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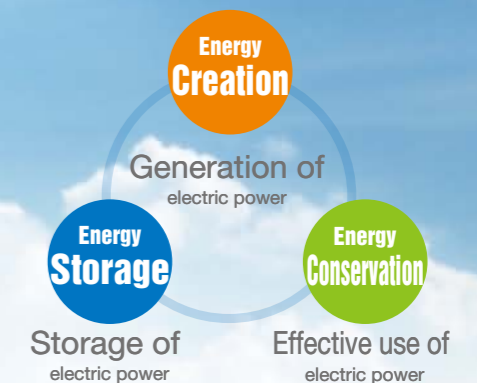
<http://www.zbr.co.jp>

# Solar Inverter General Catalog



# EneTelus

Society faces the problem of balancing the supply and demand of energy, as well as increasing environmental problems. Consumers are looking for energy solutions that combine three types of technology: energy creation, energy conservation, and energy storage. Electric energy is generated from natural sources and from fuel cells. Energy conservation is achieved through the use of rechargeable batteries that store generated power that is used when needed. The core of this energy management system is the control device, the solar inverter. Through products designed for this environmental era, Tabuchi Electric is making further contributions to society.



## The History of the Tabuchi Electric Power Electronics Business

Since its founding in 1925, Tabuchi Electric's core business has been transformer products, and even now, Tabuchi is well known to public as a transformer manufacturer. In 1976, Tabuchi advanced into the power supply unit business with a focus on the development and deployment of high-frequency transformer technology. With the deregulation of the electric power industry in 1995, we began to develop the PV solar inverter, a culmination of experience using transformer and power supply unit technology. Since that time, for over 10 years, PV generation has attracted great interest thanks to the support of the national government and local municipalities, as well as a growth in environmental awareness. During this period, Tabuchi Electric has continued production and

development of solar inverters. We have also accumulated and expanded our knowledge of power electronics technology. In 2005, in addition to our core consumer-oriented business area, Tabuchi Electric advanced into the heavy electrical and industrial field. As a result, we are now able to respond to demands in both consumer and industrial domains. The knowledge we have accumulated in power electronics technology over the past 10 years has found application in many areas. It is our mission and responsibility to make use of this technology for the global environment. In 2011, following the ZEBRA transformers and power supply units, we introduced EneTelus as our new brand of energy products.

## INDEX

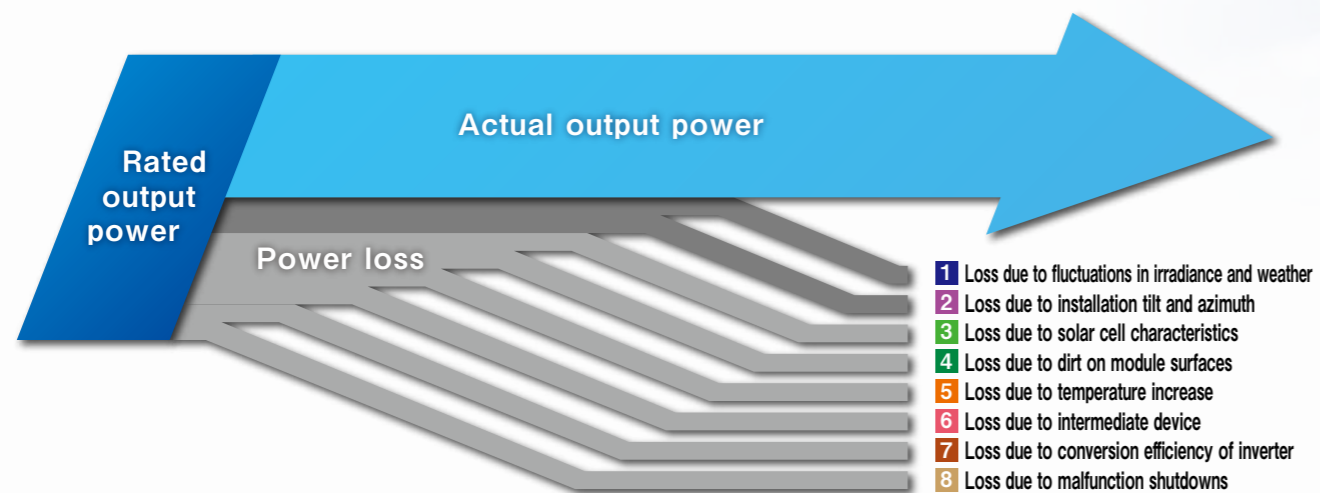
The Superiority of EneTelus	P. 2	Installation Plan: Industrial	P.54
Product line up	P.10	Display System for Industrial Products [Third-party Vendors]	P.56
Display device for single-phase solar inverters	P.46	Solar Inverter Selection	P.61
External control systems for three-phasesolar inverters	P.48	Frequently Asked Questions	P.62
Installation Example: Residential	P.50	Explanation of EneTelus Terminology	P.63
String Sizing of PV Panels	P.51	Accessories/Options	P.64
Multiple unit installation design	P.53		

# 01 The Solar Age

PV systems are environmentally friendly and economical, making them ideal for generating power. However, there are currently a host of issues that need to be resolved, from the planning stage to post-installation.

## What You Should Know About Power Loss in PV Systems.

There are a number of factors underlying power loss. Let's explain each factor one by one.



### 1 Loss due to fluctuations in irradiance and weather

Since it is impossible to avoid fluctuations in insolation due to latitude and climate conditions, it is important to perform adequate simulations when developing the installation plan. Check regional insolation information and other data to build a system that can dependably generate sufficient power under the anticipated conditions mentioned above.

### 2 Loss due to installation tilt and azimuth

With 100% irradiance at due south, irradiance decreases the more the panel orientation (azimuth) faces to the east or west. The optimum tilt (angle of inclination) for PV panels in Japan is roughly 30°.

**Multi-string inverters offers more flexibility for PV system design.**

### 3 Loss due to solar cell characteristics

Internal losses in a solar module are varied and linked to the imbalances between solar cells. Voltage imbalances are particularly apt to occur when PV strings are connected in parallel. Current flowing from the higher voltage PV string to a lower voltage PV string results in a voltage drop at the inverter input of the system.

**A multi-string system controls voltage loss.**

### 4 Loss due to dirt on module surfaces

Dirt on the surface of the solar panels impedes the system's ability to receive sunlight. Rainfall does not wash away some types of dirt, so the ability to maintain generation capacity is dependent on periodic cleaning. In particular, leaf litter and other foreign matter that has blown onto the panels can reduce irradiation. Partial shading can affect the generation capacity of PV panels and cause loss similar to **3**

**A multi-string system minimizes loss due to dirt and partial shade.**

### 5 Loss due to temperature increase

Typically, the conversion efficiency of solar cells decreases as the temperature rises. More power is generated on cool spring or fall days than during the summer when there is a great deal of irradiation. A good design practice provides plenty of airflow around PV panels.

### 6 Loss due to intermediary devices

Diodes are installed in junction boxes and panel boards to prevent reverse current damage to solar cell modules. However, the operating power of these diodes and the heat generated when they run results in a loss of power. Even more voltage conversion loss occurs when booster units are used. The anticipated nameplate capacity will not be attained if the overall efficiency of the system is not taken into consideration.

**Built-in junction boxes eliminate loss due to intermediary devices.**

### 7 Loss due to conversion efficiency of inverter

Conversion efficiency does not account for all loss caused by the solar inverter. When the internal temperature of the inverter increases, its efficiency decreases. Furthermore, a higher grid voltage may also decrease the inverter efficiency. When the inverter is installed indoors, in an enclosed space, temperature monitoring is likely to activate the cooling system. The inverter may shutdown without proper ventilation or cooling.

**Outdoor installation reduces loss due to temperature increase.**

### 8 Loss due to malfunction shutdowns

When panels or devices deteriorate or malfunction, the system must be stopped until repairs are made. The longer it takes to detect a malfunction and complete repairs, the greater the decrease in power generated.

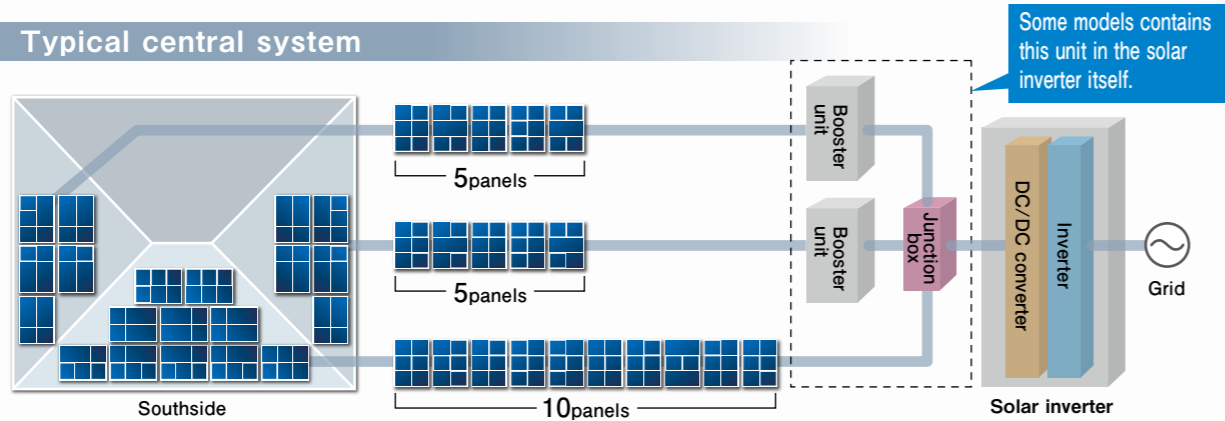
**Even when panels malfunction, multi-string systems continue to generate power.**

# 02

## Multi-string systems reduce power loss

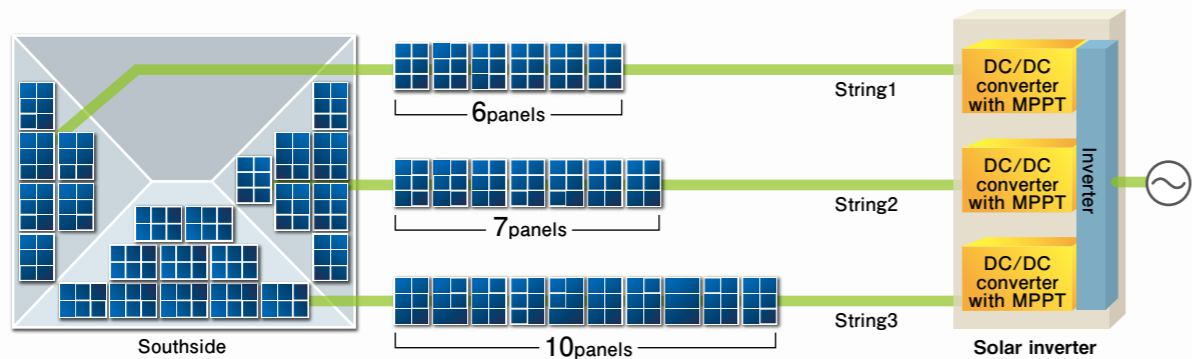
Since a multi-string system can control the voltage input of each string, there is no need to adjust the capacity as with central systems. Installation is simple, there is no need for junction boxes, booster units, or any other such intermediary devices. Also, input connections can be made directly to the inverter without causing intermediate losses. Multiple strings makes it possible to combine different types of solar panels. Since devices can now be installed in locations that were previously impossible, installers can make the most effective use of roof surface area for the generation of electric power.

### Typical central system



### Multi-entry system (Multi-string system)

Generation amount increases! Power loss decreases!

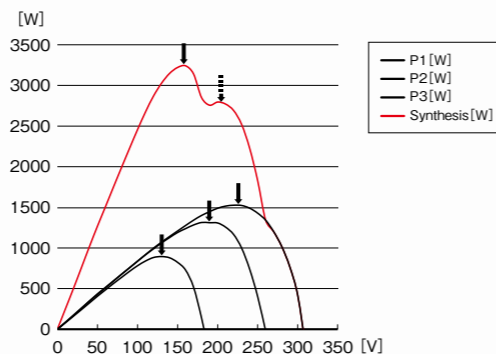


\*String-level monitoring is possible.

### Maximum Power Point Tracking (MPPT)

Since there are multiple input peaks\* in a central inverter design, the maximum power point can be lost. However, with a multi-string inverter, MPPT control is used on each string, so it typically attains the maximum power point.

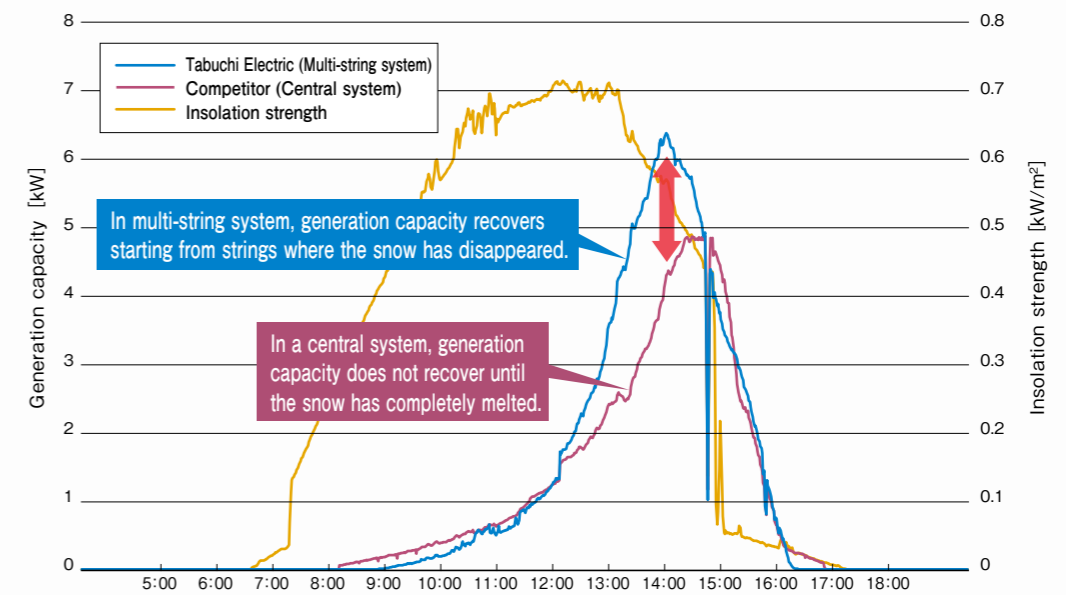
\*The maximum power point is the peak of the P-V (power-voltage) curve.



### The Multi-string Inverters: See the Difference! Comparison Study: Generation capacity when snow melts

The following chart shows the amount of generation the day after snowfall. There is a significant difference in the recovery of power generation capacity between a multi-string system and a central system as the snow on the panels melts. (Actual data from the Tabuchi Electric Renewable Energy Research Center)

### Comparison of generation capacity when snow melts



\*This does not constitute a guarantee of power generation when snow has accumulated.

# 03

## Supports a wide variety of panels

Thanks to steady progress and technical innovation, new types of PV panels are constantly making inroads into the market.

EneTelus solar inverters are designed with a wide range of input parameters to support different types of PV panels.

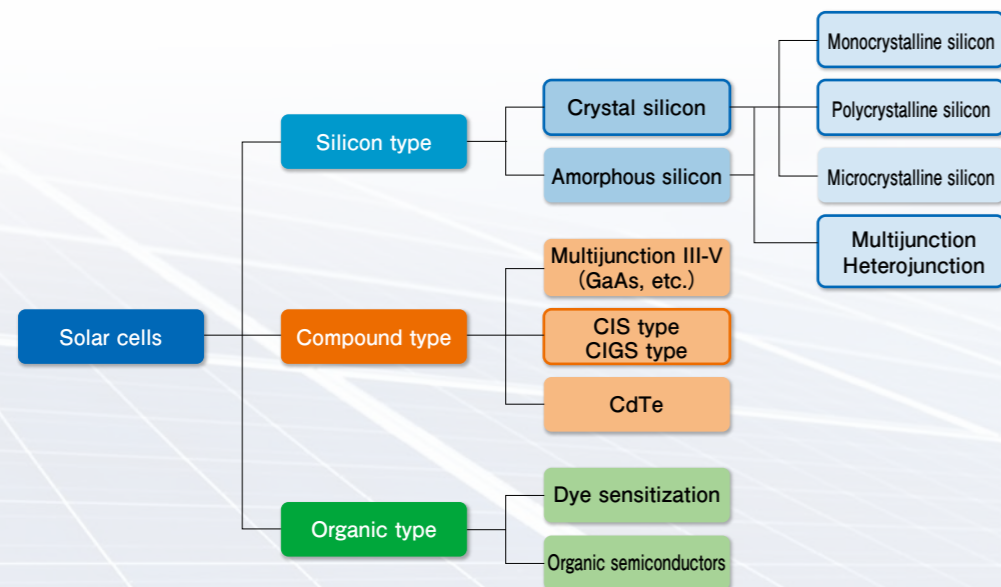
The Tabuchi Electric Renewable Energy Research Center evaluates new panels from each manufacturer, collecting verified data by testing the panels under natural conditions for a medium to long period of time.



Test combining PV panels and solar inverters

### Solar Cells: Types & Characteristics

Solar cells are currently classified by the type of material they are made from.



Type		Features
Silicon type	Monocrystalline	Although monocrystalline solar cells excel in performance and reliability, substrate prices are high.
	Polycrystalline	These solar cells have polycrystalline silicon substrates. Although conversion rates are lower than monocrystalline panels, these panels dominate the market because they are cheaper and easier to make.
	Amorphous	This type of solar cell uses an amorphous silicon film on a glass substrate. Although conversion efficiencies are less than crystalline systems, they can be mass produced for large surfaces.
	Multi-contact type	Solar cells with multiple layers of silicon film. This method uses smaller amounts of silicon and lends itself to the mass production of large surface areas. Since these panels absorb a wide band of wavelengths, they are more efficient than amorphous solar cells.
Compound type	CIS system CIGS system	Solar cells made using copper, indium, gallium, selenium, and other compounds. They are thin so they conserve resources and are easily mass produced. They offer high performance, so a great deal of work is being done on their development.

# 04

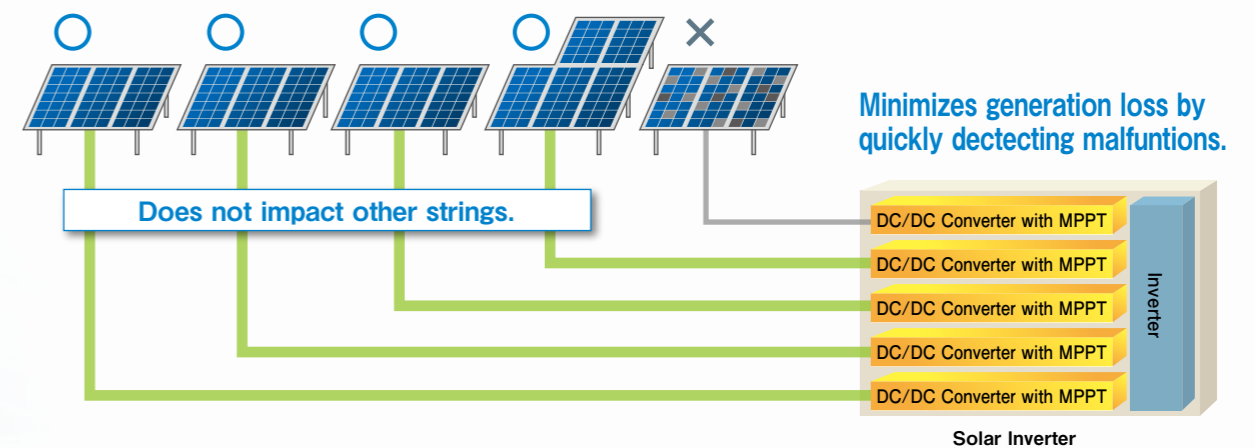
## Ease of maintenance & repair

Solar panels degrade over their lifespan. Years of use and potential damage to the panels may reduce their power output. The causes of these problems are not visible, so output gradually declines. Loss will continue to occur until the problems are discovered and repairs are made. Also, if a malfunctioning panel remains connected to the system, it can have a negative impact on other panels. Timely maintenance is important to ensure consistent generation capacity. However, the multi-string solar inverter is designed to minimize loss and reduce the burden on customers as much as possible after installation.

### Steps taken to minimize loss

In the EneTelus multi-string system, each string is independent of the other strings. Even if some panels in a particular string malfunction, the other strings remain unaffected.

Since strings can be turned on and off individually, the malfunctioning string can be electrically isolated. The system can continue to generate power until the malfunctioning string is repaired.



### Also suitable for large-scale generation!

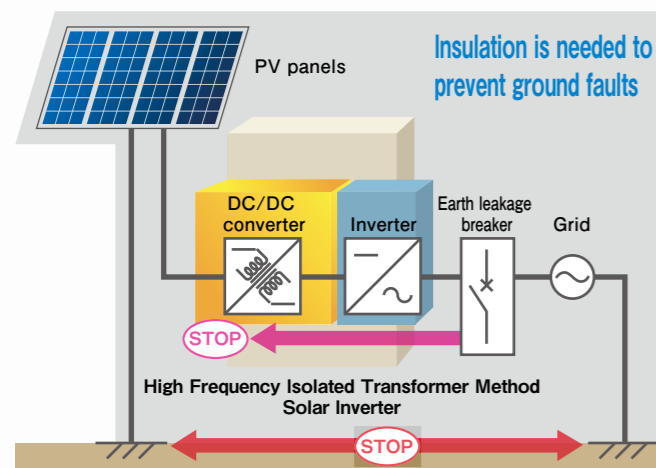
With EneTelus multi-string systems, panel generation data can be collected for each string so decreases in output can be detected early on. Also, since exactly which panel is defective can be identified, maintenance can be performed without delay. Therefore, loss is minimized when the system is shut down for routine maintenance or when a malfunction occurs.

# 05

## For a safe and secure life

### High frequency isolated transformer method


EneTelus anticipates longterm use and utilizes high-frequency isolation transformer design. Systems designed with EneTelus are reliable and dependable even when there is a lightning strike or a problem with the grid.



The amount of static electricity between the solar panels and the ground increases the risk of activating the leakage breaker. The high frequency isolated transformer method isolates the solar panels from the grid, protecting the panels from thunderstorms or earthquakes that cause large amounts of electric current back-flow. Moreover, with the HF transformer designed into the inverter, it is not necessary to install external transformers.

### Outdoor installation

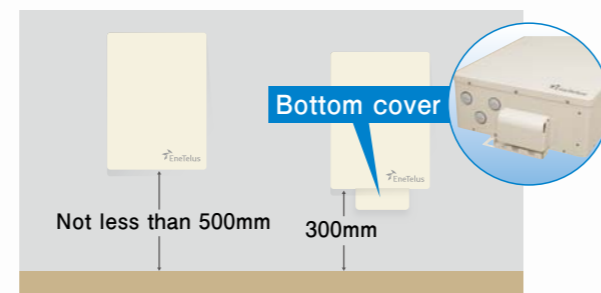
EneTelus is a solar inverter that is especially suited for outdoor installation in residential areas of Japan. For that reason, we use a metal case that is extremely weather resistant. EneTelus are ideally suited for retrofitting existing homes.

<b>Noise</b> (high frequency sound)	Operational noise and high frequency sound is unpleasant.	<p><b>Solves problems related to indoor installation!</b></p>  <p>Fits neatly on installation on an exterior wall.</p>
<b>For wide use indoors</b>	Hard to find space indoors.	
<b>Generates heat</b>	Conversion loss generates heat, causing an increase in room temperature and a decrease in solar inverter output.	

### Installation requirement (single-phase solar inverters)







































































With the **Bottom Cover (Option: Order production)**, the height requirement for installation should not be less than 300mm (not less than 500mm above the ground without the bottom cover).

- Supported models**
- EPC-S40MP2-L   EPC-S49MP3-L   EPC-S55MP3-L
  - EPC-S55MP4-L   EPC-S99MP5-L



**EneTelus PRODUCTS**  
EneTelus Solar Inverters

# PRODUCTS LINEUP

Product name	Feature	Energy source	Applications	Installation condition	Installation method	Number of strings	Topology	Display/Operation
 <b>4.0kW</b> EPC-S40MP2-L	  		 	Outdoor	Wall-mounted	2	High frequency isolated transformer	Color LCD remote controller <a href="#">» P.12</a>
 <b>4.9kW</b> EPC-S49MP3-L	  		 	Outdoor	Wall-mounted	3	High frequency isolated transformer	Color LCD remote controller <a href="#">» P.16</a>
 <b>5.5kW</b> EPC-S55MP3-L EPC-S55MP4-L	  		   	Outdoor	Wall-mounted	3 4	High frequency isolated transformer	Color LCD remote controller <a href="#">» P.20</a>
 <b>Single-phase 9.9kW</b> EPC-S99MP5-L	    		   	Outdoor	Wall-mounted	5	High frequency isolated transformer	Color LCD remote controller <a href="#">» P.24</a>
 <b>Three-phase 9.9kW</b> EPU-T99P5-SFL	   		  	Outdoor	Wall-mounted Mount on the racking	5	High frequency isolated transformer	Embedded in the chassis Master box <a href="#">» P.28</a>
 <b>Three-phase 25kW</b> EPU-T250P8-FPL	   			Outdoor	Mount on the racking	8	Transformer-less	Embedded in the chassis Master box <a href="#">» P.32</a>
 <b>Hybrid Inverter</b> PV:5.5kW Battery:9.89kWh EHC-S55MP3B-PNH EHC-S55MP3B-PNJ	   	 	 	Outdoor (Battery unit must be installed indoor)	Floor-mounted	3	High frequency isolated transformer	Color LCD remote controller <a href="#">» P.36</a>
 <b>Portable battery storage system</b> Battery:2.5kWh ESC-B-S25B-LB			  	Indoor	Floor-mounted	—	—	Unit panel <a href="#">» P.42</a>
 <b>Portable battery storage system</b> Battery:5.0kWh ESC-C-S50B-LB			  	Indoor	Floor-mounted	—	—	Unit panel <a href="#">» P.44</a>

# EPC-S40MP2-L 4.0kW Solar Inverter

[ Energy source ] [ Applications ]



\*Output control cannot be operated manually. Only operates by following the utility company's order.  
\*Remote controller for output control is necessary to activate output control. (Output cannot be controlled by the customer) (Please refer to P.47)



ZREM-35ENP01 (Required)  
(Please refer to P.47)

## For residential use

Minimizes decreased generation output due to shade or dirt on the PV panels. This multi-string system ensures PV power generation even in the event of a fault in a solar module or string. Outdoor installation makes this system ideal for retrofitting existing homes. Access via the front panel allows for easy installation. This unit cannot be used as a high voltage system.

- 1 Multi Grid Connection Certified/Output Control Available
- 2 2 individual MPPT tracking strings
- 3 Uses the high frequency isolated transformer method
- 4 For outdoor installation
- 5 No need for junction boxes or booster units



A maximum of 5 solar inverters can be connected with a remote controller.

※See p. 47 for details about concurrent use with other models in combination.

## Specifications

Input (DC)	
Max. input power per string	2150W
Max. input voltage	450V
Operation voltage range /rated input voltage	80-450V/250V
MPPT voltage range	80-450V
Min. input voltage / initial input voltage	80V/100V
Number of MPP tracker input / inputs	2
Max. input current per string	10.3A
Output (AC : Grid connected)	
Connection phases	Single-phase, 2-wire type (connected to single-phase, 3-wire wiring)
Conversion method	Voltage type current controller method
Rated output power*1	4000W
Rated AC voltage	202V
Nominal AC voltage range	190~214V
Rated output frequency	50Hz,60Hz
Rated output current	20A
Power factor at rated output power	Over 0.99
Distortion rate of the output current	Combined: less than 5%, Each: less than 3%
Output (AC : Stand alone)	
Electrical mode	Single-phase 2-wire
Conversion method	Voltage type voltage controller method
Rated output power	1.5kVA
Rated output voltage	101V
Efficiency	
Efficiency*2	94.0%
Max. efficiency	94.7% (In case of DC250V, 80% output)
Protection	
Islanding operation detection : Passive	Frequency change rate detection method
Islanding operation detection : Active	Frequency feedback method with step implantation
General Data	
Dimensions (W/H/D)	487/681.5/200mm
Weight	23kg
Installation condition	Outdoor
Operating temperature range	-20°C~+45°C (Output controlled at 40°C and above)
Noise (typical)*3	Less than 40dB
Internal consumption (night)	Less than 10W/Less than 20VA
Topology	High frequency isolated transformer method
Cooling concept	Forced air cooling using a cooling fan
Degree of protection (JIS)	Equivalent to IP55
Features	
DC terminal	Terminal block (+,-)×2
AC terminal	Terminal block (U,O,W)
Stand-alone terminal	Terminal block (2 poles)
Grounding terminal	Terminal block (1 pole)
Display	None
Remote controller	Required
Cable (Remote controller)	Required
Remote controller for output control	ZREM-35ENP01
Interface	RS-485
JET certification number	Applying now

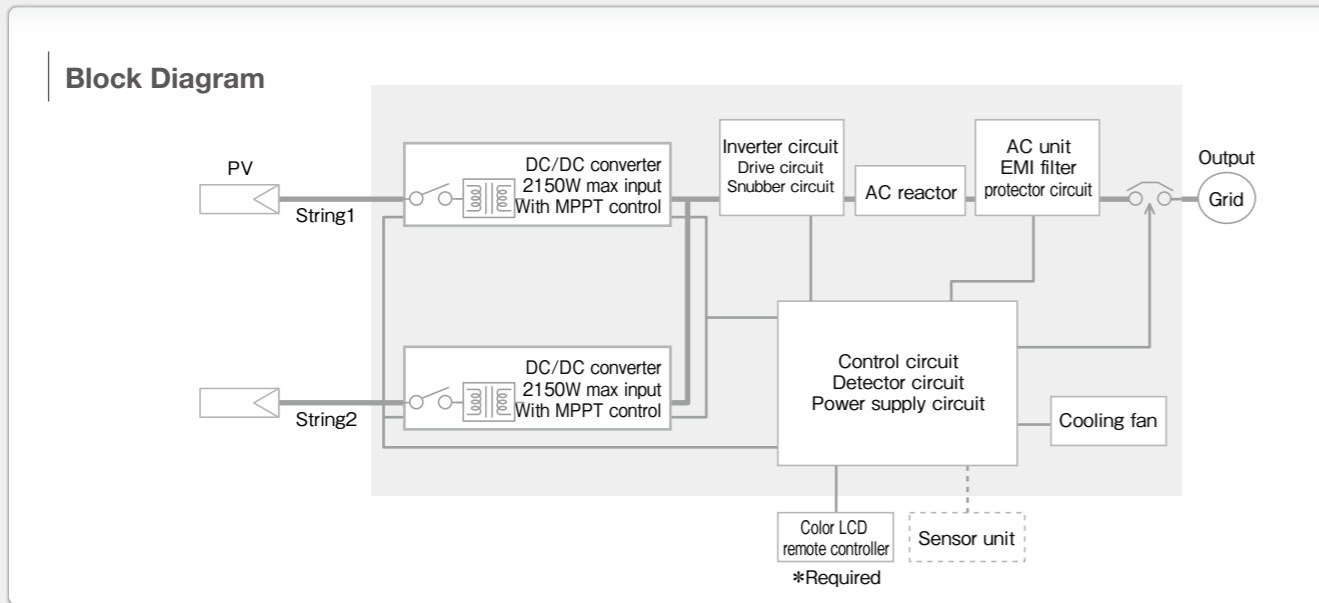
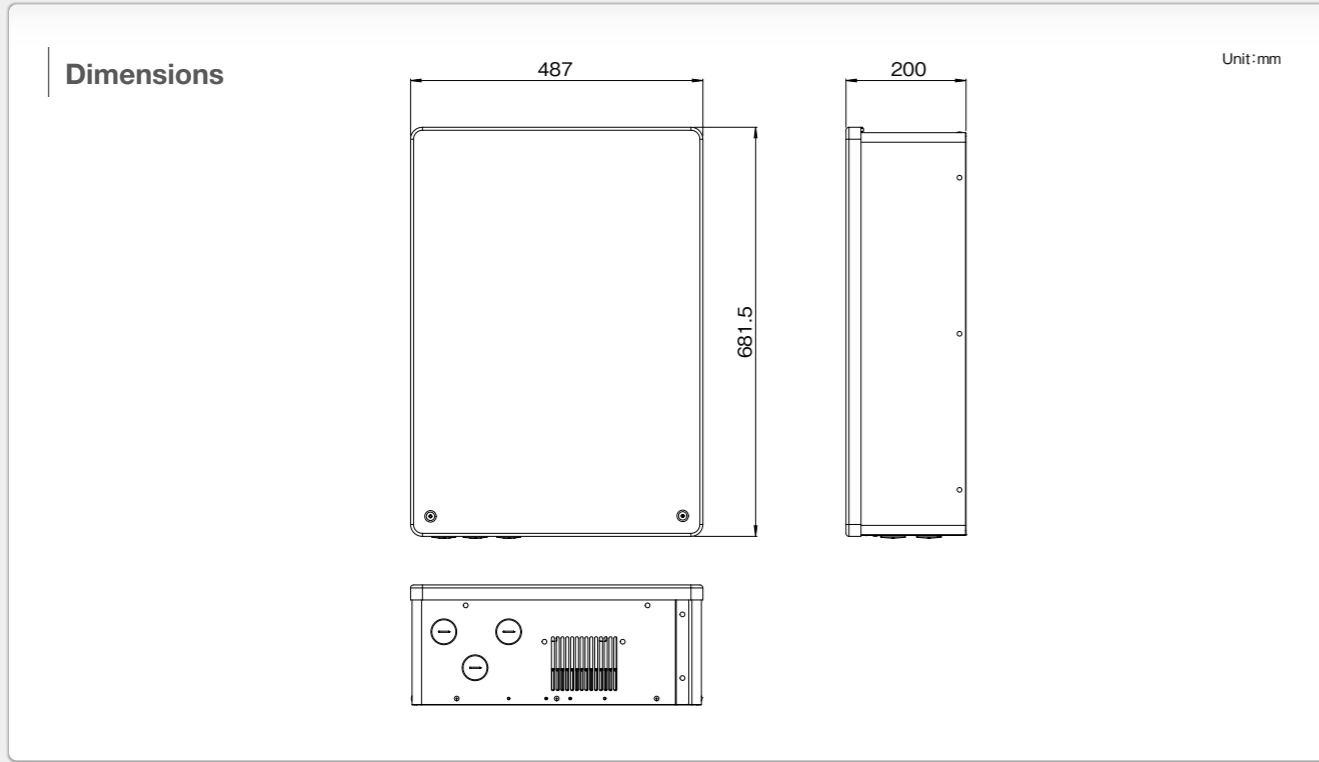
\*1 Value calculated when all strings were in use.

\*2 Efficiency under the conditions defined in JIS C 8961

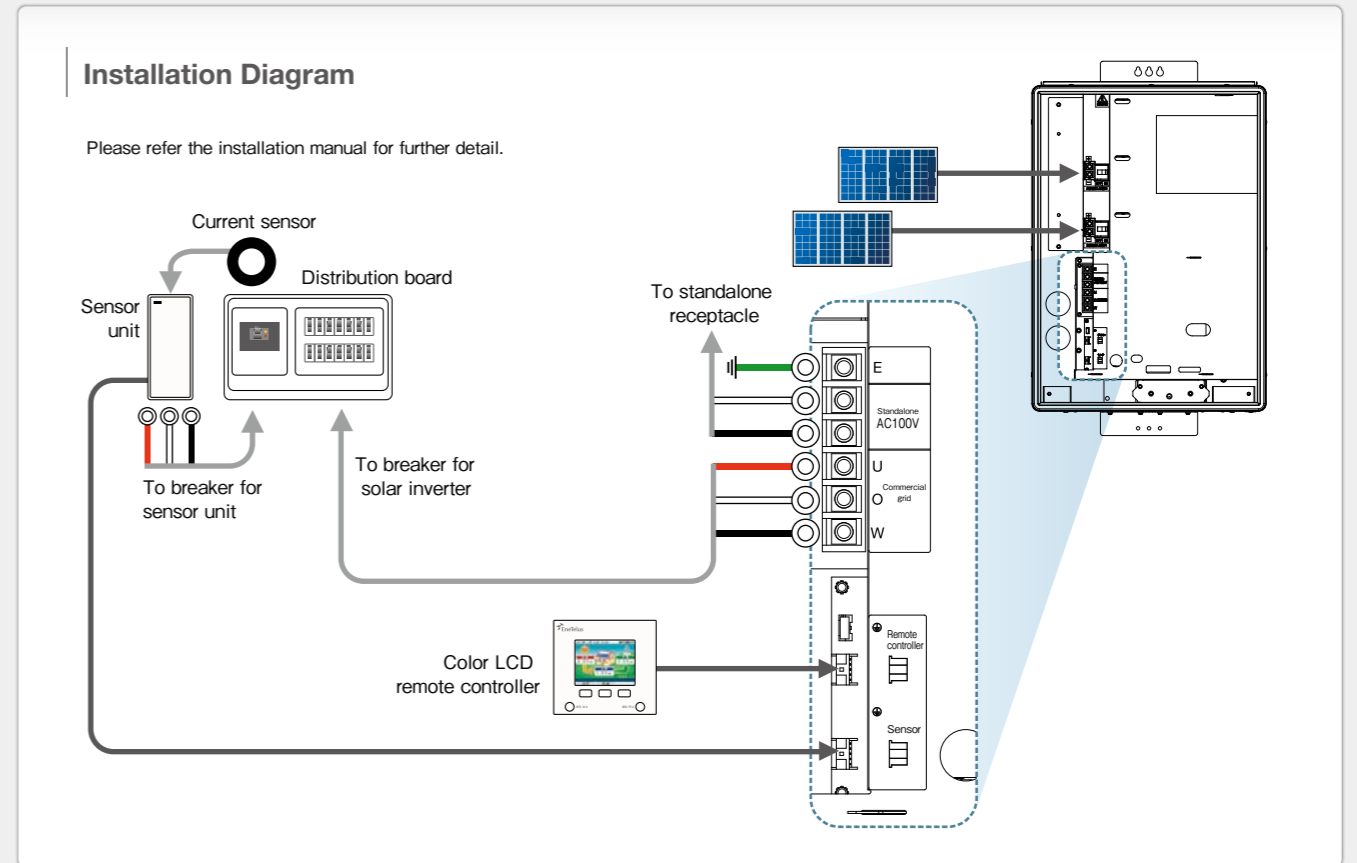
\*3 According to A characteristics of JIS C1509-1 A, noise measurements are taken at a position, 1m away from the center of the front side of the solar inverter at 1m above the floor face.

Some specifications or aspects of appearance may be changed without notice to improve the product





\*1 Order production  
\*2 Sensor cable required



### Configuration

Protector relays		Setting values	Setting ranges
AC overvoltage OVR	Detection levels	115V	110V, 113V, 115V, 119V
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
AC undervoltage UVR	Detection levels	80V	80V, 85V, 90V, 93V
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Over frequency OFR	Detection levels	50Hz	51.0Hz
		60Hz	61.0Hz
		Detection time limits	1.0 second
			0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Under frequency UFR	Detection levels	50Hz	47.5Hz
		60Hz	57.5Hz
		Detection time limits	1.0 second
			0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Breaker function delay after the power restoration		300 seconds	10 seconds, 150 seconds, 180 seconds, 240 seconds, 300 seconds
Voltage increase controller function		109V	107V~ 112V (0.5V steps), off

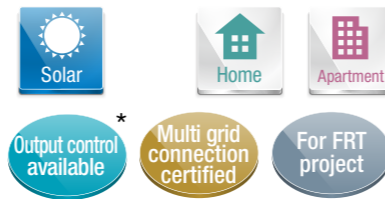
  

Islanding operation detection method			Setting values*	Setting ranges
Passive method	Frequency change rate detection method	Detection levels	1.2Hz	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 3.0, 4.0, 5.0Hz
		Detection element	Frequency change	—
Active method	Frequency feedback method with step implantation	Parallel off time limit	Passive method / 0.5 second or less	Fixed
			Active method / 0.2 second or less	

\*Passive and active method action settings can not be set individually.

# EPC-S49MP3-L 4.9kW Solar Inverter

[ Energy Source ] [ Applications ]



\*Output control cannot be operated manually. Only operates by following the utility company's order.  
\*Remote controller for output control is necessary to activate output control. (Output cannot be controlled by the customer) (Please refer to P.47)



ZREM-35ENP01 (Required)  
(Please refer to P.47)

## For residential use

Minimizes decreased generation output due to shade or dirt on PV panels.

A multi-string system ensures a constant supply of generated power.

Outdoor installation makes this system ideal for retrofitting existing homes.

New design allows interior access via the removable front panel.

This unit cannot be used as a high voltage system.

**1 Multi Grid Connection Certified/Output Control Available**

**2 3 individual MPPT tracking strings**

**3 Uses the high frequency isolated transformer method**

**4 For outdoor installation**

**5 No need for junction boxes or booster units**



A maximum of 5 solar inverters can be connected with a remote controller.

※See p. 47 for details about concurrent use with other models in combination.

## Specifications

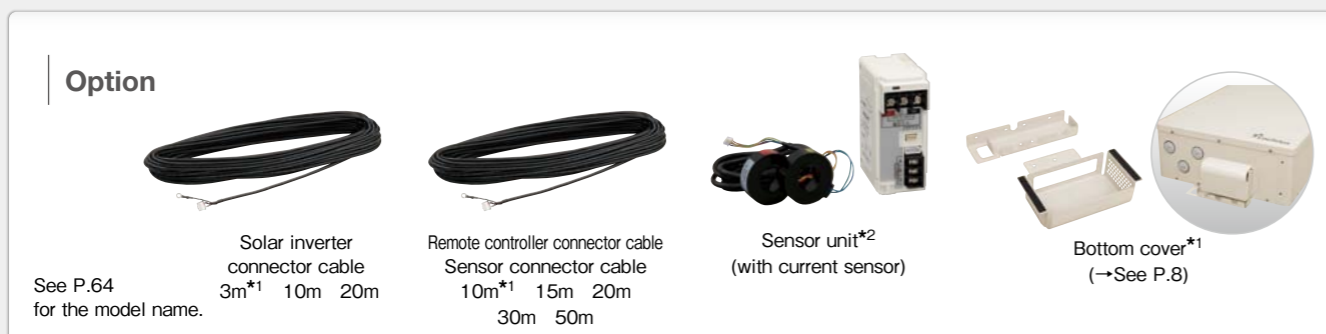
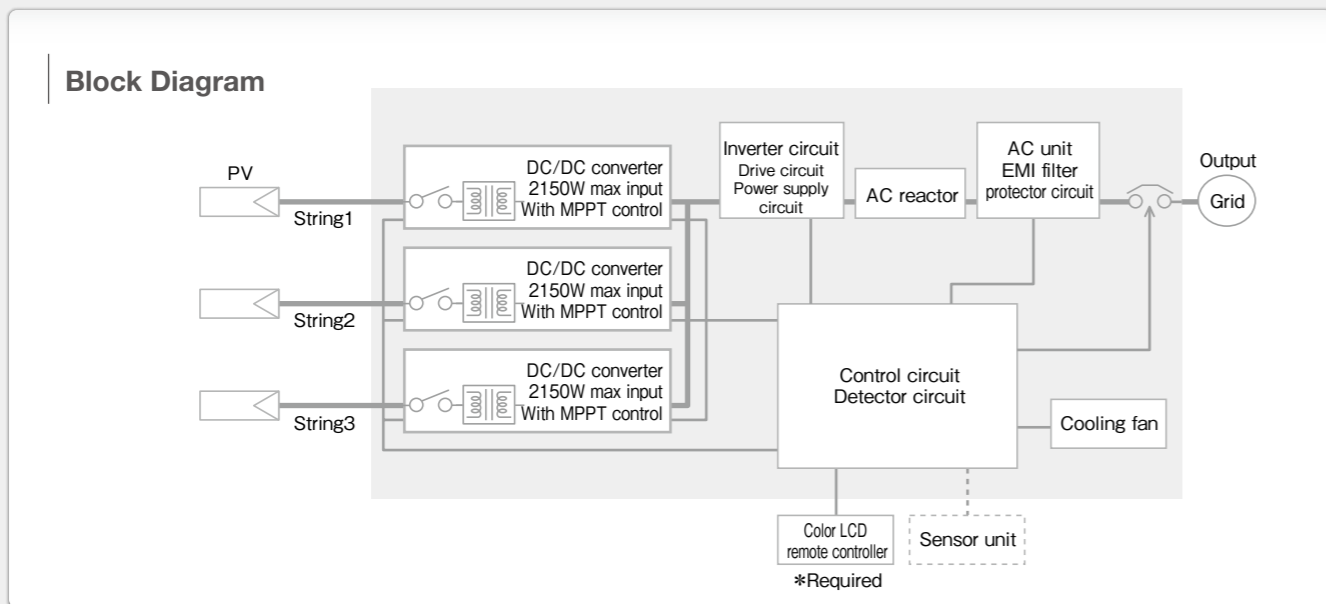
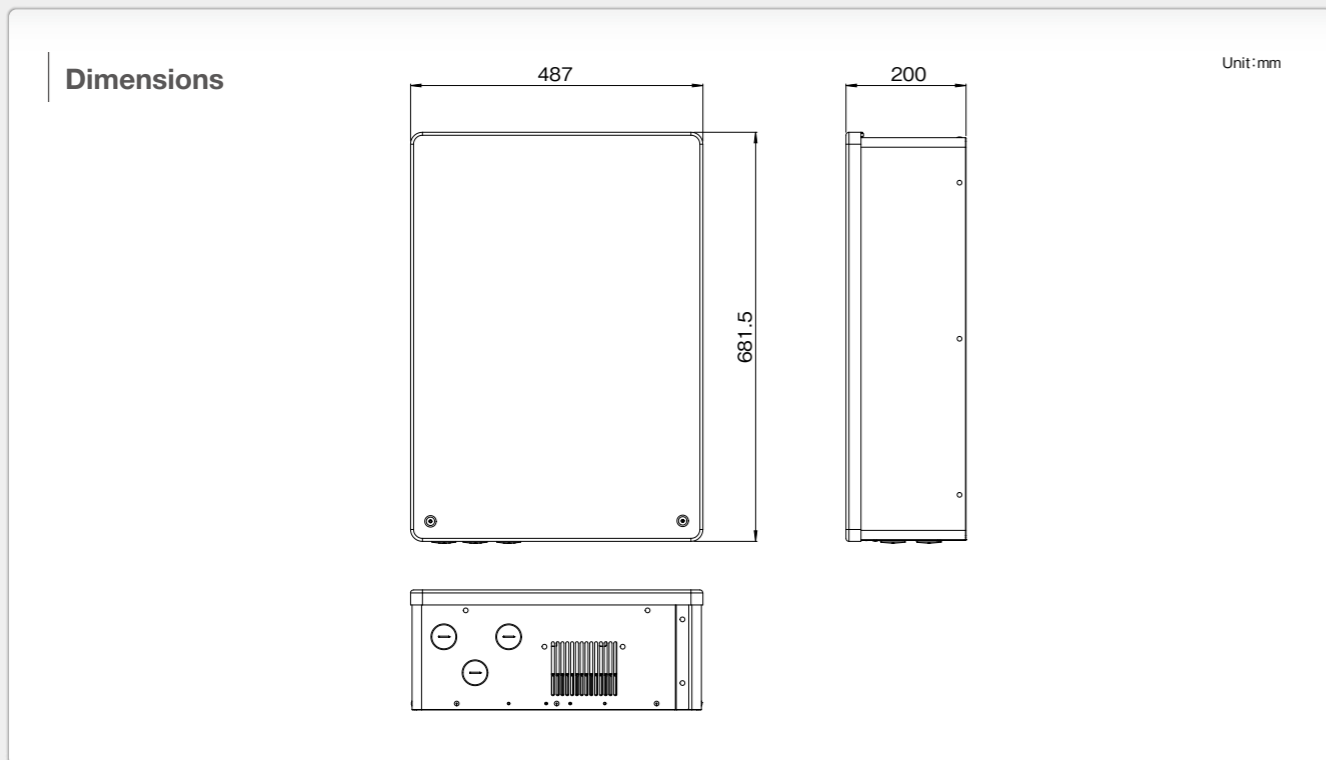
Input (DC)	
Max. input power per string	2150W
Max. input voltage	450V
Operation voltage range /rated input voltage	80-450V/250V
MPPT voltage range	80-450V
Min. input voltage / initial input voltage	80V/100V
Number of MPP tracker input / inputs	3
Max. input current per string	10.3A
Output (AC : Grid connected)	
Connection phases	Single-phase, 2-wire type (connected to single-phase, 3-wire wiring)
Conversion method	Voltage type current controller method
Rated output power*1	4900W
Rated AC voltage	202V
Nominal AC voltage range	190~214V
Rated output frequency	50Hz,60Hz
Rated output current	24.5A
Power factor at rated output power	Over 0.99
Distortion rate of the output current	Combined: less than 5%, Each: less than 3%
Output (AC : Stand alone)	
Electrical mode	Single-phase 2-wire
Conversion method	Voltage type voltage controller method
Rated output power	1.5kVA
Rated output voltage	101V
Efficiency	
Efficiency*2	94.5%
Max. efficiency	94.7% (In case of DC250V, 55% output)
Protection	
Islanding operation detection : Passive	Frequency change rate detection method
Islanding operation detection : Active	Frequency feedback method with step implantation
General Data	
Dimensions (W/H/D)	487/681.5/200mm
Weight	24kg
Installation condition	Outdoor
Operating temperature range	-20°C~+45°C (Output controlled at 40°C and above)
Noise (typical)*3	Less than 40dB
Internal consumption (night)	Less than 10W/Less than 20VA
Topology	High frequency isolated transformer method
Cooling concept	Forced air cooling using a cooling fan
Degree of protection (JIS)	Equivalent to IP55
Features	
DC terminal	Terminal block (+, -)×3
AC terminal	Terminal block (U, O, W)
Stand-alone terminal	Terminal block (2 poles)
Grounding terminal	Terminal block (1 pole)
Display	None
Remote controller	Required
Cable (Remote controller)	Required
Remote controller for output control	ZREM-35ENP01
Interface	RS-485
JET certification number	MP-0065

\*1 Value calculated when all strings were in use.

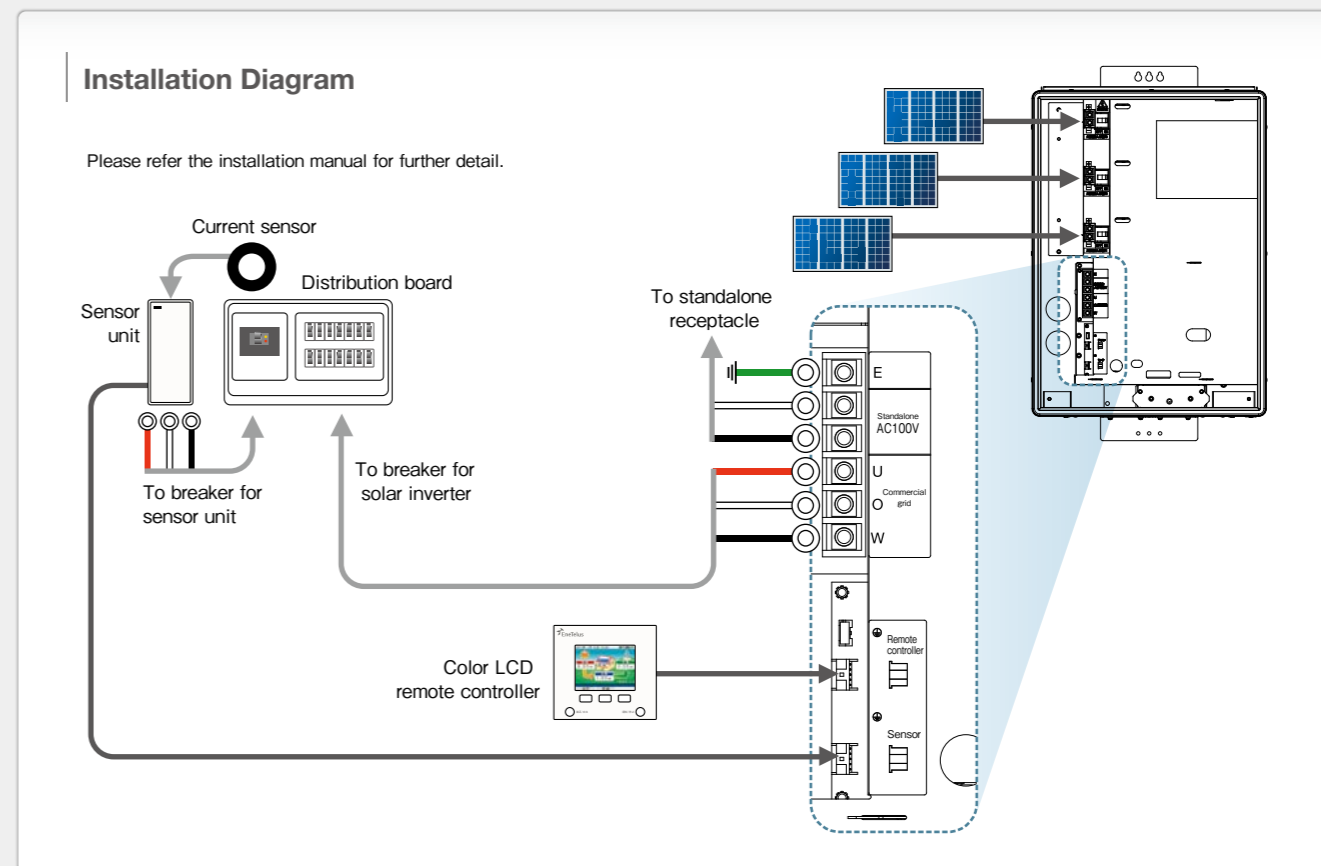
\*2 Efficiency under the conditions defined in JIS C 8961

\*3 According to A characteristics of JIS C1509-1 A, noise measurements are taken at a position, 1m away from the center of the front side of the solar inverter at 1m above the floor face.

Some specifications or aspects of appearance may be changed without notice to improve the product



\*1 Order production  
\*2 Sensor cable required



### Configuration

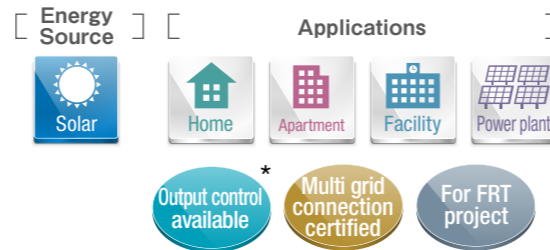
Protector relays		Setting values	Setting ranges
AC overvoltage OVR	Detection levels	115V	110V, 113V, 115V, 119V
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
AC undervoltage UVR	Detection levels	80V	80V, 85V, 90V, 93V
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Over frequency OFR	Detection levels	50Hz	51.0Hz
		60Hz	61.0Hz
Under frequency UFR	Detection levels	50Hz	49.5Hz, 49.0Hz, 48.5Hz, 48.0Hz, 47.5Hz, 47.0Hz
		60Hz	57.5Hz
Detection time limits		1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Breaker function delay after the power restoration		300 seconds	10 seconds, 150 seconds, 180 seconds, 240 seconds, 300 seconds
Voltage increase controller function		109V	107V~ 112V (0.5V steps), off

Islanding operation detection method			Setting values*	Setting ranges
Passive method	Frequency change rate detection method	Detection levels	1.2Hz	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 3.0, 4.0, 5.0Hz
		Detection element	Frequency change	—
Active method	Frequency feedback method with step implantation	Parallel off time limit	Passive method / 0.5 second or less Active method / 0.2 second or less	Fixed

\*Passive and active method action settings can not be set individually.

# EPC-S55MP3-L/EPC-S55MP4-L 5.5kW Solar Inverter



\*Output control cannot be operated manually. Only operates by following the utility company's order.  
\*Remote controller for output control is necessary to activate output control. (Output cannot be controlled by the customer) (Please refer to P.47)



ZREM-35ENP01 (Required)  
(Please refer to P.47)

## For residential use

New 5.5kW single-phase inverter now with 3 MPPT.  
Minimizes decreased generation output due to shade or dirt on the PV panels.  
A multi-string system ensures a constant supply of generated power.  
Outdoor installation makes this system ideal for retrofitting existing homes.  
This unit cannot be used as a high voltage system.

- 1 Multi Grid Connection Certified/Output Control Available**
- 2 3 individual MPPT tracking strings**
- 3 Uses the high frequency isolated transformer method**
- 4 For outdoor installation**
- 5 No need for junction boxes or booster units**



A maximum of 5 solar inverters can be connected with a remote controller.

※See p. 47 for details about concurrent use with other models in combination.

## Specifications

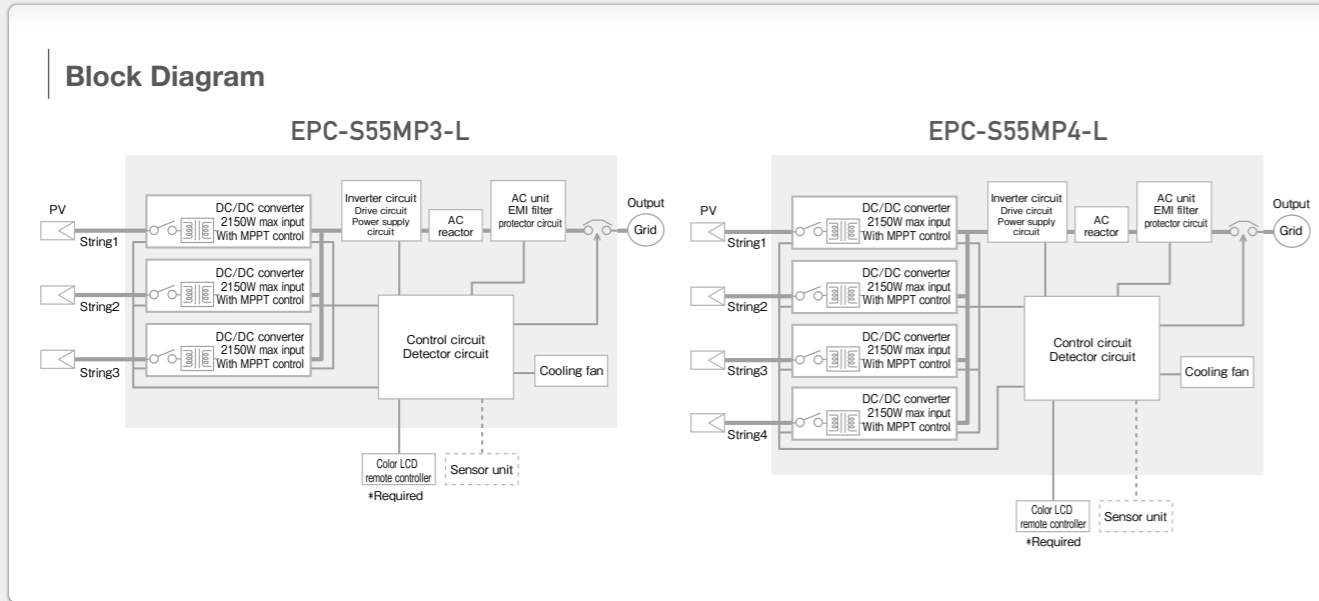
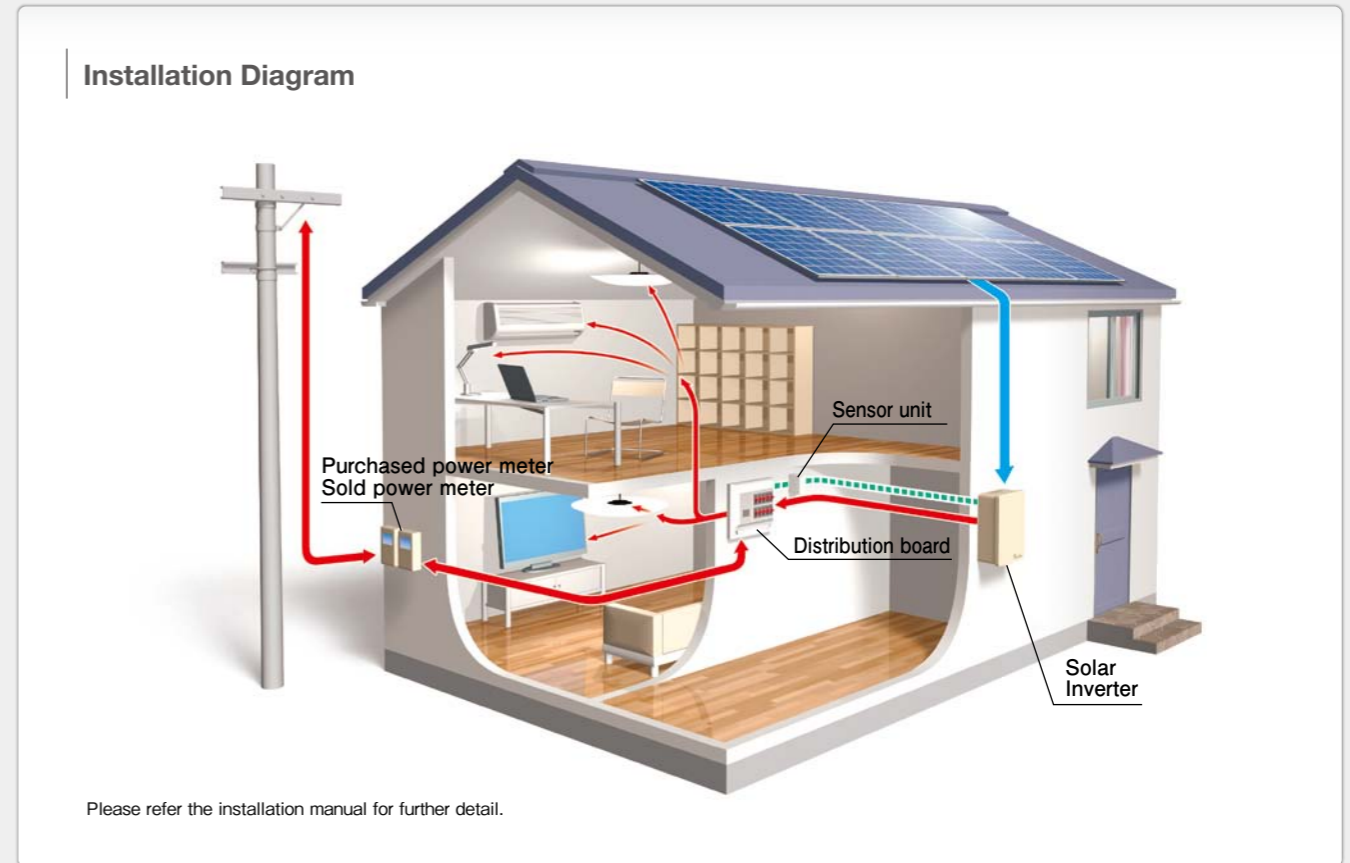
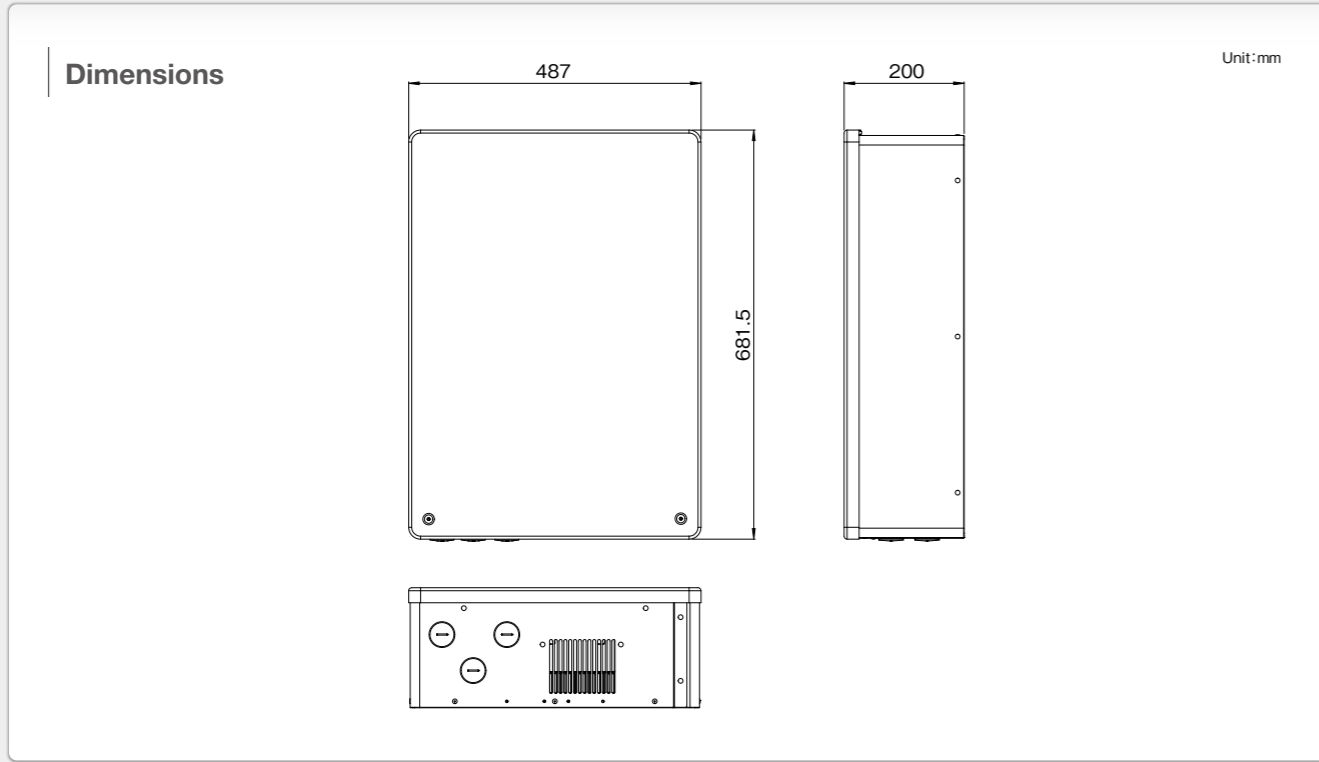
Input (DC)	EPC-S55MP3-L	EPC-S55MP4-L
Max. input power per string	2150W	
Max. input voltage	450V	
Operation voltage range /rated input voltage	80-450V/250V	
MPPT voltage range	80-450V	
Min. input voltage / initial input voltage	80V/100V	
Number of MPP tracker input / inputs	3	4
Max. input current per string	10.3A	
<b>Output (AC : Grid connected)</b>		
Connection phases	Single-phase, 2-wire type (connected to single-phase, 3-wire wiring)	
Conversion method	Voltage type current controller method	
Rated output power*1	5500W	
Rated AC voltage	202V	
Nominal AC voltage range	190~214V	
Rated output frequency	50Hz,60Hz	
Rated output current	27.5A	
Power factor at rated output power	Over 0.99	
Distortion rate of the output current	Combined: less than 5%, Each: less than 3%	
<b>Output (AC : Stand alone)</b>		
Electrical mode	Single-phase 2-wire	
Conversion method	Voltage type voltage controller method	
Rated output power	1.5kVA	
Rated output voltage	101V	
<b>Efficiency</b>		
Efficiency*2	94.5%	
Max. efficiency	94.7% (In case of DC250V, 55% output)	94.6% (In case of DC250V, 80% output)
<b>Protection</b>		
Islanding operation detection : Passive	Frequency change rate detection method	
Islanding operation detection : Active	Frequency feedback method with step implantation	
<b>General Data</b>		
Dimensions (W/H/D)	487/681.5/200mm	
Weight	24kg	26kg
Installation condition	Outdoor	
Operating temperature range	-20°C~+45°C (Output controlled at 40°C and above)	
Noise (typical)*3	Less than 40dB	
Internal consumption (night)	Less than 10W/Less than 20VA	
Topology	High frequency isolated transformer method	
Cooling concept	Forced air cooling using a cooling fan	
Degree of protection (JIS)	Equivalent to IP55	
<b>Features</b>		
DC terminal	Terminal block (+, -)×3	Terminal block (+, -)×4
AC terminal	Terminal block (U, O, W)	
Stand-alone terminal	Terminal block (2 poles)	
Grounding terminal	Terminal block (1 pole)	
Display	None	
Remote controller	Required	
Cable (Remote controller)	Required	
Remote controller for output control	ZREM-35ENP01	
Interface	RS-485	
JET certification number	MP-0062	MP-0064

\*1 Value calculated when all strings were in use.

\*2 Efficiency under the conditions defined in JIS C 8961

\*3 According to A characteristics of JIS C1509-1 A, noise measurements are taken at a position, 1m away from the center of the front side of the solar inverter at 1m above the floor face.

Some specifications or aspects of appearance may be changed without notice to improve the product



\*1 Order production  
\*2 Sensor cable required

### Configuration

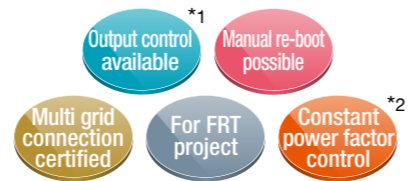
Protector relays		Setting values	Setting ranges
AC overvoltage OVR	Detection levels	115V	110V, 113V, 115V, 119V
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
AC undervoltage UVR	Detection levels	80V	80V, 85V, 90V, 93V
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Over frequency OFR	Detection levels	50Hz	51.0Hz
		60Hz	61.0Hz
	Detection time limits	50Hz	50.5Hz, 51.0Hz, 51.5Hz, 52.0Hz
		60Hz	60.5Hz, 61.0Hz, 61.5Hz, 62.0Hz
Under frequency UFR	Detection levels	50Hz	47.5Hz
		60Hz	57.5Hz
	Detection time limits	50Hz	49.5Hz, 49.0Hz, 48.5Hz, 48.0Hz, 47.5Hz, 47.0Hz
		60Hz	59.5Hz, 59.0Hz, 58.5Hz, 58.0Hz, 57.5Hz, 57.0Hz
Breaker function delay after the power restoration		300 seconds	10 seconds, 150 seconds, 180 seconds, 240 seconds, 300 seconds
Voltage increase controller function		109V	107V~112V (0.5V steps), off

Islanding operation detection method		Setting values*	Setting ranges
Passive method	Frequency change rate detection method	Detection levels	1.2Hz
		Detection element	Frequency change
Active method	Frequency feedback method with step implantation	Parallel off time limit	Passive method / 0.5 second or less Active method / 0.2 second or less
			Fixed

\*Passive and active method action settings can not be set individually.

# EPC-S99MP5-L Single-phase 9.9kW Solar Inverter



\*1-1 Output control cannot be operated manually. Only operates by following the utility company's order.  
 \*1-2 Remote controller for output control is necessary to activate output control. (Output cannot be controlled by the customer) (Please refer to P.47)  
 \*2 Individual grid connect discussion with the utility company is required to activate the constant power factor control.



ZREM-35ENP01 (Required)  
(Please refer to P.47)

## For residential / small sized commercial solar system

Our multi-string solar inverters now have more capacity.

This slim profile solar inverter looks great on a home. A single unit can generate up to 9.9kW.

Outdoor installation makes this system ideal for retrofitting existing homes.

Moreover with our fastening screw structure on the front panel, it realizes ease of installation.

This unit cannot be used as a high voltage system.

**1 Multi Grid Connection Certified/Output Control Available**

**2 5 individual MPPT tracking strings**

**3 Uses the high frequency isolated transformer method**

**4 For outdoor installation**

**5 Function of Manual Re-boot available**



A maximum of 5 solar inverters can be connected with a remote controller.

※See p. 47 for details about concurrent use with other models in combination.

## Specifications

Input (DC)	
Max. input power per string	2150W
Max. input voltage	450V
Operation voltage range /rated input voltage	80-450V/250V
MPPT voltage range	80-450V
Min. input voltage / initial input voltage	80V/100V
Number of MPP tracker input / inputs	5
Max. input current per string	10.3A
Output (AC : Grid connected)	
Connection phases	Single-phase, 2-wire type (connected to single-phase, 3-wire wiring)
Conversion method	Voltage type current controller method
Rated output power*1	9900W
Rated AC voltage	202V
Nominal AC voltage range	190~214V
Rated output frequency	50Hz,60Hz
Rated output current	49.5A
Power factor at rated output power	Over 0.99
Distortion rate of the output current	Combined: less than 5%, Each: less than 3%
Output (AC : Stand alone)	
Electrical mode	Single-phase 2-wire
Conversion method	Voltage type voltage controller method
Rated output power	1.5kVA
Rated output voltage	101V
Efficiency	
Efficiency*2	94.0%
Max. efficiency	94.7% (In case of DC250V, 55% output)
Protection	
Islanding operation detection : Passive	Frequency change rate detection method
Islanding operation detection : Active	Frequency feedback method with step implantation
General Data	
Dimensions (W/H/D)	449/963/206mm
Weight	36kg
Installation condition	Outdoor
Operating temperature range	-20°C~+45°C (Output controlled at 40°C and above)
Noise (typical)*3	Less than 44dB
Internal consumption (night)	Less than 10W/Less than 20VA*4
Topology	High frequency isolated transformer method
Cooling concept	Forced air cooling using a cooling fan
Degree of protection (JIS)	Equivalent to IP55
Features	
Constant power factor control	80%~100%
DC terminal	Terminal block(+, -)×5
AC terminal	Terminal block (U,O,W)
Stand-alone terminal	Terminal block (2 poles)
Grounding terminal	Terminal block (1 pole)
Display	None
Remote controller	Required
Cable (Remote controller)	Required
Remote controller for output control	ZREM-35ENP01
Interface	RS-485
JET certification number	MP-0084

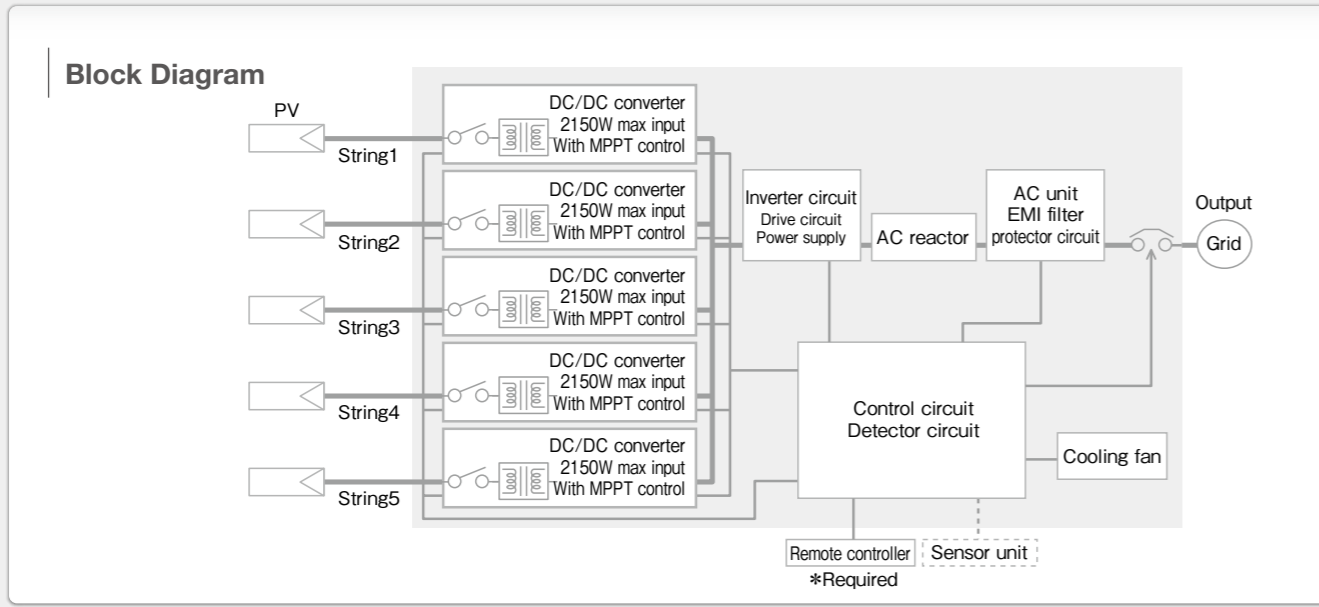
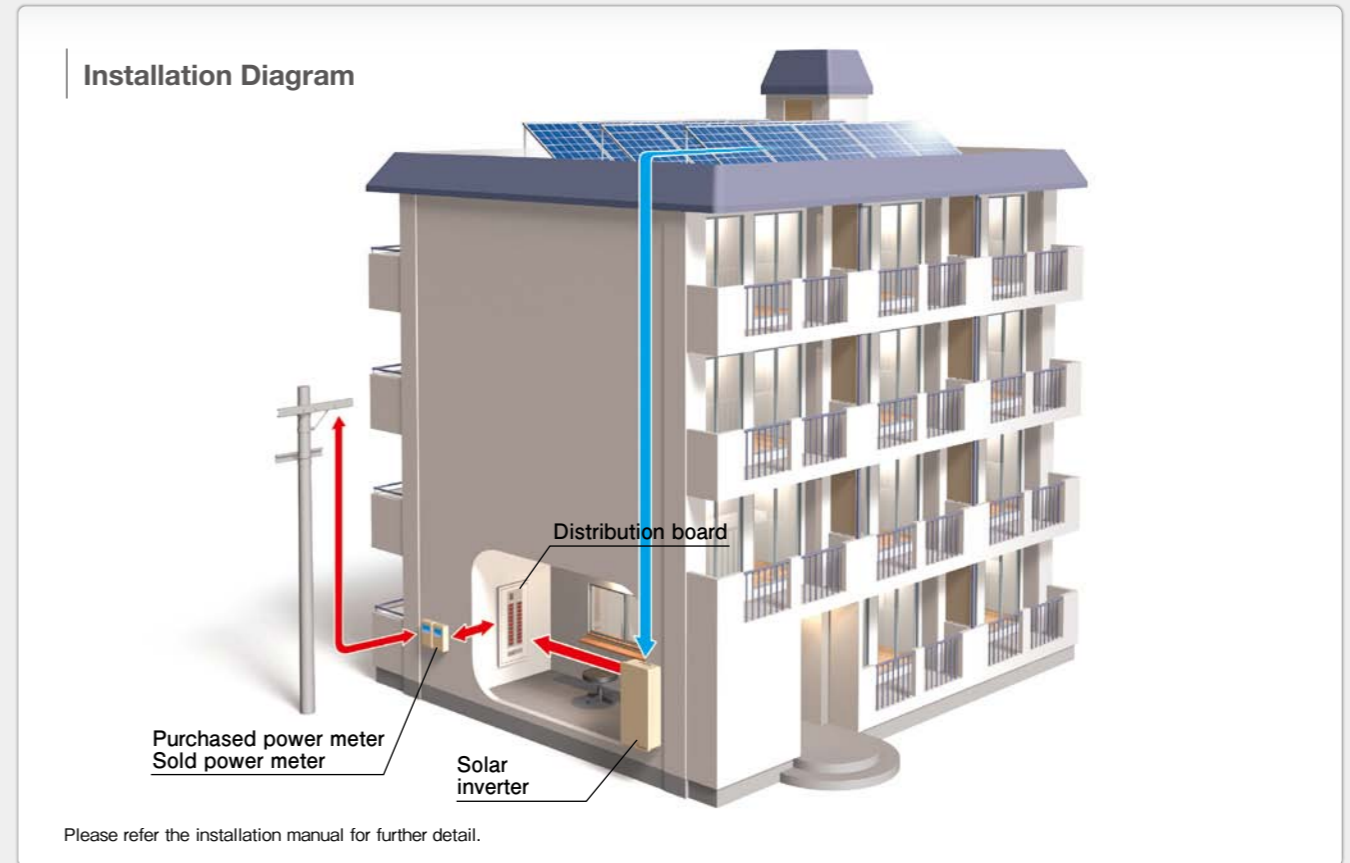
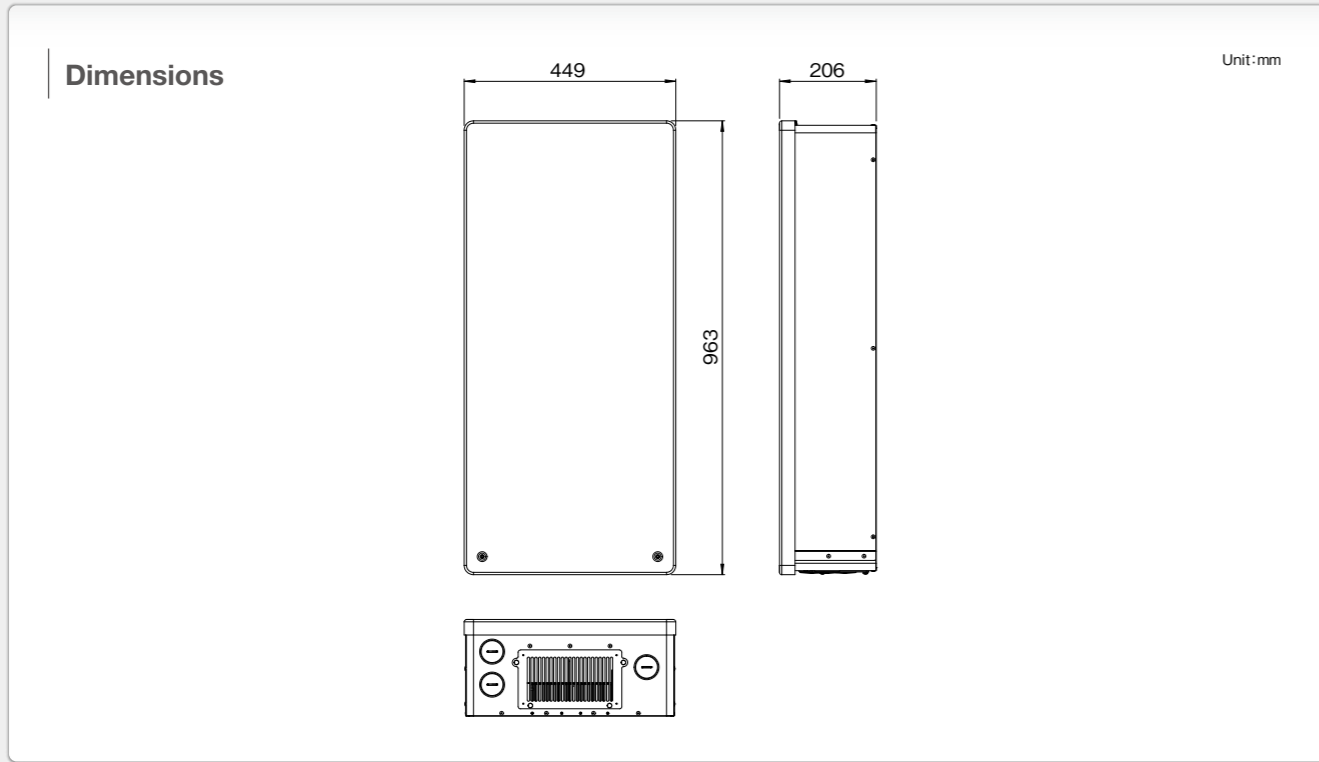
\*1 Value calculated when all strings were in use.

\*2 Efficiency under the conditions defined in JIS C 8961

\*3 According to A characteristics of JIS C1509-1 A, noise measurements are taken at a position, 1m away from the center of the front side of the solar inverter at 1m above the floor face.

\*4 30VA in case of manual re-boot

Some specifications or aspects of appearance may be changed without notice to improve the product



\*1 Order production  
\*2 Sensor cable required

### Configuration

Protector relays		Setting values	Setting ranges	
AC overvoltage OVR	Detection levels	115V	110V, 113V, 115V, 119V	
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds	
AC undervoltage UVR	Detection levels	80V	80V, 85V, 90V, 93V	
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds	
Over frequency OFR	Detection levels	50Hz	51.0Hz, 50.5Hz, 51.0Hz, 51.2Hz, 51.5Hz, 51.8Hz, 52.0Hz	
		60Hz	61.0Hz, 60.5Hz, 61.0Hz, 61.2Hz, 61.5Hz, 61.8Hz, 62.0Hz	
	Detection time limits		1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
	Under frequency UFR	Detection levels	50Hz	49.5Hz, 49.0Hz, 48.8Hz, 48.5Hz, 48.2Hz, 48.0Hz, 47.5Hz, 47.0Hz
60Hz			57.5Hz, 59.5Hz, 59.0Hz, 58.8Hz, 58.5Hz, 58.2Hz, 58.0Hz, 57.5Hz, 57.0Hz	
Detection time limits		1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds	
Breaker function delay after the power restoration		300 seconds	1 second, 10 seconds, 150 seconds, 180 seconds, 240 seconds, 300 seconds, Manual reboot	
Voltage increase controller function		109V	107V~112V (0.5V steps), off	

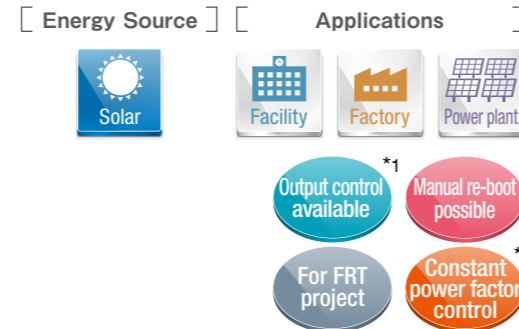
Islanding operation detection method		Detection levels	Setting values*	Setting ranges
Passive method	Frequency change rate detection method	Detection levels	1.2Hz	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 3.0, 4.0, 5.0Hz
		Detection element	Frequency change	—
Active method	Frequency feedback method with step implantation	Parallel off time limit	Passive method / 0.5 second or less Active method / 0.2 second or less	Fixed

\*Passive and active method action settings can not be set individually.

# EPU-T99P5-SFL

## Three-phase 9.9kW

### Solar Inverter



\*1 In order to activate the output control, this unit has to be used with output controllable Master Box. (please refer P.48)

\*2 Individual grid connect discussion with the utility company is required to activate the constant power factor control.



EOU-A-MBX01-L \*1  
(Please refer to P.48)

## For Small to Medium Commercial Systems

Capable of generating power even during a grid outage, May be used as a power source.  
For medium-scale commercial systems installing multiple inverters will maximize project scalability.

- 1 For FRT projects / Output control available (Master box is necessary in case of output control)
- 2 Stand-alone operation (AC 101V 2.0kVA x 2 outlets)
- 3 Capable of string monitoring with optional measurement devices.
- 4 Up to 30 inverter connections per line. (32 units maximum, when using Master Box.)
- 5 Networking control via Master Box (→See p. 48)

## Specifications

Input (DC)	
Max. input power per string	2170W
Max. input voltage	570V
Operation voltage range /rated input voltage	150-550V/250V
MPPT voltage range	150-550V
Min. input voltage / initial input voltage	150V
Number of MPP tracker input / inputs	5
Max. input current per string	10.3A
Output (AC : Grid connected)	
Connection phases	Three-phase 3-wire (Compatible with three-phase 4-wire wiring)
Conversion method	Voltage type current controller method
Rated output power*1 *2	9900W
Rated AC voltage	202V
Nominal AC voltage range	182-222V
Rated output frequency	50Hz,60Hz
Rated output current	28.3A
Power factor at rated output power	Over 0.95
Distortion rate of the output current	Combined: less than 5%, Each: less than 3%
Output (AC : Stand alone)	
Electrical mode	Single-phase 3-wire
Conversion method	Voltage type voltage controller method
Rated output power	2.0kVA×2
Rated output voltage	202V/101V
Efficiency	
Efficiency*3	93.5%
Max. efficiency	93.7% (In case of DC300V, 60% output)
Protection	
Islanding operation detection : Passive	Voltage phase jump detection method
Islanding operation detection : Active	Synchronous high frequency injection method
General Data	
Dimensions (W/H/D)	810.2/563.1/242.2mm
Weight	53kg
Installation condition	Outdoor
Operating temperature range	-20°C~+50°C (Output controlled at 40°C and above)
Noise (typical)*4	Less than 51dB
Internal consumption (night)	Less than 11W/Less than 80VA
Topology	High frequency isolated transformer method
Cooling concept	Forced air cooling using a cooling fan
Degree of protection (JIS)	Equivalent to IP55
Features	
Constant power factor control	80%~100%
DC terminal	Terminal block (+, -)×5
AC terminal	Terminal block (U,V,W)
Stand-alone terminal	Terminal block (U,O,W)
Grounding terminal	Terminal block (1 pole)
Contact point output circuit	Yes
Display	7-segment LED (Embedded in the chassis)
Controller	Master box (Optional)
Master box for output control	EOU-A-MBX01-L
Interface	RS-485
JET certification number	P-0226

\*1 Value calculated when all strings were in use.

\*2 When the Power factor is 1.0 during inverter operation.

\*3 Efficiency under the conditions defined in JIS C 8961

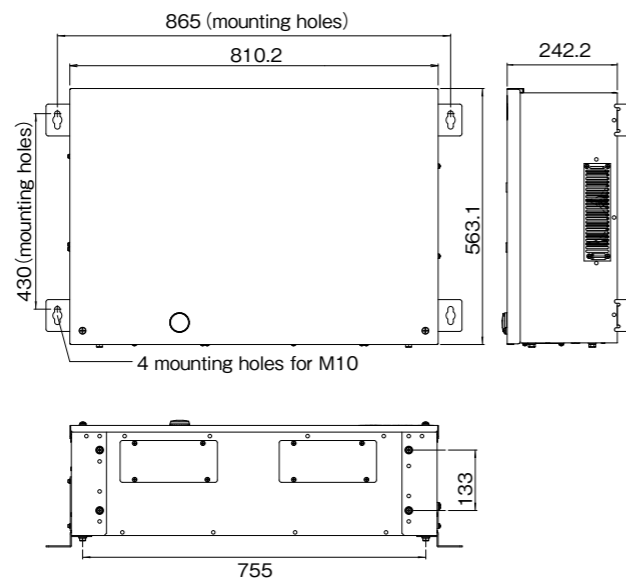
\*4 According to A characteristics of JIS C1509-1 A, noise measurements are taken at a position, 1m away from the center of the front side of the solar inverter at 1m above the floor face.

Some specifications or aspects of appearance may be changed without notice to improve the product

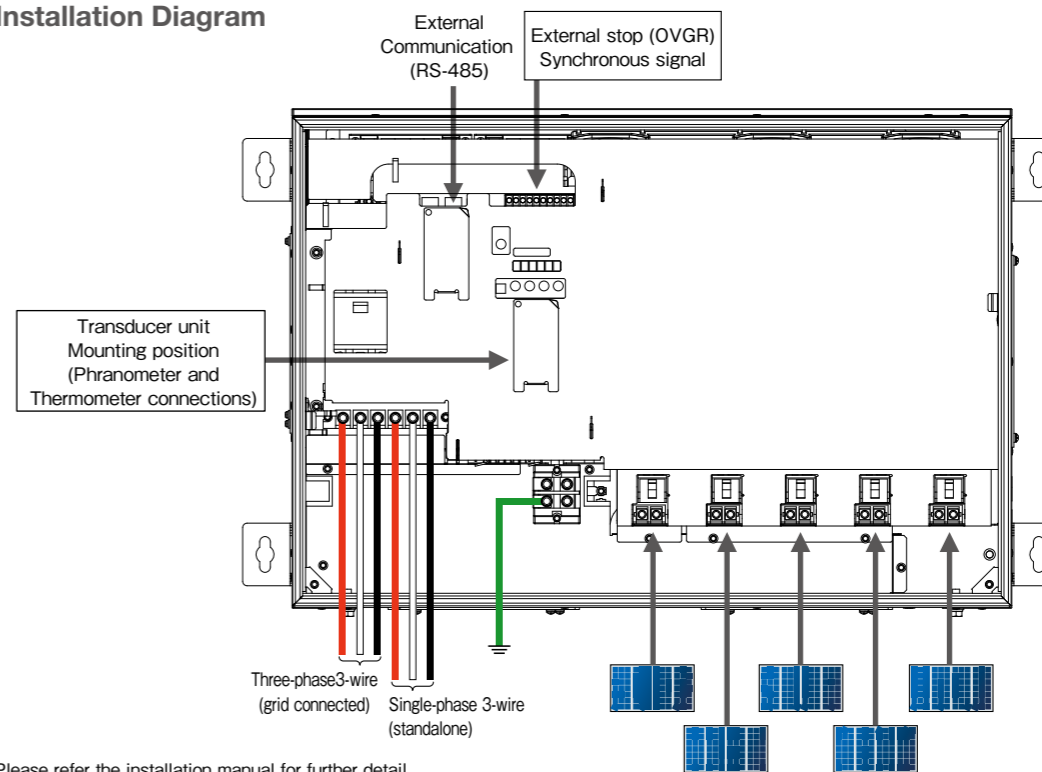


### Dimensions

Unit:mm

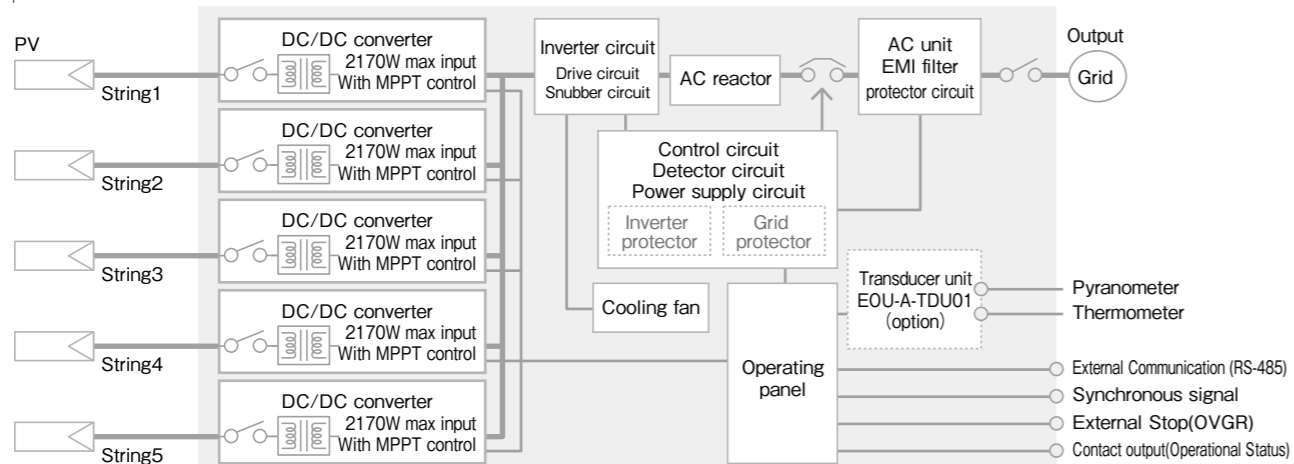


### Installation Diagram



Please refer the installation manual for further detail.

### Block Diagram



### Option

Transducer unit EQU-A-TDU01 can't be used in case solar radiation intensity and thermometer are connected with master box.



Transducer unit  
EQU-A-TDU01  
(→ See p. 49)



Master box\*  
EQU-A-MBX01-L  
(→ See p. 48)



Super master box  
EQU-A-SMB01-L  
(→ See p. 49)

\* Necessary when the output control is required. (→ See P. 48)

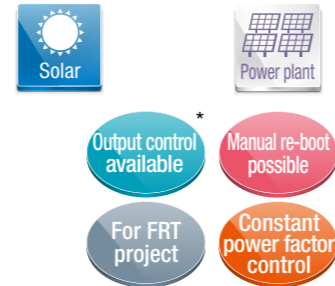
### Configuration

Protector relays		Setting values	Setting ranges
AC overvoltage OVR	Detection levels	232V	220~240V (1V steps)
	Detection time limits	1.0 second	0.2~2.0 seconds (0.1 second steps)
AC undervoltage UVR	Detection levels	162V	160~180V (1V steps)
	Detection time limits	1.0 second	0.2~2.0 seconds (0.1 second steps)
Over frequency OFR	Detection levels	50Hz	51.0Hz
		60Hz	61.2Hz
	Detection time limits	50Hz	50.5~51.5Hz (0.1Hz steps)
		60Hz	60.6~61.8Hz (0.1Hz steps)
Under frequency UFR	Detection levels	50Hz	48.5Hz
		60Hz	58.2Hz
	Detection time limits	50Hz	47.5~49.5Hz (0.1Hz steps)
		60Hz	57.0~59.4Hz (0.1Hz steps)
Breaker function delay after the power restoration		300 seconds	Automatic restoration 5~300 seconds (1 second steps) Manual restoration
Voltage increase controller function		225V	202~240V (1V steps)

Islanding operation detection method		Setting values	Setting ranges	
Passive method	Voltage phase jump detection method	Detection levels	7°	
		Detection time limits	Less than 0.5 seconds	
Active method	Synchronous high frequency injection method	Detection levels	50Hz	0.278 seconds
			60Hz	0.231 seconds
		Parallel off time limit	0.5~1.0 seconds	Fixed

# EPU-T250P8-FPL Three-phase 25kW Solar Inverter

[ Energy source ] [ Applications ]



\*In order to activate the output control, this unit has to be used with output controllable Master Box. (please refer P.48)



EOU-A-MBX03-L (Required)  
(Please refer to P.48)

## For High Voltage Grid-tied Megawatt Systems

Our EneTelus Mega Value System is a space-saving distributed generation system that is simple to install and maintain, and allows for detailed monitoring.

- 1 For FRT projects/Output control available
- 2 DC cable cost is reduced with our distributed design inverter systems.
- 3 Outdoor installation (IP65 compatible), passive cooling, and corrosion-resistant steel.
- 4 Installs below PV modules on racking system. Multi-string input does not require a combiner box.
- 5 String-level monitoring allows easy fault detection.

## Specifications

Input (DC)	
Rated input power per string	3250W
Max. input voltage	750V
Operation voltage range /rated input voltage	100-750V/500V
MPPT voltage range	100-660V
Min. input voltage / initial input voltage	100V
Number of MPP tracker input / inputs	8
Max. input current per string	10A
Output (AC : Grid connected)	
Connection phases	Three-phase 3-wire
Conversion method	Vector modulation method
Rated output power*1	25000W
Rated AC voltage	440V
Nominal AC voltage range	396-484V
Rated output frequency	50Hz,60Hz
Rated output current	34.4A
Power factor at rated output power	Over 0.95
Distortion rate of the output current	Combined: less than 5%, Each: less than 3%
Efficiency	
Efficiency*2	97.0%
Max. efficiency*2	97.8% (In case of DC670V, 50% output)
Protection	
Islanding operation detection : Passive	Frequency change detective method
Islanding operation detection : Active	Frequency shifting method
General Data	
Dimensions (W/H/D)	1350/480/300mm (Including mounting metal fittings)
Weight	81kg
Installation condition	Outdoor
Operating temperature range	-20°C~+50°C (Output controlled at 40°C and above)
Noise (typical)*3	Less than 45dB
Internal consumption (night)	Less than 20W/Less than 45VA
Topology	transformer-less
Cooling concept	Fan-less-model provides passive cooling
Degree of protection (JIS)	Equivalent to IP65
Features	
Constant power factor control	80%~100%
DC terminal	Terminal block (+, -)×8
AC terminal	Terminal block (U,V,W)
Grounding terminal	Terminal block (1 pole)
Contact point output circuit	Yes
Display	7-segment LED (Embedded in the chassis)
Controller	Master box (Required)
Master box for output control	EOU-A-MBX03-L
Interface	RS-485

\*1 When the Power factor is 1.0 during inverter operation.

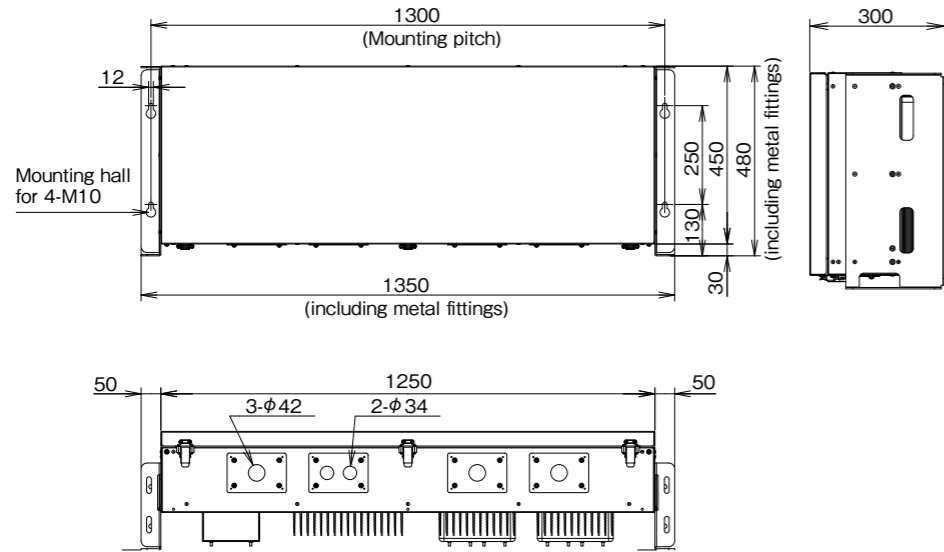
\*2 Efficiency under the conditions defined in JIS C 8961

\*3 According to A characteristics of JIS C1509-1 A, noise measurements are taken at a position, 1m away from the center of the front side of the solar inverter at 1m above the floor face.

Some specifications or aspects of appearance may be changed without notice to improve the product

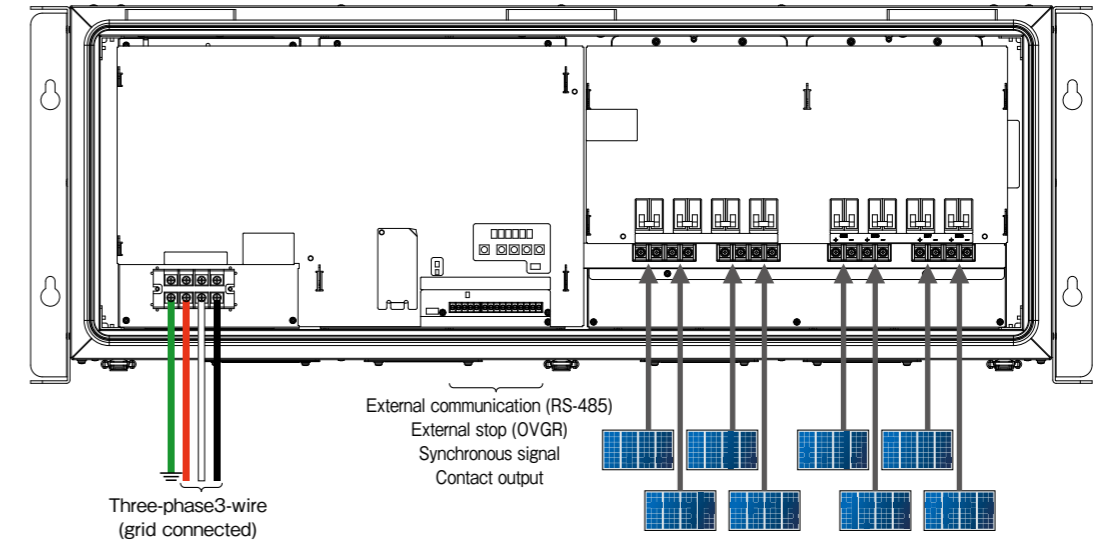
### Dimensions

Unit:mm

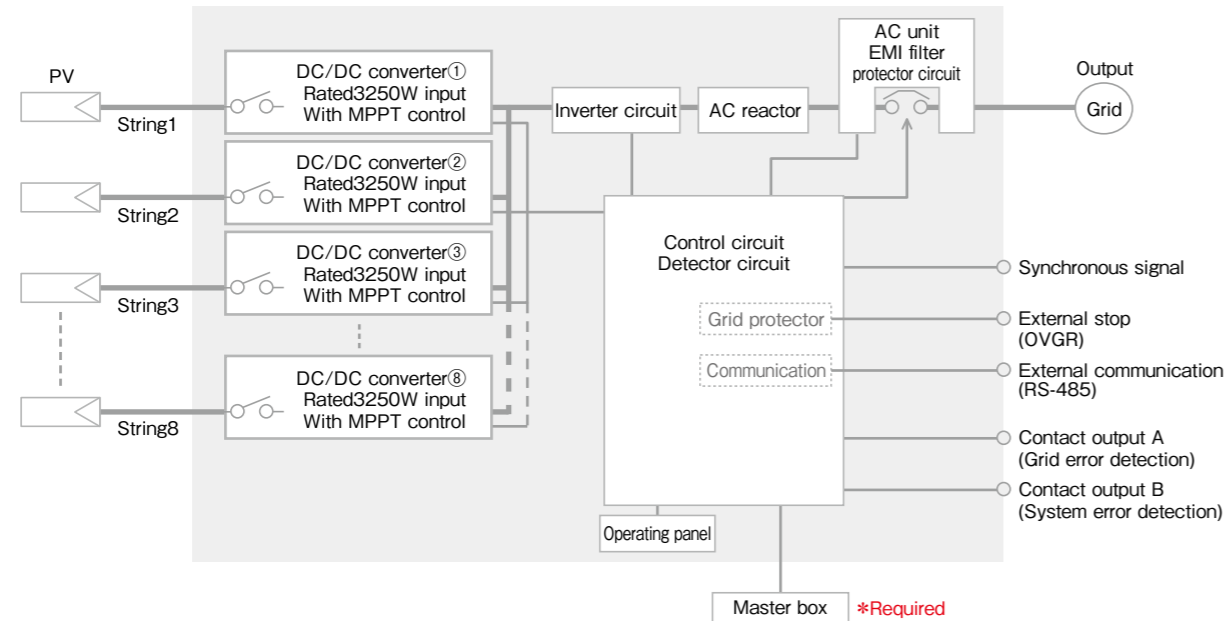


### Installation Diagram

Please refer the installation manual for further detail.



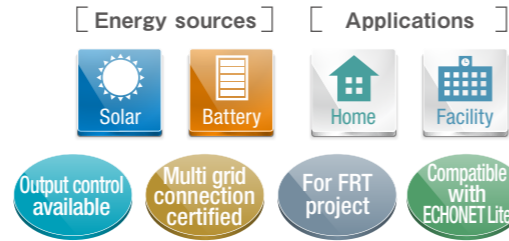
### Block Diagram



### Configuration

Protector relays		Setting values	Setting ranges		
AC overvoltage	Detection levels	506V	484~528V (1V steps)		
	OVGR	Detection time limits	1.0 second	0.5~2.0 seconds (0.1 second steps)	
AC undervoltage	Detection levels	374V	352~396V (1V steps)		
	UVR	Detection time limits	1.0 second	0.5~2.0 seconds (0.1 second steps)	
Over frequency	OFR	Detection levels	50Hz	51.0Hz	50.5~52.0Hz (0.1Hz steps)
		60Hz	61.0Hz	60.5~62.0Hz (0.1Hz steps)	
Under frequency	UFR	Detection time limits	1.0 second	0.5~2.0 seconds (0.1 second steps)	
		Detection levels	50Hz	48.5Hz	46~49.5Hz (0.1Hz steps)
		60Hz	58.5Hz	56~59.5Hz (0.1Hz steps)	
		Detection time limits	1.0 second	0.5~2.0 seconds (0.1 second steps)	
Breaker function delay after the power restoration		300 seconds	Automatic restoration 5~300 seconds (1 second steps) Manual restoration		
Voltage increase controller function		484V	440~496V (1V steps)		
Islanding operation detection method		Setting values	Setting ranges		
Passive method	Frequency change detection method	Detection levels	0.4Hz	0.05~2.00Hz	
		Detection time limits	Less than 0.5 seconds	Fixed	
Active method	Frequency shifting method	Detection levels	1.0Hz	Fixed	
		Parallel off time limit	0.5~1.0 seconds	Fixed	

# EHC-S55MP3B-PNH EHC-S55MP3B-PNJ Hybrid Solar Inverter with Embedded Battery



In case of black-outs it could be also used as a standalone system. Our line-up includes 2types. The system includes the inverter and the racking-unit.

## EHC-S55MP3B-PNH [ORDER PRODUCTION]<sup>\*6</sup>

### Manual On/Off mode

In case of black-outs/power restoration of the grid, the system could be turned ON/OFF with the remote controller. As the ordinary solar inverter the load circuit could be designed on the customer side.

## EHC-S55MP3B-PNJ

### Automatic mode

When the system detects black-out the system will automatically switch its mode to stand-alone. And when the power is restored the system will automatically switch to grid-connected mode.



ZREM-35ENB02

EOC-LB100-PN  
(Compatible battery model)



## The smart way to use electric power

Storage batteries are an effective way to store solar power and facilitate utility rate "peak cutting". Batteries may be charged from the grid or PV array. Patented software prevents arbitrage of power export from battery to grid.

- 1 Hybrid system combining PV generation and Lithium-ion storage batteries
- 2 Outdoor installation
- 3 Prevents back-flow of power from storage batteries from the grid
- 4 Bidirectional inverter facilitates battery charging from either the grid or PV array

## Specifications

Input (DC : Photovoltaic)	EHC-S55MP3B-PNH	EHC-S55MP3B-PNJ
Max. input power per string	2150W	
Max. input voltage	450V	
Operation voltage range /rated input voltage	80-450V/250V	
Min. input voltage / initial input voltage	80V/100V	
Number of MPP tracker input / inputs	3	
Max. input current per string	10.3A	
<b>Charge/Discharge(DC : Battery)</b>		
Compatible battery model	EOC-LB100-PN <sup>*1</sup>	
Storage capacity	Minimum 9.48kWh (Typical 9.89kWh)	
Number of input circuit	1 circuit	
Charge energy	1.5kW <sup>*2</sup>	
Discharge energy	2.0kW <sup>*2</sup>	
Conversion method(Charge)	Grid connected operation: PWM method by power command (Constant current, constant voltage control) Standalone operation: Bus voltage stabilization PWM method (Constant current, constant voltage control)	
Conversion method(Discharge)	Grid connected operation: PWM method by power command / Standalone operation: Bus voltage stabilization PWM method	
<b>Output (AC : Grid connected)</b>		
Connection phases	Single-phase, 2-wire type (connected to single-phase, 3-wire wiring)	
Conversion method	Voltage type current controller method	
Rated output power <sup>*3</sup>	5500W	
Rated AC voltage	202V	
Nominal AC voltage range	160-238V	
Rated output frequency	50Hz,60Hz	
Rated output current	27.5A	
Power factor at rated output power	Over 0.95	
Distortion rate of the output current	Combined: less than 5%, Each: less than 3%	
<b>Output (AC : Stand alone)</b>		
Electrical mode	Single-phase 2-wire	
Conversion method	Voltage type voltage controller method	
Rated output power	Max.2.0kVA	
Rated output voltage	101V±5V	
<b>Efficiency (Solar)</b>		
Efficiency <sup>*3</sup>	92.5%	
Max. efficiency	93.0% (In case of DC250V, 50% output)	
<b>Protection</b>		
Islanding operation detection : Passive	Frequency change rate detection method	
Islanding operation detection : Active	Frequency feedback method with step implantation	
<b>General Data</b>		
Main unit dimensions (W/H/D)	580/1000/250mm	
Special rack dimensions (W/H/D)	580/450/250mm	
Battery dimensions (W/H/D)	580/600/551.5mm <sup>*1</sup> Includes the castor wheels	
Main unit weight	Approximately 60kg	
Special rack weight	Approximately 13kg	Approximately 17kg
Battery weight	Approximately 110kg	
Installation condition	Outdoor (Battery unit must be installed indoor)	
Operating temperature range (Inverter)	-20°C~+40°C	
Operating temperature range (Battery)	0°C~+40°C	
Noise (typical) <sup>*4</sup>	TBD	
Internal consumption (night)	Less than 40W/Less than 70VA	
Topology	High frequency isolated transformer method	
Cooling concept	Forced air cooling using a cooling fan	
Degree of protection (JIS)	Equivalent to IP55	
<b>Features</b>		
DC terminal	Terminal block (+, -)×4	
AC terminal	Terminal block (U,O,W)	
Stand-alone terminal	Terminal block (2 poles)	
Grounding terminal	Terminal block (2 poles)	
Display	None	
Remote controller	Accessory	
Cable (Remote controller)	Required	
Interface	RS-485	
Certification	MD-0009	

<sup>\*1</sup> The inverter is designed for the battery (EOC-LB100-PN)

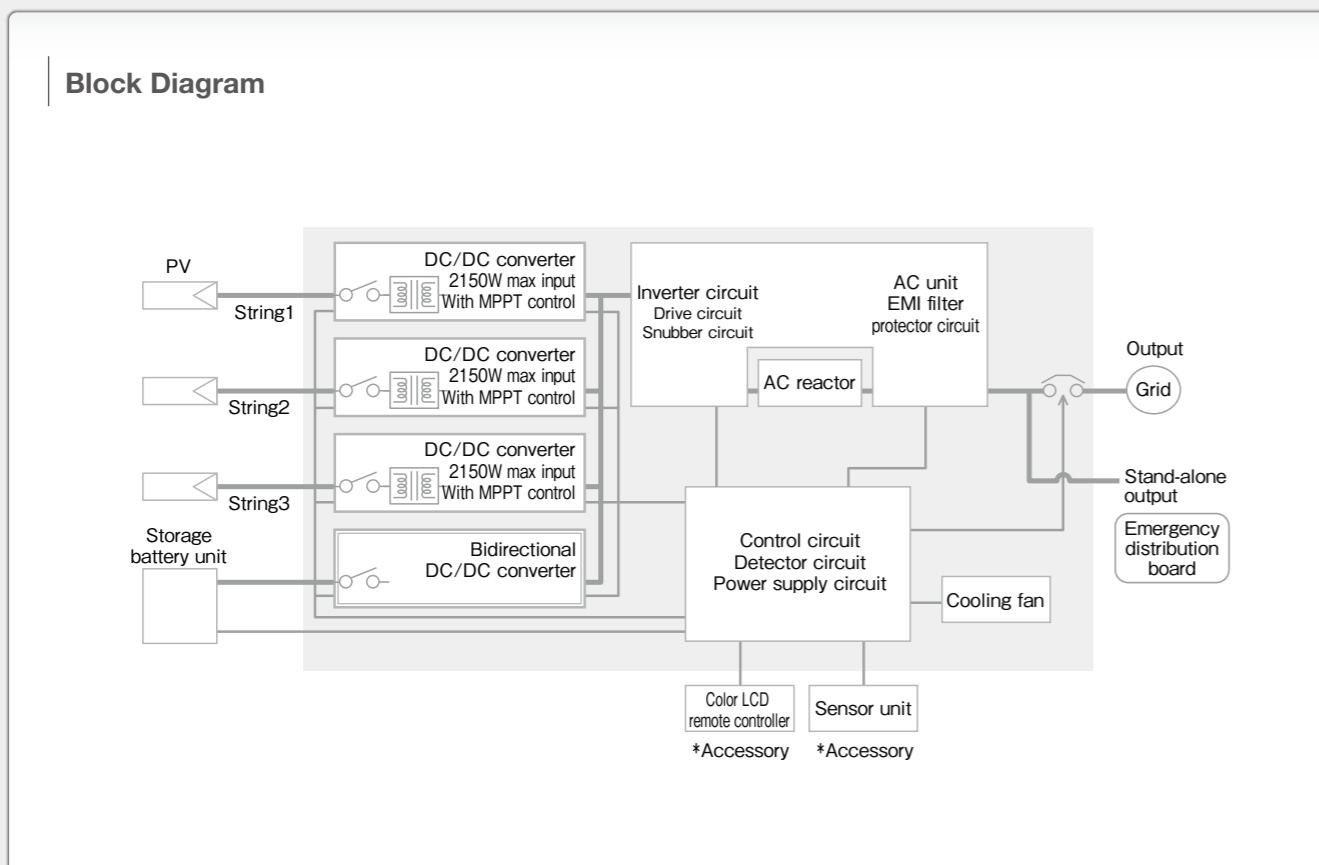
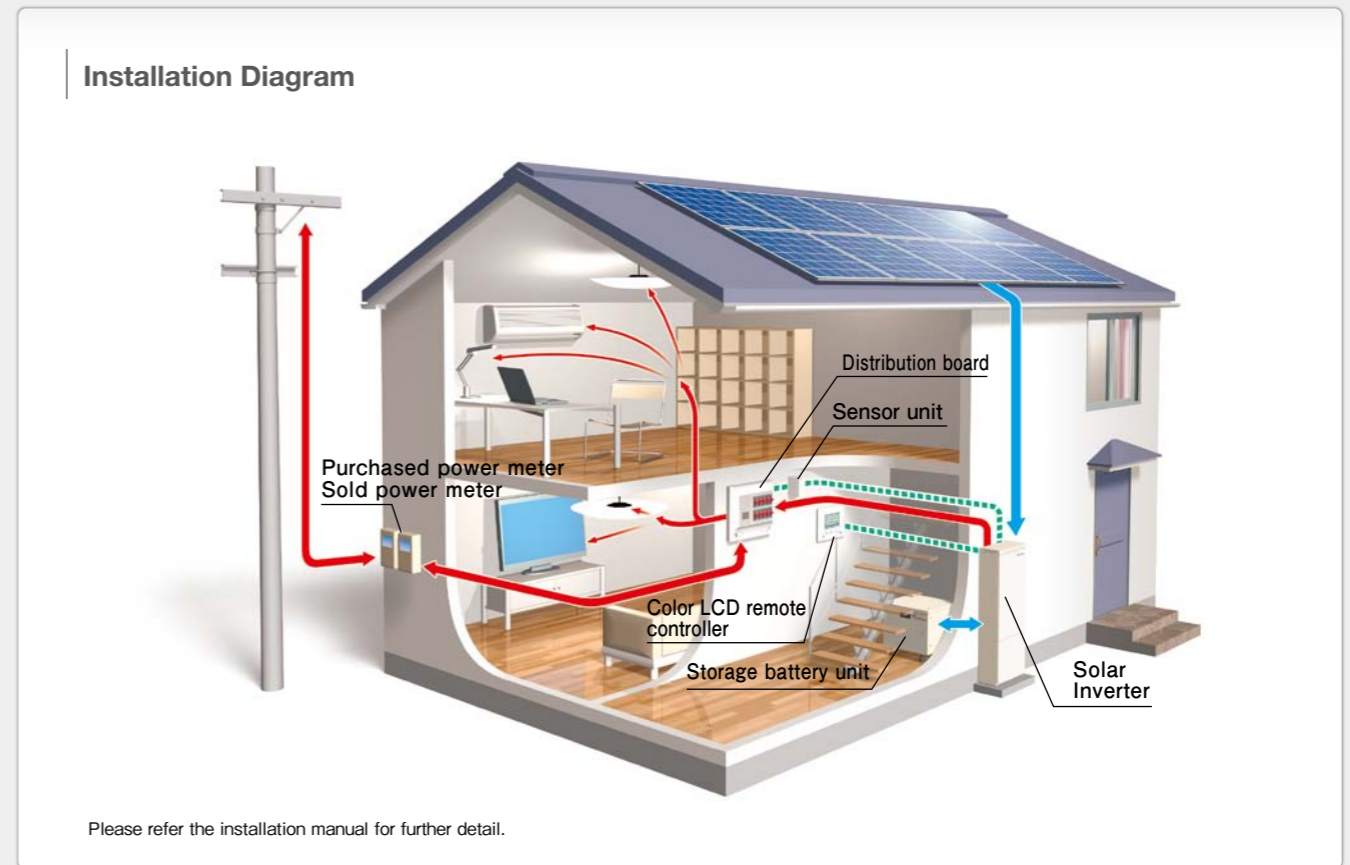
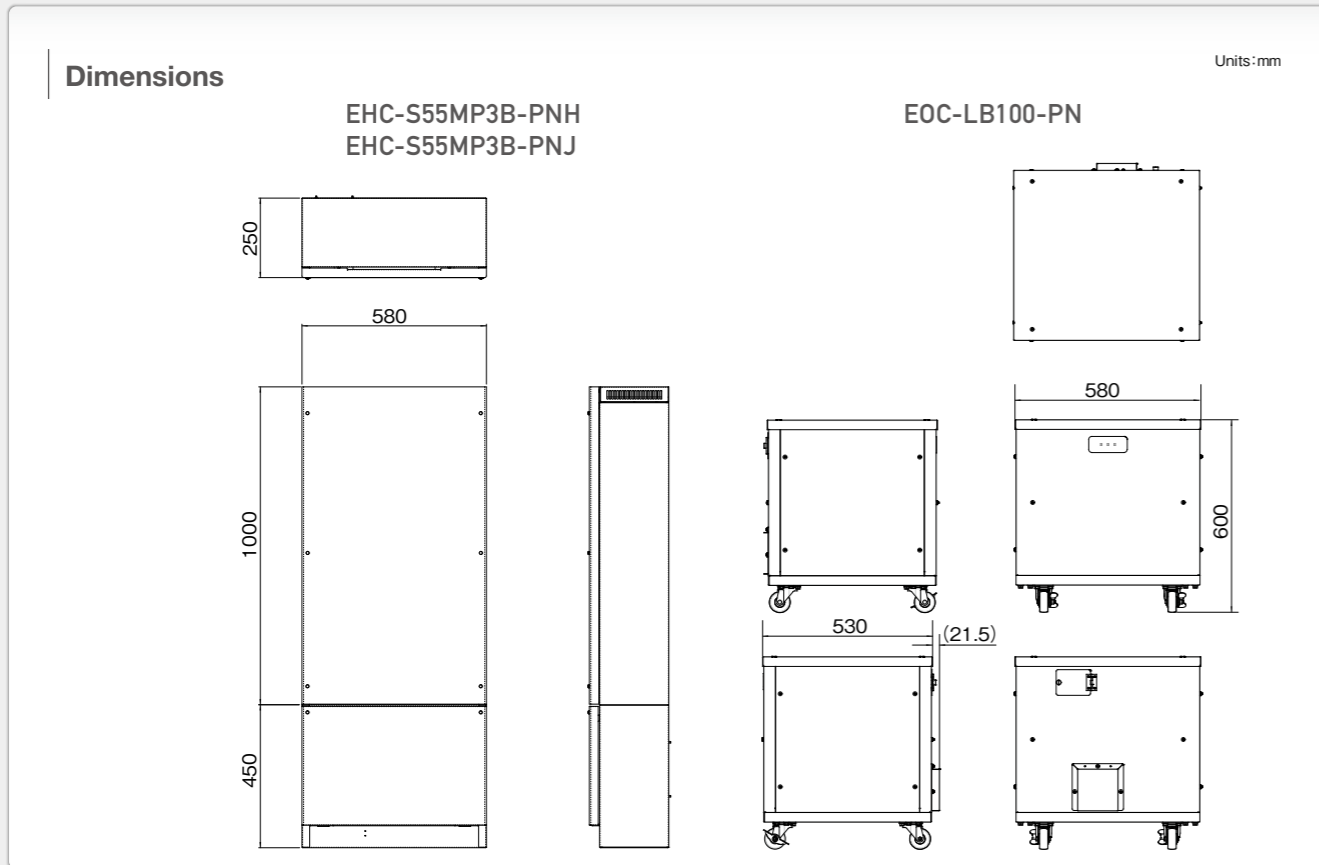
<sup>\*2</sup> Limited periods of maximum output.

<sup>\*3</sup> Value calculated when all strings were in use.

<sup>\*4</sup> Efficiency under the conditions defined in JIS C 8961

<sup>\*5</sup> According to A characteristics of JIS C1509-1 A, noise measurements are taken at a position, 1m away from the center of the front side of the solar inverter at 1m above the floor face.

<sup>\*6</sup> Order production



### Configuration

Protector relays		Setting values	Setting ranges
AC overvoltage	Detection levels	115V	110V, 113V, 115V, 119V
OV	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
AC undervoltage	Detection levels	80V	80V, 85V, 90V, 93V
UVR	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Over frequency	Detection levels	50Hz	51.0Hz
OF	60Hz	61.0Hz	60.5Hz, 61.0Hz, 61.5Hz, 62.0Hz
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Under frequency	Detection levels	50Hz	47.5Hz
UFR	60Hz	57.5Hz	49.5Hz, 49.0Hz, 48.5Hz, 48.0Hz, 47.5Hz, 47.0Hz
	Detection time limits	1.0 second	0.5 seconds, 1.0 second, 1.5 seconds, 2.0 seconds
Breaker function delay after the power restoration		300 seconds	10 seconds, 150 seconds, 180 seconds, 240 seconds, 300 seconds
Voltage increase controller function		109V	107V~112V (0.5V steps), off

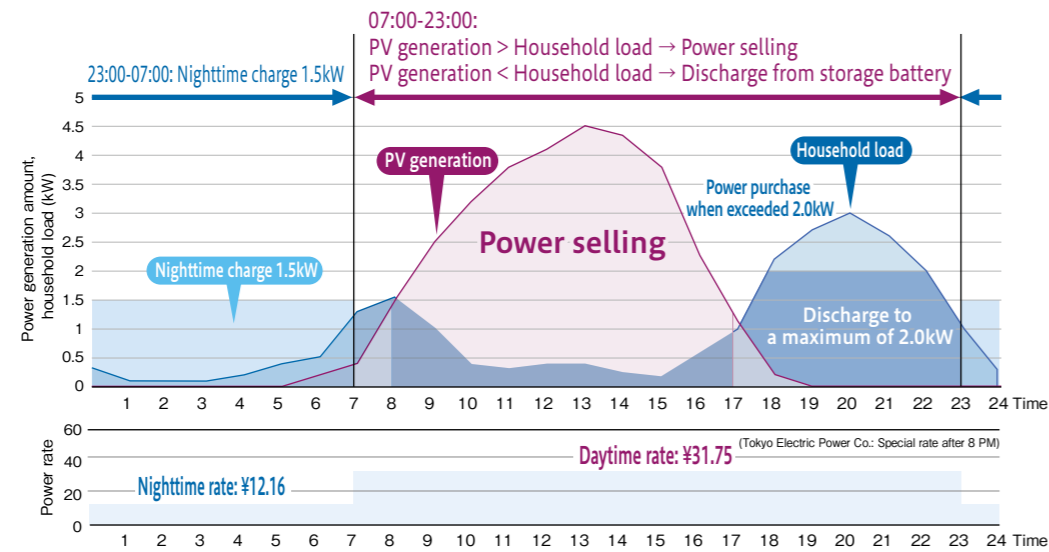
Islanding operation detection method			Setting values*	Setting ranges
Passive method	Frequency change rate detection method	Detection levels	1.2Hz	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 3.0, 4.0, 5.0Hz
		Detection element	Frequency change	—
Active method	Frequency feedback method with step implantation	Parallel off time limit	Passive method / 0.5 second or less	Fixed
			Active method / 0.2 second or less	

\*Passive and active method action settings can not be set individually.

# Three Operating Modes-Normal, Energy-saving, and Storage

## 1 Normal mode

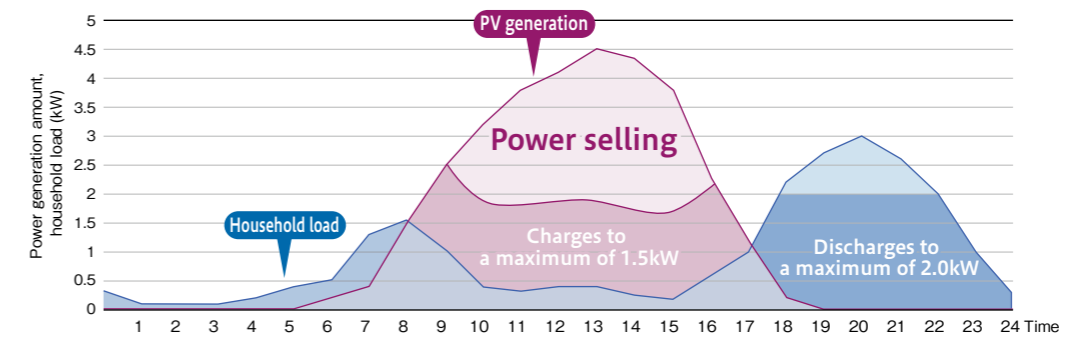
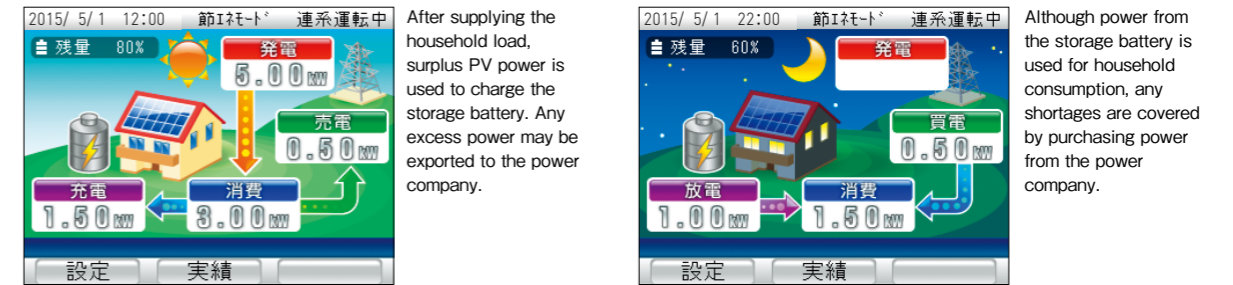
The most economical daily use of electric power is through the charging and discharging of storage batteries. This mode prioritizes selling PV-generated power during the day and uses the power stored in the battery to cover the household load in the evening when demand is high. The battery is charged overnight when power rates are low to compensate for the power used during the daytime and the evening.



By charging at night when rates are low and discharging during the daytime when rates are high, power purchase rate can be saved.

## 2 Energy-Saving Mode

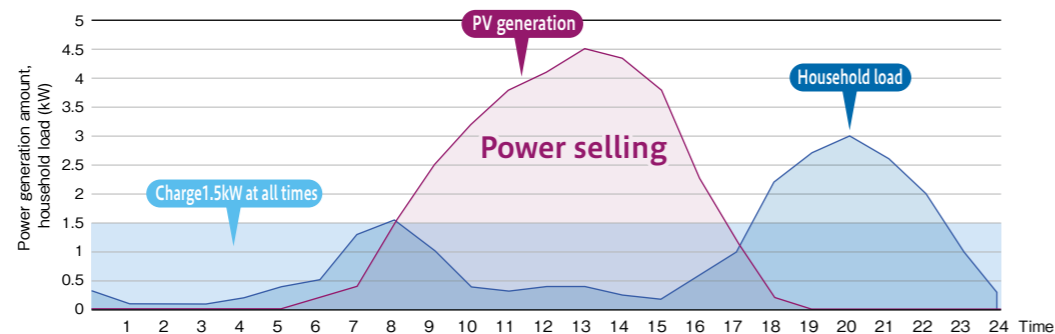
This mode increases energy savings by increasing the amount of self-generated power, reducing purchasing from the grid. This mode stores surplus PV-generated power during the daytime and discharges power in the evening and overnight to cover the household load.



This mode minimizes power purchases from the grid by replacing it with clean renewable energy.

## 3 Storage mode

This mode was designed for areas that are subject to power failure. Storage Mode keeps the storage batteries fully charged at all times by using surplus PV-generated power during the daytime and purchasing power from the power company at night.



## No worry about power failures

### During a power failure, power is not purchased from the grid.

In case of blackout or lack of PV generation, the battery could provide constant energy with maximum of 2.0kVA power. Moreover, since the Hybrid Inverter can be connected to the distribution board, multiple loads could be used without swithcing the outlet. (The system cannot be used with more than its maximum stand alone output)



# ESC-B-S25B-LB Portable Storage System 2.5kWh

[ Energy sources ] [ Applications ]

Battery

Home Facility Factory

UPS function



## Specifications

Input (AC)	
Input voltage	AC100V
Input frequency	50Hz/60Hz
Connection phase	Single phase, 2 wire type
Charge/Discharge(Battery)	
Battery type	Lithium-Ion-Battery
Storage capacity	2.5kWh
Discharge capacity	2.0kWh
Charging time	Fully charged within 6 hours
Output (AC)	
Rated AC voltage	AC100V
Rated output frequency	50Hz/60Hz
Connection phase	Single phase 2 wires
Rated output power	1100VA(When operated with commercial power)/1100VA(When the battery is operating)
Max.output power	1800VA 1second (Auto shut-down function included in case of over-load)
Power Outage Switching Time	0秒 (Uninterruptable, UPS function)
General Data	
Operating temperature range	0°C~+40°C
Operating humidity range	20%~85% RH (Without condensation)
Installation condition	Indoor
Dimensions(W/H/D)	300/582.2/640mm (Does not include the lug)
Weight	65kg
Type	Transportable
Input/Output plug type	Input: Outlet with grounding pole /Output: Outlet with grounding pole

## Off-grid-solution for power outages

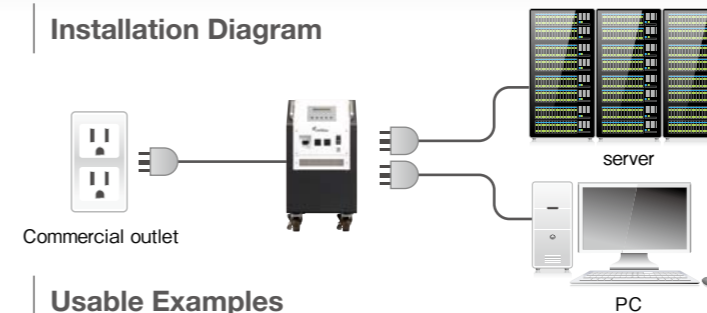
A fully charged system will run continuously for up to 4 hours at 500W output with no charging activity.

With the UPS function available, the system runs without powering down.

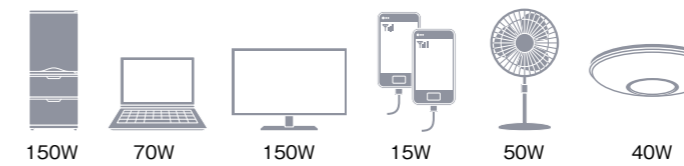
Wheels allow for easy installation and repairs/part replacement.

- 1 2.5kWh Lithium-Ion-Battery
- 2 UPS function available
- 3 Easy installation/replacement with wheels
- 4 2 output outlets
- 5 Built-in Peak-shift Function

## Installation Diagram



## Usable Examples

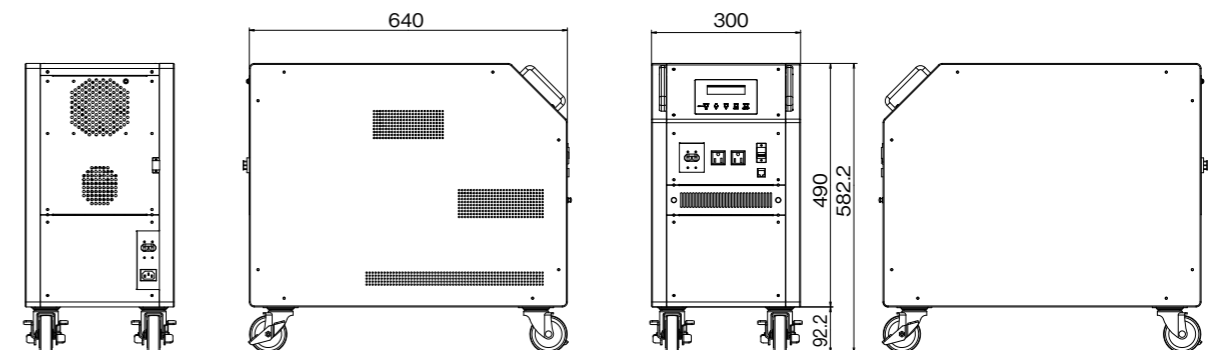


\*The power consumption will differ by the type of product.  
Please make sure to check the products power consumption before connecting it to the battery.



## Dimension

Unit:mm



# ESC-C-S50B-LB

## Portable Storage System 5.0kWh



### Specifications

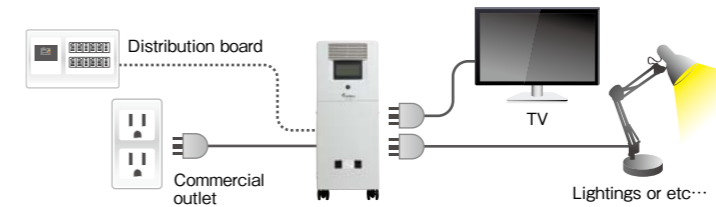
Input (AC)	
Input voltage	AC100V
Input frequency	50Hz/60Hz
Connection phase	Single phase, 2 wire type
Charge/Discharge(Battery)	
Battery type	Lithium-Ion-Battery
Storage capacity	5kWh
Discharge capacity	4.4kWh
Charging time	Fully charged within 8 hours
Output (AC)	
Rated AC voltage	AC100V
Rated output frequency	50Hz/60Hz
Connection phase	Single phase 2 wires
Rated output power	1500VA(When operated with commercial power)/1500VA(When the battery is operating)
Max.output power	1500VA (Overload Stop Function)
Power Outage Switching Time	About 10 seconds *20ms when the timer is set
General Data	
Operating temperature range	0°C~+40°C
Operating humidity range	20%~85% RH(Without condensation)
Installation condition	Indoor
Dimensions(W/H/D)	250/649/626mm (Does not include the lug)
Weight	65kg
Type	Transportable
Input/Output plug type	Input: Outlet with grounding pole /Output: Outlet with grounding pole, terminal block

### For peak-shifting / off-grid solutions

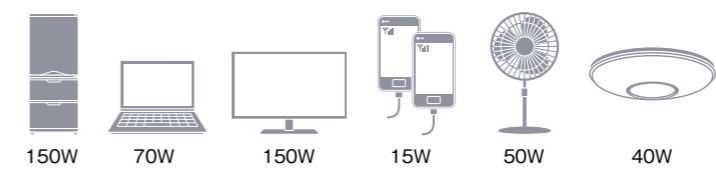
A fully charged system will last up to **9** hours at 500W output with no charging activity. With a large capacity 5.0kWh battery, the system can run for long time with several loads. Wheels allow for easy installation and repairs/part replacement.

- 1 5.0kWh Lithium-Ion-Battery
- 2 Easy installation/replacement with wheels
- 3 2 output outlets
- 4 Built-in Peak-shift Function

### Installation Diagram



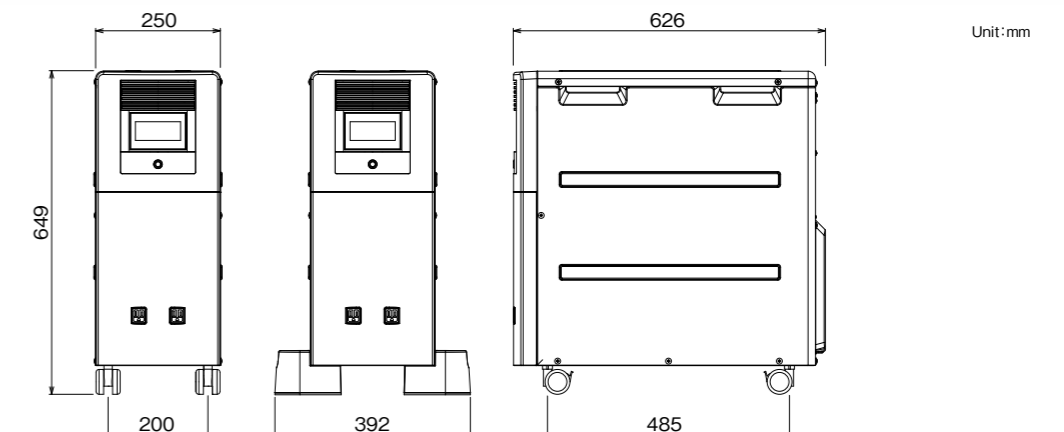
### Usable Examples



\*The power consumption will differ by the type of product. Please make sure to check the products power consumption before connecting it to the battery.



### Dimension





# LCD Remote Controller for single-phase solar inverters

## ZREM-35ENP01

Output control available

### Color LCD remote controller (Output controllable product)

Displays the generation, consumption, amount of power purchased, selfsupply rate, and other power-related information in real time. Various features support energy conservation.

Output control will be available only when combining output controllable inverter and remote controller.

#### 1 Generated power

Displays the power currently being generated.

#### 2 Power consumption

Displays the power currently being consumed by the household.

#### 3 Control Status Display

Displays the output control status of the solar inverter: Temperature Control, Voltage Control, and Temperature Voltage Control.

#### 4 Operational Status

Displays the operational status of the solar inverter.

#### 5 Power Sold/Power Purchased

Displays the amount of PV power sold to the power utility, as well as power purchased from the utility.

\*Only for selling surplus power.



#### Supported models

Output controllable product	
EPC-S40MP2-L	EPC-S49MP3-L
EPC-S55MP3-L	EPC-S55MP4-L
EPC-S99MP5-L	

#### Products without output control

EPC-A-30P-H	EPC-A-55P-H
EPC-B-S80P	EPC-B-S80P-J
EPC-A-S99P	EPC-A-S99P-J
EPC-A-S49MP	EPC-A-S55MP
EPC-A-S55MP4	

#### 6 Self-supply rate

Displays the current amount of self-supplied electricity.  
(Generated power ÷ Consumed power × 100)  
\*Applies only when selling PV power.

#### 7 Function Button

Executes the function displayed in the button area.

#### 8 Grid/Stand-alone button

Switches solar inverter operating modes between grid connected operation and stand-alone operation

#### Operational Status Display Lamp

The button is illuminated (flashes) when the solar inverter is operational.

#### 9 Run/Stop button

Switches the solar inverter operating status between run and stop.

#### Sold/Purchased power display lamp

Button is illuminated (flashes) when power is sold/purchased.  
\*Only for Excess Power Export.

#### General Specifications

Dimensions/ H120×W130×D22.8mm (not including brackets)  
Weight/ set unit: 217.5g Brackets: 42g  
LCD/ 3.5-inch color LCD  
Mounting method: wall-mounted

Rated power consumption/ 3.1W  
Maximum power consumption/ less than 4W  
Installation/ Interior

\*\*The solar inverter provides power for the remote display.  
One remote display is required per system.

#### Energy-saving feature



Power graph

2015/4/30 12:00 連系運転中			
省エネアシスト 2015年 4月 1日			
時間	発電量 (kWh)	消費量 (kWh)	自給率 (%)
12時	3.4	2.2	154
13時	4.6	1.3	353
14時	5.2	1.0	520
15時	5.0	0.8	625
日間	29.1	14.2	204

Numerical display

#### Electricity Bill Conversion Feature

2015/4/30 12:00 連系運転中			
電気代換算 2015年			
月	消費量 (円)	売電量 (円)	買電量 (円)
9月	6300	11000	3600
10月	7500	11500	4200
11月	7200	12000	4100
12月	6900	9000	3800
年間	81600	126000	52400

Numerical display

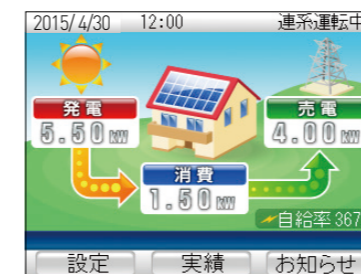


Graphical display

### Choice of displays: selling PV power, amount of power purchased, etc.

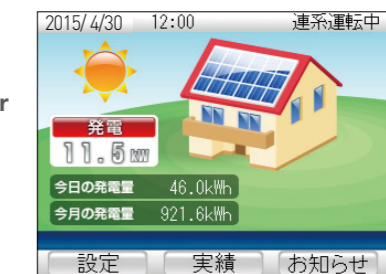
(Only from commissioning of the system.)

#### ▶ For PV power export sales contracts



Displays amount of power generated, consumed, and sold.  
\*Requires sensor unit.

#### ▶ For total PV power export sales contracts



Displays the total amount of generation.

## EneTelus remote controller for single-phase Solar Inverter

Please refer to the following table for the maximum number of connectable solar inverters and the number of required remote controllers.

Single remote controller can be connected to 5 solar inverters.

Please refer our company website (<http://www.enetelus.jp/english/products/remote.html>) for the old models which is not listed on the following chart.

Symbol	◎:Compatible(Controller is necessary.)
○	Compatible (Controller is option.)
▲	Compatible with condition

Remote Controller Model	ZREM-35ENP01
Communication method	EPC 2.0 EPC 3.0 EPC 4.0
Maximum units of inverters	1:5 5 inverters are connectable
Display	Surplus power selling / All power selling switch setting*1

Solar Inverter Model	Compatible models
EPC-A-S30P-H Single-phase, 3.0kW 2 strings*2	▲*3
EPC-A-S55P-H Single-phase, 5.5kW 3 strings*2	▲*3
EPC-B-S80P Single-phase, 8.0kW 4 strings*2	◎
EPC-B-S99P Single-phase, 9.9kW 5 strings*2	◎
EPC-B-S80P-J Single-phase, 8.0kW 4 strings*2	○
EPC-B-S99P-J Single-phase, 9.9kW 5 strings*2	○
EPC-A-S49MP Multi grid connection certified, Single-phase, 4.9kW 3 strings	◎
EPC-A-S55MP Multi grid connection certified, Single-phase, 5.5kW 3 strings	◎
EPC-A-S55MP4 Multi grid connection certified, Single-phase, 5.5kW 4 strings	◎
EPC-S40MP2-L Output control available, Single-phase, 4.0kW 2 strings	◎
EPC-S49MP3-L Output control available, Single-phase, 4.9kW 3 strings	◎
EPC-S55MP3-L Output control available, Single-phase, 5.5kW 3 strings	◎
EPC-S55MP4-L Output control available, Single-phase, 5.5kW 4 strings	◎
EPC-S99MP5-L Output control available, Single-phase, 9.9kW 5 strings	◎

#### Communication specification

EPC 2.0	EPC-A-S30P-H EPC-B-S80P-J EPC-A-S55P-H EPC-B-S99P EPC-B-S80P EPC-B-S99P-J
EPC 3.0	EPC-A-S49MP EPC-A-S55MP4 EPC-A-S55MP and any other EPC2.0 series
EPC 4.0	EPC-S40MP2-L EPC-S55MP4-L EPC-S49MP3-L EPC-S99MP5-L EPC-S55MP3-L and any other EPC2.0 and EPC3.0 series

\*1 Choose either Surplus or Total Power Sales for the initial setting.

\*2 Products which is no longer produced.

\*3 Maximum connectable inverters for ▲ (EPC-A-S30P-H, HPC-A-S55P-H) is 2 units. When 5 units connection is required, please combine with the units with ◎ or ○. In case of this, the DIP switch must be set from 1st or 2nd unit. Further units from 3rd unit cannot be set. For further detail please refer the installation manual.

# External control systems for three-phase solar inverters

**EOU-A-MBX01-L** (compatible with EPU-T99P5-SFL)  
**EOU-A-MBX03-L** (compatible with EPU-T250P8-FPL:Required)

Output control available

## Master box

Collective control for multiple solar inverters

Output control will be available only when combining output controllable inverter and master box.

### Basic functions

#### 1 Remote control

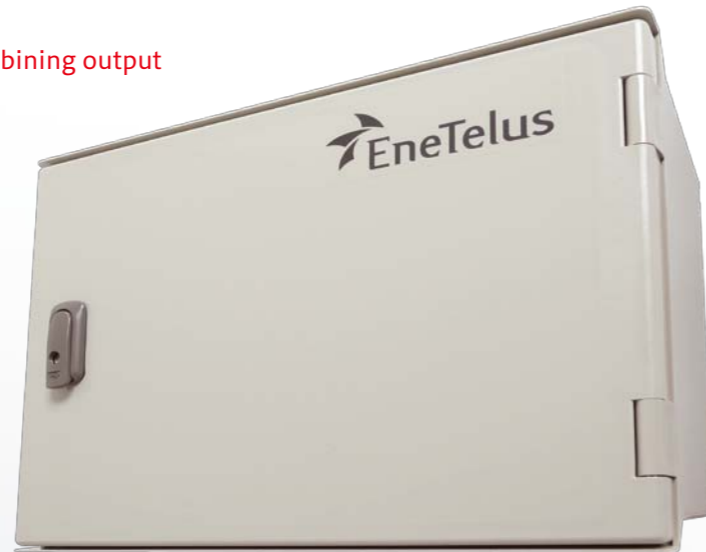
System set points and parameters, turns the inverter on or off, and manual restart.

#### 2 PV Generation Status Management

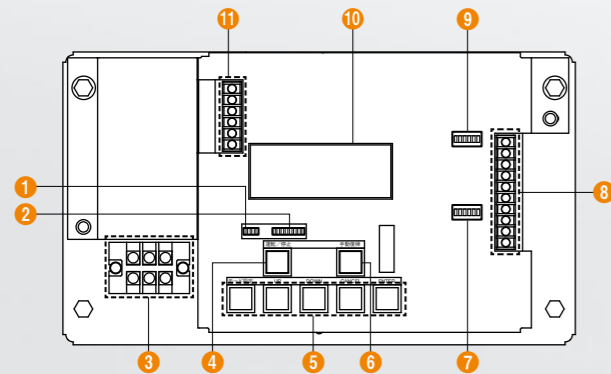
Manages operational status, errors, generation status, etc, and displays it on an LCD panel.

#### 3 Number of Solar Inverters

Up to 32 solar inverters can be connected to a master box. Up to 30 Master Boxes may be networked together by a Super Master Box.



### Internal structure



- 1 Operation Setting Switch**  
Sets Master Box operation.
- 2 Address Setting Switch**  
Sets the address for the Master Box.
- 3 Relay terminal panel for power supply connection**  
Connects the external power supply cable.
- 4 Start/stop button**  
Starts and stops the operation of connected solar inverters.
- 5 Operating button**  
Changes modes and settings
- 6 Manual recovery button**  
Manual restart after fault.
- 7 Solar inverter communication terminal setting switch**  
Sets terminal resistance for solar inverter communication.
- 8 Terminal Strip for Signal Line Communication**  
Inputs and outputs of communication signal, and outputs signal to an external monitor.
- 9 Master box communication terminal setting switch**  
Sets Master Box communication terminal resistance.
- 10 LCD panel**  
Displays generation status, system information, and settings.
- 11 Input Terminal Strip for Power Supply Output, Pyranometer, and Thermometer**  
Connects cables from power supply output (power for optional device), pyranometer, and thermometer.

### Basic specifications

Exterior dimensions: 400 x 300 x 165mm  
 (dustproof and waterproof (IP65 relevant))  
 Weight: 4.0 kg  
 Working temperature range: -20°C - +50°C  
 Input power supply voltage: AC 85 V - 265 V (47-63 Hz)  
 Power consumption: 3 W  
 Installation method: Wall-mounted

### Sample LCD Displays (EOU-A-MBX01-L)

**Overall System Generation Status**

Current date and time: 09/04 16:00 MasterBox

System state: ジョウタイ:レンケイオンデン

Total system generation amount: ハツデンリョウ: 100.0 kW

Existence of any stopped solar inverter: テイシPCS: ナシ

Generating state for overall system

**Integrated System Power Generation**

TOTAL: 330000000 kWh ← Cumulative PV-generated power of entire system

PCS 01: 9999000 kWh ← Generation per solar inverter.

PCS 02: 9999000 kWh

PCS 03: 9999000 kWh

Integrated power amount

**System Value Setting Screen**

[セティチセツチ]

カデンアツレベル: 232V <<<

カデンアツジャン: 100.0ms

フソクアツレベル: 1.60V

Value setting screen

**Error history**

History number: [イベントリレキ] 001

Date and time of occurrence: 09/04 16:00

Solar inverter identification name: PCS 09

Event code: EVENT\_FLG: 1234

Event history

Individual Solar Inverter Display

**Generation Status**

Solar Inverter Number: 09/04 16:00 PCS01

State: ジョウタイ:レンケイオンデン

Generation: ハツデンリョウ: 3.0 kW

DC bus voltage: チョクリュウデンアツ: 380V

Generation status for individual solar inverter

**String input state**

09/04 16:00 PCS01

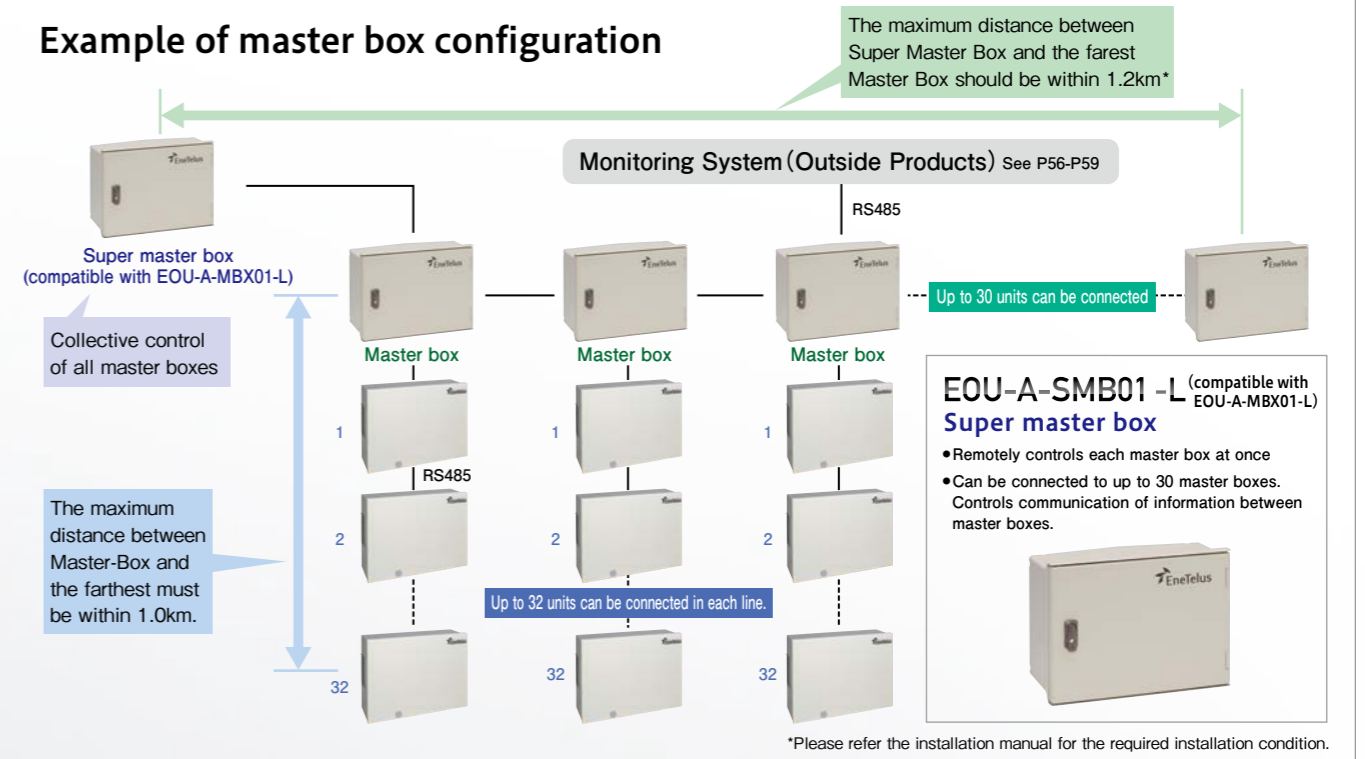
PV1: 4.0 kW PV2: 3.9 kW

PV3: 4.0 kW PV4: 3.9 kW

PV5: 4.0 kW

Series input circuit status

### Example of master box configuration



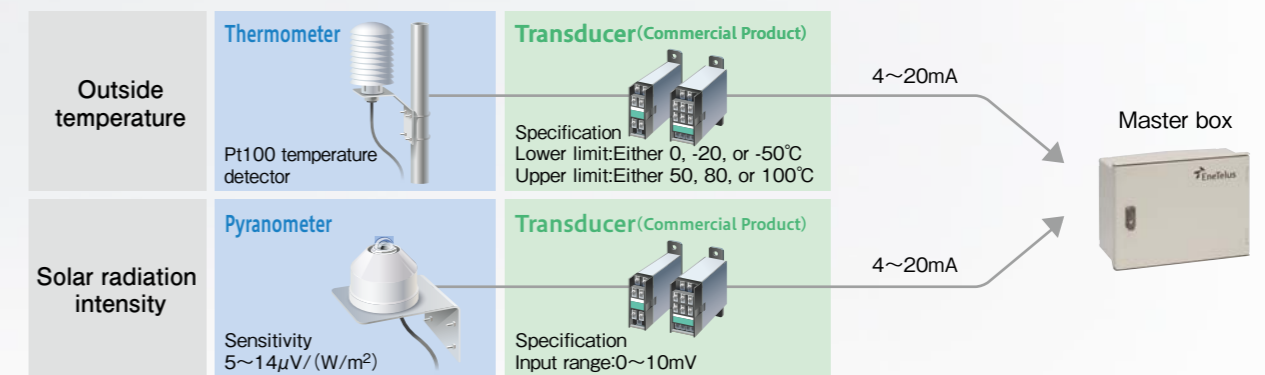
**EOU-A-SMB01-L** (compatible with EOU-A-MBX01-L)  
**Super master box**

- Remotely controls each master box at once
- Can be connected to up to 30 master boxes. Controls communication of information between master boxes.

\*Please refer the installation manual for the required installation condition.

### In case of connecting pyranometer and thermometer with master box

Transducer unit EOU-A-TDU01 can not be connected when a Pyranometer and thermometer are connected to the master box. Please use a commercially available transducer and prepare a power source for operation of the transducer.

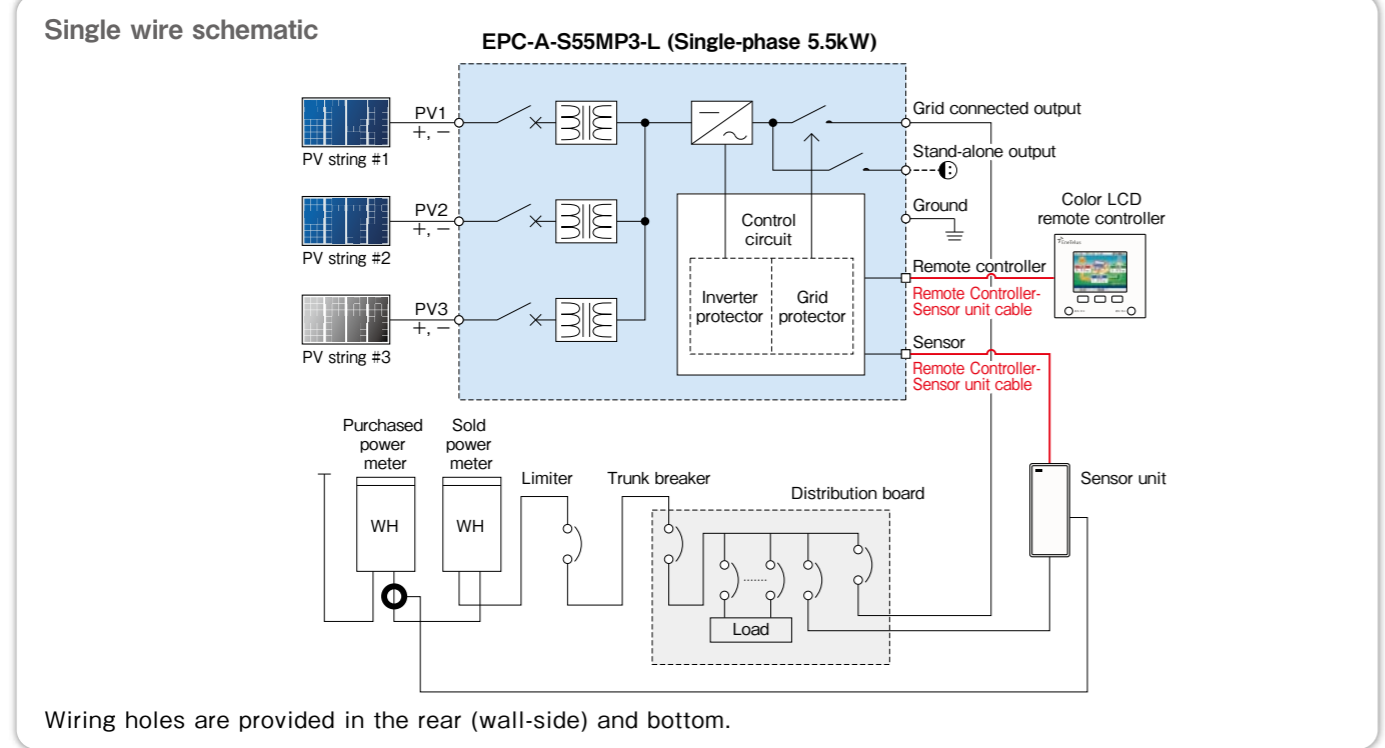
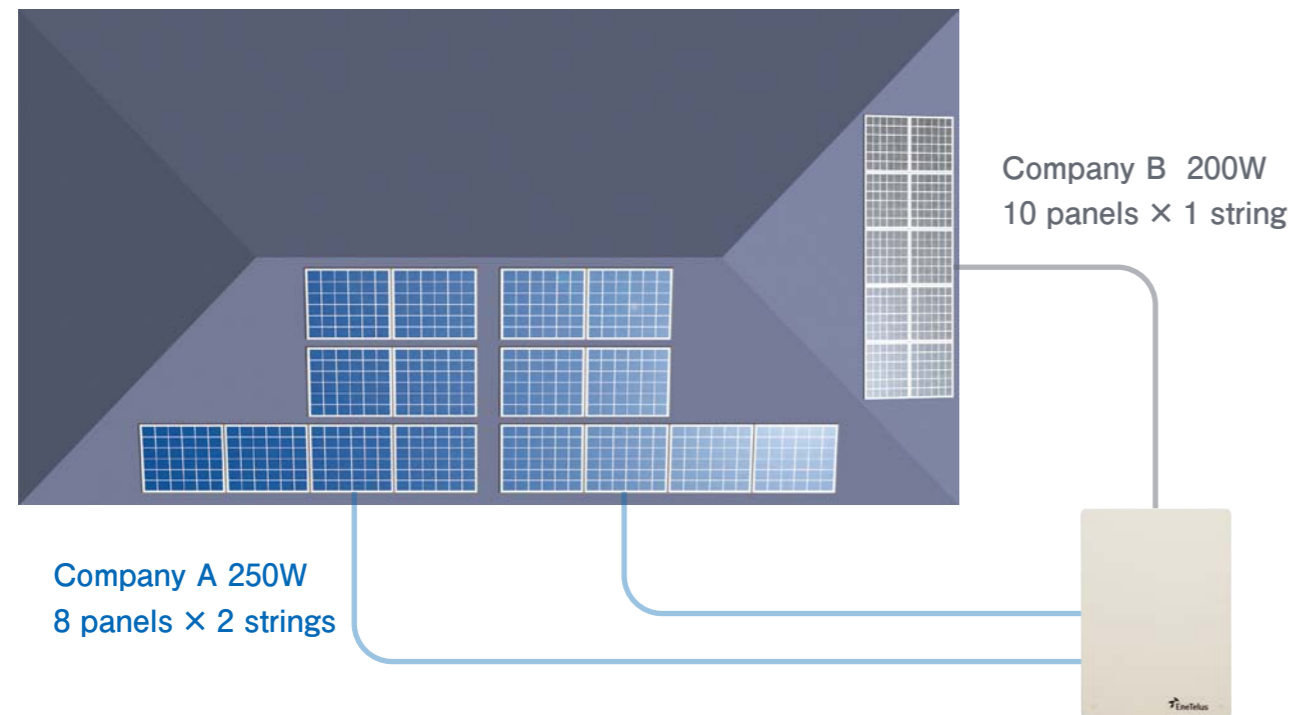


# Example of Installation Plan

(Residential home)

## Excess Power Export 5.5kW

When you have several roof areas facing to the south and the sizes of the installation areas vary, different types of panels can be used for each unit of strings.

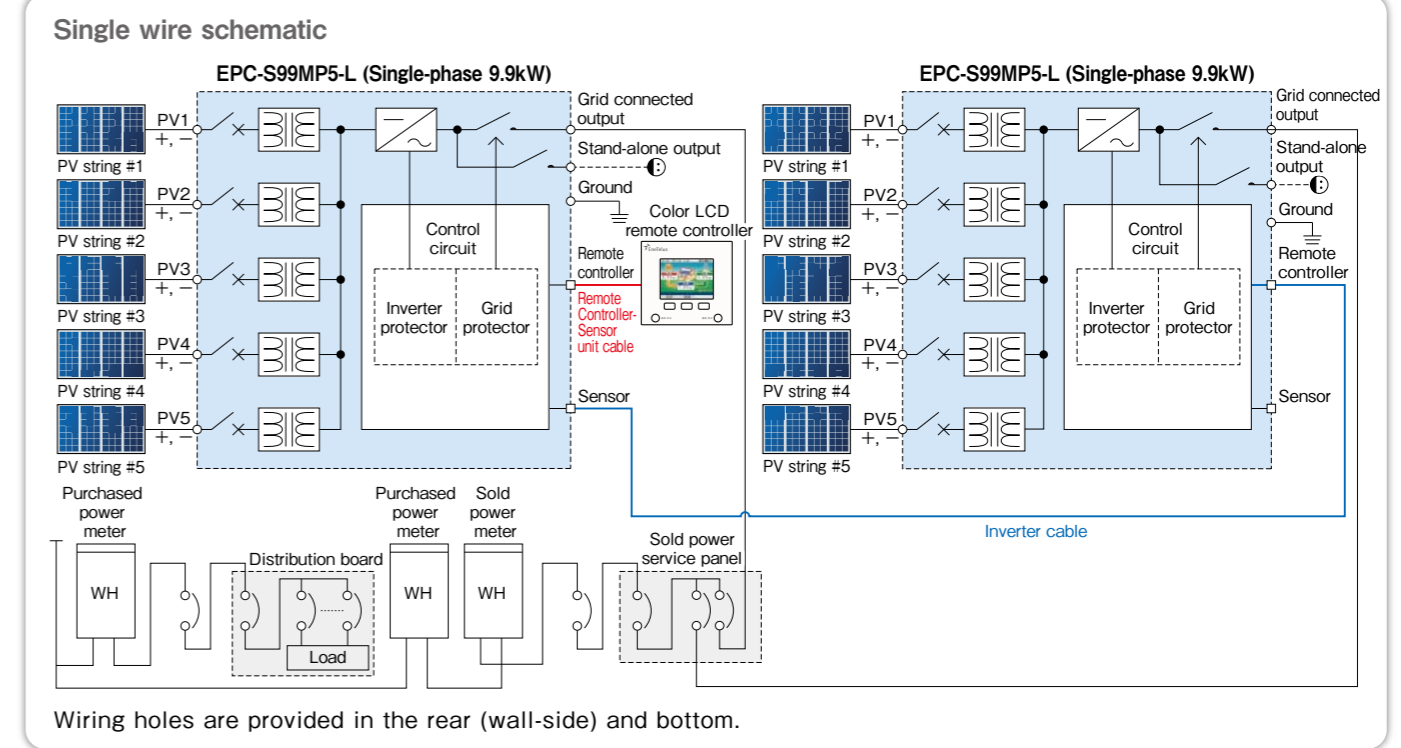
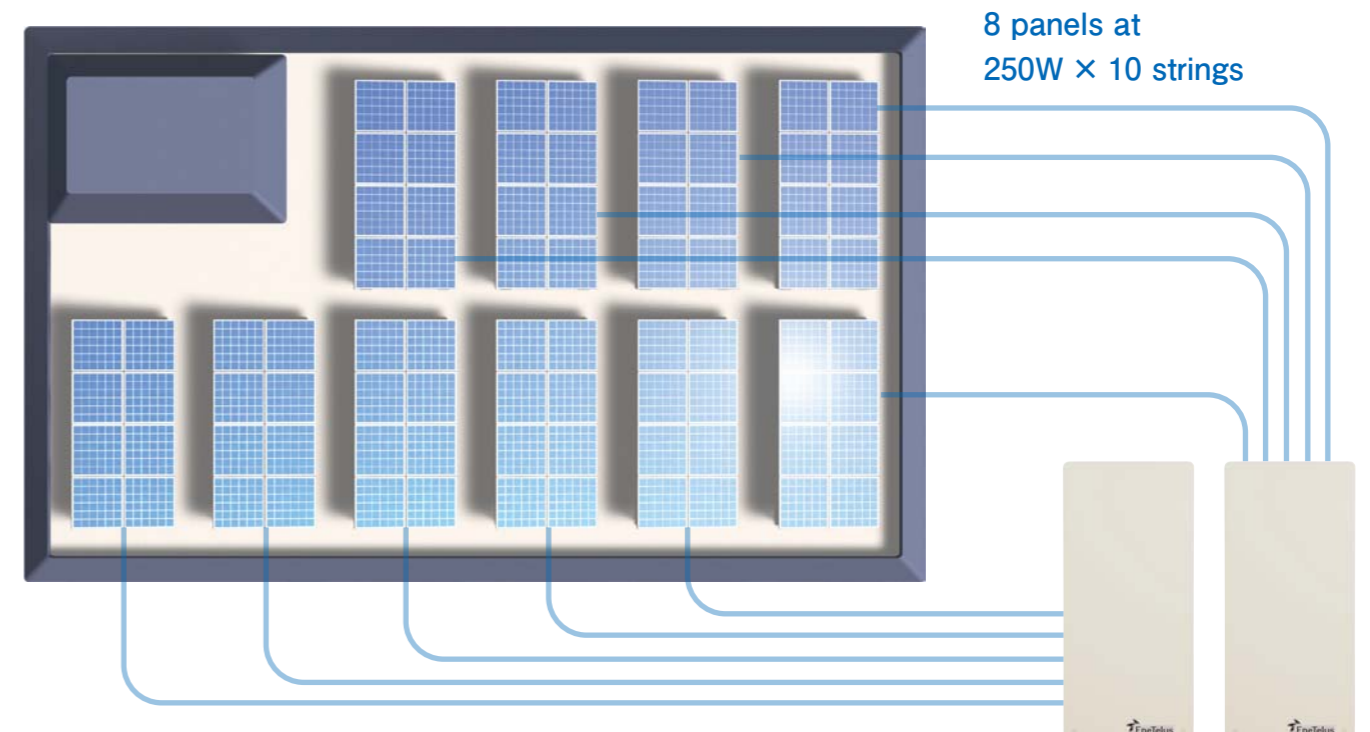


# Example of Installation Plan

(Apartment building)

## Total Power Export 17.9kW

Full amount electricity sales can be done when it is possible to install system more than 10kW or apartment buildings, etc. When using the EPC-S99MP5-L, it is possible to install a single-phase low-voltage system (under 50kW) by using 5 units.

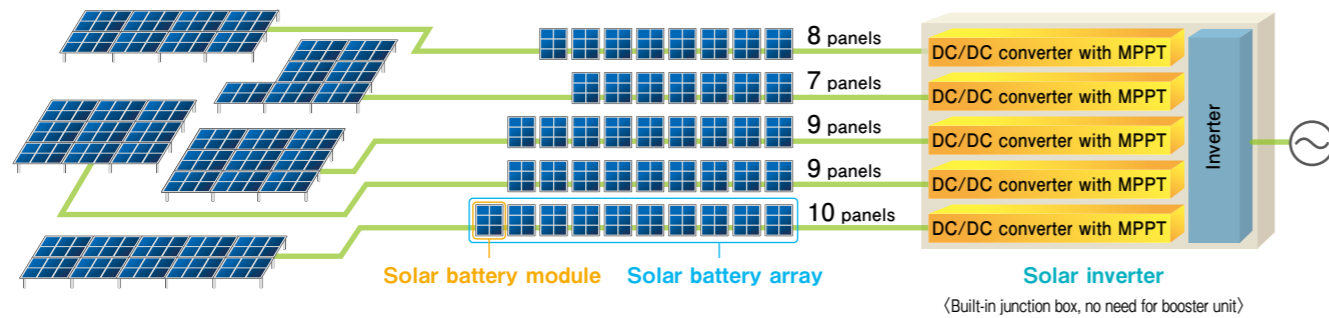


# String Sizing of PV Panels for Solar Inverters

## Basic approach

Solar inverters by EneTelus adopt the multi-string system. There is no need to equalize voltages between arrays.

### Multi-string system,



## Calculation method for the number of input solar battery modules (array configuration)

### 1 Approximate calculation from generation capacity

- Confirm the maximum input value per string on solar inverter. Generation capacity exceeding the maximum input value can be converted to the maximum input value only.
  - \*Under actual weather conditions, our generating criteria are 1.1-1.3 times of the maximum input values. (Varies according to the customer)
  - ※Since PV panel output may be lower depending on weather conditions, set the capacity of the solar inverter slightly over the generation capacity of the PV panels.
- Comparison of (module maximum output power × number of panels) and the maximum input value of the solar inverter

### 2 Basic method for calculating the number of series-connected solar battery modules -- based on voltage value

- Calculations are made from the solar inverter "MPPT voltage range," the "starting voltage," and the PV module specifications.
- Upper limit of panels that can be connected in series → Design the array voltage to be lower than the upper limit of the "MPPT voltage range."
  - Minimum required number of panels connected in series → Design the array voltage to be higher than the "starting voltage."
  - Upper limit of panels that can be connected in series →  $\frac{[\text{MPPT voltage range upper limit}] \times [\text{margin rate} 90\%]}{[\text{PV module no-load voltage}]}$  (rounded down to the nearest whole number)
  - Minimum required number of panels connected in series →  $\frac{[\text{starting voltage}] \div [\text{margin rate} 80\%]}{[\text{PV module maximum operating voltage}]}$  (rounded up to the nearest whole number)
- In case voltage drops due to the effects of shade and other factors, the required voltage may not be reached because it is calculated on outside temperature.
- ※1 Margin rate: For voltage rise due to low temperature ※2 Margin rate: For voltage drop due to high temperature

### 3 Basic calculation method for the number of panels connected in parallel for each string -- based on electric current value

- Upper limit of panels that can be connected in parallel:  $\frac{[\text{Maximum input current}]}{[\text{PV module short-circuit current}]}$  (rounded down to the nearest whole number)

## Sample Calculation

Solar inverter	EPU-T99P5-SFL
Maximum input power per string	2170W
MPPT voltage upper limit per string	570V
Starting voltage	150V
Maximum input current per string	10.3A

PV module (example)	
Maximum output	240W
No-load voltage	37.8V
Maximum output operating voltage	32.0V
Short-circuit current	8.5A

### 1 Recommended amount based on generation capacity

$2170W \div 240W \Rightarrow$  Recommended number of panels: 9 panels  
Under actual weather conditions, 10 panels are recommended (2400 W: 1.11 times), 11 panels (2640 W: 1.22 times) and so on.

### 2 Number in series

(Upper limit)  $550V \times 90\% \div 37.8V \approx 13$  (rounded down to the nearest whole number)  
(Lower limit)  $150V \div 80\% \div 32.0V \approx 6$  (rounded up to the nearest whole number)

### 3 Number in parallel

$10.3A \div 8.5A \approx 1$  (rounded down to the nearest whole number)

### 4 Sample calculation results

With a margin 1.11 times greater than the string's maximum input power under actual weather conditions, the recommended number of panels is a series of 10 panels (× 1 parallel) × 5 strings = 50 panels (input total: 12000 W). When limitations effect the installation location and the number of panels that can be installed, characteristics of the multi-string system can be used to design a system where 6-13 panels are connected in each string.

#### Note 1 Installation in cold areas

The calculation above is the basic method for determining the number of panels to connect in a series per string. In cold areas, there may be a significant rise in voltage due to the characteristics of the solar battery. (\*The "margin rate 90%" mentioned above was calculated by assuming voltage rises due to low temperatures). Please keep in mind both the minimum temperature that can be anticipated in the installation location and the temperature characteristics of the PV modules.

#### Note 2 Input into all strings is recommended

In order to attain the "rated output" of the solar inverters, all "DC/DC converters with MPPT" operations are needed. If there is a limit on the number of panels that can be connected, make sure to use all input strings

# Multiple Unit Installation Design

[EPU Series]



## EPU-T99P5-SFL / EPU-T250P8-FPL

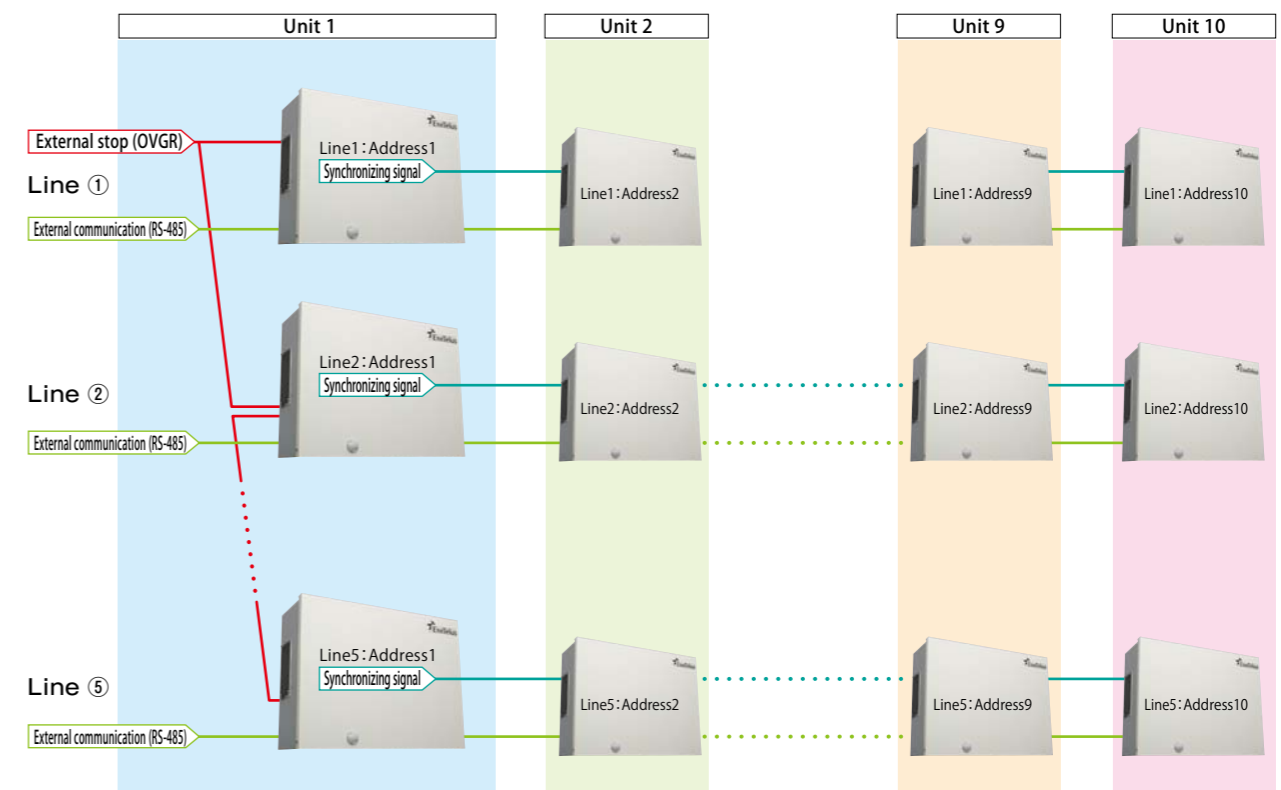
When you connect multiple units, the recommended configuration is master-slave control to ensure a highly reliable configuration. Data signal wiring will be needed when acquiring operating data. When designing with this product 30 units may be installed for data measurement and 32 units for the Master Box.

## Maximum number of unit that can be installed in a single system

In case of using EPU-T99P5-SFL, 30 units can be installed in case of data measurement and 32 units in case of master box use. In case of using EPU-T250P8-FPL, please use it with the Master-Box (necessary). Maximum number of connectible solar inverters for the EPU-T250P8-FPL is 32 units.

## 50 Unit Installation Design Example

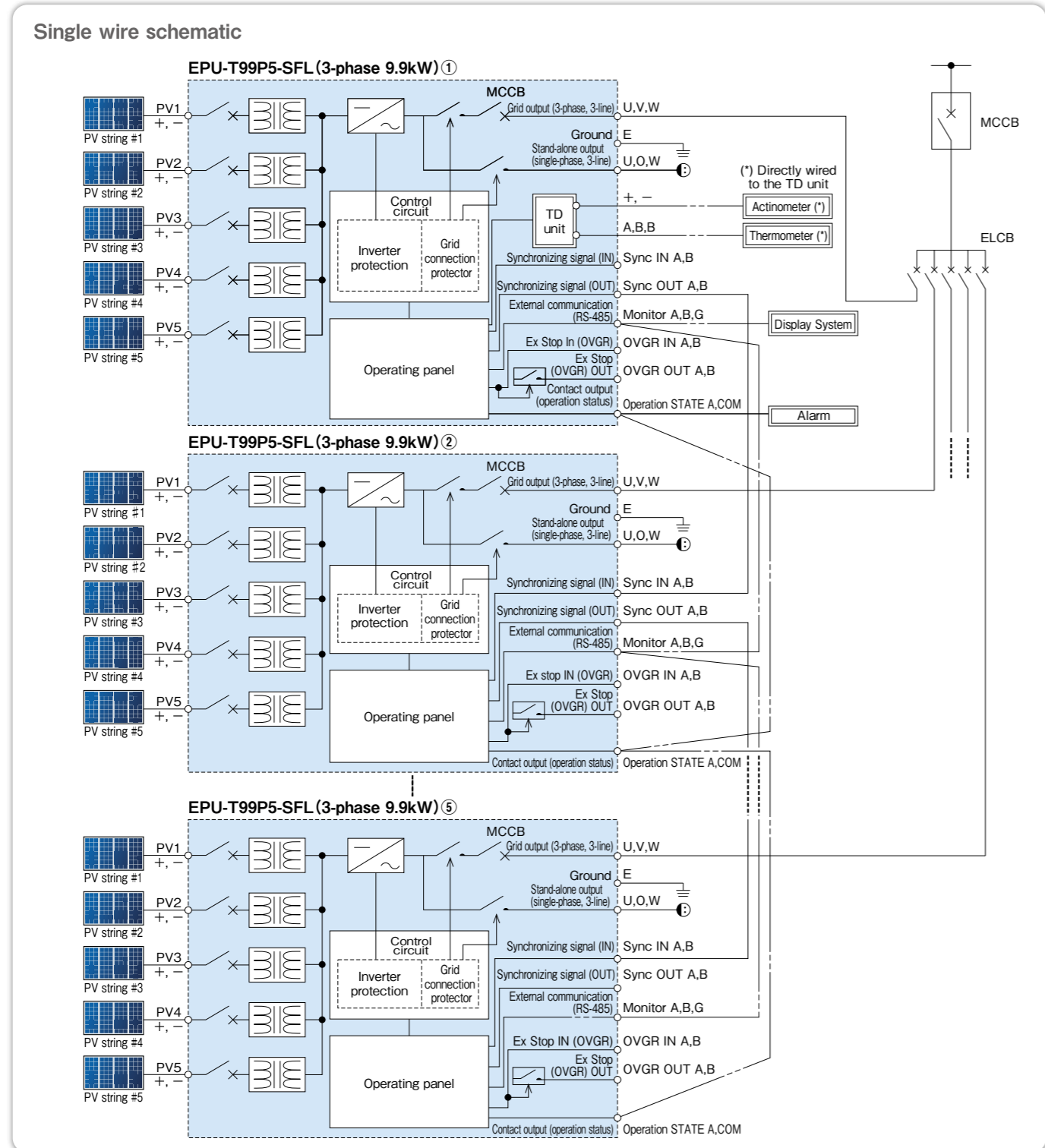
The system will be networked as 10 units per line × 5 lines. Each line will set the address as unit 1 to unit 10. OVGR will be lined to each UNIT1 (Host). The synchronizing signal form UNIT1 to all the units below will be daisy chain wired. Data measurements are carried out for each line.



# Example of Installation Plan (Industrial)

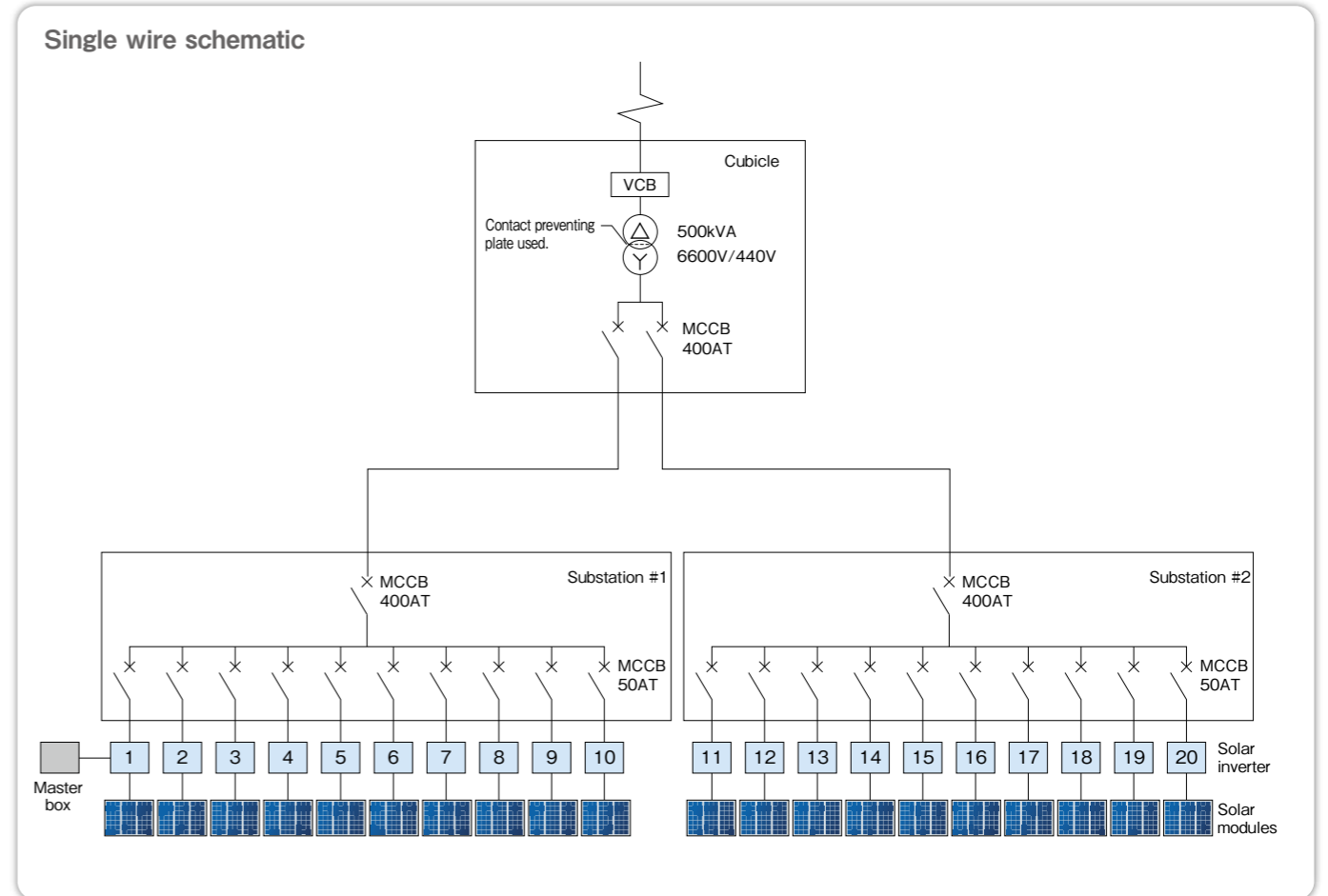
## 49.5kW Multiple Inverter Industrial Installation (FIT Project) (low voltage grid connection)

This system makes efficient use of available space because the inverter system is installed outdoors underneath the PV panels on the racking. The AC output of multiple inverters are combined at the utility grid connection.  
(Example of a distributed system using EPU-T99P5-SFL.)



## 500kW FIT Project (Designed with EPU-T250P8-FPL with High voltage grid connection)

When installing PV systems greater than 100kW, AC voltage drop may be controlled by installing 50-100kW substations with junction boxes and transformer cabinets that step the voltage up to a higher value.



### Advantages of installing multiple units

- ① Only one unit needs to be stopped for an inspection or when a malfunction occurs.
- ② Allows for incremental system monitoring and early detection of system problems.
- ③ AC can be converted close to the panel.
- ④ If ground faults occur, the system is safe because solar inverters are isolated.
- ⑤ Due to the application of MPPT Control for every 3.25kW, the system has a measure of shade tolerance.

### ⚠ Precautions!

- The schematics presented on pp. 50, 51, 54, 55 are examples of installation plans and do not constitute a guarantee that they will be valid under every circumstance.
- Customers should have qualified persons develop appropriate design plans for their transformer equipment.
- Due to regulations, the power company, and grid conditions, different equipment may be required. Design should be developed to conform with regulatory and other requirements.
- Outdoor installations may not be possible due to climate conditions, installation locations, and other factors.
- Installation in unstable locations can cause accidents. Do not install units in locations where they cannot be mechanically fastened down, or in locations where installation and inspection work is hard to perform.
- Please check the installation manual before the actual installation.

# Industrial Display Systems

## [Third-party vendors]

EneTelus solar Inverters are compatible with the following software systems and products. Please contact the companies listed below for more information.

### Supported models

\*Please contact each company for details of compatible models and number of units in advance.

EPC-A-S30P EPC-A-S55P	EPC-A-S49MP EPC-A-S55MP EPC-A-S55MP4 and all other EPC2.0 series
EPC-A-S30P-H EPC-A-S55P-H EPC-B-S80P	EPC-B-S80P-J EPC-B-S99P EPC-B-S99P-J

### Supported series

			Under development					Under development

## Field Logic Inc.

"For your measurement needs."  
Offering a variety of measurement systems to meet diverse needs.

Large display software

Providing our customers with diverse visualization options.

Clear object monitor

System flow monitor

Example of customized screen

Combined Management for Multiple Sites

Your operation and maintenance "buddy" for secure and stable remote monitoring.

Combined management of plural measurement sites

Customized grid diagram monitoring display

株式会社 フィールドロジック  
**Field Logic** TEL:(81)6-6446-2300 FAX:(81)6-6446-2500 URL:http://www.f-logic.jp/global/

## Laplace system Co., Ltd.

### Solar Link series

Real time monitoring and display for installed systems.  
Combines attractive presentation features with sophisticated monitoring capabilities.  
We make sure that our systems are easy to understand, providing you with the exact information you want.

Eye-catching new monitoring and display

Packed with functionality and expandability in a small form factor

Solar Link ZERO series

Supports data readings, displays, and connections to internal LAN systems.

For products that support remote monitoring Solar Link ZERO Terminal

Data can be viewed and downloaded from the Internet. Ideal for remote monitoring, string system monitoring, and will provide email notification when problems occur.

\*Optional large screen display for PR purposes.  
\*Monitoring for low voltage PV system available as well.

**Laplace System**

TEL: (81)75-604-4741(Direct connection to the Sales Dept.) FAX: (81)75-621-3665 URL: http://www.lapsys.co.jp/english/

EPC-S40MP2-L EPC-S49MP3-L EPC-S55MP3-L	EPC-S55MP4-L EPC-S99MP5-L and all other EPC2.0, PC3.0 series	EOU-A-MBX01 EOU-A-MBX01-L (Compatible with EPU-B-T99P series, EPU-E-T99P-SF, EPU-T99P5-SFL)	EOU-A-MBX03 (For EPU-C-T250P-FP)
EPU-B-T99P series EPU-E-T99P-SF EPU-T99P5-SFL		EOU-A-MBX02 (For EPU-C-T250P-S)	EOU-A-MBX03-L (For EPU-T250P8-FPL)

### Supported series

			Under development					Under development

## Onamba Co., Ltd.

### Monitoring system for low voltage grid connection PVU-Finder mini

- Cost performance for power plants where a large number of solar inverters are used  
When using the EPU-B-T99P series or EPU-E-T99P-SF, a maximum of 15u nits × 4 input solar inverters can be monitored.
- Capable of saving sting-by-string data  
The CSV string data saving function is wellsuited for Tabuchi solar inverters.

Top screen for solar inverter monitoring

Solar Inverter Generation Graph

Report screen

A maximum of 60 to 108 solar inverters (depending on the manufacturer and model) can be monitored at the same time. Solar inverters are denoted by color in the Solar Inverter Generation Graph to allow customers to check the generation status of each inverter.

**ONAMBA** Access to the Future TEL:(81)6-6976-7401 FAX:(81)6-6976-6100 URL:http://www.onamba.co.jp/english/index\_e.html

## CONTEC CO., LTD.

### Cloud Service with 3G line Monitoring package SolarView® Air

It is a all in one package for monitoring system. By using this system customers can monitor multiple systems from single site.  
The package includes, measuring unit and 3G router as turn key system with competitive price.

**For small to middle scale PV system (With 3G line)** Any where which has 3G signal can be the installation site. Maximum of 20 sites could be monitored remotely. It includes automatic e-mail alert which activates whenever the PV has problem.

Commercial PV system

PV farms

Maximum 20 PV sites can be monitored. Monitoring

Cloud Service (Running cost 24,000 JPY/Year)

E-mail notice

Monitoring detail

Detail with graphs

Operation history

Summary of PV system

**CONTEC** TEL:(81)6-6477-7861 FAX:(81)6-6478-1031 URL:http://www.contec.com

# Industrial Display Systems

[Third-party vendors]

EneTelus solar Inverters are compatible with the following software systems and products. Please contact the companies listed below for more information.

**Supported models**  
\*Please contact each company for details of compatible models and number of units in advance.

<b>EPC 1.0</b>	EPC-A-S30P EPC-A-S55P	<b>EPC 3.0</b>	EPC-A-S49MP EPC-A-S55MP EPC-A-S55MP4 and all other <b>EPC2.0</b> series
<b>EPC 2.0</b>	EPC-A-S30P-H EPC-A-S55P-H EPC-B-S80P	<b>EPC-B-S80P-J</b> <b>EPC-B-S99P</b> <b>EPC-B-S99P-J</b>	

<b>EPC 4.0</b>	EPC-S40MP2-L EPC-S49MP3-L EPC-S55MP3-L	<b>EPC-S55MP4-L</b> <b>EPC-S99MP5-L</b> and all other <b>EPC2.0</b> , <b>PC3.0</b> series	<b>MBX T99P</b>	EOU-A-MBX01 EOU-A-MBX01-L (Compatible with EPU-B-T99P series, EPU-E-T99P-SF, EPU-T99P5-SFL)	<b>MBX T250PF</b>	EOU-A-MBX03 (For EPU-C-T250P-F)
<b>EPU T99P</b>	EPU-B-T99P series EPU-E-T99P-SF EPU-T99P5-SFL		<b>MBX T250PS</b>	EOU-A-MBX02 (For EPU-C-T250P-S)	<b>MBX T250PL</b>	EOU-A-MBX03-L (For EPU-T250P8-FPL)

## Kinkei System Corporation

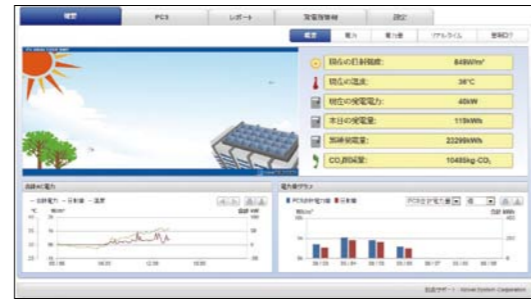
### Monitoring System SWF830/850/870

The system detects major failures and minor error codes as well. Three monitoring products are available to meet all customer needs.



**Supported series**

EPC 1.0 EPC 2.0 EPC 3.0 EPC 4.0 EPU T99P MBX T99P MBX T250PS MBX T250PF MBX T250PL



Overview



Inverter status

**株式会社 近計システム** TEL:(81)6-6613-2591 FAX:(81)6-6613-2592 http://www.kinkei.co.jp/en/index.html

## Digital-Core Co., Ltd.

### Nanako

- Errors of the system will be immediately reported by e-mail. Moreover, the data gathered could be downloaded with sorting function. With the conspicuous display, customers could see the information right a way.
- Unlimited number of Inverters and Master Boxes allowed.
- PR displays can be generated on the user interface.



Main screen



TEL:(81)43-232-2266 FAX:(81)43-232-6077 URL:http://www.digitalcore.co.jp

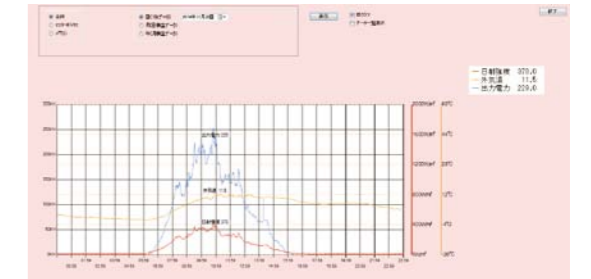
**Supported series**

EPC 1.0 EPC 2.0 EPC 3.0 EPC 4.0 EPU T99P MBX T99P MBX T250PS MBX T250PF MBX T250PL

Under development

項目	機種	種別	内容	開発時期	開発状況	
正器PCSW	1	12	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	10	007	OV保護	2014.08.07.08.23.01	開発済み
正器PCSW	1	9	006	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	3	047	DC Vc 4 ストップ異常	2014.08.07.08.23.01	開発済み
正器PCSW	1	5	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	11	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	12	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	3	047	DC Vc 4 ストップ異常	2014.08.07.08.23.01	開発済み
正器PCSW	1	10	007	OV保護	2014.08.07.08.23.01	開発済み
正器PCSW	1	19	007	OV保護	2014.08.07.08.23.01	開発済み
正器PCSW	1	12	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	5	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	10	007	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	11	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	11	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	3	047	DC Vc 4 ストップ異常	2014.08.07.08.23.01	開発済み
正器PCSW	1	5	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	19	007	OV保護	2014.08.07.08.23.01	開発済み
正器PCSW	1	11	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	12	008	標準モニタ画面	2014.08.07.08.23.01	開発済み
正器PCSW	1	3	047	DC Vc 4 ストップ異常	2014.08.07.08.23.01	開発済み
正器PCSW	1	9	006	標準モニタ画面	2014.08.07.08.23.01	開発済み

Multifunction / Warning screen

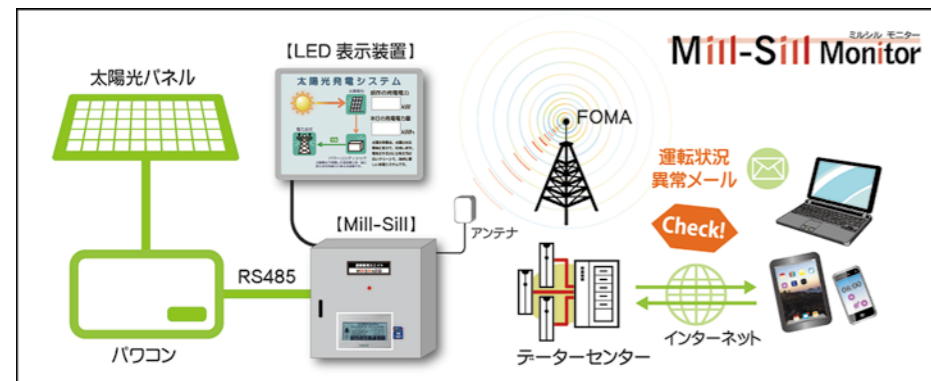


Solar generated power per string

## TOKAI EC co., ltd.

### Mill-Sill Monitor

The monitoring components, for example, LED display, control unit, connect to the solar inverter. This system is capable of networking 5 inverters or 5 groups of 6 solar inverters (30 inverters). Reports operational status or errors via email. Compatible with smartphones, tablets, or PC.



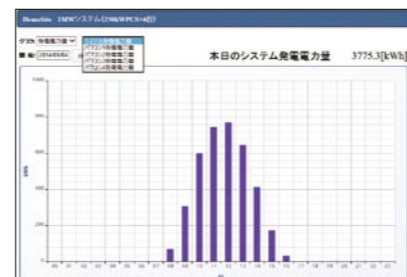
**Supported series**

EPC 1.0 EPC 2.0 EPC 3.0 EPC 4.0 EPU T99P MBX T99P MBX T250PS MBX T250PF MBX T250PL

Under development    Under development    Under development



Main screen



Generation amount for one day

**TOKAI EC CO.LTD.** TEL:(81)52-859-1400 FAX:(81)52-859-1401 URL:http://www.tokaiec.co.jp

## EKO Instruments Co., Ltd.

### Smart monitoring system

- The cloud server is capable of storing and monitoring information from multiple PV sites. This service also includes e-mail notification when PV system errors occur.
- The data logger is capable of monitoring up to 60 solar inverters and multiple meters as well.
- Compatible with Master-Box. Ideal for distributed Middle and Mega solar systems.
- Calculates estimated solar generation based on the temperature of the site and standard hardware set-up. Then, that data is compared with actual generation data to generate the operation efficiency.
- Generation per inverter, daily, weekly, and monthly generation data, and generation analysis is available. Reports can be generated for all of the aforementioned data.

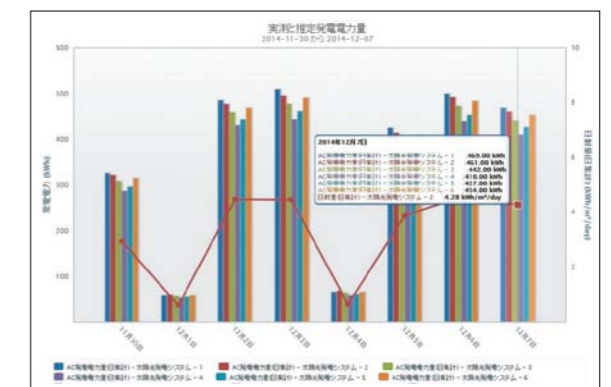
**Supported series**

EPC 1.0 EPC 2.0 EPC 3.0 EPC 4.0 EPU T99P MBX T99P MBX T250PS MBX T250PF MBX T250PL

Under development    Under development    Under development



Overview



AC energy of inverters and solar irradiance

**EKO INSTRUMENTS CO., LTD.** TEL:(81)3-3469-6714 FAX:(81)3-3469-6719 URL:http://eko-eu.com

# Renewable Energy Research Center

We established a Renewable Energy Research Center in 2011 at Tabuchi Denshi Kogyo (Otawara-shi, Tochigi), our solar inverter manufacturing location. The Renewable Energy Research Center studies the characteristics of products designed for the energy field from a variety of angles and conducts demonstration testing. We have also completed construction of a "Smart House" testing facility at the Center. The "Smart House" makes the most efficient use of electricity in the home. Using this facility, we have begun joint development efforts with home builders on HEMS (Home Energy Management System). To provide our customers with dependable and safe products, we do our utmost to perform comprehensive system evaluations.



PV solar farm in Tabuchi Denshi Kogyo



The system is located on top of the parking lot. The capacity of the system is 500kW. The purpose of this system is to prove the advantages of using our Multi-String-Inverter in distributed PV system. The testing and monitoring is on site today.

## 20kW PV generation



Acquisition of data comparing generation characteristics between multi-string solar inverters and central system solar inverters. Data analysis on the effect of panel deterioration on the solar inverter over time and differences in generation capacity associated with environmental change and long-term operation.

## Full range of environmental assessment apparatus

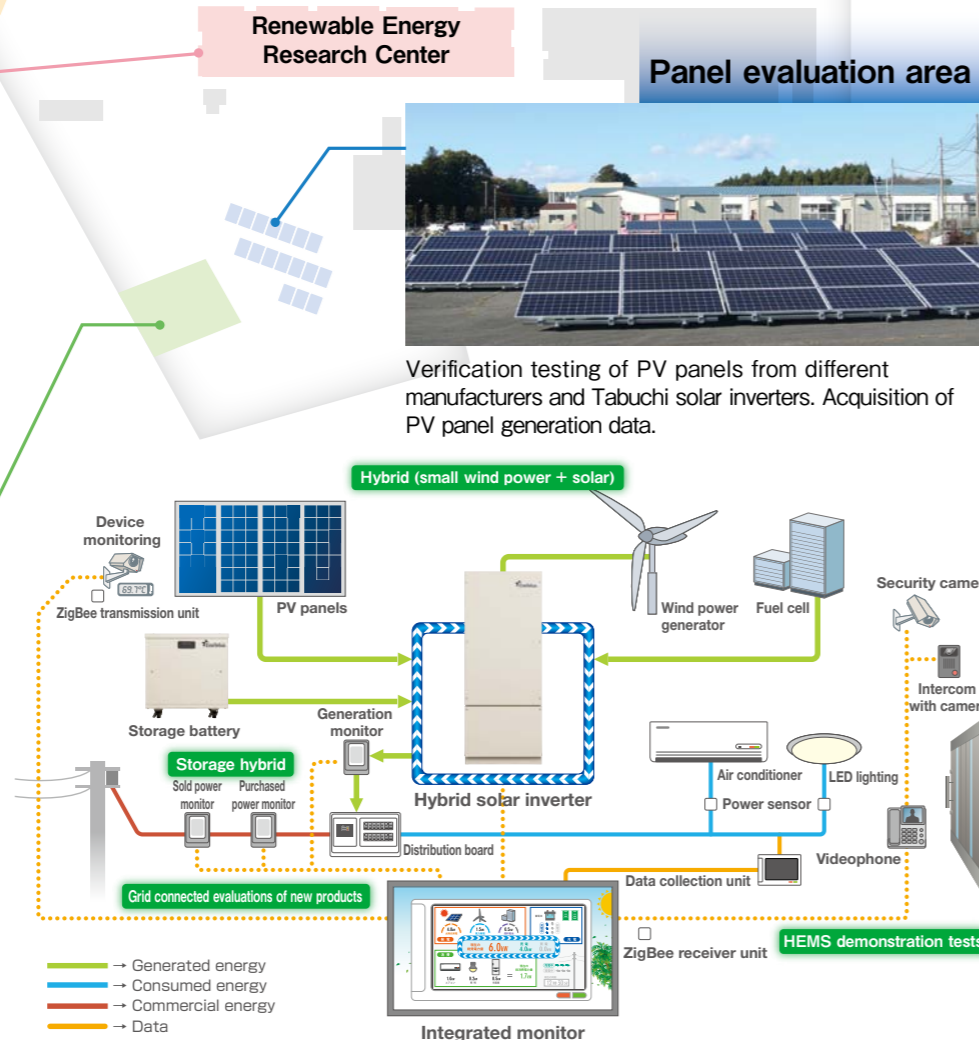


Implementing a full range of dustproofing, waterproofing, drop testing as well as environmental tests under harsh conditions, including high temperature and high humidity environments.

## Smart House



Here we collect demonstration test data to deal with the kinds of issues associated with the effective use of alternative energy sources, including solar and small wind generation, fuel cells, and secondary batteries, as well as home energy conservation and electric power peak-cutting strategies.



## Renewable Energy Research Center

## Panel evaluation area



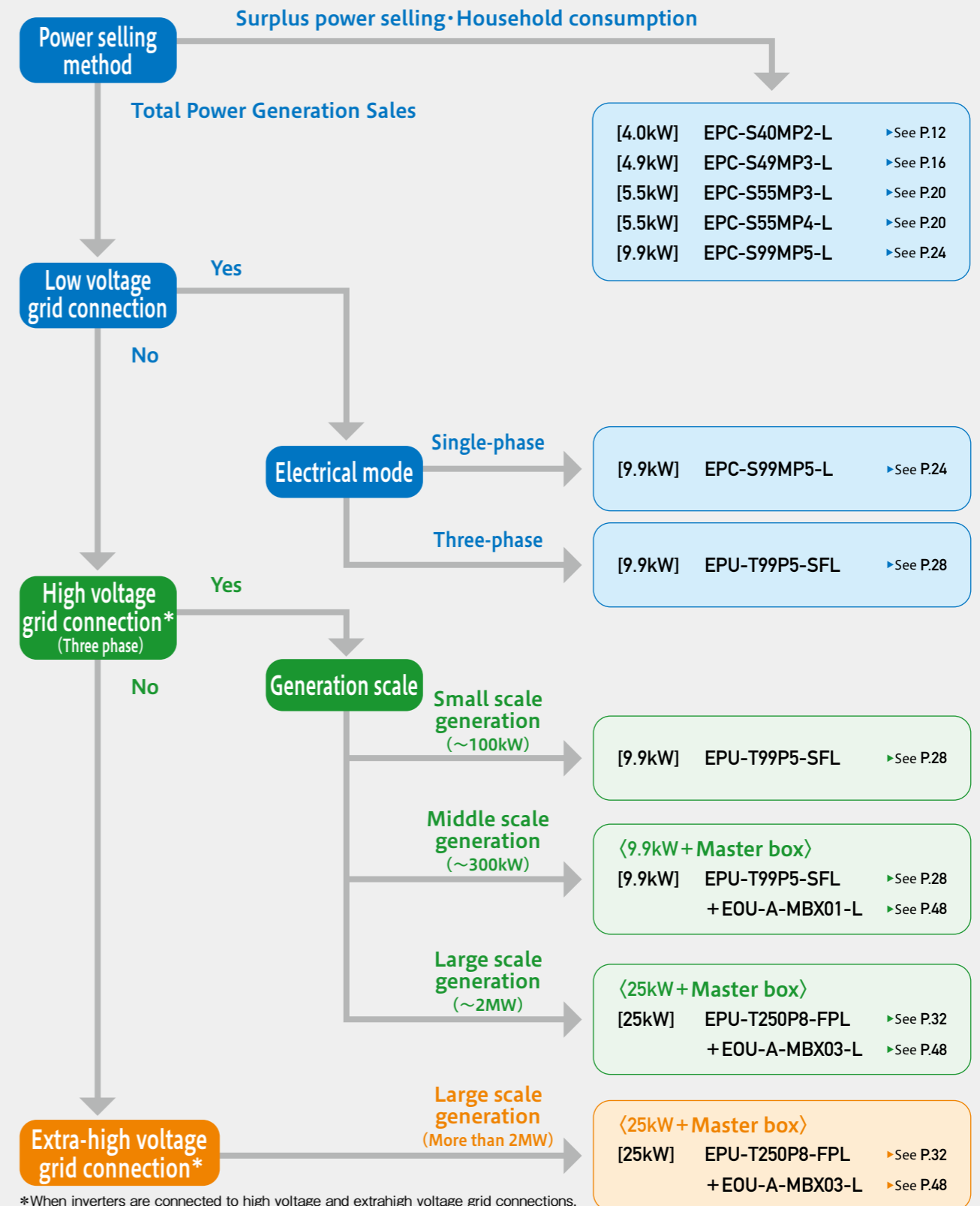
Verification testing of PV panels from different manufacturers and Tabuchi solar inverters. Acquisition of PV panel generation data.

# Solar Inverter Selection Process



## Selecting the optimal solar inverter

When selecting solar inverters, remember that facilities vary depending on the power selling method and the electrical mode of the grid connection point. Please refer to the following flow chart to select the optimal solar inverter for your needs.



\*When inverters are connected to high voltage and extrahigh voltage grid connections, electrical transmission and distribution systems other than inverters are necessary.



## Frequently Asked Questions

- 1 Q: What is the maximum number of solar inverters that can be installed?**  
**A:** See p.47 for single-phase solar inverters, and p.53 for three-phase solar inverters.
- 2 Q: What precautions need to be followed when installing solar inverters in a row?**  
**A:** For singlephase inverters, air is taken in from the bottom of the unit and released from the top, line units up horizontally.  
 For threephase 9.9kW inverters, air is taken in from the right and released from the left, line units up vertically or make sure there is sufficient space between units. For three-phase 25kW inverters, there is no cooling fan. Be sure to leave enough space for work and ventilation.
- 3 Q: Can I use cables other than those provided by Tabuchi to wire the units?**  
**A:** Do not use cables other than those provided by Tabuchi for the EPC Series remote controller or for connecting the solar inverters.  
 Regarding the type of cables please refer to p.64.  
 Please procure the cables that are specified for the EPC Series.
- 4 Q: Tell me about the standby power values for the solar inverters?**  
**A:** This information is provided in the specifications tables for each model.  
 Although the maximum power consumption of the remote controller is 4W, power is supplied by the solar inverter, and this includes the standby power of the solar inverter.  
 The maximum power consumption of the sensor unit is 2W. The sensor unit is powered directly by the service panel.
- 5 Q: I would like to install weather sensors (insolation meter, thermometer).**  
**A:** Three-phase inverters can incorporate weather sensor data by using the optional transducer unit. Weather sensors cannot be incorporated into the single-phase inverters.  
 Regarding the usage of transducer please refer p.49.  
 Please use a separate measurement system or data logger.
- 6 Q: Is a sensor unit required?**  
**A:** Sensor units acquire data on the amount of power bought and sold. If you have a contract to sell excess power, you will not be able to display the amount of power sold accurately without a sensor unit.  
 A sensor unit is not needed when selling all the power generated by the system.
- 7 Q: What will happen if I connect the system to solar cell modules that have voltage or current that exceeds the values listed in the catalog?**  
**A:** For current that exceeds the maximum input current: Although this will not cause a malfunction, only the maximum input current will be input.  
 For voltage that exceeds the maximum input voltage: Malfunctions may occur. Do not exceed the maximum input voltage under any circumstances. (see p.52)
- 8 Q: Tell me about grid connection procedures and equipment certification.**  
**A:** Please inquire with your local power company about grid connection procedures, and ask your local Bureau of Economy, Trade, and Industry for information about equipment certification.  
 Tabuchi Electric includes all the necessary solar inverter documentation needed for your application.
- 9 Q: Can a Tabuchi Electric representative be present when grid connections are being made?**  
**A:** We ask that our customers and installers be present when grid connections are made.
- 10 Q: Is a controlled power supply necessary for the nighttime?**  
**A:** A separate controlled power supply is not necessary because standby power is supplied by the Grid.
- 11 Q: Can I adjust the cable for Remote Controller, Inverter, or Sensor Unit for own use?**  
**A:** Please Do-Not extend or shorten the "Inverter cable" / "Remote controller-Censor cable" by connecting an another cable or by cutting it.  
 (Please follow the installation manual for further detail.)

### To ensure long-term safe operations

- High voltage is applied to the solar inverter. Be sure to read the manual carefully and use the solar inverter properly.
- We do not guarantee and will not repair solar inverters that have malfunctioned due to improper use that does not conform with the user manual, installation manual, precautions, etc.
- Maintenance is necessary to ensure long-term use of the solar inverter.
- Information and product specifications in this catalog may be changed without notice.
- Installation work should be performed by qualified personnel.

## Explanation of EneTelus Terminology

### Multi-string system

A string of multiple PV modules that are interconnected.  
 Tabuchi Solar Inverters have multiple builtin DC/DC converters for creating capacity.  
 Since the DC/DC converter has a voltage booster function, generation loss is controlled because there are strings for each panel direction.

### Maximum Power Point Tracking (MPPT) system

This is a control feature that allows DC/DC converters to extract the maximum output voltage from the power that is the mathematical product of the voltage and current from the solar cells. In operating PV systems, it is important to track the maximum power point consistently relative to solar cells that have a variety of characteristics.

### Stand-alone operation

Standalone operation serves as an emergency electric power source during a power failure. When PV panels are not generating electricity, this mode cannot be used. Also, please use a special outlet for stand-alone operation. Do not use other outlets. During a power failure, switch to the "Stand-alone operation Mode" according to the instruction manual. ※After power is restored, manually switch to "Grid-connected Operation Mode".

### JET certification

Certification received from the Japan Electrical Safety & Environment Technology Laboratories (JET), an independent organization. JET-certified solar inverters allow power companies to streamline procedures.

### Islanding operation prevention

Commercial power supplies may be interrupted due to power outages or other incidents on the grid-side (power company). When this happens, islanding operation prevention prevents the reverse flow of current. The purpose of this feature is to prevent maintenance personnel from being injured by lines that are not supposed to be energized due to a power outage.

### FRT Compliance in Japan

In order to prevent the excess backflow of power to the Grid, our inverters have a function that stops the entire system whenever there are problems with the Grid, which complies with FRT certification in Japan and prevents islanding.

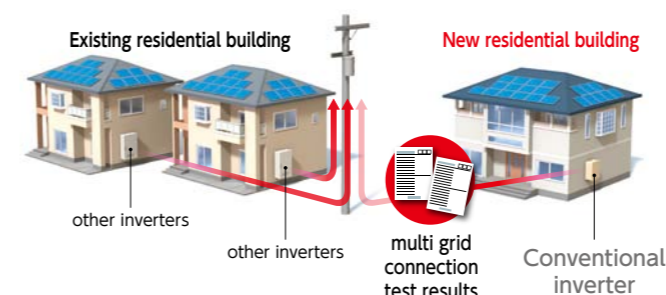
### Multi-Grid-Connection-Certified inverter

In Japan, when multiple inverters are installed, additional documents regarding islanding function must be submitted to the power company. The Multigrid Connection Certified Inverter eliminates the need to submit additional documents, simplifying the process.

### The Multi-grid Connection Certified Inverter Advantage

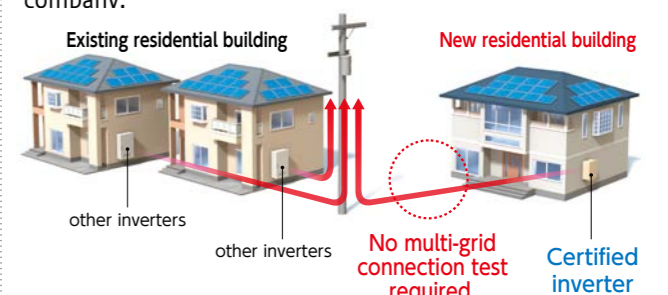
#### Existing product

These products require "multigrid connection test results" to be installed in residential areas.











#### Multi grid connection certified inverter

"Multi grid connection test results" are not required. Our inverter dramatically decreases installation time because test results do not have to be submitted to the power company.



## Accessories/Options

Product	Model name	notes
<b>LCD remote controller for single-phase solar inverter</b> 	Switching selling contract setting of surplus and full amount power <b>ZREM-35ENP01</b>	*For more details, refer to p.46.
Please get it with the single-phase-inverter as a set.		
<b>Solar inverter connector cable (Exclusive goods)</b> 	Cable between inverters (3m) <b>ZC-PP03B</b> Cable between inverters (10m) <b>ZC-PP10B</b> Cable between inverters (20m) <b>ZC-PP20B</b>	*Compatible with single-phase solar inverters *Order production *Compatible with single-phase solar inverters *Compatible with single-phase solar inverters
Please get it with the single-phase-inverter as a set.		
<b>Remote controller/Sensor connector cable (Exclusive goods)</b> 	Remote controller/Sensor connector cable (10m) <b>ZC-RS10B</b> Remote controller/Sensor connector cable (15m) <b>ZC-RS15B</b> Remote controller/Sensor connector cable (20m) <b>ZC-RS20B</b> Remote controller/Sensor connector cable (30m) <b>ZC-RS30B</b> Remote controller/Sensor connector cable (50m) <b>ZC-RS50B</b>	*Compatible with single-phase solar inverters *Order production *Compatible with single-phase solar inverters *Compatible with single-phase solar inverters *Compatible with single-phase solar inverters *Compatible with single-phase solar inverters
Please get it with the single-phase-inverter as a set.		
<b>Sensor unit (with current sensor)</b> 	Sensor unit (with current sensor) <b>OR536EMKEIKI-C</b>	*Compatible with single-phase solar inverters
<b>Bottom cover</b> 	For single-phase 4.0kW/ 5.5kW solar inverter <b>EOC-BCV-Z50</b> For single-phase 9.9kW solar inverter <b>EOC-BCV-Z55</b>	*For more details, refer to p.8. *Order production *For more details, refer to p.8. *Order production
<b>Master box</b> 	For three-phase 9.9kW solar inverter <b>EOU-A-MBX01-L</b> For three-phase 25kW solar inverter <b>EOU-A-MBX03-L</b>	*For more details, refer to p.48. *For more details, refer to p.48.
<b>Super master box</b> 	For three-phase 9.9kW solar inverter <b>EOU-A-SMB01-L</b>	*For more details, refer to p.49.
<b>Transducer unit</b> 	For three-phase 9.9kW solar inverter <b>EOU-A-TDU01</b>	*For more details, refer to p.49.

