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PV MODULE-LEVEL POWER OPTIMIZATION  
& INTELLIGENT MANAGEMENT EXPERTS



# COMPANY PROFILE

## About Us

GNE specializes in developing and manufacturing solar optimization devices, rapid shutdown system and intelligent monitoring system. We provide an entire solution of module-level power optimization, rapid shutdown system, real-time data acquisition, module-level remote monitoring and big data analysis to revise or overcome the factors that lead to power-loss and efficiency-drop, consequently to achieve more power output, lower O&M cost and higher safety.

GNE takes innovation as a driving force for enterprise development. Based on customer demand and cutting-edge technology, GNE is always in the forefront of the industry, and leads the development of the industry. We have more than 50% of employees engaging in innovation, research and design, made dozens of inventions and patents, which has laid a solid foundation to become a world-class provider of intelligent optimization solution.

Now we have won the trust of customers and grow rapidly, starting from the domestic market sales, gradually expanding to Europe, America, Japan and other major PV markets, as an influential high-tech enterprise in the field of PV power optimization and intelligent management.

Intelligence is the trend of photovoltaic development. GNE creates the Internet of PV Things with own expertise of information and communication, to promote a comprehensive system of interconnected components of photovoltaic plants, improve the PV power generation efficiency, achieve intelligent operation and maintenance, promote the development of green energy and benefit mankind!



### Specializes

in developing  
and manufacturing solar  
optimization devices and  
intelligent monitoring system



### Dozens

of Inventions and  
patents with independent  
intellectual property rights



### Gradually

expanding to  
Europe, America, Japan and  
other major PV markets

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# PV Power Optimizer

## Introduction to PV Power Optimizer



Honeybee400 (~PLC)

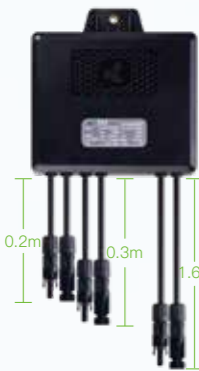


Honeybee650 (~PLC)

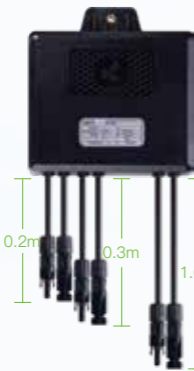


Honeybee850 (~PLC)

-----Sole Power Optimizer-----



Honeybee800



Honeybee1300



honeybee1600 (~PLC)

-----Dual Power Optimizer-----



Swarm  
Data Acquisition Unit



Beehive  
Data Aggregation Device



Beebox-H  
Optimizer Initiator

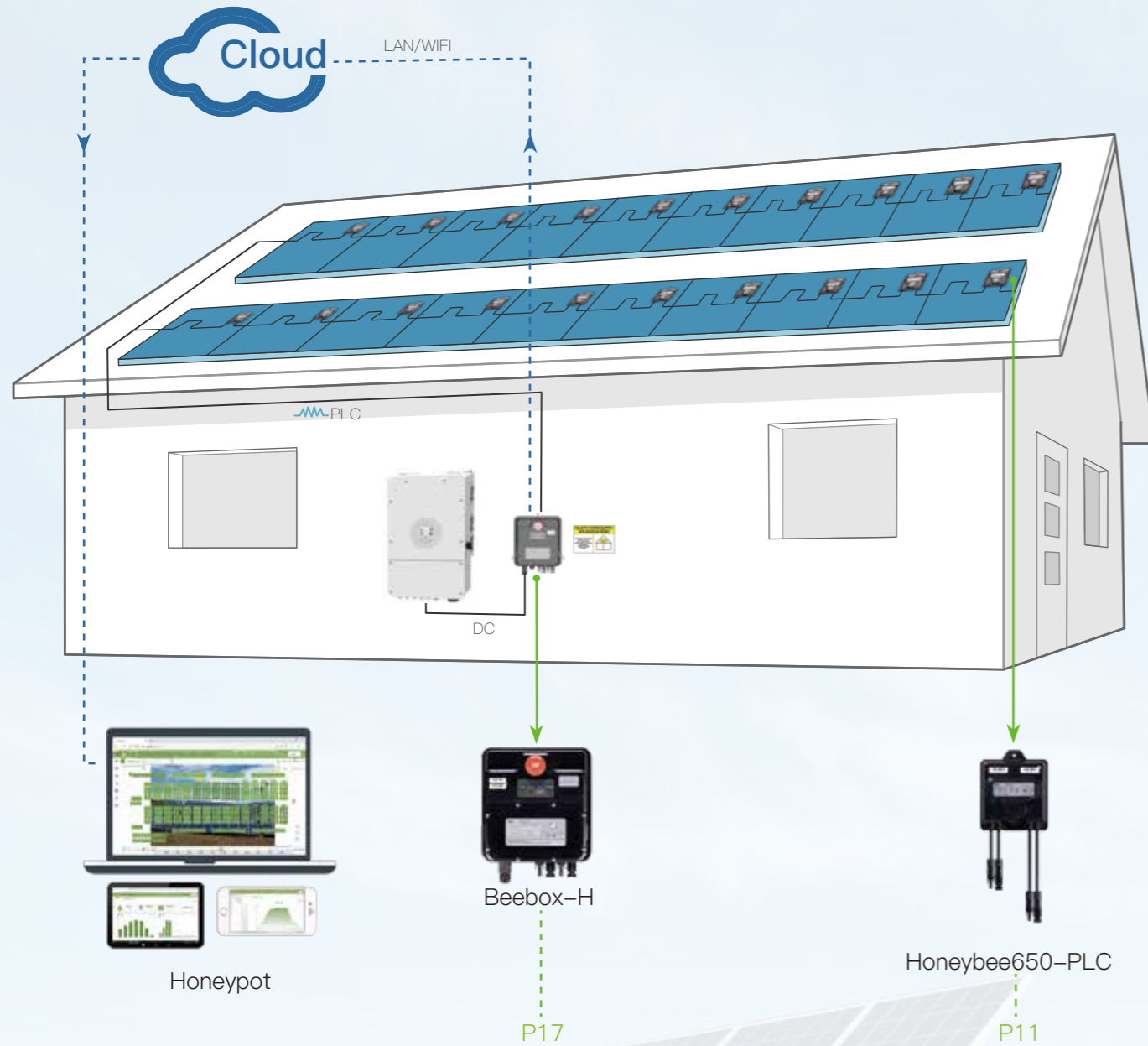
## Wireless Optimizer System Diagram



- Optimize power generation: Optimizer tracking maximum power point in input of each module and adjust maximum output to boost energy yield. Perfectly solve the power loss caused by module shading, module variances and modules mismatch.
- Real-time module-level monitoring: Optimizer collects current, voltage and temperature of each module in real-time and displays in monitoring system.
- Remote shutdown: Entire system can be remotely switch off by APP or web monitoring portal to prevent shock hazard. With data processing device(Beehive) sending "shutdown commands" to each optimizer to cut off power generation.



## PLC Optimizer System Diagram



- Optimize power generation: Optimizer tracking maximum power point in input of each module and adjust maximum output to boost energy yield. Perfectly solve the power loss cause by module shading, module variances and modules mismatch.
- Real-time module-level monitoring: Optimizer collects current, voltage and temperature of each module in real-time and displays in monitoring system.
- Rapid shutdown(PLC): This solution complies with NEC 2014, 2017, and 2020 690.12 requirements. The PLC optimizer is on standby mode, activated after receive "operate" signal from Beebox-H. Rapid shutdown entire system by stop sending "operate" signal after press emerge button on Beebox-H to prevent shock hazard.

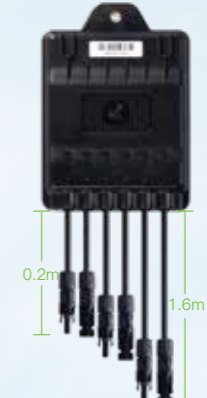
## Rapid Shutdown (RSD)

### Rapid Shutdown Device Introduction



Scoutbee800 (~M)

Sole Rapid Shutdown Device



Scoutbee1600 (~M)

Dual Rapid Shutdown Device



Beebox-S

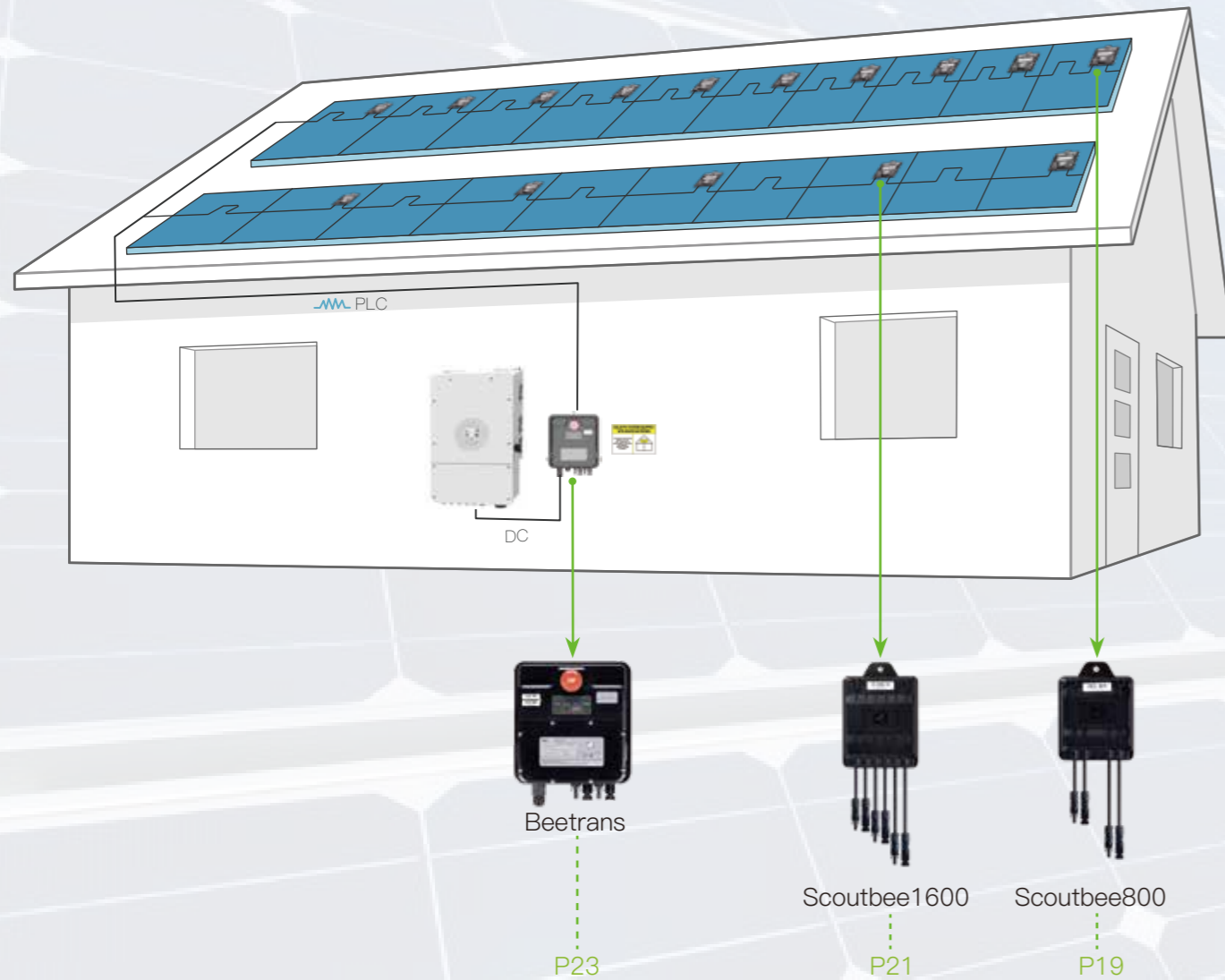
Shutdown Initiator (EUR)



Beetrans

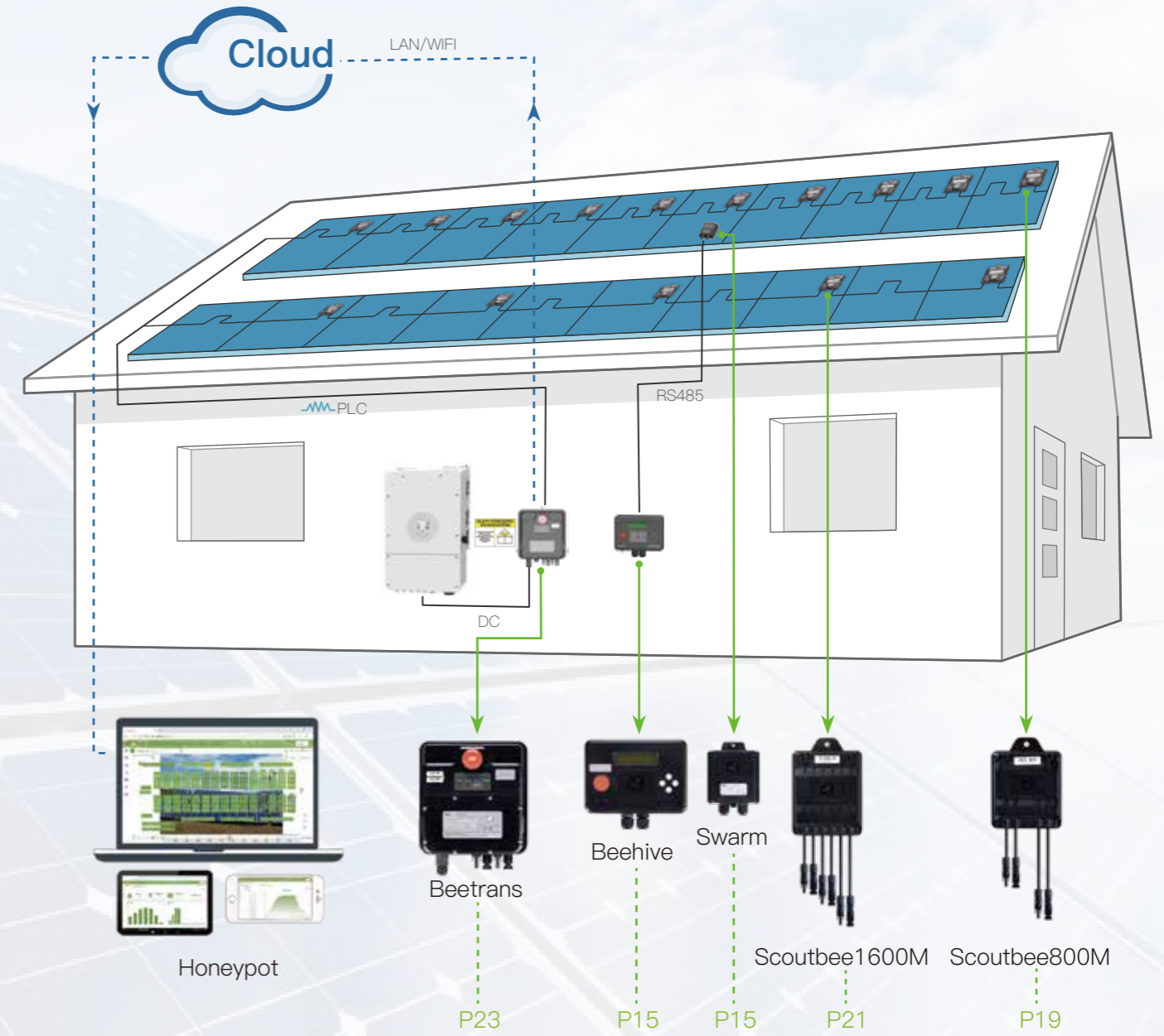
Shutdown Initiator (US)

### Rapid Shutdown System Diagram



- GNE Rapid shutdown system: This solution complies with NEC 2014, 2017, and 2020 690.12 requirements.
- Rapid shutdown: Voltage limited to not more than 30 volts within 30 seconds of entire system after press emerge button on Beebox-H to prevent shock hazard.

### Rapid Shutdown + Module Level Monitoring System Diagram

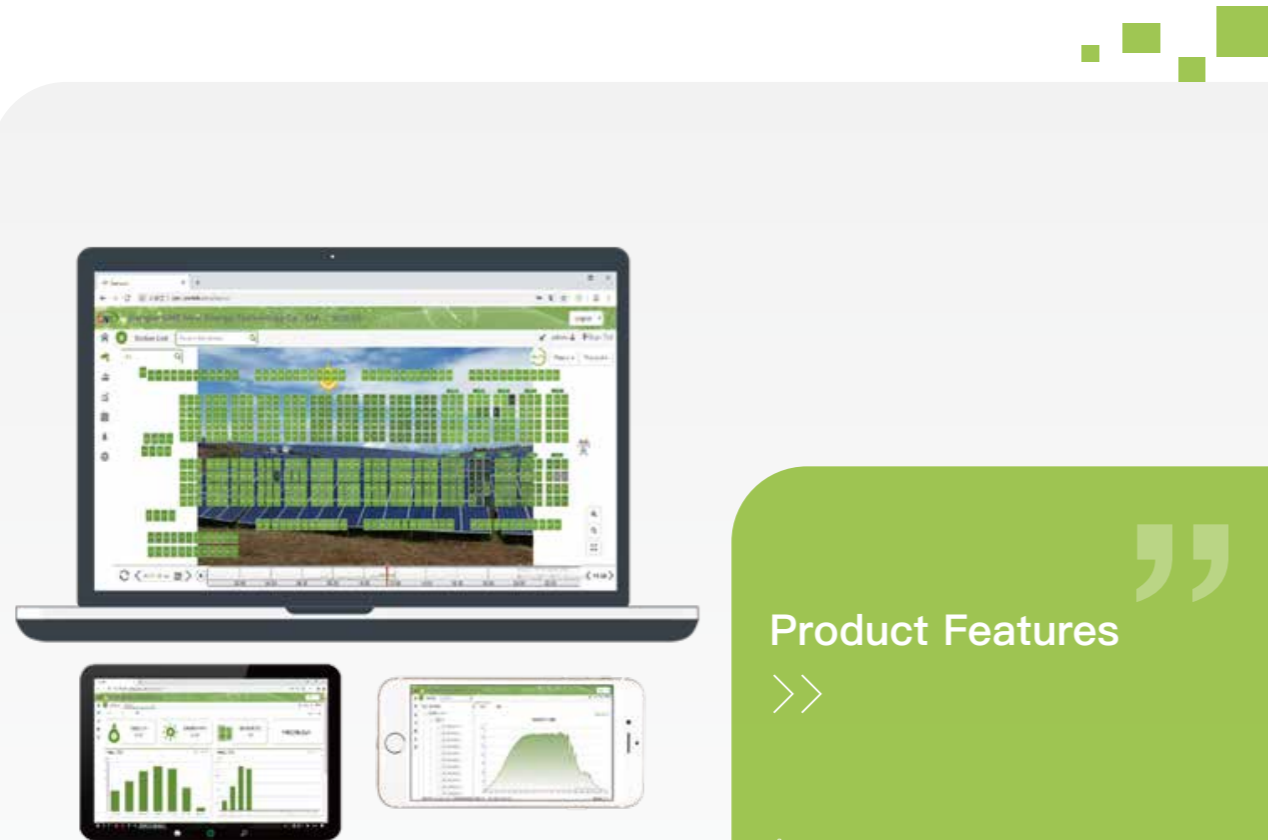


- GNE Rapid shutdown system: This solution complies with NEC 2014, 2017, and 2020 690.12 requirements.
- Rapid shutdown: Voltage limited to not more than 30 volts within 30 seconds of entire system after press emerge button on Beebox-H to prevent shock hazard.
- Module-level monitoring: Rapid shutdown system achieve module-level monitoring accompanied by GNE monitoring device (swarm&beehive).



# HoneyPot

## Data Cloud Center



### Product Features

- ⚙️ Dynamically display the status of entire PV power station and every module in real-time
- ⚙️ Promptly locate the system failure and inform user by email or short message
- ⚙️ Remotely deactivate the optimizers for maintenance or emergency purposes
- ⚙️ Multi-terminal login: PC, PAD and smart phone
- ⚙️ Historical data query, big data analysis and automatic table report

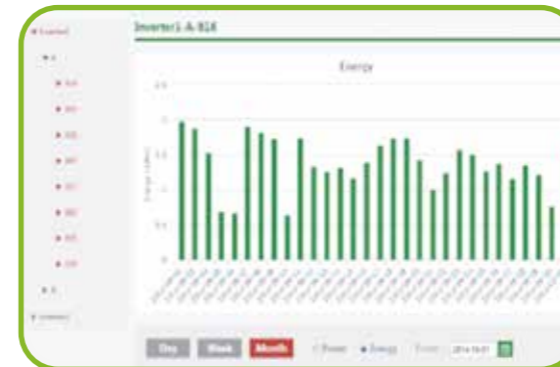
### 1. Real time Monitoring



### 2. Power Trends



### 3. Generating Summary



### 4. Date Query



### 5. Warning

Alert Level	Type	Event	Action
...	...	...	...

### 6. Emergency Shutdown



# Honeybee400/650/850

## Sole Power Optimizer



### Product Features

- ⚙️ Module-level Maximum Power Point Tracking(MPPT), 5~25% more power yield
- ⚙️ Real-time module level monitoring, timely warning and positioning the problem
- ⚙️ Secure solar system,remote shutdown, elimination of high voltage danger
- ⚙️ Module add-on, compatible with third party inverter, available for the new or the existing solar power station
- ⚙️ 25 years lifespan, perfectly matching solar modules

Dual Power Optimizer	Honeybee400	Honeybee650	Honeybee850
<b>INPUT</b>			
Support Modules	450W	650W	850W
Max.Input Power	75VDC	75VDC	60VDC
Operating Voltage Range	12~75VDC	12~75VDC	14~60VDC
MPPT Voltage Range	12~75VDC	12~75VDC	14~60VDC
Isc	15A	16A	23A
Max.Input Current	13A	15A	21A
<b>OUTPUT</b>			
Max.Output Power	450W	650W	850W
Voltage Range	0 ~ 75VDC	0 ~ 75VDC	0 ~ 60VDC
Max.Output Current	13A	15A	21A
Max.Efficiency	99.50%	99.50%	99.50%
<b>OTHERS</b>			
Max.System Voltage	1500VDC	1500VDC	1500VDC
Operating Temperature Range	-40~+85 °C	-40~+85 °C	-40~+85 °C
Relative Humidity	0~100%	0~100%	0~100%
Ingress Protection	IP68	IP68	IP68
Protective Class	II	II	II
Communication	868M/915M/2.4G/PLC	868M/915M/2.4G/PLC	868M/915M/2.4G/PLC
<b>INSTALLATION SPECIFICATION</b>			
Size	130.3x109.6x25mm	130.3x109.6x25mm	130.3x109.6x25mm
Weight	520g	520g	520g
Connector(Input/Output)	Compatible with MC4	Compatible with MC4	Compatible with MC4
<b>STANDARD/ CERTIFICATION</b>			
Safety	IEC/EN 62109-1:2010 the Low Voltage Directive(2014/35/EU)		
EMC	EN 61000-6-1:2007 EN 61000-6-3:2007/+A1:2011 EN 61000-6-2:2005 EN 61000-6-4:2007/+A1:2011 the EMC Directive(2014/30/EU)		
Certification	CE		
COMM	EN 50663: 2017, EN 62479: 2010 EN 301 489-1 V2.2.3, EN 301 489-3 V2.1.1, EN 300 220-2 V3.1.1		

\*Honeybee650-PLC and Honeybee850-PLC Working status can be customized (Default on or off)

# Honeybee800/1300/1600

## Dual Power Optimizer



### Product Features

- ⚙️ Module-level Maximum Power Point Tracking(MPPT), 5~25% more power yield
- ⚙️ Real-time module level monitoring, timely warning and positioning the problem
- ⚙️ Secure solar system, remote shutdown, elimination of high voltage danger
- ⚙️ Module add-on, compatible with third party inverter, available for the new or the existing solar power station
- ⚙️ 25 years lifespan, perfectly matching solar modules

Dual Power Optimizer	Honeybee800	Honeybee1300	Honeybee1600
<b>INPUT</b>			
Support Modules	2pcs	2pcs	2pcs
Max. Input Power	450W/450W	650W/650W	800W/800W
Max. Input Voltage	75VDC/75VDC	60VDC/60VDC	60VDC/60VDC
Operating Voltage Range	13~75VDC/13~75VDC	13~60VDC/13~60VDC	13~60VDC/13~60VDC
MPPT Voltage Range	13~70VDC/13~70VDC	13~60VDC/13~60VDC	13~60VDC/13~60VDC
Isc	15A/15A	16A/16A	23A/23A
Max. Input Current	13A/13A	15A/15A	20A/20A
<b>OUTPUT</b>			
Max Output Power	900W	1300W	1600W
Voltage Range	0 ~150VDC	0 ~120VDC	0 ~120VDC
Max. Output Current	13A	15A	20A
Max. Efficiency	99.60%	99.60%	99.50%
<b>OTHERS</b>			
Max. System Voltage	1500VDC	1500VDC	1500VDC
Operating Temperature Range	-40~+85°C	-40~+85°C	-40~+85°C
Relative Humidity	0~100%	0~100%	0~100%
Ingress Protection	IP68	IP68	IP68
Protective Class	II	II	II
Communication	868M/915M/2.4G	868M/915M/2.4G	868M/915M/2.4G/PLC
<b>INSTALLATION SPECIFICATION</b>			
Size	129x130x25mm	129x130x25mm	144x130x26.8mm
Weight	810g	810g	875g
Connector(Input/Output)	Compatible with MC4	Compatible with MC4	Compatible with MC4
<b>STANDARD/ CERTIFICATION</b>			
Safety	IEC/EN 62109-1:2010 the Low Voltage Directive(2014/35/EU)		
EMC	EN 61000-6-1:2007 EN 61000-6-3:2007/+A1:2011 EN 61000-6-2:2005 EN 61000-6-4:2007/+A1:2011 the EMC Directive(2014/30/EU)		
Certification	CE		
COMM	EN 50663: 2017, EN 62479: 2010 EN 301 489-1 V2.2.3, EN 301 489-3 V2.1.1, EN 300 220-2 V3.1.1		



# Swarm & Beehive

## Data Processing Device



### Product Features

- ⚙ Automatic dynamic networking, with self-healing function
- ⚙ Multiple communication methods
- ⚙ Automatic primary route relay function
- ⚙ Local or remote shutdown in emergency circumstances

Product Code	Swarm
INPUT	
Working Voltage	12 V
Working Current	25 mA
Power Consumption	≤0.3 W
Installation Specification	
Connector	RS485*2
Wireless Range	(Swarm to Honeybee) ≤30m
Wireless Band	868M/915 M/2.4G Hz
Max No. of Bees	≤200 Pcs
Size	124 x 99 x 32 mm
Weight	155 g
Working Temperature	-40°C~+85°C
Ingress Protection	IP65
Safety Standards	EN 62368-1:2020+A11:2020
Communication	EN 50663: 2017, EN 62479: 2010 EN 301 489-1 V2.2.3, EN 301 489-3 V2.1.1, EN 300 220-2 V3.1.1
Product Code	Beehive
INPUT	
Working Voltage	12 V
Working Current	250 mA
Power Consumption	≤3 W
Installation Specification	
Connector	RS485*2、RJ45、USB2.0
No. of connectable Honeybees	≤1000 Pcs
No. of connectable Swarms	≤5 Pcs
Size	158 x113 x 36.8 mm
Weight	300 g
Working Temperature	-20°C~+60°C
Ingress Protection	IP20
Safety Standards	EN 62368-1:2020+A11:2020

# Beebox-H

## Optimizer Initiator



### Product Features

- ⚙️ Automatic dynamic networking, with self-healing function
- ⚙️ Multiple communication methods
- ⚙️ Automatic primary route relay function
- ⚙️ Local or remote shutdown in emergency circumstances

Product Code	Beebox-H
<b>INPUT</b>	
Maximum input Current Per String	20 A
Support Strings	2Strings
Maximum System Voltage	1000V / 1500V
Voltage & Frequency	100~240Vac; 50/60Hz; 1Aac
<b>INSTALLATION SPECIFICATION</b>	
Connector	Compatible with MC4
Size	220 x 210 x 65 mm
Weight	880 g
Working Temperature	-20 ~ +60°C
Ingress Protection	IP65
<b>FUNCTION</b>	
Default Internet Access	LAN+WIFI
Local Rapid Shutdown Function	Yes
Remote Rapid Shutdown Function	Yes
Open Circuit Voltage	Yes (Optional)
Automatic Shutdown After Power Failure	Yes (Optional)
DC arc Detection Function	No
Communication Method to Optimizers	Yes(PLC)
Support Production Type	PLC optimizers(Honeybee 400-PLC,650-PLC,850-PLC,1600-PLC)
Data Transmission Frequency	5Minutes
<b>STANDARD/ CERTIFICATION</b>	
Regulations	NEC 2017 690.12
Safety	IEC/EN 62109-1:2010 the Low Voltage Directive(2014/35/EU)
EMC	EN IEC 61000-6-2:2019 EN 61000-6-3:2007/+A1:2011 the EMC Directive(2014/30/EU)
Certification	CE



# Scoutbee800/Scoutbee800M

## Sole Rapid Shutdown Device



### Product Features

- ⚙️ Module-level shutdown to shut off the source high voltage of string, completely eliminating the risk of personal shock
- ⚙️ Default shutdown state to ensure safety of personnel for installation and maintenance
- ⚙️ PLC communication, no need of additional communication cable, and convenient for installation
- ⚙️ Safe and reliable, with function of output short circuit protection, no risk of high temperature for any component failure
- ⚙️ 25 years lifespan, perfectly matching solar modules

Product Code	Scoutbee800	Scoutbee800M
<b>INPUT</b>		
Max. Input Power	800W	
Max. Input Voltage	80VDC	
Operating Voltage Range	12 ~ 80VDC	
Max. Input Current	20A	
<b>OUTPUT</b>		
Voltage Range	12~80VDC	
Max. Output Current	20A	
Max. Output Power	800W	
Shutdown Voltage	0.8~1VDC	
Efficiency	>99.8%	
Default Working State	Shutdown	
ShutdownTime	15Seconds	
<b>COMMUNICATION</b>		
Rapid Shutdown	PLC (Power Line Communication)	
Real-time Monitoring	Wireless(868M/915M/2.4G)	
<b>OTHERS</b>		
Temperature range	-40 ~ +85 °C	
Relative humidity range	0~100 %	
Ingress Protection	IP68	
Protective Class	II	
<b>INSTALLATION SPECIFICATION</b>		
Max. No. of Modules per String	30Pcs	
Input Cable Length	200mm	
Output Cable Length	1000mm	
Size	107×82×20mm	
Weight	360g	
Connector (Input/Output)	Compatible with MC4	
<b>STANDARD/ CERTIFICATION</b>		
Regulations	NEC 2017 (690.12)	
Safety	IEC/EN 62109-1:2010 the Low Voltage Directive(2014/35/EU)	
EMC	EN IEC 61000-6-2:2019 EN 61000-6-3:2007/+A1:2011 the EMC Directive(2014/30/EU)	
Certification	CE	

# Scoutbee1600/Scoutbee1600M

## Dual Rapid Shutdown Device



### Product Features

- ⚙️ Module-level shutdown to shut off the source high voltage of string, completely eliminating the risk of personal shock
- ⚙️ Default shutdown state to ensure safety of personnel for installation and maintenance
- ⚙️ PLC communication, no need of additional communication cable, and convenient for installation
- ⚙️ Safe and reliable, with function of output short circuit protection, no risk of high temperature for any component failure
- ⚙️ 25 years lifespan, perfectly matching solar modules

Product Code	Scoutbee1600	Scoutbee1600M	
<b>INPUT</b>			
Number Of Module	2Pcs		
	Input#1	Input#2	Input#1
Max. Input Power	800 W	800 W	800 W
Max. Input Voltage	80VDC / 80VDC		
Operating Voltage Range	12~80VDC / 12~80VDC		
Max. Input Current	20A / 20A		
<b>OUTPUT</b>			
Voltage Range	0~160VDC		
Max. Output Current	20A		
Max. Output Power	1600W		
Shutdown Voltage	1.6~2VDC		
Efficiency	>99.8%		
Default Working State	Shutdown		
ShutdownTime	15Seconds		
<b>COMMUNICATION</b>			
Rapid Shutdown	PLC (Power Line Communication)		
Real-time Monitoring	Wireless(868M/915M/2.4G)		
<b>OTHERS</b>			
Temperature range	-40 ~ +85 °C		
Relative humidity range	0~100 %		
Ingress Protection	IP68		
Protective Class	II		
<b>INSTALLATION SPECIFICATION</b>			
Max. No. of Modules per String	30Pcs		
Input Cable Length	200mm / 300mm		
Output Cable Length	1600mm		
Size	121x86x20mm		
Weight	530g		
Connector (Input/Output)	Compatible with MC4		
<b>STANDARD/ CERTIFICATION</b>			
Regulations	NEC 2017 (690.12)		
Safety	IEC/EN 62109-1:2010 the Low Voltage Directive(2014/35/EU)		
EMC	EN IEC 61000-6-2:2019 EN 61000-6-3:2007/+A1:2011 the EMC Directive(2014/30/EU)		
Certification	CE		



# Beetrans/Beebox-S

## Shutdown Initiator



### Product Features

- Support two PV strings, suitable for most roof station
- Cascade connection with Max. 10Pcs, suitable for large scale roof station
- PLC Communications, no need additional communication cable, easy to install
- String detection to ensure shutdown system more secure and reliable

Product Code	Beetrans	Beebox-S
<b>INPUT</b>		
Maximum input Current Per String	15A	20A
Support Strings	2Strings	
Cascade control	YES	N/A
Maximum number of cascading	9	N/A
Maximum System Voltage	1000V / 1500V	
Voltage & Frequency	12Vdc	100~240Vac; 50/60Hz; 1Aac
<b>INSTALLATION SPECIFICATION</b>		
Connector	Compatible with 3/4 Inch EMT 3pcs	Compatible with MC4
Size	220 x 210 x 65 mm	
Weight	880g	
Working Temperature	-20 ~ +60 °C	
Ingress Protection	IP65	
<b>FUNCTION</b>		
Default Internet Access	N/A	LAN+WIFI
Local Rapid Shutdown Function	YES	
Remote Rapid Shutdown Function	YES	
Open Circuit Voltage	YES	
Automatic Shutdown After Power Failure	YES	
DC arc Detection Function	NO	YES
Support Production Models	Scoutbee800/800M, Scoutbee1600/1600M, Scoutbox450	
Data Transmission Frequency	N/A	5 Minutes(PV Status)
<b>STANDARD/ CERTIFICATION</b>		
Regulations	NEC 2017 690.12	
Safety	UL1741,CSA C22.2 No. 330,UL 1703,ULC1703-01	IEC/EN 62109-1:2010 the Low Voltage Directive(2014/35/EU)
EMC	FCC Part15 ClassB IEC61000-6-2 / IEC61000-6-3 EN61000-6-2 / EN61000-6-3	EN IEC 61000-6-2:2019 EN 61000-6-3:2007/+A1:2011 the EMC Directive(2014/30/EU)
Certification	CSA	CE

# Smartbee600/Smartbee600S

## Integrated Power Optimizer



### Product Features



- ⊗ Module level Maximum Power Point Tracking (MPPT), 5~25% more power yield
- ⊗ Real-time module level monitoring, timely warning and positioning the problem
- ⊗ Secure solar system, remote shutdown, elimination of high voltage danger
- ⊗ Simplify the design scheme of the power station and make full use of the roof or floor area
- ⊗ Flexible system design for maximum space utilization
- ⊗ 25 years lifespan, perfectly matching solar modules

Product Code		Smartbee600
<b>INPUT</b>		
Max Output Power		600 W
Max Output Current		15 A
Output Voltage Range		0 V~ 75 V
MPPT Voltage Range		12 V ~ 75 V
System Voltage		1000 V/1500 V
<b>EFFICIENCY</b>		
Max Conversion Efficiency		99.60%
European Efficiency		98.50%
CEC Efficiency		98.30%
<b>INSTALLATION SPECIFICATION</b>		
Size		152 x 133 x 25.9 mm
Weight		540g
Output Connector		Compatible with MC4
Working Temperature		-40~+85°C
Ingress Protection		IP68
Relative Humidity		0~100%
<b>STANDARD COMPLIANCE</b>		
EMC		IEC61000-6-2, IEC61000-6-3
Safety Regulations		IEC62109-1 (Class II safety)
Overvoltage Category		III
Product Code		Smartbee600S
<b>INPUT</b>		
Max Output Power		600 W
Cell-string MPPT Voltage Range		7 V~20 V
PV Module MPPT Voltage Range		16 V~ 60 V
Max Output Current		15 A
Output Voltage Range		0 V ~60 V
System Voltage		1000 V/1500 V
<b>EFFICIENCY</b>		
Max Conversion Efficiency		99.5%
European Efficiency		98.3%
CEC Efficiency		98.2%
<b>INSTALLATION SPECIFICATION</b>		
Size		148.6x 127.6x 27mm
Weight		580g
Output Connector		Compatible with MC4
Working Temperature		-40 ~+85°C
Ingress Protection		IP68
Relative Humidity		0~100%
<b>STANDARD COMPLIANCE</b>		
EMC		IEC61000-6-2, IEC61000-6-3
Safety Regulations		IEC62109-1 (Class I1 safety)
Overvoltage Category		III



# Cases

1MW PV Station in Three Gorges New Energy ◀

▶ 20MW PV Station in Hetian Xinjiang, China





▶ 50KW PV Station in Ibaraki, Japan



5MW Floating Project in Bangkok, Thailand ◀







► Optimized 1MW PV Station in Xinjiang, China



► 875KW PV Station in Takasaki, Japan



► 30KW Rooftop PV Station in Sofia, Bulgaria



► 10.08KW Rooftop PV Station in Poland

