Stock code
002334

SP100—New generation solar pump controller

INVT Solar Pump Product Line

www.invt.com

Achieve Customers | Performance Orientation | Open and Win-Win | Striving for Innovation

CONTENTS

PART 01

Product line overview

Product line overview

INVT Solar pump product line

AC Solar pump system

Solar pump system

GD100-PV/GD170-PV

- Suitable for various occasions with water supply needs such as agricultural irrigation and desert control
- Power range：0.4~500kw
- AC/DC hybrid input
- AC/DC auto switch
- IoT functions

SP100 AC & DC version

- High protection level design, can be directly used outdoors without the need for additional cabinets
- Low usage and maintenance costs
- Power range 0.75-22kw
- Built-in Booster below 4kW
- LCD screen
- AC/DC hybrid input and energy display
- Supports IoT functions

SP100 DC version

- High protection level design, can be directly used outdoors without the need for additional cabinets
- Low usage and maintenance costs
- Power range: 2.2-18.5kw
- LCD screen
- Supports IoT functions
- Supports SKD

02

PART 02

SP100 Overview

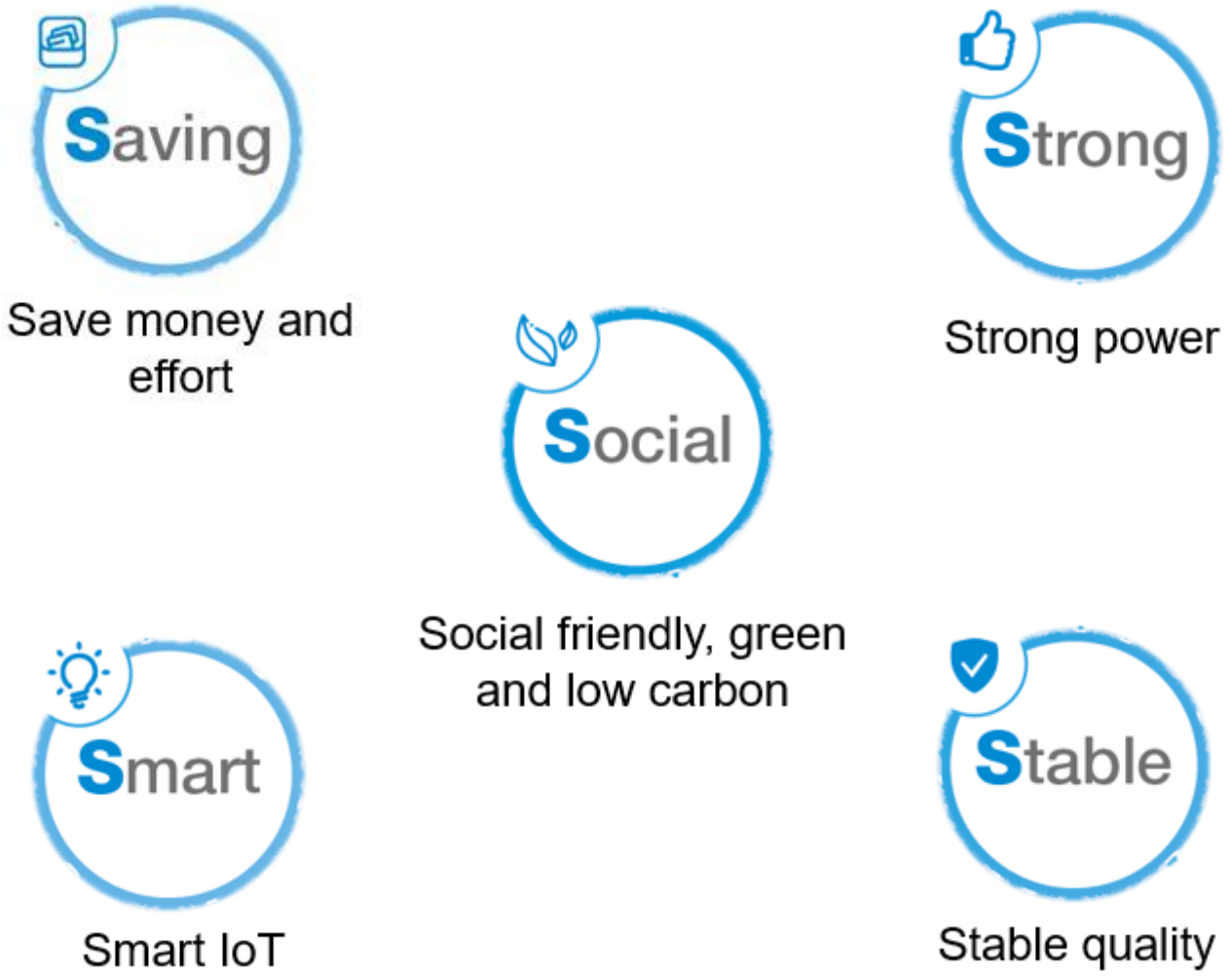
- Overview
- Saving
- Social
- Smart
- Strong
- Stable

1. Product Overview

SP100 is a new generation solar water pump inverter product developed by INVT. The power range covers 0.75-22kW. The full series of protection levels can reach IP66, dust-proof and waterproof, and can be directly applied to harsh outdoor environments without electric cabinet. It is mainly used for agricultural irrigation, livestock water, household water, municipal water.

IP66	More suitable for the use of solar water pumps	LCD screen	LCD display, more information display
Good-looking	Using environmentally friendly and UV resistant materials	IOT	Supports optional 4G,WIFI,Bluetooth
Hybrid	Support AC&DC power same time and power display	Large water discharge	Efficient MPPT control algorithm with high energy conversion rate
Booster	Below 4kW has built-in boost module	Powerful	long distance transmission

2. Features

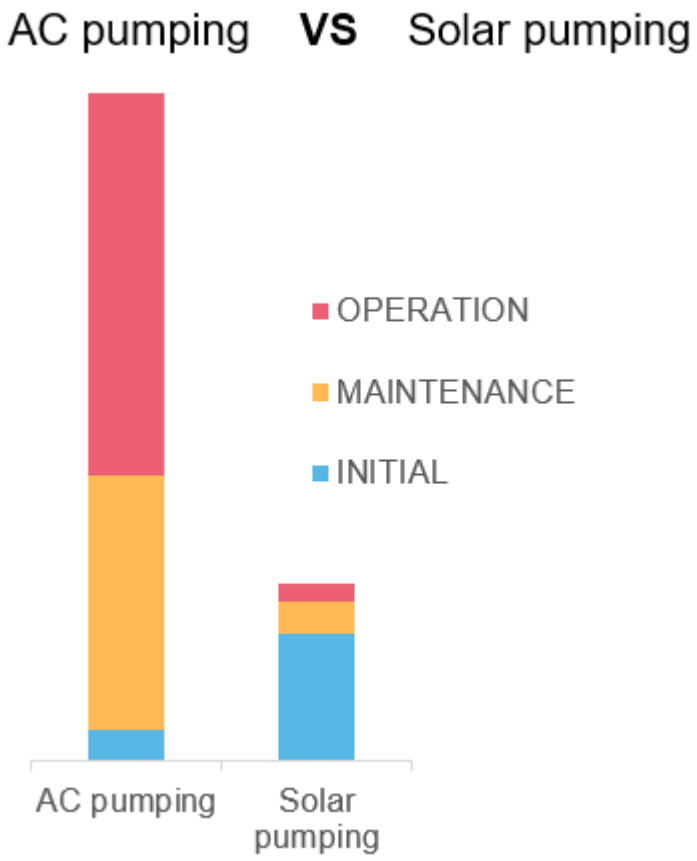

Saving
Save money and effort
Strong
Strong power
Social
Social friendly, green and low carbon
Smart
Smart IoT
Stable
Stable quality

SP100—Save money and effort

Solar pump can save money

➢ Life-Cycle cost comparison

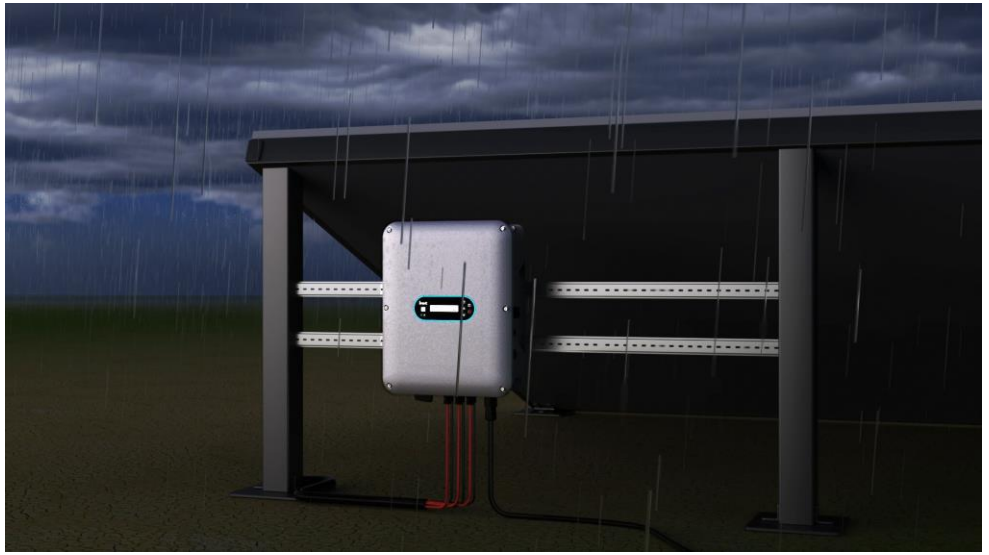
ROI: 1-3 years



What IP66 can bring you?

➢ SP100 can make solar pumping system simpler

IP66 protection level

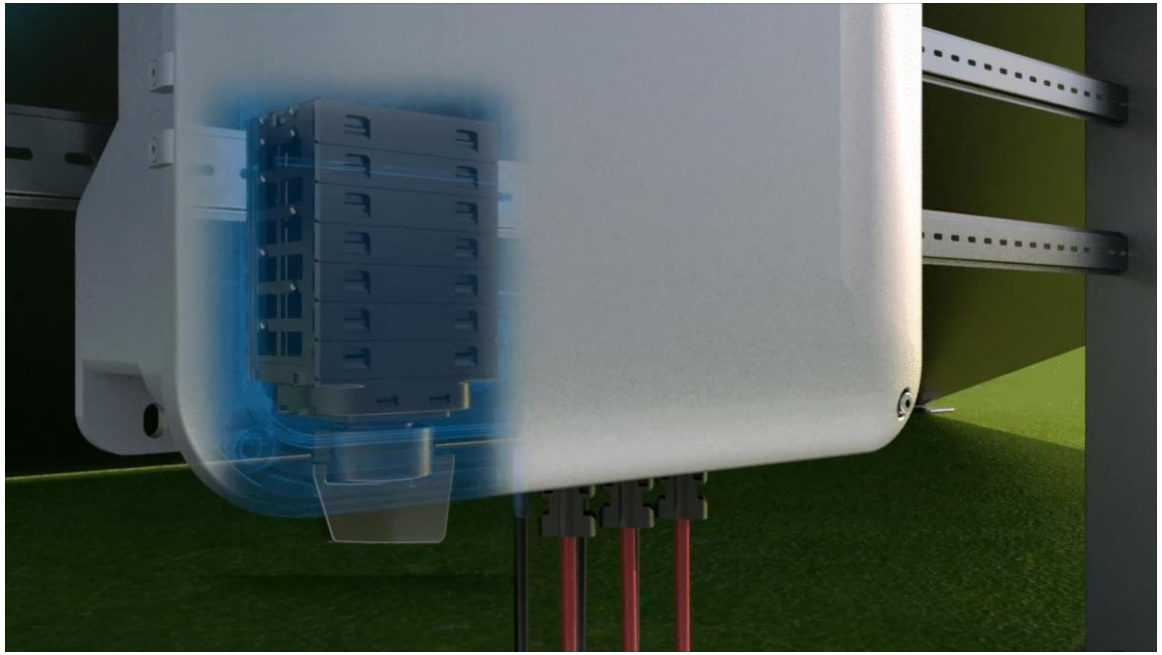


IP66 means is can installed outdoors without electric cabinet.

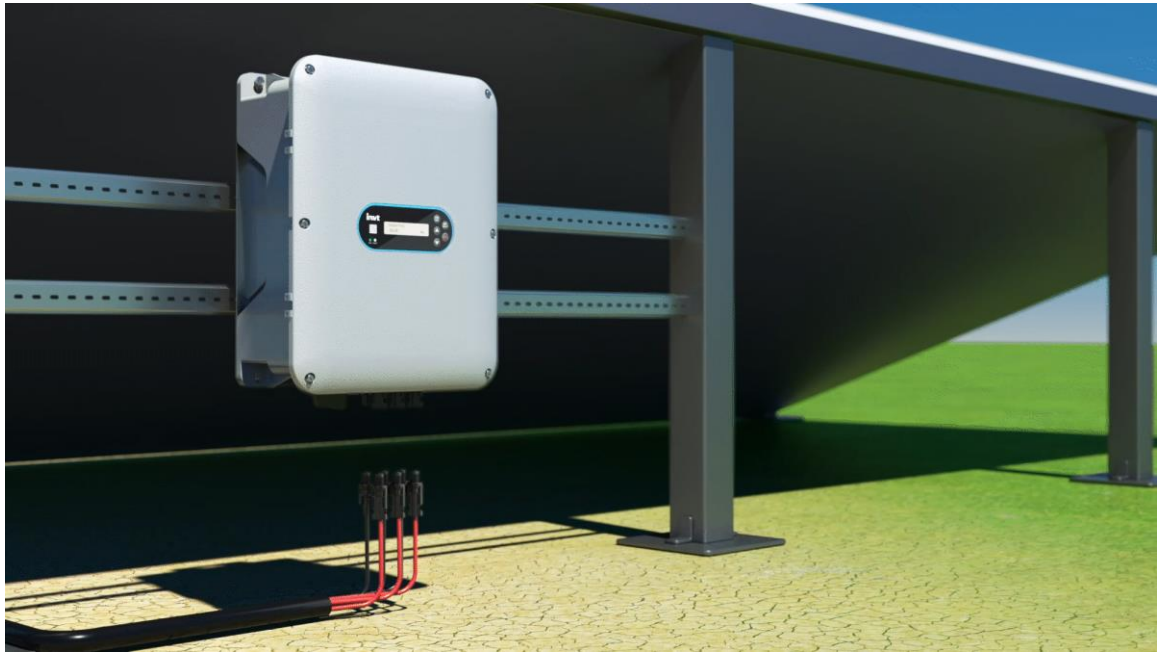
SP100—Save money and effort

➢ **SP100 can make solar pumping system simpler**

- **SP100 equipped with built-in DC switch, fuse, and SPD**



- **11-18.5kw equipped with built-in Bus-bar**

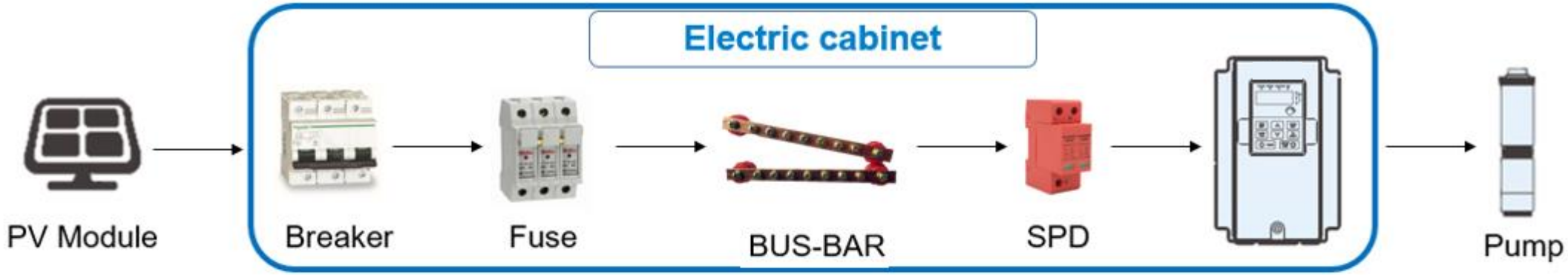


SP100 can completely replace the combiner box

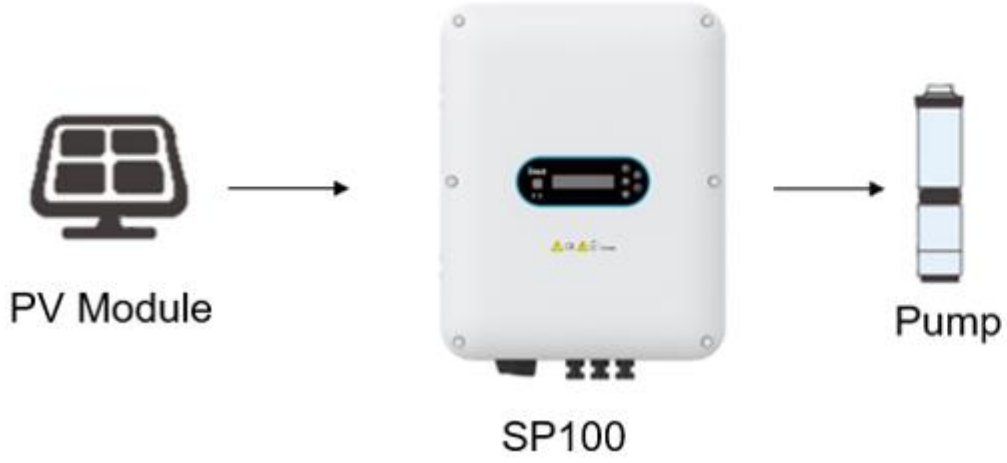
SP100—Save money and effort

SP100 can make your system simpler

Common products



SP100



SP100—Save money and effort

➢ **SP100 can save the cost of maintenance**

Common causes of fault:

Moisture

Dust/Sand

Insects

Waterproofing

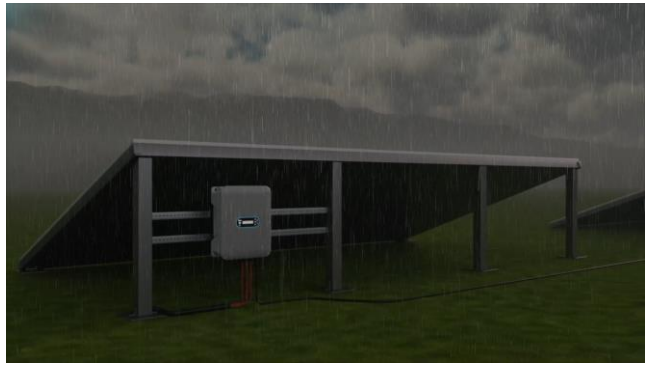
Water flow rate:
(100±5)L/min，3 minutes

High/Low temperature

Working: -25°~60° for 8 hours
Storage: -40°~85° for 16 hours

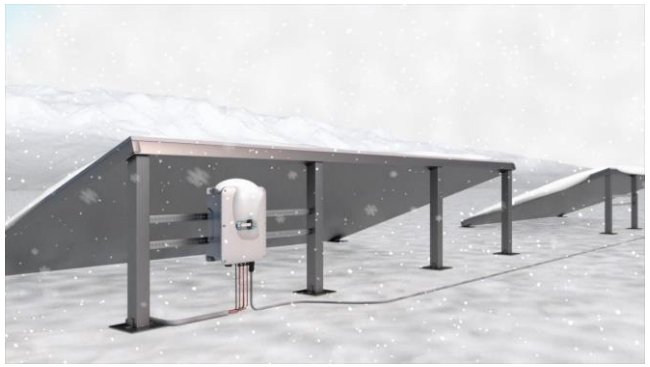
Dust prevention

Dust blowing for 4 hours



Rainfall

Insects and dust

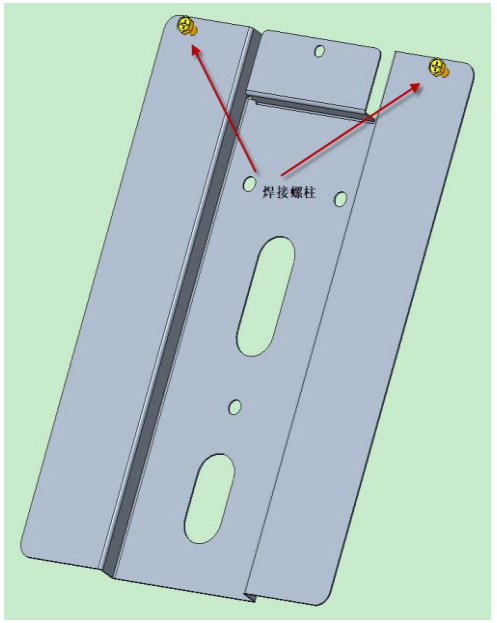


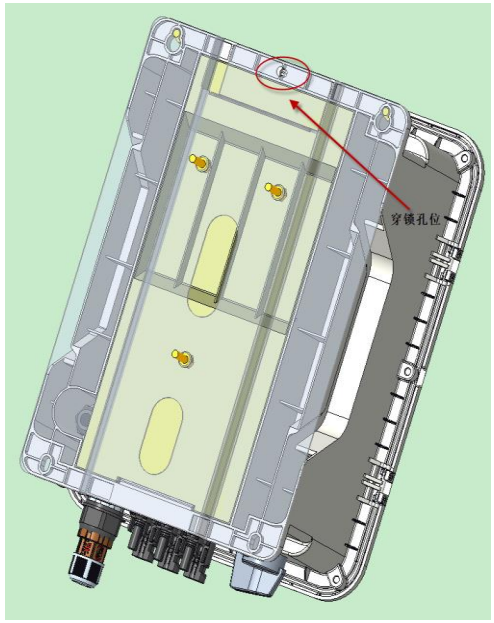
Extreme weather

SP100—Save money and effort

Worried about being stolen if no electric cabinet ???

SP100 has anti-theft design





Physical anti-theft board

SP100—Strong power

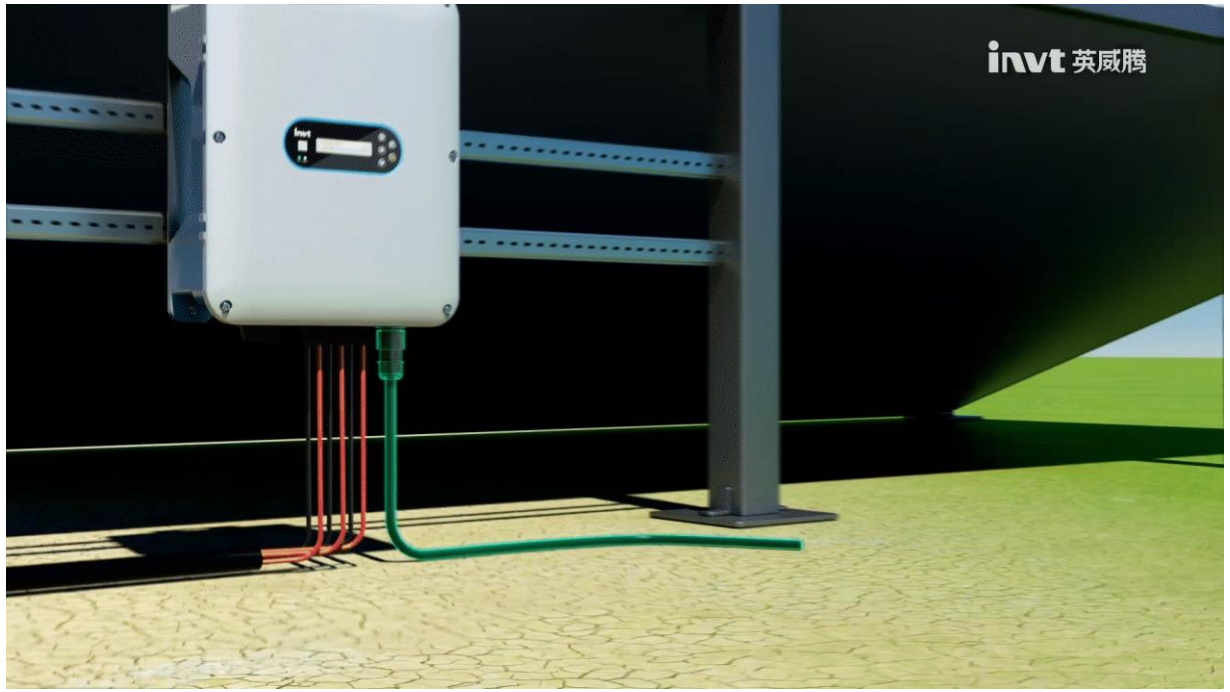
➢ Long cable transmission

Demands

- Low ground water level and deep well depth makes controller far from the water pump, led to high output harmonic content

Value

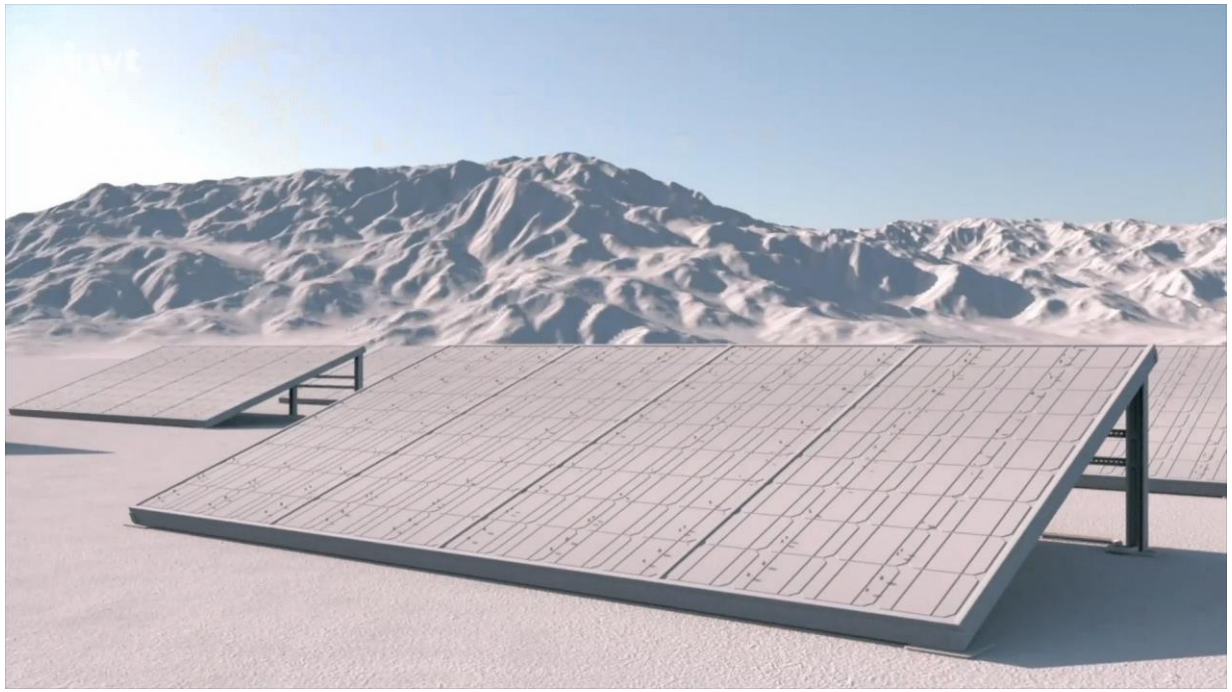
- Support motor cable length up to 200 meters without output reactor



➢ Standard 900V capacitor

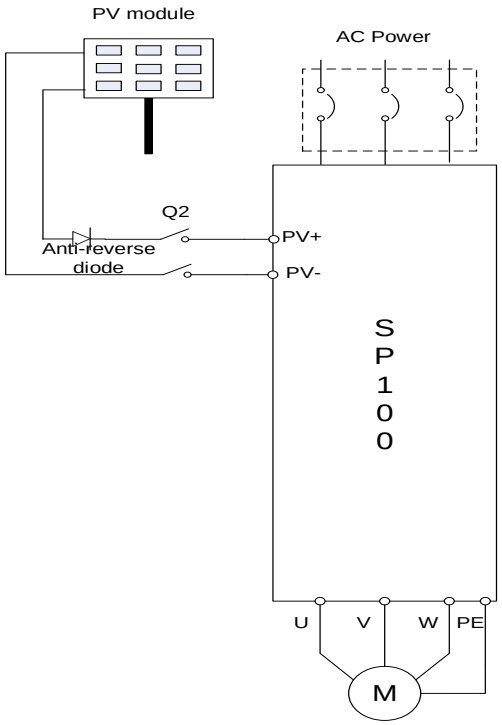
- 900V capacitor

- More efficient PV panels configuration solutions
- Start earlier and stop later



SP100—Strong power

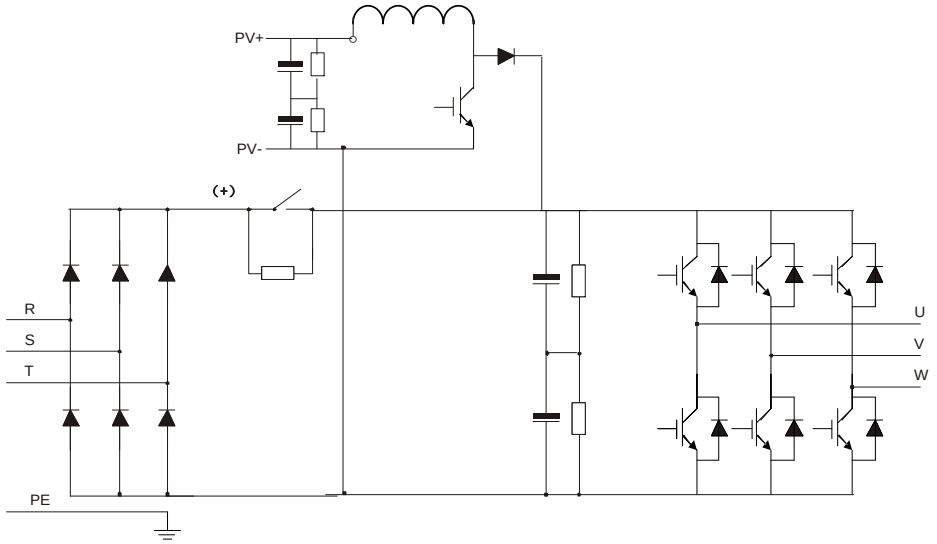
➢ Hybrid function



- AC&DC power supply same time
- Built-in Anti-reverse diode

Ps: this function only supported by AC&DC version

➢ Built-in Booster module

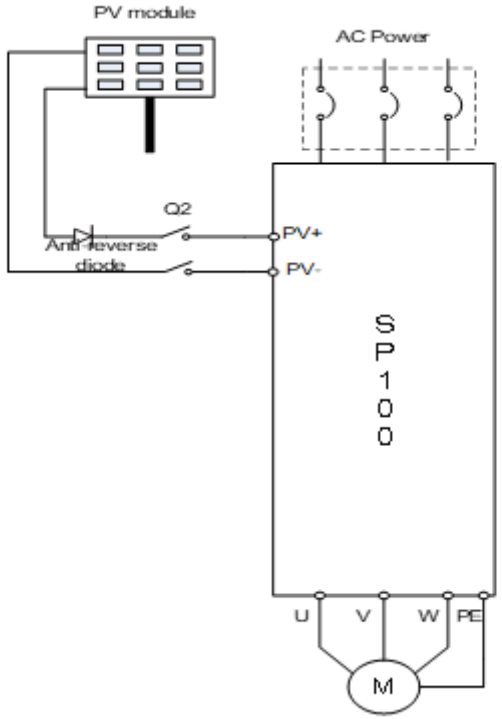


- Rise the voltage automatically
- Reduce the number of solar panels

Ps: Below 4kw support built-in Booster module

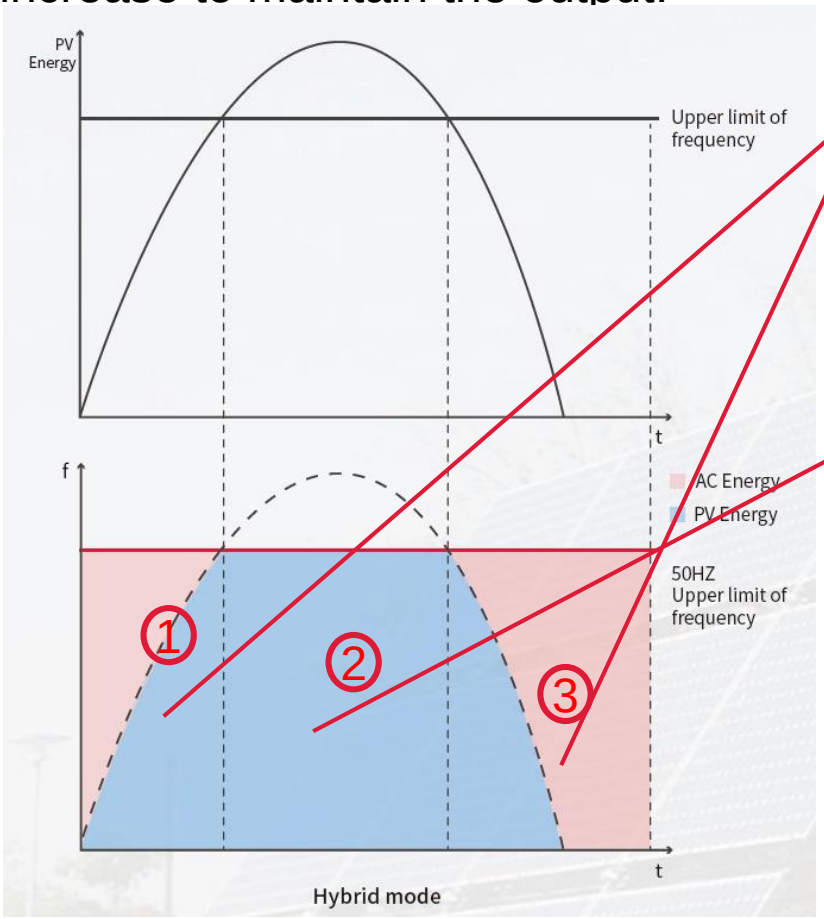
SP100—Strong power

➢ Hybrid Mode



- AC&DC power supply same time
- Built-in Anti-reverse diode

In hybrid mode, SP100 will use the energy of both PV modules and grid (or generator) at same time. The stronger the light radiation, the less AC energy is consumed. As the radiation reduction, the consumption of AC energy will increase to maintain the output.

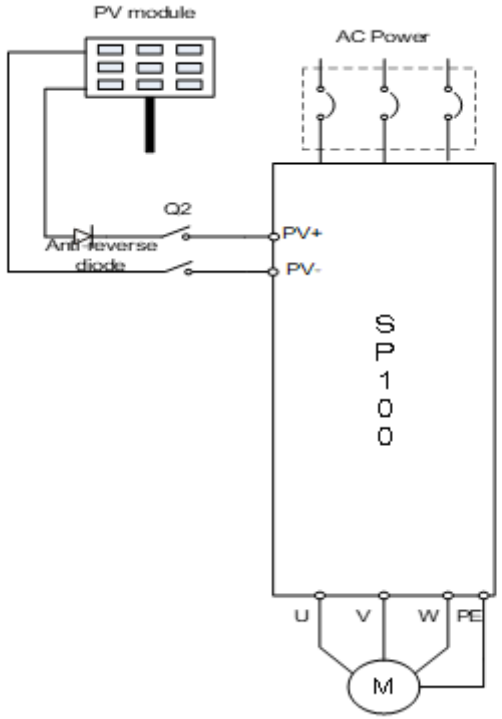


①，③:
PV energy is insufficient to maintain full load operation and AC energy is used as a supplement

②:
PV energy is insufficient to maintain full load operation and AC energy is used as a supplement

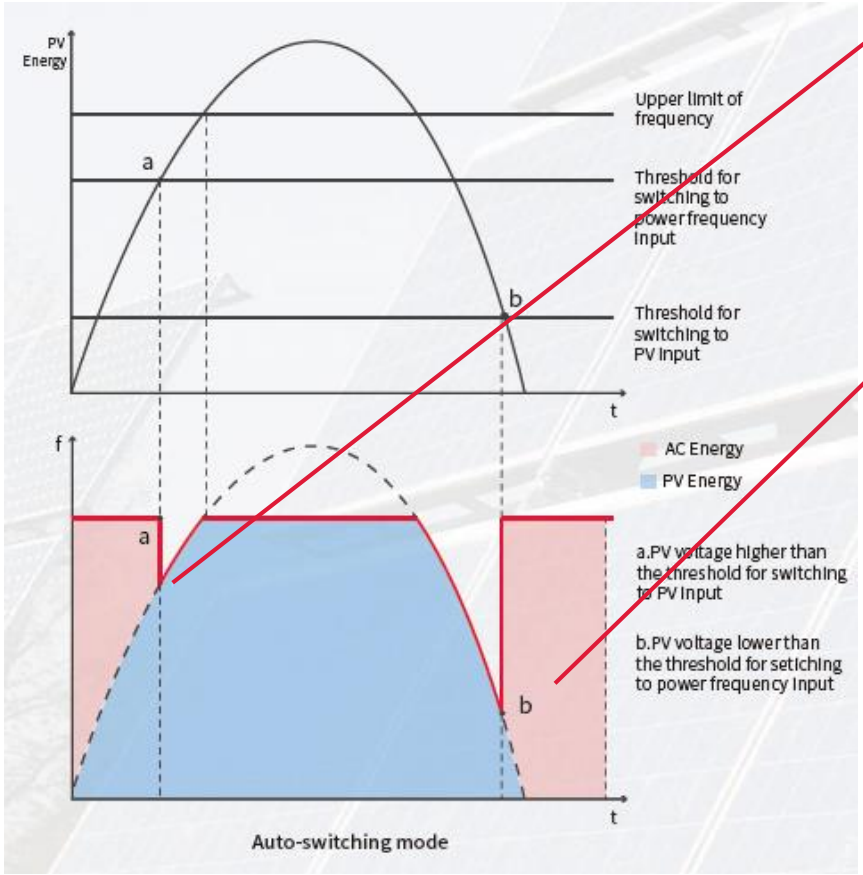
SP100—Strong power

➢ Auto-Switch Mode



- AC&DC power supply same time
- Built-in Anti-reverse diode

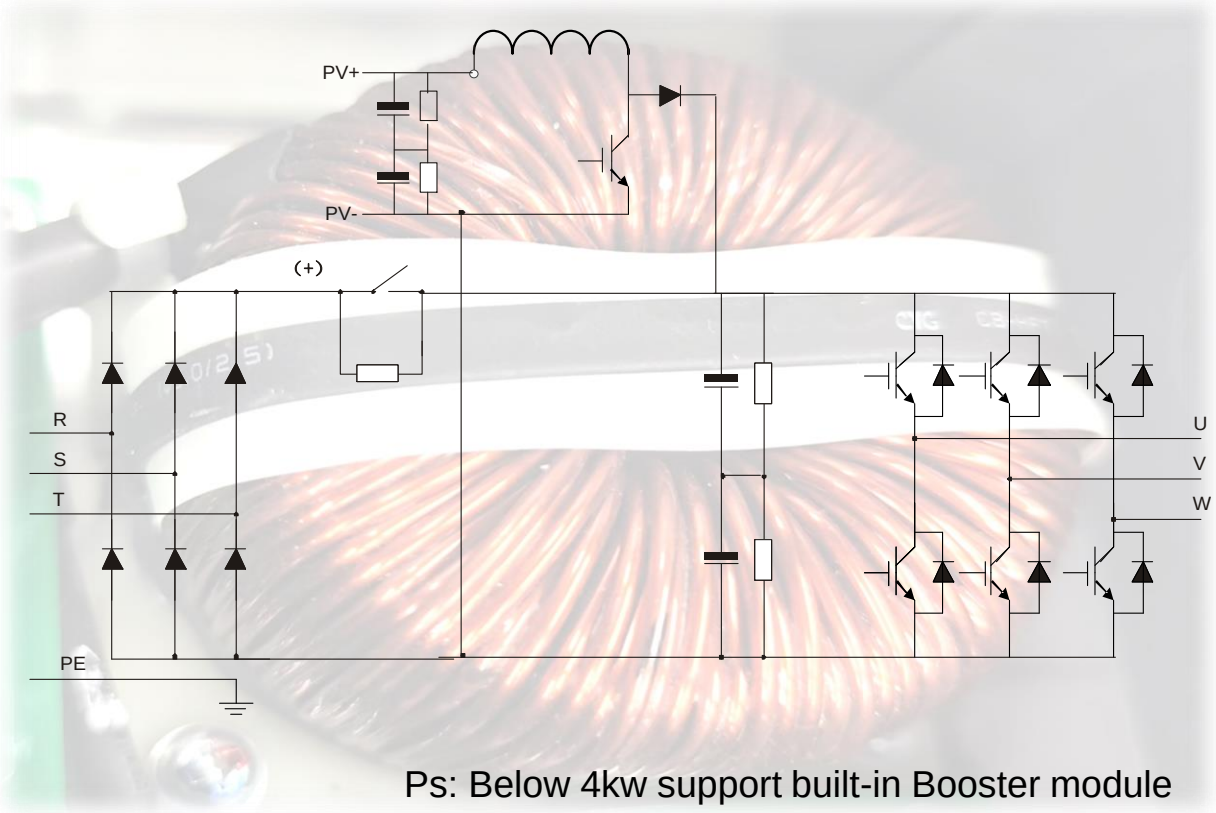
If don't need to run at full high frequency at all times, you can choose to configure an auto-switch module. It can monitor the PV voltage, and when the voltage is below the set threshold, it can control the contactor to act and connect AC power to meet energy needs. When the voltage on the PV side exceeds the set threshold, the contactor can be controlled to operate and disconnect the AC power to reduce energy consumption.



a:
PV voltage higher than the threshold for switching to PV input

b. PV voltage lower than the threshold for switching to AC working mode.

➢ Built-in Booster module



Ps: Below 4kw support built-in Booster module

- Ease of use

It can automatically identify the inverter type so as to set the bus voltage based on the type, increase the voltage to 350V for 220V inverters and 570V for 380V inverters.

- Auto switch between the grid and PV input

The function can be implemented by connecting both grid and PV input after setting P15.32 to 0 (autswitch). When the PV voltage is lower than P15.33, the input power is switched to the grid. When PV voltage is bigger than P15.34, the power is switched back to PV input.

● **Reduce** costs ● **Improve** efficiency

Necessary conditions for solar pumping system operation

Power

$$P_0 = P_m / \eta_m / \eta_{VFD} / \eta_{PV}$$

Empirical formula:

$$P_0 = (1.2 \sim 1.3) * P_m$$

Voltage

Voltage Class	Voltage	Description	DC input range	Recommended Mpp voltage
4	380V	Support AC input	250-900V	570V
D4		Without AC input		
4-T		Built-in booster	220-900v	\
2	220V	Support AC input	150-450v	350V
D2		Without AC input		
2-T		Built-in booster	100-450v	\

1.Voc ≤ Voltage limitation（900V，450V）
2.Vmp approaching the recommended Mpp voltage

Example: PV Module: P=550W Voc=50V Vmp=40V ; Inverter: 4kW ; Pump: 4kW

Without booster

(1) Power of solar panels:

$$P_0 = (1.2 \sim 1.3) * P_m = 1.2 * 4kW = 4800W$$

(2) Number of solar panels:

$$N = P_0 / P = 4800 / 550 \approx 9$$

(3) Number of solar panels in series:

$$Ns = 570 / Vmp = 570 / 40 \approx 14$$

(4) Verify if the voltage limitation requirements are met:

$$Vs = 14 * Voc = 14 * 50V = 700V < 900V$$

(5) Final configuration:

14*1

With booster

(1) Power of solar panels:

$$P_0 = (1.2 \sim 1.3) * P_m = 1.2 * 4kW = 4800W$$

(2) Number of solar panels:

$$N = P_0 / P = 4800 / 550 \approx 9$$

(3) Verify if the minimum starting voltage has been reached

$$V = 9 * Vmp = 9 * 40V = 360V > 100V$$

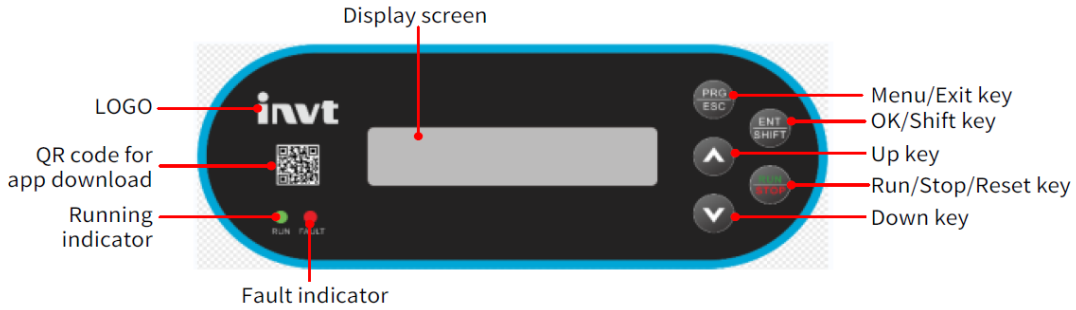
(4) Final configuration:

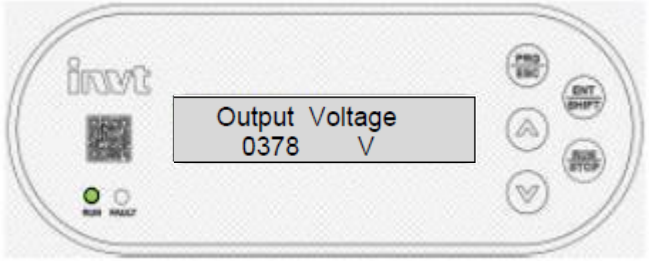
9*1

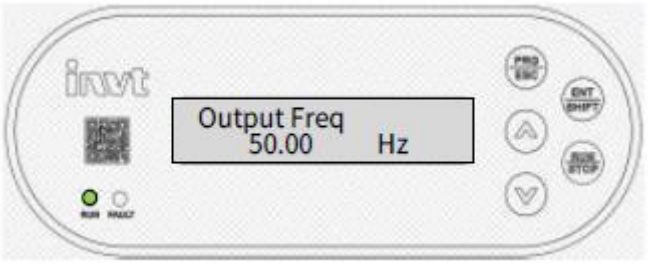
SP100—Smart and Intelligence

➢ LCD screen display

- Richer information display
- AC&DC energy display

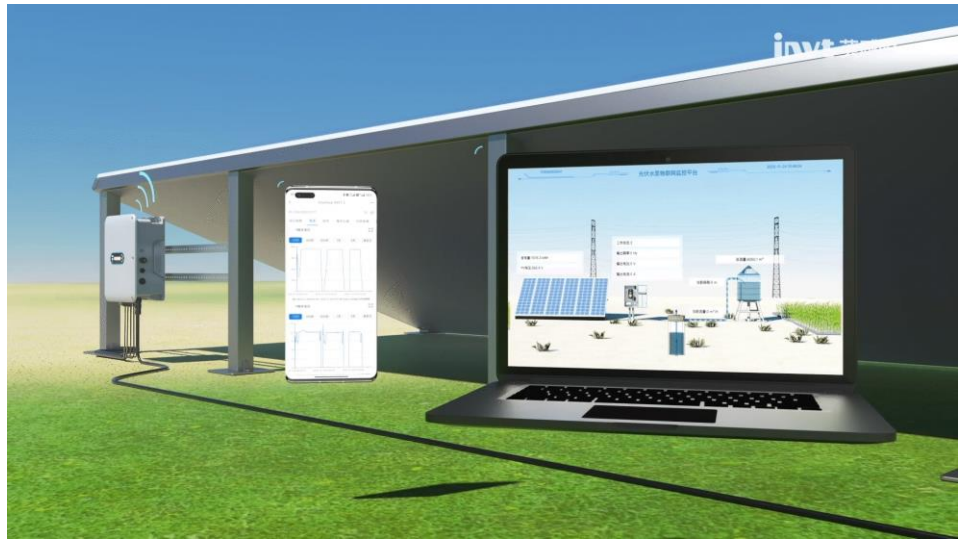






SP100—Smart IOT and Intelligence

➢ Multiple IoT solutions

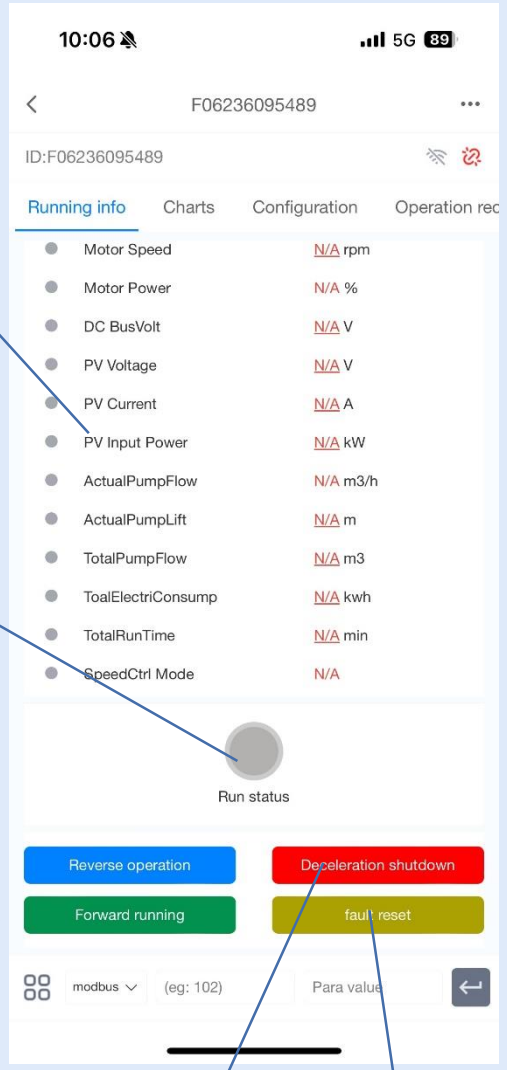


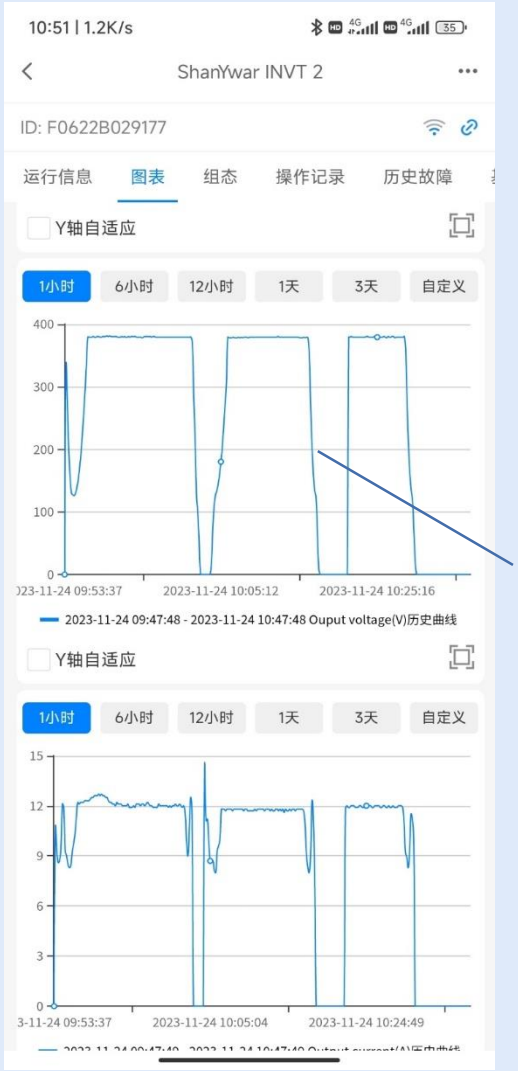
➢Improve efficiency:
Automated and intelligent control

➢Reduce costs:
Remote monitoring and management of devices, reducing the manpower.

➢Improve quality and security
Detect fault in a timely manner,

Data terminal





Running information

Status

Forward running

Reverse operation

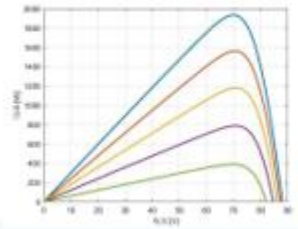
Curve

STOP

Fault reset

SP100——Smart driven, Surging water

Stable quality and excellent performance



- **MPPT efficient≥99%,**
- **MPPT rapid response tracking**

➢ Greater water discharge
➢ Anti water hammer, protect pipelines and prolong life

Mature and stable motor control algorithm

The motor control algorithm has been fully verified for more than 10 years, and can be adapted to PMSM,AM, BLDC, single phase motor.

Industrial-grade components, high protection level design

➢ Can adapt to harsh environments such as hot, cold, sandstorm, and rainfall.
➢ Lower faulty rate

EU authoritative CE certification

Product quality is stable and reliable

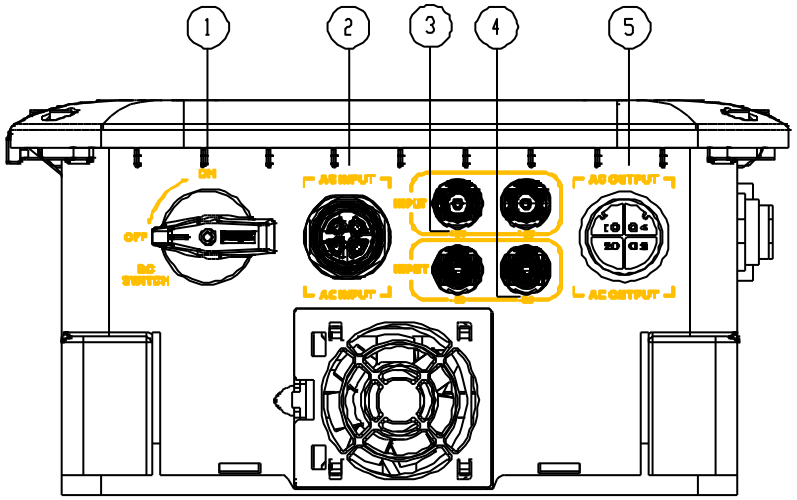
PART 03

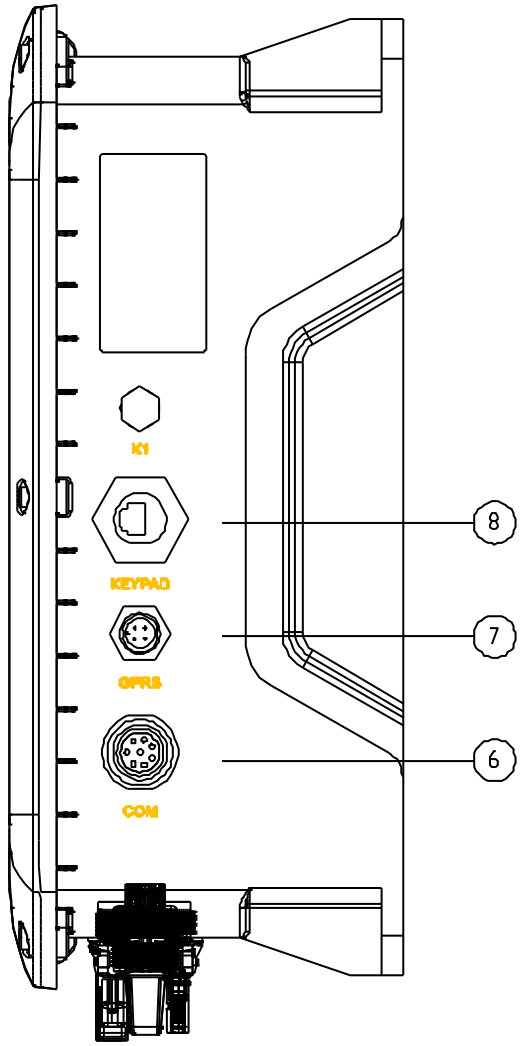
Specification

- Model Naming
- Product Rating
- Product Selection

Specification

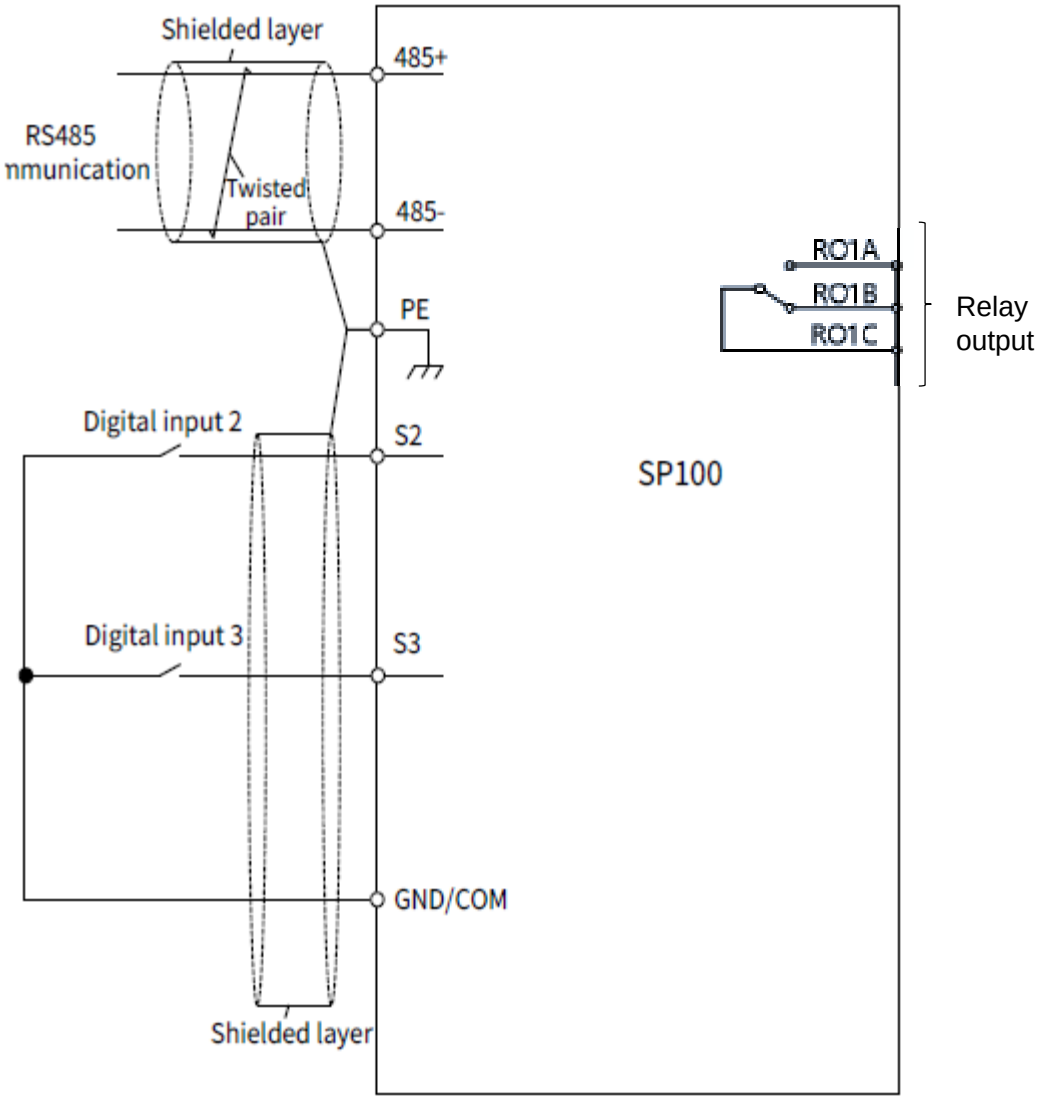
Standard external interface





Serial Number	Terminal name	definition
①	DC Switch	/
②	AC input	1. R/L1
		2. S/L2
		3. T/L3
		4. PE
③	PV Input + MC4	+DC INPUT
④	PV Input - MC4	-DC INPUT
⑤	AC output	1. V
		2. W
		3. U
		4. PE
⑥	COM	1. 485+
		2. 485-
		3. S2
		4. S3
		5.GND/COM
		6.
		7. GND/COM
		8. PE
⑦	GPRS (Optional)	1. + 5V
		2. 485+
		3. 485-
		4. GND/COM
⑧	Keypad (Optional)	RJ45

Control circuit terminals



Control circuit terminals	
RO1A	Relay output. RO1A: NO; RO1B: NC; RO1C: common Contact capacity: 3A/AC 250V, 1A/DC 30V
RO1B	
RO1C	
S1	Digital input terminals. The terminals support switch signal only. Max. input frequency: 1kHz Programmable digital input terminals. Users can set the terminal function by function code. Select S2 – S3 terminals for the running commands. The S1 terminal is valid only when the running command is set to jogging. It is reserved for the local button.
S2	
S3	
GND/COM	Common point of digital signals S1 – S3, digital power ground
5V	5V power supply
485+	RS485 communication port.
485-	
GND/COM	5V power GND

Specification

➢ Model Naming:

SP100-5R5-4-T-6-S

Product series	SP100: SP100 series solar pump controller
Power range	5R5: 5.5kW
Voltage class	4-T: AC 3PH 380V(-15%)-440V(+10%); DC 220V-900V 2-T: AC 1PH/3PH 220V(-15%)~240V(+10%); DC 100V~450V D4: DC 250V-900V D2: DC 150V-450V
Boost module	Empty: No built-in boost module T: With built-in boost module
Ingress protection (IP)	0: IP00 6: IP66
Product configuration	S: Standard

Product Rating:

Product model	Output power (kW)	AC input current (A)	PV max. input current(A)	Output current(A)
D4: DC 250V~900V				
SP100-2R2-D4-6-S	2.2	-	15	5
SP100-004-D4-6-S	4	-	15	9.5
SP100-5R5-D4-6-S	5.5	-	30	14
SP100-7R5-D4-6-S	7.5	-	30	18.5
SP100-011-D4-6-S	11	-	30	25
SP100-015-D4-6-S	15	-	45	32
SP100-018-D4-6-S	18.5	-	45	38
SP100-022-D4-6-S	22	-		
D2: DC150V~450V				
SP100-2R2-D2-6-S	2.2	-	15	10
4-T: AC 3PH 380V~440V; DC 220~900V				
SP100-2R2-4-T-6-S	2.2	5.8	15	5.5
SP100-004-4-T-6-S	4	13.5	15	9.5
2-T: AC 1PH/3PH 220V~240V;DC 100V~450V				
SP100-0R7-2-T-6-S	0.75	9.3	15	7.2
SP100-1R5-2-T-6-S	1.5	15.7	15	10.2
SP100-2R2-2-T-6-S	2.2	24	15	14

Specification

Product Rating:

Product model	Output power (kW)	AC input current (A)	PV max. input current(A)	Output current(A)
2: AC 1PH/3PH 220V~240V; DC 100~450V				
SP100-2R2-2-6-S	2.2	24	12	14
4: AC 3PH 380V~440V; DC 220~900V				
SP100-2R2-4-6-S	2.2	5.8	12	5.5
SP100-004-4-6-S	4	13.5	16.5	9.5
SP100-5R5-4-6-S	5.5	19.5	23.9	14
SP100-7R5-4-6-S	7.5	25	30.6	18.5
SP100-011-4-6-S	11	32	39.2	25
SP100-015-4-6-S	15	40	49	32
SP100-018-4-6-S	18.5	47	50	38
SP100-022-4-6-S	22	51	60	45

Product selection

Power		INPUT	Voltage(V)	Voltage phases		SP100 model
kW	Hp			AC Input	AC Output	
0.75	1	AC&DC	220	Single phase	Single phases	SP100-1R5-2-T-6-S
				Singe phase	Three phases	SP100-0R7-2-T-6-S
				Three phases	Three phases	SP100-0R7-2-T-6-S
			380	Three phases	Three phases	SP100-2R2-4-6-S ; SP100-2R2-4-T-6-S
1.5	2	AC&DC	220	Single phase	Single phases	SP100-2R2-2-6-S ; SP100-2R2-2-T-6-S
				Singe phase	Three phases	SP100-1R5-2-T-6-S
				Three phases	Three phases	SP100-1R5-2-T-6-S
			380	Three phases	Three phases	SP100-2R2-4-6-S ; SP100-2R2-4-T-6-S
2.2	3	AC&DC	220	Single phase	Single phases	SP100-2R2-2-6-S ; SP100-2R2-2-T-6-S
				Singe phase	Three phases	
				Three phases	Three phases	
			380	Three phases	Three phases	SP100-2R2-4-6-S ; SP100-2R2-4-T-6-S
		DC	220	✕	Three phases	SP100-2R2-D2-6-S
			380	✕	Three phases	SP100-2R2-D4-6-S

Product selection

Power		INPUT	Voltage(V)	Voltage phases		SP100 model
kW	Hp			AC Input	AC Output	
4	5	AC&DC	220	Single phase	Single phases	\
				Singe phase	Three phases	None standard
				Three phases	Three phases	None standard
			380	Three phases	Three phases	SP100-004-4-6-S ; SP100-004-4-T-6-S
		DC	380	✕	Three phases	SP100-004-D4-6-S
5.5	7.5	AC&DC	380	Three phases	Three phases	SP100-5R5-4-6-S
		DC	380	✕	Three phases	SP100-5R5-D4-6-S
7.5	10	AC&DC	380	Three phases	Three phases	SP100-7R5-4-6-S
		DC	380	✕	Three phases	SP100-7R5-D4-6-S
11	15	AC&DC	380	Three phases	Three phases	SP100-011-4-6-S
		DC	380	✕	Three phases	SP100-011-D4-6-S
15	20	AC&DC	380	Three phases	Three phases	SP100-015-4-6-S
		DC	380	✕	Three phases	SP100-015-D4-6-S

Product selection

Power		INPUT	Voltage(V)	Voltage phases		SP100 model
kW	Hp			AC Input	AC Output	
18.5	25	AC&DC	380	Three phases	Three phases	SP100-018-4-6-S
		DC	380	✕	Three phases	SP100-018-D4-6-S
22	30	AC&DC	380	Three phases	Three phases	SP100-022-4-6-S
		DC	380	✕	Three phases	SP100-022-D4-6-S

Product selection

	Box A1	Box A2	Box A3	Box A4
appearance				
Model	SP100-2R2-D2-6-S SP100-2R2-D4-6-S SP100-004-D4-6-S	SP100-2R2-2-6-S SP100-2R2-4-6-S SP100-5R5-D4-6-S SP100-7R5-D4-6-S	SP100-0R7-2-T-6-S SP100-1R5-2-T-6-S SP100-2R2-2-T-6-S SP100-2R2-4-T-6-S SP100-004-4-T-6-S SP100-004-4-6-S SP100-5R5-4-6-S SP100-7R5-4-6-S SP100-011-D4-6-S SP100-015-D4-6-S SP100-018-D4-6-S	SP100-011-4-6-S SP100-015-4-6-S SP100-018-4-6-S SP100-022-4-6-S SP100-022-D4-6-S
Dimensions(mm) (W*H*D)	252*247*120	270*274*150	298*372*150	481*390*211

Specification

production configuration:

Product model	Product configuration				
	DC Breaker	Confluence (Number of string)	Fuse	SPD	Booster
SP100-2R2-D4-6-S	√	1	×	√	×
SP100-004-D4-6-S	√	1	×	√	×
SP100-5R5-D4-6-S	√	2	×	√	×
SP100-7R5-D4-6-S	√	2	×	√	×
SP100-011-D4-6-S	√	2	×	√	×
SP100-015-D4-6-S	√	3	√	√	×
SP100-018-D4-6-S	√	3	√	√	×
SP100-2R2-D2-6-S	√	1	×	√	×
SP100-2R2-4-T-6-S	√	1	×	√	√
SP100-004-4-T-6-S	√	1	×	√	√
SP100-0R7-2-T-6-S	√	1	×	√	√
SP100-1R5-2-T-6-S	√	1	×	√	√
SP100-2R2-2-T-6-S	√	1	×	√	√

Specification

production configuration:

Product model	Product configuration				
	DC Breaker	Confluence (Number of string)	Fuse	SPD	Booster
SP100-2R2-2-6-S	√	1	×	√	×
SP100-2R2-4-6-S	√	1	×	√	×
SP100-004-4-6-S	√	1	×	√	×
SP100-5R5-4-6-S	√	2	×	√	×
SP100-7R5-4-6-S	√	2	×	√	×
SP100-011-4-6-S	√	2	×	√	×
SP100-015-4-6-S	√	3	√	√	×
SP100-018-4-6-S	√	3	√	√	×
SP100-022-4-6-S	√	3	√	√	×
SP100-022-D4-6-S	√	3	√	√	×

PART 04

comparison

Comparison

Product features \ series		SPC	BPD	SP100
				
Basic characteristics	Power and voltage	DC 450V: 2.2kW DC 800V:4-7.5kW	1AC 220V:0.75-2.2kW 3AC 380V:2.2-5.5kW	DC 450V:2.2kW DC **900V:0.75-22kW** **AC&DC 2.2-22kW** **Built-in booster 0.75-4kw**
	Installation	Wall mounting	Wall mounting	Wall mounting and **support anti-theft**
	Protection level	IP65/IP00 IP00:2.2-7.5kW	IP65	**IP66**/IP00 **IP00:2.2-11kW**
	Cooling method	Natural cooling	Natural cooling	Natural cooling(≤7.5kw) Air cooling
	AC input	\	√	√
	DC input	Standard	Standard	Standard

Comparison

series / Product / Product features		SPC	BPD	SP100
Hardware	Analog Input	/	/	1 (Expansion card)
	Digtal input	2	3	3+1(Expansion card)
	Relay output	1	/	1
	Keypad	LED	External LED	**LCD**
	DC switch	Built-in	Built-in	Built-in
	IOT	Built-in 2G	\	External **4G WIFI**
	connecting terminal	Aviation plug/PG plug	Aviation plug	Aviation plug/PG plug
Certification		\	CE	CE

Comparison

Model	GD100-PV	SP100 (DC Version)	SP100 (AC&DC Version)	SP100 advantages
Photo				
Power range	0.4-500kW	2.2-22kW	0.75-22kW	
PV INPUT (DC input)				
Max input DC voltage	440V 800V (900V optional)	440V 900V		
MPPT efficiency	99%	99%	99%	
Boost function	Optional and External	Not have	Built-in （Below 4kw)	
AC INPUT and OUTPUT				
Voltage class	SS2 1PH input/1PH output 220V		2: **1PH,3PH** input/1PH,3PH output 220V	Stronger compatibility
	S2 1PH input/3PH output 220V		4: 3PH input/3PH output 380V	
	2 3PH input/3PH output 220V		2-T: same with 2 and built-in Booster	
	4 3PH input/3PH output 380V		4-T: same with 4 and built-in Booster	

Comparison

Model	GD100-PV	SP100 (DC Version)	SP100 (AC&DC Version)	SP100 advantages
Photo				
Product configuration				
Protection class	IP20 and support IP54 cabinet	IP66 and IP00	IP66	SP100 can be directly installed outdoors, reduce the cost of electric cabinet.
DC Breaker	Not have	Built-in 		Control PV power ON/OFF, makes the operation more convenient and safer
Confluence function	Not have	Built-in 		No need for Combiner box
Anti-reverse diode	External (QH100)	Not have	Built-in	Protect the solar panels when configure AC power

Comparison

Model	GD100-PV	SP100 (DC Version)	SP100 (AC&DC Version)	SP100 advantages
Photo				
Anti-reverse diode	External (QH100)	Not have	Built-in	Protect the solar panels when configure AC power
Fuse	Not have	Built-in 		When current backflow occurs between PV modules, protect the modules
SPD	Built-in	Built-in	Built-in	To avoid surge lightning current input, achieve protect the inverter.
Cooling	Forced air cooling	Natural Cooling and Forced air cooling	Natural cooling	Fan-less makes less noise and lower fault rate

Comparison

Model	GD100-PV	SP100 (DC Version)	SP100 (AC&DC Version)	SP100 advantages
Photo				
GPRS(IOT)	 4G WIFI(IP20)	 4G WIFI(IP65)		4G: ICA400-02 (IP20,For GD100) ICA400-06(IP65,For SP100) WIFI: ICA100-02(IP20,For GD100) ICA100-06(IP65,For SP100)