This module is used for the assessment of the network disturbances according to the D-A-CH-CZ technical rules, which has been released by the utility associations

- VDN – Verband der Netzbetreiber in Germany,
- VSE – Verband Schweizerischer Elektrizitätsunternehmen in Switzerland,
- VEÖ – Verband der Elektrizitätsunternehmen in Austria and
- CSRES – Ceske sdruzeni rozvodnych Energetickych Spolecnosti in Czeck Republik.

Due to the increased employment of power electronics and the thereby associated rise in nonlinear consumers at all network levels, disturbances on the networks occur at an increasing rate, which can make themselves noticeable by undesired changes in

- the level
- the waveform
-

of the mains voltage. As a consequence of this, other electrical devices and plants connected to the network can be disturbed through interference. One differentiates between:

- Functional failures
- Malfunctions
- Direct or indirect damage including possible consequential damage.

The possible disturbances are dependent on the amplitude, the frequency and the duration of the network disturbances, as well as the degree of spread of certain types of devices. In addition, the simultaneity factor of the electrical devices and plants, that in operation cause network disturbances, is to be taken into account.

The disturbances on the network itself can manifest themselves e.g. in the following manner:

- Deterioration of the power factor (increase in the transmission losses and reduction in the efficiency)
- Insufficient ground-fault compensation.

It is in the interest of all

- to ensure the adherence to a balance between additional emitted disturbances in the network and the protection of other electrical devices and plants connected to the network.
- to meet the significantly increased quality demands of modern devices and processes despite the rising pressure of costs.
- to maintain the existing high level of quality in the face of the changing generation structures and the additional requirements on the networks resulting therefrom.

For this reason, the network operators must have the possibility of keeping the network disturbances caused by the electrical devices and generating stations connected to their networks and their consequences within tolerable limits, even under changing framework conditions.

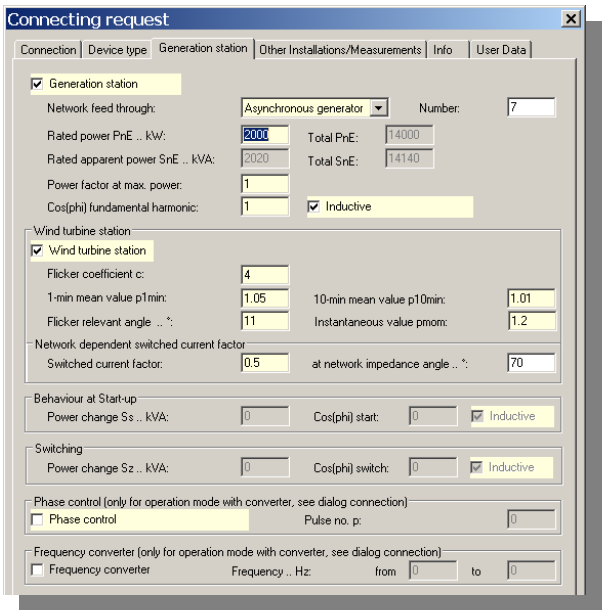
For the purpose of an appropriate distribution of the resulting responsibility, for this the following fields of action come into consideration:

- suitable design and operative measures in the networks, under consideration of the objective quality requirements and the economic justification.
- an adapted setting of limiting values for requirements on electrical devices and equipment in the relevant EMC-standards as well as their observance.
- if necessary, the imposed duty to undertake corrective measures to reduce network disturbances

This method of procedure is supported by several statutory regulations at European or individual member state level.

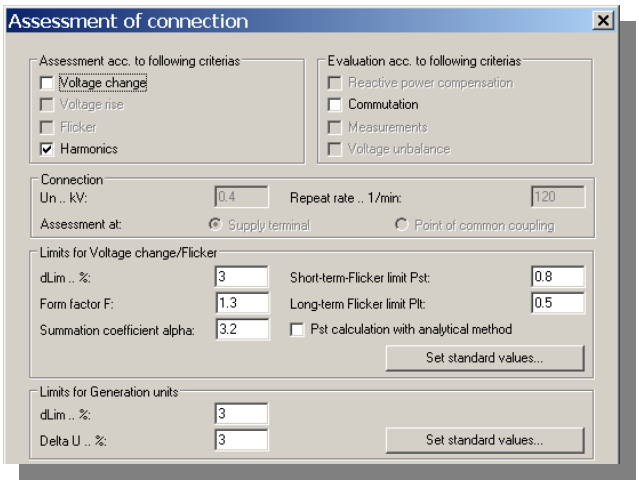
Input values

- Installation can be a motor, welding machine, converter drive motor, wind power plant, photo voltaic plant, biogas plant, small water plant, hybrid electric vehicles, etc.
- Network connection point
- Type of connection: 3-phase, 2-phase, 1-phase connection
- Apparent power of the installation (equipment or plant). Maximum power change.
- Power consumer or generator.
- Cos(phi) of the power or current change
- Repeat rate of power or current change per minutes
- Temporary return feed possible.
- Assignment to harmonic group



Assessment criteria

- Voltage change
- Voltage rise
- Flicker
- Harmonics
- Voltage unbalance
- Measurements
- Data for the reactive power compensation



Results

- Connection permissible or only with measurements
- Maximum voltage change or rise
- Short- and long-term flicker intensity Pst, Plt
- Total harmonic load
- Allowed harmonic current/voltage limits, comparison with measured I/U-harmonics
- Evaluation of voltage unbalance
- Maximum impedance for minimum absorption effect for compensation (ripple control systems)