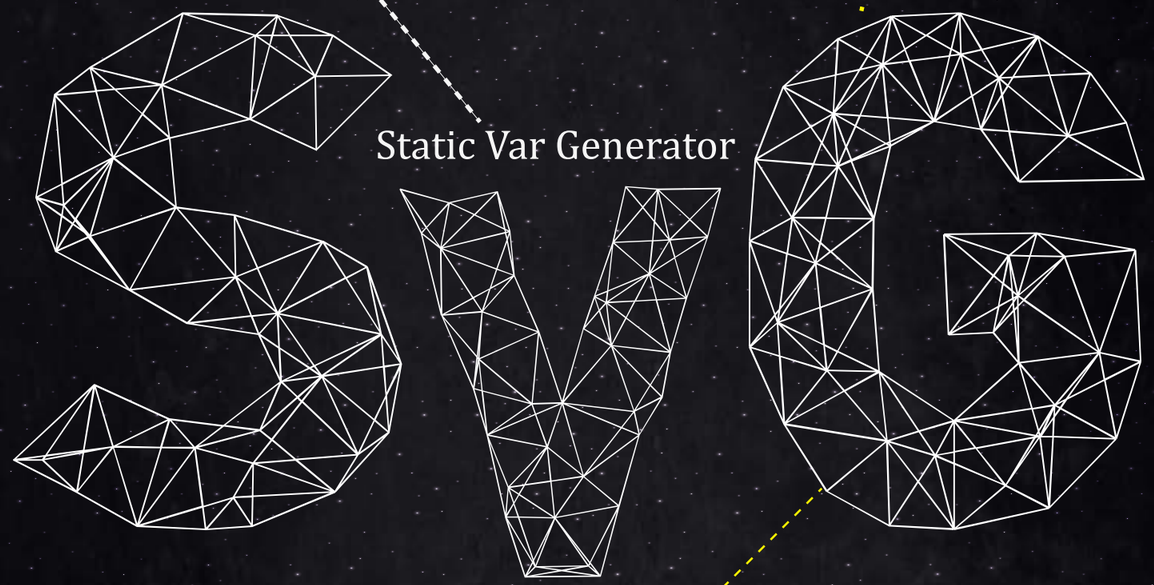
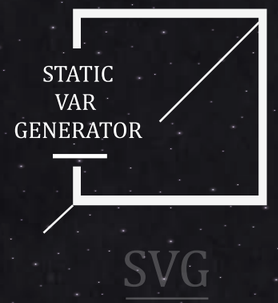
Sinexcel

inverter base PFC solution

Power quality





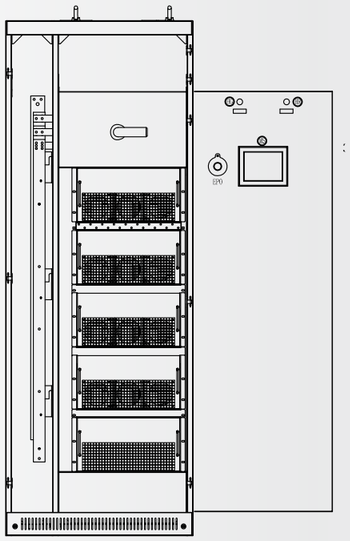
SVG

Maintenance Free

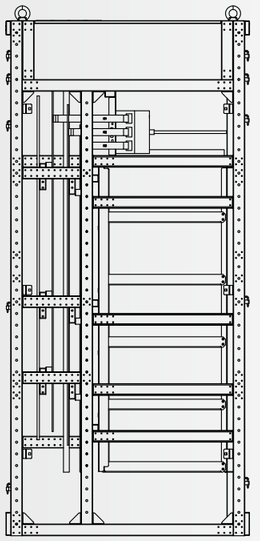
PF 0.99

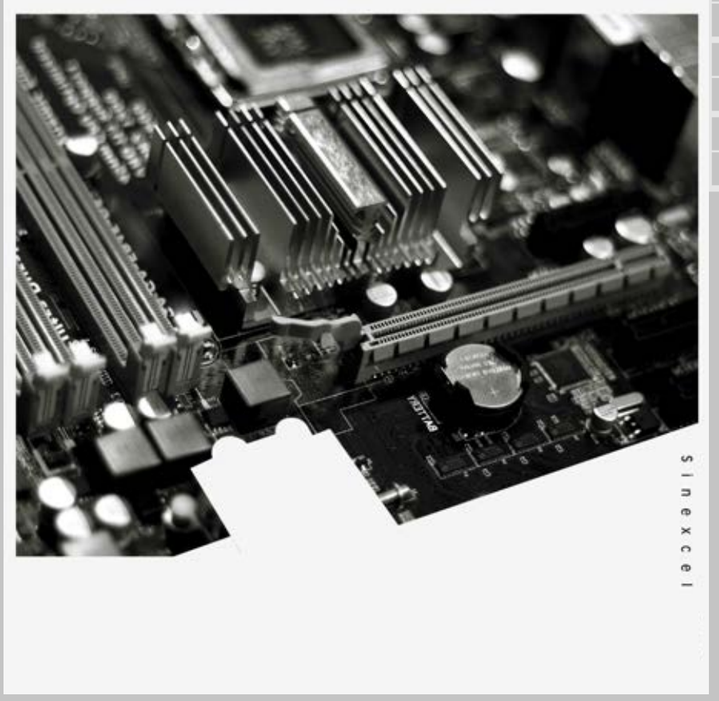
Stepless PFC

Front View

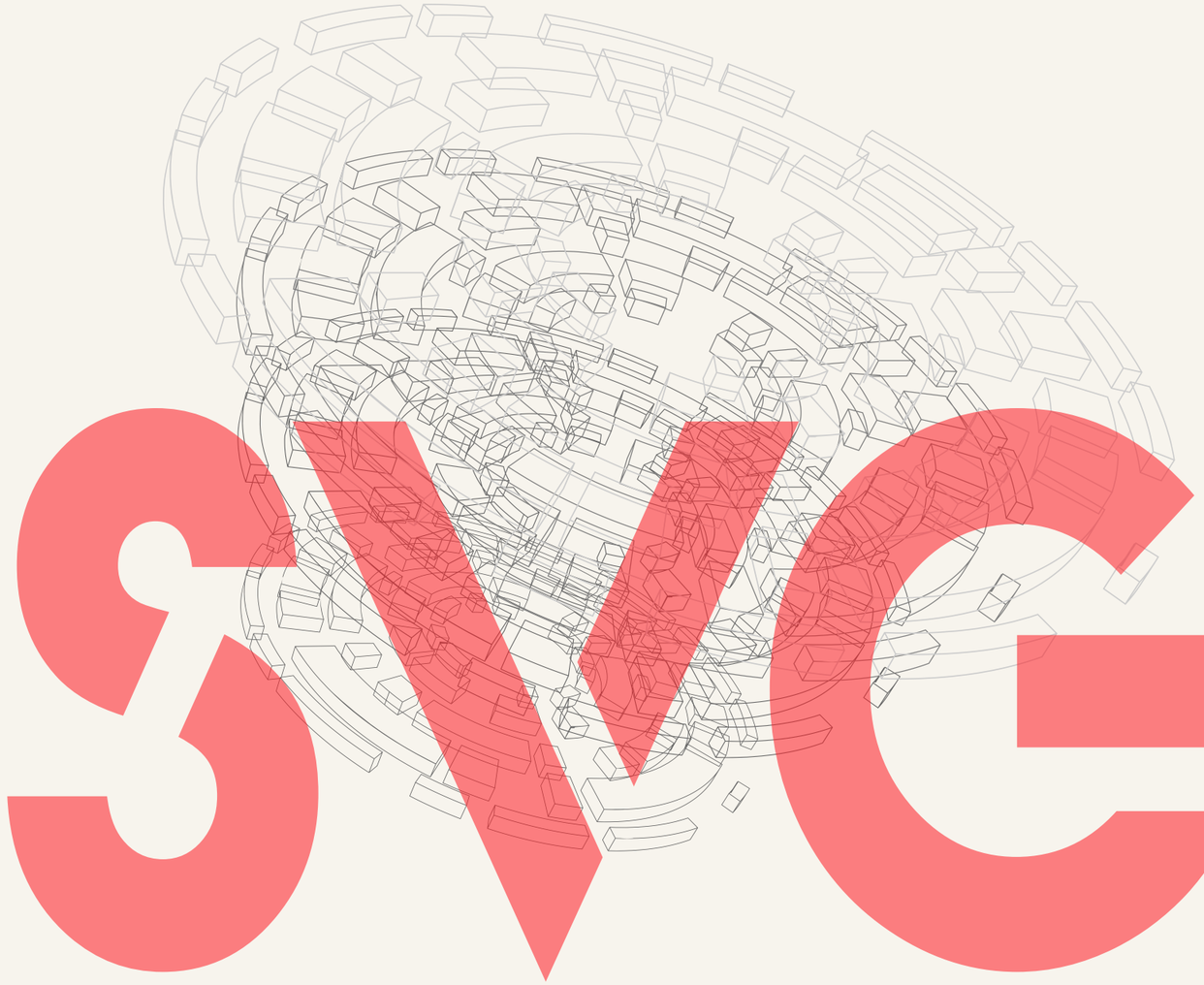


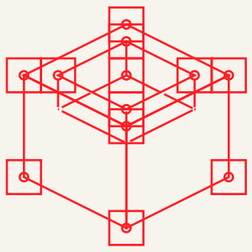
Left Side View





Static Var Generator



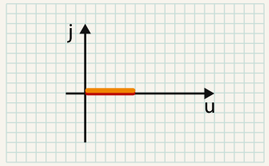


Static Var Generator
SVG, reactive power compensation
SVG , with the idea of being used as a component , could compensate both inductive and capactive loads to achieve PF 0.99 and avoid under and over compensation.

REACTIVE POWER COMPENSATION

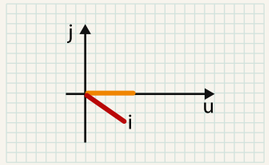
Different compensation models for different loads

★ Current
Voltage
Compensation Current



RESISTIVE LOAD

RESISTIVE LOAD such as filament lamp in vector gram,
load appears resistive when current and voltage are phase congruency.

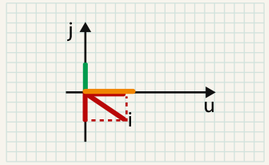


Inductive load

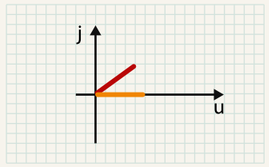
INDUCTIVE LOAD such as motor, compressor, relay and transformer.

1、Current of inductors lags voltage

In vector gram, anticlockwise direction is set to be positive direction and U direction as the horizontal direction. Load appears inductive and resistive when I is within 0 to -90 degree.



SVG generates capacitive current to neutralize inductive content of the load, achieving the performance for current and voltage phase congruency.

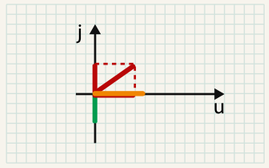


Capacitive load

CAPACITIVE LOAD such as capacitor bank

2、 Current of capacitors leads voltage

In vector gram, anticlockwise direction is set to be positive and U direction as the horizontal direction. Load appears capacitive and resistive when I is within 0 to 90 degree.

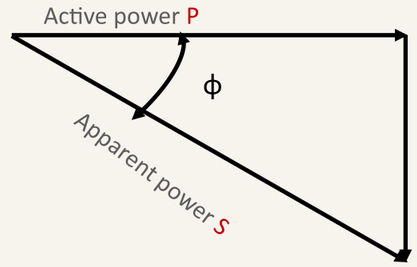


SVG generates inductive current to neutralize capacitive content of the load, achieving the performance for current and voltage phase congruency.

POWER FACTOR

Optimize your reactive power compensation efficiency

Active power, reactive power, Apparent power and power factor



$P^2+Q^2=S^2$

Power factor Cos ϕ

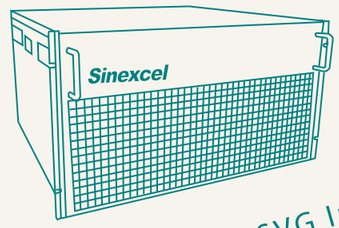
$$\cos\phi = \frac{P}{S}$$

Benefit from PFC

★ Avoid penalty for low PF by utility company

★ Reduce electric power loss

★ Release system capacity occupied by reactive power and increase usage effectiveness of system capacity.

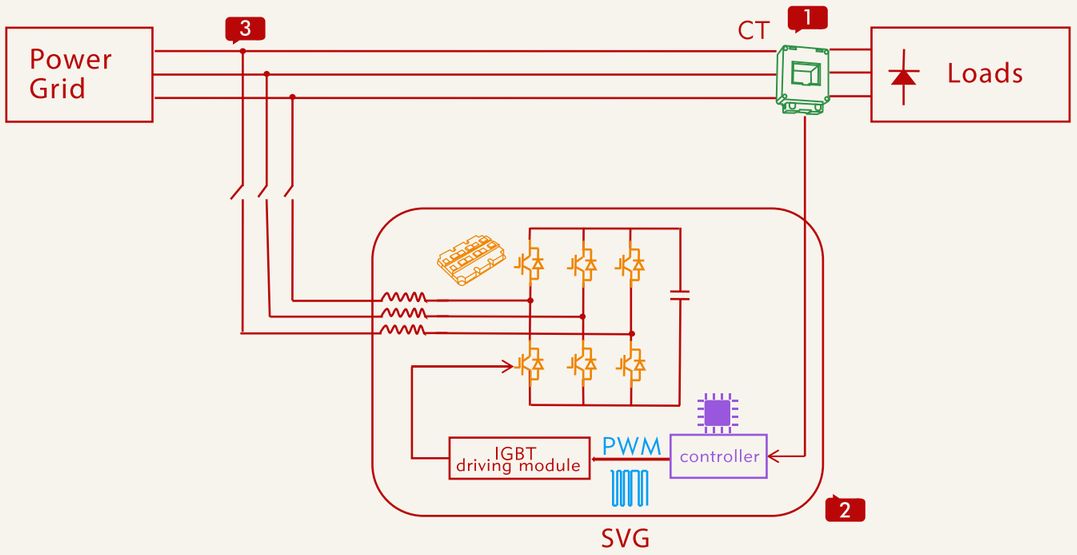


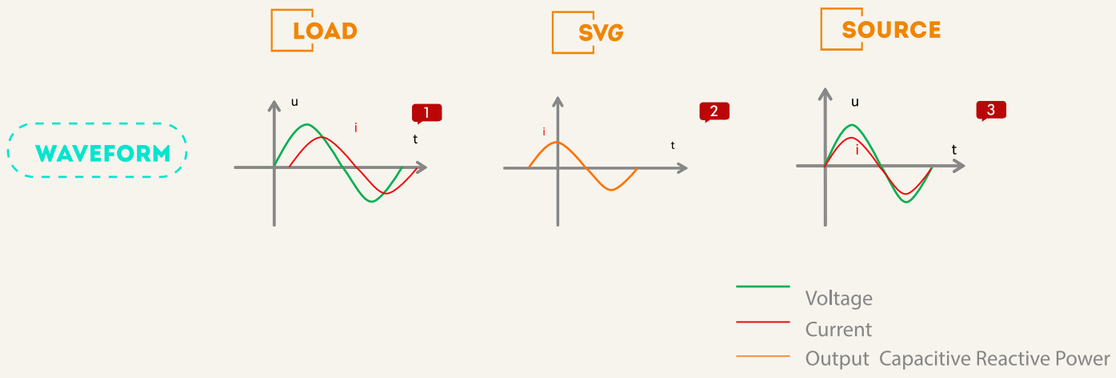
SVG Inverter Base

SVG WORKING PRINCIPLE

Optimize your reactive power compensation efficiency

External CT detects the load current. DSP as CPU has advanced logic control arithmetic, could quickly track the instruction current, divides the load current into active power and reactive power by using the Instantaneous Reactive Power Algorithm, and calculates the reactive power change rate rapidly and accurately, then sends PWM signal to IGBT's driver board to control IGBT on and off at average 20kHz frequency. Finally inductive or capacitive power compensation current is generated on inverter inductor, at the same time CT also 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.





External CT functionsas eye
Detects the load current

DSP as CPU has advanced logic control arithmetic, could quickly track the instruction current, divides the load current into active power and reactive power by using the Instantaneous Reactive ower Algorithm, and calculates the reactive power changing rate

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.

DSP functions as brain
Analyzes and calculates the reactive power content of the load current

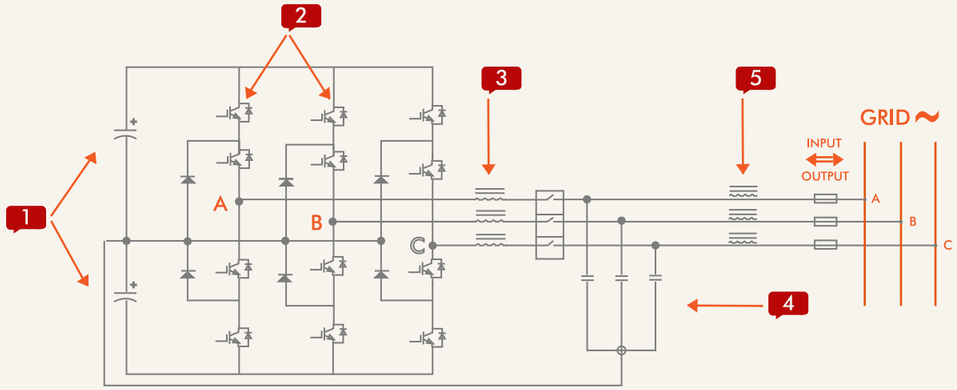
DSP sends PWM signal to drive IGBT and control IGBT on and off at average 20kHz frequency.

IGBT functions as heart
Generates inductive or capacitive reactive power compensation current on inverter Induction

Realize accurate reactive power compensation

UNDERSTAND HOW SVG COMPENSATES REACTIVE POWER

Optimize your reactive power compensation efficiency



DC bus capacitor

1

DC bus capacitor , AC to DC rectifier storage

IGBT

2

Controlled by DSP software algorithm, IGBT on-off timing selection and length could control inverter to generate an accurate reactive power compensation current.

Inverter Induction

3

IGBT Compensates inductive reactive power or capacitive reactive power by controlling inverter inductor to generate capacitive or inductive current to achieve bidirectional reactive power compensation.

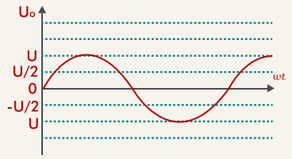
LC filter circuit

4

high frequency inductor

5

Both are 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 SVG

PFC Performance

PFC performance PF 0.99

Step-less compensation without over-compensation and under-compensation, SVG compensates specific capacity that system needs.

Full PFC process within 15ms and maintain at PF 0.99 no matter how the system reactive power changes.

Compensation of inductive reactive power and capacitive reactive power.

The voltage of the grid has poor influence on SVG compensation capacity as SVG is like a current source.

Maintenance free, safe and easy to use

Could work under high THDu up to 15%, no capacitor explosion risk and no safety accident .

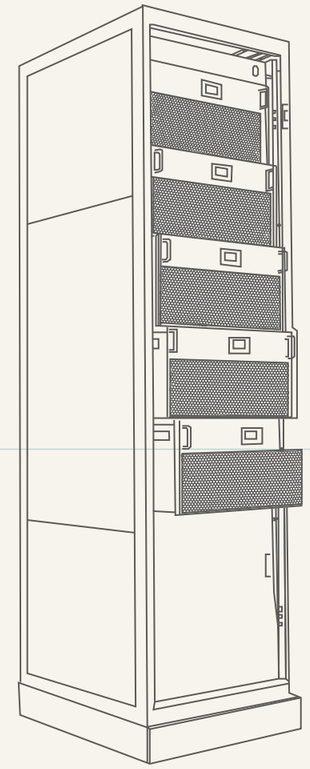
Minimal loss, maintenance-free and no need to replace cap bank every certain time.

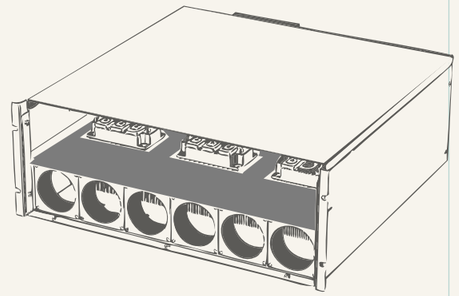
MTBF (mean time between failures) up to 100,000 hours, helps consumers lower the cost .

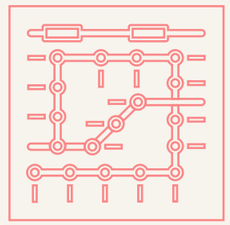
Advanced technology and easy to use with HMI monitor

Space and Capacity

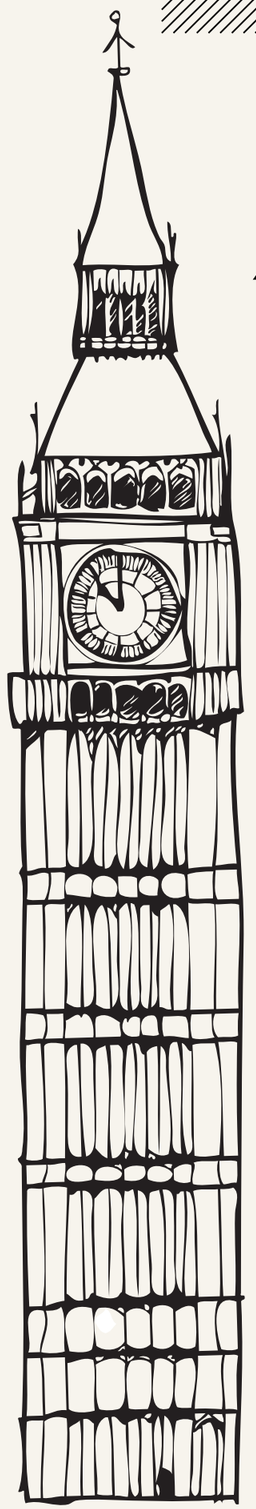
Minimal footprint to save more than 70% space compared with cap bank.







SVG Inverter Base

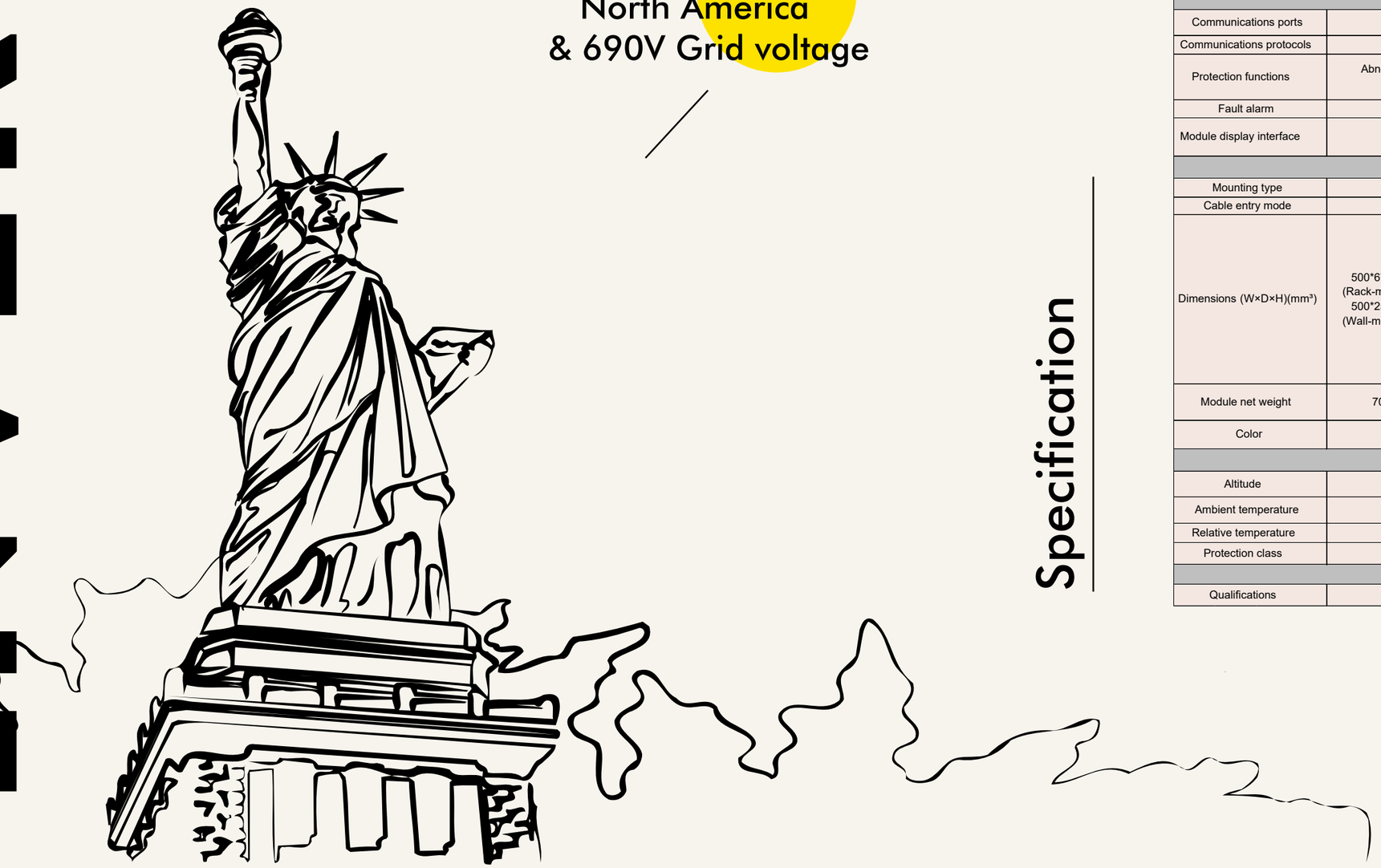


400V Grid Voltage

Specification

Item	400V				Integrated large capacity SVG		
	Sinexcel SVG 030	Sinexcel SVG 050	Sinexcel SVG 100	Sinexcel SVG 200	Sinexcel SVG 480	Sinexcel SVG 600	Sinexcel SVG 690
System Parameter							
Input phase voltage range	228V~456V				384V~576V	480V~720V	552V~759V
Power grid frequency	50Hz/60Hz (range:45Hz~62Hz)						
Parallel operation	Unlimited				4 units		
Overall efficiency	>97%				>99% (at 50 % inductive load)		
Power grid structure	3P3W/3P4W				3P3W		
CT Ratio	150/5~30,000/5			600/5~10000/5	800/5~10,000/5		
Circuit topology	3-Level						
Performance Indicator							
Rated capacity	30kvar	50kvar	100kvar	200kvar	480/960/1440/1920/2400kvar	600/1200/1800/2400/3000kvar	690/1380/2070/2760/3450kvar
Function	Reactive power compensation, Three phase balancing, Voltage regulation						
Response time	<15ms				<40ms		
Target power factor	-1 to +1						
Cooling air requirement	240CFM	481CFM	825CFM	1060CFM	Smart air cool ing:5040CFM(*1-4)		
Noise level	<65dB			<75dB	<70dB		
Communication & Monitoring Capability							
Communications ports	RS485, CAN (reserved), Ethernet port (RJ45)				RS485, Ethernet port (RJ45)		
Communications portocols	Modbus						
Protection functions	Abnormal voltage/frequency protection; Inverter short-circuit protection; Abnormal output current protection; Inverter over-loaded protection, Over-tempearture protection etc.						
Fault alarm	Available						
Module display interface	4.3-inch touch screen monitor and optional 7-inch touch screen centralized monitor				7-inch touch screen centralized monitor		
Mechanical Properties							
Mounting type	Wall-mounted/Rack-mounted/Cabinet				Fixed cabinet		
Cable entry mode	Rear entry for rack-mounted type Top entry for wall-mounted type Top or bottom entry for cabinet				Bottom entry		
Dimensions(W x D x H)(mm^3)	500*586*190 (Rack-mounted) 500*190*560 (Wall-mounted)		500x630x270 (Rack-mounted) 500x273x623 (Wall-mounted)	500*690*370 (Rack-mounted) 500*370*725 (Wall-mounted)	600*800*2200 1200*800*2200 1800*800*2200 2400*800*2200 3000*800*2200		
Module net weight	36kg		48kg	110kg	500kg(one cabinet)		
Color	Wall mount aluminum-zincunted:RAL7035(gray),Rack mounted:original color				Cabinet design, inner modules are aluminum-zinc coated.		
Environment Requirement							
Altitude	≤1500m; Between 1500m to 4000m, derating 1% every additional 100m.						
Ambient temperature	-10℃~40℃ (may derate capacity if ambient temperature exceeds 45℃)						
Relative humidity	5%~9 5%,non-condensing						
protection class	IP20(other IP degrees are customizable)						
Related Qualifications & Standards							
Qualifications	CE				CE		

North America & 690V Grid voltage



Specification

Item	208V	480V	600V	690V
	Sinexcel SVG 35	Sinexcel SVG 40/80	Sinexcel SVG 50/100	Sinexcel SVG 50/120
System Parameter				
Input phase voltage range	208V(176V~264V)	384V~552V	420V~690V	483V~793V
Power grid frequency	50Hz/60Hz(range:45Hz~66Hz)			
Parallel operation	Unlimited			
Overall effciency	≥97%			
Power grid structure	3P3W/3P4W			
CT Ratio	150/5~30,000/5			
Circuit topology	3-Level			
Performance Indicator				
Rated capacity	35kvar	40/80kvar	50/100kvar	50/120kvar
Function	Reactive power compensation, Three phase balancing, Voltage regulation			
Response time	<15ms			
Target power factor	Adjustable from-1 to+1			
Cooling air requirement	761CFM	725CFM(40kvar) 761CFM(80kvar)	725CFM (50kvar) 761CFM (100kvar)	725CFM (50kvar) 761CFM (120kvar)
Noise level	<65dB			
Communication & Monitoring Capability				
Communications ports	RS485, CAN(reserved), Ethernet port(RJ45)			
Communications protocols	Modbus			
Protection functions	Abnormal voltage/frequency protection; Inverter short-circuit protection; Abnormal output current protection; Inverter over-loaded protection; Over-tempearture protection etc,.			
Fault alarm	Available			
Module display interface	7-inch touch screen centralized monitor(rack-mount) and 4.3-inch touch screen monitor(wall-mount)			
Mechanical Properties				
Mounting type	Wall-mounted/Rack-mounted/Cabinet			
Cable entry mode	Top and bottom entry for cabinet			
Dimensions (W×D×H)(mm³)	500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)	For 40kvar 500*540*180 (Rack-mounted) 500*184*627 (Wall-mouned) For 80kvar 500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)	For 50kvar 500*540*180 (Rack-mounted) 500*184*627 (Wall-mouned) For 100kvar 500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)	For 50kvar 500*540*180 (Rack-mounted) 500*184*627 (Wall-mouned) For 120kvar 500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)
Module net weight	70kg	40kg(40kvar) 70kg(80kvar)	40kg(50kvar) 70kg(100kvar)	40kg(50kvar) 70kg(120kvar)
Color	Wall mounted: RAL7035(gray), Rack mounted: original color of aluminum-zinc			
Environment Requirement				
Altitude	≤1500m; Between 1500m to 4000m, derating 1% every additional 100m			
Ambient temperature	-20℃~40℃(may derate capacity if ambient temperature exceeds 45℃)			
Relative temperature	5%~95%, non-condensing			
Protection class	IP20(other IP degrees are customizable)			
Related Qualifications & Standards				
Qualifications	CE, cULus			

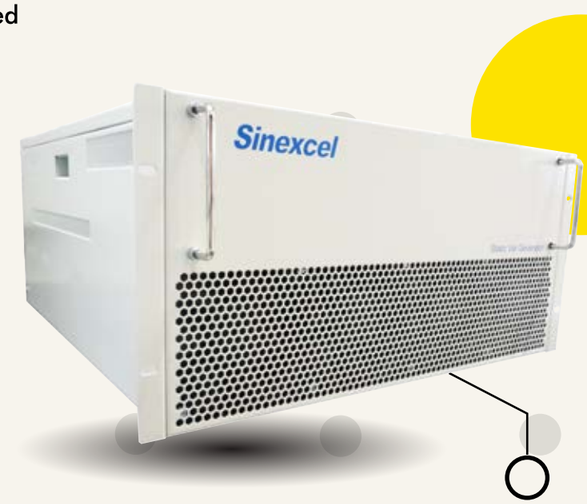
INVERTER

S

400V

30kvar/50kvar/Wall-mounted
500*190*560mm³ / 36kg

100kvar/Wall-mounted
500*273*623mm³ /48kg



30kvar/50kvar/Rack-mounted
500*586*190mm³ /36kg

100kvar/Rack-mounted
500*273*623mm³ /48kg

400V

200kvar wall/rack
500*690*370 mm³ 110kg

INVERTER S

400V

Flexible Engineering Cabinet

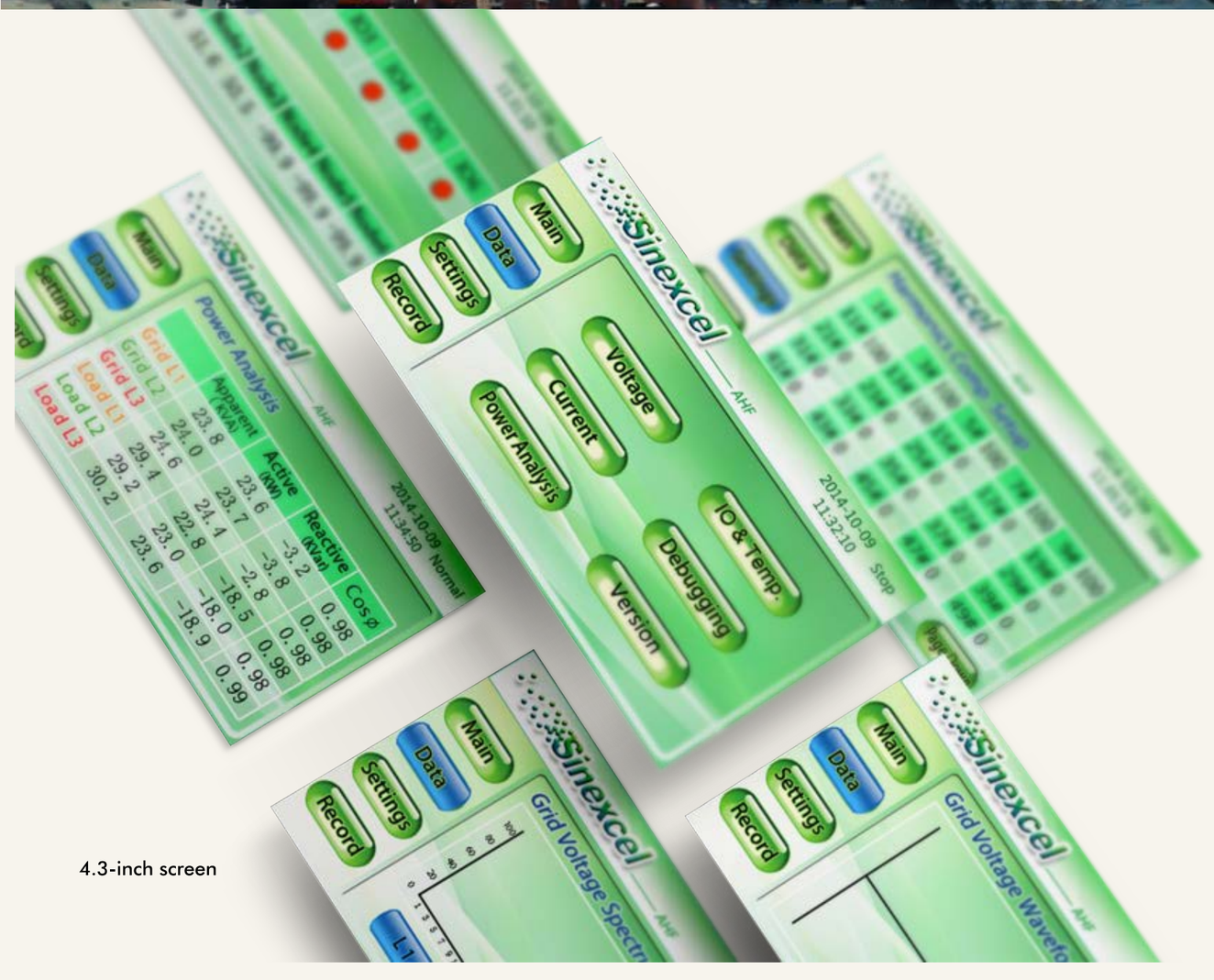
- Flexible dimension
  600*1000*2200mm^3,800*1000*2200mm^3,800*800*2200mm^3,1000*1000*2200mm^3 are available.
- Flexible capacity
  AHF, 25A/35A/50A/60A/75A/100A/150A/300A adapt to cabinet
  SVG, 30kvar/50kvar/100kvar/200Kvar adapt to cabinet
  AHF, SVG modules adapt to cabinet
- Flexible incoming connection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

400V

400V SVG PLUG TYPE CABINET

One plug type cabinet could hold five 100kvar modules to achieve 500kvar .
The plug type cabinet has built-in module which can be easily removed and added.
The dimension of plug type cabinet: 600*800*2200mm.

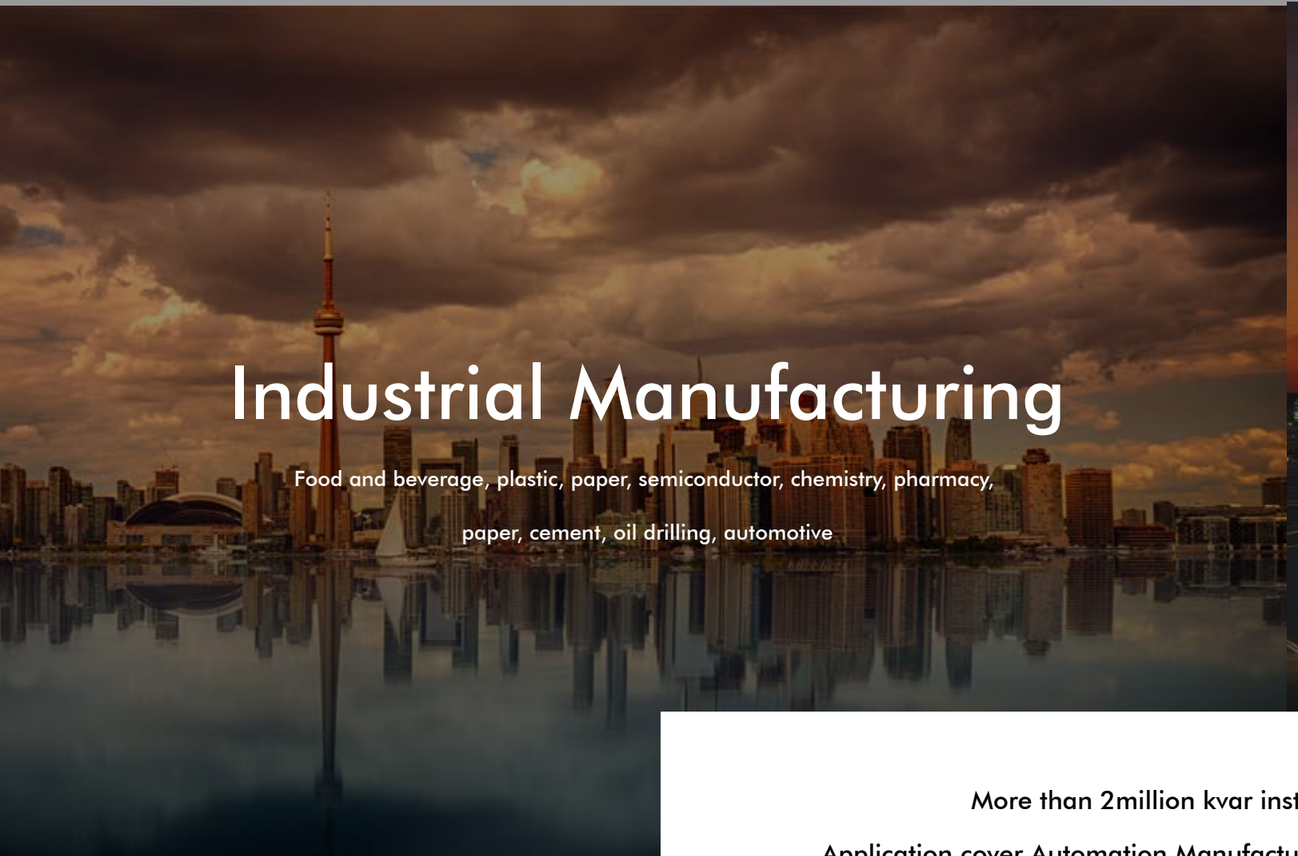
MONITORING



4.3-inch screen

Centralized monitoring System

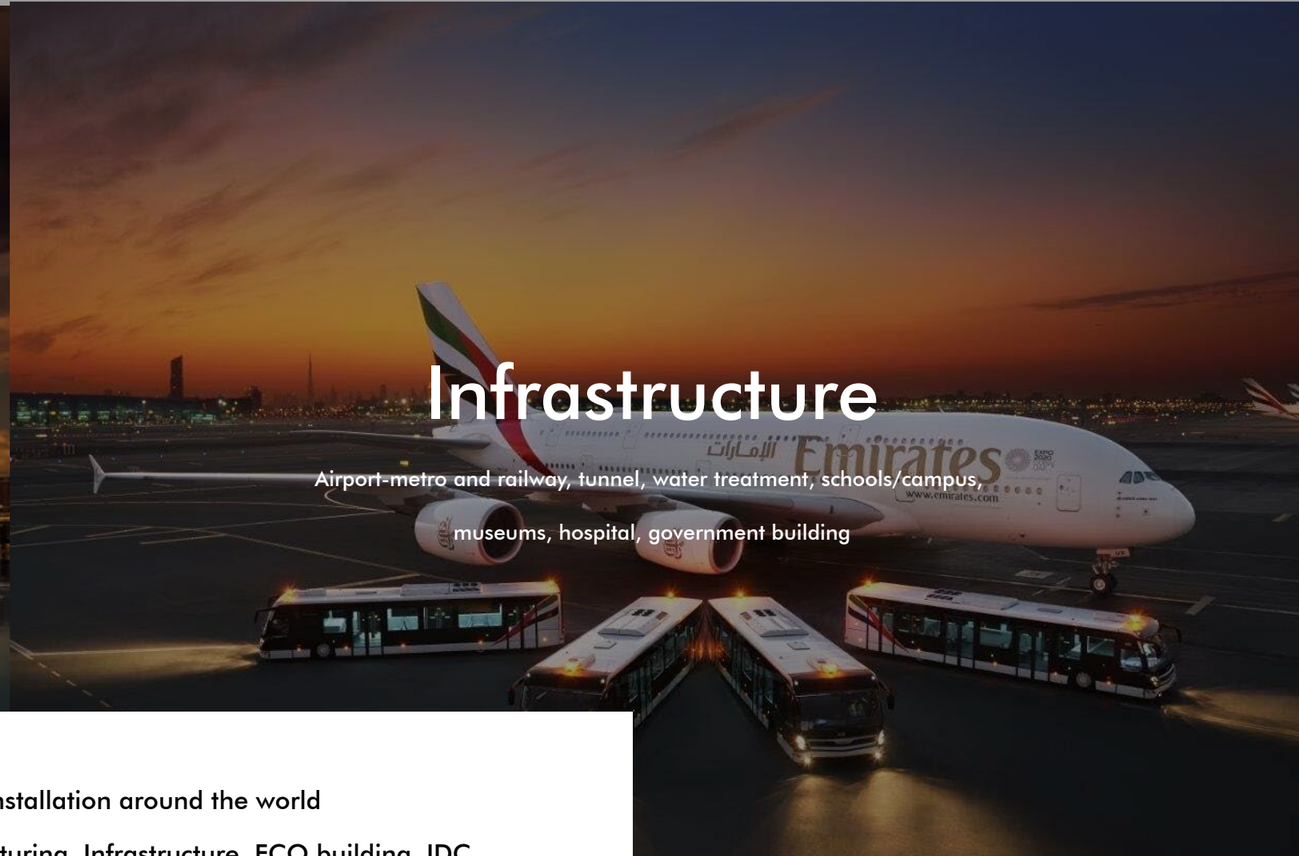
GLOBAL APPLICATION



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 kvar installation around the world

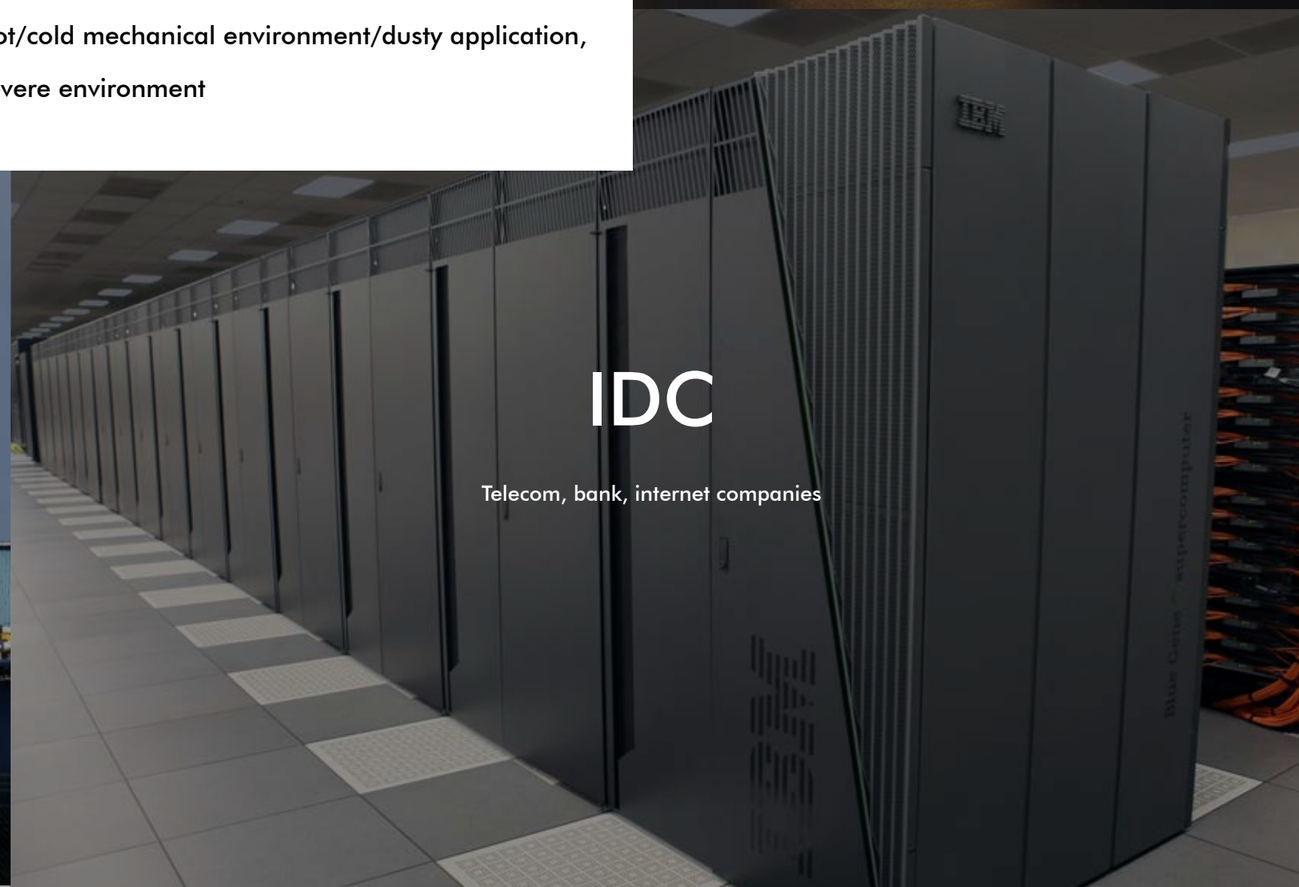
Application cover Automation Manufacturing, Infrastructure, ECO building, IDC

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

China, Coca Cola, SVG 150kvar

Industrial Manufacturing

Malaysia, Perodua, SVG 1800kvar
Welding process load changes too fast,capacitor bank can not switch in.

Thailand, Mitrphol Sugar, 2500kvar SVG
The biggest sugar manufacture in the world,
motor load change fast at sugar crane crush process capbank can not switch in

Thdi 5%
Thdu5%

New Zealand, Parliament Library, SVG 200kvar
John Fulton was taking photo for SVG performance,
because he was surprised at the consistent Cos fi 0.99 by SVG

Australia, Griffith University, SVG 4300kvar
A very big campus with many transformers,
some challenge SVG installations are 200M from coast with high corrosion by IP54 outdoor SVG

Infrastructure

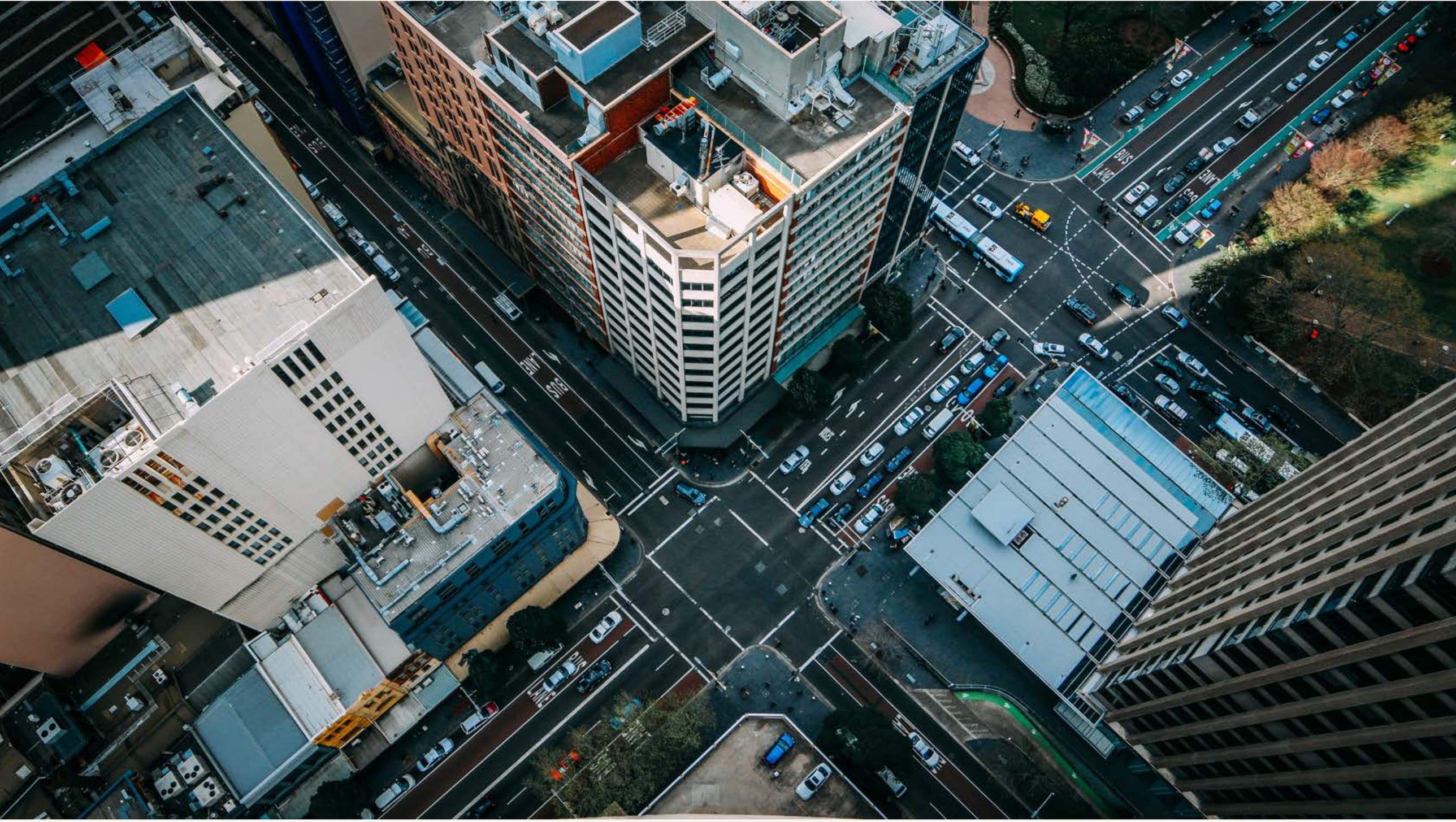
IDC

Hong Kong, China, NTT Data Centre, SVG 3500kvar
One of the most important data center in Asia, the stock market data of the US is running at this facility.
SVGs take charge of both lagging and leading PF from UPS, fully protect the normal operation of the mainframe.

ECO building

Hong Kong, China, Far East Financial Centre, SVG 100kvar
High speed lift keeps running up and down which generates very dynamic current,
SVG 15ms full response time easily covers the fast changing current challenge and realizes cos fi 0.99

Sri Lanka, industrial, SVG, Prima Flour Mill Powder



GLOBAL APPLICATION

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