







**K** Solare *Since 2012..*

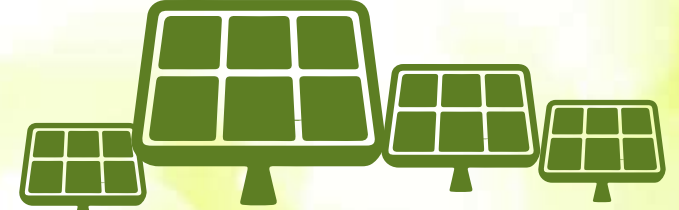
**Technology..**  
*That connects*  
*Human with Nature..*

Innovation, Designed & Mfg. in India





# COMPANY PROFILE



- ❖ **KSolare Energy Pvt.Ltd.** was established in **2012**, Located in Pune.
- ❖ The promoter of the company has wide experience over **35 years** in field of renewable energy particularly in power electronics & had worked in multinational companies in US, Spain, Germany & Portugal.
- ❖ The company products covers Grid Tie & Hybrid Inverters in Technical collaboration with big International companies.
- ❖ As one of the largest manufacturing set up in India, **KSolare** has all advanced automatic testing equipment's available in factory.
- ❖ **KSolare** executed total installation **965+MW** over **2.08L** Inverters in PAN India with efficient after sales service support.
- ❖ With min. failure ratio of 1.38% with 99% Customer satisfaction.





We Support Women





***Our Vision is to become  
ATMANIRBHAR .. by developing  
indigenous products in India and to  
provide employment to our people***



Supporting  LET THE VOCAL FOR LOCAL

Supported By  MeitY Government of India  MEITY STARTUP

# IAF Atmanirbhar भारत Award

Presented on the occasion of  
**National Atmanirbhar Bharat E-Summit**

Conferred Upon

**Sunil Sinnarkar**  
Managing Director  
KSOLARE ENERGY PVT. LTD.  
Pune, Maharashtra

For exemplary work towards achieving Atmanirbharta

  
Harish Chandra  
President

Organizer 

  
S. Ravi Shankar  
Hon. Secretary

Sponsors  IDBI BANK Bank Also Dost Jaisa  LIC

Event Partner  Brandworks [iafindia.com](http://iafindia.com)

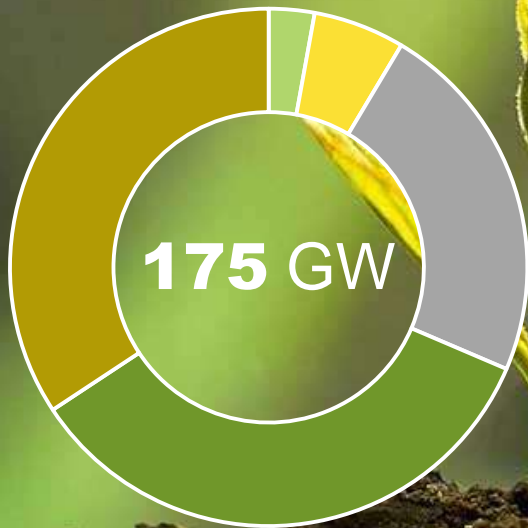
Media Partners  CSR TIMES  ACHIEVERS' WORLD








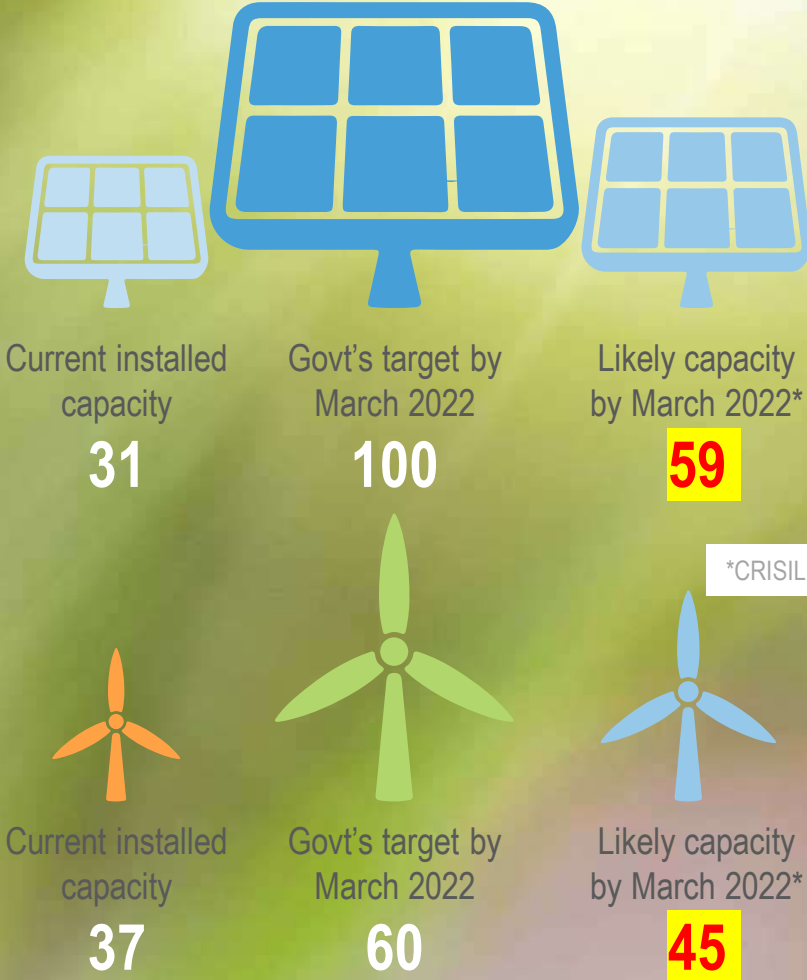
# INDIANS RENEWABLE ENERGY TARGET

## India's Renewable Energy Target by 2022 (By Source)

Unit Gigawatts



-  **5 GW**  
Small Hydro
-  **10 GW**  
Biomass
-  **40 GW**  
Rooftop solar
-  **60 GW**  
Wind
-  **60 GW**  
Solar photovoltaic



India is set to achieve **450 GW** of renewable energy installed capacity by 2030, the Ministry of New and Renewable Energy (MNRE) said on Monday 11-Oct-2021



# Company Growth (2012 ~2022)

Credit goes to all our Dealers ,EPC players ,System Integrators ,Distributors & Ksolare Team

2.08 Lakh Unit Sold PAN India







# INHOUSE PRODUCTION & QUALITY-PROCESS

100% Products comes with below Testing Methods:

## Assembly



## HV Test



## Heat Run Test



## ATE Test



## IP 65



## QC & Packaging





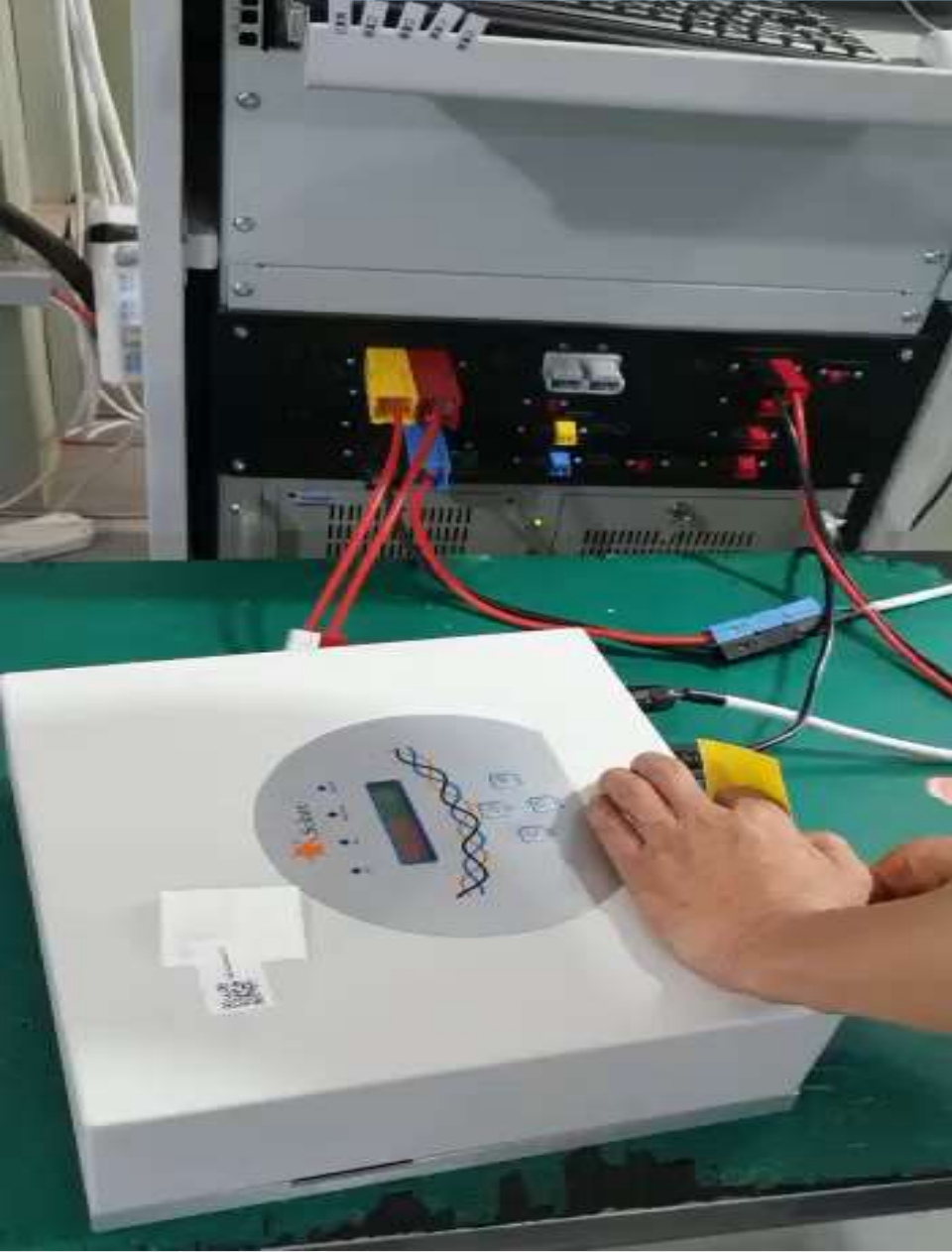
## Inhouse Test : IP 21/65/66/67

Checking the air pressure , if there is any leakage the system will blow alarm with **RED** indication





# ATE In House TEST



ATE Machines test all the parameters in few seconds like:

1. **MPPT range, DC Over/Under current, Isc, Imp, Ripple, Efficiency, Thermal Management, DC boost voltage parameters.**
2. **AC output High/Low for Frequency/Voltage/Current, Harmonics ,THD, Efficiency, Switching frequency etc.**
3. **WIFI module transmitter & receiver signals, LED status etc.**
4. **LCD display, LED Status, Switch functionality.**





# Inhouse CAD-CAM with IP65/66 Automated Gluing





# In-House Tooling & Fabrication



**CNC MACHINE**



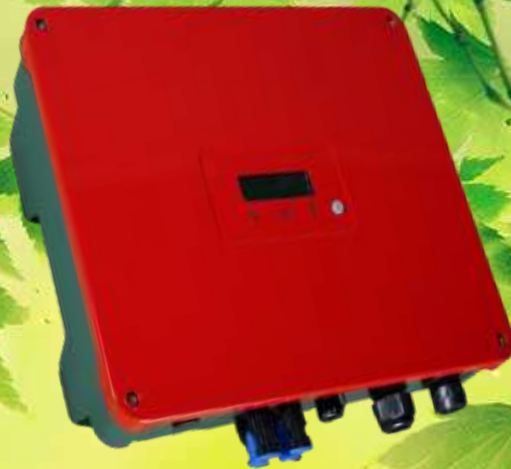
**LASER CUTTING MACHINE**

**DIE PUNCH FOR FRONT COVER**

**Final Polishing & Rubbing Process**



# MORE DYE & Cabinet's for OEM,s





# Inhouse Heat Sink Tooling & Machining





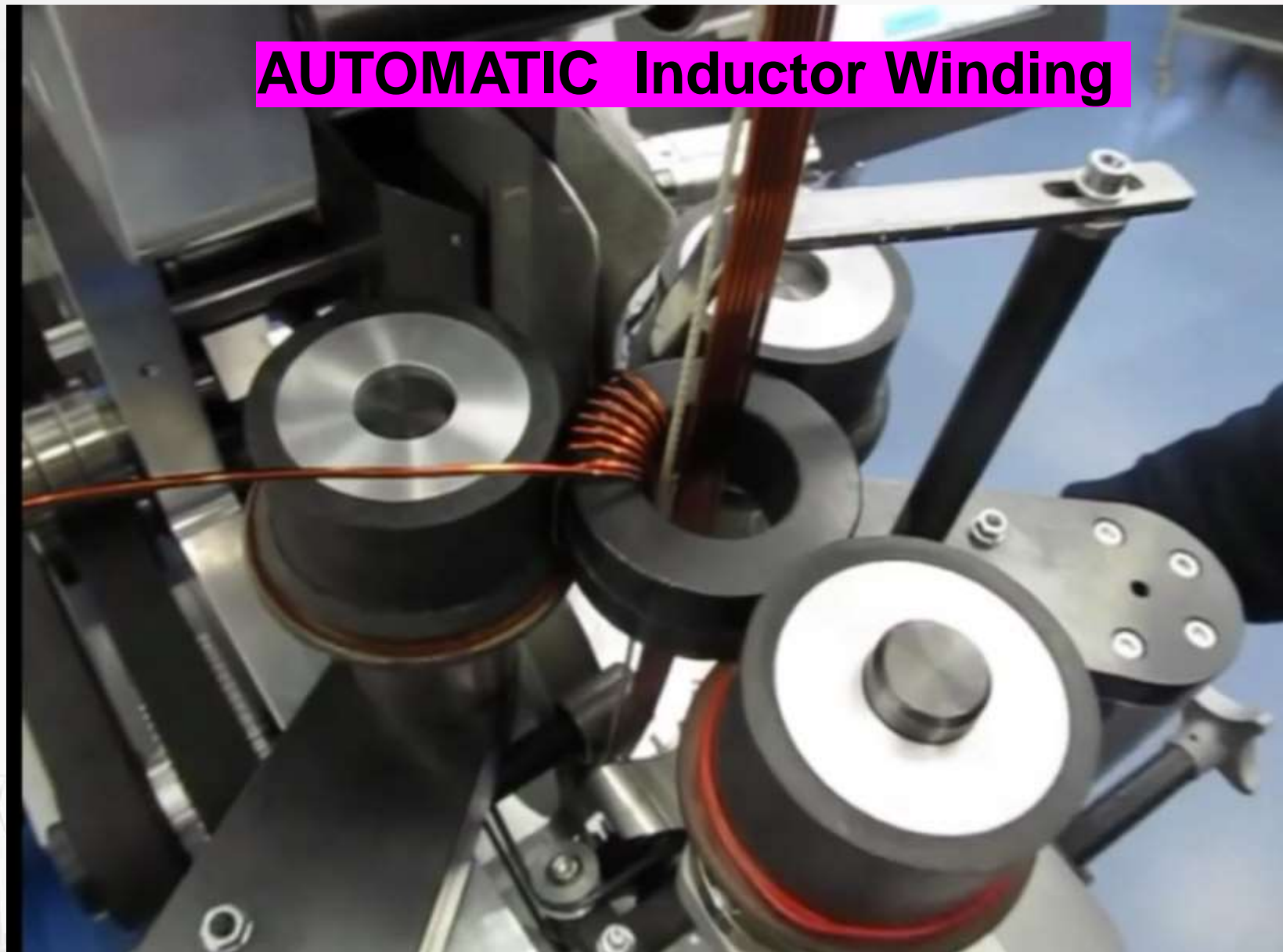
# INDUCTOR ASSEMBLY



Manual Inductor Winding

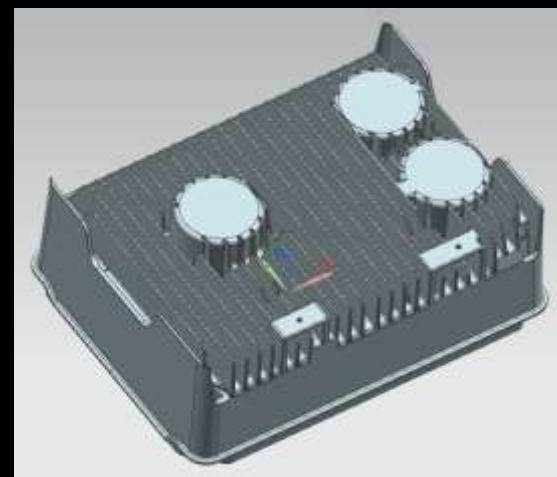
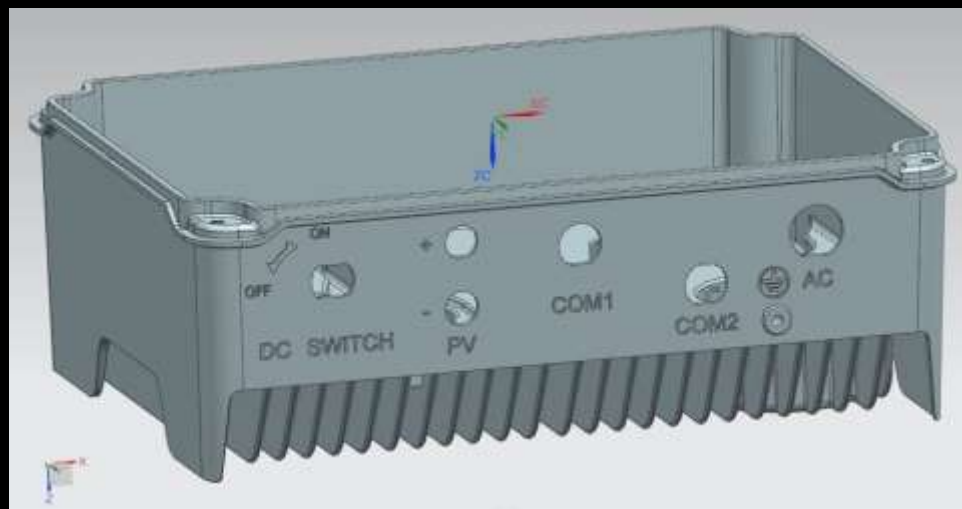
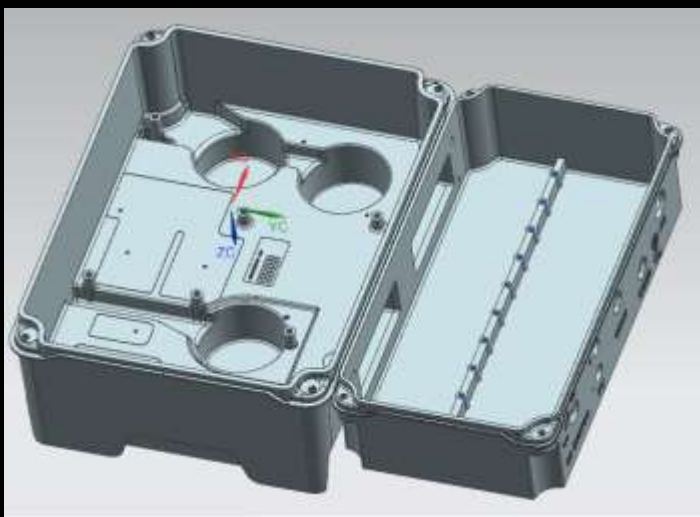
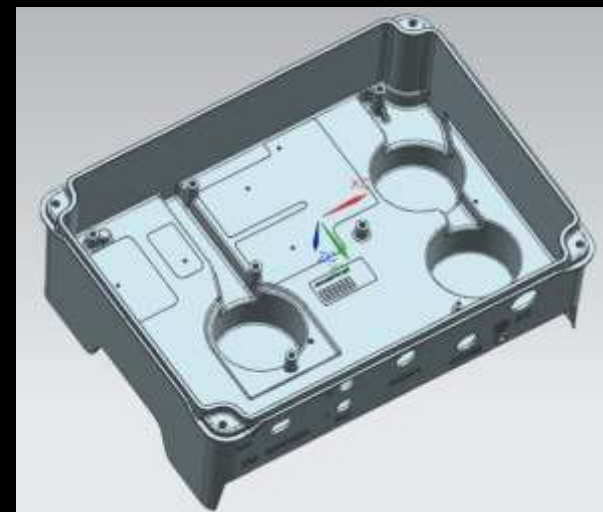
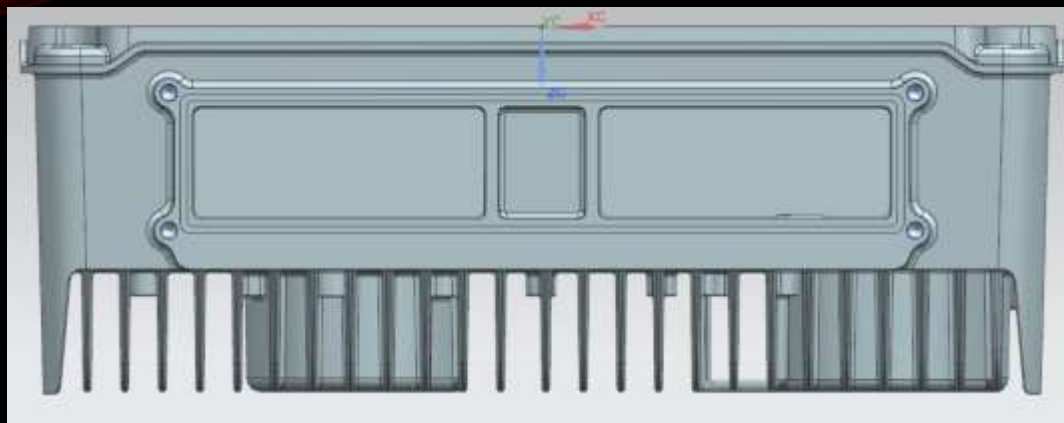
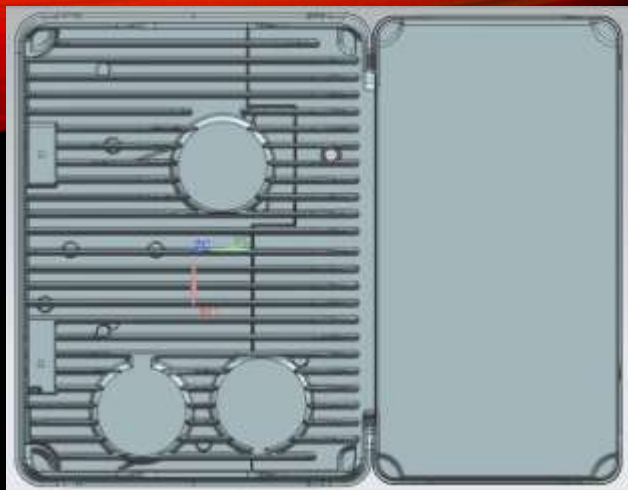


AUTOMATIC Inductor Winding





# • Different DIE for OEM





# DIE CAST HOUSING FOR INVERTER





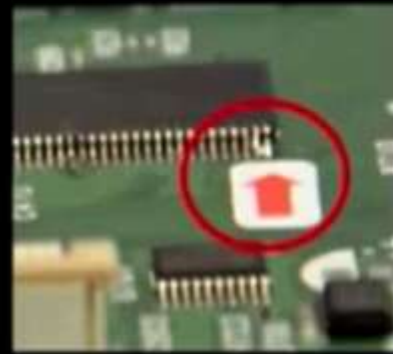
# DIE CAST HOUSING FOR INVERTER





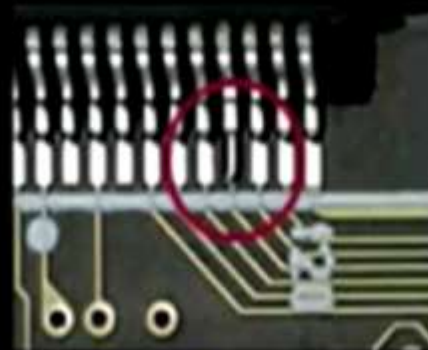
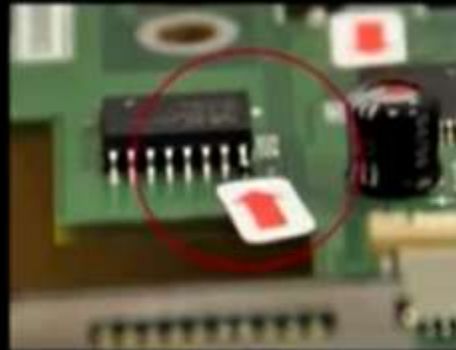
# ICT & FCT Testing

## Manufacturing Defects



Tombstoning

Solder Shorts



Missing

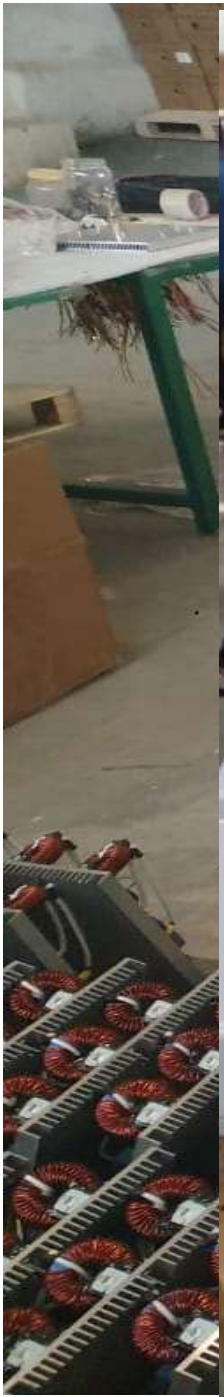
Lifted Pin

Poor Soldering



## Special Glue to enhance the life of components at extreme conditions







# Which inverter you want to buy

- Company should be at least 10 years old in successful manufacturing operation ✓
- Company should have very strong service network all INDIA level ✓
- Company Core or Management should have very strong knowledge of their own product & technology ✓
- Company should have all the testing equipment's like Analyzer, Scope, DC & DC HV testers etc. ✓
- Company should have in-house IP-65 testing ,ATE testing ,Heat Run Testing ,Testing Jigs ✓
- Company should provide the circuit diagram and should know & do analysis of their own products ✓
- Company should have all the certification's required for Inverters as per MNRE ✓
- Company should have approvals from local agencies, Utility companies ,Nodal agencies ✓
- Company should have Financial strength to mitigate in case of failures after warranty period ✓
- Company should provide spares and components at reasonable cost ✓
- Company should have all the inhouse infrastructures for Factory Testing Facilities. ✓
- Company should give tailor made solutions when ever its required by customers ✓
- Company should give 24x7 service to the customers ✓
- Company should not give any excuses for not attending the service or replacement to the customers ✓



# Why consider Ksolare Inverter

- 01 Indian First Company to cross 2.09 Lacs Nos of production of GTI
- 02 Indian First MSME to be awarded ISO certification for Mfg GTI
- 03 Indian First MSME Company where NTPC, GEDA, CESCO, WEBREDA, PSPL, CREST, SGS, RITES etc visited for factory Inspections
- 04 Indian First Company whose inverters are serviced at site on SMD basis since 2012
- 05 Indian First Company to developed and used Indian components like Inductors, Heat sinks, Aluminum cabinets cables etc.
- 06 Indian First co. to be awarded SKY(25MW) & KUSUM (55MW) Grid Tie inverters
- 07 Now Ksolare production capacity is increased upto 1.5 Lacs units annually
- 08 India's First company awarded for ATMANIRBHAR AWARD for GTI



Since **2012**



# Ksolare inverter Range

	5G	5G-Pro	5G MEGA	5G MEGA-HV	5G Pro-H	5G Ultra	6G Fetherlite-H	7G Infinity
Chipset	80Mhz	200Mz	200Mz	400Mz	400Mz	200Mz	200Mz	400Mz
Topology-Bridge	3L	3L	3L	3L	3L	3L	3L	3L
Topology-MPPT	Boost	Boost	Boost	Boost	Boost	Boost	Buck-Boost	Buck-Boost
AC Range	140V ~300V(P-N)							
DC Voltage-Max	500	600	1000	1100	1500	600	600	650
Max Temp-Degree	50	60	58	58	60	56	55	60
Warranty	5yrs	8yrs	8yrs	8 yrs	8yrs	5yrs	5yrs	25yrs



# 5G-PRO Grid-Tie Inverter

## 1KW-60KW

1st Company with Zero defect Manufacturing process.



AC/DC Amorphous Inductors

Special Al alloy with SNHM design for low heating



# 28 Features

- Ultra-Light, easy to install and monitor all the parameters on Indian based server.
- Robust technology with new Al Alloy Die-Casting with IP 65.
- Extra high DC overloading up to 30%.
- 4 level testing - ICT, FCT, HV, ATE for 100% greater reliability at extreme temperature condition.
- Full Integrated All in one PCBA + silicon/urethane Conformal coating for extra high protection against heat, corrosion, humidity, vibration, dust & micro cracks.
- Designed to take very high spike, surge protecting, capacity, EMI/RFI reduction.
- World's light weighted inverter with SNHM-silicon nitrate heat management technique.



## Ksolare VS Others

3 Level IGBT topology with Texas dual core processor.	2 Level Inverter Topologies for Micro Grid
Super sonic working speed of 200Mhz for high performance.	Working speed 80Mhz gives low performance.
Low startup voltage with wider MPPT bandwidth for more Generation (70~ 100) /AC (140~300v).	High component count-low reliability Narrow MPPT bandwidth (360~860) /AC (170~ 270v)
Component Level Repair Services.	Service of Box Replacement.
Sustain extreme high surges.	No inbuilt SPD's
O/P voltage B/W: 130-295V	O/P voltage B/W: 175-275V
Derating temp: 60°C	Derating temp: 50°C

# 5G Mega-HV

Grid Tie Inverter

## 50KW-250KW



**1100VDC**

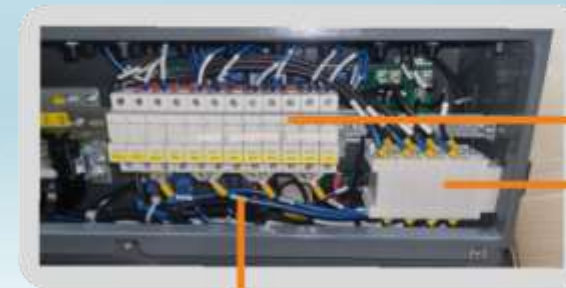
1st Company with Zero Defect Manufacturing Process.



AC SPD

Big Termination for Round  
Lug with Aluminium Cable

**It Will Reduce Your BOS Cost**



DC FUSE

DC SWITCH

& AC RCCB

DC SPD

# Features for Mega series

- ❑ Max Efficiency 99.09 % helps for higher energy
- ❑ Dynamic Intelligent cooling system with Si-Ni lower down the separate use and increases the efficiency
- ❑ Wide range of MPPT helps in maintaining same Inverter and variable Panels for Entire project life
- ❑ 200% DC/AC Ratio for more overloading with same design
- ❑ Max DC Input Power with 12 MPPT & 24 Strings with Individual string monitoring
- ❑ PLC control monitor for large utility scale project.
- ❑ String Level Monitoring : Remote Firmware Upgradation to repair & set all parameters remotely
- ❑ Night SVG(Static VAR (Volt-Ampere Reactive) Generator) function for correction of Grid Abnormalities.
- ❑ Reactive power compensation for stabilization of Grid.
- ❑ Supporting high-power Mono Perc ,Bi-Facial modules and high current panels.
- ❑ Protection for Earthing leakage AC, Isolation leakage DC.
- ❑ IP66 Protection for use in harsh climatic conditions.
- ❑ Onsite & Offsite Protection with RMS via Bluetooth/WIFI/GPRS/485 Connectivity.
- ❑ Using Low RFI & EMI Filters, Fuses, Type II SPD's for both AC/DC side.
- ❑ Compatible with Al & Cu cable with on board Round type LUG connectors.
- ❑ Component level Servicing with 24/7 real time monitoring
- ❑ String Level Monitoring : Remote Firmware Upgradation to repair & set all parameters remotely

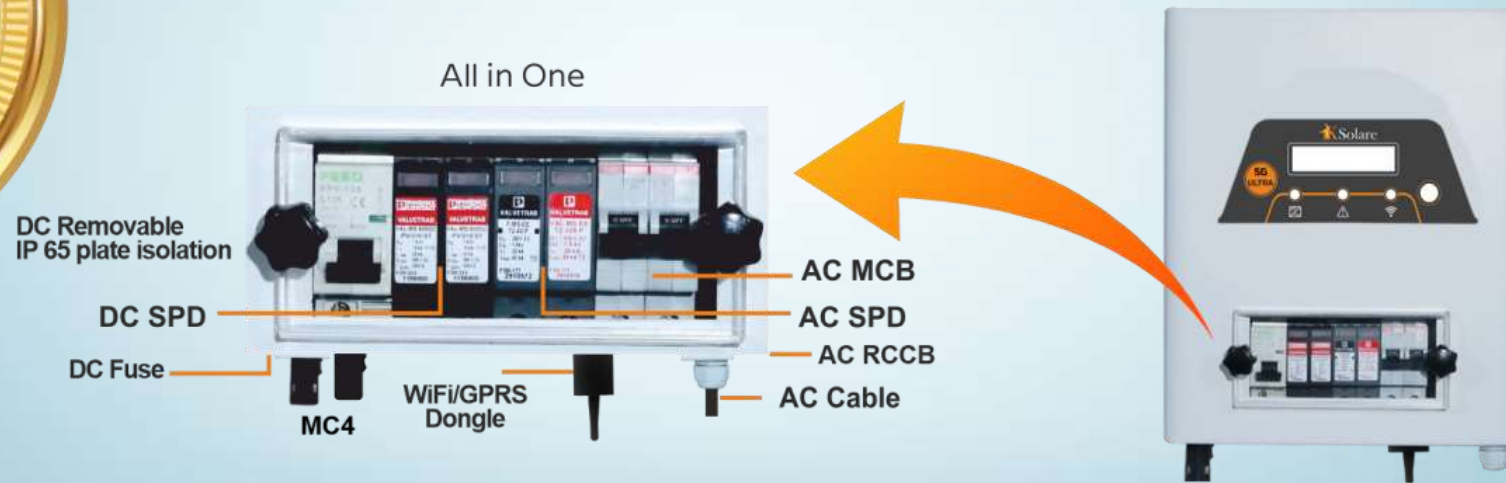


# 5G Ultra GRID TIE INVERTER

## (1KW-6.2KW SINGLE PHASE SINGLE MPPT)



Extra Saving with Effortless Installation

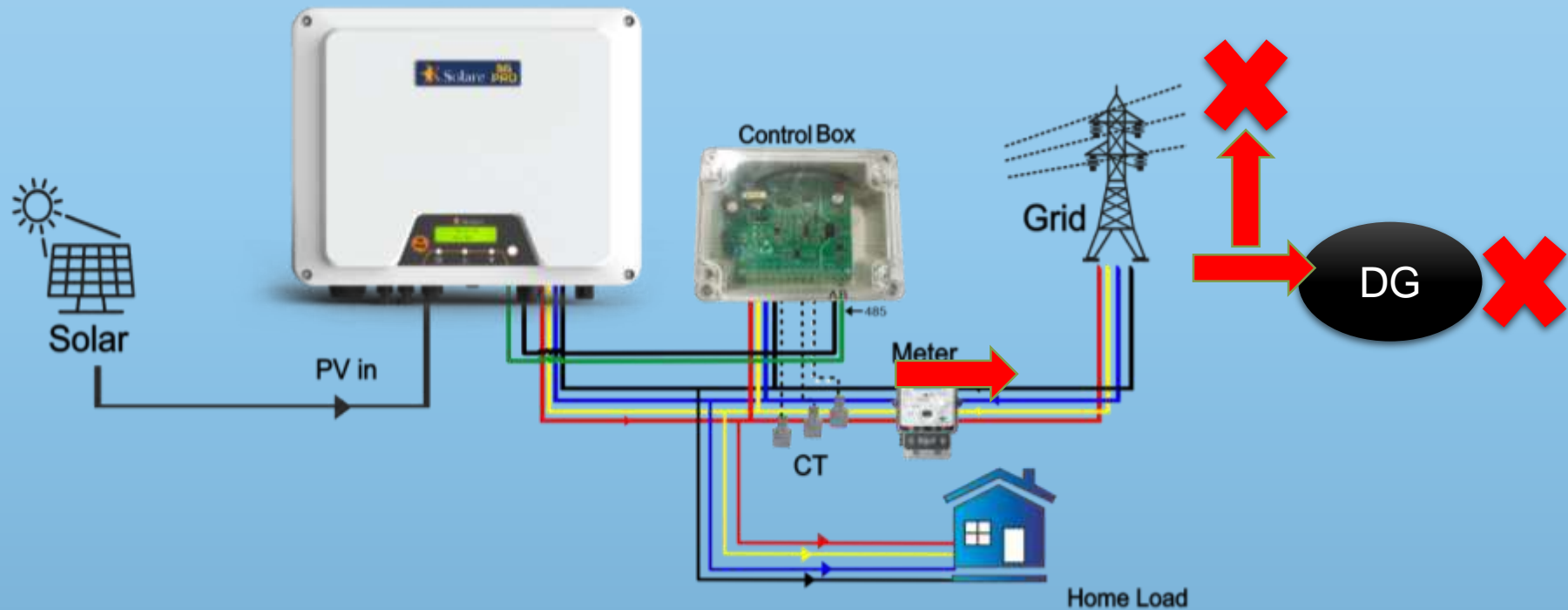


- Inbuilt ACDB/ DCDB with Type -2 SPD's, AC MCB, DC switch & direct output AC Cable.
- 5G Ultra Model with IGBT Technology with maximum efficiency 98.9%.
- Easy to replace (SPD/ MCB from front with Visual Indication).
- Wide Output voltage Bandwidth:145 – 295VAC.
- Ultra Low voltage starts up: 70VDC for more generator.



# ZERO EXPORT KIT

Reverse Power Limiter With TI Dual Core Processor



- For Standard meter go to the menu & enable or disable the zero-export program.
- It collects counter current power to control the output power.
- It forces excess power to not be feed back to the grid.
- Solution for DG Synchronization using ZeX.



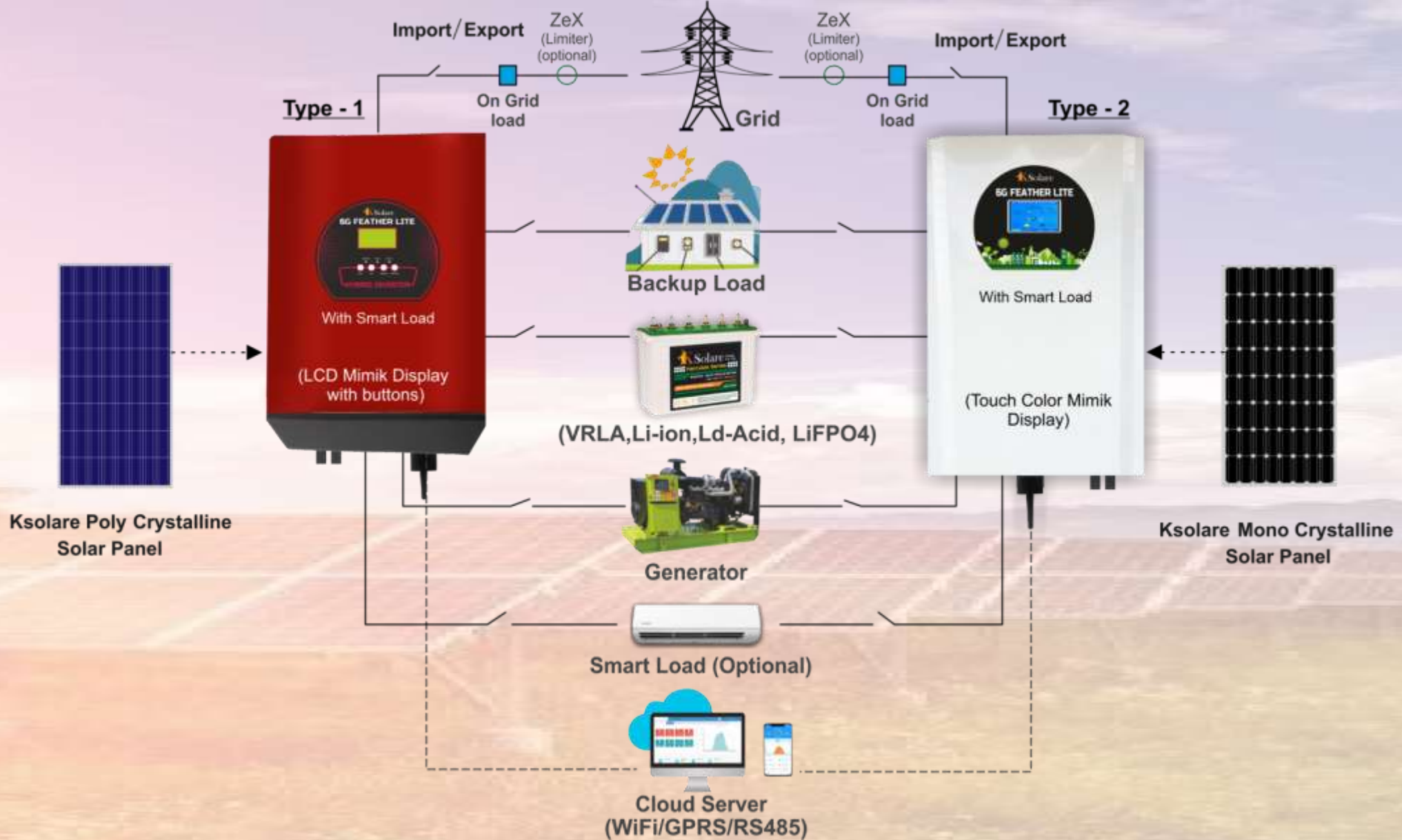


# 5G PRO-MEGA Series (50KW-110KW)

		<b>KSOLARE-5G Pro</b>	<b>KSOLARE-Mega</b>	<b>OTHERS</b>
1	IP	IP 65	IP 66	IP 65
2	VOC	1000 Voc	1100 Voc	1000 Voc
3	MPPT	220-1000/1100	220-1000/1100	360-860
4	INBUILT	Electronics Fuse	String Fuse	NA
5	STRING MONITORING	No	Yes	NA
6	A/C CABLE	Aluminium with round lug	Aluminium with round lug	Copper Cable with Pin Lug
7	Electrical & Electronics Box	Separate	Separate	Combine
8	Processor	T-200Mhz	T-200Mhz	80 Mhz
9	Servicing	Onsite/Chip Level	Onsite/Chip Level	Replacement
10	DC-Overloading	30%	30%	20%
11	Technology	3 Level	3 Level	2 Level
12	Manufacturing	In India	In India	In China
13	Heat Sink	SSM Die Cast	SSM Die Cast	Extrusion

# Comparison Circuit wise

	The max input&output power/voltage/current, inputs numbers and mppt numbers are similar, the difference is between the size and weight, the volume ratio is 1.488 and the weight ratio is 15kg/11kg = 1.364. The SUN-8K-G is lighter and smaller because it use less materials and electric device(It will decrease the safety and operation life) - we will elaborate in the following part:		
	hopeSun8KTL	SUN-8K-G	Explanation To Customers
Input EMI Circuit&Boost Circuit	With Type II SPD	No DC SPD	Potential lightning risks, decrease the operation life and increase the danger of family members
	With X Capacitance & Y Capacitance X: n * 630V-0.33uF±10% Y: n * 250Vac-4.7nF±20% and m * 300Vac-33nF±10%	Only Y	The capacitance design will decrease the stability and operation life and it will affect the temperature rise as well - decrease the output power due to the
	There are Halls at each MPPT	There is no Hall in MPPT2 (Share the common one Hall)	Decrease the sampling accuracy and potential misjudgment
	The Y capacitance and filter capacitance/inductance value of SUN-8K-G is much smaller(for example capacitance: only 1/2) than hopeSun8KTL		Potential risks of efficiency, stability and heat dissipation
Inverter Circuit&AC Output	The power module devices use the separate windings of the transformer of auxiliary board source drive board source	Sharing the same windings	Potential EMC problem of the common windings - this design is forbidden in EV
	There is parallel design of each high-frequency power module on the inverter side:A total of 8 high-frequency diode/tube and 2 flyback(freewheeling) diode/tube	Without parallel design, only 4 high-frequency tubes + 2 flyback freewheeling tubes are used.	Ensure the stability and operation life of inverter because this can make current changes smoothly to avoid the occurrence of surge voltage



# Installation & Govt. Empanelled Agencies



**TSREDCO**  
(Telangana)



**PSPCL**  
(Punjab)



**CREDA**  
(Chhattisgarh)



**BESCOM**  
(Karnataka)



**NTPC**



**SECI**



**SDMC**  
(South Delhi)



**REIL**  
(Rajasthan)



**IIT**  
(Indore)



**PGVCL**  
(Gujarat)



**IOCL**  
(Indian Oil Corp. Ltd.)



**JREDA**  
(Jharkhand)



**MPMKVVCL**  
(Madhya Pradesh)

**CREST**  
(Chandigarh)

**MEDA**  
(Maharashtra)

**GEDA**  
(Gujarat)

**CESC**  
(Mysore)

**BREDA**  
(Bihar)

**UPNEDA**  
(Uttar Pradesh)



# Approvals & Test Reports under MNRE –IEC & BIS

**SGS CERTIFICATE OF CONFORMITY**  
 Model: SOLARE ENERGY PVT.LTD.  
 Variant models: KSY-200W  
 Technical Data: Nominal Power (kW): 0.2, 0.3, 0.5, 1, 1.5, 2  
 Nominal Voltage (V): 230  
 Nominal Frequency (Hz): 50  
 Phase variation: Display software version: Ver 1.00  
 Number of phases: Three phase  
 Installation: NO

**EMC TEST REPORT**  
 Issued by: EMC Technology Co., Ltd.  
 Issued to: SOLARE ENERGY PVT.LTD.  
 Report No.: ML-SZ1900079-000  
 Test Date: Apr. 18, 2019 - Apr. 19, 2019  
 Issued Date: Apr. 23, 2019

**SGS CERTIFICATE OF CONFORMITY**  
 Model: SOLARE ENERGY PVT.LTD.  
 Variant models: KSY-200W / KSY-300W / KSY-500W  
 Technical Data: Nominal Power (kW): 0.2, 0.3, 0.5, 1, 1.5, 2  
 Nominal Voltage (V): 230  
 Nominal Frequency (Hz): 50  
 Phase variation: Display software version: Ver 1.00  
 Number of phases: Three phase  
 Installation: NO

**SGS CERTIFICATE OF CONFORMITY**  
 Model: SOLARE ENERGY PVT.LTD.  
 Variant models: KSY-200W / KSY-300W / KSY-500W / KSY-1000W / KSY-2000W  
 Technical Data: Nominal Power (kW): 0.2, 0.3, 0.5, 1, 1.5, 2, 3  
 Nominal Voltage (V): 230 / 400  
 Nominal Frequency (Hz): 50  
 Phase variation: Display software version: Ver 1.00  
 Number of phases: Three phase  
 Installation: NO

**NISE Test Report**  
 National Institute of Solar Energy  
 Report No.: A-2019-01  
 Issued to: SOLARE ENERGY PVT.LTD.  
 Issued Date: 2019-07-01

**SGS CERTIFICATE OF CONFORMITY**  
 Model: SOLARE ENERGY PVT.LTD.  
 Variant models: KSY-200W / KSY-300W / KSY-500W  
 Technical Data: Nominal Power (kW): 0.2, 0.3, 0.5, 1, 1.5, 2  
 Nominal Voltage (V): 230  
 Nominal Frequency (Hz): 50  
 Phase variation: Display software version: Ver 1.00  
 Number of phases: Three phase  
 Installation: NO

- ❑ IEC Certificate Under MNRE
- ❑ NABL Lab Test-SGS, Spain & NISE, India.
- ❑ EMC/EMI/RFI Tests
- ❑ Inhouse testing facility NTPC & other Utility companies

- IEC( Int. Electrotechnical Commission)
- IP-65,
- Anti Islanding
- Environment Protection
- Safety Protections
- Inverter Efficiency
- Insulation Test
- HV Test
- Temperature Test



# Temperature Derating

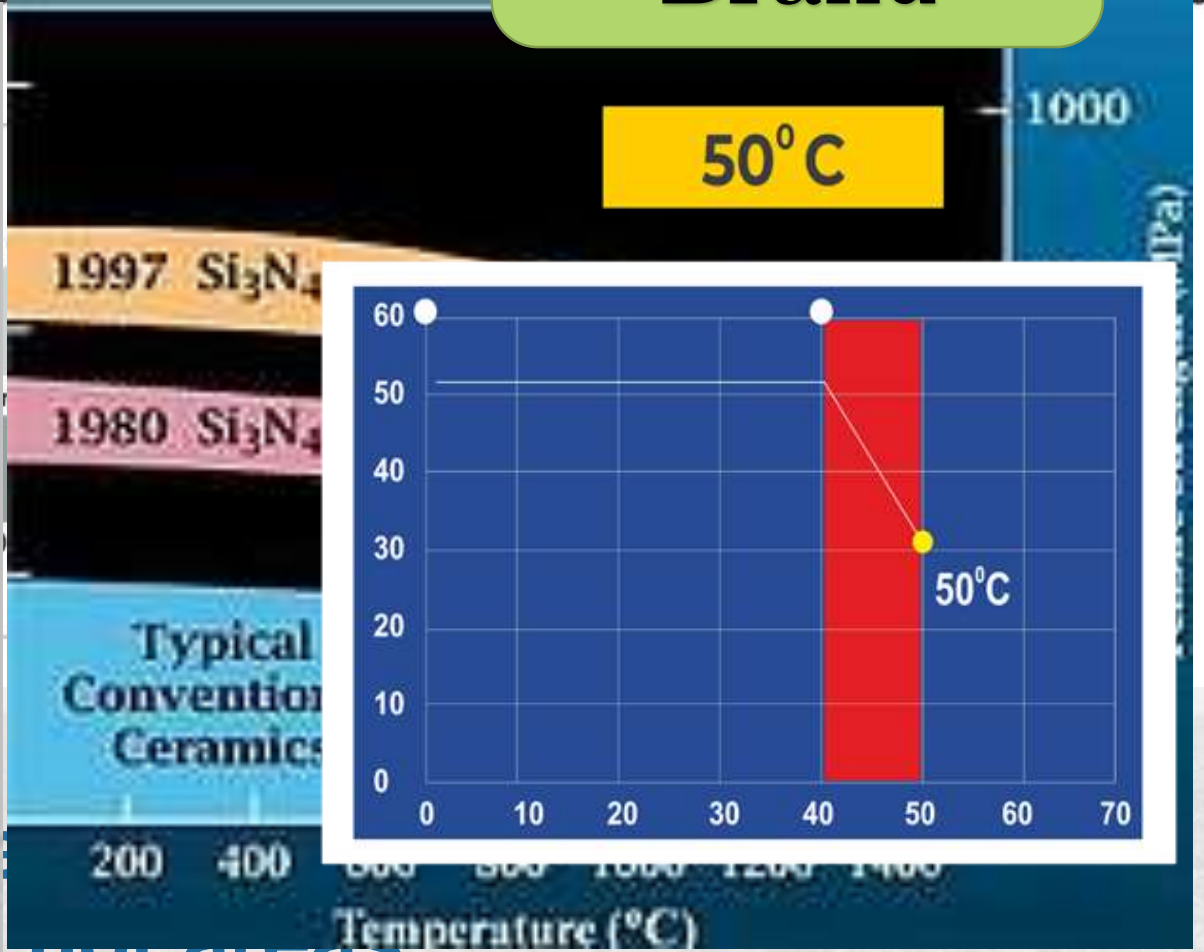
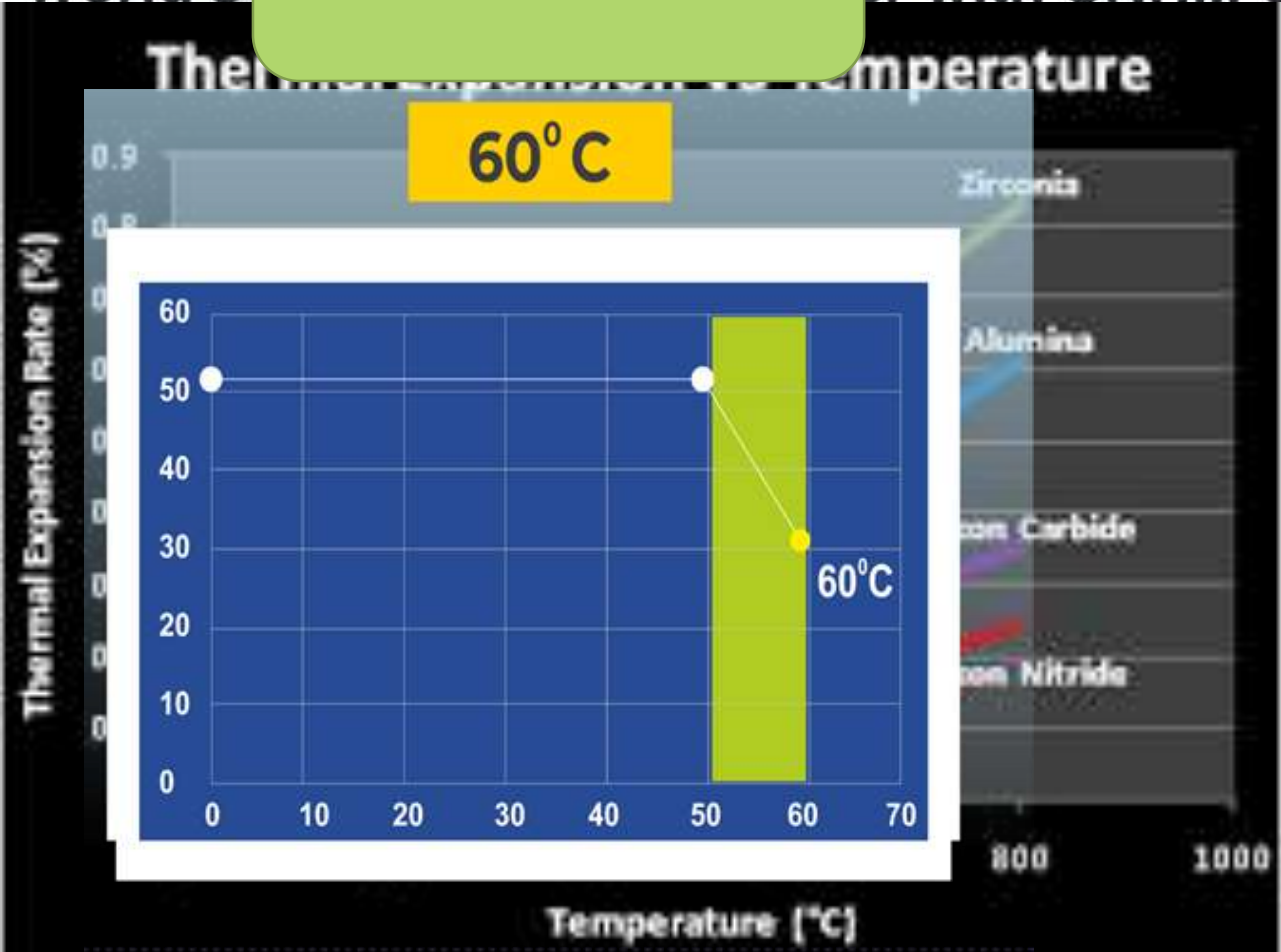
Ksolare

Other Brand

World's

er with SNHM-silicon nitrate hea

que.



Degree in hot areas



# OTHER OLD TECHNOLOGY



Damages due to loose contacts

Micro Chip 80 MHz

Board Connection



# 5G Pro –Technology(1~60KW)



SBT technology, No additional PCB, Simple and easy for service

Onboard Texas Dual Core Processor chip with 200Mhz Speed



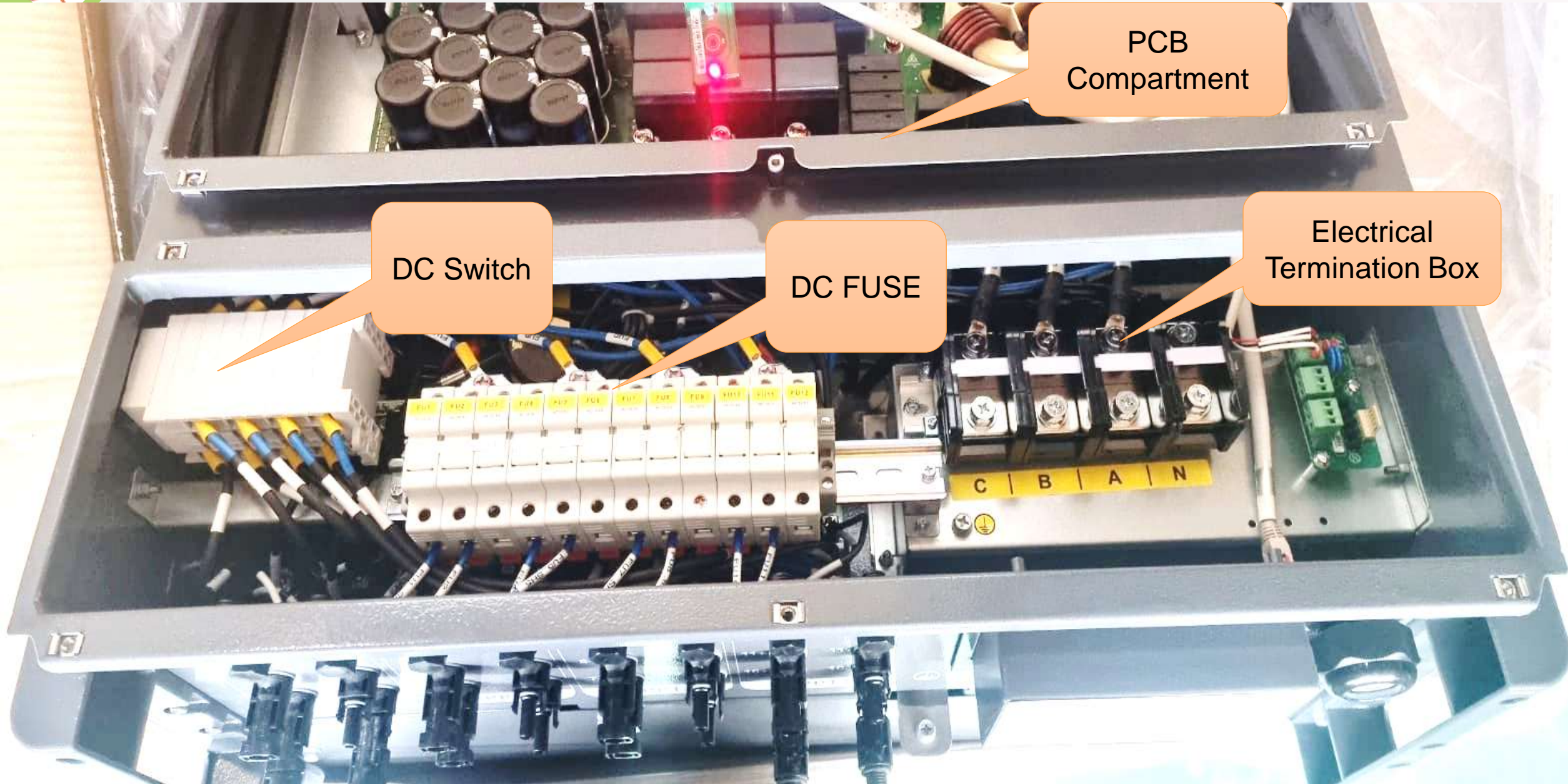
# OTHER 100KW INVERTERS TERMINATION



Dangerous to use  
Pin Type Lugs



# KSOLARE INVERTERS 100KW TERMINATION



PCB  
Compartment

DC Switch

DC FUSE

Electrical  
Termination Box

FU1 FU2 FU3 FU4 FU5 FU6 FU7 FU8 FU9 FU10 FU11 FU12

C | B | A | N



# Eg: 500Wp Mono Perc Panel with Ksolare Inverters

VOC of 550Wp Mono – STC:49.80V & NOCT:46.69A

Imp of 550Wp Mono – STC:13.2A & NOCT-10.52A

So the STC Voc - 49.80 & NOCT-10.52A

Ksolare all Inverters are designed & can be used for all type on Panels with 15Amps Current

12 nos Panels per MPPT

1st MPPT-1st Strings



2nd MPPT-2nd Strings





# Trina-605Wp Mono Perc panel configuration with Ksolare Inverters

VOC of 605Wp Mono – STC:41.7V & NOCT:39.3V

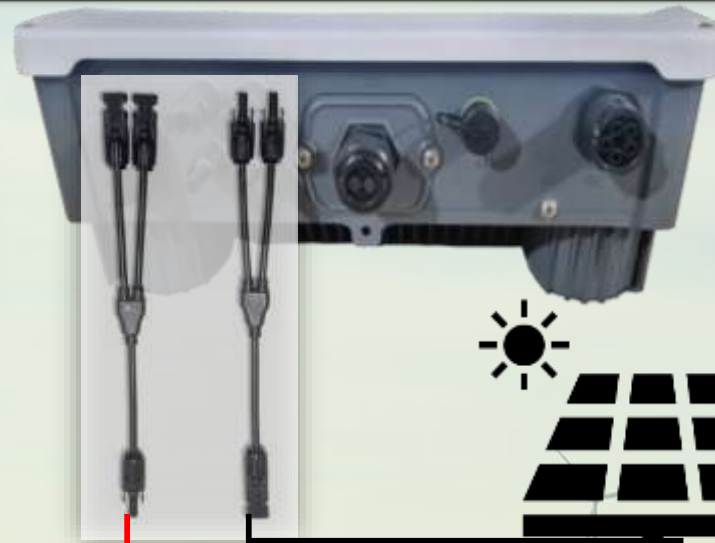
Imp of 605Wp Mono – STC:17.49A & NOCT:14.96A

**OPTION1: to use 20 panels in series with 'Y' Connector**

**OPTION2: to use 20 panels in series in SPD box with two SPD input common**



From LCD  
Menu choose e  
the parallel  
command for  
using 2 MPPT  
common

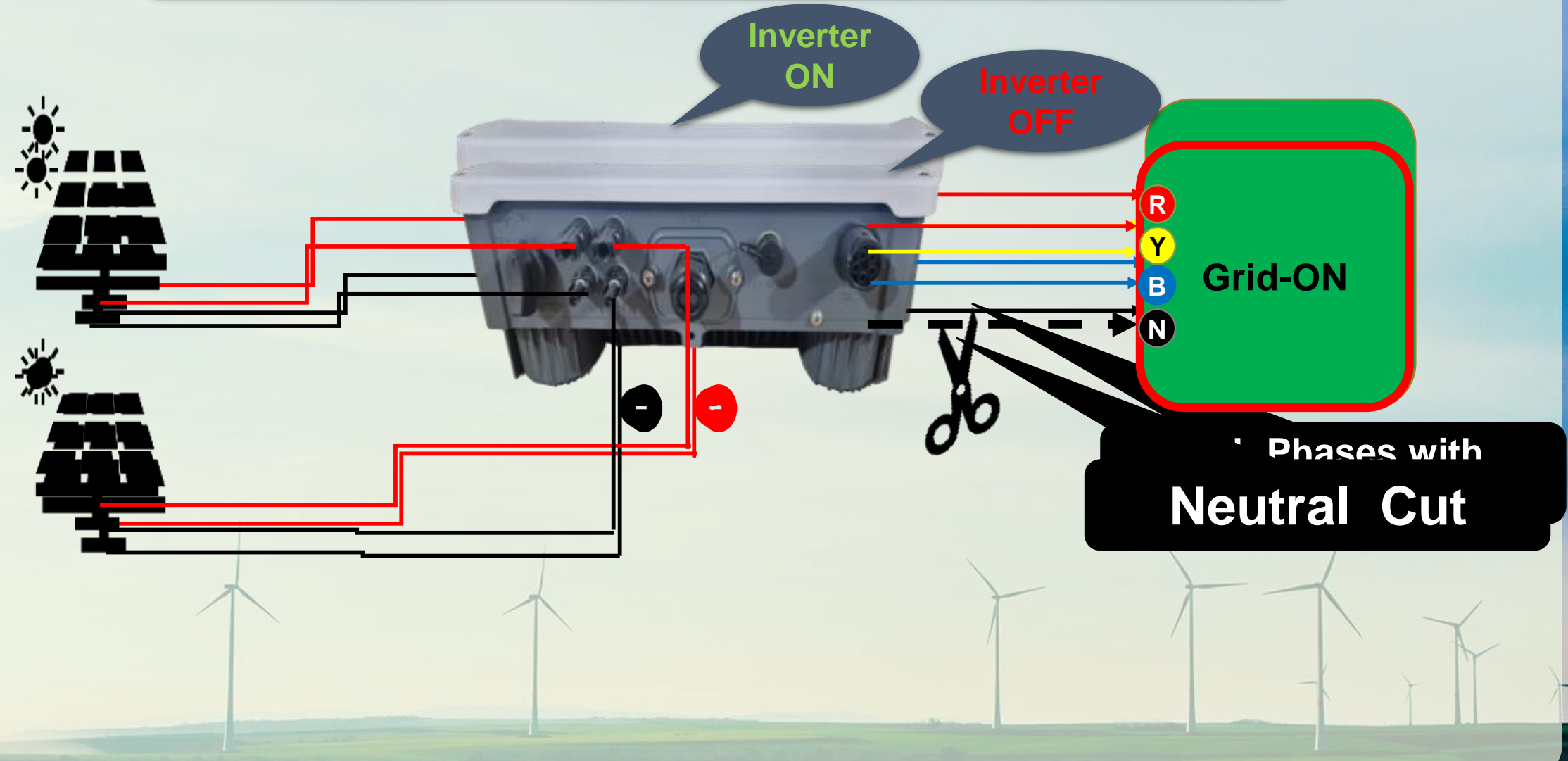


**20 Nos Panels = 12.10KW**

Ksolare all  
Inverters are  
designed &  
can be used  
for all type on  
Panels



# Ksolare 5G Pro series N with Neutral cut features





# 5KW/6KW/7KW Ksolare 5G Pro with Single MPPT

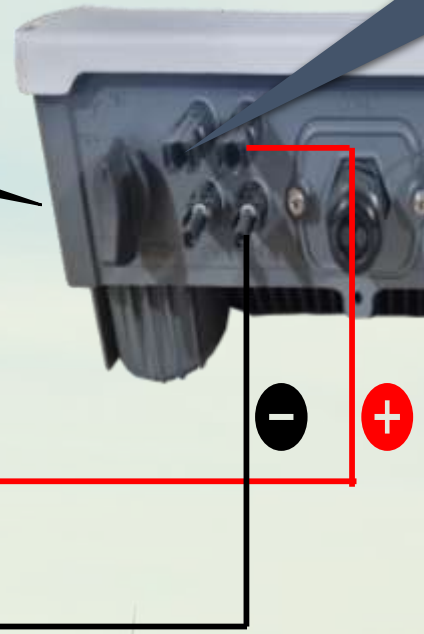
**3~5% Extra Generation with LOW Price**

**ONE MPPT 1000VDC**

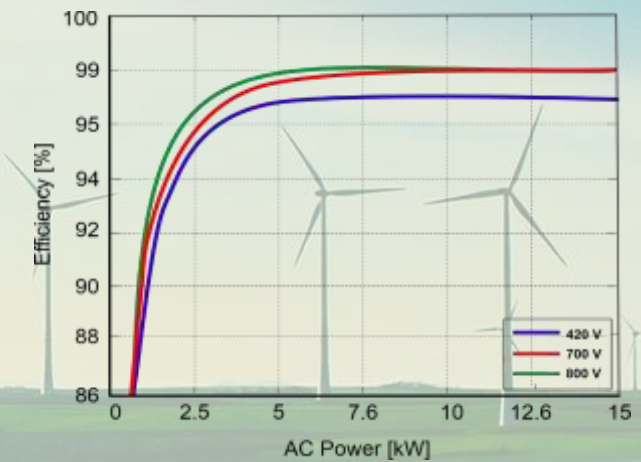
- R** Grid-
- Y** ON
- B**
- N**



**Single String of 7KW**

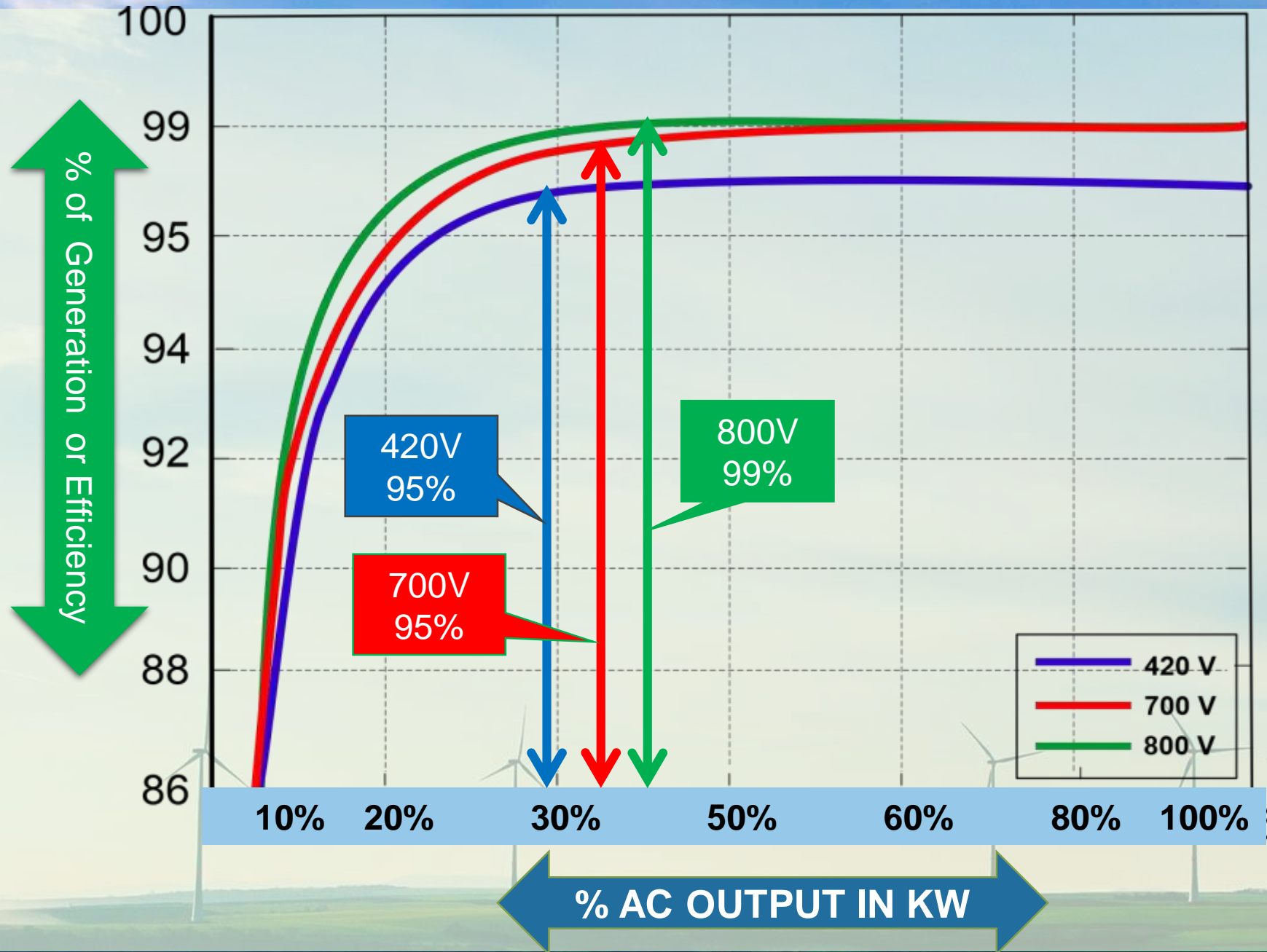


**Total Capacity: 330Wp x 21 Panels=6.930KW**  
**VOC: 21 Panels x45 Voc=495V(<1000Vdc)**





# IMPACT OF MPPT STING VOLTAGE ON EFFICIENCY & GENERATION



# Case study for 100KW Poly with 10% Over Loading -335Wp



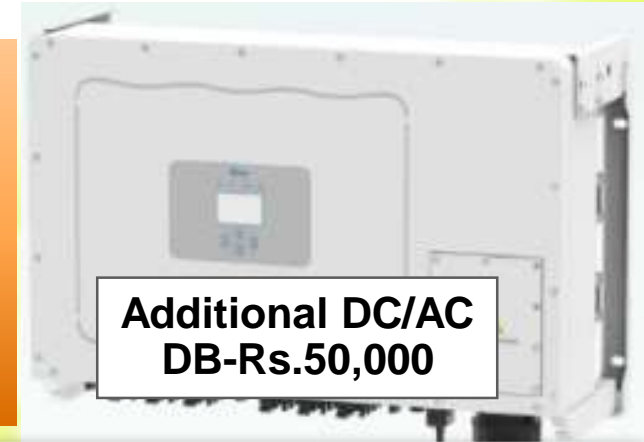
100KW -  
4Nos MPPT  
(65Amps/M  
PPT)-5  
String per  
MPPT & DC  
Max-1100V

Warranty-8 years without DCDB  
& ACDB Box

Total Vmp @ 38Vx22nos=836V which  
is less than 1100VDC

✓	IP-66	✗
✓	DC Fuse	✗
✓	DC SPD II	✗
✓	AC SPD II	✗
✓	RCCB	✗
✓	BIG R-TB	✗
✓	String Monitoring	✗
✓	PLC Control	✗
✓	Dual section	✗

100KW -  
6Nos MPPT  
(40Amps/MP  
PT) with  
6String per  
MPPT & DC  
Max-1000V



Additional DC/AC  
DB-Rs.50,000

Warranty-5 years covers only if  
DCDB & ACDB Box is installed

Total Vmp @38Vx19nos=722v which  
is less than 1000vdc

Inverter always perform with higher efficiency only at high DC voltage

2~3% loss in energy generation is observed

So approx. 5 units /kwh x 120 kw x 300 days=1.8 Lac Units with 3% loss in = 5400 Unit loss x Rs. 10 per  
unit=54000 you loss by using 15 nos. or you can gain **54000** by using 20Nos of strings



# Case study for 100KW with 540Wp x 240 Nos (129.6KW) MONO PERC panels



**Yes**

- DC Switch
- DC Fuse
- DC SPD
- AC SPD
- AC RCCB

100KW -4 MPPT-5 String (65 Amps per MPPT)

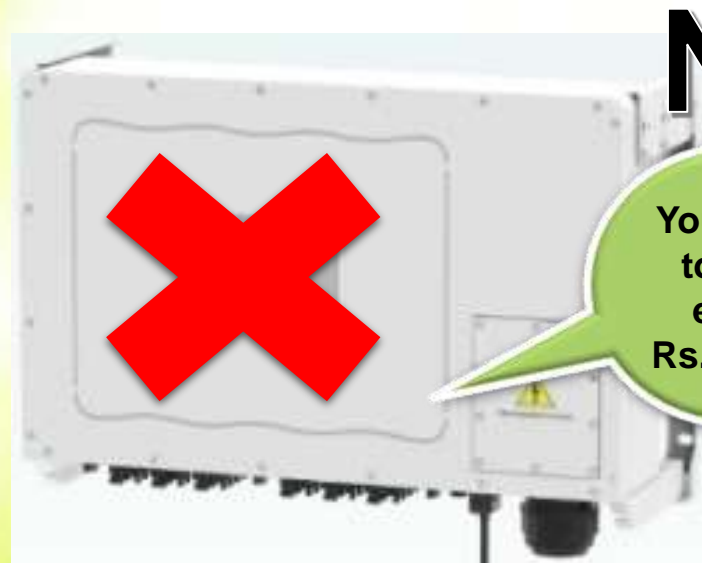
MONO PERC Panel VOC-39V & Imp -13.2A

60 Nos. of panels per MPPT-20 Nos per Strings x 4 Strings

Panel Imp-13.2Amps x 4 Strings=52.8Amp(<65Amps)

Total VOC for 20 Nos-980 VDC

Total Vamp for 20 Nos-780 VDC



**No**

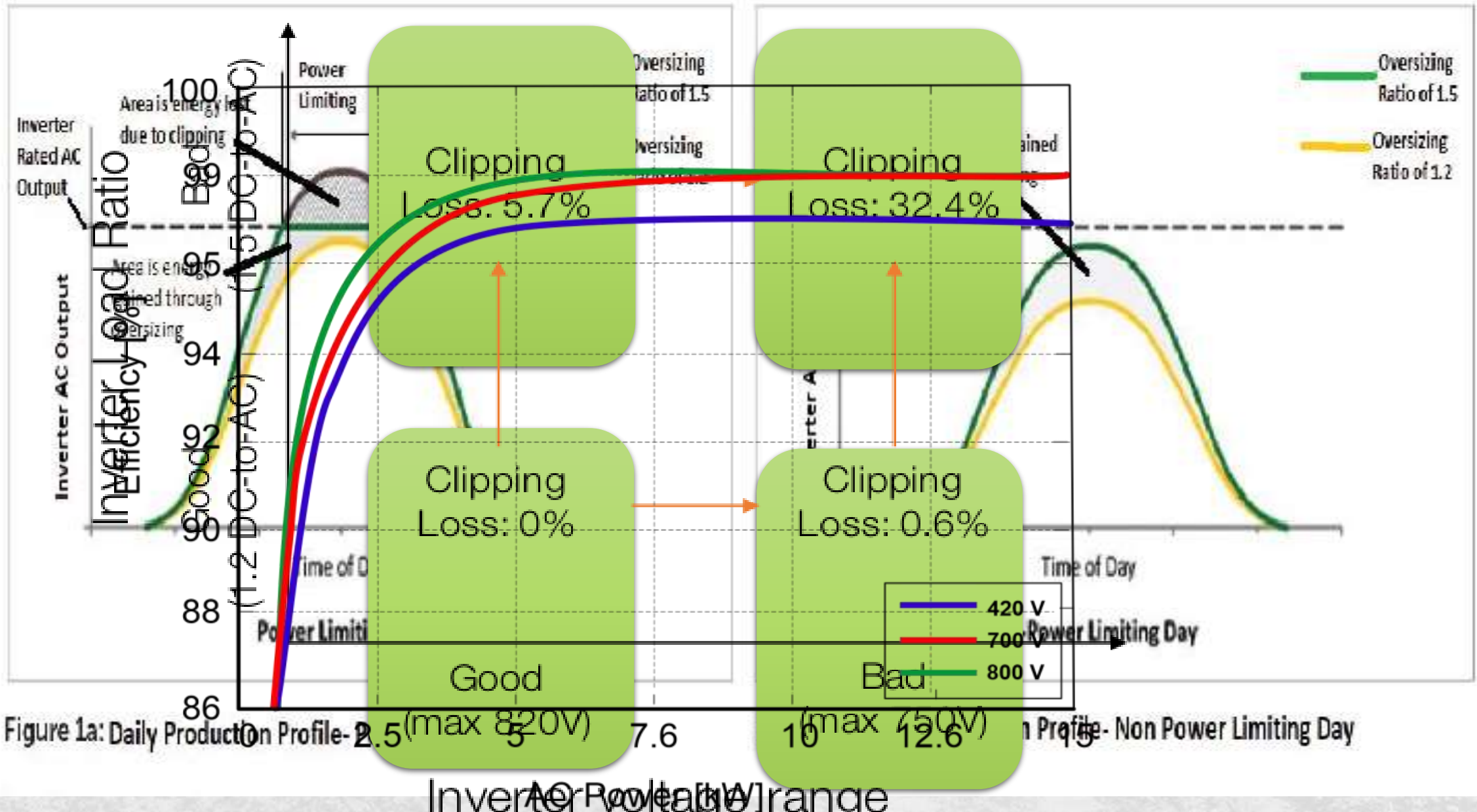
- DC Switch
- DC Fuse
- DC SPD
- AC SPD
- AC RCCB

You have to Pay extra Rs.70,000

Panel Current is 13 AMPS for this 100KW inverter with MPPT Cannot be use as there is limitation of String current of 10Amp max ,If some one use it their will be low Generation at peak power



# DC OVERLOADING

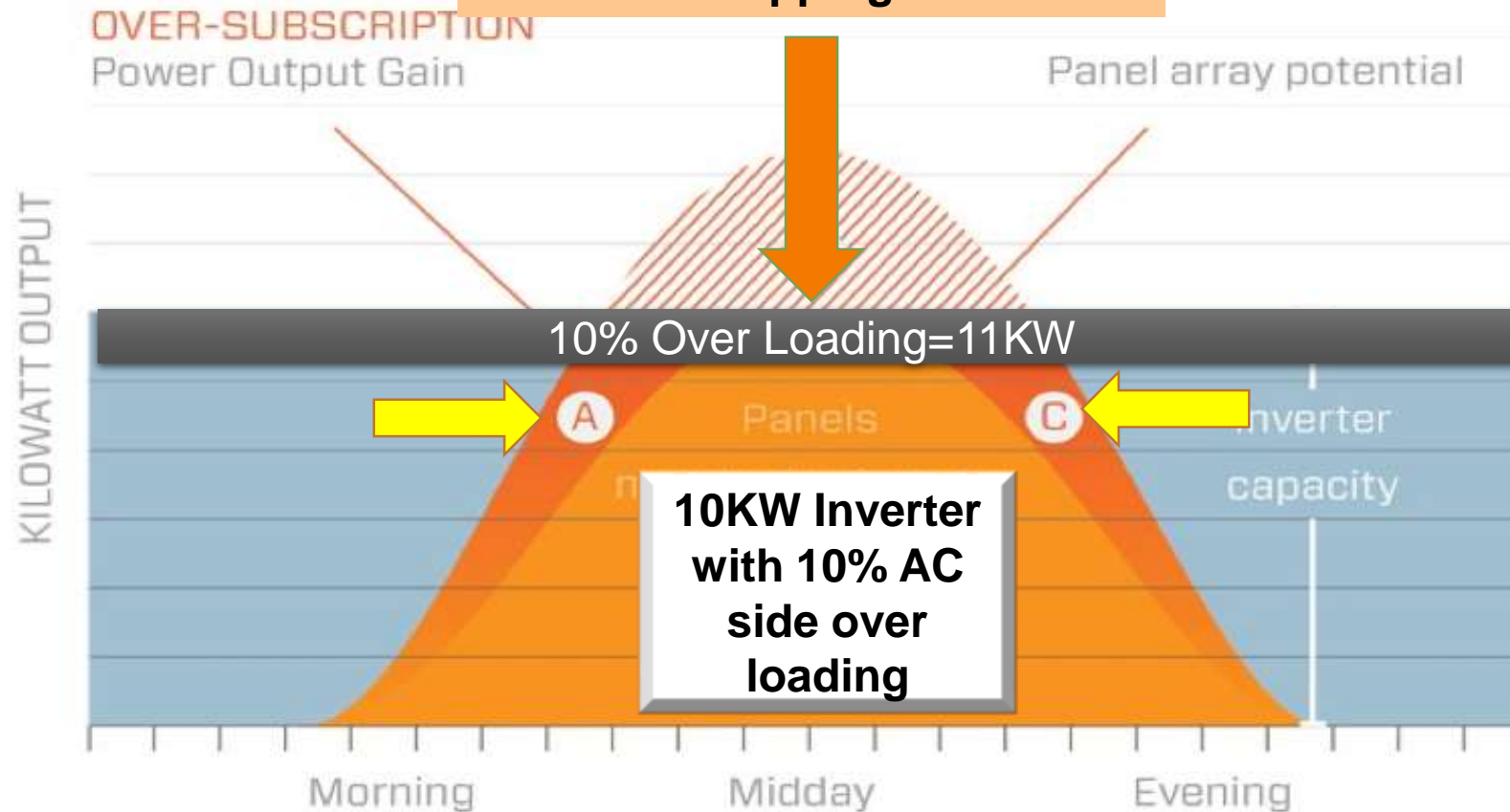




# DC OVERLOADING-👍👎

## Inverter Clipping and Advantages of Higher DC/AC Ratios

4KW-40 % Clipping Loss

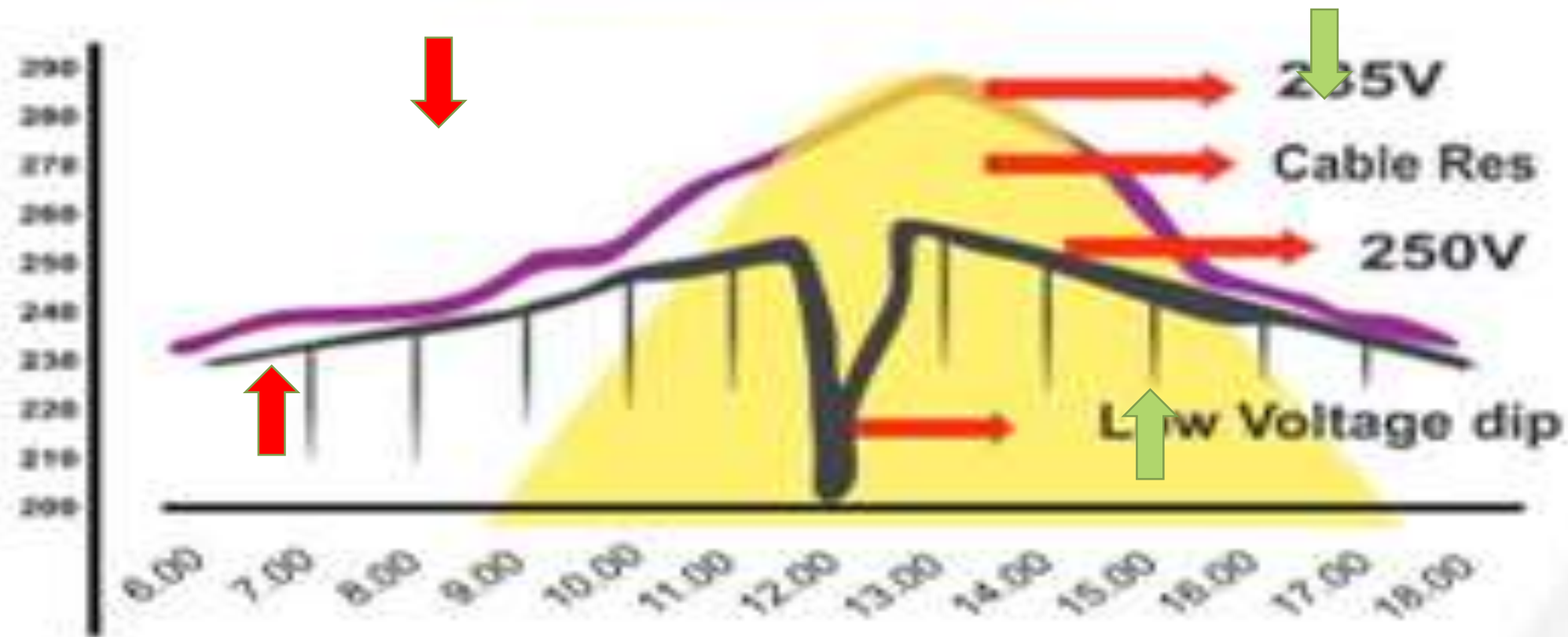


15KW  
Panel  
with  
10KW  
Inverter  
(50%  
O/L)

For Example if you have 10KW system & you want to overload it by 50% then 5 KWp extra panel to be install & price would be Rs.1,00,000 extra & if you use inverter of 15 KW you have to pay Rs. 20,000 only + extra heating



### (Illustration)





# Protections

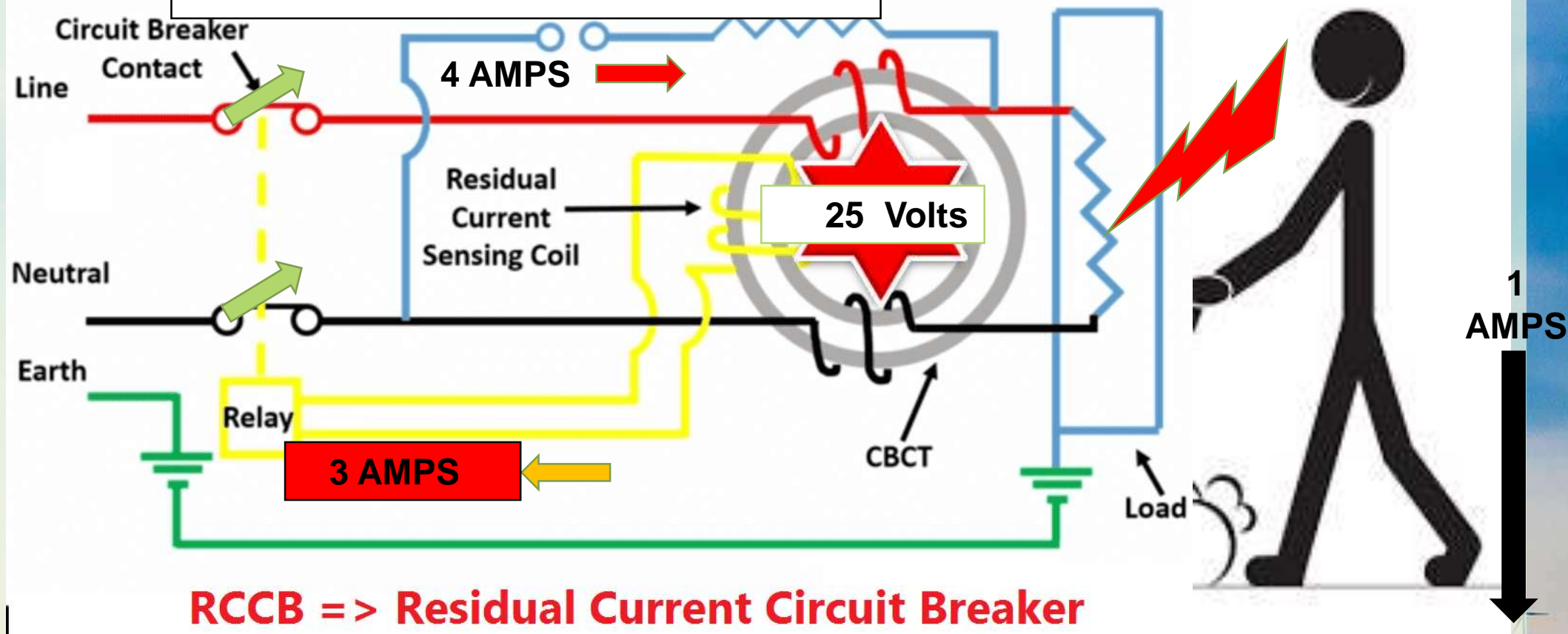
1. **SPD** ✓
2. Fuse
3. Isolator
4. **RCCB** ✓
5. DC & AC Earthing
6. MCB or MCCB

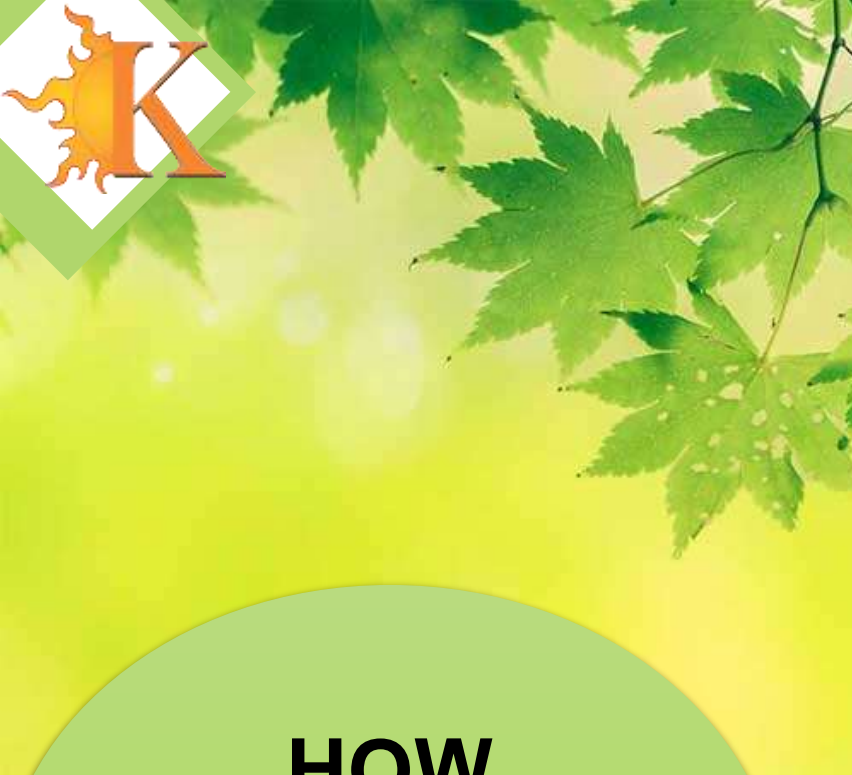




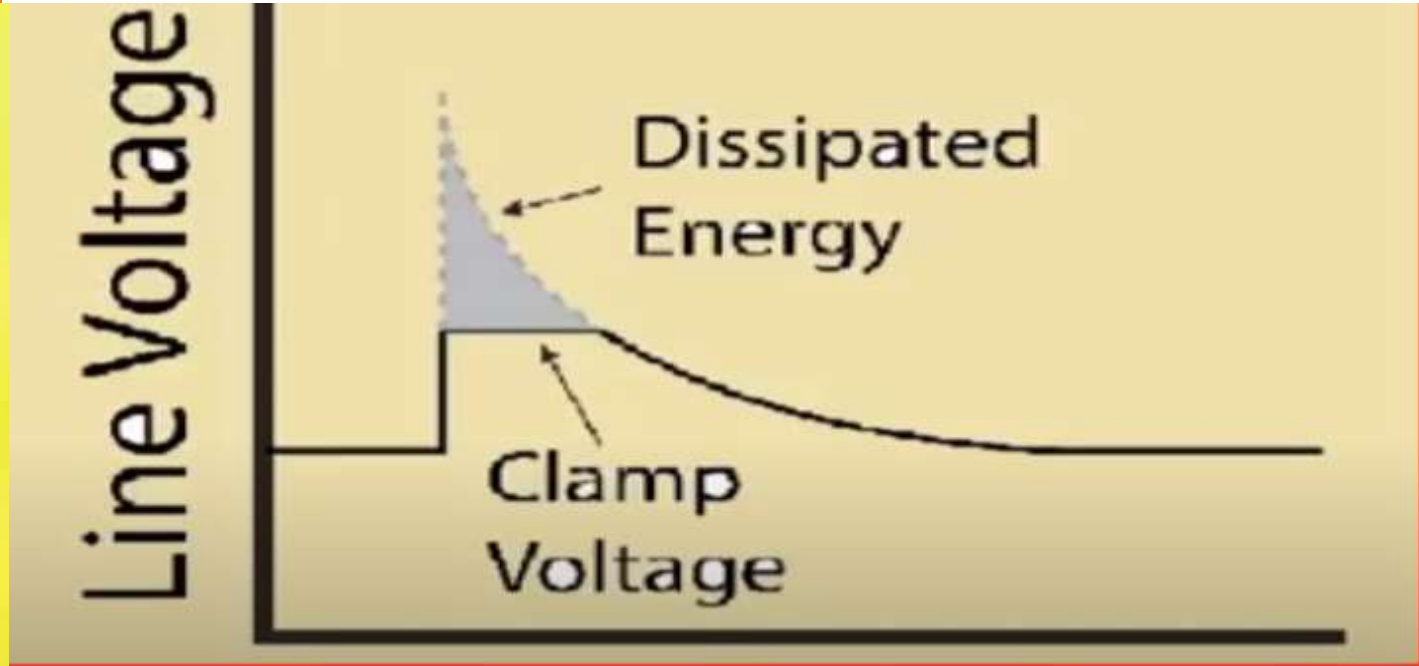
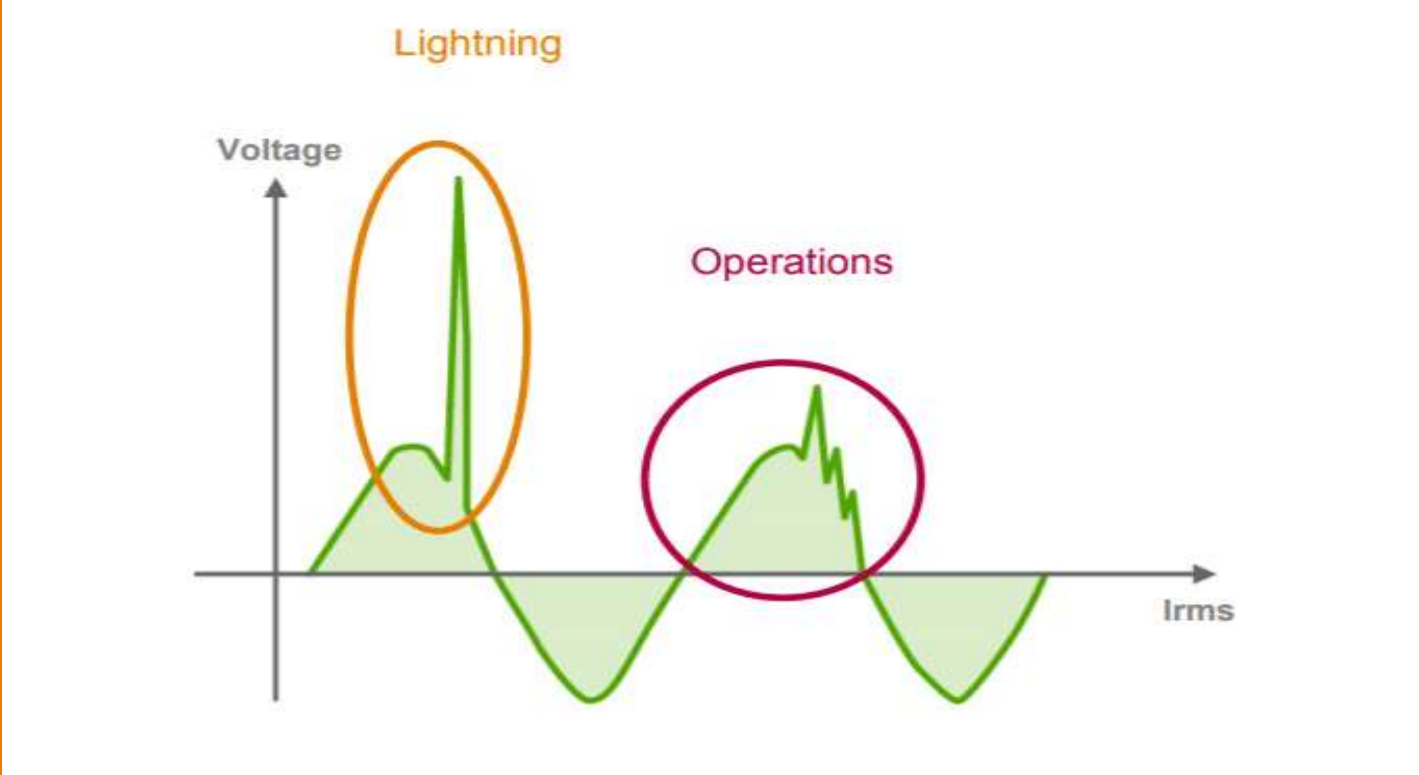
# HOW ELCB / RCCB WORK

**ABNORMAL CONDITION**



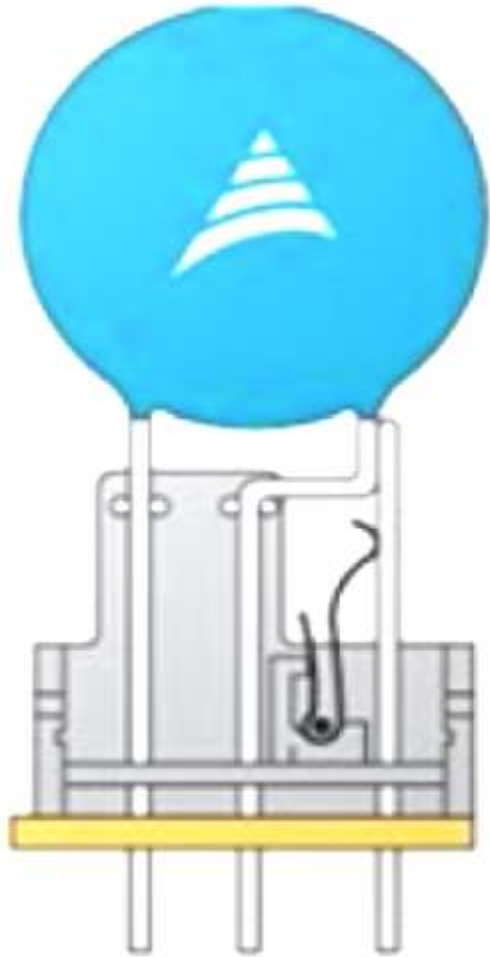


**HOW  
SPIKES  
ARE  
GENERATED**



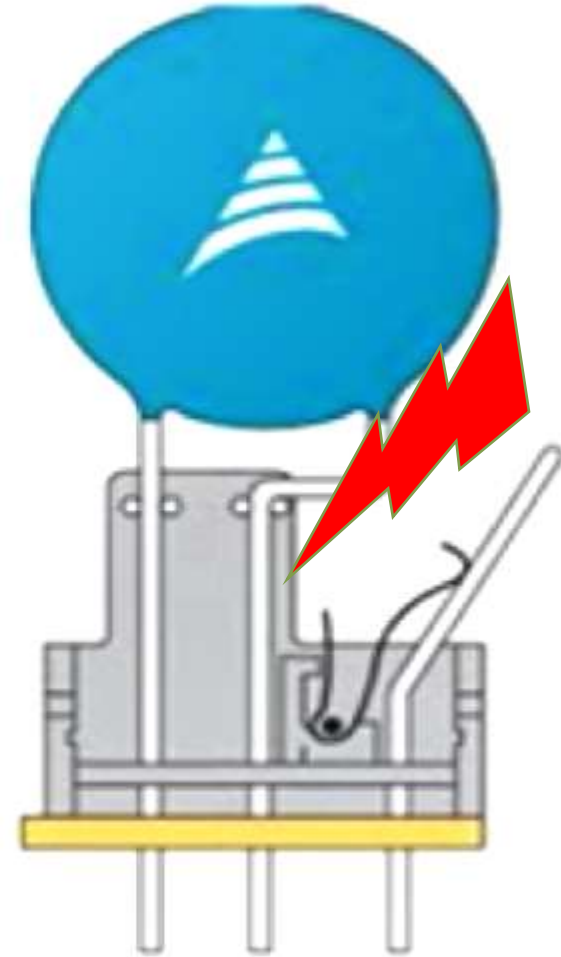


# Behaviour of SPD's for HV Spike



ThermoFuse operating

When temperature increased to 120 degree the DC supply will cut-off automatically



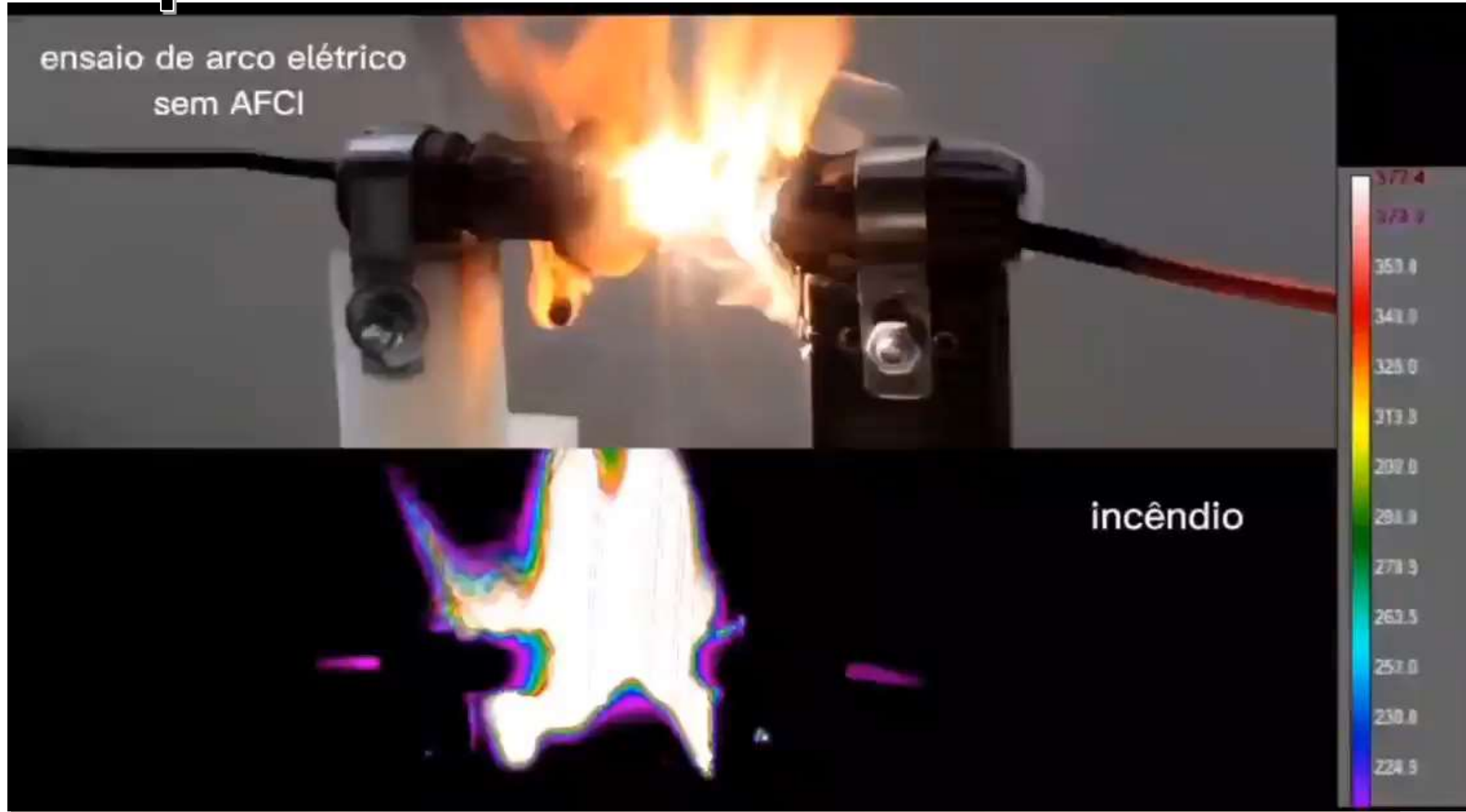
ThermoFuse disconnected



# K Importance of MC4 Connection



# Importance of MC4 Connection





## THERE ARE THREE METHODS TO TEST THE SOLAR PANELS :

- ❑ **Physical test** :one can carry out the physical test after the received of the solar panel at the site .
- ❑ **Electrical Test.** If you have a proper multimeter you can test the basic parameters of the solar panel during the peak radiation probably in afternoon by taking the short circuit current .
- ❑ **Factory Test**: During the factory test each and every panel is subjected to all the extreme conditions like IP 65 test simulation test IV curve test vibration test damp test , as electroluminescence (EL) testers, sun simulators, thermal cameras or resistance testers. Etc. we can take test report from the concern manufacturer so has to get an idea of what they have tested and what is the ultimate result so we can compare with from the data sheet .



## a) Broken or chipped solar cells

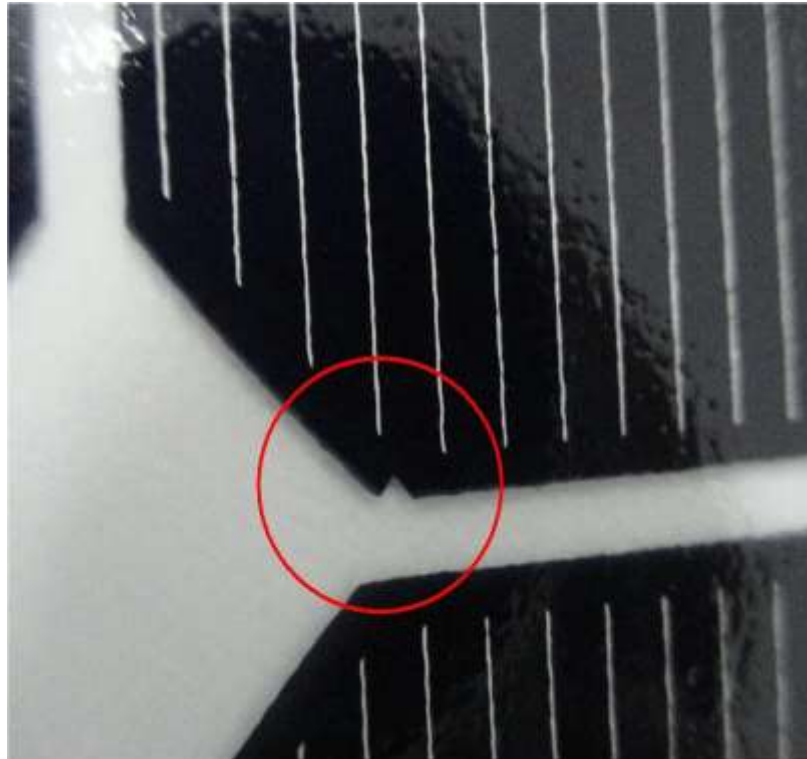
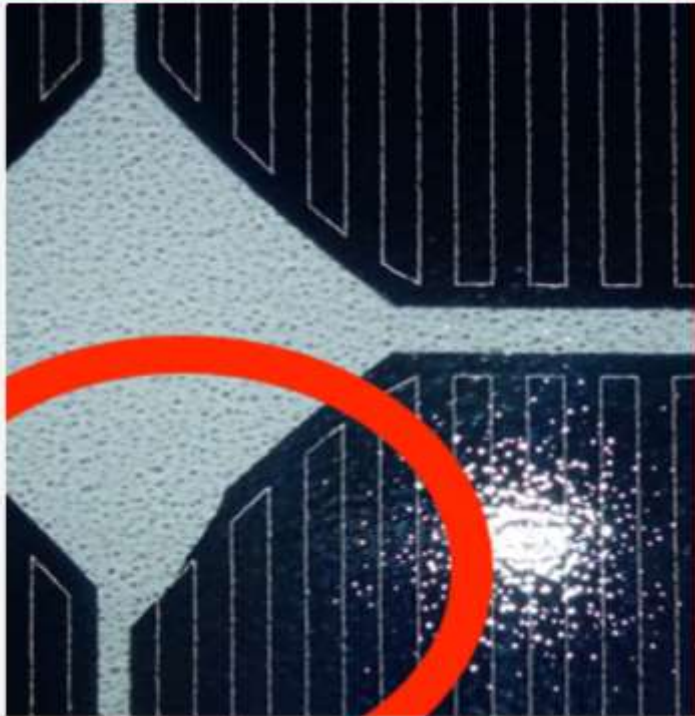
Broken and chipped solar cells are common and can indicate different issues.

If several solar modules have chipped solar cells, your manufacturer may be using Grade B solar cells or a serious problem as they may be cheating you on the most valuable component used in the solar modules.

Alternatively, the solar cell has been damaged during handling, most likely during the soldering process.

During **manual soldering** the solar cell breakage rate is higher than during automatic soldering.

As you can see this defect can be easily spotted by performing a visual inspection. Also it's distinctly visible during the EL testing.





## Solar cell string alignment

A misplaced string alignment is usually an aesthetic problem. String alignment is easily picked up by the eye and will therefore be picked up by the end customers. Also: if the spacing between the solar cells is too small (standard is 2mm), it may cause arching.





## d) Scratches on the glass

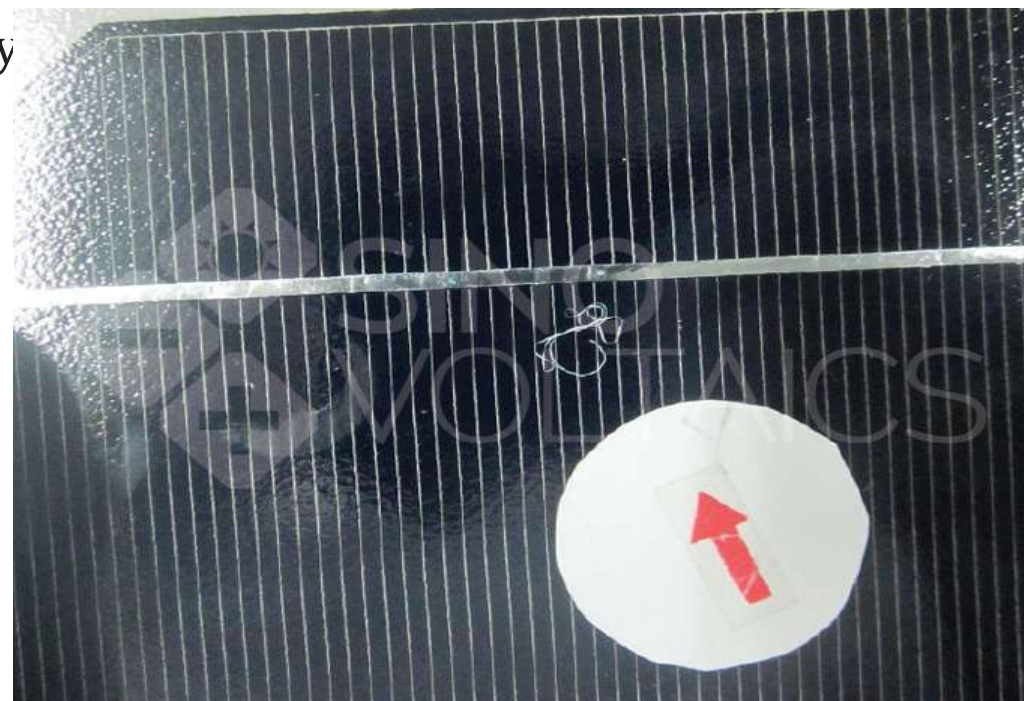
A major and prevalent quality issue are scratches on the glass cover of the solar module.

On average, small and large scratches on the thin glass covers are found during more than 70% of independent 3rd party quality inspections ,

These scratches are in many cases a result of **improper handling** of the module at the factory or **negligent and unsafe packing**.

Scratches, small and large, potentially lead to **output degradation** of the affected module. While less severe scratches superficially may cause some slight shading on the cells, larger and deeper scratches can heavily compromise the sensitive and nano-meter-thin antireflection coating that nowadays many module manufacturers apply, impacting the transmittance of light.

The coating being damaged, air, dust and water can get underneath which then causes the lifting of the rest of the coating and in the long run cause a delaminating effect.





## e) External particles inside the solar module

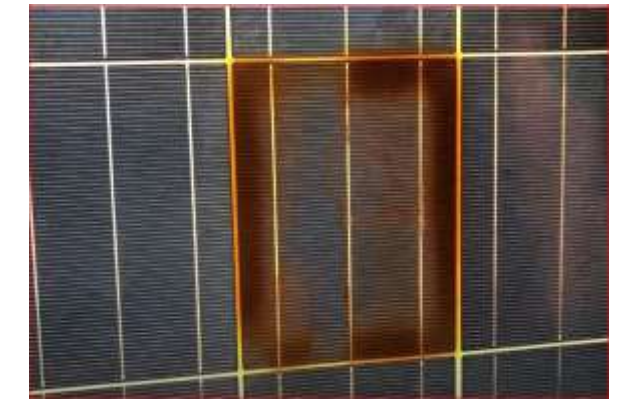
- Another defect you can easily spot yourself are **external particles** inside the solar module.
- These particles may vary, including simple soldering debris (often small pieces of tab wire), cloth or even **insects**.
- Similar to previous visual defects: if you spot such problem, it means a manufacturer is much likely neglecting simple quality checking procedures and there may be other problems.
- Debris the size as per below sample picture will have the same effect as shading and will, due to the cell-string structure of solar modules, affect its performance significantly.
- Moreover, with the exposure of the solar module to sunlight, the particle may heat up, even burn, cause severe damage to the module and moreover the whole system and project...
- Here an example of an external particle between cell and glass:





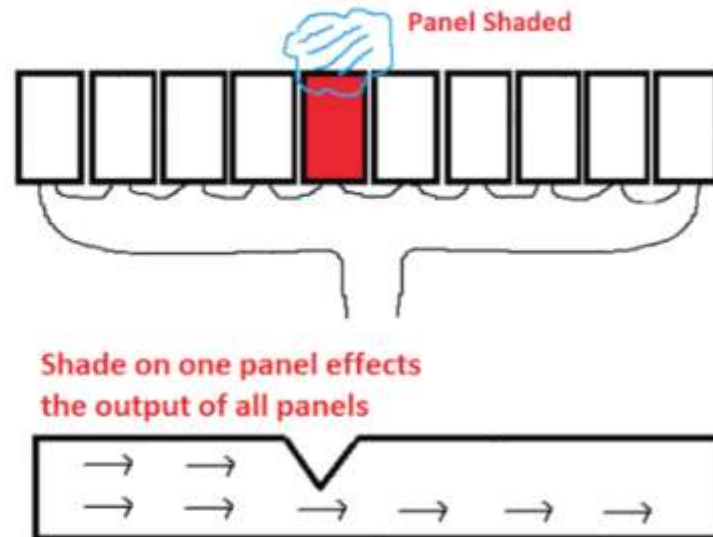
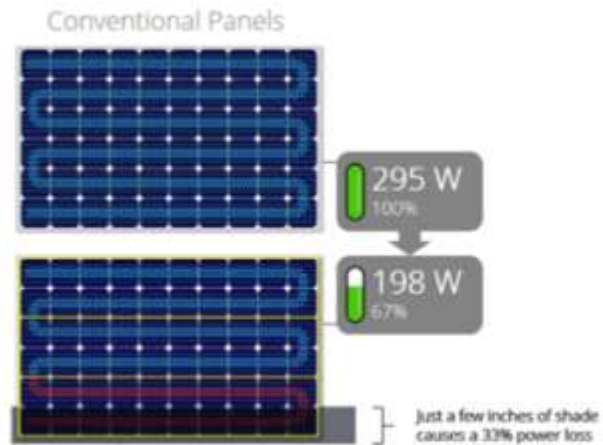
# Hot spots

- Hot spots are basically those places on the panels which are overloaded and hence tend to become warm.
- Badly soldered connections can lead to low resistance in that part of the solar panel which gets the power generated by the cell. Or greatly affected due to shading
- The problem of hot spots can cause short circuits and may also lead to lowering of the lifespan and performance of the solar panels.

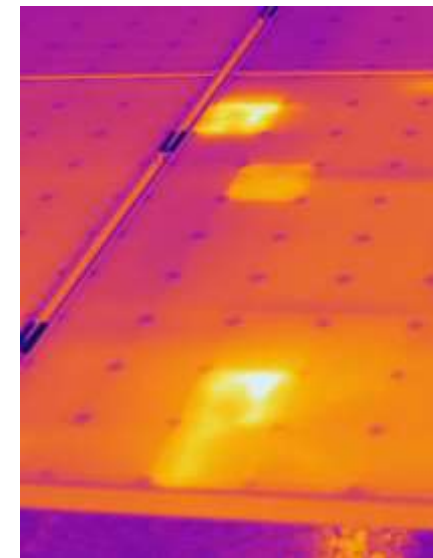


## Solar Panels and Shade

G



Even if only a minimal amount of your solar array is in the shade, the effect on the performance of your whole photovoltaic system can have a considerable impact.



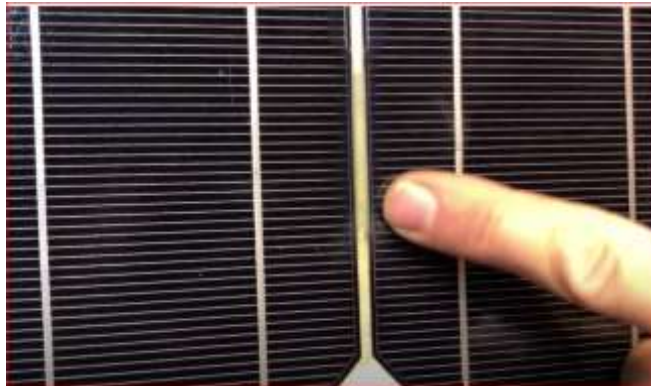




# Internal corrosion and delamination

When moisture seeps in the panel, it can lead to *internal corrosion* and this is one of the most common problems with solar panels. Given below is its description:

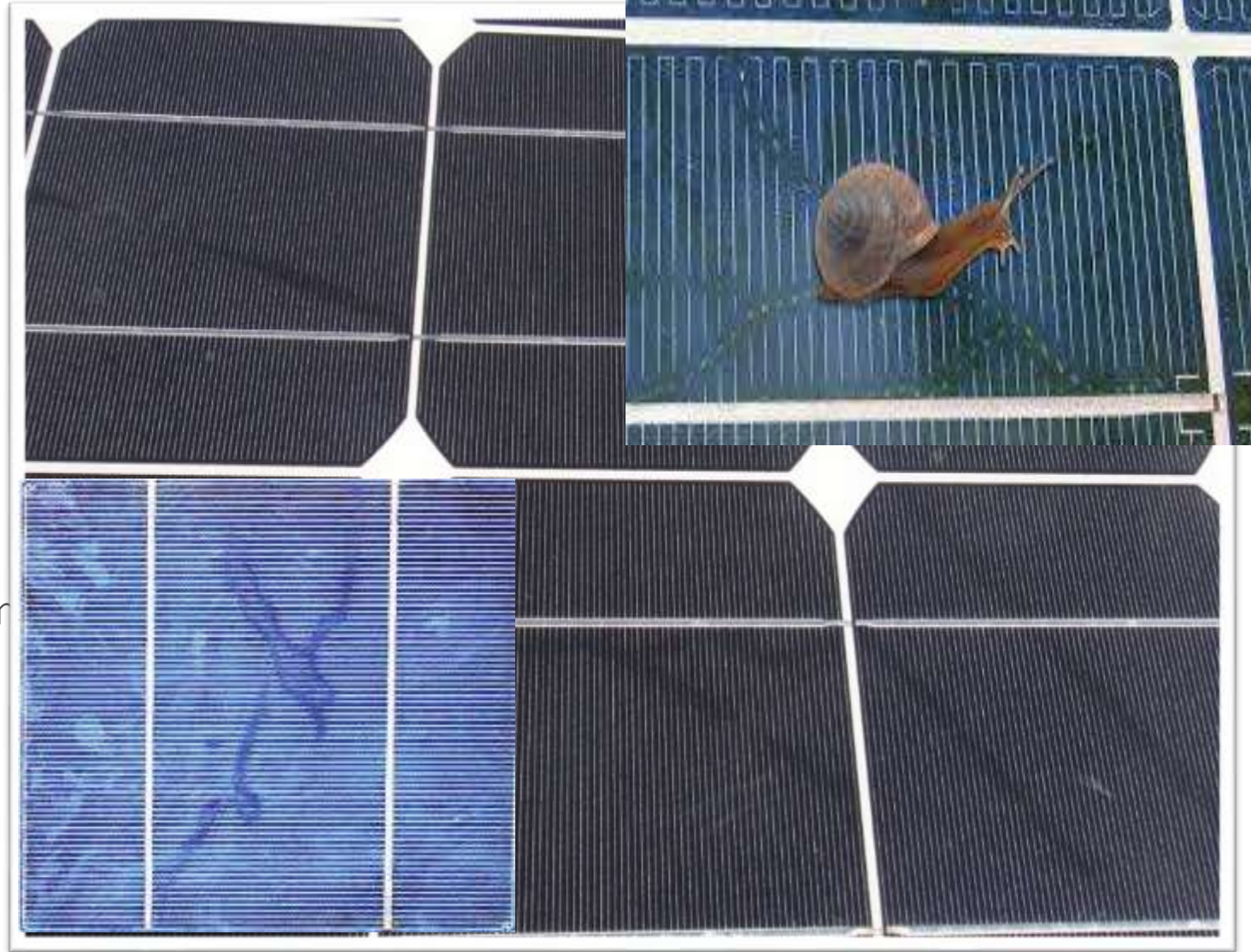
- For this reason, the solar panels must be water and air tight and the components of the panels must be laminated under vacuum.
- In case the lamination is not done correctly then it can lead to *delamination*.
- Delamination is basically the detachment of the laminated components.



# Snail trail contamination

Another one of the common problems with solar panels is *snail trail contamination*. Read on to find out more information about this problem:

- Snail trail is basically a contamination occurred in the panel which comes up only after a few years of production.
- There can be many reasons for this problem and some include defective front metallization silver paste in the solar cell manufacturing procedure and others.



# K EV CHARGERS

## RASPBERRY-AC Chargers for ONBOARD Internal Chargers



2 Wheeler  
3 Wheeler  
4 Wheeler  
(Type 2 port)



TATA Nexon



MG





# EV CHARGERS

# BLACKBERRY – Fast DC Chargers-500VDC



MG

TATA Nexon





# EV CHARGERS BLUEBERRY HV-Superfast DC Chargers 1000VDC

German Award for Best Technology & Iconic Look

Products from I Charging ,Europe

100% Assembled in India

Zero Chinese components



TATA NEXON



BMW



AUDI



TATA Nexon

MG



TESLA



Mercedes





# 7G Infinity Inverter with 25 years life-long warranty



Quad Core Multiplex Chipset

SIC Semiconductors

Silicon Nitrate Heat management Technology

Very High MTBF components

Individual Isolated PS for individual SC

Very High Surge caring capacity

Dynamic heat Management technology

Inbuilt Super fast & very High Gain Wifi with supersonic Antenna & Watch-Dog Circuitry for 3-level Protection

Inbuilt Super fast & very High Gain Wifi with supersonic Antenna



# New Upcoming Products

**Dynamic Load Balancing**

**EMS-Energy Management System**

**Inverters with Voice messages in fault conditions**

**Electrical Vehicle Charging System with Renewable Input and use EV battery for load & in case of excess power it can be exported to grid**



# World First Inverter-Replacement is done without hurdles



Failures due to Grid - **No Questions**

Failure due to faulty wiring - **No Questions**

Failure due to surge & lightning -  
**No Questions**

Failure in case you have not use external  
SPD's - **No Questions**

Failure due to mishandling of inverters -  
**No Questions**



 **K Solare**

*Since 2012..*



**Thank You...**

**For more queries: 8530111222, 7030955501, 7888009286**