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深圳思凌科半导体技术有限公司

Shenzhen Siliconductor Technology Co., Ltd.

光伏智能采集网关 PV Smart Gateway

用户手册

USER MANUAL

PV-G1000 / SL-SRSD-TYPE A2



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目录

CONTENTS

1 基本概述	5
1 Overview	5
1.1 手册概述	5
1.1 Manual Overview	5
1.2 读者对象	5
1.2 Operating Personnel	5
1.3 修订记录	5
1.3 Revision Record	5
1.4 手册声明	5
1.4 Notice	5
1.5 FCC警告说明	6
1.5 FCC Warning	6
2 注意事项	7
2 Precautions	7
2.1 产品声明	7
2.1 Liability Exemption	7
2.2 对操作人员的要求	8
2.2 Requirements for Operators	8
2.3 对操作条件的要求	8
2.3 Requirements for Operational Environment	8
3 产品介绍	9
3 Product Introduction	9
3.1 产品简介	9
3.1 Brief introduction on Gateway	9
3.2 产品型号	10
3.2 Product Models	10
3.3 产品结构	10
3.3 Product Structure Drawing	10
3.4 图标说明	10
3.4 Icon Descriptions	10
3.5 组网场景	11
3.5 Networking Scenarios	11

4 现场安装	12
4 Site Installation	12
4.1 环境要求	12
4.1 Matters Need Attention	12
4.2 套件清单	13
4.2 Gateway & Functional Kit Package	13
4.3 安装前检查	14
4.3 Open-Packaging Inspection	14
4.4 安装步骤	14
4.4 Installation Procedure	14
5 智慧运维平台	16
5 Smart Operation & Maintenance Platform	16
6 功能检查	17
6 Function Check	17
7 产品认证和质量管理	18
7 Product Certification & Quality Management	18
8 技术参数	19
8 Technical Specifications	19

1 基本概述

1 Overview

1.1 手册概述

1.1 Manual Overview

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。

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 读者对象

1.2 Operating Personnel

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。

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

1.3 修订记录

1.3 Revision Record

序号 No.	内容 Contents	文档版本 Version	发布时间 Date of Issue
1	创建文档Create document	V1.0.0	2024.01.09
2	添加型号内容：PV-G1000 Add content of Model: PV-G1000	V1.1.0	2024.04.17

1.4 手册声明

1.4 Notice

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。

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.

由于产品版本升级或其他原因，用户手册的内容会不定期进行更新。除非另有约定，本用户手册仅作为使用指导，其中的所有陈述、信息和建议不构成任何明示或暗示的担保。

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警告说明

1.5 FCC Warning

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。

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.

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：

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

- (1) 该设备可能不会造成有害干扰；

This device may not cause harmful interference;

- (2) 此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。

This device must accept any interference received, including interference that may cause undesired operation.

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。

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 注意事项

2 Precautions

2.1 产品声明

2.1 Liability Exemption

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。

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.

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：

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

(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）；

Damage and accidents that attributed to force majeure.(including but not limited to earthquake, flood, fire, war and other extreme conditions);

(2) 因运输条件恶劣而导致的产品损坏和事故；

Product damage and accidents that attributed to improper transportation conditions;

(3) 因存储条件恶劣而导致的产品损坏和事故；

Product damage and accidents that attributed to improper storage;

(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；

The installation & use process does not comply with applicable local laws & regulations also does not meet the requirements of local standard;

(5) 非专业、未经培训的人员对产品进行操作使用；

Non-professional, untrained personnel operate and use the device;

(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；

Disassemble or change of products and modify the software code without authorization or permission;

(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；

To operate devices outside the range permitted by technical parameters, use devices out of Warranty period;

(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。

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 对操作人员的要求

2.2 Requirements for Operators

1、操作人员应阅读完本用户手册，并知悉所有注意事项；

Each operator should read the user manual and be aware of the requirements and precautions;

2、操作人员应掌握光伏并网发电系统的构成和工作原理；

Operators should know on the structures & working principles of grid-connected photovoltaic generation systems;

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；

Operators should comply with safety regulations and requirements related to electric systems, mechanical operation and work high above the ground scene;

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；

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、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；

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

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）。

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

2.3 对操作条件的要求

2.3 Requirements for Operational Environment

1、设备安装前：

1.Before operation:

(1) 设备存放的环境应温湿度适宜、清洁干燥、通风良好；

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

(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；

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

(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；

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

(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。

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

2、设备安装中:

2.During Installation:

(1) 确保电缆连接牢固、绝缘良好;

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

(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;

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

(3) 安装中请勿触摸接线工作需要以外的其他部件。

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

3、设备运行时:

3 During Run Time:

(1) 请勿随意触摸设备，以免造成触电、烫伤或其他事故。

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

3 产品介绍

3 Product Introduction

3.1 产品简介

3.1 Brief introduction on Gateway

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。

The PV Intelligent Date 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 产品型号

3.2 Product Models

本用户手册主要涉及以下产品型号：

This user manual mainly covers the following product models:

产品型号 Models
PV-G1000 / SL-SRSD-TYPE A2

3.3 产品结构

3.3 Product Structure Drawing

产品型号 Model	图示 Drawing
PV-G1000 / SL-SRSD-TYPE A2	

3.4 图标说明

3.4 Icon Descriptions

序号 No.	图示 Icon	含义 Icon meaning
1		网络指示灯，红灯快闪代表通信正常 Network LED: Red light flashing quickly indicates normal communication
2		载波通信灯，绿灯亮代表通信正常 Carrier Signal LED: Green Light indicates normal communication
3		电源指示灯，红灯代表供电正常 Power LED: Red light indicates normal power supply

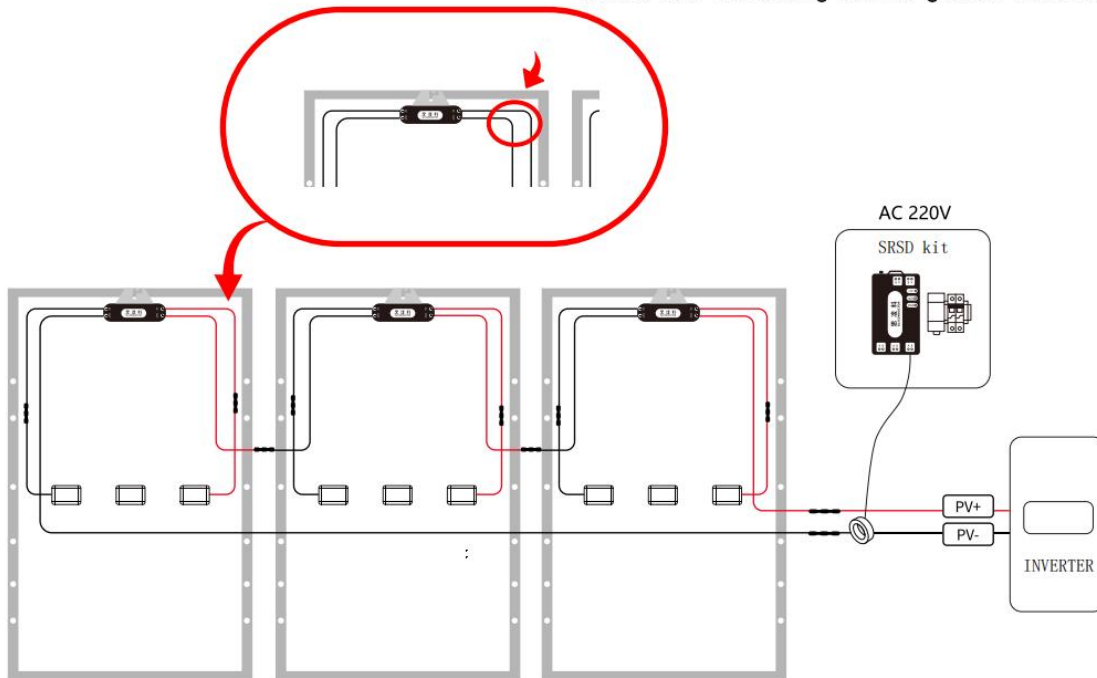
3.5 组网场景

3.5 Networking Scenarios

1. 下图为关断器与光伏智能采集网关组网场景：

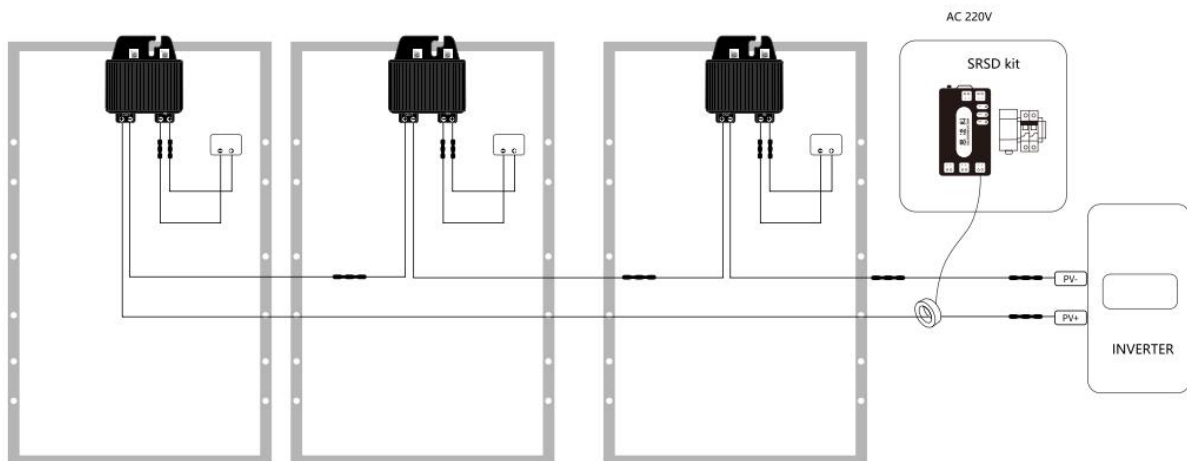
The following diagram shows the networking scenario of the shutdown device and the intelligent acquisition gateway:

注意：安装线缆时，靠近机壳的线缆弯曲半径必须大于 50mm。
NOTE: When installing cables, the bending radius of the cables near the casing must be greater than 50mm.



2. 下图为优化器与光伏智能采集网关组网场景：

The following diagram shows the networking scenario of the optimizer and the intelligent acquisition gateway:



4 现场安装

4 Site Installation

4.1 环境要求

4.1 Matters Need Attention

- 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；

Conduct fully site research leave enough space and plan reasonably for the installation position on both gateway and water-proof control box kit;

- 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；

Strictly prohibited to install gateway outside water-proof box or exposed to soaking scene;

- 3、请确保线缆能够正常连接；

Ensure the cables length is enough to connect;

- 4、禁止在光伏采集网关套件安装区域存放易燃易爆物品。

Strictly prohibited to store flammable and explosive materials in the installation area of gateway & matched kit box.

4.2 套件清单

4.2 Gateway & Functional Kit Package

序号 No	名称 Item	数量 quantity	小样图 (以实际为准) Sample Drawing (In kind prevail)	备注 Remarks
1	智能采集网关 Intelligent Date Acquisition Gateway	1		
2	防水箱 Water-proof Box	1		铁皮/塑料材质 可选 Iron/plastic material option
3	断路器 Master switch	1		
4	电源 Power supply	1		220V转10~18V 电源模块 Voltage converter module on 220V to 10~18V
5	磁环 Magnet Ring	1		开口磁环或闭口 磁环可选 Open or closed magnetic rings are optional
6	4G模组 4G module	1		需要配置4G卡 Mated with 4G card
7	4G天线 4G antenna	1		可选配 option
8	WiFi天线 WiFi antenna	1		可选配 option
9	关断按钮/急停开关 Emergency stop button	1		可选配 option
10	导轨 Rail	1		
11	导线、螺丝、螺钉等 wire、screw、bolt	若干 some	N/A	以实际为准 In kind prevail

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。

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 安装前检查

4.3 Open-Packaging Inspection

1、检查外包装

Outer Packing carton Inspection

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。

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 dealer and do not open the carton if you find the packaging is in bad conditions.

2、检查交付物

Devices Inspection

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。

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 dealer as soon as possible.

4.4 安装步骤

4.4 Installation Procedure

1、装配天线：

Assembling Antenna:

A. 若使用4G通信方式：① 插入4G卡

A. Option of 4G communication mode: ① Insert 4G card:

(1) 安装SIM卡之前，先保证采集网关处于断电状态；

- Ensure the Gateway is power off before installing the SIM card;

(2) 往上推开采集网关卡扣，将采集网关从导轨上取下，打开采集网关上盖；

- Push the Gateway clip upward to unlock from the rail and open the upper cover;

(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；

- 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;

(4) 按下卡盖并推动卡盖锁住SIM卡；

- Press the card holder cover and push down to lock the SIM card;

(5) 盖好采集网关上盖，将其装回导轨上并扣好卡扣。

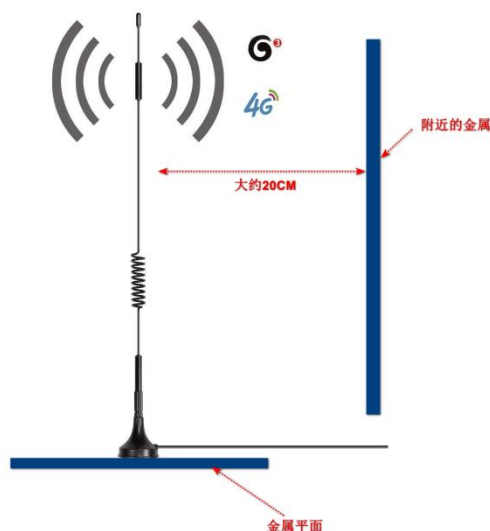
- Cover the Gateway upper cover back and lock down to the rail.

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)。

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. 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)：

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、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；

If the connecting wires and magnetic rings are not wrapped, 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、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；

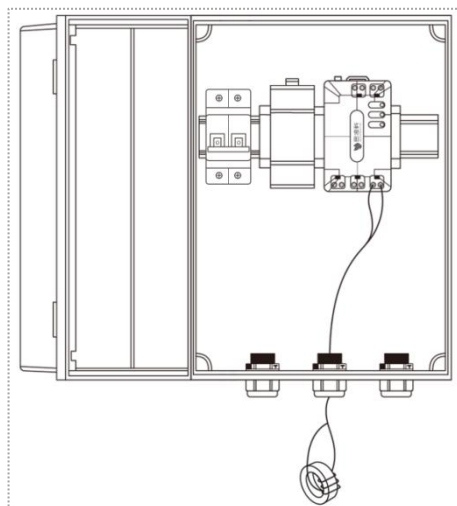
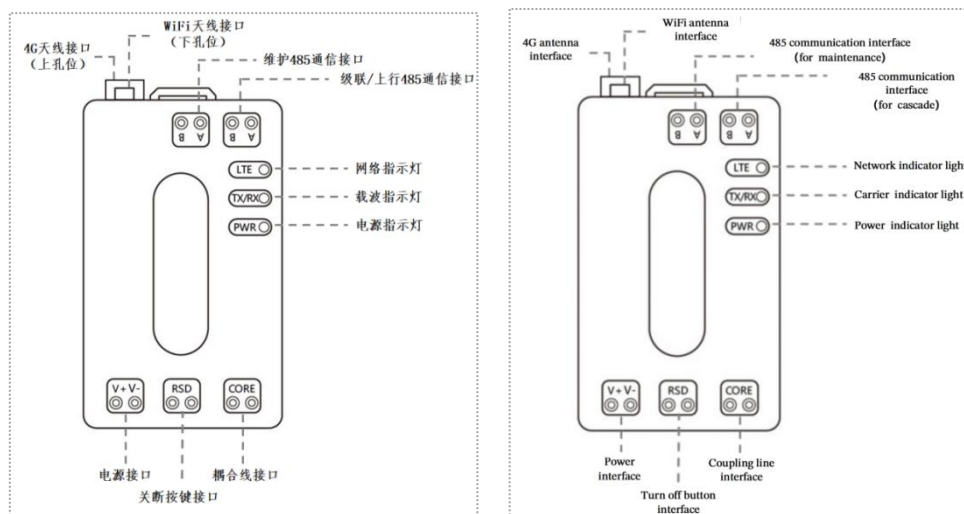
In networking system, the DC bus must pass through the magnetic ring (see 3.5 Networking Scenario), that the DC bus can be both positive and negative, but if it passes through multiple DC buses, they must all be positive or negative;

4、找到电源接口，使用连接线连接电源；

Connect to power interface by wire;

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。

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).



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。

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 prevail.

5 智慧运维平台

5 Smart Operation & Maintenance Platform

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“光伏云平台”）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）。

The Gateway works rely on coordinated support with PV module level rapid shutdown device

(abbreviate as "RSD/MRSD")、PV module level optimizer (abbreviate as "Optimizer")、intelligent operation and maintenance management platform (abbreviate as "platform") to implement intelligent O&M on PV power station. The connection methods and usage details with supporting products can be checked in user manual(contact your distributor for user manual or scan code to download).

6 功能检查

6 Function Check

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:

When the node (shutdown device or optimizer) and the photovoltaic intelligent acquisition gateway have been configured, the photovoltaic cloud platform can be used to check the function of the whole photovoltaic module intelligent operation and maintenance system. The check steps are as follows:

1、关断器与光伏智能采集网关连通性检查

-Check the connectivity between the node(RSD/MRSD or Optimizer) and gateway

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;

In general, after the archive is imported into the acquisition gateway, the gateway will send a heartbeat signal to the node. During this time, to conduct a check, it is necessary to use the local host computer to read the node parameter information under the acquisition gateway. If the information can be read normally, it indicates that the two-way communication between the node and the acquisition gateway is functioning properly;

2、光伏智能采集网关与光伏云平台连通性检查

Check connectivity between Gateway and Cloud platform

(1) 在光伏云平台中创建对应电站;

Create the corresponding power station on the PV cloud platform;

(2) 输入采集网关SN号,为该电站绑定采集网关;

Enter the SN number of the gateway to bind the gateway to the power station;

(3) 绑定完成后,检查当前SN的网关是否在线。

After the binding is complete, check whether the gateway of the current SN is online.

7 产品认证和质量管理

7 Product Certification & Quality Management

产品认证 (Product Certification)

UL 1741: UL Std. No. 1741-2021

CSA C22.2 No. 330-23

UL 3741: ANSI/CAN/UL 3741-2020

CE-LVD: EN IEC 62368-1 2020

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

安规标准 (Safety Standard)

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

快速关断标准 (Rapid Shutdown Standard)

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

FCC认证说明 (Federal Communications Commission)

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

IC认证说明 (Industry Canada)

IC: ICES-003: Issue 7 October 2020



国家管理体系认证 (Management System Certification)

GB/T19001-2016/ISO9001:2015质量管理体系

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

GB/T24001-2016/ISO14001:2015环境管理体系

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

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

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

供应链管理说明 (Supply Chain Management)

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。

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 技术参数

8 Technical Specifications

产品型号 Model		PV-G1000 / SL-SRSD-TYPE A2	
通信方式 Communication			
通信方式 Communication Scenario	南向 Power Line Communication	HPLC (高速电力线载波通信) HPLC (High-speed power line carrier communication)	
	北向 (可选, 2选1或2选2) With Platform (Option, choose 1 or both)	4G	WiFi
通信速率 Communication Speed	南向 Power Line Communication	1600 Kbps ~ 8 Mbps/自适应 1600 Kbps ~ 8 Mbps/adaptive approach	
	北向 With Platform	最大下行 10 Mbps 最大上行 5 Mbps Max downlink rate 10 Mbps Max uplink rate 5 Mbps	支持Wifi 2.4G 802.11b/g/n Sport Wifi 2.4G 802.11b/g/n
认证 Certification			
安全 Safety	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 Weight and Overall Dimension			
最大支持组件数 Maximum Support Quantity of Modules	200		
数据采集间隔 Maximum Support Quantity of Strings	5min (可配置) 5min(configurable)		
电源 Data Acquisition Interval	10~18V DC		
平均功耗 Power Supply	<2W		
接口数量 Number of Interfaces	2*RS485		
串口速率 Serial Port Rate	9600bps		
尺寸 Dimension	90mm(长)×54mm(宽)×36.5mm(厚) 90mm(length)×54mm(width)×36.5mm(thickness)		
重量 Weight	<0.1kg (不含套件) <0.1kg (No kits included)		
工作温度 Operating Temperature	-20~+65℃		
湿度范围 Humidity Range	0 ~ 100%		



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