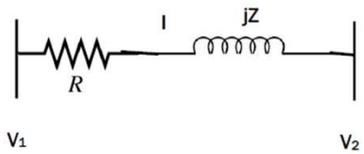
ELCO SYSTEMS LV SHUNT REACTOR BANKS (SPRL)

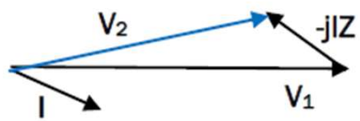
Applications in Renewable energy gas generator power plants up to 30Mw coupling. According to the Malaysian Renewable Energy Act 2011, interconnections of Proposed Distributed Power Plants of up to 2Mw are suggested to be connected to the grid at local PE, (Pencawang Elektrik) injected through a step up transformer at the level of 11kV. Such applications will often require the use of a Low Voltage Shunt Reactor Banks applied using multiple smaller steps of reactors in order to provide greater voltage control. ELCO Systems®, SRPL is a fully functional independent Shunt Reactor Bank capable of injecting reactive inductive powers into the network for the sole purpose of voltage control via an intelligent Voltage Measuring Device[VMD] from ELCO Partners, ESKAP ENA7000 and can be programmed with several parameter options to induce continuous control of inserted inductive reactive powers into the point of common coupling to achieve perfect voltage control in compliance to Suruhanjaya Tenaga's Distribution Grid Code where voltage is limited to a [+10% ~ - 6%] band.

Concept of Application

During power systems studies of the localized grid, when applying Distributed Generation(DG), penetration of up to 85% of Source trough load is allowed according to TNB, with reverse power relays effecting controls if at all limits are surpassed. Not withstanding System Adequacy studies, load flow studies to determine that voltage fluctuations are operating within the limits of the National Grid Code as sanctioned by Suruhanjaya Tenaga. In doing this, we assume that the local network comprise the following simplistic network where the DG is sitting on Bus 1 and tries to inject power into the network to Bus 2, via a series of local resistances and reactance, which are possibly made up of local loads of pumps, motors, cable losses, and transformer reactance. This is represented by the following single line.



Where V2 = V1 – IZ , V2 voltage at the receiving end.
when V1, V2, I are complex vectors with angular difference Ø1,and Ø2 respectively, when β = Ø1 - Ø2, and if I is maintained inductive with the use of ELCO Systems®, SRPL with lagging power factors giving a lower voltage at Bus 2, by way of activating multiple shunt reactive steps as shown in phasor diagram below.



TECHNICAL SPECIFICATION

Electrical Standards	IEC61439, IEC61641, IEC61921,IEC60007-6, IEC61558-2-20
Rated Voltage	<1000V
Rated Frequency	50Hz/60Hz
Rated Current	<6300A
Rated Inductive Powers	<3000kvar
Rated Short Circuit Current	<100kA
Insulation Voltage	2500Vac/1min
Lighting Impulse Voltage	8kV[indoor]/15kv[outdoor]
Panel Sheet Steel	EG/GI/SS
Ingress Protection	IP23/54[indoor/outdoor]
Form of Separation	2b or higher
Control Algorithm	VMDA, voltage triggered
Data capture & Analysis	SD[internal] or RJ45 via Cat5 cables[external]
Remote Power Quality, Fault & Transient Analyzer	Optional –SCADA*
Shunt Reactor Modules	<200kvar/step
SR Modules Rated Voltage	400v/415v/440v
Peak Saturation Current	169%
Insulation Class	Class F/H
Winding Temperature Rise, 40°C	Class F/<115°C
Winding Losses	<1.3%
Winding Material	Aluminium
Internal Connection	Y
*Options are available for full Power Quality Systems , Fault and Transient Analysis including Harmonics and Supraharmonics up to 128th Order or higher	SCADA Option*