technische universität
dortmund

Fakultät für
Elektrotechnik und
Informationstechnik

Institut für Energiesysteme,
Energieeffizienz und
Energiewirtschaft

Masterthesis for N.N.

Software Tool for evaluation of the thermal status of low voltage grid equipment

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The low voltage grid is temporarily subjected to higher power demands due to the rising number of charging stations for electrical vehicles. Therefore, in perspective, many low voltage grid sections will reach their transmission capacity only during short time periods of the year.

Low voltage grid assets like transformers and cables are limited in their power transport capacity by temperature. Therefore, manufacturers of cable name a thermal current limit and manufactures of transformers name the nominal power. Both values are identified for permanent load. This indicates that, given by the thermal capacity of the components, a temporarily over load would not be harmful. A detailed analysis and a practical software implementation is necessary to make this aspects usable for control and monitoring systems.

This thesis shall work out a software tool (e.g. based on Panda Power and realized in Python) to evaluate the thermal status of low voltage grid equipment during the time. First the student should work out the basics about thermal cable and transformer models. Based on that information the models should be modified to use data sheet and installation information for parametrization. Under usage of this parametrizable model, a tool or algorithm should be realized (e.g. in Python) to evaluate the equipment status for each step of a time series of the transmitted power. The developed tool should be tested and demonstrated under usage of the simbench benchmark data set. The results have to be discussed and evaluated.

The following working structure is proposed:

- Literature review on thermal cable and transformer models for low voltage grids
- Identification of relevant parameters for evaluation of the status of standard equipment
- Parametrizable thermal equipment model
- Formulation and implementation of a tool/algorithm to evaluate the thermal equipment status considering time series of transmitted power
- Test the algorithm with time series examples from the simbench data sets
- Evaluation of the results
- Conclusion of criterions for in-field-use
- Documentation of the results

Following this thesis, the results of the work will be reported in a presentation.

Start of work: as soon as possible
Language: English, German

The thesis is suitable for students of electrical engineering or physics.

Supervision: Prof. Dr.-Ing. Christian Rehtanz (ie3),

Jonas Claus (M.Sc.) (ie3, ct.e Controltechnology Engineering GmbH)
claus@cte-ingenieure.de, jonas.claus@tu-dortmund.de, +49 152 - 5467 1525