SIEMENS

Operating Manual

SIMARIS

Planning Tool

SIMARIS therm

Edition 11/2016

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SIEMENS

SIMARIS

Software
SIMARIS them Planning Tool

Operating Manual

V 2.1

11/2016

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.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

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.

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℗ 01/2017 Subject to change

Changing's in SIMARIS therm V2-1

A) Import devices related to single panels

1. Data are extended by
    - Customer order number
    - Remark

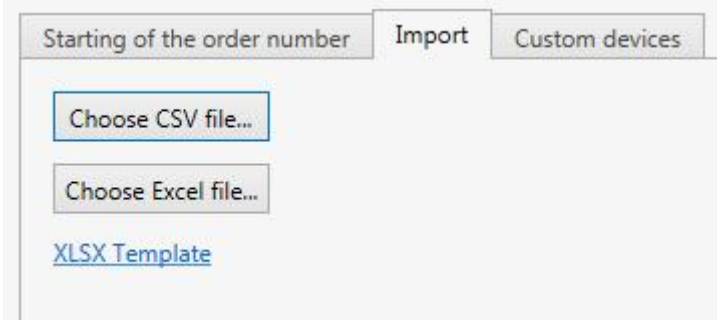
2. Data of „own devices“ extended by
    - Customer order number
    - Remark

3. Import works more easy
    - „Underscore“ = wild card for any figure or number

4. Data format is Excel (.xls or .xlsx) plus CSV

5. Import function – Detail
    - The number of columns is free selectable a least one column either Nr. or customer number. Missing data will be taken from the databases integrated (first Siemens, second own database)

    - Only columns having our column title will be imported.
      To see our titles for all possible columns please do first click on the “XLS Template” (see screenshot below)



    - Data necessary but not imported will be taken from the internal databases if available there.

      Note:

If Siemens devices are in both databases (Siemens and own database) the date must be the same in both databases.

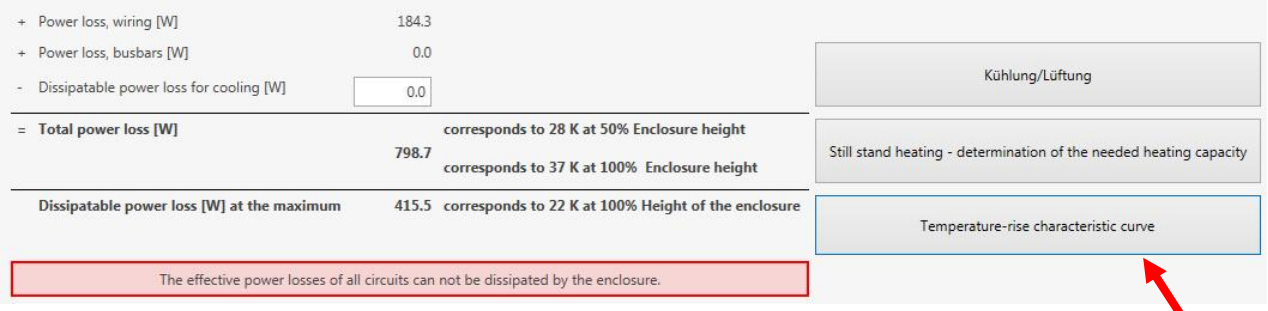
- If it occurs a failure or more a log file is generated, which can be opened via Excel. Each failure will be shown in an separate line, i.e. for one Order Number there can be more than one line.

B) Characteristic curve of the temperature-rise inside the enclosure

This curve is only available if the calculation is done according IEC 60890.

The goal of this calculation method is to show the temperature in accordance to the height of the panel. The project designer has no to verify that each device is installed in areas where the temperature is not higher than the allowed temperature of the device given by the manufacturer of the device.

1. Selecting the curve via the menu “calculation”



Button in light grey shadow signalizes that the calculation method is not according IEC 60890. If the curve is wanted, please change the calculation method.

2. According to IEC 60890

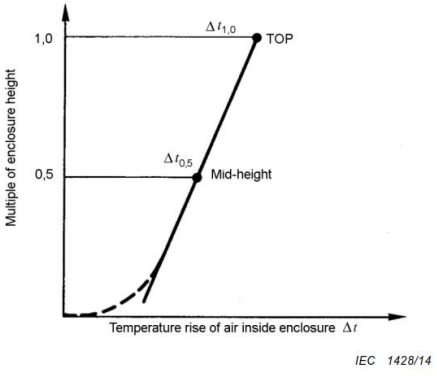


Figure 1 – Temperature-rise characteristic curve for enclosures with A_e exceeding 1,25 m²

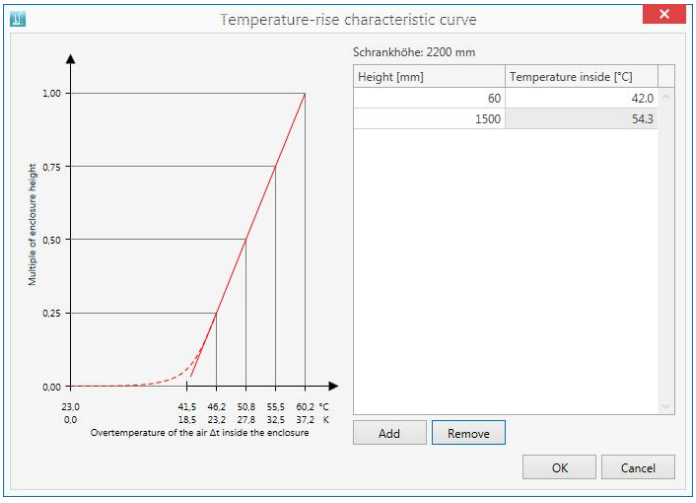
a. In the curve itself we will show only 4 values for the height;
H = 25%; 50%; 75%; 100%

b. The axis for the temperature shows 2 different value lines
- Absolute temperature in °C

- Temperature difference (Delta) in °K
aligned to the values of the height

3. Additionally: in the rigth half there can be added several lines.
As input can be done the desired temperature and the software gives the height in mm back of it can be filled in the desired height and the software gives the temperature back in absolute °C.

   a. Graphics in SIMARIS therm



   To add or remove additionally pairs of values please us the buttons ADD or REMOVE.

   b. Print out:
   The print can be together with the calculation report, by selecting or de-selection of the check box below the button “Calculation Report”.

C) Following topics are changed now

- RDF for Panels now active
- Update of Siemens Database
- Way of erection for 8MF, now extended to all possibilities
- The temperature values are now absolute values in °C, outside panel and inside panel. Additionally the difference will be shown
- The calculation Report shows now also the Order numbers of the Still Stand Heating
- With the calculation method according IEC 60890 is only possible for certein cubicle sizes.
  If this note appears than either the calculation method need to be changed or the panel size, or there should be used more than one panel
- RDF for each single device now default value is 100% but it will not be shown
- Panel board system 8MF
  - Calculation via both methods possible.
  - Using the easy way the software calculates the max. Dissipateable heat loss with the heat transfer coefficient of 5.5.

- Possible temperatures are not between -50°C and plus 80°C
- Own devices: Deletion of more than one line possible

Table of contents

Software description

1

SIMARIS therm is a software for switchgear builders, control panel builders and end users.

The thermal balance in switchgear and control panels can be determined using SIMARIS therm. With the results, suitable corrective measures can be identified and implemented.

SIMARIS therm does not perform a plausibility check as to whether the selected devices match one another - or fit in the selected enclosure.

1.1 Possibilities of determining the thermal balance

Two methods can be applied to determine the thermal balance.

Method 1 – easy estimation

The actual power loss in the cubicle is determined, and compared with the heat the cubicle power loss can actually dissipate.

The dissipatable power loss can be determined using two methods:

- Preferred way: The dissipatable power loss is entered if the enclosure manufacturer specifies this.
- Entering the k factor
  Thermal transmission coefficient in watts per m^2 per Kelvin temperature difference (not defined in EN 61439-1)

The thermal balance is acceptable if the cubicle can dissipate the power loss that occurs.

If the cubicle can dissipate less power loss than actually occurs, then the user can apply suitable corrective measures.

Corrective measures

- Larger enclosure
- Reduce the rated diversity factor (RDF[1)]) (assuming that the application permits this reduction)
- Slightly overdimension the devices
- Install filter fans
- Install air conditioning

These filter fans and/or air conditioning can be easily selected from the Siemens product portfolio and added. Alternatively, the additional dissipatable power loss can be specified.

[1] A detailed explanation of how to apply the RDF (rated diversity factor) is provided in IEC / EN / DIN EN 61439-1. The rated diversity factor (RDF) can be used for machine control cubicles according to IEC / EN / DIN EN 60204-1 for the load factor/rated diversity factor. The RDF takes into account that in a plant/system all of the devices are never simultaneously switched on – and not with their full rated power.

Method 2 – calculation according to IEC 60890

The actual power loss in the cubicle is determined.

Based on this power loss, the temperature that is obtained at enclosure heights 50 %, 75 % or 100 % is determined (depending on the effective cooling surface). If the effective cooling surface according to IEC 60890 is too large, then the enclosure must be subdivided into fictitious smaller enclosures. For instance, the width can be reduced - so that this panel is made up of several panels, which are lined up next to one another.

The user must compare the determined temperature with the maximum permissible operating temperature of the installed devices.
If the devices can be operated at the temperature that is reached, then the thermal balance is acceptable.
If the devices (or just individual devices) cannot be operated at this temperature, then corrective measures must be taken.

Corrective measures

- Larger enclosure
- Reduce the rated diversity factor (RDF[1]) (assuming that the application permits this reduction)
- Slightly overdimension the devices
- Install the devices at a different height so that the maximum permissible temperature is not exceeded
- Install filter fans
- Install air conditioning

These filter fans and/or air conditioning can be easily selected from the Siemens product portfolio and added. Alternatively, the additional dissipatable power loss can be specified.

[1] A detailed explanation of how to apply the RDF (rated diversity factor) is provided in IEC / EN / DIN EN 61439-1. The rated diversity factor (RDF) can be used for machine control cubicles according to IEC / EN / DIN EN 60204-1 for the load factor/rated diversity factor. The RDF takes into account that in a plant/system all of the devices are never simultaneously switched on – and not with their full rated power.

1.2 Database

The software includes as standard many devices from the Siemens portfolio for power distribution and control cubicles.

The following enclosures are stored as standard:

- Siemens 8MF cubicles
- Siemens SIMBOX

A dedicated configuring tool called "simaris configuration scf" is available for all other Siemens enclosures.

For any arbitrary enclosure, an enclosure template is already created in the installation ("Freely definable enclosure (Page 28)").
Enclosure template can be used as basis for other customer-specific enclosures.

For each individual device, a current that deviates from the rated current can be entered - as well as a utilization factor. This means that the power loss can be determined that is as close as possible to the loss that occurs under the actual operating conditions.
If a device is entered with a quantity greater than 1, then the different utilization of the individual devices of this type can be adapted.

Devices that are not included in the database - or are third-party devices

If Siemens devices are not included in the default installation, then these can be added at any time.
A sales person can be contacted so that Siemens devices, which are not in the database, can be subsequently added. If third-party devices must be used, then the software also allows these to be integrated. The user is responsible for integrating third-party devices.
Missing devices can be added in User-defined devices (Page 19).

1.3 Anti-condensation heating

The software can determine the necessary heating power as a function of the external temperature and the minimum temperature inside the enclosure.
The user can select suitable Siemens heating devices from a list to achieve the necessary heating power.

1.4 Data export options

The software provides the following Outputs (Page 49) after data has been entered and calculated:

- Calculation report
  The documentation to prove that the temperature limits have been complied with can be provided when the calculation is exported.
- Parts list
  The parts list (bill of materials) contains all devices and the enclosure that the user integrated into his particular project.

The following import and export formats are available:

- CSV (comma-separated values)
- XLSX (Microsoft Excel)

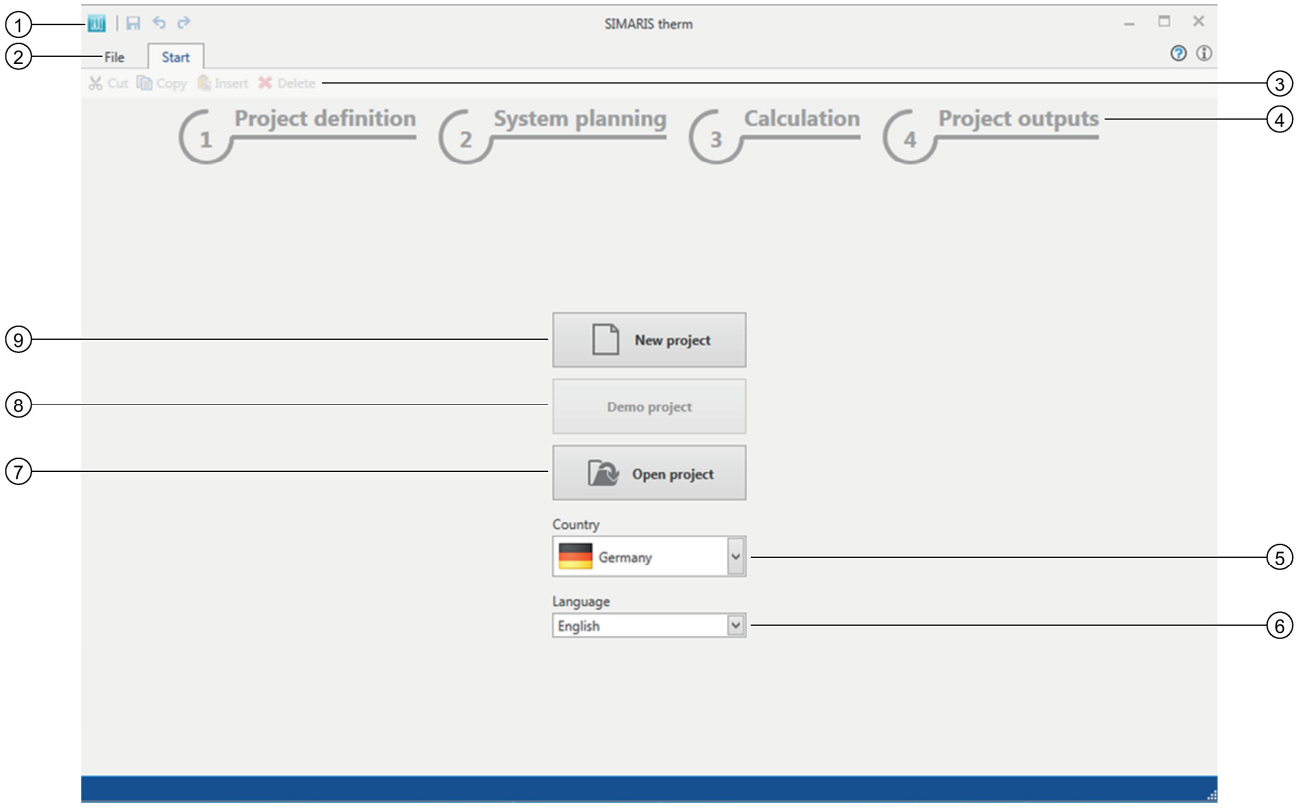
See also

User-defined devices (Page 19)

Software user interface

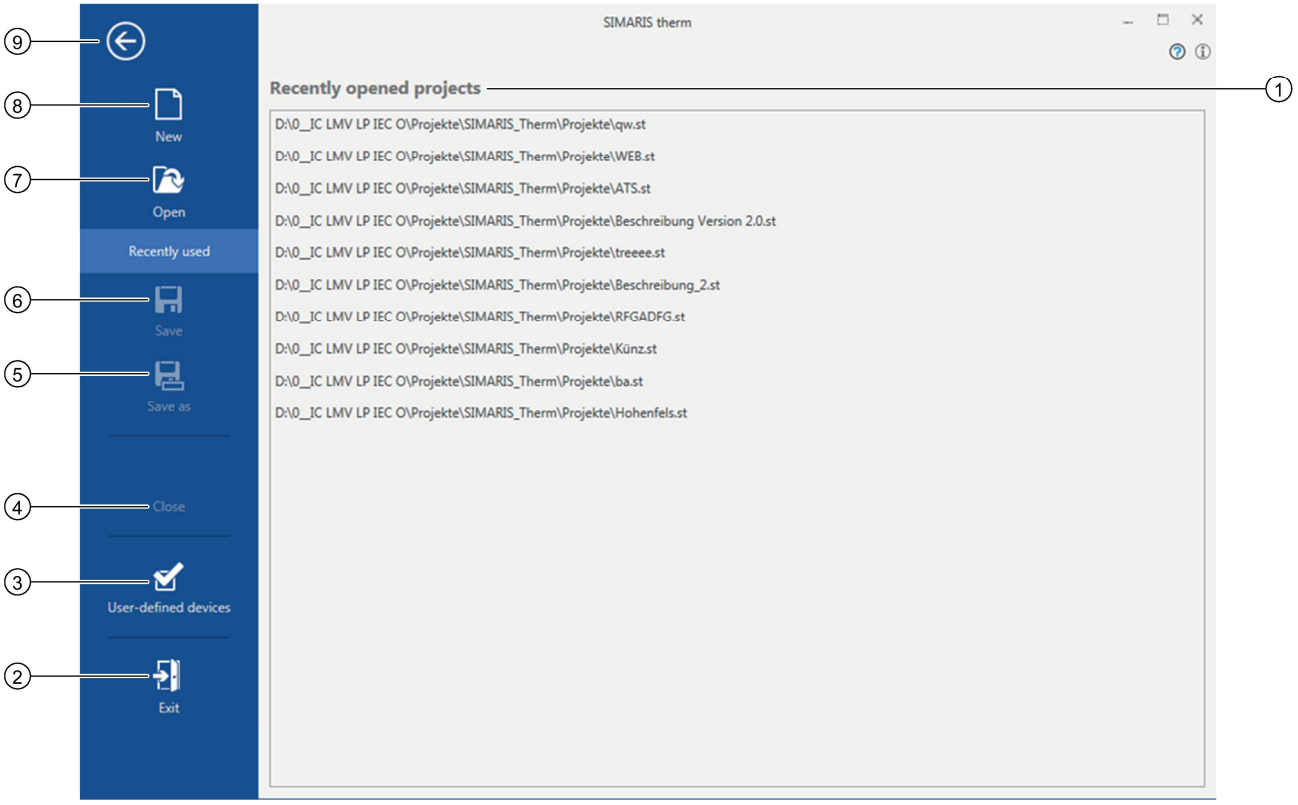
2

2.1 Start



① Window control
② Change to File (Page 18)
③ Edit toolbar
④ Configuring phase selection
⑤ Country selection (country where the equipment is installed)
⑥ Language selection for the user interface
⑦ Open existing project.
⑧ Open demonstration project.
⑨ Create new project.

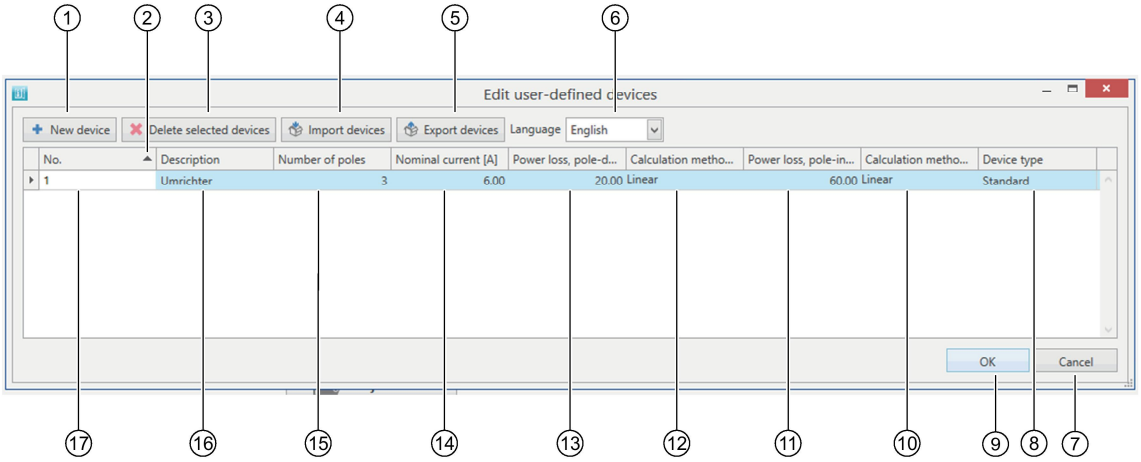
2.2 File



① List of projects last opened
② Close program.
③ Open User-defined devices (Page 19) view.
④ Close current project.
⑤ Save current project as
⑥ Save current project.
⑦ Open existing project.
⑧ Create new project. (Page 23)
⑨ Back to the last view

2.3 User-defined devices

In the user-defined devices view, missing Siemens devices and missing third-party devices can be manually added.



① Add new device
② Set sorting sequence.
③ Delete selected devices.
④ Import devices.
⑤ Export selected devices.
⑥ Language selection[1)]
⑦ Reject changes.
⑧ Device type
⑨ Accept changes.
⑩ Calculation type selection for pole-independent power loss
⑪ Pole-independent power loss
⑫ Calculation type selection for pole-dependent power loss
⑬ Pole-dependent power loss
⑭ Rated current
Is required for pole-dependent power loss or linear or quadratic power loss.
⑮ Pole number (is required for the pole-dependent power loss)
⑯ Device designation
⑰ Order number of the device

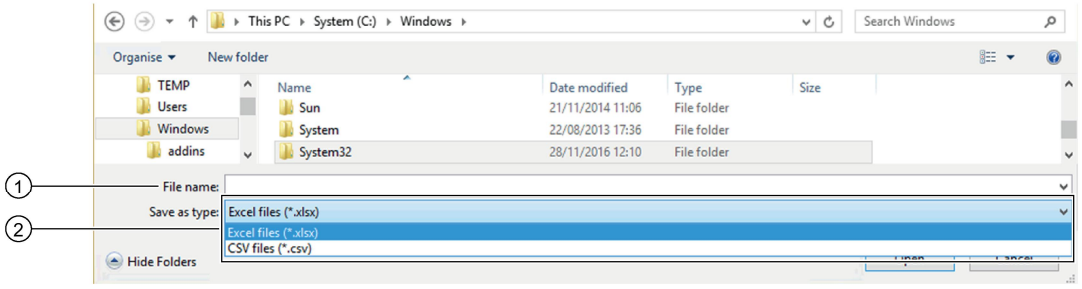
[1)] Device designation, toggle between "Designation de-DE" and "Designation en-US".

Importing/exporting devices

Note

To ensure the correct data structure when importing a new device, first export a file with sample values.

1. Click on "Import device" or "Export device".
   The file dialog is displayed.



① Input field for file name
② Selection field for file type

2. Enter file name or select file.
3. Select file type.
4. Confirm with "Save" or "Open".

Note

Only edit CSV files using a text editor (e.g. "notepad.exe" under Windows). After editing with Microsoft Excel, it is possible that SIMARIS therm can no longer open the CSV file.

Calculation type

The following calculation types are available:

- Linear
- Quadratic
- Constant

Linear

The power loss changes directly proportional to the current.
Examples:

- 50 % current = 50 % power loss
- 70 % current = 70 % power loss

This response only occurs sporadically - so therefore the device manufacturer must be contacted.

Note

Exception: Frequency converter (FC)

The power loss of frequency converters depends on the operating point[1)].

[1)] For the relative motor stator frequency and relative torque current

Quadratic

The power loss changes quadratic to the current.
Examples:

- 50 % current = 25 % power loss (ratio 1:0.5^2)
- 70 % current = 49 % power loss (ratio, 1:0.7^2)

The response occurs for:

- All devices and equipment where the main current paths comprise electrically conductive materials
- Cables
- Conductors
- Busbars

Constant

The power loss remains constant over the complete operating time.

For example, the response occurs for:

- Contactor coils
- Undervoltage releases

Pole-dependent power loss

This data only refers to one pole of the device.
To determine the actual device power loss, the determined power loss must be multiplied by the number of poles to be connected.

The pole-dependent power loss is specified for power losses that have either a linear or quadratic characteristic.

Pole-independent power loss

The data refers to the complete device.
The determined power loss does not have to be multiplied.

The pole-independent power loss is specified for power losses that have either a linear or quadratic characteristic.

Device type

The following device types can be selected:

- Normal
- Converter (frequency converter)

Normal

In operation, this type of device generates a power loss that also increases the temperature of the switchgear and controlgear assembly.

Converter (frequency converter)

When creating devices, enter the maximum value of the power loss of the converter so that it can be universally used; and if a manual entry is not made, is incorporated in the calculation in order to obtain the most precise result.

For this device type, the "Power loss" field can be manually changed when designing plants and systems (Page 24).

Device type for cables and conductors

Take into account the power loss of cables and conductors.

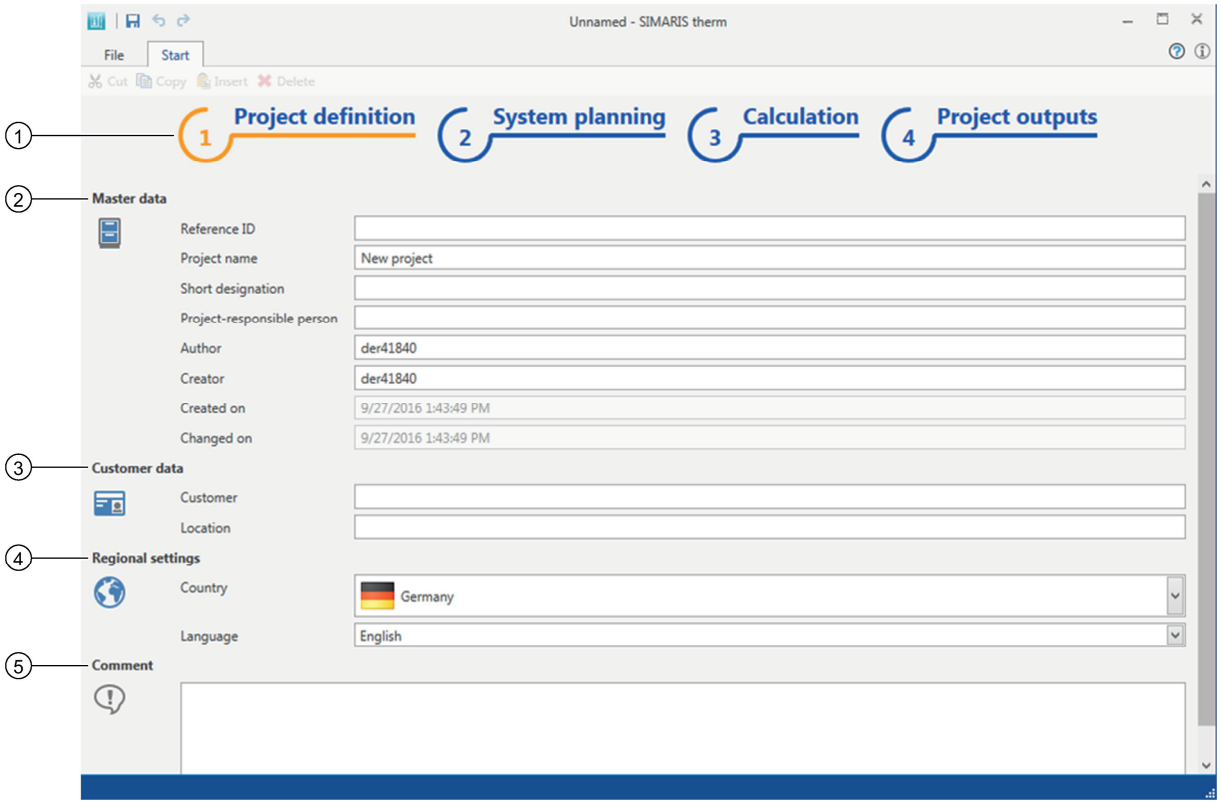
The power loss can be retrieved from the following sources:

- IEC / EN / DIN EN 61439-1, Annex H
- Manufacturers data sheet

Cables and conductors can be created as a user-defined device:

Calculation type dependent on the number of poles	Quadratic
Number of poles	1, single-phase AC power outlets 3, for symmetrical three-phase AC power outlets
Unit of length	1 m, specified in the description
Device type	Normal

2.4 Project definition



① Project execution phases[1)]:

- Project definition
- System planning (Page 24)
- Calculation (Page 43)
- Project outputs (Page 49)

② Master project data

③ Customer's data

④ Country selection (country where the equipment is installed)

⑤ Language selection for the user interface

⑥ Comment on the project

The following fields are automatically populated; however, they can be modified:

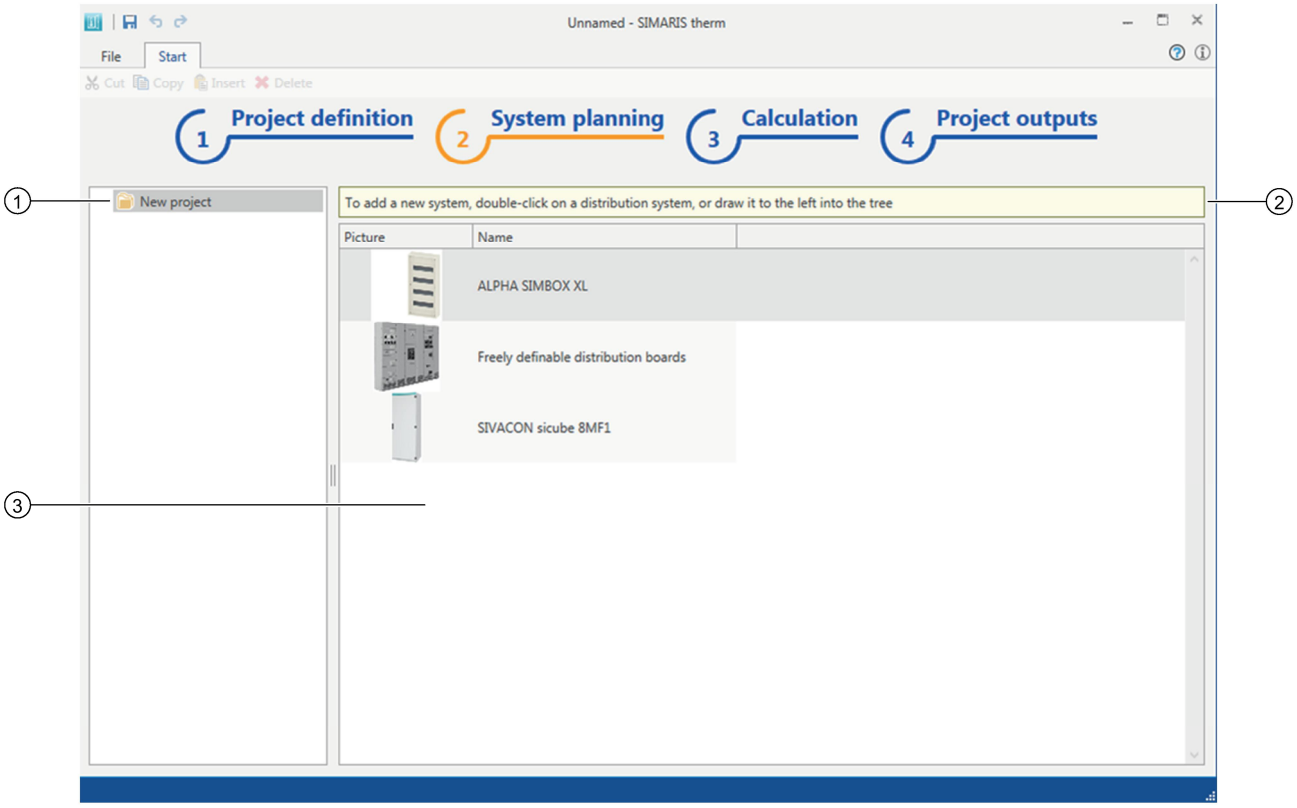
- Project name
- Author
- Creator

Note

Several authors can be entered in the "Author" field, e.g. the first and last author.

[1] When required, you can toggle between the phases as required.

2.5 System planning



① Project tree with project name and project structure
② Note
③ Selection window for the cubicle system

Project tree

The project can include several systems, and a system can include several cubicles, however only one cubicle system.
Mixing various cubicle systems in one system is not possible, as there are no associated connecting sets.

If several cubicle systems are used, then these must be subdivided into several systems – even if these are located directly next to one another.
In this case, the final panel must be used as "final panel mounted at the wall". You will find more information on this in Chapter "Installation types (Page 29)".

Selection for the cubicle system

The following cubicle systems can be selected:

- ALPHA SIMBOX XL
- Freely definable enclosure
- Siemens Sicube 8MF cubicles

Dedicated configuration software is available for all other switchgear and control assemblies from Siemens, which also takes into account the power loss.

Deleting a system

1. Select the system in the project tree.
2. In the menu bar, click on "Delete".

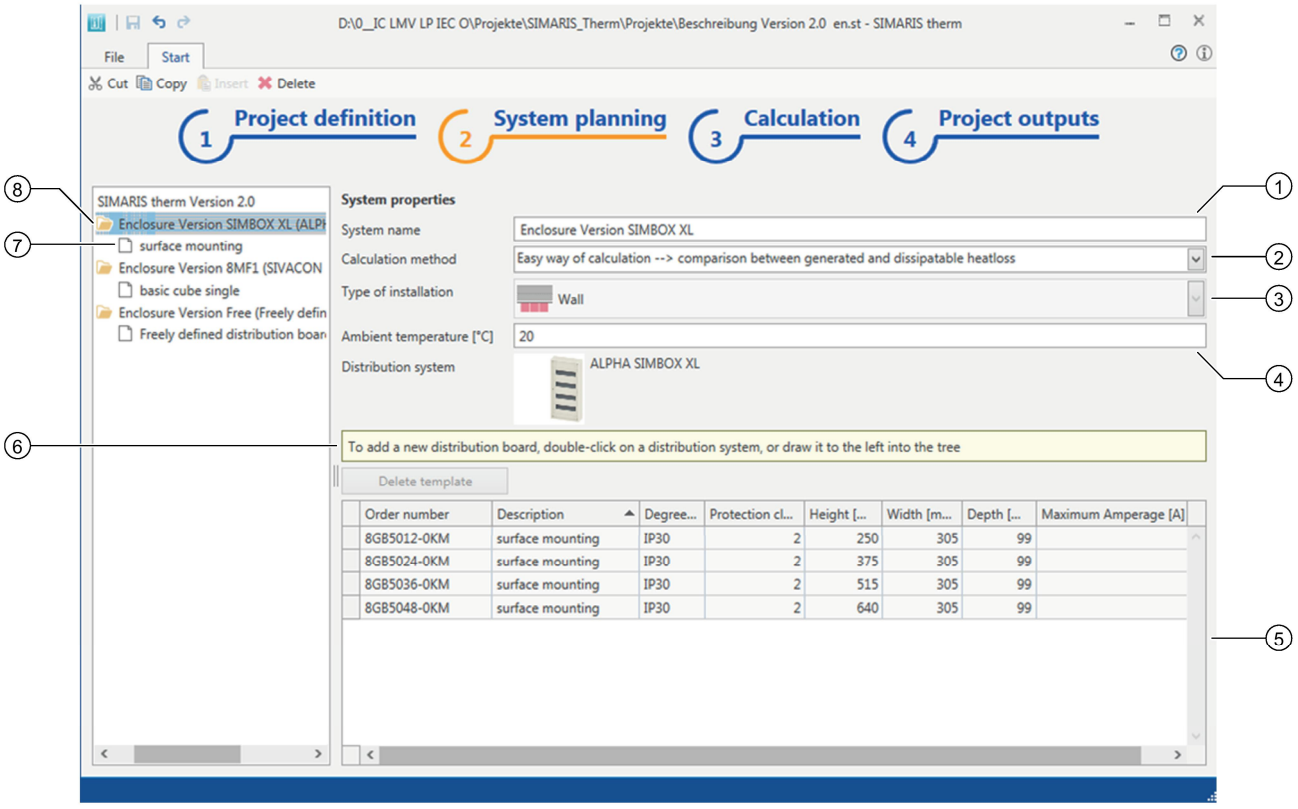
Copying a system

1. Select the system in the project tree.
2. In the menu bar, click on "Copy".
   The system is now in the clipboard.
3. Select a new project in the project tree, and in the menu bar, click on "Insert".
   The system is taken from the clipboard and inserted into the new project.

Shifting a system

1. Select the system in the project tree.
2. With the left-hand mouse key pressed, shift the system to the required location and then release the mouse key (drag and drop).

2.5.1 System planning - ALPHA SIMBOX XL



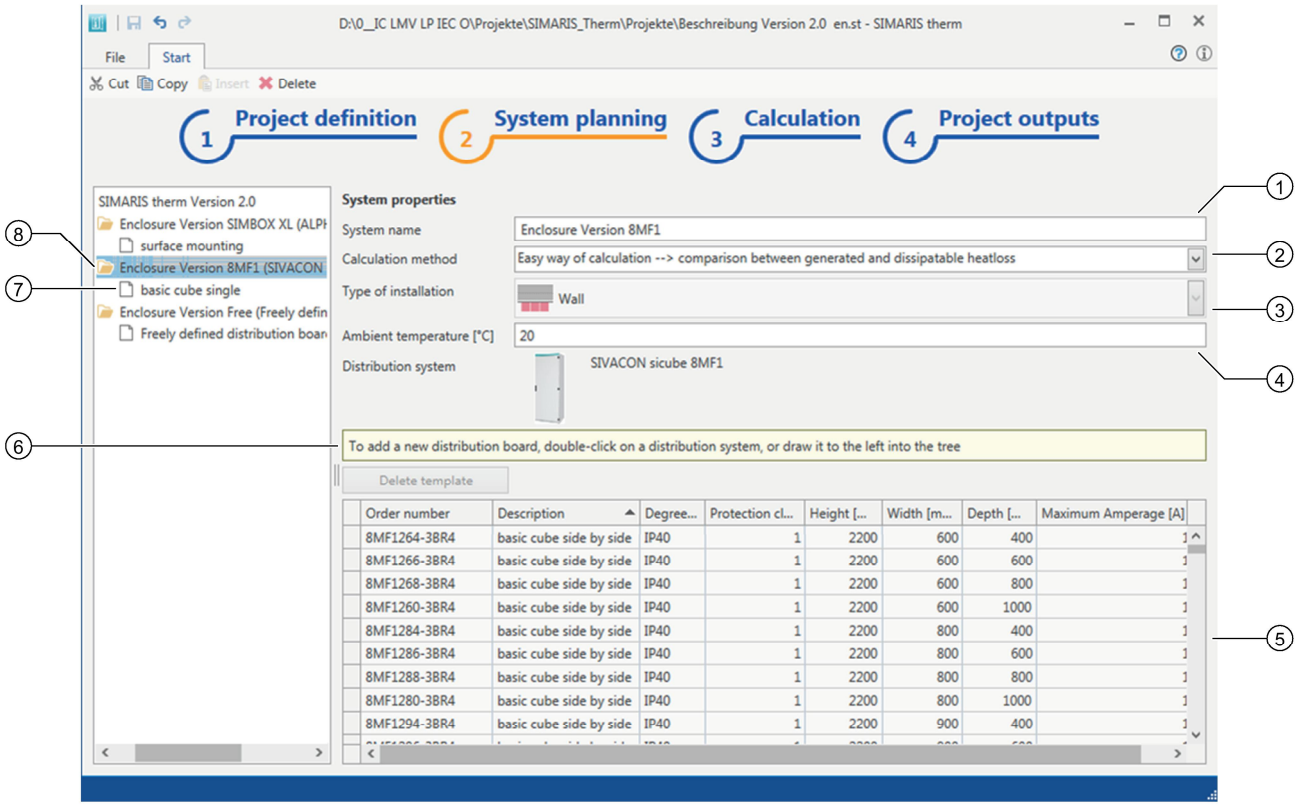
① System name
② Calculation methods
③ Installation type
You can find additional information on this topic in Chapter "Installation types (Page 29)".
④ Average ambient temperature at which the system is operated
⑤ Technical data from the Siemens basic data
⑥ Note
⑦ ALPHA SIMBOX XL version
⑧ Project tree with project name and project structure

[1] Only the basic calculation is available for ALPHA SIMBOX XL.

This view is displayed if one of the following operations was performed:

- "ALPHA SIMBOX XL" was selected in the project tree.
- "ALPHA SIMBOX XL" was selected in System planning (Page 24).

2.5.2 System planning - SIVACON sicube 8MF

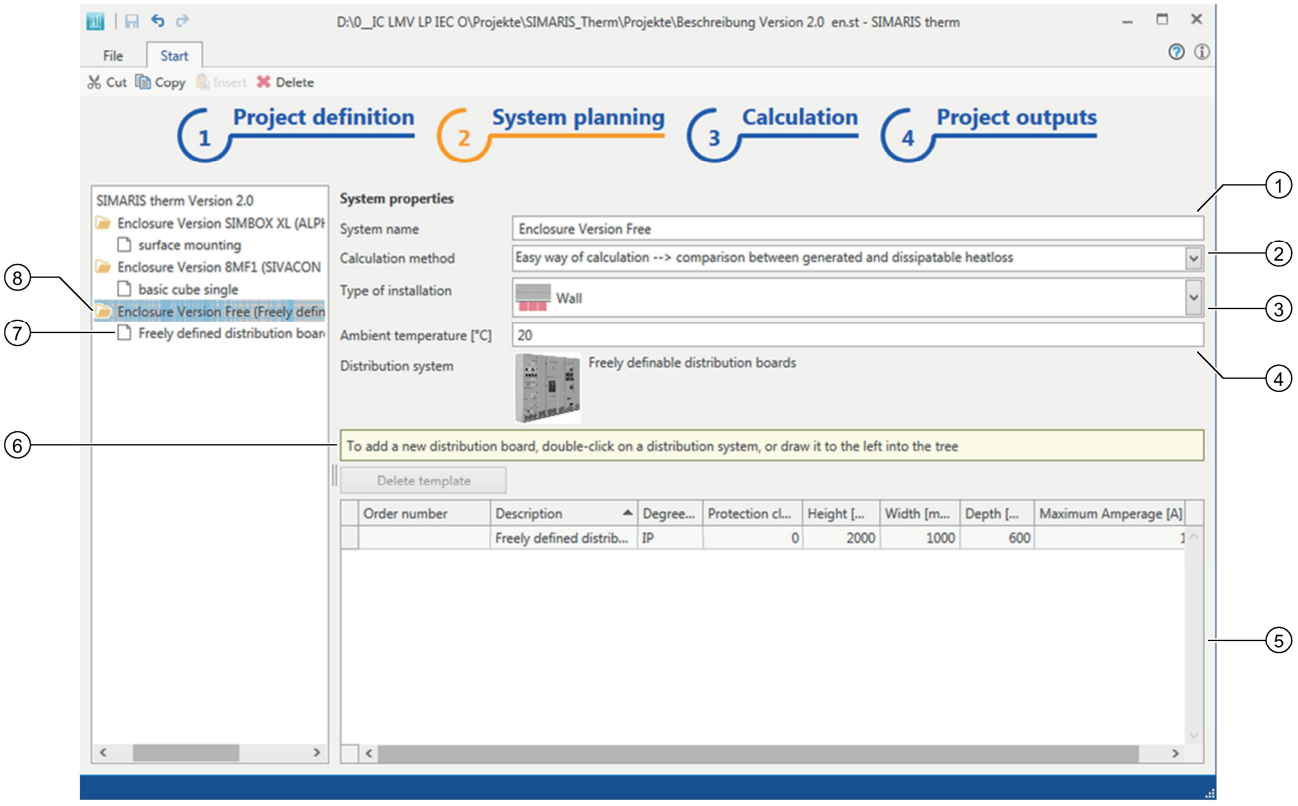


① System name
② Calculation methods
③ Installation type
You can find additional information on this topic in Chapter "Installation types (Page 29)".
④ Average ambient temperature at which the system is operated
⑤ Technical data from the Siemens basic data
⑥ Note
⑦ SIVACON sicube 8MF version
⑧ Project tree with project name and project structure

This view is displayed if one of the following operations was performed:

- "SIVACON sicube 8MF" was selected in the project tree.
- "SIVACON sicube 8MF" was selected in the System planning (Page 24).

2.5.3 System planning - Freely definable enclosure



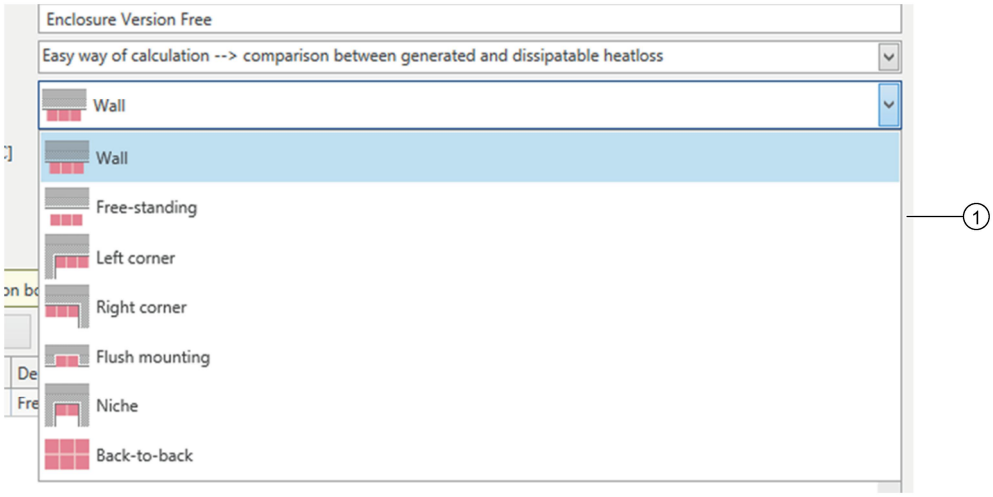
① System name
② Calculation methods
③ Installation type
You can find additional information on this topic in Chapter "Installation types (Page 29)".
④ Average ambient temperature at which the system is operated
⑤ Technical data from the view Distribution cubicle (Page 36)
⑥ Note
⑦ Version of the freely definable enclosure
⑧ Project tree with project name and project structure

This view is displayed if one of the following operations was performed:

- In the project tree, a system with "Freely definable enclosure" was selected.
- "Freely definable enclosure" was selected in System planning (Page 24).

Any number of enclosures and cubicles can be created using this system type. You can find additional information for entering data for this system type in Chapter "System planning - Freely definable enclosure - File entry (Page 36)".

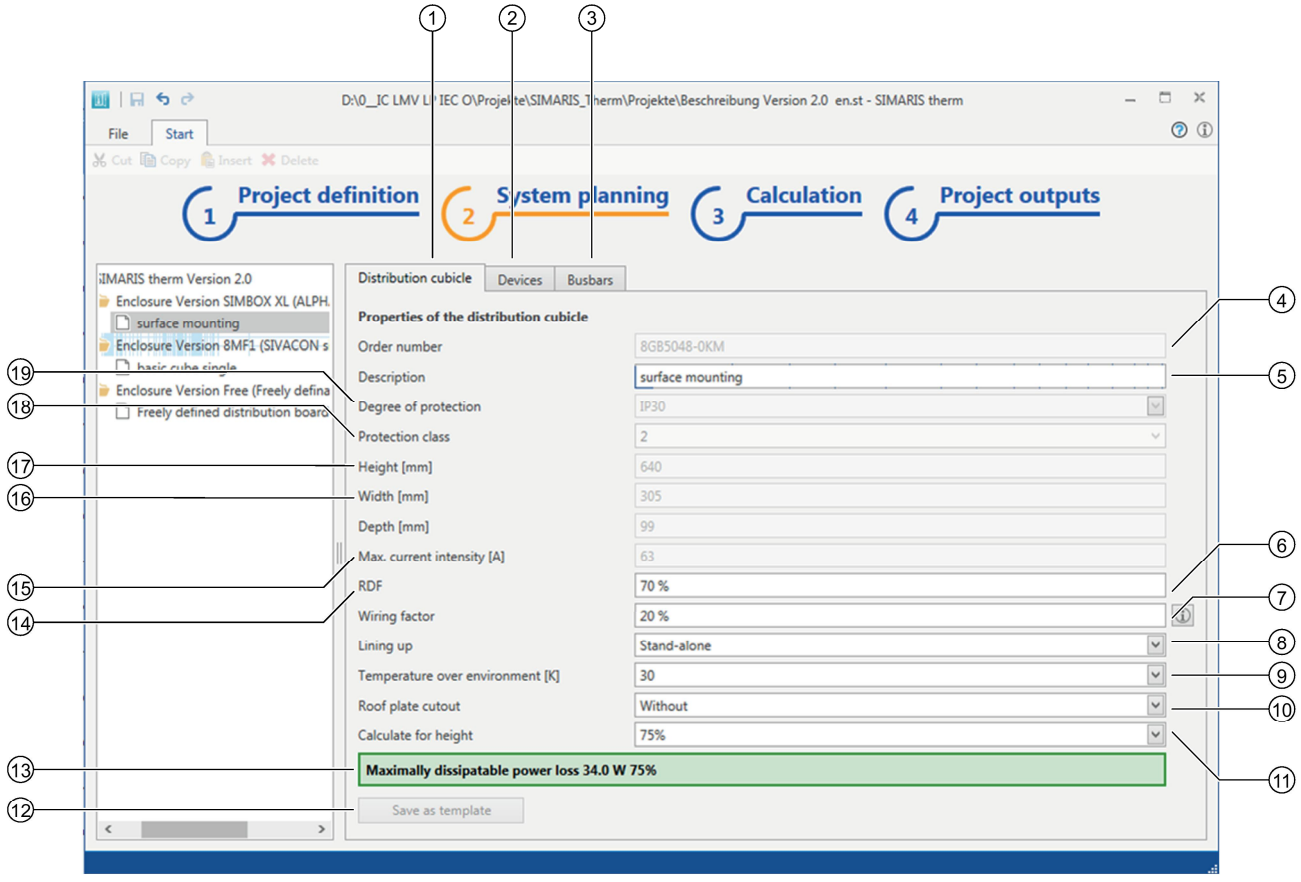
2.5.4 Installation types



① Possible installation types[1)]

[1)] The selection can be restricted depending on the particular system.

2.5.5 System planning - ALPHA SIMBOX XL - file input



① Submenu "Distribution cubicle"
② Submenu "Devices (Page 19)"
③ Submenu "Busbars (Page 40)"
④ Order number (display field only)
⑤ Distribution board description
⑥ RDF for the distribution board
⑦ Wiring factor
⑧ Type of lineup
⑨ Temperature inside the enclosure
⑩ Cutouts, roof plate[1)]
⑪ Height calculation
⑫ Maximum dissipatable power loss for the enclosure with the specified parameters
⑬ Save the enclosure with parameters as template[2)]
⑭ Maximum current for the enclosure
⑮ Enclosure depth in mm (display field only)
⑯ Enclosure width in mm (display field only)
⑰ Enclosure height in mm (display field only)
⑱ Enclosure protection class (display field only)
⑲ Degree of protection (display field only)

[1] Only the "Without" option can be selected.

[2] The actual enclosure type cannot be saved. The enclosure type already exists in the Siemens database.

This view is displayed if one of the following operations was performed:

- A "ALPHA SIMBOX XL" system was selected in the project tree.
- A specific ALPHA SIMBOX XL was selected in System planning - ALPHA SIMBOX XL (Page 26).

RDF for the distribution board

RDF = rated diversity factor (as a %)

The default assignment is 80 %; however, this can be changed at any time corresponding to the actual requirements.
Possible input values lie between 0 % and 100 % as integer numbers. A value of 0 % means that no rated current flows through the enclosure – and 100 % means that the full rated current flows through the enclosure.

The RDF is specified by the manufacturer of the switchgear and controlgear combination as a percentage of the rated current with which the outputs of a switchgear and controlgear assembly in an enclosure can be simultaneously loaded, taking into account the mutual thermal influences.

The RDF can be used for machine control cubicles according to IEC / EN / DIN EN 60204-1 for the load factor/rated diversity factor.

Additional information on how to apply the RDF is provided in IEC / EN / DIN EN 61439-1.

Wiring factor

This percentage value refers to the sum of the power loss of the entered switching devices – as well as the busbars – and is added to the power loss of the individual devices.

The wiring factor is not part of the relevant standards, and is a practical approach to take into account, for example auxiliary devices, control circuit wiring without having to make complex calculations. The power loss of auxiliary contactors is not necessarily part of the product approval; as a consequence, no corresponding value is listed in the product data sheets.

30 % is adequate for power distribution systems. However, for pure control cubicles, this value can be significantly higher.

The database does not include any cable/conductor power losses. For example, the power loss of a cable with 10 mm^2 carrying 25 A in cable duct and a control cubicle temperature of 55°C, is 1.37 W per meter single length. This can also be taken into account using the wiring factor. Alternatively, cables/conductors can also be created as user-defined devices. More information is provided in Chapter "User-defined devices (Page 19)".

Type of lineup

The type of lineup indicates whether it involves an individual enclosure - or at which location it is positioned in the lineup.

The following options can be selected:

- Standalone
- Center
  An enclosure is directly mounted to the left and right.
- At the left end
  An additional enclosure is only mounted on the right side.
- At the right end
  An additional enclosure is only mounted on the left side.

Cutout, roof plate

For other enclosures, this field is an input field for the cross-section of the cooling/ventilating openings in cm^2.

This field is only displayed if the calculation is performed according to IEC 60890.

For the easy calculation, the cooling/ventilating openings should already have been taken into account by the enclosure manufacturer based on the dissipatable enclosure power loss.

Note

In order that the cooling/ventilating openings are effective, several secondary conditions must be satisfied:

- An air inlet and an air outlet are always required in order to achieve an adequate air flow.
- For natural ventilation, the cross-section of the air outlet openings should be at least 10 % larger than the cross-section of the air inlet openings.
- It must be ensured that the air can flow unobstructed between the inlet and outlet openings.

All devices, which are not in the air flow, cannot be additionally cooled. As a consequence, all devices must be arranged so that they are located in the air flow.

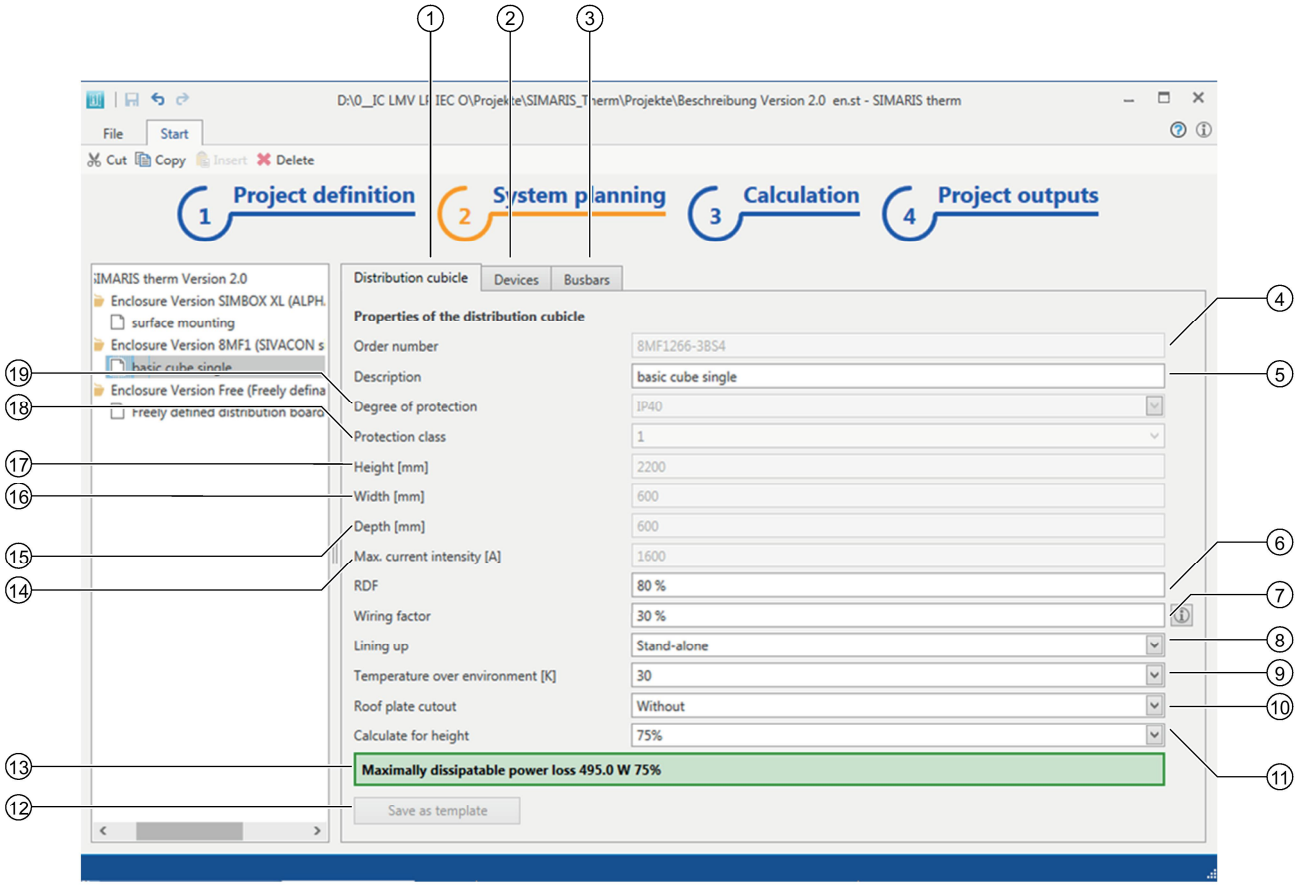
Height calculation

For the enclosure approval, the maximum dissipatable power loss of the enclosure is checked at various heights.

The software checks as to whether the test values are exceeded. The software specifies which power loss of the selected temperature difference (= internal temperature) of the enclosure can be installed at the selected enclosure height.

The selection of either 75 % height or 100 % height can be made to be dependent on where the largest individual power loss was installed.

2.5.6 System planning - SIVACON sicube 8MF - file input



① Submenu "Distribution cubicle"
② Submenu "Devices (Page 19)"
③ Submenu "Busbars (Page 40)"
④ Order number (display field only)
⑤ Distribution board description
⑥ RDF for the distribution board
⑦ Wiring factor
⑧ Type of lineup
⑨ Temperature inside the enclosure
⑩ Cutouts, roof plate[1)]
⑪ Height calculation
⑫ Maximum dissipatable power loss for the enclosure with the specified parameters
⑬ Save the enclosure with parameters as template[2)]
⑭ Maximum current for the enclosure
⑮ Enclosure depth in mm (display field only)
⑯ Enclosure width in mm (display field only)
⑰ Enclosure height in mm (display field only)
⑱ Enclosure protection class (display field only)
⑲ Degree of protection (display field only)

[1] Only the "Without" option can be selected.

[2] The actual enclosure type cannot be saved. The enclosure type already exists in the Siemens database.

This view is displayed if one of the following operations was performed:

- A "SIVACON sicube 8MF" system was selected in the project tree.
- A specific SIVACON sicube 8MF was selected in System planning - SIVACON sicube 8MF (Page 27).

RDF for the distribution board

RDF = rated diversity factor (as a %)

The default assignment is 80 %; however, this can be changed at any time corresponding to the actual requirements.
Possible input values lie between 0 % and 100 % as integer numbers. A value of 0 % means that no rated current flows through the enclosure – and 100 % means that the full rated current flows through the enclosure.

The RDF is specified by the manufacturer of the switchgear and controlgear combination as a percentage of the rated current with which the outputs of a switchgear and controlgear assembly in an enclosure can be simultaneously loaded, taking into account the mutual thermal influences.

Additional information on how to apply the RDF is provided in IEC / EN / DIN EN 61439-1.

Wiring factor

This percentage value refers to the sum of the power loss of the entered switching devices – as well as the busbars – and is added to the power loss of the individual devices.

The wiring factor is not part of the relevant standards, and is a practical approach to take into account, for example auxiliary devices, control circuit wiring without having to make complex calculations. The power loss of auxiliary contactors is not necessarily part of the product approval; as a consequence, no corresponding value is listed in the product data sheets.

30 % is adequate for power distribution systems. However, for pure control cubicles, this value can be significantly higher.

The database does not include any cable/conductor power losses. For example, the power loss of a cable with 10 mm^2 carrying 25 A in cable duct and a control cubicle temperature of 55°C, is 1.37 W per meter single length. This can also be taken into account using the wiring factor. Alternatively, cables/conductors can also be created as user-defined devices. More information is provided in Chapter "User-defined devices (Page 19)".

Type of lineup

The type of lineup indicates whether it involves an individual enclosure - or at which location it is positioned in the lineup.

The following options can be selected:

- Standalone
- Center
  An enclosure is directly mounted to the left and right.
- At the left end
  An additional enclosure is only mounted on the right side.
- At the right end
  An additional enclosure is only mounted on the left side.

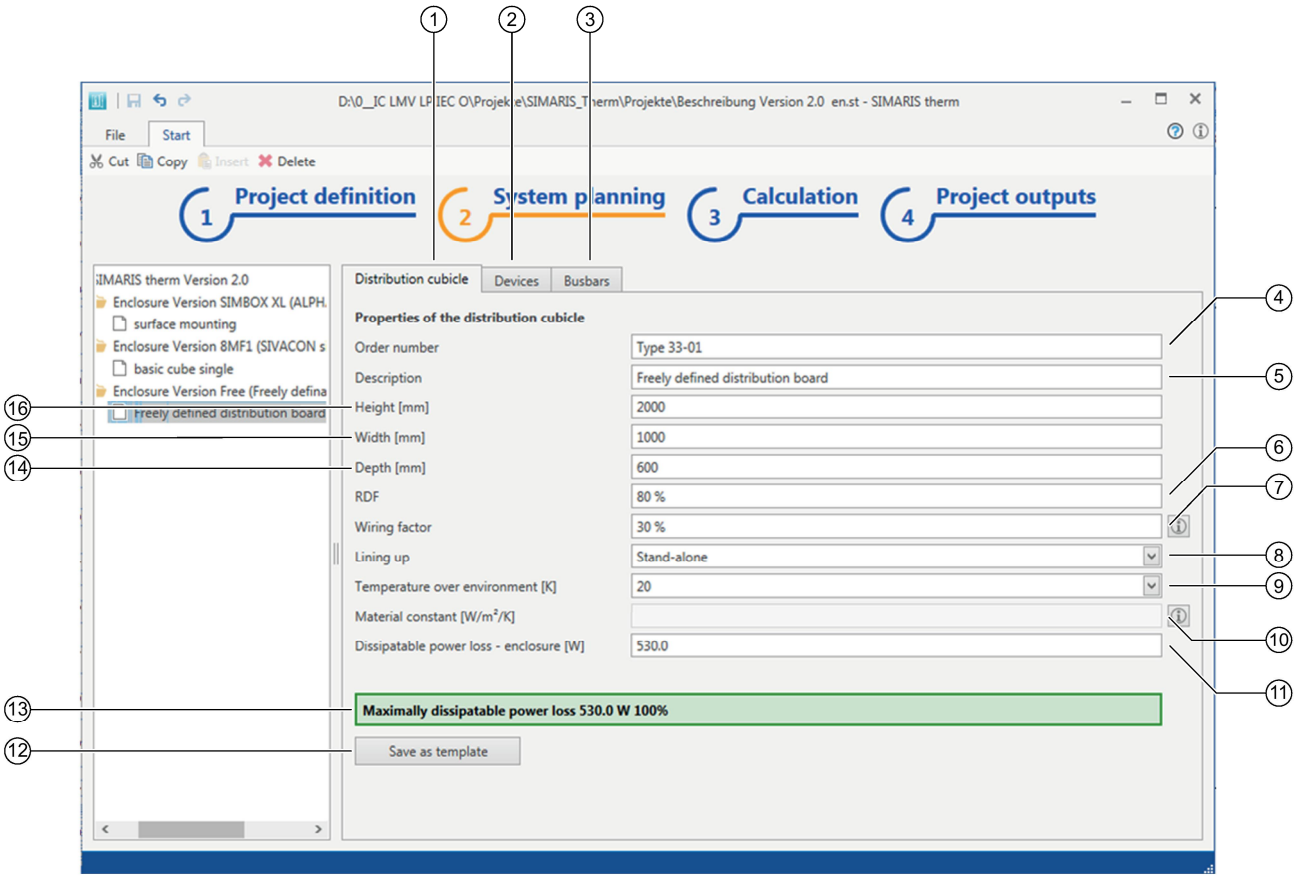
Height calculation

For the enclosure approval, the maximum dissipatable power loss of the enclosure is checked at various heights.

The software checks as to whether the test values are exceeded. The software specifies which power loss of the selected temperature difference (= internal temperature) of the enclosure can be installed at the selected enclosure height.

The selection of either 75 % height or 100 % height can be made to be dependent on where the largest individual power loss was installed.

2.5.7 System planning - Freely definable enclosure - File entry



① Submenu "Distribution cubicle"
② Submenu "Devices (Page 19)"
③ Submenu "Busbars (Page 40)"
④ Article number
⑤ Distribution board description
⑥ RDF for the distribution board
⑦ Wiring factor
⑧ Type of lineup
⑨ Temperature inside the enclosure
⑩ Heat transfer coefficient in W/m²/Kelvin
⑪ Dissipatable power loss of the enclosure in Watt
⑫ Maximum dissipatable power loss for the enclosure with the specified parameters
⑬ Save the enclosure with parameters as template.
⑭ Enclosure depth in mm
⑮ Enclosure width in mm
⑯ Enclosure height in mm

This view is displayed if one of the following operations was performed:

- In the project tree, a system with "freely definable enclosure" was selected.
- Submenu "Freely definable enclosure" was selected in System planning - Freely definable enclosure (Page 28).

RDF for the distribution board

RDF = rated diversity factor (as a %)

The default assignment is 80 %; however, this can be changed at any time corresponding to the actual requirements.
Possible input values lie between 0 % and 100 % as integer numbers. A value of 0 % means that no rated current flows through the enclosure – and 100 % means that the full rated current flows through the enclosure.

The RDF is specified by the manufacturer of the switchgear and controlgear combination as a percentage of the rated current with which the outputs of a switchgear and controlgear assembly in an enclosure can be simultaneously loaded, taking into account the mutual thermal influences.

Additional information on how to apply the RDF is provided in IEC / EN / DIN EN 61439-1.

Wiring factor

This percentage value refers to the sum of the power loss of the entered switching devices – as well as the busbars – and is added to the power loss of the individual devices.

The wiring factor is not part of the relevant standards, and is a practical approach to take into account, for example auxiliary devices, control circuit wiring without having to make complex calculations. The power loss of auxiliary contactors is not necessarily part of the product approval; as a consequence, no corresponding value is listed in the product data sheets.

30 % is adequate for power distribution systems. However, for pure control cubicles, this value can be significantly higher.

The database does not include any cable/conductor power losses. For example, the power loss of a cable with 10 mm^2 carrying 25 A in cable duct and a control cubicle temperature of 55°C, is 1.37 W per meter single length. This can also be taken into account using the wiring factor. Alternatively, cables/conductors can also be created as user-defined devices. More information is provided in Chapter "User-defined devices (Page 19)".

Type of lineup

The type of lineup indicates whether it involves an individual enclosure - or at which location it is positioned in the lineup.

The following options can be selected:

- Standalone
- Center
  An enclosure is directly mounted to the left and right.
- At the left end
  An additional enclosure is only mounted on the right side.
- At the right end
  An additional enclosure is only mounted on the left side.

Heat transfer coefficient in W/m²/Kelvin

The heat transfer coefficient is not included in the applicable standards to determine a thermal balance or to verify this. Using the heat transfer coefficient, the heat dissipation for enclosures can be determined, whose manufacturers do not specify the dissipatable power loss.

The value specifies how many Watt per square meter of free cubicle surface per Kelvin temperature difference (between the temperature inside the enclosure and outside enclosure) can be dissipated.

Examples for the value dependent on the material used can be identified by clicking on the Info button at the end of the input line.
This value is not part of the standard. As a consequence, a check must be made as to which value makes sense for a specific enclosure. For more information regarding heat transfer coefficients, please contact the enclosure manufacturer.
The value is not automatically taken from the information field. The information field must be actively closed.

Before the heat transfer coefficients can be entered, the subsequent field "Dissipatable power loss - enclosure [W]" must be empty. After entering the heat transfer coefficients, the subsequent field "Dissipatable power loss - enclosure [W]" is blocked so that data can no longer be entered and is grayed out.

In order to subsequently enter a value in field "Dissipatable power loss - enclosure [W]", the heat transfer coefficient must first be deleted.

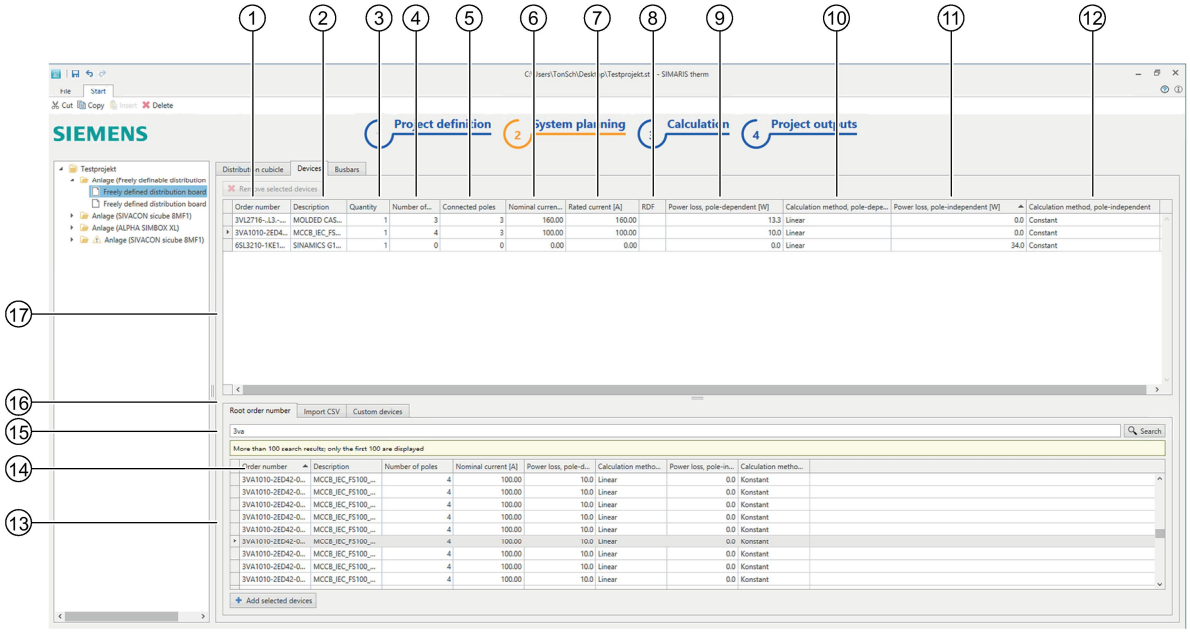
Dissipatable power loss of the enclosure in Watt

This value is the preferred entry as the value specified by the enclosure manufacturer must be able to be verified by testing the enclosure.

Before the dissipatable power loss is entered, the previous field "Heat transfer coefficient in W/m²/Kelvin" must be empty. After entering the dissipatable power loss, the previous field "Heat transfer coefficient in W/m²/Kelvin" is blocked so that data can no longer be entered and is grayed out.

In order to be able to subsequently enter a value in field "Heat transfer coefficient in W/m²/Kelvin", the dissipatable power loss must first be deleted.

2.5.8 System planning - device selection



① Article number
② Designation
③ Unit quantity of several devices with the same usage, which are installed in the system.
④ Number of poles
⑤ Number of connected/used poles[1)]
⑥ Rated current
⑦ Rated current[1)]
⑧ RDF (rated diversity factor)[2)]
⑨ Pole-dependent power loss[3)]
⑩ Calculation type dependent on the number of poles
⑪ Pole-independent power loss
⑫ Calculation type independent of the number of poles
⑬ List of devices in the database
⑭ Column headers for the list contents
⑮ Input field to filter the list
⑯ Submenus:

- Main order number (Siemens devices)
- CSV / Excel export (parts list with relevant data)
- Own devices (user-defined devices (Page 19))

⑰ List of devices installed in the system

[1)] If the value is "0" or is not specified, then the pole-dependent power loss is not calculated.

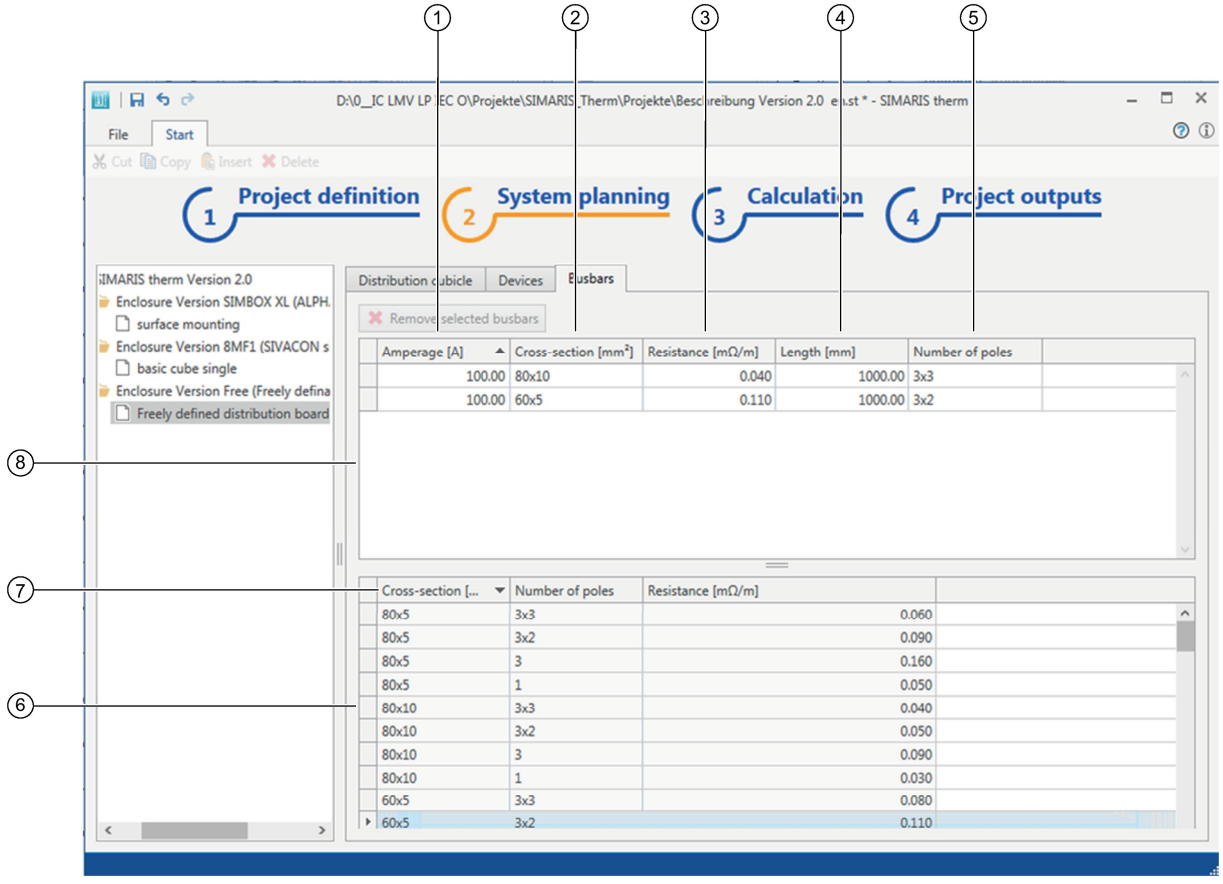
[2)] If the value is "0" or is not specified, then 100% is used in the calculation.

[3)] Default value for frequency converters is the rated value of the device from the database. The value can be changed for a different power loss.

This view is displayed if the submenu "Devices" was selected in one of the following views:

- System planning - ALPHA SIMBOX XL (Page 26)
- System planning - SIVACON sicube 8MF (Page 27)
- System planning - Freely definable enclosure (Page 28)

2.5.9 System planning - busbars



① Rated current that continually flows through the busbar.
② Cross-section
③ Specific resistance[1)]
④ Length[2)]
⑤ Number of poles
⑥ Selection area for busbars
⑦ Column headers
⑧ List of devices installed in the system

[1] To check as to whether the busbars used have almost the same specific resistance.

[2] The length that can be entered is limited to 2400 mm. The length must be multiplied by the number of poles to obtain the required length. More information is provided in Chapter "Length of the selected busbars".

This view is displayed if the submenu "Busbars" was selected in one of the following views:

- System planning - ALPHA SIMBOX XL - file input (Page 30)
- System planning - SIVACON sicube 8MF - file input (Page 33)
- System planning - Freely definable enclosure - File entry (Page 36)

Selection of busbars - consideration of the N conductor

If the N conductor conducts the operating current, then the N conductor must be added as additional 1-pole busbar.
N conductors with operating current occur in the following situations:

- In a 1-phase network
- In asymmetrical[2] three-phase systems

In three-phase systems with several sub conductors per phase, the preferred solution is a three-phase multi-conductor busbar system[2] as the impedance can differ depending on the arrangement, and therefore also the specific resistance of the overall system.

[1] In addition to pure three-phase loads, several 1-phase loads are also connected.

[2] This can be identified with the data 3*2 or 3*3.

Specific resistance

If the specific resistance of the actually used busbars deviates from the existing busbars, then the busbars must be created as user-defined device. More information is provided in Chapter "User-defined devices (Page 19)".

Formula to calculate the power loss of a busbar:

$$P_V = I^2 * R_{spez} * l$$

P_V = Power loss in watt [W]
I^2 = Rated current in amps [A]
R_{spez} = Specific resistance of the busbar in mΩ per meter [mΩ/m]
l = Busbar length in meters [m]

Length of the selected busbar

If the required length[1] of a busbar cannot be entered, then the busbar can be split up into several fictitious busbars. The length is obtained by multiplying the length by the number of busbars.

Example:

Required busbar = 100*10; number of poles 3*3

Required length = 4000 mm

2 individual busbars are entered as workaround:

Entry 1: Busbar = 100*10; length 2000 mm; number of poles 3*3

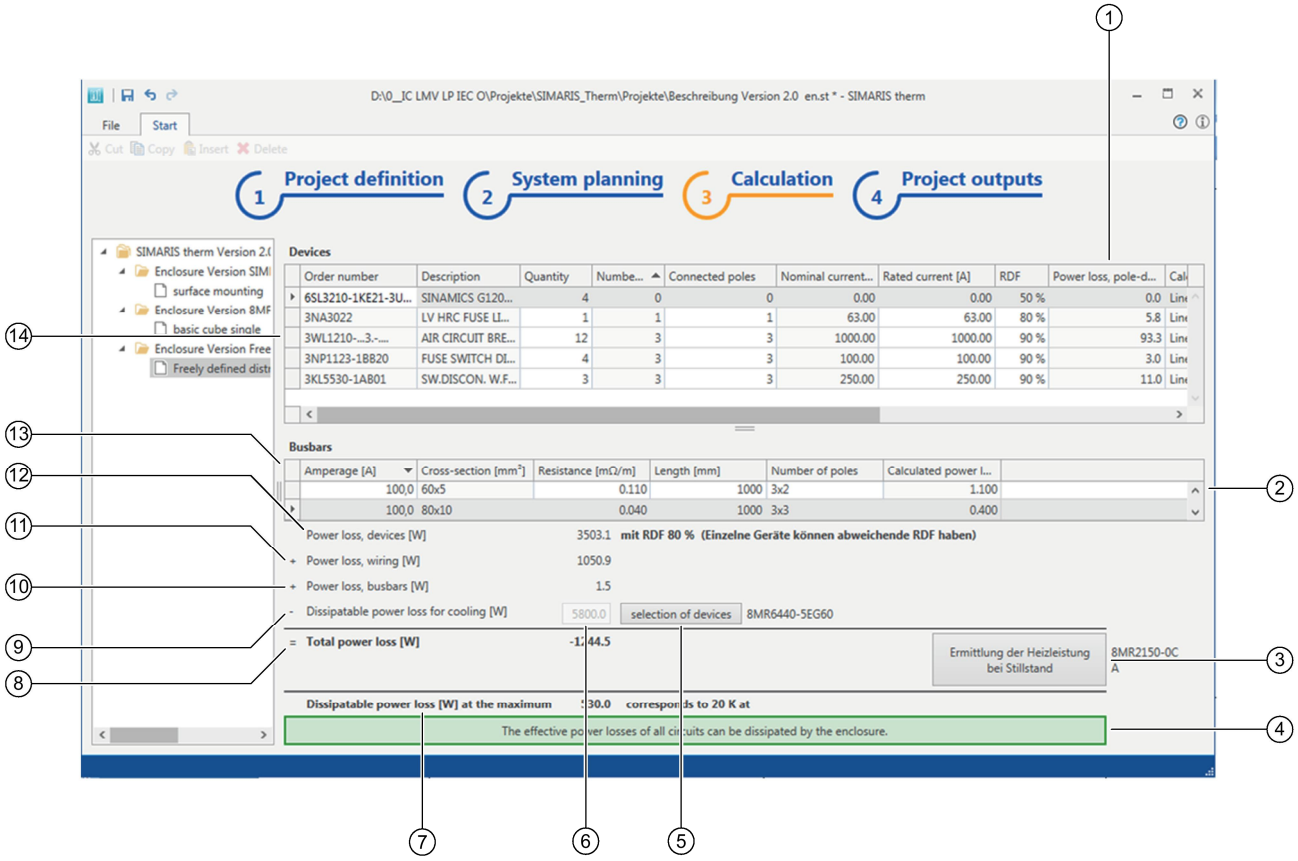
Entry 2: Busbar = 100*10; length 2000 mm; number of poles 3*3

This resolves the problem of length restrictions.

[1)] Length restrictions are as a result of transport units, and/or EN 61439-1 Sheet 2.

2.6 Calculation

2.6.1 Basic calculation

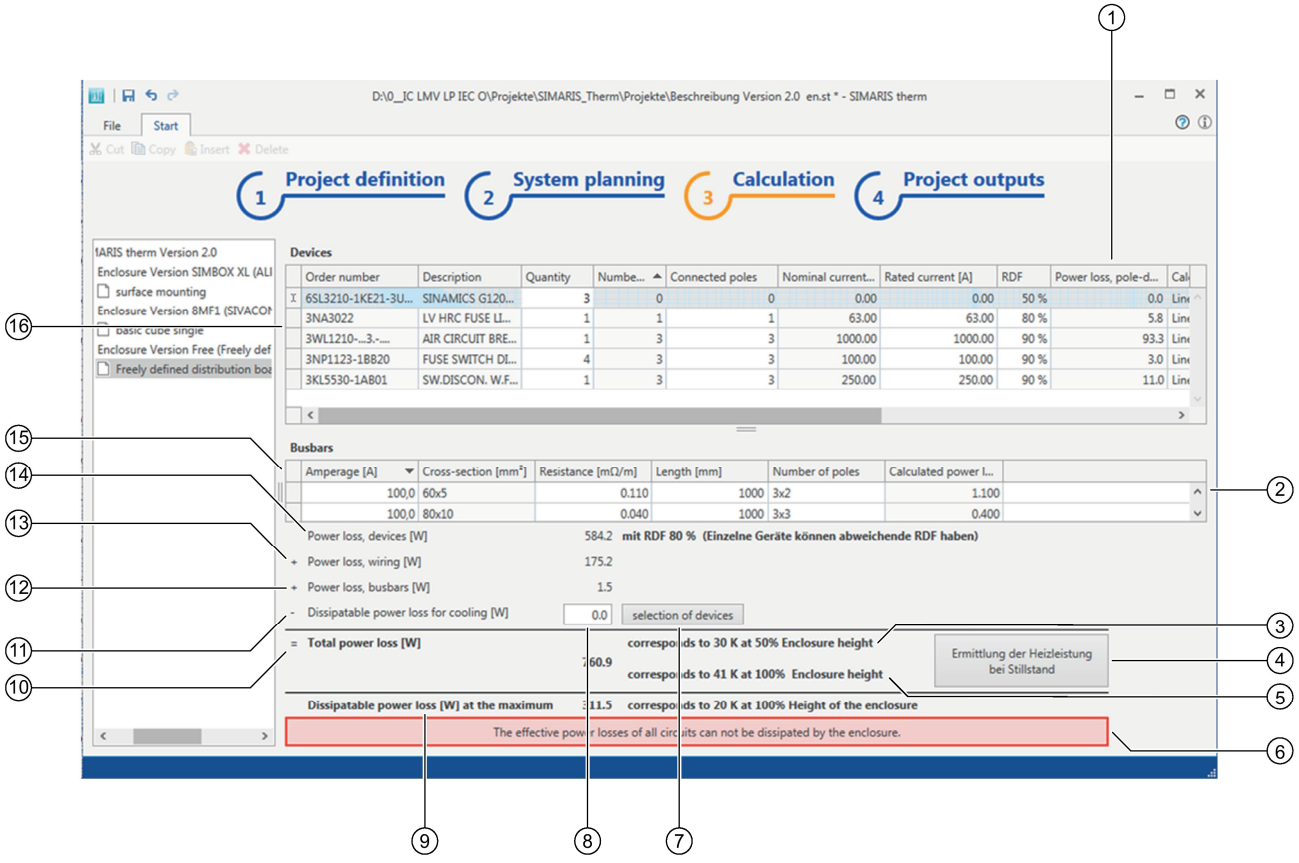


① Power loss per device, corresponding to the specified usage
② Selected busbars, according to the enclosure selected in the tree
③ Button to determine the minimum required heating power if anti-condensation heating is being used
④ Note regarding the maximum dissipatable power loss through the enclosure
⑤ Selection of a suitable Siemens device
⑥ Input field for the dissipatable power loss of an additionally installed cooling system or filter fan[1)]
⑦ Maximum dissipatable power loss through the enclosure This data refers to the temperature difference, which is additionally specified.
⑧ Total power loss, which must be dissipated through the enclosure
(generated power loss of the devices + wiring power loss + busbar power loss - additional dissipatable power loss (cooling system or fan))
⑨ Power loss that can be dissipated by the additional cooling system
⑩ Total power loss of the selected busbars
⑪ Total power loss of the wiring according to the selected wiring factor
⑫ Total power loss of the devices, including the specified RDF for the selected enclosure
⑬ Column headers

⑭ Selected devices, according to the enclosure selected in the tree

[1] If, for ⑤ a Siemens device was not selected.

2.6.2 Calculation according to EN 61439-1 Sheet 2



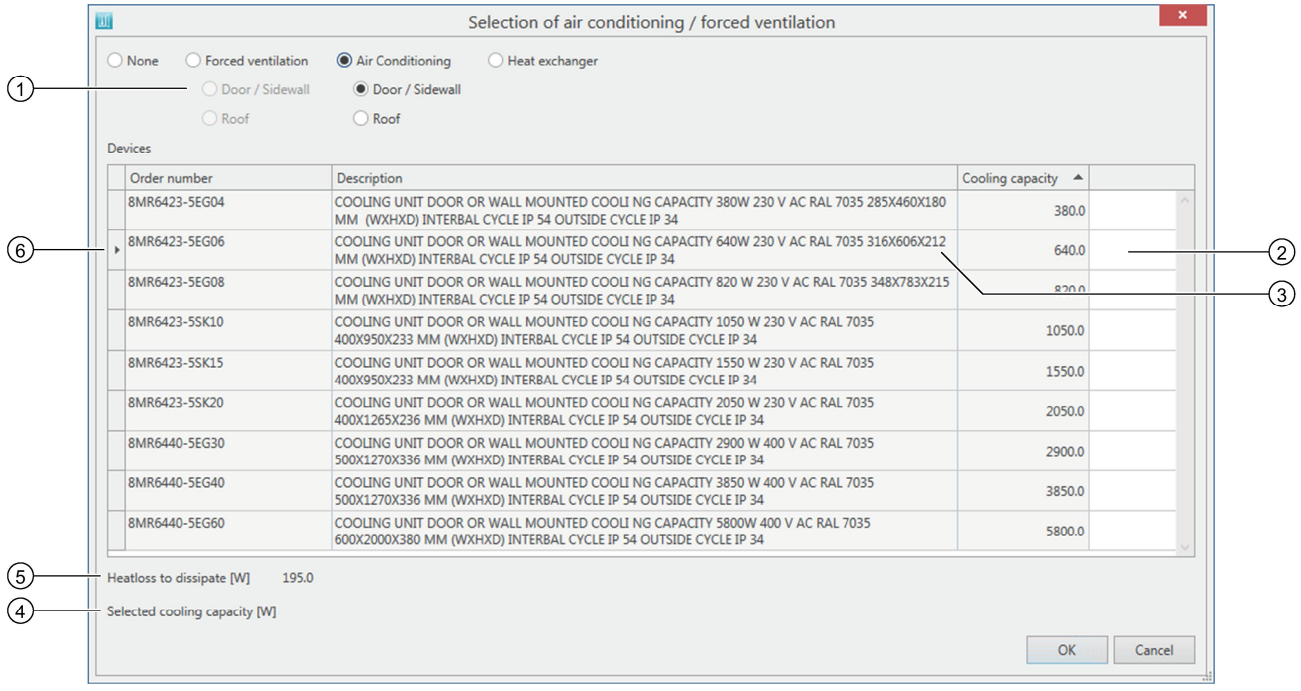
① Power loss per device, corresponding to the specified usage
② Selected busbars, according to the enclosure selected in the tree
③ Temperature increase in the enclosure for the specified power loss
(temperature in °C = temperature outside the cubicle + specified temperature rise)
Example: 20°C + 16 K = 36°C inside the cubicle for 50 % = approx. center of the cubicle
④ Button to determine the minimum required heating power if anti-condensation heating is being used
⑤ Temperature increase in the enclosure for the specified power loss
(temperature in °C = temperature outside the cubicle + specified temperature rise)
Example: 20°C + 22 K = 42°C inside the cubicle for 100 % = approx. center of the cubicle
⑥ Note regarding the maximum dissipatable power loss through the enclosure
⑦ Selection of a suitable Siemens device
⑧ Input field for the dissipatable power loss of an additionally installed cooling system or filter fan[1)]
⑨ Maximum dissipatable power loss through the enclosure This data refers to the temperature difference, which is additionally specified.
⑩ Total power loss, which must be dissipated through the enclosure
(generated power loss of the devices + wiring power loss + busbar power loss - additional dissipatable power loss (cooling system or fan))
⑪ Power loss that can be dissipated by the additional cooling system
⑫ Total power loss of the selected busbars
⑬ Total power loss of the wiring according to the selected wiring factor

⑭ Total power loss of the devices, including the specified RDF for the selected enclosure
⑮ Column headers
⑯ Selected devices, according to the enclosure selected in the tree

Contrary to the basic calculation (Page 43), with the calculation according to EN 61439-1 Sheet 2 / IEC 60890, the temperature that is obtained is determined depending on the installation height (③, ⑤) in the enclosure.
The temperatures that are determined are decisive for the devices to be installed. It must be checked as to whether the devices used at the specified height may be operated at the specified temperature. You can find more information about this in the data sheet of the product manufacturer.

2.7 Selecting the cooling system/fan

The cooling system should be selected using a practical and straightforward approach, which is adequate for many applications.



① Basic selection of the cooling system
② Rated cooling power[1)]
③ Additional technical data
④ Selected power loss
⑤ Additional power loss to be dissipated
(maximum possible power loss of the enclosure that can be dissipated - sum of the power losses generated)
⑥ Selected cooling system[2)] (marked with the arrow)
Only 1 cooling system can be selected per enclosure.

[1] Referred to the fact that the cooling system maintains the temperature inside the cubicle at 35 °C for an outside temperature of 35 °C.

[2] Depending on the additional power loss to be dissipated, additional cooling systems are displayed, which as a minimum can dissipate the specified power loss.

The cooling power, dependent on the actual outside temperature and temperature inside the cubicle, can be precisely determined using data sheets and characteristics. As a consequence, depending on the prevailing room temperature and installation altitude, in individual cases, the cooling system can be selected to be smaller - or must be selected to be larger.

Selected cooling system – selecting fans

For fans, a combination of fan and air outlet filter is always listed. This combination includes the necessary filter mats according to the specified degree of protection in field ③ "Description".

SIMARIS therm does not check the installation dimension. The installation of fans/cooling systems depends on various factors:

- Situation where the enclosure is installed (e.g. traffic routes, in wall niches; covered roof surface)
- Location where devices are installed in the enclosure
- Air flow in the enclosure
- Possible hotspots
- Devices with additional ventilation/cooling (e.g. converters, SIMATIC)

The user must check as to whether the selected fan/cooling system can be installed in the enclosure.

Nominal cooling capacity

From the air flow, that is obtained e.g. when using a specific inlet, outlet filter and filter mat, degree of protection, for fans, the power loss that can be dissipated is determined using the following formula:

$$V = f \times \frac{Pv}{\Delta T}$$

V = air flow in m^3/h

f = air constant in m^3K/Wh ; K=Kelvin ; in this case: 3.5 (up to 1000 m above sea level)

Pv = power loss in W, which must be dissipated.

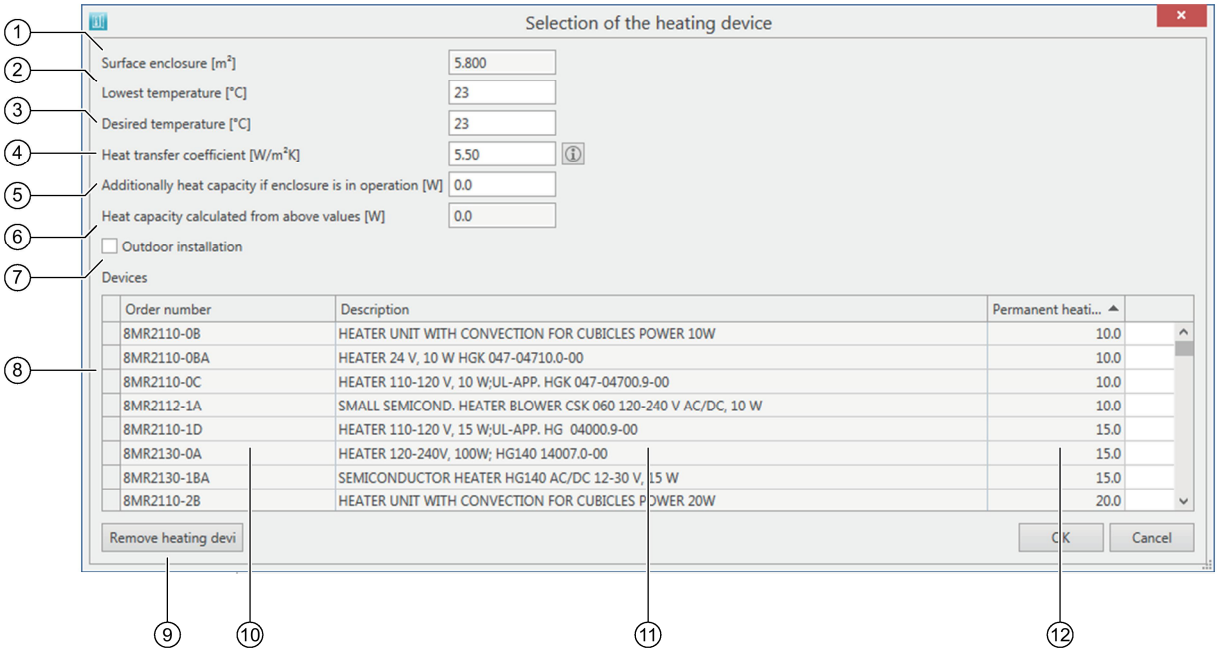
ΔT = temperature difference in Kelvin

For cooling systems and heat exchangers, the cooling capacity is directly specified in watt. Also in this case, the cooling capacity is used.

Note

The "freely blowing" value is not suitable as basis for the power loss to be dissipated. When determining the value, the software assumes that a suitable outlet filter and the necessary filter mats have been taken into account.

2.8 Selecting a heating unit



① Cubicle surface (also relevant for cooling)

② Lowest temperature outside the cubicle

③ Setpoint temperature in the cubicle

④ Heat transfer coefficient[1)]
You can obtain information by clicking on the Info button.

⑤ Power loss that additionally occurs in the cubicle when the heating unit is operational.

⑥ Minimum heating power required

⑦ Selection as to whether the cubicle is installed in a building or outdoors.
When installed outdoors, the heating power must be doubled.

⑧ List of possible heating units, whose nominal heating power is higher than the minimum heating power that was determined. Click on the required heating unit. The selection is displayed using an appropriate marking and with a small arrow at the beginning of the line. If another heating unit is selected, then the previous selection is deleted.

⑨ Remove the selected heating unit.

⑩ Order number (Siemens)

⑪ Description of the order number

⑫ Nominal duration for the heating power

[1)] Additional information on the heat transfer coefficient is provided in Chapter "System planning - Freely definable enclosure - File entry (Page 36)".

Anti-condensation heating if required can be determined with the nominal duration. Possible additional fans for the heating unit are not taken into account.

Heating power

$$P_H = A \times k \times \Delta T$$

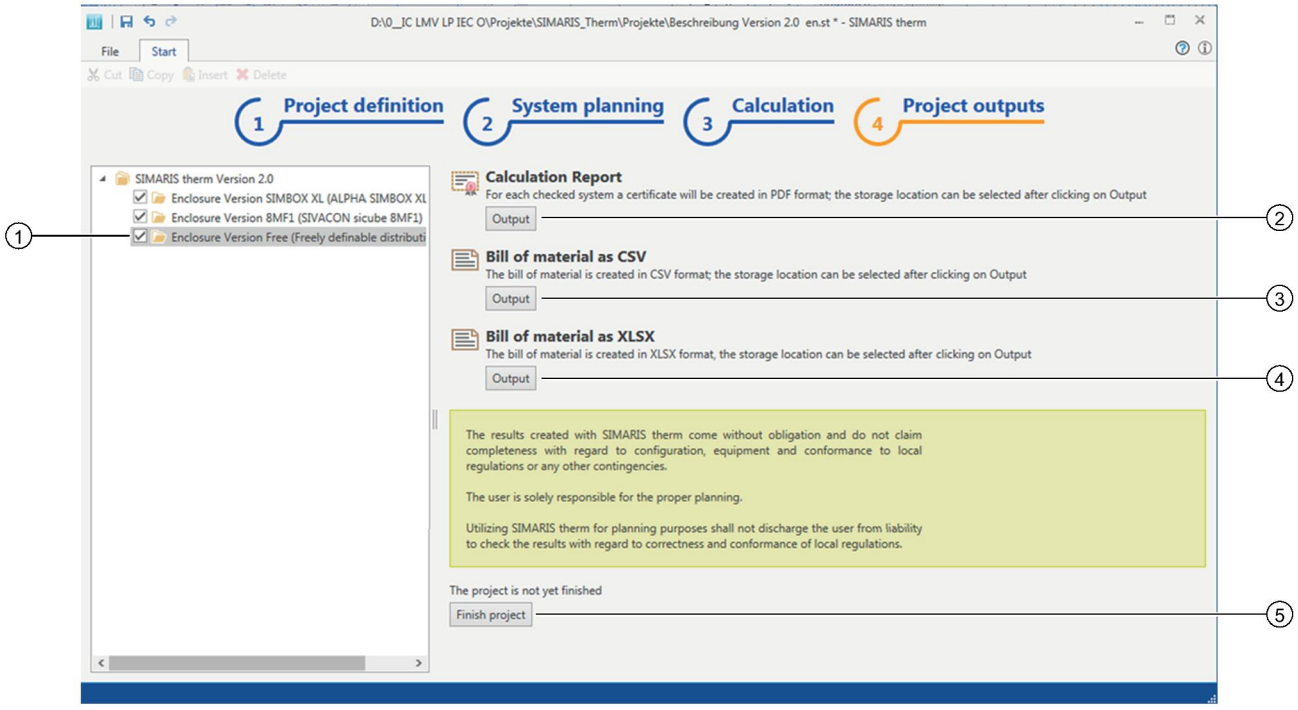
P_H = necessary heating power in W

A = cubicle surface in m^2
The calculated enclosure radiating surface is used.

k = thermal transmission coefficient (power loss to be dissipated in $W/m^2Kelvin$)

ΔT = temperature difference in Kelvin

2.9 Project outputs



① System selection
The project outputs are only created for selected systems.

② Calculation report in the PDF format

③ Parts list as CSV (not formatted)[1)]

④ Parts list as XLSX (partially formatted)[2)]

⑤ Button to close the project. As long as the project has not been completed, the software assumes that changes are still possible; as a consequence, the "Project not completed" watermark is printed in the calculation report. This watermark is only removed if the project is closed using this button.

For a data update, devices that have already been selected in projects that have not been completed, are also updated. Completed projects are not changed for a data update.

[1] For processing/editing using a text editor (e.g. "notepad.exe" under Windows)

[2] For processing in Microsoft Excel

Note

A project must be saved before it can be output.

Opening a finished project

A finished project can be opened at any time. When opening, the software asks whether the project is only to be displayed in the read only mode, or should be opened for processing/editing. In order to protect the original project from changes, before processing the project, save the project under a new name.

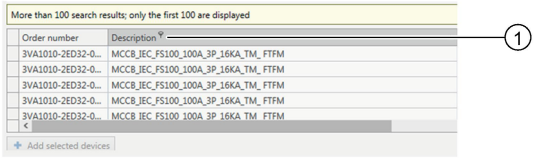
Operation

3

3.1 Filter of the columns

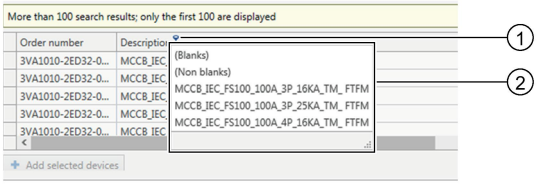
The lists can be filtered in various views for a better overview.

1. Position the mouse over the appropriate column header.
   A pushpin icon is displayed.



① Pushpin icon

2. Click on the pushpin icon.
   A list of filter options is opened.



① Pushpin icon
② List of filter options

3. Click on the filter entry.
   Only those entries are displayed that correspond to the selected filter.

3.2 Copying across projects

Distribution cubicles from existing projects can be shifted or copied into other projects with the same system type

Moving

1. Move the distribution cubicle in the project tree by dragging and dropping from the source project to the target project.

Copying

1. Select a distribution cubicle in the source project.
2. In menu bar[1)] click on "Copy".
   The previously selected distribution cubicle is placed in the clipboard.

3. Select the target project in the project tree.
4. In the menu bar[1)] click on "Insert".
   The copied distribution cubicle is inserted from the clipboard.

[1)] Additional information on the menu bar is provided in Chapter "Start (Page 17)".

Further Information

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