ELEKTRA

Static Var Generator

IGBT Based Compensation

Power Factor 0.99 – 1 (PF)

Stepless Quick Compensation

DynamiX

www.elektra.com.tr

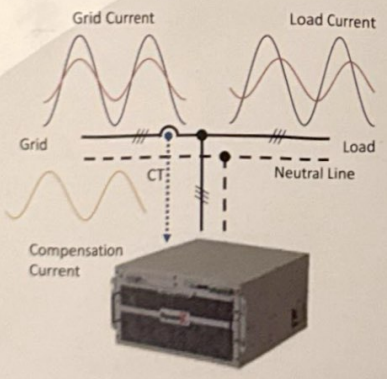
GENERAL DESCRIPTION AND PRINCIPLE OF OPERATION

ELEKTRA DynamiX Static VAr Generators provide a complete solution for industrial and commercial facilities with dynamic variations in reactive power, poor power factor and unbalanced loads. Their modular design and compact structure allows scaling up the reactive power rating easily and make them ideal for stepless power factor correction, load balancing and also harmonic filtering in industrial and commercial buildings. Some key features of ELEKTRA DynamiX Static VAr Generators are:

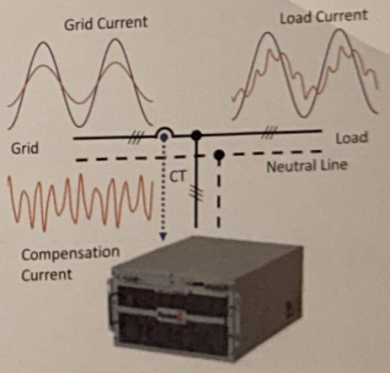
- Reactive power rating up to 500kVAr for each cabinet
- Instantaneous reactive power support
- Dynamic reaction time of 31 μs
- Compensate both inductive and capacitive loads and achieve power factors greater than 0.99
- Supports three-wire (3W) and four-wire (4W) installations
- Hotswap supported on rack-modules
- Load balancing
- Harmonic filtering up to 13th harmonic

ELEKTRA DynamiX Static VAr Generators are successfully applied to facilities with high voltage THD, dynamic load variations, load unbalances, and harmonically distorted loads. Application areas include (but not limited to):

- Any facility with sensitivity to grid conditions
- Plastic industry – injection, extrusion and molding
- Office buildings and shopping malls
- Industrial production machines
- Induction furnaces
- UPS systems
- Data centers
- Hospitals
- Textile Factories



Principle of operation for reactive power compensation



Principle of operation for load balancing and harmonic filtering

DYNAMIX SVG MODULES
TECHNICAL SPECIFICATIONS

Technical Specifications

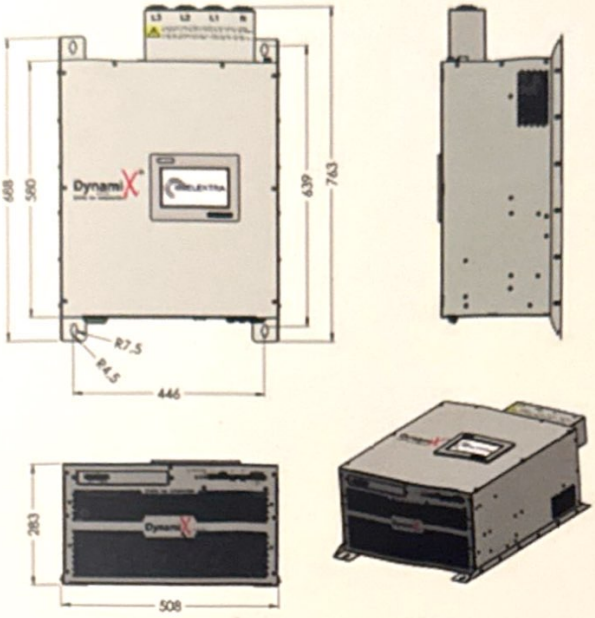
ELEKTRA DynamiX Static VAr Generators come in two options. One is Wall mount structure and other is rack type modular structure. In both cases the products provide identical performance. Wall mount units are available in 35, 50 and 100kVAr ratings. Rack type modules come in 50 and 100kVAr ratings. Rack type system can include upto 5 modules and a total of 500kVAr in one cabinet. User can install as many cabinets as needed to achieve desired reactive power rating. Technical specifications for Wall mount and floor mount DynamiX Static VAr Generator units are tabulated below.

Model	SVGA40350400P	SVGA40500400P	SVGA41000400P
Wiring	3P3W, 3P4W		
Reactive Power Rating	35kVAr	50kVAr	100kVAr
Current Rating	50A	75A	150A
Voltage	3P3W: 200V ~ 480V 3P4W: 200V ~ 415V		
Topology	Three-Level NPC		
Frequency	50/60Hz ± 3 Hz		
Switching Frequency	20 kHz	20 kHz	16 kHz
Reaction Time	25 µs	25 µs	31 µs
Harmonic Filtering	Up to 13th harmonic, each one individually selectable		
Power Factor Correction	0 ~ 100% Inductive and Capacitive		
Load Balancing	Up to 100% rating continuously		
Mechanical Dimensions (WxDxH)	Wall type	508 x 283 x 688 mm	
	Rack type	544 x 678 x 283 mm	
Current Transformer	Open-loop and closed-loop operation supported. Class 1 or better Primary: 100A ~ 2500A Secondary: 1A ~ 5A		
Typical Losses	< %3		
Ambient Temperature	-10 ~ +45 °C		
Noise Level	<64 dB		
IP Class	IP20		
Relative Humidty	% 95		
Standards	EN 50178, EN 55011, EN 61000-6-2, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11		
Certification	CE - ISO 9001 - ISO 14001 - ISO 45001		
HMI Screen	7"		
Communication	Modbus TCP IP, R5485, Remote Monitoring		
HMI Languages	Turkish, English, German, Polish, Russian, Spanish		

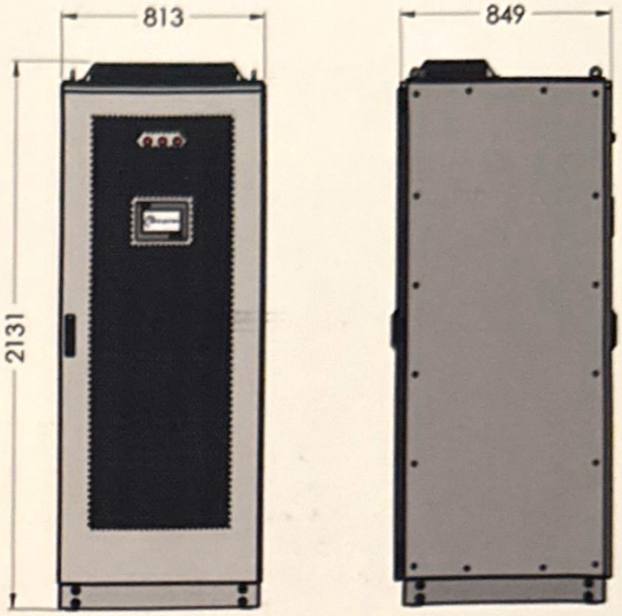
TRADITIONAL COMPENSATION & SVG (STATIC VAR GENERATOR)

	Capacitor Banks or Reactor Banks	Static Var Generators /Active PF Compensators
Response Time	Contactor-based solutions take at least 2s to 3s to mitigate the problem and thyristor-based solutions 10 ms	Real-time mitigation of power quality problems as the overall reponse time is less than 100µs
Output	Depends on step sizes, cannot match load demand in real time. Depends on grid voltage as capacitor units & reactors are used	Instantaneous, continuous, stepless and seamless. Grid voltage fluctuation has no influence on the output
Power Factor Correction	Capacitor banks needed for inductive loads and reactor banks for capacitive loads. Problems in systems with mixed loads. Not possible to guarantee unity power factor as they have steps, system will be having continuous over and undercompensation	Correct simultaneously from -1 to +1 power factor of lagging (inductive) and leading and leading (capacitive) loads Guaranteed unity power factor at all times without any over or undercompensation (stepless output)
Unbalance	Do not correct load unbalance	Can correct by selecting the amount of load balancing
Design & Sizing	Reactive power studies needed to size the proper solutions. Usually oversized to better adjust to changing load demands. Need to be designed taking into account system harmonics. Custom-built for specific load and network conditions	Does not require extensive studies as it is adjustable and modular. Mitigation capacity can be exactly what load demands. Unaffected by harmonic distortion in the system. Can adapt to load and network conditions and variations
Resonance	Parallel or series resonance can amplify currents in the system	No risk of harmonic resonance with the network
Transients	Caused by the switching of capacitor units or shunt reactors	No transients (no switching of passive components)
Overloading	Possible due to slow reponse and / or variation of loads	Not possible as current is limited to max. RMS current
Footprint & Installation	Medium to large footprint, especially if several harmonic orders exist. Installation is not simple, especially if loads are upgraded frequently	Small footprint and simple installation as modules are compact in size. Existing switchgear can be used
Expansion	Limited and depends on load conditions and network topology	Simple (and not dependent) by extra adding modules
Maintenance & Lifetime	Use components capacitor units that need extensive maintenance like fuses, circuit breakers, contactors, reactors and capacitor units. Switching, transients and resonances reduce lifetime	Simple maintenance and service life up to 15 years as there is no electro-mechanical switching and no risk of transients or resonance

TECHNICAL DRAWINGS



Technical drawing of wall types

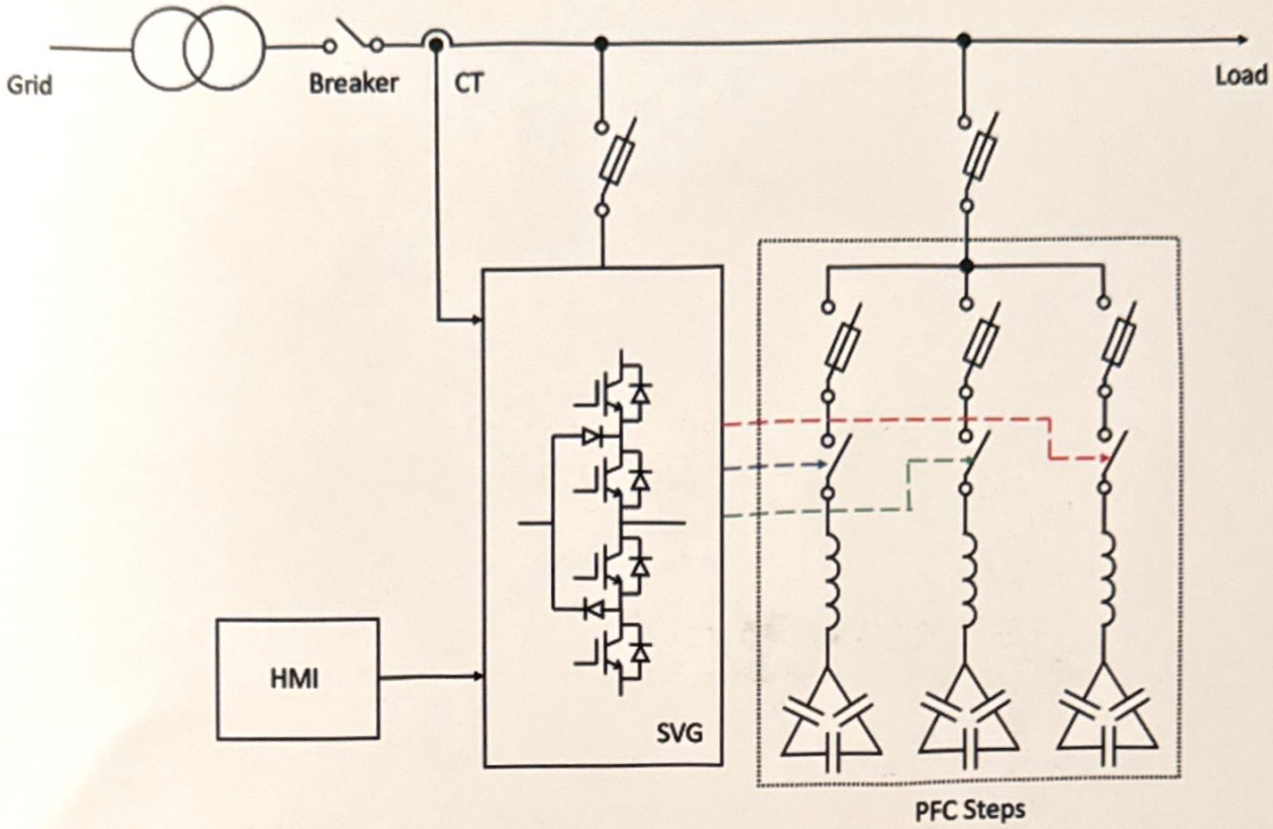


Technical drawing of panel type system

HMI INTERFACE AND HYBRID POWER FACTOR SOLUTIONS

Small steps are used to ensure accuracy in conventional power factor correction systems. In order to respond to inductive and capacitive loads, 1-phase or 3-phase steps of capacitors and shunt reactors are necessary. In hybrid power factor correction systems there is no need for steps (capacitor/shunt reactor) that are smaller than the total SVG power, since there is an infinite step advantage in IGBT-based power factor correction systems. SVGs can respond to inductive and capacitive correction needs at the same time. In addition, there is no need for a Power Factor Controller to control the capacitor steps.

HYBRID COMPENSATION
SINGLE LINE DIAGRAM



ELEKTRA

ELEKTRA ELEKTRONİK SAN. ve TİC. A.Ş.

Head Office & Factory

Akçaburgaz Mah. 3137 Sok. No:1
Esenyurt / İstanbul / TÜRKİYE

Tel : +90 212 886 20 80-81-82-83
Faks : +90 212 886 97 85
Email : satis@elektra.com.tr
Web : www.elektra.com.tr

Sales Offices

Bursa
Ankara
Denizli : satis@elektra.com.tr

China & Germany : export@elektra.com.tr