

Installation and Operating Manual



1. Introduction

1.1 General

Thank you for choosing Darfon PVI4000 inverters as your power conversion devices in the solar power system. This document contains important information for the installation and settings of this product. Therefore, before you start the installation and settings, it is highly recommended to read this manual carefully.

The use of string PV concept significantly reduces the cabling costs on a photovoltaic system. The use of just two parallel strings of PV modules in series has proven advantageous by delivering a high operating voltage to the solar inverter.

This advantage is primarily reflected in a higher efficiency of the inverter. Careful optimization of the overall inverter system's cost and efficiency lead to the choice of a 550V DC maximum system voltage for the PVI4000 for use with 1 kW to 5.3 kW PV arrays per inverter.

The PVI4000 inverter is designed to cover solar electric power into utility grade electricity that can be used by home or local power company.

PVI4000 inverter is designed to support two (2) PV strings and operate automatically without any configuration once it is installed and commissioned according to the technical specifications. When at least one of the DC input voltages generated by the photovoltaic module goes above the initial voltage setting and under the pre-set threshold value, the embedded controller is then waked up and goes through the checking mode and then stay at CNTing mode because the pre-set threshold value is not reached yet. At this time, the PVI4000 inverter would not feed the AC power to the mains utility; instead, it keeps watching the input DC voltage. Once the input DC voltage goes up above the pre-set threshold value and all

other conditions necessary for grid connection are checked and fulfilled for a certain period of time, the PVI4000 inverter goes into the Grid with MPPT mode that turns the AC relays on and begins feeding the AC voltage into the grid steadily. When all of the input DC voltages fall below the initial voltage setting which is 100Vdc, the PVI4000 inverter will then shut itself down. The PVI4000 inverter will be waked up automatically when one or more of the input DC voltages go up above the initial voltage setting.

Maximum power point tracking

The PVI4000 inverter use Darfon proprietary maximum power point (MPPT) tracking technology to get the maximum amount of energy form the solar array, which helps your arrays to have maximum output at all times.

1.2 Specification Table

Model Name	PVI 4000
Grid Side (AC output)	
AC Nominal Voltage / Range	220-240 V / 180-280 V
AC Grid Frequency	50 / 60 Hz
Nominal Output Power	4000 W
Maximum Output Power	4000 W
Maximum Output Current	18 A
Waveform	True sine
Power Factor	> 0.99
THD	< 3%
Phase	Single
PV Side (DC input)	
Maximum DC Power	4300 W
Maximum Input Voltage	550 VDC
MPP Voltage Range	125V ~ 440 V
Peak Power Tracking Voltage	205 V ~ 440 V
Maximum DC Input Current	2 x 11 A
Number of MPP Tracker	2
Efficiency	
Max. Efficiency	> 96.5 %
Euro. Efficiency	> 95.5 %
Consumption: Operating(standby) / Night	< 20 W / < 0.5 W

Model Name	PVI 4000
General Specification	
Dimensions (W x H x D) in mm	430* 495 * 166
Weight / Shipping Weight	28 kg
Cooling	Fan Controlled
Ambient Temperature Range	-20°C to 60°C
Protection Degree	IP65
Topology	Transformer-less
Others	
DC Connection	Tyco(Std.)/MC3(Opt.)/MC4(Opt.)
DC Switch	Yes
AC Connection	Plug-connector
Display	Graphic LCD
Interface	RS485/RS422
Certifications	EN 61000-6-2, EN 61000-6-3, EN 61000-3-11,EN 61000-3-12, VDE0126-1-1, IEC62109

1.3 Installing Accessories

- Operating Manual x1
- AC Connector x1
- DC Connector (female) x2
- DC Connector (male) x2
- RS485/RS422 Connector x2
- Bracket x1

2.Safety

2.1 Safety Notification



The PVI4000 inverters may contain high voltages and the risk of electrical shock, even when no external voltage is present. Only the trained qualified electrical personnel are allowed to perform the electrical installation, wiring, opening, repair, and modification of the PVI4000 inverters.

The temperature of the heat sinks outside of the device can reach over 70°C in normal operation. There is risk of burn injury when these parts are touched.

Before using this unit please read these operating instructions carefully. Take special care to follow the warnings indicated in the unit itself as well as the safety suggestion list below. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the device. The manufacturer assumes no liability for the customer's failure to comply with these requirements.

2.2 Safety Symbols

To reduce the risk of injury and to ensure the continued safe operation of this product, the following safety instructions and warnings are marked in this manual.

	<p>Warning, risk of electric shock</p> <p>The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of dangerous voltage with in the product's enclosure that may be constitute a risk of injury or death to users and / or installers.</p>
	<p>Caution (refer to accompanying documents)</p> <p>The exclamation point within an equilateral triangle is intent to alert the user to the presence of important information to prevent damage to this product.</p>

2.3 Wiring the Inverter

The following three sections describe the connections of wirings for the DC, AC, and communication ports. The PVI4000 has two (2) pairs of DC connection terminals, string A and B. The DC connection terminals are used to connect to PV strings through circuit breakers. Each pair of the DC connection terminals shall be connected to one PV string with the maximum rating value of voltage and current. The AC connection terminal used to connect to the main utility through a circuit breaker that shall be closed to the distribution panel. The inverter has two (2) RS422/RS485 connectors, are used for external communication to a remote computer or terminal.

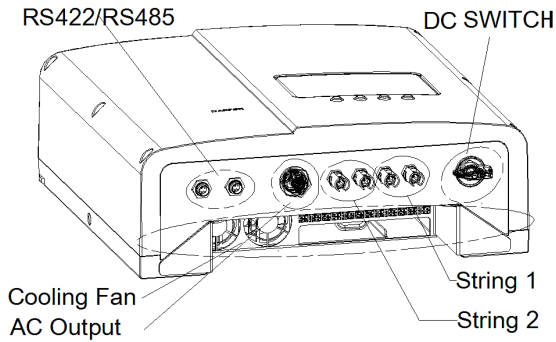


Fig. 3.3.1 *Wiring compartment bottom view*

2.3.1 DC Cable Connection

The PVI4000 is designed to support two independent PV strings, string A and B.

Each PV string shall provide a DC input voltage with maximum power of 3000 W and maximum current of 12 A. There are two (2) terminals, labeled as “+” and “-”, DC voltage input located on the bottom of the inverter used for the DC cable connections.

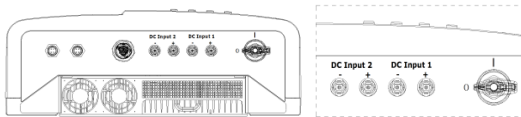





Fig. 3.3.2.1 DC terminals for DC cable connection

- Connect the Positive (+) wire from the #1 PV string to the PV1 (+) terminal. Double check the wire is in the proper location and tight it with screw.
- Connect the Negative (-) wire from the #1 PV string to the PV (-) terminal. Double check the wire is in the proper location and tight it with screw.
- Repeat for the #2 PV string, if there is one. Double check the wire is in the proper location and tight it with screw.

	CAUTION! The DC voltage must be less than 550 V in any condition.
	WARNING! Route the DC connection cables to the PVI4000 inverters away from any possible hazards that could damage the cables.
	WARNING! Allow at least 5 minutes for PVI4000 inverter to discharge energy completely, since the hazardous voltage will remand on the device after disconnecting all PV DC input.

2.3.2 Communication Cable Connection

The PVI4000 inverter supports one common data interface standards, RS485/RS422 that will be used to communicate to the remote computer or terminal.

2.4 Operation Feature

(1)Independent / parallel mode automatic detection:

PVI4000 can provide two inputs in connection with PV arrays, and it can detect automatically the connection type of PV arrays; that is parallel or independent mode.

Through this convenient method, we give more flexible connections of PV arrays for system installers. It lets the system installers match the PV arrays with more appropriate and optimum solutions and get more power efficiency.

(2)Independent / parallel MPPT mode:

We provide two kinds of MPPT mode for PVI4000. They are individually called parallel mode and independent mode. While PVI4000 detect the connection type of PV arrays is parallel mode, PVI4000 has one set of MPPT. MPPT built in program can make the PV arrays achieve the optimum power efficiency. In contrast, if PVI4000 detect the connection type of PV arrays is two individual inputs, there will be two sets of MPPT making both of two individually PV arrays attain the optimum power efficiency.

(3)Graphic display:

There is different from the traditional character displays, and we adopt the graphic display as the measure of showing messages for PVI4000. By the graphic display, the users can understand the current operation status, history information, power in accumulation and so on. More details are referred to **Chapter 4.4**, and there will be more contents and descriptions about it.

(4)Wide input voltage range:

PVI4000 can have the ability of wide input voltage range, and it gets the system installers one good avenue to have more economical and efficient combinations of PV arrays.

There will be good effects when PVI4000 matches well with good selection of PV arrays combination

2.5 Technical Specifications

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DARFON

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