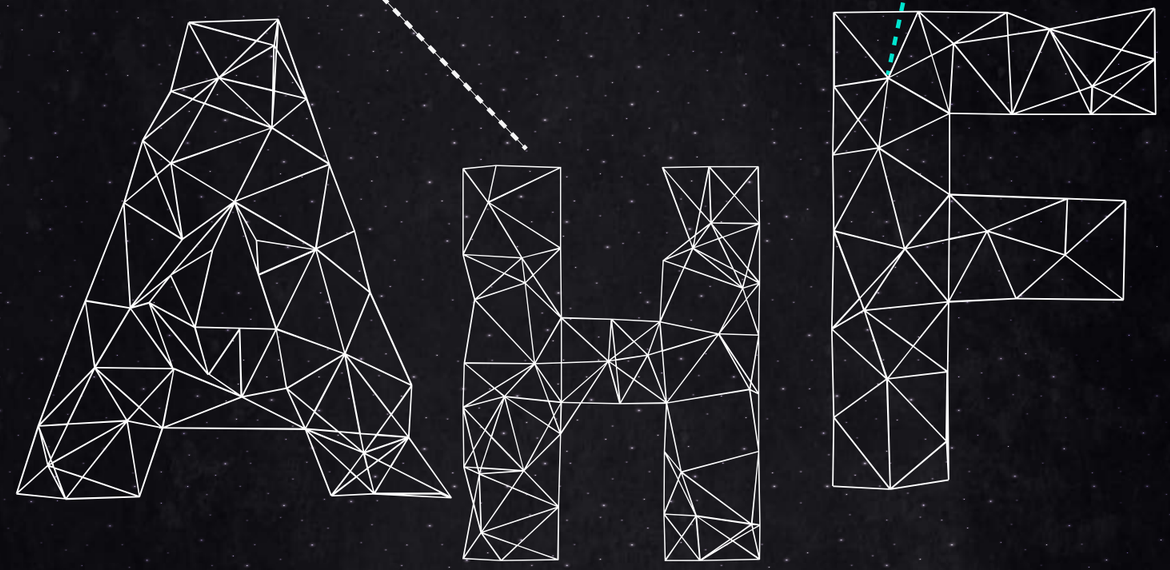
ACTIVE
HARMONIC
FILTER

AHF

Sinexcel

Energy Efficiency

Power Quality



Flexible Alternative Current

Harmonic Mitigation

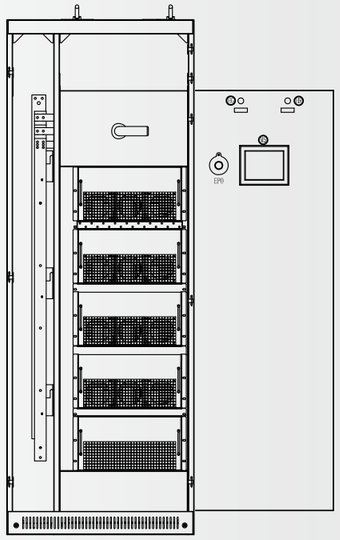
Inverter Based PQ

Active Harmonic Filter

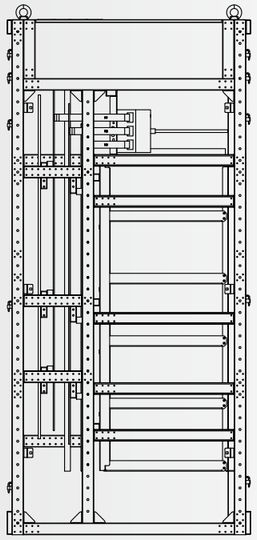
Modular

Solution

Front View



Left Side View



NONLINEAR LOADS

Different compensation model for different loads

NONLINEAR LOADS

INDUSTRIAL EQUIPMENT

Induction furnaces,
static converters,VFD,
welding machines

OFFICE EQUIPMENT

Computers, servers, printers

HOUSEHOLD APPLIANCES

Fluorescent lightings, TV light,
dimmers, microwave ovens.

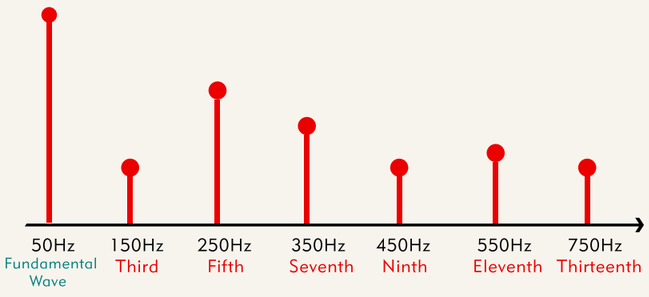
UNINTERRUPTIBLE POWER SUPPLIES (UPS)

WHY HARMONIC HURT YOUR SYSTEM?

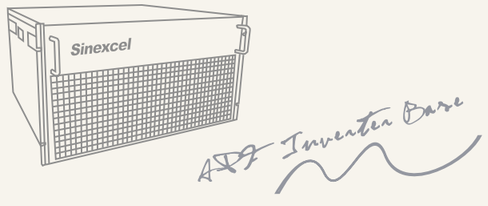
Higher harmonic current would lead to capacitors' inner swelling, oil spilling and fire risk, severe discharge, flashover and overheat, resulting in over-current and over-voltage, accelerating the aging of the capacitor dielectric, lower safety levels of installations , which cause the unnecessary financial losses .

Higher harmonic orders cause more serious distortion on the grid voltage and current, which will increase the transformer copper and iron losses or load imbalance.

Affect the equipment efficiency and occupy unnecessary grid capacity. Overheating of equipment and shortening the lifetime.



Electrical network with poor power quality results in financial loss and safety concerns. Good power quality not only improves the efficiency of the energy by decreasing the loss of electrical equipment, but also guarantees that the power system could support stable and healthy operation. It becomes more and more convenient for us both in daily life and industry because of fast developing technology, which is also accompanied with the development of non-linear loads .



AHF WORKING PRINCIPLE

Optimize your harmonic compensation efficiency

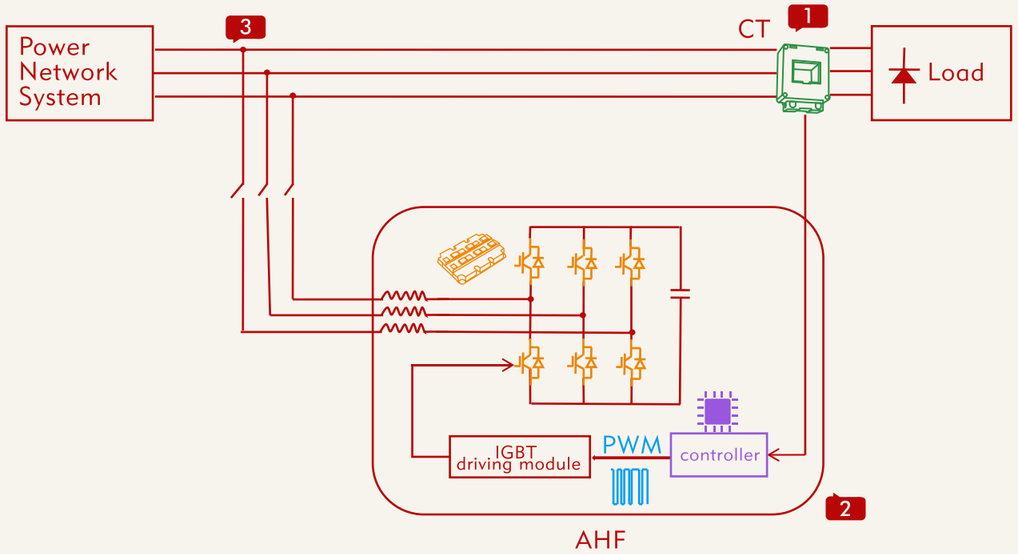
Flexible Alternative Current

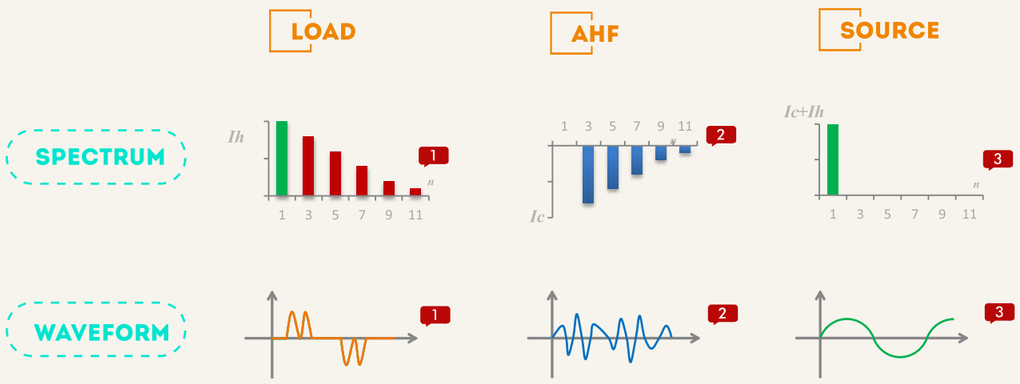
Harmonic Mitigation

Inverter Based PQ

Active Harmonic Filter

External CT detect the load current, DSP as CPU has advanced logic control arithmetic, could fast track the instruction current, divides the load current into active power and reactive power by using the intelligent FFT, and calculates the harmonic content rapidly and accurately. Then sends PWM signal to internal IGBT's driver board to control IGBT on and off at 20KHZ frequency. Finally generates opposite phase compensation current on inverter induction, at the same time CT also detects the output current and negative feedback goes to DSP. Then DSP proceeds the next logical control to achieve more accurate and stable system.





External CT function as eye
detect the load current

DSP as CPU has advanced logic control arithmetic, could fast track the instruction current, automatically study the grid environment and system impedance by using the intelligent FFT, and calculates the harmonic content rapidly and accurately.

CT detects the output current and negative feedback goes to DSP. Then DSP proceeds the next logical control to achieve more accurate and stable system.

DSP function as brain
Analyze and calculate harmonic content of the load current

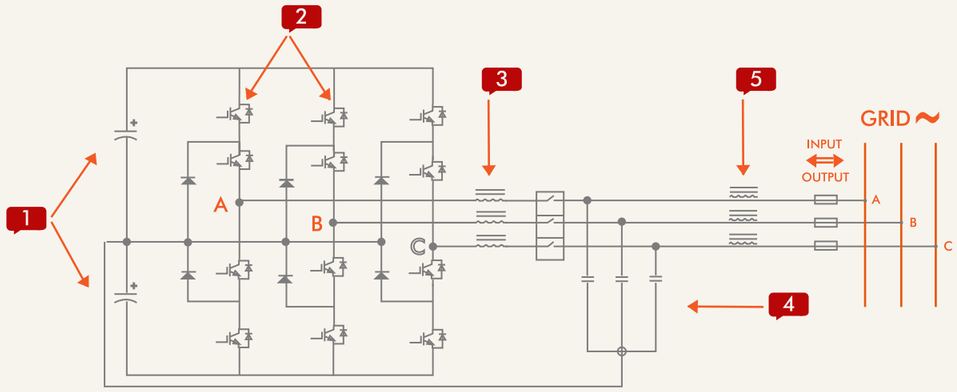
Send PWM signal to drive IGBT control IGBT on and off at 20kHz frequency

IGBT function as heart
Generate opposite phase harmonic compensation current by rectifier and inverter

Realize harmonic compensation

UNDERSTAND HOW AHF COMPENSATE HARMONIC

Optimize your harmonic compensation efficiency



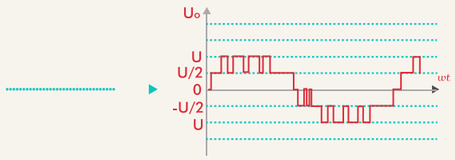
DC BUS CAPACITOR 1

AC to DC rectifier storage

IGBT 2

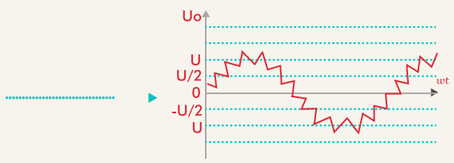
Controlled by DSP software algorithm, IGBT on-off timing selection and length could control inverter to generate a harmonic current.

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



INVERTER INDUCTION 3

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



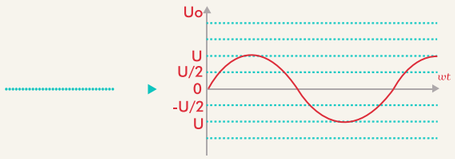
LCL FILTER CIRCUIT

LC FILTER CIRCUIT 4

LC filter circuit filter out impurities of the harmonic. High frequency inductor The rest of high frequency harmonic will be filtered by the high frequency inductor.

HIGH FREQUENCY INDUCTOR 5

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



KEY FEATURES AND BENEFITS

Impressive compensation effect of AHF

MODULAR DESIGN

Ultra-compact design, wall and rack mount installation, easy to use in new or exiting switch room upgraded

Module 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 system from resonance, high system reliability

Real time electrical system resonance monitor and management

GRAPHICAL USER INTERFACE

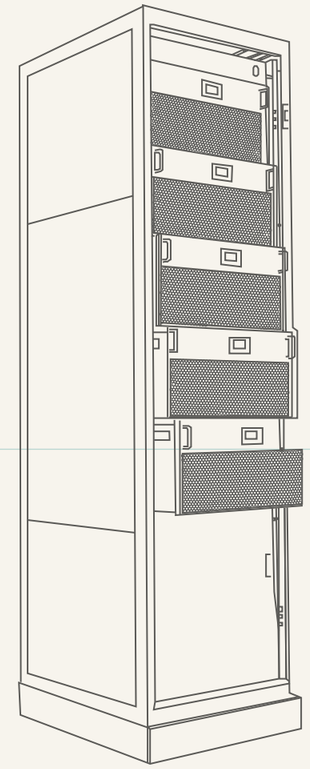
Module 4.3 inch HMI, cabinet 7 inch HMI central

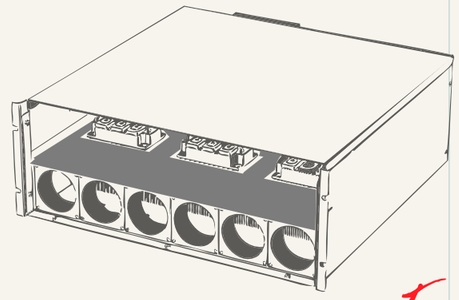
Display electrical system voltage, current, frequency, before and after THDi, Apparent/Active/Reactive power, etc

Display before and after waveform, spectrum in same page with clearly comparison

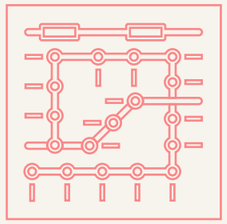
MAINTENANCE FREE DESIGN

Independent air flow separate electronic components from air flow Free of dust cleaning maintenance requirement, improve product reliability

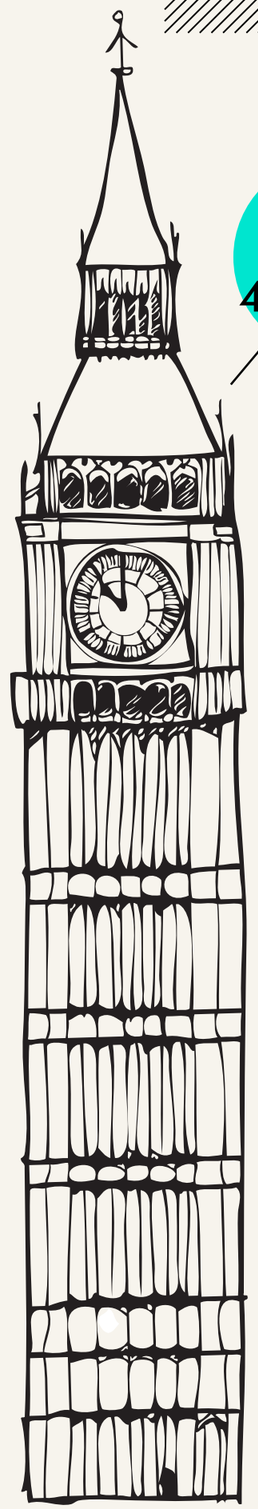




AHF Cabinet



ACTIVE HARMONIC FILTER



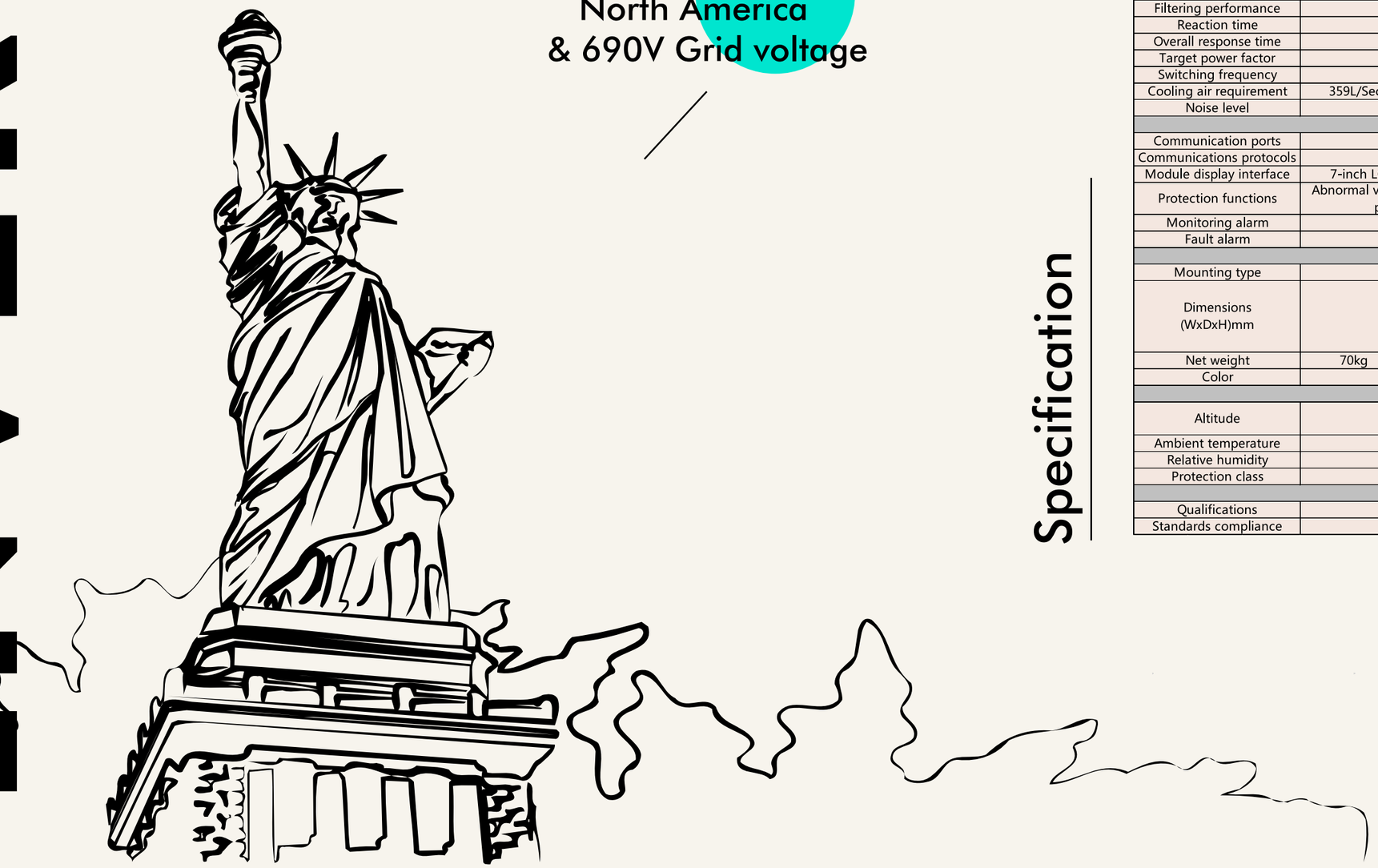
400V Grid Voltage

Specification

Item		AHF 5/10/15	AHF 25/35	AHF 50/60	AHF 75	AHF 100	AHF 150	AHF 300
		Sinexcel Active Harmonic Filter						
		System Parameters						
Nominal voltage		400V						
Voltage range		228~456Vac						
Nominal frequency		50/60Hz (Range : 45Hz ~ 62.5Hz)						
Paraller quantities		Unlimited						
Efficiency		≥ 97%						
Wiring configuration		3 Phase 4 Wire/3 Phase 3 Wire						
Current Transformer		0 ~ 30,000/5						
Topology		Three level						
		Performance Indicators						
Capacity		5/10/15A	25/35A	50A/60A	75A	100A	150A	300A
Harmonic Comp.		Default						
Reactive Power Comp.		Default						
Unbalance Comp.		Default						
Compensation Har. Order		2~61 order	2~50 order					
Harmonic compensation rate		> 97%(AHF loading >50% with non-linear loads inductive impedance >3%)						
Fast response Time		＜20μs	< 50μs					
Overall response Time		< 5ms						
Target PF		-1 ~ 1 adjustment						
Overall response Time		FFT, intelligent FFT, and instantaneous reactive power						
Switching frequency		average 50kHz	average 20kHz					
Cooling (Smart ventilation)		44L/Sec	151L/Sec	115L/Sec	222L/Sec	336L/Sec	360L/Sec	500L/Sec
Noise level		＜68dB	＜56dB				＜65dB	＜75dB
		Monitoring						
Communication port		RS485，Ethernet(option)						
Communication protocal		Modbus、TCP/IP(option)						
Display interface		Wifi display 7-inch HMI(optional)	4.3-inch LCD touch panel；LED indicator, central monitor(optional 7-inch touch screen)					
Protecting		over-voltage protection, under-voltage protection, inverter bridge inverse protection, over-compensation protection, and etc						
Event recorded		Yes，max. up to 500 records						
		Mechanical Characteristic						
Installation		Wall mounted / Rack mounted	Wall mounted / Rack mounted / Cabinet					
Dimension (W * D * H, mm)	Rack mount, LED	410*340*45	440*490*150	500*515*180	500*546*190	500*575*200	500*605*269	500*726*370
	Rack mount, LCD	/	440*490*150	500*515*180	500*586*190	500*605*200	500*630*269	500*726*370
	Wall mount, LCD	410*45*340	440*150*485	500*180*540	500*190*571	500*200*599	500*273*638	500*370*729
Net weight		4.98kg	18kg	23kg	28kg	35kg	44kg	110kg
Color		Black	Black					
		Environment Requirment						
Altitude		≤ 1500m 1500 ~ 4000m (according to GB/T3859.2，increase every 100m derating capacity 1%)						
Operation temperature		-10℃ ~ +40℃						
Relative humidity		5% to 95%, non-condensing						
Protection class		IP20，others IP class could be customized						
Qualifications		CE						

A

North America & 690V Grid voltage



Specification

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 input	220V(176V~264V)	480V(384V-552V)	600V(420V-690V)	690V(483V-793V)
Power grid fequency	50/60Hz (range: 45Hz~62.5Hz)			
Parallel quantities	Unlimited			
Efficiency	**>97%**			
Power grid structure	3P3W/3P4W			
CT	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	**＞97%(AHF loading >50% with non-linear loads inductive impedance >3%)**			
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	<65dB			
Communication & Monitoring Capability				
Communication ports	RS485, Ethernet port (RJ45)			
Communications protocols	MODBUS (RTU, TCP/IP)			
Module display interface	7-inch LCD touched screen/LED(rack-mounted); 4.3-inch LCD touched screen(wall-mounted)			
Protection functions	Abnormal voltage/frequency protection; Inverter short-circuit protection; Abnormal output current protection; Inverter over-loaded protectio; Over-tempearture protection etc,.			
Monitoring alarm	Available			
Fault alarm	Available, 500 alarm records			
Machanical Properties				
Mounting type	Wall-mountedd/Rack-mounted/Cabinet			
Dimensions (WxDxH)mm	For 25A/35A/50A 500*540*180 (Rack-mounted) 500*184*627 (Wall-mounted) For 60/75/90/100A 500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)			
Net weight	70kg	40kg (25/35/50A); 70kg (60/75/90A/100A)		
Color	Black			
Environment Requirement				
Altitude	≤1500m; Between 1500m to 4000m, derating 1% every additional 100m			
Ambient temperature	-20℃-40℃ (may derate capacity if ambiet temperature exceeds 45℃)			
Relative humidity	5% to 95%, non-condensing			
Protection class	IP20			
Related Qualifications & Standards				
Qualifications	CE, cETLus, cULus, DNV/BV/RINA			
Standards compliance	IEEE 519, ER G5/4, IEEE 61000			

INVERTER

A

400V

25A/35A wall 440*150*485mm ³ 18kg
rack 440*490*150mm³ 18kg

400V

50A/60A	wall	500*180*540mm ³	23kg	rack	500*515*180mm ³ 23kg
75A	wall	500*190*571mm ³	28kg	rack	500*546*190mm ³ 28kg
100A	wall	500*200*599mm ³	35kg	rack	500*575*200mm ³ 35kg

ACTIVE HARMONIC FILTER

A

400V

480V
600V
690V

300A wall 500*273*638mm³ 110kg
rack 500*370*729mm³ 110kg

150A wall 500*273*638mm³ 44kg
rack 500*605*269mm³ 44kg

50A wall 500*184*627mm³ rack 500*540*180mm³ 40kg
90A wall 500*253*590mm³ rack 500*590*250mm³ 62kg
100A wall 500*250*723mm³ rack 500*675*250mm³ 70kg

INVERTER

A

400V

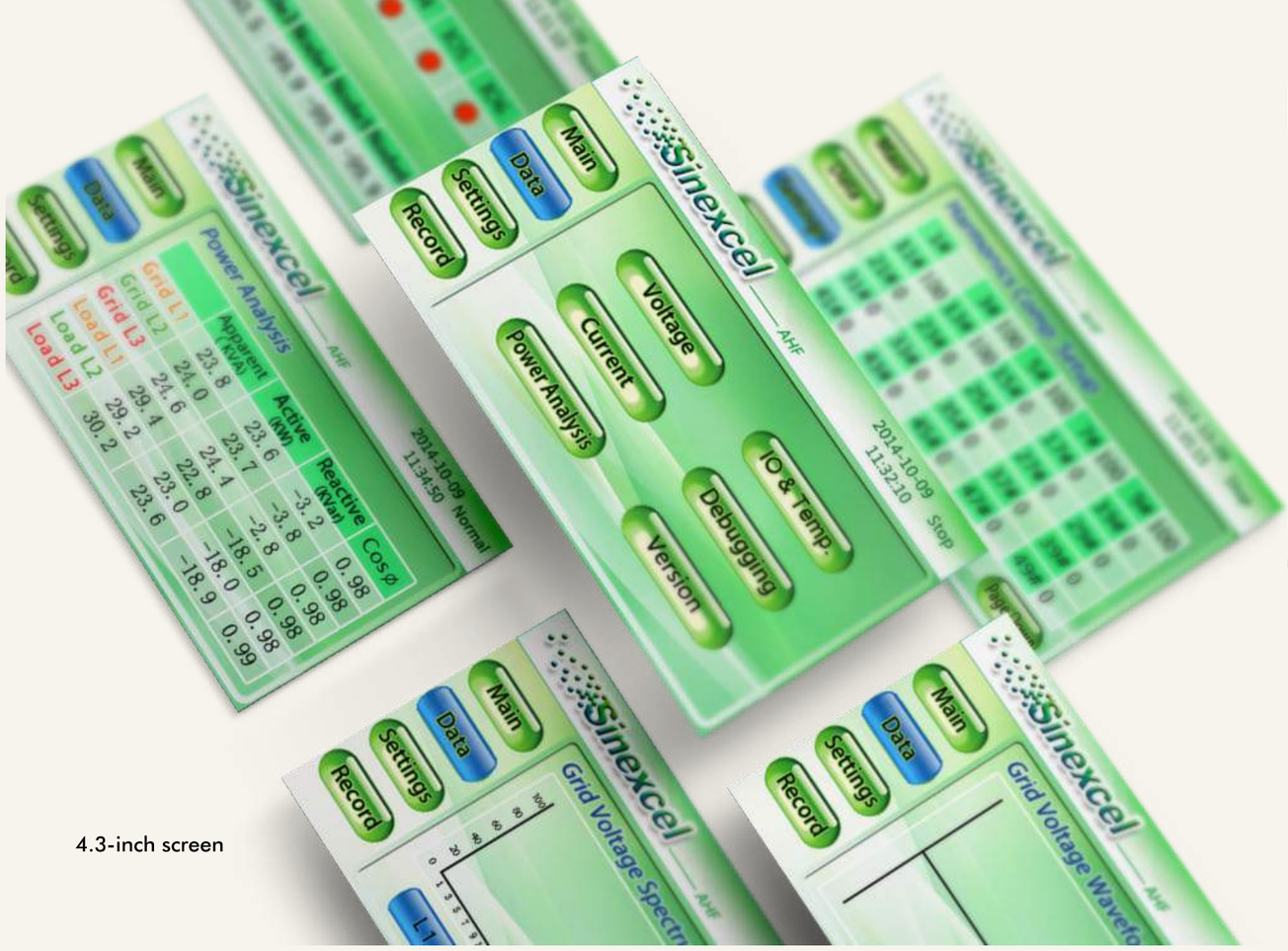
5A/10A/15A wall/rack 410*340*45mm^3 4.98kg

400V

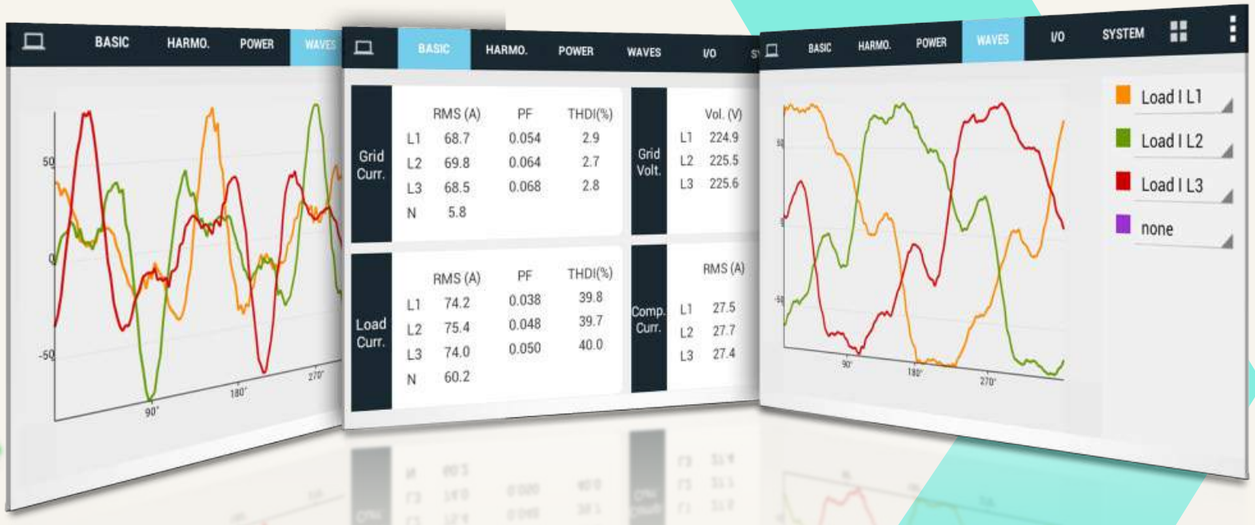
Flexible Engineering Cabinet

- Flexible dimension
  600*1000*2200mm^3,800*1000*2200mm^3,800*800*2200mm^3,1000*1000*2200mm^3 are available.
- Flexible Capacity
  AHF, 25A/35A/50A/60A/75A/100A/150A/300A adapt to cabinet
  SVG, 30kvar/50kvar/100kvar/200kvar adapt to cabinet
  AHF, SVG module adapt to cabinet
- Flexible incoming connection
  Top / Bottom cable entrance
  Top / Bottom MCCB position

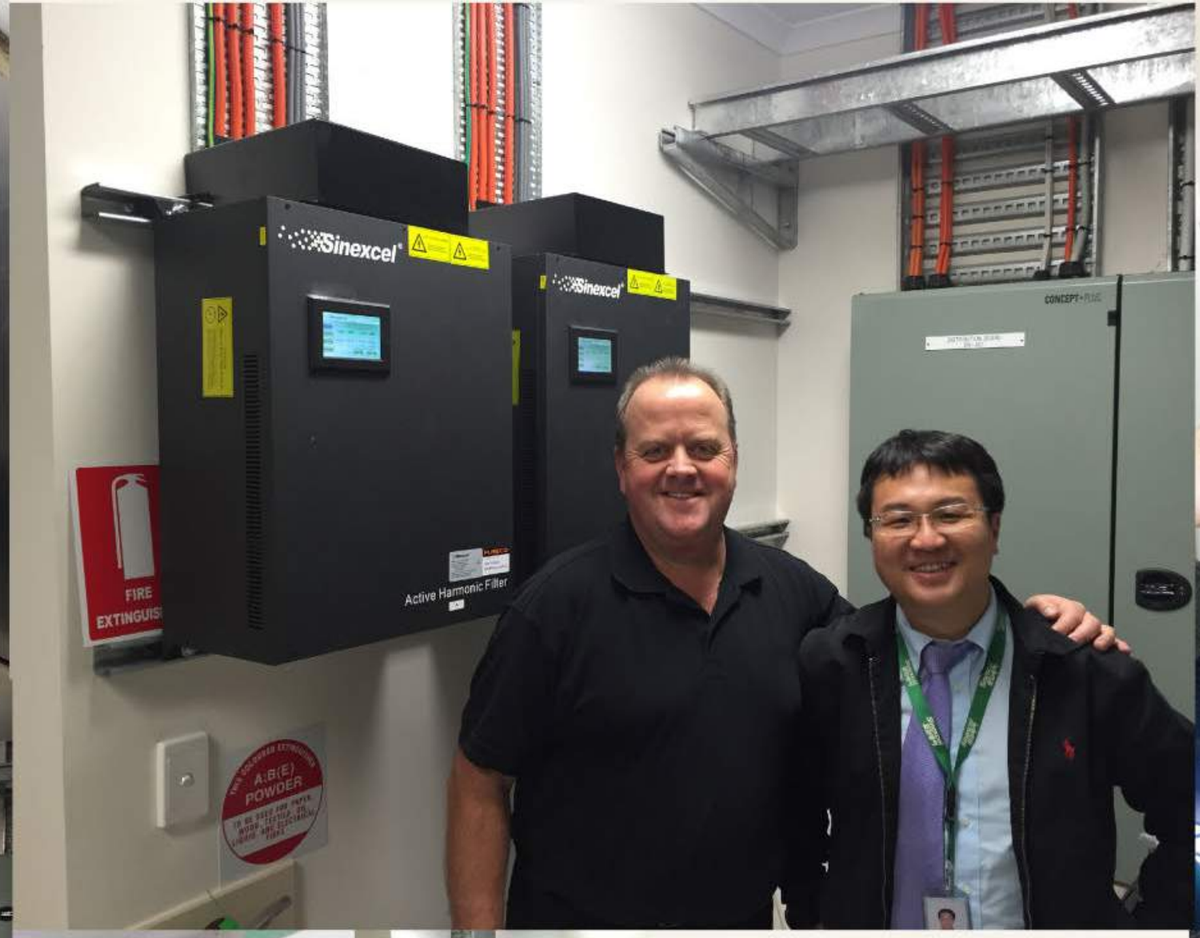
MONITORING



4.3-inch screen



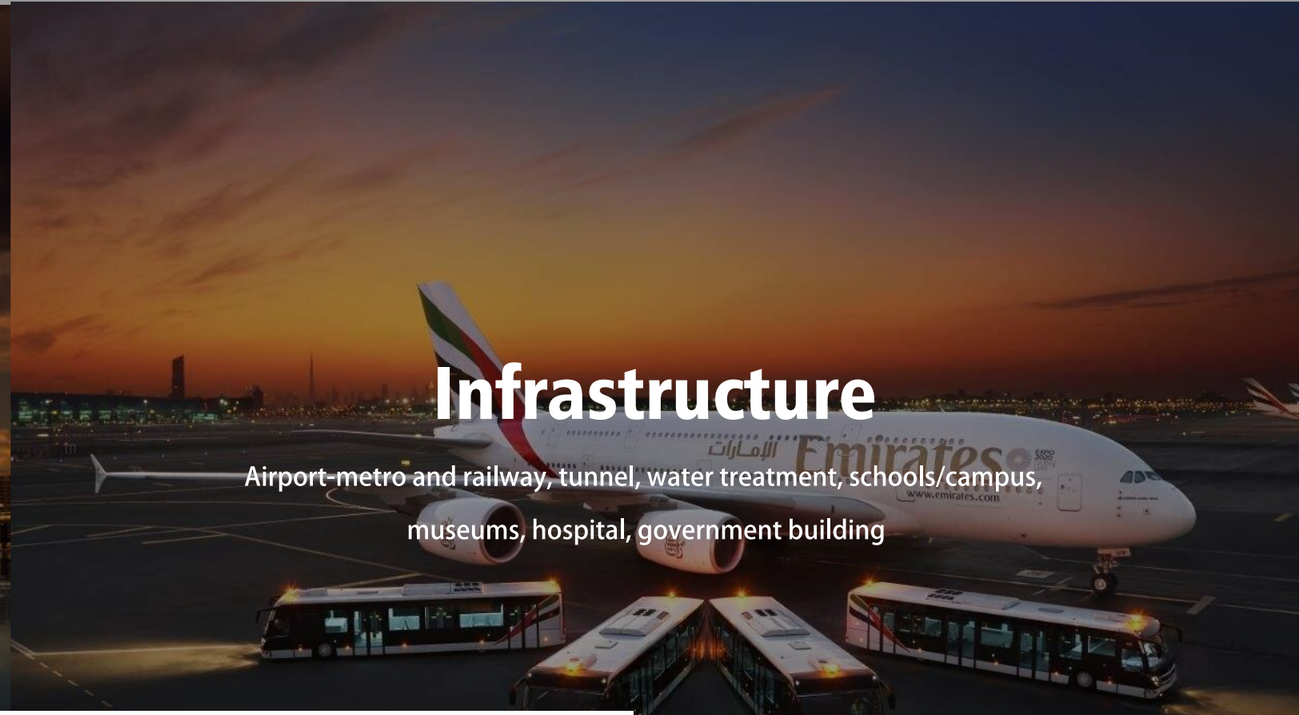
Centralized monitoring System



GLOBAL APPLICATION

Industrial Manufacturing

Food and beverage, plastic, paper, semiconductor, chemistry, pharmacy, paper, cement, oil drilling, automotive



Infrastructure

Airport-metro and railway, tunnel, water treatment, schools/campus, museums, hospital, government building

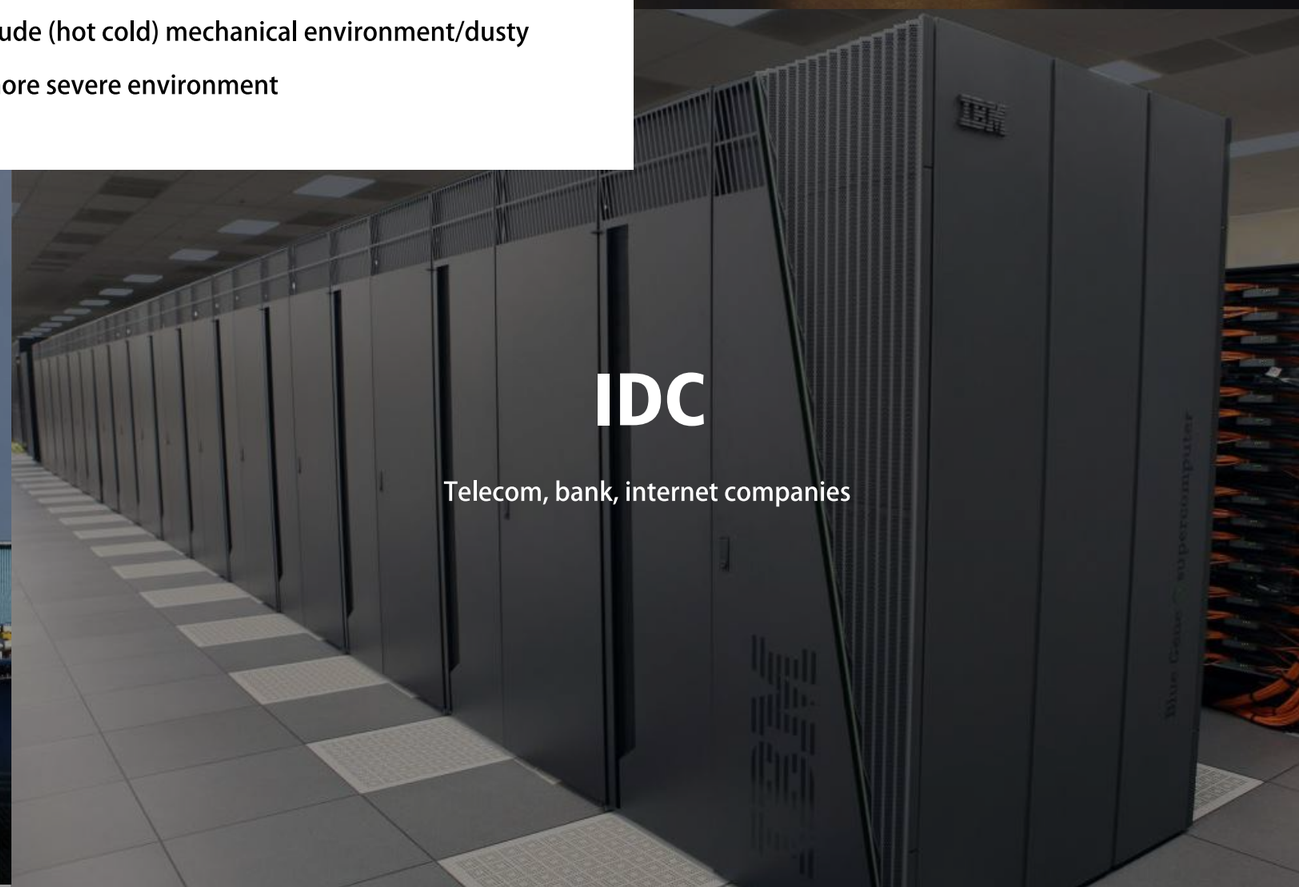
More than 2million Ampere installation around the world

Application cover Automation Manufacturing, Infrastructure, ECO building, IDC

Application cover indoor/outdoor, high altitude (hot cold) mechanical environment/dusty application, land/offshore severe environment

ECO Building

Skyscraper-Commercial building, shopping mall, apartments



IDC

Telecom, bank, internet companies

Canada, Hylife Food, AHF 1440A

The United Kingdom, Glabina cheese, AHF 350A

Industrial Manufacturing

Infrastructure

Australia, Sydney Opera house, AHF 200A

China, Beijing Tian An Men Square, AHF 440

Hong Kong Airport, AHF 150A

Dubai Airport, AHF 700A

Singapore Airport, AHF 150A

Goteborg Airport, SVG 270kVAr by invert based PQ

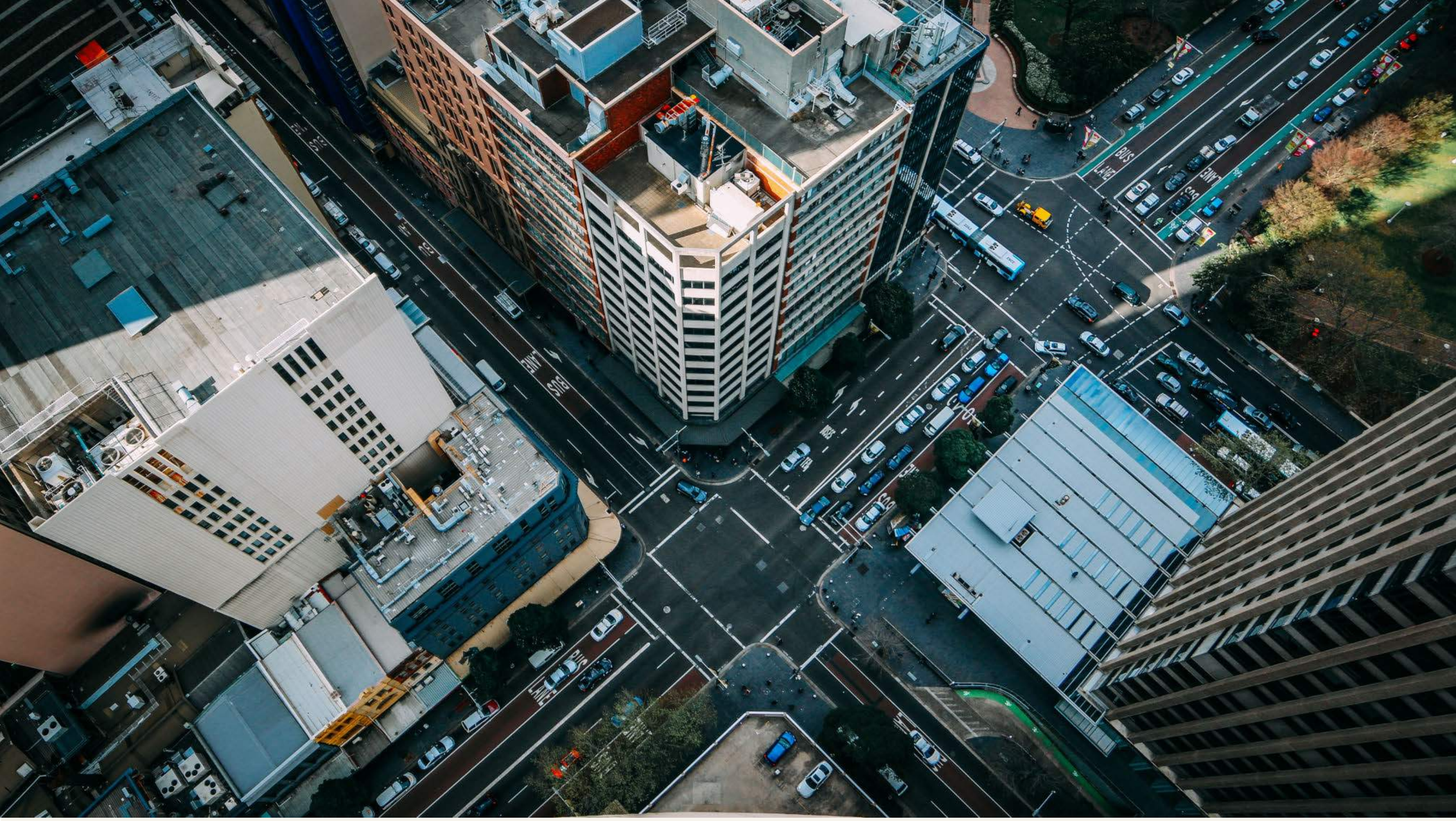
ECO building

Singapore, Microsoft Headquarter of Southeast Asia, AHF 1800A

IDC

South Korea
Daegu bank AHF 150A/SVG 400kVAr

HongKong(China)
China Unicom Data Centre, AHF 4425A



GLOBAL APPLICATION

Sinexcel AHF application covers Asia, Oceania, Europe, Africa, North America, South America.