



## Active power filtering solutions in input/output sides of thyristor-based P2X power conversion systems

In case of power conversion systems for P2X systems (Electrolysers), Thyristor-based AC–DC converters (rectifiers) are one of the most economical ones wherein the current is high in terms of kA and the voltage is low (less than 1kV). However, these rectifiers generally suffer from problems of power quality in terms of harmonics injected, caused poor power factor, AC voltage distortion, and rippled DC outputs. There are several standards and guidelines as references for designers, manufacturers, and users to determine minimum power quality factors on the AC side from the grid point of view. On the other side, Electrolyser manufacturers specify the requirement of output DC voltage in detail. In total, there are clear requirements for AC and DC sides to be covered by rectifiers.

Several solutions have been proposed by industry and researchers to mitigate the problems of Thyristor-based rectifiers such as novel configurations, modified hardware design, passive filters, active power filters, and hybrid filters.

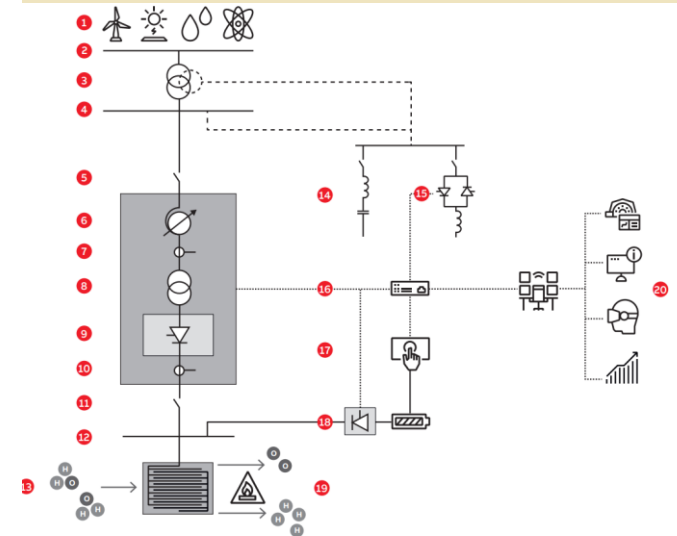
Many of these filters have been developed for low-power applications and in some cases, the ratings of these filters are close to the main rectifier rating which is not applicable for high-power cases.

This work aims to first review the practical solutions for high current thyristor-based rectifiers and classify them based on power flow, number of pulses used, isolated and no isolated topologies, and various techniques used to improve AC profile and output dc current waveform. In the second stage, the best passive and active solutions are selected, and a systematic design method is developed. In the final stage, the proposed solutions will be proved for a real-case project by evaluating designing stages in a spreadsheet editor like Excel and conducting simulations in MATLAB Simulink.

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