

ACTIVE POWER FILTER SERIES

Z3 and Z4 - 3 Phase Power Product Line

Active Power Filter Series

Z3 Series

3 phase, 3 wires

Z3-025

Z3-050

Z3-100

Z3-150

Z3-200

Z4 Series

3 phase, 4 wires

Z4-025

Z4-050

Z4-100

Z4-150

Z4-200

True Harmonics Solution

- Active Harmonics Compensation
- Improves Power Quality
- Easy Selection
- Minimum Heat-Loss during Operation
- Instantaneous Dynamic Response
- Flexible Upgrading / Redundancy
- Various Capacity Ranges 25A to 1200A



ZCOMAX
TECHNOLOGIES

ACTIVE POWER FILTER SERIES

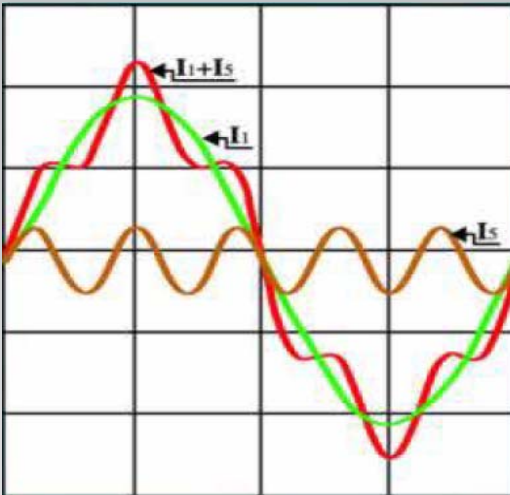
Z3 and Z4 - 3 Phase Power Product Line

Harmonics Pollution

Harmonics pollution is an increasing problem which affects all power distribution networks in industrial, commercial, telecom and medical applications.

Most power converting equipment and facilities can generate harmonics pollution:

- Uninterruptible Power Systems (UPS)
- DC power systems/chargers
- Frequency converters
- AC/DC variable speed drivers
- Fluorescent lamps
- Welding machines



Zcomax "Z" Series, The True Harmonics Solution

The Z series is a solid-state power converter that uses the following advantages to improve power quality:

- Eliminate all harmonic currents from non-linear loads
- Compensate reactive power factors of lagging loads
- Act as a virtual damping resistor to prevent possible harmonic resonance

The Z Series APF behaves like a harmonics current generator. It will measure the harmonics generated from the non-linear loads and cancel these harmonics with a newly generated, opposite phase shifted harmonics current of the same amplitude.

Effects of Harmonics Pollution

The utility fundamental frequency waveform is either 50 or 60Hz. Harmonics are impure components with higher frequency order than that of the fundamental waveform. For example, the 5th harmonic order is 250Hz, 5 times that of the 50Hz fundamental waveform. These impurities pollute the voltage/current waveform and deteriorate the power effectiveness of an equipment or system.

Such deterioration will lead to the following effects:

- Over voltage/current in the distribution network
- Overheated power cables due to skin effect and copper and iron loss in transformers, motors and generators
- Overheating in all types of electronics systems causing component failures
- Nuisance tripping in circuit breakers and protection relays
- Malfunction of automatic control systems
- Damage to capacitors due to resonance
- Inaccuracy of instrument measurement
- Interference in telecommunication systems
- Voltage distortion and lagging in power factor

Easy Selection

There is no need to measure the impedance of the power system or analyze the load harmonic spectrum and individual amplitude. The selection is based on the known estimated load harmonics, current amplitude (I_{Lh}) to be compensated, and then the Zcomax Z series APF model which has the output compensating current rating greater than that of the I_{Ln} . Generally as a thumb of rule, we recommend a 25% higher rating than the I_{Lh} to be compensated. For example, if the known load harmonics current amplitude is 80 Amps, the appropriate rating of the Z series APF should be 100 Amps.

Zcomax Technologies, Inc. Mission Statement

At Zcomax we are a dedicated team of professionals striving to provide the highest quality power design products that meet the needs and demands of the most difficult environments along with the support that is critical for today's complex power needs.



ACTIVE POWER FILTER SERIES

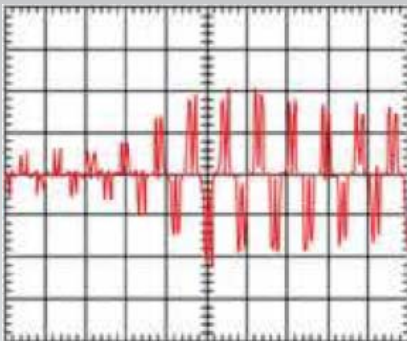
Z3 and Z4 - 3 Phase Power Product Line

Minimum Heat-Loss During Operation

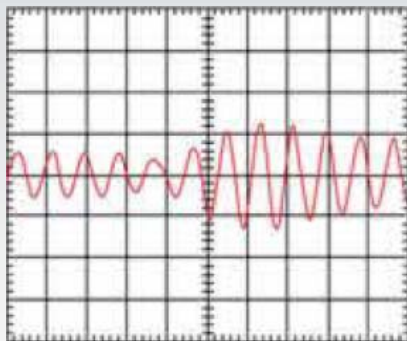
Thanks to their unique design, the Z Series APFs produce insertion losses of less than 3% at full compensation, offering significant cost savings in energy. For example, the maximum heat-losses of the Z Series 100A/380V is less than 2kW

Instantaneous Dynamic Response

The Zcomax Z Series APF employs IGBT PWM converter switching at 20 kHz high frequency, using advanced control techniques. It responds instantaneously to the dynamic variation produced by harmonic loads.



Load current (before compensation)



Source current (after compensation)

Flexible Up-Grading Redundancy

In the event that the real values of the ILh is higher than the estimated one, or the ILh increases due to additional loads being added, there is no overload risk to the Z Series APF. The APF units have current-limit capability up to their full rating, thus will not shut down or malfunction but will continue to operate in full compensating mode. Additional Z Series APF's can be added in parallel on site later to meet the increases of the ILh values.

User Friendly Control Panel

The Zcomax Series APFs are equipped with user friendly control panels: Simple on / off controls, buzzer silence and 4 system status LEDs for; Power On, Filtering, Full Correcting & Error. The optional LCD panel with special blue back light offers access to all parameters, waveforms, & spectrums for management of both The Z Series and system power quality. The graphic LCD display & control panel gives easy access to load, source, & Z Series information:

- Complete with V, I, F, PF, kVA, THD parameters
- Waveforms & harmonics spectrum
- Control commands & settings
- Status & alarms
- Events log



Voltage Free Contacts

The Zcomax Z Series comes with standard 3 voltage free contact signal outputs for easy monitoring:

- General Alarm
- Power On
- Filtering

Optional Monitoring and Signaling

The Zcomax Z Series provides optional advanced, comprehensive communication interfaces:

- Serial port RS232/RS485
- Ethernet network RJ45



ACTIVE POWER FILTER SERIES

Z3 and Z4 - 3 Phase Power Product Line

Specification

Item	Model	25A	50A	100A	150A	200A
Line Voltage (V)		208 / 380 / 400 / 415 / 480 ± 15%				
Phase / Wires - Z3 Series		3 Phase, 3 Wires				
Phase / Wires - Z4 Series		3 Phase, 4 Wires				
Frequency		50 / 60 ± 3 Hz				
Compensating current in phase		25 Arms	50 Arms	100 Arms	150 Arms	200 Arms
Compensating current in neutral (1)		75 Arms	150 Arms	300 Arms	450 Arms	600 Arms
Transient Response Time (2)		<1 millisecond				
Inrush Current		Less than rated current				
Current Limitation		Yes, at full correcting				
Soft Start		10 sec				
Heat-Loss (Watt)		550	950	2000	3000	41000
Audible Noise from 1 Meter (dBA)		60	60	63	63	65
Mechanical Specification						
Net weight - Z3 Series (kg)		55	70	230	260	430
Net weight - Z4Series (kg)		60	75	270	300	540
Dimension (WxDxH)		(millimeters)				
Z3 Series		410x390x880		600x810x1930		1200x810x1930
Z4 Series		490x400x920		700x810x1930		1400x810x1930
Color		RAL9001				
Protection Index		IP20				
General Characteristics						
Storage Temperature		-20°C ~ +70°C				
Operating Temperature		12°C ~ 25°C (Recommended), +0°C ~ +40°C (Tolerant)				
Relative Humidity		<95%				
Operating Altitude		<1000 m				
Reference Harmonic Standard		EN 61000-3-4, IEEE 519-1992				
Reference Design Standard		EN60146				
Safety Standard		EN50178				
Electromagnetic Compatibility		EN55011, EN50081-2, EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN610006-2				

(1) Applicable for ES34 series only

(2) The Total time from detection to steady compensation at 100% load step is less than 30 mSec



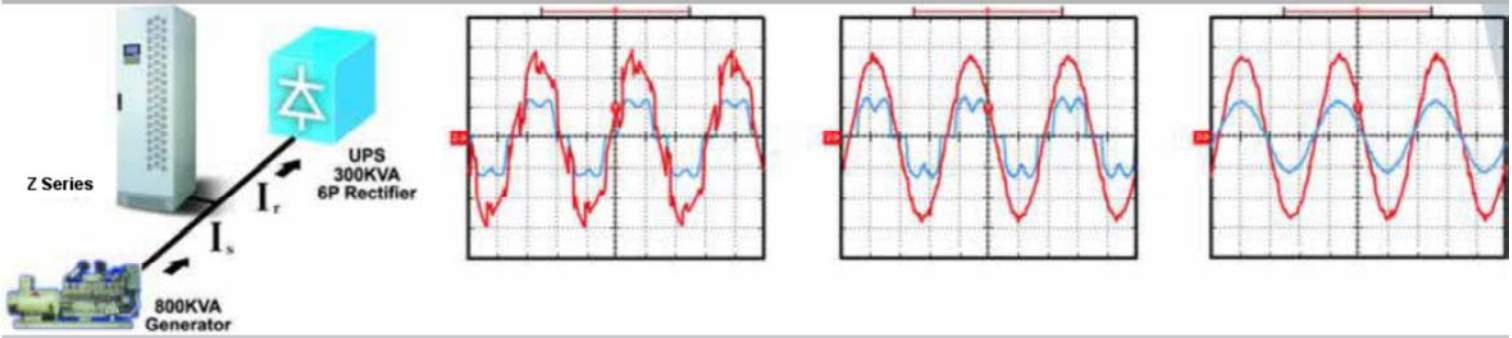
ACTIVE POWER FILTER SERIES

Z3 and Z4 - 3 Phase Power Product Line

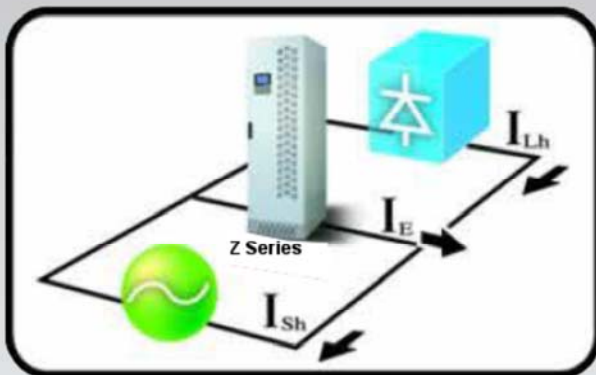
Z Series Design Details

Case Study

Normally large 3-phase UPS with 6-pulse rectifiers, feedback heavy harmonics current of 30%-40% THO into mains or emergency generators. This can cause line voltage distortion or generator malfunctions. The Z Series APFs are well adapted to operate with large UPS's to perform very low harmonic feedback, generating less than 5% feedback.



Harmonic Attenuation

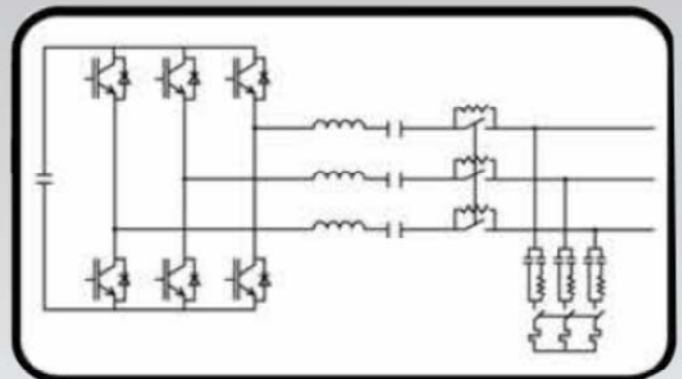


The compensation ability of the Z series APF is defined in terms of Harmonic Attenuation Ratio (HAR, I_{LH} / I_{SH}) Typically it is greater than 10.

Headquarters:

Zcomax Technologies, Inc.
14545 Valley View Avenue
Unit S, Santa Fe Springs, CA 90670
Email: power@zcomax.com
Tel. 1-562-926-4588

Architecture of The Z series APF



The APF provides 3 phase harmonic current compensation. The main components of the APF are as follow:

- Ripple Current Filter Module
- Electromagnetic Contactor Module
- High Frequency Inductor-Capacitor Module
- IGBT Power Converter Module
- DC Capacitor Module

