First Silicon

SolpoMax®

(Power Optimizer)

Installation Manual

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Contents

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS – This manual contains important instructions for Models __SolpoMax_FS600A__ that shall be followed during installation and maintenance of the _SolpoMax__FS600A_.

1. Precautions for safety

○ Safety precautions must be observed to prevent accidents or dangers, so that the product can be used safely and correctly.

○ Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

○ Precautions are divided into 'Warning' and 'Caution'. The meanings of **'Warning'** and **'Caution'** are as follows.

WARNING: Potential injury or death may result from violating instructions

CAUTION: Potential for minor injury or damage to the product from violating the instruction.

Is a 'symbol' for caution when there is a danger of electric shock under certain conditions.

○ To use SolpoMax® safely, please read the Instruction manual carefully before use, and keep it in a place where other users can see at any time.

Warning

○ Never operate SolpoMax® with the front cover open. Exposed high voltage terminals or charging parts may cause electric shock.

○ Do not touch SolpoMax® while the output power (AC grid power) is turned on. It may cause product damage or electric shock.

○ Even if the power is not on, do not open the front cover except for regular inspections. There is some charged voltage inside SolpoMax® for a while even if the power is cut off, which may cause electric shock.

○ When wiring or performing periodic inspections, turn off the inverter over 10 minutes and check the DC voltage of SolpoMax® has been discharged by measuring equipment such as a multi-tester (VOM).
Otherwise, it may cause electric shock.

○ Do not use if the electric cable covering is damaged. It may cause electric shock.

○ Do not put heavy objects on the cable. This can damage the cable sheath and it may cause electric shock.

Caution

○ Do not install near flammable materials. Installation on or near flammable materials may cause a fire.

○ Turn off SolpoMax® input (solar panel) and output power (AC grid) before working on SolpoMax®. If not, may cause electric shock or fire due to secondary accidents.

○ Inside of SolpoMax® is hot, so when it is working or even for a certain period of time after the power is turned off, be careful when you touch it.

○ Do not turn on power to a SolpoMax® that has been damaged on products or in components, even if installation is completed. It may cause electric shock.

○ Do not allow foreign objects such as metal, water, or oil to enter inside SolpoMax®. It may cause fire.

Precautions for Use

(1) Transport

○ Carry it in the proper way according to the weight of the product and take "fragile" care.

○ Please check the appearance of product, if there's any abnormality.
○ Do not store up more than the limited regulations. (under 5-layer loading)
○ Be aware of the strong impact or dropping since SolpoMax® is a precision device.

(2) How to use

○ If the operating voltage is higher than the starting voltage(10Vdc), it starts operation automatically. And the operation automatically stops if the operating voltage is lower than the starting voltage.
○ If the fault is reset, SolpoMax® will be restarted after 5 seconds of waiting time.
○ Do not disassemble or modify the inside of the product.
○ Reset the parameter will automatically change the parameter value to the factory outgoing initial level.

(3) Actions in abnormal occasion

○ If SolpoMax® is damaged and becomes out of control, please contact us as soon as possible and stop the operation until getting solution.

(4) Maintenance check and parts replacement

○ Do not use a Mega tester (insulation resistance meter) to SolpoMax® control circuit.
○ Refer to Chapter 6 for inspection.

(5) Disposal

○ Please dispose it as general industrial waste.

(6) General

○ Sometimes the picture shown in this installation manual is described without the front cover for detailed explanation. However, when operating the product, be sure to install the front cover and then follow the manual process.

Precautions in installation

(1) Installation of SolpoMax®

○ Install it according to the instructions in manual.
○ Install it on the structure of frame of solar panel, if possible.
○ Install it no direct sunlight place.
○ Install it over 150cm height from the ground.
○ Only electric technicians should perform installation work.
○ Do not place heavy objects on it.
○ Do not spray or place nearby flammable materials on it.
○ Please follow the install direction in manual.
○ Do not drop it or give strong impact.
○ Install it on the structure of steel frame grounded of Class 3 or above.
○ Do not use other home appliances nearby it. Abnormality or noise may occur.
○ Before install it, you should turn off the inverter, first. After installing it, turn on the inverter. Otherwise, it may be damaged or malfunction, resulting in an accident.

(2) Wiring

○ A wrong terminal connection may cause damage to SolpoMax®.
○ Pay attention to the terminals of (+/-) polarity when connecting the DC connector. Be sure to check the installation manual.
○ When installing SolpoMax®, pay special attention between power line and grounding cable when connecting the AC connector.
○ After installing SolpoMax®, perform wiring connection (connector).
○ Only qualified technicians should perform wiring work and checks.

(3) Adjustment for trial run

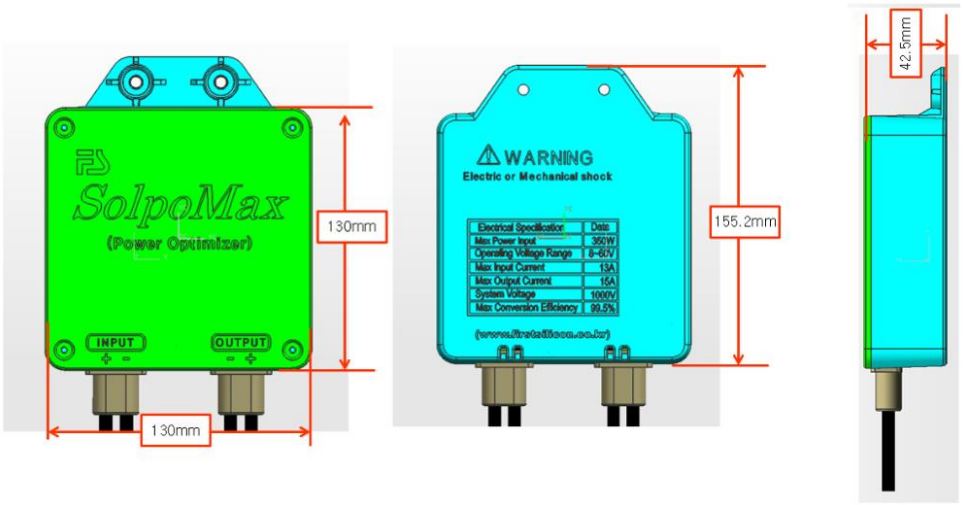
○ Check various setting values before operation.

2. Product Overview

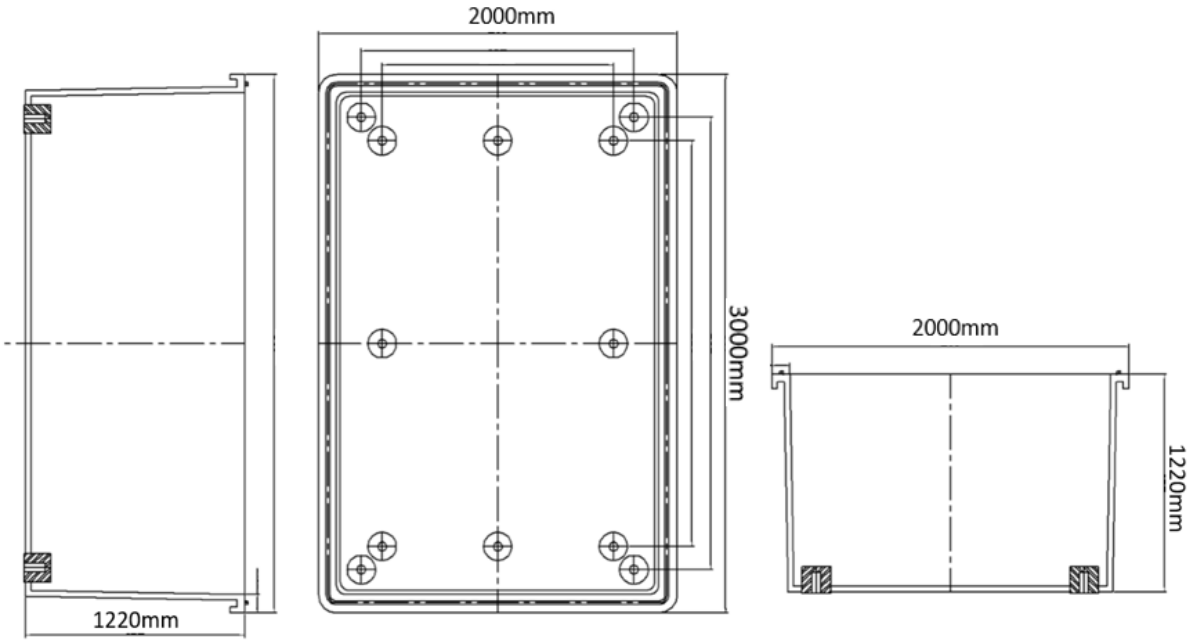
2.1 Basics Information

2.1.1 Product appearance

(1) SolpoMax®



(2) Gateway



2.1.2 Identification of Product

Remove the packing box of SolpoMax® , check the nameplate on the side of the main unit, the product type and output rating match the product ordered. Also check for any damages during transportation.

(1) SolpoMax®

FS600

Character	Description	Character	Description
FS	Firstsilicon SolpoMax	600	Rated Input DC Power (W)

(2) Gateway

FG100

Character	Description	Character	Description
FG	Firstsilicon Gateway	100	Allowed wireless devices

If there are any missing accessories such as operation and installation manuals, Input(DC)- and Output(AC)-connectors, or the product is damaged, please contact us.

2.1.3 Preparation of Equipment and Parts for Operation

Preparations for operation vary depending on the installation site, so prepare the necessary parts (e.g. Multi-tester for checking voltage and wiring, power tool for setting on structure frame, etc.).

2.1.4 Installation

In order to prevent SolpoMax® lifespan or performance deterioration, install it avoiding direct sunlight, considering the installation location, direction, and surrounding space.

2.1.5 Wiring

Refer to "3.3 Installation & Connection Terminal Diagram" for terminal part of main power line.

2.1.6 Product Features

(1) Increment of solar power generation

○ With shade : The amount of power generation increases up to 10 ~ 30% than the total amount of photovoltaic power reduced due to shading.

○ Without shade : Power generation increases by reducing the effect of performance deviation or aging of each panel (20-year average: 5 ~ 10%)

○ Real-time monitoring with PC / Mobile Phone, immediate repair can increase the power generation.

(2) Easy O&M(Operation & Maintenance)

○ Using wireless communication system, each module's real-time power generation status monitoring is possible and reduce maintenance costs.

○ Monitoring is possible for module failure, degradation, under-standard, etc.

○ Quick checking is possible for failure diagnosis & location with the internal intelligent control program.

(3) Improved convenience

○ Different model's or company's panels can be connected to one string.

○ It can be installed in a place with partial shading, so space utilization is high.

(4) Improved safety

○ Wireless communication system enables remote control without additional wiring.

○ Each panel's voltage can be lowered by the function of remote shut down for safe operation.

○ It is easy to prevent electric fire using the function of emergency stop in case of DC ground fault.

(5) MPPT(Maximum Power Point Tracking)

○ According to solar radiation, temperature, humidity, climate and environment, the output of solar panel is ununiformed DC(Direct Current). But SolpoMax® connected to solar panel controls to maintain maximum power point tracking.

(6) Easy capacity expansion

○ If the number of solar panel is increased, it is easy to increase the capacity of power by adding SolpoMax®, 1~18 series-connected.

(7) Simple installation and operation

○ It is designed to connect solar panel and grid-power easily and safely by using normal connector.

(8) High reliability

○ SolpoMax® is designed to minimize defects using optimized components.

(9) Electromagnetic Compatibility (EMC)

○ SolpoMax® is designed to meet the Electromagnetic Compatibility (EMC) standard by optimizing the power circuit design.

2.2 Product Specifications

(1) SolpoMax® (600Wp)

Item		Value / Description	
INPUT	Rated Input DC Power	600	Wattp
	Absolute Maximum Input Voltage (Voc at lowest temperature)	60	Vdc
	MPPT Operating Range	8~60	Vdc
	Maximum Short Circuit Current(Isc)	15	Adc
	Maximum Efficiency	99.5	%
	Weighted Efficiency	98.8	%
OUTPUT DURING OPERATION (SolpoMax® CONNECTED TO OPERATING INVERTER)	Maximum Output Current	15	Adc
	Maximum Output Voltage	60	Vdc
OUTPUT DURING STANDBY (SolpoMax® DISCONNECTED FROM INVERTER OR INVERTER OFF)	Safety Output Voltage	1~2.5	Vdc
INSTALLATION SPECIFICATIONS	Maximum Allowed System Voltage	1000	Vdc
	Dimensions (W x V x H)	130 x 155 x 42.5	mm
	Weight (including cables)	590	g
	Input Connector	MC4	
	Output Connector	MC4	
	Output Wire Length	1.2	m
	Operating Temperature Range	-40 ~+85	℃
	Relative Humidity	0 ~ 100	%
	Communication	Wireless(Zig Bee)	

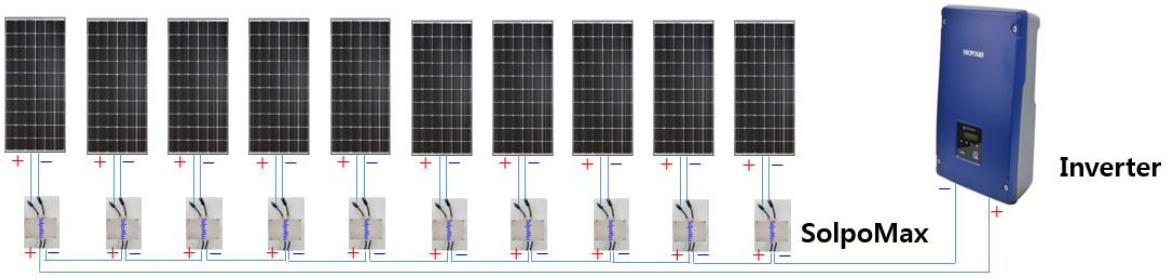
(2) Gateway

Item	Value / Description	
Input AC Power	100~240V , 50~60Hz , 0.3A	-
LAN cable	10Mbps UTP Cable[Ethernet communication with Server]	
Communication Line	RS485 Cable [Communication with Inverter]	

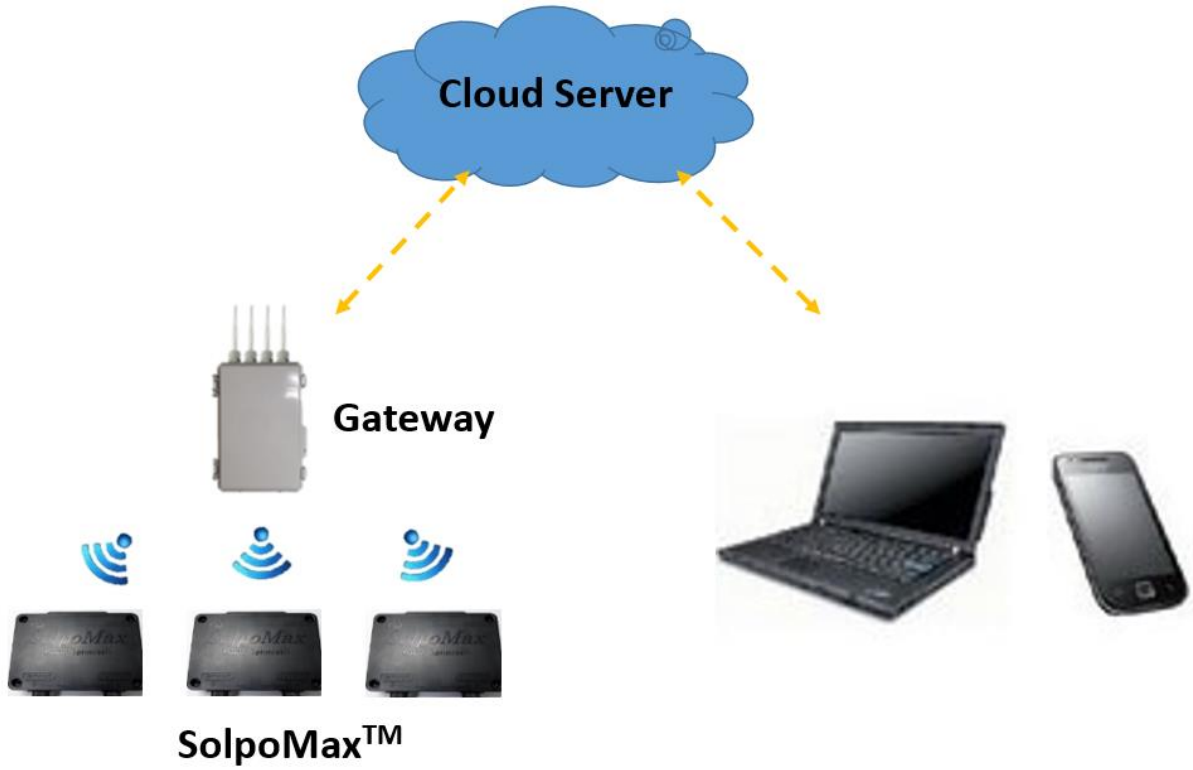
3. Installation

3.1 Configuration

(1) SolpoMax®



(2) Gateway



3.2 Installation place

Install in the place that meets the following conditions.

(1) Install it in a place not exposed to direct sunlight.

(2) Do not install it in the place with vibration.

(3) The life of SolpoMax® is affected by the ambient temperature. Do not install to the place exceed the allowable temperature (-20 to 65 ℃)

(4) Avoid the place with high humidity (relative humidity less than 90%, no dew condensation).

(5) Since SolpoMax® is a high-temperature heating element, install it on the flame-retardant material side.

(6) Secure a space (5-10cm) around SolpoMax® for smooth heat dissipation.

(7) Avoid the place where oil mist, flammable gas, fiber dust, dust, moisture, etc.

(8) Install firmly with direct screws.

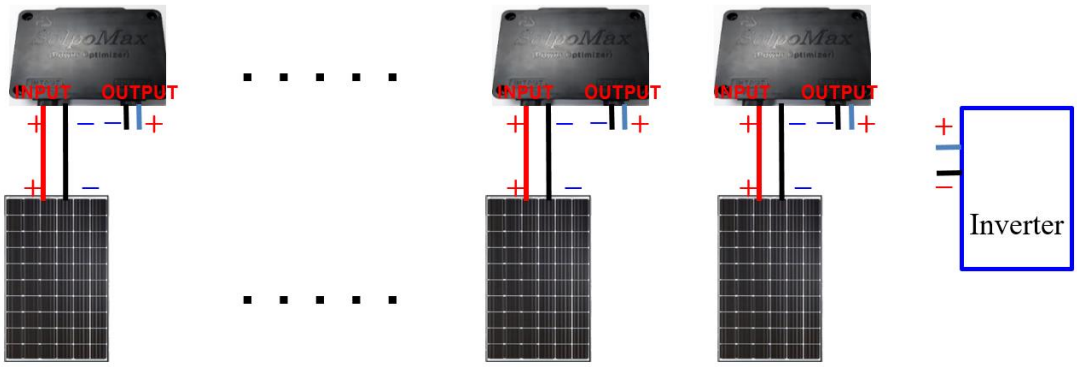
(9) When you install it in salty sea side area, please contact us for safe operation.

3.3 Installation & Connection Terminal Diagram

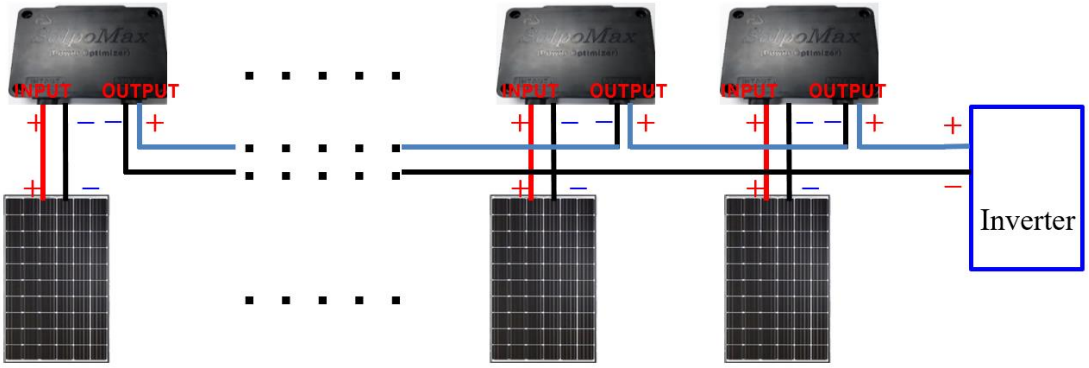
(1) SolpoMax®

Step1) Fix it to the structure using M4 or M5 direct screw.

Step2) Connect (+) and (-) terminals of junction box on back-side of the solar panel with the (+) and (-) input terminals of SolpoMax®. (See the picture below). After connecting, check the output voltage of SolpoMax® output terminal is normal.



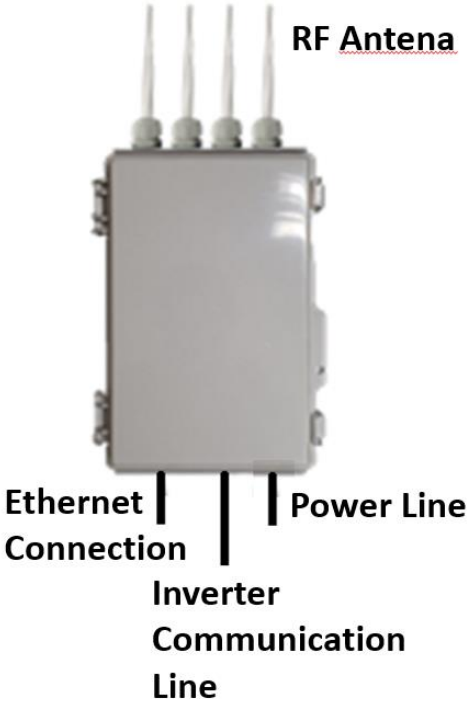
Step3) Connect each SolpoMax® in series. (See the picture below)



Ref) Description of Main Connection Cable

Symbol	Name	Description
Input(+)	SolpoMax® (+)Input	Connect with the solar panel (+)
Input(-)	SolpoMax® (-)Input	Connect with the solar panel (-)
Output(-)	SolpoMax® (-)Output	Connect with SolpoMax® (+) Output or inverter (-)
Output(+)	SolpoMax® (+)Output	Connect with SolpoMax® (-) Output or inverter(+)

(2) Gateway



Step1) Connect Ethernet cable(LAN cable) to the terminal inside the gateway.

Step2) Connect the power cable and turn on the power, then connect to Wi-Fi (5G).

Example) If Wi-Fi SSID (Service Set IDentifier) “FSGateway_1” is found.

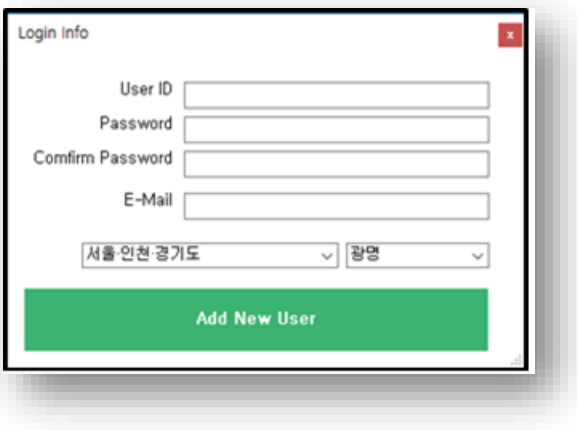
Step3) Run the GatewayManager.exe program. 

Step4) Enter the user ID and password of the installer, and press the [Login] button to log in.

Step5) Power Plant Selection

(Internal) Register new user account of generators

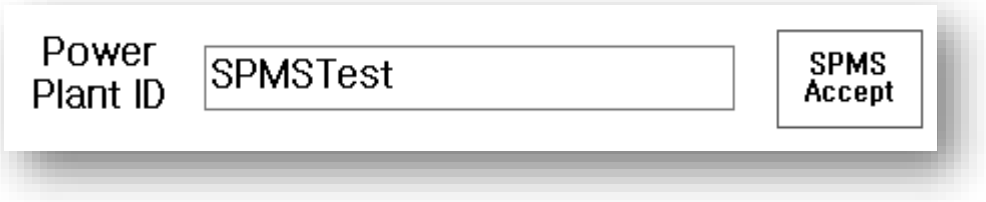
After registering DB Server, entering User ID, Password, E-mail, and region, press [Add New User] button to register a new user.



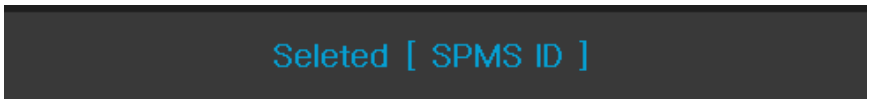
Step5-1) Power generation companies need to join membership through the designated webpage and receive a power plant ID (account).

URL : www.fs.com/register/...

Step5-2) Input the "Power Plant ID" and press [SMPS Accept] button to connect.



If the connection is successful, following screen will appear.



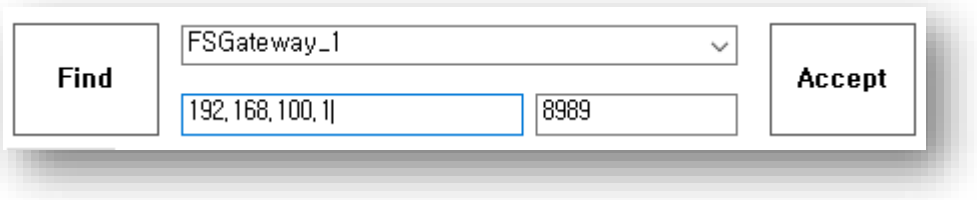
If the connection fails, following screen appears.

Check ID or Wi-Fi environment.

Step6) Gateway connecti

1) After connecting the gateway Wi-Fi, click the [Find] button to find the gateway and select the SSID.

2) Select the gateway to connect, and click the [Accept] button to connect.



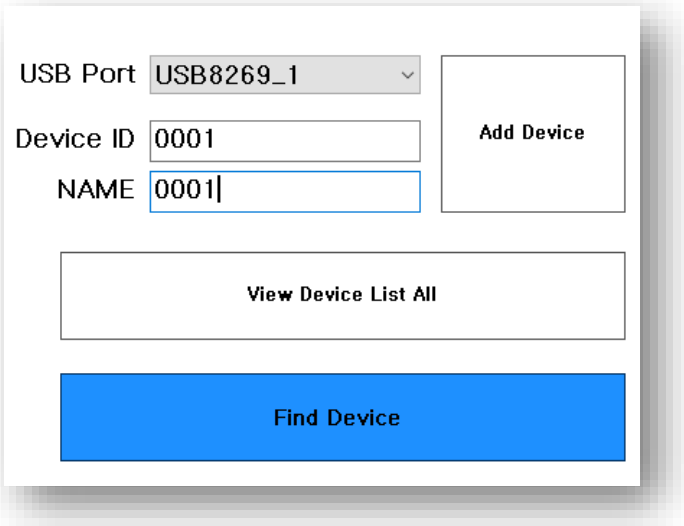
If the connection is successful, following screen will appear.

If the connection fails, following screen appears.

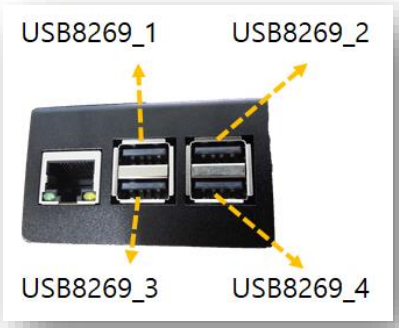
Check your Wi-Fi environment.

Step7) SolpoMax® registration by USB8269 Port

1) Select 'Device' tab to open USB8269 wireless communication module registration window.



2) Select USB8269 wireless communication module in the 'USB Port' input box. Port location of each USB8269 is as follows.



3) Enter individual SolpoMax® information

Enter 'Device ID' and 'NAME' and click the [Add Device] button to register SolpoMax®.

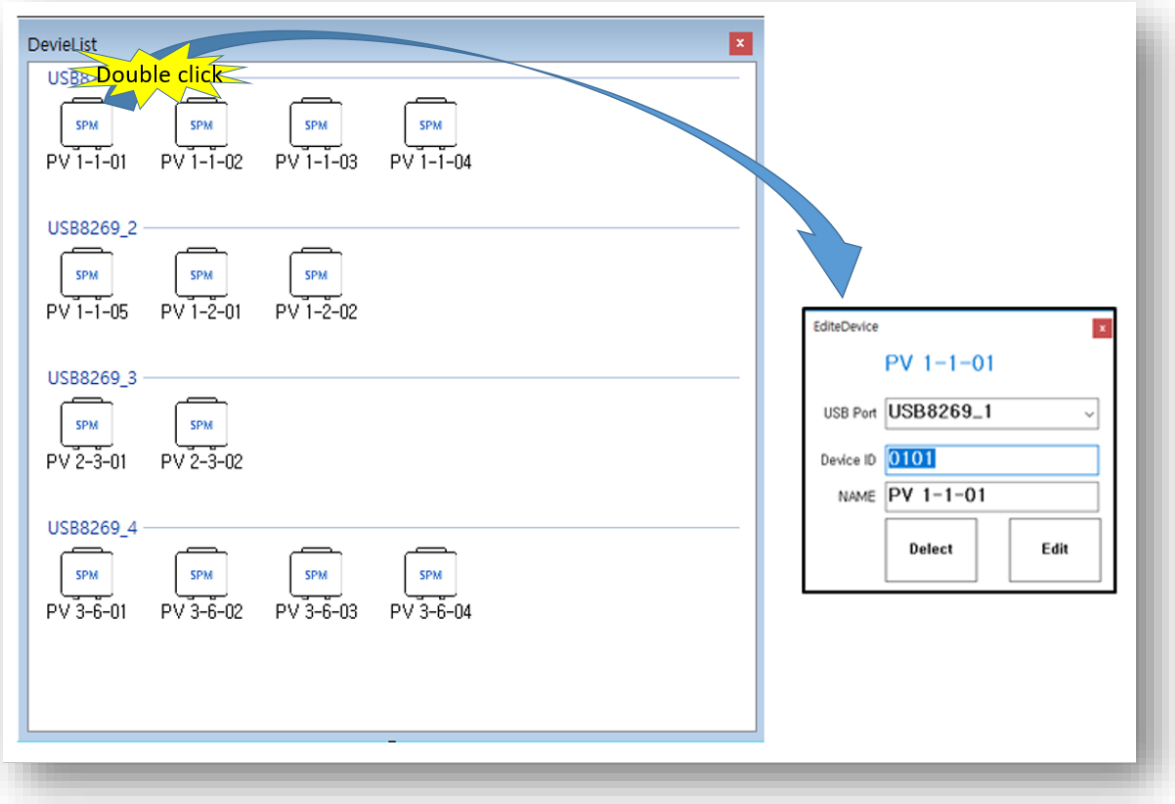
-Device ID : Enter the last 4 digits of the barcode attached to SolpoMax®

Example) In case of '19D3F00016', input '0016' for Device ID.

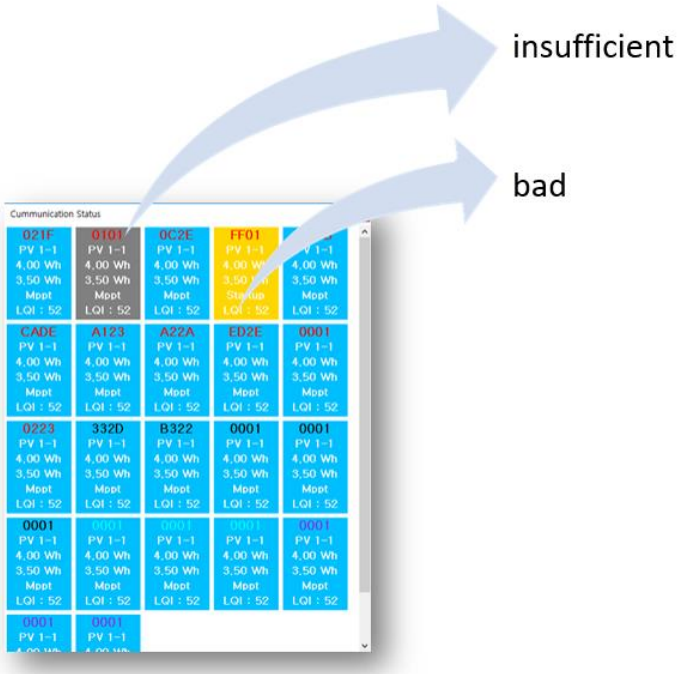
-Name : Name to be displayed in SPMS

Example) Display name 'PV 1-1-01'

4) Click [View Device List All] button to check SolpoMax® registered to the related USB port. You can edit or delete the contents of the device by double-clicking SolpoMax® image.



5) Click [Find Device] button to check the wireless connection and operation status of SolpoMax® set in the related USB port.



- In case of insufficient condition

  : Check the wiring status of SolpoMax® or the position of gateway.

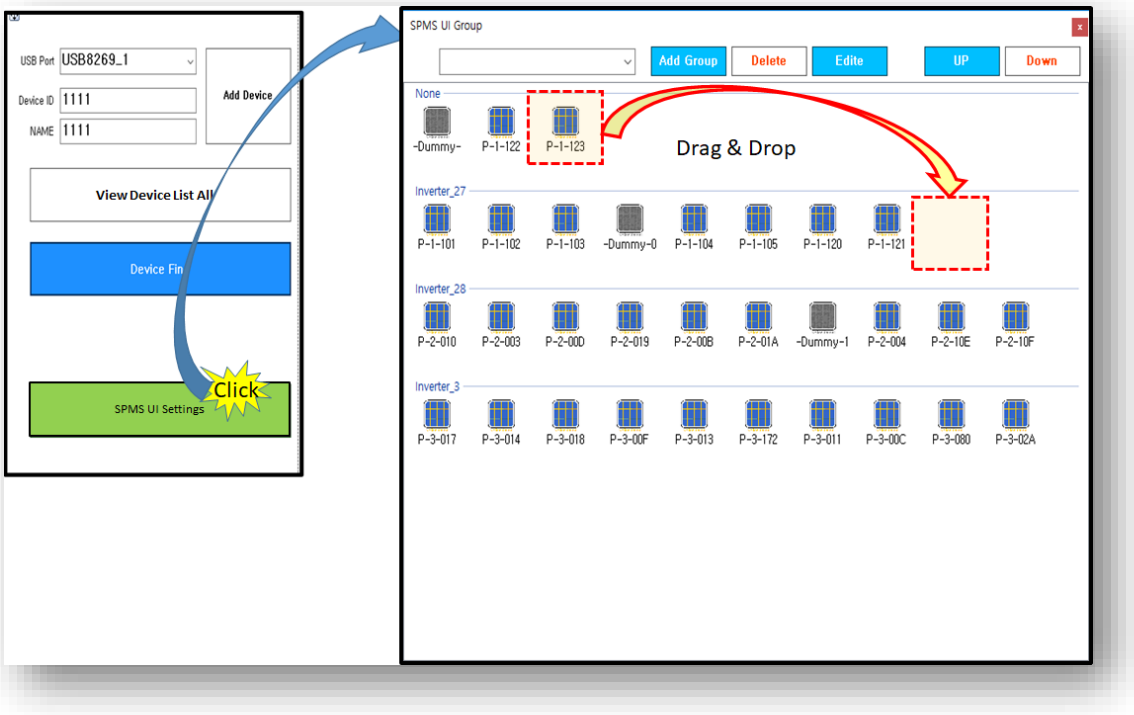
- In case of bad condition

  : Check the device ID and operation status of SolpoMax®.

6) (Internal only) [SPMS UI Settings] Click the SPMS button to set up the UI configuration.

   After entering the group name, click the [Add Group] button to create the group.

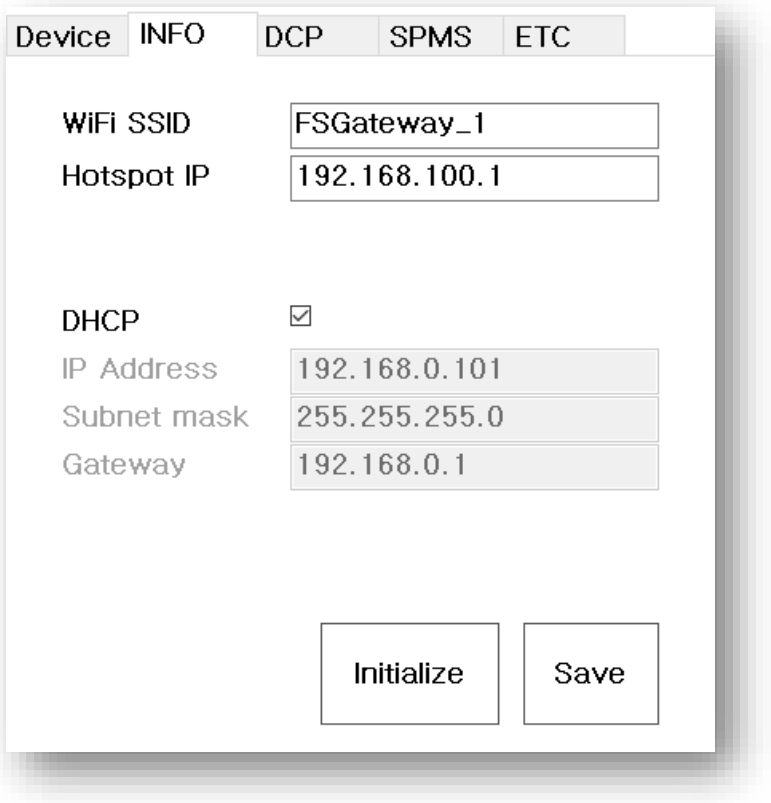
   - Default group is not displayed in SPMS monitoring.
   - Move SolpoMax® icon of the Default group to add the desired group.



Step8) (Internal only) Exceptional case set up method

(Network connection is not possible or use customer's own server...e.t.c)

1) Select the [Info] tab in the setting window.



2) Gateway IP Setting (Local, Wi-Fi)

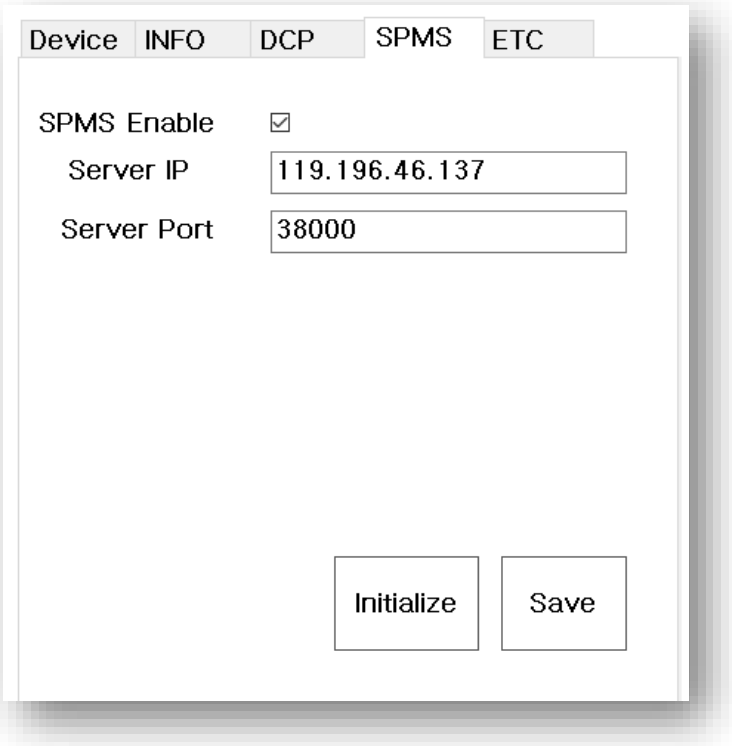
- Wi-Fi SSID : FSGateway_1
- Hotspot IP : 192.168.100.1

3) DHCP set up

- If there is DHCP (IP auto-assign function) in main router
  : Check DHCP and click [Save] button to save.
- If there is no DHCP (IP auto-assign function) in main router
  : Uncheck DHCP, manually enter the IP address of subnet mask/ gateway in the gateway, and click the [Save] button to save it.

Step9) (Internal Only) SPMS Server Settings

1) Select the [SPMS] tab in the setting window.



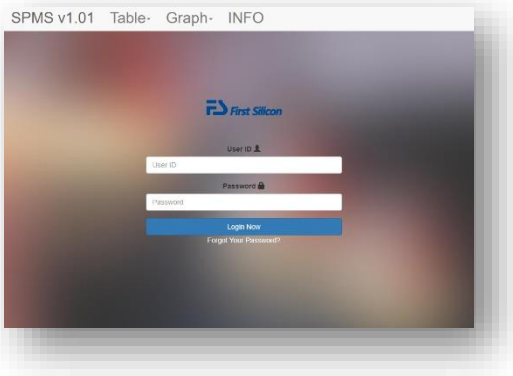
2) enter the SPMS server IP/Port manually, click the [Save] button to save it.

Step10) Check the operating status in the monitoring program.

Monitoring program : enter ID, Pass word and access in the portal web site.

URL : http://spms.firstsilicon.co.kr/login

a) Login

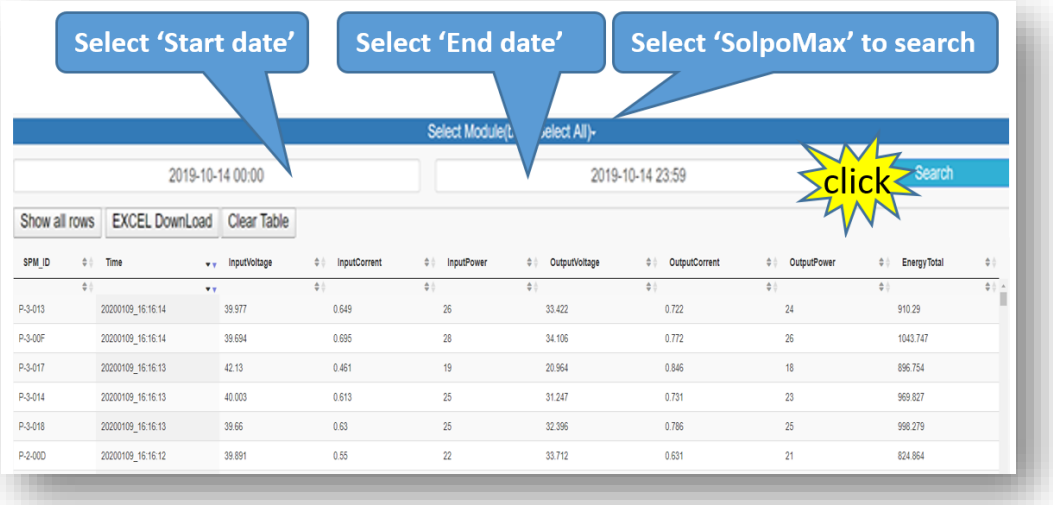


b) Instructions by each display screen

1) SolpoMax® Real-time Monitoring Viewer

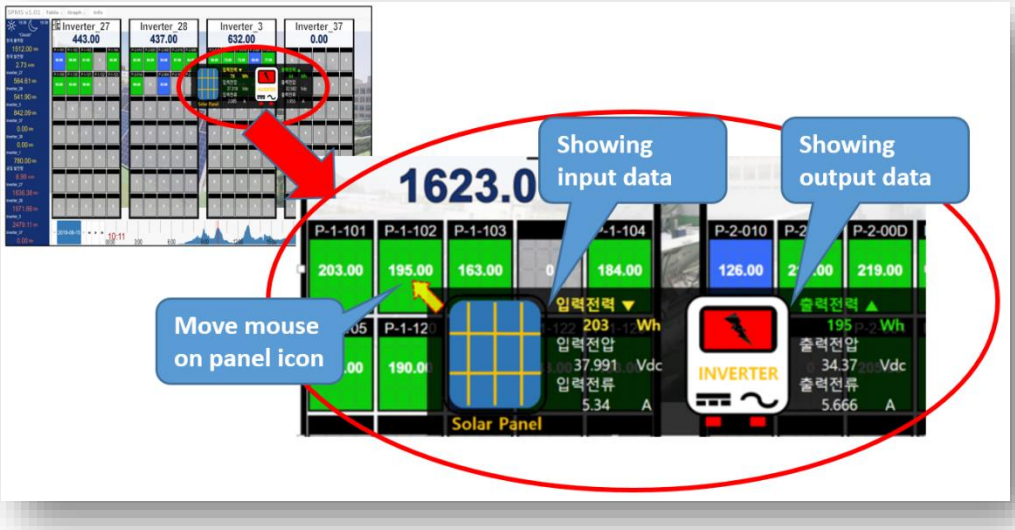
① Menu (SPMS version information, checking table, checking graph)

② Display real-time total power generation status of SolpoMax® connected to each string.

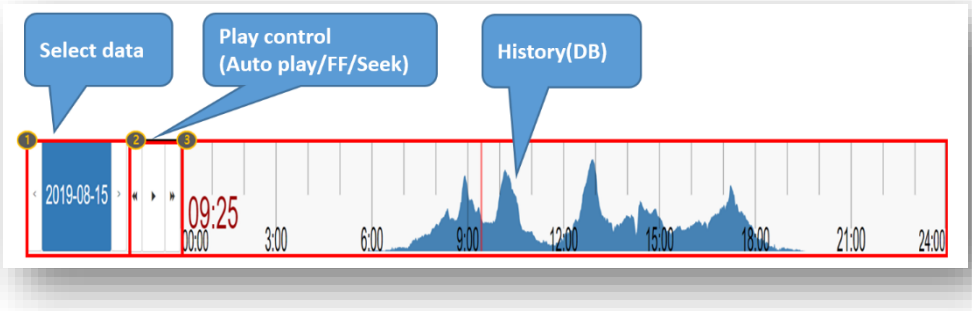


③ Total daily power generation display of each inverter(option)

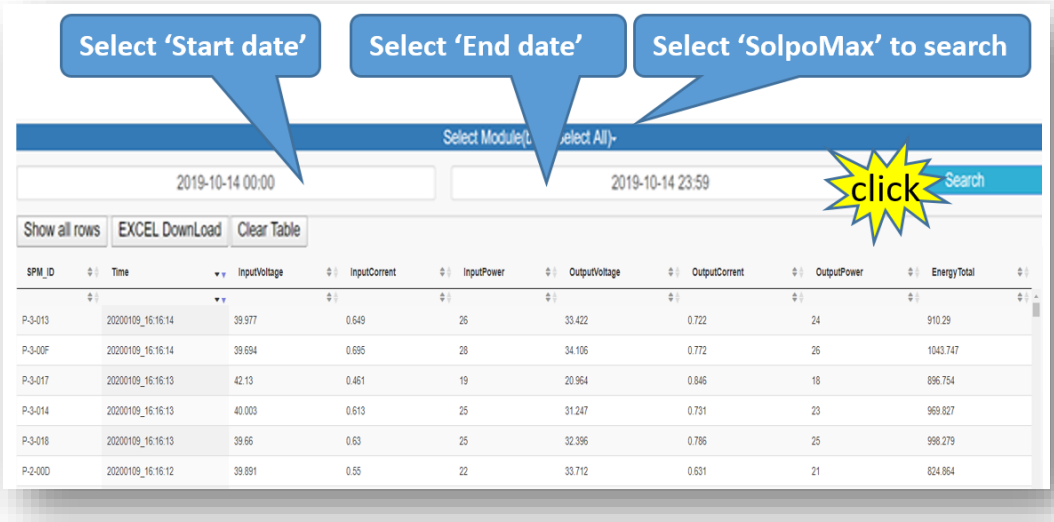
④ Display data value for each panel



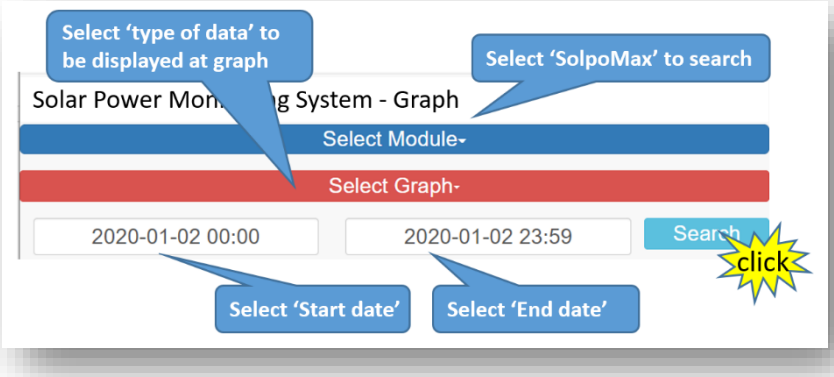
⑤ Hourly Selection Window

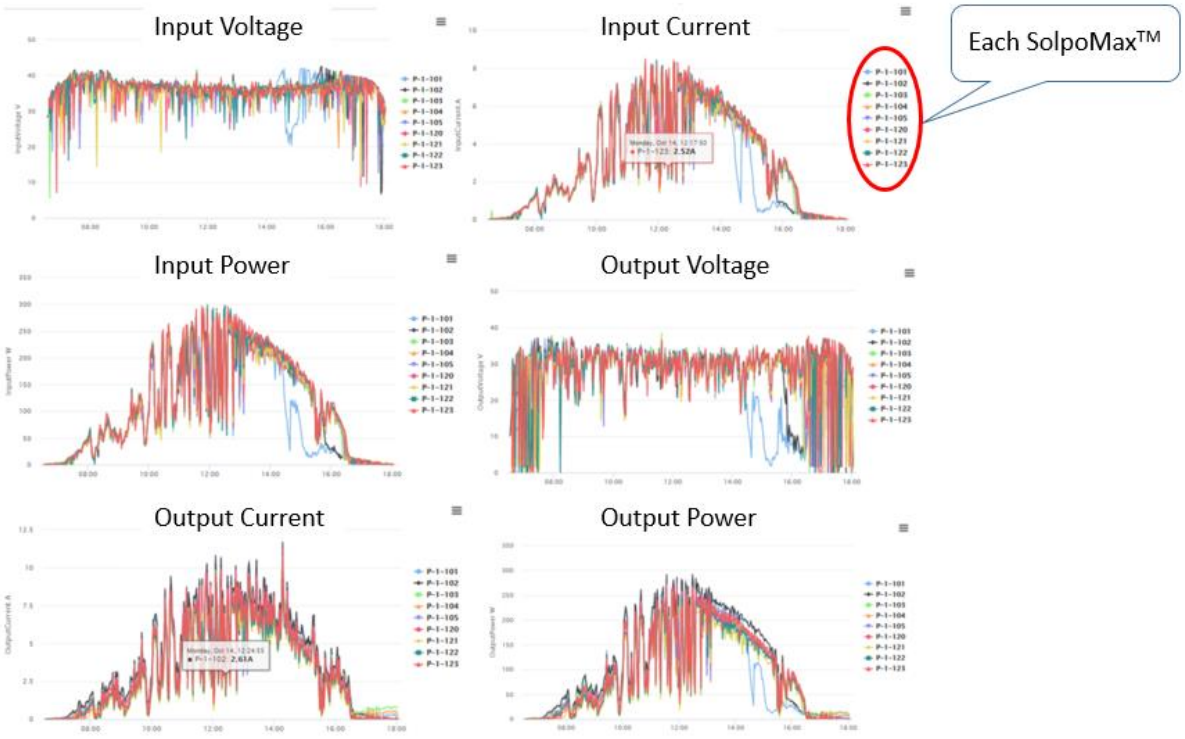


2) SolpoMax® and Inverter Table Viewer



3) SolpoMax® and Inverter Graph Viewer: Input·Output of Current / Voltage / Power Graph



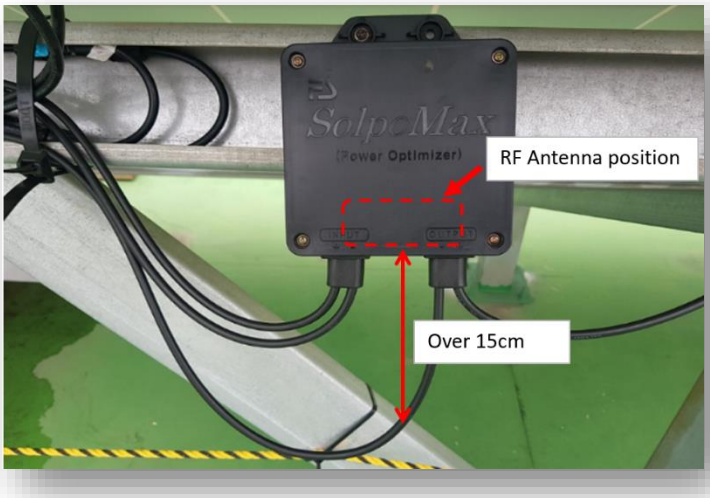

Input Voltage
Input Current
Each SolpoMax™
Input Power
Output Voltage
Output Current
Output Power

3.4 Installation Precautions

(1) SolpoMax®

1) Recommended installation state

○ Since SolpoMax® has a built-in antenna set for wireless communication, the wiring must be checked after installation.



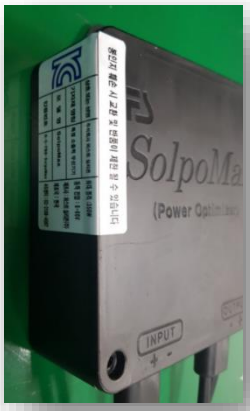
○ Arrange cable connectors inside the structure, so that they do not touch the floor.

2) Abnormal installation case

○ Please separate the wiring so as not to affect the electromagnetic part of the SolpoMax® internal antenna.

○ Barcode damage caution

- Be careful not to damage the barcode or seal on the side of the product.
- Products with arbitrary damaged barcode stickers are not available for A/S.



3.5 Wiring

3.5.1 Main Circuit Wiring

(1) Precautions when wiring the main circuit

○ Be careful of the damage by a fire caused by incorrect wiring of SolpoMax®.

○ Do not separate to the connectors while operating.

○ When wiring the system in operation, turn off the inverter and wait at least 10 minutes before proceeding.

○ When dissolving SolpoMax® , disconnect the output terminal first.

○ To prevent electric shock, always fix the SolpoMax® enclosure to the frame and ground it.

4. SPMS (Solar Power Monitoring System)

4.1 Checklist before using SPMS

(1) SolpoMax® is set to automatic operation mode at the factory for shipments. At sunrise, if the solar panel voltage is above the set value, SolpoMax® will start automatic operation.

(2) At sunset, the voltage of the solar panel become down to reach below the set voltage, SolpoMax® stops the operation, automatically

(3) Real-time power production is displayed while SolpoMax® is under operation.

(4) SPMS is web based, so please check the external internet connection of your PC.

(5) Optimized for Explorer 8.0+, Chrome, FireFox.

5. Maintenance and Repair

5.1 Symptoms of Failure

Abnormal symptoms of SolpoMax®

(1) Input Overvoltage Protection

If the input voltage is over the specified voltage, SolpoMax® is stopped to protect system.

(2) Output Over-Current Protection

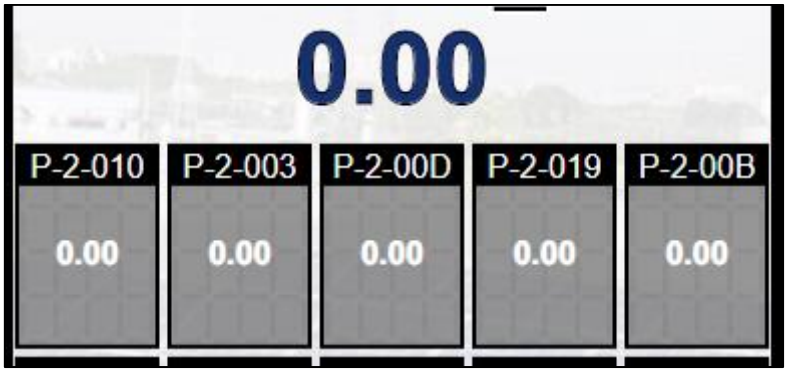
If the output current is over load due to the abnormal condition, SolpoMax® is stopped to protect the system.

(3) Overheat Protection

If the temperature inside SolpoMax® exceeds 95 ℃, it stops operating to prevent overheating. If the internal temperature of SolpoMax® returns to normal, operate it normally after reset.

If the above abnormal symptom occurs, the output power of the terminal is maintained at “0” voltage and the voltage of the related string is reduced same as the terminal.

For more information on this phenomenon, you can check the status of SolpoMax® via SPMS.



If data is not changed form gray screen for more than one day in SPMS, check if communication between SolpoMax® & gateway is no problem.

(1) If communication is good

1) Please check the internet of the main router.
2) Check the connection status between the gateway and the main router.
3) Check the IP set in the gateway.

(2) If communication is bad

1) Adjust the position where SolpoMax® is installed.
2) Check if the USB8269 connected to the gateway is connected properly.

5.2 Troubleshooting & Repair

Check if there is any problem in SolpoMax® or not,

if the product has any problem, check the following and request service from your distributor or First Silicon HQ.

○ Model name
○ Manufacturing number
○ Where to buy
○ Purchase year
○ Quality Assurance
○ Failure contents

Revision history

version	description	Date
V1.0	Initial release	2020.10.12

This device complies with part 15 of the FCC Results. Operation is subject to the following two conditions :

(1) This Device may not cause harmful interface, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for CLASS B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try correct the interference by one or more of the following measures:

1.1. Reorient or relocate the receiving antenna.

1.2. Increase the separation between the equipment and receiver.

1.3. Connect the equipment into an outlet on a circuit different from that to which receiver is connected.

1.4. Consult the dealer or experienced radio/TV technician for help.

WARNING

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

IMPORTANT NOTE:

FCC RF Radiation Exposure Statement:

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.