GNE module level optimization and monitoring system
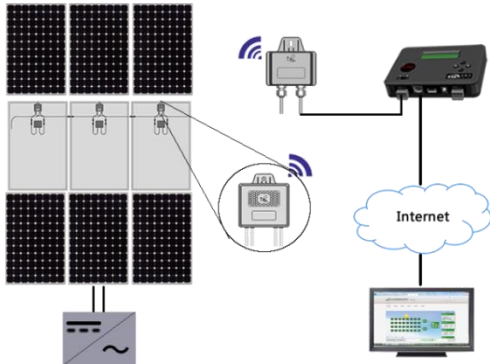
Installation User Manual

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

Notice

◆ This user manual is used to install and maintain GNE power optimizer models Honeybee 350/400/650/850, Honeybee 700/800/1600, PV Rapid Shutdown models Scoutbee800/800M/1600/1600M 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 montoring 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.
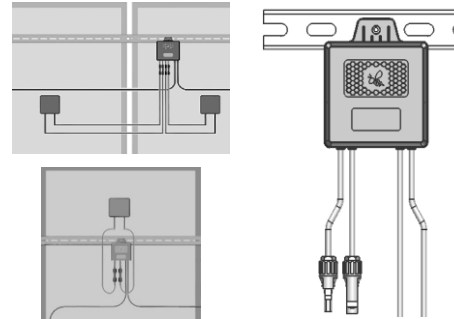
Installation Steps:

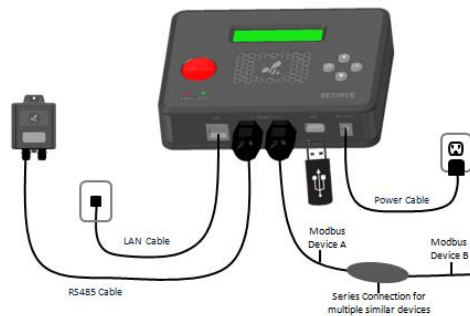| 1. Smart PV diagram (Apidae)	2. Register MACID of GNE models	3. Installation of optimizers	4. Installation of data acquisitoin unit (Swarm)

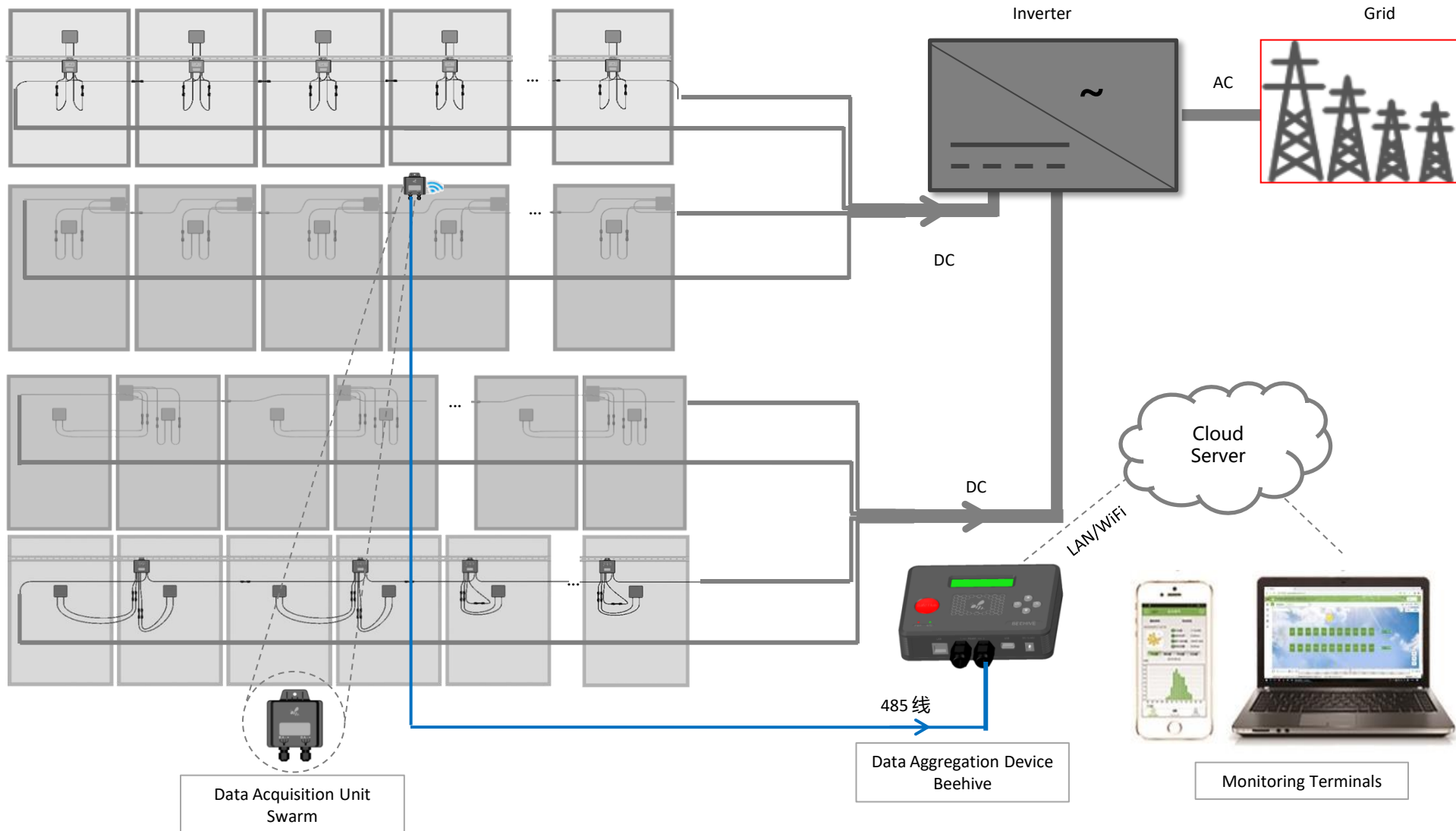| 5. Connection to Swarm and Beehive	6. Installation of data aggregation device (Beehive)	7. Setup in data cloud center (Honeypot)	8. Shutdown Description

1. Smart PV Diagram(Apidae)

Connection Description:
- Honeybee400/650/850: connect one PV panel, fixed on the racks or the edge of PV panel
- Honeybee800: connect Two PV panels, fixed on the racks or the edge 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


Honeybee400
Honeybee650
Honeybee850

Honeybee800

Inverter

Grid

AC

DC

DC

Cloud Server

LAN/WiFi

485线

Data Acquisition Unit Swarm

Data Aggregation Device Beehive

Monitoring Terminals

2. Register MACID of GNE models

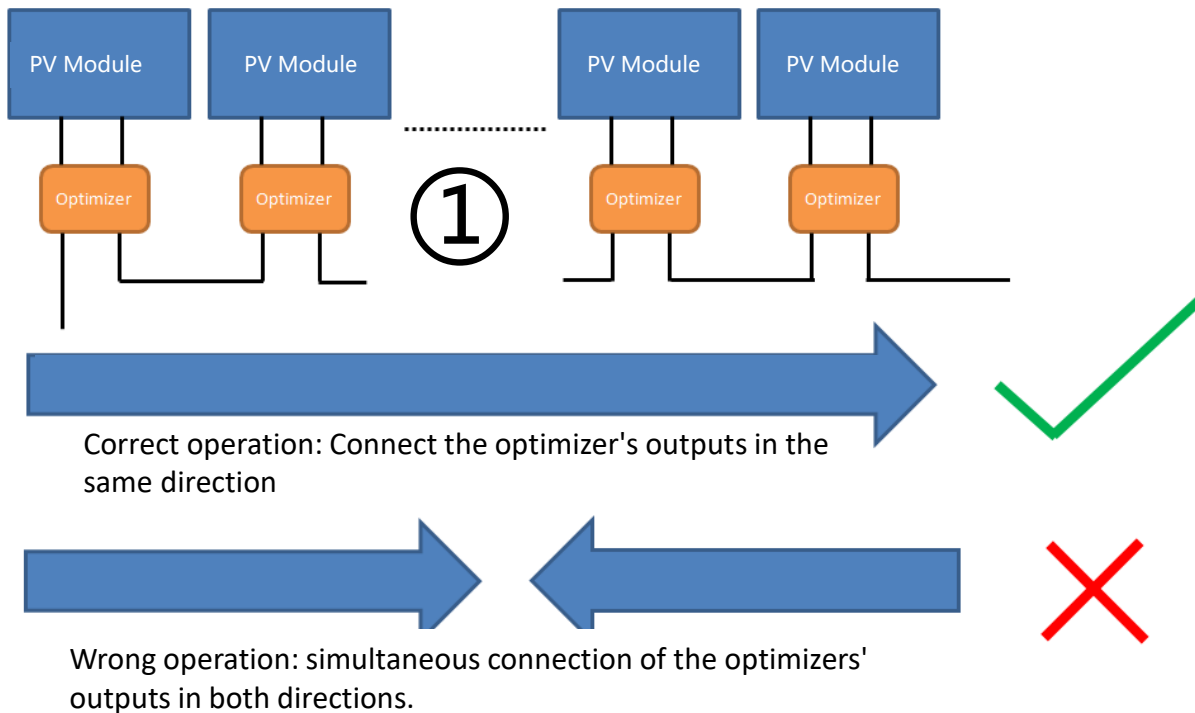①. Plan the installation location of each power optimizer or PV module monitor
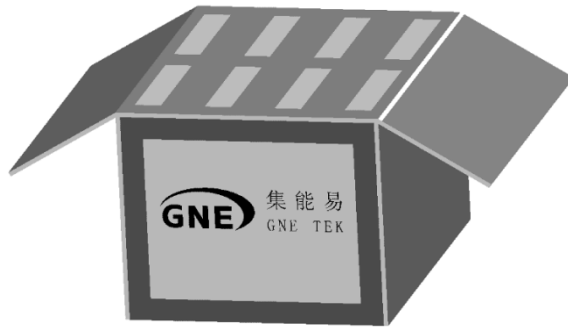
②. Take the power optimizer or PV module monitor and write down the 8-digit MACID number on the plant map, or string list, or construction drawing. And write down the 8-digit MACID number of Swarm and Beehive.

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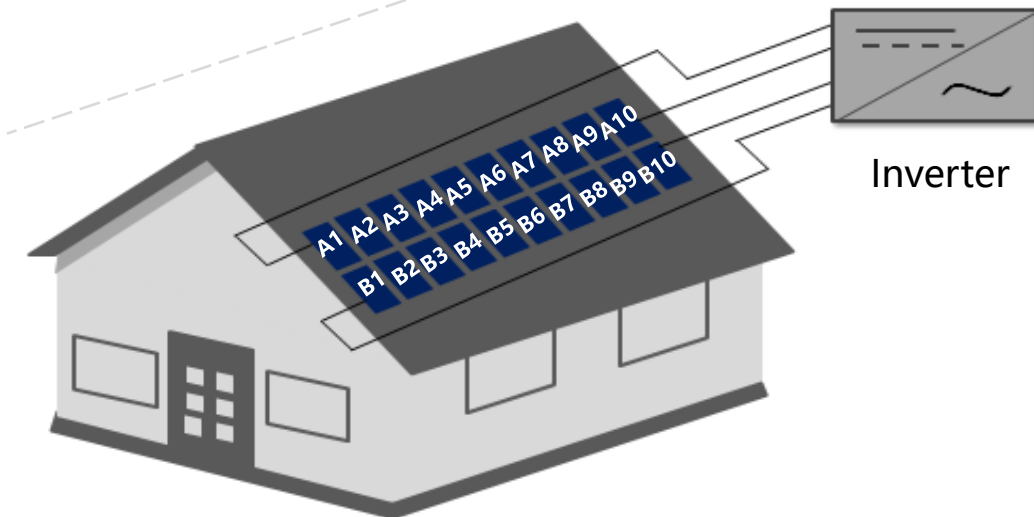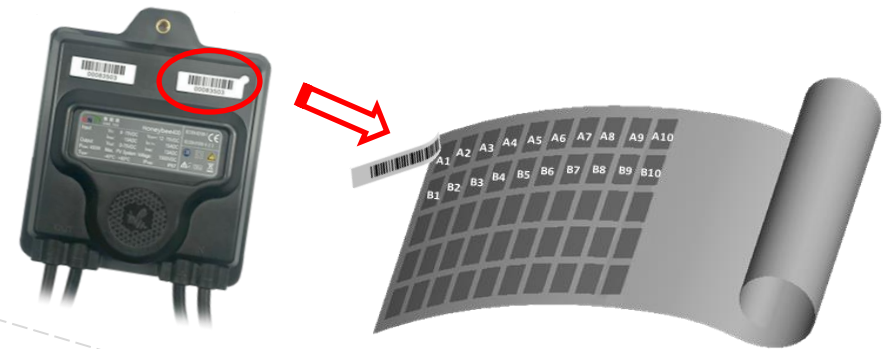
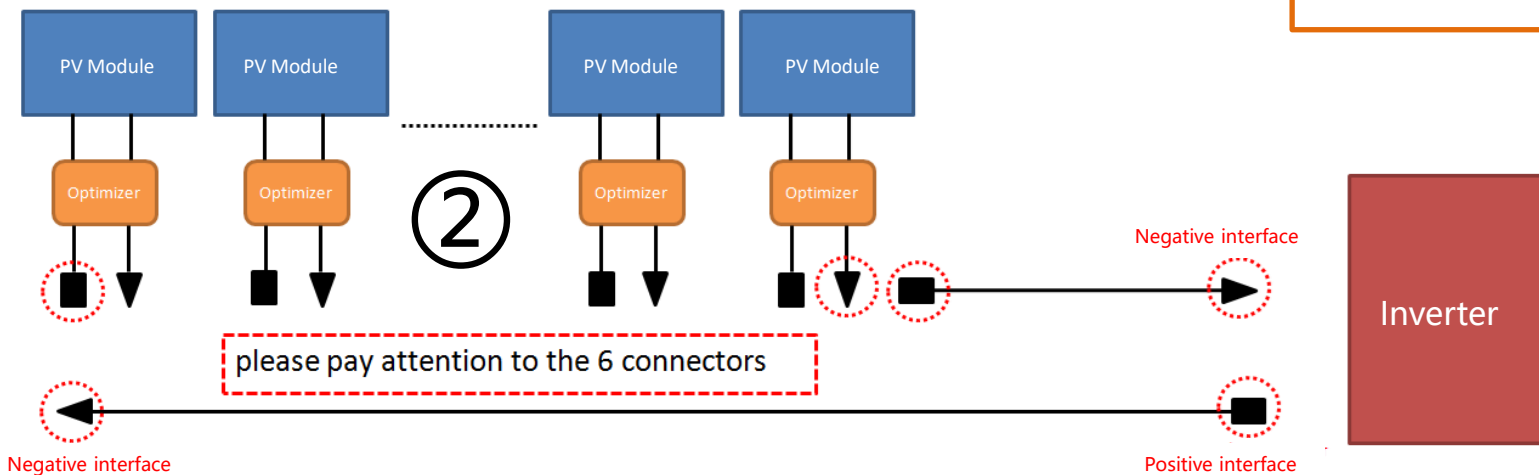③. The installation position of the power optimizers or the PV module monitors should accord to the previously recorded MACID order.

3. Installation of optimizers or PV monitors

➤ Precautions before installation

PV Module   PV Module   ....   PV Module   PV Module

Optimizer   Optimizer   ①   Optimizer   Optimizer

Correct operation: Connect the optimizer's outputs in the same direction ✓

Wrong operation: simultaneous connection of the optimizers' outputs in both directions. ✗

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).

PV Module   PV Module   ....   PV Module   PV Module

Optimizer   Optimizer   ②   Optimizer   Optimizer

Negative interface

please pay attention to the 6 connectors

Inverter

Negative interface

Positive interface

3. Installation of optimizers or PV monitors

①. Record the product MACID numbers of the optimizers or PV monitor on the system form or power station map or construction drawing to establish a power station in cludy center for tracking the operation status of each panel even the whole PV station.
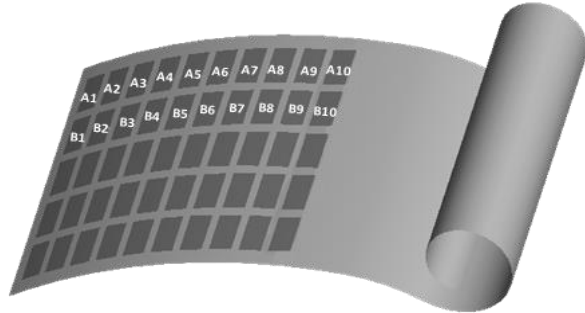
②. Use a screw or cable tie to position the optimizer or PV monitor one by one according to the registered MACID number position, and fix it on the bracket or panel frame. If the bracket has no mounting holes, it can be drilled and mounted with a hole size of 6mm.
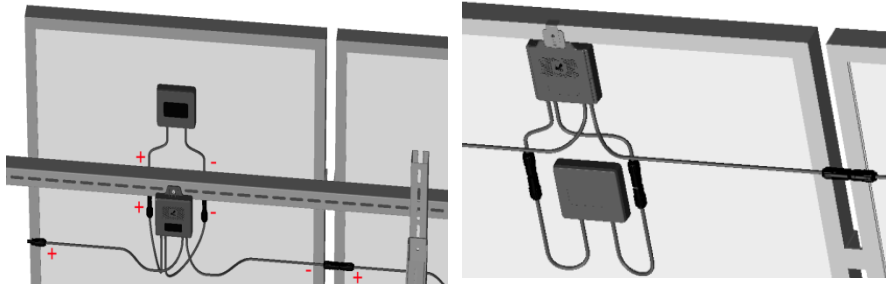
Remarks:
When connecting the dual module optimizer Honeybee800 to one PV panel, one pair of the input cables of the optimizer are connected the output ends of the PV module, and the other pair is directly docked.

③. The shorter pair of cables of the power optimizer or the PV monitor are the input terminals, and the longer pair of cables are the output terminals for the power optimizer or the PV monitor to be connected in series and finally connected to the inver 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 previous page for notes)

# 4. Installation of data acquisitoin 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

30m

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.

RS485

Connect next Swarm

RS485

Connect Beehive or the Swarm in the front
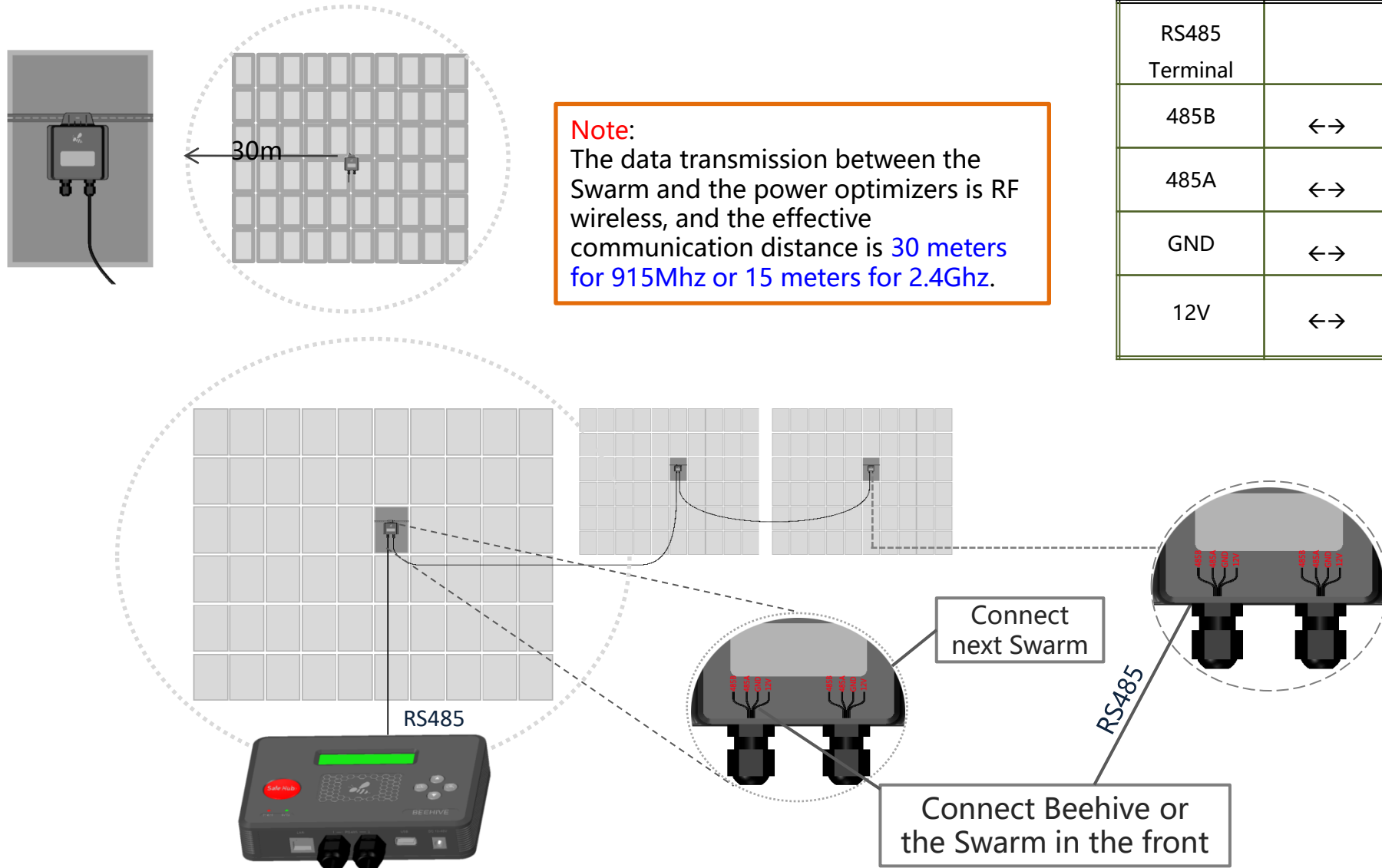
5. Connection to Swarm and Beehive

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)

100~240V

Power cord

Ethernet cable

Modbus Device A

Modbus Device B

RS485 cable

A third-part device
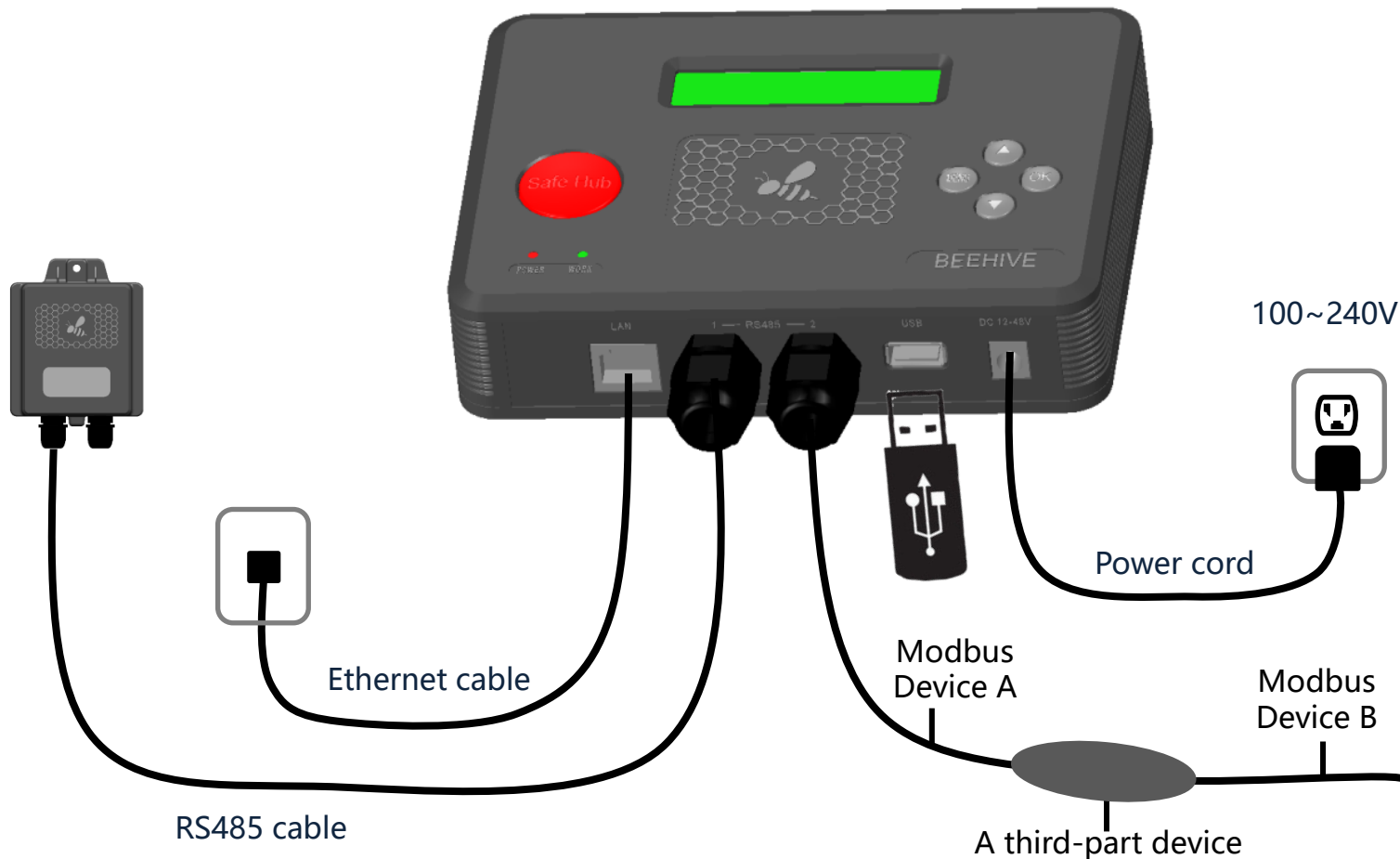
7. Setup in data cloud center (Honeypot)

Log in the GNE homepage: http://gne.gnetek.com, click on the monitoring center in the upper right corner
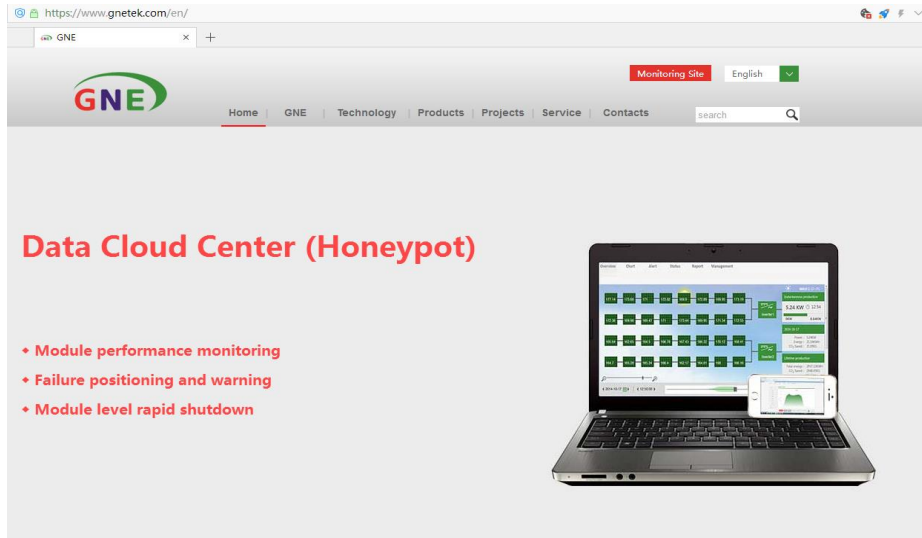
① Register New Account

Select language
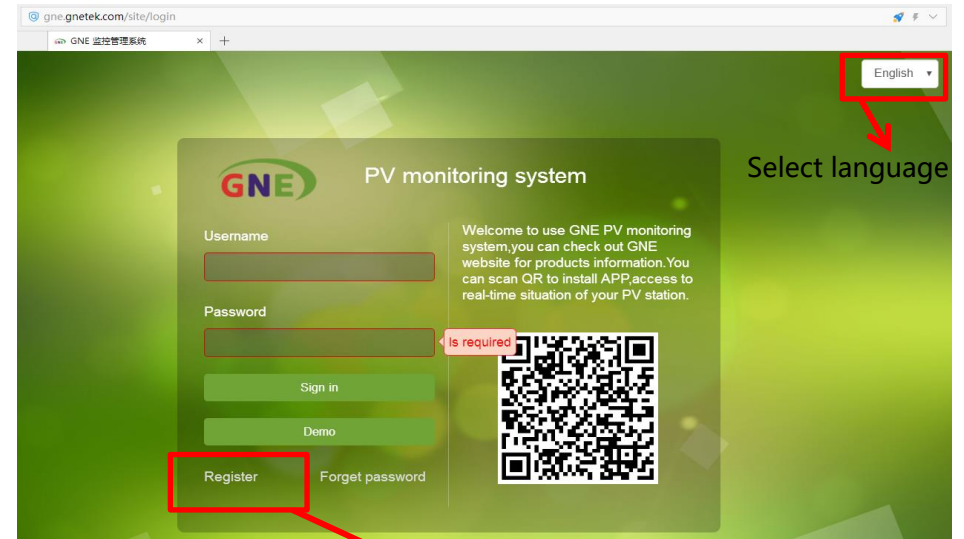
Register New account

② Fill in the information of the new account

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

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

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

7. Setup in data cloud center (Honeypot)

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

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:

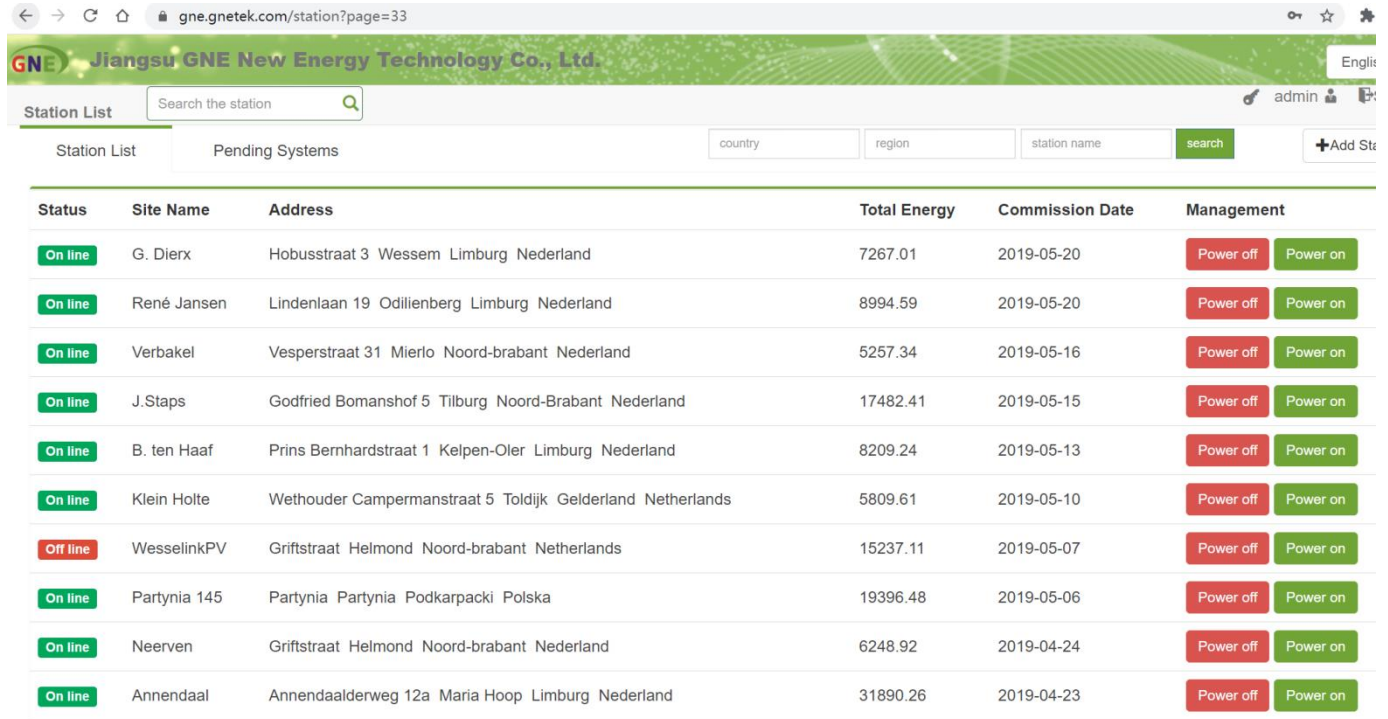Press the red button Safehub and the white up arrow on the right at the same time to turn off the optimizer output;

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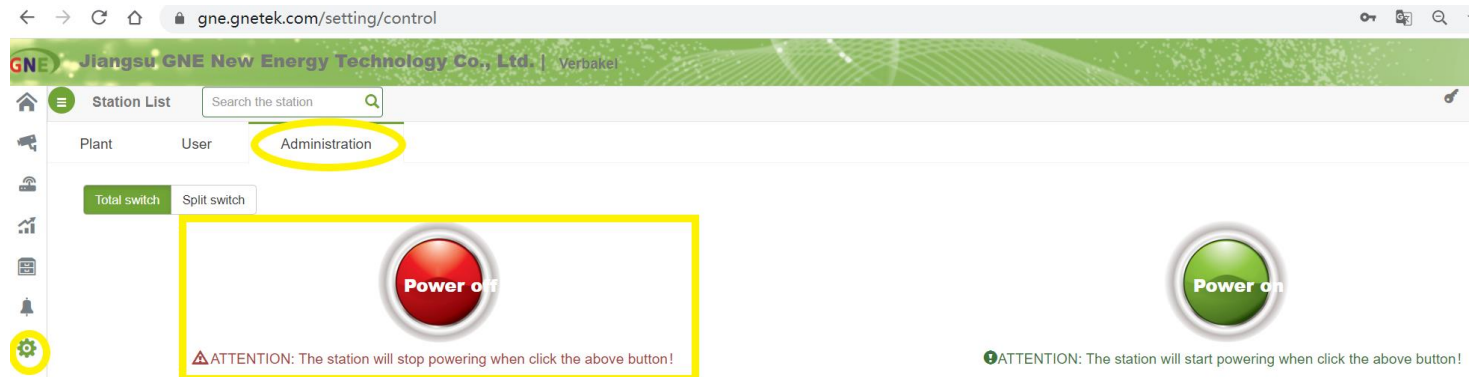Click "Power On" and enter the account password to turn on the output of the optimizer.

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.