

# Improved reliability at a cinema by cancelling harmonic distortions produced by HVAC loads

## Challenge

Use of heat, ventilation and air conditioning (HVAC) systems have increased in the last decade to efficiently control temperature for example in hospitals, shopping malls and offices. Variable Speed Drives (VFDs) are increasingly being used to increase the efficiency of various HVAC system's components such as compressors, chillers, fans and pumps. However, VFDs are sources of harmonic distortions, especially high in 5th, 7th and 11th order harmonic currents.

VOX cinema experienced reliability and other issues commonly associated with harmonic distortions. Merus Power's authorized local partner in Egypt, Eta Electric was approached by the consultant of the project to analyse the prevailing power quality issues and solve them. A power quality audit performed by ETA Electric revealed high current harmonic distortions on the transformer feeding the Cinema with THDi% close to 18%.

## Solution

Based on the power quality audit, the required harmonic compensation capacity was calculated for the transformer feeding the VOX cinema. Along with VFDs, Cinema also had single-phase LED lighting loads which predominantly create zero sequence tripled harmonic (Odd multiples of 3rd harmonics). Thus, a 3-phase 4-wire active harmonic filtering Solution was chosen to cancel harmonics in 3-phases as well as in neutral.

Merus Power delivered the Merus™ Active Harmonic Filter module, whereas the integration of the module into the cabinet, and the installation in a closed-loop connection at the site was taken care of by ETA Electric according to Merus Power's guidelines. Commissioning of the solution was carried out by Merus Power as per the agreement.

## Result

The main individual harmonics at the Cinema were 3rd, 5th, 7th, 9th, 11th and 13th order harmonics. With Merus Power HMI, selective harmonic filtering configuration was chosen, and harmonic filtering solution was commissioned.

The total current harmonic distortions were dropped from around 18% to below 3%. Tripled harmonics which were overloading the neutral wire were now successfully mitigated, improving the safety of the cinema.



**Application:**  
HVAC lightings, Cinema,  
Shopping Mall

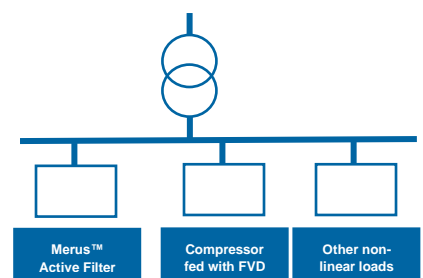
**Location:**  
Cairo/Egypt

**Power quality issues:**

- High harmonic current distortion

**Merus™ Solution:**

- Merus™ Active Harmonic Filter module



### Customer Benefits:

- Superior customer experience and satisfaction
- Improved reliability
- Significant decrease in THD%
- Long lifetime of equipment
- Compliance with harmonic distortion standards & recommendations