

Distributed generator grid connection according to EEG

PSS®SINCAL

Connecting distributed generators in medium- and low-voltage networks

Due to the rapid increase of distributed generators in medium- and low-voltage networks in recent years, we are witnessing the ever increasing need to verify the conformity of such connections according to national standards by local regulatory bodies, such as the Renewable Energy Law of Germany (Erneuerbare-Energien-Gesetz (EEG)), to ensure continued safe and reliable network behavior.

In the German regulatory framework, the connection of decentralized generators is summarized in the BDEW Guidelines. PSS®SINCAL currently offers a module which provides the capability of automating the necessary calculations, and provides a conclusion regarding the network compliance in Germany. It also generates the necessary documentation for the regulatory approval process in a ready-to-use format.

With this module the user can significantly increase the efficiency in his

daily compliance check workflow, which is typically dominated by repetitive checks under steadily changing network conditions. At the same time, automation reduces the chances for human errors and standardizes the workflow and the documentation amongst groups of employees.

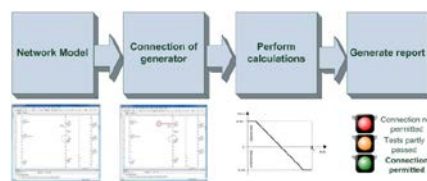


Figure 1: Workflow of a distributed generator network compliance check using PSS®SINCAL

Area of application

The module can be adapted to check for compliance according to specific local standards and generate documentation in a ready-to-use format for the connection process.

Presently, the implementation assesses compliance according to the German standard BDEW Guidelines. The

relevant generators of the following types are those that are to be connected or to be run in parallel, or those that are to be significantly modified:

- wind
- water power plant
- CHP (e.g. biomass, biogas or natural gas)
- photovoltaic

Which tests are performed?

- voltage changes – quick and slow voltage changes
- network equipment utilization – utilization at maximum generation as well as maximum load
- harmonic distortion, according to EN 50160
- long-term flicker
- dynamic grid support – distributed generation devices need to be able to participate in voltage control
- maximum admissible short-circuit current – effect of the short-circuit current contribution from having the distributed generator in the network
- active power supply/reactive power supply – the generator needs to be able to be operated at reduced power and be able to supply at every operating point a reactive power which leads to a $\cos\varphi$ at network connection point in a specified range
- in the case where many generators are to be connected, their combined effect will to be considered.

Wizard leads through the tests

To make the handling even easier, directly at the generator a wizard will guide the user through the automation. Here the necessary technical settings can be defined and –based on the PSS®SINCAL load-flow, short-circuit and harmonic calculations – all necessary calculations will be run automatically and systematically by the wizard and the results presented to the user.

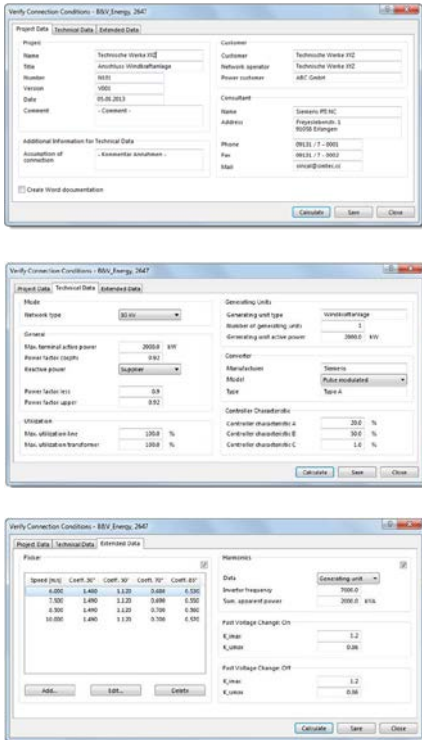


Figure 2: Wizard leads the user through the automation and collects necessary technical input

Results of tests at one glance

All major results are summarized in the results view of PSS®SINCAL and an overall compliance check result can be directly read. From here the user can go to the detailed documentation or go back to the wizard, where input data can be modified and the tests newly started.

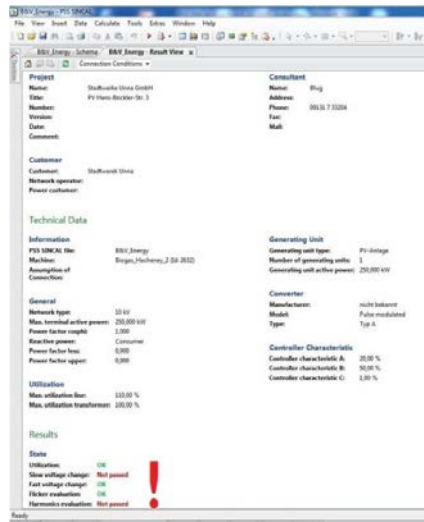


Figure 3: PSS®SINCAL results view with compliance check result

Documentation in ready to use form

For the connection process, documents usually need to be provided to the regulatory authorities. PSS®SINCAL provides the documentation in a ready-to-use Microsoft® Word® document, in which all necessary results of the tests are documented.



Figure 4: Documents to be handed in to regulatory authority

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