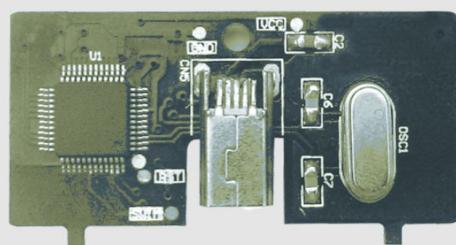




**User Manual of Photovoltaic Pump  
Expanding Cards**



# V1.0

## User Manual of Photovoltaic Pump Expanding Cards

### Product Overview

APV-B309 is an auxiliary photovoltaic pump expanding card for our V series inverters, applicable in any occasions relevant with the photovoltaic water pump industry.

### Product Features

1. Flexible matching modes, convenient for installation, change and updating;
2. Self-catering intelligent CPU control system for more accurate and faster control;
3. Compensation function, ensuring smooth system acceleration, deceleration and stable running;
4. Standard keyboard allowing for copying parameters and exempting repeated and complicated function settings; and
5. MPPT function for real-time tracking of maximum output power of solar cells.

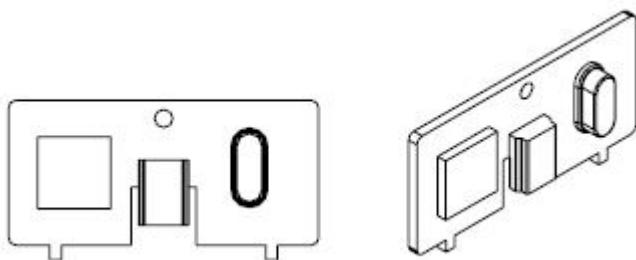
### Installation Precautions

This product should be installed and debugged by specialized persons. Make sure to pay attention to following items during installation:

1. Be sure not to install the product with damp hands for the fear of causing electrical shock.
2. After having installed the expanding card, do not connect to the power supply unless the front cover plate is covered. Do not move cover plates when connecting to the power supply for the fear of causing electrical shock.
3. When connecting to the power supply for the inverter, do not touch the inverter's terminal even if the motor is at stop; otherwise, electrical shock may be caused.
4. Use insulating protective tools during operation. Never leave thread residues or metal objects in the machine.
5. After change of the control panel, be sure to set corresponding parameters before running; otherwise, the machine may be damaged.

## Product Appearance

The appearance of the photovoltaic pump expanding card is shown in below figure:



## Installation

Refer to Figure 1 for installing the photovoltaic pump expanding card.

1. Remove the inverter's operating panel, insert the photovoltaic pump expanding card into the socket and then press it into place.

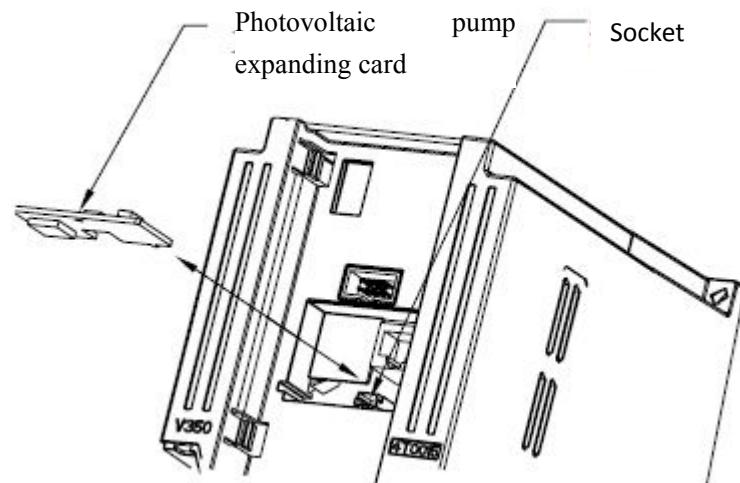


Figure 1 Installation Diagram of Photovoltaic Pump Expanding Card APV-B309.

## Wiring

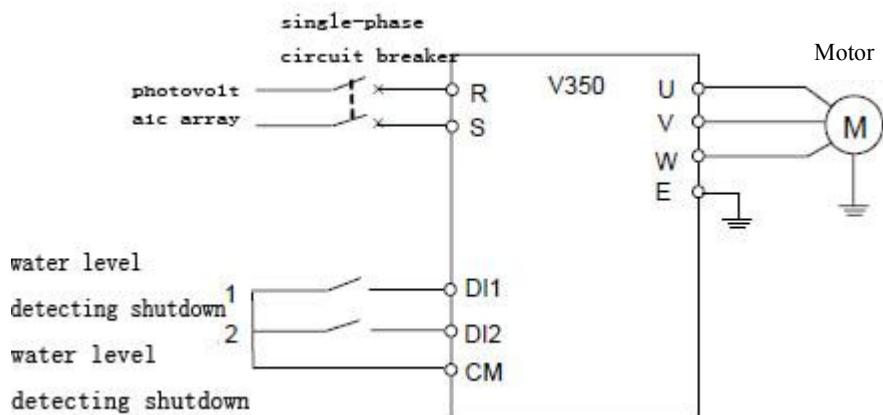


Figure 2 Photovoltaic Pump System Wiring Diagram

## Instructions

1. Connect the inflow water-level detecting signal to DI1. When it is detected that there is no water in the suction sump, DI1 will become effective and the inverter will automatically stop; the outlet water-level detecting signal is connected to DI2. When it is detected that the water storage tank is full of water, DI2 will become effective and the inverter will automatically stop.
2. The expanding card can detect the inverter's status at real time, and can be automatically reset without manual operation in the case of any fault is detected and then eliminated.

## Functional Parameters

The symbols in the function table:

“R” means that the parameter is only readable and cannot be modified.

Function Code	Name	Setting Range and Description	Resolution	Default Value	Modification Limit
FC.2.10	Start and stop selection	1: Activate other values: shutdown	1	1	
FC.2.11	Shutdown DC side voltage	0~1000V	1	390	
FC.2.12	Proportion coefficient	0~200(%)	1	6	
FC.2.13	Integral coefficient	0~200(%)	1	40	
FC.2.14	Constant voltage coefficient	75~85(%)	1	78	

FC.2.15	Reserve				
FC.2.16	Start frequency	0.00~50.00Hz	0.01	6.00	
FC.2.17	Start delay	30~120 Sec	1	90	
FC.2.18	Start open-circuit DC side voltage	0~1000V	1	600	
FC.2.19	Start acceleration time	0.01~600.00 Sec	0.01	2.00	
FC.2.20	Reserve		0.1	0.0	
FC.3.21	Current limit	0~10.0A	0.1	5.5	
FC.3.22	Reserve		1	0	

Monitoring parameters are as blow:

Function Code	Name	Setting Range and Description	Resolution	Change restriction
D1.1.30	Current running frequency	0.00~50.00	0.01	R
D1.1.31	Target voltage	0~1000V	1	R
D1.1.32	U*I value	0~65535	1	R
D1.1.33	DC side voltage	0~1000V	1	R

## Description of Functional Parameters

<b>FC.2.10</b>	Start and stop selection	Default value	1
	Setting range	1: Activate other values: shutdown	

When this parameter is set to 1, the expanding card control mode is activated to control inverter operation. When the parameter is set to other values, the inverter is at the shutdown state, no under control of the expanding card.

<b>FC.2.11</b>	Shutdown DC side voltage	Default value	390
	Setting range	0~1000V	

This parameter is used to set the DC side voltage value when the inverter is shut down. If the DC side voltage is lower than this setting value during operation of the inverter, the inverter will stop automatically.

<b>FC.2.12</b>	Proportion coefficient	Default value	6
	Setting range	0~200(%)	
<b>FC.2.13</b>	Integral coefficient	Default value	40
	Setting range	0~200(%)	

This parameter is used to set the control coefficient tracked by the maximum power of the photovoltaic system.

<b>FC.2.14</b>	Constant voltage coefficient	Default value	78
	Setting range	75~85(%)	

This parameter is used to set the ratio of the clocked DC side voltage to the open-circuit DC side voltage when the inverter is started.

<b>FC.2.16</b>	Start frequency	Default value	6.00
	Setting range	0.00~50.00Hz	

This parameter is used to set the initial frequency when the inverter is started, and is not limited by the lower limiting frequency F0.1.22. During running of the inverter, when the running frequency is lower than the initial frequency, the inverter will stop automatically.

<b>FC.2.17</b>	Start delay	Default value	90
	Setting range	30~120Sec.	

This parameter is used to set the interval from the time the starting signal is given to the time the inverter gets running.

<b>FC.2.18</b>	Start open-circuit DC side voltage	Default value	600
	Setting range	0~1000V	

This parameter is used to set the inverter's open-circuit voltage, and the inverter will not be allowed to start until its voltage is higher than this setting.

<b>FC.2.19</b>	Start acceleration time	Default value	2.00
	Setting range	0.01~600.00 Sec.	

This parameter is used to set the time needed for the inverter to rise from 0.00Hz to the start frequency [FC.2.14].

<b>FC.3.21</b>	Current limit	Default value	5.5
	Setting range	0.0~10.0A	

When the inverter's output current is higher than this setting, the inverter's frequency will not be influenced by the solar output. This parameter is used to limit the inverter's output power, so as to protect the inverter.

## Parameter Setting of Photovoltaic Pump Expanding Card

Function Code	Function Name	Recommended Setting Value
F0.0.07	Parameter initialization	7 (one-off initialization of parameter setting the)
F0.0.09	Control mode selection	9 (V/F control)
F1.0.03	Acceleration time 1	0.50 ~ 2.00 Sec.
F1.0.04	Deceleration time 1	1.00 ~ 6.00 Sec.
F0.3.33	Control command	1 (external terminal control)
F0.1.21	Upper limiting frequency	50.00Hz
F0.1.22	Lower limiting frequency	0.00Hz
FC.2.10	Start and stop selection	1 (auto start)
FC.2.11	Stop DC side voltage	360 ~ 420V
FC.0.24	Proportion coefficient	2 ~ 10(%)
FC.0.26	Integral coefficient	20 ~ 40(%)
FC.0.33	Constant voltage coefficient	78 ~ 80(%)
FC.0.34	Start frequency	5.00 ~ 7.00Hz
FC.0.35	Start delay	80 ~ 100 Sec.
FC.0.37	Start open-circuit DC side	580 ~ 620V
FC.0.38	Start acceleration time	50.00 ~ 70.00 Sec.
FC.0.39	Current limit	Rated current

## Debugging instructions

### 1. Constant voltage debugging

The tracking target voltage at startup should be set to be 0.78 - 0.80 times of the open-circuit DC side voltage according to output power of the solar cell,

### 2. PID debugging

If the FC.2.12 value is set to a larger value, the system can more rapidly track the maximum power. There are certain overshoots. If the setting value is too small, the tracking speed will be influenced. The larger the setting value is, the more possibility of eliminating overshoots, but the speed of tracking the maximum power will be reduced.

### 3. Current limit debugging

The current limit is for the purpose of protecting the inverter. When the inverter's output current reaches the set current limit, the inverter's output frequency will not increase, hence limiting the inverter's output frequency. The current limit should be set to be the inverter's rated current or above more or less.

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