



PV Module-Level Power Optimization Solution

GNE New Energy Technology Co., Ltd.

Decorative wavy lines in shades of red and grey sweep across the bottom of the slide.

Company Profile



100+
Employees

50+
Patents

60+
Countries

6GW+
Shipments

Jiangsu GNE New Energy Technology Co., Ltd. (abbreviated as GNE) was established in 2013. It is a high-tech leading enterprise of PV MLPE in China.

GNE has long focused on the R&D, manufacturing and sales of **PV storage inverters, power optimizers, intelligent rapid shutdown devices, module-level monitoring and PV communication systems**. The products have been widely used in around the world. It provides customers with a full set of solutions including Module-level power optimization, Module-level rapid shutdown and real-time data acquisition, remote monitoring, so that the factors that cause the decline in the power generation system can be overcome. At the same time, it largely increases the power generation efficiency, reduces the operation and maintenance costs, and improves the safety of the system.

Issues with Traditional Power Plants

04~07

Main Product Introduction

08~17

Solution Overview

18~23

Case Study

24~35

CONTENTS

01

Issues with Traditional Power Plants

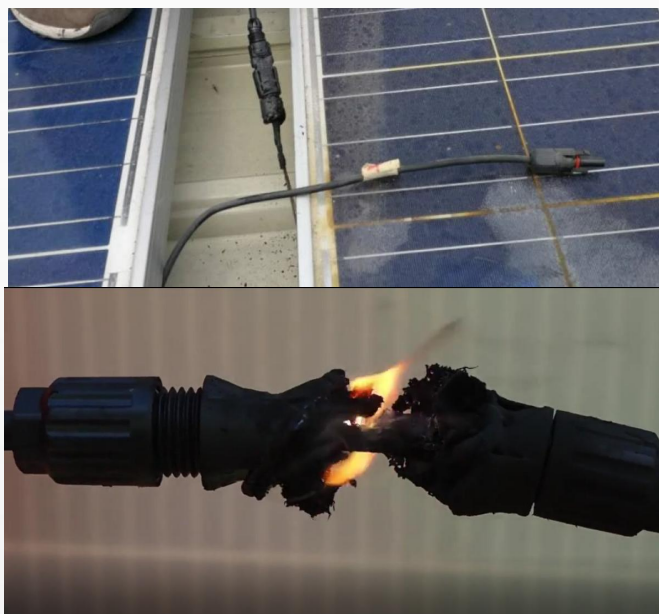
Safety Risks



- **Eliminate High-Voltage Hazards**
- **Ensure the Safety of Safeguarding Personnel and Asset**

DC Arc Fault Risks

Poor contact in PV module connectors or damaged insulation cables can easily lead to DC arc faults, which is a major cause of fires in PV systems.



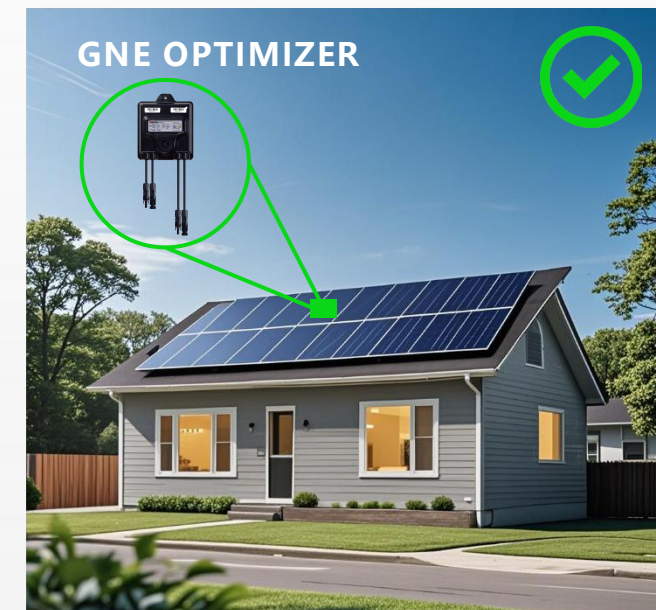
High DC Voltage

String DC voltage can reach up to 2000V, posing significant risks to installers and maintenance personnel. During a fire, the high-voltage DC string cannot be de-energized, and it will prevent rescue teams from using water to extinguish flames and leading to delayed damage control.



GNE Solution

GNE optimizers have automatic protection against overtemperature, overvoltage, and overcurrent. They enable local or remote shutdown within **1 second**, eliminating string high voltage and ensuring safety. Once the arc occurs, the optimizer will alarm.



Causes of Power Generation Loss

Various Shadings



Dust accumulation



Snow

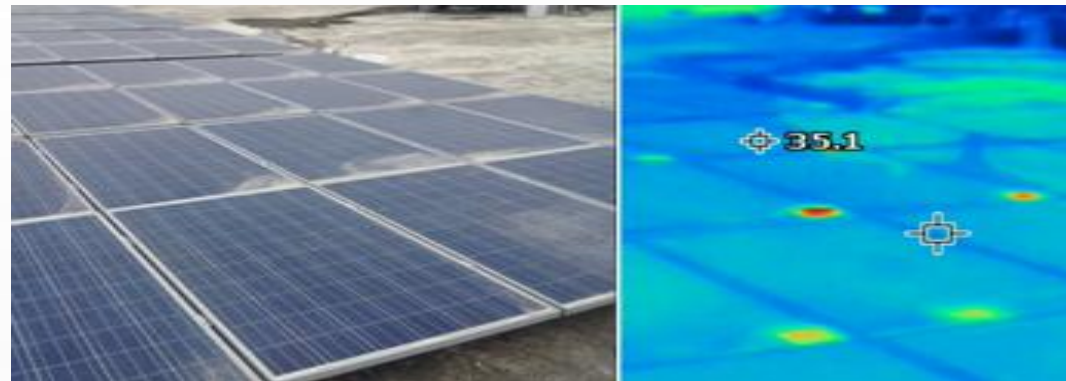


Tree shadows



Building obstructions

Dust buildup & hot spots



Inconsistent module Aging



Different Orientations



GNE optimizers recover the lost energy caused by module mismatch, ensuring maximum power harvest even under uneven shading or aging conditions.

O&M Efficiency and Cost

Traditional photovoltaic operation and maintenance

Rely on manual inspection, need to carry professional equipment to the top of the inspection, time-consuming, high cost. failure discovery lag (average 3-7 days) → long processing cycle (4-6 hours/place)

Projects and Programs	Traditional manual inspection	GNE Monitoring System	Saving effect
Single inspection cost	500-1000 RMB/time (including equipment and labor)	0 RMB (automatic real-time monitoring)	100% savings
Annual inspection frequency	4-6 times (need to go to the station regularly)	All-weather automatic monitoring	80% reduction in upstations
Hidden Losses	5-10% of generation (not detected in time)	<1% (real-time alarms)	Recover 4-9% of revenue



Optimizer Smart O&M:

- ✓ Module-level monitoring + fault location in seconds, O&M efficiency is greatly improved
- ✓ Remote diagnosis rate of 100%, reducing the need to go to the power plant site by 60%.
- ✓ Mobile phone APP automatic alarm, hidden losses reduced to less than 1%.

Case: 1MW industrial and commercial rooftop power plant

- Traditional: 2 inspections per year, 24 visits/day, cost of about 10,000 RMB, hidden loss of about 40,000 RMB.
- GNE: After the first year of hardware investment, the annual operation and maintenance cost is reduced to 0.



02

Main Product Introduction

■ Products Introduction



Honeybee650 2.4G/PLC
Honeybee850 2.4G/PLC/HPLC
Sole Power Optimizer

Honeybee1600 2.4G/HPLC
Dual Power Optimizer



Swarm 2.4G / PLC
Beehive-N
Data Acquisition Unit
Data Aggregation Device



Beetrans-Max-M
HPLC Shutdown Controller

Solutions: Module-Level Optimization + Shutdown + Monitoring



One power optimizer connects to one or two solar module(s) and tracks the maximum power point of the module in real-time and ensures maximum power output, recovering the power loss caused by module mismatch.

Automatic shutdown when the module overloads.

Each optimizer has built-in communication module.

The data acquisition unit Swarm communicates optimizers by RF or HPLC, acquires real-time operating data (voltage, current, power, temperature) of each module, and sends to the data aggregation device Beehive by RS485 cable.

Beehive uploads the data to the cloud server by LAN, Wi-Fi or 4G.

The optimizer performs sub-second scanning of PV module and promptly sends alerts and accurate location information in case of any module abnormalities. Users can receive notification on web or mobile device.

Sole Power Optimizer



- **Increase Efficiency:** Module-level MPPT tracking to increase system power generation by 5-30%
- **Safe and Reliable:** Functions with over-voltage, over-current, and over temperature protection, module level shutdown with one click to eliminate the danger of high voltage
- **Precise Positioning:** Real-time monitoring of each module and the entire station, timely failure detection and accurate positioning
- **Convenient Installation:** It can be directly connected to the existing PV power system without changing the original line
- **Ultra-long Life:** 25-year lifespan, match PV modules

Model		Honeybee650
Input		
Max. Input Power		650 W
Max. Input Voltage		75 VDC
Operating Voltage Range		12~75 VDC
MPPT Voltage Range		12~60 VDC
Isc		16 A
Max. Input Current		15 A
Output		
Max. Output Power		650 W
Voltage Range		0~75 VDC
Max. Output Current		15 A
Max. Efficiency		99.50%
Others		
Max. System Voltage		1500 VDC
Operating Temperature Range		-40~+85 °C
Relative Humidity		0~100%
Ingress Protection		IP68
Protective Class		II
Communication		868M/2.4G/PLC
Installation Specification		
Cable length		Input: 160 mm *2 / Output: 1000 mm *2 (or Customizable)
Size		130.3x109.6x25 mm
Weight		530g
Connector (Input/Output)		Compatible with Staubli MC4 or Customizable
Standard / Certification		
CE		IEC/EN 62109-1:2010
EMC		EN 301 489-1;EN 301 489-3; EN/IEC 61000-6-1;EN/IEC 61000-6-3
RoHS		2011/65/EU ; (EU) 2015/863
REACH		REACH (EC) No 1907/2006 Compliant
WEEE		2012/19/EU ; EN 50419:2022

※ The working status of PLC optimizers can be customized (Default on or off)

Sole Power Optimizer



- **Increase Efficiency:** Module-level MPPT tracking to increase system power generation by 5-30%
- **Safe and Reliable:** Functions with over-voltage, over-current, and over temperature protection, module level shutdown with one click to eliminate the danger of high voltage
- **Precise Positioning:** Real-time monitoring of each module and the entire station, timely failure detection and accurate positioning
- **Convenient Installation:** It can be directly connected to the existing PV power system without changing the original line
- **Ultra-long Life:** 25-year lifespan, match PV modules

Model		Honeybee850
Input		
Max. Input Power		850 W
Max. Input Voltage		75 VDC
Operating Voltage Range		12~75 VDC
MPPT Voltage Range		12~65 VDC
Isc		25 A
Max. Input Current		22 A
Output		
Max. Output Power		850 W
Voltage Range		0~75 VDC
Max. Output Current		22 A
Max. Efficiency		99.50%
Others		
Max. System Voltage		1500 VDC
Operating Temperature Range		-40~+85 °C
Relative Humidity		0~100%
Ingress Protection		IP68
Protective Class		II
Communication		2.4G/PLC/HPLC
Installation Sprcification		
Cable length		Input: 800mm, 200mm / Output: 1000 mm *2 (or Customizable)
Size		118x111x25 mm
Weight		740 g
Connector (Input/Output)		Compatible with Staubli MC4 or Customizable
Standard / Certification		
CE		IEC/EN 62109-1:2010
EMC		EN 301 489-1;EN 301 489-3; EN/IEC 61000-6-1;EN/IEC 61000-6-3
RoHS		2011/65/EU ; (EU) 2015/863
REACH		REACH (EC) No 1907/2006 Compliant
WEEE		2012/19/EU ; EN 50419:2022

※The working status of PLC optimizers can be customized (Default on or off)

Dual Power Optimizer



- **Increase Efficiency:** Module-level MPPT tracking to increase system power generation by 5-30%
- **Safe and Reliable:** Functions with over-voltage, over-current, and over temperature protection, module level shutdown with one click to eliminate the danger of high voltage
- **Precise Positioning:** Real-time monitoring of each module and the entire station, timely failure detection and accurate positioning
- **Convenient Installation:** It can be directly connected to the existing PV power system without changing the original line
- **Ultra-long Life:** 25-year lifespan, match PV modules

Model	Honeybee1400	Honeybee1600
Input		
Support Modules	2	2
Max. Input Power	700W/700W	800W/800W
Max. Input Voltage	60VDC/60VDC	60VDC/60VDC
Operating Voltage Range	13~60VDC/13~60VDC	13~60VDC/13~60VDC
MPPT Voltage Range	13~55VDC/13~55VDC	13~55VDC/13~55VDC
Isc	20A/20A	23A/23A
Max. Input Current	18A/18A	20A/20A
Output		
Max. Output Power	1400 W	1600 W
Voltage Range	0~120 VDC	0~120 VDC
Max. Output Current	18 A	20 A
Max. Efficiency	99.50%	99.50%
Others		
Max. System Voltage	1500 VDC	
Operating Temperature Range	-40~+85 °C	
Relative Humidity	0~100%	
Ingress Protection	IP68	
Protective Class	II	
Communication	2.4G/PLC/HPLC	
Installation Sprcification		
Cable length (Input/Output)	Input 1: In1- 200 mm / In1+ 900 mm Input 2: In2- 1100 mm / In2+ 300 mm Output: Out- 2800 mm / Out+ 200 mm	
Size	128x113x25 mm	
Weight	970 g	
Connector (Input/Output)	Compatible with Staubli MC4 or Customizable	
Standard / Certification		
CE	IEC/EN 62109-1:2010	
RoHs	2011/62EU 2015/863EU	
REACH	EU REACH Regulation No 1907/2006 Article 33	
WEEE	EN 50419:022	

※The working status of PLC optimizers can be customized (Default on or off)

Monitoring Kit



Data Acquisition Unit
Swarm 2.4G / PLC



Data Aggregation Device
Beehive-N

- **Diverse combination:** Automatic dynamic networking, with network autonomous domain function
- **Multiple Internet Access:** Supports LAN/WiFi connection
- **One-click Remote Shutdown:** Intelligent monitoring management platform, users can remotely turn off the output of modules with one click
- **Strong Anti-interference:** Support data resumption, solve data packet loss problem

Model Swarm	
Basic Parameters	
Working Voltage	12 Vdc
Working Current	25 mA
Power Consumption	≤0.3 W
Installation Sprcification	
Connector	RS485*2
Wireless Range	20~50m
Wireless Band	868M/2.4G Hz
Max. No. of Bees	≤200
Size	124x99x32 mm
Weight	158 g
Working Temperature	-40~+85 °C
Ingress Protection	IP65
Standard / Certification	
CE	IEC/EN 62109-1:2010
REACH	REACH (EC) No 1907/2006 Compliant
WEEE	2012/19/EU ; EN 50419:2022
RoHS	2011/65/EU ; (EU) 2015/863

Model Swarm-PLC	
Basic Parameters	
Support Strings	4
Maximum Input Current Per String	20 A
Maximum System Voltage	1000V / 1500V
Voltage & Frequency	12 Vdc
Installation Sprcification	
Connector	Compatible with Staubli MC4
Size	140x99x50.4 mm
Weight	470 g
Working Temperature	-40~+85 °C
Ingress Protection	IP65
Function	
Communication	PLC、RS485
Support Production Models	Optimizer (PLC Version)
Standard / Certification	
CE	IEC/EN 62109-1:2010
REACH	REACH (EC) No 1907/2006 Compliant
WEEE	2012/19/EU ; EN 50419:2022
RoHS	2011/65/EU ; (EU) 2015/863

Model Beehive-N	
Basic Parameters	
Working Voltage	100~240 VAC
Communication Mode	RS485
Communication Distance	1000 m
Installation Specifications	
Interfaces	RS485*2、RJ45
Maximum Number of Connected Collectors	≤ 5 units
Dimensions	220x210x66 mm
Weight	860 g
Operating Temperature Range	-25 ~ +65 °C
Relative Humidity Range	0~100%
Protection Class	NEMA Type 3R / IP65
Standard / Certification	
CE	IEC/EN 62109-1:2010; UL 1741; UL 3741:2020; CSA C22.2 No.330:2023
ETL	CSA C22.2 No.107.1:2016
RoHS	2011/65/EU; (EU) 2015/863

Monitoring Kit

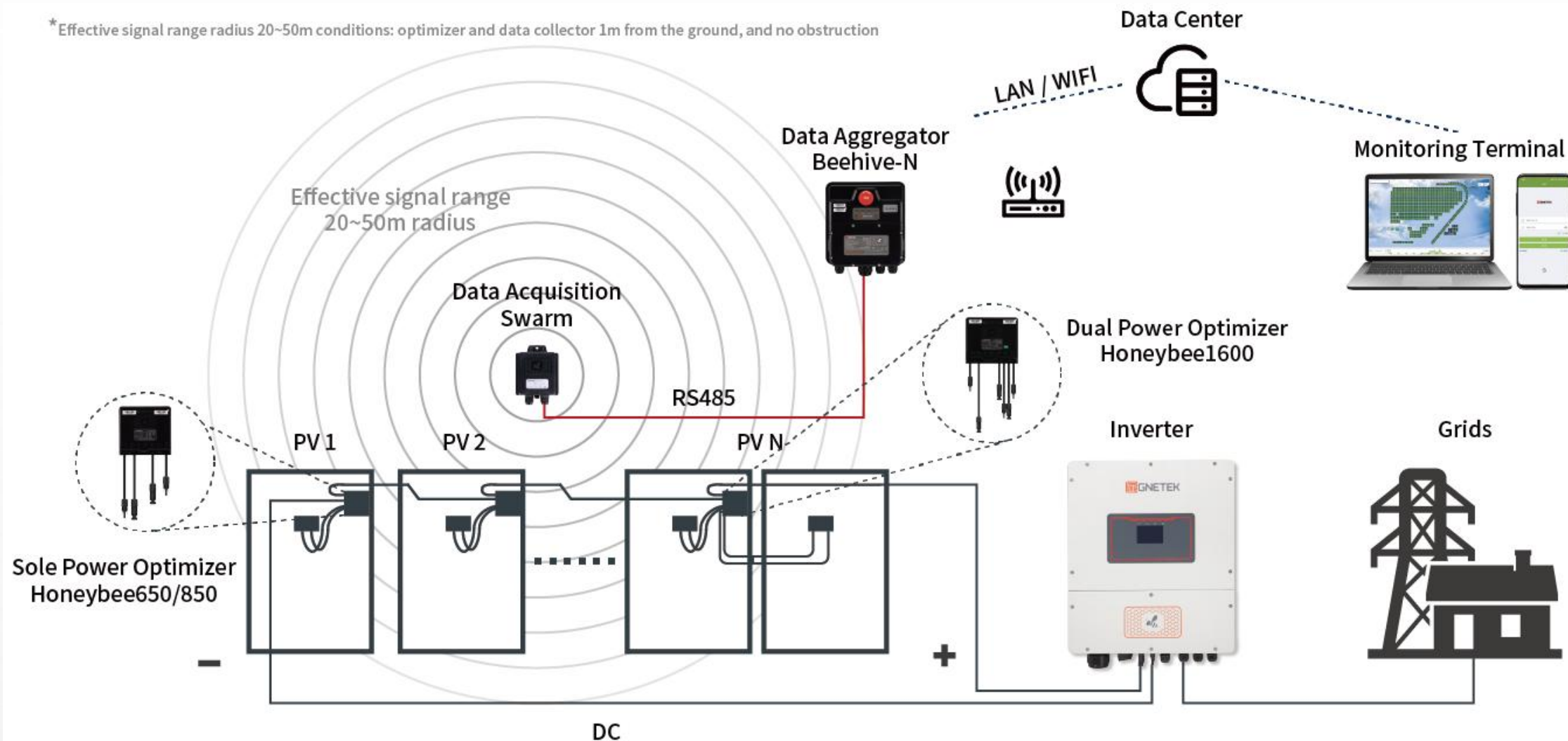


HPLC Shutdown Controller
Beetrans-Max-M

- Beetrans-Max-M achieves **module-level monitoring and rapid shutdown** functionality to HPLC version optimizers.
- It can be equipped with 4 pairs of magnetic rings and supports up to 32 strings of up to 500 Optimizers.
- Pressing the red “Emergency Button” or disconnecting AC power to the Beetrans-Max-M will shut off the output of each Optimizer.
- Complied with NEC 2017&2020 690.12 requirements and UL1741 /UL3741 regulations, Module-level rapid shutdown within 1 second
- Multiple Internet Access via LAN/WiFi connection

Model		Beetrans-Max-M
Specification		
Maximum No. of Core equipped		4pairs
Maximum String Voltage		1500 V
Maximum Controlled Optimizer Count		500
Communication method		HPLC
Access to Internet		LAN /WiFi/4G
Application		
Working temperature range		-25~+65 °C
Relative Humidity range		0~100%
Ingress Protection		NEMA Type3R / IP65
Maximum Supported Cable Length		300 m
Certification		
Regulations		NEC 2017&2020 690.12
CE		NEC2017/2020 690.12B
ETL		UL1741 / UL3741
RoHS		CSA C22.2 No.330
Structure		
Size		220x210x66 mm (excluding cable length)
Weight		860 g
Power Supply Parameters		100–240 VAC
Magnetic Ring Parameters		
Inside diameter / Outside diameter		29mm / 65mm
Maximum current per ring		160A
Maximum Supported String Count per Ring		≤5

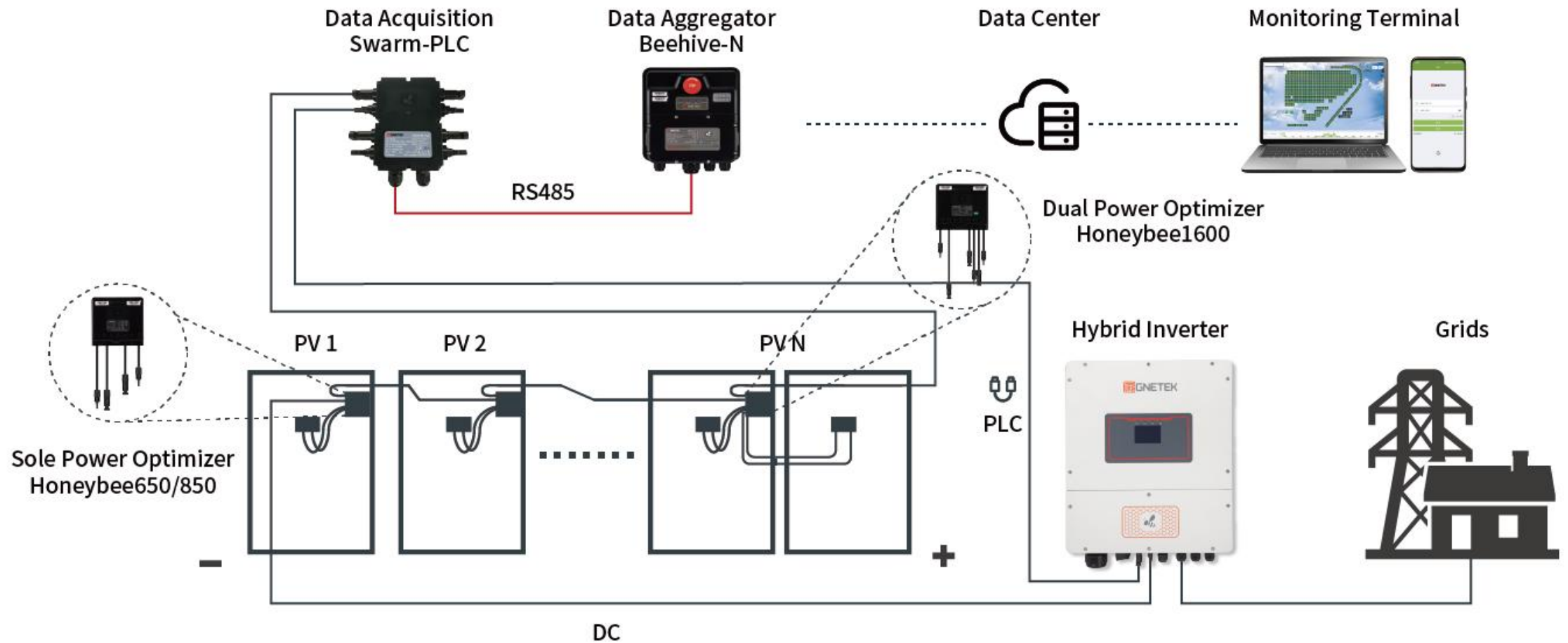
Optimizer Wireless Communication Monitoring System Diagram



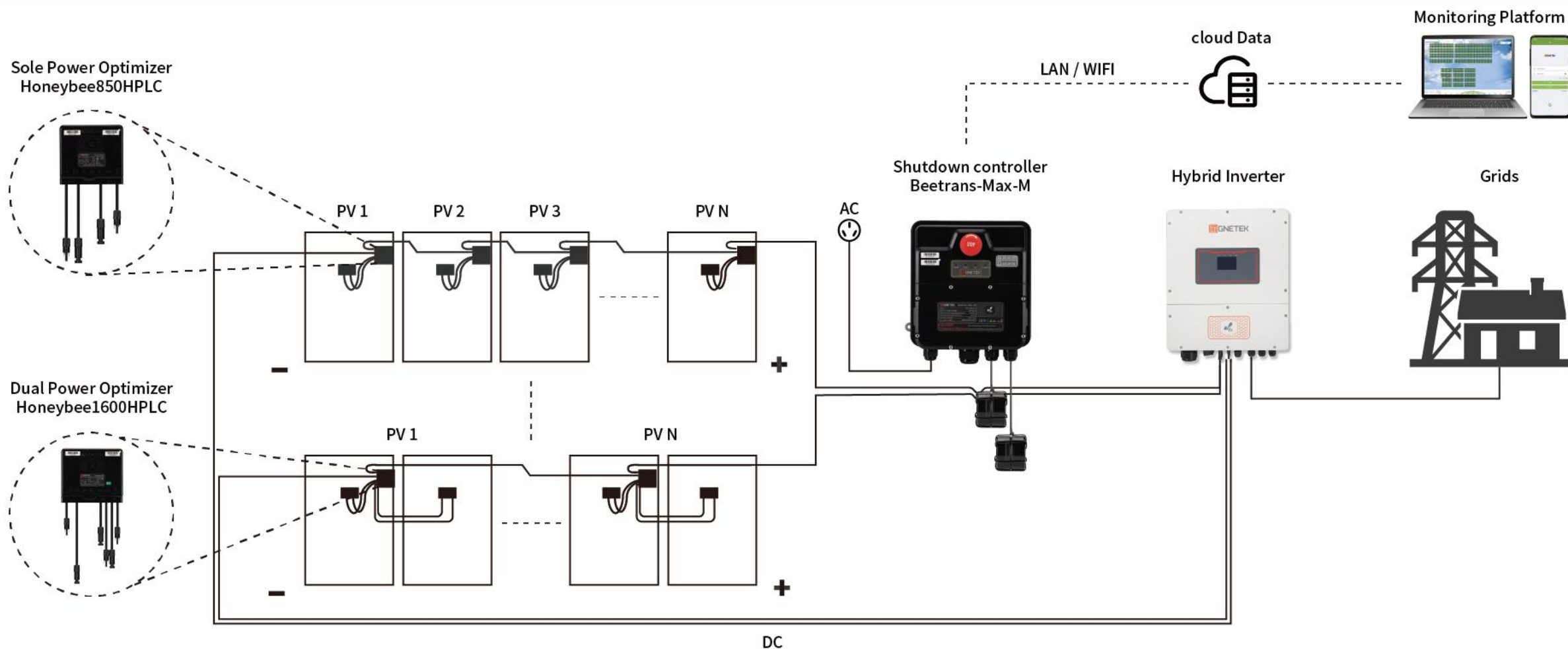
Optimizer PLC Communication Monitoring System Diagram



*Honeybee500/650 with Beebox-H , Honeybee850 with Swarm-PLC



Optimizer HPLC Communication Monitoring System Diagram



03**Solution Overview**

Optimization Principle

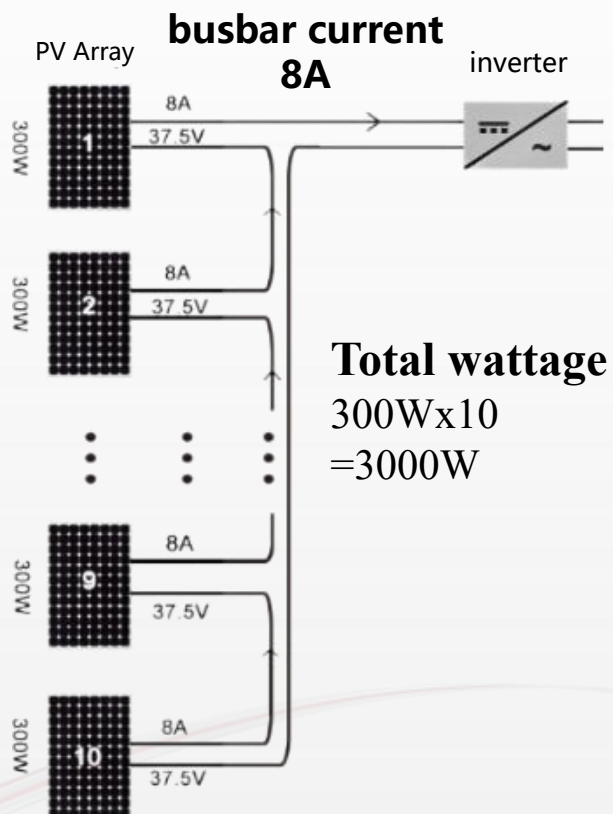


Barrel Effect: The string current in a series circuit depends on the current of the shading module.

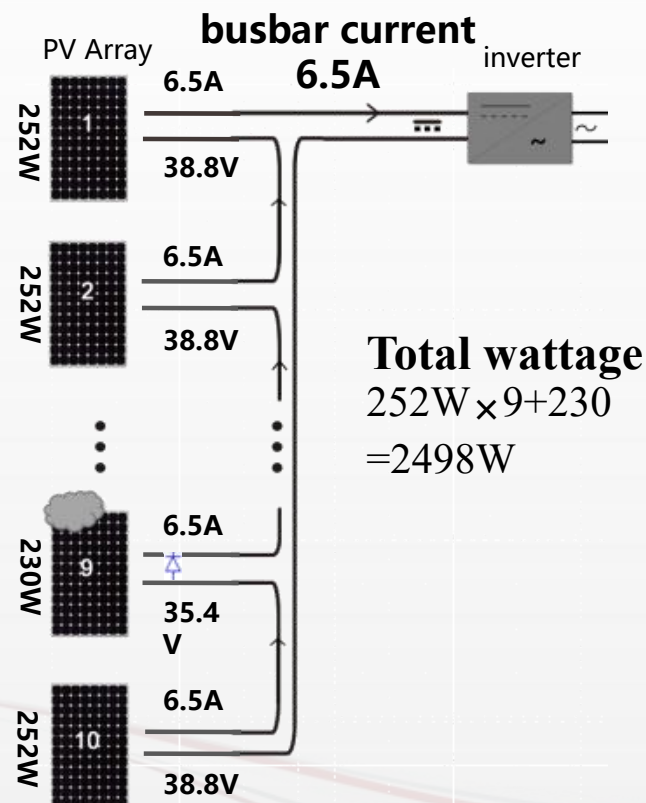
Optimization principle: By reducing voltage and increasing current at the output end of the obstructed module's optimizer, the busbar current is increased, thereby increasing power generation of the system.



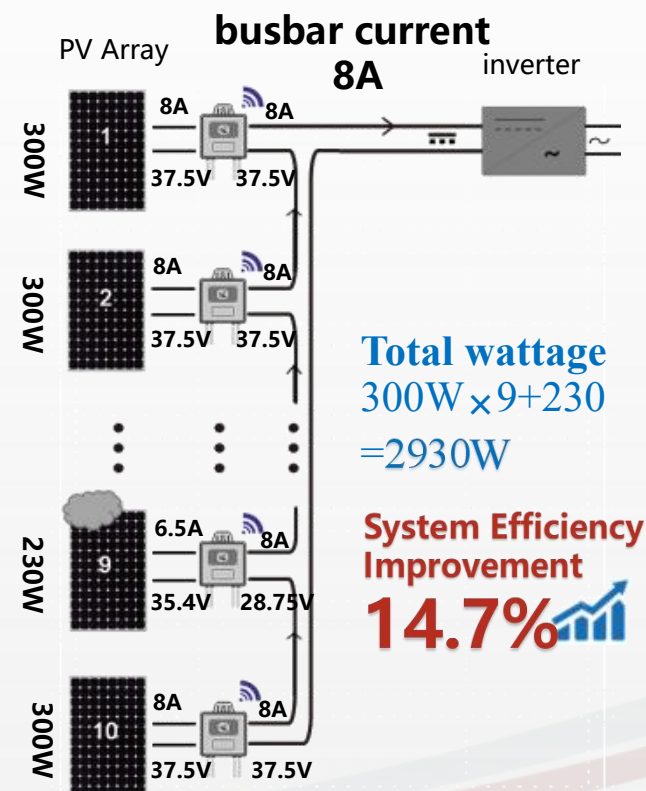
Ideal State



Reality



GNE Optimization



Data Cloud Monitoring Platform



- **Local and remote shutdown:** When a fire occurs, besides the on-site shutdown of the modules, users can also shut down remotely through APP or Web
- **Real-time monitoring and alarming:** Users can monitor the data of each module in real time. When a problem occurs, it will automatically alarm and quickly locate the faulty module
- **Data administration:** It is convenient for users to understand the current and historical operating status of every detail of each power station

[Link to GNE
Monitoring Platform](#)



Cloud Center (PC/Mobile)
Honeyport

Real time monitoring



Power Station Alarm

报警时间	报警类型	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态
2014-08-08 10:00:00	报警	报警内容	报警位置	报警状态

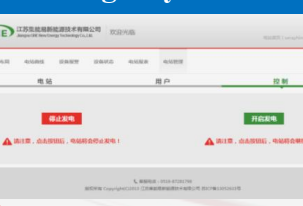
Data aggregation



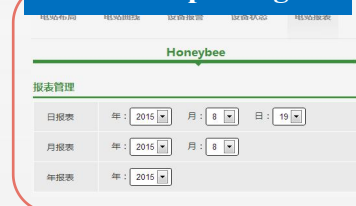
Data Query



Emergency shut-off



Data reporting



Mobile APP Download



Android



Apple



Google



Asia:

- China
- Japan
- South Korea
- India
- Pakistan
- Bangladesh
- Thailand
- Malaysia
- Singapore
- Indonesia
- Philippines
- Vietnam

Europe:

- United Kingdom
- Ireland
- France
- Germany
- Italy
- Spain
- Portugal
- Belgium
- Netherlands
- Luxembourg
- Switzerland
- Austria
- Czech Republic
- Slovakia
- Hungary
- Poland
- Romania
- Bulgaria
- Greece
- Turkey
- Norway
- Denmark
- Sweden
- Finland

Africa:

- Morocco
- South Africa
- Kenya
- Nigeria
- Côte d'Ivoire
- Ghana

America:

- United States
- Canada
- Mexico
- Belize
- Panama

Oceania:

- Australia
- New Zealand

Why Choose Optimizer?

Module-level MPPT

- Optimize the power output of each PV module, which can increase power generation by 5~30%

Module-level Monitoring

- Every detail of the power station is monitored in real time.
- Alarmed in the event of a problem, and faulty modules are accurately located.

Module-level rapid shutdown

- Default shutdown status to ensure the personal safety of installation and maintenance personnel;
- Once fire occurs, users can remotely shut down the output of the optimizer to facilitate the spraying.

Big Data Management

- Collect generation data of inverter and each module in real time, and upload to the server, support data analysis and historical data query, etc.

Save on O&M costs

- Simplified design to fully utilize the roof area
- Save monitoring room and staff cost

Why choose GNE?

Leading Position

The first optimizer and RSD manufacturer in China, with the largest domestic shipment volume, exceeding 6 million units.

Global Certification

Passed UL, CE and other international certifications, deeply trusted by customers.

Rich Experience

Successfully applied to PV power stations of different scales and types in more than 60 countries around the world.

One-stop Service

Provide optimizer/rapid shutdown device + inverter + monitoring platform.

04 Cases

Kangdawei 150kW rooftop PV project in Liyang Jiangsu
594 Sole Optimizers installed in September 2014



Junda 500KW rooftop PV plant in Minhang Shanghai

1200 Dual Optimizers Installed in May, 2016



Xinjiang New Energy 20MW Ground PV Plant in Fukang Xinjiang

4120 Sole Optimizers installed in October 2016

TEBA 500kw inverter 2pcs + GCL 250w Module 4120pcs



■ Case

Project: 875KW Ground PV Power Station in Takasaki City, Japan
1700 Sole Optimizers installed in September 2017



Project: 5MW Water-Floating PV Plant in Bangkok, Thailand
16,048 Sole Optimizers installed in October 2018



14MW Water-Floating PV Plant in Laos

22,580 Dual Optimizers installed in August 2019



Three Gorges New Energy 265MW PV Frontrunner Project in Shanxi Tongchuan

3080 Sole Optimizers installed in July 2019

Sungrow 125kw inverter 8pcs +Longi 340w Module 3120pcs



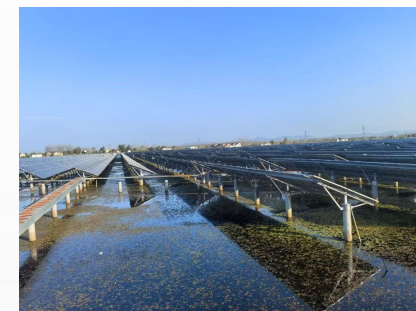
Headman Shamen Factory 2.8MW Rooftop PV Plant in Wenzhou Zhejiang 1600 Sole Optimizers installed in October 2022



Sungrow Xianpi Lake 100MW Fishing and Solar PV Power Plant in Hefei, Anhui

451 Dual Optimizers installed in September 2024

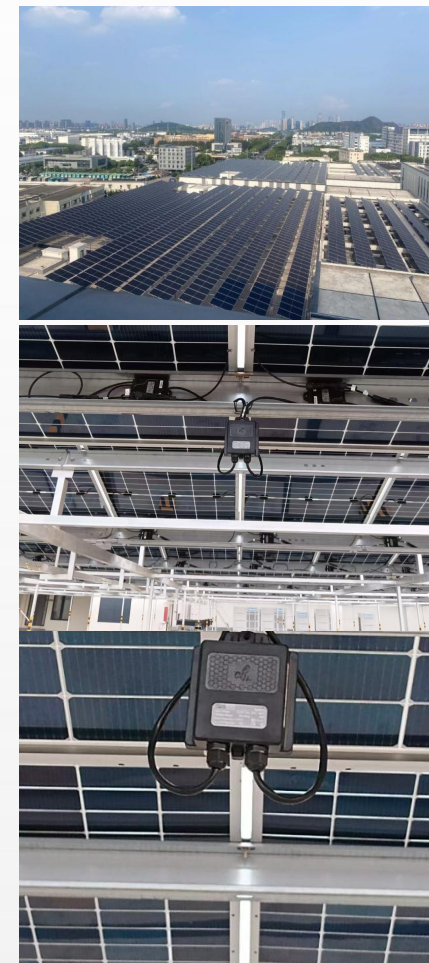
Sungrow Inverters + Tongwei 575W 902pcs



SND Park 1.984MW Rooftop PV Plant in Suzhou, Jiangsu

3400 Sole Optimizers installed in August 2024

Huawei 300KW Inverter 7pcs; CanadianSolar 580W Panel 3400pcs



Case

Colgate 1.25MW Rooftop PV Plant in Guangzhou, Guangdong

1200 Dual Optimizers installed in December 2024

Sungrow Inverter 110kW*10pcs + Longi 555w Module 2252pcs



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