

# Static Var Generators and Active Power Filtering

Dynamic Power Quality Technology  
for modern infrastructure

Smart Distribution



 [nhp.com.au](http://nhp.com.au) | [nhpnz.co.nz](http://nhpnz.co.nz)

 1300 647 647 | 0800 647 647

 [nhpsales@nhp.com.au](mailto:nhpsales@nhp.com.au) | [sales@nhp-nz.com](mailto:sales@nhp-nz.com)

# A changing electrical network brings new power quality issues.

Today the way we generate, use, and control our energy is changing. New and renewable generation and distribution technology is becoming common, and combined with more dynamic and complex load profiles, there are more challenges faced by the network and energy users to provide high power quality.

## A new way to improve your power quality.

A modern and changing transmission and distribution network requires new solutions to correct power quality issues. NHP brings to market a new range of dynamic power quality solutions designed to provide high power quality to your installation.



## Dynamic Power Quality Solutions

The energy market of today is radically different and continually changing. New generation and distribution technologies, such as solar and wind, are changing the infrastructure of the electrical network, and new loads and technology are changing the way power is drawn and used.

Today's load profiles are becoming more dynamic and fast changing, leading to more demanding power requirements and rapid reactive power needs. As well as this, the technology powering these loads are utilising solid state technology more often. These 'non-linear' loads draw current non-sinusoidally, creating harmonic disturbances on the network.

Modern problems, such as these, require modern solutions. Delta Electronics' range of Power Quality units use high quality inverter technology to provide market leading solutions to poor power quality problems.

## Power Quality

High **Power Quality** is the ability to deliver a clean and stable power supply. Essentially this is a pure, low harmonic, sinusoidal wave, with voltage and current in phase.

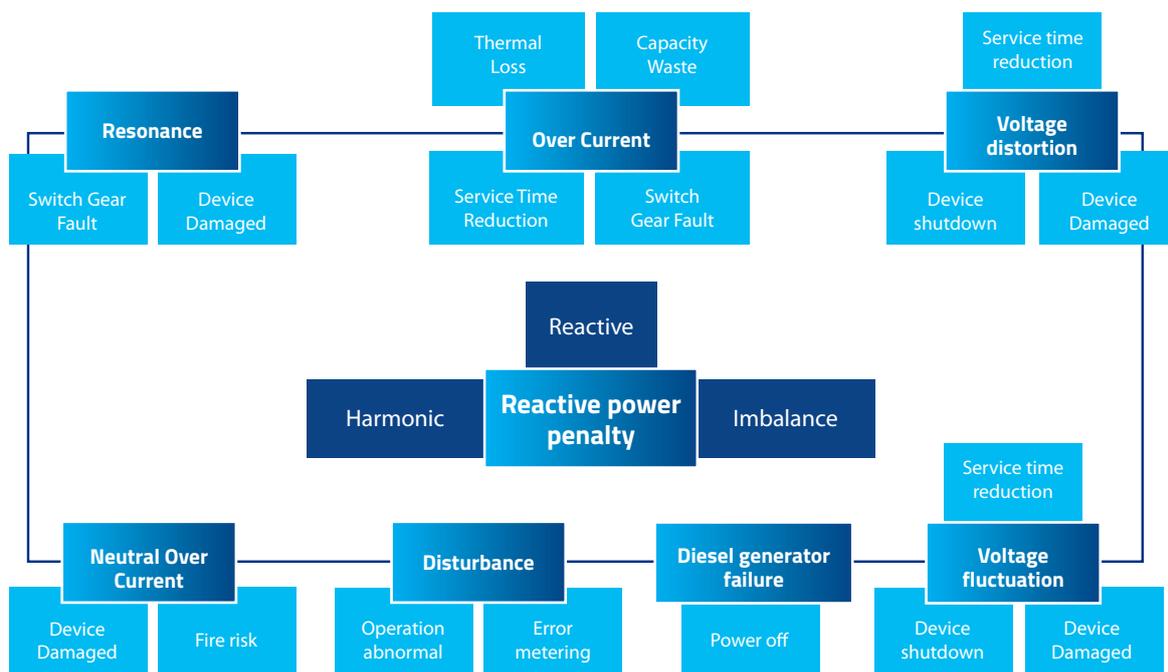
There are three common power quality issues faced across the electrical network today:

**Power Factor:** a poor power factor results in a phase angle difference between the current and voltage waveforms in an AC system.

**Harmonics:** multiples of the fundamental frequency impacting the supply, resulting in heavily distorted waveforms.

**Network Imbalance:** differing line voltages across phases, caused by unbalanced loads and single phase and phase-to-phase connections.

Poor power quality has many negative impacts on an installation, from nuisance tripping and losses through to shut down and equipment damage. These impacts often have a direct effect on the bottom line and your facility. Improving power quality can reduce your energy costs, increase efficiency, and improve service life of infrastructure.



Impact of Power Quality Issues on Electrical Infrastructure

## The Modern Power Quality Solution

Fast, dynamic correction to power quality problems, with a total response time of less than 20ms.



The systems are rugged and adaptable, with a wide input voltage range (308 – 480V) and excellent environmental capabilities (-10°C to 50°C).

Utilizing solid-state inverter technology, the units enhance power quality and contribute to the stability of the network by providing high impedance and advanced control features.

With a modular design, the units are highly adaptable and configurable.

Simple installation, less maintenance, and ease of service provide lower costs, a longer service life, and peace of mind to the end user.

Multifunctional capability, provide reactive power, mitigate harmonics and balance three phase networks.



# Superior Technology

*Better, reliable, adaptable, affordable and modern technology to improve power factor and mitigate harmonics.*

## Static Var Generator

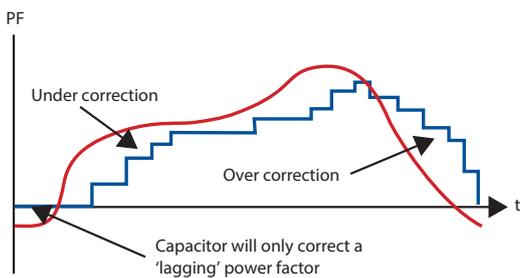
The Static Var Generator (SVG) is the newest technology on the market used to correct power factor issues.

Utilizing solid state inverter technology, the SVG delivers instantaneous power factor correction to the grid by injecting current within 20ms. With no risk of over- or under-correction, the SVG can correct the power factor of the system to > 0.99 under all load conditions. As well as this, the SVG can correct the power factor of both leading and lagging loads and can correct unbalanced networks.

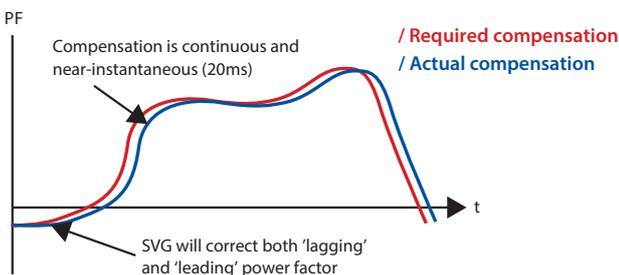
- Precise and step-less compensation
- Fast and dynamic compensation, with a response time less than 20ms
- Rugged and adaptable
- Highly stable and configurable

Modular, and highly adaptable, the Static Var Generator is the modern solution for power factor correction.

Traditional Technology (Capacitor bank)



New technology (SVG)



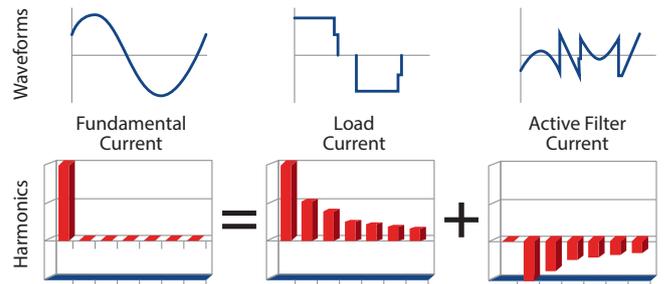
## Active Power Filter

Active harmonic filters are the premier solution available today for mitigating harmonic issues. The Active Power Filter (APF) provides market leading solutions for harmonic correction.

Able to mitigate harmonics up to the 50th order with a harmonic filtering rate up to 98%, the APF can also correct power factor and unbalanced three phase networks. High efficiency (>97%), low losses (<3%), and fast total response (20ms) the APF is adaptable and ensures network stability by providing infinite impedance to the grid.

The Active Power Filter is the premium solution available for correcting your power quality requirements.

- Multifunctional compensation for all power quality requirements
- Highly efficient and capable
- Fast, dynamic response under all load conditions



Active power filters combine load current with the active filter current to produce a fundamental current by dynamically adjusting to cancel out harmonics and reactive power, ensuring improved power quality.

# The Complete Power Quality Solution

The Power Quality range consists of modular units, and combine to provide large capacity in a small footprint.

- Wall mount options up to 100kVAr (SVG) and 100A (APF).
- Floor standing options up to 700kVAr (SVG) and 700A (APF) in a single cabinet.
- IP30 and IP54 options available.
- RAL2000 and RAL7035 colour options.



SVG / APF 100  
kVAr / A module



SVG / APF 50kVAr /  
A Wall mount



SVG / APF 100kVAr /  
A Wall mount



IP54  
Wall Mount



SVG/APF Floor  
standing cabinet

## Total Power Factor Correction Solutions

Thanks to the modular nature of the SVG and APF cabinets, hybrid configurations are available. Total Power Factor Correction (TPFC) systems are designed to correct power factor, mitigate harmonics and load balance across phases.

Whilst an active power filter can mitigate harmonics and correct power factor, it is generally not economically viable to use a harmonic filter to correct the power factor of a load. In many applications however, there is a requirement to correct both power factor and mitigate a level of harmonics which are present.

Combining Static Var Generator and Active Power Filter modules in a single cabinet provides a simple solution to this issue. The SVG will work to correct the bulk reactive power requirements of the system while the APF focuses purely on harmonics, with both module types able to balance the load. This harmonious solution is easy to implement, economically viable, and provides a complete, single tier solution to the main power quality issues faced on site.



## Services

NHP can provide comprehensive power quality audit services to determine your site's power quality issues. Our experienced application engineers can then work with you to determine the best solution for your installation.

Our service team can also provide onsite commissioning, working with you to configure a system to meet your unique system requirements.

Systems commissioned by NHP service team will receive an additional 12 months warranty on top of the standard 12 months provided by NHP.

NHP can provide preventative maintenance and emergency breakdown assistance, to ensure continuing operation and efficiency of your site.



# Power Quality Systems | Order Form

Ordering Branch / Agent:	Date:
Branch Sales Order No.	

## Customer details

Customer:
Deliver to:
Project:
Request delivery date:
Customer Order No.

## Required Compensation Type

- Harmonics (APF) \_\_\_\_\_
- Power Factor (SVG) \_\_\_\_\_
- Load Balancing
- Unsure/Power Quality Audit (PQA) requested

## IP Rating

- IP30
- IP54

## System Configuration

- Wall Mount
- Floor Standing

## Installation accessories\*

- Upstream breaker
- Current Transformers (CTs)

\* for a quote on the installation accessories additional site information may be required to present to your NHP representative.

## Number of Wires for Floor Standing

- Three Phase, 3-Wire
- Three Phase, 4-wire (required there is an imbalance in the network)

## Services

- Commissioning

## Colour

- Grey (RAL7035)
- Orange (RAL2000)

## Special Requests

- 690V required (APF only)

Please send this request form to NHP Electrical Engineering Products (Australia) Pty Ltd sales@nhp.com.au, by fax on 1300 NHP FAX or your local NHP representative.

# Technical Specifications

	Rated Voltage	SVG AC 415V		APF AC 415V		APF AC 690V
<b>Electrical Specification</b>	Input Voltage Range	AC 308V~480V				AC 432V~880V
	Electric Connection	3P3W / 3P4W <sup>1</sup>				3P3W
	Rated Frequency	50(60)Hz ±10%				
	Input Voltage THD Range	≤15%				
	Rated Capacity per Module	50kVAr	100kVAr	50A	100A	100A
	Rated Current per Cabinet	50-100kVAr (module combination)	100~700kVAr (module combination)	50-100A (module combination)	100~700A (module combination)	100~500A (module combination)
	Redundancy	Each module is an independent reactive compensation system		Each module is an independent filtering system		
	Harmonic Elimination Range	NA		2nd ~ 50th order (selectable)		2nd ~ 31st order (selectable)
	Harmonic Filtering Degree	NA		0 - 100% programmable per harmonic in Ampere value		
	Harmonic Filtering Performance	NA		Filter up to 98% harmonics at rated load, THDv<3%, THDi<5% after filtering		
	Reactive Power Compensation Capability	Both inductive and capacitive reactive power				
	Reactive Power Compensation Performance	Cosφ≥0.99 after compensation (if the SVG capacity is sufficient)		Cosφ≥0.99 after compensation (if the APF capacity is sufficient)		
	Imbalance Correction Capability	Mitigate negative and zero sequence				
	Full Response Time	<20ms				
	Instant Response Time	<100us				
	Thermal Loss	≤3% of SVG rated capacity		≤3% of APF rated capacity (kVA)		
	Output Current Limitation	Automatic (100% rated capacity)				
Parallel Expansion (System)	Up to 10 Cabinets in parallel (max. 7 modules per cabinet)				Up to 10 Cabinets in parallel (5 modules per cabinet)	
MTBF	>100,000 hours					
<b>Control Technology</b>	Switching Frequency	30kHz		60kHz	30kHz	20kHz
	Controller	DSP control				
	Communication	Modbus Protocol, RS232/485				
	Monitoring	Embedded Webpage				
<b>Physical Specifications</b>	IP Grade of Cabinet	IP30, IP54 available				
	Cooling method	Intelligent forced air cooling				
	Noise Level	< 60dB(A) @1m (Module)		< 65dB(A) @1m (Module)		< 70dB(A) @1m (Module)
<b>Environmental Requirement</b>	Ambient Temperature	-10~50°C				
	Relative Humidity	0~95% (Non-condensing)				
	Altitude	≤1000m rated capacity, 1000~2000m(derating 1% per 100m)				

**Note:**  
1) Maximum voltage for 3P4W connection is 456V. For a connection where the input voltage is 456V ~ 480V 3P3W is required.







**NHP**

[nhp.com.au](http://nhp.com.au)  
SALES 1300 647 647  
[nhpsales@nhp.com.au](mailto:nhpsales@nhp.com.au)

[nhpnz.co.nz](http://nhpnz.co.nz)  
SALES 0800 647 647  
[sales@nhp-nz.com](mailto:sales@nhp-nz.com)

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A.B.N. 84 004 304 812

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NHP 9BCH 11/24