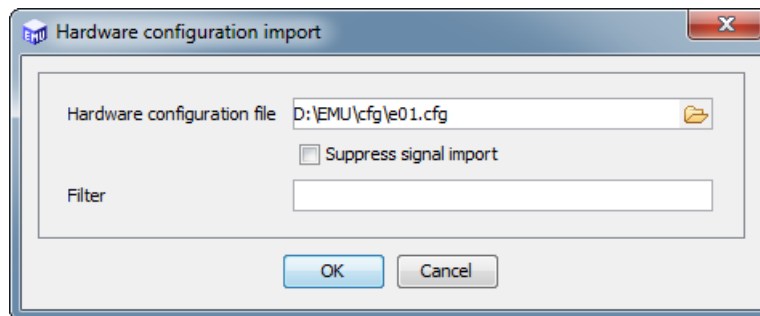## 4.1 Hardware configuration import

Symbol

Description

This action is used to import the hardware configuration file (*.cfg) that was created as part of the PCS 7 hardware configuration. The following two elements are taken over into the Emulation Manager in this way:

- AS stations
- I/O signals

The import is executed with the following dialog box:

Enter the following information:

- **Hardware configuration file**
  Specify the hardware configuration file you want to import here. This can be a reference file with links to a number of hardware configuration files.
  Enter the full file path directly or select the file with " ".

Note

If you work with reference files: The links to the hardware configuration files are not relative. If these files were created on a different system, the paths contained are invalid.

- **Suppress signal import**
  Select this check box if the signals are not to be read from the hardware configuration file.

- **Filter**

  Enter a filter with regular expressions in order to exclude certain variable names from the import. Multiple regular expressions are separated by semicolons (;). You can find additional information on this in the section: Regular expressions (Page 99).

Click "OK" to start the import and close the dialog box.

While the "Hardware configuration import" action is being executed, a dialog box shows the current progress.

Additional dialog boxes open when a new resource is added. Enter the required information in these dialog boxes.

Newly found objects

The following new objects may be found during an import:

- **AS(s)**

  A corresponding dialog box opens if a new AS is found. Enter the required information here. In this case, proceed as you would for manually adding an AS. You can find additional information on this in the help "SIMIT Virtual Controller (VC) - User Manual > Creating a new emulation project > Importing resources".

- **CPU modules**

  A corresponding dialog box opens if a previously unknown CPU module is found. Enter the required information here. In this case, proceed as you would when manually adding a CPU module. You can find additional information on this in the help "SIMIT Virtual Controller (VC) - User Manual > Creating a new emulation project > Importing resources".

- **Sensor types**

  A corresponding dialog box opens if a previously unknown sensor type is found. Enter the required information here. In this case, proceed as you would for manually adding a sensor type. You can find additional information on this in the section: Sensor types - "Properties..." dialog box (Page 26).

- **I/O**

  If a new I/O is found, it is automatically added to the list of unknown modules. A corresponding message is displayed. An additional dialog box is displayed for all modules whose MLFB numbers do not correspond to the PCS 7 standard. In it, you determine whether or not these modules are added to the list with unknown modules.

  If you want to integrate I/O signals in the Emulation Manager and new I/O modules were found, you need to specify the following additional information for each module:

  – Module type (analog or digital)

  – In use (if the module is to be used in emulation)

4.2 Symbol import
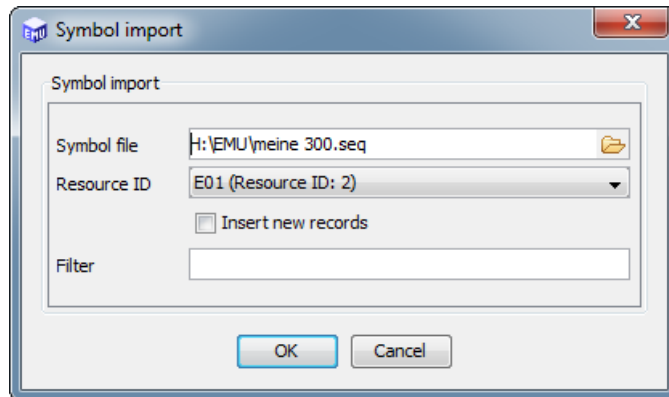
Symbol

Description

You use this action to import a symbol table from PCS 7.

You can use the symbol import to integrate the following information in the Emulation Manager.

● Fully resolved I/O signals

● Data block numbers of previously imported symbolic data block names

The symbol import is executed with the following dialog box:

Make the following settings in the dialog box:

● **Symbol file**
Here you enter the path to the symbol file. This file must be exported as an SEQ, SDF, or DIF file.
Enter the full file path directly or select the file with the " 🗁 " button.

● **Resource ID**
Enter the resource ID of the VC to which the symbols in the file belong.

● **Insert new records**
Select this check box if you want to import new symbols.
Do not select this check box if you only want to use the symbol file for the address resolution of existing symbols.

● **Filter**
Enter a filter with regular expressions in order to exclude certain variable names from the import. Multiple regular expressions are separated by semicolons (;). You can find additional information on this in the section: Regular expressions (Page 99).

Click "OK" to start the import and close the dialog box. While the symbol import is being executed, you are informed about the current progress in a dialog box.

4.3 STL source import

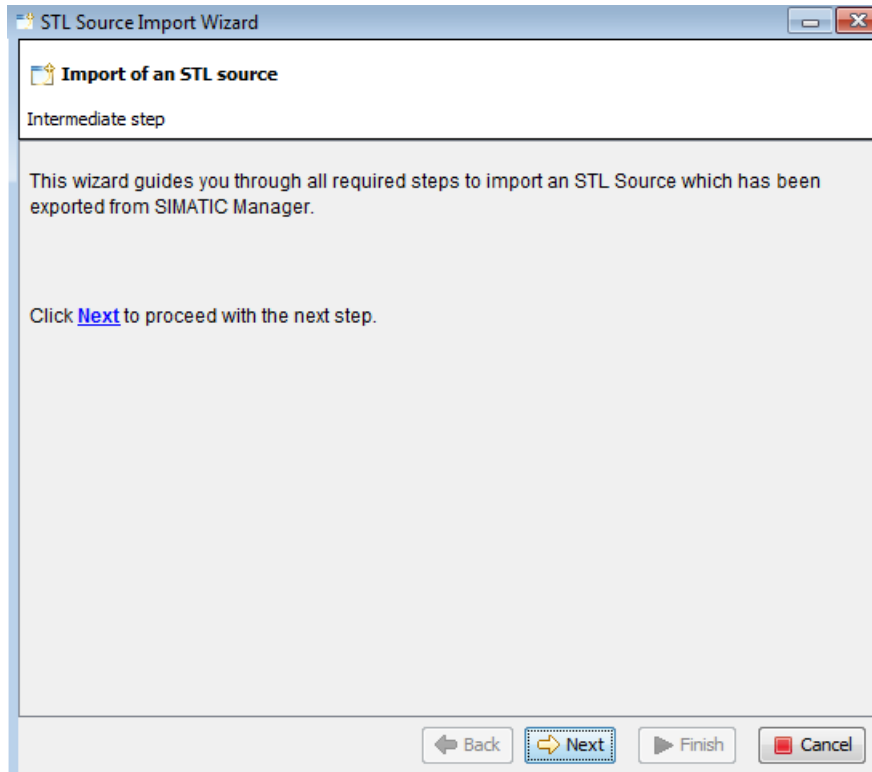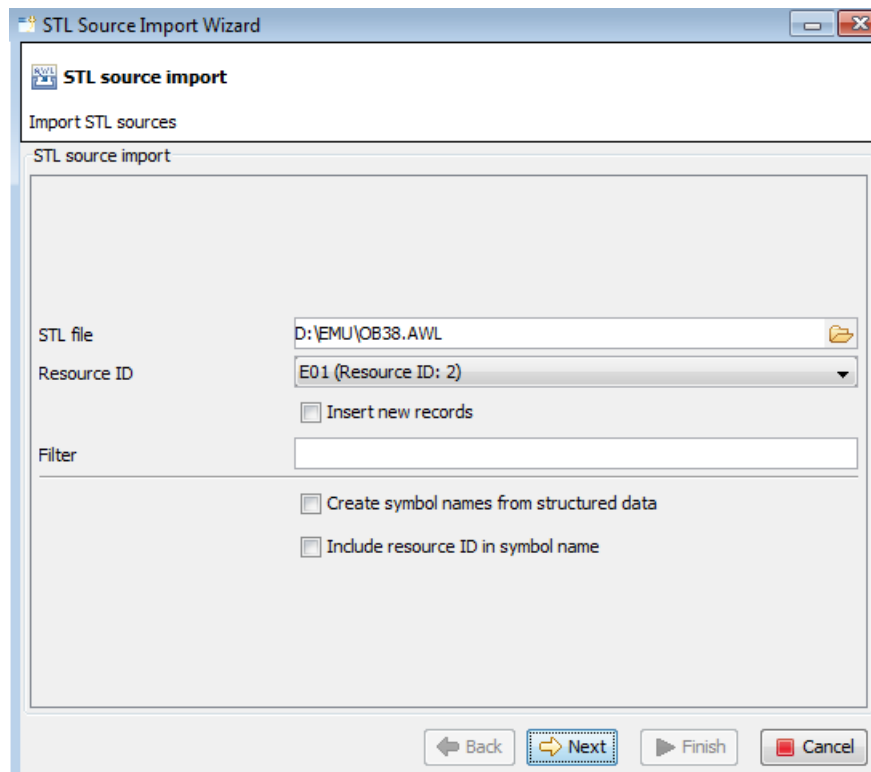## 4.3.1 STL source import wizard

Symbol

Description

Use this action to import an STL source which was exported from the PCS 7 SIMATIC Manager. The STL source is imported with the help of a wizard:

Click "Next" to continue with the next step.

This dialog box is used to select the STL source file and make the following settings:

- **STL file**
  You need to specify the STL source file here. Only data blocks and those UDTs which are used with the data blocks may be exported.
  Enter the full path directly or search for the file using the "📂" button.

- **Resource ID**
  Enter the resource ID to which the data blocks in the file belong.

- **Insert new records**
  Select this check box if you wish to import new data records. Clear this check box if you want to use the STL source file for address resolution of existing data records.

- **Filter**
  Enter a filter with regular expressions in order to exclude certain variable names from the import. Multiple regular expressions are separated by semicolons (;). You can find additional information on this in the section: Regular expressions (Page 99).

- ● **Create symbol names from structured data**

  Select this check box if symbol names should be taken from the names of nested structures as follows:

  <Data block name>.<Structure 1>.<...>.<Structure n>.<Symbol>
  where *n* is the depth of the nested structure to which the current symbol belongs.

  If this check box is not selected, the symbol names are composed as follows:

  <Data block name>.<Symbol>

- ● **Include resource ID in symbol name**
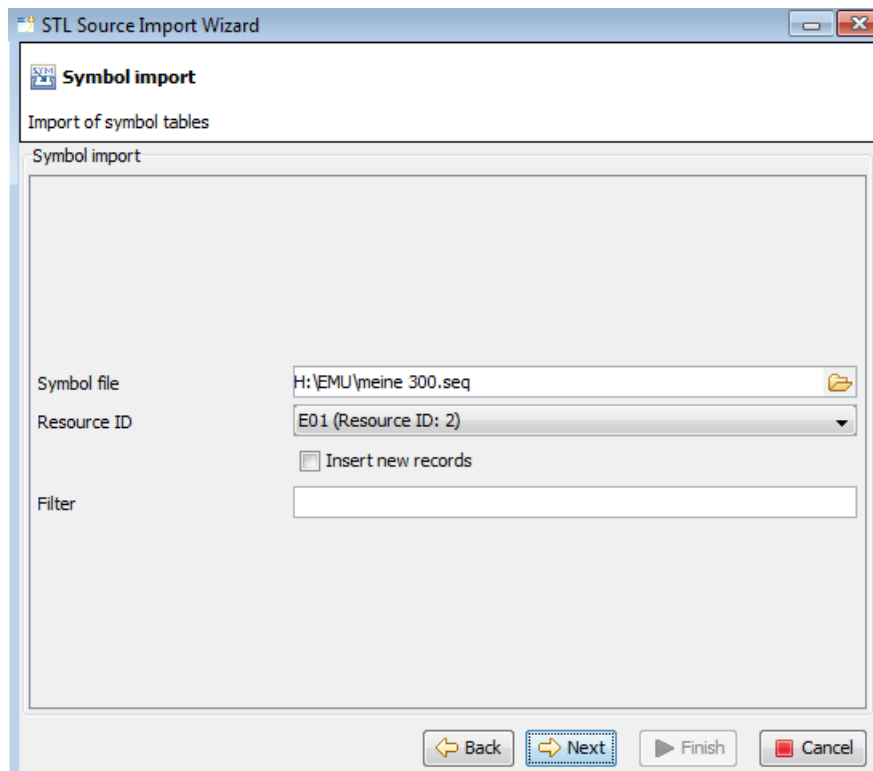
  Select this check box if you want to integrate the resource ID in the symbol name as follows:

  ID<Number>.<Data block name>.<Symbol>

  You can combine both options. In this case, the resource ID is placed at the far left in the symbol name as follows:

  ID<Number>.<Data block name>.<Structure 1>.<...>.<Structure n>.<Symbol>

Click "Next" to continue with the next step.

Select a symbol table. The symbol table is used to resolve symbolic data block names (DB). The symbol table selected for import must contain information about the data blocks (DB) imported with the STL source file previously selected. You can find additional information on this in the section: Symbol import (Page 72).

Click "Next" to continue with the next step.
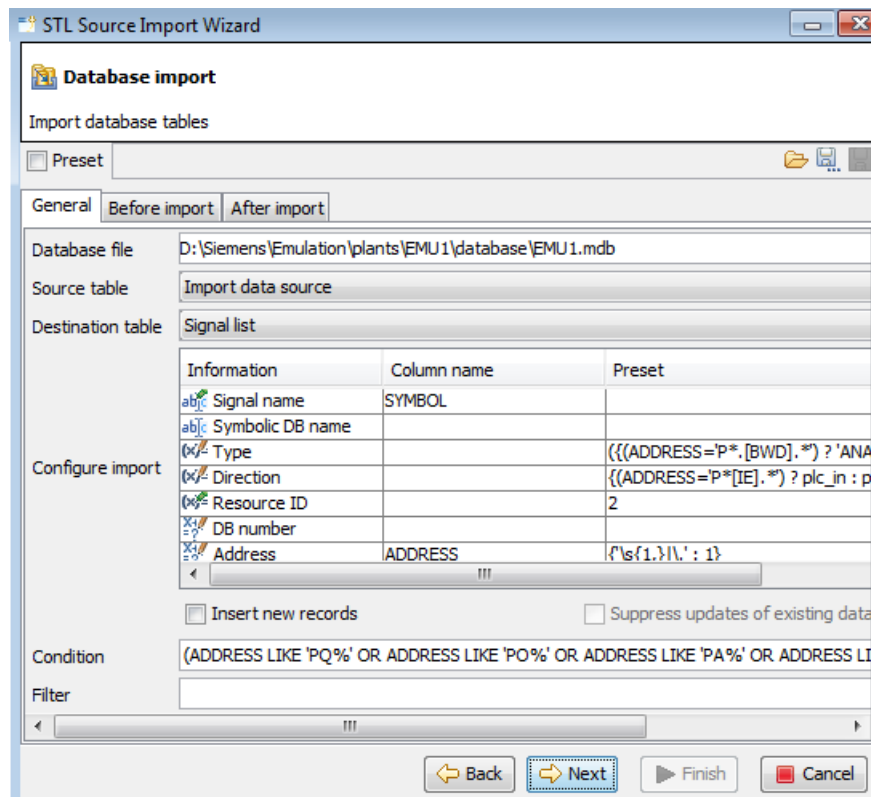
The database import is performed when the new entries of the selected STL source file have already been imported into the signal list. The database import only works with the signal list. This means that the entry under "Database file" must refer to its own SIMIT VC project database, and the "Source table" and "Target table" must refer to the same signal list table.

Since neither the STL source nor the signal list include information on the signal direction, it must be derived from the available information.
The signal direction can, for example, be derived from the DB number or the signal name. You define the rules for it in the "After import" tab.

You can find additional information on the database import in the section: Database import (Page 78).

Click "Next".
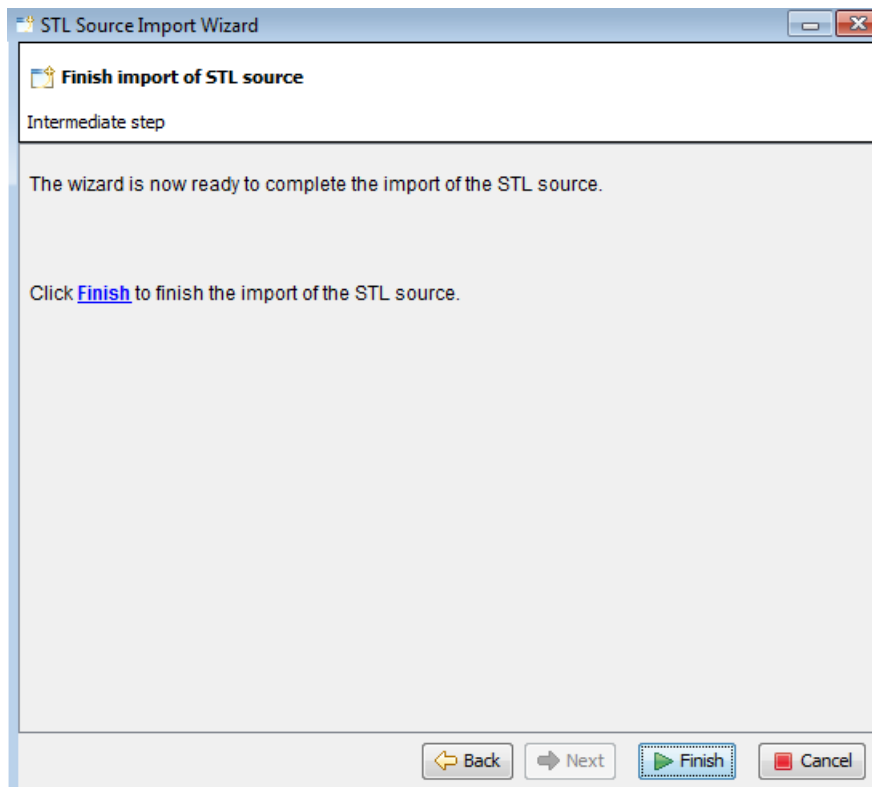
This closes the STL source import wizard. Click "Finish" to complete the import, or click "Back" to return to a previous step.

4.3.2 Database import

4.3.2.1 Database import

Note

Database import is integrated into the STL source import wizard and can only be accessed and operated using this wizard.

The database import imports an external MS Access database (*.mdb) to SIMIT VC.

The dialog box has 3 tabs. The following operator controls are available on each tab:

- **Default setting**

  For loading a predefined file with all the necessary settings. This function is only available if the default settings option is enabled.

  To browse the directory structure, click " ".

  Click " " to create a new predefined file.

  Click " " to apply changes to the current predefined file.

Click "OK" to perform the import. Click "Cancel" to abort the process. No import is performed and any data entered are discarded unless they have been saved in a predefined file.

A dialog box indicates the current progress while the "Database import" action is executed.

Script functions

Database import is a highly flexible data processing tool. The script functions are used to defined certain default settings and values. Default settings are defined on the "General" tab and values on the "After import" tab.

Expressions

Expressions are always given in round brackets. Generally, an expression consists of one or more constants or references to data cells in the source table that can be combined with specific operators to evaluate a specific formula.

An expression always produces data that can be used to fill a data cell in the destination table or used in instructions. Unquoted string values are usually treated as possible references to data cells in the source table. If an unquoted string value does not refer to a data cell, it is treated as a constant string value.

To prevent a constant string value from being treated as a reference to a data cell, put it in single quotation marks.

Calculate a few numerical values with the operators "+" (add), "-" (subtract), "*" (multiply) and "/" (divide). You can use brackets within a formula. Before evaluation, all numeric values are converted to floating-point values (doubles). All constants and references to data cells within a mathematic formula must correspond to valid numerical values. If the result of the formula is to be an integer, you must use the function `Round(<numerical expression>)`.

Text (string) values are chained with the plus operator "+". Other operators are invalid for text values.

Spaces before and after constants and references to data cells are removed before processing. Use "" if you require an empty string constant. Use a backslash "\" to quote the following character. This is, for example, useful if you need to use a control character within an a string expression. The quoted control character is then treated like a normal character.

Instructions

Instructions are always given in brackets "**{**" and "**}**". Two types of instruction are available: Conditions and string splitting.

Conditions

Conditions are used to perform a comparison based on an expression that evaluates to "true" or "false" to continue with part of the script. A conditional instruction always consists of the condition itself, a part that is executed if the condition is true, and another part that is executed if the condition is not true.

A conditional expression consists of an expression value in single quotation marks:
`{"<expression>" ? <true> : <false>}`

If the conditional expression relates to a column name other than the one specified under "Column name", the desired column name is used as the prefix to the conditional expression followed by an equal sign:

```
{(<column>="<expression>") ? <true> : <false>}
```

Any valid regular expression can be used as an expression. You can place both expressions and instructions in the conditional branches. This allows you to create an infinite number of nested conditions.

String splitting

The string splitting method splits a string when matches of any regular expression are found into multiple tokens to evaluate an individual token in more detail. You can find more information about regular expressions in: Regular expressions (Page 99).

The instruction always consists of a split pattern and an expression or instruction that is evaluated in accordance with the split index. The split index refers to a specific token:

```
{"<split expression>" : <split index>}
```

The tokens output by this function contain all substrings of the input which are ended with a substring that corresponds to the specified split expression or that is ended at the end of the string. The tokens are specified in the order in which they come in the input string. If the split expression does not correspond to any part of the input, only the input string is available as single token.

The pattern of the split expression is used as often as possible; any token number can therefore result. Following empty strings are discarded.

The first token is assigned the split index 0. The last token is assigned the reference n-1, where n is the number of tokens.

4.3.2.2 "Database import" dialog box

"General" tab

Use this tab to enter general information required for importing the external database.
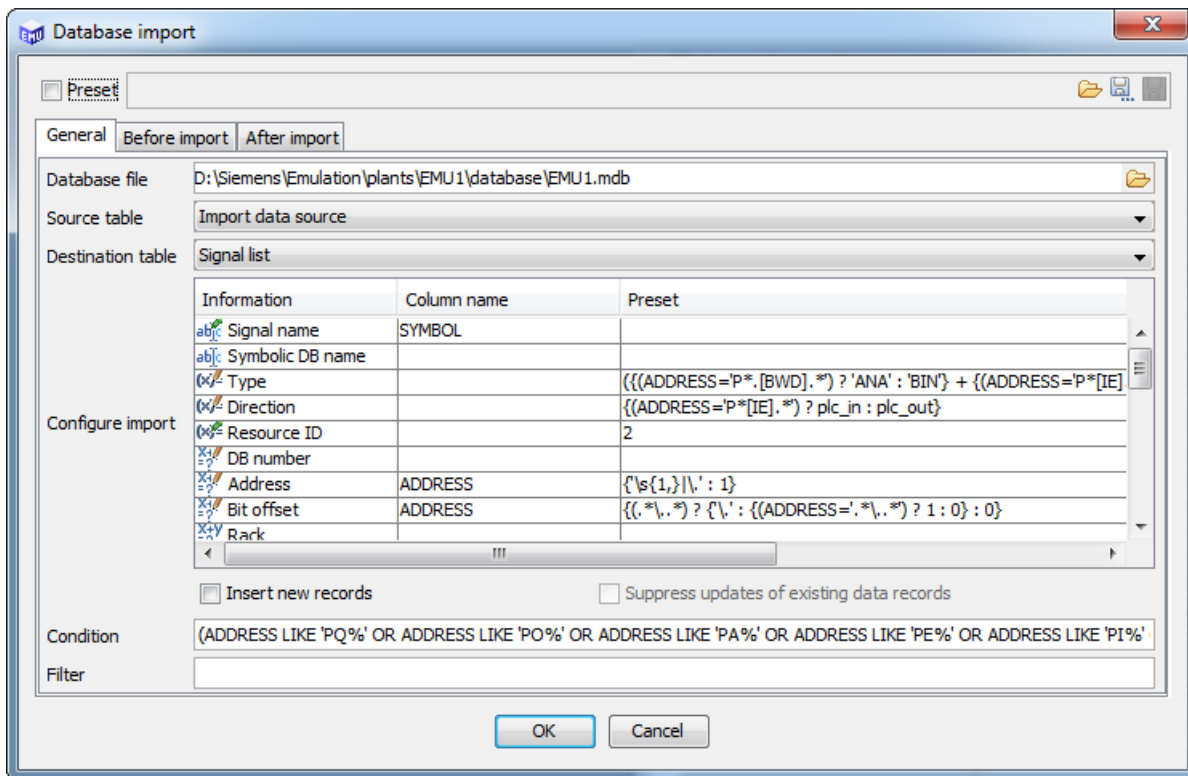
- **Database file**
  Enter the database file that you want to import.
  Enter the full file path directly or click "📂" to select the file from the directory.

- **Source table**
  From the drop-down list, select the name of the source table for the import. Select "Import data source" if you want to process data that you have previously imported from a file.

- **Destination table**
  From the drop-down list, select the name of the table to which you wish to import the data.

- **Configure import**
  This is a table assigning the data (information) requested by the Emulation Manager to its position (column name) in the external database. A drop-down list will open if you click on a cell in the "Column name" column. Select a name.
  The "Default setting" column is used to define a number of preset values, for example if you want to use rules or if some data is not available in the source database.

- **Insert new records**
  Select this check box if you wish to import new data records. If the checkbox is not selected, only rules for existing data records will be used.

- **Suppress updates of existing data records**
  Select this checkbox if you do not want to search for existing entries requiring updating. This will speed up the import process. If you import existing data records again, the destination table will contain duplicate data records. This can cause problems if there are inconsistencies.

- **Condition**
  This text box is used to specify a condition for the data to be imported.

- **Filter**
  Enter a filter with regular expressions in order to exclude certain variable names from the import. Multiple regular expressions are separated by semicolons (;).

  You can find more information about regular expressions in: Regular expressions (Page 99).

"Before import" tab

The "Before import" tab is used to define certain rules to be applied to the signal list in the Emulation Manager before database import.

- To add a new rule, click the " " button.

- Delete rules with the " " button. At least one rule must first be selected.

- Click " " to copy rules to the internal dialog clipboard. At least one rule must first be selected.

- Click " " to paste content from the clipboard. Content from the clipboard and new rules are always added at the end of the table.

Click on one of the following fields to edit a rule:

- **Command**
  Two types of rule are available: "Refresh" and "Delete". Select the required type from the drop-down list.

- **Information**
  This field is only required for rule type "Refresh". Select the information to be changed from the drop-down list.

Note

The drop-down list only contains the values that can be changed with rules.

- **Value**
  This field is only required for rule type "Refresh". Enter the value that you wish to assign during refresh.

- **Condition**
  Define a condition. Data in the signal list of the Emulation Manager are either deleted or updated in accordance with this condition. The syntax of the condition must correspond to the SQL standard. Leave this field empty if you do not wish to define a condition. If the field is active, a drop-down list will appear when you right-click on it. Here you set up your own conditional expressions.

"After import" tab

This tab is used to define certain rules to be applied to the signal list in the Emulation Manager after database import.

- To add a new rule, click the " " button.

- Delete rules with the " " button. At least one rule must first be selected.

- Click "⧉" to copy rules to the internal dialog clipboard. At least one rule must first be selected.
- Click "📋" to paste content from the clipboard. Content from the clipboard and new rules are always added at the end of the table.

Click on one of the following fields to edit a rule.

- **Command**
  Two types of rule are available: "Refresh" and "Delete". Select the required type from the drop-down list.

- **Information**
  This field is only required for rule type "Refresh". Select the information to be changed from the drop-down list.

  Note

  The drop-down list only contains the values that can be changed with rules.

- **Value**
  This field is only required for rule type "Refresh". Enter the value that you wish to assign during refresh. You can enter a simple value or a macro for which the basic commands "+", "-", "*" and "/" are allowed. Use the brackets "()" and the "ROUND()" function to round up floating-point values to integers.

- **Condition**
  Define a condition. Data in the signal list of the Emulation Manager are either deleted or updated in accordance with this condition. The syntax of the condition must correspond to the SQL standard. Leave this field empty if you do not wish to define a condition. If the field is active, a drop-down list will appear when you right-click on it. Here you set up your own conditional expressions.

"Emulation" menu

5.1 Consistency check

The consistency check is used to find and resolve errors in the project configuration before you start the emulation project. Perform a consistency check if you have made changes to the project configuration. The consistency check is performed automatically before the emulation project is started.

An ongoing consistency check in the Emulation Manager is graphically displayed as shown in the figure below:
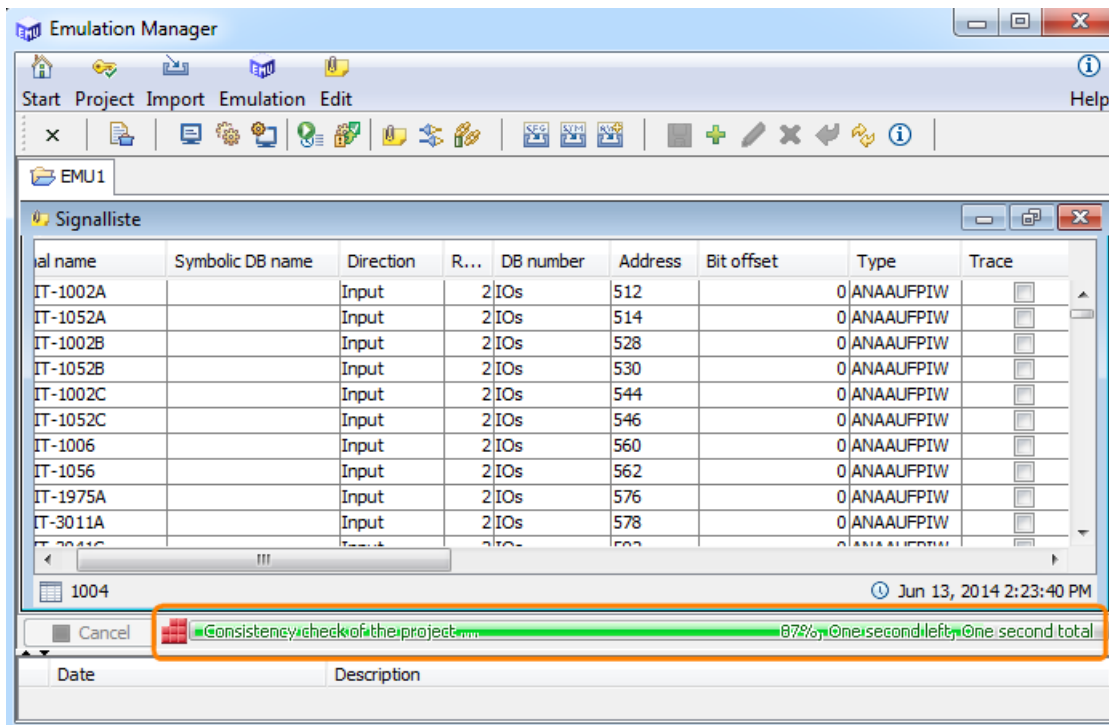
If no error is found, the consistency check is terminated without further notice.

If an error is found, you can find a description of the error in the message log. The message log then opens automatically and provides information on clearing errors. Errors can be processed individually or together, automatically or manually. If automatic correction is run, the SIMT VC database entry that is causing the error is deleted unless otherwise specified.

Not all errors can be cleared automatically. Corresponding information is displayed in the message log.
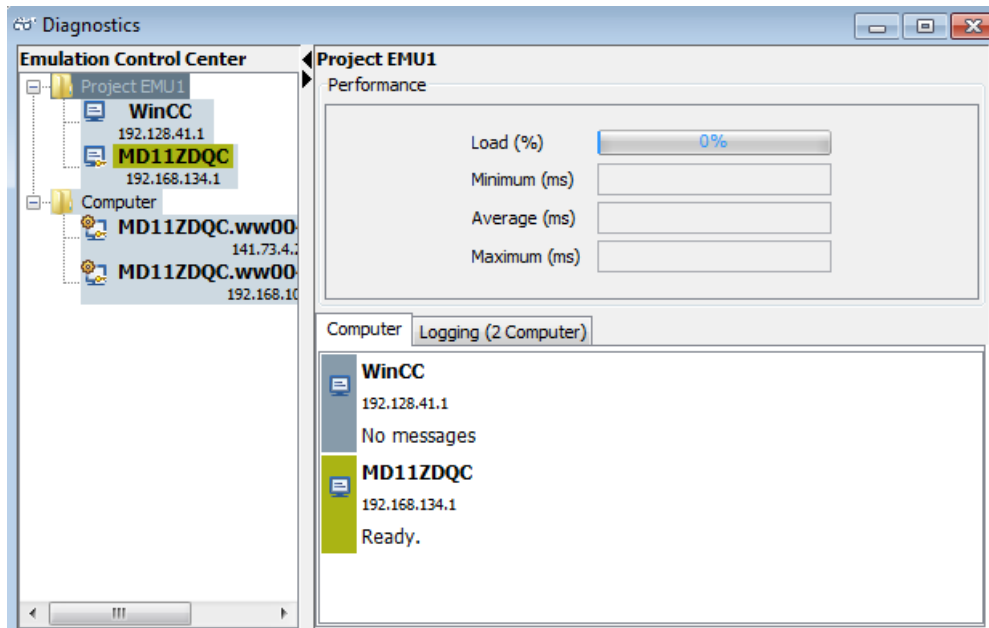
5.2   Diagnostics

Symbol

Description

This menu command is used to launch the diagnostics window for monitoring the emulation environment.

Diagnostics give you a quick overview of the project currently open and access to the log.

"Emulation Control Center" area

The computer configuration of the project is displayed in a tree structure in this area. The "Project <project name>" folder lists the configured computers referenced in resource distribution.

The "Computer" folder lists the computers currently accessible over the network. The network address via which the computer is accessed by the diagnostic function is shown under the computer name.

"Project" diagnostics

Select the "Project <project name>" folder in the "Emulation Control Center" area to see an overview of the overall system load in the "Performance" area.

"Performance" area

- Load (%)
  Percentage load of the overall system as the quotient of the current token runtime and configured simulation cycle.

- Minimum (ms)
  The shortest token runtime reached in this simulation run.

- Average (ms)
  The average token runtime reached in this simulation run.

- Maximum (ms)
  The longest token runtime reached in this simulation run.

"Computer" tab

The "Computer" tab displays a group message on the state of the computer relating to the emulation environment. The different messages are highlighted in different colors:

	The computer monitored is ready.
	The computer monitored is in an operating state that may, depending on the project configuration, result in problems.
	The computer monitored is in an irregular operating state. Check the state of the system components and execute the restore function if necessary.
	The computer monitored does not return any diagnostic information. Diagnostic information can only be returned by computers on which SIMIT VC (Engineering or Runtime) is installed.

"Computer" diagnostics

Select a monitored computer in the "Emulation Control Center" area to view detailed information on the system components that are configured on this computer on the right.

"Performance" area

The "Performance" area displays information on distribution of the computing load:

- Computer
  Total load of computer capacity in relation to the set cycle time.

- Emulation runtime
  VC proportion of cycle time.

- Signal mirroring
  Signal mirroring proportion of cycle time.

- Siemens Emulation Runtime Control Service (gross)
  Total computing time used by this service. If a fixed cycle time is expected, this entry also includes the idle time required to arrive at the selected cycle time once all system components have completed their cycles.

- Siemens Emulation Runtime Control Service (net)
  Net computing time used by this service.

- Emulation idle time
  Unused computing time within a cycle time.

"Computer" tab

This is where the computers' system components in the "Emulation control center" are monitored.

- Siemens Emulation Runtime Control Service
  This service coordinates the SIMIT VC system components on an emulation computer.

- Siemens Emulation System Control Interface
  Transfers commands between the connected computers.

- Siemens Emulation SIMIT Command Service
  Connects SIMIT VC to the Remote Control Interface (RCI) of SIMIT SF.

- Siemens Emulation SIMIT Monitoring Service
  Checks whether SIMIT SF has been started.

- Softbus S7 gateway
  Required for VC S7 connections over the network card and SIMATIC NET .

The operating state of each of these services is indicated in color as follows:

⚙	The system component is ready.
⚙	The system component contains warnings and/or information that do not, however, directly disrupt the operation of SIMIT VC.
⚙	There are conflicts that are preventing the correct operation of SIMIT VC. Check relevance for your current system state and execute the diagnostics and restore function if necessary.
⚙	The system component does not return any diagnostic information.

"Logging" tab

The "Logging" table displays all messages assigned to the selected node in the tree in the emulation control center. If the "Project" node is selected, all messages for the configured computers with diagnostics capability will appear.

Select a suitable message threshold from the "Messages" drop-down list. The following message classes (from highest to lowest message threshold) are available. If a lower message threshold is selected, all higher messages are automatically also selected for logging.

- Exc(0x0): Exceptions

- ERR(0x10000000): Error messages

- WRN(0x20000000): Warnings

- LOG(0x40000000): Logging

- DBG(0x80000000): Detailed information

Note

The "DBG" message class returns extremely large and detailed log files. These may be required by Support.

Additional functions are available with the following symbols:

▶	Start logging
■	Stop logging
�	The logging running in the background is stored and exported in a file. All logging files that were started with " ▶ " and stopped with " ■ " are overwritten. Exported files can be found on the relevant computers under "\<installation drive\>:/Siemens/Emulation/logging". **Note:** Logging running in the background has only a limited size. It always runs when no other logging was configured or is active.
🗑	Deleting log files
👓	Filtering messages to be logged using function areas.
☑ ☐	Individual function areas can be selected and deselected with checkboxes.
⟳	Updating messages displayed.

The current status of diagnostics (in progress/stopped/exported to files/files have been deleted) is displayed in the lower message area of the diagnostics window with the symbols listed above.
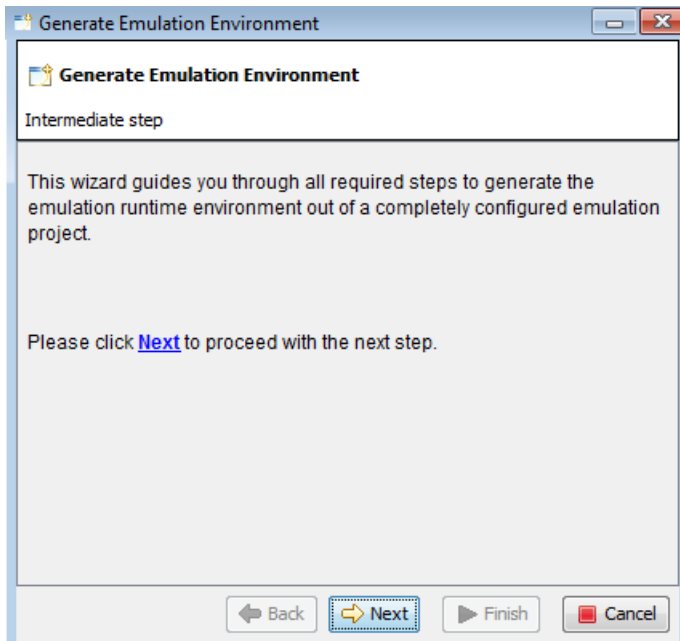
5.3 Creating an emulation environment
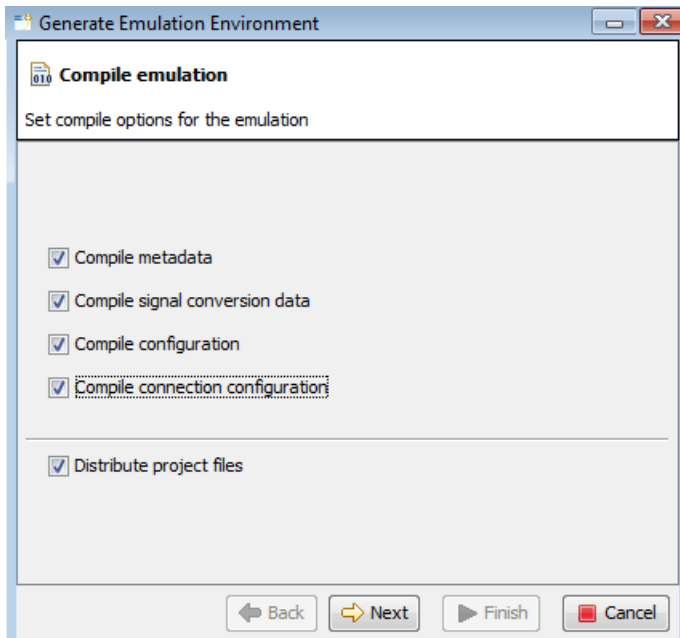
Symbol

1010
0101

Description

Use this menu command to open the wizard for generating the emulation environment:

Click **"Next"** to continue with the next step.

In the next step, you set options for generating the project:

Depending on the project settings, some options may be preset. Some options may have a gray background. These options have to be generated.

- **Compile metadata**
  Select this option to generate the basic emulation data of the computer and network configuration, the resource configuration, the resource distribution and the signal list.

- **Compile signal conversion data**
  Select this option to generate the emulation data for the resource configuration, the resource distribution and the signal list.

- **Compile configuration**
  Select this option to generate the emulation data for resources.

- **Compile connection configuration**
  Select this option to generate the emulation data for communication between resources.

- **Distribute project files**
  Select this check box to distribute all emulation data to all computers when the generation is complete. The option is only available when the emulation system consists of several computers.

Click **"Next"** to continue with the next step.

Generation can now be completed:
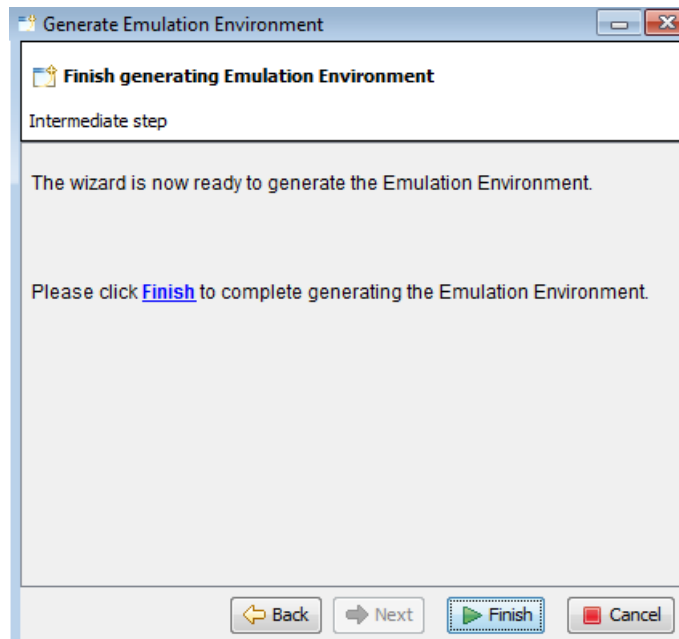
To continue, click the **"Finish"** button. The emulation environment is now generated. The generation progress is displayed in another dialog box:
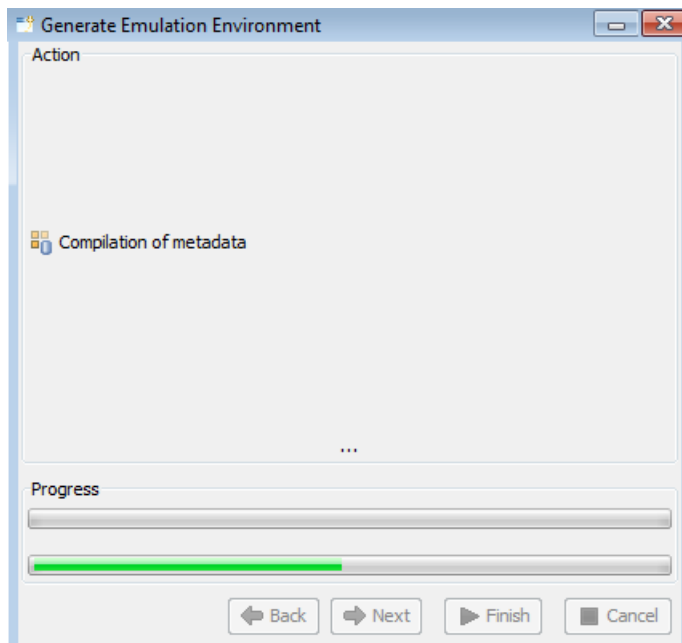
The dialog box closes automatically as soon as the generation has been carried out successfully. This completes the generation.

"Edit" menu

<div align="right">

6

</div>

6.1　　　Save

Edit > Save

Symbol	Keyboard shortcut	Meaning
🖫	Ctrl+S	You save changes to the current project with this menu command.

6.2　　　Add...

Edit > Add

Symbol	Keyboard shortcut	Meaning
✚	Ctrl+N	Use this menu command to insert a new object into the current dialog box.

6.3　　　Properties...

Edit > Properties...

Symbol	Keyboard shortcut	Meaning
✏	Enter	Use this menu command to open the "Properties..." dialog box of the current dialog box.

6.4　　　Undo

Edit > Undo

Symbol	Keyboard shortcut	Meaning
↩	Ctrl+Z	Use this menu command to undo all actions performed in the dialog box since you last saved.

6.5 Delete

Edit > Delete

Symbol	Keyboard shortcut	Meaning
✖	Del	Use this menu command to delete the selected object from the current dialog box.

6.6 CSV import

Edit > CSV import

Symbol	Meaning
	This menu command executes a data import in the current dialog box. The data is imported from a previously exported CSV file.

6.7 CSV export

Edit > CSV Export

Symbol	Meaning
	Use this menu command to perform a data export of the current dialog box to a CSV file.

6.8 Consistency check

Edit > Consistency check

Symbol	Meaning
The symbol of the current document is displayed.	Use this menu command to perform a consistency check only on the current document.

"Help" menu 7

7.1 Version

You use this menu command to open the "Version" dialog box. In this dialog box, you can find information about the installed version of SIMIT VC.

7.2 User manual

Use this menu command to open the user manual of SIMIT VC. The user manual describes the operation of SIMIT VC and guides you through the creation of an emulation project step-by-step.

7.3 Reference manual

Use this menu command to open the reference manual of SIMIT VC. The reference manual describes the interface and menu commands of SIMIT VC.

Abbreviations

AP	Automation Processor (= PLC), emulated as VC
CFC	Control Function Chart
CPU	Central Processing Unit
DB	Data block
ES	Engineering Station
FB	Function Block
GB	Gigabyte (PC storage capacity)
GHz	Gigahertz (PC CPU clock frequency)
HLL block	High Level Language function, function of a higher-level programming language (used in the VC as a substitute for SFCs/SFBs)
HMI	Human Machine Interface
HW	Hardware
ICSS	Integrated Control and Safety System
MB	Megabyte (PC storage capacity)
OPC	OLE for Process Control: The OPC specification is a non-manufacturer-specific technical specification that defines a group of standard interfaces on the basis of the Microsoft OLE/COM technology.
OS	Operator Station
PC	Personal Computer
PLC	Programmable Logic Controller (= automation processor)
SFB	System function block (operating system function of the SIMATIC S7-CPU)
SFC	Caution! Two different meanings: Sequential Function Chart or System function (similar to SFB)
SoftPLC	Synonym for virtual controller
SW	Software
TCP/IP	TCP/IP (Transmission Control Protocol/Internet Protocol) is the fundamental communication language or the Internet protocol. It can also be used as a communication protocol in a private network (either an Intranet or an Extranet).
UIF	User Interface
MPI	Multi Point Interface
UDP	User Datagram Protocol
VC	Virtual Controller (emulated controller)

Regular expressions

<div style="text-align: right; font-size: large;">9</div>

Summary of regular-expression constructs

Construct	Matches
Characters	
x	The character x
\\	The backslash character
\0n	The character with octal value 0n (0 <= n <= 7)
\0nn	The character with octal value 0nn (0 <= n <= 7)
\0mnn	The character with octal value 0mnn (0 <= m <= 3, 0 <= n <= 7)
\x$hh$	The character with hexadecimal value 0xhh
\u$hhhh$	The character with hexadecimal value 0x$hhhh$
\t	The tab character ("\u0009")
\n	The newline (line feed) character ("\u000A")
\r	The carriage-return character ("\u000D")
\f	The form-feed character ("\u000C")
\a	The alert (bell) character ("\u0007")
\e	The escape character ("\u001B")
\c$x$	The control character corresponding to x

Construct	Matches
Character classes	
[abc]	a, b, or c (simple class)
[^abc]	Any character except a, b, or c (negation)
[a-zA-Z]	a through z or A through Z, inclusive (range)
[a-d[m-p]]	a through d, or m through p: [a-dm-p] (union)
[a-z&&[def]]	d, e, or f (intersection)
[a-z&&[^bc]]	a through z, except for b and c: [ad-z] (subtraction)
[a-z&&[^m-p]]	a through z, and not m through p: [a-lq-z](subtraction)

Construct	Matches
Predefined character classes	
.	Any character (may or may not match line terminators)
\d	A digit: [0-9]
\D	A non-digit: [^0-9]
\s	A whitespace character: [\t\n\x0B\f\r]
\S	A non-whitespace character: [^\s]

\w	A word character: [a-zA-Z_0-9]
\W	A non-word character: [^\w]

POSIX character classes (US-ASCII only)

\p{Lower}	A lower-case alphabetic character: [a-z]
\p{Upper}	An upper-case alphabetic character:[A-Z]
\p{ASCII}	All ASCII:[\x00-\x7F]
\p{Alpha}	An alphabetic character:[\p{Lower}\p{Upper}]
\p{Digit}	A decimal digit: [0-9]
\p{Alnum}	An alphanumeric character:[\p{Alpha}\p{Digit}]
\p{Punct}	Punctuation: One of !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~
\p{Graph}	A visible character: [\p{Alnum}\p{Punct}]
\p{Print}	A printable character: [\p{Graph}]
\p{Blank}	A space or a tab: [\t]
\p{Cntrl}	A control character: [\x00-\x1F\x7F]
\p{XDigit}	A hexadecimal digit: [0-9a-fA-F]
\p{Space}	A whitespace character: [\t\n\x0B\f\r]

Classes for Unicode blocks and categories

\p{InGreek}	A character in the Greek block (simple block)
\p{Lu}	An uppercase letter (simple category)
\p{Sc}	A currency symbol
\P{InGreek}	Any character except one in the Greek block (negation)
[\p{L}&&[^\p{Lu}]]	Any letter except an uppercase letter (subtraction)

Boundary matchers

^	The beginning of a line
$	The end of a line
\b	A word boundary
\B	A non-word boundary
\A	The beginning of the input
\G	The end of the previous match
\Z	The end of the input but for the final terminator, if any
\z	The end of the input

Greedy quantifiers

X?	*X*, once or not at all
*X**	*X*, zero or more times
X+	*X*, one or more times

X{n}   *X*, exactly n times
X{n,}   *X*, at least n times
X{n,m}   *X*, at least n but not more than m times

Reluctant quantifiers

X??   *X*, once or not at all
X?*   *X*, zero or more times
X+?   *X*, one or more times
X{n}?   *X*, exactly *n* times
X{n,}?   *X*, at least *n* times
X{n,m}?   *X*, at least *n* but not more than m times

Possessive quantifiers

X?+   *X*, once or not at all
X+*   *X*, zero or more times
X++   *X*, one or more times
X{n}+   *X*, exactly *n* times
X{n,}+   *X*, at least *n* times
X{n,m}+   *X*, at least *n* but not more than m times

Logical operators

XY   *X* followed by *Y*
X|Y   Either *X* or *Y*
(X)   *X*, as a capturing group

Back references

n   Whatever the *n*th capturing group matched

Quotation

\\   Nothing, but quotes the following character
\\Q   Nothing, but quotes all characters until \\E
\\E   Nothing, but ends quoting started by \\Q

Special constructs (non-capturing)

(?:*X*)   *X*, as a non-capturing group
(?idmsux-idmsux)   Nothing, but turns match flags on - off
(?idmsux-idmsux:*X*)   *X*, as a non-capturing group with the given flags on - off
(?=*X*)   *X*, via zero-width positive lookahead

(?!*X*)	*X*, via zero-width negative lookahead
(?<=*X*)	*X*, via zero-width positive lookbehind
(?<!*X*)	*X*, via zero-width negative lookbehind
(?>*X*)	*X*, as an independent, non-capturing group

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