



集能易
GNE TEK

GNE PRODUCT SPECIFICATION & SOLUTION

2023.02



公司简介

Jiangsu GNE New Energy Technology Co., Ltd has been focused on the power optimization and intelligent monitoring of solar systems more than ten years, concentrating on improving the power output of solar systems and creating the photovoltaic IoT systems.

It is guided by customer needs and continue to innovate to win the trust of customers all over the world, and has established long-term cooperative relations with many well-known photovoltaic enterprises. GNE has grown into an influential high-tech company in the market of module-level optimization and monitoring system.



- GNE PV Module Optimization & Monitoring & Shutdown Solution
- GNE PV Module Optimization & Monitoring & Shutdown Devices
- GNE PV Module Optimization & Monitoring & Shutdown Diagram

- GNE PV Rapid Shutdown (& Monitoring) Solution
- GNE PV Rapid Shutdown (& Monitoring) Devices
- GNE PV Rapid Shutdown (& Monitoring) Diagram



GNE PV Module Optimization & Monitoring & Shutdown Solution

This scheme consists of **PV power optimizers** + **data processing devices** + **monitoring platform** (network version + Mobile APP)

Each module is connected with a power optimizer in series. The optimizer tracks the maximum power point of each module in real time, and realizes the maximum power output of the module to recover the power generation loss of the system caused by the module power mismatch.

The data processing device communicates optimizers via RF or PLC communication to collect the real-time data (voltage, current, power and temperature) of each module and upload it to the monitoring system.

The optimizer performs second level scanning on PV modules, and can timely alarm and accurately locate modules when they are abnormal; The power station administrator can remotely monitor the operation status of power stations and each module in the monitoring system to achieve accurate operation and maintenance.



GNE PV Module Optimization & Monitoring & Shutdown Solution

- **Module level MPPT to optimize the power generation of PV system**

Recover the loss of power generation caused by the power difference between the modules of the same string, and ensure the maximum power output of the string under the unfavorable environment such as shadows, sundries and dust

- **Module level monitoring to improve operation and maintenance efficiency**

Realize module level monitoring of PV station, timely alarm and accurate positioning in case of failure, so as to facilitate the operation and maintenance personnel to deal with it in the first time

- **Module level Shutdown to strengthen the safety of the system**

The output of each optimizer can be shut off in site or remotely in case of fire and other emergencies, to facilitate disaster relief.

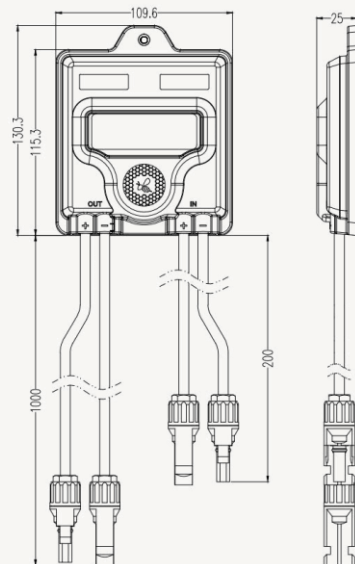
- **Improve the installed density and simplify the layout design of building area**

Installed with optimizers, the module numbers of parallel strings can be different, one series can connect more modules, make full use of the roof area, increase power generation and ensure the layout of the roof power station.



GNE PV Module Optimization & Monitoring & Shutdown Devices

Sole PV Power Optimizer Honeybee400/650/850



Features:

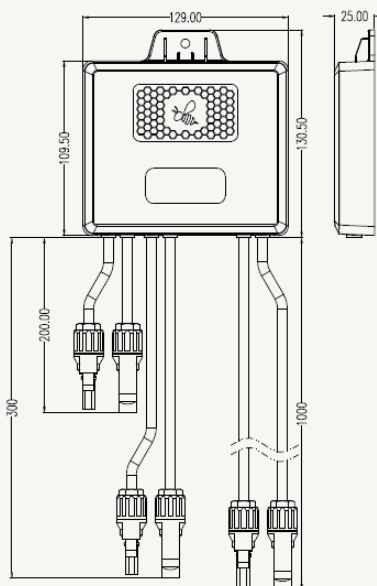
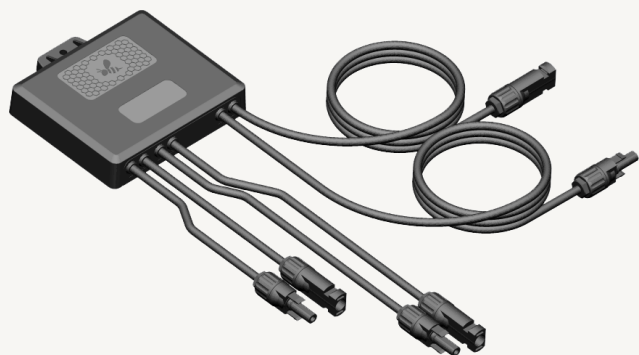
1. Module-level maximum power point tracking, increasing system power generation by 5-25%
2. Real-time monitoring of the operating status of each PV module, timely detection of faulty modules and accurate positioning
3. Module level shutdown to eliminate the high voltage and improve the safety of PV 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
OUTPUT	Short Current	15A	16A	23A
	Max. Output Power	450W	650W	850W
	Max. Output Voltage	75V	75V	60V
	Max. Output Current	13A	15A	21A
SYSTEM	Max. Conversion Efficiency	99.6%	99.5%	99.5%
	Max. System Voltage	1500V		
Application	Communication Mode	RF(2.4G/915M) / PLC		
	Working Temperature Range	-40 ~ +85°C		
	Relative humidity range	0 ~ 100%		
Certification	Ingress Protection	IP68 / NEMA Type6P		
	EMC	IEC61000-6-2 / IEC61000-6-3		
	Safety Regulations	IEC62109-1 (Class II safety)		
Structure	Overvoltage Category	III		
	Dimension	130.3×109.6×25 mm		
	Weight	530g		
	Input Length	200mm/Customized		
	Output	1000mm/Customized		
	Connector	Compatible with MC4		



GNE PV Module Optimization & Monitoring & Shutdown Devices

Dual PV Power Optimizer Honeybee800



Features:

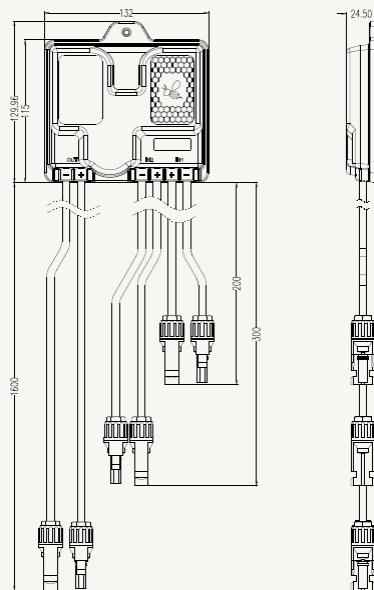
1. Module-level maximum power point tracking, increasing system power generation by 5-25%
2. Real-time monitoring of the operating status of each PV module, timely detection of faulty modules and accurate positioning
3. Module level shutdown to eliminate the high voltage and improve the safety of PV 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	20mm / 30mm
	Output	1600mm/Customized
	Connector	Compatible with MC4



GNE PV Module Optimization & Monitoring & Shutdown Devices

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



GNE PV Module Optimization & Monitoring & Shutdown Devices

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

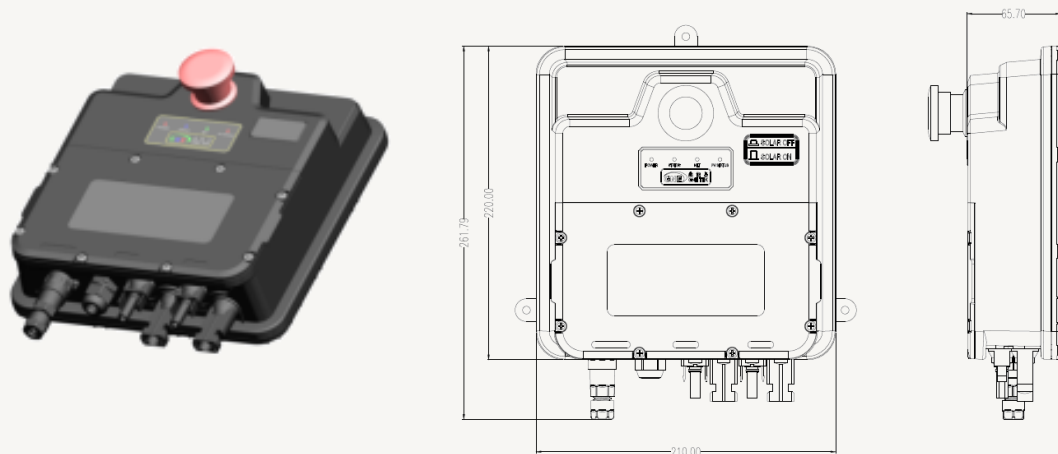
Code		Swarm
INPUT	Working Voltage	12V
	Working Current	25mA
	Power Consumption	≤0.3W
Installation Specification	Connector	RS485x2
	Wireless Range	(Swarm to Honeybee) ≤30m
	Wireless Band	915M / 2.4G Hz
	Max. No. of Bees	≤200
	Dimension	124x99x32mm
	Weight	155g
	Working Temperature Range	-40 ~ +85°C
Ingress 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	

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



GNE PV Module Optimization & Monitoring & Shutdown Devices

PLC Data Processing Device Beebox-H



Features:

1. Intelligent dynamic networking and de-netting, with network self-healing function
2. With data breakpoint resuming function
3. Local or remote rapid shutdown of module output
4. Automatic shutdown after power failure or inverter turn-off
5. Support 2 strings, available of rooftop PV installations

Remark: Beebox-H is used together with GNE PLC optimizers

Code	Beebox-H
<i>INPUT</i>	
Max. Input Current per String	20A
Supportable No. of String	2
Supportable System Voltage	1000V / 1500V
Power Supply	100 ~ 240Vac; 50/60Hz; 1Aac
<i>Installation Specification</i>	
Connector	Compatible with MC4
Dimension	261.8 x 210 x 65.7 mm
Weight	880 g
Working Temperature Range	-20 ~ +60 °C
Ingress Protection	IP65
<i>FUNCTION</i>	
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)
Support Product Codes	PLC Honeybee400/650/850/1600
Data Transmission Frequency	Per 5 minutes
<i>STANDARD / CERTIFICATION</i>	
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 10

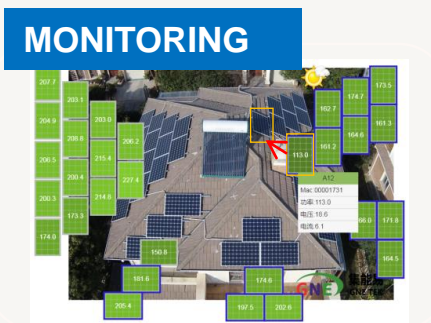


GNE Monitoring System – Data Cloud Center (HoneyPot)

- **Module-level shutdown:** In addition to shutting down modules through the devices on site, it can also be remotely shut down through mobile phone APP or web monitoring platform
- **Real-time monitoring and alarming:** Users can monitor the data of each module in real time, automatically alarm when the module is abnormal, and quickly locate the faulty module
- **Data management:** Convenient for users to check the current and historical operating data of each module or the whole station

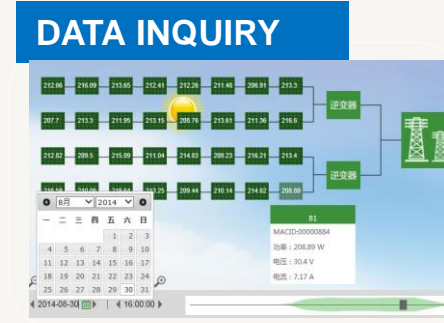
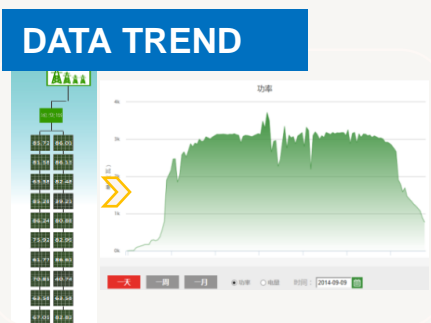


Data Cloud Center
HoneyPot



ALERM

日期/时间	等级	设备名称	设备编号	报警内容	报警状态
2015-03-18 18:00:03	一般	Honeybee	0000124	光伏逆变器功率上	关闭
2015-03-18 18:00:03	一般	Honeybee	0000181	光伏逆变器功率上	关闭
2015-03-18 18:00:03	一般	Honeybee	0000187	光伏逆变器功率上	关闭
2015-03-18 18:00:03	一般	Honeybee	0000195	光伏逆变器功率上	关闭
2015-03-18 18:00:03	一般	Honeybee	0000129	光伏逆变器功率上	关闭
2015-03-18 18:00:03	一般	Honeybee	0000126	光伏逆变器功率上	关闭
2015-03-18 18:00:03	一般	Honeybee	0000129	光伏逆变器功率上	关闭
2015-03-18 18:00:03	一般	Honeybee	0000181	光伏逆变器功率上	关闭



DATA DOWNLOAD

报表管理

日报表 年: 2015 月: 8 日: 19

月报表 年: 2015 月: 8

年报表 年: 2015

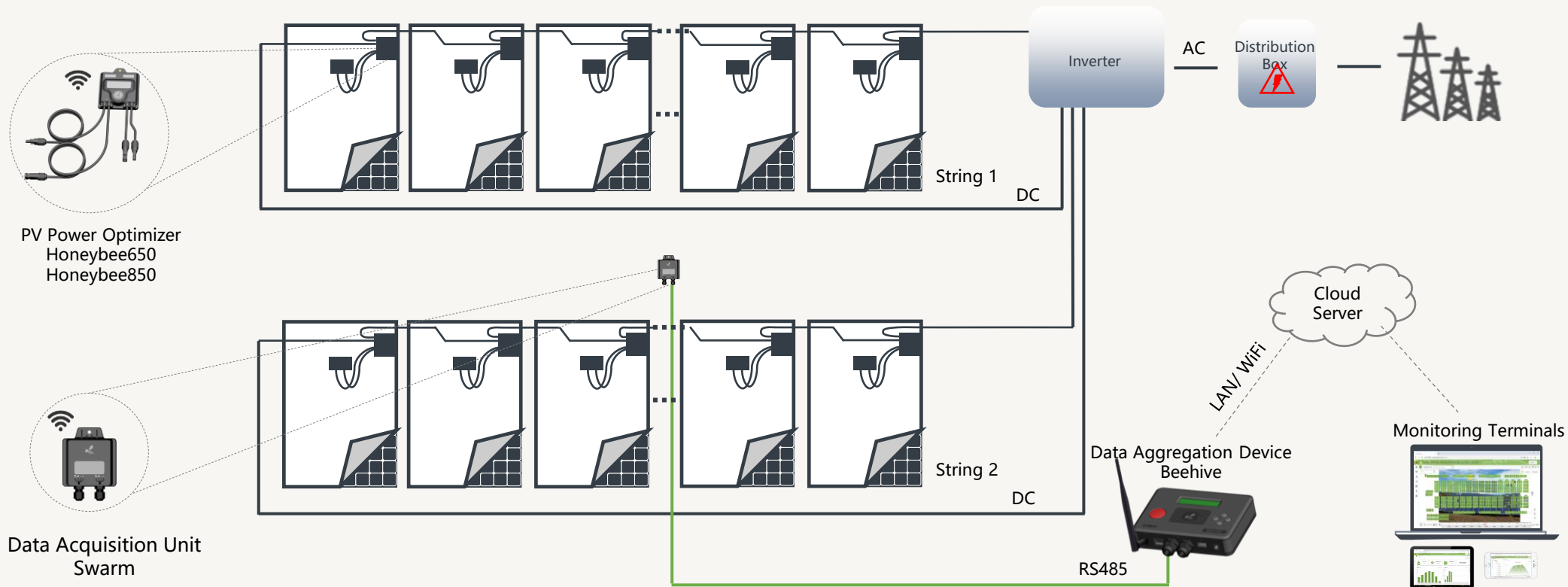


GNE PV Module Optimization & Monitoring & Shutdown Diagram

----- (Add-on Optimizers, RF 2.4G/915M/868M, Residential Projects)

Case: 10kW PV System, 625W module 16pcs, 1-2 Strings

16 Honeybee650/Honeybee850 + 1 Swarm + 1 Beehive



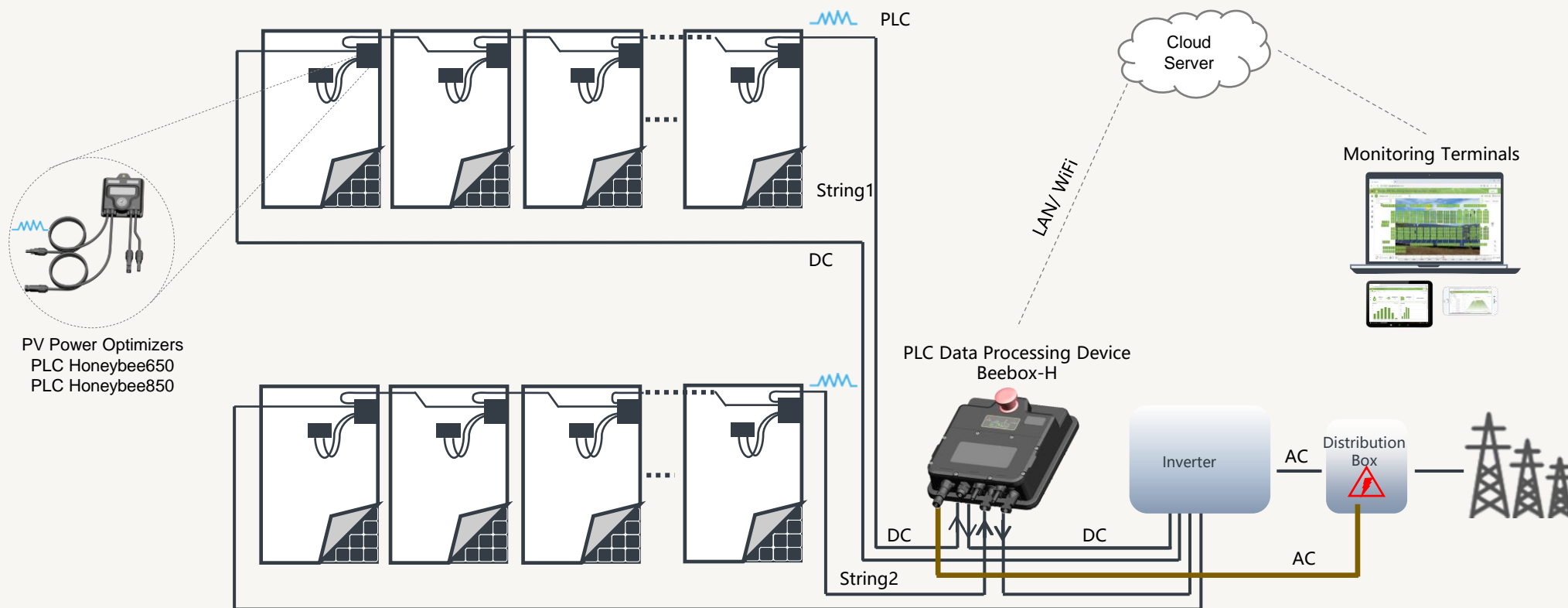


GNE PV Module Optimization & Monitoring & Shutdown Diagram

----- (Add-on Optimizers, PLC Communication, Residential Projects)

Case: 10kW PV System, 625W module 16pcs, 1-2 Strings

16 PLC Honeybee650/Honeybee850 + 1 Beebox-H



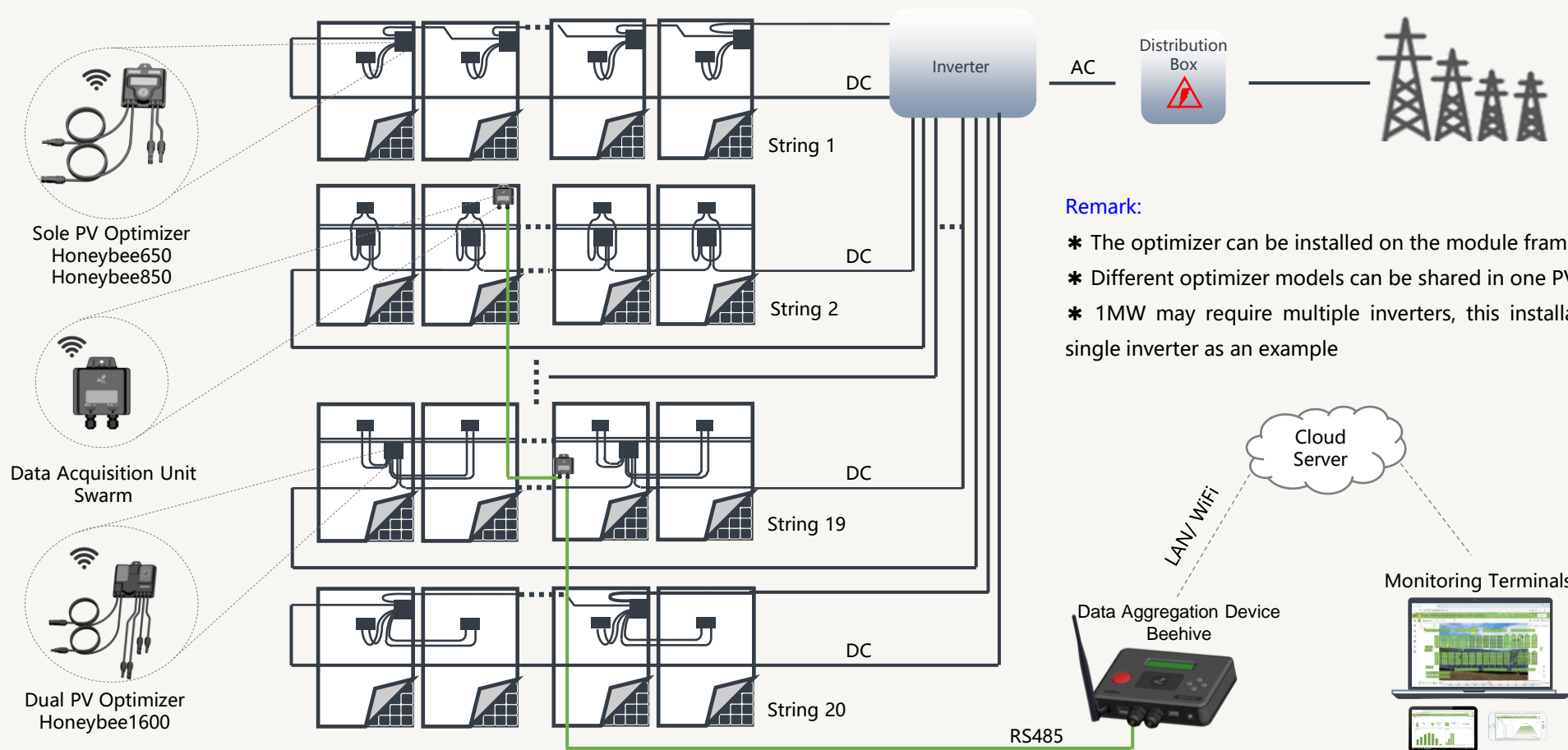


GNE PV Module Optimization & Monitoring & Shutdown Diagram

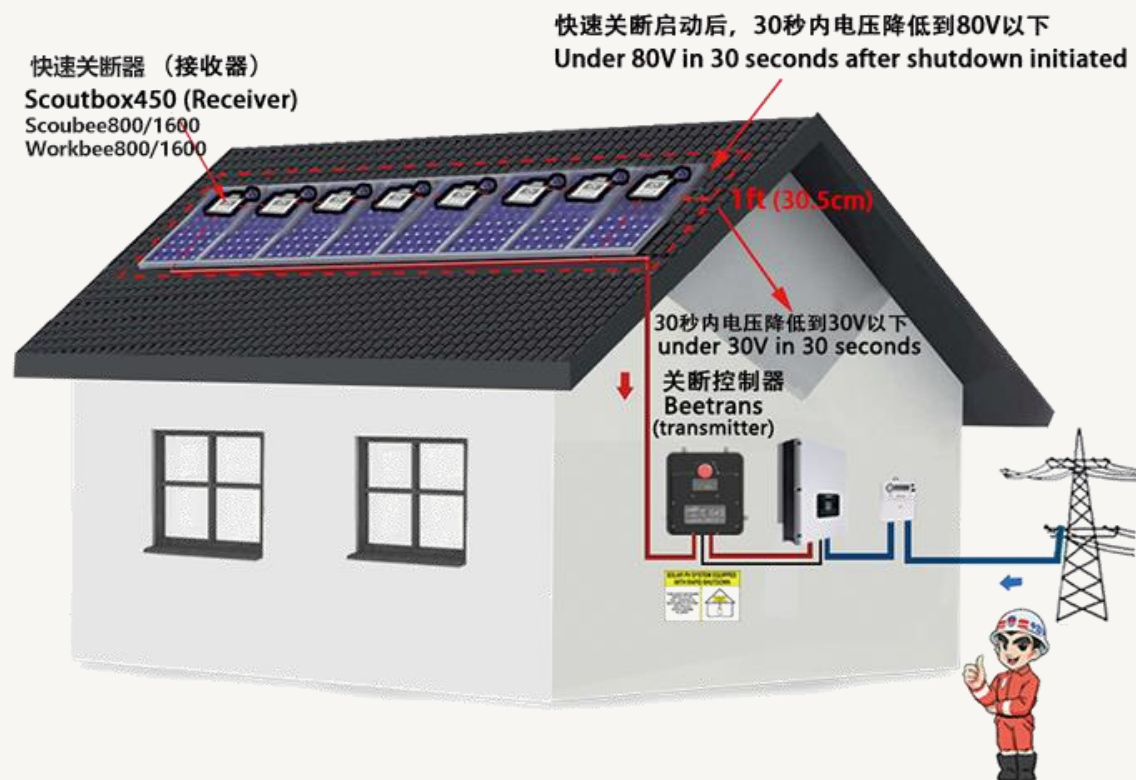
----- (Add-on Optimizers, RF 2.4G/915M/868M, Medium or Large Projects)

Case: 1MW PV System, 625W module 1600pcs, 20 modules per string, 80 Strings

1600 Honeybee650/Honeybee850 or 800 Honeybee1600 + 8 Swarm + 2 Beehive



The GNE rapid shutdown solution meets the regulatory requirements of 2017/2020 NEC 690.12(B) and UL1741, and supports SunSpec shutdown communication protocol.





GNE PV Module Rapid Shutdown (+Monitoring) Solution

This solution consists of **PV rapid shutdown device** + **shutdown controller** (+ **monitoring platform**), with the following functions:

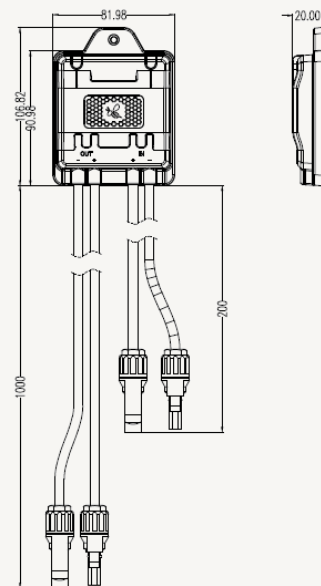
- **Module-level rapid shutdown**, directly shutting off the high-voltage source of the string, reducing the risk of electric shock to personnel
- **Power line communication**, no need for additional communication cables, easy installation and stable communication
- **Default shutdown configuration**, ensuring the personal safety of installation and maintenance personnel
- Safe and reliable, with output short-circuit protection function, no risk of high temperature when any component fails
- Implement module-level monitoring and accurately locate faulty modules according to project needs



GNE PV Module Rapid Shutdown (+Monitoring) Device

Sole PV Rapid Shutdown Device

Scoutbee800/800M



Features:

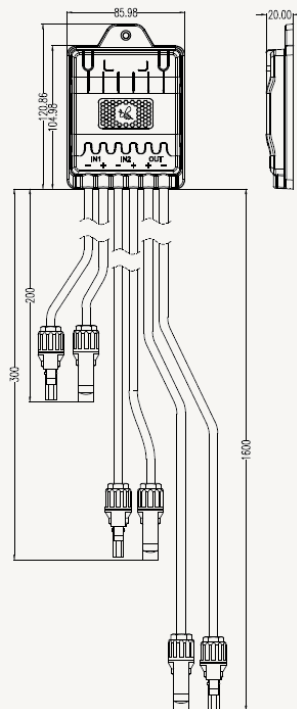
1. Connect **ONE** PV module, module-level shutdown, directly shuts off the high-voltage source of the string, reduce the risk of electric shock to humans.
2. PLC communication, no additional communication cables needed, convenient installation, and stable communication.
3. Default shutdown status, ensures the personal safety of installation and maintenance personnel.
4. Safe and reliable, with output short-circuit protection function, no high temperature risk for any component failure
5. 25-year life span, matching PV modules.
6. Compliant with USA NEC2017/2020 (690.12), UL1741 rapid shutdown specifications, and support the SunSpec rapid shutdown protocol.

Code		Scoutbee800	Scoutbee800M
Input	No. of Module	1	
	Maximum Power	800W	
	Maximum Voltage	80V	
	Maximum Current	20A	
	Working Voltage	12 ~ 80V	
Output	Maximum Power	800W	
	Maximum Voltage	80V	
	Maximum Current	20A	
	Conductive Efficiency	>99.8%	
	Default Working Status	Shutdown	
	Shutdown Voltage	0.8~1V	
Communication	Rapid Shutdown	PLC	
		PLC communication distance: 300M	
	Monitoring	N/A	RF(915M/2.4G)
		N/A	Diameter 30M
System			
Maximum No. of Modules per string		30Pcs	
Shutdown Time (Vsystem<30V)		15 Seconds	
Application			
Temperature Range		-40 ~ +85°C	
Relative humidity range		0 ~ 100%	
Ingress Protection		IP68 / NEMA Type6P	
Certification			
Regulations		NEC2017/2020 (690.12)	
Safety		UL1741;IEC62109-1;EN62109-1	
EMC		FCC Part15 Class B IEC61000-6-2; IEC61000-6-3 EN61000-6-2; EN61000-6-3	
Structure			
Dimension		107×82×20 mm	
Weight		400g	
Input Cable Length		200mm/Customized	
Output Cable Length		1000mm/Customized	
Connector (Input/Output)		Compatible with MC4	



GNE PV Module Rapid Shutdown (+Monitoring) Device

Dual PV Rapid Shutdown Device Scoutbee1600/1600M



Features:

1. Connect **TWO** PV module, module-level shutdown, directly shuts off the high-voltage source of the string, reduce the risk of electric shock to humans.
2. PLC communication, no additional communication cables needed, convenient installation, and stable communication.
3. Default shutdown status, ensures the personal safety of installation and maintenance personnel.
4. Safe and reliable, with output short-circuit protection function, no high temperature risk for any component failure
5. 25-year life span, matching PV modules.
6. Compliant with USA NEC2017/2020 (690.12), UL1741 rapid shutdown specifications, and support the SunSpec rapid shutdown protocol.

Code		Scoutbee1600		Scoutbee1600M	
Input	No. of Module	2			
	Maximum Power	800W	800W	800W	800W
	Maximum Voltage	80V	80V	80V	80V
	Maximum Current	20A	20A	20A	20A
	Working Voltage	12 ~ 80V	12 ~ 80V	12 ~ 80V	12 ~ 80V
Output	Maximum Power	160W			
	Maximum Voltage	12~160 V			
	Maximum Current	20A			
	Conductive Efficiency	>99.9%			
	Default Working Status	Shutdown			
Communication	Shutdown Voltage	1.6±0.2V			
	Rapid Shutdown	PLC			
	Monitoring	PLC communication distance 300M		RF	
		N/A		RF communication distance: 50M	
System					
Maximum No. of Modules per string		30Pcs			
Shutdown(Vsystem<30V)		15Seconds			
Application					
Temperature Range		-40 ~ +85°C			
Relative Humidity range		0 ~ 100%			
Ingress Protection		IP68/NEMA Type6P			
Certification					
Regulations		NEC2017/2020 (690.12)			
Safety		UL1741;IEC62109-1;EN62109-1			
EMC		FCC Part15 Class B IEC61000-6-2; IEC61000-6-3 EN61000-6-2; EN61000-6-3			
Structure					
Dimension		127.5×106×22 mm			
Weight		450 g			
Input Cable Length		200mm/Customized		300mm/Customized	
Output Cable Length		1600mm/Customized			
Connector (Input/Output)		MC4/Customized			



GNE PV Module Rapid Shutdown (+Monitoring) Device

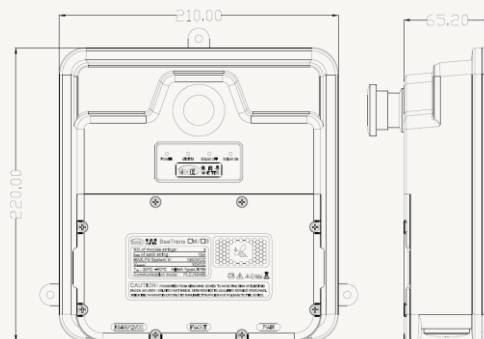
Shutdown Controller (for Northern American)
Beetrans



(NA) Master shutdown controller
Beetrans-Master



(NA) Slave Shutdown Controller
Beetrans-Slave



Features:

1. Send shutdown and turn-on signals to the rapid shutdown device, one controller supports two strings
2. **Up to 9 controllers can be cascaded**, supporting large rooftop PV stations
3. PLC communication mode, no other communication cables needed, easy to install, and higher reliability
4. Support SunSpec shutdown communication protocol
5. With function of string voltage detection , safer and more reliable

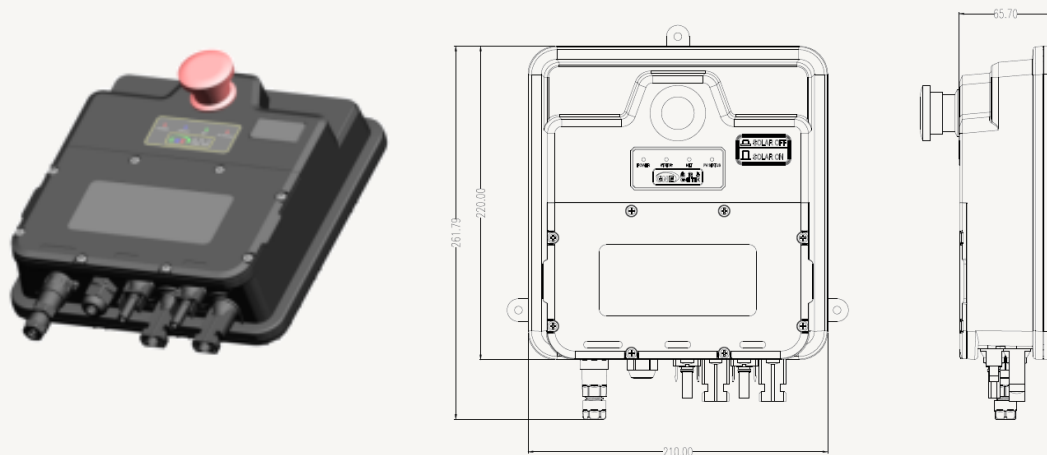
Item		Parameter	Unit
Basic parameters	Input Voltage	12	Vdc
	Power Consumption	1.2	W
	Support Strings	2	String
	Maximum current per sting	15	A
	Cascade Control	Yes	-
	Maximum No. of cascading	5	Pc
Communication	Communication method	PLC	-
		RS485	-
Application	Working Temperature range	-20 ~ +60	°C
	Relative Humidity range	0 ~ 100	%
	Ingress Protection	IP65 / NEMA Type4	
System	Maximum System voltage	1500	Vdc
Certification	Standard and Regulation	NEC 690.12	-
		UL1741	-
		CSA C22.2 No.330	-
		SunSpec	-
Structure	Size(L×W×H)	220×210×65	Mm
	No. of Hole	3	Pc
	Diameter of Hole	27.8	Mm
	EMT tube diameter	¾	Inch
	Weight	850	g



GNE PV Module Rapid Shutdown (+Monitoring) Device

Shutdown Controller (for Europe)

Beebox-S



Features:

1. Send shutdown and turn-on signals to the rapid shutdown device, one controller supports two strings
2. **With arc detection function**, the output of the system will be automatically shut down when arc is found
3. PLC communication mode, no other communication cables needed, easy to install, and higher reliability
4. Support SunSpec shutdown communication protocol
5. With function of string voltage detection , safer and more reliable

Item		Parameter	Unit
Basic parameters	Input Voltage	12	Vdc
	Power Consumption	1.2	W
	Support Strings	2	String
	Maximum current per sting	15	A
	Cascade Control	N/A	-
	Maximum No. of cascading	N/A	Pc
Communication	Communication method	PLC	-
		LAN+Wifi	-
	Data transmission Frequency	5 minutes	
Application	Working Temperature range	-20 ~ +60	°C
	Relative Humidity range	0 ~ 100	%
	Ingress Protection	IP65 / NEMA Type4	
System	Maximum System voltage	1500	Vdc
	DC Arc detection function	Yes	
Certification	Standard and Regulation	NEC 690.12	-
		UL1741	-
		CSA C22.2 No.330	-
		SunSpec	-
Structure	Size(L×W×H)	261.8×210×65.7	Mm
	Connector	Compatible with MC4	
	Weight	880	g



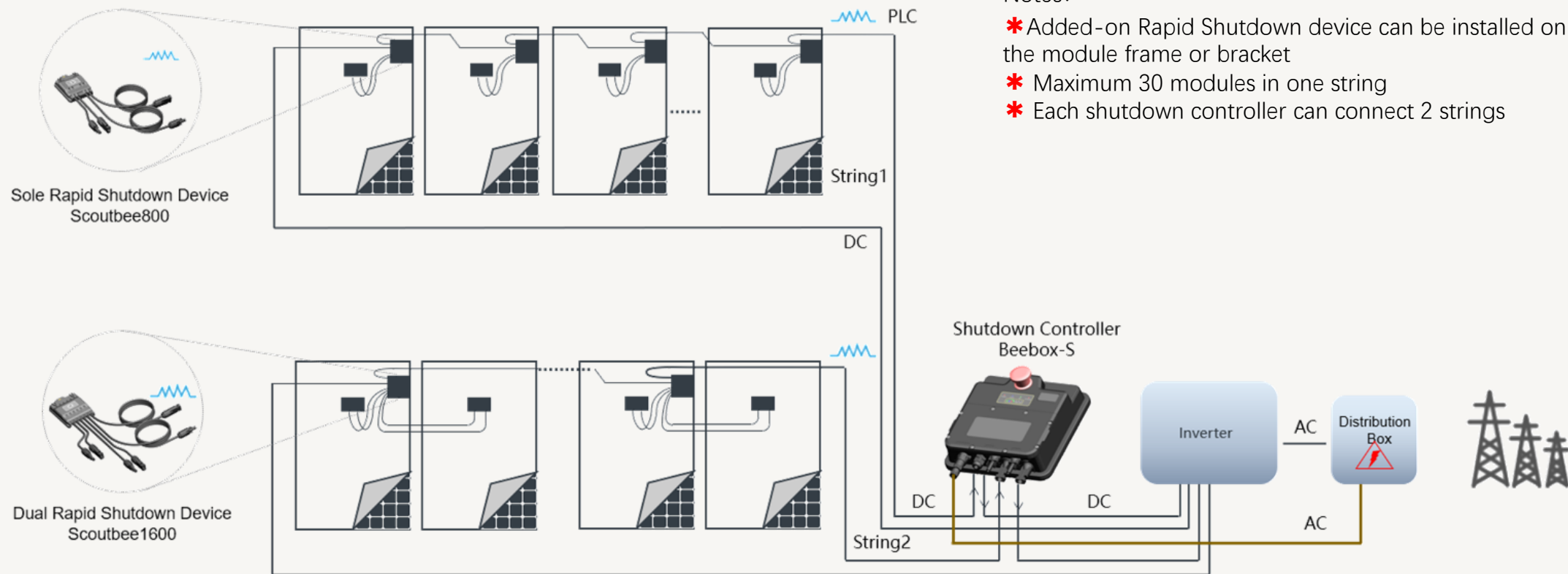
GNE PV Module Rapid Shutdown Diagram

----- (Add-on RSD, PLC, Residential Projects)

Case:

10KW PV Station: 16pcs 625W modules, 1-2 Strings

16pcs Scoutbee800 or 8pcs Scoutbee1600 + 1pc Beebox-S



Notes:

- * Added-on Rapid Shutdown device can be installed on the module frame or bracket
- * Maximum 30 modules in one string
- * Each shutdown controller can connect 2 strings



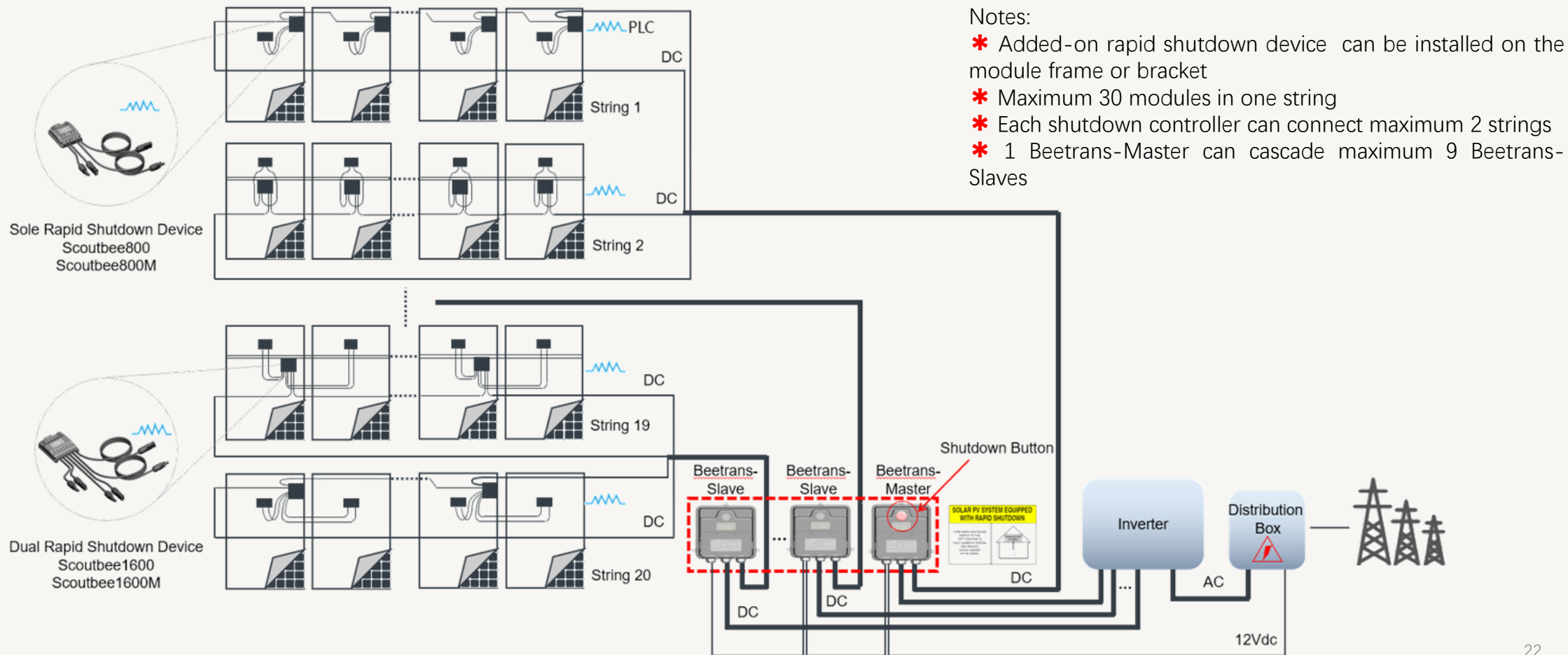
GNE PV Module Rapid Shutdown Diagram

------(Add-on RSD, PLC, Medium Projects)

Case:

200KW PV Station: 320pcs 625W modules, 20 modules per String, 16 Strings in total

320pcs Scoutbee800 or 160pcs Scoutbee1600 + 1pc Beetrans-Master + 7pcs Beetrans-Slave





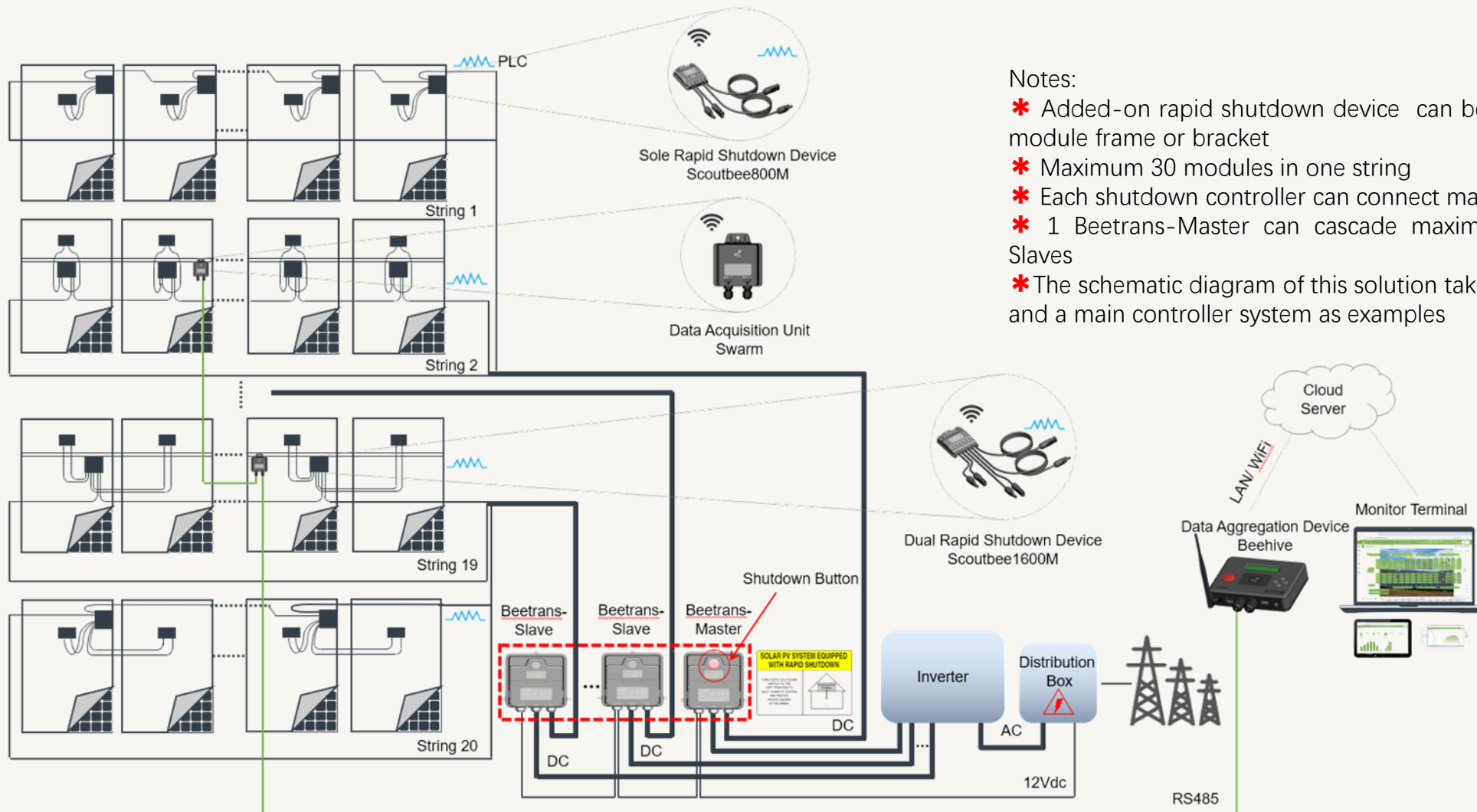
GNE PV Module Rapid Shutdown + Monitoring Diagram

----- (Add-on RSD, RF+PLC, Large Projects)

Case:

1MW PV Station: 1600pcs 625W modules, 20 modules per String, 80 Strings in total

1600pcs Scoutbee800M or 800pcs Scoutbee1600M + 4pcs Beetrans-Master + 36pcs Beetrans-Slave + 8pcs Swarm + 2pcs Beehive



Notes:

- * Added-on rapid shutdown device can be installed on the module frame or bracket
- * Maximum 30 modules in one string
- * Each shutdown controller can connect maximum 2 strings
- * 1 Beetrans-Master can cascade maximum 9 Beetrans-Slaves
- * The schematic diagram of this solution takes an inverter and a main controller system as examples

THANK YOU!

JIANGSU GNE NEW ENERGY TECHNOLOGY CO., LTD.

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