


Static Var Generators and Active Power Filtering

Dynamic Power Quality Technology for modern infrastructure

POWER DISTRIBUTION AND PROTECTION





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, noise free, 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.



Poor Power Factor

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



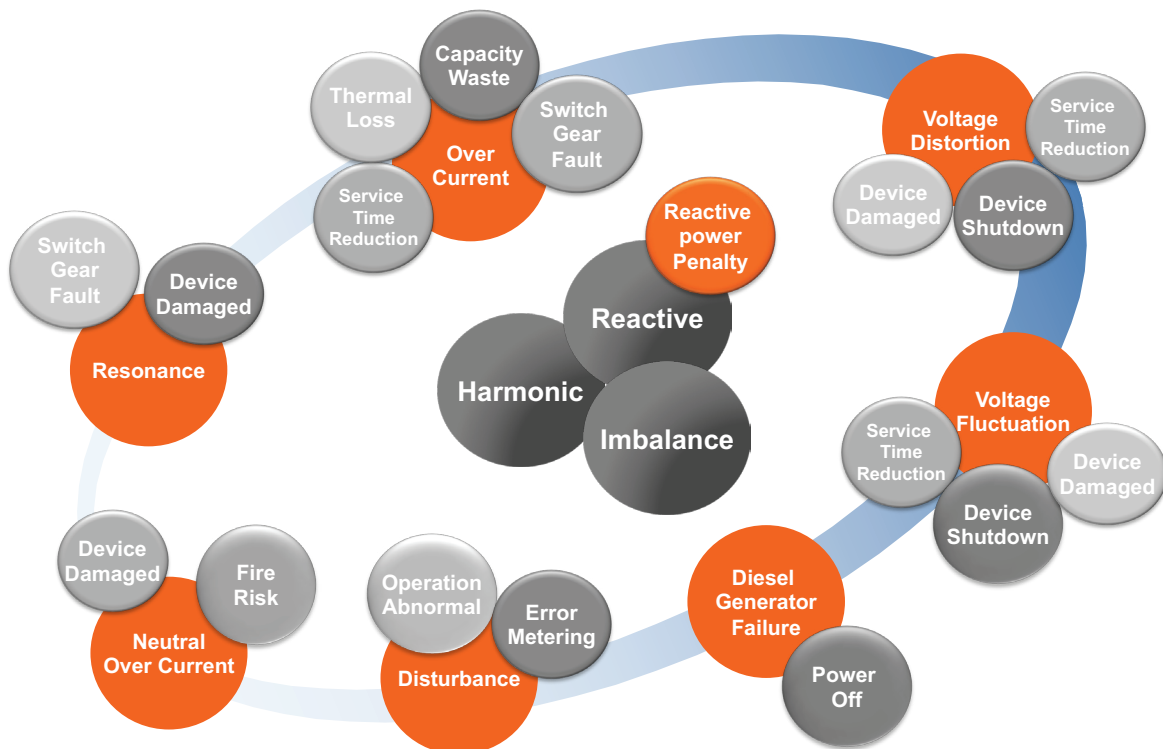
Harmonics

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



Network Imbalance

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.





The Modern Power Quality Solution

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



Available in IP30 or IP54, with hot-swappable module options available.

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 provide infinite impedance to the grid ensuring stability of the network.

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.

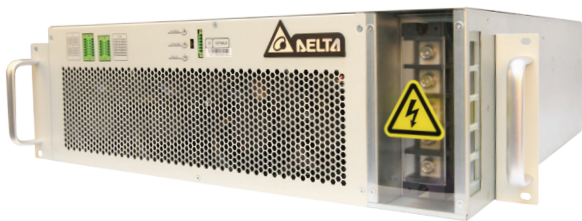
Static Var Generator

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

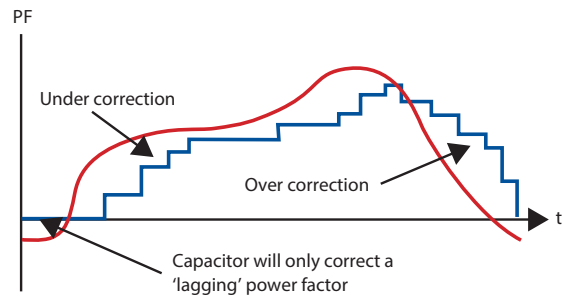
Utilizing solid state inverter technology, the SVG delivers instantaneous power factor correction to the grid by injecting current within 20ms. With no risk of over- or under-correction, the SVG can correct the power factor of the system to > 0.99 under all load conditions. As well as this, the SVG can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

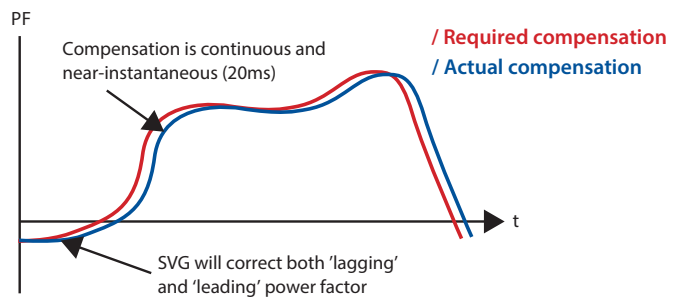
Robust, modular, and highly adaptable, the Static Var Generator is the modern solution for power factor correction.



Traditional Technology (Capacitor bank)



New technology (SVG)



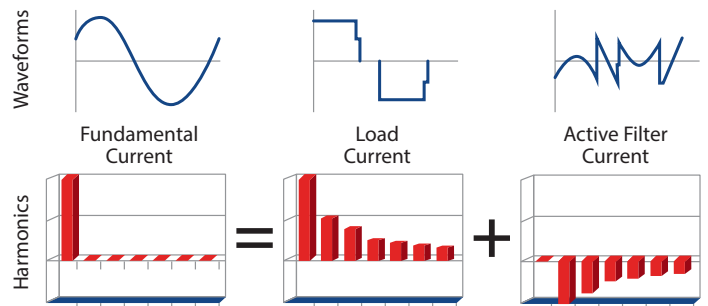
Active Power Filter

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
- Excellent environmental adaptability



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.
- Hot swappable modules available upon special request.



SVG 50kVAr
Module



APF 50A
Wall Mount



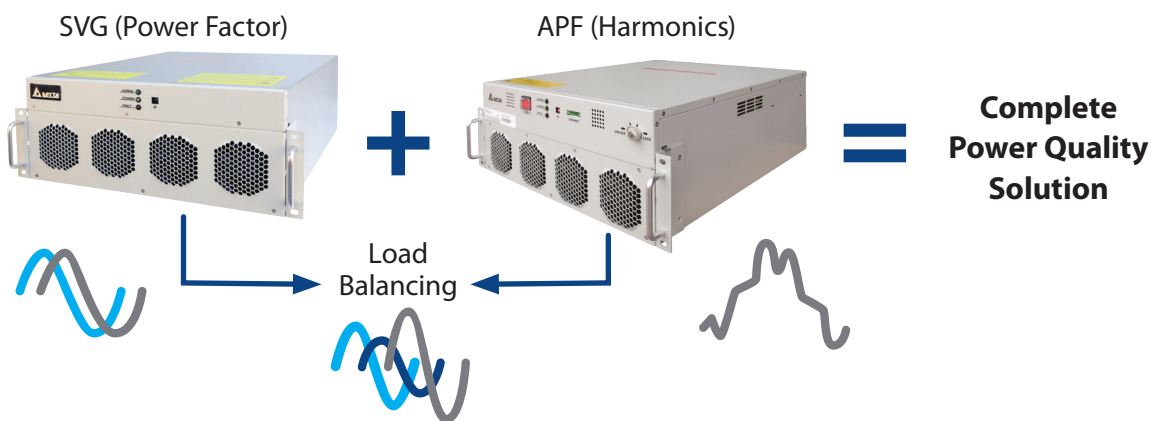
SVG / APF
Floor Standing Cabinet

Hybrid Solutions

Modular systems allow for the building of hybrid configurations, 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 what your site 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.

Ordering Information

For a floor standing Static Var Generator (SVG) solution, select the number of power modules based on the compensation required, then select the enclosures to suit.

Static Var Generator (SVG) Floor Standing Module Ordering Information (3 Phase 4 Wire ¹⁾)

Size kVAr	Type	Catalogue No.	Module dimensions (W x H x D mm)
100	Front connection - Fixed	PQ-SVGM-100-X-G-4-F-FC-X-1A	600 x 190 x 606

Static Var Generator (SVG) Floor Standing Enclosure Ordering Information

Size kVAr	Type	IP Rating	Colour ²	Connection	Maximum expansion capacity (modules)	Catalogue No.	Overall dimensions (W x H x D mm)
100	Front connect	IP30	RAL7035 Grey	Top or Bottom Entry	2	PQ-SVGC-200-30-G-X-F-FC-X-1A	800 x 2000 x 1000
200							800 x 2000 x 1000
300							800 x 2000 x 1000
400							800 x 2000 x 1000
500							800 x 2000 x 1000
600							1000 x 2258 x 1000
700							1000 x 2258 x 1000
100		IP54		Bottom Entry	3	PQ-SVGC-300-54-G-X-F-FC-X-1A	1000 x 2000 x 1000
200							1000 x 2000 x 1000
300							1000 x 2000 x 1000

Static Var Generator (SVG) Wall Mount System Ordering Information (3 Phase 4 Wire)

For a wall mount Static Var Generator (SVG) solution, the power module is included in the enclosure. Additional accessories are required with the 50kVAr wall mount module.

Size kVAr	Type	IP Rating	Colour ²	Connection	Catalogue No.	Overall dimensions (W x H x D mm)
50	Wall mount	IP31	RAL7035 Grey	Top Entry	PQ-SVGWM-50-31-G-4-X-X-T-1A	440 x 700 x 239
100		IP30			PQ-SVGWM-100-30-G-4-X-X-T-1A	700 x 800 x 198

Accessories required (50kVAr Wall Mount only)

Item description	Catalogue No.
Wall Mount Bracket	3313192900SP
Touch Screen HMI For Wall Mount System	PQCMA101ANB21B0

Notes:

¹⁾ 3 Phase 3 Wire options available. Simply replace within the part number above '4-' with '3-'. I.e. PQ-SVGM-100-X-G-3-F-FC-X-1A

²⁾ RAL2000 orange options available. Simply replace within the part number above 'G-' with 'O-'. I.e. PQ-SVGC-200-30-O-X-F-FC-1A



Ordering Information

For a floor standing Active Power Filter (APF) solution, select the number of power modules based on the compensation required, then select the enclosures to suit.

Active Power Filter (APF) Modules Ordering Information (3 Phase 4 Wire ¹⁾ – Floor Standing

Size Amps	Type	Catalogue No.	Module dimensions (W x H x D mm)
50	Rear connection - Fixed	PQ-APFM-50-X-G-4-F-RC-X-1A	440 x 174 x 522
75		PQ-APFM-75-X-G-4-F-RC-X-1A	440 x 174 x 522
100		PQ-APFM-100-X-G-4-F-RC-X-1A	605 x 220 x 729
100	Front connection – Fixed ³	PQ-APFM-100-X-G-4-F-FC-X-1A	600 x 190 x 606

Active Power Filter (APF) Enclosure Ordering Information – Floor Standing

These enclosures are only suitable for the rear connect APF power modules. For enclosures to suit the front connect APF modules, select an SVG cabinet from the previous page.

Size Amps	Type	IP Rating	Colour ²	Connection	Maximum expansion capacity (modules)	Catalogue No.	Overall dimensions (W x H x D mm)
100	Rear connect	IP30	RAL7035 Grey	Top or Bottom Entry	3	PQ-APFC-300-30-G-X-F-RC-X-1A	800 x 2000 x 1000
200							800 x 2000 x 1000
300							800 x 2000 x 1000
400					5	PQ-APFC-500-30-G-X-F-RC-X-1A	800 x 2000 x 1000
500							800 x 2000 x 1000
100		IP54		Bottom Entry	3	PQ-APFC-200-54-G-X-F-RC-X-1A	800 x 2000 x 1000
150							800 x 2000 x 1000
200							800 x 2000 x 1000
300							800 x 2000 x 1000

Active Power Filter (APF) Wall Mount System Ordering Information (3 Phase 4 Wire)

For a wall mount Active Power Filter (APF) solution, the power module is included in the enclosure. Additional accessories are required with the 50A wall mount module.

Size Amps	Type	IP Rating	Colour ²	Connection	Catalogue No.	Overall dimensions (W x H x D mm)
50	Wall mount	IP31	RAL7035 Grey	Top Entry	PQ-APFWM-50-31-G-4-X-X-T-1A	440 x 700 x 239
100		IP30			PQ-APFWM-100-30-G-4-X-X-T-1A	700 x 800 x 198

Accessories required (50A Wall Mount only)

Item description	Catalogue No.
Wall Mount Bracket	3313192900SP
Touch Screen HMI For Wall Mount System	PQCM101ANB21B0

Notes:

¹⁾ 3 Phase 3 Wire options available. Simply replace within the part number above '-4-' with '-3-', i.e. PQ-APFM-100-X-G-3-F-FC-X-1A

²⁾ RAL2000 orange options available. Simply replace within the part number above '-G-' with '-O-', i.e. PQ-APFC-300-30-O-X-F-RC-1A

³⁾ The Front connect modules are only compatible with the SVG cabinets in the previous page

Ordering Information

Hybrid (SVG + APF) Modules Ordering Information (3 Phase 4 Wire 1)

Size	Type	Catalogue No.	Module dimensions (W x H x D mm)
50kVar	Rear connection - Fixed	PQ-SVGM-50-X-G-4-F-RC-X-1A	440 x 174 x 522
50A		PQ-APFM-50-X-G-4-F-RC-X-1A	440 x 174 x 522
75A*		PQ-APFM-75-X-G-4-F-RC-X-1A	440 x 174 x 522
100kVar	Front connection – Fixed	PQ-SVGM-100-X-G-4-F-FC-X-1A	600 x 190 x 606
100A		PQ-APFM-100-X-G-4-F-FC-X-1A	600 x 190 x 606

Hybrid (SVG + APF) Cabinets Ordering Information

Compatible Modules	Type	IP Rating	Colour ²	Connection	Maximum expansion capacity (available module slots)	Catalogue No.	Overall dimensions (W x H x D mm)
50kVar + (50A or 75A*)	Rear connect	IP30	RAL7035 Grey	Top or Bottom Entry	4	PQ-APFC-300-30-G-X-F-RC-X-1A	800 x 2000 x 1000
		IP54			7	PQ-APFC-500-30-G-X-F-RC-X-1A	800 x 2000 x 1000
100kVar + 100A	Front connect	IP30		Top or Bottom Entry	2	PQ-SVGC-200-30-G-X-F-FC-X-1A	800 x 2000 x 1000
					5	PQ-SVGC-500-30-G-X-F-FC-X-1A	800 x 2000 x 1000
		IP54		Bottom Entry	7	PQ-SVGC-700-30-G-X-F-FC-X-1A	800 x 2000 x 1000
					3	PQ-SVGC-300-54-G-X-F-FC-X-1A	800 x 2000 x 1000

Notes:

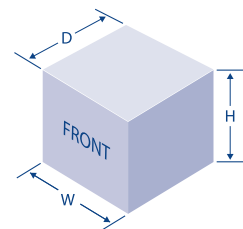
1) 3 Phase 3 Wire options available. Simply replace within the part number above '4-' with '3-'. I.e. PQ-SVGM-50-X-G-3-F-RC-X-1A

2) RAL2000 orange options available. Simply replace within the part number above 'G-' with 'O-'. I.e. PQ-APFC-500-30-O-X-F-RC-X-1A

*75A APF modules are a non-stocked item – please contact NHP for lead time information.

Cabinet Dimensions

Cabinet	Dimension (W x H x D) mm	Weight (kg)
50kVar Wall Mount	440 x 700 x 239	42
50kVar IP30 Cabinets	800 x 2000 x 800	~220
100kVar IP30	1000 x 2258 x 1000	~220
50A Wall Mount	440 x 700 x 239	42
50A IP30 Cabinets	800 x 2000 x 800	~170
100A IP30/50A IP54 Cabinets	1000 x 2000 x 1000	~220





Technical Specifications

	Rated Voltage	SVG AC 415V		APF AC 415V			APF AC 690V	
Electrical Specification	Input Voltage Range	AC 308V~480V					AC 432V~880V	
	Electric Connection	3P3W / 3P4W					3P3W	
	Rated Frequency	50(60)Hz ±10%						
	Input Voltage THD Range	≤15%						
	Rated Capacity per Module	50kVAr	100kVAr	50Amp	75Amp	100Amp	100Amp	
	Rated Current per Cabinet	50~700kVAr (module combination)		50~700Amp (module combination)			100~500Amp (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							
Control Technology	Switching Frequency	30kHz		60kHz	30kHz	20kHz		
	Controller	DSP control						
	Communication	Modbus Protocol, RS232/485						
	Monitoring	PQC Monitor Software (Optional)						
Physical Specifications	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)		
	Dust Filter	Optional						
	Weights (kg)	30	57	41	63	78		
Dimensions (WxHxD) mm	440 x 174 x 600	600 x 190 x 606	440 x 174 x 522	605 x 220 x 728.2	606 x 270 x 728			
Environmental Requirement	Ambient Temperature	-10~50°C						
	Relative Humidity	0~95%						
	Altitude	≤1000m rated capacity, 1000~2000m(derating 1% per 100m)						



Services and training solutions to improve your business

To support our range of quality products, NHP also offer a wide range of service and training options, including technical support, field service, maintenance contracts, repair services and training – all of which are delivered by qualified technicians.

This access to NHP's expertise, combined with our extensive local stockholding further enables customers to experience a holistic approach across their automation, industrial switchgear, training and commissioning business requirements, for complete peace of mind.

At NHP, we understand the complexities of your project and our product and service offering is designed to help you overcome them. If your project is focused on a profitable, safe and sustainable operation, NHP's customised value add service and training offering is the place to start.

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