

GNE module level optimization and monitoring system

Installation User Manual

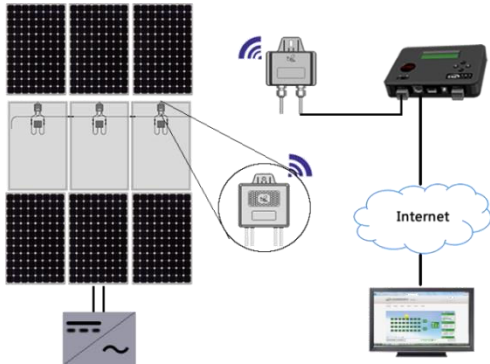
(Honeybee400/650/850, Honeybee800/1300/1600, Swarm, Beehive)

Notice

- ◆ This user manual is used to install and maintain GNE power optimizer models Honeybee350/400/650/850, Honeybee700/800/1300/1600, and data processing devices.
- ◆ No permission to disassemble and repair the products to ensure the safety of personnel. For services, please look for trained or qualified professionals.
- ◆ Before installing and using the power optimizers, please familiarize yourself with all the tips and warnings on the products, as well as the safety instructions and other applicable safety guidelines in the inverter manual and the PV module installation instructions.
- ◆ To reduce the risk of fire and electric shock, install the power optimizers in strict accordance with local electrical standards and codes.
- ◆ Installation must be performed by a trained professional. GNE is not liable for any loss or damage caused by improper operation, discomfort or misuse of these products.
- ◆ Before installing the optimization and monitoring products, please remove all metal accessories that you wear to reduce the risk of touching live circuits. It is strictly forbidden to install and debug in bad weather.
- ◆ Do not operate if the GNE products can be physically damaged. Check existing cables and connectors to ensure they are in good condition and status. Do not operate the cables and connectors of GNE products if they are damaged or unqualified.
- ◆ Do not connect or disconnect the GNE power optimizers and monitoring products under load. There is also a risk of electric shock when shutting down the inverter or the GNE products. After disconnecting all power supplies, the capacitor inside the inverter can continue to charge for a few minutes. Before measuring the line, first measure the voltage at the inverter and confirm that the capacitor is no longer charged.
- ◆ Before the GNE customer service personnel provide services, please make sure that the data aggregation device Beehive is powered on and the internet is fine, and optimizers work in power-on status, then check the current, voltage and power of the PV series.

Installation Steps:

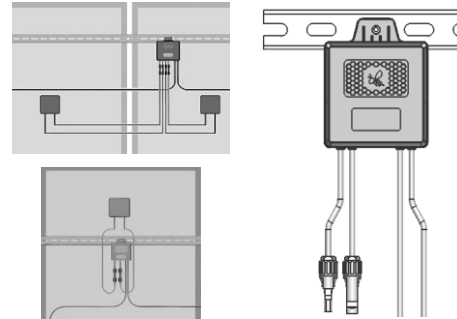
1. Smart PV diagram (Apidae)



2. Register MACID of GNE models



3. Installation of optimizers



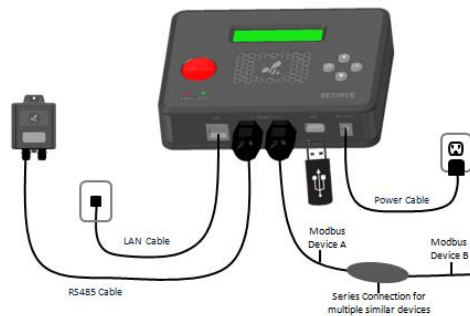
4. Installation of data acquisition unit (Swarm)



5. Connection to Swarm and Beehive



6. Installation of data aggregation device (Beehive)



7. Setup in data cloud center (HoneyPot)



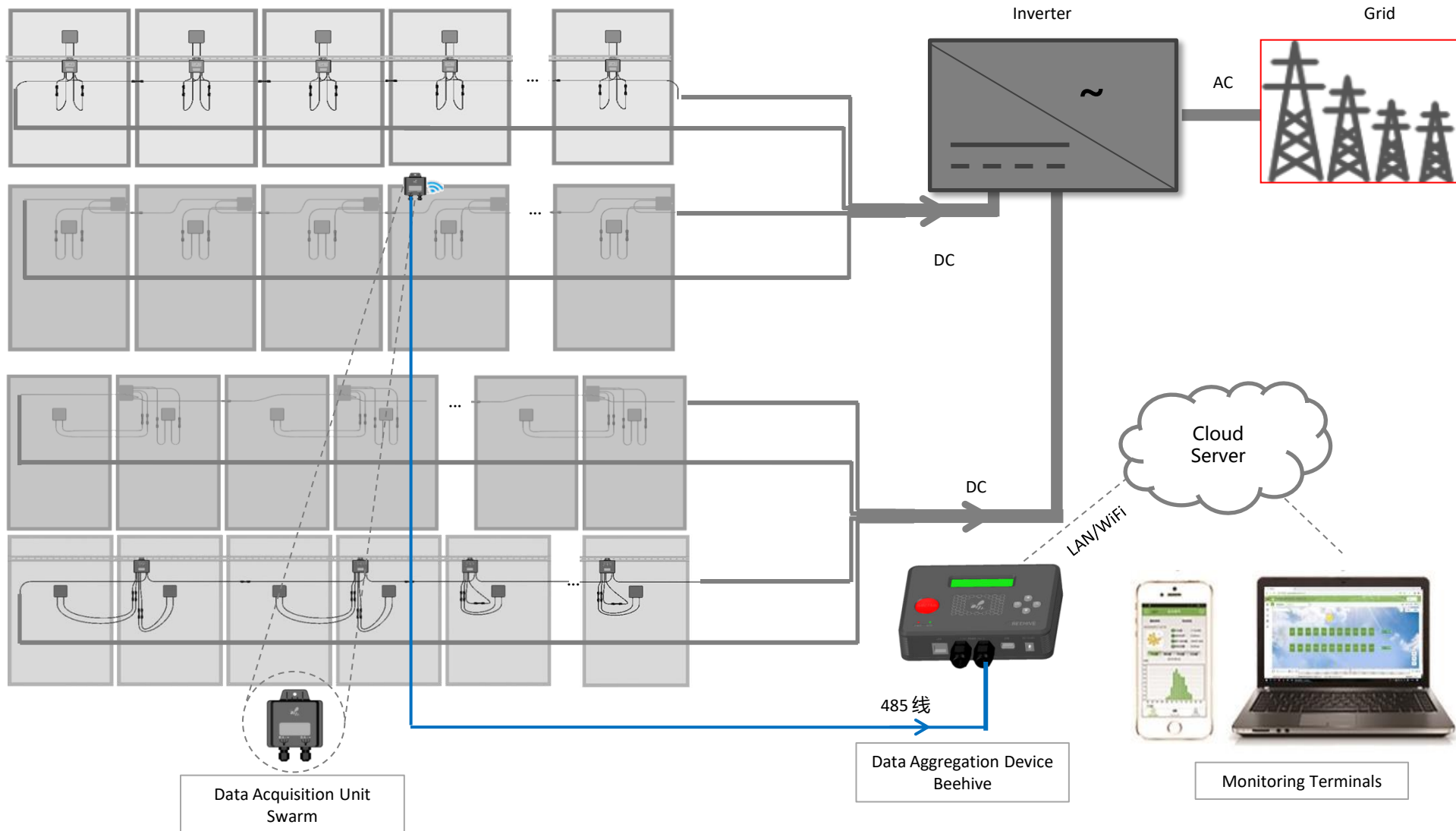
8. Shutdown Description



1. Smart PV Diagram(Apidae)

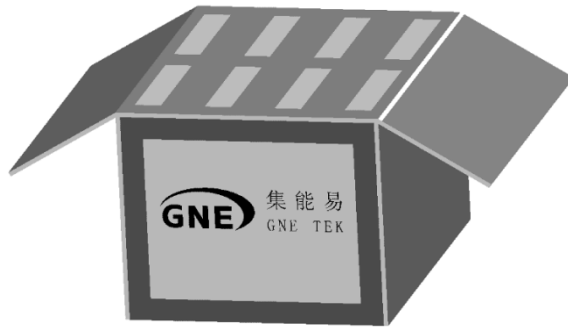
Connection Description:

- Honeybee400/650/850: connect one PV panel, fixed on the racks or the frame of PV panel
- Honeybee800/1300/1600: connect Two PV panels, fixed on the racks or the frame of PV panel
- The short pair cables of the optimizers connect PV panel(s), and the long pair cables to link the adjacent optimizer(s), finally connect to inverter
- 1 Swarm can wirelessly communicate maximum 200 optimizers, fixed in the middle of PV arrays
- 1 Beehive can communicate up to 5 Swarms by 485 cable and gather the generation data of 1000 optimizers

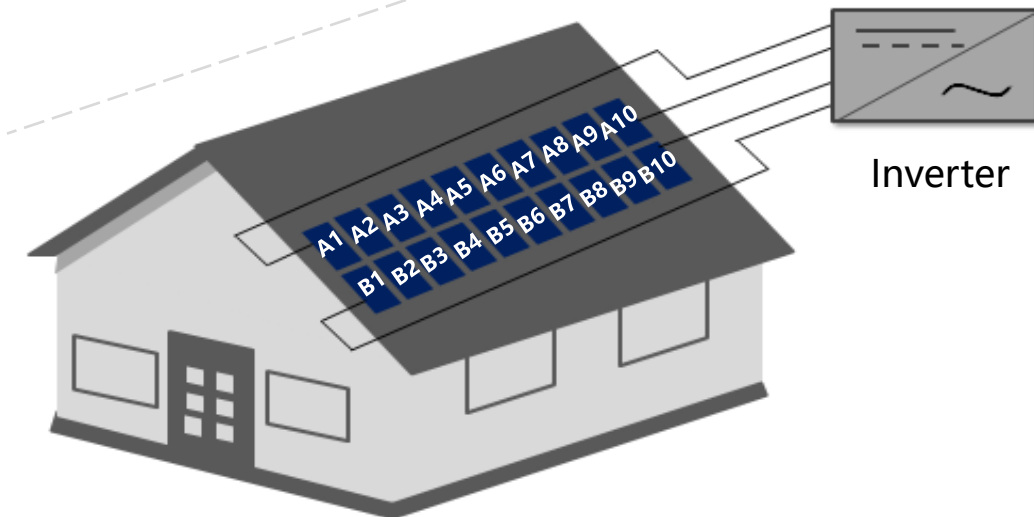
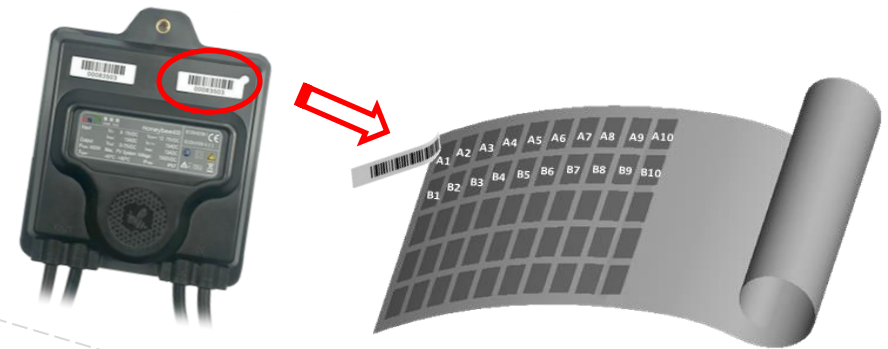


2. Register MACID of GNE models

- ①. Plan the installation location of each power optimizer or PV module monitor



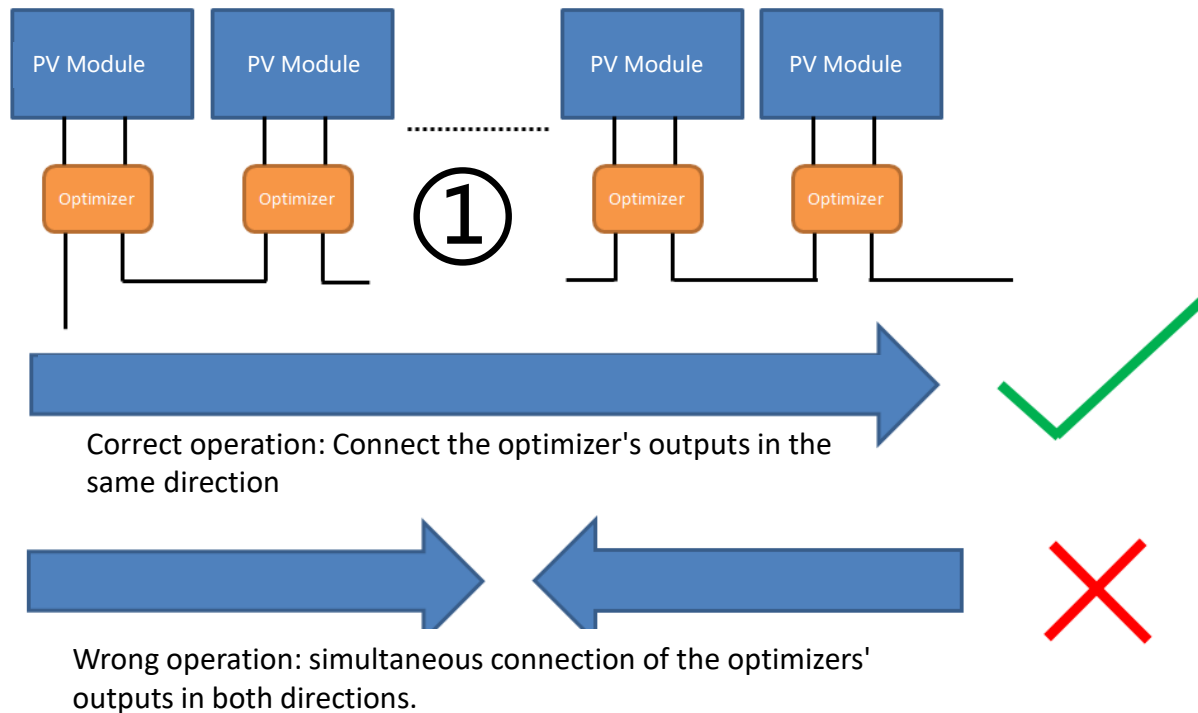
- ②. Take the power optimizer or PV module monitor and write down the 8-digit MACID number on the plant map, or string list, or construction drawing. And write down the 8-digit MACID number of Swarm and Beehive.



- ③. The installation position of the power optimizers or the PV module monitors should accord to the previously recorded MACID order.

3. Installation of optimizers or PV monitors

➤ Precautions before installation

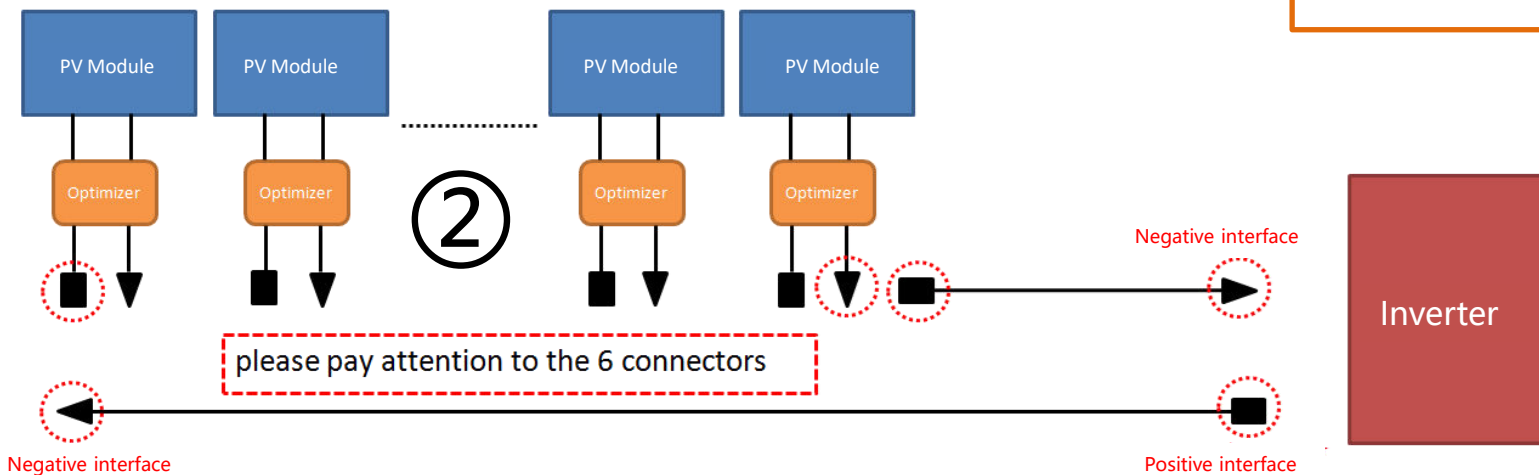


Description:

When all the inputs of the optimizers are connected to the output of the PV junction boxes, the outputs of the optimizers are connected in series.

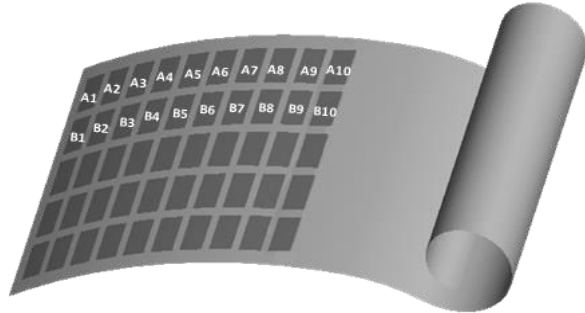
Correct operation:

Connect the outputs of the optimizers in the same direction to ensure that the last two ends of the string are the positive and negative two-pole interfaces, not the same-pole interface (as shown in Figure 2).

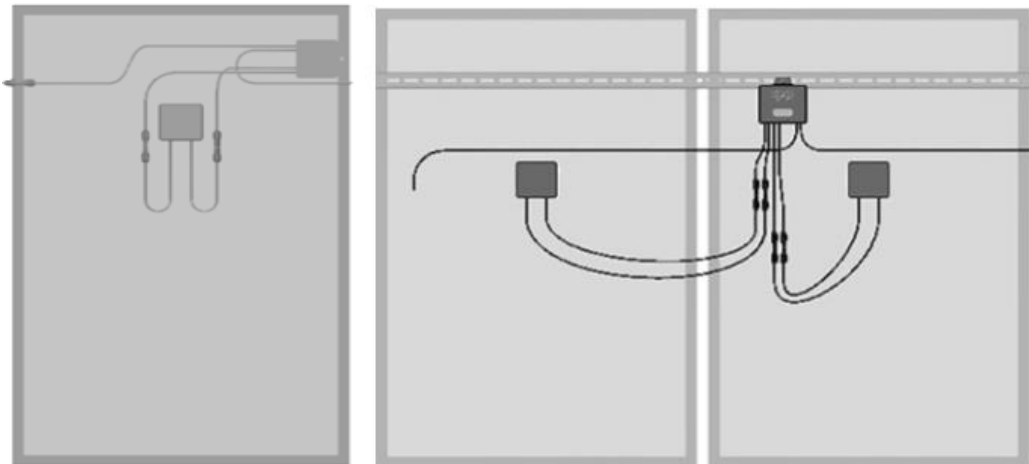


3. Installation of optimizers or PV monitors

①. Record the product MACID numbers of the optimizers on the system form or power station map or construction drawing to establish a power station in cloudy center for tracking the operation status of each panel even the whole PV station.

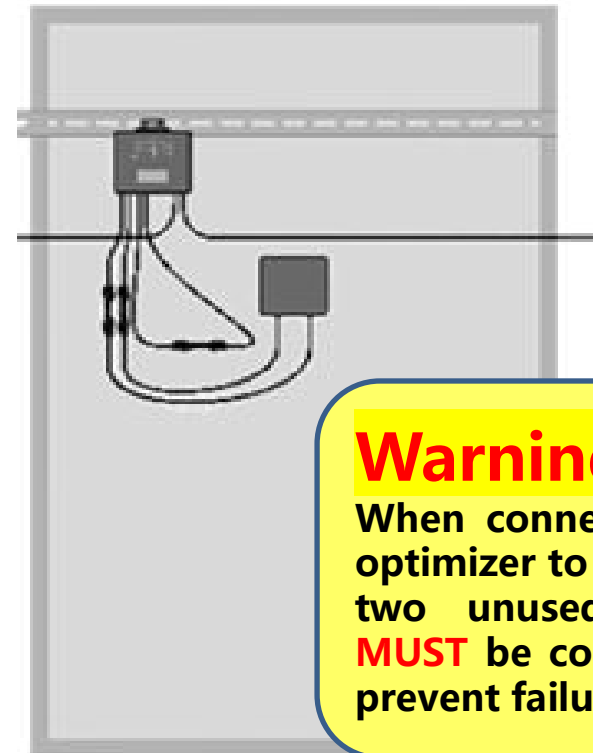


②. Use a screw or cable tie to position the optimizer one by one according to the registered MACID number position, and fix it on the bracket or panel frame. If the bracket has no mounting holes, it can be drilled and mounted with a hole size of 6mm.



③. The shorter pair of cables of the power are the input terminals, and the longer pair of cables are the output terminals for the power optimizer to be connected in series and finally connected to the inverter or the combiner box.

Cabling sequence: firstly connect all the input cables of the optimizers to the output cables of the PV junction box, then connect the output cables of all the optimizers in series (please refer to the notes in the previous page)



Warning ⚠:

When connecting the dual port optimizer to only 1 PV panel, the two unused MC4 connectors **MUST** be connected together to prevent failure of the unit.

4. Installation of data acquisition unit (Swarm)

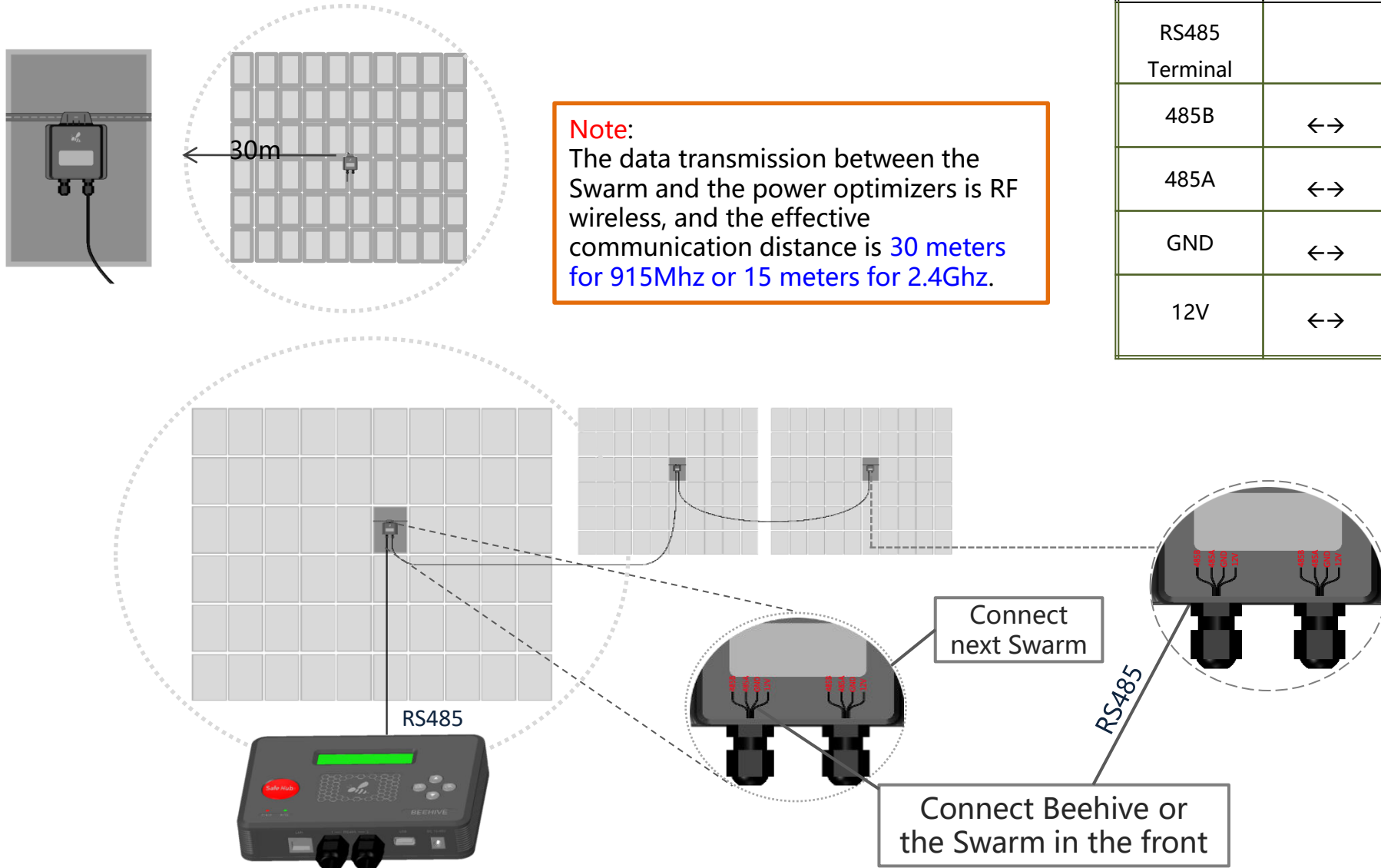
①. Swarm is mounted on the bracket at the center of the PV module array and can be fixed with cable tie or a screw of diameter 6mm.

②. If you need to connect more Swarms, please connect them with RS485 cable.

Swarm cascade table:

Swarm	Cascade	Swarm
RS485 Terminal		RS485 Terminal
485B	↔	485B
485A	↔	485A
GND	↔	GND
12V	↔	12V

Note:
The data transmission between the Swarm and the power optimizers is RF wireless, and the effective communication distance is **30 meters for 915Mhz or 15 meters for 2.4Ghz.**



5. Connection to Swarm and Beehive

- ① Determine where the Beehive is installed and the length of RS485 cable from the Beehive to the Swarm. **Note:** recommend to use RS485 cable with 4 wires and double twisted-wire, and the diameter of each wire 0.50~0.75mm²
- ② Open the back covers of the Beehive to the Swarm
- ③ Connect the 485 cable to the RS485 port numbered 1 on the Beehive (refer to the right table for the wiring connection table) and tighten it with a flat head screwdriver.
- ④ Connect the other end of the 485 cable to any one RS485 interface of the Swarm, and the wiring order of the four color wires of the RS485 in the Swarm and the Beehive are consistent. **Note:** Any error in the connection order would cause damage to the Swarm or the Beehive.
- ⑤ Tighten the screws on the back cover of the Swarm and the Beehive with a cross screwdriver.

The wiring connection table of Swarm and Beehive

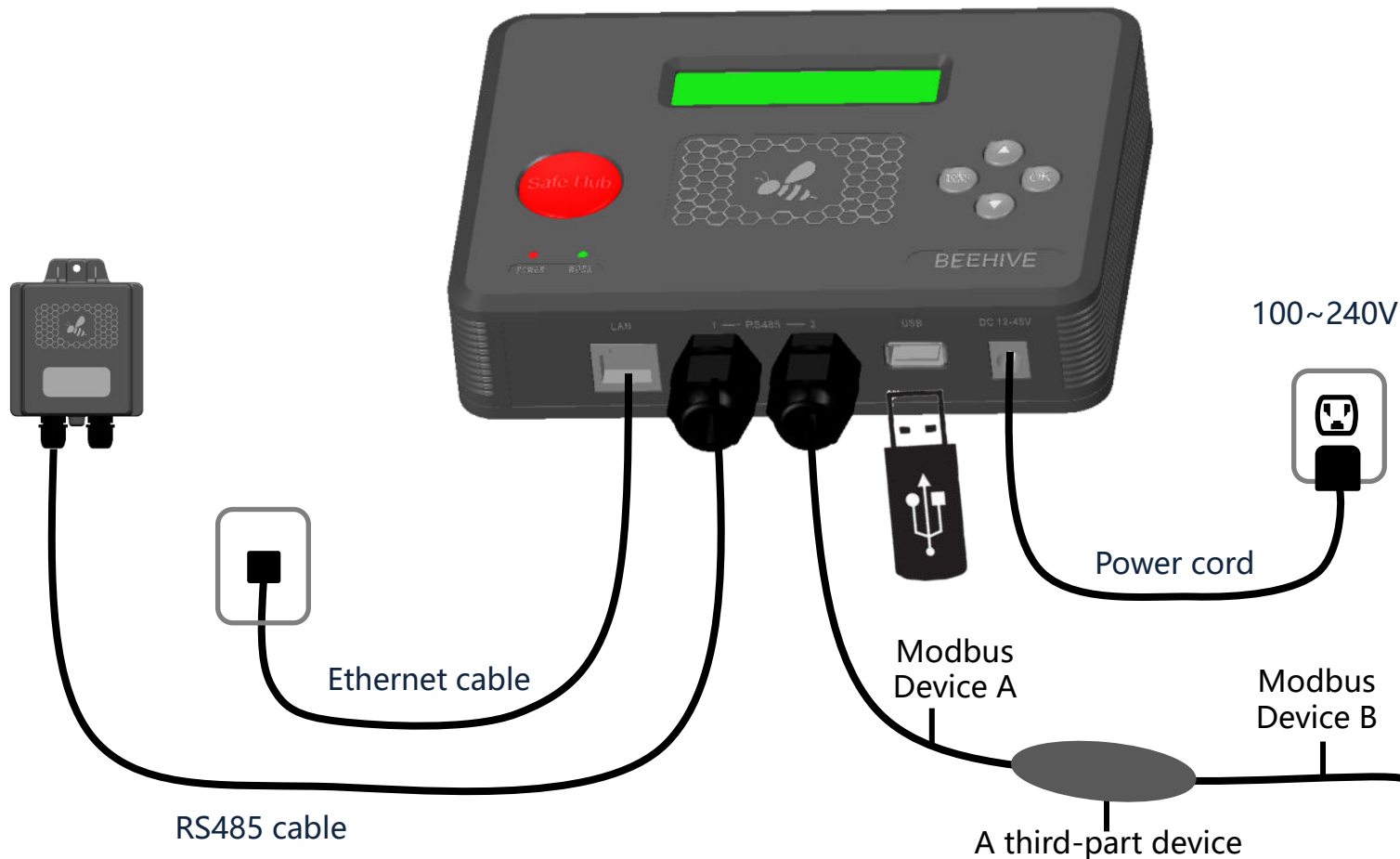
Swarm	Cascade	Swarm		Beehive			A third device
RS485 Terminal		RS485 Terminal		RS485 Terminal 1	RS485 Terminal 2		RS485 Terminal
485B	↔	485B	↔	485B	485B	↔	485B
485A	↔	485A	↔	485A	485A	↔	485A
GND	↔	GND	↔	GND	GND	↔	GND
12V	↔	12V	↔	VCC	VCC-USER		



6. Installation of data aggregation device (Beehive)

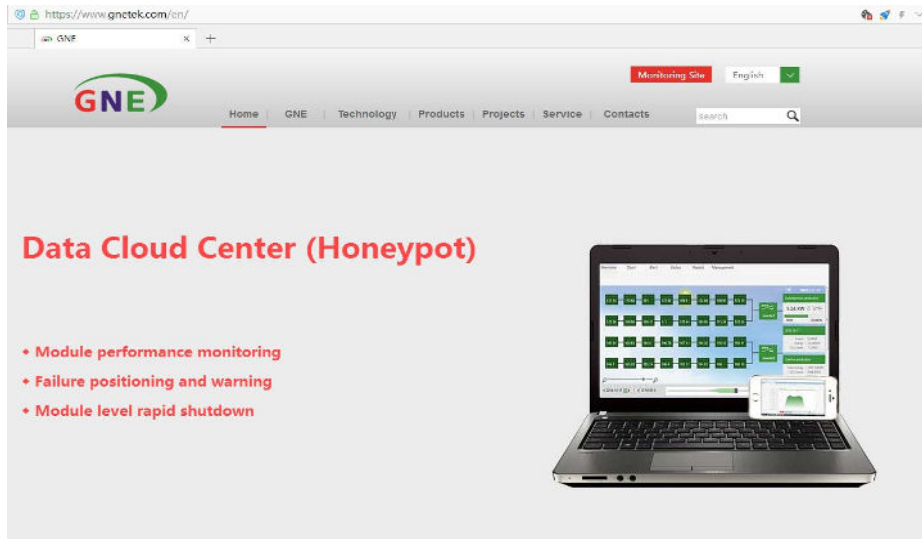
Notes for Operation:

1. The protection grade of the Beehive is IP20 and needs to be installed indoors. If it needs to be installed outdoors, please add a waterproof box.
2. Connect power, ethernet cable or third-party device to the corresponding terminals.
3. Test whether the Swarm and the network cable work normally (select "FIND 485" in the menu of the Beehive, press "OK" , then the connection number of the 485 devices will be displayed)



7. Setup in data cloud center (Honeypot)

Log in the GNE homepage: <http://gne.gnetek.com>, click on the monitoring center in the upper right corner



① Register New Account



Register New account

② Fill in the information of the new account

The screenshot shows the "Register" form on the GNE website. The header includes the GNE logo and "Jiangsu GNE New Energy Technology Co., Ltd." with an "English" language selector. The form title is "Register" with a note: "Note: This page is for new user to create account." The form fields are: *User Name (required), *Confirm Password, *Confirm Email, First Name, PostCode, *Verification Code, *Password (required), *Email, Company, Street, and *TimeZone (dropdown menu with "[UTC] Western European Time, Green" selected). A "Submit" button is at the bottom right. A watermark "xwxl / o" is visible near the bottom.

7. Setup in data cloud center (Honeypot)

③ Fill in the information of the inverter and the panel

Add more inverters or panels if needed

Station List Search the station

Plant User Administration cepsolar Sign Out Delete

1. Station information 2. Inverter & Module 3. Data Devices 4. Station Setting 5. Layouts

Inverter Add More

Inverter

*Label: Is required *Manufacturer:

Model: *Peak power(kW): Is required

*Number of strings: *Modules per string: Is required

Module Add More

Module

Manufacturer: Model:

*Module power(W): Is required

Save

④ Fill in the 8-digit MAC ID of the Beehive

Station List Search the station

Plant User Administration cepsolar Sign Out Delete

1. Station information 2. Inverter & Module 3. Data Devices 4. Station Setting 5. Layouts

Beehive Setting

*Unit Id: Device: OFF

Save

⑤ Select optimizer model, fill in 8-digit MAC ID of the optimizers

Plant User Administration admin Sign Out Delete

1. Station information 2. Inverter & Module 3. Data Devices 4. Station Setting 5. Layouts

Mode A Mode B

Station Setting Add More

Inverter-Growatt

String-A

Honeybee-700	MAC ID: 60020885 -1	Module: NSP(305W) Delete Insert
	MAC ID: 60020885 -2	Module: NSP(305W)
Honeybee-700	MAC ID: 60021770 -1	Module: NSP(305W) Delete Insert
	MAC ID: 60021770 -2	Module: NSP(305W)
Honeybee-700	MAC ID: 60020951 -1	Module: NSP(305W) Delete Insert
	MAC ID: 60020951 -2	Module: NSP(305W)
Honeybee-700	MAC ID: 60021700 -1	Module: NSP(305W) Delete Insert

7. Setup in data cloud center (HoneyPot)

⑥ Adjust the location of the optimizers per the physical layout of the PV station

The screenshot displays the 'Layouts' configuration page in the GNE monitoring system. The interface features a top navigation bar with the company name 'Jiangsu GNE New Energy Technology Co., Ltd.' and a user profile 'J. Brugman'. Below this is a 'Station List' search bar and a navigation menu with options for 'Plant', 'User', and 'Administration'. A progress bar indicates the current step is '5. Layouts', following '1. Station information', '2. Inverter & Module', '3. Data Devices', and '4. Station Setting'. The main workspace shows a grid-based layout of a PV station with a central inverter labeled 'Growatt 36000TL-S' and several modules labeled A1 through A12, each with a unique ID. A 'Page Setup' panel on the right allows for adjusting the background, width (800), and height (600) of the layout view.

Remark:

After the PV station setup in the monitoring site well, please come to the page of module level monitoring to check if the data of all modules are displayed. If one PV module is displayed in gray, it means the optimizer communication is abnormal, and you need to troubleshoot the cause of the abnormality or replace the optimizer (the optimizer with abnormal communication cannot receive the shutdown signal after the system sends the shutdown command, and it will not be able to shut down the connected Photovoltaic modules).

8. Shutdown Description

The shutdown function of the optimizer can be implemented in the following ways:

①. On the data aggregation device Beehive or the data processing device Beebox, the red button Safehub is the safe button, and the four white buttons on the right are the function buttons:

Press the red button Safehub and the white up arrow on the right at the same time to turn off the optimizer output;

Press the red button Safehub and the white down arrow on the right at the same time to turn on the optimizer output.



8. Shutdown Description

②. After logging in the user name and password on gne.gnetek.com, the power station list displays the information of each completed power station. When all the optimizer communicate well and the power station displays "online":

Click the red button "Power Off" on the right and enter the account password to turn off the output of each optimizer in the photovoltaic power station;

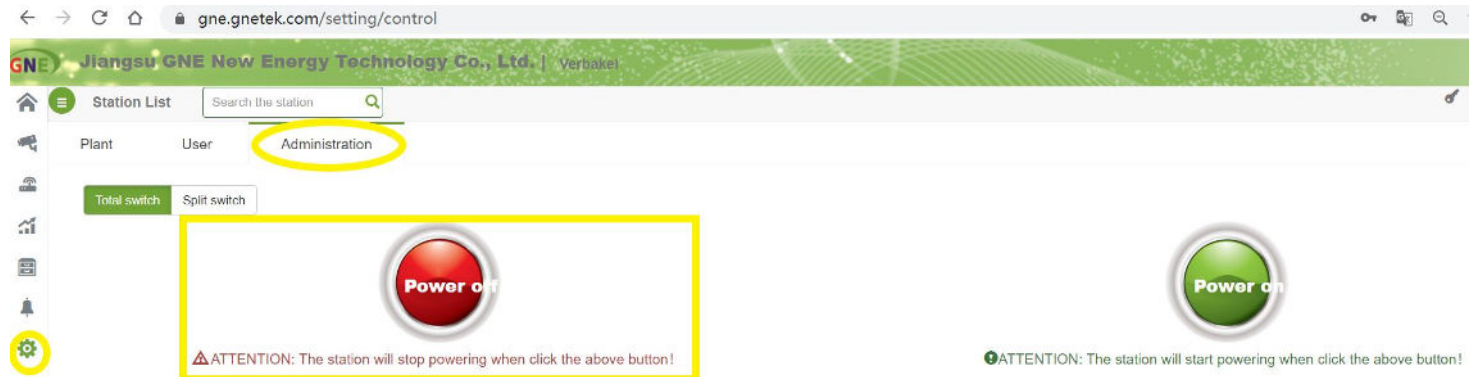
Click "Power On" and enter the account password to turn on the output of the optimizer.

Status	Site Name	Address	Total Energy	Commission Date	Management
On line	G. Dierx	Hobusstraat 3 Wessem Limburg Nederland	7267.01	2019-05-20	Power off Power on
On line	René Jansen	Lindenlaan 19 Odilienberg Limburg Nederland	8994.59	2019-05-20	Power off Power on
On line	Verbakel	Vesperstraat 31 Mierlo Noord-brabant Nederland	5257.34	2019-05-16	Power off Power on
On line	J.Staps	Godfried Bomanshof 5 Tilburg Noord-Brabant Nederland	17482.41	2019-05-15	Power off Power on
On line	B. ten Haaf	Prins Bernhardstraat 1 Kelpen-Oler Limburg Nederland	8209.24	2019-05-13	Power off Power on
On line	Klein Holte	Wethouder Campermanstraat 5 Toldijk Gelderland Netherlands	5809.61	2019-05-10	Power off Power on
Off line	WesselinkPV	Griftstraat Helmond Noord-brabant Netherlands	15237.11	2019-05-07	Power off Power on
On line	Partynia 145	Partynia Partynia Podkarpacki Polska	19396.48	2019-05-06	Power off Power on
On line	Neerven	Griftstraat Helmond Noord-brabant Nederland	6248.92	2019-04-24	Power off Power on
On line	Annendaal	Annendaalderweg 12a Maria Hoop Limburg Nederland	31890.26	2019-04-23	Power off Power on

③. After logging in the user name and password on the gne.gnetek.com monitoring system, click on the power station list to display the corresponding power station, and enter "Settings→Administration" to display the power station' s "Power Off" and "Power On" options, which will be displayed in the power station. When all the optimizer communicate well and the power station displays "online":

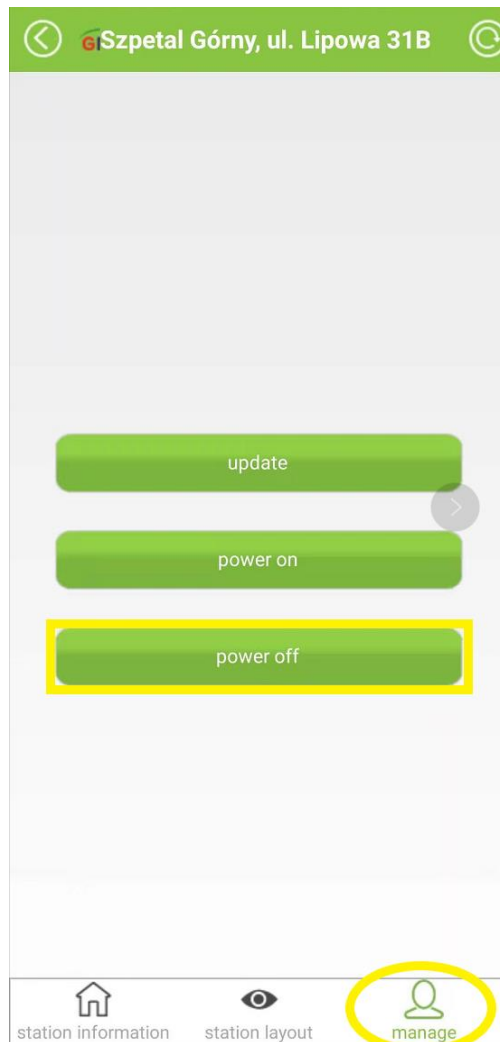
Click the red button "Power Off" and enter the account password to turn off the output of each optimizer in the photovoltaic power plant;

Click "Power On" and enter the account password to turn on all the outputs of the optimizer that are turned off.



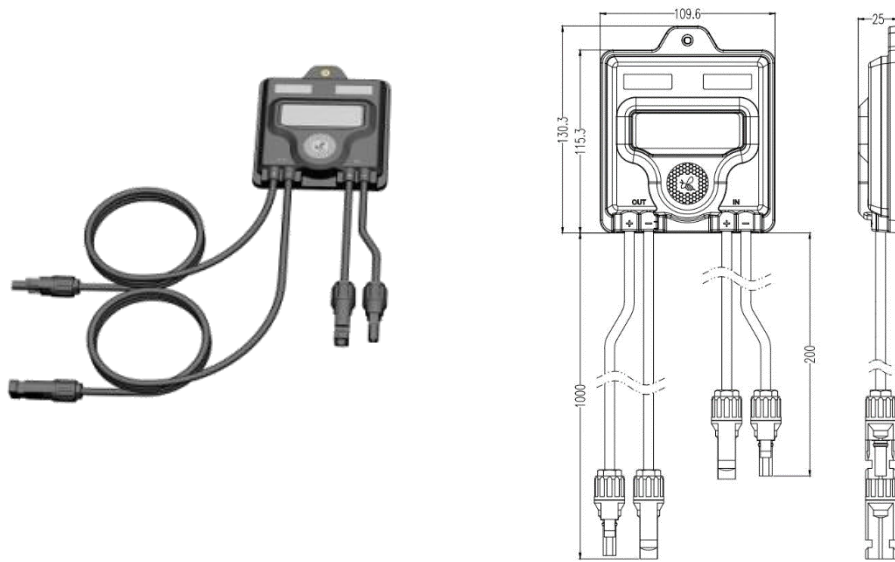
8. Shutdown Description

④ After logging in the user name and password on the GNETEK APP monitoring platform, the power station list displays the information of each completed power station, click on the corresponding power station' s "manage" interface, and then display "Update", "Power On", "Power Off" "Three options, when all the optimizer communicate well and the power station displays "online": Click "Power on" and enter the login password to turn off the output of each optimizer in the photovoltaic power station; Click "Power off" and enter the login password to turn on the output of the optimizer.



Appendix - Specification

Sole PV Power Optimizer Honeybee400/650/850



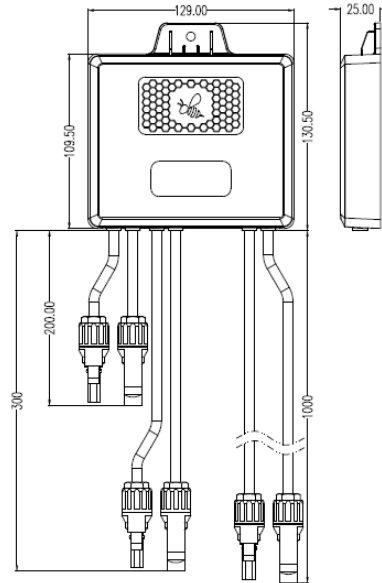
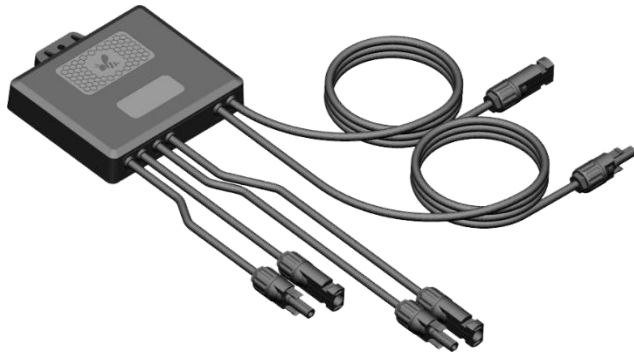
Features:

1. Module-level maximum power point tracking, increasing system power generation by 5-25%
2. Real-time monitoring of the operating status of each PV module, timely detection of faulty modules and accurate positioning
3. Module level shutdown to eliminate the high voltage and improve the safety of PV system
4. Safe and reliable, with overvoltage, overcurrent, overtemperature, short-circuit protection, no high temperature risk when any component fails
5. Can be installed on the new or existing PV systems, without changing the original line, easy to install and maintain
6. 25-year life design, matching PV modules

Code		Honeybee400	Honeybee650	Honeybee850
INPUT	No. of Module Connected	1		
	Max. Input Power	450W	650W	850W
	Max. Input Voltage	75V	75V	60V
	Max. Input Current	13A	15A	21A
	Working Voltage Range	12 ~ 75V	12 ~ 75V	14 ~ 60V
	MPPT Voltage Range	12 ~ 70V	12 ~ 75V	14 ~ 60V
	Short Current	15A	16A	23A
OUTPUT	Max. Output Power	450W	650W	850W
	Max. Output Voltage	75V	75V	60V
	Max. Output Current	13A	15A	21A
	Max. Conversion Efficiency	99.6%	99.5%	99.5%
SYSTEM	Max. System Voltage	1500V		
	Communication Mode	RF(2.4G/915M) / PLC		
Application	Working Temperature Range	-40 ~ +85°C		
	Relative humidity range	0 ~ 100%		
	Ingress Protection	IP68 / NEMA Type6P		
Certification	EMC	IEC61000-6-2 / IEC61000-6-3		
	Safety Regulations	IEC62109-1 (Class II safety)		
	Overvoltage Category	III		
Structure	Dimension	130.3×109.6×25 mm		
	Weight	530g		
	Input Length	200mm/Customized		
	Output	1000mm/Customized		
	Connector	Compatible with MC4		

Appendix - Specification

Dual PV Power Optimizer Honeybee800



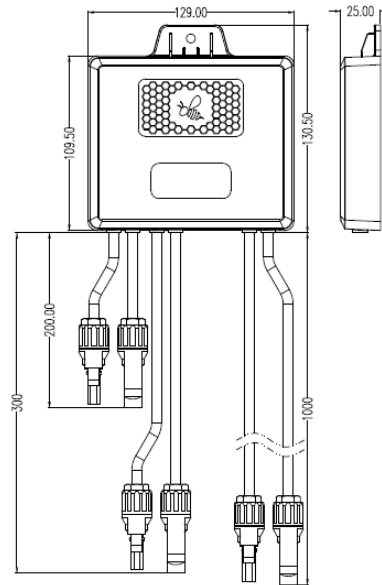
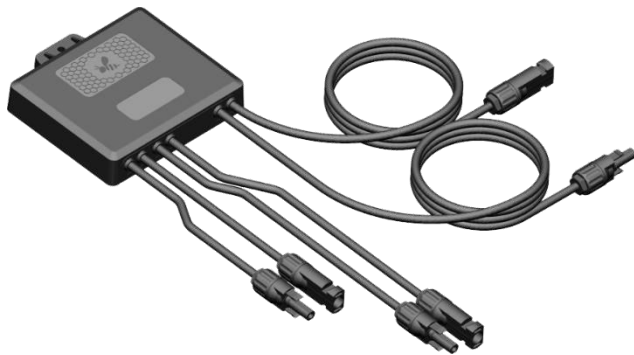
Features:

1. Module-level maximum power point tracking, increasing system power generation by 5-25%
2. Real-time monitoring of the operating status of each PV module, timely detection of faulty modules and accurate positioning
3. Module level shutdown to eliminate the high voltage and improve the safety of PV system
4. Safe and reliable, with overvoltage, overcurrent, overtemperature, short-circuit protection, no high temperature risk when any component fails
5. Can be installed on the new or existing PV systems, without changing the original line, easy to install and maintain
6. 25-year life design, matching PV modules

Code		Honeybee800
INPUT	No. of Module Connected	2
	Max. Input Power	450W / 450W
	Max. Input Voltage	75V / 75V
	Max. Input Current	13-75V / 13-75V
	Working Voltage Range	13-70V / 13-70V
	MPPT Voltage Range	13A
	Short Current	15A
OUTPUT	Max. Output Power	900W
	Max. Output Voltage	0-150V
	Max. Output Current	13A
	Max. Conversion Efficiency	99.6%
SYSTEM	Max. System Voltage	1500V
	Communication Mode	RF(2.4G/915M)
Application	Working Temperature Range	-40 ~ +85°C
	Relative humidity range	0 ~ 100%
	Ingress Protection	IP68 / NEMA Type6P
Certification	EMC	IEC61000-6-2 / IEC61000-6-3
	Safety Regulations	IEC62109-1 (Class II safety)
	Overvoltage Category	III
Structure	Dimension	130.5×129×25 mm
	Weight	810g
	Input Length	¹⁸ 20mm / 30mm
	Output	1600mm/Customized
	Connector	Compatible with MC4

Appendix - Specification

Dual PV Power Optimizer Honeybee1300



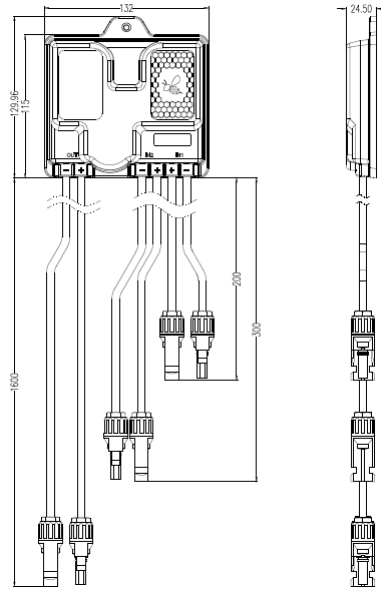
Features:

1. Module-level maximum power point tracking, increasing system power generation by 5-25%
2. Real-time monitoring of the operating status of each PV module, timely detection of faulty modules and accurate positioning
3. Module level shutdown to eliminate the high voltage and improve the safety of PV system
4. Safe and reliable, with overvoltage, overcurrent, overtemperature, short-circuit protection, no high temperature risk when any component fails
5. Can be installed on the new or existing PV systems, without changing the original line, easy to install and maintain
6. 25-year life design, matching PV modules

Code		Honeybee1300
INPUT	No. of Module Connected	2
	Max. Input Power	650W / 650W
	Max. Input Voltage	60V / 60V
	Max. Input Current	13-60V / 13-60V
	Working Voltage Range	13-60V / 13-60V
	MPPT Voltage Range	15A
	Short Current	16A
OUTPUT	Max. Output Power	1300W
	Max. Output Voltage	0-120V
	Max. Output Current	15A
	Max. Conversion Efficiency	99.6%
SYSTEM	Max. System Voltage	1500V
	Communication Mode	RF(2.4G/915M)
Application	Working Temperature Range	-40 ~ +85°C
	Relative humidity range	0 ~ 100%
	Ingress Protection	IP68 / NEMA Type6P
Certification	EMC	IEC61000-6-2 / IEC61000-6-3
	Safety Regulations	IEC62109-1 (Class II safety)
	Overvoltage Category	III
Structure	Dimension	130.5×129×25 mm
	Weight	810g
	Input Length	¹⁹ 20mm / 30mm
	Output	1600mm/Customized
	Connector	Compatible with MC4

Appendix - Specification

Dual PV Power Optimizer Honeybee1600



Features:

1. Module-level maximum power point tracking, increasing system power generation by 5-25%
2. Real-time monitoring of the operating status of each PV module, timely detection of faulty modules and accurate positioning
3. Module level shutdown to eliminate the high voltage and improve the safety of PV system
4. Safe and reliable, with overvoltage, overcurrent, overtemperature, short-circuit protection, no high temperature risk when any component fails
5. Can be installed on the new or existing PV systems, without changing the original line, easy to install and maintain
6. 25-year life design, matching PV modules

Code		Honeybee1600
INPUT	No. of Module Connected	2
	Max. Input Power	800W / 800W
	Max. Input Voltage	60V / 60V
	Max. Input Current	14-60V / 14-60V
	Working Voltage Range	14-60V / 14-60V
	MPPT Voltage Range	18A
	Short Current	20A
OUTPUT	Max. Output Power	1600W
	Max. Output Voltage	0-120V
	Max. Output Current	18A
	Max. Conversion Efficiency	99.5%
SYSTEM	Max. System Voltage	1500V
	Communication Mode	RF(2.4G/915M) / PLC
Application	Working Temperature Range	-40 ~ +85°C
	Relative humidity range	0 ~ 100%
	Ingress Protection	IP68 / NEMA Type6P
Certification	EMC	IEC61000-6-2 / IEC61000-6-3
	Safety Regulations	IEC62109-1 (Class II safety)
	Overvoltage Category	III
Structure	Dimension	130×132×24.5 mm
	Weight	820g
	Input Length	20mm / 30mm
	Output	1600mm / Customized
	Connector	Compatible with MC4

Appendix - Specification

Data Acquisition Unit
Swarm



Data Aggregation Device
Beehive



Features:

1. Intelligent dynamic networking and de-netting, with network self-healing function
2. With automatic primary route relay function
3. With data breakpoint resuming function
4. Local or remote shutdown of module output
5. 200 optimizers per Swarm and 5 Swarms per Beehive

Remark: Swarm and Beehive are used together with GNE RF optimizers

Code		Swarm
INPUT	Working Voltage	12V
	Working Current	25mA
	Power Consumption	≤0.3W
Installation Specification	Connector	RS485x2
	Wireless Range	(Swarm to Honeybee) ≤30m
	Wireless Band	915M / 2.4G Hz
	Max. No. of Bees	≤200
	Dimension	124x99x32mm
	Weight	155g
	Working Temperature Range	-40 ~ +85°C
Ingress Protection	IP65	
Code		Beehive
INPUT	Working Voltage	12V
	Working Current	250mA
	Power Consumption	≤3W
Installation Specification	Connector	RS485x2、RJ45、USB2.0
	No. of connectable Honeybees	≤1000
	No. of connectable Swarms	≤5
	Dimension	124x99x32mm
	Weight	300g
	Working Temperature Range	-40 ~ +85°C
	Ingress Protection	IP20