

# SIGRADE

## Software for overcurrent protection coordination

### At a glance

SIGRADE is a professional software tool for overcurrent protection coordination. It was designed to visualize the switch-off characteristics of protection elements in electrical networks, like fuses and relays. In addition, time-current diagrams show the selectivity of the chosen grading paths.

Our SIGRADE software provides:

- Easy-to-handle and flexible tools
- Visual single line diagrams, grading paths and grading diagrams for project documentation
- User Support in the form of training and hotline

### The challenge

In case of short circuit current faults or overloads, network elements like cables, transformers or motors can be damaged. Protection elements should switch off faults as quickly as possible, and generally restrict them to local areas.

### Our solution

#### *CASE - the single-line editor*

SIGRADE contains a powerful, easy-to-use editor for building single-line diagrams of power systems.

The level concept in the drawing section offers the user a wide range of possibilities in graphic processing and in the preparation of documents:

- Combination of elements, e.g. voltage levels or stations
- Level for additional graphics / information or help texts
- Levels for input / resulting data

A double click on a drawing element opens the appropriate data input window for the respective element group.

For the parametrizing of protective relays, SIGRADE holds an extensive relay archive. This archive contains approximately 600 standard characteristics of circuit breakers with current transformers, low-voltage circuit breakers, bimetal relays and miniature circuit breakers (MCBs). In addition, all setting parameters required for relay coordination with the device specific designations, setting ranges and steps are listed.

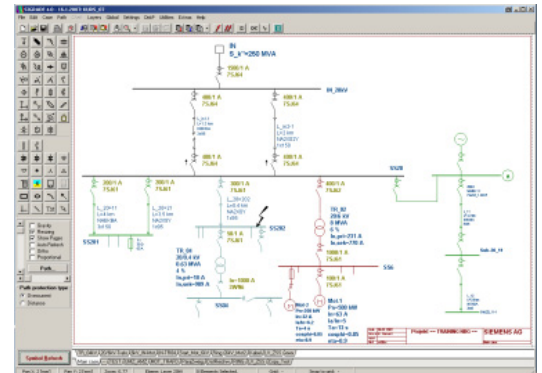


Figure 1: Single-line diagram

Besides the standard archives included in the scope of supply for protection devices and cables, the user can define and manage own user archives.

#### *Short circuit calculation*

At present, the following calculation methods as per VDE have been implemented to show fault current sharing:

- 3-, 2- and 1-phase short circuit with / without earth fault

### PATH - the grading path editor

By opening the grading path editor and then selecting elements in the circuit diagram, a chain of elements is created. This chain is then displayed in a grading path layout along with the characteristic values of the elements, setting ranges and the setting values of the relays.

### CHART - the diagram editor

The selectivity of overcurrent time relays is checked by means of a current time diagram on a double logarithmic scale. The selectivity of the grading path can be assessed on the basis of the tripping curve position and the time grading.

The diagram editor has a wide range of parametrizing facilities for diagram layout and representation.

### Application example

Figure 2 shows a selected grading path and the respective current time grading diagram, which shows the selectivity of the proposed protection settings.

Based on the single-line diagram SIGRADE can automatically generate an impedance scheme (see Figure 3). Distance protection zones will be shown in the scheme after the input of the range of protection data and the switch-off time.

The SIGRADE program system offers a wide range of possibilities for protective relay coordination. From a quick representation of the network scheme to a detailed single line diagram to final documentation in form of a grading path with the calculated settings for the relays and a current-time diagram which shows the selectivity. The protection range of the installed distance protection devices can be represented in an automatically generated impedance scheme.

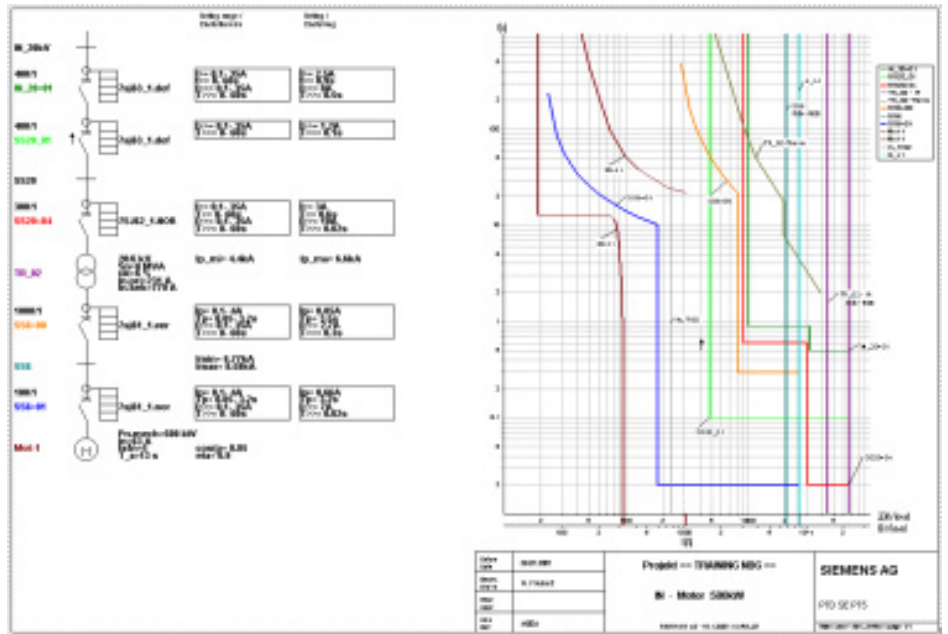


Figure 2: Grading path and diagram

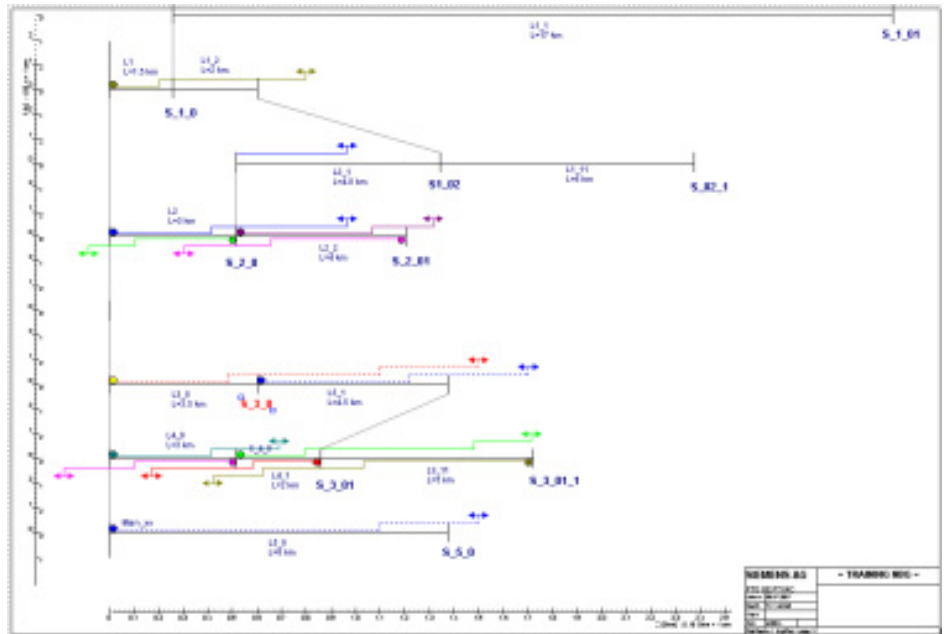


Figure 3: Impedance scheme