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Reactive Power Generator

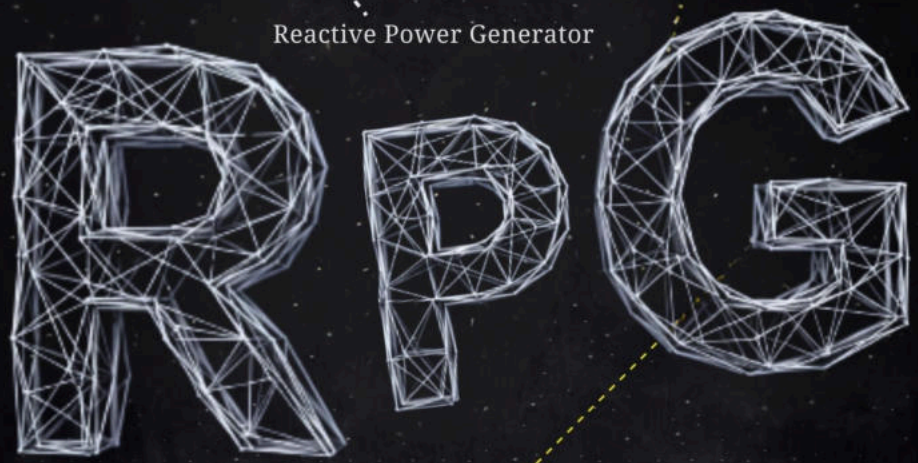
RPG

www.purityelec.com

inverter base PFC solution

Power quality

Reactive Power Generator



Maintenance Free

Stepless

Reactive Power Generator

PurityElec

Pure Energy, Smart Savings!

RPG

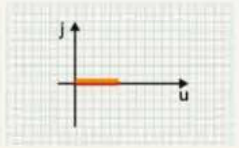
PurityElec's Reactive Power Generator

RPG, Reactive Power Generator
RPG, with the idea of using it as a component, could compensate both inductive and capactive loads to achieve PF 0.999 and avoid under and over compensation.

REACTIVE POWER COMPENSATION

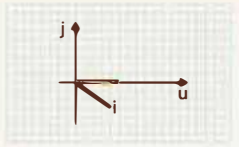
Different compensation model for different loads

* 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.

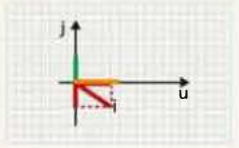


Inductive load

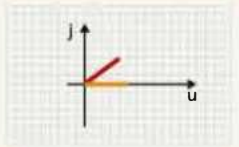
INDUCTIVE LOAD such as motor, compressor, relay and transformer.

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.



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

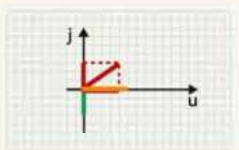


Capacitive load

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.

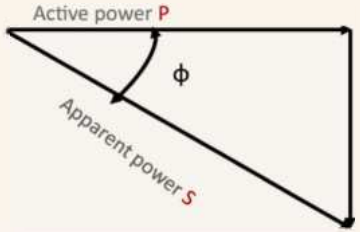


RPG generates inductive current to neutralize capacitive content of the load, achieving the performance for current and voltage phase congruency.

POWER FACTOR

Optimize your reactive power compensation efficiency

Active power, reactive power , Apparent power and power factor



Reactive power Q

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

Power factor Cos ϕ

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

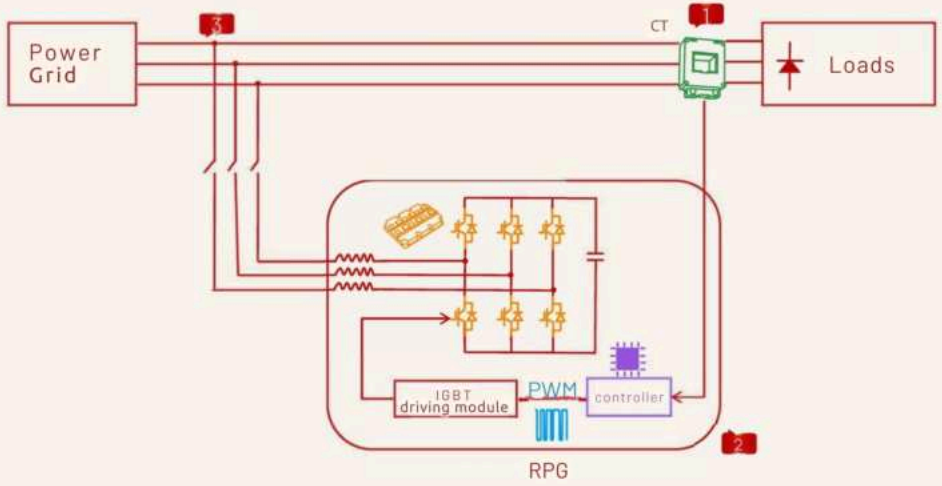
Benefit from PFC

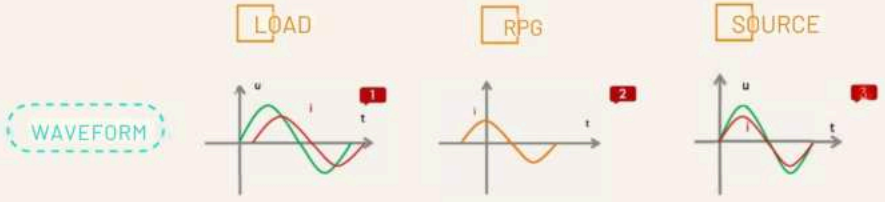
* Avoid penalty for low PF by Utility Company
* Reduce electric energy loss
* Release system capacity occupied by reactive power, increase usage effectiveness of system capacity.

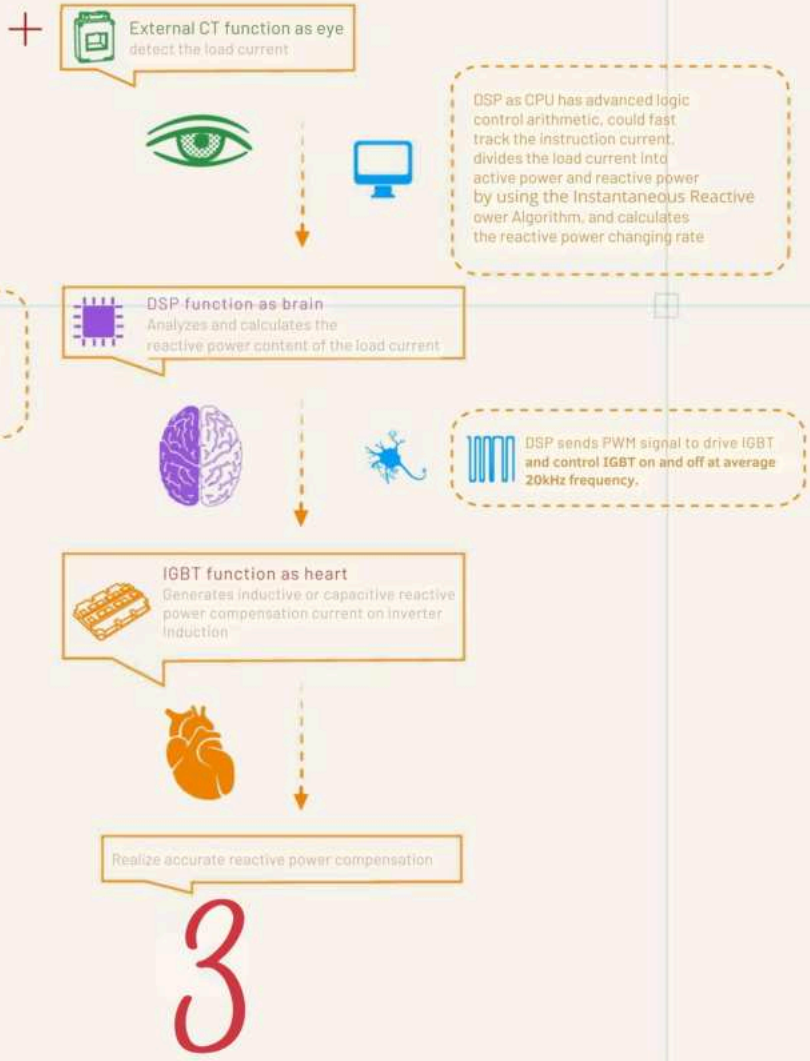
RPG WORKING PRINCIPLE

Optimize your reactive power compensation efficiency

External CT detects 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 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 induction, 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.

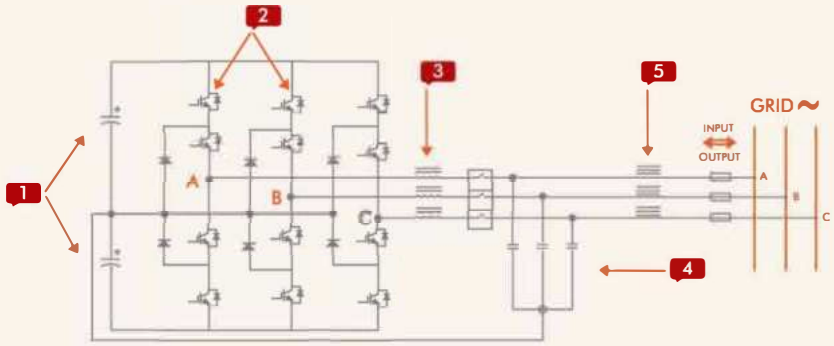






UNDERSTAND HOW RPG COMPENSATE REACTIVE POWER

Optimize your reactive power compensation efficiency



DC bus capacitor

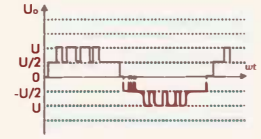
1

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 Compensating inductive reactive power or capacitive reactive power by controlling inverter induction to generate a capacitive current or inductive current to achieve bidirectional reactive power compensation.

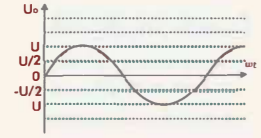
LC filter circuit

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

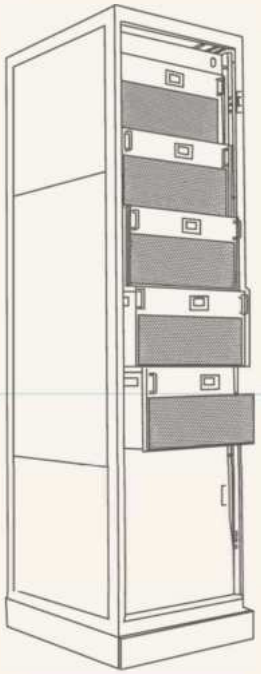
PFC performance 0.999

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

Full PFC process within 15ms and maintain at PF0.99 no matter how the system reactive power changes.

Compensation with inductive reactive power and capacitive reactive power.

The voltage of the grid has little influence on RPG compensation capacity as RPG 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 .

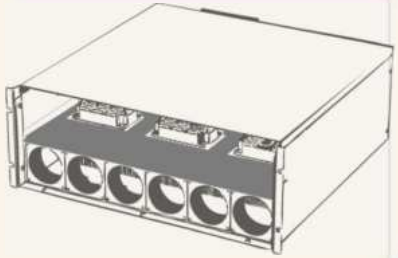
Minimal loss, maintenance-free and no need to replace cap bank every certain time.

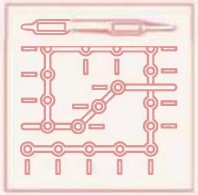
MTBF (mean time between failures) up to 100,000 hours, helps consumers lower the cost .

Advanced technology and easy to use with HMI monitor

Space and Capacity

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





RPG Inverter Base

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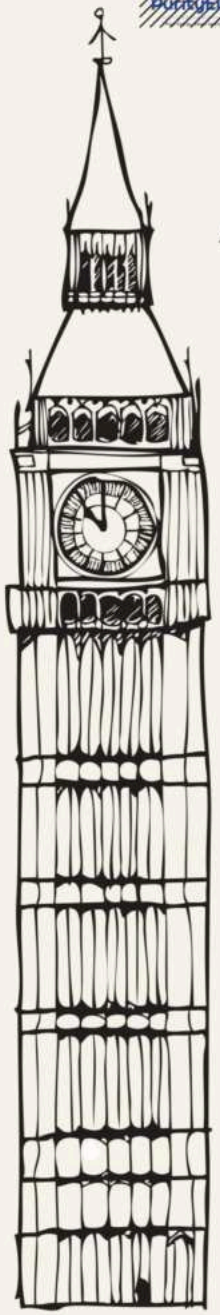

400V Grid Voltage

Specification

Item		
Input phase voltage range		
Power grid frequency		
Parallel operation		
Overall efficiency		
Power grid structure		
CT Ratio		
Circuit topology		
Rated capacity		
Function		
Response time		
Target power factor		
Cooling air requirement		
Noise level		
Communications ports		
Communications portocols		
Protection functions		
Fault alarm		
Module display interface		
Mounting type		
Cable entry mode		
Dimensions (W x D x H)(mm³)	Rack mount, LED	
	Rack mount, LCD	
	Wall mount, LCD	
Module net weight		
Color		
Altitude		
Ambient temperature		
Relative humidity		
protection class		
Qualifications		

400V				Integrated large capacity RPG		
PurityElec's RPG 030	PurityElec's RPG 050	PurityElec's RPG 100	PurityElec's RPG 200	PurityElec's RPG 480	PurityElec's RPG 600	PurityElec's RPG 690
System Parameter						
228V~456V				384V~576V	480V~720V	552V~759V
50Hz/60Hz(range:45Hz~62Hz)						
Unlimited				4 units		
>97%				>99% (at 50% inductive load)		
3P3W/3P4W				3P3W		
150/5~30,000/5		600/5~10000/5		800/5~10,000/5		
3-Level						
Performance Indicator						
30kvar	50kvar	100kvar	200kvar	480/960/1440/1920/2400kvar	600/1200/1800/2400/3000kvar	690/1380/2070/2760/3450kvar
Reactive power compensation, Three phase balancing, Voltage regulation						
<15ms				<40ms		
Adjustable from-1 to+1						
115L/Sec	222L/Sec	360L/Sec	500L/Sec	Smart air cooling: 5040CFM(*1-4)		
< 56dB	< 56dB	< 65dB	<75dB	<70dB		
Communication & Monitoring Capability						
RS485, CAN (reserved), Ethernet port (RJ45)				RS485, Ethernet port (RJ45)		
Modbus						
Abnormal voltage/frequency protection; Inverter short-circuit protection; Abnormal output current protection; Inverter over-loaded protection, Over-tempearture protection etc.						
Available						
4.3-inch touch screen monitor and optional 7-inch touch screen centralized monitor				7-inch touch screen centralized monitor		
Mechanical Properties						
Wall-mounted/Rack-mounted/Cabinet				Fixed cabinet		
Rear entry for rack-mounted type Top entry for wall-mounted type; Top or bottom entry for cabinet				Bottom entry		
500*515*180	500*546*190	500*605*269	500*722*370	600*800*2200/1200*800*2200/1800*800*2200/2400*800*2200/3000*800*2200		
500*515*180	500*586*190	500*630*269	500*722*370			
500*180*540	500*190*571	500*273*638	500*370*722			
23kg	28kg	44kg	110kg	500kg(one cabinet)		
Aluminium-Zinc alloy coated for rack mounted, LED type / RAL7035 for rack mount LCD and wall mounted type				Cabinet design, inner modules are aluminum-zinc coated.		
Environment Requirement						
≤1500m; Between 1500m to 4000m, derating 1% every additional 100m.						
-10℃~40℃(may derate capacity if ambient temperature exceeds 45℃)						
5%~95%,non-condensing						
IP20(other IP degrees are customizable)						
Related Qualifications & Standards						
CE				CE		

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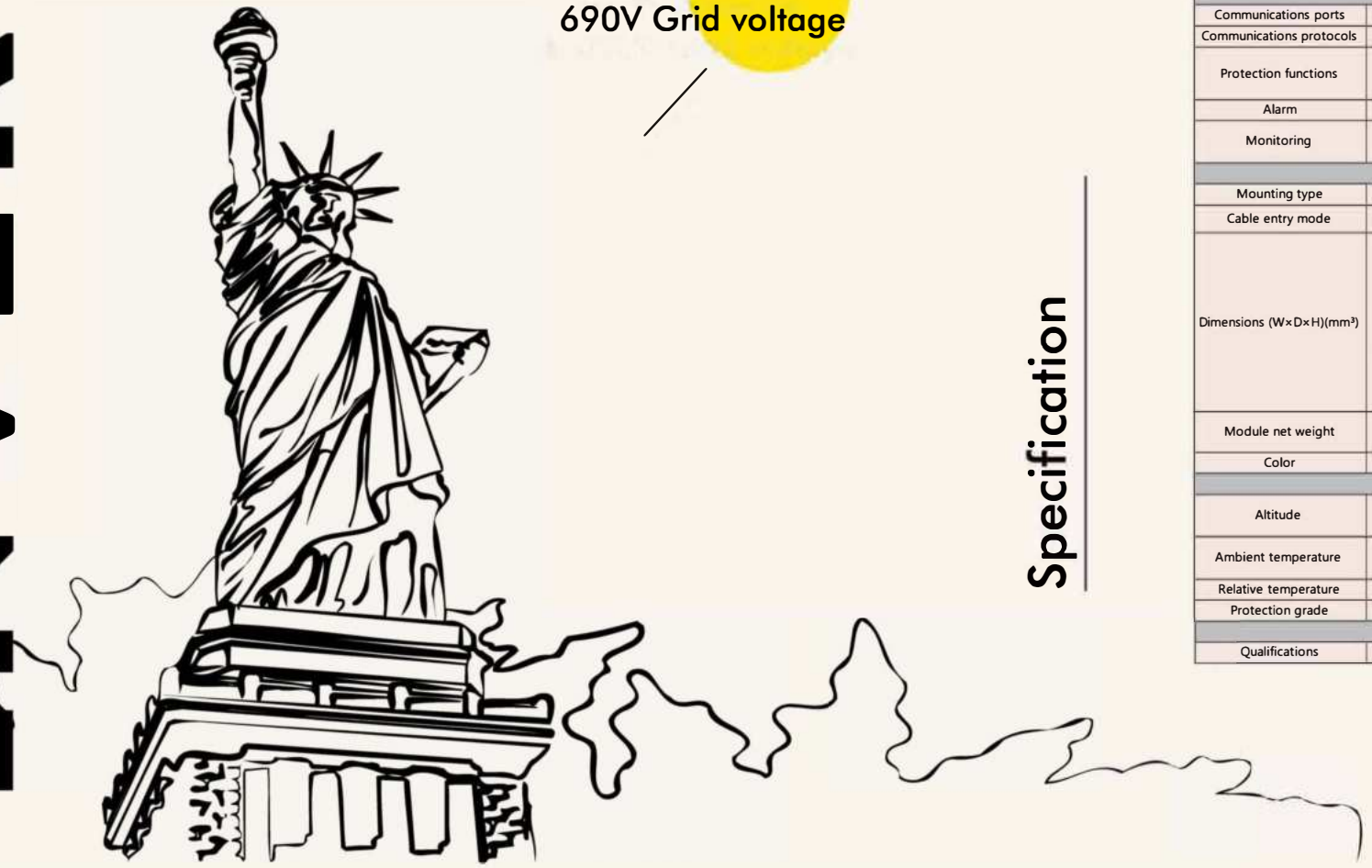
690V Grid voltage



Specification

Item	208V	480~690V		
	PurityElec's RPG 35	PurityElec's RPG 30/40/50/80	PurityElec's RPG 40/50/80/100	PurityElec's RPG 40/50/80/120
System Parameter				
Rated input line voltage	208V	480V	600V	690V
Input phase voltage range	220V(176V~264V)	384V~552V	420V~690V	483V~793V
Power grid frequency	50Hz/60Hz(range:45Hz~62Hz)			
Parallel operation	Unlimited			
Overall effciency	>97%			
Power grid structure	3P3W/3P4W			
CT	150/5~30,000/5			
Circute topology	3-Level			
Performance Indicator				
Single-module compensation capacity	35kvar	30/40/50/80kvar	40/50/80/100kvar	40/50/80/120kvar
Response time	<15ms			
Target power factor	Adjustable from -1 to +1			
Cooling mode	359L/Sec	342L/Sec (30/40kvar) 359L/Sec (50/80kvar)	342L/Sec (40/50kvar) 359L/Sec (80/100kvar)	342L/Sec (40/50kvar) 359L/Sec (80/120kvar)
Noise level per module	<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,.			
Alarm	Available			
Monitoring	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 30/40kvar 500*540*180 (Rack-mounted) 500*184*627 (Wall-mounted) For 50/80kvar 500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)	For 40/50kvar 500*540*180 (Rack-mounted) 500*184*627 (Wall-mounted) For 80/100kvar 500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)	For 40/50kvar 500*540*180 (Rack-mounted) 500*184*627 (Wall-mounted) For 80/120kvar 500*675*250 (Rack-mounted) 500*250*723 (Wall-mounted)
Module net weight	70kg	40kg (30/40kvar) 70kg (50/80var)	40kg (40/50kvar) 70kg (80/100var)	40kg (40/50kvar) 70kg (80/120var)
Color	RAL7035(gray)			
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 grade	IP20(other IP degrees are customizable)			
Related Qualifications & Standards				
Qualifications	CE, cETLus, cULus			

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400V

30kvar Wall-mounted
500*180*540mm³/23kg

50kvar Wall-mounted
500*190*571mm³/28kg

100kvar Wall-mounted
500*273*638mm³/44kg

30kvar Rack-mounted
500*515*180mm³/23kg

50kvar Rack-mounted
500*546*190mm³/28kg

100kvar Rack-mounted
500*605*269mm³/44kg

400V

200kvar Wall-mounted
500*370*722mm³/110kg

200kvar Rack-mounted
500*722*370mm³/110kg

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INVERTER

400V

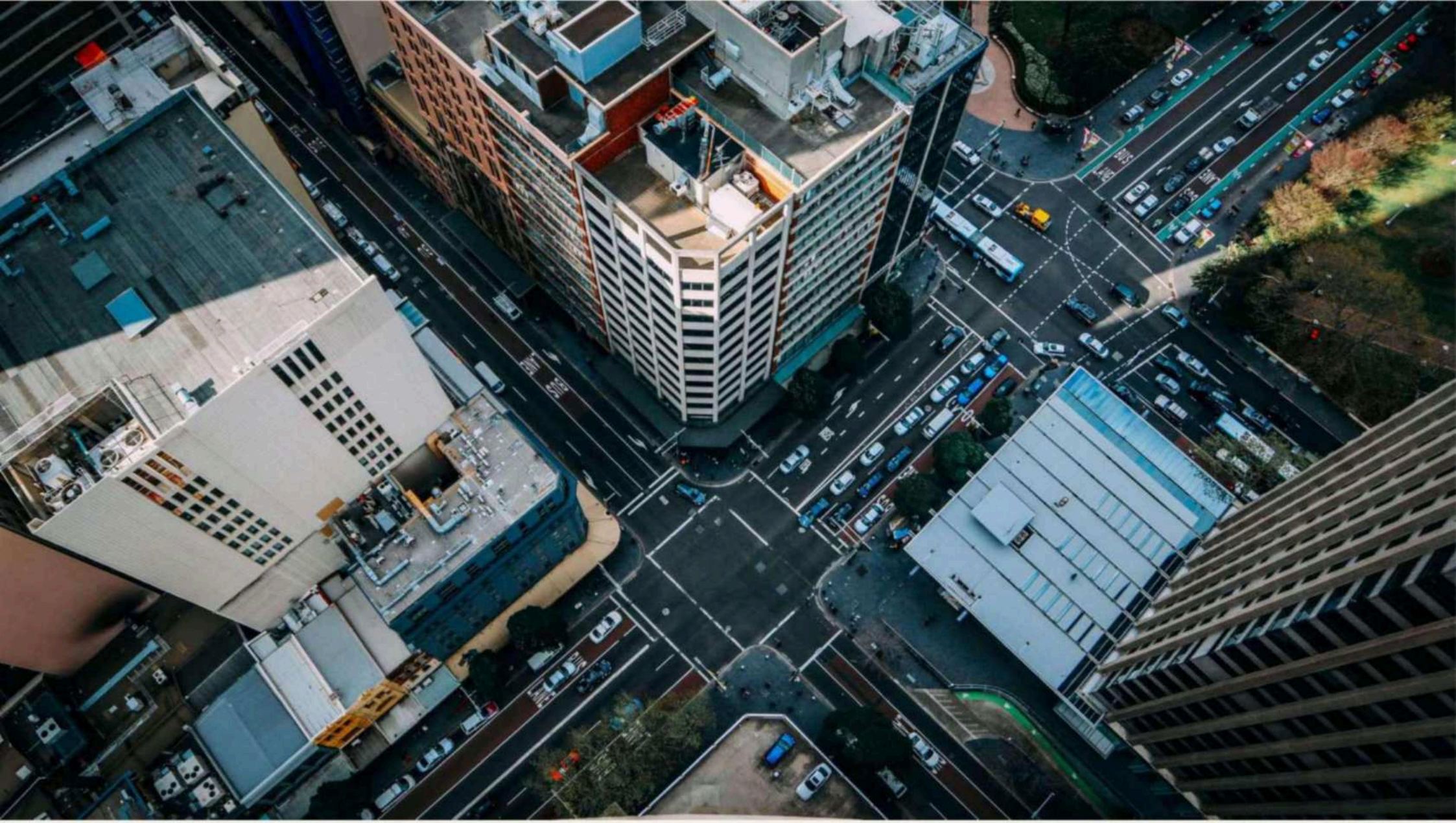
Flexible Engineering Cabinet

- Flexible dimension
  600*1000*2200mm3,800*1000*2200mm3,800*800*2200mm3,1000*1000*2200mm3 are available.
- Flexible capacity
  AHF, 25A/35A/50A/60A/75A/100A/150A/300A adapt to cabinet
  RPG, 30kvar/50kvar/100kvar/200Kvar adapt to cabinet
  AHF, RPG module adapt to cabinet
- Flexible incoming connection
  Top / Bottom cable entrance
  Top / Bottom MCCB position

400V

400V RPG 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.



Thank You!

(+91) 8588001002
(+91) 8588002004

001-002, 1st Floor, C1 Tower, Engineers Enclave
Haldoni Mod, Greater Noida - 201306 (U.P.)

www.purityelec.com

support@purityelec.com
sales@purityelec.com

PurityElec