SIEMENS

SIMARIS deSign

for Windows 95/98, Windows NT 4.0, Windows 2000 and Windows ME

User Manual

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Safety notes

This manual includes notes which you must observe for your own personal safety and for the prevention of property damage. These notes are highlighted with a warning triangle and are listed according to the degree of hazard they represent:

Danger
indicates that death, severe personal injury or substantial property damage **will** result if proper precautions are not taken.

Warning
indicates that death, severe personal injury or substantial property damage **can** result if proper precautions are not taken.

Caution
indicates that minor personal injury or property damage can result if proper precautions are not taken.

Caution
indicates that property damage may result if proper precautions are not taken.

Attention
indicates important information on the product, its handling or the corresponding part of the documentation to which the reader's attention is to be drawn.

Qualified personnel

Commissioning and operation of a device may only be performed by **qualified personnel**. Qualified personnel in terms of the safety notes given in this manual are persons who are authorized to commission or start-up devices, systems or circuits, to earth and to label them according to the relevant standards of safety technology.

Approved purpose

Please note the following:

Warning
The equipment may only be used for the applications specified in the catalogue and the technical description and only in connection with third-party devices and components recommended or approved by Siemens.
Correct and safe operation of the product requires appropriate transportation, appropriate storage, installation and mounting as well as careful operation and maintenance.

Trademarks

SIMARIS® is a registered trademark of SIEMENS AG.
All other brand names in this publication may be trademarks the use of which by third persons for their own purposes may infringe the rights of their registered owners.

Disclaimer of liability

Although we have carefully checked the contents of this publication for conformity with the hardware and software described, we cannot guarantee complete conformity since errors cannot be excluded. The information provided in this manual is checked at regular intervals and any corrections which might become necessary are included in the next releases. Any suggestions for improvement are welcome.

Hotline: Phone: +49 (0) 70 00-SIMARIS +49 (0) 70 00-7 46 27 47
E-mail: simaris@siemens.com Internet: www.siemens.de/simaris

Siemens AG
Automation and Drives; Power Transmission and Distribution
SIMARIS deSign
P.O. Box 3240
D-91050 Erlangen

Siemens Aktiengesellschaft

Contents

A Introduction

A.1 What can I do with SIMARIS deSign?

SIMARIS®deSign supports the planning of electrical power supply systems in buildings worldwide. SIMARIS deSign automatically dimensions the following for the resulting network:

- the power requirement of the system infeed (higher-level network, transformer or generator)
- the medium-voltage switchgear
- the cross-section of the low-voltage cables/wires
- the number of cores in the low-voltage cables/wires
- the low-voltage protective devices
- the type of distribution board
- the space required for the enclosures

SIMARIS deSign provides a complete solution based on the technical properties of the equipment.

SIMARIS deSign offers you the following for your project documentation:

- single-line circuit diagram
- enclosure front view and base cutouts
- calculation results
- current-time characteristics
- the sum total of the list prices for the low-voltage distribution boards including devices
- texts for tender documents

Before you start to work with SIMARIS deSign, please read the licensing terms carefully.

Warning
SIMARIS deSign supports you when designing the power supply. The plausibility of the results from SIMARIS deSign must be examined by an expert.

A.2 How do I work with the SIMARIS deSign User Manual?

To facilitate your orientation, the user manual is divided into three sections:

Chapter A.3 General Information

In this section you can find information

- about the properties of the program.

Chapter A.4 - A.9 Introductory Example

When you work through these chapters, you will learn

- how to use SIMARIS deSign.
- how you can design the configuration with SIMARIS deSign more efficiently.

Chapter A.10 - A.13 Appendix

In these chapters you can find help for concrete questions which might arise when you regularly configure with SIMARIS deSign:

- important terms and abbreviations in SIMARIS deSign
- recommendations for further reading and information
- a template for necessary information about the loads and the distribution boards

A.3 Which program features do I need to to know?

A.3.1 Allocation of mouse functions

Left mouse button

- activation of the drop-down list of tree nodes
- selecting tree nodes/browsing
- pressing buttons
- selection of lines in a list box
- selection of menu items

Centre mouse button
or (if a function has already been allocated to it) **double-clicking on the left mouse button**

- activates the text field of the node
- activates the drop-down list of distribution boards

Right mouse button

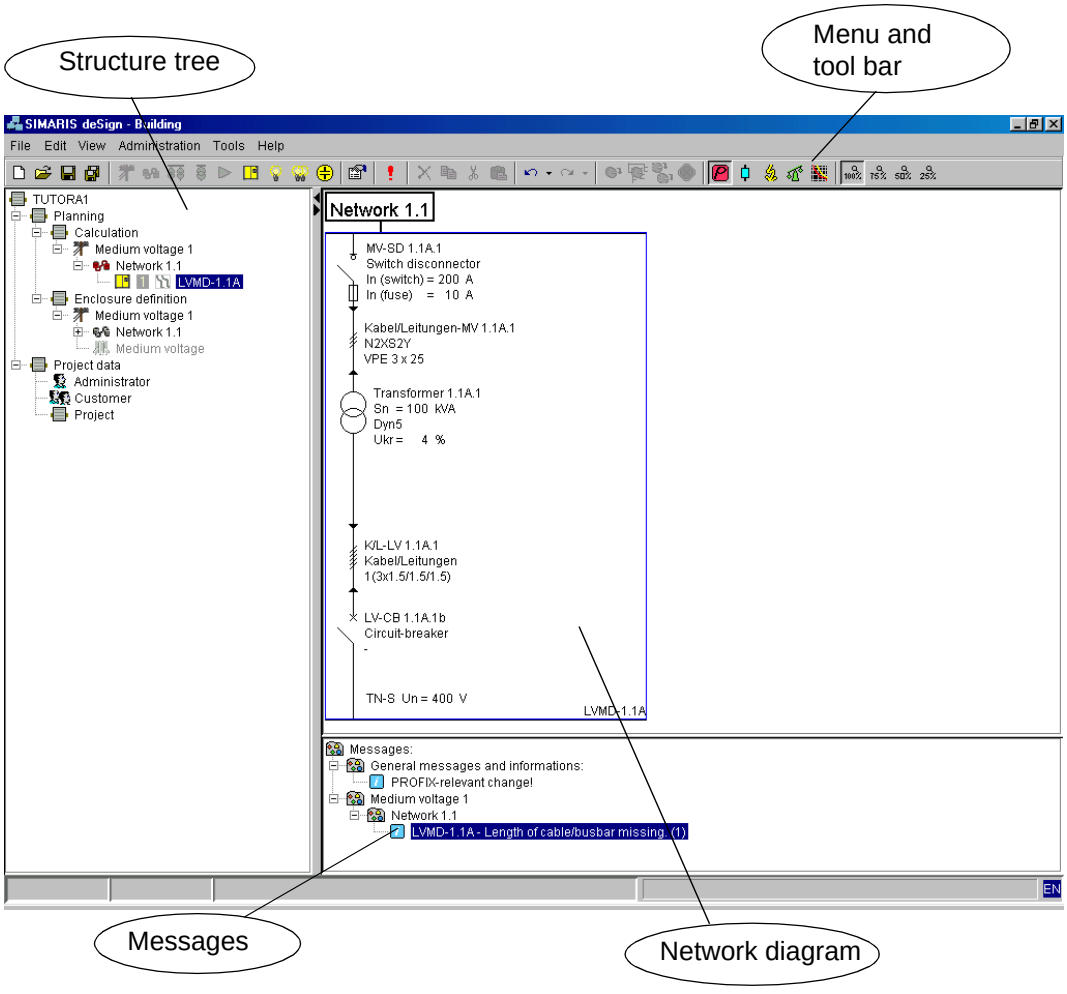
- polling the context menu for the respective node (detailed Information in the menu descriptions)

Double-clicking on the right mouse button

- Direct polling of the respective **Properties** dialog boxes

A.3.2 Calculation module

The calculation module is divided into several sections:



1. Toolbars

You can control the functions of the module with the toolbar.
The toolbar is divided into several functional groups:

File

You can create a new project or open or save an existing project.

Inserting medium voltage

You can insert a medium-voltage level with a downstream low-voltage network or unloaded transformers.

Adding a transfer link

You can add an outgoing cable to another subnetwork.

Only one link is allowed per subnetwork, which is to be selected directionally starting from an output distribution board.
SIMARIS deSign supports the selection of the destination distribution board by suggesting all permissible destination distribution boards.

Inserting low-voltage circuits

You can insert circuits such as the system infeed, distribution boards or loads.The circuits are automatically added within the hierarchy below the distribution board selected in the calculation tree. Depending on the position in the tree, these functions are only partially available.

Editing missing input boxes

In sequence you can poll all of the **Properties** dialog boxes with missing input.

Properties

Displays the properties of the selected circuit.

Editing

Editing functions such as copy & paste are stored here.

Undo / Redo

These buttons are used to undo completed editing steps in the program as well as to redo steps which have been undone.

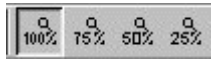
Dimensioning

You can start the dimensioning of devices or enclosures. You can dimension both entire networks and individual network sections.

View

The display format of the network diagram can be selected here.

Zoom



The display size of the network to be displayed in the network diagram can be selected here.

2. The window area with the structure tree

The structure tree is based on the functionality of Windows Explorer. By double-clicking on the icon or clicking on the nodes in the structure tree, you can activate a drop-down list of the branches.

The structure tree is divided into several sections:

- Under **Planning > Calculation** you can set up the electrical network.
- Under **Planning > Definition Enclosure** the respective switchgear cabinets can be selected and dimensioned. The dimensioning of the enclosure is always related to the network under **Calculation**. If this network has not been completely dimensioned, no respective distribution board can be selected. If the dimensioning has been carried out correctly, all of the nodes in the structure tree are marked with a green icon.
- All of the administrative data relating to the current project is listed under **Project data**.

3. Network diagram window / Enclosure window

This window graphically displays the circuits listed in the structure tree.

In the node **Calculation > Network1:**

The structure tree is displayed in the network diagram window in the form of an electrical block diagram. The circuit selected in the structure tree is highlighted by a blue border in the network diagram.

In addition, device and circuit data is displayed in the network diagram window for each device. You can select four different data masks:

Single-line diagram with device parameters 

Giving an overview of the rating and the default settings of the circuit. This is the standard view.

Single-line diagram with load flow/ load distribution 

The properties of the network and the equipment during operation are displayed here.

Single-line diagram with short-circuit load 

An overview of the properties of the network and the equipment in the event of fault.

Energy balance 

An overview of all of the types of power and the inrush apparent current at the nodes.

Selectivity 

In this view you can

- observe and evaluate the tripping performance of each protective device in terms of the short-circuit current and upstream and downstream devices.
- manually adjust the protective settings for adjustable devices.

Since the properties are dependent on the type of device, this view is only available after dimensioning.

In the node **Definition Enclosure > Network1:**

Detailed information about the enclosure components is displayed in the right section of the window.

4. Message box

This window in the lower section of the screen displays messages, errors and notes that have arisen during the network calculation. These could be caused by false, incomplete or non-permissible circuit settings.

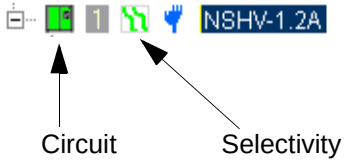
If you click on one of the messages, the affected circuit in the structure and network diagram window will be highlighted.

A.3.3 Planning module

There are up to four icons for each node of the structure tree. These include:

- Circuit icon
- Selectivity status
- Hand icon

Example:



Circuit icon

This icon shows which category the circuit belongs to. There are:

- (Sub-) distribution boards
- Fixed loads
- Non-stationary loads
- Capacitors

Along with the Distibution icon, main distribution boards also receive a designation for the number of parallel infeed circuits leading to the busbar.

SIMARIS deSign supports the progress of your work by displaying the nodes in the structure tree in different colours depending on the status of the work:

YELLOW
You still have to input default settings for this circuit. It is imperative to at least enter the cable length.
When you have fulfilled this condition, the circuit becomes grey.

RED
In any case, this item must still be processed. This circuit has not been dimensioned, i. e. SIMARIS deSign has not selected any devices for this circuit. Notes on the causes can be found in the message window, see chapter A.7.9 Trouble shooting.

GREEN (or **BLUE**)
This circuit has been correctly dimensioned.

GREY
All of the data for this circuit is available for the calculation, however the circuit has not been dimensioned.

TIP
If you are colour-blind (red/green), select blue icons. You can modify the colour settings via the menu **Extras > Settings.** In the Settings dialog box, select **Desktop > View**.

Selectivity icon

SIMARIS deSign supports you in evaluating the selectivity of your network. The circuit can be evaluated in terms of both overload selectivity and short-circuit selectivity.

The icon in the structure tree displays the state of the circuit:

GREEN
The characteristic curve of this circuit does not intersect with the envelope curve of the upstream devices within the evaluated range. The circuit is fully selective within the evaluated range.

YELLOW
The characteristic curve of this circuit intersects the envelope curve of the upstream devices within the range of I_N and the smaller $I_{k,min}$.
The circuit is partially selective.

ORANGE
The characteristic curve of this circuit intersects the envelope curve of the upstream devices within the range >= $I_{k,min}$.
The circuit is partially selective.

GREY
The ciruit has not been dimensioned yet. It is not possible to give any information on selectivity.

TIP
Detailed information on the selectivity of a switch can be displayed in the message box.

1. Open the **Extras > Settings** menu.
2. In **Desktop > Messages**, select whether messages about selectivity
   - are not to be displayed.
   - are only to be displayed for partially selective combinations.
   - are to be displayed for both partial selectivity as well as for full selectivity.

Hand icon
You have manually modified at least one device in this circuit.
This device will not be taken into consideration when the automatic dimensioning is carried out. In the network diagram, you can see which device is stationary.

Input box

Input boxes with a RED background
An inadmissible value is listed in the input box. You have either exceeded or fallen below the defined intervals. A tool tip will inform you about the permissible interval.

TIP
If you enter the value via the keyboard, the background will momentarily turn red since both spaces and zeros are inadmissible values in the text box. When you continue writing, the colour will change back to white.

Input boxes with a YELLOW background
The entered value deviates from a standard default setting. The input is technically possible, however it is not normal.

A.4 How do I work efficiently with SIMARIS deSign?

The following chapters are geared toward new users of SIMARIS deSign.

These chapters provide you with a quick introduction to the SIMARIS deSign software.
In this example you will generate the power supply for a high-rise building with a elevator. You will quickly configure this network with SIMARIS deSign according to the selected standards and regulations for installation.

With this example you will learn the functionality of SIMARIS deSign:

- Starting the program
- Working with default settings
- Inputting and editing the network
- Selectivity observation
- Defining the enclosures
- Exiting the program

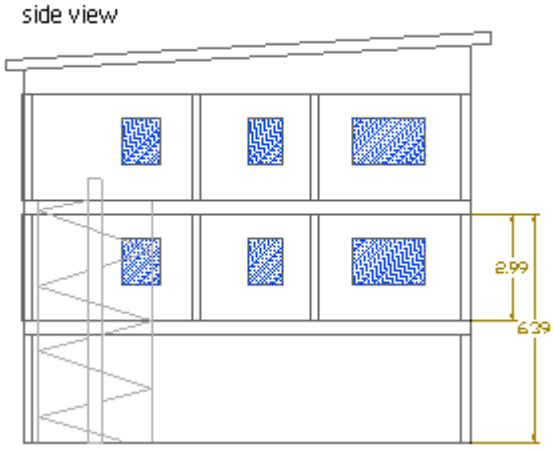
The purpose of the model network is to familiarize you with the application of SIMARIS deSign and to motivate you to try it out and test it.

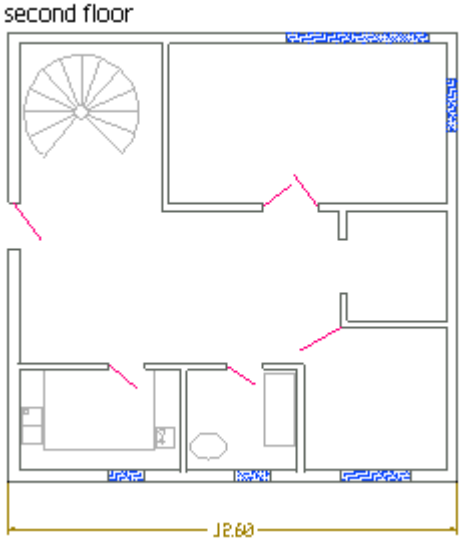
Install the software (the functionality of the demo version is also sufficient) and follow the project as described.

A.4.1 Introductory example

The company TUTORA EVENT is planning a new branch office in the industrial park in Any Village.

Your customer has turned to you with an initial architectural drawing:





Your customer needs the following at short notice for the further planning stages:

- block diagram of the electrical network
- network calculations
- estimation of the space needed for the power supply
- specifications of work and services for the power supply

You have learned the following from the conversation with your customer and the drawings:
The offices are to have the same functionality on all floors:

Lighting	20 kW
Outlets for PCs etc.	2.5 kW; with 50 % in reserve
Kitchen	7 kW
Elevator	50 kW
Air conditioning	50 kW

- The system infeed is carried out via the 20 kV network of the local power utility. The transformer power is to be minimized.
- The cables are to be **laid free below the ceiling**.
- The entire project will be executed **inexpensively using both fused and fuseless technology**.

A.5 How do I start my project in SIMARIS deSign?

A.5.1 Preparation

In order to work efficiently with SIMARIS deSign, several points must be taken into consideration in advance:

A.5.1.1 Determine the similarities

- Look for corresponding factors in the power supply requirements for your project.
- Make a note of the information about the type of desired equipment.
- What do you know about the connections, their installation type, the switchgear and the fuses?
- Construct a standard case which applies for most of the cases in your project.
- Clarify in advance the standards and the general settings for the network to be created.

A.5.1.2 Strive for the creation of a modular structure

Select typical loads for the default settings. To save time, you can use these repeatedly using copy & paste.

TIP

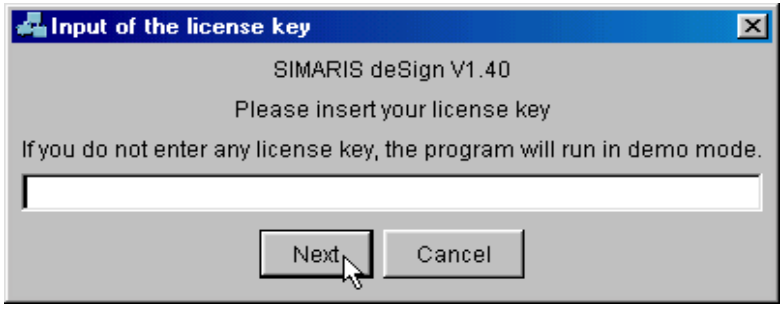
When you start a new project, begin by compiling a list of loads and distribution boards:

- List all of the loads with their technical data.
- Group these into distribution systems.
- Delegate these distribution boards and further necessary loads to one (main) distribution board.
- Repeat this procedure until you have reached the system infeed.
- Specify your infeed.

A respective list for this example can be found in chapter A.13.

A.5.2 Registering as a SIMARIS deSign license holder

Before starting SIMARIS deSign, you will be asked to enter your license key:

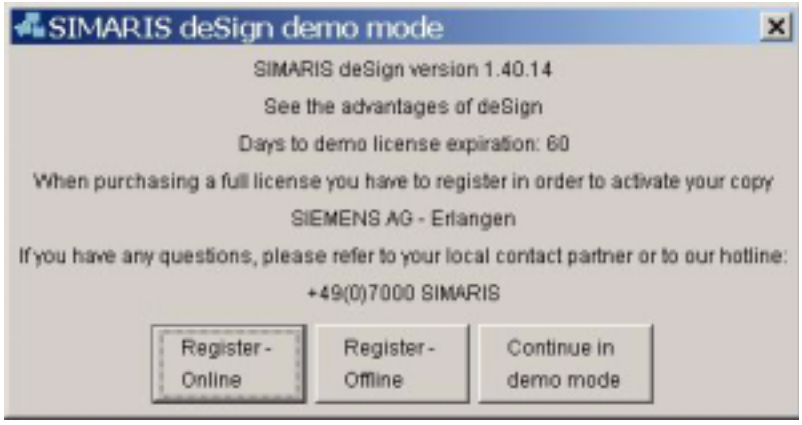


If you already have a valid license key, enter it now and then click on **Next**. The license key will now be checked and SIMARIS deSign will be activated for unrestricted use.

If you have not yet received a license key, you must register with SIEMENS AG and request a license key.

If you click on **Next** without entering a license key, you will have the following options:

- Starting SIMARIS deSign in demo mode
- Requesting a license key via the Internet
- Requesting a license key per fax



The fax form can be found under <local drive>/SIMARIS/ Projects/design/templates.

When requesting the license key, please ensure that you have your authorisation code at hand. The authorisation code is enclosed with the certificate you received together with the software.

After you have registered, you can start SIMARIS deSign by clicking **Continue in demo mode**. The requested license key will be sent to you either by e-mail or by post.

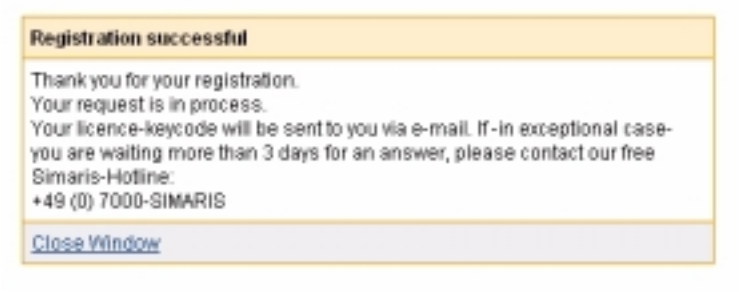
You are entitled to receive a license key if you are the owner of a complete version (single-user or multi-user license).

Online Registration

- In order to receive your license key via the Internet, click on **Register - Online**.
- Your Internet browser will automatically start and connect you to the SIMARIS website.

- Fill out the registration form:
- In the **Authorisation code** input box, enter the authorisation code you received with your order confirmation.
- The input boxes marked with * must be filled in in order to be able to send the form.
- When all of the relevant input boxes have been filled in, click on **Send**.

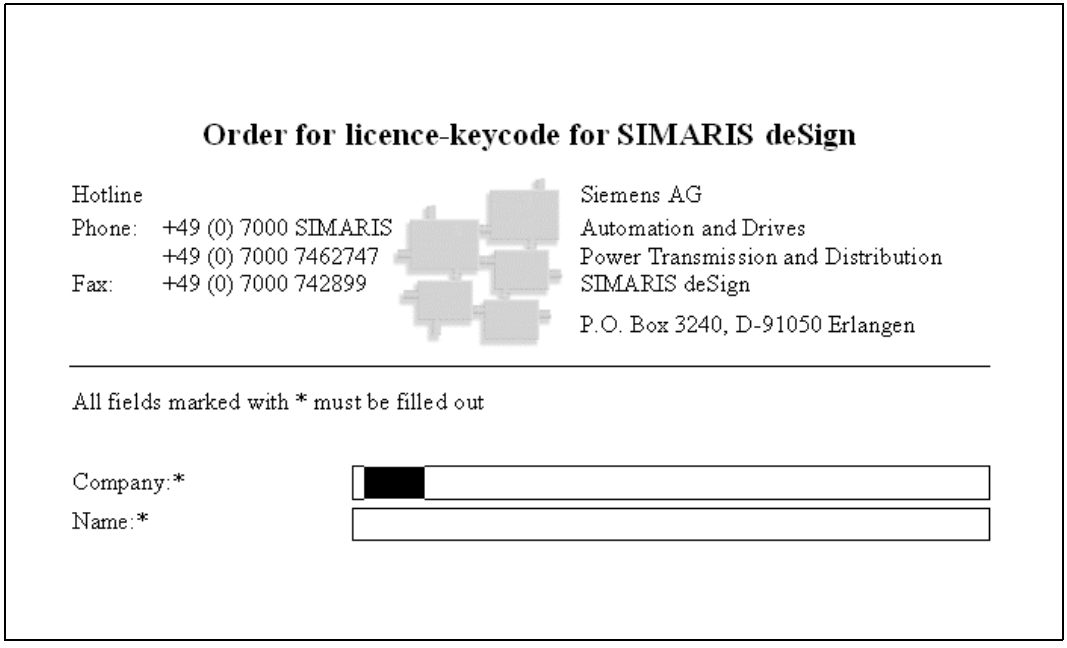
- After you have registered successfully, the following message will appear:



- Your data will now be transmitted to the SIMARIS deSign help-desk and you will receive your valid license key via E-mail within one day.
- Until you receive your license key, you can start SIMARIS deSign by clicking on **Continue in demo mode**.

Offline Registration

- Click on Register - Offline to receive your license key per fax. The fax form will be automatically started in Word.



Order for licence-keycode for SIMARIS deSign

Hotline
Phone: +49 (0) 7000 SIMARIS
+49 (0) 7000 7462747
Fax: +49 (0) 7000 742899

Siemens AG
Automation and Drives
Power Transmission and Distribution
SIMARIS deSign
P.O. Box 3240, D-91050 Erlangen

All fields marked with * must be filled out

Company:*
Name:*

- Fill in the input boxes and send the fax to the number listed in the letter head. Enter your authorisation code in the **Authorisation code** text box. The authorisation code is listed in the certificate you received with your order confirmation.

When you receive your license code, you can enter it

- when you re-start SIMARIS deSign.
- via the **Administration > License** menu during the application

A.5.3 Starting the program

1 Start SIMARIS deSign

- via the menu **Start > Program > Simaris > SIMARIS deSign**

- by double-clicking on the icon on the desktop.

2 After a short load time you will be requested to enter your user name and your password.

Register using your personal user name. When you start SIMARIS deSign for the first time, **Administrator** will be listed in the User text box. Leave this default during the practice example.

3 Register with your personal password. As a standard the Administrator has not been allocated a password. When you start the program for the first time, simply confirm with **OK**.

4 Select the user interface language for the current session. If you have selected several languages from the product database during installation, select one language from the drop-down list box for the current session. You can select between

- German
- English (GB)

You can change the user interface language during the session.

5 Confirm with **OK**.

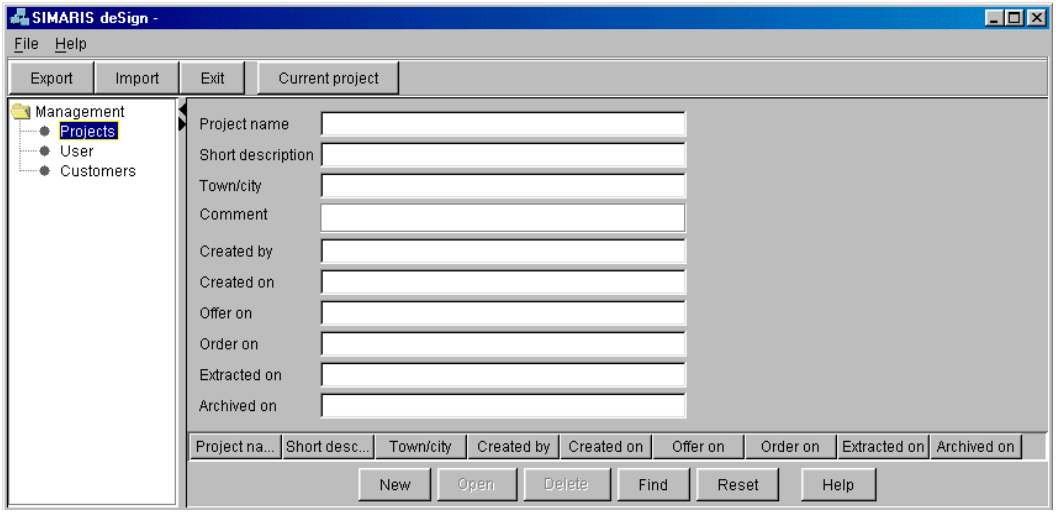
If the name and the password are correct, the program will begin with the Management module.

ATTENTION
If you do not have user identification or if an error message appears when registering, please contact your SIMARIS deSign administrator.

A.6 What does the Management module provide?

This module supports three main functions:

- project management
- user management
- customer management



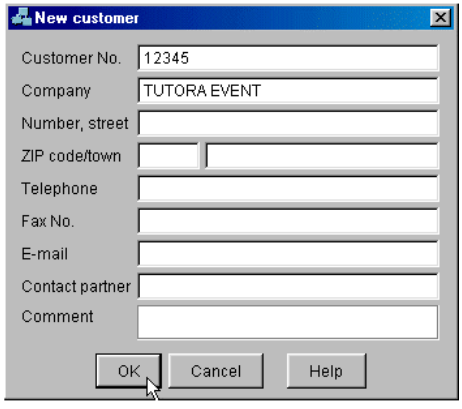
A.6.1 Registering a customer

1 In the **Management** structure tree, click on **Customers**.

An input form will appear on the right side. If you have not yet registered any customers, this list will be empty.

2 Click the **New** button.

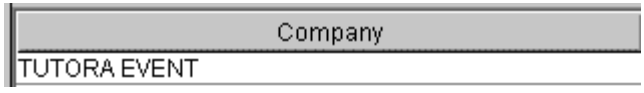
3 The **New customer** dialog box will appear.



4 Enter a customer number.
This text box is mandatory. If you do not enter a customer number, the text box will be highlighted in red.

5 Enter the company name of the model project, **TUTORA EVENT**, in the **Company** text box.

6 Click **OK**.
The new customer name will now appear in the list below the input mask.

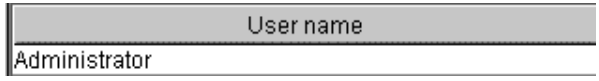


The registration of the customer has now been completed. Select a data line to modify the customer data in the upper text box.

A.6.2 Registering a user

1 In the **Management** structure tree, click on **User**.

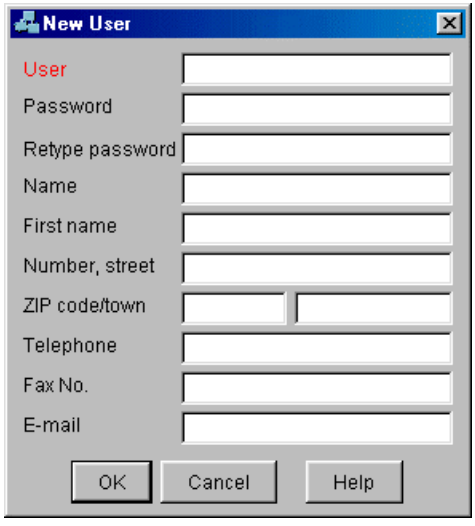
An input form will appear on the right side. Below this list a list appears in which the administrator is entered as the only user.



Select a data line to modify user data in the upper section. Then confirm your modifications with Save.

2 To register a new user, click the **New** button.

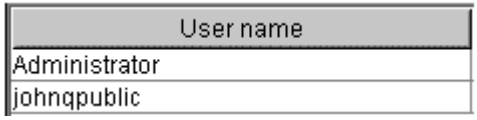
3 The **New customer** dialog box will appear.



4 Enter **johnqpublic** as the user name.
Since it is mandatory to fill out this text box, it is highlighted in red.

5 Enter your data in the other text boxes as desired.

6 Click **OK**.
The new user will now appear in the list below the input mask.



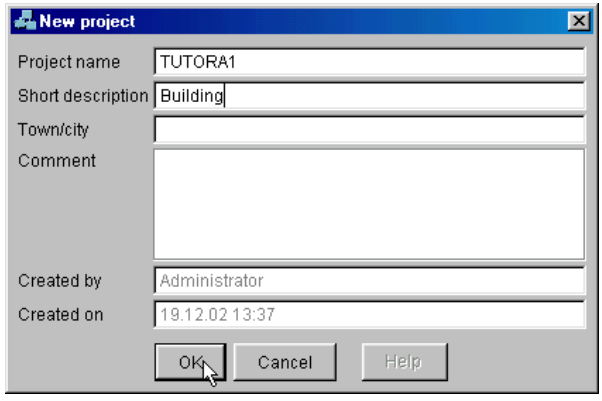
The registration of the user has now been completed.
Select a data line to modify the customer data in the upper text box.

A.6.3 Creating a new project

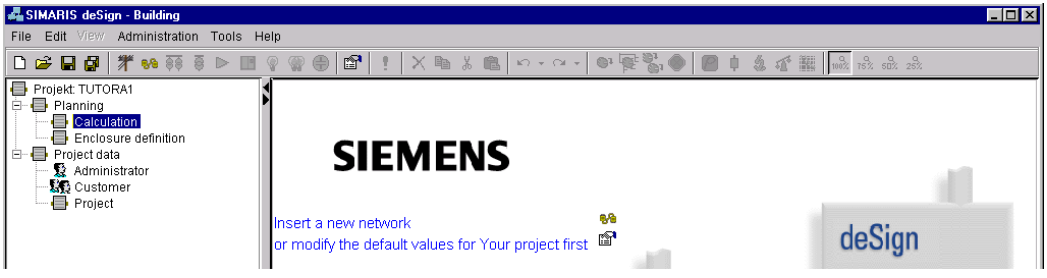
1 In the **Management** structure tree, click on **Projects**.

2 Click the **New** button.

3 Enter the predefined data in the subsequent input box:
Project name: **TUTORA1**
Short description of the project: **Building**
It is imperative to enter both the project name and the short description.



4 Confirm with **OK**.
SIMARIS deSign will change over to the calculation module.



A.7 How do I work in the Calculation module?

A.7.1 Specifying default values and settings

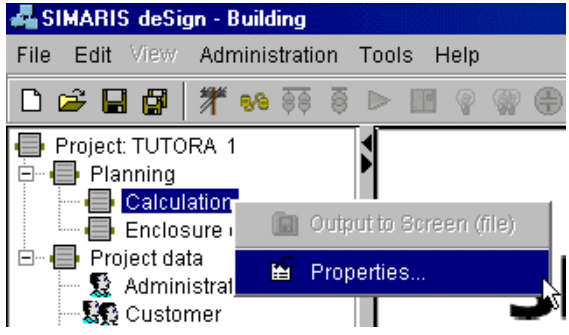
In the global properties you define the default settings for your network elements and the settings specifically designated for this project.

These default settings will always be taken into account by the program when you add **new** networks and circuits.

Define the global properties in the structure tree under **Project > Planning > Calculation**.

To modify the properties of your project,

- click with the right mouse button on the **Calculation** node and select **Properties** in the context menu.



- double-click the node with the right mouse button.

- select the node with the left mouse button and click on the **Properties** icon in the toolbar.

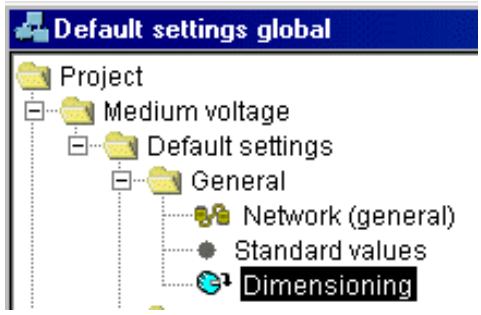
ATTENTION
If you do not wish to specify any settings at this time, it is possible to do so later. However, the properties should be defined here in such a way that they correspond to the requirements of the project. Depending on the size of the project, modifications to an existing network made at a later time can be very time-consuming. Always start with the default settings which apply for the majority of the circuits used in the project.

ATTENTION
SIMARIS deSign takes the requirements of the current VDE 0102 and IEC/EN 60909 into consideration.
All of the networks are calculated with a new low-voltage factor cmax. This can lead to conflicts with existing projects that have already been dimensioned. Information on the current norm and standard values can be found via **Network > Properties**.

A.7.1.1 Defining the medium voltage system infeed for the network

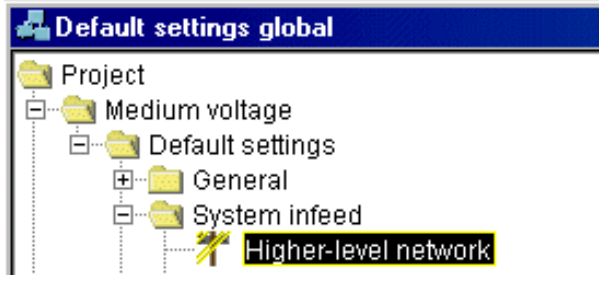
1 Double-click on **Calculation** with the right mouse button to display the dialog box for the global properties.

2 Select **Project > Medium voltage > Default settings > General > Dimensioning** from the structure tree.



Deactivate the **Automatic switchover from the switch disconnector to the circuit-breaker** check box to save priority fuse/switch disconnector combinations where these are permissible.

3 Select **Project > Medium voltage > Default settings > System infeed > Higher-level network** from the structure tree.



4 Enter the following values in the text boxes of the Higher-level medium voltage network section:
Nominal voltage Un [kV]: **20**
Max. short-circuit power [MVA]: **550**
Min. short-circuit power [MVA]: **250**
Neutral-point connection: **compensated**

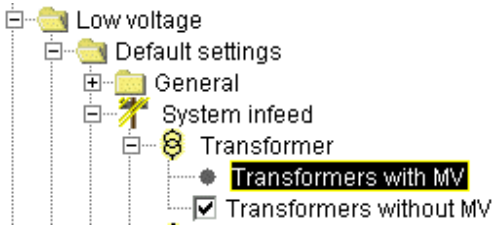
For recording the earth fault detection at the medium voltage side I_{rest} thus applies.
In the 20 kV network this current is approximately 3 % of I_{CE}.
For the model network, enter **50** in the input box for **capacitive earth-fault current I_{CE} [A]** and **1.5** in the input box for **earth-fault residual current I_{rest} [A]**.

5 Apply the standard settings of the equipment for the example.

A.7.1.2 Defining the low-voltage system infeed

1 Select **Project > Low voltage > Default settings > System infeed > Transformer** from the structure tree.

2 Select **Transformers with MV**, i. e. transformer with higher-level medium voltage.



3 Apply the standard settings for the parameters:
Rated voltage [V]: **400**
Network system/connection to earth: **TN-C**
Frequency [Hz]: **50**

4 Select **1** Transformer per **1** busbar section

As an alternative, you can also specify a preference for a network without medium voltage.

1 Select **Generator without DMT** from the structure tree.

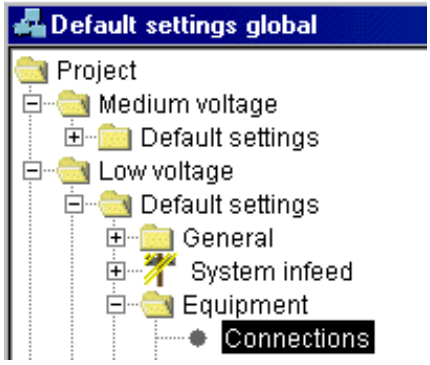
2 Apply the standard settings for the parameters:
Rated voltage [V]: **400**
Network system/connection to earth:**TN-C**
Frequency [Hz]: **50**

3 Select **1** Generator per **1** busbar section.

A.7.1.3 Defining cables for the circuit

All cables in the introductory example should be laid in an identical manner:

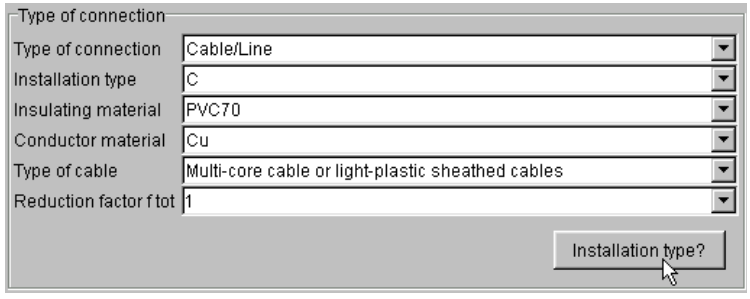
1 Select **Project > Low voltage > Default settings > Equipment > Connections** from the structure tree.



In the right section of the window you can enter all of the properties for the type of connection.

2 Click in the **Type of connection** text box and select **Cable/line** from the dropdown list box.

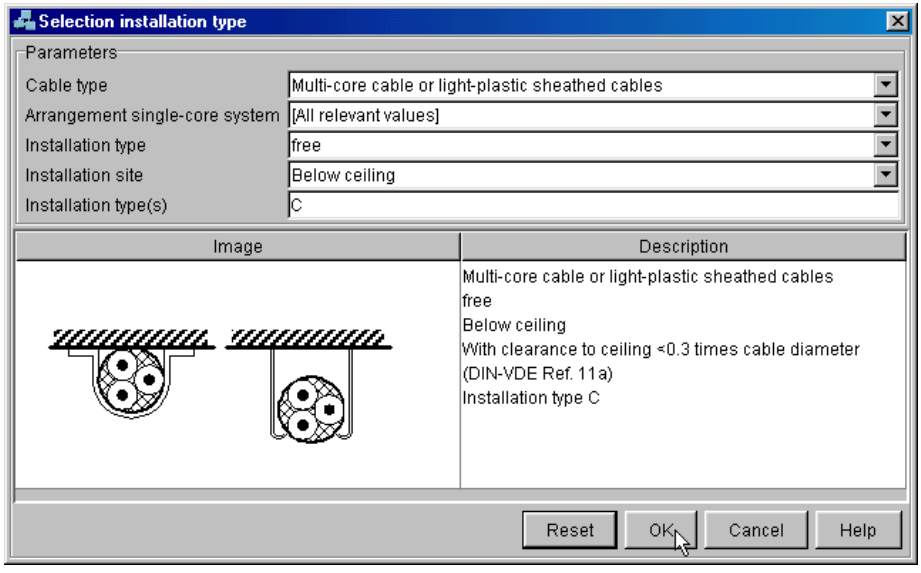
3 Click the **Installation type?** button to determine which installation is coded.



In the Selection of installation type dialog box you will find images of all available installation types for each cable type. You can limit the selection with the help of the input boxes. Then the image bar will only contain those installation types which are permissible within the set limitations.

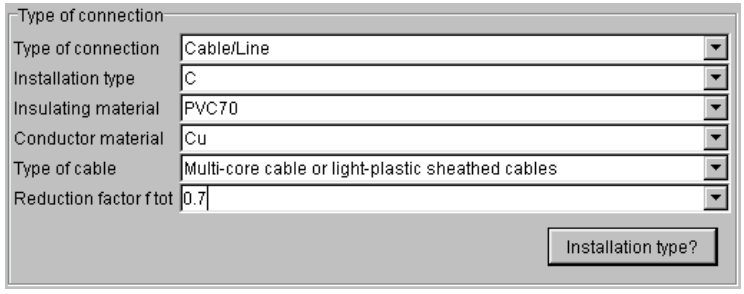
4 Click on the **Installation type** text box and select **free** from the drop-down list box.

5 Click on the **Installation site** text box and select **Below ceiling** from the drop-down list box.
With these limitations, you can now only select installation type(s) **C**.



6 Click in the vicinity of **Image** and confirm with **OK**.

7 Check the contents of the other text boxes:
Enter a general value in the **Reduction factor ftot** text box.
An empirical value is often **0.7**.
You can specify this value either via the drop-down list box or by directly entering the value.

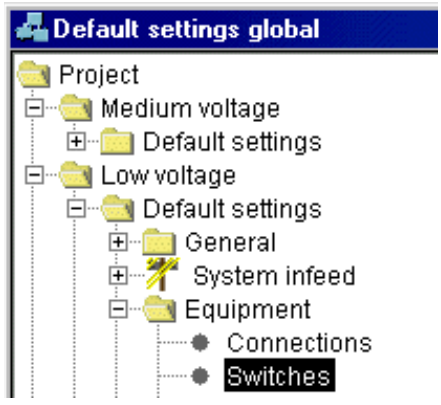


TIP
If you enter the value via the keyboard, the background will momentarily turn red since both spaces and zeros are inadmissible values in the text box. When you continue writing, the colour will change back to white.

A.7.1.4 Defining switches for circuits

All of the low-voltage switches should be identical in the beginning:

1. In the 'Default settings global' dialog box, select **Project > Low voltage > Default settings > Equipment > Switches** from the structure tree.



2. **Circuit-breaker** is the standard setting for the **Switch Selection** input box. Retain the standard selection.
3. Earth fault detection for all types of circuit-breakers is activated as the standard setting if required. Retain the standard selection to always insure automatic tripping in case of indirect contact.

A.7.1.5 Determining the properties of the circuits

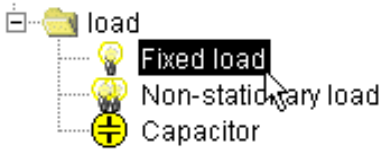
SIMARIS deSign supports you in evaluating selectivity.

1. Select **Project > Low voltage > Default settings > Electrical circuit > I-t diagram option** from the structure tree.
   The stipulations that are valid for a circuit at the beginning are listed in the right section of the window in the Selectivity view.
2. Select **Circuit properties** from the structure tree and the option **Back-up protection** in the right section of the window for cost-effective dimensioning.
3. In the Standard setting, partial selectivity is checked within both the overload range as well as the short-circuit range. Accept this setting for the example.

A.7.1.6 Defining loads for circuits

Specify a template for fixed loads by selecting the data for both of the large loads, the air conditioning and the elevator, as the standard settings:

1. In the 'Default settings global' dialog box, click on **Project > Low voltage > Default settings > Load > Fixed load**.



2. Enter **50** in the Active power [kW] text box.

Specify a non-stationary load:

1. In the Default settings global dialog box, click on **Project > Low voltage > Default settings > Load > Non-stationary load**.

2. Enter **7** in the Active power [kW] text box.
3. Accept the pole number **3+n** and set the capacity factor ai to **1**.

You have now specified the default settings for the project to be planned.

A.7.1.7 Selecting the settings in the low-voltage network

In the mask you can find settings, i. e. manipulated variables which you can select as planning conditions and which directly influence your project. There are separate settings for medium and low voltage.

1. Select **Project > General > Settings**.
2. For this example, accept Destination country: **Germany** as the standard setting.

TIP
If you want to use the selected default settings quite often, you can save them. To do this, select the **Save as default setting** button. To use a saved default setting, click on the **Load default** button and select the desired file.

3. Confirm your entry with **OK**.

Conditions for the specific medium voltage network include:

- general network data
- standard values
- the higher-level network
- default specifications for downstream low-voltage networks

Values which are valid for the entire network include:

- general network data for medium and low voltage
- standard values for low voltage
- dimensioning target for medium and low voltage
- calculation factors of the low-voltage components
- parameters of the low-voltage system infeed
- Enclosure preferences

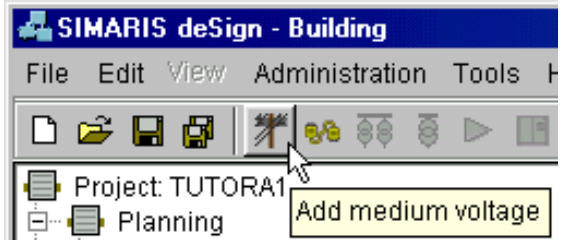
A.7.2 Adding a network

The system for adding networks, distribution boards and loads is set up strictly hierarchically. This structure is parallelled in the operation. The starting point for the circuit is always the **Calculation** node.

TIP
When you start to plan a network, it is advisable to first compile a list of all of the loads and to delegate them to specific distribution boards. An example of such a list can be found in chapter A.13.

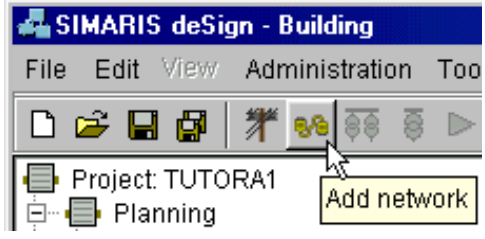
1 Select the **Calculation** node.

2 Click on the **Add medium voltage** icon.



TIP
If you would like to enter a network without defining a higher-level medium voltage, drop **step 2** and add a low-voltage network directly below the **Calculation** node.

3 Click on the **Add network** icon.



A node **Network1.1** will be added with an assigned main distribution board.to your structure tree.

SIMARIS deSign is equipped with a number of different views of the network diagram. The **Single-line diagram with device parameters** view is activated as the standard setting.

The icons in the structure tree have different colours. This corresponds to a colour code within the structure tree of SIMARIS deSign.

The colours represent the following:

YELLOW
You still have to input default settings for this circuit. It is mandatory to at least enter the cable length.
When you have fulfilled this condition, the circuit becomes GREY.

RED
In any case, this item must still be processed. This circuit has not been dimensioned, i. e. SIMARIS deSign has not selected a device for this circuit. Notes on the causes can be found in the message window, see chapter A.7.9 Trouble shooting.

GREEN (or **BLUE**)
This circuit has been correctly dimensioned.

GREY
All of the data for this circuit is available for the calculation, however the circuit has not been dimensioned yet.

TIP

First specify your main distribution boards and then the sub-distribution boards. If you already know that you can re-insert one of the distribution boards and the connected subnetwork into the entire network, then continue setting up this subnetwork. In regards to the further procedure, deal with the settings for the connection length and other points relating to the specific circuit only when these are also to be valid elsewhere. You can copy subnetworks below the main distribution board and paste them in another position.

TIP

If you are colour-blind (red-green), select blue icons. You can modify the colour settings via the menu **Extras > Settings.** In the Settings dialog box, select **Desktop > View**.

A.7.3 Editing the circuits

You can edit the properties of the circuits via the respective property window. You can open this window by

- clicking on the respective circuit with the right mouse button and selecting **Properties** from the context menu.
- double-clicking on the circuit with the right mouse button.
- selecting the respective circuit with the left mouse button and clicking on the **Properties** icon in the toolbar.

TIP
If an icon in the structure tree appears yellow or red, please refer to the corresponding information in the message box. When you open the Properties window of a yellow icon, the input boxes where data is missing are highlighted in red.

The default settings defined in the global properties will appear in the Properties window of the circuit (see chapter A.7.1). You can now modify these in the respective circuits.

You can give the circuits individualized names.

1. Double-click with the left mouse button on the **LVMD-1.1A** node in the structure tree.
2. Change the name in **Main Distribution**.

3. Confirm your modification by pressing **Enter** ↵.

Determine which properties of the main distribution board are missing:

1. Open the Properties window of the main distribution board by double-clicking with the right mouse button. Missing data will be highlighted in red.
2. In the Circuit system infeed dialog box, add the value **10** in the **Length [m]** text box in **Medium voltage.**
3. Click the **...** button next to the connection. Select the value **0.7** in the **Reduction factor ftot** text box.
4. In the Circuit system infeed dialog box, enter the value **20** in the **Length [m]** text box in **Low voltage**.
5. Confirm with OK.

The colour of the icon in the structure tree is now red, because no loads have yet been specified.

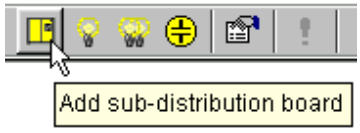
TIP
In SIMARIS deSign you can select up to four parallel infeeds for the main distribution.
For each section of the busbar, you can select parallel circuits via the Circuits tab in the **Circuit Infeed** mask.
If you only want to process one particular circuit, select the number next to the Circuit icon in the structure tree and select the properties.

A.7.4 Adding and editing circuits

A.7.4.1 Adding sub-distribution boards

This is the procedure for creating the first sub-distribution board with its respective loads:

1. Select the **Main distribution** node in the structure tree with the left mouse button.
2. Click on the **Add sub-distribution board** icon in the toolbar.



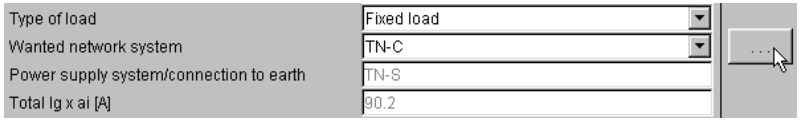
   An additional distribution icon will be created in the structure tree.
3. Double-click the sub-distribution board with the right mouse button.
4. Enter the value **30** in the **Length [m]** text box.
5. The current type of network appears in the **Network system/ connection to earth** text box. SIMARIS deSign will check if the desired type of network is permissible.
   According to the DIN VDE 0100 standard, a TN-C network is only permissible for cross-sections Cu > 10 mm^2 (or Al 16 mm^2).
   Since the basic cross-section of the connecting cable is set with 1.5 mm^2 < 10 mm^2 for the dimensioning, SIMARIS deSign sets the current configuration to **TN-S**.
   Modify the type of network in **TN-S** in the lower window section under **Wanted network system**.
6. Confirm with **OK**.

A.7.4.2 Adding loads for the distribution board

This is the procedure for adding the first load:

1. Select the **LVSD1.1A.1** distribution board.
2. Click on the **Add fixed load** icon in the toolbar.

3. Click on **Fixed load1.1A.1.1** in the structure tree. Open the Properties window by double-clicking the right mouse button and enter the value **20** in the **Length [m]** text box.
4. Click the **...** button in the lowest section of the window to define the advanced properties of the fixed load.

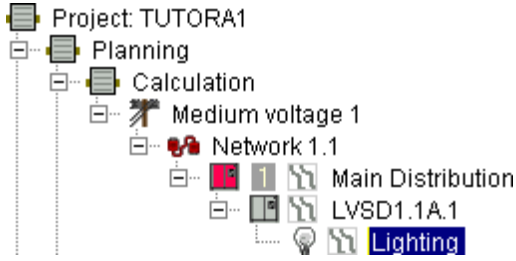


The **Fixed load** dialog box will appear.

1. Change the Fixed load1A.1.1 designation to **Lighting**.
2. Enter **3+n** in the **Number of poles (type of network)** text box.
3. Change the active power to **20** kW.
4. Confirm with **OK**.
5. Close the Circuit load dialog box with **OK**.

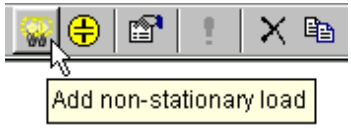
TIP
You can also rename the load directly in the structure tree.

In the structure tree you can see that the icon in front of the **Lighting** node now appears grey. This means that all of the data needed for dimensioning is present for this circuit, but that the circuit has not yet been dimensioned.



Complete the distribution boards for each floor with the other loads.

1. Select the **LVSD1.1A.1** distribution board.
2. Click the **Add non-stationary load** icon in the toolbar twice.



3. Select the **Edit missing input boxes** button in the toolbar to poll the first load.

4. Enter the value **20** in the **Length [m]** text box within the 'Circuit load' dialog box.
5. Click the **...** button in the lowest section of the window to define the advanced properties of the fixed load.
6. Change the load designation to **Kitchen**.
7. Select **7 kW** as the active power and **1** as the capacity factor ai.
8. Confirm by double-clicking **OK**.

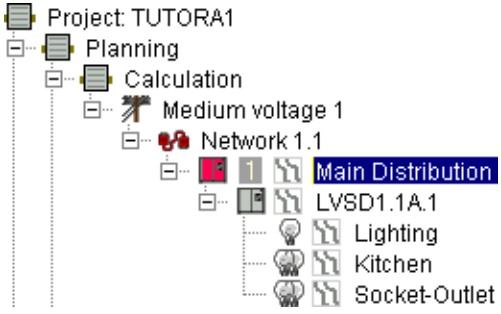
You will automatically change to the Properties window of the second non-stationary load.

1. Enter the value **20** in the **Length [m]** text box within the 'Circuit load' dialog box.
2. Click the **...** button in the lowest section of the window to define the advanced properties of the fixed load.
3. Change the load designation to **Socket-Outlet**.
4. Change the number of poles to **1** and the active power to **2.5** kW.
   The rated voltage will automatically change from 400 V to **230 V**.

TIP
If you change the number of poles in the Properties dialog box first, the rated voltage will be automatically recalculated.

5. Set the capacity factor ai to **0.5** to create a load reserve.
6. Confirm by double-clicking **OK**.

Your structure tree now looks like this:



A.7.4.3 Adding the elevator load

This is the procedure for adding the elevator load.

1. Select the **Main distribution** node in the structure tree.
2. Click on the **Add fixed load** icon in the toolbar.

3. Select the new load and open the Properties window.
4. Enter the value **50** in the **Length [m]** text box.
5. Enter **TN-S** as the desired network system.
6. Click the **...** button in the lowest section of the window to define the advanced properties of the fixed load.
7. In the Fixed load dialog box, change the designation to **Elevator**.
8. Check if the number of poles is **3**, the active power is **50** kW and the voltage is **400** V.
9. Confirm by double-clicking **OK**.

If you have entered the global settings according to chapter A.7.1, the characteristic data for the elevator circuit have already been correctly preset.

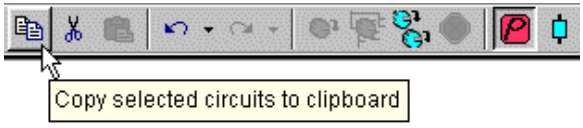
Once again, this makes the function of the default settings apparent. It serves as a kind of circuit template:
When added, all of the circuits are created with the preset properties. The default settings can be modified as often as desired, since they only affect new circuits, not already added circuits.

A.7.5 Copying and Pasting

The copy & paste functions are similar to the ones used in other Windows applications. A distribution board corresponds to a data file. When you copy a distribution board, for example, you copy the selected node with all of the lower-level circuits.
You can create the **Air conditioning** circuit on the basis of the **elevator** circuit:

A.7.5.1 Adding the air conditioning load

1. Select the **Elevator** node in the structure tree.
2. Click on the **Copy selected circuits to clipboard** icon in the



   structure tree.
3. Select the **Main distribution** node in the structure tree.
4. Click on the **Paste from clipboard** icon in the toolbar.

   An identical **Elevator** load will be added to the structure tree.
5. Change the name of the newly added **Elevator** load to **Air conditioning**. To do this, first click with the right mouse button, then consecutively with the left mouse button on the **Elevator** node. You can now rename the load.
6. Confirm the name change by pressing **Enter** ↵.

ATTENTION
If you have changed the name of a load and then copy it, it will be added again with the same name. A load whose designation has not been changed will be added with subsequent numbering.

To create distribution boards for each floor with identical loads, you only need to copy the first sub-distribution board.

1. Select the **LVSD1.1A.1** distribution board in the structure tree.
2. Hold down both the Ctrl key and the left mouse button and drag the cursor to the **Main Distribution** node. A blue arrow next to the cursor indicates that the distribution board has been added below the main distribution.
3. Release the mouse button.

SIMARIS deSign has now created an identical distribution, **LVSD1.1A.2**, with all of the loads.

TIP
In this way it is possible for you to quickly create distributions for additional floors.

This is the procedure for creating a distribution for additional floors:

1. Double-click with the left mouse button on the **LVSD1.1A.1** node in the structure tree.
2. Name the floor distribution board **First floor**.
3. Confirm the new designation by pressing **Enter** ↵.
4. Select the **LVSD1.1A.2** node.
5. Name this floor distribution board **Second floor**.
6. Confirm the new designation by pressing **Enter** ↵.
7. Open the Properties window of the **Second floor** distribution board by double-clicking the right mouse button and enter the value **40** as the **cable length [m]**.
8. Confirm with **OK**.

TIP
The mouse functions:

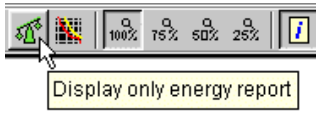
- Drag selected nodes to the last position of a distribution board by holding down the left mouse button.
- Copy nodes to the last position of a distribution board using Ctrl + left mouse button.
- Drag nodes within a distibution level using Alt + left mouse button.

A.7.6 Setting the properties of the capacitor

SIMARIS deSign is equipped with a number of different views of the network diagram. The **single-line diagram with device parameters** view is activated as the standard setting.

The **Energy report** view is very helpful for minimizing the connecting power.

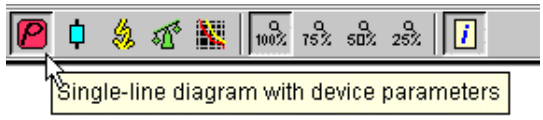
1. Select **Main Distribution**.
2. Select the **Energy report** icon in the toolbar.



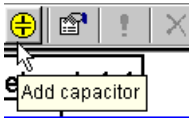
In the list of loads on page A-98 as well as in the Energy report view, you can see that the total active power P is approx. 160 kW.

Cosφ = 0.9 is economically optimal.
With P = S*cosφ, the optimal apparent power of the transformer results in approx. 180 kVA (instead of 202 kVA).
The inductive downward-flowing reactive-power component Q is then approx. 40 % of the optimal apparent power S, i. e. Q_{soll} = - 70 kvar.
The total reactive power is momentarily Q_{ist} = - 121 kvar.
With a capacitor as capacitive load, you can compensate the excess 50 kvar $\widehat{=}$ 30% of P with the following steps.

1 Select the **Single-line diagram with device parameters** icon in the toolbar.



2 Select the **Add capacitor** icon in the toolbar.



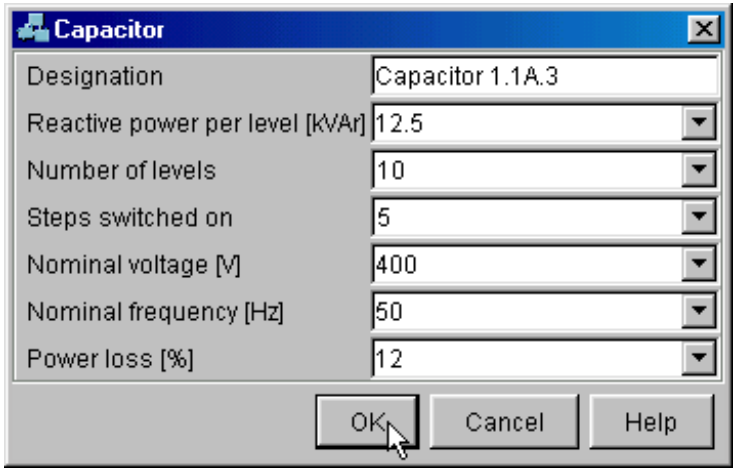
3 Open the Properties window of the capacitor by double-clicking with the right mouse button.

4 Enter **10** m as the cable length.

5 Click on the **...** button next to the capacitor icon.

The **Capacitor** dialog box will appear. A 10-module capacitor with 6 active modules has been set with 50 kvar reactive power each.
With 300 kvar the capacitor is oversized.

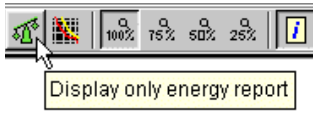
Reduce the capacitor power:



1. Change the value for the reactive power per module to **12.5** kvar.
2. Change the number of modules switched on to **4**.
3. Confirm by double-clicking **OK**.

This is the procedure for changing to the **Energy report** view.

1. Select the **Main distribution** node in the structure tree.
2. Select the **Energy report** icon in the toolbar.



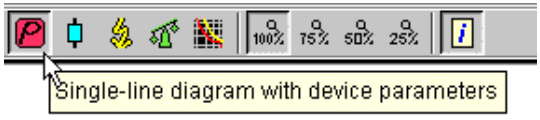
SIMARIS deSign will automatically calculate the new values. The reactive power Q at the busbar of the main distribution board is now only - 71.1 kvar. The resulting apparent power S has thus been reduced.

A.7.7 Dimensioning the network

The term dimensioning refers to the selection of suitable switching/protective devices, connections and infeed power. The basis for this is the database incorporated in SIMARIS deSign which encompasses all of the data for the products from SIEMENS which are necessary for the correct selection of equipment.

TIP
For the first and the last dimensioning stage, it is recommended that the entire network be dimensioned for an overview of all of the remaining errors. In between you can confine yourself to dimensioning selected circuits and subnetworks only in order to work in a time-optimized manner.

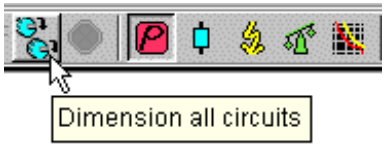
1 Select the **Single-line diagram with device parameters** icon in the toolbar.



The **Main distribution** node is highlighted in red. All of the other levels are grey. No input is missing. These networks can be dimensioned.

2 Select any circuit in the network.

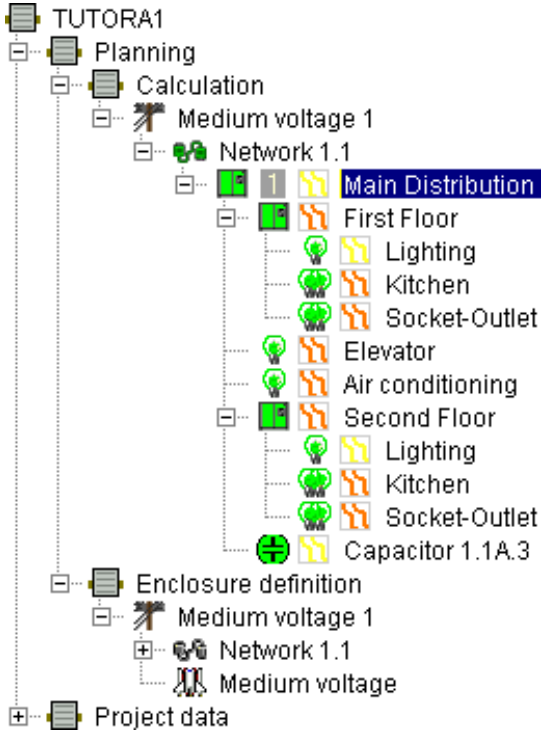
3 Click on the **Dimension all circuits** icon in the toolbar.



All of the circuits will be dimensioned. In the structure tree, a small icon marks the circuit presently being processed.

When SIMARIS deSign has successfully dimensioned all of the equipment, the circuit icons in the structure tree are all green. Red icons mean that the respective circuit could not be dimensioned.

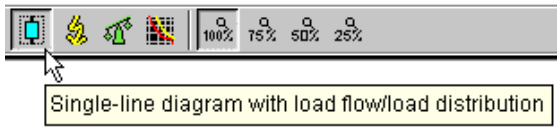
If you have created the network according to the stipulations, the structure tree now looks like this:



Warning
Both modifications made to the entire system and modifications made to the equipment always require a new analysis of the network.
Modifications can, for example, be new cable lengths or loads; as a result, the dimensioning must be carried out again or a switching/ protective device must be replaced.

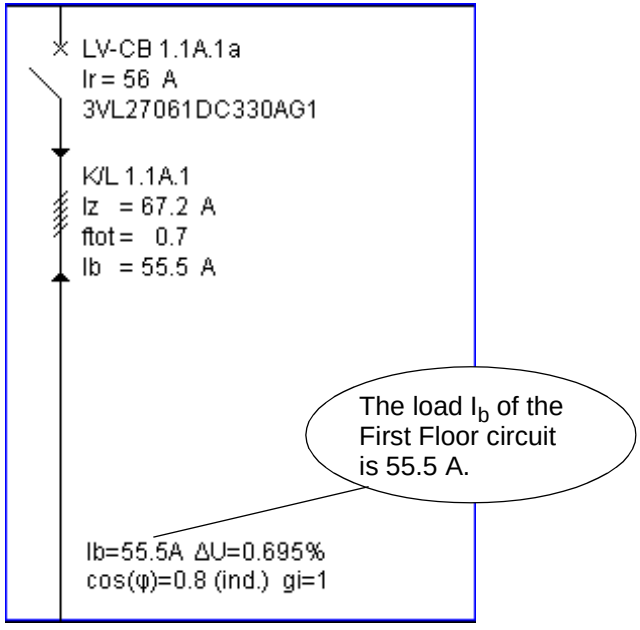
A.7.8 Dimensioning subnetworks

1 Select the **Single-line diagram with load flow/load distribution** icon in the toolbar.

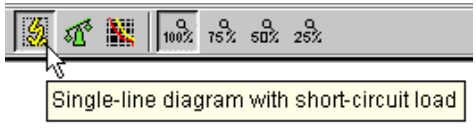


2 Select the **First Floor** node.

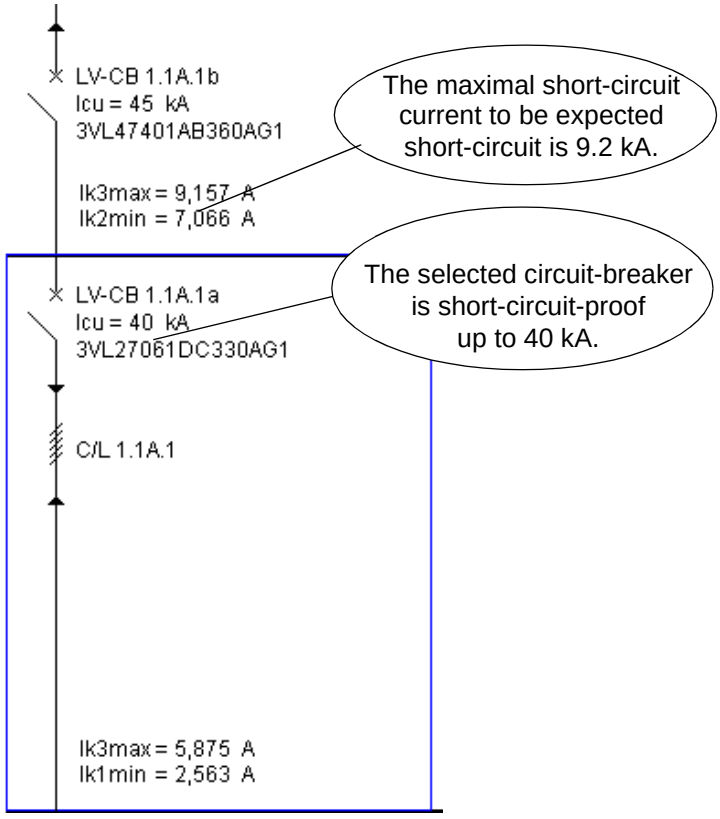
3 Examine the load of the infeed of the floor distribution boards: The currents are very small, less than 63 A.



4 Click on the **Single-line diagram with short-circuit load** icon in the toolbar.



5 Again examine the infeed of the floor distribution boards:



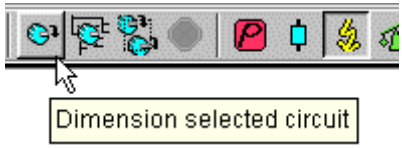
A cost-effective alternative to a moulded-case circuit-breaker is a fused solution:

1 Open the Properties window of the **First Floor** distribution board.

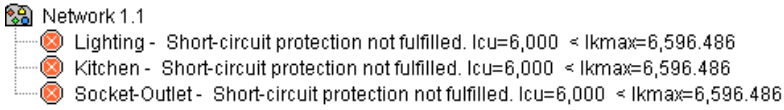
2 Under **Type of switchgear**, select **Fuse switch disconnector** from the drop-down list box.

3 Confirm with **OK**. The node will turn red, since it has not been dimensioned yet. The circuit-breaker icon has changed.

4 Select the **Dimension selected circuit** icon in the toolbar.



The Ground Floor circuit will be newly dimensioned. The downstream circuits remain unaffected. The dynamic checking system in SIMARIS deSign will recognise and report any faulty dimensioning in the outgoing circuits.

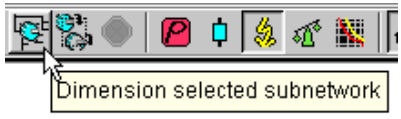


5 Open the Properties window of the **Second Floor** distribution board.

6 Change the type of switchgear to **Fuse switch disconnector**.

7 Confirm with **OK**.

8 Dimension the **Second Floor** subnetwork. Select the **Dimension selected subnetwork** icon in the toolbar.



Only the **Second Floor** infeed will be newly dimensioned in a technically correct manner. All of the circuit icons are now green.

A.7.9 Dealing with notes

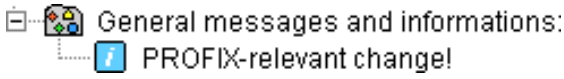
SIMARIS deSign supports your project planning with explicit notes and messages.

The message box displays a result tree similar to the project tree.

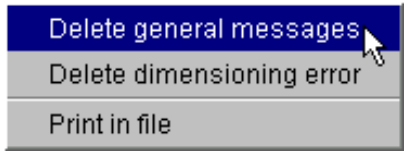
A.7.9.1 General messages

SIMARIS deSign differentiates between messages in the circuit calculation, messages in the enclosure definition and general messages.

Messages listed under General messages can not be linked to a particular circuit. These are higher-level notes such as



If you click with the right mouse button in the message box, the following context menu will appear:



Delete general messages
All of the general messages will be deleted from the message tree.

Delete dimensioning error
All of the dimensioning errors will be deleted from the message tree. If you ignore the message and continue working, SIMARIS deSign will post the note again.

A.7.9.2 Configuration notes

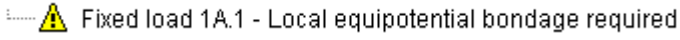
The program lists the messages according to the hierarchy of the project structure.
SIMARIS deSign differentiates between 4 different message categories:

- **Red circle - checking error**
  You are manually editing the network or individual circuits.
  If, during the editing process, a conflict arises between the calculated requirements and the selected device, a note will appear and the signal control of the affected circuit will change in the structure tree.
  Solution: Either modify the corresponding circuit properties manually or have the circuit be automatically dimensioned.

- **Warning with a warning triangle**

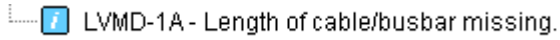
Warning
The results of the dimensioning are only partially correct.
Take this note into consideration when you implement the network in order to comply with the protective measures.

The project tree is green.
Example:

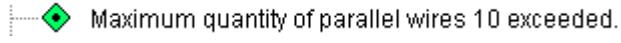


The warning messages will be included in the output of the result lists (refer to Chapter A.7.12). The output format can be set in the menu via **Extras > Settings > Calculation results**.

- **Input note with a blue Info icon**
  Some circuits have not been dimensioned yet. You are adding new circuits.
  In the project tree the affected circuit is either yellow or grey.
  This note requires you to supplement the minimally required information for the dimensioning.
  Example:



- **Dimensioning error**
  The program is dimensioning the network.
  This note appears when a conflict arises between the conditions and the marginal requirements or the stored database during the dimensioning.
  In the project tree, the signal control of the affected circuit turns red.
  Solution: Modify the properties of the affected circuit according to the instructions in the message.



  In this example, you have to change the installation type or the maximum permissible cross-section of the cable in the **Properties circuit** dialog box.

TIP
When you click a message, the circuit that triggered the message will automatically be highlighted in the structure tree.
This message can be corrected via the Properties window.

A.7.10 Manual device selection

SIMARIS deSign automatically dimensions:

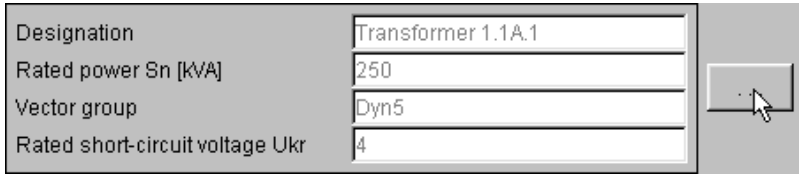
- Transformer capacity
- Switching devices and protective devices
- Cable cross sections

You can manually process and specify these devices at any time. SIMARIS deSign will take these devices into consideration when dynamically checking the state of the network. These components will be ignored during the automatic dimensioning process.

A.7.10.1 Processing transformers

Increase the transformer capacity

1. Open the Properties window of the **Main distribution circuit**.
2. In the **Medium voltage** tab, select the ... button next to the transformer icon in the lower section of the window.

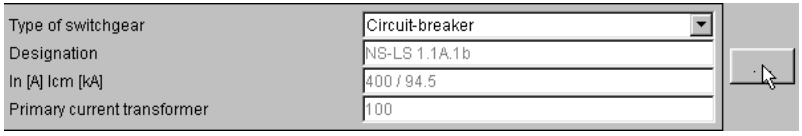


3. Select the value **315** for the **Rated power Sn [kVA]** from the dropdown list box.
   The linked text box **Short-circuit loss Pk [kW]** will be automatically updated.
   The **Automatic dimensioning** check box has been deactivated.
4. Confirm with **OK**.

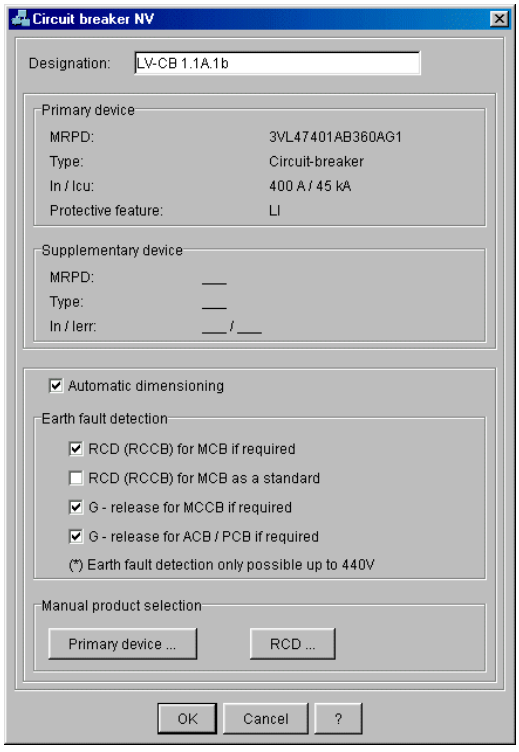
A.7.10.2 Manual device selection

Via the manual device selection, you can modify the automatic selection of SIMARIS deSign and select a switching device yourself. For this selection, SIMARIS deSign will also check to ensure that all of the planning requirements are complied with.
Exchange the moulded-case circuit-breaker in the main distribution board with an air circuit-breaker.

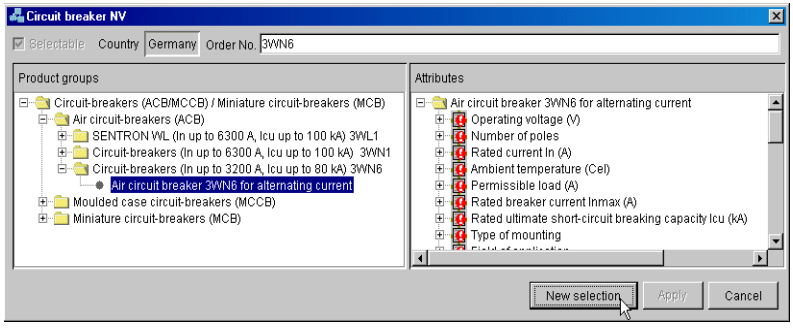
1. Change over to the **Low voltage** tab. **Circuit-breaker** is displayed in the **Type of switchgear** dropdown list box for the lower switch.
2. Click on the **...** button next to the lower switch.



3 In the Circuit-breaker NV dialog box, click the **Primary device...** button.

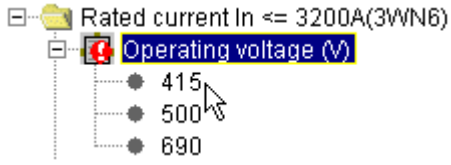


4 In the structure tree, select **Circuit-breakers > Air circuit-breakers (ACB) > Circuit-breakers (In up to 3200 A, Icu up to 80 kA) 3WN6 > Air circuit-breaker 3WN6 for alternating current**.



5 Click on the **New selection** button.
All of the properties of the series of switches will appear in the attributes box. All of the properties which have not been checked off in green still have to be defined.

6 In the structure tree in the right section of the window, click on **Operating voltage (V): 415**.



TIP
The individual menu items are interactively linked with each other. Properties which can only assume one value due to the product specifications will be automatically selected. In this way it can be guaranteed that selected devices can really be ordered.

7 Proceed in the same way for the rest of the device properties:

Ambient temperature (°C):	**50**
Number of poles:	**3**
rated current I_n (A):	**630**
I_{cu} (kA):	**65**
Overcurrent release/protective features:	**LSIN**
Design/Overcurrent release:	**D**
Type of connection, main circuit:	**rear connected; horizontal**
Operating mechanism:	**Manual operating mechanism with stored energy feature with mechanical closing**
LCD display:	**Basic functions with LCD display**
Auxiliary contact:	**with auxiliary contact 2NO + 2NC**
1^{st} auxiliary release:	**without**
2^{nc} auxiliary release:	**without**

ATTENTION
In this function, the green check mark only indicates that a characteristic value has been selected. It does not give any indication that the selected option is actually technically permissible in the affected circuit. Pay attention to messages in the message window.

8 As MRPD you will receive: **3WN60611DD050AA1**.
After making a new selection, you can also directly enter the MRPD in the input box at the top on the right and confirm by pressing **Enter**↵.

9 Confirm with **Apply**.
In the Circuit-breaker LV dialog box, the **Automatic dimensioning** check box was deactivated. This means that the device has been taken into consideration in the calculation, but is frozen. SIMARIS deSign will no longer automatically change it. The query with the network requirements and the notes will remain, however.

10 Confirm by double-clicking **OK**.

The manual selection is clearly marked in the structure tree by a small blue hand next to the icon.

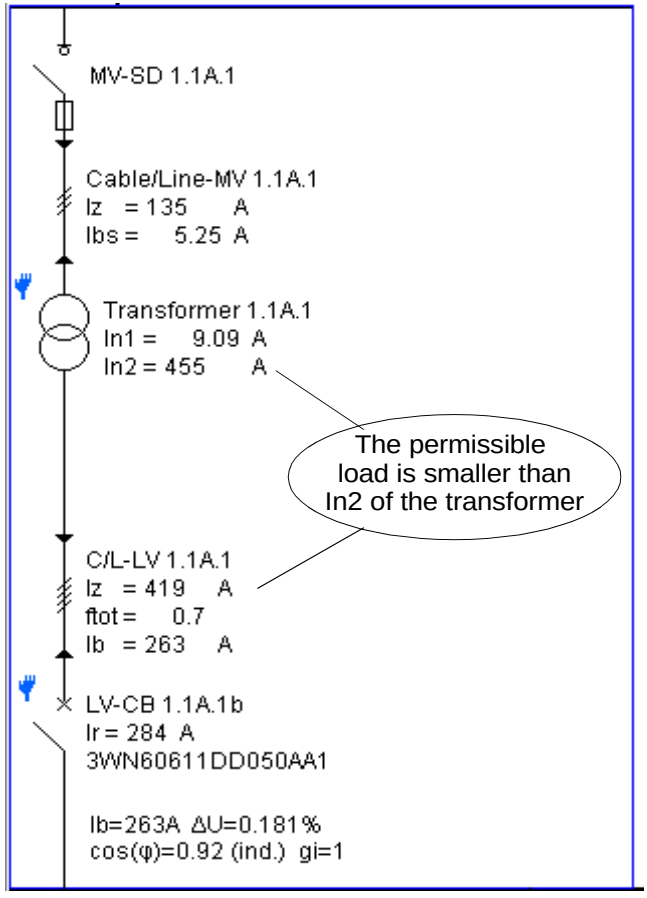
Increasing the transformer capacity increases the short-circuit currents. The Second Floor subnetwork has been incorrectly dimensioned.

1 Select the **Second Floor** node.

2 Select **Dimension selected subnetwork**.

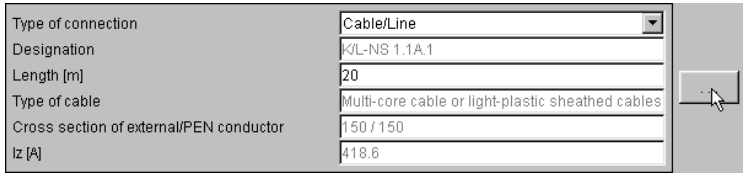
A.7.10.3 Processing cable selection

- Select the **Main distribution** node and change over to the **load flow** view.

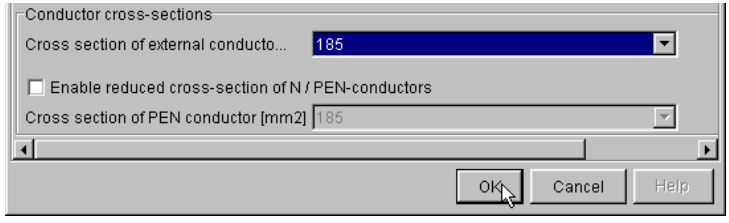


Increasing the cable cross section.

1. Open the properties window for the **Main distribution circuit**.
2. In the **Low voltage** tab, click on the **...** tab next to the connection.



3. For the **Cross section of external conductor [mm^2]**, select the value **185** from the drop-down list box. The linked **Cross section of external PEN conductor [mm^2]** text box will be automatically updated. The **Automatic dimensioning** control box has been deactivated.



4. Confirm twice with **OK**.

A.7.11 Setting the protective devices

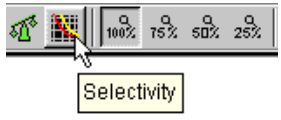
A.7.11.1 General information

In the **Selectivity** view you can

- observe the tripping performance of each protective device in terms of the selected limits and the devices connected upstream and downstream.
- manually carry out the protective settings for adjustable devices. SIMARIS deSign supports you with a report of the current state.

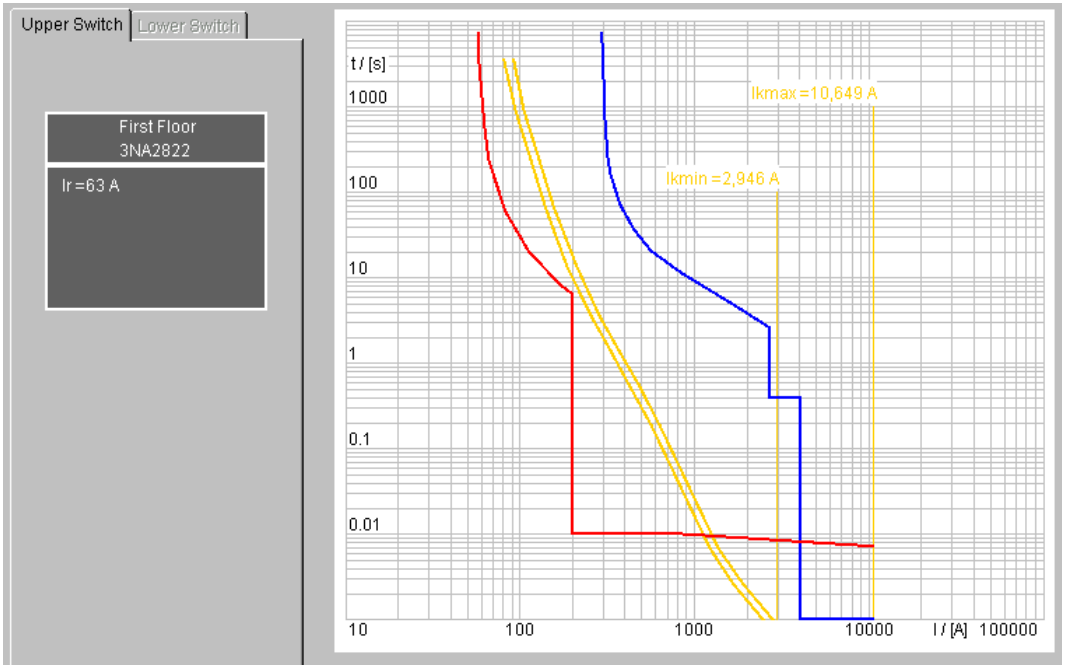
Since the characteristic curve is dependent on the type of device, this view is only available after dimensioning.

1. Select the **First Floor** distribution board in the structure tree.
2. Select the **Selectivity** icon in the toolbar.



In the message window you will receive a message regarding selectivity for each circuit. You can activate these messages via the **Extras > Settings** menu. In the structure tree, select **Settings > Desktop > Messages** to specify the number of selectivity messages.

In the displayed diagram you can see the current-time characteristics of the upper switch of this circuit in relationship to the switches connected upstream and downstream.



As a standard setting, the different lines are designated by specific colours:

Yellow designates the upper switch of the current circuit.

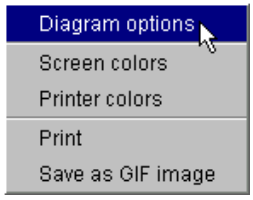
Green designates the lower switch of the current circuit.

Blue designates the sum total envelope curve of all of the higher-level devices.

Red designates the resulting characteristic curve of the next downstream circuit level.

Diagram options

1 Click with the right mouse button in the diagram box to display the context menu.



2 Select **Diagram options**.

3 You can select the limit values and characteristic curves to be displayed in the diagram using the check boxes in the input mask.

4 Click **Apply** to apply your settings that were previously only valid for this specific circuit to all of the other circuits in the network.

5 Confirm your modifications by clicking **OK** and change over to the updated diagram.

Defining screen colours

1 Click with the right mouse button in the diagram box to display the context menu.

2 Select **Screen colours**.

3 Select a node in the left section of the window and define the colours of the screen diagram as desired.

4 Click **Apply** to see your colour modifications in the diagram. The **Local default colour set** button deletes your modifications and selects the standard combination.

5 By clicking **OK** you will return to the diagram.

Printer colours

1. Click with the right mouse button in the diagram box to display the context menu.
2. Select **Printer colours**.
3. Define the colours of the data output diagram as desired.
4. The **Load Black&White printer defaults** button displays the standard settings of the respectively selected colour or black&white printer.
5. With **Preview in the selectivity screen** you can see the view of your personal colour selection.

TIP
For the black&white printer, select different colour intensities for the curves. The curves can then be more easily differentiated in the printout.

Printing

1. Click with the right mouse button in the diagram box to display the context menu.
2. Select **Print**.
3. Select your choice of printer for the selected curve diagram.

Saving as a GIF image

1. Click with the right mouse button in the diagram box to display the context menu.
2. Select **Save as GIF image**.
3. Save your curve diagram in the desired folder in GIF format.

WARNING!
The upper and lower tolerance bands help to make it easier to evaluate selectivity. The tolerance bands are displayed in SIMARIS deSign in a simplified manner. However, with a high probability, the tripping character of the switches remains within this range. Please refer to the operating manuals of the respective individual switches for detailed information on their exact behaviour.

A.7.11.2 Viewing selectivity

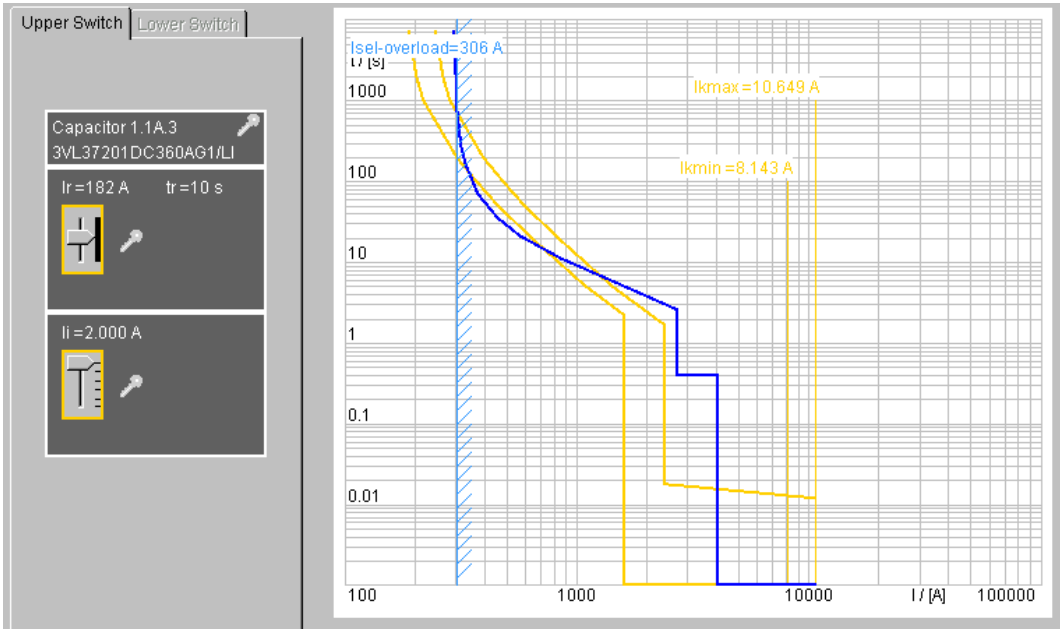
In SIMARIS deSign, **Backup protection** is set as the standard for the dimensioning priority.

TIP
This setting can be modified separately for each circuit:

1. With the right mouse button, double-click on any circuit in the structure tree.
2. Click on the **Circuit properties** button. In the Circuit properties dialog box, you can select the dimensioning target and the resulting evaluation for each circuit.
3. By clicking **Accept**, you can accept your settings for all of the existing circuits within a network. If you want to accept your settings as defaults for new circuits, click on the **As default** button. These network-specific defaults will then be imported under **Network > Low voltage > Default values > Circuit > Circuit properties**.

- Select the **Capacitor** load in the structure tree.

In the following diagram you can see the current-time characteristics for the switch of this circuit (yellow) in relationship to the higher-level incoming circuit-breaker (blue).



I_{kmax} Maximum short-circuit current which the current switch must resist.
For the instantaneous short-circuit release I_i the condition $I_i < I_{kmax}$ is valid.

I_{kmin} Minimum short-circuit current which the current switch must disconnect.
For the short-time delayed short-circuit release I_d the condition $I_d < I_{kmin}$ is valid.

I_{sel} Calculated selectivity-limiting current, i. e. the intersection of the displayed curves. For the automatic evaluation, SIMARIS deSign distinguishes between intersections

in the overload range: $I_n <= I_{sel\text{-}overload} < I_{kmin}$

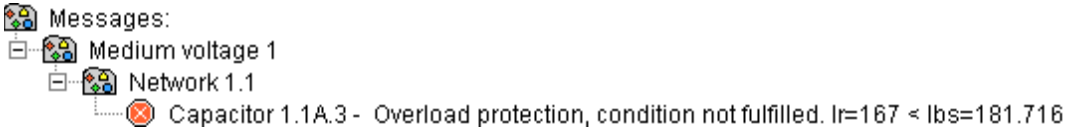
and the short-circuit range: $I_{kmin} <= I_{sel\text{-}short\ circuit} <= I_{kmax}$

If there is an intersection within the overload range, an intersection within the short-circuit range will be neglected.

Two switches are fully selective to each other when $I_{sel} > I_{kmax}$.

You can now modify the properties of the characteristic curves via the linear regulator to the left of the diagram.

1 Slide the regulator of the overload release I_r slightly downward. You are now violating the overload condition.



In the background, SIMARIS deSign will simultaneously check the overload, tripping and short-circuit conditions. As soon a a conflict about the requirement arises, it will be displayed in the message window and the respective circuit nodes will change colour.

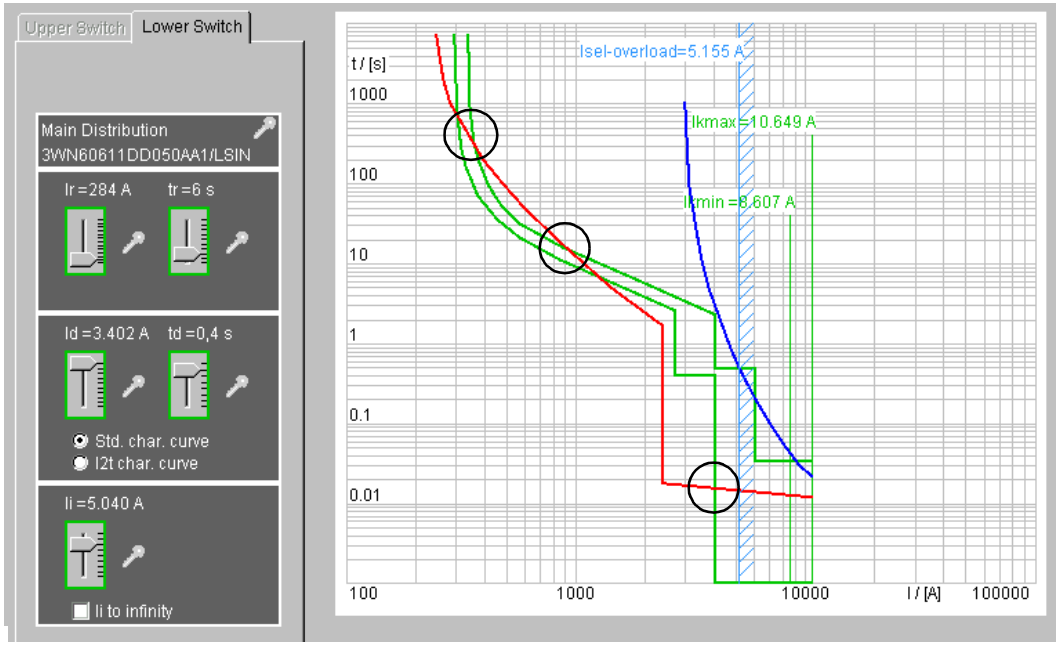
2 Slide the regulator of the overload release I_r back to **182 A**.

TIP
Click on the scale above or below the regulator to set a parameter one step lower or higher.

The short-circuit release I_i is at 2000 A
.

1 The intersection $I_{sel\text{-}overload}$ shows that the protection setting in the upstream devices must be changed in order to increase selectivity.

2 Select the **Main Distribution** node.



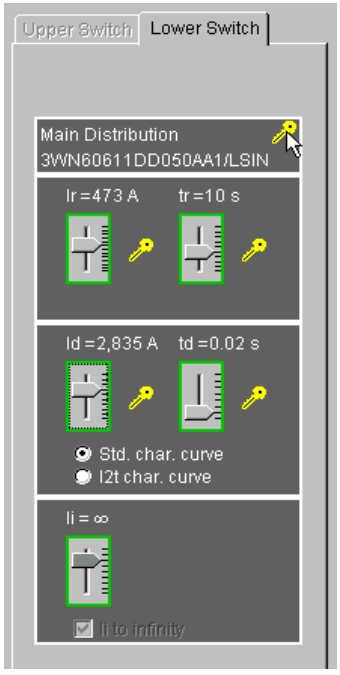
The characteristic curves of the incoming switch (green) and the upstream switch (red) intersect in several places within the overload and short-circuit range.

In oder to reach selectivity and dissolve the intersections, the green characteristic curve must be moved to the right. The intersection $I_{sel\text{-}overload}$ with the HV HRC fuse must be additionally moved within a tripping range of < 0.1 seconds.

1. Set the release of the overload range I_r to **473 A.**
2. Activate the check box **I_i to infinity**.
3. Slide the regulator t_d for the short-circuit delayed release to a minimum of **0.02 s**.
4. Select tr = **10 s** as the tripping time.

5 Slide the regulator for the short-time delayed release I_d to **2835 A**, i.e. below the blue curve.

6 Click the key next to the designation Main Distribution to lock or unlock your selected settings.

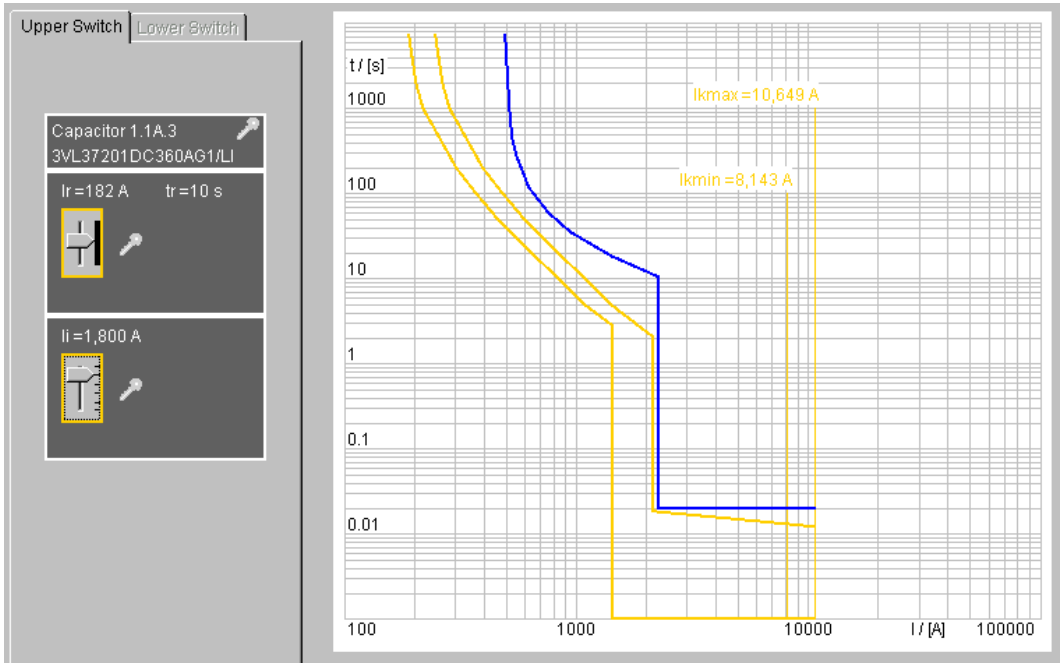


This corresponds to deactivating the **Automatic dimensioning** button. The settings will then be taken into consideration for the circuit calculations, but will no longer be automatically modified.

The Selectivity icon for the circuit capacitor remains unchanged.

1 Select the **Capacitor** node**.**

2 The intersection $I_{sel\text{-}overload}$ is now at 2268 A. Slide the regulator for the Ii release down to **1800 A**.



The protective device of the capacitor is now completely selective to the incoming switch, i. e. the curves do not intersect. All of the Selectivity icons downstream from the infeed are green and the network is fully selective on the secondary side.

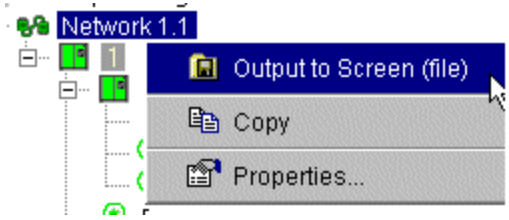
A.7.12 Output of results

In this section, as required by the task, you will generate

- an overview block diagram
- the results of the network calculation

1 Select the **Network 1.1** node in the structure tree.

2 Click the node with the right mouse button to display the context menu.



3 Select **Output to Screen (file)**.

4 Activate **Network diagram (FelixCAD)** as well as all of the check boxes under **Calculation results**.

5 Select **Entire network or Subnetwork**.
All of the circuits below the highlighted circuit **Network 1.1** will then be included in the output.

If desired, it is also possible to only output the results from parts of the network.

6 Confirm with **OK**.

It is only possible to output the text for tender docments when the enclosure has also been dimensioned.

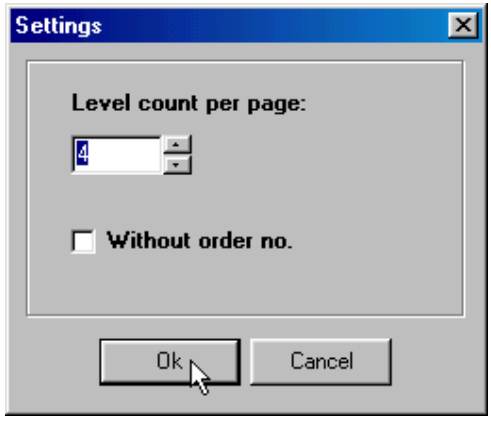
All of the necessary applications will automatically open.

When SIMARIS deSign was installed, FelixCAD was also installed. The block diagram is generated in FelixCAD and can be further edited (printed, saved as .dwg/.dxf) there.

1 For your output in FelixCAD, select a network view. The icons correspond to the view icons in SIMARIS deSign.

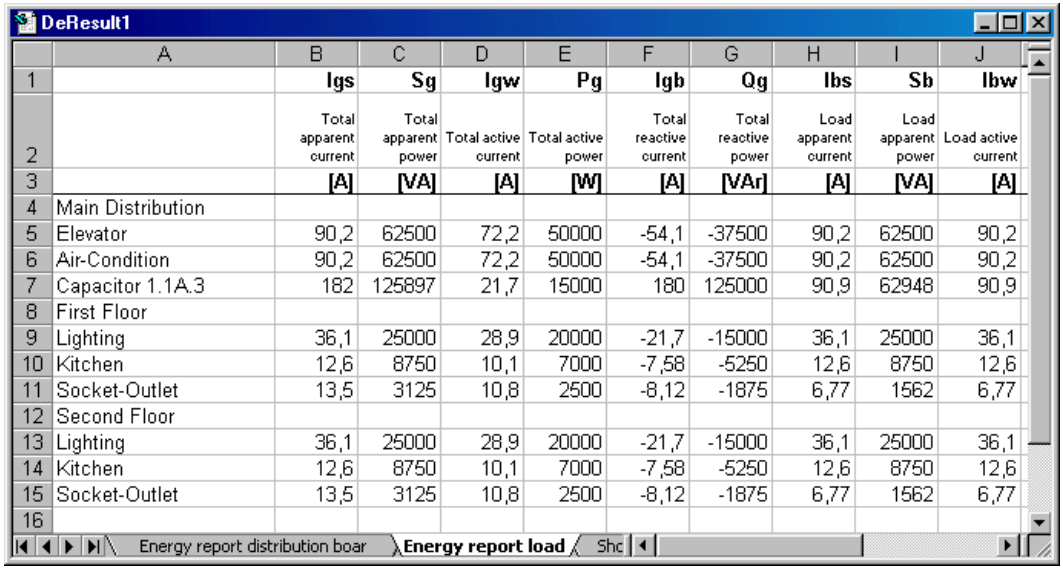
2 Select the **Settings** icon in the toolbar to

- select a manufacturer-neutral view.
- select the number of displayed levels per page. One level corresponds to a level in the structure tree.
  For the current example, select **4**.



3 Confirm with **OK**.

The results of the network calculation and the equipment dimensioning will be summarized in a table. It is possible to change from one table to another one via the tabs on the lower edge. The tables can be further edited here.



DeResult1

	A	B	C	D	E	F	G	H	I	J
1		**Igs**	**Sg**	**Igw**	**Pg**	**Igb**	**Qg**	**Ibs**	**Sb**	**Ibw**
2		Total apparent current	Total apparent power	Total active current	Total active power	Total reactive current	Total reactive power	Load apparent current	Load apparent power	Load active current
3		**[A]**	**[VA]**	**[A]**	**[W]**	**[A]**	**[VAr]**	**[A]**	**[VA]**	**[A]**
4	Main Distribution									
5	Elevator	90,2	62500	72,2	50000	-54,1	-37500	90,2	62500	90,2
6	Air-Condition	90,2	62500	72,2	50000	-54,1	-37500	90,2	62500	90,2
7	Capacitor 1.1A.3	182	125897	21,7	15000	180	125000	90,9	62948	90,9
8	First Floor									
9	Lighting	36,1	25000	28,9	20000	-21,7	-15000	36,1	25000	36,1
10	Kitchen	12,6	8750	10,1	7000	-7,58	-5250	12,6	8750	12,6
11	Socket-Outlet	13,5	3125	10,8	2500	-8,12	-1875	6,77	1562	6,77
12	Second Floor									
13	Lighting	36,1	25000	28,9	20000	-21,7	-15000	36,1	25000	36,1
14	Kitchen	12,6	8750	10,1	7000	-7,58	-5250	12,6	8750	12,6
15	Socket-Outlet	13,5	3125	10,8	2500	-8,12	-1875	6,77	1562	6,77
16										

Energy report distribution boar | **Energy report load** | Shc

A.8 How do I define the enclosure?

A.8.1 General information

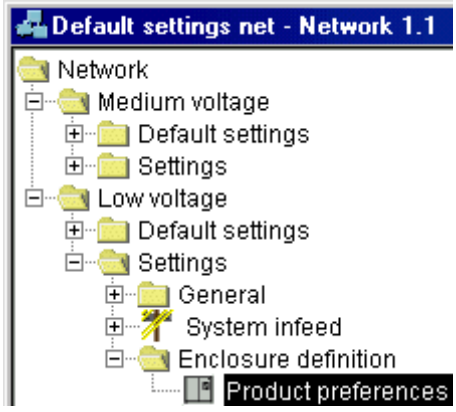
When defining enclosures, the smallest possible enclosure in which all of the devices determined by the calculation module can fit is selected from the database. A rough suggestion is also made for the general distribution of space within the enclosure.

ATTENTION
The enclosure is dimensioned without the influence of the ambient conditions. It is therefore necessary to take derating factors into account when configuring the switchgear! (For example, derating factors for the ambient temperature, installation elevation, packing density, IP degree of protection, etc.)

The enclosure is always dimensioned in relation to the previously calculated network and can only then be correctly dimensioned when all of the nodes in the circuit dimensioning are green, i. e. when they have all been successfully dimensioned.

The enclosure preferences can be directly defined in the **Default settings net** dialog box. After being confirmed, the settings immediately affect your project and the network.

1. Open the dialog box for the settings by double-clicking with the right mouse button on **Network 1.1**.
2. Select **Project > Low voltage > Settings > Enclosure definition > Product preferences** in the structure tree.



You can now deactivate particular types of distribution boards or set priorities in the right section of the window.

3. Deactivate **ALPHA160** by clicking on the respective check box.
4. Give **SIVACON 8PT** priority.

Distribution board	Group	Enable	Priority within the gr...
SIVACON 8PT	6	☑	☑
SIKUS 3200	6	☑	☐
ALPHA 630	4	☑	
ALPHA 400	3	☑	
ALPHA 160	2	☐	
SIMBOX WP	1	☑	☐
SIMBOX 63	1	☑	☑

These are all of the default settings for this model project.

5. Confirm with **OK**.

A.8.2 Dimensioning the enclosure

The procedure for dimensioning the enclosure is schematically similar to the procedure for dimensioning the network:

- For the first and the last dimensioning stage, it is recommended that the entire network be dimensioned.
- In between you can confine yourself to dimensioning selected enclosures only in order to work in a time-optimized manner.

1 Open **Planning > Enclosure definition > Medium voltage1 > Network 1.1 > >Distribution board > Low voltage** in the structure tree.

2 Click on the **Dimension all enclosures** icon in the toolbar.

When the enclosure has been selected, all of the circuits currently being processed are marked by a small icon:

- If a distribution board has been successfully delegated to an enclosure, the respective icon is green after the processing has been completed.
- If it is not possible to delegate a distribution board or if no selection is possible, a message will appear and the icon will be red.

For an overview of the enclosures, open the complete tree under **Low voltage**.

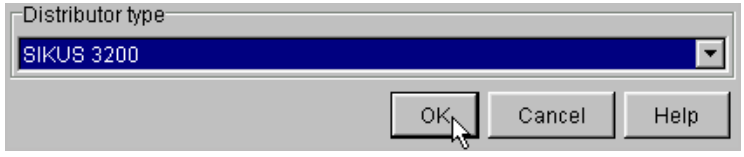
If you now successively select the individual nodes and view the respective images in the right section of the window, you will see different views of the enclosure:

- If you select the icon of a distribution board, i. e. **Main distribution**, in the structure tree, a schematic dimensioned drawing of the selected enclosure will be displayed.
- If you select, for example, **Panel 1** in the structure tree, the switchgear cabinet will be displayed with all of the corresponding devices.

A.8.3 Manual enclosure selection

As described in chapter A.8.1, certain enclosures could already be eliminated or particular types could be given priority in the global default settings. It is also possible to manually replace the enclosures automatically selected by SIMARIS deSign with other types of enclosures.

1. Open the Properties window of the enclosure for the **Main Distribution**.
2. In the **Distributor type** section**,** select **SIKUS 3200** from the drop-down list.



3. Confirm with **OK**.

TIP
When you manually select an enclosure, the **Automatic dimensioning** check box will be deactivated. When a new dimensioning is carried out, the enclosure will no longer be modified. It is also possible to manually deactivate the check box if, for example, you want to retain an automatically selected enclosure even after modifications have been made to the circuit.

If you now successively select all of the sub-items of the enclosure you will see that some of the properties have automatically been modified:
The **Main Distribution** now shows a schematic diagram of the SIKUS enclosure with the modified dimensions.
The panels were automatically adjusted to the new type of enclosure.

A.8.4 New placement of devices in the panels

In the case of self-contained enclosures, you can drag selected devices to new panels and thus manually vary the placement within your panels.

1. Select **Main Distribution_Panel 2** in the structure tree.

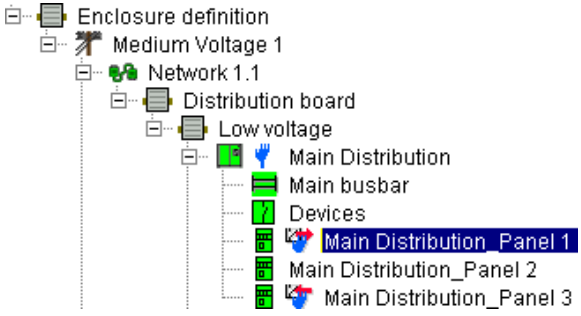
   SIMARIS deSign will automatically place the 3VL compact circuit-breaker and the 3NP fuse strip in this panel. Now place the compact circuit-breaker in its own panel.

2. Hold the shift key ⇧ down and select items 2 through 4 in the list of devices by clicking with the left mouse button.
3. Select the **Place in new panel** button**.**

   A new **Panel 3** will be automatically generated in the structure tree.

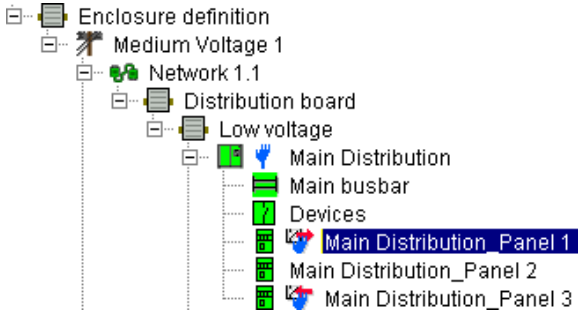
   Small red arrows indicate both the panel out of which a device was taken and the panel to which the device was added.
4. Click on the **Main Distribution_Panel 2**.
   Only items 5 and 6 are left in the device list. They are marked by a hand.



A.8.5 Dragging panels

You can customize the arrangement of the panels within a distribution board.

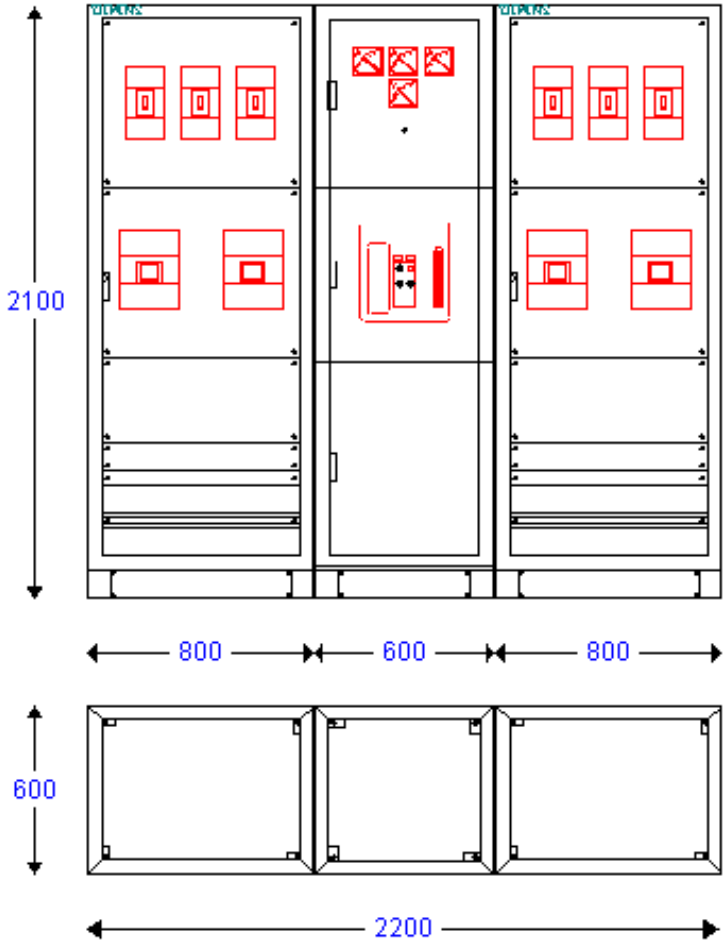
1. Select the **Main Distribution_Panel 1** node.
   In the diagram, the circuit-breaker is to be placed to the left in Panel 1 of the main distribution board.



2. Hold the left mouse button down and drag the mouse cursor to the **Main Distibution_Panel 2.**
   The cursor indicates with a blue arrow that Panel 1, which is highlighted in purple, has been dragged below Panel 2.
3. Release the mouse button.
4. Select the **Main Distribution** node.

TIP
If you drag a panel, a blue arrow next to the cursor indicates whether the panel will be added above or below the selected node.

The diagram under the Main Distribution has now also been modified.



TIP
If you drag a panel, the panel will always be added to the circuit over which the mouse button has been released.

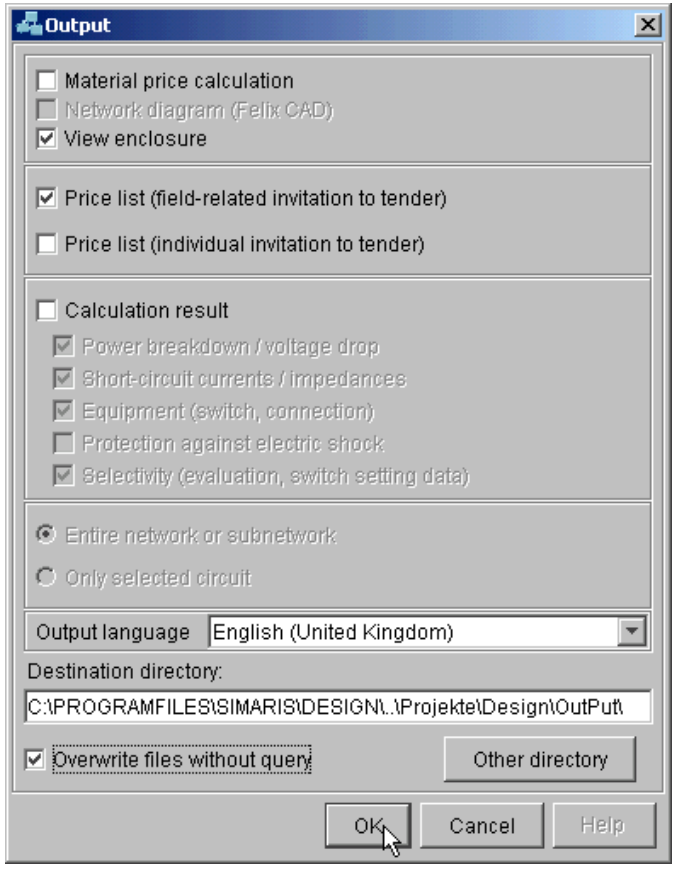
A.8.6 Output of results

In this section, as required by the task, you will generate documentation for

- the space requirements in the distribution boards
- the specifications of work and services

1. Click with the right mouse button on **Main Distribution** in the structure tree.
2. Select **Output to Screen (file)** from the context menu.
   You can determine the output properties in the **Output** dialog box.
3. Activate **View enclosure**.
4. Deactivate **Calculation result**.
5. Activate **Price List (field-related invitation to tender)**.
6. Confirm with **OK**.
   The necessary applications will automatically open.

To retain the enclosure view for the **First Floor** and the **Second Floor** sub-distribution boards, proceed accordingly without step 5.

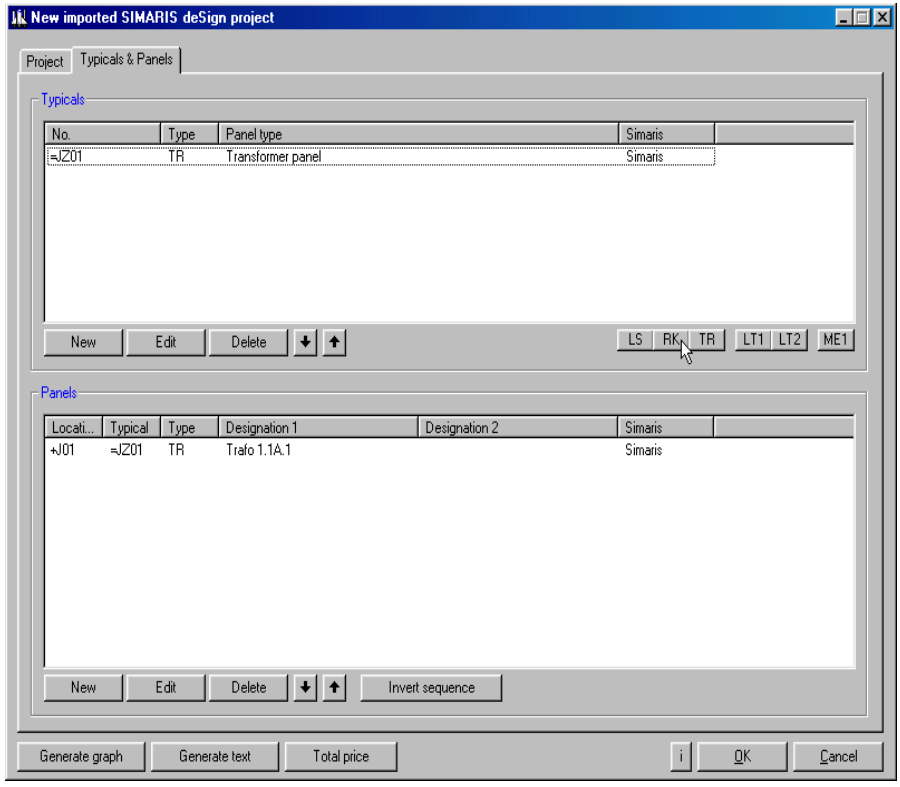


TIP
The **Material price calculation** option can only be used if you have previously loaded the material prices in the program. This function can only be used with a licensed single-terminal or multiuser version.

A.8.7 Medium voltage

The medium voltage enclosure can only be defined after the medium voltage calculations for a network have been completely and successfully carried out.
The PROFIX 8DH10 tool is integrated in SIMARIS deSign:
PROFIX enables you to create a block diagram, a front view of the enclosure and layout drawings.
You can estimate the space needed for the medium voltage system.
You can configure the necessary field types for the 8DH10 medium-voltage system.
The values calculated by SIMARIS deSign are highlighted in grey in the master data and can only be modified in the SIMARIS deSign-interface.

1. Select the **Medium voltage** node in the **Enclosure Definition** structure tree.
2. Open the context menu with the right mouse button.
3. Click on **Start Profix**.



The window is divided into two sections:

- List of typicals:
  In Profix for SIMARIS deSign, the configured secondary infeed is automatically stored as a typical.

  Abbreviations:

LS	Circuit-breaker panel
RK	Ring cable panel
TR	Transformer panel
LTx	Bus tie, versions 1 & 2
ME1	Metering panel

- List of panels
  Profix has created transformer feeder panels based on the imported typical corresponding to the number of transformers defined in SIMARIS deSign.

Further information on configuration can be found in the separate Profix 8DH10 user's manual on the installation CD under **PROFIX**.

TIP

The following free software is included on the CD:

- PROFIX SIMOSEC (air-insulated, applicable up to 24 kV, 25 kA and 1250 A)
- PROFIX NXPLUS C (gas-isolated, applicable up to 24 kV, 31.5 kA and 2500 A) for configuring switchgear on your own.

The setup files, installation and operating instructions are in the **PROFIX** path.
Manually accept the technical requirements from SIMARIS deSign. Configure independently according to your own needs.

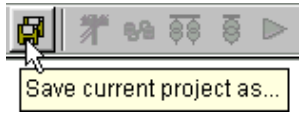
A.9 How do I exit the program?

A.9.1 Saving and exporting the project

You can use the respective icons in the toolbar to save the project.

- Click **Save current project** or

- click **Save current project as...**.



TIP
SIMARIS deSign has its own project management. You have already become aquainted with it in the Management module in chapter A.6.3.

Saving as described above only saves the project within this management database.

Use the **Export** function to save a project in a folder outside of the SIMARIS deSign folders if you, for example, wish to further edit it on another computer.

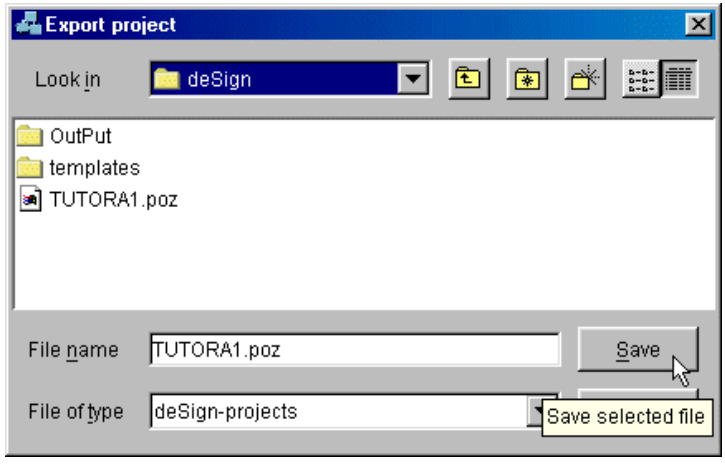
1 Click on the **Administration > Projects** menu item.

SIMARIS deSign will change over to the Management module.

2 Select **TUTORA1** in the list.

3 Select the **Export** button.

You can enter both the storage path and the name of the export file in the Export project dialog box. SIMARIS deSign project files have the extension **.poz** .

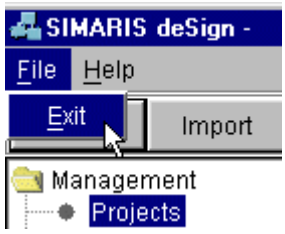


4 Confirm with **Save**.

A.9.2 Exiting SIMARIS deSign

Exiting SIMARIS deSign is similar to other Windows applications.

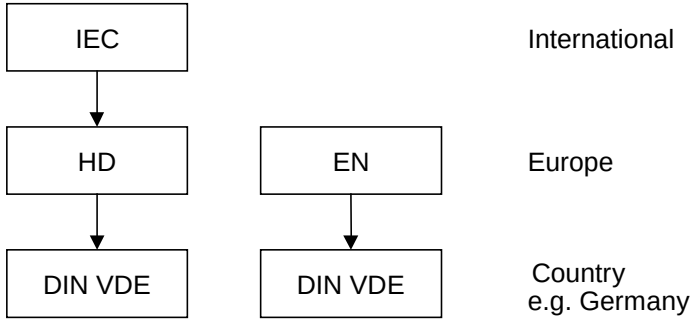
Select **File > Exit** in the menu.



A.10 Which abbreviations & standards are used in SIMARIS deSign?

A.10.1 Standards

SIMARIS deSign takes the following standards and regulations into account for dimensioning and calculation.



The diagram illustrates interrelations between the individual standard designations.

The following SIMARIS deSign relevant parts und excerpts are considered

- for dimensioning circuits.
- for dimensioning connections.
- for inserting devices into their respective enclosures.

The table lists the standards and regulations considered in SIMARIS deSign.

DIN VDE regulation			IEC publications and CENELEC harmonisation documents or EN regulations			
Titel	**Nr.**	**Teil**	**Title**	**IEC-Pub.**	**HD**	**EN**
Errichten von Starkstrom-anlagen mit Nennspannun-gen bis 1000 V	0100	100 - 600	Scope, object, fundamental principles	60364	384	
Kurzschlussströme der Ströme in Drehstromanlagen	0102		Short-circuit currents - calculations in three-phase a.c. systems	60909		
Kurzschlussströme - Berechnung der Wirkung	0103		Short-circuit cur-rents - Calculation of effects			
Niederspannungs-Schaltgeräte - Leistungs-schalter			Specification for low-voltage switchgear and control gear - Circuit-breakers	60947-2		60947-2
Begriffe und Berechnungs-verfahren		1	Definitions and cal-culation methods	60865		60865
Niederspannungs-Schalt-gerätekombinationen	0660	500 - 506	Low-voltage switch-gear and control gear assemblies	60439		
		507		60890 +C	520 S2	
Verwendung von Kabeln und isolierten Leitungen für Starkstromanlagen	0298	4			60384	

SIMARIS deSign takes the permissible standards for the selected destination country into account.

A.10.2 Terms & abbreviations

SIMARIS deSign uses the following abbreviations, in particular for default settings and calculation results.

Currents

I_2	Large test current	[A]
I_{bel}	Load current	[A]
I_{bem}	Rated setpoint current of the switching device	[A]
I_{bw}	Active load current	[A]
I_{bb}	Reactive load current	[A]
I_{bs}	Apparent load current	[A]
I_{cm}	Rated short-circuit making capacity	[A]
I_{cn}	Ryated ultimate short-circuit breaking capacity	[A]
I_{cu}	Rated ultimate short-circuit breaking capacity	[A]
I_{cs}	Rated service short-circuit breaking capacity	[A]
I_{cw}	Rated short-time withstand current (r.m.s. value)	[A]
$I_{\Delta n}$	Rated fault current	[mA]
I_{gw}	Total active current	[A]
I_{gb}	Total reactive current	[A]
I_{gs}	Total apparent current	[A]
I_k	Continuous short-circuit current	[A]
I_{k1max}	Maximum 1-pole short-circuit current	[A]
I_{k1min}	Minimum 1-pole short-circuit current	[A]
I_{k2min}	Minimum 2-pole short-circuit current	[A]

I_{k3max}	Maximum 3-pole short-circuit current	[A]
I_{k3min}	Minimum 3-pole short-circuit current	[A]
I_{pk}	Rated peak withstand current	[A]
I_{th}	Thermal fault-withstand capability (cf. I_{cw})	[A]
I_n	Rated device current for the operating current	[A]
I_{nmax}	Rated device current at a standard temperature of 40 °C	[A]
I_{nzul}	Permissible circuit-breaker load	[A]
I_{sel}	Calculated selectivity-limiting current	[A]
I_{zul}	Permissible cable load current	[A]
I_r	Set value of the overload (L)-release	[A]
Rel I_r	Relative current value of the L-release	[A]
Abs I_r	Absolute current value of the L-release	[A]
I_d	Set value of the short-time delayed short-circuit (S)-release	[A]
Rel I_d	Relative current value of the S-release	[A]
Abs I_d	Absolute current value of the S-release	[A]
I_i	Set value of the instantaneous short-circuit (I)-release	[A]
Rel I_i	Relative current value of the I-release	[A]
Abs I_i	Absolute current value of the I-release	[A]
I_g	Set value of the release for the earth-fault detection	[A]
Rel I_g	Relative current value of the G-release	
Abs I_g	Absolute current value of the G-release	[A]

Voltages

U_n	Rated voltage	[V]
U_{Nenn}	Rated device voltage	[V]
U_{Netz}	Rated network voltage	[V]
U_{kr}	Rated short-circuit transformer voltage	[%]
ΔU	Cumulated voltage drop of the network diagram node	[%]
ΔU_k	Total voltage drop up to the indicated node displayed in the Quick Info	[V]
ΔU_{rel}	Relative voltage drop of the current path/circuit in the Quick Info	[%]

Resistances

R_1	Resistance of positive phase-sequence system	[Ω]
X_1	Reactance of positive phase-sequence system	[Ω]
Z_1	Impedance of positive phase-sequence system	[Ω]
R_0	Resistance of zero phase-sequence system	[Ω]
X_0	Reactance of zero phase-sequence system	[Ω]
Z_0	Impedance of zero phase-sequence system	[Ω]
r1	Specific active resistance of the positive phase-sequence system	[mΩ/m]
x1	Specific reactance of the positive phase-sequence system	[mΩ/m]
r0ph-n	Specific active resistance of the zero phase-sequence system for the phase/neutral conductor loop	[mΩ/m]
x0ph-n	Specific reactance of the zero phase-sequence system for the phase/protective conductor loop	[mΩ/m]
r0ph-pe	Specific active resisance of the zero phase-sequence system for the phase/protective conductor loop	[mΩ/m]
x0ph-pe	Specific reactance of the zero phase-sequence for the phase/protective conductor loop	[mΩ/m]
R0ΔU	Resistance of the zero phase-sequence system at the cable at the selected calculation temperature for the voltage drop, Standard: 55 °C	[mΩ]

X0ΔU	Reactance of the zero phase-sequence system at the cable for the voltage drop, independent of the temperature	[mΩ]
X1ΔU	Reactance of the positive phase-sequence system at the cable for the voltage drop, independent of the temperature	[mΩ]
R1ΔU	Resistance of the positive phase-sequence system at the cable for the selected calculation temperature for the voltage drop, Standard: 55 °C	[mΩ]
Re	Sum of the resistance of the earth connections and the possibly wired protective conductor between exposed conductive parts and earth in the TT network.	[mΩ]
Ra	Sum of the resistance of the earth connections and the possibly wired protective conductor between exposed conductive parts and earth in the IT network.	[mΩ]

Energy and power

P	Active power	[W]
Q	Reactive power	[var]
Q_e	Active capacitor VAr	[var]
S	Apparent power	[VA]
p_v	Related (active) power loss	[%]
I^2t	Cut-off I^2t value	
S^2K^2	Thermal fault-withstand capability of the cable	

Factors

a_i	Capacity factor
b	Type of load (ind. = -1/cap. = +1)
c	Voltage factor
f_{tot}	Reduction factor
g_f	Simultaneity factor
φ	Phase angle of the current *180 / π
cos (φ)	Power factor

Other parameters

f_{nenn}	Rated device frequency	[Hz]
f_{Netz}	Rated network frequency	[Hz]
pz	Number of poles	
$t_{a, zul.}$	Permissible tripping time	[s]
t_r	Time value of the L-release (absolute)	[s]
t_d	Time value of the S-release (absolute)	[s]
t_i	Time value of the I-release (absolute)	[s]
t_g	Time value of the G release (absolute)	[s]

Tu	Ambient device temperature	[°C]
L	Phase conductor	
N	Neutral conductor	
PE	Protective conductor	

Indices

F1	The displayed short-circuit current is related to a fault in the busbar.
F2	The displayed short-circuit current is related to a fault on the primary side of the transformer.
F3	The displayed short-circuit current is related to a fault on the secondary side of the transformer.
max	Maximum
min	Minimum
NB	Downstream equipment
Nenn *or* n	Rated, nominal
Netz	Network ..., Operating ....
i	Running index variable
T	Transformer
v	Device
VB	Upstream switching device
zul *or* z	Permissible

Other abbreviations

Dev	Device
Fumo	Functional module
MBB	Main busbar
L1	Phase 1
L2	Phase 2
L3	Phase 3
MRPD	Machine-readable product designation
MV	Medium voltage
LV	Low voltage
LVMD	Low-voltage main distribution
LVSD	Low-voltage subdistribution
DMT	Definite-time overcurrent-time protection
MW	Modular width

SIMARIS deSign language:

Back-up protection

Interaction of two co-ordinated series-connected overcurrent protective devices in locations where the downstream device, e.g. an MCB, cannot switch the prospected short-circuit current independently in the event of a fault.
The upstream protective device will then take some load off the closest downstream protective device thus preventing excessive stress on this device.

Calculation

refers to a node in the structure tree.
Calculation in SIMARIS deSign includes:
- definition of the marginal conditions, also default settings of a network,
- building and processing a network while the program is simultaneously performing load flow and short-circuit calculations for the present state.
- dimensioning

Enclosure definition

includes all operations from the selection of a type of enclosure for the configured devices up to the subsequent specification of certain properties.
If you have correctly dimensioned the network in the **calculation** mode, you can now define the enclosures.

Dimensioning

You have to distinguish between the nodes for **calculation** and **enclosure definition**. In dependence of the marginal conditions such as network data and standard etc. which you have defined, the program automatically selects the following in the **calculation** mode:
- the required infeed power
- suitable cable cross-sections
- suitable switching devices and their overcurrent protection

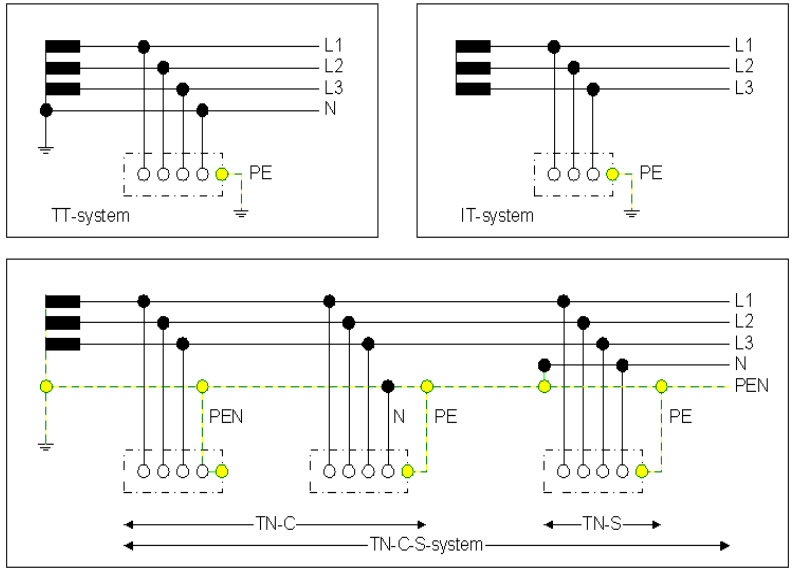
In dependence of the marginal conditions, such as destination country and standard etc. which you have defined, the program automatically selects
- suitable distribution board housings

in the **enclosure definition.**

Connection to earth	Conductive connection between the conductive part to be earthed and the earth potential. (also see **Network system**)
Node	Within the scope of program “node” designates a branch in the structure tree. Branches below the **calculation** node electrically correspond to a subnetwork. The smallest node is a load circuit. Branches below the **enclosure definition** node correspond to the distribution board components: main busbar, devices and panels. Branches below the **project data** node refer to project-administrative elements: user, customer and project.
n-1 principle	refers to the safety principle of infeed applied in SIMARIS deSign. A prerequisite for this option is that the number of parallel infeeds is > 1. This function ensures fault compensation for one infeed device by the remaining n-1 infeed devices.

Network system

Electrical networks can be distinguished according to their voltage, design and shape:
SIMARIS deSign is suitable for radial networks up to 1000 V.
This means with regard to SIMARIS deSign, the data box 'network system' only refers to the shape of the network. It is determined by the type of earth connection of the neutral point and the exposed conductive parts. The following illustration depicts the network variants permitted in SIMARIS deSign:



Selectivity

defines the interaction of series-connected overcurrent protective devices in order to limit effects of a fault in space and time.

Circuit

A circuit consists of the following elements:

- network system/connection to earth
- switching device, top
- Connection
- switching device, bottom
- power consuming device or distribution board (Network system/connection to earth)

Fixed circuit types in the SIMARIS deSign planning:

- LV main distribution
- LV subdistribution
- fixed load
- non-stationary load
- capacitor

Power consuming devices

Devices which transform electrical energy into a different type of energy.

Distribution board

Part of an electrical installation which distributes energy to the downstream power consuming devices or device groups.
A distribution board consists of
- busbar system
- switching devices

for outgoing cables and wires.

The components are mounted into the respective enclosures. One unit constitutes a panel.

A.11 Literature

SIMARIS deSign is a planning aid which provides a network calculation and device selection based on your network concept and its marginal conditions.

You will also find more detailed information on network planning in:

1. Planning of Power Distribution -
the manual for Totally Integrated Power
Siemens AG
Erlangen, 2001

2. Electrical Installation Technology,
by Günter Seip, Siemens AG
4th edition, Erlangen, Munich: Publics-MCD Publishing House, 2000
ISBN 3-89578-160-6

3. Switching, Protection and Distribution in Low-Voltage Networks
Siemens AG
4th substantially revised and expanded edition
Erlangen, Munich: Publics-MCD Publishing House, 1997
ISBN 3-89578-041-3

4. Power Engineering Guide (only available in English)
Siemens AG
Erlangen, 2000
www.ptd.siemens.de/de/pages/powereng.htm

- Enter **Power+Engineering+Guide** in the Look for: text box.

A.12 Further information

You will find further information on products of the SIMARIS range, such as

- SIMARIS deSign
- ALPHA P.I.S.A.A

at:

www.siemens.de/simaris

Our hotline is available at:
+49 (0)7000-SIMARIS
+49 (0)7000 7462747
E-mail: simaris@siemens.com

A.13 Template of the device list for the introductory example

Project number: **12345**
Project name: **TUTORYA1**

							Load					Connection						
	Designation	**Choose as Template**	**Assign Distribution**	**Simultaneity Factor**	**Network Configuration**	**fixed (Trip Time = 5 s); non-stationary (Trip Time ≤ 0,4 s)**	**No. of Poles (1, 3, 3 + n)**	**Active Power [kW]**	**Rated Voltage [V]**	**cos Phi**	**Capacity Factor**	**Length [m]**	**Configuration/Type of Cable**	**Insulating Material**	**Conductor Material**	**Installation Type**	**Reduction factor f_{tot}**	**permissible voltage drop of circuit [%]**
1	Lighting		1st floor		TN-S	fixed	3+n	20	400	0,8	1	20	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
2	Kitchen		1st floor		TN-S	non-stationary	3+n	7	400	0,8	1	20	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
3	Socket-Outlet	x	1st floor		T-NS	non-stationary	1	2,5	230	0,8	0,5	20	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
4	Lighting		2nd floor		TN-S	fixed	3+n	20	400	0,8	1	20	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
5	Kitchen		2nd floor		TN-S	non-stationary	3+n	7	400	0,8	1	20	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
6	Socket-Outlet		2nd floor		T-NS	non-stationary	1	2,5	230	0,8	0,5	20	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
7	Board 1st floor		Main distribution	1	TN-S							30	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
8	Board 2nd floor		Main distribution	1	TN-S							40	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
9	Elevator	x	Main distribution		TN-S	fixed	3	50	400	0,8	1	50	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
10	Air-condition		Main distribution		TN-S	fixed	3	50	400	0,8	1	50	multi-core cable	PVC70	Cu	free below ceiling	0,7	4
11	Main distribution		Network	1	TN-C							20	multi-core cable	PVC70	Cu	free below ceiling	0,7	4

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