ECOsine™ Active
Increased reliability in building technology

energy efficiency and reliability

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The show will go on – thanks to ECOsine™ Active

For a unique, internationally-esteemed concert hall like the Lucerne KKL (Culture and Conference Centre), it is essential to have electrical and electronic systems that function with absolute reliability at all times.

**Above-average failure rates and signs of wear**

In the Lucerne KKL, a large number of single-phase and three-phase non-linear loads are used. These include lighting equipment, for example dimmers for spotlights, stage machinery with numerous motor drives, sound equipment, HVAC systems and the entire IT infrastructure with the switched power supplies that are typically used.

These loads draw mostly non-sinusoidal current from the mains – current with a large harmonic component. The side-effects typically associated with this have led to above-average failure rates and signs of wear in the lighting, electronic ballasts and power units, as well as a high thermal load on the infrastructure, especially the neutral conductors. Because mains harmonics lie in the audible frequency range, there was also repeatedly interference in the audio range.

**Requirement for a sustainable remedy**

An independent measurement institute was commissioned by the responsible party to perform a comprehensive analysis of the mains quality according to the D-A-CH-CZ (Technical rules for assessing mains feedback). The goal of this investigation was to identify causes and approaches to solving these problems. The following requirements were defined:

- Reducing the interference with the sound system
- Eliminating premature equipment failures
- Reducing the thermal load on the electrical installations, especially the neutral conductors

**ECOsine™ Active masters all of the challenges**

The measurement institute came to the conclusion that the best way to deal with the problems would be 12 decentrally installed active filters. They opted for FN3450 series ECOsine™ Active filters from Schaffner, modern active filters with four-wire technology and compensation currents of 60 and 120A. All of the available filter functions were required:

- Harmonics compensation
- Reactive-power compensation
- Load balancing

All of these tasks can be accomplished by one and the same device. The most modern and fastest filters currently on the market provide optimal results even with phase-controlled dimmers. What is more, the 60A active filters from Schaffner are impressive for their superior EMC and minimal audible noise generation, important features in building technology and especially in the sensitive environment of a concert hall.
Compensation of dimmers (phase angle control)

Current waveforms on mains and load side from the connection point of the active filter.

Compensation and balancing of the lighting system

Non-linear load current waveforms without filtering measures

Lighting system compensated and balanced by means of active filter

Improvement of the mains quality of an unbalanced mixed load

Voltage (above) and current waveforms without filtering measures

Voltage (above) and current waveforms with ECOsine™ Active
The approval measurements after installation of the active filters show that the problems of harmonic loading, reactive power consumption and unbalances in the mains have been corrected sustainably. Therefore measurably fewer equipment failures and malfunctions can be expected.

Thanks to the specific use of ECOsine™ Active, discerning concert audiences are guaranteed entertainment of the highest standard.