

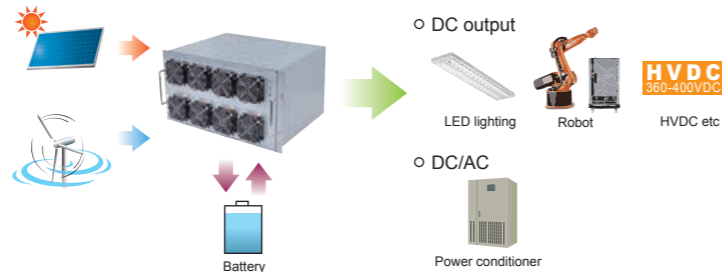
# Smart Grid Power Supplies available Small to Large Scale Available

## Special Features for Smart Grid

Smart Grid is attracting worldwide attention including Japan as part of the energy policy. It is power distribution system that enables an electric power control from both demand and supply sides. Previously the electricity has been delivered from the supply side such as electric power company, but Smart Grid enables the demand side to generate electric power and to distribute excess electricity to electric power companies or other demand sides. Also, it can control the status of use and the condition of use in electricity so that it can relax the power outage during peak energy hours at an electricity shortage or during the blackout affected by the disaster or an accident. The key factor for the realization of Smart Grid is an electric generation at demand side. It is mainly generated by natural energy of solar power. The advantage of using Natural energy is that it can be utilized semi-permanently but, on the other hand, it cannot always supply stable energy by being affected from the weather. Many companies and organizations are working on reducing disadvantage factors by trial and error. Nipron also keeps mainly developing the power supplies for the application of Smart Grid and Green Best Mix power supply, following under our philosophy "Guard Global Environment", that is what we believe to contribute for achieving the Smart Grid market.

### For the customer who is planning a Smart Grid project

#### Integrated control of disparate inputs Green Best Mix power supply



AC power (commercial source), battery, natural energy etc., these disparate inputs are converted from DC to DC with high efficiency. The supplied energy can be externally controlled according to the amount of each generated power or time of the day etc. Also, the structure can be built flexibly with the line-up of "step-up", "step-down", "power capacity", "two-way operation", "MPPT control", and "monitoring function" etc.

#### To the battery which is necessary for natural energy utilization CG3U series

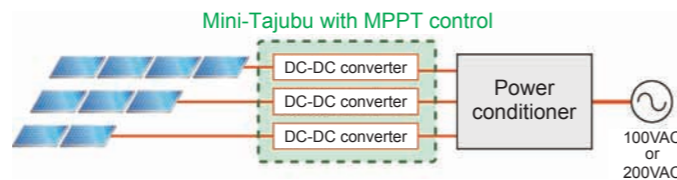


CG3U series "Solar Charger" is just released. It can charge the electric power which is generated by solar panel to a battery. With 94% ultra-high efficiency, MPPT control circuit, and ultralow-loss circuit, solar energy can be charged efficiently. Also, CD3U series, constant output voltage type is provided in our line-up.

#### From middle to large size application Mini-Tajubu



\* This model is provisional and the appearance is subject to change

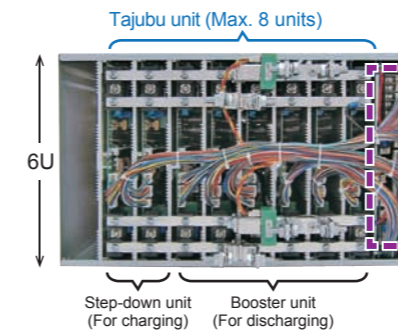


Small size DC-DC converter will be released. It is the top-class 98% high efficiency in industry and having MPPT control circuit in it so that it takes maximum electric power from solar cells (scheduled to be released in June 2013)

## Integrated control of disparate inputs Green Best Mix power supply



#### 6U Tajubu rack



#### Control unit

Drive signal function, parallel operating function, remote ON/OFF function etc. are carried. It is the central unit of this power supply.

#### Operation control

Each function is settable by external communication

#### Information acquisition

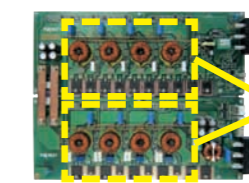
A variety of information can be output by external signal transmission.

It is available to put in max 8 units of Tajubu in a 6U rack. For the use of charging and discharging of battery, it is possible to combine the Tajubu units for charging and discharging in 8 units max according to their capacity. (2 units for charging, 6 units for discharging etc.) Also, if the load capacity is small, one 6U rack can adapt 2 input resources (4 units for solar power, 3 units for wind power etc.)\* Tajubu unit (power supply unit) is modularized for the flexible adoption of various systems by the combination of the modules. Tajubu unit and control unit are 6U size height in order to put in 6U rack server.

\*Each solar power and wind power requires control unit(s)

- Maximum solar cell energy can be achieved with MPPT circuit
- Inrush current prevention circuit equipped
- n+1 redundant operation available
- Higher reliability with coated PCB
- Increase in capacity with parallel connecting
- Various input/output signals equipped
- More than twice peak current capacity (10 sec) of rated output

#### Tajubu unit



Tajubu unit is composed of our unique multiple boosting (or step-down) circuit. The phase shifting of each switching gives the downsizing and high efficiency.

#### Multiple boosting(step-down) circuit

Tajubu unit has 2 multiple boosting (step-down) circuits in order to increase the capacity by connecting in series if boosting (step-down) rate is high or by connecting in parallel if the rate is low.

#### Input/output specification of step-up/-down units (schedule)

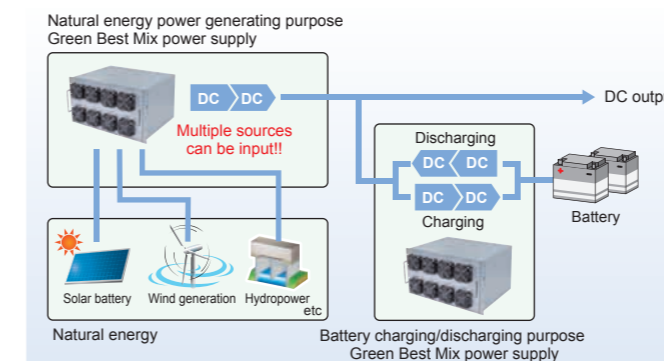
Booster unit	Connection	Rated input voltage	Rated output voltage	Output power
Booster unit	Series (2 steps type)	40~70V	200~400V	2.5kW
	Parallel (1 step type)	100~350V	200~400V	4.5kW
	Parallel (1 step type)	200~500V	400~650V	3.5kW
Step-down unit	Connection	Rated input voltage	Rated output voltage	Output power
Step-down unit	Series (2 steps type)	200~400V	40~70V	2.5kW
	Parallel (1 step type)	200~400V	100~350V	4.5kW
	Parallel (1 step type)	400~650V	200~500V	3.5kW

Contact us if you have other inquiry for input/output voltages.

### For the upcoming age of DC electric supply

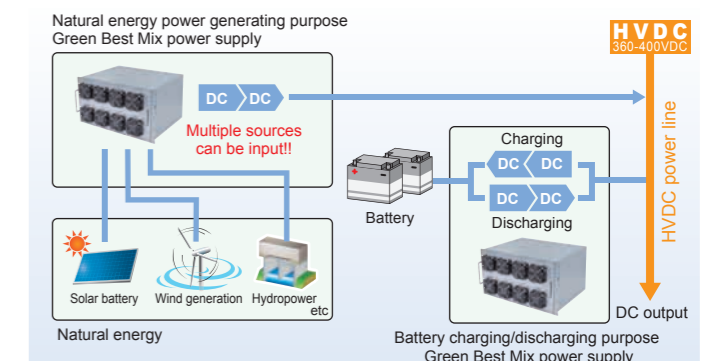
General power generation systems of natural energy at houses, facilities, and factories are interconnection systems for the Electric power purchasing system. With connecting to the power grid of electric power company, dealing of electric power is enabled. However, since this interactive trading is in AC power, the generated power should be converted to AC. If equipment can be operated on DC power, it saves the AC conversion power loss and it is most efficient way to utilize natural energy. This DC electric supply attracts attention in the recent energy policy. However, natural energy has the problem that its power generation is affected by the weather or time of day. Therefore power supplies are required to stabilize natural energy. Nipron highly recommends our Green Best Mix power supply and introduces the example of construction of the DC electric supply system using a Green Best Mix power supply.

#### The construction image using a battery of the system for disaster prevention



When natural energy is generating more power than the requirement of load, Green Best Mix power supply converts the energy efficiently and charges the excess power to batteries. If natural energy runs short, the charged energy will be used for the stable energy supplying. (Fuel cell or commercial power is also available.)

#### The construction image using HVDC of the system for disaster prevention

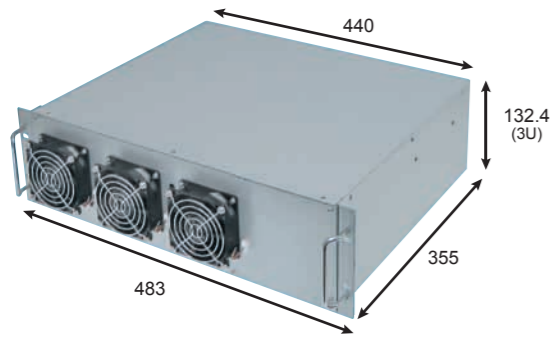


This system puts priority on the utilization of natural energy such as solar power rather than HVDC load power, and it controls HVDC to replenish the power if natural energy is not enough. Also, Green Best Mix power supply for battery charging/discharging can be connected to HVDC line in order to charge the excess power.



# To the battery which is necessary for natural energy utilization

## Solar charger



High efficiency charger for solar power generation

# CG3U series

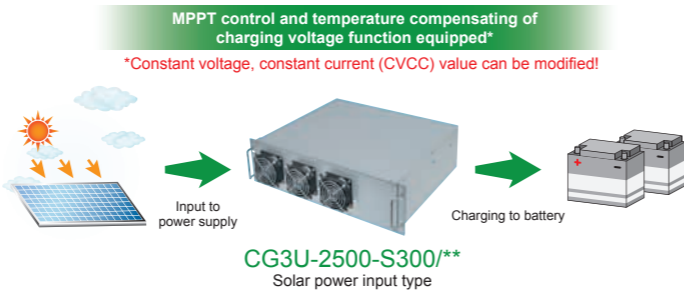
Ultrahigh efficiency 94% typ. and ultralow loss circuit for getting the most out of solar power

Nipron has developed CG3U series as the high efficiency charger and CD3U series for constant voltage output type!! This solar charger has MPPT control to charge solar energy efficiently. Also, by using the ultralow loss circuit, it can charge solar energy even if the amount of power generation is low.

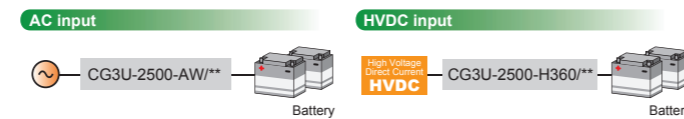
- Achieved ultrahigh efficiency 94% typ. by equipping the high efficiency circuit.
- Build-in MPPT control circuit for solar power generation
- Modified the number of using embedded power supplies possible depending on the output power of solar cell. (2.5kW max.)
- The constant voltage and constant current values are modifiable
- 19-inch rack-mountable (3U height)

**Direct charging from solar power to battery**  
(Lithium-ion or other batteries can be adopted)

### Direct charging system structure



Other models inputting from other power than solar are also available.



### CG3U series line-up

Battery charger 2.5kW		**: Output voltage
Model	Function(input)	
CG3U-2500-S300/**	With MPPT Solar power input	
CG3U-2500-H360/**	HVDC input	
CG3U-2500-AW/**	AC worldwide input	

\* Contact us about input/output voltage

### Constant voltage output type is also provided in lineup! CD3U series

DC-DC power supply 1.5kW		**: Output voltage
Model	Function(input)	
CD3U-1500-48/**	48VDC input	

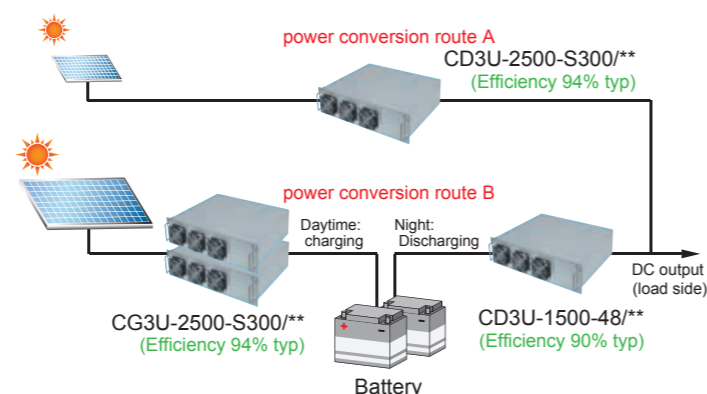
AC-DC power supply 2.5kW		**: Output voltage
Model	Function(input)	
CD3U-2500-AW/**	AC worldwide input	

DC-DC power supply 2.5kW		**: Output voltage
Model	Function(input)	
CD3U-2500-H360/**	HVDC input	

\* Contact us about input/output voltage

### Application example

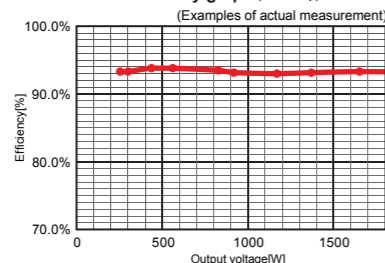
During the daytime, the power conversion route B charges a battery and the power conversion route A supplies the electricity to the load directly so that it gives most efficient energy utilization.



### Efficiency actual measurement

Input power[W]	Output power[W]	Efficiency[%]
271.9	253.7	93.3%
320.2	298.7	93.3%
460.7	432.3	93.8%
605.5	568.1	93.8%
893.1	835.3	93.5%
981.0	913.3	93.1%
1260.0	1171.5	93.0%
1473.9	1372.9	93.1%
1767.0	1648.5	93.3%

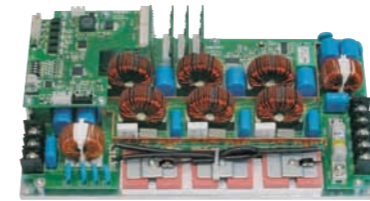
### CG3U series efficiency graph (at fan stop)



# From middle to large size application

## Mini-Tajubu with MPPT control

(scheduled to be released in June 2013)



\* This model is provisional and the appearance is subject to change

### [Tajubu with MPPT control circuit Specification]

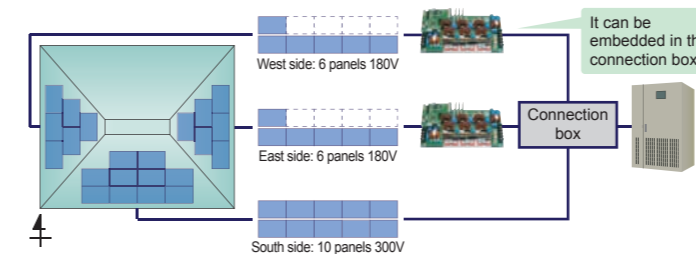
- Input voltage range: 20~300 VDC
  - Output voltage range: 100~400 VDC
  - Output capacity: Rated 1kW  
(The capacity is depend on the input-output voltage difference.)
- 2.5kW rated power type will be also provided in our line-up**

### Streamlined power generation system can be realized as a converter for remainder

In a solar power generation system, several panels connected in series are regarded as one line and all the power which is generated by each line shall be combined to be input to a power conditioner. The connection of generated power is mainly conducted in connection box, and all lines should input the same voltage to connection box.

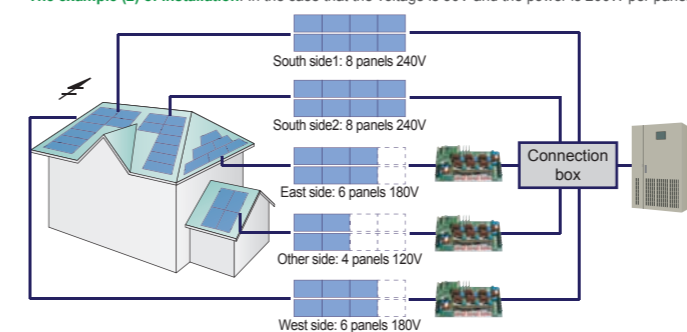
In the case of the roofs which the different panels are set on, like the example(1) of installation, the mini-Tajubu can be used to boost the voltage of the lines that have fewer panels (low voltage) up to the same voltage to all the lines.

The example (1) of installation: In the case that the voltage is 30V and the power is 200W per panel



Also, even if the installation space is small and the setting panels are not enough for solar power generation system, like the example (2) of installation "other", the mini-Tajubu can be input from low voltage so that it can constitute a solar power generation system without leaving a space.

The example (2) of installation: In the case that the voltage is 30V and the power is 200W per panel



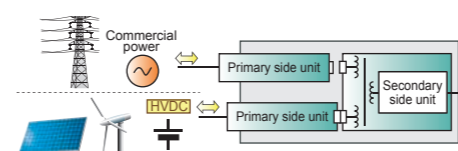
### Other Smart Grid power supplies

#### Disparate inputs available, eco-friendly server power supply Primary redundant power supply

##### pNSP2U-1000P



Primary redundant power supply is the power supply whose primary side is redundant and secondary side is common. It is realized by Nipron's unique circuit technology. By changing primary unit, disparate inputs such as natural energy (solar cells, wind power etc.) and HVDC become usable.



Industry-leading levels of ultrahigh efficiency **MAX. 98%!!**  
Without electrolytic capacitor and without fan **Long life!!**

The compact size DC-DC boosting converter debuted! By equipping MPPT control function and having the top level efficiency at 98% in the industry, this converter derives the maximum power from solar cell in getting most beneficial way. Our unique circuit which boosts voltage with multiple small parallel circuits is adopted so that the short-lived components such as electrolytic capacitor and fan can be excluded. This gives the unit longer lifetime. This model is available for not only solar cell, but also fuel cell or wind power. In addition, its high efficiency, long lifetime and compact size are suitable for robot use.

### Strings can be controlled for stable power feeding

If the power generation of a solar panel is interrupted by malfunction or partial shade, the power generation balance of each line breaks down and it cannot maintain its stable power.

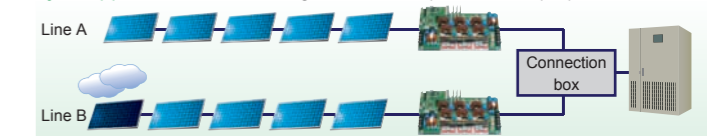
For example, in the case of building 2.0kW system like the system (1) below, if a panel stops power generation on the line B, it becomes 1.8kW system. However, the maximum 1.8kW cannot be taken because of the off-balance between A and B lines. In addition, if the interrupted panels are increased on the line B, sometimes the line B stops power feeding due to the large amount of power difference between A and B lines.

System (1): In the case that the voltage is 30V and the power is 200W per panel



In the case of system (2) using our mini-Tajubu, it can take the maximum 1.8kW with the MPPT circuit even if it is in the same situation as the system (1). In addition, the mini-Tajubu can work with low input voltage so that it can supply power from the line B even if the interrupted panels are increased on the line B.

System (2): In the case that the voltage is 30V and the power is 200W per panel



The mini-Tajubu enables us to utilize the stable solar energy efficiently

### Other features

- Output ceiling voltage is adjustable by DIP switch or voltage adjusting knob
- Various output signals (power on signal, output overvoltage alarm, internal temperature rising alarm)
- Operating status indication by green LED (power on / at abnormal / power off)
- With remote ON/OFF function

### Energy converter equipped with MPPT control Tajubu



Tajubu with MPPT control circuit converts (boosts) clean energy such as solar power, wind power and fuel cell, or unstable hard-to-use energy such as battery or capacitor into stable easy-to-use energy with high efficiency. This output can be connected to HVDC line directly so that it is utilized in DC power distribution system.

