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APV Series Smart Photovoltaic Combiner Box

Installation and Use Manual V1.2

Acrel Co., Ltd.

Statement

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Contents

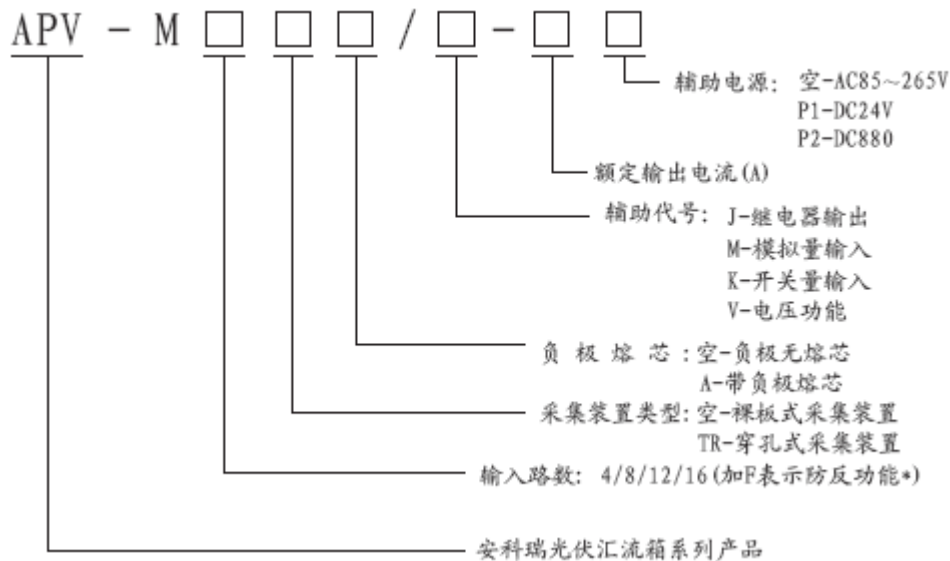
1 Summary.....	1
2 Product Designation.....	1
3 Characteristics.....	2
4 Technical Parameters.....	2
5 Basic Structure.....	3
6 Installation and Use.....	5

APV Series Smart Photovoltaic Combiner Box

1 Summary

In a large photovoltaic power generation system, it is necessary to connect numerous photovoltaic battery packs in the series and parallel combination to reach the required voltage and current value in order to maximize the power generation efficiency. The main purpose of APV series smart photovoltaic combiner box is to conduct the first-stage confluence for the photocell array input which is used to reduce the wiring between photovoltaic battery array and inverter, optimize the system structure, improve the reliability and maintainability. The APV series smart photovoltaic combiner box not only provides lightning protection confluence function, but also provides the function of photocell current measurement, detection for solar panel operation in the photocell array, battery voltage after confluence, the total confluence power, the branch power, acquisition of combiner lightning protector state, acquisition of DC breaker state, the relay contact output, the interface with the air speed, temperature sensor and irradiator etc. available for customer's option. The device of standard configuration has a RS485 interface which can upload the picked-up data and equipment state to the monitoring system.

2 Product Designation



辅助电源: 空-AC85~265V Auxiliary Power: Air-AC85~265V

P1-DC24V

P2-DC880

额定输出电流(A) Rated Output Current (A)

辅助代号: J-继电器输出 Assistant Code: J-Relay Output

M-模拟量输入 M-Analog Input

K-开关量输入 K-Switch Input

V-电压功能 V-Voltage Function

负极熔芯: 空-负极无熔芯 Negative Fusing Core: Air-No Negative Fusing Core

A-带负极熔芯 A-With Negative Fusing Core

采集装置类型:空-裸板式采集装置 Collection Device Type: Air-Bare Plate Collection Device
 TR-穿孔式采集装置 TR-Punched Collection Device
 输入路数: 4/8/12/16(加F表示防反功能*) Input Channels: 4/8/12/16 (The addition of F denotes the reverse protection function *)
 安科瑞光伏汇流箱系列产品 Acrel Photovoltaic Combiner Box Series Products

*Note: the combiner box with the reverse protection function can only select the TR-punched photovoltaic confluence collection device.

3 Characteristics

Conform to 《CGC/GF002: 2010》 PV array combiner box specifications

- The waterproof rating is IP65 which meets the in-room and outdoors installation requirements
- The measuring element uses the Hall sensor which measures up to 16 inputs by isolation
- PV breaker which can withstand DC1kV at a selectable fusing current
- The selectable voltage measurement function which can measure maximum voltage of DC 1kV
- The selectable external sensor input interface which can measure the irradiation, temperature and wind speed etc.
- Have a RS485 communication port which uses the ModBus-RTU communication protocol
- There are many available power supply modes (DC24V, AC/DC220V and DC880V) which are suitable for the roof solar energy or professional PV power station application
- It can be equipped with the PV DC circuit breaker, PV DC fuse, lightning protector etc from ABB manufacturers of foreign country according to the customer's demand.

4 Technical Parameters

Product Type		APV-M4XX	APV-M8XX	APV-M12XX	APV-M16XX
Input Channels		4	8	12	16
Input Scope		DC \pm 18A			
Response Time		1s			
Measuring Accuracy		Grade 0.5 for PV battery measurement, grade 0.2 for the external analog			
RS485 Comm.		RS485/ModBus-RTU protocol, 4800/9600/19200/38400bps			
Additional Function	Relay Output	2 group switches 5A/AC250V (5A/DC 30V)			
	Switch Input	3 groups of external state inputs (optocoupler or dry contact)			
	Analog Input	PT100, DC 0(4)~20mA, DC 0~10V and 24V power supply with the max. current \leq 25mA			
Humidity/Temp.		The working temperature: -25~+60°C, R.H.: 95%, the worksite does not have the condensed and corrosive gas			
Altitude		\leq 3000m			
Insulation Resistance		\geq 100M Ω			
Auxiliary Power		Auxiliary Power : AC85V~265V or DC 300~880V or DC 24V(\pm 10%)			
Case Waterproof Rating		IP65			
Weight		Approx. 30kg			
Volume(W×H×D)		700×575×220			

5 Basic Structure

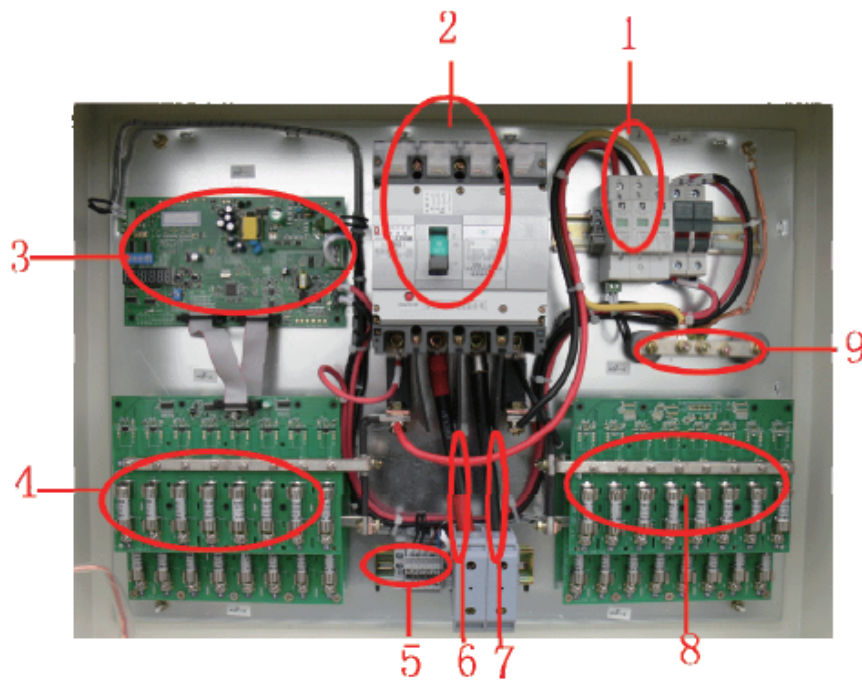
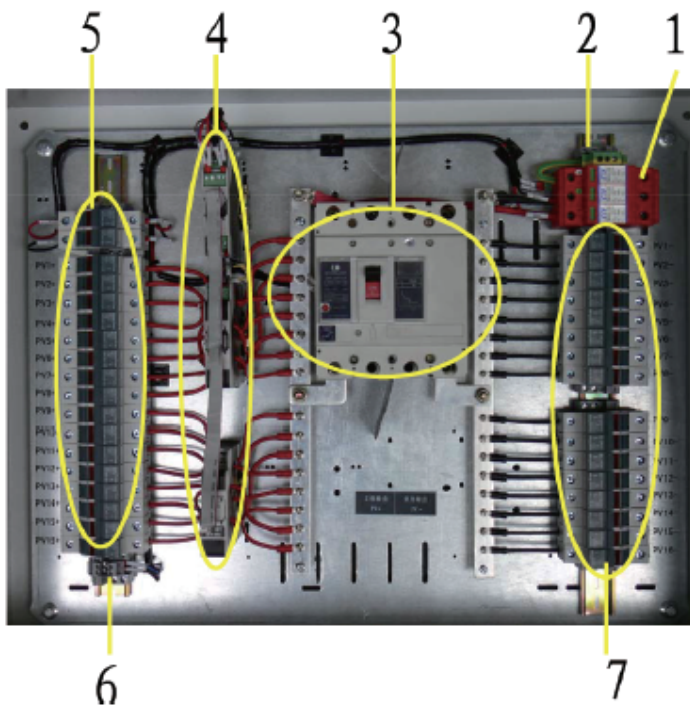


Fig. 1: The Inside Picture (Plate Type)

No.	Part Name
1	Lightning Protector
2	DC Circuit Breaker
3	Mainboard
4	DC+ Collection Panel (Each input connects a fuse in series)
5	Communication RS485 Terminal
6	DC+ Confluence Output
7	DC- Confluence Output
8	DC- Collection Panel (Each input connects a fuse in series)
9	Ground Terminal



No.	Part Name
1	Lightning Protector
2	Ground Terminal
3	DC Circuit Breaker
4	Punched Confluence Collection Device
5	Positive Fusing Core
6	Communication RS485 Terminal
7	Negative Fusing Core

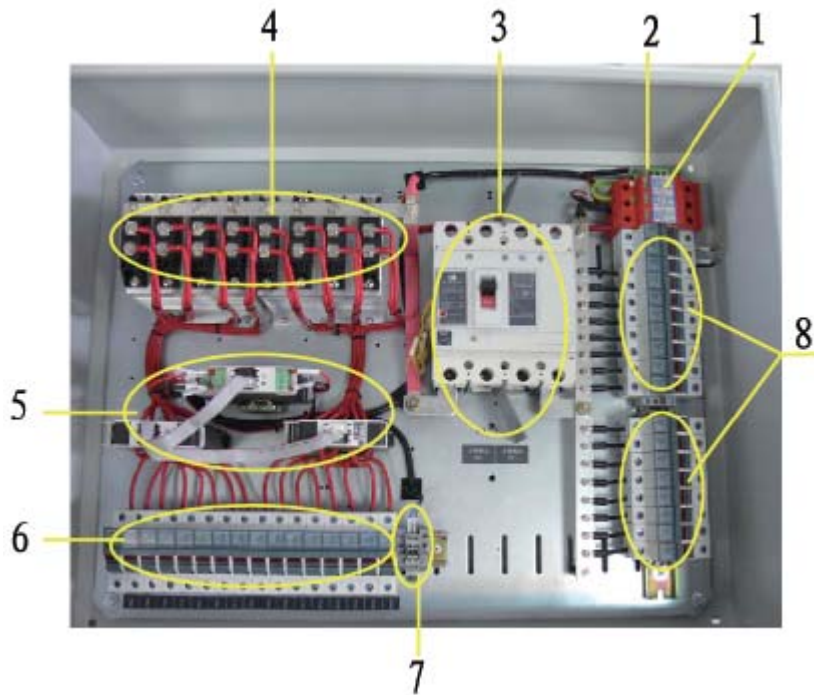


Fig. 3 Inside Picture (the Punched Reverse Protection Function Type)

No.	Part Name	No.	Part Name
1	Lightning Protector	5	Punched Confluence Collection Device
2	Ground Terminal	6	Positive Fusing Core
3	DC Circuit Breaker	7	Communication RS485 Terminal
4	Reverse Protection Module (With Heat Sink)	8	Negative Fusing Core

6 Installation and Use

6.1 Check for the Damage due to Transportation

Before installation, check the product for the damage or deformation and check if there is any loosening, fall-off or spoilage with the components inside the box. If any of above exceptions is found, please promptly stop the installation of product and contact our company. If possible, please provide us the picture of position in question for analysis and disposal.

6.2 Basic Installation Requirements

The protection rating of the product is IP65. The installation environment in design is the outdoors installation. However, because of many precise electronic components inside it, do not place it in a damp location, if possible.

6.3 Overall Dimensions

The dimension of 16-channel box in the product is 700mm×575mm×220mm (Width × Height × Depth), the dimension of 8-channel box is 610mm×410mm×160mm (Width × Height × Depth). The product cannot be horizontally installed and shall be vertically wall mounted. See the below Fig. for the detailed installation dimension.

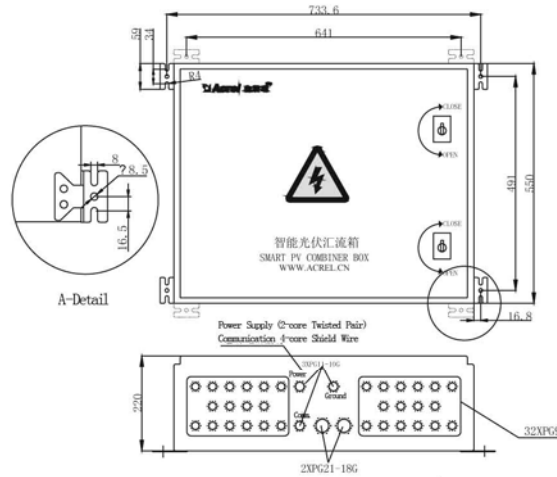


Fig. 4 Box Dimensions (16-channel)

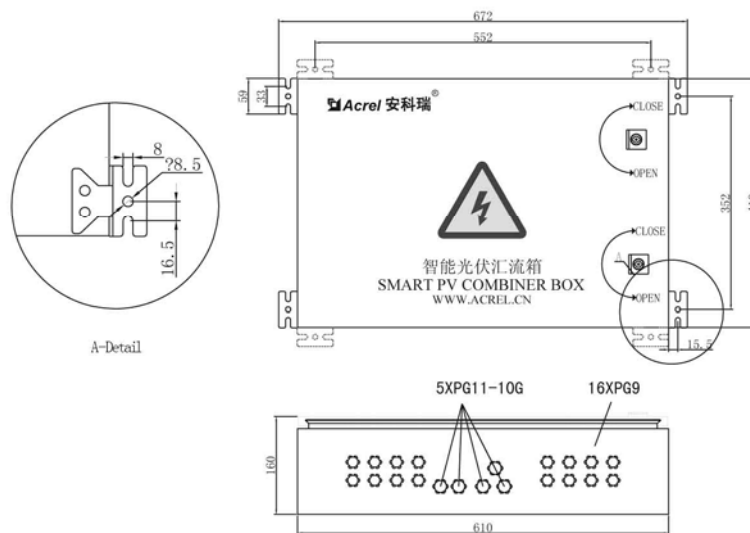


Fig. 5 Box Dimensions (8-channel)

Note: the imaginary lines in Fig. 4 and 5 are the selectable installation direction.

6.4 Terminal Size and Connection Wire Size

The user can inquire and select the suitable cables for various terminals as per the following table:

Terminal Description	Terminal Spec	Recommended Wires
Ground Terminal	PG11-10G	16mm ²
Communication Terminal	PG11-10G	2.5mm ²
Power Terminal	PG11-10G	2.5mm ²
DC+ Input	PG9	4mm ²
DC- Input	PG9	4mm ²
DC+ Confluence Input	PG21-18G	70mm ²
DC- Confluence Input	PG21-18G	70mm ²

6.5 Open and Close the Frame Box



Fig. 6 Frame Box Appearance

All the PV array lightning protection combiner boxes of our company have provided a key for opening or closing the box. Notice that the box will be effectively opened or closed only when both locks on the upper and lower parts are unlocked or locked at the same time.

6.6 Input Wire Connection

The positive PV confluence input is located at the left side under the case, the negative PV confluence input is located at the right side under the case. When the user connects the wire, he needs to unscrew the waterproof terminal and then connects the wire with the confluence input wiring terminal, tightens the screw and properly fixes the wiring and at last tightens the outside waterproof terminal (See Fig.7).

6.7 Output Wire Connection

The output of combiner box is located under the case. See the following Fig. for the detail connection positions.

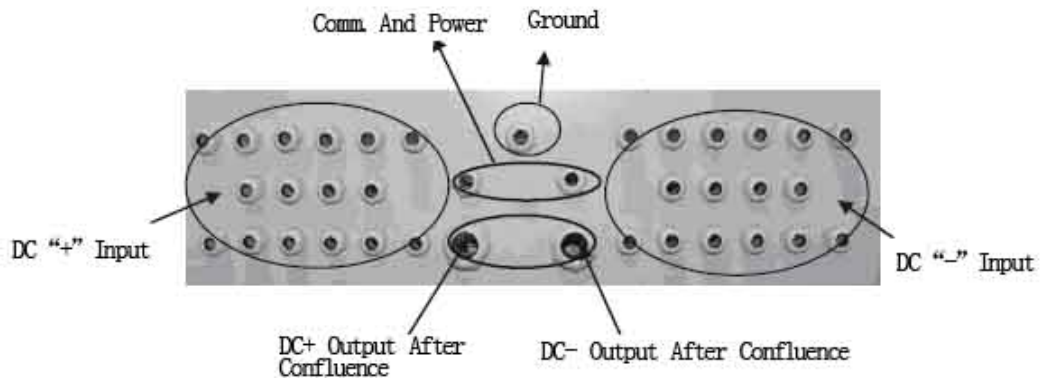


Fig.7 Input and Output Terminals