

Sinexcel

MH

ACTIVE HARMONIC FILTERS

Meets IEEE-519
harmonic
standards



Modular Solution

Active Harmonic Filter



CAUSES & EFFECTS OF HARMONIC

NONLINEAR LOADS

INDUSTRIAL EQUIPMENT

Induction furnaces, static converters, VFD, welding machines

OFFICE EQUIPMENT

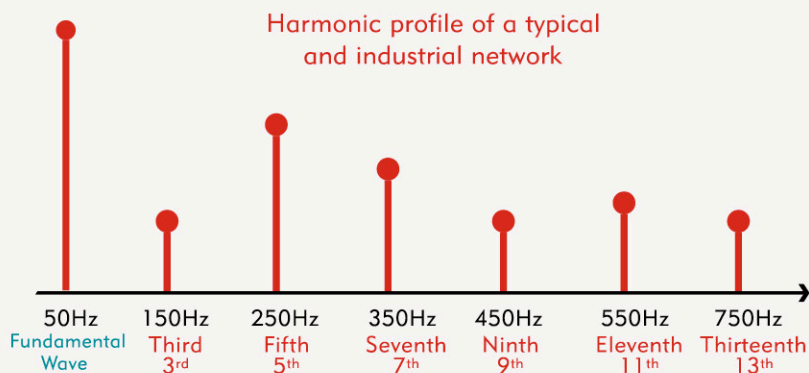
Computers, servers, printers, LED lights

HOUSEHOLD APPLIANCES

Fluorescent lightings, TV LED display dimmers, microwave ovens, inverter airconditioners

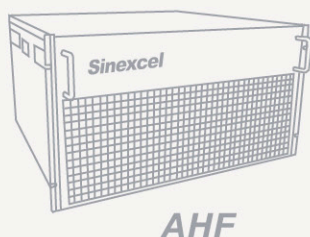
UNINTERRUPTIBLE POWER SUPPLIES (UPS)

Non-Linear loads draw harmonic current on the supply network which introduce a voltage distortion back to the supply line. Loads sharing the same supply network will experience an increased electrical stress due to this voltage distortion. Their working life span, stability and efficiency will be greatly impacted.



SOME OF THE COMMON EFFECTS FROM HARMONIC DISTORTION ARE:

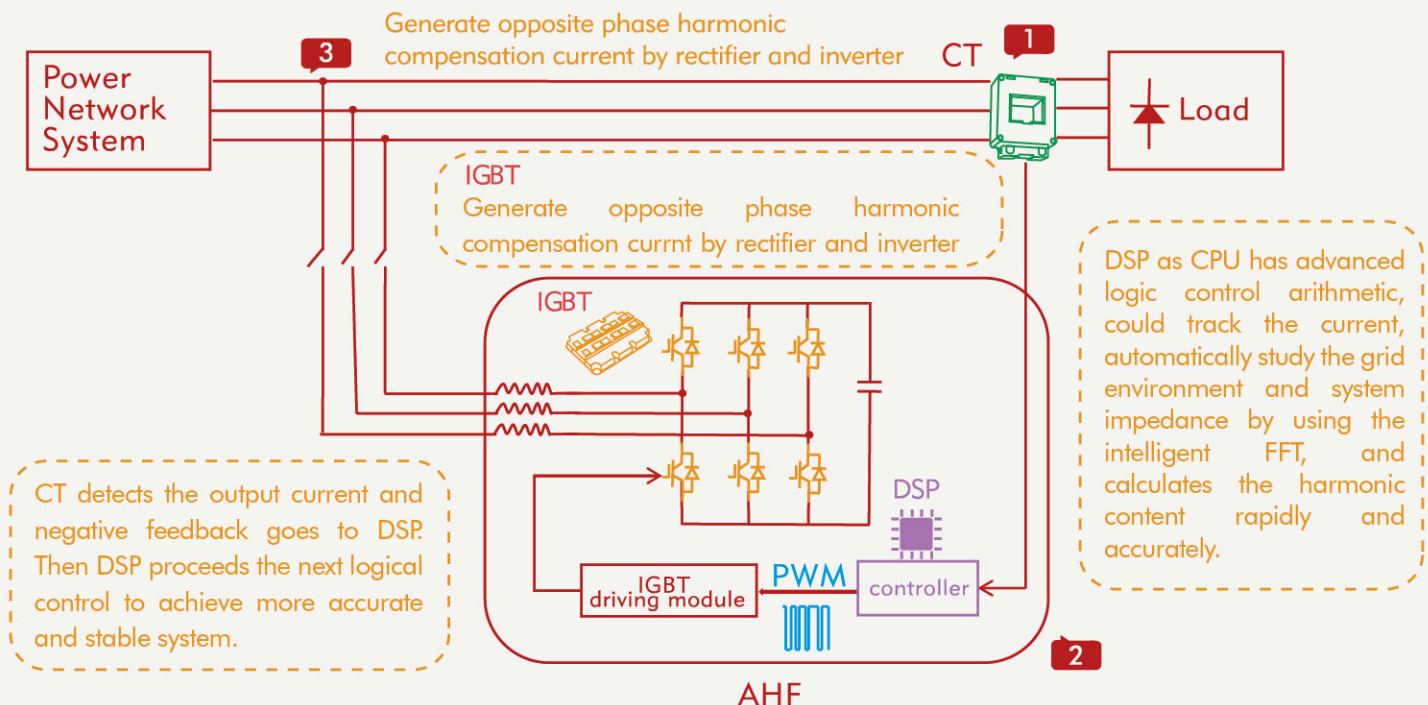
- Power factor capacitor failure
- Nuisance tripping of circuit breaker and protection relay
- Power supply unit failure of computer, power electronics, PLC controller
- Overheating of neutral conductor
- Hot spot formation on switchboard busbar joints
- Cable Installation



AHF WORKING PRINCIPLE



Current Transformer (CT) detects the load current. Digital Signal Processor (DSP) has advanced logic control arithmetic, could analyse the current, divides the load current into active power and reactive power by using the intelligent Fast Fourier Transform (FFT), and calculates the harmonic content rapidly and accurately, then sends Pulse Width Modulation (PWM) signal to internal Insulated-gate Bipolar Transistor's (IGBT) driver board to control IGBT on and off at average 20kHz frequency. Finally generates opposite phase compensation current, at the same time CT detects the output current and forms a negative feedback to DSP. Then DSP proceeds the next logical control to achieve more accurate and stable system.

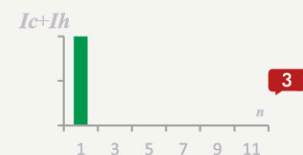
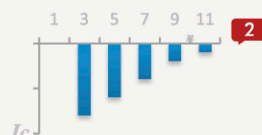
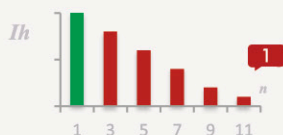


LOAD

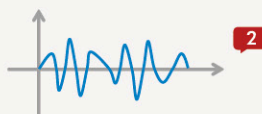
AHF

SOURCE

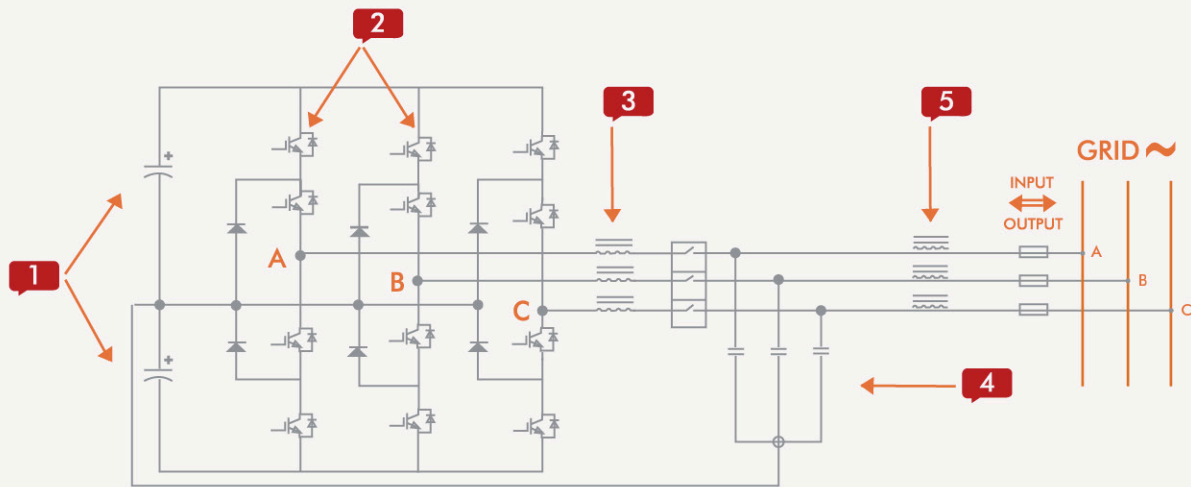
SPECTRUM



WAVEFORM



ADVANCED DESIGN FEATURES



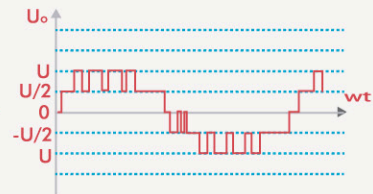
DC BUS CAPACITOR

AC to DC rectifier storage

IGBT

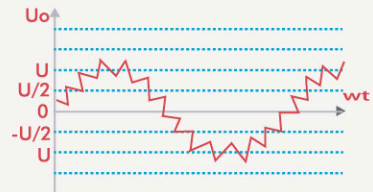
Controlled by DSP software algorithm, IGBT on-off timing selection and length could control inverter to generate a harmonic current.

IGBT generates square wave, it's outline is like sinusoid.



INVERTER INDUCTION

The square wave will convert into triangular wave, which is more like sinusoid after inverter inductor.

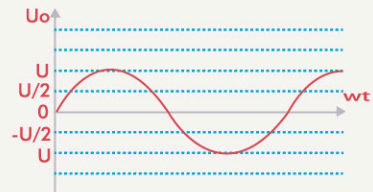


LC FILTER CIRCUIT

LC filter circuit filter out impurities of the harmonic.

HIGH FREQUENCY INDUCTOR

Both for filtering. The combination of LC filter circuit and high frequency inductor are called LCL filter circuit.



KEY FEATURES AND BENEFITS

MODULAR DESIGN

Ultra-compact design, wall and rack mount installation, easy to install in new or existing switch room

Modular structure with highest reliability of system

3P4W and 3P3W adapted by same modules, same harmonic mitigation capability

INTELLIGENT FFT

Unique intelligent FFT algorithm automatically study the electrical system impedance, to prevent harmonic resonance and increase system reliability

Real time electrical system resonance monitor and management

GRAPHICAL USER INTERFACE

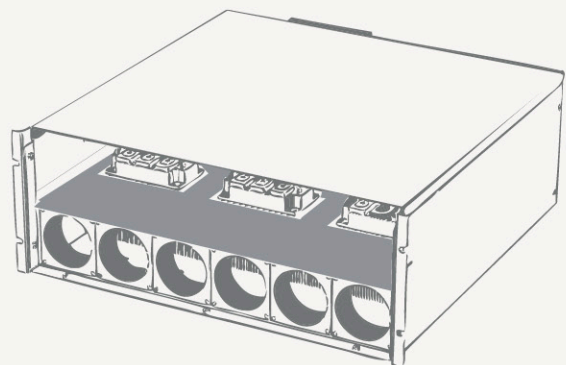
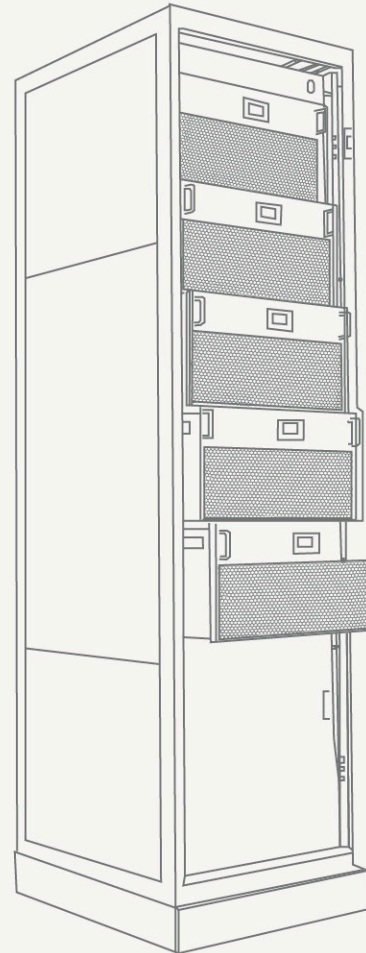
4.3 inch HMI for individual wall mount module, 7 inch centralise HMI for cabinet type.

Display multiple electrical parameters, i.e. Voltage, Current, Power Factor, Frequency, Apparent / Active / Reactive Power, THDi and THDv.

Comparison of waveform and harmonic spectrum display for before and after turned on of harmonic filter.

MAINTENANCE FREE DESIGN

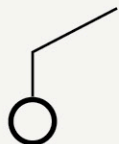
Independent air flue, separate electronic components from air flue. Maintenance free design, improve product reliability.



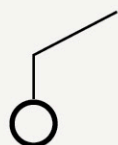
Items	400V					
	Sinexcel AHF 005/010/015	Sinexcel AHF 025/035	Sinexcel AHF 050/060	Sinexcel AHF 075/100	Sinexcel AHF 150	Sinexcel AHF 300
System Parameter						
Rated Voltage	380 (228V~456V)					
Rated frequency	50/60Hz (range:45Hz~62Hz)					
Parallel quantities	Unlimited					
Efficiency	≥97% (Full load)					
Distribution system	3P3W/3P4W					
CT Ratio	50/5~10,000/5 (15A)	150/5~30,000/5 (25~150A) module ; 600/5~10,000/5 (300A)				
Circuit topology	3-Level					
Performance Indicator						
Rated capacity	5A/10A/15A	25A/35A	50A/60A	75A/100A	150A	300A
Function	Harmonic compensation, Reactive power compensation, Unbalance compensation					
Control algorithm	Intelligent FFT / Instantaneous Reactive Power / FFT					
Filtering range	2 nd to 61 th orders	2 nd to 50 th orders				
Filtering performance	≥95%					
Reaction time	20μs	<50μs				
Overall response time	5ms	<5ms				
Target power factor	Adjustable from -1 to +1					
Switching frequency	Average 50KHz	Average 20kHz				
Cooling air requirement	44L/Sec	151L/Sec	151L/Sec	256L/Sec	389L/Sec	500L/Sec
Noise level	<65 dB	<56 dB			<65 dB	<75 dB
Communication & Monitoring Capability						
Communications ports	RS485	RS485, Ethernet port (RJ45)				
Communications protocols	MODBUS (RTU)	MODBUS (RTU, TCP/IP)				
Interfacing	WIFI display, 7inch HMI (central monitor)	4.3-inch HMI (module), 7-inch HMI (central monitor), LED				
Protection functions	Abnormal voltage / frequency protection; Inverter short-circuit protection; Abnormal output current protection; Inverter over-loaded protection; Over -temperature protection etc.					
Monitoring alarm	Available					
Fault alarm	Available	Available, 500 alarm records				
Mechanical Properties						
Mounting type	Wall mount / Rack mount	Wall mount / Rack mount / Cabinet				
Dimension(W x D x H) mm	410*340*45 (Rack mount) 410*45*340 (Wall mount)	400*490*150 (Rack mount) 440*150*470 (Wall mount)	400*590*190 (Rack mount) 440*190*610 (Wall mount)	500*600*190(75A)/ 400*599*230(100A) (Rack mount) 500*190*585(75A)/ 440*232*625(100A) (Wall mount)	500*560*269 (Rack mount) 500*286*557 (Wall mount)	500*722*370 (Rack mount) 500*370*722 (Wall mount)
Net weight	4.98kg	18kg	35kg	40kg	48kg	110kg
Color	Silver	Black				
Environment Requirement						
Altitude	≤1,500m; Between 1,500m to 4,000m, derating 1% every additional 100m					
Ambient temperature	-10°C~40°C (may derating if ambient temperature exceeds 45°C)					
Relative humidity	5%~95%, non-condensing					
Protection Class	IP20 (IP degrees can be customized)					
Related Qualifications & Standards						
Qualifications	CE, cETLus					
Standard compliance	IEE 519, ER G5/4, IEC 61000					

Items	208V	480V	600V	690V
	Sinexcel AHF 25/35/50/60/75	Sinexcel AHF 25/35/50/60/75/90/100	Sinexcel AHF 25/35/50/60/75/90/100	Sinexcel AHF 25/35/50/60/75/90/100
System Parameter				
Rated Voltage	220V(176V~264V)	480V(384V~552V)	600V(420V~690V)	690V(483V~793V)
Rated frequency	50/60Hz (range:45Hz~62.5Hz)			
Parallel quantities	Unlimited			
Efficiency	>95%			
Distribution system	3P3W/3P4W			
CT Ratio	150/5~30,000/5			
Circuit topology	3-Level			
Performance Indicator				
Rated capacity	25/35/50/60/75/90/100A			
Function	Harmonic compensation, Reactive power compensation, Unbalance compensation			
Control algorithm	FFT / Intelligent FFT / Instantaneous Reactive Power			
Filtering range	2 nd to 50 th orders			
Filtering performance	>95%			
Reaction time	<50μs			
Overall response time	<5ms			
Target power factor	Adjustable from -1 to +1			
Switching frequency	Average 20kHz			
Cooling air requirement	359L/Sec	For 25/35/50A 342L/Sec ; For 60/75/90/100A 359L/Sec		
Noise level	<65 dB			
Communication & Monitoring Capability				
Communications ports	RS485, Ethernet port (RJ45)			
Communications protocols	MODBUS (RTU, TCP/IP)			
Interfacing	7-inch LCD touched screen / LED (rack mount) ; 4.3-inch LCD touched screen (wall mount)			
Protection functions	Abnormal voltage / frequency protection; Inverter short-circuit protection; Abnormal output current protection; Inverter over-loaded protection; Over-temperature protection etc.			
Monitoring alarm	Available			
Fault alarm	Available, 500 alarm records			
Mechanical Properties				
Mounting type	Wall mount / Rack mount / Cabinet			
Dimension (W x D x H)mm	For 25A/35A/50A 500*540*180 (Rack mount) 500*184*627 (Wall mount) For 60/75/90/100A 500*675*250 (Rack mount) 500*250*723 (Wall mount)			
Net weight	70kg	40kg (25/35/50A); 70kg (60/75/90A/100A)		
Color	Black			
Environment Requirement				
Altitude	≤1,500m; Between 1,500m to 4,000m, derating 1% every additional 100m			
Ambient temperature	-20℃~40℃ (may derate if ambient temperature exceeds 45℃)			
Relative humidity	5%~95%, non-condensing			
Protection Class	IP20			
Related Qualifications & Standards				
Qualifications	CE, cETLus, cULus, DNV / BV / Rina			
Standard compliance	IEE 519, ER G5/4, IEC 61000			

AHF 400V NETWORK TYPE

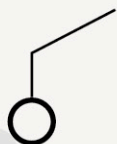


AHF 25 / 35A (wall mount)



AHF 25 / 35A (rack mount)

AHF 400V NETWORK TYPE



AHF 50 / 60A (wall mount)



AHF 75 / 100A (rack mount)

AHF 400V NETWORK TYPE



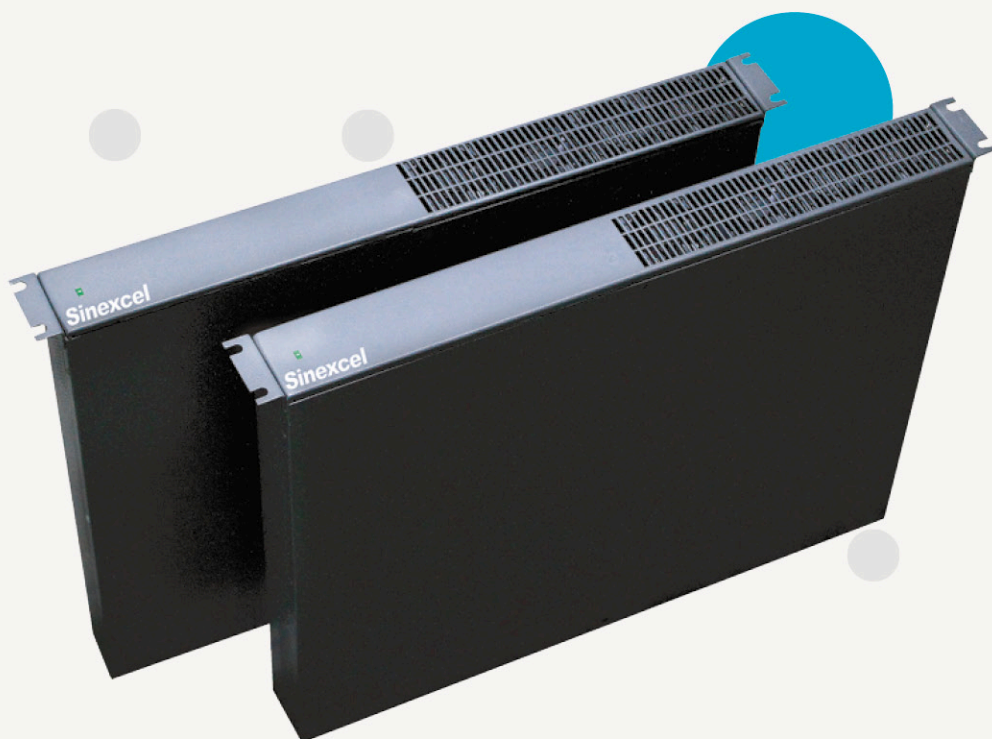
AHF 150A (rack mount)

AHF 480 / 600 / 690V NETWORK TYPE



AHF 90A (rack mount)

AHF 400V NETWORK TYPE



AHF 5 / 10 / 15A (wall / rack mount)

CABINET FOR RACK MOUNT

(Optional)



Flexible Cabinet

- Dimension 600*1000*2200mm
- Flexible capacity
- Flexible incoming connection
 - Top / Bottom cable entrance
 - Top / Bottom MCCB position

Mun Hean AHF Project Reference

Critical Facilities

- Resorts World Sentosa, Singapore
- Canberra MRT Station, Singapore
- National University Hospital, Singapore
- Gleneagles HK Hospital, Hong Kong
- NTT Com Asia, Hong Kong
- Hang Seng Bank, Hong Kong
- China Unicom, Hong Kong
- Bank of East Asia, Hong Kong
- China Mobile, Hong Kong
- Tin Sui Wai Hospital, Hong Kong
- Airport P568, Hong Kong
- Measat Broadcast Networks System, Malaysia
- BDC Specialist Hospital, Malaysia
- Westport Container Gate, Malaysia
- CGC Data Center, Malaysia

Commercial Buildings

- Marina Bay Financial Centre Tower 1 & 3, Singapore
- Asia Square Tower 1 & 2, Singapore
- Metropolis Tower 1 & 2, Singapore
- Ocean Financial Centre, Singapore
- South Beach Tower, Singapore
- Keppel Bay Tower, Singapore
- One Raffles Place North Tower, Singapore
- One Raffles Quay South Tower, Singapore

- Capita Green, Singapore
- SATS Building, Singapore
- UOB Plaza 2, Singapore
- Jewel Changi Airport, Singapore
- Singpost Building, Singapore
- Guoco Tower, Singapore
- New Kowloon Private Condo Development, Hong Kong
- City University, Hong Kong
- Queensway Government Administration Office, Hong Kong
- West Kowloon Police Headquarter, Hong Kong
- Dongfang View Hotel – LED Media Screen, Hong Kong
- Nam Cheong Station Residential Development, Hong Kong
- Austin Commercial Development, Hong Kong
- Taikoo Place I and Taikoo 2A, Hong Kong
- Central Government Office, Hong Kong
- Putrajaya Prime Minister Administration Office, Malaysia
- Swinburne University, Malaysia
- Fishermen Show Theatre in Mui Ne, Vietnam

Industrial Application

- Hanergy Photovoltaic Network, Hong Kong
- Japfa Comfeed, Indonesia
- KHI Pipe Industries, Indonesia
- Evans Indonesia (Palm & Oil), Indonesia
- Air Stulz, Indonesia

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