

Active Harmonic Filters

Designers &
Manufacturers
of Power Factor
Correction Equipment
& Harmonic Filters

Electrotek Ltd.
1016 34 AV SE Calgary, AB Canada T2G 1V4

Tel: 403 287 2200
Toll Free: 1 800 404 9114

contact@electrotekltd.com
www.electrotekltd.com



Harmonic Pollution ~ Origin and Consequences

The impact of harmonic pollution is an increasing problem given the growth of sophisticated power electronics and the proliferation of non-linear loads in power systems. Such loads are increasingly used in all industrial and commercial installations.

Typical non-linear loads include:

- Industrial equipment (induction furnaces, static converters, welding machines)
- Uninterruptible power supplies (UPS)
- Variable speed drives (VSD)
- Office equipment (computers, servers)
- Saturated magnetic devices (transformers)



Minimizing the harmonic pollution (harmonic distortion) on a system is crucial for the well-being of the system load as well as the utility and neighbouring systems.

The presence of harmonic currents increases the RMS current in power networks. The circulation of harmonic currents through the system impedance creates voltage harmonics resulting in voltage distortions, leading to the deterioration of the supply voltage quality. Such adverse effects are more prevalent at the power consumer's end, often manifested in the following forms:

- Costly production / processes downtime leading to financial losses
- Increase operating and energy costs
- Overheating of transformers, motors and cables
- Overloading of neutral conductors
- Load imbalance
- Premature failure of equipment
- Logic faults or component failures in programmable logic controller's, computers or other sensitive loads
- Nuisance tripping of protective devices

Harmonic Distortion ~ Correcting the Problem

Passive harmonic filters have been used for many years to achieve acceptable levels of harmonic distortion, and continue to be a reliable and suitable solution for many applications. Passive harmonic filters attract harmonics to themselves, absorb them and dissipate them as heat.

A newer technology ~ Active Harmonic Filters ~ also works to reduce / eliminate harmonic distortion, but via a different method, as described below.

Active Harmonic Filters (AHF) reduce system harmonics by producing harmonics at a 180 degree phase shift to those being created by the non-linear load on a system, thereby cancelling the harmonics instead of absorbing them like passive filters. Active filters operate in real time so they provide an instantaneous reduction in harmonics.

Electrotek's Sinexcel AHF Delivers Perfect Power Quality

When harmonic mitigation is required, the operating circuit measures the load current and calculates the harmonic current spectrum via the advanced control algorithm programmed in the Digital Signal Processor. Our AHF employs a Fast Fourier Transform logic calculation method for the harmonic current spectrum from 2nd to 50th order. The logic then determines the amplitude of the compensated current control signal to be injected at the opposite phase angle for each harmonic order selected.

Three modes of compensation are available as a standard, with the user being able to select the priority of each compensation mode, or even turn off individual compensation modes.



Harmonic compensation:

Cancels out the 2nd to the 50th harmonic simultaneously. The order of the harmonic current and its compensation rate can be individually selected as required, so you can choose to cancel any number of harmonic orders, or all of them.



Reactive power compensation:

Stepless capacitive and inductive compensation and perfect reactive power compensation (PF=1.00). Target power factor adjustable from 0 to 100% both lagging and leading so you can inject either capacitive reactance or inductive reactance at your discretion.



3 phase unbalance compensation:

3 phase active unbalance compensation, 3 phase reactive unbalance compensation, and single phase compensation, gives you perfectly balanced loads on all phases all the time.

Compact Designs available in
Wall or Rack Mount.



Product Specification

Items	240V	480V	600V	690V
Electrotek AHF - 25, 35, 50, 75, 90 and 100A modules				
System Parameters				
Rated input	240V (200V~276V)	480V (400V~552V)	600V (500V~690V)	690V (575V~793V)
Power grid frequency	50/60Hz (range: 45Hz~62Hz)			
Parallel quantities	unlimited			
Efficiency	>97%			
Power grid structure	3P3W, 3P4W			
CT	150:5 ~ 10,000:5 (2 required for 3P3W AHF, 3 required for 3P4W AHF)			
Circuit topology	3-level			
Performance Indicators				
Rated capacity	25/35/50/75/90/100A			
Harmonic compensation	Available as standard			
Reactive power compensation	Available as standard			
Unbalance compensation	Available as standard			
Control algorithm	Intelligent FFT, FFT, and instantaneous reactive power algorithm			
Filtering range, order, degree	2 nd ~ 50 th orders			
Filter performance	>95%			
Reaction time	<50μs			
Overall response time	<5ms			
Target power factor	Adjustable from 0 ~ 100% lagging and leading			
Switching frequency	20kHz			
Cooling air requirement	180L / sec			
Noise level	<65dB			
Communication and Monitoring Capabilities				
Communication ports	RS485 and Ethernet port (RJ45)			
Communications protocols	Modbus (RTU)			
Module display interface	7-inch (rack-mounted), 4-inch (wall-mounted) LCD touch screen			
Protection functions	Over-voltage, under-voltage, over-temperature, short-circuit , inverter bridge inverse, etc.			
Monitoring alarm	Available			
Fault alarm	Available, max 500 alarm records			
Mechanical Properties				
Mounting type	Wall-mounted or Rack-mounted			
Dimensions	253 * 504 * 640 (wall-mounted), Type 1, up to 90A. Contact Electrotek for other enclosure Types and / or over			
Net weight	66kg for wall-mounted, Type 1, up to 90A. Contact Electrotek for other enclosure Types and / or over 90A.			
Colour	Black for wall-mounted, Type 1, up to 90A. ASA 61 Grey for other enclosure Types and / or over 90A.			
Environment Requirements				
Altitude	≤1500m; between 1500m ~ 4000m, as per GB/T3859.2, the power decreases by 1% for every additional 100m.			
Ambient temperature	-20°C ~ +40°C (automatically derates capacity if ambient temperature exceeds 45°C)			
Relative humidity	5% ~ 95%, non-condensing			
Protection class	Type 1 (wall-mounted), Types 2, 3R, 4, 12 & X versions (floor-mounted)			
Related Qualifications and Standards				
Approvals	cULus, cETLus, IEEE61000, CE			
Standards compliance	IEEE519, ER G5/4			

A:\WP\BROCHURE\2016 Sinexcel Active Filter Brochure\AHF - brochure 4pg 2019.wpd