PVI 10kW
PVI 13kW
PVI 15kW
208, 240 and 480VAC

INSTALLATION AND OPERATION MANUAL

Commercial, Grid-Tied Photovoltaic Inverter

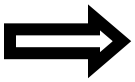
Subject to Change

IMPORTANT SAFETY INSTRUCTIONS

This manual contains important instructions that shall be followed during installation and maintenance of the PVI 10kW / PVI 13kW / PVI 15kW Inverter. These instructions apply to 208, 240 and 480 VAC options only.

To reduce the risk of electrical shock, and to ensure the safe installation and operation of the inverter, the following safety symbols are used to indicate dangerous conditions and important safety instructions.

WARNING: This indicates a fact or feature very important for the safety of the user and/or which can cause serious hardware damage if not applied appropriately.
Use extreme caution when performing this task.



NOTE: This indicates a feature that is important either for optimal and efficient use or optimal system operation.

EXAMPLE: This indicates an example.

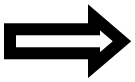
SAVE THESE INSTRUCTIONS

PRESCRIPTIONS DE SECURITE IMPORTANTES

Ce manuel contient des instructions importantes qui doivent être suivies lors de l'installation et de l'entretient des onduleurs PVI 10kW / PVI 13kW / PVI 15kW.

Afin de réduire les risques de choques électriques et d'assurer une installation et une opération sécuritaires de l'onduleur, les symboles suivants sont utilisés pour identifier les situations dangereuses et les instructions importantes de sécurité.

ATTENTION: Ceci indique un élément important pour assurer la sécurité de l'utilisateur ou pour éviter d'endommager l'appareil si la procédure n'était pas suivie correctement.
Veuillez procéder avec précaution.



NOTE: Ceci identifie un attribut important soit pour assurer un fonctionnement efficace et optimal du système.

EXEMPLE: Ceci indique un exemple.

CONSERVEZ CES INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

- All electrical installations shall be done in accordance with the local and US and Canadian national electrical codes ANSI/NFPA 70.
- The PVI 10kW / PVI 13kW / PVI 15kW contains no user serviceable parts. Please contact Solectria Renewables or a Solectria Renewables authorized system installer for maintenance.
- Before installing or using the PVI 10kW / PVI 13kW / PVI 15kW, please read all instructions and caution markings in this manual and on the PVI 10kW / PVI 13kW / PVI 15kW unit as well as the PV modules.
- Connection of the PVI 10kW / PVI 13kW / PVI 15kW to the electric utility grid must be done after receiving prior approval from the utility company and performed only by qualified personnel.
- Completely cover the surface of all PV-arrays with opaque (dark) material before wiring them. PV arrays produce electrical energy when exposed to light and could create a hazardous condition.

SAVE THESE INSTRUCTIONS

PRESCRIPTIONS DE SECURITE IMPORTANTES

- Tous les travaux d'installation électrique doivent être exécutés en conformité aux normes électriques locales ainsi qu'à la norme nationale américaine et canadienne ANSI/NFPA 70.
- Le PVI 10kW / PVI 13kW / PVI 15kW ne contient aucune pièce requérant un entretient effectué par l'utilisateur. Pour toute maintenance, veuillez consulter Solectria Renewables ou un installateur agréé par Solectria Renewables (les coordonnées de Solectria Renewables et des installateurs agréés sont indiquées sur le site web de Solectria Renewables: www.solren.com).
- Avant d'installer ou d'utiliser le PVI 10kW / PVI 13kW / PVI 15kW, veuillez lire toutes instructions et toutes les mises en garde présentes dans ce manuel, sur le PVI 10kW / PVI 13kW / PVI 15kW et sur les modules PV.
- Le raccordement du PVI 10kW / PVI 13kW / PVI 15kW au réseau électrique ne doit être effectuée qu'après avoir obtenu une entente d'interconnexion auprès de la compagnie locale de distribution électrique et uniquement par du personnel autorisé et qualifié.
- La surface de tous les capteurs PV doivent être recouverte entièrement d'un matériel opaque (noir) avant de procéder au câblage. Les capteurs PV exposés a la lumière produisent du courant électrique susceptible de créer une situation de risque.

CONSERVEZ CES INSTRUCTIONS

Table of Contents

1 – Introduction

The PVI 10kW / PVI 13kW / PVI 15kW is a commercial, 3-phase grid-tied PV inverter designed to be inter-connected to the electric utility grid. With this manual the PVI 10kW / PVI 13kW / PVI 15kW can be installed and operated safely. This installation guide is used as reference for the commissioning and as a guideline on how to use the inverter most effectively.

Feeding power into the grid involves conversion of the DC-voltage from the PV-array to grid compatible AC-voltage by "inverting" DC to AC. This unit feeds power into a standard 208V AC, 3-phase commercial, industrial or institutional facility's electrical system which is connected to the electrical grid (480VAC version is also available, and 240VAC versions available as special order).

If the PV system and inverter are providing the same amount of electrical power that the facility is using then no power is taken from or fed into the utility grid. If the facility is using more power than the PV system is providing, then the utility grid provides the balance of power. If the facility is using less power than the PV system is generating, then the excess is fed into the utility grid.

Be sure to look into local regulations regarding Net Metering/inter-connection in your local area. Note that some utilities need to change their revenue kWh meter for proper Net metering measurement and billing.

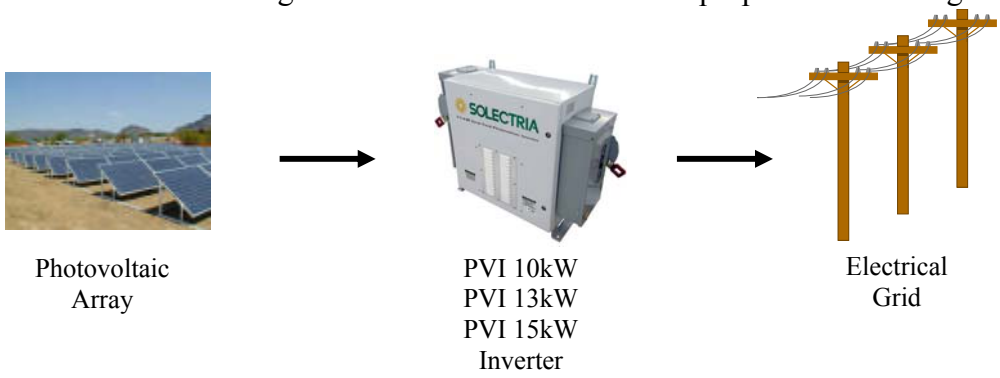


Fig. 1 Grid tied inverter application

2 – Installation

WARNING: Before installing the PVI 10kW / PVI 13kW / PVI 15kW, read all instructions and caution markings in this manual and on the PVI 10kW / PVI 13kW / PVI 15kW as well as on the photovoltaic modules.

WARNING: Electrical installation shall be done in accordance with all local electrical codes and the National Electrical Code (NEC), Canadian Electrical Code, ANSI/NFPA 70.

WARNING: Connecting the PVI 10kW / PVI 13kW / PVI 15kW to the electric utility grid must only be done after receiving prior approval from the utility company and installation completed only by qualified personnel/licensed electrician(s).

2.1 – Checking for Shipping Damage

The PVI 10kW / PVI 13kW / PVI 15kW inverters are thoroughly checked and tested rigorously before they are shipped. Even though they are delivered strapped onto a rugged, oversized pallet or in a crate, the inverters can be damaged in shipping which typically is the fault of the shipping company.

Please inspect the inverter thoroughly after it is delivered. If any damage is seen please immediately notify the shipping company. If there is any question about potential shipping damage, contact Solectria Renewables. A photo of the damage may be helpful.

Do not accept unit if it is visibly damaged or you note visible damage when signing shipping company receipt. Report any damage immediately to shipping company. Do not remove the unit from pallet / packaging. If it is determined that the unit must be returned, an RMA number must be obtained from Solectria Renewables.

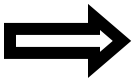
2.2 – Inverter Mounting

The PVI 10kW / PVI 13kW / PVI 15kW inverter is made up of a NEMA 3R (rainproof) industrial enclosure containing electrical and electronic components including transformer, filters, contactor, fusing, a sealed IP65 power & control electronic inverter unit (DMGI245) and AC and DC disconnects mounted on the sides of the main enclosure. On the standard versions, the disconnects are side facing. An option is available with forward-facing disconnects for tight spaces where width is limited (see fig 2.2b). This option is especially useful in locations where limited space if available side-to-side to allow local code clearance for the standard side facing disconnects.

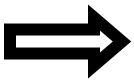
Using the mounting diagrams in fig. 2.2a and fig. 2.2c, choose whether floor / roof, wall or stand mounting will be used. The inverter includes mounting feet for attachment to floors, roofs / roof plates / roof pans or stands. It also includes mounting tabs for wall mounting. You can also use a combination of both mounting provisions. For example, 2 bolts in floor mount feet and 2 bolts in the wall mount tabs.

It is recommended to use galvanized grade 5 or better bolts or stainless steel bolts. The correct bolt size is 3/8” (10mm) diameter. If wall mounting is used, be sure to verify sheer and pullout strength of anchors or other wall attachments.

WARNING: Severe injury or death could occur if the inverter mounting fails and the unit falls on a person.



NOTE: If the PVI 10kW / PVI 13kW / PVI 15kW is mounted outside, make sure the enclosure door remains closed in case of rain during the installation process. Since the AC and DC connections are made in the disconnects only, there is no need to open the main enclosure during installation.



NOTE: Always use all 4 mounting tabs if wall mounted.

NOTE: The 380 lb. weight of the inverter will exert as much as 100 lbs. per bolt on the 4 wall mounts. Tension on the top bolts could also be 100 lbs. Make sure an appropriate safety margin is used for both shear and tension of wall mounting bolts, anchors or other attachments.

NOTE: If the roof / floor mounting only uses the inverter's mounting feet, be sure you use all 4 available foot mount bolt positions. If a stand is used, be sure inverter is securely mounted to stand, the stand is adequately designed for the unit's weight and the stand is adequately attached to the floor / wall or roof.

NOTE: In the case of roof / floor mounting, temporary removal of disconnect doors may facilitate easy wiring of the unit (only while wiring) however, only do so if necessary and acceptable by local codes. Do not ever leave disconnect or main enclosure doors open when you are not actively working on the unit.

Notes regarding mounting and placement of the inverter

Criteria for device mounting:

- Because the power electronics is in an IP65 sealed enclosure within the NEMA 3R main enclosure, the inverter can be mounted outdoors.
- The very longest life for the inverter can be achieved by mounting it in a clean, dry and cool location even given the unit's robust construction and powerful cooling system.
- For optimal electrical efficiency, use the shortest possible AC and DC cables and use the maximum allowable cable size.
- Avoid installation in close proximity to people or animals, as there is a small amount of high-frequency switching noise.
- Install the inverter in an accessible location following local codes for enclosure and disconnect door clearances and proximity to other equipment (see mounting diagrams, Fig. 2.2a & 2.2c).
- Although not required, installation at eye-height allows easy reading of the indicator LEDs on the right side of the inverter above the DC (PV) disconnect.
- For optimal inverter life and performance, do not mount the inverter in direct sunlight, especially in hot climates, although the inverter is designed to function at full power continuously in up to 50^{o}C ambient temperatures. In hot climates if the unit must be mounted in direct sunlight a metal sun-shield is recommended. It is recommended that the inverter is mounted on the north side of buildings or on the north side of a PV array (which can provide some shade).
- The inverter weighs 380 lbs. Be sure to verify load capacity of floor, roof or wall mounting area.

- The ambient temperature must be between –25°C and +50°C for full power, continuous operation. The inverter will automatically reduce power or shut down to protect itself if ambient air temperature rises above 50 °C.

- The National Electrical Code (NEC) and Canadian Electrical Code require that the inverter be connected to a dedicated circuit and no other outlets or device may be connected to this circuit. See NEC Section 690-64(b)(1). The NEC also imposes limitations on the size of the inverter and the manner in with it is connected to the utility grid. See NEC Section 690-64(b)(2).

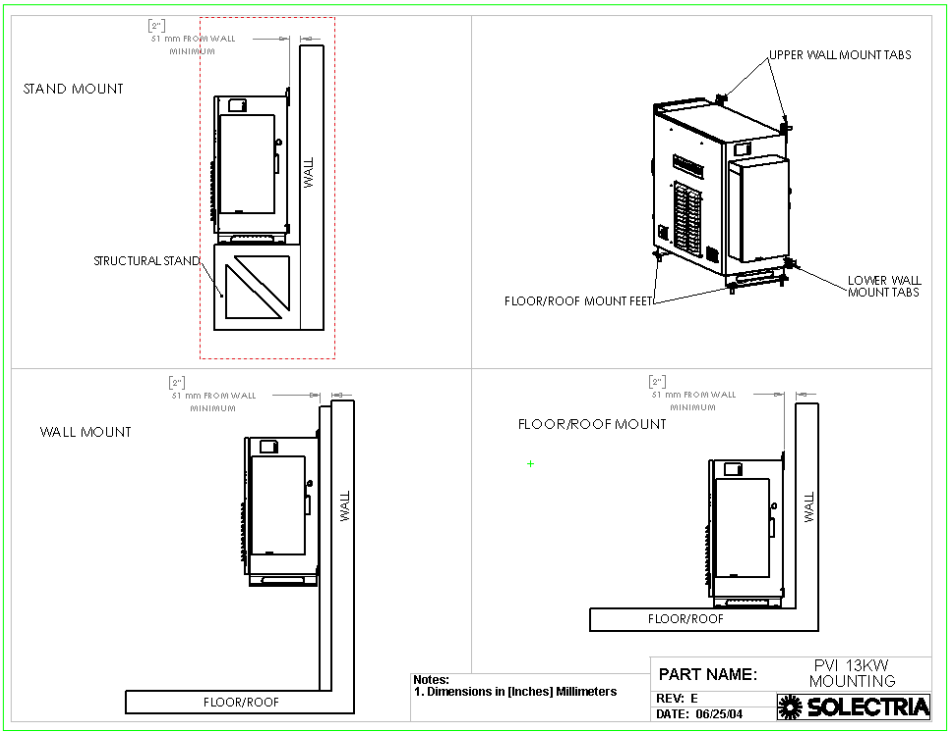
- The cooling air exhausts at the bottom of the unit. Nothing should block the 2" clear space under the enclosure defined by the 2" tall mounting feet.

- A minimum distance of 10" must be clear above the inverter for ventilation.

- The inverter must be mounted with at least a 2" open space behind it. If wall-mounted, vertical, 2" x 2" uni-strut or channel can be used. Air should be able to flow behind the unit from below it to above it.

- If you are installing the inverter in a utility vault or electrical closet, the air circulation must be sufficient for heat dissipation – provide external ventilation if necessary to maintain an ambient condition of less than +50°C. The ambient temperature should be kept as low as possible.

- Correct mounting positions for the inverter are shown on the following pages:



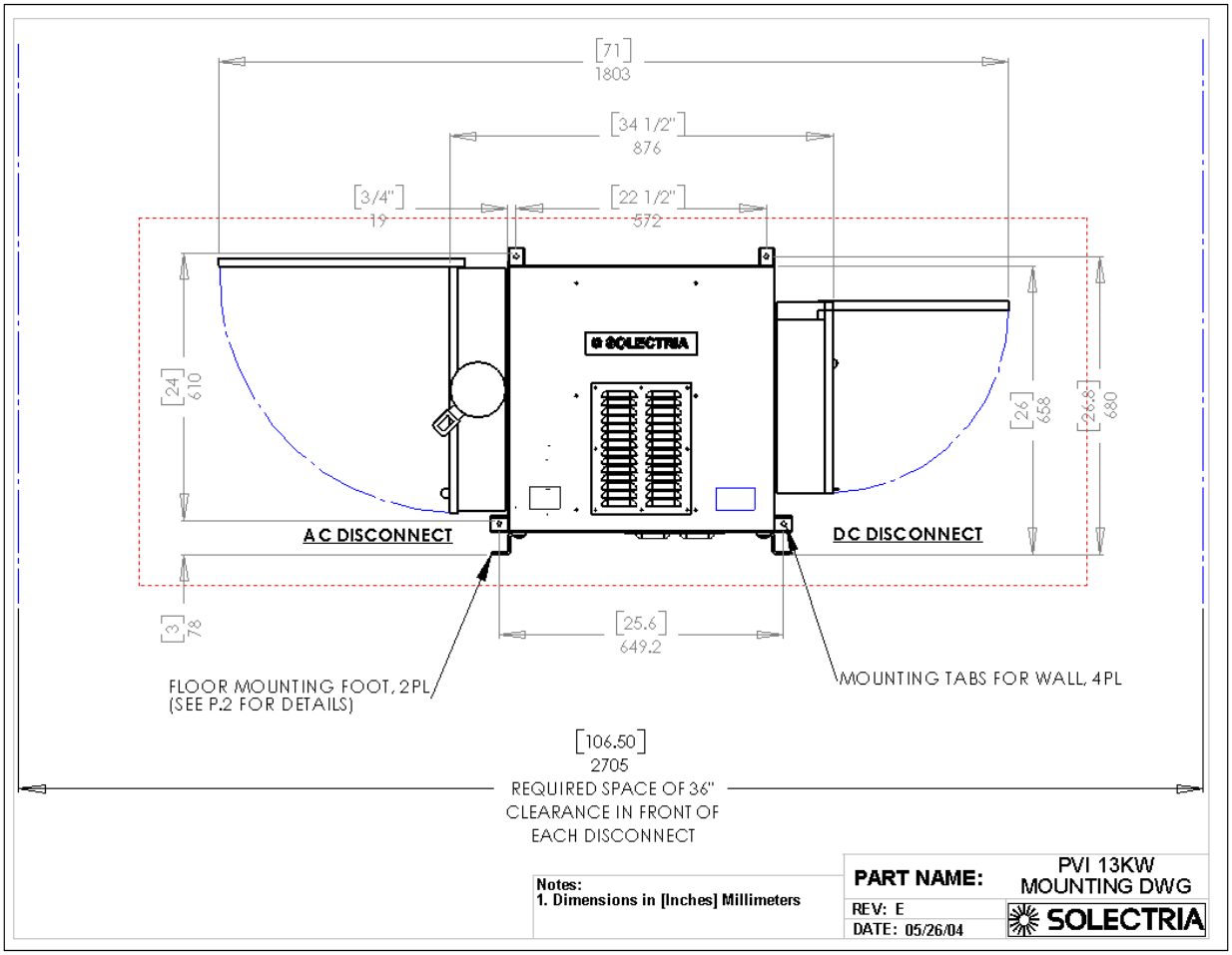


Fig. 2.2a PVI 10kW / PVI 13kW / PVI 15kW Mounting Diagram with standard side-facing disconnects

Fig. 2.2b PVI 10kW / PVI 13kW / PVI 15kW with optional forward-facing disconnect option

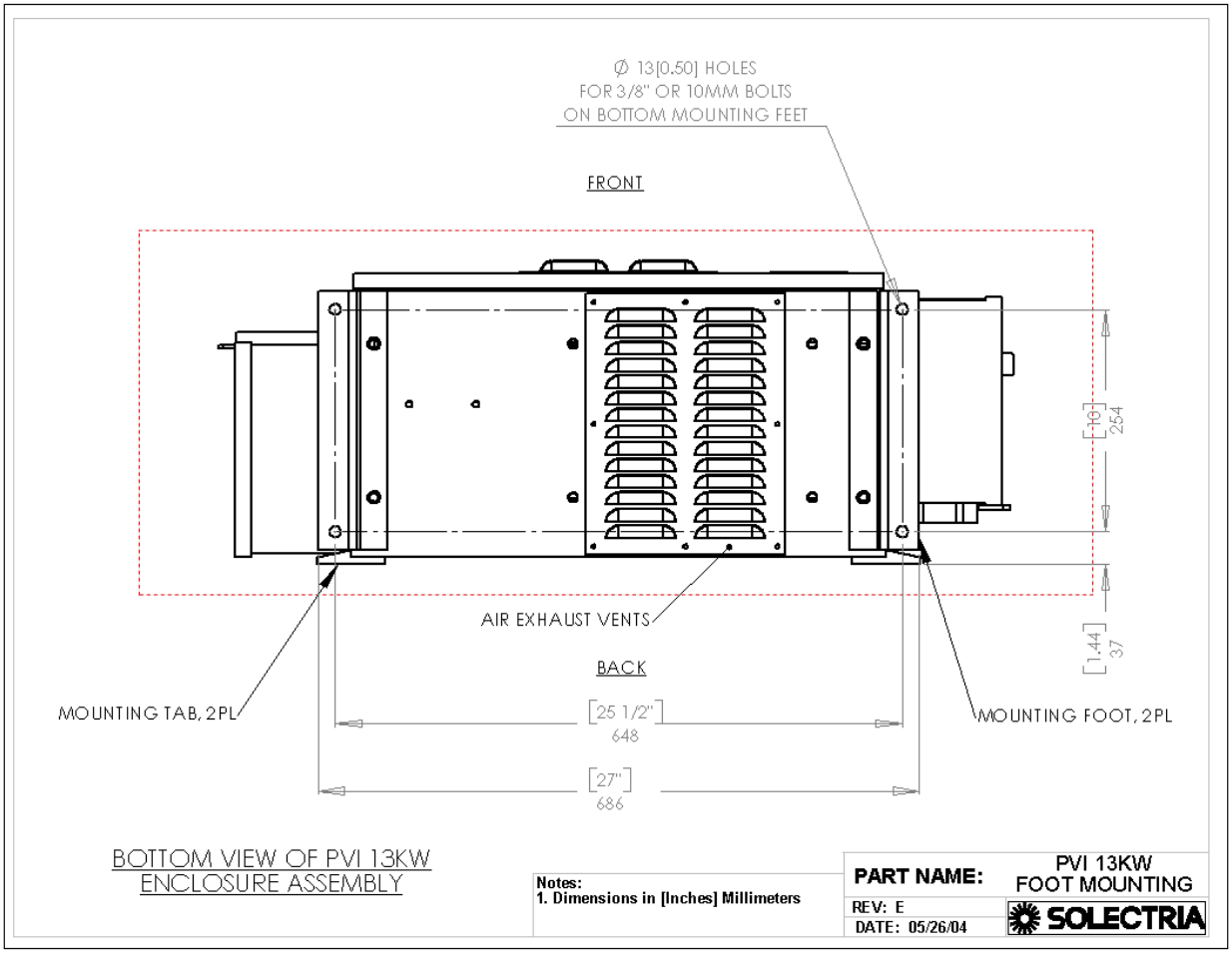


Fig. 2.2c PVI 10kW / PVI 13kW / PVI 15kW Mounting Diagram with standard side-facing disconnects

2.3 – Electrical Connection Considerations

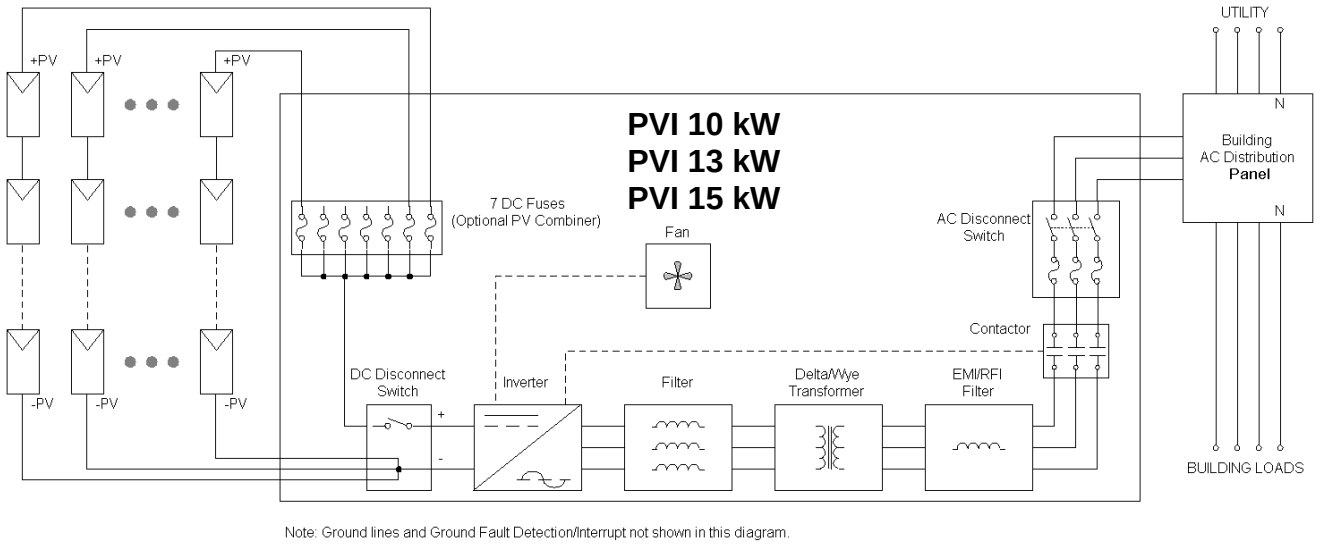


Fig. 3 Simplified electrical connection diagram

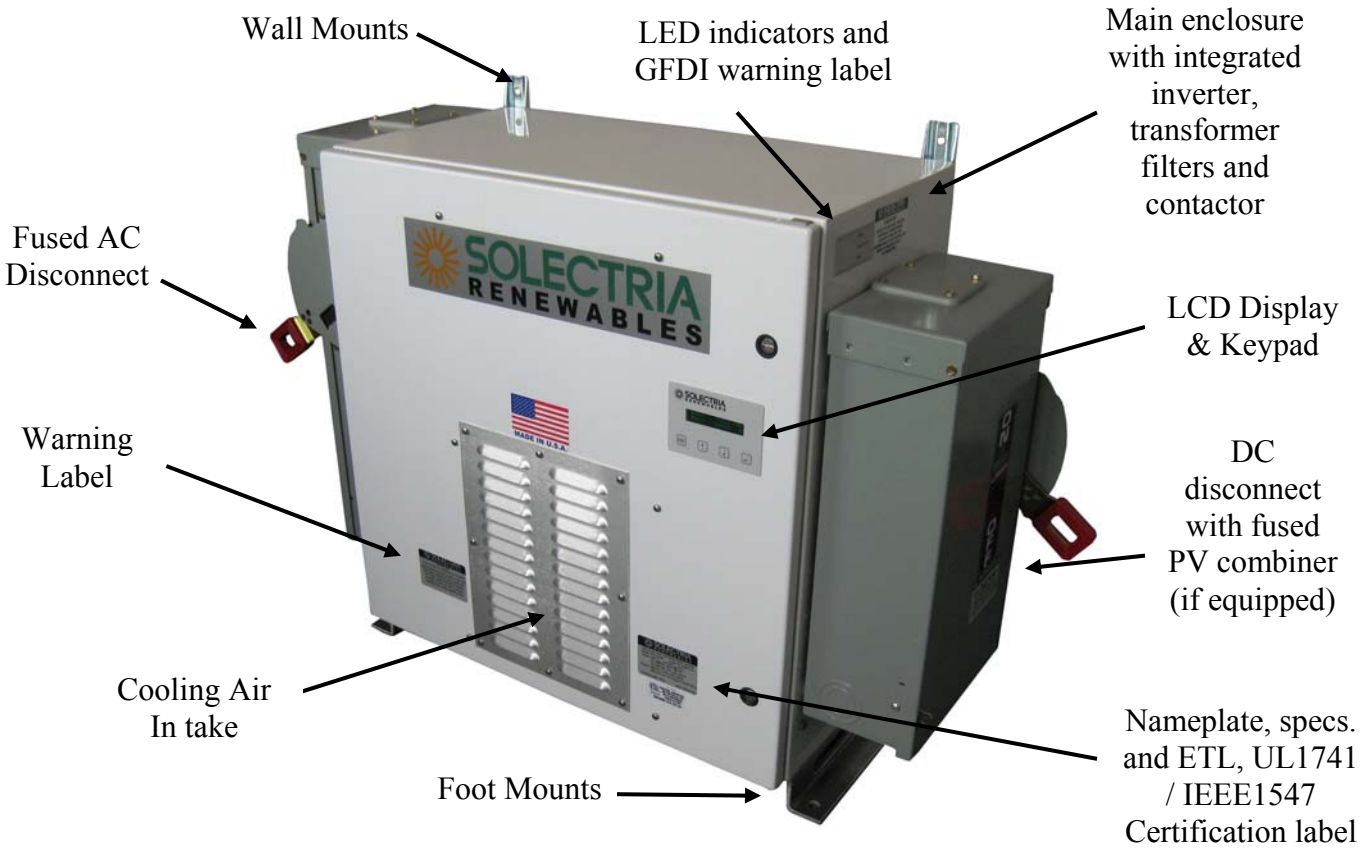


Fig. 4 Integrated Inverter Package

WARNING: All electrical installations shall be done in accordance with all local electrical codes and the National Electrical Code, Canadian Electrical Code, ANSI/NFPA 70.

WARNING: The grounded DC photovoltaic connection (typically the negative DC connection) is bonded to ground within the inverter through the ground fault detection and interruption circuit (GFDI). The grounded DC connection should not be bonded to ground at any other point in the system. The ungrounded DC connection (typically the positive DC connection) must never be grounded at any time.

NOTE: When conduit hubs are used on the AC and DC disconnects in an outdoor or wet location, rain-tight or wet location hubs that comply with the requirements of "Standard For Fittings For Conduit and Outlet Boxes", UL514B, are to be used.

AC Wiring

For the ***3-phase AC wiring***, three conductors are required (one per phase) plus additional conductors for grounds (see grounding section below). No neutral connection is needed. 90°C copper conductors must be used. The disconnect terminals are listed for 75°C wire; see NEC 310.10 regarding temperature ratings of wire and terminals. Torque terminal screws to 45-50 in-lb. Temperature derates, voltage drop and other considerations may dictate that larger than minimum wire sizes be used. 2 AWG is the maximum size conductor that can be landed in the terminals. Verify that any wire size choices meet local codes.

Inverter Model	AC Voltage	Overcurrent Protection	Number of AC Conductors	Minimum AC Wire Size	Maximum AC Wire Size
10kW	208VAC	40A	3 (1 per phase)	8 AWG, 90°C Cu	2 AWG, 90°C Cu
10kW	240VAC	40A	3 (1 per phase)	8 AWG, 90°C Cu	2 AWG, 90°C Cu
10kW	480VAC	30A	3 (1 per phase)	10 AWG, 90°C Cu	2 AWG, 90°C Cu
13kW	208VAC	50A	3 (1 per phase)	6 AWG, 90°C Cu	2 AWG, 90°C Cu
13kW	240VAC	50A	3 (1 per phase)	6 AWG, 90°C Cu	2 AWG, 90°C Cu
13kW	480VAC	40A	3 (1 per phase)	8 AWG, 90°C Cu	2 AWG, 90°C Cu
15kW	208VAC	60A	3 (1 per phase)	6 AWG, 90°C Cu	2 AWG, 90°C Cu
15kW	240VAC	60A	3 (1 per phase)	6 AWG, 90°C Cu	2 AWG, 90°C Cu
15kW	480VAC	40A	3 (1 per phase)	8 AWG, 90°C Cu	2 AWG, 90°C Cu

The AC grid impedance value at the connection point should be as low as possible to avoid an increase of the AC voltage to non-permissible values while the inverter feeds to the grid. Minimizing wiring impedance also results in higher system efficiency.

EXAMPLE: The impedance is the sum of the electricity grid impedance at building distribution and all impedance values of conductors and connections.

Single conductor impedance values are:

- Approximately 0.14 Ω for 250 feet (76.2 m) 8 AWG conductor
- Approximately 0.09 Ω for 250 feet (76.2 m) 6 AWG conductor
- Approximately 0.05 Ω for 250 feet (76.2 m) 4 AWG conductor
- Conductor impedance of < 0.09 Ω is recommended.

The total impedance phase to phase of the grid plus the interconnecting AC conductors should be less than 0.18 Ω. Keep in mind that with larger wires, the AC voltages at the inverter will be closest to the voltages at the building's circuit panel, allowing for the most reliable inverter operation.

DC Wiring:

For the ***DC wiring without an integrated fused PV combiner***, two conductors are required (one for the grounded conductor and one for the ungrounded conductor) plus additional conductors for grounds (see grounding section below). 90°C copper conductors must be used. The disconnect terminals are listed for 75°C wire; see NEC 310.10 regarding temperature ratings of wire and terminals. Torque terminal screws to 120 in-lb. Temperature derates, voltage drop and other considerations may dictate that larger than minimum wire sizes be used. 2/0 AWG is the maximum size conductor that can be landed in the terminals. Verify that any wire size choices meet local codes.

Inverter Model	Maximum DC Input Current	Number of DC Conductors	Minimum DC Wire Size (at Max. DC Input Current)	Maximum DC Wire Size
10kW	52A	2	6 AWG, 90°C Cu	2/0 AWG, 90°C Cu
13kW	68A	2	4 AWG, 90°C Cu	2/0 AWG, 90°C Cu
15kW	77A	2	4 AWG, 90°C Cu	2/0 AWG, 90°C Cu

For the ***DC wiring with the optional integrated fused PV combiner***, 10-14 total conductors are required (one for the grounded conductor and one for the ungrounded conductor of each string) plus additional conductors for grounds (see grounding section below). 90°C copper conductors must be used. The disconnect terminals are listed for 75°C wire; see NEC 310.10 regarding temperature ratings of wire and terminals. Ungrounded conductors (typically the positive DC conductors) are landed in the touch-safe fuse holders; torque their terminal screws to 12 in-lb. Grounded conductors (typically the negative DC conductors) are landed in the terminal block; torque their terminal screws to 35 in-lb. Temperature derates, voltage drop and other considerations may dictate that larger than minimum wire sizes be used. 2/0 AWG is the maximum size conductor that can be landed in the terminals. Verify that any wire size choices meet local codes.

String Fuse Size	Minimum DC Wire Size	Maximum DC Wire Size
8A	12 AWG, 90°C Cu	8 AWG, 90°C Cu
10A	12 AWG, 90°C Cu	8 AWG, 90°C Cu
12A	12 AWG, 90°C Cu	8 AWG, 90°C Cu
15A	12 AWG, 90°C Cu	8 AWG, 90°C Cu

AC and DC Grounds, Including Equipment Grounding Conductors and Grounding Electrode Conductors:

In accordance with local codes, specifically 690 NEC 2008, all grid-tie PV systems must have the following:

- DC Equipment Grounding Conductor (EGC)
- DC Grounding Electrode Conductor (GEC) and DC Grounding Electrode
- AC Equipment Grounding Conductor (EGC)
- AC Grounding Electrode Conductor (GEC) and AC Grounding Electrode

In certain cases, local codes may allow for a common grounding electrode to be used for both the AC and DC grounding electrode. In that instance, the grounding electrode conductor should be connected to the AC ground bar in the AC disconnect. If required, additional ground lugs of the appropriate size for the grounding conductors can be added in the disconnects and bonded to the existing ground bar in a code compliant manner.

Connection	Number of Open Positions	Wire Range
DC Ground Bar	3	10 - 4 AWG, Cu
AC Ground Bar	3	10 - 4 AWG, Cu

Lightning and Surge Protection:

The inverter is designed with certain protections against voltage surges including certification to UL 1741 / IEEE 1547, ANSI / IEEE 62.41 / 62.42. However, added protection and solid grounding provisions are important for best protection against utility surges and surges created by indirect lightning strikes.

The installation of a lightning surge arrester of the correct specification is recommended on both the DC and AC sides of inverter. These can be installed on the outside of the disconnects and wired using the manufacturer's directions. These devices gives important added protection from indirect lightning strikes and resulting surges that provide protection beyond the inverter's included surge protection.

It is a good idea to have the lightning protection system of the building checked and upgraded if needed before the PV system is installed. (Are there air conductors along the roof-line of the building well above the PV array? Do you see a copper ground wire running from the air conductors to a ground rod?) These added protections are especially important for areas prone to thunder storms and possible nearby lightning strikes. Although these added precautions cannot guarantee that there will be *no* damage from lightning, they can help prevent or limit potential damage to the inverter.

Inverters connected in conjunction with emergency back-up generators:

WARNING: Please follow all applicable local codes. The inverters meet and are certified to all UL1741 and IEEE1547 requirements.

Solectria Renewables does not endorse any of the connections discussed below. The following are recommended courses of action that must be approved by local building officials before any connections are made.

There are two methods to connect inverters to a grid-connected building that includes an emergency generator.

1.) Connect inverter(s) on the grid-side of the transfer switch that disconnect the building when the utility goes off. With this method, when the grid goes off, the inverters go offline, the transfer switch disconnects the building from the PV inverters and grid. Then the generator starts and runs for the duration of power outage. In this case, the inverter is on the grid-side of the transfer switch and the inverters remain off the entire time until the grid returns.

2.) Connect inverter(s) on the load / building side of the transfer switch that disconnects the building when the utility goes off. With this method when the grid goes off, the inverters go off, the transfer switch disconnects the building with inverter(s) from the grid and the generator starts, the inverter(s) will attempt to start in parallel with the building/load/generator. With a large size generator and load, the inverter will most likely come back on and run well. If at any time the voltage or frequency of the system goes outside of the limits set in UL1741, then the inverter will go off and re-start 5 minutes later. This trial and restart sequence should not cause any trouble for the building, generator or inverter, however, if the PV system has close to or more than the power level of the generator and/or loads at any time, it is not recommended to use this hook up configuration (with the inverter on the building/load side of the transfer switch)

2.4 – Making the Electrical Connections

WARNING: Follow PV module manufacturer’s directions. PV modules produce electrical energy when exposed to light and could create a hazardous condition. To assure safety from shock, completely cover the surface of all PV modules with opaque (dark) material before wiring them.

WARNING: Before making the DC connections at the DC disconnect, check the correct polarity and admissible DC voltage between the grounded and ungrounded DC connections.

WARNING: The wiring connections of the inverter to the DC voltage from the PV strings and the AC voltage of the utility must be done with the AC and DC disconnects off, building AC source circuit panel / breaker off and the PV module strings disconnected (or covered with an opaque material). Open DFDI fuse holder before wiring DC connections.

WARNING: A fused, correctly rated PV combiner must be used with this version of the inverter.

WARNING: Even when in the off position, the DC disconnect will remain live on the PV side ("line") when the PV modules are in daylight. The inverter ("load") side of the disconnect will also remain live after the disconnect has been shut off until 60 seconds after the LEDs turn off, as electrolytic DC bus capacitors in the inverter discharge.

- Connect each of the AC phase conductors and the AC equipment and electrode grounds to the terminal in the AC disconnect. Phase conductors should land in the "LINE" terminals and ground conductors should land in the ground bar.

- For the ***DC wiring without an integrated fused PV combiner***, connect the DC conductors from an external string combiner to the labeled + and – terminals inside the DC disconnect. Connect the DC grounds to the ground bar.

- For the ***DC wiring with the optional integrated fused PV combiner***, connect the DC conductors from each string to the labeled + and – terminals inside the DC disconnect. Connect the DC grounds to the ground bar.

- Measure and verify proper DC voltages and polarity. Measure and verify proper AC voltages and phase rotation. AC conductors must follow **clockwise** phase rotation for: L1/A, L2/B and L3/C. Test with a phase rotation tester or a scope-meter. Extech, Fieldpiece, Fluke, UEi and many others make phase rotation meters, sometimes referred to as motor rotation meter. Do not assume existing color code or building wiring is correct! Incorrect phase sequence at the AC connection can damage the inverter.

WARNING: AC and DC fuses may only be replaced with the following, available through Solectria Renwables:

Inverter Model	AC Voltage	AC Fuse Replacement (Class R, 600V)	DC Fuse Replacement for String Combiner
10kW	208VAC	FRS-R-40A	KLM-8, 10, 12 or 15A
10kW	240VAC	FRS-R-40A	KLM-8, 10, 12 or 15A
10kW	480VAC	FRS-R-30A	KLM-8, 10, 12 or 15A
13kW	208VAC	FRS-R-50A	KLM-8, 10, 12 or 15A
13kW	240VAC	FRS-R-50A	KLM-8, 10, 12 or 15A
13kW	480VAC	FRS-R-40A	KLM-8, 10, 12 or 15A
15kW	208VAC	FRS-R-60A	KLM-8, 10, 12 or 15A
15kW	240VAC	FRS-R-60A	KLM-8, 10, 12 or 15A
15kW	480VAC	FRS-R-40A	KLM-8, 10, 12 or 15A

3 – Commissioning the Inverter

The inverter is mounted, all electrical connections are made and you are ready to apply power.

NOTE: Make sure all tools, parts, etc. are removed from the vicinity of the inverter before turning on.

WARNING: Make a final check for correctness of all AC and DC wiring to the inverter and in the system.

NOTE: With the PV modules connected and inverter disconnects still off, it is a good final precaution to check PV voltage and polarity once more by carefully using a 600V, DC rated digital volt meter and probing the positive (+) and negative (-) PV connections in the disconnect enclosure. Also, verify clockwise phase rotation (L1-L2-L3) in the AC disconnect using a phase rotation meter.

Turning on the inverter:

- Turn on the dedicated 3-phase circuit breaker in the building electrical panel.
- Verify the proper CLOCKWISE phase sequence at the "line" side terminals of the AC disconnect.
- Turn on the PVI 10kW / PVI 13kW / PVI 15kW inverter's 3-phase AC disconnect.
- Turn on the PVI 10kW / PVI 13kW / PVI 15kW inverter's DC disconnect.
- Watch the LED indicators for initialization (all three LEDs on), then slow-blinking green.
- Listen for contactor clunk (inverter on-line) and fast blinking green LED.
- Listen for slight hum (transformer on-line).
- Following the fast-blinking green LED and high frequency switching sound (inverter on-line and beginning to feed power into 3-phase circuit), the green LED should become solid indicating that the inverter is operating normally.

Operation:

The inverter operates automatically without the need for user interaction or maintenance. The PVI 10kW / PVI 13kW / PVI 15kW inverter automatically starts back feeding 3-phase AC power into the grid every morning as the sun rises, as soon as sufficient DC voltage and PV power is available. The inverter DSP runs through various checks before going online with the grid and feeding power into the grid.

The control electronics and DSP will be active as soon as DC (PV) voltage reaches 200V DC. The inverter will go on-line with the utility / building 3-phase grid when the DC voltage first exceeds 270V DC open circuit (strike voltage). Next, the inverter will load the array, bringing the DC voltage down from 270V DC to not less than 205V DC.

Once there is enough PV power at 205V DC to back feed 3-phase AC, power switching will automatically feed power to the grid.

Operating states, GFDI status and error indications shown by the LED indicators, which are described in the next sections.

4 – Power, GFDI and Error LED Indicators and LCD display

4.1 Power, GFDI and Error LED Indicators

The LED indicators mounted on the right-hand side of the enclosure just above the DC disconnect give the user a quick look at what state the inverter is in and if it is operating normally.

GREEN – indicates "power", the unit is powered up and / or feeding power to the grid

RED – "ERROR" or "FAULT", the inverter is not providing power due to an error or fault

RED & YELLOW – indicate that a ground fault has been detected and it must be located before the inverter will function. Check GFDI fuse if RED LED remains solid.

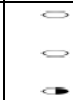
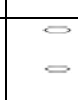
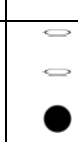
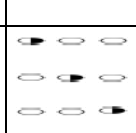
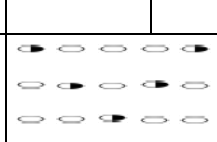
NOTE: If the GFDI fuse is blown, see "Opening the Main Enclosure" and Fig. 6, "Description and Location of Components". Turn off AC & DC power and locate, check and replace the GFDI fuse with a 3/4A midget fuse 500V DC or 600V DC rated such as Solectria Renewables P/N KLK ¾ or KLKD 3/4, or Bussmann, KLK-3/4 or KLKD-3/4.

Fig. 5 LED indicators

Description of LED symbols used to indicate LED status in this manual

- LED Off
- LED flashing (25% on, 75% off)
- LED on once per second
- LED on two times per second
- LED on with short interruptions (75% on, 25% off)
- LED on

LED indicator		Operating condition	Description
green: yellow: red:		standby (night)	input voltage < 125 VDC
green: yellow: red:		initialization	unit is being initialized
green: yellow: red:		stop	Input voltage low < 210V (275V @ startup)
green: yellow: red:		stop	input voltage high > 430V (475 VDC is the maximum allowable PV open circuit voltage)
green: yellow: red:		waiting for stronger sun	available DC power is too low
green: yellow: red:		waiting, checking grid	presence of valid grid conditions Is being checked
green: yellow: red:		starting / synchronizing	-starting transformer -synchronization to grid -closing contactor
green: yellow: red:		waiting for AC disconnect/breaker to be closed	grid voltage Is absent
green: yellow: red:		AC fuse blown (one phase)	One AC power fuse blown Or one v-sense fuse blown Or one grid phase off/blown
green: yellow: red:		AC VOLTAGE TOO HIGH (alternating green & red LED)	AC Grid Voltage above UL limits (>228V if 208VAC, >528V if 480VAC)
green: yellow: red:		feeding grid MPP or constant voltage mode	normal daytime operation
green: yellow: red:		de-rating mode or inverter at full power	reduction of power fed to the grid due to increased temperature of the heatsink or inverter is at full rated power
green: yellow: red:		GFDI fuse failure	GFDI fuse is defective see chapter 5

green: yellow: red:		Contactor Failure (one blink)	Contactor timer run out before successful open or close
green: yellow: red:		Vsense Failure (two blinks)	DSP board cannot communicate with vsense board
green: yellow: red:		Thermal Overshot (three blinks)	Contactor open during power operation because of thermal overshot
green: yellow: red:		Current Sensor Failure (Four blinks)	Current sensor failed self-calibration during the unit wakeup
green: yellow: red:		Temperature Sensor Failure (five blinks)	Temperature sensor read below -30C
green: yellow: red:		Desat Failure (one blink (pause) two blinks)	Power stage desaturation failure
green: yellow: red:		IGBT over temperature (one blink (pause) three blinks)	Power stage junction temperature over limit (125C)
green: yellow: red:		Utility Failure	A failure of the Utility (i.e. a blackout or brownout) has occurred Unit will restart 5 min after grid (AC) restored
green: yellow: red:		5 minute wait for re-start (alternating green, yellow & red LEDs in sequence)	Utility required 5 minute wait for restart in process since grid (AC) restored
green: yellow: red:		Wong AC Phase Sequence	Switch two phase wires for correct clockwise sequence

4.2 LCD Display

Button Description

ESC: To move up a level from the current menu.

↑↓: To scroll up/down the individual menu items

↵: To enter into selected menu.

Main/Default Screen

Eac: XXXX kWh
Pac: XX W

Press any of the following keys to move from the main/default screen into the Start Menu↑↓↵
To enter into selected menu item, press the ↵ key.

Start Menu

1. Measurements
2. Set Inverter
3. Set Monitor
4. KYZ Meter
5. Display Info

Measurements Menu

This displays the data retrieved from the inverter. Use the ↑↓ buttons to move up and down the list:

- AC Energy
- AC Power
- AC Voltage
- AC Current (3 phase average)
- DC Voltage

Pressing ESC will take the screen back to the start menu. *Note: data will only be available when inverter is awake and communicating.*

Set Inverter Menu

Displays inverter parameters, some of which may be modified with the keypad.

- Inverter ID *Serial port address/ID of the inverter*
- Baud Rate *Serial port baud rate (Currently not adjustable)*
- Vac Very High *AC Voltage Critical High (Not adjustable)*
- Vac High *AC Voltage High (Not adjustable)*
- Vac Low *AC Voltage Low (Not adjustable)*
- Vac Very Low *AC Voltage Critical Low (Not adjustable)*
- Fac Low *AC Frequency Low (Not adjustable)*
- Fac Very Low *AC Frequency Critical Low (Not adjustable)*
- Fac High *AC Frequency High (Not adjustable)*

Note: data is only available when inverter is awake and communicating.

Monitor Menu

Displays monitor settings that may be modified with the keypad.

1. LAN *Local Area Network configuration, applicable only for SolrenView monitoring*
   a. DHCP Mode *See SolrenView manual on DHCP*
   b. Static/Fallback IP *If DHCP is turned on, this is then used as the fallback IP*
   c. Gateway IP *IP address of LAN's default gateway.*
   d. Netmask *Subnet mask*
2. Date/Time *Manual time set. This may be overwritten by scheduled NIST updates.*
3. Reboot *Reboots the monitor*
4. Remote SRV *This starts the transmit process necessary for SolrenView monitoring. Units that are ordered with SolrenView monitoring will have this field turned on. Caution: Enabling this field when SolrenView service has not been confirmed/authorized may result in unnecessary wear on the unit.*
5. Reset SRV *Settings are cleared to factory defaults. Caution: This will clear Revenue-grade KYZ counters.*

KYZ Meter Menu

Displays KYZ readings, if installed. See Solrenview manual for KYZ installation.

1. AC Energy *Cumulative energy count*
2. AC Power *Power reading*
3. Pulse Weight *Multiplier to convert pulses to WH for display. F*

For example Pulse Weight = 10 WH
➔ 1 pulse = 10 WH

5 – Trouble Shooting

The PVI 10kW / PVI 13kW / PVI 15kW is designed, produced and rigorously tested for long life and reliability in a wide range of climate conditions, voltage and power levels.

With a properly shipped, sited, mounted, wired and tested installation, the integrated PVI 10kW / PVI 13kW / PVI 15kW inverter unit should give many years of trouble-free and maintenance-free service.

The following trouble shooting information will help in the event that the inverter does not function, stops functioning or does not provide full performance.

WARNING: Before attempting to open disconnects or the main enclosure, read the entire manual, especially warning messages and "Opening The Main Enclosure" later in this section. Only qualified personnel should attempt to open any of these enclosure doors or do any service or troubleshooting.

PV system not functioning

- Check LED indicator status
- Check connection to grid, 3-phase AC voltage & CLOCKWISE phase rotation (with meter)
- Check DC (PV) string connections or main PV feed conductor connections
- Verify PV voltage range including hot module temperature MPP voltage and cold module temperature, open circuit voltage (OCV)
- Contact installer or Solectria Renewables if malfunction persists
- If contacting Solectria Renewables for assistance, please provide part number, serial number, short description of problem (LED indicator status, when problem started, how often problem occurs, under what conditions the problem occurs) and information on PV modules (string layout, number of modules per string, number of strings, module model and part number, output power, short-circuit current and open circuit voltage)

Some specific problems that can be identified quickly:

- GFDI Problem: If the LED indicators show a ground fault problem but the GFDI fuse is not blown then a ground fault in PV array or wiring must be found. If the LED indicators show that the GFDI fuse is blown, the fault in PV array or wiring must be found and GFDI fuse replaced. For fuse replacement, see section 4 "Power, GFDI and Error LED Indicators".

- Inverter over heating and power de-rating. If the power output is lower than normal and there is an LED indication of power de-rating due to high temperature, check the following
  - Is the ambient air temp above 45-50^{o}C?
  - Is the intake (front) louver grill or output (bottom) visibly blocked?
  - Is the unit in direct sunlight which is adding extra heat to the inverter?

Unit over heating, power de-rating, or unit not putting out power

- Check insect screens in front louver grill on main enclosure door for clogging from dust, pollen and debris. The louver/grill can be removed with 8 Philips screws holding it on and insect screen can be cleaned or replaced (Solectria Renewables P/N HDW-150005-001)

- Fan not running, blocked or slow
  - Check fan fuse inside main enclosure (1A) AC
  - Check fan relay inside main enclosure
  - Check the fan, make sure it spins freely (when unit turned off)
- No grid sensing
  - Grid sensing fuses blown (0.5A or as labeled) AC inside main enclosure. Contact Solectria Renewables (Do not replace fuses, as this represents an abnormal failure).
- No LED indications when sun is shining. If grid voltage and DC (PV) voltage is present and no response from inverter is evident
  - Verify AC & DC (PV) voltages are within proper ranges
  - Verify fuses in AC & DC (PV) disconnect (If equipped with PV Combiner) are good

If at some point it is determined that the unit or any part of the unit should be shipped to Solectria Renewables for repair or replacement, be sure to get an RMA# from Solectria Renewables and use the same packing method as when it was shipped to you, or request instruction on packing and/or packing materials from Solectria Renewables to help insure a safe shipment.

Intake Louver Vent Cleaning

With the unit off, DC disconnect off (to prevent needless ingestion of more dust), for example do early morning or late evening so little or no energy generation is lost.

Method 1: without removing vent, use a powerful vacuum and clean entire louver vent/screen.

Method 2: remove vent by removing all Philips Pan #2 machine screws holding louver vent onto inverter. Use compressed air from the back (insect screen) side of the louver vent/screen unit to remove all debris. Re-assemble putting all screws in LOOSELY first and then tighten snug (do not over-tighten).

Opening the Main Enclosure

Normally the main enclosure (or disconnects) will not have to be opened for any reason by the user. If opening the unit is necessary follow these guidelines:

WARNING: The inverter should only be opened by qualified service technician.

WARNING: Only open the inverter when clear and dry outside if the inverter is outdoors.

WARNING: Both DC and AC disconnects must be in the off position and wait 60 seconds after the LED indicators are off before opening as electrolytic capacitors on the internal DC "bus" are discharging during this time.

- Switch off DC disconnect
- Switch off AC disconnect (and AC building panel circuit breaker if desired)
- Watch until all LED indicators have been off for 60 seconds (if not already off)
- Use a large flat screwdriver or coin to turn latches ¼ turn counter-clockwise

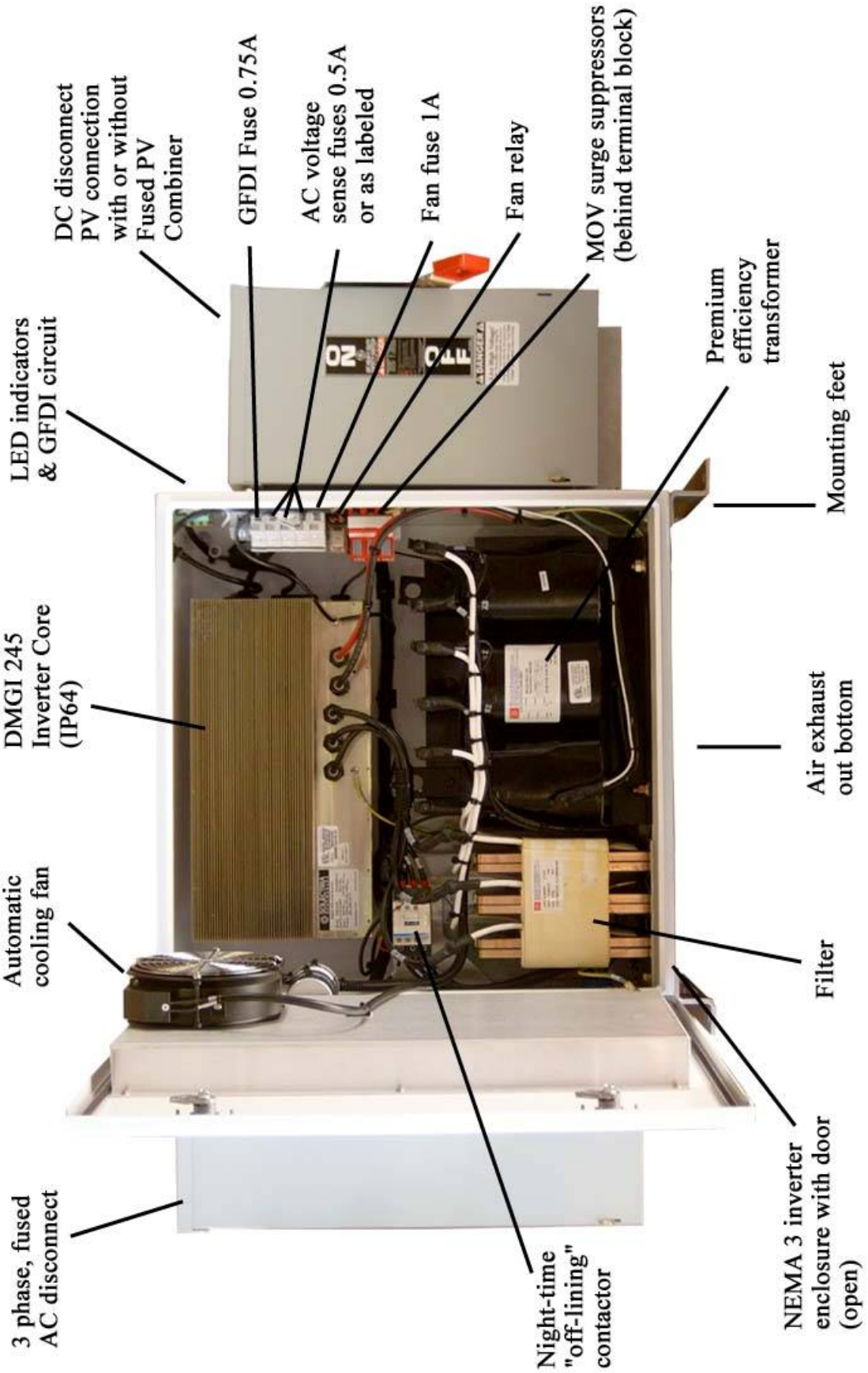


Fig. 6 Description and location of components

Inside the Main Enclosure you will see:

- DMGI 245 Controller and power electronics inverter module with fan
- Isolation transformer
- Filters
  - Inductor assembly
  - Rectangular Filter (silver/gray box behind inductor and contactor)
- 3-phase off-lining contactor
- Fuse blocks
  - GFDI, 0.75A DC fuse
  - Grid Sense Phase A, 0.5A AC Fuse (or as labeled)
  - Grid Sense Phase B, 0.5A AC Fuse (or as labeled)
  - Grid Sense Phase C, 0.5A AC Fuse (or as labeled)
  - Fan, 1A AC Fuse
- Fan Control Relay
- GFDI/LED Indicator PCB

Before closing the main enclosure always check for any signs of problems such as corrosion, loose parts, insect or animal infestation, excessive dirt/dust or over heated or deformed/aged-looking parts. Also be sure if any wires were moved or cable ties cut, that they are replaced as new.

6 – Product Warranty & RMA Policy

6.1 Warranty Policy

The Solectria Renewables Warranty Policy is stated below.

Solectria Renewables Warranty Coverage:
Solectria Renewables Limited Warranties are provided by Solectria Renewables, LLC. ("Solectria Renewables") and cover defects in workmanship and materials.

Duration of a Solectria Renewables Warranty Period:
The warranty period is 60 months from the date of purchase of the PVI 10kW / PVI13kW / PVI15kW by the end user or 64 months after the delivery date from Solectria Renewables to distributor or dealer/installer, whichever is shorter. If a warranty extension has been purchased, the term is defined as extension beyond 60 months. For example, if a 5-year extension (to 10 years total) is purchased, the term becomes 120 months from date of purchase.

If Solectria Renewables repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater.

All warranties are null and void if full payment for products and associated shipping are not received in full and in a timely manner by Solectria Renewables.

Please contact Solectria Renewables Customer Service for further details on other products.

What will Solectria Renewables do?
Solectria Renewables will, at its option, repair or replace the defective product free of charge, provided that you notify Solectria Renewables of the product defect within the Warranty Period for your product, and provided that Solectria Renewables, through inspection, establishes the existence of such a defect and that it is covered by the Limited Warranty.

Solectria Renewables will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. Solectria Renewables reserves the right to use parts or products of original or improved design in the repair or replacement. All replaced products and all parts removed from repaired products become the property of Solectria Renewables.

Solectria Renewables will attempt to repair the unit within a reasonable time period (there is no reimbursement for lost energy production.)

Solectria Renewables covers both parts and labor necessary to repair the product, and return shipment to the customer via a Solectria Renewables-selected non-expedited surface freight within the contiguous United States and Canada. Alaska and Hawaii and Rest Of The World are excluded. Contact Solectria Renewables customer service for details on freight policy for return shipments outside of the contiguous United States and Canada.

In the event an extended warranty option has been purchased, this extended warranty only applies to exposed outdoor locations (defined as rooftop or open/unprotected locations) if the product has been purchased to include the gasket-sealed AC and DC disconnect option or has a protective cover around 3 sides of inverter unit (back and sides) and over the top, 4”- 60” away from back and top and 30”- 96” from sides.

Obtaining Service:
If your product requires troubleshooting or warranty service, contact your distributor or dealer/installer. If you are unable to contact your distributor or dealer/installer, or the distributor or dealer/installer is unable to provide service, contact Solectria Renewables directly at the number listed on the website in the customer service section for your product.

Solectria Renewables may send personnel to a jobsite or contract with an area technician, installer or other authorized, trained service personnel to service/replace components.

Reimbursement for contracted services: Solectria Renewables will submit a purchase order to the designated service personnel before work is performed. This purchase order will cover time expected for the required service and most likely an allocation for travel time.

Direct returns may be performed according to the Solectria Renewables Return Material Authorization Policy.

In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Solectria Renewables.
Proof of purchase may be in any one of the following forms:
- The dated purchase receipt from the original purchase of the product at point of sale to the end user, or
- The dated distributor or dealer/installer invoice or purchase receipt showing original equipment

manufacturer (OEM) status, or
- The dated invoice or purchase receipt showing the product exchanged under warranty.

Solectria Renewables provides trouble-shooting service Monday-Friday, 9am-6pm EST. Once a problem is identified, necessary replacement component(s) will be dispatched within 1-2 days to the jobsite or the designated service personnel's address or will be brought to the site by Solectria Renewables' personnel.

What does the Solectria Renewables warranty not cover?

Solectria Renewables Limited Warranties do not cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. These warranties do not apply to and Solectria Renewables will not be responsible for any defect in or damage to:

a) The product, if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;

b) The product, if it has been subjected to fire, water, generalized corrosion, biological infestations, acts of God or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Solectria Renewables product specifications including high input voltage from generators and lightning strikes;

c) The product, if repairs have been done to it other than by Solectria Renewables or authorized, trained service personnel;

d) The product, if it is used as a component part of a product expressly warranted by another manufacturer;

e) The product, if its original identification (trademark, serial number) markings have been defaced, altered, or removed;

f) The product, if it has been damaged in shipping (unless approved in writing by Solectria Renewables);

g) Any installation and operation beyond the scope covered by relevant safety regulations (UL1741, NEC (Canadian Electrical Code), etc.);

h) Fat Spaniel hardware, if option has been purchased, is not covered under the Solectria Renewables warranty but is covered by Fat Spaniel's 5-year warranty. Extended warranties covering Solectria Renewables inverters do not cover Fat Spaniel hardware.

DISCLAIMER

SOLECTRIA RENEWABLES LIMITED WARRANTIES ARE THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY SOLECTRIA RENEWABLES IN CONNECTION WITH YOUR SOLECTRIA RENEWABLES PRODUCT AND ARE, WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OR CONDITION OF QUALITY, DISTRIBUTOR OR DEALER/INSTALLER ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTY OF DISTRIBUTOR OR DEALER/INSTALLER ABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT SHALL

BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY.

IN NO EVENT WILL SOLECTRIA RENEWABLES, LLC, INCLUDING ITS SUPPLIERS, MANUFACTURERS, VENDORS, SUBCONTRACTORS, DISTRIBUTORS, DEALERS AND ANY OTHER AFFILIATES BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, COSTS OR EXPENSES HOWEVER ARISING WHETHER IN CONTRACT OR TORT INCLUDING WITHOUT RESTRICTION ANY ECONOMIC LOSSES OF ANY KIND, ANY LOSS OR DAMAGE TO PROPERTY, ANY PERSONAL INJURY, ANY DAMAGE OR INJURY ARISING FROM OR AS A RESULT OF ANY USE, MISUSE OR ABUSE, OR THE (IN-) CORRECT INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT.

Solectria Renewables neither assumes nor authorizes any other person to assume for it any other liability in connection with the repair or replacement or the Product.

Exclusions of the Policy:
If your product is a consumer product, federal law does not allow an exclusion of implied warranties. To the extent you are entitled to implied warranties under federal law, to the extent permitted by applicable law they are limited to the duration of this Limited Warranty. Some states and provinces do not allow limitations or exclusions on implied warranties or on the duration of an implied warranty or on the limitation or exclusion of incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to you. This Limited Warranty gives you specific legal rights. You may have other rights, which may vary from state to state or province to province.

WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, UNLESS SPECIFICALLY AGREED TO BY IT IN WRITING, SOLECTRIA RENEWABLES
(a) MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN MANUALS OR OTHER DOCUMENTATION PROVIDED BY IT IN CONNECTION WITH THE PRODUCT; AND
(b) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSSES, DAMAGES, COSTS OR EXPENSES, WHETHER SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION.
THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER'S RISK.

WARNING: LIMITATIONS ON USE
Please refer to your product user manual for limitations on uses of the product. Specifically, please note that Solectria Renewables products are not intended for use in connection with life support systems and Solectria Renewables makes no warranty or representation in connection with any use of the product for such purposes.

Please review our Return Merchandise Authorization Policy for returning product to Solectria Renewables.

6.2 Return Material Authorization Policy

Please review our Return Merchandise Authorization Policy below after reviewing our Solectria Renewables Warranty Policy.

Obtaining a required, Return Material Authorization:
Before returning a product directly to Solectria Renewables you must obtain a Return Material Authorization (RMA) number and the correct factory "Ship To" address. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without an RMA number clearly marked on the outside of the shipping box, if they are shipped collect, or if they are shipped to the
wrong location.

Information Solectria Renewables needs when you are obtaining service:
1) The model names and serial number of your product
2) Information about the installation and use of the unit
3) Information about the failure and/or reason for the return
4) A copy of your dated proof of purchase.

Preparing the product for shipping:
1) Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.
2) Include the following:
a. The RMA number supplied by Solectria Renewables, LLC clearly marked on the outside of the box
b. A return address to which the unit can be shipped. Post office boxes are not acceptable.
c. A contact telephone number where you can be reached during work hours.
d. A brief description of the problem.
Ship the unit prepaid to the address provided by your Solectria Renewables customer service representative.

Returning a product from outside of the USA or Canada:
In addition to the above, you MUST include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.

7 – Technical Data

Technical Information and specifications – see appendix for complete PVI 10KW / PVI 13KW / PVI 15KW data sheet

Input (DC) from PV array:

- Maximum open circuit voltage of PV array: 475V DC
- Maximum operating voltage of the inverter: 430V DC (will not start up if over 430VDC)

WARNING: NEC 690-7 must be followed to calculate the maximum number of PV modules allowed for a maximum inverter open circuit voltage (OCV) of 475V DC in extreme cold temperatures for the installation location.

The open circuit voltage of PV modules depends on the cell temperature and the solar irradiation. The highest open circuit voltage occurs when the PV modules are at the coldest temperature and in bright sun. (See the following figure – Fig. 10)

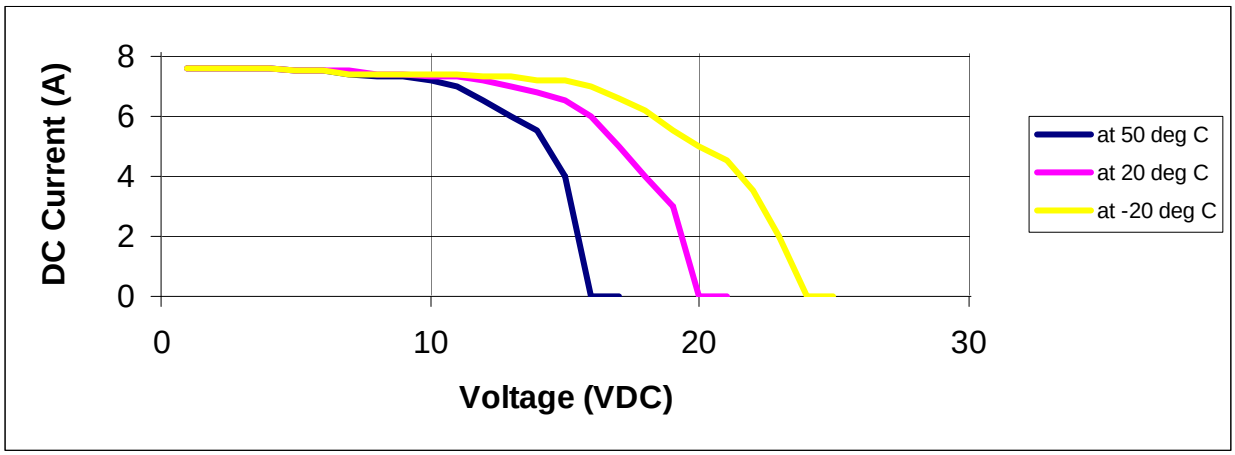


Fig. 10 Example representative PV module voltage versus current characteristic at various cell temperatures

Because the PV modules also have a reduction in voltage at high cell temperatures, you must make sure the MPP voltage of the strings will not drop below the minimum inverter DC input voltage of 205V DC in very hot temperature conditions.

Both the maximum open circuit voltage (OCV) when at cold extreme and minimum MPP voltage when at hot extreme can be calculated for a PV module using its specification sheet. PV module string sizing can then be used to determine how many modules can/should be used in a string.

Input DC (PV) specifications for PVI 10KW / PVI 13KW / PVI 15KW inverter

Inverter Model	PVI 10KW	PVI 13KW	PVI 15KW	
Operating Voltage Range (Power)	205-430	205-430	205-430	VDC
Input voltage MPP range	205-385	205-380	205-380	VDC
CEC full power range	235-380	235-380	235-380	VDC
Maximum open circuit voltage (under all conditions)	475	475	475	VDC
Maximum input current	52	69	77	ADC
Maximum input power (inverter limited)	10.6	14	16	kW DC
Maximum recommended	12	15-16	16-18	kW DC
PV power (modules @ STC) (for 0-5 deg flat roof)	13	17	19	kW DC
DC disconnect for PV positive (+)	included	included	included	
Ground fault protection	per UL 1741/2005 NEC 690.5			
Ground fault detection, must detect	0.75	0.75	0.75	A
Ground fault interrupt	0.75	0.75	0.75	A

Output to AC grid connection:

The PVI 10KW / PVI 13KW / PVI 15KW is designed to feed power into a standard 60Hz, 3-phase AC utility service or AC provided within a facility by a step down transformer of not less than 15kVA. As required by local codes, there must be a dedicated 3-phase circuit breaker for the PV inverter connection.

	PVI 10KW	PVI 13KW	PVI 15KW
208 VAC	40 A	50 A	60 A
240 VAC	40 A	50 A	60 A
480 VAC	40 A	40 A	40 A

	PVI 10KW	PVI 13KW	PVI 15KW
208 VAC	183-228 V	183-228 V	183-228 V
240 VAC	212-264 V	212-264 V	212-264 V
480 VAC	423-528 V	423-528 V	423-528 V

Output (AC) specifications for PVI 10KW / PVI 13KW / PVI 15KW Inverter:

Nominal and Maximum output power of the PVI 10KW		10.0 kW AC	
of the PVI 13KW		13.2 kW AC	
of the PVI 15KW		15.0 kW AC	
Operating voltage range (+10%/- 12%)	208VAC	240VAC	480VAC
Operating frequency range		59.3 to 60.5 Hz	
Operating voltage range (VAC)	183 - 228	211 - 264	423 – 528
Over / under voltage trip points and times		per IEEE Std. 1547-2003, Table 1	
Voltage measurement accuracy		+/- 2%	
Over / under frequency trip points and times		per IEEE Std 1547-2003, Table 2	
Frequency measurement accuracy		+/- 0.1 Hz	
Maximum Output Current PVI 10KW	28 A	24A	12 A
Maximum Output Current PVI 13KW	37 A	32A	16 A
Maximum Output Current PVI 15KW	42 A	37A	18 A
Peak short circuit output current		75 A	
Total Harmonic distortion (THD) (@ full power)		< 4%	
Power Factor		> 95%	
Anti-islanding protection		per UL 1741, IEEE 1547	
AC disconnect, 3-phase		included	
Over current protection		inverter limited	
Short circuit protection		per UL1741 / IEEE1547	
Surge test		per UL1741 / IEEE1547	
Inverter peak Efficiency		94.8%	

Other specifications:

DC combiner-fuse enclosure (Optional)	8/10/12/15A fuses available 5-7 pole, NEMA 3R, TVSS
DC Disconnect (Integral)	Break load rated, NEMA 3R
Ambient Temperature	-25^{o} to 50^{o} C
Storage Temperature	-25^{o} to 50^{o} C

Cooling	Forced Convection
Enclosure	UL1741 rainproof
Enclosure-core electronics	IP-64 (sealed)

Other Applicable Standards/Compliance: CSA22.2 #107.1, FCC Part 15 Class A

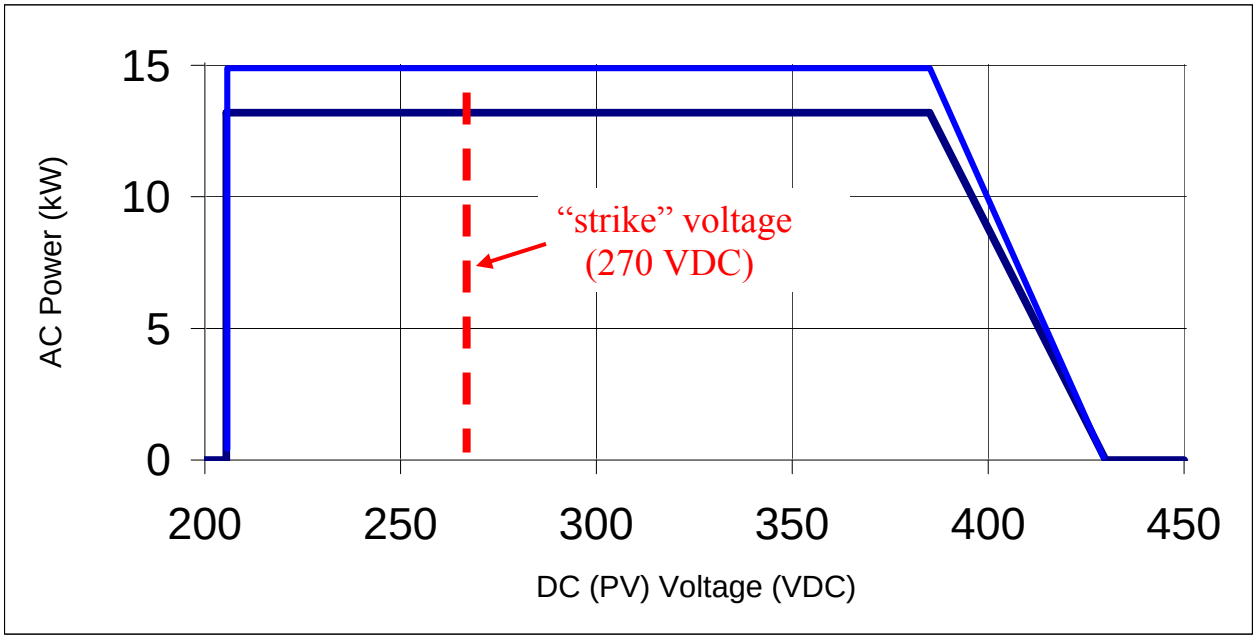


Fig. 11 Output power of PVI 13KW (example)

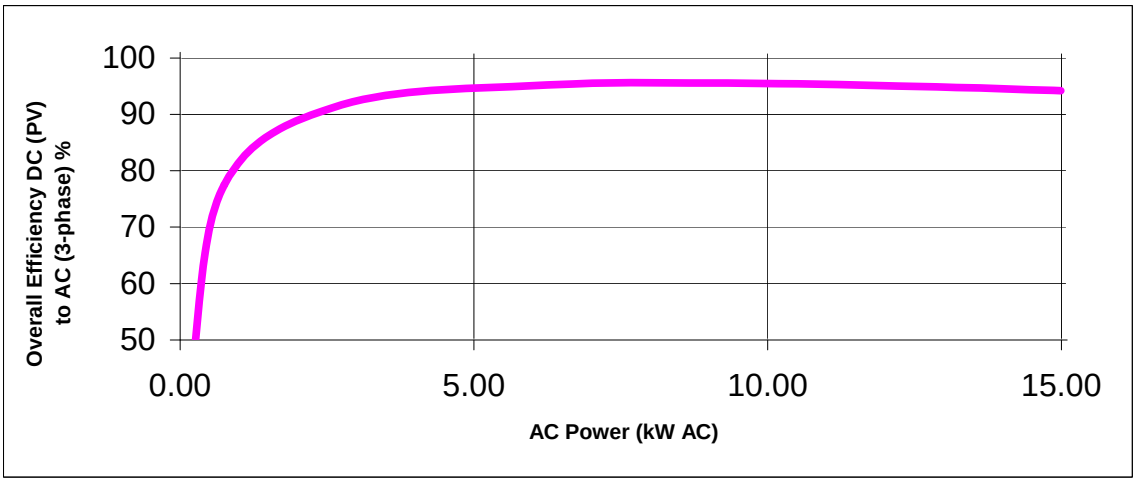


Fig. 12 PVI 10kW / PVI 13kW / PVI 15kW peak efficiency plot at 280VDC input and 25C ambient temperature.

Appendix A – PVI 10kW / PVI 13kW / PVI 15kW Data Sheet

Link to brochure: http://www.solren.com/downloads/PVI_13KW.pdf

Appendix B –PV string sizing

Visit our interactive string sizing tool: http://www.solren.com/stringSizing.html

Appendix C - Contact Information

Solectria Renewables LLC
360 Merrimack Street, Building 9
Lawrence, Massachusetts, 01843, USA

Tel: 978.683-9700
Fax: 978.683-9702
Email: inverters@solren.com
Website: www.solren.com

Authorized Distributors / Dealers / Installers / Designers:

Specific Link: www.solren.com/distributors.html

Appendix D – UL1741/IEEE1547 Certification Letter

Intertek ETL SEMKO

April 6, 2007

Letter Report No. 3113125CRT-001a
Project No. 3113125

James Worden
Solectria Renewables, LLC
360 Merrimack Street
Lawrence, MA 01843 USA

Ph: (978) 683-9700
Fx: (978) 683-9702
email: James@solren.com

Subject: ETL testing of Solectria's PVI 13 kW and PVI 15 kW solar inverters

Dear Mr. Worden,

This letter confirms that Intertek Testing Services has completed our Safety evaluation of your PVI 13 kW and PVI 15 kW solar inverters, and have listed the following products to the Standard *Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources, UL 1741First Edition, Dated May 7, 1999 - Revisions through and including November 7, 2005.*

As part of the listing noted above, Intertek confirmed by test that the products above conform to the surge test requirements specified in IEEE C62.41.2.

If you have any questions related to the status of this product, please do not hesitate to contact the undersigned.

Prepared by:	Donald Osborne	Reviewed by:	Steven Pasternack
Title:	Project Engineer	Title:	Sr. Staff Engineer
Signature:		Signature	
Date	4/6/2007	Date:	4/6/2007

An Independent Organization Testing for Safety and Performance Page 1 of 1

Intertek Testing Services NA, Inc.
3933 US Route 11 Cortland, NY 13045
Telephone: 1-607-758-6711 Fax: 1-607-753-1045 Web: www.intertek-etlsemko.com
SD 12.1.2 (3/22/07) Informative