

High-Efficiency Electronic Transformer for Powering of Individual Consumers from the Medium Voltage Grid

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Abstract—The proposed and argued concept for realization includes the possibility of realizing an average of the medium voltage transformer, for example, with 10 / 0.22 kV parameters. Equipment with these parameters is known as Solid State Transformer (SST), which provides direct connection of consumers to the medium voltage power supply. The output frequency of these transformers is equal to the industrial frequency of 50 Hz. The implementation of such equipment can lead to a change in the paradigm of supplying energy to individual consumers and a noticeable reduction in losses in distribution networks. We will mention another feature of this equipment - the two-way power exchange capacity. As a result, it is possible to simply connect the renewable energy sources to the centralized network, for example the so-called "micronetworks". The innovation of the proposed solution is to reduce the number of AC / AC transformation steps compared to known solutions as well as to simplify the equipment topology. This ensures a reduction in manufacturing costs and losses. Traditional transformers have specific mass indices per unit of nominal power about 20 times higher than SST transformers, and the cost of the installed unit power of the TMG transformers overtakes that of SST transformers by about 1.8-3.0 times.

Keywords— Solid State Transformer; medium voltage; low voltage; three phases; high frequency; industrial frequency

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