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深圳思凌科技术有限公司

Shenzhen Siliconconductor Technology Co., Ltd.

# 光伏智能采集网关 PV Intelligent Data Acquisition Gateway

## 用户手册 USER MANUAL PV-G1000 / SL-SRSD-TYPE A2



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# 1 基本概述

## 1.1 手册概述

本用户手册详细介绍了光伏智能采集网关系列产品（下述简称“采集网关”）的功能特性和应用安装方法。在安装和使用设备之前，请先仔细阅读用户手册中的声明、要求和注意事项。

## 1.2 读者对象

本用户手册适用于设备安装工程师、技术支持工程师、销售工程师和电站业主等人员。

## 1.3 修订记录

序号	内容	文档版本	发布时间
1	创建文档	V1.0.0	2024.01.09
2	添加型号内容：PV-G1000	V1.1.0	2024.04.17
3.	更新：3.5组网场景&电源电压范围&认证信息	V1.2.0	2024.05.07

## 1.4 手册声明

本用户手册中描述的内容可能不在用户的购买或使用范围之内，用户购买或使用的产品或服务应受到思凌科商业合同和条款的约束。

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## 1.5 FCC警告说明

请注意，未经合规负责方明确批准的更改或修改可能会使用户失去操作设备的权限。

此设备符合FCC规则第15部分的规定。操作受以下两个条件约束：

- (1) 该设备可能不会造成有害干扰，并且
- (2) 该设备必须接受接收到的任何干扰，包括可能导致不希望的操作的干扰。

该设备符合FCC针对非受控环境规定的辐射暴露限值。安装和操作该设备时，散热器和身体之间的距离应至少为20厘米。

## 2 注意事项

### 2.1 产品声明

在运输、存储、安装、操作、使用和维护产品前，请先阅读本用户手册，并开展全面的产品实施调研。产品应在符合设计规格要求的环境下使用，使用过程中应严格遵循本用户手册中要求的注意事项，遵守当地适用的法律法规、标准和规范要求。

发生以下任一情况或下述情况导致的结果，本公司不承担任何责任：

- (1) 因不可抗力因素导致的产品损坏和事故（如地震、洪水、火灾、战争等极端状况）；
- (2) 因运输条件恶劣而导致的产品损坏和事故；
- (3) 因存储条件恶劣而导致的产品损坏和事故；
- (4) 在安装和使用中，未遵守当地的法律法规，不符合当地的标准要求；
- (5) 非专业、未经培训的人员对产品进行操作使用；
- (6) 未经授权或未经允许，擅自拆卸、更改产品或者修改软件代码；
- (7) 在超出规定的技术参数范围外运行产品，或产品超出质保期限；
- (8) 用户或者第三方（非本公司原因）的疏忽、故意、重大过失、操作不当，引发的人身伤亡、财产损失等。

### 2.2 对操作人员的要求

- 1、操作人员应阅读完本用户手册，并知悉所有注意事项；
- 2、操作人员应掌握光伏并网发电系统的构成和工作原理；
- 3、操作人员应遵守电气系统、机械作业、高空作业等相关的安全规范和要求；
- 4、操作人员应遵守产品所在的国家或地区有关安全和电气的法规及相关标准；
- 5、操作人员应经过思凌科光伏系列产品安装操作培训，熟悉并掌握产品的操作和使用；
- 6、操作人员必须佩戴防护用具并做好绝缘防护，严禁穿戴易导电物品（如手表、戒指等）。

### 2.3 对操作条件的要求

- 1、设备安装前：
  - (1) 设备存放的环境应温湿度适宜、清洁干燥、通风良好；
  - (2) 设备应避免存放在存在大量灰尘及挥发性气体的环境中；
  - (3) 严禁在恶劣天气下（如雷电、暴雨、大风等）安装、使用和操作设备；
  - (4) 安装工具应具备安全性和专业性，应确保工具绝缘并牢固，不超负荷。
- 2、设备安装中：
  - (1) 确保电缆连接牢固、绝缘良好；
  - (2) 确保优化器、逆变器和电源等开关均处于关闭状态，确保组串无电压；

(3) 安装中请勿触摸接线工作需要以外的其他部件。

3、设备运行时：

(1) 请勿随意触摸设备，以免造成触电、烫伤或其他事故。

### 3 产品介绍

#### 3.1 产品简介

光伏智能采集网关是一款安装于光伏组件关断和监控采集系统中的通信设备。光伏智能采集网关通过灵活自动的组网机制和高速稳定的通信方式，能够迅速识别关断指令，快速关断光伏组串和组件，确保光伏系统安全。同时，本光伏智能采集网关能够实时监控光伏组串和组件的运行状态，并上报至云平台，实现光伏电站的智能运维管理。光伏智能采集网关需要搭配套件进行使用。

#### 3.2 产品型号

本用户手册主要涉及以下产品型号：

产品型号
PV-G1000 / SL-SRSD-TYPE A2

#### 3.3 产品结构

产品型号	图示
PV-G1000 / SL-SRSD-TYPE A2	

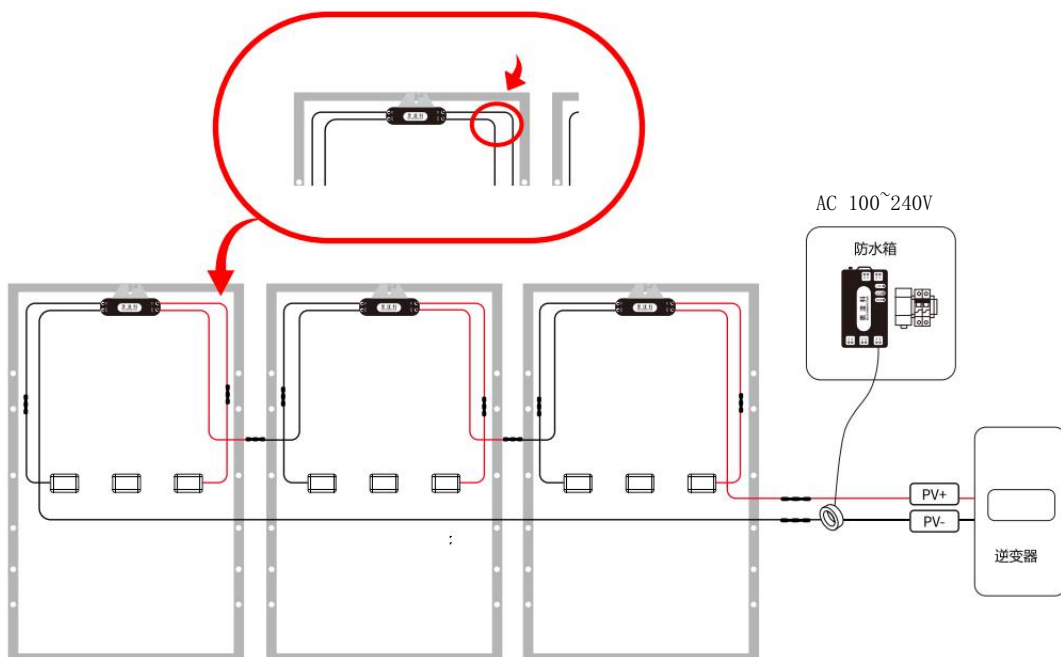
#### 3.4 图标说明

序号	图示	含义
1		网络指示灯，红灯快闪代表通信正常
2		载波通信灯，绿灯亮代表通信正常
3		电源指示灯，红灯代表供电正常

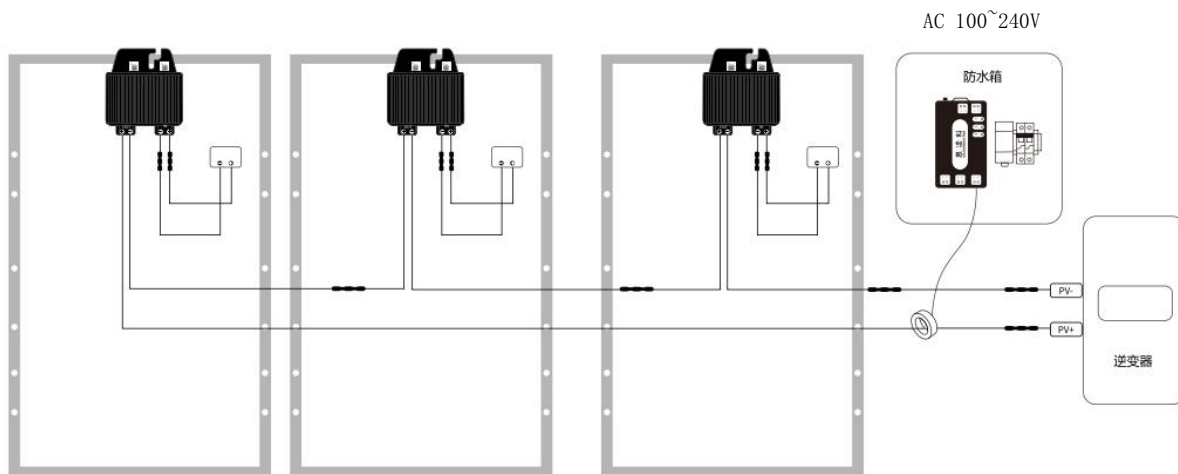
### 3.5 组网场景

1. 下图为关断器与光伏智能采集网关组网场景：

注意：安装线缆时，线缆弯曲半径必须大于 50mm。



2. 下图为优化器与光伏智能采集网关组网场景：

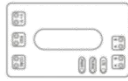
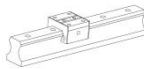


## 4 现场安装

### 4.1 环境要求

- 1、请充分开展现场调研并预留足够空间，合理规划光伏采集网关及其套件的安装位置；
- 2、禁止将光伏采集网关直接暴露在无遮挡或浸水的环境中；
- 3、请确保线缆能够正常连接；
- 4、禁止在光伏采集网关套件安装区域存放易燃易爆物品。

## 4.2 套件清单

序号	名称	数量	小样图（以实际为准）	备注
1	智能采集网关	1		
2	防水箱	1		铁皮/塑料材质 可选
3	断路器	1		
4	电源	1		100~240V转 10~18V电源模 块
5	磁环	1		开口磁环或闭 口磁环可选
6	4G模组	1		需要配置4G卡
7	4G天线	1		可选配
8	WiFi天线	1		可选配
9	关断按钮/急停开关	1		可选配
10	导轨	1		
11	导线、螺丝、螺钉等	若干	N/A	以实际为准

注意：本表格仅列举重点物料，配图仅供参考，请以实际安装需求和交货情况为准。

## 4.3 安装前检查

### 1、检查外包装

拆开外包装之前，请检查外包装是否有可见的破损，例如出现空洞、裂纹或其他可能造成内部损坏的迹象。如果有任何外包装损坏的情况，请勿拆开，并尽快联系您的经销商。

## 2、检查交付物

如果外包装无破损，在拆开外包装之后，请检查包装内交付物是否齐备，并检查是否有任何明显的外部损坏。如果发现物件缺少或损坏，请尽快联系您的经销商。

## 4.4 安装步骤

### 1、本产品可用以下两种通信方式：

#### A. 若使用4G通信方式

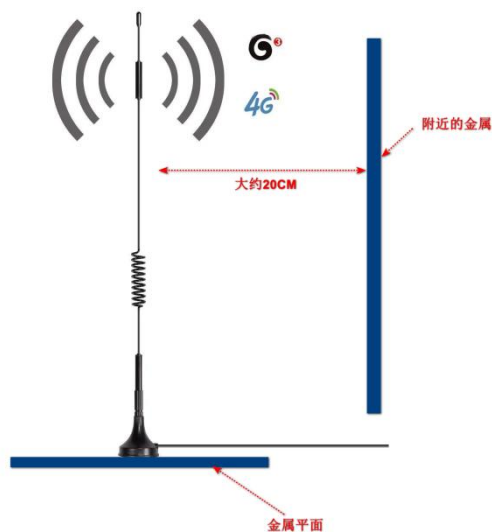
##### ① 插入4G卡

- (1) 安装SIM卡之前，先保证采集网关处于断电状态；
- (2) 往上推采集网关卡扣，将采集网关从导轨上取下，打开采集网关上盖；
- (3) 推开SIM金属卡盖，将nano SIM卡放入卡槽中，请注意缺口方向需要保持一致；
- (4) 按下卡盖并推动卡盖锁住SIM卡；
- (5) 盖好采集网关上盖，将其装回导轨上并扣好卡扣。

② 找到4G天线接口，安装吸盘式4G天线(注意：天线竖直吸附在金属上，距离周围金属距离大于20CM)。

#### B. 若使用WiFi通信方式

① 找到WiFi天线接口，安装WiFi天线(注意：天线竖直吸附在金属上，距离周围金属距离大于20CM)：

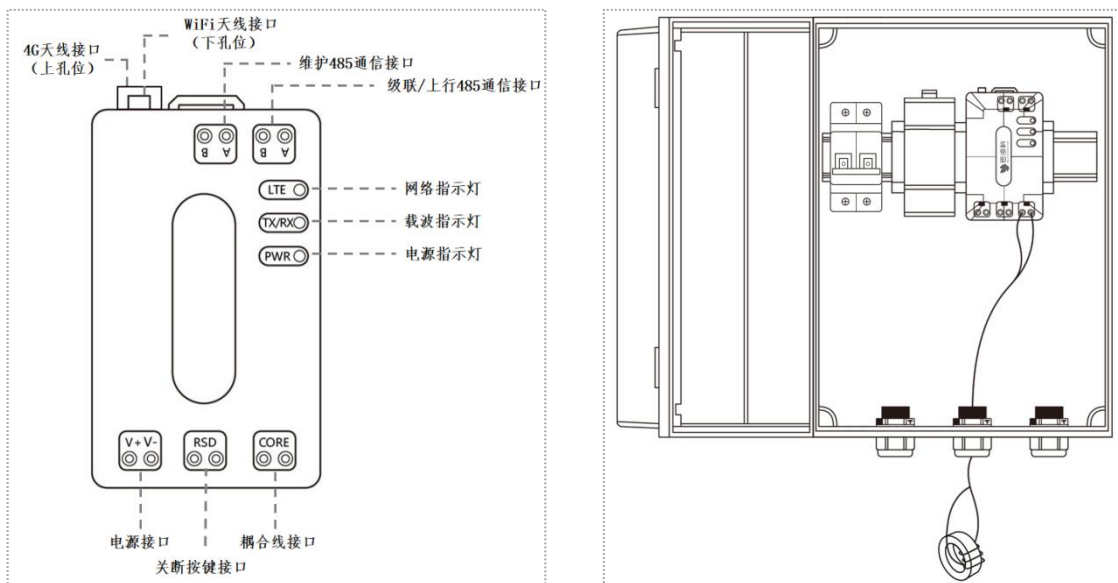


2、如连接线和磁环未进行缠绕，可找到耦合线接口，使用连接线（不分正负极）连接后，缠绕磁环3圈；

3、在组网环境中，直流母线需要穿过磁环（参照3.5组网场景），注意直流母线既可是正极也可是负极，但若穿过多条直流母线，必须都为正极或者都为负极；

4、找到电源接口，使用连接线连接电源；

5、若套件中包含关断按钮，请找到关断按钮接口，使用连接线（不分正负极）连接关断按钮。



注意：上述仅描述防水箱内的安装操作，防水箱外部的布线方式，请以现场实际情况为准。

## 5 光伏智慧运维管理平台

本款光伏智能采集网关需要与光伏组件级快速关断器/光伏组件级监控关断器（下述简称“关断器”）、光伏组件级优化器（下述简称“优化器”）、光伏智慧运维管理平台（下述简称“云平台”）等配套使用，以实现光伏电站的智能运维管理。与配套产品的连接方式与使用详情，请参考对应产品的用户手册（请联络经销商获取或扫码下载）。

## 6 功能检查

当节点（关断器或优化器）和光伏智能采集网关已完成配置后，可使用光伏云平台，对整套光伏组件智能运维系统进行功能检查。检查步骤如下：

### 1、从节点（关断器或优化器）与光伏智能采集网关连通性检查

一般情况下，档案导入采集网关后，采集网关会将心跳信号发送给节点；此时开展检查，需要使用本地上位机读取采集网关下的节点参数信息；如果能正常读取，说明节点与采集网关之间的双向通信是正常的；

### 2、光伏智能采集网关与光伏云平台连通性检查

- (1) 在光伏云平台中创建对应电站；
- (2) 输入采集网关SN号，为该电站绑定采集网关；
- (3) 绑定完成后，检查当前SN的网关是否在线。

## 7 产品认证和质量管理

### 产品认证

UL 1741: UL Std. No. 1741-2021

CSA C22.2 No. 330-23

UL 3741: ANSI/CAN/UL 3741-2020

CE-LVD: IEC/EN 62109 1-2010

CE-RED: EN 301 511, EN 301 908-1/13, EN 300 328

### 安规标准

EMC:EN 301 489-1/17/52, EN IEC 61000-6-1/2/3/4, EN IEC 61000-3-2/3

### 快速停机标准

NEC-2017/ NEC-2020/ NEC-2023 Section 690.12

### FCC认证说明

FCC: 47 CFR Part 15B, 47 CFR Part 15C (15.247), 47 CFR 2.1091

### IC认证说明

IC: ICES-003: Issue 7 October 2020



### 国家管理体系认证

GB/T19001-2016/ISO9001:2015质量管理体系

GB/T24001-2016/ISO14001:2015环境管理体系

GB/T45001-2020/ISO45001:2018《职业健康安全管理体系》

### 供应链管理说明

严格的供应商资格审核和定期评估，进货材料控制规范，材料质量提升，从源头控制产品质量，为客户提供更可靠的产品。

## 8 技术参数

产品型号		PV-G1000 / SL-SRSD-TYPE A2	
通信方式			
通信方式	南向	HPLC (高速电力线载波通信)	
	北向	4G	WiFi
通信速率	南向	1600 Kbps ~ 8 Mbps/自适应	
	北向	最大下行 10 Mbps 最大上行 5 Mbps	支持Wifi 2.4G 802.11b/g/n
认证			
安全	UL 1741 UL 3741 CSA C22.2 No. 330-23 NEC-2017&2020&2023 690.12 IEC/EN 62109-1		
EMC	FCC: 47 CFR Part 15B ICES-003:2020 IEC/EN61000-6-1/-2/-3/-4		
常规参数			
最大支持组件数	200		
最大支持组串数	12		
数据采集间隔	5min (可配置)		
电源	10~18V DC		
平均功耗	<2W		
接口数量	2*RS485		
串口速率	9600bps		
尺寸	90mm(长)×54mm(宽)×36.5mm(厚)		
重量	<0.1kg (不含套件)		
工作温度	-20~+65℃		
湿度范围	0 ~ 100%		

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# 1 Overview

## 1.1 Manual Overview

This manual contains detailed introductions of PV Intelligent Data Acquisition Gateway series products (abbreviate as "Gateway" in follows) about functional performances, installation methods. Before installing or using the devices, please read the instructions, requirements and precautions in the user manual carefully.

## 1.2 Operating Personnel

This manual is suitable for device Installers, O&M Staff, FAE, Technical Support Engineers, Sales Engineers and Power Station Owner.

## 1.3 Revision Record

No.	Contents	Version	Date of Issue
1	Create document, Newly Add content of Model: SL-SRSD-TYPE A2	V1.0.0	2023.09.25
2	Update related content of SL-SRSD-TYPE A2	V1.1.0	2023.12.07
3	Add content of Model: PV-G1000	V1.2.0	2024.04.17
4	Modify description & Update authentication	V1.2.1	2024.05.07

## 1.4 Notice

All or part of the products, services and features described in the manual may not be within the purchase scope or the usage scope. The purchased products, services and features are stipulated by the commercial contracts signed between Siliconductor and the customer.

This user manual will be updated at irregular intervals and be subject to change without notice.

Unless otherwise specified, this user manual is only used as a operation guide, all statements, information and recommendations in the manual are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

## 1.5 FCC Warning

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two

conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

## 2 Precautions

### 2.1 Liability Exemption

Before shipping, storage, installation, operation, use, and maintenance of the product, please read this user manual and conduct a comprehensive product implementation research. The product must be used under the conditions that complies with the design specifications; the use process shall strictly follow the precautions in this user manual, and comply with applicable local laws, regulations, standards, and code requirements.

In the event of any listed of the following, the manufacturer does not assume liability for quality warranty and product safety:

- Damage and accidents that attributed to force majeure.(including but not limited to earthquake, flood, fire, war and other extreme conditions);
- Product damage and accidents that attributed to improper transportation conditions;
- Product damage and accidents that attributed to improper storage;
- The installation & use process does not comply with applicable local laws & regulations also does not meet the requirements of local standard;
- Non-professional, untrained personnel operate and use the device;
- Disassemble or change of products and modify the software code without authorization or permission;
- To operate devices outside the range permitted by technical parameters, use devices out of Warranty period;
- Any personal injury, death, and property loss caused by action of negligent, intentional, gross negligence or improper operation of the user or a third party (not the reason of the Manufacturer).

### 2.2 Requirements for Operators

- 1 Each operator should read the user manual and be aware of the requirements and precautions;
- 2 Operators should known on the structures & working principles of grid-connected photovoltaic generation system;
- 3 Operators should comply with safety regulations and requirements related to electric systems,

mechanical operation and work high above the ground scene;

4 Operators should comply with the relevant regulations and standards related to safety and electrical in the country or region where the device is used;

5 Operators should be well-trained by SLC on product installation & operating and be familiar with operation and use of devices;

6 Operators should wear personnel protective equipment and make good insulation protection; Strictly prohibit of wearing conductive metallic jewelry(such as watch and rings).

## 2.3 Requirements for Operational Environment

1 Before operation:

- Ensure that the devices are stored in a suitable temperature & humidity, clean & dry and well-ventilated environment;

- Avoid storing the device in an environment with large amounts of dust and volatile gases;

- Strictly prohibited to install, use and operate the devices in inclement weather.(such as lightning, rainstorm, and strong wind);

- Mounting tools should be safe and professional, which should be insulated and qualified for electrical operation and should not be overload operated.

2 During Installation:

- Ensure that the cable connections are tightly and well-insulated;

- Ensure that there is no voltage in the strings by switching off the RSD/MRSD, inverter and power supply;

- During installation, do not touch any components other than those required for wiring work.

3 During Run Time:

- Do not touch the devices intentionally to avoid electric shock, burns or other accidents.

## 3 Product Presentation

### 3.1 Product Introduction

The PV Intelligent Data Acquisition Gateway (abbreviate as “Gateway” in follows) is a communication facility set up in the PV module-level shutdown system. Through the flexible and automatic networking mechanism and high-speed and stable communication mode, the gateway can quickly identify the shutdown instruction and quickly shut off the PV module to ensure the safety of the photovoltaic system. At the same time, the gateway can monitor the running status of the module in real time upload message to the cloud platform to implement the intelligent operation and maintenance management of the PV power station. The gateway is designed to perform function with matched supporting parts.

### 3.2 Product Models

This user manual mainly covers the following product models:

Models
PV-G1000 / SL-SRSD-TYPE A2

### 3.3 Product Structure

Model	Drawing
PV-G1000 / SL-SRSD-TYPE A2	

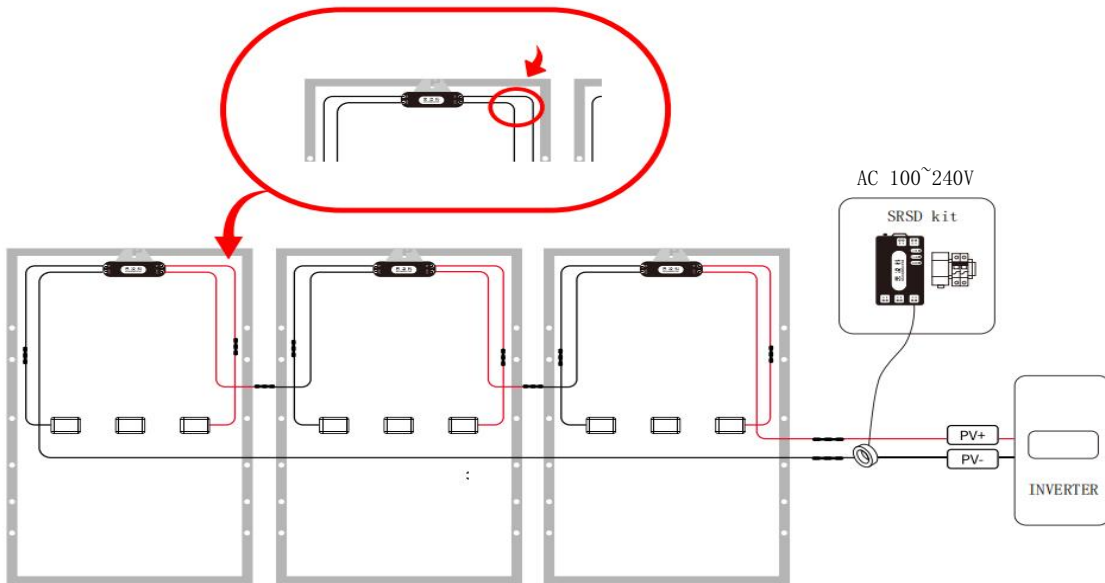
### 3.4 Icon Descriptions

No	Icon	Icon meaning
1		Network LED: Red light flashing quickly indicates normal communication
2		Carrier Signal LED: Green Light indicates normal communication
3		Power LED: Red light indicates normal power supply

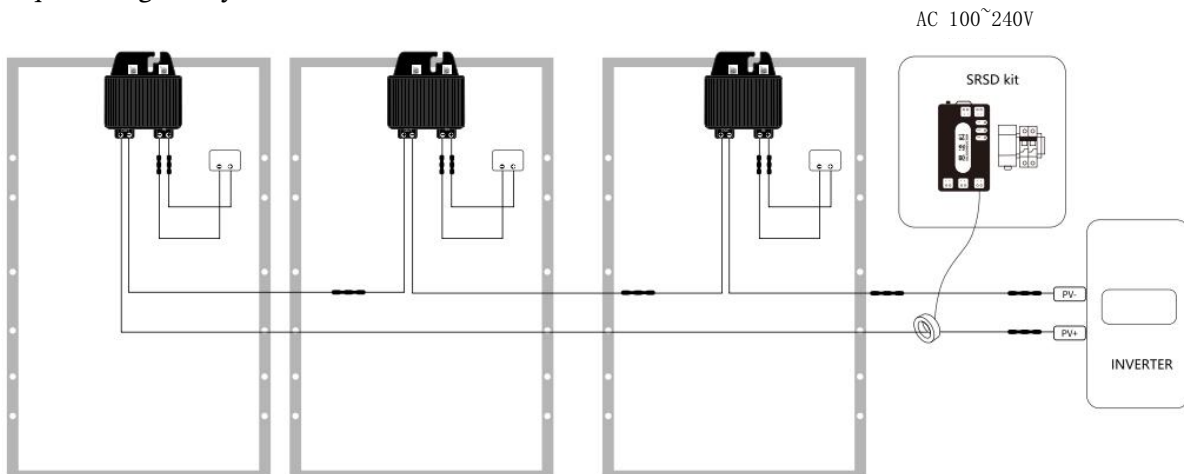
### 3.5 Networking Scenarios

1 The following diagram shows the networking scenario of the shutdown device and the intelligent data acquisition gateway:

**NOTE:**When installing cables, the bending radius of the cables must be greater than 50mm.



2 The following diagram shows the networking scenarios of the optimizer and the intelligent data acquisition gateway:

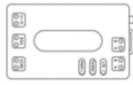
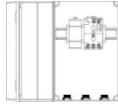
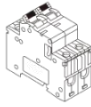


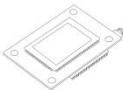



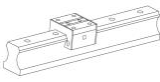


## 4 Site Installation

### 4.1 Matters Need Attention

- 1 Conduct fully site research leave enough space and plan reasonably for the installation position on both gateway and water-proof control kit;
- 2 Strictly prohibited to install gateway outside of the kit or exposed to soaking scene;
- 3 Ensure the cables length is enough to connect;
- 4 Strictly prohibited to store flammable and explosive materials in the installation area of gateway & matched kit box.

## 4.2 Gateway & Functional Kit Package

No	Item	quantity	Sample Drawing (In kind prevail)	Remarks
1	Intelligent Data Acquisition Gateway	1		
2	Water-proof Box	1		Iron/plastic material option
3	Master switch	1		
4	Power supply	1		Voltage converter module on 100~240V to 10~18V
5	Magnet Ring	1		Open or closed magnetic rings are optional
6	4G module	1		Mated with 4G card
7	4G antenna	1		option
8	WiFi antenna	1		option
9	Emergency stop button	1		option
10	Rail	1		
11	wire、screw、bolt	some	N/A	In kind prevail

Note: Only the key materials be listed in the table and for reference only. The final delivery fittings can be optional integrated refer to the actual requirements.

## 4.3 Open-Packaging Inspection

### 1 Outer Packing carton Inspection

Any packaging damage (include of carton broken, hole or other bad carton conditions) may result in devices damaged in the carton. So please contact directly to your distributor and do not open the carton if you find the packaging is in bad conditions.

## 2 Devices Inspection

If packaging is in good conditions then open the box and check whether the inside contents are complete and intact. Any items is missing or damaged, contact your distributor as soon as possible.

## 4.4 Installation Procedure

1 This product can use the following two communication methods:

A. Option of 4G communication mode:

① Insert 4G card:

- Ensure the Gateway is power off before installing the SIM card;
- Push the Gateway clip upward to unlock from the rail and open the upper cover;
- Push upward to open the metal cover of the SIM card holder and insert the NANO SIM card. Be note to keep the SIM card gap and make sure card tray gap in same direction when sim card inserting;
- Press the card holder cover and push down to lock the SIM card;
- Cover the Gateway upper cover back and lock down to the rail.

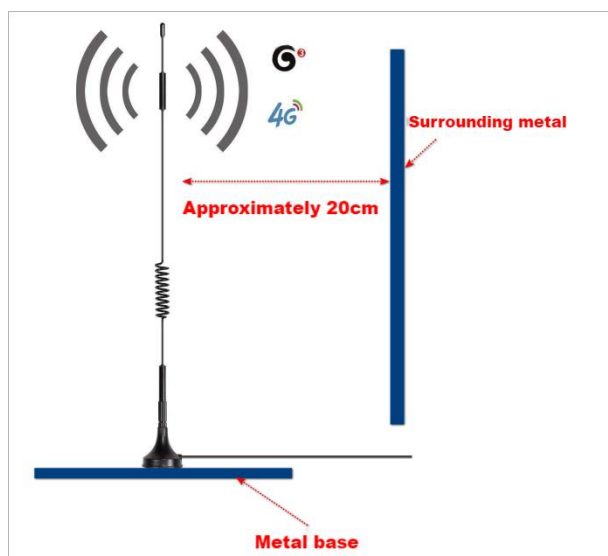
② Install suction cup 4G antenna to suitable place and connect it to gateway 4G antenna port(Attention:

The antenna is vertically attached to the metal, and the distance from the surrounding metal is greater than 20CM).

B. Option of WIFI communication mode

① Install WIFI antenna to suitable place and connect it to gateway WIFI antenna port(Attention: The

antenna is vertically attached to the metal, and the distance from the surrounding metal is greater than 20CM).

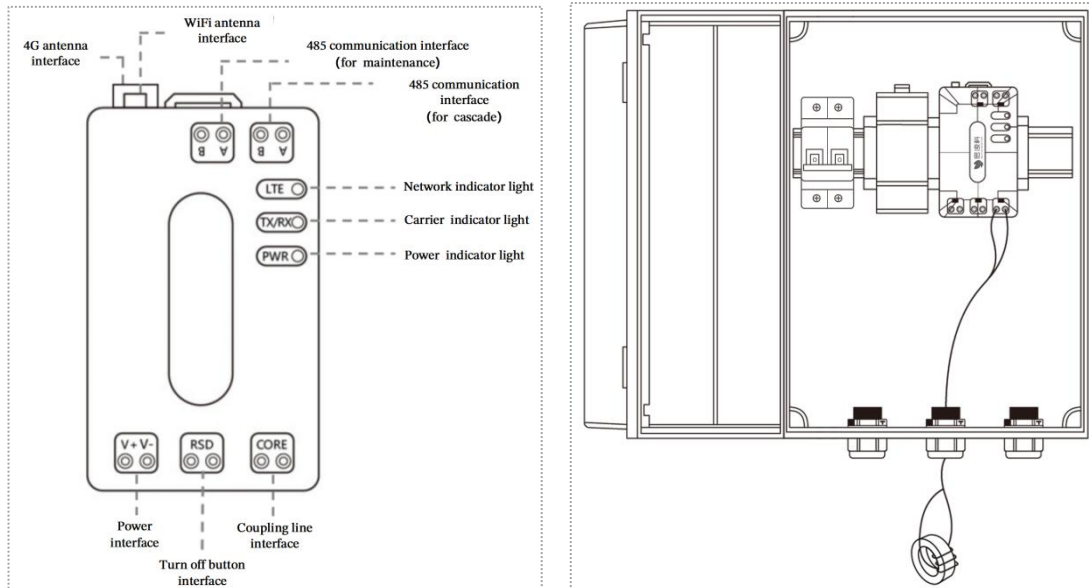


2 Connect the magnet ring to gateway coupling interface port through a wire (No need to distinguish positive and negative poles), the wire should be wrapped 3 times around the magnet ring;

3 In networking loop, the DC bus must pass through the magnetic ring (see 3.5 Networking Scenario), that the DC bus can be both positive and negative, but if it passes through multiple DC buses, they must all be positive or negative;

4 Connect to power port by wire;

5 If there is an emergency stop button used in the Gateway & functional kit package, then connect them through a wire (No need to distinguish positive and negative poles).



Note: Above descriptions of inner fitting-up and outside connection pattern of water-proof box is just for reference only. The final implement refer to the actual operation situation.

## 5 Intelligent O&M Management Platform

The Gateway works rely on coordinated support with PV module level rapid shutdown device (abbreviate as "RSD/MRSD" ) or PV module level optimizer (abbreviate as "Optimizer" ) 、 Intelligent O&M Management Platform (abbreviate as "Cloud Platform" ) is to implement intelligent O&M on PV power station. The connection methods and operation details with supporting products can be checked in user manual(please contact the distributor to obtain or scan the QR code to download).

## 6 Function Check

When the nodes (shutdown device or optimizer) and the gateway have been configured, the photovoltaic cloud platform can be used to check the function of the whole Cloud Platform. The check steps are as follows:

1 Check the connectivity between the nodes(RSD/MRSD or Optimizer) and gateway. In general, after the SN collection file is imported into the gateway, which will send a "keep alive" signal to the nodes.

Meanwhile the nodes activation will be triggered and implemented of testing, adjustment and allocation by data acquisition from nodes under the gateway through local upper computer software . If the data can be read normally, it refer the two-way communication between the nodes and the gateway is running properly;

2 Check connectivity between Gateway and Cloud platform.

- Online establish the corresponding power station on the PV cloud platform;
- Import the SN number of the gateway to bind the gateway to the power station;
- After the binding is complete, check whether the gateway of the current SN is online.

## 7 Product Certification & Quality Management

### Product Certification

UL 1741: UL Std. No. 1741-2021

CSA C22.2 No. 330-23

UL 3741: ANSI/CAN/UL 3741-2020

CE-LVD: IEC/EN 62109 1-2010

CE-RED: EN 301 511, EN 301 908-1/13, EN 300 328

### Safety Regulations

EMC:EN 301 489-1/17/52, EN IEC 61000-6-1/2/3/4, EN IEC 61000-3-2/3

### Rapid Shutdown Standard

NEC-2017/ NEC-2020/ NEC-2023 Section 690.12

### Federal Communications Commission

FCC: 47 CFR Part 15B, 47 CFR Part 15C (15.247), 47 CFR 2.1091

### Industry Canada

IC: ICES-003: Issue 7 October 2020



### Management System Certification

GB/T19001-2016/ISO9001:2015 Quality Management System

GB/T24001-2016/ISO14001:2015 Environmental Management System

GB/T45001-2020/ISO45001:2018 Occupational Health and Safety Management System

### Supply chain management

Strict supplier qualification audit and regular assessment, incoming material control specifications, incoming materials quality enhancement, controlling product quality from the source, providing more reliable products for customers.

## 8 Technical Specifications

<b>Model</b>		PV-G1000 / SL-SRSD-TYPE A2	
<b>Communication</b>			
<b>communication scenario</b>	<b>Power line communication</b>	HPLC (High-speed power line carrier communication)	
	<b>With platform</b>	4G	WiFi
<b>communication speed</b>	<b>Power line communication</b>	1600 Kbps ~ 8 Mbps/adaptive approach	
	<b>With platform</b>	Max downlink rate 10 Mbps Max uplink rate 5 Mbps	Support Wifi 2.4G 802.11b/g/n
<b>Certification</b>			
<b>Safety</b>		UL 1741 UL 3741 CSA C22.2 No. 330-23 NEC-2017&2020&2023 690.12 IEC/EN 62109-1	
<b>EMC</b>		FCC: 47 CFR Part 15B ICES-003:2020 IEC/EN61000-6-1/-2/-3/-4	
<b>Weight and Overall Dimension</b>			
<b>Maximum support quantity of modules</b>		200	
<b>Maximum support quantity of strings</b>		12	
<b>Data acquisition interval</b>		5min(configurable)	
<b>Power supply</b>		10~18V DC	
<b>Number of interfaces</b>		2*RS485	
<b>Serial port rate</b>		9600bps	
<b>Dimension</b>		90mm(length)×54mm(width)×36.5mm(thickness)	
<b>Weight</b>		<0.1kg (No kits included)	
<b>Operating Temperature</b>		-20~+65°C	
<b>Humidity Range</b>		0 ~ 100%	



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