KEYMEN ENERJI

Stabilon

Smart Control Steady Energy

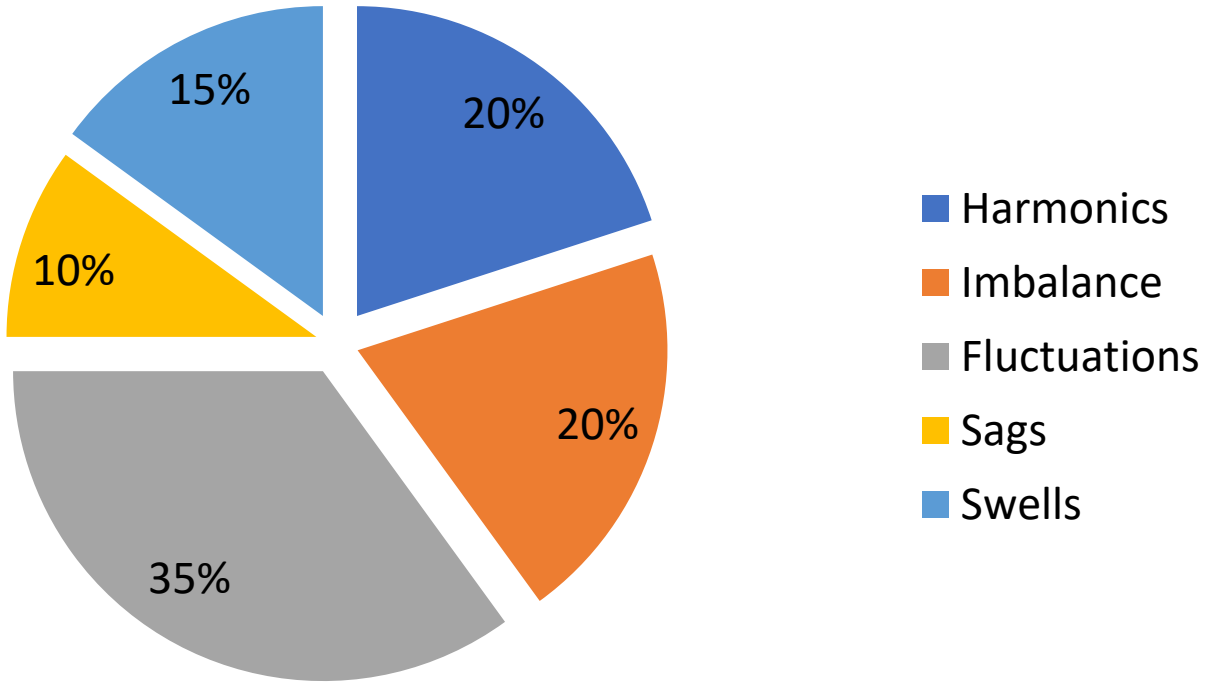
Static VAr Generator (SVG)

Contents

- Power Quality
- *Stabilon* Static VAr Generator (SVG)
- Advantages of SVGs
- Hybrid Power Factor Correction Systems

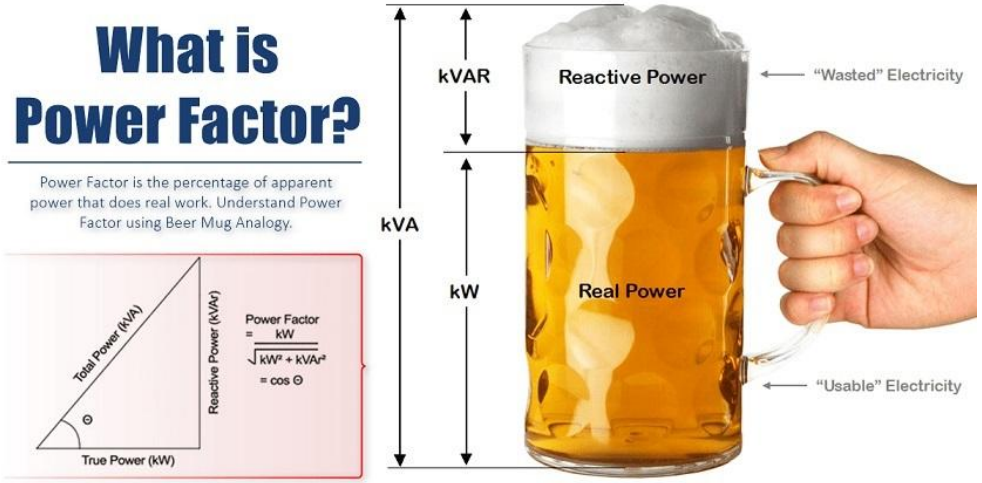
Factors Impacting Power Quality

- Reactive Power
- Harmonics
- Unbalanced Loads
- Neutral to Earth Voltage
- Transients
- Frequency Changes
- Resonance
- Flicker



What is Reactive Power?

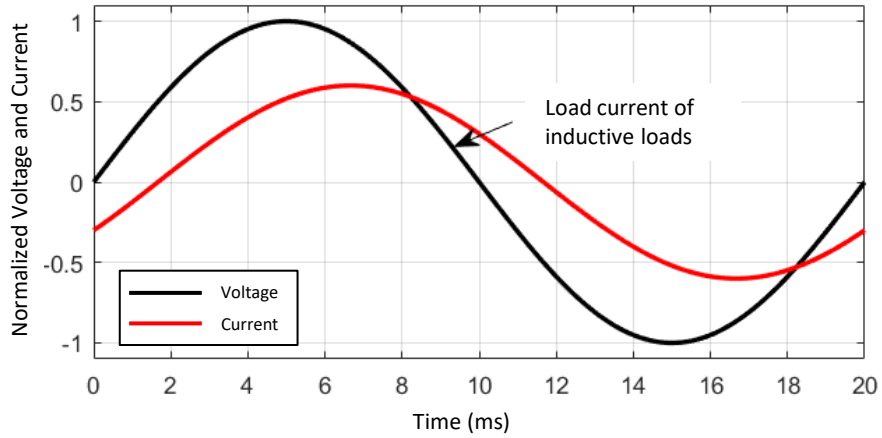
- **Active (real) Power:** “Usable” Electricity
- **Reactive Power:** Reactive power is a term for the imaginary (non-real) power from inductive loads like motors and reactors or capacitive loads.
- **Apparent Power:** The total power flowing is known as the “apparent power” and is measured as the product of the voltage and current.

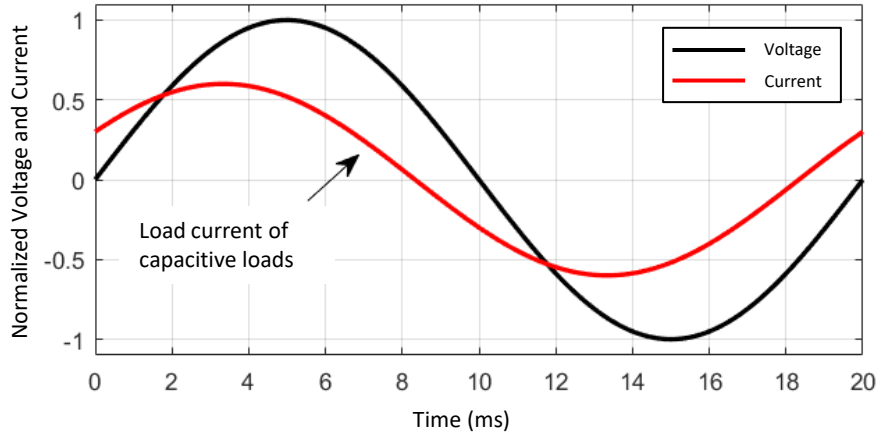


$$S^2 = P^2 + Q^2$$

Reactive Power

- Inductive loads draw reactive power from the grid.
- Drawing reactive power from the grid reduces bus voltage.
- Capacitive loads inject reactive power to the grid.
- Injected reactive power increases the bus voltage.
- In both cases, there is a phase difference between voltage and current.
- This phase difference means low power factor.



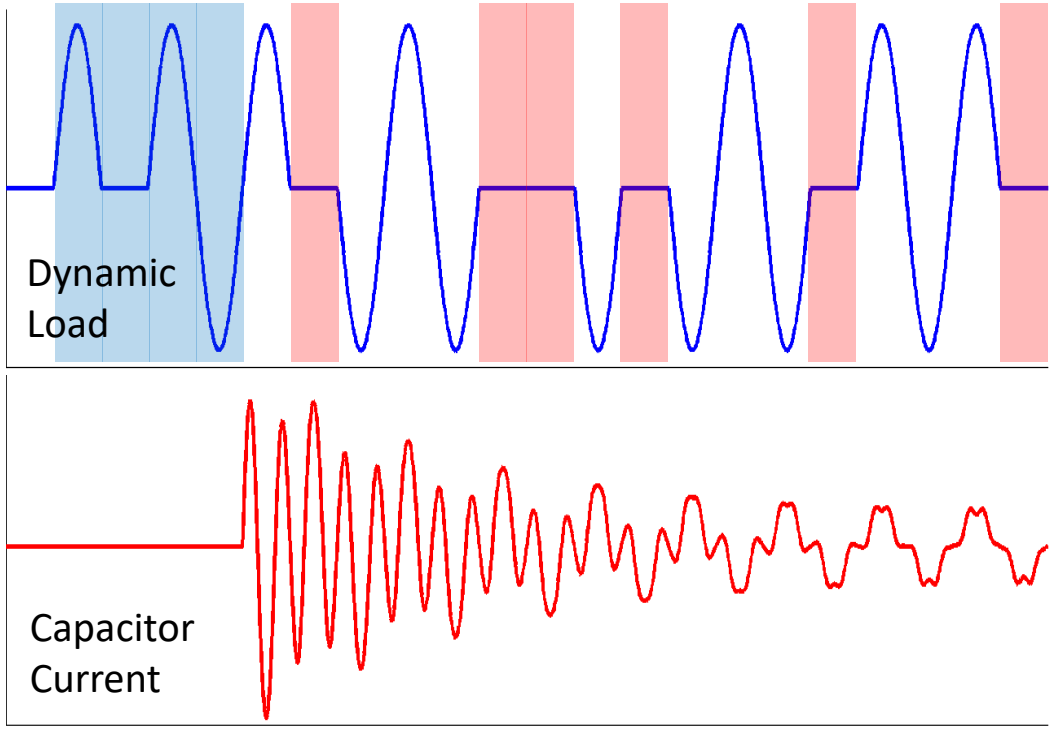


Power Factor Compensation

- Traditional mechanical contactors
- Thyristor based capacitor switching
- *Stabilon* SVG
- Hybrid PFC

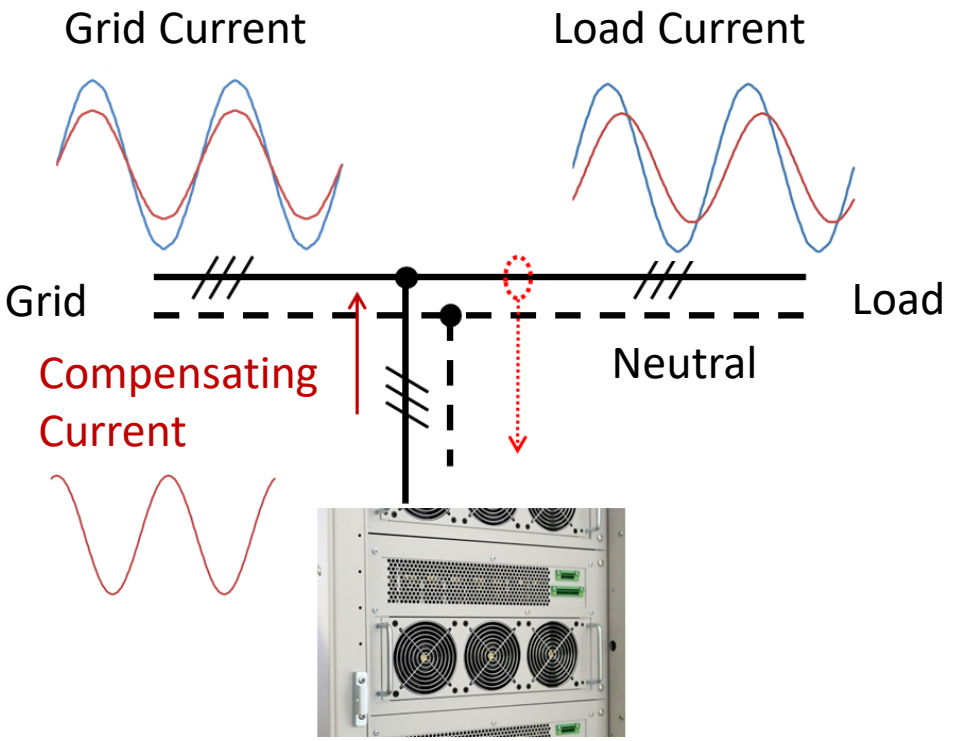
Traditional PFC

- Dynamic changes in low power factor loads makes power factor correction difficult.
- It may not be possible to keep the power factor high and constant with traditional PFC.
- Risk of penalties in facilities with dynamic load changes.
- By the time the capacitor is connected, the load may have changed or disappeared.



SVG-based PFC

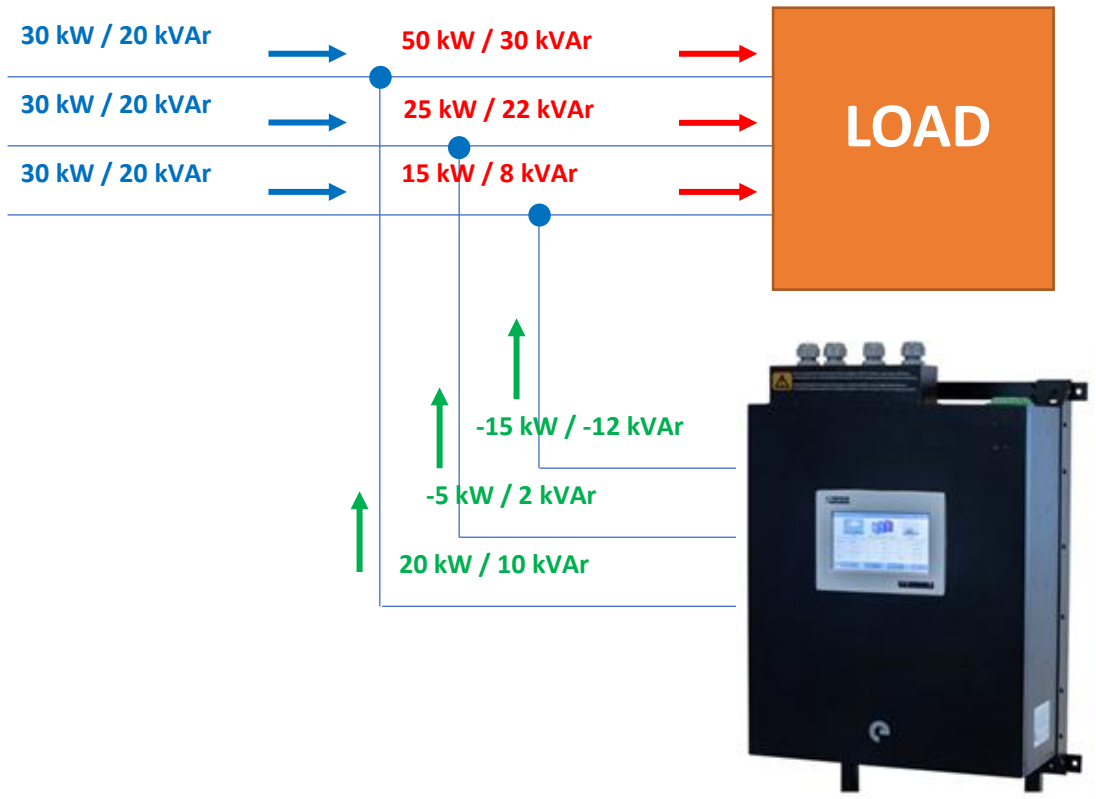
- Complete IGBT solution
- Provides inductive and capacitive reactive power between 0-100% of its rating
- Stepless PFC
- Each phase is compensated independently
- Dynamic response time is 25µs
- Fastest SVG response time in the market
- Load balancing
- Active filtering upto 13th harmonic
- Resonance protection is standard



Stabilon SVG

Load Balancing

- Unbalanced loads draw different real and reactive power from phases
- 4W systems also have neutral current
- Stabilon SVGs balance the real and reactive power flow from the grid
- Reactive power may also be canceled from the grid side



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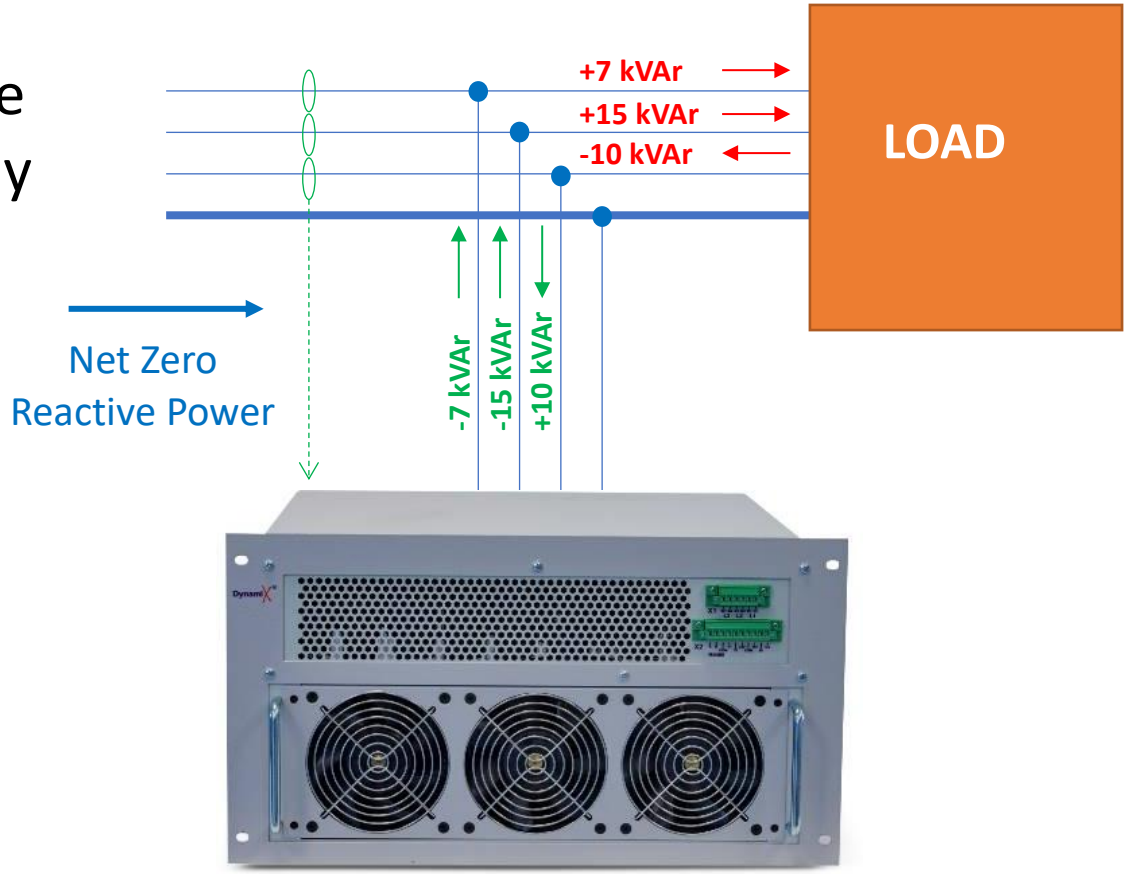
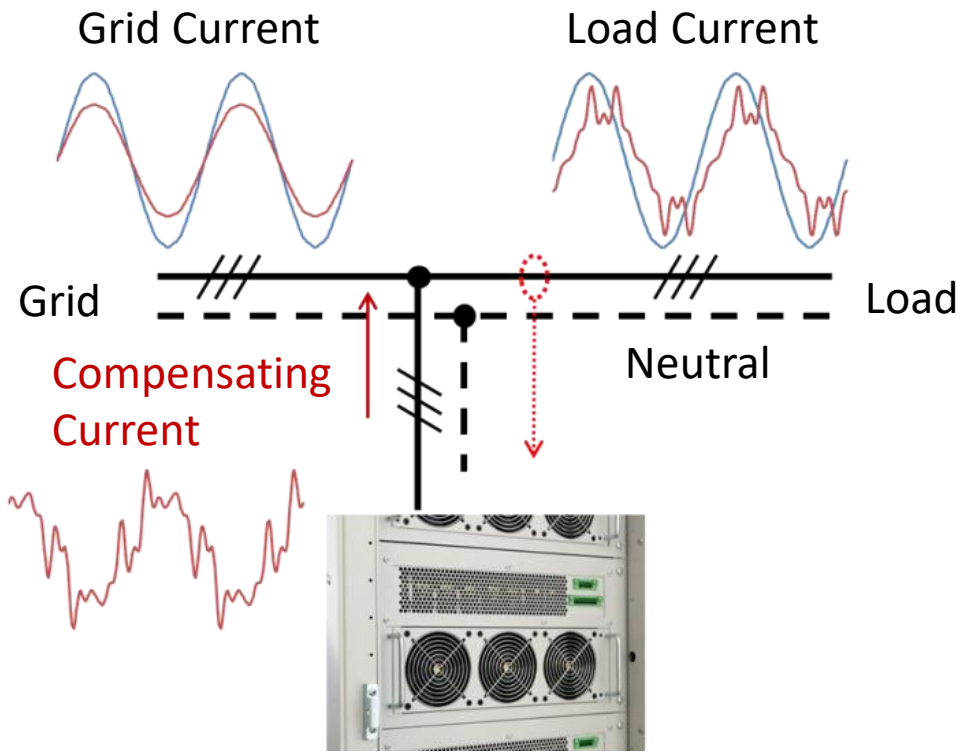
Power Factor Control

- Stabilon SVG operates inductive and capacitive within 0-100% of its rating and independently on each phase
- Phases are independently controlled
- System injects the exact amount of compensating current in each phase to achieve PF > 0.99
- Stepless PFC



Stabilon SVGs:

- Embedded control system calculates the load imbalance and harmonics within 25µs
- Load imbalance and harmonics are eliminated with a compensating current which is in exact phase opposition to the harmonics and negative sequence in grid current
- *Stabilon* SVGs are utilized with resonance detection and protection algorithms



Stabilon SVGs:

- Wall mount and rack mount solutions
- Module Ratings:

  208-480V 25kVAr

  208-480V 35kVAr

  208-480V 50kVAr

  208-480V 100kVAr

Stabilon SVG

Technical Specifications

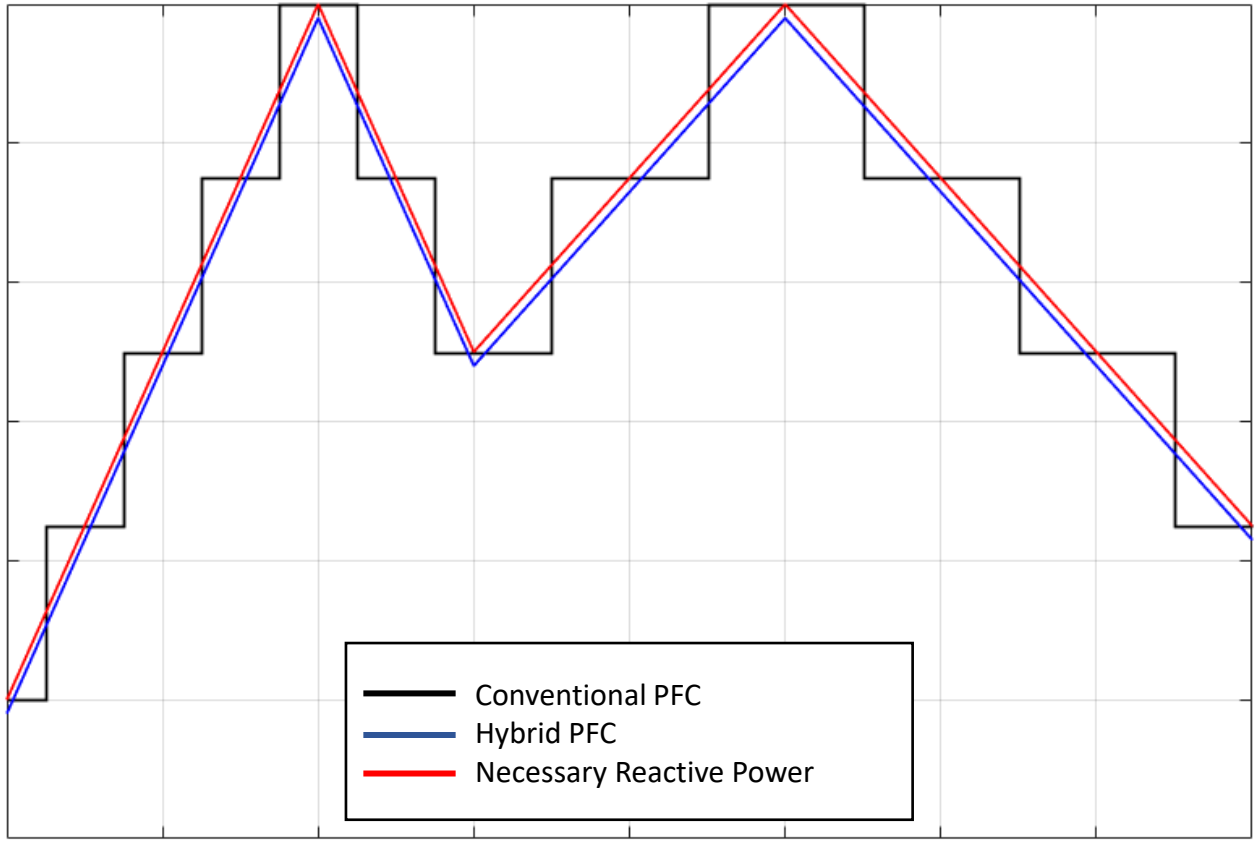
Model	SVGA41000400P	**Resonance Protection**	Available
Wiring	3P3W, 3P4W	**Dimensions**	447 x 606 x 500 mm
Power	100 kVAr	**Current Transformer**	Class 1 or better 100A – 2500A / 1A – 5A
PFC	0-100% Ind. / Cap.	**Losses**	3%
Voltage	3P3W: 200 – 480V 3P4W: 200 – 415V	**Max. Ambient Temperature**	-10 - +45°C
Topology	Three-level NPC IGBT	**IP Class**	IP20
Frequency	50/60Hz ± 3Hz (±10 Hz)	**Relative Humidity**	95%
Switching Frequency	20kHz	**Standards**	EN50178, EN55011, EN61000-6-4, EN61000-6-2
Dynamic Reaction Time	25µs	**Certification**	CE
Harmonic Filtering	Upto 13th harmonic	**Interface**	7’’ Touch Display

Hybrid PFC

- More Affordable alternative of complete SVG solution
- SVG rating is set according to the dynamic load changes
- Conventional PFC steps for static or less dynamic loads
- HMI Touch interface with language support
- Up to 24 capacitor steps are supported
- Does not require a separate power factor controller

Hybrid PFC

- Conventional PFC solutions cannot exactly match load reactive power
- Risks for over or under compensation
- SVG solution eliminates this risk and exactly matches load reactive power
- System power factor is kept above 0.99 at all conditions



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