

Toward An Era of Generated Electricity "Energy (Wh)" from "Power (W)"

The Most Efficient Power Generating Systems

Special Features for the 100-year Converter

String **tajubu** Converter (Nickname: ST-CON)

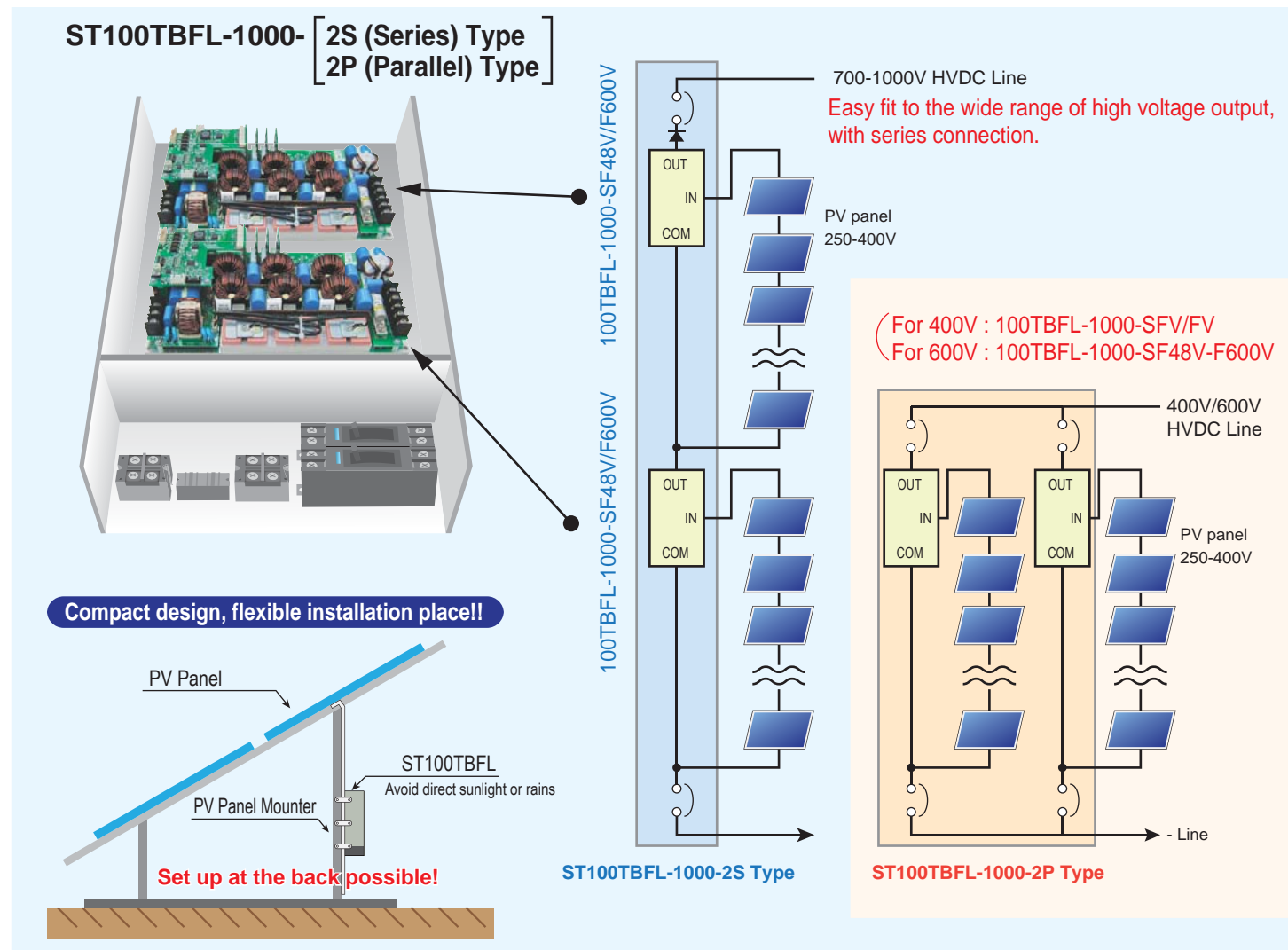
With the improvement of semi-conductor technology, the conversion efficiency of photovoltaic (PV) panels have been improved around 17% now which used to be under 10%. It is addressed to be 40% by 2050. However, it is necessary to focus on improving as whole PV systems, not only the conversion efficiency of PV panels.

The amount of generated power from PV systems depend on the number of PV panels installed. Therefore, as the number of PV panels increase, the amount of generated power will increase.

However, even generated power is high, it cannot be utilized efficiently without keeping it constant and stable. The most important thing for PV systems is not only the momentary generated power, but how much power generated as total by the end of the PV system lifetime. Natural energy never be stable, so if the PV system cannot utilize maximum power efficiently, even it installed high conversion efficiency PV panels, generated power will be the same as the systems which installed low conversion efficiency PV panels.

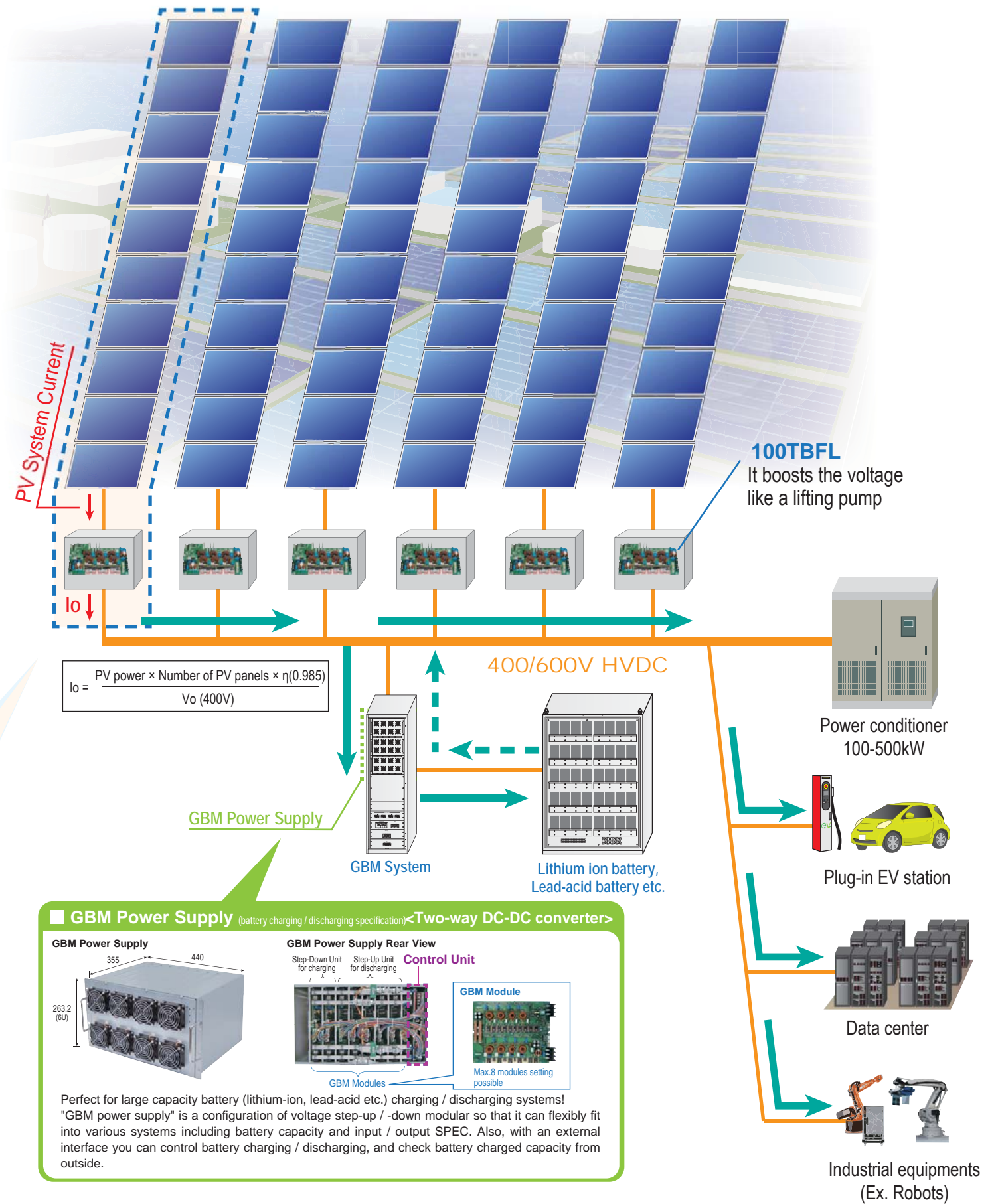
Nipron developed "String Tajubu Converter (Nickname: ST-CON)": this power supply achieves a high efficiency PV system construction which provides stable power. With ST-CON, you can get 10-20% or more generated power from your PV system compared to the generated power from the systems without ST-CON.

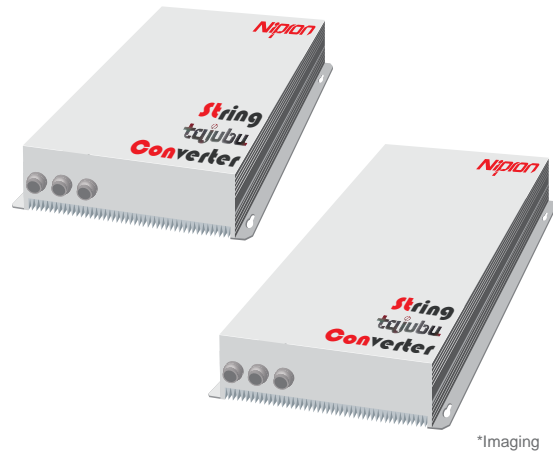
**"String" consists of several PV panels connected in series. Capable to generate a certain amount of energy.



ST-CON Mega Solar System

The mega solar system with ST-CON boosts voltage efficiently even from one PV panel.



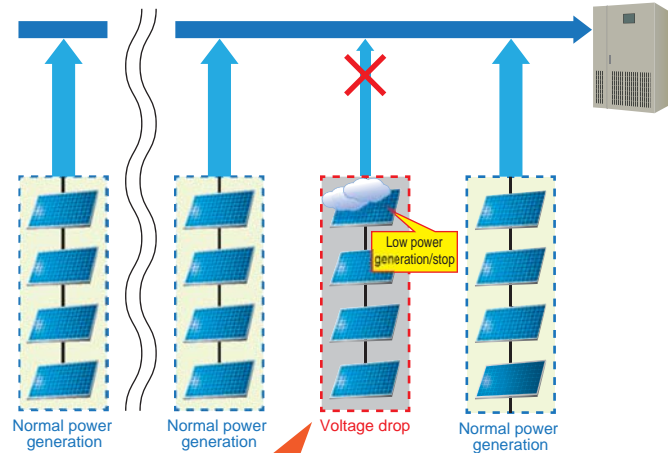


- **Ultrahigh efficiency (98-98.7%)** DC-DC converter with Nipron's original multiple boosting circuit.
- Effectively utilize low solar energies in the mornings and evenings by boosting up the voltage. This is from Tajubu's greatest feature "ultra wide range input (24-400 VDC)".
- **Minimize the electric power loss.** Voltage drop affected by fallen leaves, bird droppings or shades occurred in one PV panel in parallel connected string causes a power loss of whole string. With ST-CON, by boosting-up the voltage with high efficiency enables the string to minimize the electric power loss.
- ST-CON smoothes voltage only with energy of the multiply-connected choke coils. **NO electrolytic capacitor use resulting lifetime 15-20 years or more, and it has IP44 structure for outside installation.**

Nipron's ST-CON plays a role of "lifting pump"!
It pumps approx. 100% small electricity like puddles. Efficiently pumps up from one PV panel.

[Without ST-CON]

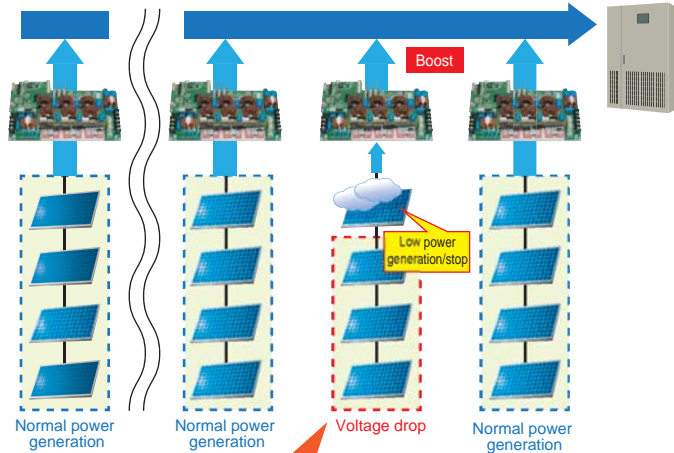
If the voltage difference happened in between the strings, the low voltage string cannot be delivered maximum power and will make the generated power lower.



WASTE generated power from the string due to voltage drop even some PV panels in the area where they are generating.

[With ST-CON]

With ST-CON, maximum power supplying achieved. By boosting up the voltage value of the string which had voltage drop to the voltage value of the other strings.

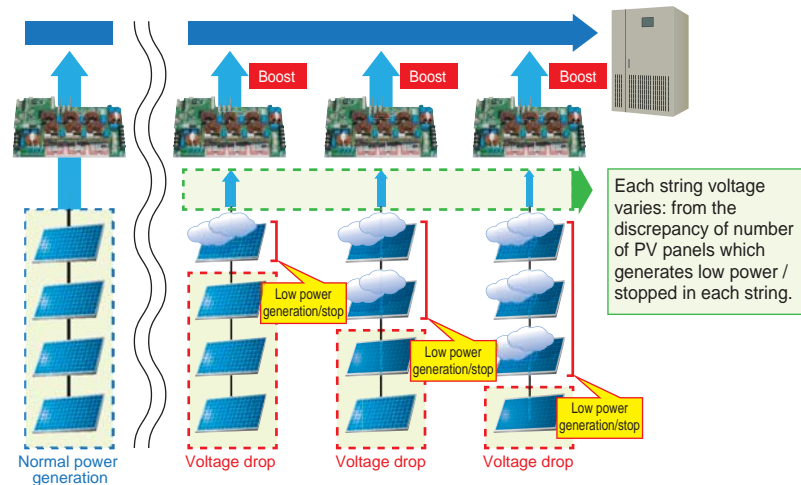


SUPPLY generated power effectively from the string, by boosting the power, even voltage drop occurs.

ST100TBFL for the case

NO problem with ST-CON even voltage drop occurs for some strings, or voltage in each string varies.

Greatest feature of ST-CON is "wide range of input voltage!"
Furthermore, **NO concerns of sudden voltage drop, it boosts the voltage and enables to supply the power MOST effectively!!**



Accidents or factors of low power generating

Bird droppings, fallen leaves or shades on PV panels interrupt / decrease power generating, this leads low power generating of whole string. This wastes the generated power from PV panels in the string which are NOT affected because its string voltage will get lower than the other strings connected in parallel.

With ST-CON, power generation of each string can be controlled. Therefore, even low power generation occurs in one PV panel, other PV panels can always supply the maximum solar power.

I. Hot-spot phenomenon

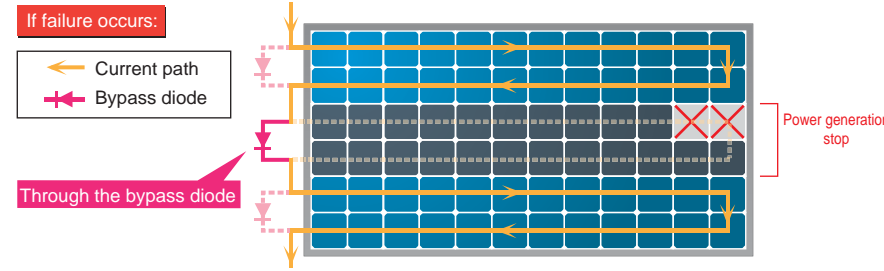
Shadows on the PV panels cause the failure, as the part turns to be resistance and generates heat.

Major causes of hot-spot phenomenon



Countermeasure of hot-spot phenomenon

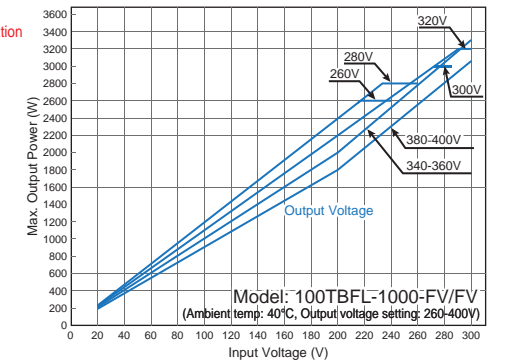
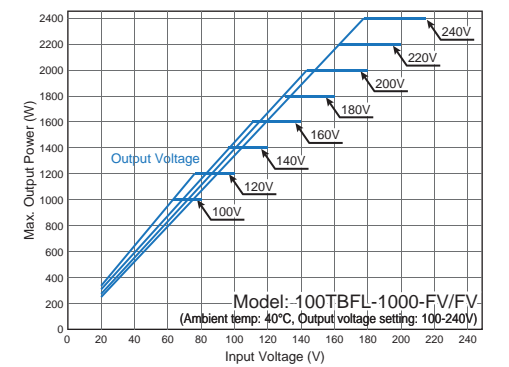
Pass the current through the bypass diode to avoid resistance part. However, it lowers the voltage and generated power.



With ST-CON

ST-CON has wide range of input, refer to the right chart. **NO concerns of sudden voltage drop, it boosts the voltage and enables to take the power out MOST effectively!!**

Input Voltage vs. Max. Output Power Characteristic (provisional)



II. Arc discharges

Arc discharges occur at cracked spots from disconnecting of high voltage line caused by natural disasters, etc. Arc discharges have the risk of smoke or fire. In 2011, National Electrical Code (NEC) established a regulation for equipments which operates input 80VDC or higher to have arc discharges detection circuit and the protection system. Accident risk can be lower by decreasing the number of panels connected in series, and increasing the number of strings connected in parallel.

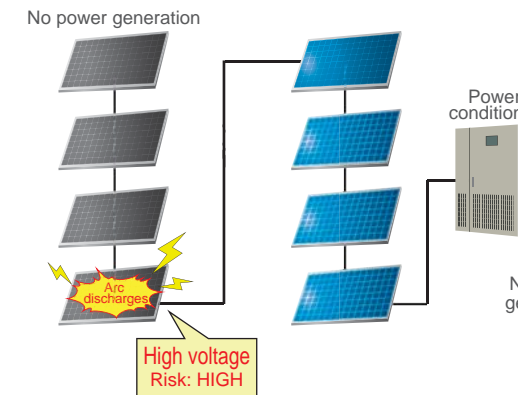


PV panel burned out by an arc discharge

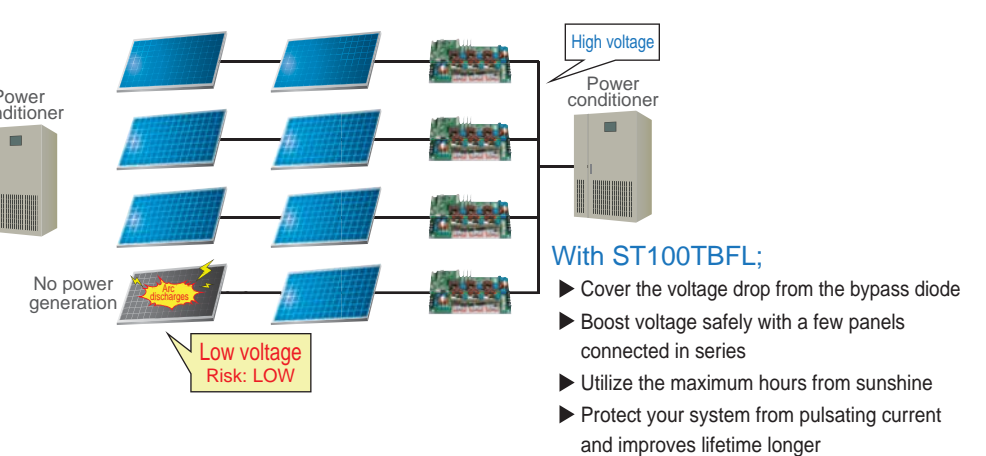
With ST-CON

- ▶ Minimize the number of panels connected in series as shown in below pic. to reduce the risk of fire.
- ▶ Enable to continue power generation except for the failure part, and prevent power generation loss.

[In the case of high voltage series connection]



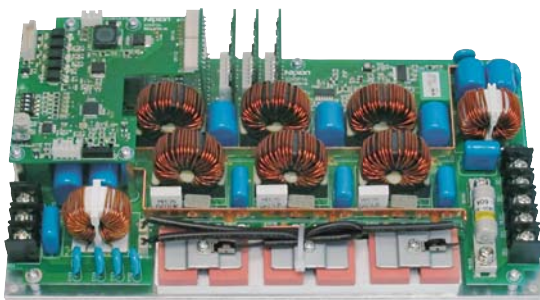
[In the case of low voltage parallel connection with ST100TBFL]



The Main Module of "ST-CON" Configuration, Ultrahigh Efficiency & Compact Step-up Converter

Fanless 100-year Converter

100TBFL series **NEW**

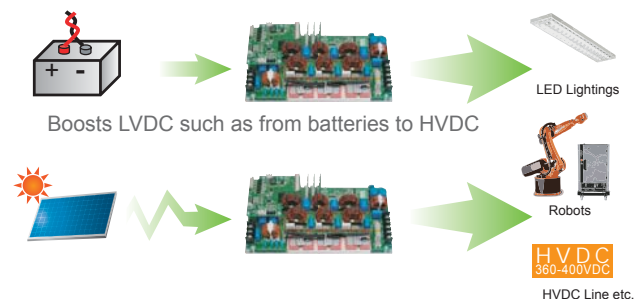


MAX. 98.7%
Industry-leading level ultrahigh efficiency

Long Lifetime
W/O electrolytic capacitors & fan

► Various Usages! for Green Products or Industrial Equipment!!

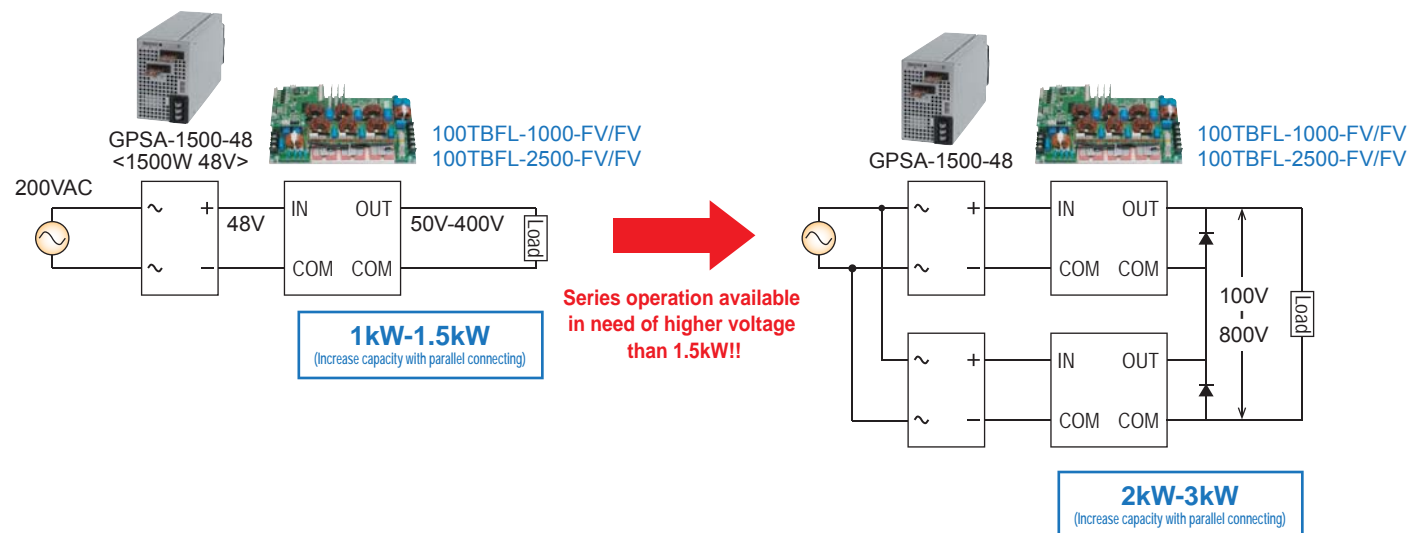
- ◆ Boosts LVDC such as from batteries, to useful HVDC
- ◆ Maximum utilization of unstable natural energies



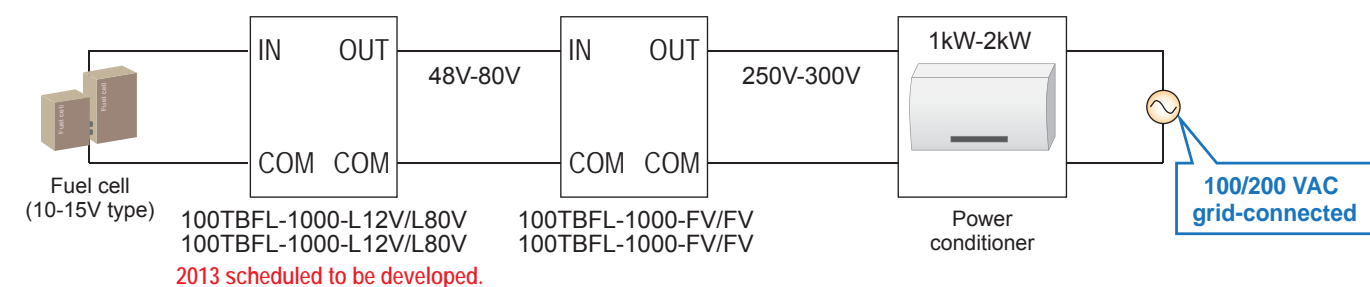
What is "100-year converter" ?

The design concept of "100-year converter" is, to stand outside harsh environment even fanless, and natural air cooling. In order to achieve this, we obsessed to EXCLUDE SHORT LIFETIME COMPONENTS: electrolytic capacitors and cooling fans. Furthermore, it achieves 15-20 years lifetime under IP44 environment, packed in aluminum-fin-configuration box, because its ultrahigh efficiency 98.7% as the "string converter" in use of PV system keeps power loss under 39W, even the string outputs approx. 3kW.

► As HVDC power supply (Parallel operation available for large capacity, 1-2kW)



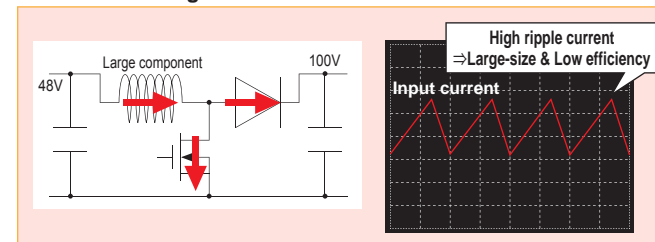
► As a step-up converter for fuel batteries



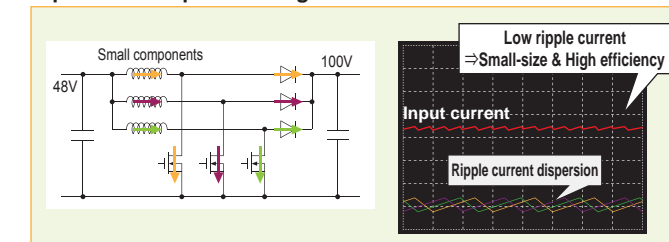
► Nipron's original "Multiple Boosting Circuit" enables Compact / High efficiency 92 to 97*%!

100TBFL has Nipron's original multiple boosting circuit. It achieved compact size and high efficiency, by phase shifting each switching.

Common boosting circuit



Nipron's "Multiple boosting circuit"



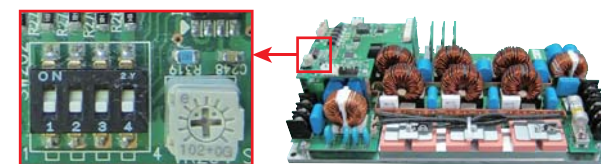
► MPPT control (S: Solar / W: Wind / F: Fuel battery type)

PV cells have the characteristic that their voltage drop when apply the load current. To utilize the energy from PV cells effectively, it is required that the current from PV cells should be controlled (MPPT controlled) for maximizing the electrical power. 100TBFL with MPPT control makes it possible to output max electrical power consistently.

► Other features

- ⊗ Perfect for fuel batteries, constant input current control available (F type)
- ⊗ Noise filters on input/output as a standard. *ZNR noise filter can be connected as an optional.
- ⊗ Parallel operation (100TBFL-2500 type)
- ⊗ Various output signals (Power on, Output overvoltage, and Internal temp. rising signal)
- ⊗ Operating status indication by green LED (Normal operation: Light / Abnormal: Blink / Shutdown: Off)
- ⊗ Remote ON/OFF function
- ⊗ OCP, OVP and OTP circuit
- ⊗ Thermal control functionality to keep internal temp. lower than the specified value by controlling the output
- ⊗ 12V / 0.5A output for fan (not insulated)
- ⊗ Extensible options

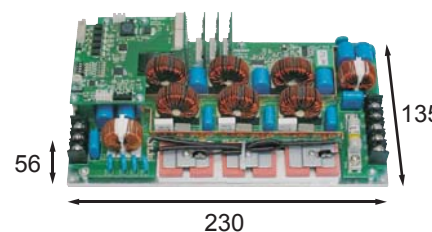
► The output voltage can be adjusted with DIP switch



*Contact us for details about voltage setup value.

► Product specification *Please note that this specification is provisional and subject to change.

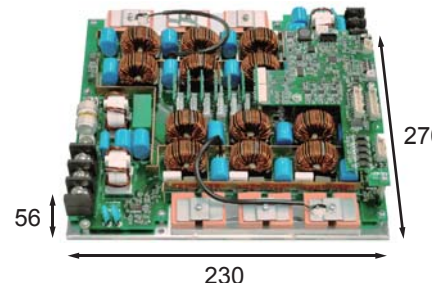
100TBFL-1000 series



Model Name	100TBFL-1000-FV/FV	100TBFL-1000-SFV/FV	100TBFL-1000-LV/LV	100TBFL-1000-SLV/LV
Input Voltage Range	24-400VDC	24-400VDC	24-75VDC	24-75VDC
Boosting start voltage	24VDC±2V min.	24VDC±2V min.	24VDC±2V min.	24VDC±2V min.
Boosting stop voltage	18VDC±3V max.	18VDC±3V max.	18VDC±3V max.	18VDC±3V max.
Output Voltage Adjusting Range	100-400VDC	100-400VDC	50-200VDC	50-200VDC
Output Power	3300W max.*		1600W max.*	
MPPT Control Circuit	×	○	×	○

*Varies by the input-output voltage difference. Please refer to the product specification for details.

100TBFL-2500 series



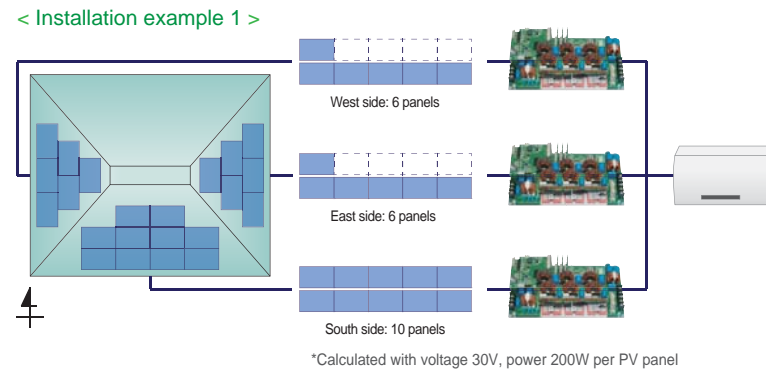
Model Name	100TBFL-2500-FV/FV	100TBFL-2500-SFV/FV	100TBFL-2500-LV/LV	100TBFL-2500-SLV/LV
Input Voltage Range	24-400VDC	24-400VDC	24-75VDC	24-75VDC
Boosting start voltage	24VDC±2V min.	24VDC±2V min.	24VDC±2V min.	24VDC±2V min.
Boosting stop voltage	18VDC±3V max.	18VDC±3V max.	18VDC±3V max.	18VDC±3V max.
Output Voltage Adjusting Range	100-400VDC	100-400VDC	50-200VDC	50-200VDC
Output Power	4600W max.*		2500W max.*	
MPPT Control Circuit	×	○	×	○

*Varies by the input-output voltage difference. Please refer to the product specification for details.

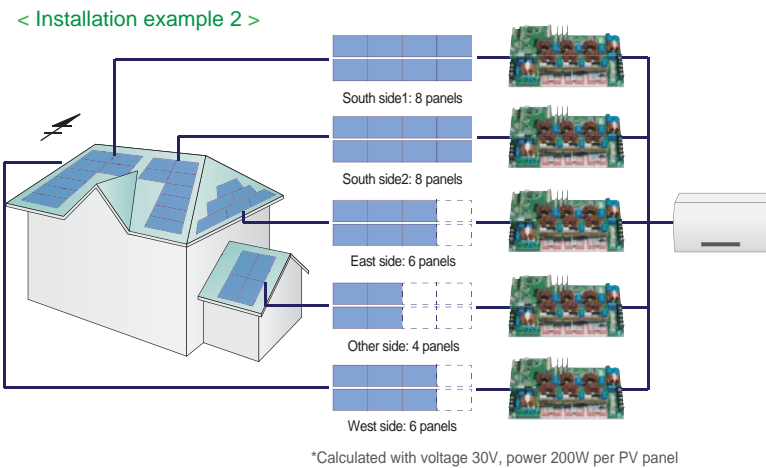
MPPT control method varies by applications. S type for Solar power, W type for Wind power, and F type for Fuel batteries.

Streamline your PV system with 100TBFL

In case that the number of panels set differently depending on the directions of setting like example 1, 100TBFL boosts the voltage of each string makes voltages balanced out, and can derive the maximum power.



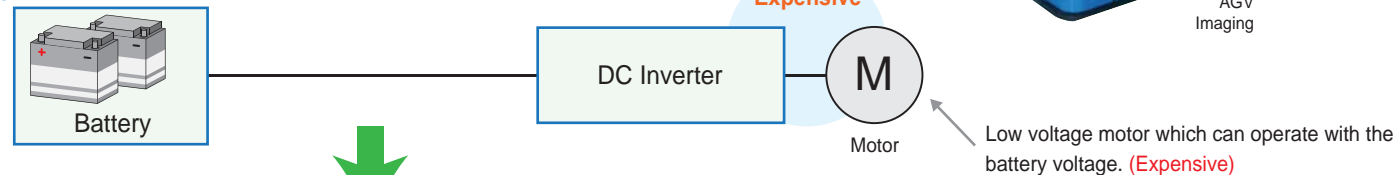
Even if the installation space is too limited to set the panels for PV system, like example 2, "other", 100TBFL can even input from low voltage so that it can constitute a solar power generation system without leaving a space.



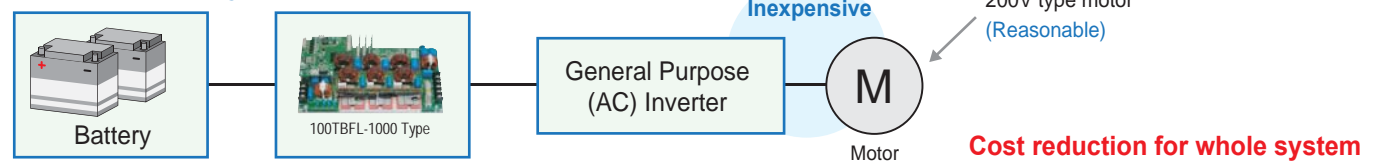
Utilize as step-up converter, for automated guided vehicles (AGVs)

If you use 100TBFL to automated guided vehicles (AGVs) powered by batteries, you can have AC inverters in your choice which are inexpensive and variously lined up.

System with DC inverter



100TBFL enables system with AC inverter



Cost reduction for whole system

With 100TBFL, system can

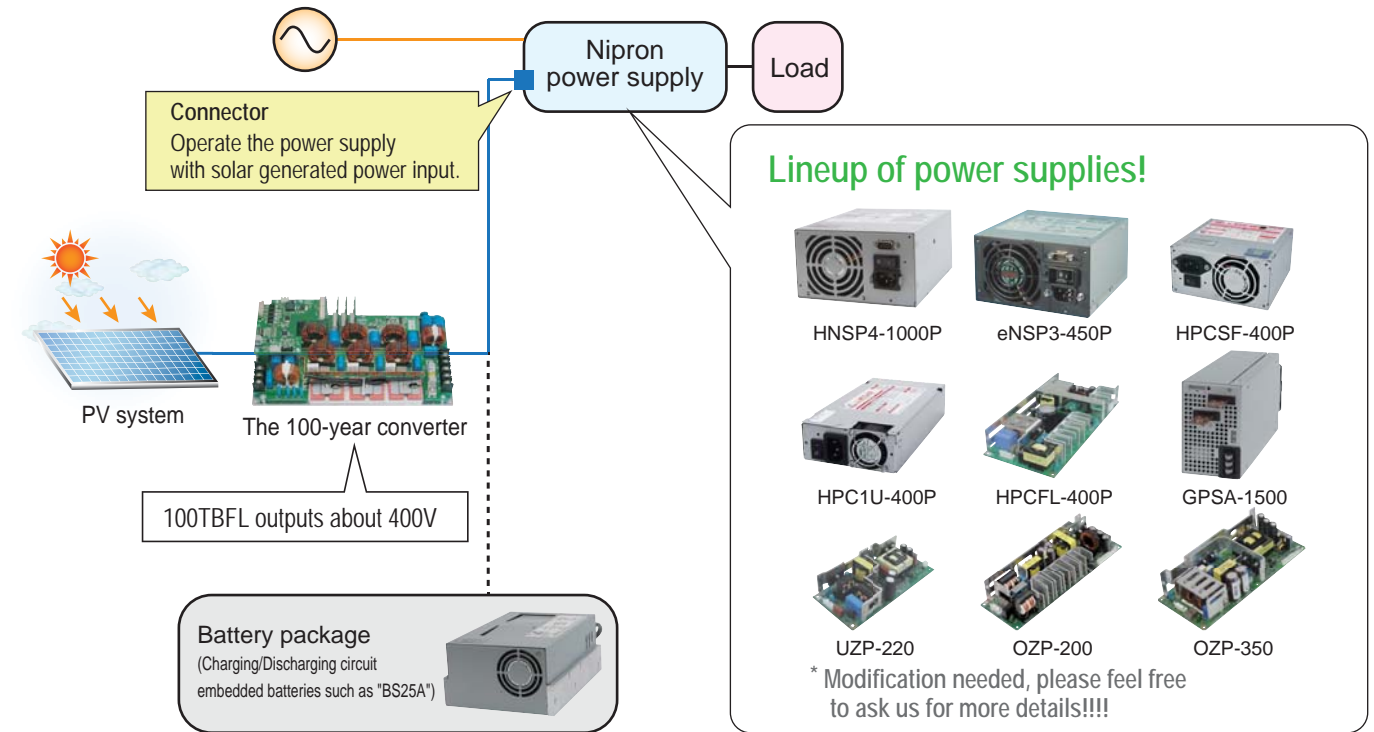
- reduce the cost for the inverter
- have more choices of the inverter

"100TBFL-2500 type" also available!

Construct a versatile PV system with the combination of a Nipron power supply

With the combination of "100TBFL" and Nipron power supply, such as Non-stop power supply, ATX power supply, or universal power supply, you can construct "Eco-operating system" utilizing solar-generated electricity, for whole system.

That system will take prior power feeding from solar-generated electricity, and if the solar-generated electricity is not high enough, AC will provide stable power to the loads. Also, you can have back up functionality by connecting a dedicated battery package.



Other "Green Power Supplies" lineup

For more efficient green energy utilization

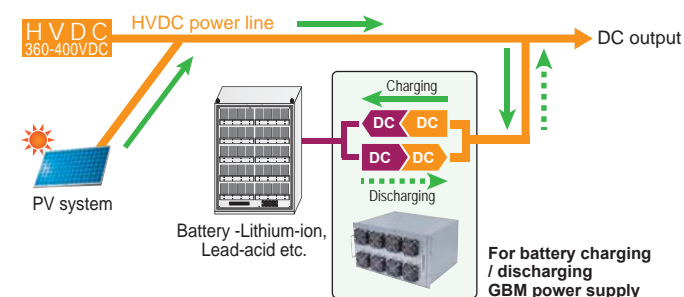
Green Best Mix power supply (GBM power supply)



Total control of battery discharging / charging

Perfect for large capacity battery (lithium-ion, lead-acid etc.) charging / discharging system! "GBM power supply" is a configuration of voltage step-up / -down modules so that it can flexibly fit into various systems including battery capacity and input / output SPEC. Also, with an external interface, you can control battery charging / discharging, and check battery charged capacity from outside.

System construction example



High Efficiency Charger for PV system

CG3U series



[Input / output example]
Input: PV cell (300-400V)
Output: 55V
2500W max.

Insulated type

Ultrahigh efficiency 94% typ. and ultralow loss circuit method

CG3U series has the function that each embedded power supplies automatically starts-up/shutdowns separately depending on the amount of PV generated power. At light load, only one embedded power supply can fully cover the operation so that can achieve a high efficiency even with the light load condition.

System construction example

