Understanding the Design
Topologies that underlie
Ashley-Edison’s larger
Three Phase AC Voltage
Stabilisers & Power Line
Conditioners
Introduction

This White Paper is presented to enable a comparison to be made between the three types of design topologies utilised by Ashley-Edison in the design of their larger Three Phase Voltage Stabilisers.

The paper assumes that the reader is familiar with the terminology of the components utilised in voltage stabiliser designs.

SESL Series Voltage Stabilisers – 200 to 1500 kVA

SE Series Voltage Stabilisers – 6 to 600 kVA

Servo Electronic Design Topology

The principle of this design is to use a motorised Variable Transformer to alter the voltage applied to the primary winding of a Buck/Boost transformer. The ratio of the primary to secondary windings of the Buck/Boost transformer means that an accurate control of the output voltage can be achieved, typically ±1%, or better.

While this is an efficient and well proven traditional method of control for smaller capacity Voltage Stabilisers as the capacity of the Stabiliser increases it is necessary, due to physical production limitations, to parallel / increase the number of Buck/Boost Variable Transformer assemblies used to provide the necessary control of the output voltage. This arrangement is also necessary to accommodate larger input voltage windows/permissible input voltage deviation swings.

The speed of correction of the output voltage is determined by the electromechanical arrangement of the motorised Variable Transformer.

Therefore SESL / SES Series Voltage Stabilisers are limited to the maximum capacity and input voltage swing they can control.
Furthermore to restrict the physical size of SESL Voltage Stabilisers and being aware that larger capacity units will often be used to stabilise the voltage of large switchboards there are no protection circuit breakers incorporated within the design.

SESL/SES Stabilisers are ideal for General Commercial and Industrial Applications.

**MVSI & IVSI Voltage Stabilisers – 200 to 3000 kVA**

Magnetic Induction Design Topology

These two ranges of Voltage Stabilisers control the output voltage by means of the magnetic coupling between a rotor and stator. By physically turning the rotor within the Stator winding the output voltage can be controlled. With IVSI models, by immersing the Rotor/Stator assemblies in oil for cooling purposes, the physical size of the Stabiliser can be minimised.

As there is only one device controlling the output voltage, as opposed to the two with the SESL design, the output accuracy is limited to ±1.5%. The speed of the control of the voltage output is determined by the arrangement of the gearing of the motor gearbox assembly and generally has a slower response to the change of the input voltage than SESL / SES Series Stabilisers.

As a result of the more expensive design topology utilised, MVSI & IVSI Stabilisers are less cost-efficient than SESL solutions, being primarily intended for more Rugged Applications and Demanding Industrial Power Environments, where a virtually maintenance free solution is required.
ESR Voltage Stabilisers – 200 to over 3000 kVA
Digital Hybrid Buck Boost SCR Design Topology

This range of Voltage Stabilisers is a static and fully digital electronic design that controls the output voltage by the use of a Buck/Boost transformer where the primary voltage is supplied by micro-processor, controlling statically selected taps on the voltage supply transformer. By using Thyristors/Triacs (dependent on the kVA rating) to select the appropriate voltage from the voltage supply transformer and applying it to the primary winding of the Buck/Boost transformer the output voltage of the Stabiliser is regulated.

The output accuracy of the Stabiliser voltage is dependent upon the number of different voltage taps available on the voltage supply transformer and is normally between 1% and 3% - dependent upon the input voltage swing. By using a micro-processor to control the regulation of the output voltage of the Stabiliser the correction of an input voltage variation is ultra-fast, being generally achieved within 20 – 40 milli-seconds.

Another feature of the ESR Series of Voltage Stabilisers is that due to the use of digital micro-processor and static components in providing regulation of the output voltage it is possible to integrate cost-efficiently additional features such as overload protection and bypass facilities within the same footprint as standard SESL or MVSI / IVSI solutions, whilst still being highly cost-efficient when compared to the other two design topology solutions offered by Ashley-Edison.

ESR Stabilisers are ideal for General Commercial and Industrial Applications where a virtually maintenance free and cost-efficient solution is required, which is highly compact and delivers unparalleled feature rich protection.