



**PVI 23TL**  
**PVI 28TL**

**INSTALLATION AND OPERATION MANUAL**

Revision A

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## **IMPORTANT REGISTRATION AND WARRANTY INFORMATION**

For warranty to become active, this inverter must be registered. To activate warranty and register inverter, please visit the link below.

[www.solectria.com/registration](http://www.solectria.com/registration)

# IMPORTANT SAFETY INSTRUCTIONS

In this manual “inverter” or “inverters” refers to the inverter models: PVI 23TL and PVI 28TL, unless one of the specific models is noted.

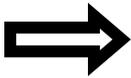
This manual contains important instructions that shall be followed during installation and maintenance of the inverter.

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

## IMPORTANT SAFETY INSTRUCTIONS

- All electrical installations shall be performed in accordance with the local, American or Canadian electrical codes.
- The inverter contains no user serviceable parts. Please contact Solectria Renewables or a Solectria Renewables authorized system installer for maintenance. See Appendix C for Solectria Renewables contact information and authorized system installers.
- Before installing or using the inverter, please read all instructions and caution markings in this manual, on the inverter, as well as on the PV modules.
- Connection of the inverter to the electric utility grid must be completed after receiving prior approval from the utility company and must only be performed by qualified personnel.
- Completely cover the surface of all PV modules with an opaque 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.
- Le PVI ne contient aucune pièce requérant un entretien 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](http://www.solren.com)).
- Avant d'installer ou d'utiliser le PVI veuillez lire toutes instructions et toutes les mises en garde présentes dans ce manuel, sur le SGI et sur les modules PV.
- Le raccordement du PVI 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

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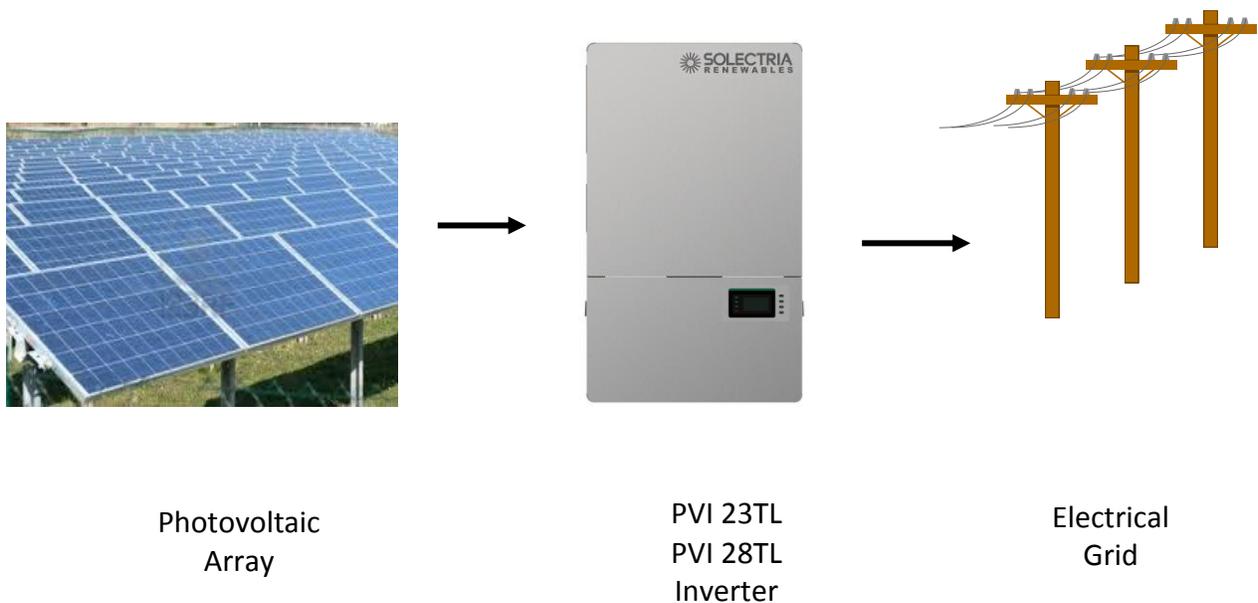
## 1. Introduction

The PVI 23TL and PVI 28TL are commercial, dual MPPT, three-phase grid-tied transformerless PV inverters designed to be interconnected to the electric utility grid. The inverter is listed for use with ungrounded (floating) PV arrays only. By following this manual the inverter can be installed and operated safely. This installation guide is used as a reference for commissioning and as a guideline on how to use the inverter most effectively.

Feeding power back to 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, three-phase commercial, industrial, institutional or electrical utility facility's electrical system which is connected to the electrical grid.

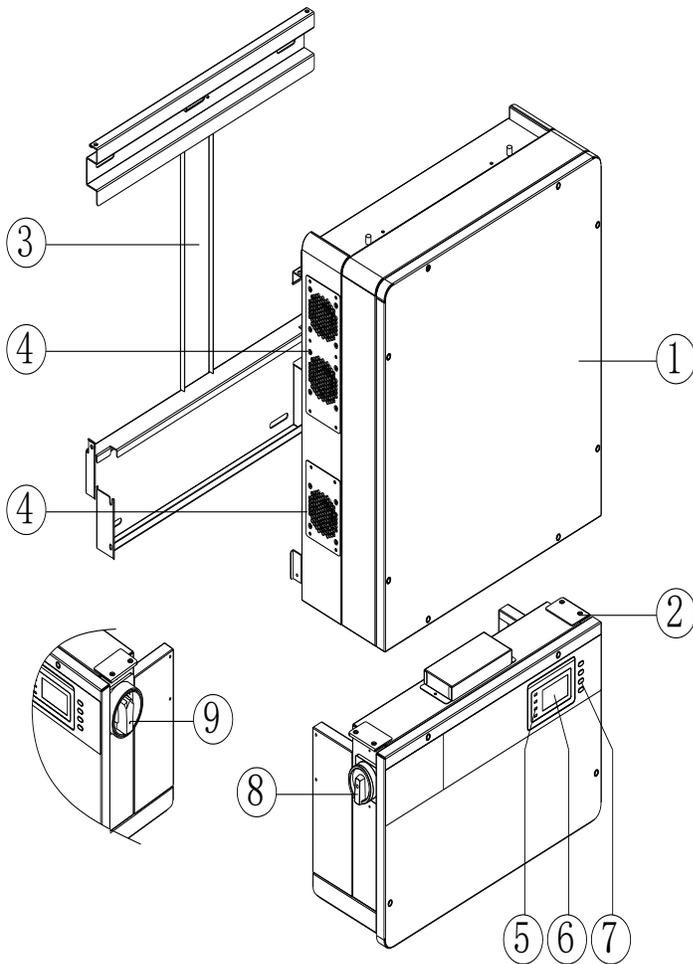
If the PV system and inverter are providing the same amount of electrical power that the facility is using, then no power is taken from or fed into the utility grid. If the facility is using more power than the PV system is providing, then the utility grid provides the balance of power. If the facility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

Be sure to follow local regulations regarding net metering and interconnection in your local area. Note that some utilities need to change their revenue kWh meter for proper net metering measurement and billing.



**Figure 1.1 – Grid-Tied Inverter Application**

## PVI 23/28TL Inverter Enclosure



① **Inverter main housing (does not contain any serviceable parts, opening this section voids Inverters warranty)**

② **Wiring Box**

For customer's AC and DC wire connections.

③ **Mounting Bracket**

④ **Cooling Fans**

⑤ **LED indicators**

There are four LED indicators used to signal the operating status of the inverter.

⑥ **LCD**

LCD screen displays all measured values and parameters.

⑦ **Control Keys**

There are 4 control keys to switch between display menus and to configure the settings on the LCD.

⑧ **DC disconnect Switch**

Built-in, lockable disconnect switch used to disconnect the DC input to the inverter

⑨ **AC disconnect Switch**

Built-in, lockable disconnect switch used to disconnect the AC output from the PV inverter.

Figure 1.2 – PVI 23TL Inverter Interface

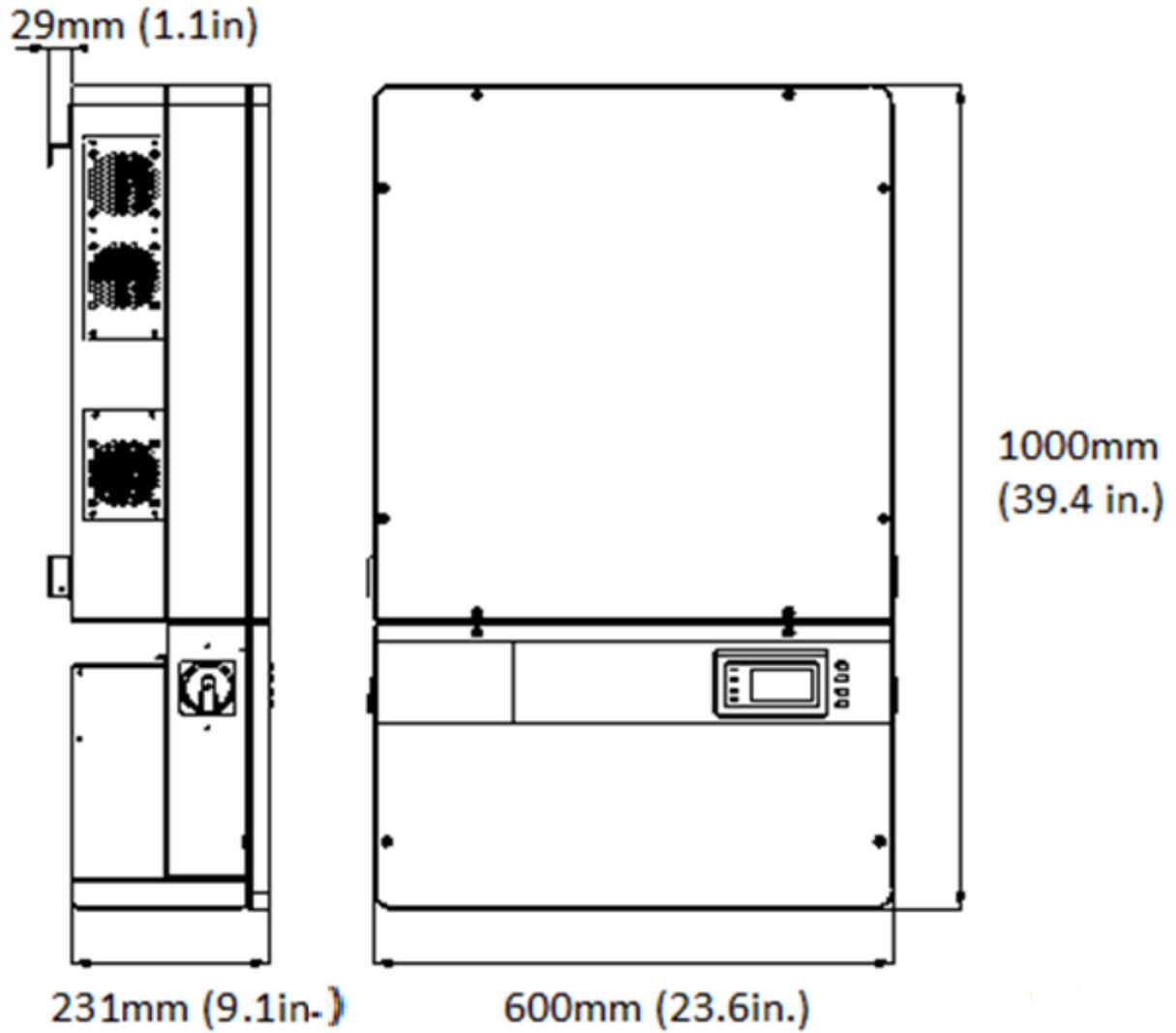


Figure 1.4 – PVI 23TL & PVI 28TL Inverter Dimensions

## 2. Site Preparation and Inverter Placement

The inverter is comprised of a NEMA 4 enclosure containing electrical and electronic components and AC and DC integrated disconnects.

 **NOTE:** If the inverter is mounted outside, ensure that the enclosure remains closed during the installation process in case of rain or snow. Leaving the cover off during installation will void the warranty. Only the wiring box cover should be removed during wiring. The inverter section cover remains on at all times.

 **NOTE:** It is recommended to store the inverter indoors before installation. If the inverter is to be stored outdoors before being installed and commissioned, care must be taken to avoid condensation inside the unit.

### 2.1 Criteria for device mounting:

- Because the power electronics are within the rainproof enclosure, the inverter can be mounted outdoors.
- The maximum life for the inverter can be achieved by mounting the unit in a clean, dry and cool location.
- For optimal electrical system efficiency, use the shortest possible AC and DC cables and use the maximum allowable cable size.
- Install the inverter in an accessible location following local electric codes for enclosure proximity to other equipment.
- Although the inverter is designed to function at full power continuously up to 50°C ambient temperature, for optimal inverter life and performance, do not mount the inverter in direct sunlight, especially in hot climates. If the unit must be mounted in direct sunlight a sun-shield is recommended but not required. It is recommended that the inverter is mounted on the north side of buildings or on the north side of a ground mount PV array.



**CAUTION:**

Please follow these guidelines:

Be sure to verify load capacity of wall or mounting area where the inverter would be mounted.

Inverter Model	Weight
PVI 23TL and PVI 28TL	122 lbs./55kg.

**Table 2.1 – Inverter Weight**

- The ambient temperature must be between  $-25^{\circ}\text{C}$  and  $+45^{\circ}\text{C}$  for full power and continuous operation. The inverter will automatically reduce power or may shut down to protect itself if ambient air temperature is outside the normal operating range of  $-25^{\circ}\text{C}$  to  $45^{\circ}\text{C}$ .
- The National Electrical Code (NEC) requires the inverter to be connected to a dedicated circuit and no other outlets or device may be connected to this circuit. See NEC Articles 690 and 705. The NEC also imposes limitations on the size of the inverter and the manner in which it is connected to the utility grid. See NEC Articles 690 and 705 for guidance within the US.
- The cooling air exhausts are at the right of the inverter. As the air intake is on the left side of the inverter section of the unit, there should be at least 19.7 inches of clear space at the left of the enclosure. Air should be able to flow all around the unit for proper ventilation. It is also recommended to have at least 23.6 inches of clearance at the bottom side. See figure 3.3 for details.
- A minimum distance of 11.8 inches must be clear above the inverter for ventilation.
- 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 to maintain an ambient condition of  $45^{\circ}\text{C}$  or less for full power. The ambient temperature should be kept as low as possible at all times for optimal inverter operation and life.

### 3. Inverter Mounting



**WARNING:** Any lifting or moving of the inverter requires **at least** two people. Lifting of the crate/pallet requires **at least** three people.

#### 3.1 Checking for Shipping Damage

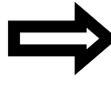
The inverter is thoroughly checked and tested rigorously before it is shipped. Even though it is packed in a crate and pallet for delivery, the inverter can be damaged during shipping by poor handling, trucking or transfer station activity.

Please inspect the inverter thoroughly after it is delivered. If any damage is seen, immediately notify the shipping company to make a claim. If there is any question about potential shipping damage, contact Solectria Renewables. Photos of the damage will be helpful in documenting potential shipping damage.

- Do not accept the unit if box or pallet is visibly damaged or if you note visible damage when signing shipping company receipt.
- Note damage on shipping papers with the truck driver. Report damage immediately to the shipping company.
- Do not remove the unit from pallet/packaging if damage is evident.
- If it is determined that the unit must be returned, a RMA number must be obtained from Solectria Renewables prior to shipping the unit back.

### 3.2 Removing the Inverter from the Crate/Pallet and Moving the Inverter into Place

It is recommended to keep the inverter secured in the crate/pallet and move it as close as possible to the final location prior to removing the inverter from the crate/pallet. To remove the crate from pallet, unscrew the #2 Phillips screws from bottom of the crate while holding it on pallet. Then lift the crate in order to remove the inverter.

 **NOTE:** Failure to follow these lifting guidelines may cause structural damage to the inverter and void the warranty.



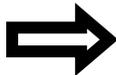
**WARNING:** Do not install the inverter on or over combustible surfaces or materials.



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



**NOTE:** The weight of the inverter will exert an added load to the wall or area where mounted. Be sure to verify proper load capacity of mounting area.



**NOTE:** Always use all the (6) mounting plate fasteners.

### 3.3 Inverter Positioning and Mounting

Correct mounting position for the inverter is vertical. A maximum tilt of 15° in backward direction is allowed (as shown in figure 3.1).

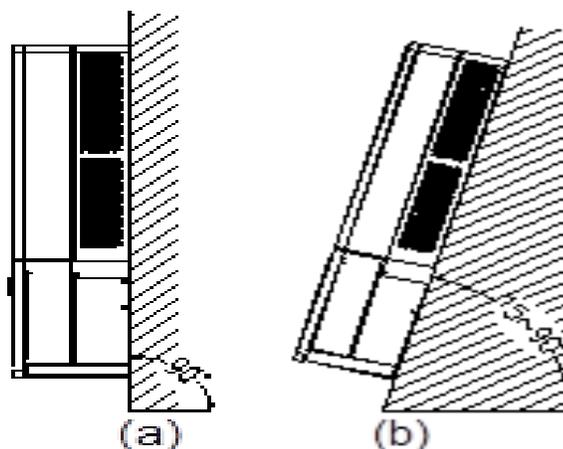
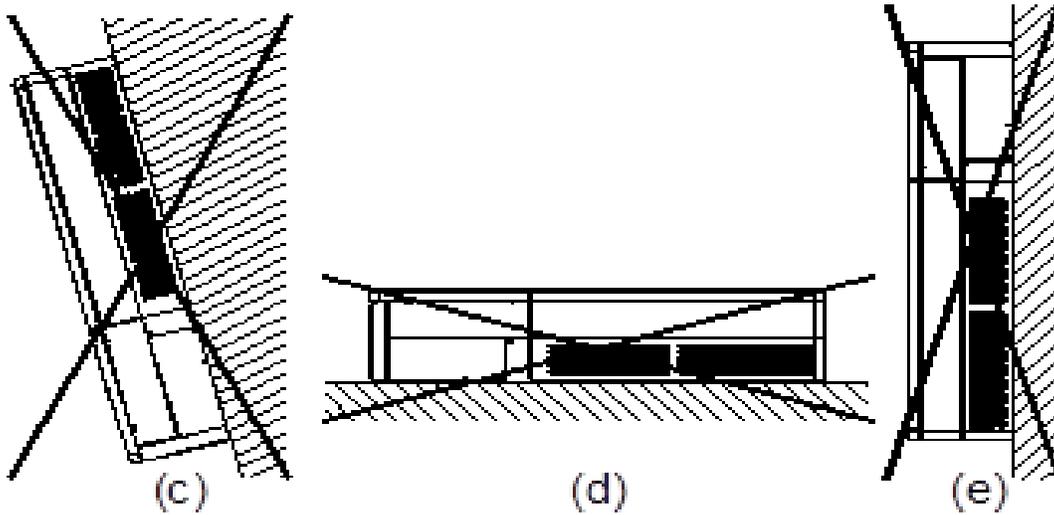


Figure 3.1 Mounting of Inverter - Allowed



**WARNING:** Do not install the inverter forward tilted, laying on its back or upside down (figure3.2).



**Figure 3.2 Mounting of inverter – Not Allowed**

The minimum distances that should be met for wall mounting are shown in Figure 3.3

- There should be a minimum of  $\geq 20$  inches of space available between two adjacently mounted inverters for adequate cooling.
- A minimum of 20 inches from the left side, 12 inches from the top are needed for adequate access and cooling.
- A distance of 24 inches from the bottom is recommended for the inverter's LCD to be at eye level. If needed this distance can be lowered to 10 inches.

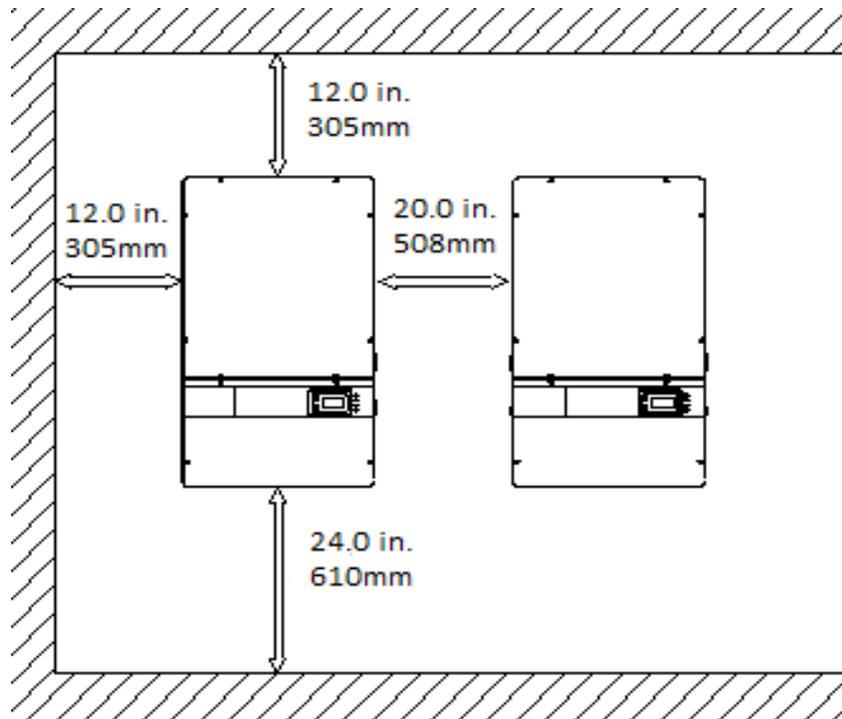


Figure 3.3 Wall mounting Clearance Requirements

The ideal mounting dimensions for Inverter mounting on a pillar are shown in Figure 3.4 below.

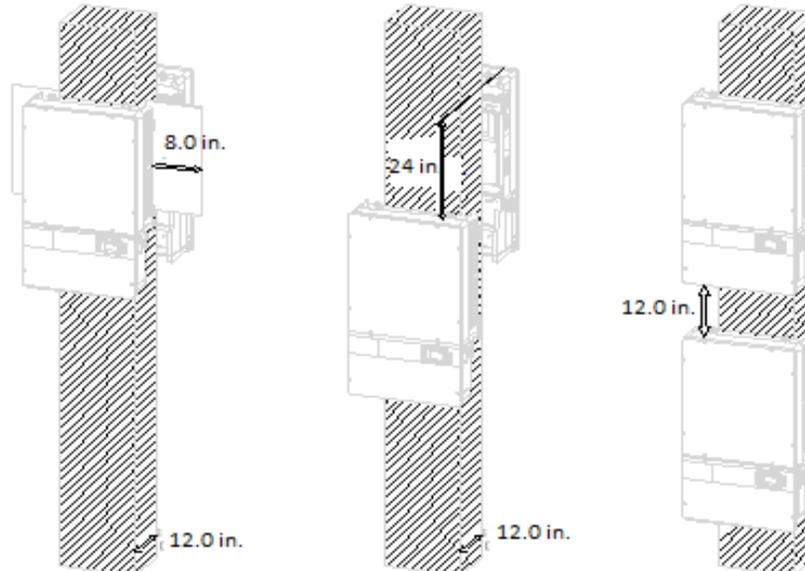
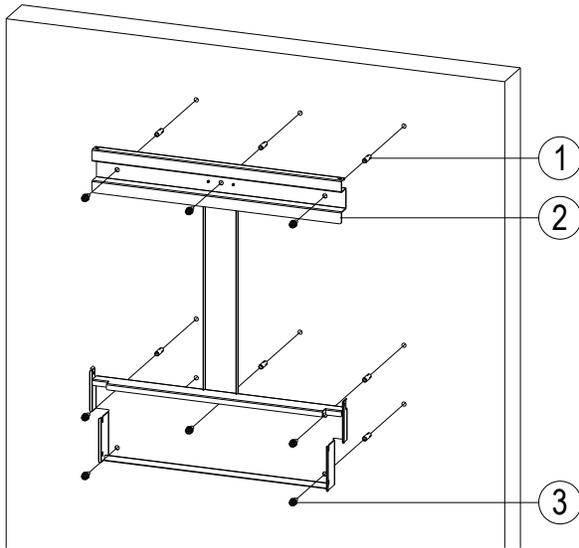


Figure 3.4 Inverter pillar mounting dimensions



**Note:** Other mounting solutions are available for other scenarios such as rack mounting, contact us at [inverters@solectria.com](mailto:inverters@solectria.com) to discuss other possible options.

### 3.4 Installing the Mounting Bracket

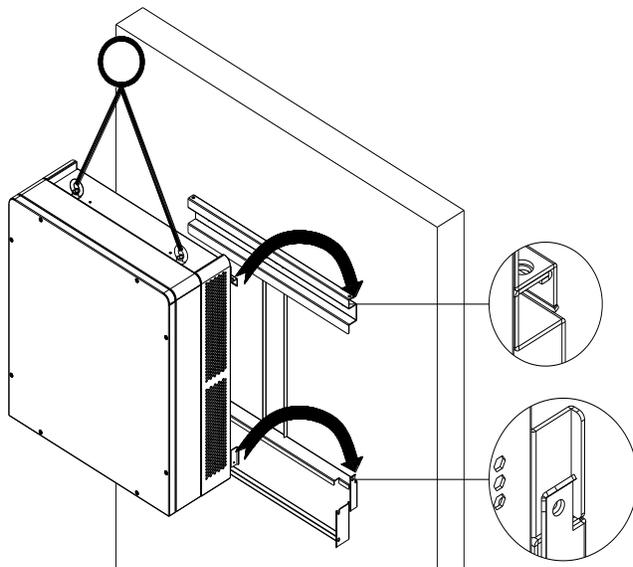


**Figure 3.5 Inverter Wall Bracket Mounting**

**1-**Mark the 8 holes on the bearing surface using the available mounting bracket as a template as shown in Figure 3-5.

**2-**Drill 8 holes with a 13/32 inch drill bit and install expansion bolts (available in accessory box).

**3-** Secure the bracket to the wall using eight 5/16" X 25 bolts as shown in Figure 3.4.

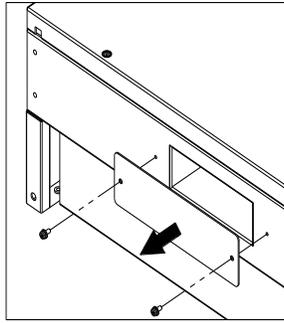


**Figure 3.6 Inverter Main Housing Mounting**

**4- Option 1: Lift mounting:** Attach the both lifting eye bolts (available in accessory box) to the inverter housing box, Use a sling rope or bar passed through both eye bolts to mount the inverter to the bracket.

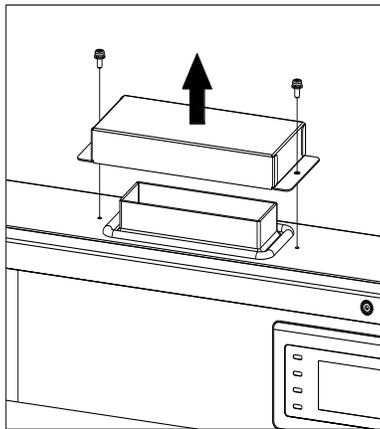
**Option 2:** Two people grab the handle from the bottom and manually mount the inverter housing box.

**5-** Carefully secure the main housing of the inverter onto the bracket.



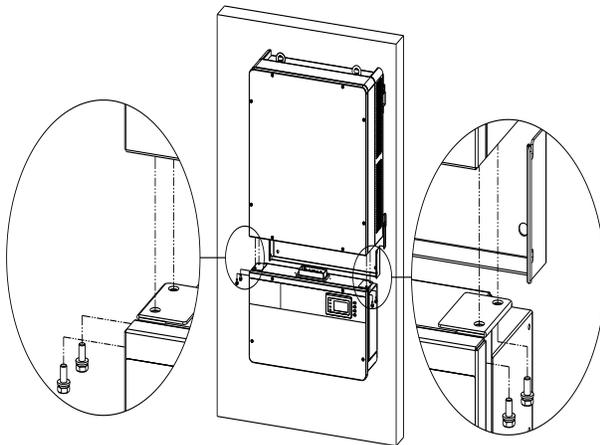
6- Using a number 2 Philips screw driver remove cover plate on the bottom of main housing

Figure 3.7 Remove cover plate of main housing



7- Using a number 2 Philips screw driver remove cover of wiring box. Keep the cover it can be secured later on to the enclosure.

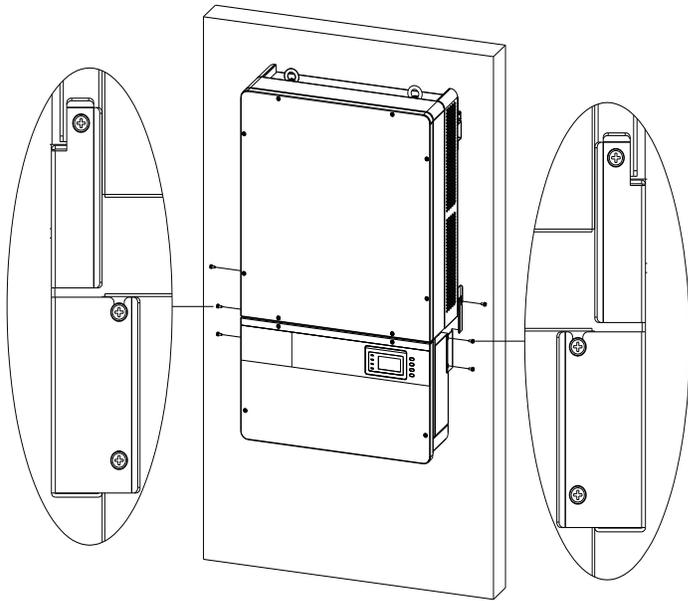
Figure 3.8 Remove cover of wiring box



8- Connect the wiring box to the main housing using four M6 \*12 screws (available in accessory box)

Torque = 25 inch-lbs

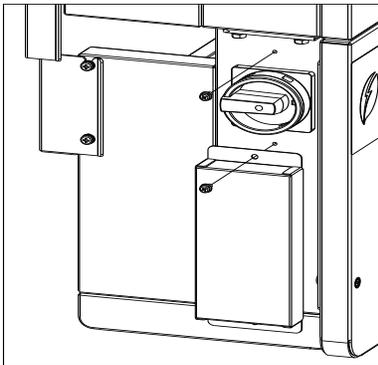
Figure 3.9 Connecting the wire box to the main housing



**9-** Connect the main housing and wiring box to the mounting bracket using a No.2 Philips screwdriver using six M5\*10 bolts.

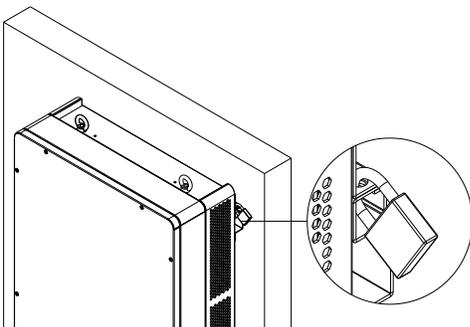
Torque= 14 inch-lbs

**Figure 3.10** Fasten the main housing and wiring box onto the bracket



**10-** Previously removed cover box can be reattached to left side of the wiring box (available in accessory box)

**Figure 3.11** Attaching the cover board



**11-** An anti-theft padlock can be installed as shown in the image to help prevent the inverter from being stolen when installed outdoors.

**Figure 3.12** Installing an anti-theft padlock

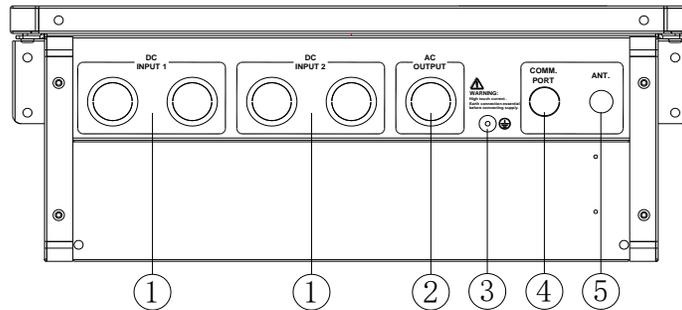
## 4. Grounding Connections



**WARNING:** All electrical installations shall be performed in accordance with all local electrical codes by electrically qualified personal. Only make AC and DC connections directly to the terminals within the wiring box.

### 4.1 DC and AC Grounds

The inverter must be properly grounded in accordance with local code. The inverter wire terminals for PVI 23TL and PVI 28TL are shown below:



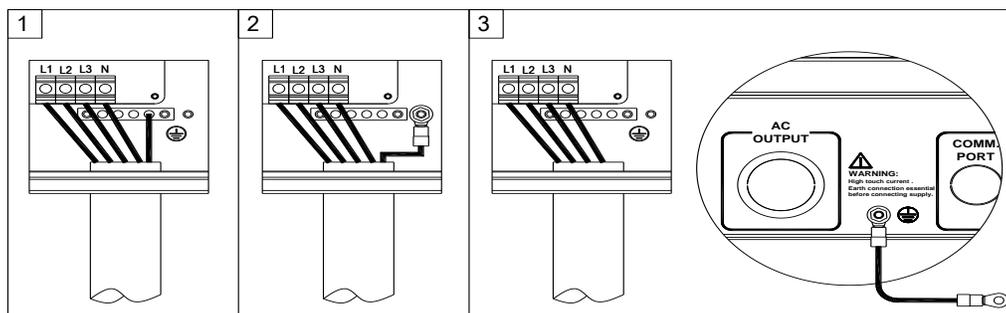
Position	Connection entry
1	Knockout holes for DC input wires and equipment ground (1" or 1-1/4")
2	Knockout hole for AC output and ground wires (1" or 1-1/4")
3	External Grounding Connection
4	Knockout hole for communication wires (3/4")
5	Spare knockout

**Figure 4.1 Available External Connections**

PVI 23TL and PVI 28TL inverters have a ground bar with four terminals used to terminate the equipment ground (Torque 14 in-lbs), one stud that fits M5 nut to terminate the AC ground (Torque for M5 nut is 14 in-lbs) and an external ground point (Torque 14in-lbs) (Note: lug for stud is located in the accessory box).



**Warning: Ground per local codes and standard.**



**Figure 4.2 Wiring Connection**

## 5. DC Connections from the PV Array



**WARNING:** All wiring connections at the inverter must be performed with the building AC source circuit panel/breaker off and the PV module strings disconnected. AC and DC disconnect switches at the inverter must also remain off during termination.



**WARNING:** All electrical wiring must be done by electrically qualified personal in accordance to local and national electrical code.



**WARNING:** Before connecting the DC conductors of the PV array to the inverter, verify the polarity of the conductors.



**WARNING:** Remove all fuses before wiring. Verify correct polarity and voltage before installing fuses.



**WARNING:** Before connecting the DC conductors of the PV array to the inverter fuse terminal or bypass them, verify that the DC voltage is less than 1000Vdc in all conditions. DC voltages over 1000V will damage the inverter. Configure the array such that the open circuit voltage will never exceeds 1000 Vdc. **Warranty is voided if more than 1000Vdc is applied to the DC section of the inverter.**



**WARNING:** Fuses in the inverter's fused combiner must only be replaced with the same type and rating fuses as originally installed.

A maximum of 16 total DC conductors (8 positive & 8 negative) can be connected and fused at 15A as shown in Figure 5.1 below:

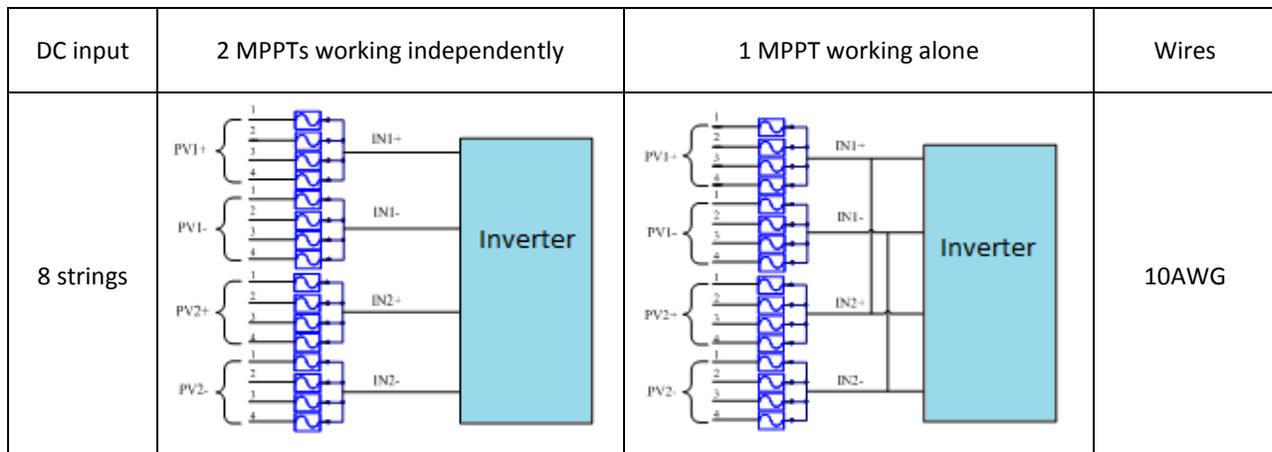
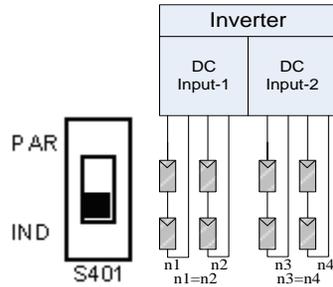


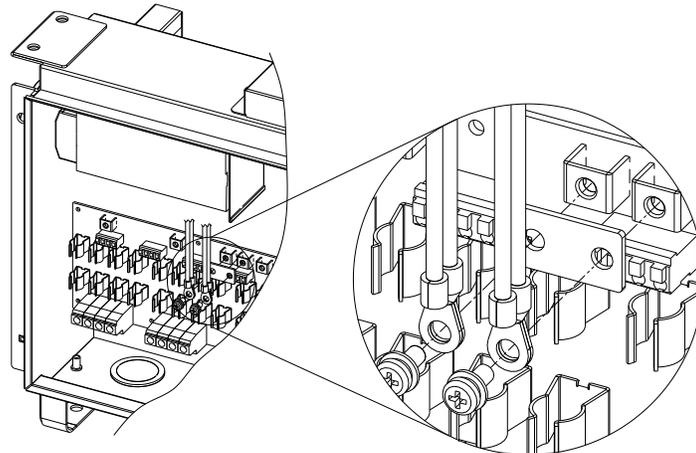
Figure 5.1 String Configurations



**Figure 5.2 Switch configuration for Dual MPPT Zone**

The two MPPT zones can be combined using a few steps:

- 1-Remove the cover of the wiring box.
- 2-Use a No.2 Philips head screwdriver and remove the wire connected to terminal J9 & J10.
- 3- Add connecting busbar in accessory kit to jumper J9 & J10.
- 4- Return wires removed in step 2 and screw down the busbar (Torque: 10 inch-lbs)  
As shown in the figure below.

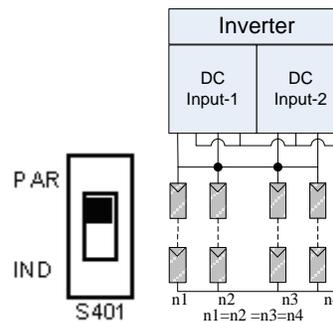


**Figure 5.3 Busbar connection used for Dual MPPT option**

- 5- Set switch S401 to setting it to parallel mode.



**Note:** Switch S401 is located under the “Enter” control key inside of the wiring box.



**Figure 5.4 Switch configuration for One Combined MPPT Zone**

90°C copper conductors must be used for wiring. The inverter terminals are listed for 75°C wire; see NEC 310.10 or the Canadian Electrical Code regarding temperature ratings of wire and terminals. The conductor size shall not be smaller than the 75°C wire size based on the ampacities given in table 310.16 of the NEC, ANSI/NFPA 70 and an additional derating factor of 125% as indicated by UL1741. Temperature derating factors, voltage drop and other considerations may dictate that larger than minimum wire sizes be used. Verify that any wire size choices meet local codes.

DC inputs	Configuration	Max DC Wire Size	Recommend PV Fuse	Conductors Torque (ALL)
8 inputs	Standard use of integrated string combiner box	10 AWG, 90°C Cu	12A/1000V for PVI 23/28TL	10 in-lbs
7 inputs	Standard use of integrated string combiner box	10 AWG, 90°C Cu	15A/1000V for PVI 23/28TL	10 in-lbs
6 inputs	Standard use of integrated string combiner box	10 AWG, 90°C Cu	15A/1000V for PVI 23TL 20A/1000V for PVI 28TL	10 in-lbs
5 inputs	Standard use of integrated string combiner box	10 AWG, 90°C Cu	20A/1000V for PVI 23/28TL	10 in-lbs
4 inputs	Standard use of integrated string combiner box	10 AWG, 90°C Cu	25A/1000V for PVI 23/28TL	10 in-lbs
String combiner box bypass, 2 inputs	Two standard inputs that bypass integrated string combiner box and use separate MPPT channels	8 AWG, 90°C Cu (Not recommended, see details below)	Fuse Bypass	10 in-lbs
String combiner box bypass, 2 inputs	Two standard inputs that bypass integrated string combiner box and use combined MPPT channels	8 AWG, 90°C Cu (Not recommended, see details below)	Fuse Bypass	10 in-lbs

**Table 5.1 Wire Sizes Associated with Integrated Fused PV Combiner**

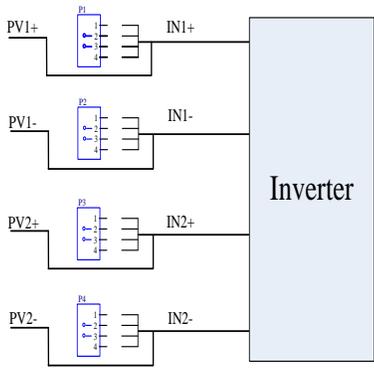
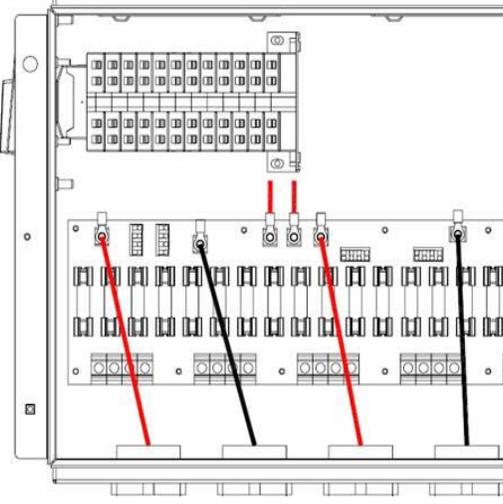
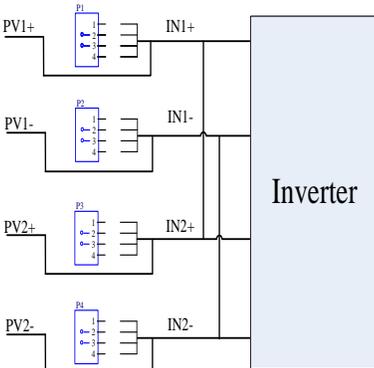
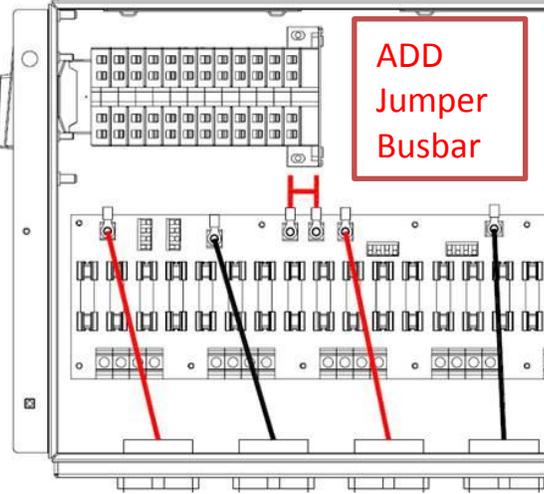
Using only one or two inputs are not recommended for best current sharing results. If needed, DC input wires can be connected to the inverter as showed in table 5.2 below.



**Warning:** DC fuses must be removed before any of the configurations in table 5.2 are allowed.



**Warning:** Fusing at the combiner box prior of the connecting to the inverter is required for all of the connections in table 5.

DC inputs/ MPPT Zones	Configuration Type	Proper Wiring	S401 switch	Wire
2 Inputs -2 MPPT Zones			IND	8 AWG
2 Inputs - 1 MPPT Zone			PAR	8 AWG

**Table 5.2 Internal String Combiner Bypass Options**

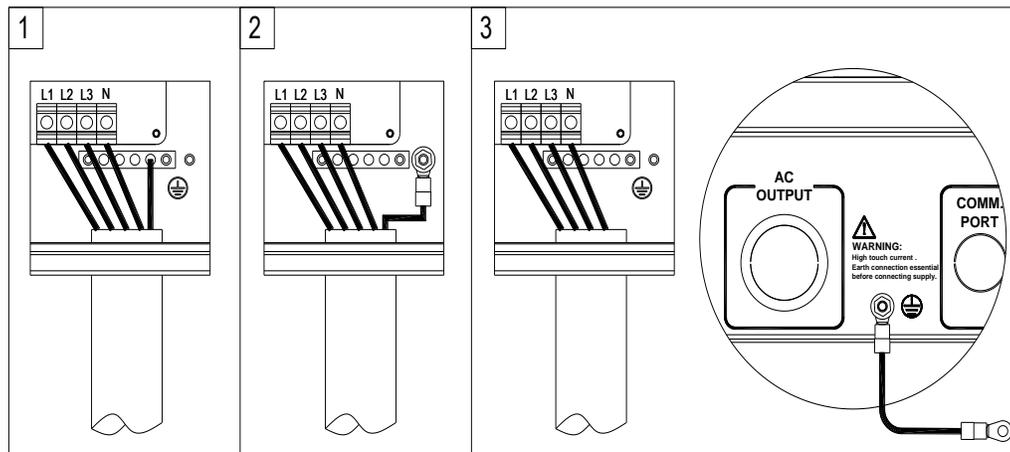
## 6. AC Connections at the Inverter

For the 3-phase AC wiring, for both PVI 23TL and PVI 28TL, five conductors are recommended, one per phase along with a neutral and an AC equipment ground as per local requirements. 90°C rated copper conductors must be used. The integrated disconnect switch terminals are listed for 75°C wire; see NEC 310.10 or Canadian Electrical Code regarding temperature ratings of wire and terminals. The conductor size shall not be smaller than the 75°C wire size based on the ampacities given in table 310.16 of the NEC, ANSI/NFPA 70 and an additional derating factor of 125% as indicated by UL1741. Temperature derating, voltage drop and other considerations may dictate that larger than minimum wire sizes be used. Verify that wire size choices meet local codes and are properly sized to reduce voltage drop.

Inverter Model	AC Voltage	Typical Number of AC Conductors	Minimum AC Wire Size	Maximum AC Wire Size	Torque	Maximum Continuous Output Current	Recommended Minimum Interconnection Breaker/Fuse Size
PVI 23TL	480VAC	4 (1 per phase) plus neutral	10 AWG, 90°C Cu	6 AWG, 90°C Cu	10 in-lbs	32 A	50 A
PVI 28TL	480VAC	4 (1 per phase) plus neutral	10 AWG, 90°C Cu	6 AWG, 90°C Cu	10 in-lbs	39 A	64 A

**Table 6.1 AC Customer Connections and Interconnection Information**

The inverter includes an M5 stud for the connection of an AC Equipment Grounding Conductor (EGC). The stud can accept a single copper conductor ranging from 8 to 10 AWG. AC EGC shall be sized per local code requirements. The AC EGC is connected to the stud via an M5 nut. A crimp lug is available in the accessory box provided. Torque: 14 in-lbs.



**Figure 6.1 AC Wire & Grounding connections**

## 6.1 AC Interconnections to Grid

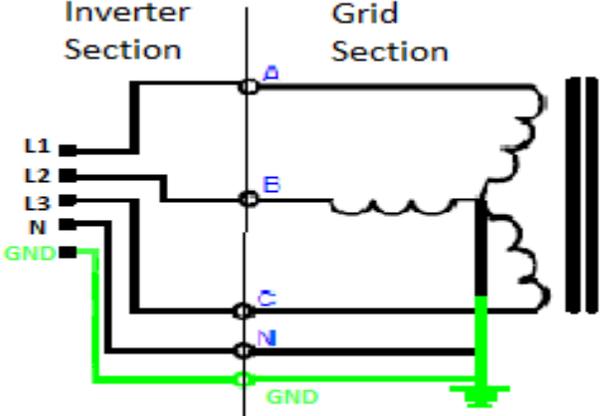
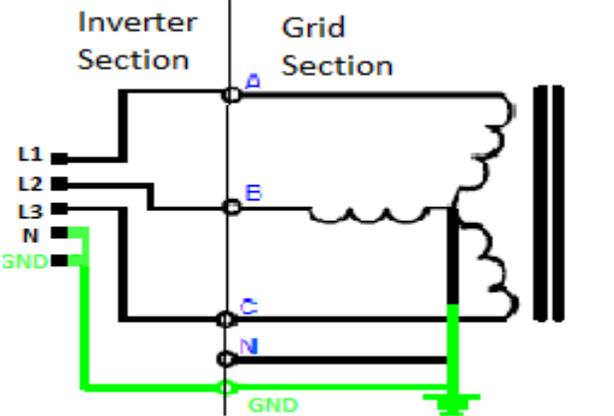
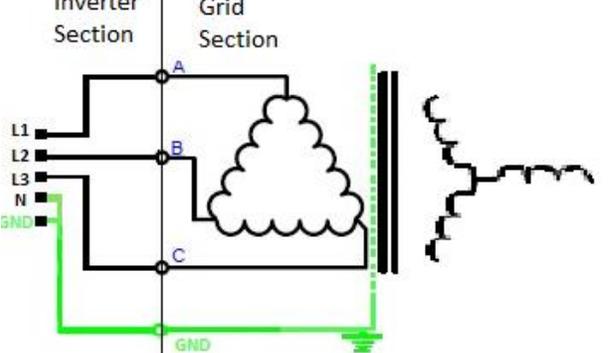
Description	Configuration	Inverter Compatibility
<p>4 Wire WYE (3 phase + Neutral +GND)</p>		<p>Compatible with 23TL Compatible with 28TL</p>
<p>3 Wire WYE (3 phase + Neutral jumper wire connected to GND at the inverter)</p>		<p>Compatible with 23TL Compatible with 28TL</p>
<p>3 Wire Delta (3 phase Delta + Neutral jumper wire connected to GND at the inverter) Note: Other side of Delta must be WYE</p>		<p>Not compatible with 23TL Not compatible with 28TL</p>
<p>Other Configurations</p>	<p>All other configurations not mentioned in this document, such as Corner Grounded Delta</p>	<p>Not compatible with 23TL Not compatible with 28TL</p>

Table 6.2: Allowable AC interconnections to Grid

## 7. SolrenView External Monitoring

PVI 23TL and 28TL inverters include an option for a SolrenView gateway integrated with the inverters wiring box. This device can be used for the purpose of Web based monitoring and data logging.

The SolrenView gateway can be factory installed, distributor installed, or field installed.

From the inverter a user can configure and monitor the inverter using a human-machine interface (HMI). This HMI consists of the LCD display and four buttons.

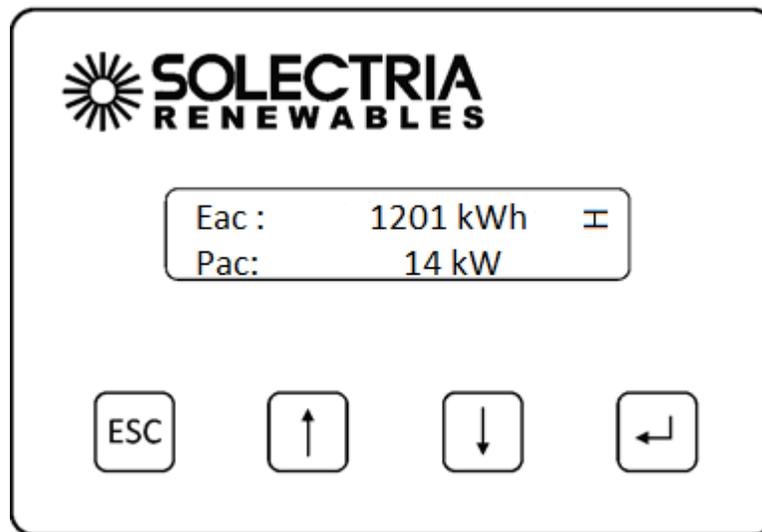


Figure 7.1 – SolrenView Gateway HMI



**WARNING:** SolrenView gateway connections must be made by qualified personnel only. To reduce the risk of electric shock, you should never attempt to open the inverter, DC, or AC enclosure doors, or perform any service or troubleshooting without prior training. Before attempting to service or troubleshoot the inverter, please read the entire manual.

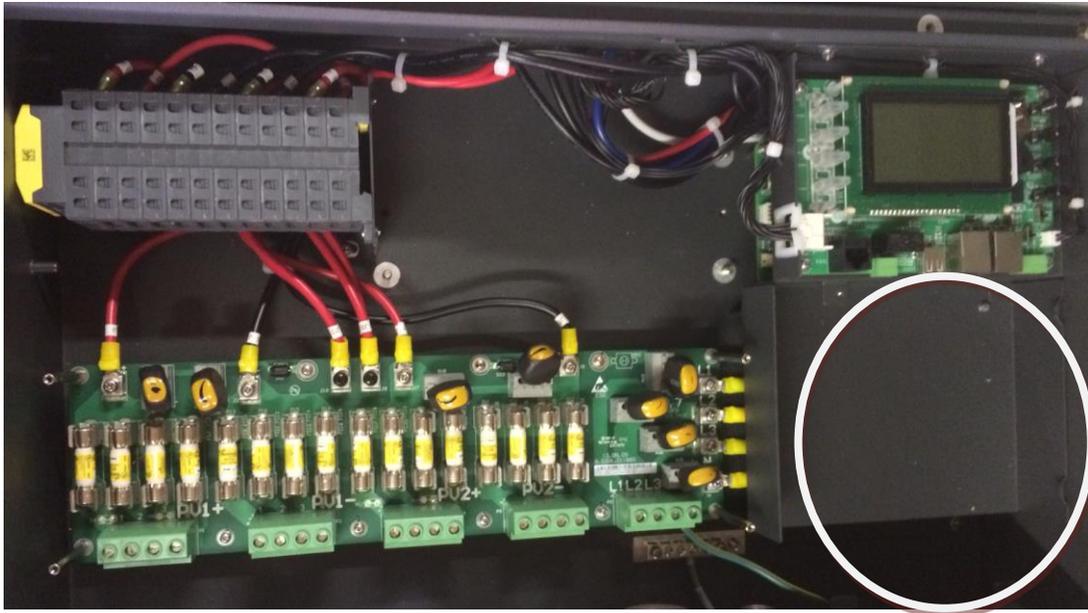
The backside of SolrenView gateway provides connectivity to the data monitoring system. Solectria Renewables' SolrenView web-based data monitoring system can be interfaced using Ethernet over twisted pair.

## 7.1 SolrenView Logger Installation (If not pre-ordered from the factory)



**WARNING:** SolrenView gateway connections must be made by qualified personnel only. To reduce the risk of electric shock, you should never attempt to open the inverter, DC, or AC enclosure doors, or perform any service or troubleshooting without prior training. Before attempting to service or troubleshoot the inverter, please read the entire manual.

1. Locate the location where the SolrenView Gateway to be installed.



**Figure 7.2 SolrenView Gateway Mounting Location in wiring box.**

2. Connect the SolrenView Monitoring Harness (WIH-030031) to the bottom of the SolrenView Gateway by plugging the six pin Molex connection into the bottom of the Gateway. The connector is keyed, so it cannot be installed incorrectly. Connectors are as follows:
3. Connect the green connector end of the SolrenView Monitoring Harness to the 5 pin socket on the Subcombiner PCB board at location P1004.
4. Mount the SolrenView Gateway into the mounting location, orientating the gateway as shown below (Torque to 8 in-lbs).

## 7.2 Communication Connection

PVI 23-28TL inverters support the industry standard RS-485 Modbus communication. Below is an analysis of available communication interfaces.

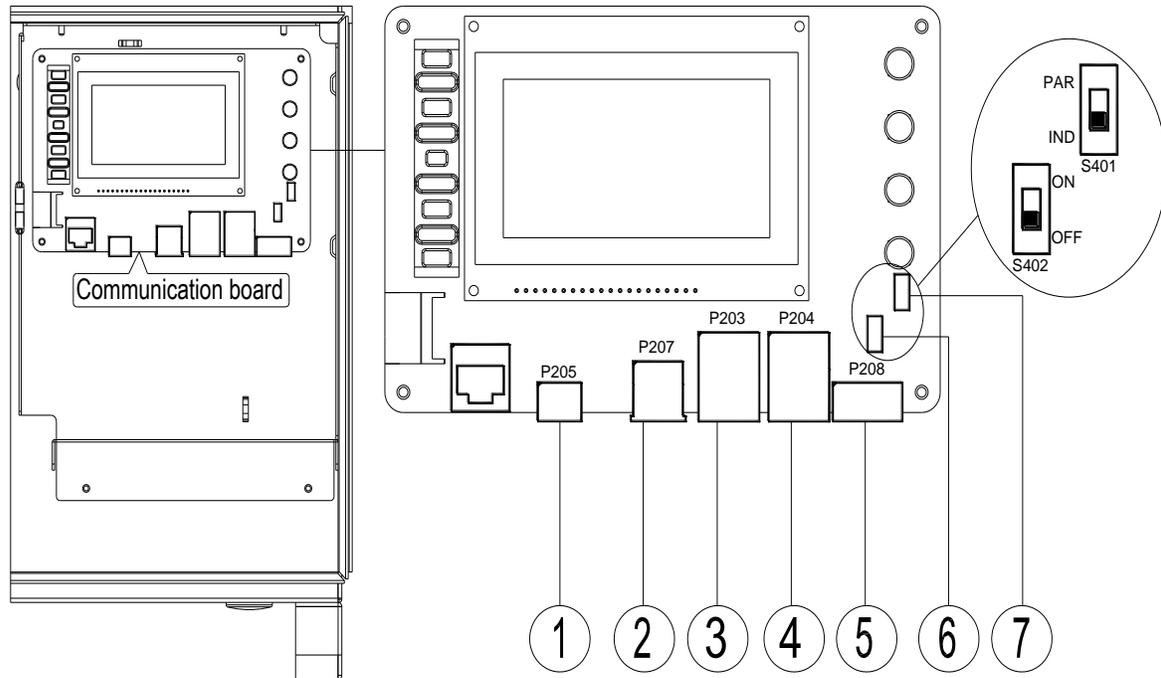
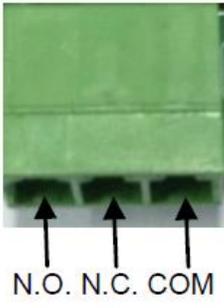
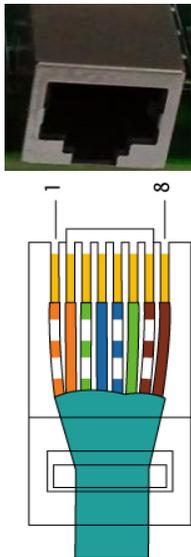
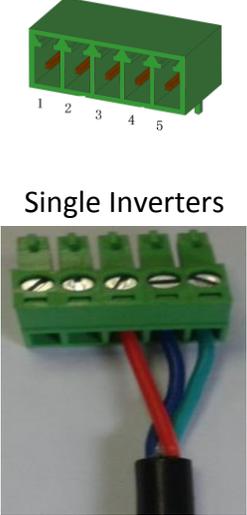
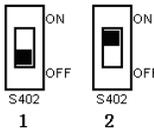
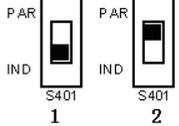


Figure 7.3 Communication section of the inverter

Item #	Port name	Item Name	Port Image	Configuration description
1	P205	Dry contact		Remote alarm option, contact us <a href="mailto:inverters@solectria.com">inverters@solectria.com</a> for possible configuration.
2	P207	USB port		Port used for firmware upgrade. Not available for customer use

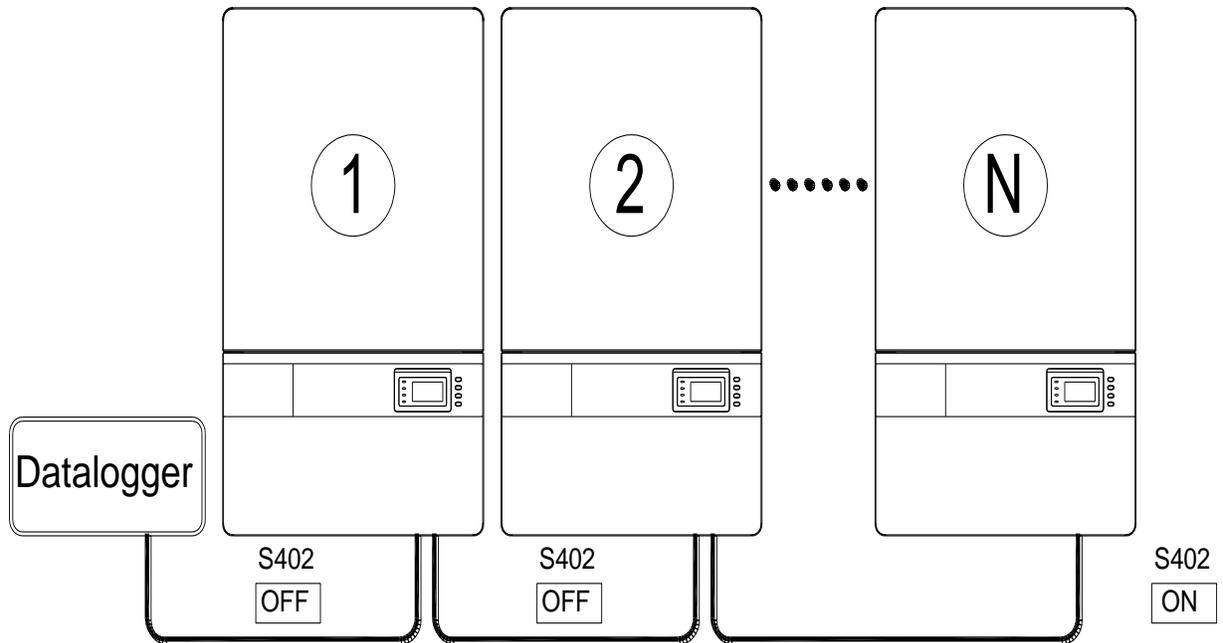
<p><b>3 and 4</b></p>	<p>P203 and P204</p>	<p>RS485 Ethernet Port</p>		<p>There are two RS485 signal ports on the inverter</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Color</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>White orange</td> <td>485+</td> </tr> <tr> <td>2</td> <td>Orange</td> <td>N.C.</td> </tr> <tr> <td>3</td> <td>White green</td> <td>485-</td> </tr> <tr> <td>4</td> <td>Blue</td> <td>N.C.</td> </tr> <tr> <td>5</td> <td>White blue</td> <td>N.C.</td> </tr> <tr> <td>6</td> <td>Green</td> <td>N.C.</td> </tr> <tr> <td>7</td> <td>White brown</td> <td>COM</td> </tr> <tr> <td>8</td> <td>Brown</td> <td>N.C.</td> </tr> </tbody> </table>	No.	Color	Function	1	White orange	485+	2	Orange	N.C.	3	White green	485-	4	Blue	N.C.	5	White blue	N.C.	6	Green	N.C.	7	White brown	COM	8	Brown	N.C.
No.	Color	Function																													
1	White orange	485+																													
2	Orange	N.C.																													
3	White green	485-																													
4	Blue	N.C.																													
5	White blue	N.C.																													
6	Green	N.C.																													
7	White brown	COM																													
8	Brown	N.C.																													
<p><b>5</b></p>	<p>P208</p>	<p>RS485 port (5pin connector)</p>	 <p>Single Inverters</p>	<p>5 pin connector also available for RS485 communication</p> <p>Single Inverter</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Color</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>NC</td> </tr> <tr> <td>2</td> <td>NC</td> </tr> <tr> <td>3</td> <td>RED_RS485+</td> </tr> <tr> <td>4</td> <td>Blue_RS485 -</td> </tr> <tr> <td>5</td> <td>Com</td> </tr> </tbody> </table>	No.	Color	1	NC	2	NC	3	RED_RS485+	4	Blue_RS485 -	5	Com															
No.	Color																														
1	NC																														
2	NC																														
3	RED_RS485+																														
4	Blue_RS485 -																														
5	Com																														
<p><b>6</b></p>	<p>S402</p>	<p>120Ω terminal switch resistor for RS485 communication</p>		<p>120 Ω resistor that can be added on or off for impedance matching on RS485 communication.</p>																											
<p><b>7</b></p>	<p>S401</p>	<p>MPPT Zone configuration</p>		<p>Used for changing between Dual and Single MPPT configuration. Covered in detail in Chapter 5.</p>																											

**Table 7.1 Available Communication options in PVI 23-28TL inverter**

### 7.3 One Gateway (Several Inverters)

For multiple inverters at one location it is possible to use one gateway for up to 1 inverters.

Connect inverter's RS-485 together using standard RJ-45 Ethernet patch cords and plugging these into RJ-45 jacks at each inverter on right side of wiring board. Connect an Ethernet cable from the Ethernet jack on the logger installed in either the first or the last inverter to router or switch for connection to the customer's broadband internet service.



**Figure 7.4 Multiple Inverters, Single SolrenView unit**

## 7.4 SolrenView Button Descriptions

The SolrenView HMI is controlled by four buttons. These buttons are operated by momentarily pushing the center of the button. The buttons perform the following functions:

- |               |  |   |
|---------------|--|---|
| <b>ESCAPE</b> |   | To move up a level from the current menu.<br>To cancel changing a data value.<br>Hold for two seconds to STOP or START the inverter from the Main Display |
| <b>UP</b>     |   | To scroll up within the individual menu items.<br>To increase a data value.   |
| <b>DOWN</b>   |   | To scroll down within the individual menu items.<br>To decrease a data value.   |
| <b>ENTER</b>  |  | To enter into the selected menu.<br>To begin to edit a data value.<br>To accept a data value.   |

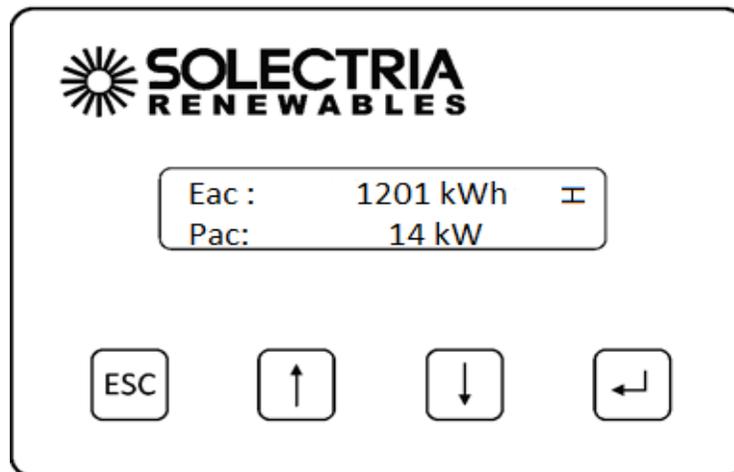
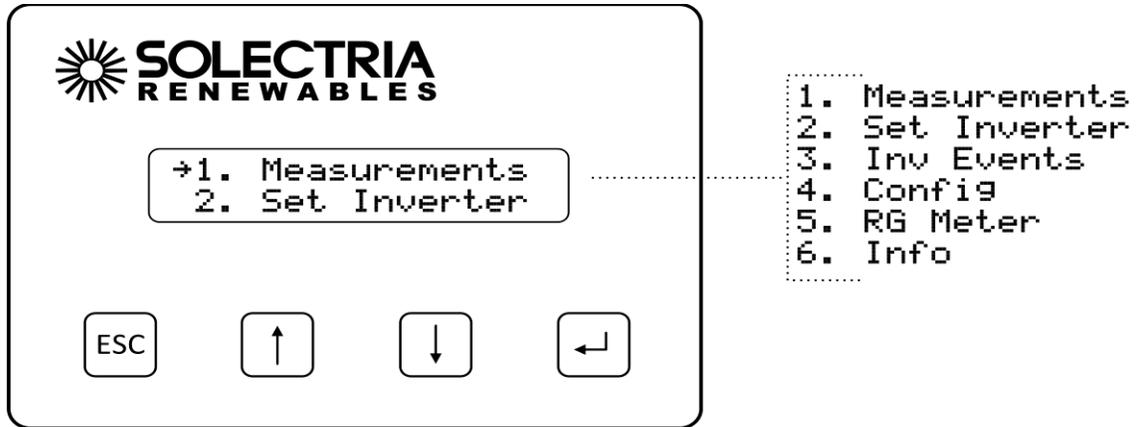


Figure 7.5 Main Display

During normal inverter operation the Main Display shows **AC Energy (Eac)** and **AC Power (Pac)**. The display updates every few seconds with new data from the inverter. Units are dynamically displayed based on the energy and power levels.

## 7.5 Accessing the Menu

From the **Main Display** press the **ENTER** button to access the menu.



**Figure 7.6 Main Menu**

The **Main Menu** allows the user to configure and monitor the inverter. The selected menu option is shown with an arrow on the left. Please note that the display only shows two menu options at a time and will scroll to show the other options.

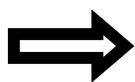
Press the **DOWN** or **UP** button to change the selected menu option, **as indicated by the arrow**. Press the **ENTER** button to activate the selected function or submenu.

## 7.6 Establishing Ethernet Connectivity

Before SolrenView web-based monitoring can function the inverter must be networked to the Internet.

To connect the inverter to the network:

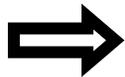
1. Locate the Ethernet port on the bottom of the SolrenView gateway.
2. Install a CAT5, CAT5e, or CAT6 networking cable between the SolrenView gateway and router/switch/firewall. If molded cables cannot be used we suggest using a network cable tester to ensure cable and crimp quality.



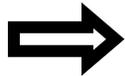
**NOTE:** The green link and yellow activity LEDs only light when the SolrenView gateway is powered.

## 7.7 Setting up TCP/IP Networking

Connection to the Internet and to the SolrenView web-based monitoring service requires a functioning TCP/IP protocol. This protocol runs over twisted pair Ethernet wiring and requires certain connections to properly operate. By default the SolrenView gateway should automatically configure TCP/IP address from a network router by using the DHCP protocol. In certain cases it may be necessary to override these settings or to manually configure the TCP/IP settings.



**NOTE:** The network router must be 10T capable.



**NOTE:** Customers using SolrenView AIR do not need to setup TCP/IP as this is done in the factory prior to shipping the inverter.

### Viewing Current TCP/IP settings:

1. Select the **Info** function on the **Main Menu** and the press **ENTER** button.
2. Information on the inverter will be displayed including the IP, gateway, and netmask settings. Press the **ENTER** button to hold the display on the item of interest.

```
IP (DHCP):  
10.0.0.101
```

```
Gateway (DHCP):  
10.0.0.1
```

```
Netmask (DHCP):  
255.255.255.0
```

In the above example, the IP address, gateway and netmask values are being automatically being set through the DHCP service. The exact values displayed will depend on the configuration of the network, but typically are in one of three ranges:

10.0.0.0	–	10.255.255.255
192.168.0.0	–	192.168.255.255
172.16.0.0	–	172.31.255.255

3. If the network is working on the Ethernet protocol level, but the SolrenView is unable to obtain settings through the DHCP service the following will typically be displayed:

```
IP (Fallback):  
192.168.1.1
```

```
Gateway:  
0.0.0.0
```

```
Netmask:  
255.255.255.0
```

4. If the network is not working on the Ethernet protocol level, such as if the twisted pair Ethernet cable is not plugged in, the following will be displayed:

```
LAN IP:  
Unknown
```

```
Gateway:  
0.0.0.0
```

```
Netmask:  
255.255.255.0
```

## Manually Configuring Network Settings

To manually configure network settings:

1. Select **Config** from the **Main Menu** then press **ENTER**.
2. Select **LAN** from the **Config Menu** then press **ENTER**.
3. Select the **DHCP** function then press **ENTER** to edit the setting.
4. Press the **DOWN** button to turn **DHCP Mode Off** then press **ENTER** to save this setting. The **DHCP Mode** setting will now show **OFF**.
5. Press the **DOWN** button to access the **Static IP** setting.
6. Press **ENTER** to modify the **Static IP** value.
7. Specify each of the four octet values (0-255), one at a time. Press the **UP** button to increment the octet. Press the **DOWN** button to decrement the octet. Press the **ENTER** button to accept the octet. Press the **ESCAPE** button to cancel entry at any point. When the fourth octet is entered the entry will be saved.

8. Press the **DOWN** button to access the **Gateway** setting.  
Change in the same manner that the **Static IP** was modified.
9. Press the **DOWN** button to access the Netmask setting.  
Change in the same manner that the **Static IP** was modified.

## Automatically Configuring Network Settings

When shipped from the factory, the SolrenView gateway uses DHCP to configure the TCP/IP settings. If the gateway has been changed to use static IP address the following instructions will explain how to turn on DHCP.

To configure the SolrenView gateway to use DHCP:

1. Select **Config** from the **Main Menu** and press **ENTER**.
2. Select **LAN** from the **Config Menu** and press **ENTER**.
3. Select the **DHCP** function and press **ENTER** to edit this setting.
4. Press the **DOWN** button to turn **DHCP Mode On** and press **ENTER** to save this setting.  
The **DHCP Mode** setting will now show **ON**.

## Setting Fallback IP Address

When the SolrenView gateway is set to use DHCP, but is unable to acquire an IP address lease, it will “fallback” to using a specified IP address after a few seconds.

To specify a fallback IP

1. Select **Config** on the **Main Menu** and press **ENTER**.
2. Select **LAN** from the **Config Menu** and press **ENTER**.
3. Confirm that the **DHCP Mode** setting shows **ON**.  
The Fallback IP is only available when DHCP is turned on.
4. Press the **Down** button to show the Fallback IP setting.
5. To change the Fallback IP, press the **ENTER** button.
6. Specify each of the four octet values (0-255), one at a time. Press the **UP** button to increment the octet. Press the **DOWN** button to decrement the octet. Press the **ENTER** button to accept

the octet. Press the **ESCAPE** button to cancel entry at any point. When the fourth octet is entered the entry will be saved.

7. Press the **DOWN** button to show the Gateway IP setting.
8. To change the Gateway, press the **ENTER** button.
9. When DHCP is on, the Gateway can either be auto detected or manually specified.
10. To configure the SolrenView gateway to auto detect the gateway from the DHCP server, select the "**Autodetect**" option in using the HMI. **Autodetect** is the special gateway value of 0.0.0.0.
11. To configure the SolrenView gateway to use a manual gateway, specify each of the four octet values (0-255), one at a time. Press the **UP** button to increment the octet. Press the **DOWN** button to decrement the octet. Press the **ENTER** button to accept the octet. Press the **ESCAPE** button to cancel entry at any point. When the fourth octet is entered the entry will be saved.
12. Press the **DOWN** button to access the **Netmask** setting.  
Change in the same manner that the Fallback IP was modified.

## Set Network ID and Baud Rate:

The inverter (see section 9.2) and SolrenView must have the same **Baud Rate** (9600) and **Address (Inverter ID)** for proper communication. However, each inverter requires it's unique Network ID.

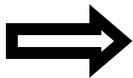
1. Select **Set Inverter** on the **Main Menu** and press **ENTER**.
2. Select **Inverter ID** from the **Set Inverter Menu** and press **ENTER**.
3. Give the inverter a unique setting and press **ENTER**.
4. Select **Baud Rate** from the **Set Inverter Menu** and press **ENTER**.
5. Set the Baud Rate to **9600** and press **ENTER**.

## 7.8 Enabling SolrenView Web-based Monitoring

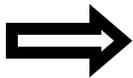
Before SolrenView web-based monitoring can function the inverter must be networked to the Internet, see sections 6.12 through 6.15 for more details.

As explained in section 6, data logging is one of the main functions of the SolrenView gateway. This option is turned on with the **SRV Mode** setting. Once enabled, the SolrenView gateway will periodically update various operational values and send this data to the SolrenView web-based monitoring service.

If **SRV Mode** is turned on and the gateway is unable to transfer data to the monitoring service then data will accumulate in a queue on the SolrenView gateway. This queue is stored in non-volatile flash memory. After a few weeks the data queue will become full and the oldest data will be lost, so it is important to establish Internet connectivity soon after the inverters are commissioned.



**NOTE:** *If a third party monitoring service is installed, SRV mode should be set to off.*



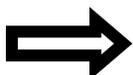
**NOTE:** *Enabling SRV Mode when the SolrenView.com data monitoring service has not been purchased will result in unnecessary wear and tear on the SolrenView gateway.*

### To enable SolrenView.com data monitoring

1. Select **Config** on the **Main Menu** then press **ENTER**.
2. Select **SRV Mode** function on the **Config** Menu then press **ENTER**.
3. The SRV Monitoring function will be displayed. Press **ENTER** to modify the setting.
4. Press the **DOWN** button to change the setting to **ON**.
5. Press the **ENTER** button to accept the setting change.

## 7.9 Viewing and setting the Date/Time

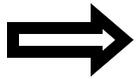
When the SolrenView web-based monitoring service is purchased and functioning, it is normally not necessary to set or maintain the time on the inverter. The time will automatically be set and adjusted based on the inverter's time-zone.



**NOTE:** *The date is only editable if **SRV Mode** is off.*

**To view the date and time:**

1. First select **Config** on the Main Menu then press **ENTER**.
2. Select the **Date/Time** option on the **Config** Menu then press **ENTER**.
3. The current date will be displayed.



**Note:** The date is only editable if SRV Mode is off. When SRV Mode is on, the date and time is automatically set.

4. Press the **ENTER** button to begin changing the date. The month will flash, indicating that this portion of the date can be changed with the buttons. Press the **UP** button to increment the month and the **DOWN** button to decrement the month. Press the **ENTER** button to accept the month. Press the **ESCAPE** button to cancel and return to the menu. Days and years can be set in a similar manner.
5. Press the **ENTER** button to begin changing the time. The format is HH:MM:SS and hours are shown in 24 hour format. The hour will flash, indicating that this portion of the time can be changed with the buttons. Press the **UP** button to increment the hour and the **DOWN** button to decrement the hour. Press the **ENTER** button to accept the hour value. Press the **ESCAPE** button to cancel and return to the menu. Minutes and Seconds can be set in a similar manner.

## 7.10 Rebooting the SolrenView Gateway

If the SolrenView Gateway cannot communicate over the Internet or is not updating inverter data it may need to be rebooted. To reboot SolrenView gateway:

1. First select **Config** on the **Main Menu** then press **ENTER**.
2. Select the **Reboot** option from the menu and press **ENTER**.
3. The Reboot monitor prompt will be shown. Press the **ENTER** button to reboot the SolrenView gateway.

## 7.11 Resetting the SolrenView Gateway to Factory Defaults

It may be necessary to reset the SolrenView gateway to factory defaults. This does not reset the inverter core, nor shutdown the inverter for any period of time.

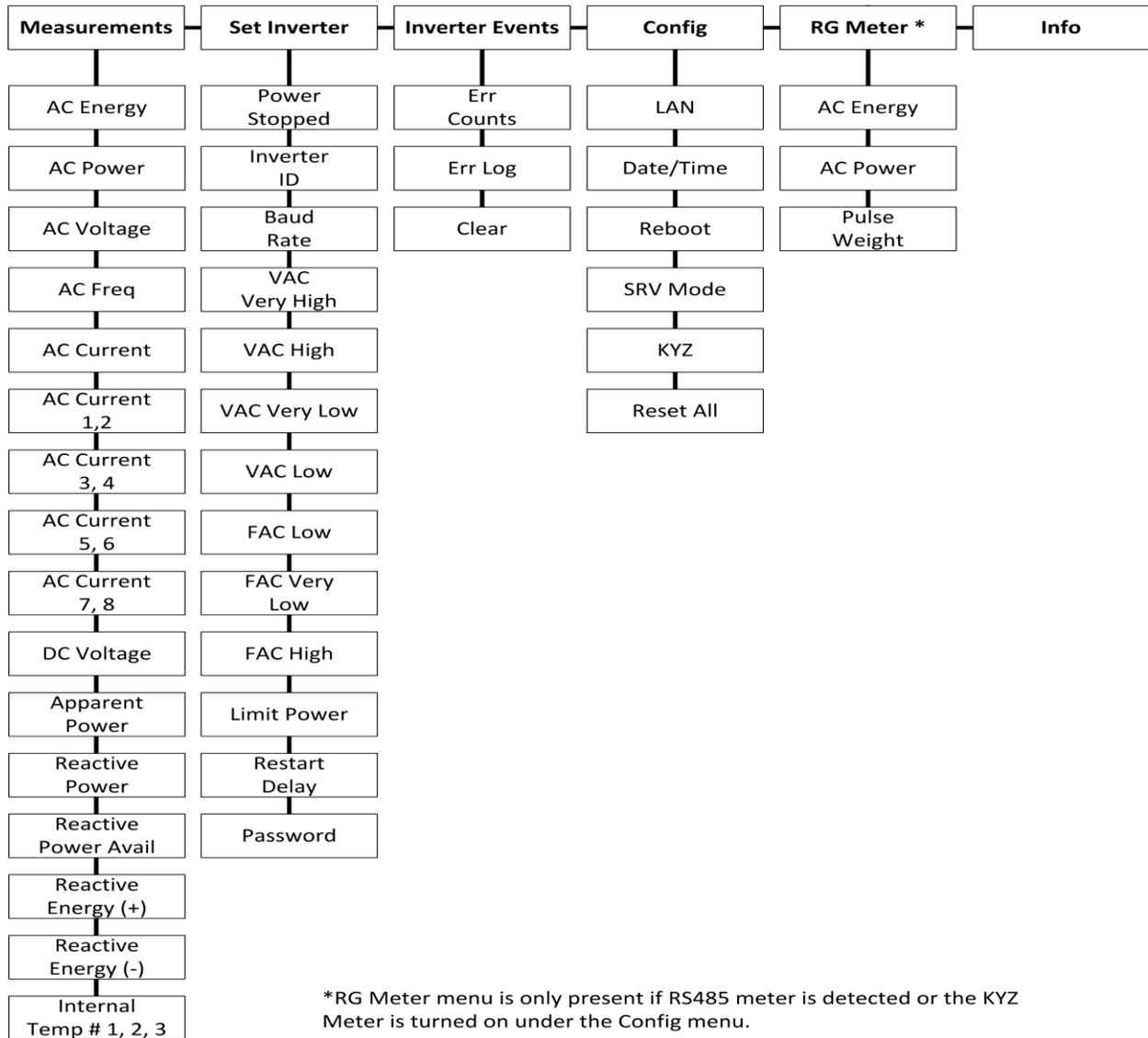


**NOTE:** Resetting the SolrenView gateway will also clear events, revenue-grade KYZ counters and SolrenView.com data queue. Caution should be used with this function to avoid data loss.

To reset the SolrenView gateway:

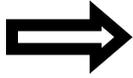
1. First select **Config** on the **Main Menu** then press **ENTER**.
2. Select the **Reset All** option from the menu then press **ENTER**.
3. A message warning that the SolrenView gateway is about to be set to factory defaults will be shown. Press the **ESCAPE** button to cancel the reset.
4. Select the Yes option under Clear settings to reset the SolrenView gateway to factory defaults. The Reset Storage screen will appear for a moment.

## 7.12 HMI Menu Structure



## 8. Commissioning the Inverter PV System

Before commissioning, ensure that the inverter is mounted, all connections are made and the inverter is ready to power up.



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



**WARNING:** Make a final check of all AC and DC wiring to the inverter and in the system before turning on.



**WARNING:** Connecting the inverter to the electric utility grid must only be completed after receiving prior approval from the utility company. Installation must be performed only by qualified personnel/licensed electrician(s).



**NOTE:** With the PV modules connected and inverter disconnect switches still off, perform a final check of the PV voltage and polarity once more using a digital volt meter and probing the positive (+) and negative (-) PV connections.

### Turning on the Inverter

- Turn on the dedicated three-phase circuit breaker or disconnect switch at the building service.
- Turn on AC disconnect first.
- Turn on DC disconnect.

### Operation

The inverter will connect to the electric grid when the DC voltage first exceeds 330VDC (strike voltage) and 300W of power is available. The inverter will shut down when the DC voltage falls below 180VDC.

### Turning off the Inverter

- Choose “4 settings” from the main menu, then Press **ENT**
- Choose “1 ON/OFF”. Move the cursor to “OFF” and press **ENT**.
- The inverter will slowly ramp down the current and shutdown.
- Turn off the DC disconnect followed by the AC disconnect.

## 9. LCD and LED Indicators

The inverter operates automatically without the need for user interaction. The LCD display and LED indicators on the front of the inverter provide valuable operating information.

### 9.1 LCD

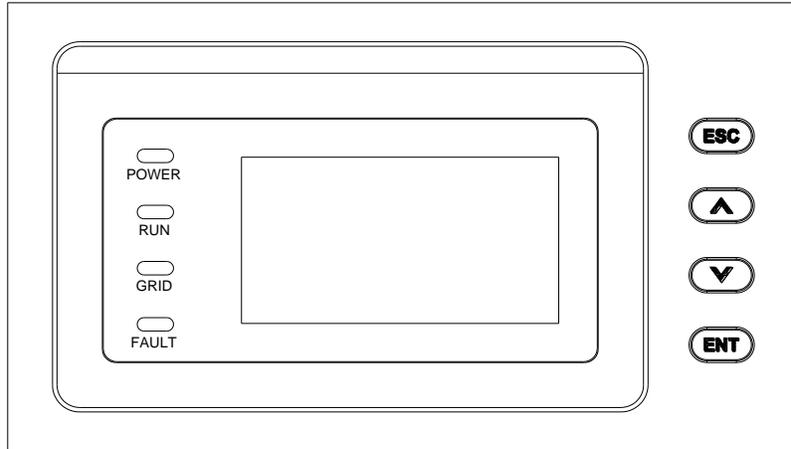


Figure 9.1 – LCD

Four touch keys are available to help the customer scroll through the information

Key	Description	Definition of function
	Escape key	Back/end/mute
	Enter key	Confirm entering the menu/confirm set point
	Up	Page up in selection menu/ +1 setting increment
	Down	Page down in selection menu/ -! Setting decrement

Figure 9.2 Key Descriptions

The LED's on the left indicate the operational status of the inverter.

LED light	Status	Indication	Troubleshooting
<b>Power</b>	Light on	DC voltage available at the Inverter	No need, Standard Operation
	Light off	Low DC or possible power supply problem	1-Check DC input polarity is correct. 2-Verify DC voltage above 180Vdc. 3-Verify DC disconnect switch is on
<b>RUN</b>	Light on	Inverter is producing Power	No need, Standard Operation
	Flash	Derating (light on 0.5s, light off 1.5s)	1-Verify Inverters ambient temperature isn't above 45C°. Note: If the input power is above the rated output power the inverter will derate.
	Light off	Inverter is not producing power	1-Verify that there is no Snow on the array. 2-Check if Error light is on or flashing, if so skip to section 10.
<b>GRID</b>	Light on	AC voltage is available at the inverter	No need, Standard Operation
	Flash	AC voltage out of setting range (light on 0.5s, light off 1.5s)	1-Check AC voltage and verify it is within range IEEE1547 specified range
	Light off	No AC voltage at the inverter	1-Verify that AC is available at the inverter
<b>FAULT</b>	Light on	Indicates a possible Fault	1-Note message on LCD and refer to fault part of Section 10.
	Slow flash	Indicates an Alarm (light on 0.5s, light off 2s)	1-Note message on LCD and refer to the alarm part in Section 10.
	Fast flash	Indicates Protective action being triggered (light on 0.5s, light off 0.5s)	1-Note message on LCD and refer to protection part in Section 10.
	Light off	No fault	No need, Standard Operation

**Figure 9.3 LED indicators meaning.**

## 9.2 Screen Descriptions

### Main Screen (Default)

Press ESC to move from the main/default screen into the start menu.

### Start Menu

1. Operation Info
2. Alarm
3. History
4. Settings
5. Power Dispatch

### Operation Info Menu

This menu displays the data stored in the inverter memory. Use the   buttons to scroll up and down through the list. Pressing  will take the screen back to the start menu.

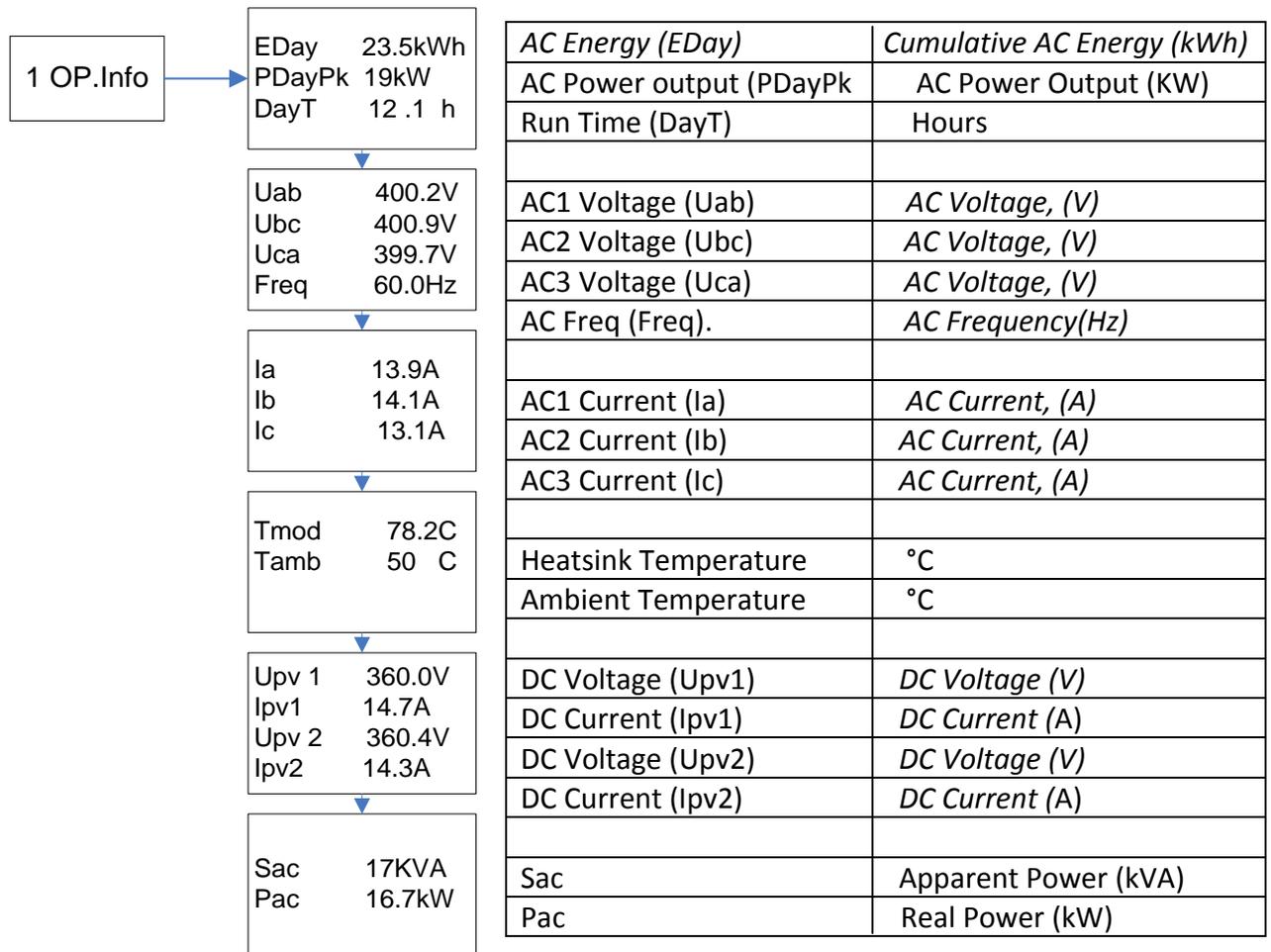


Figure 9.4 Operation Information Submenu

### Alarm Menu

This displays inverter alarm and faults, some of which may be modified with the keypad. Use the  and  buttons to scroll up and down through the list. Pressing  will take the screen back to the start menu. Any fault message will be indicated in the “Alarm” menu.

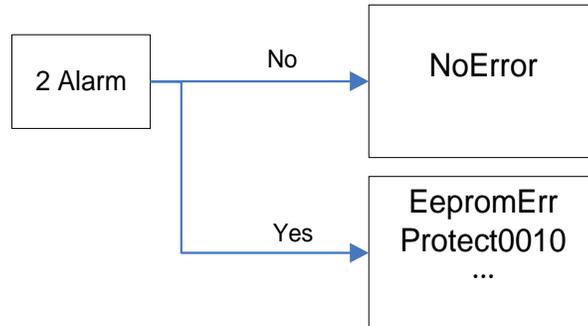


Figure 9.5 Present fault information

### History Menu

This menu displays inverter data history, some of which may be modified with the keypad. Use the  and  buttons to scroll up and down through the list. Pressing  will take the screen back to the start menu. The following information can be found in the menu:

1. Up to 100 entries of most recent fault messages are recorded and retrieved
2. The latest 21 days operation history data is available
3. Product software/hardware and serial number information
4. Cumulative generated power information

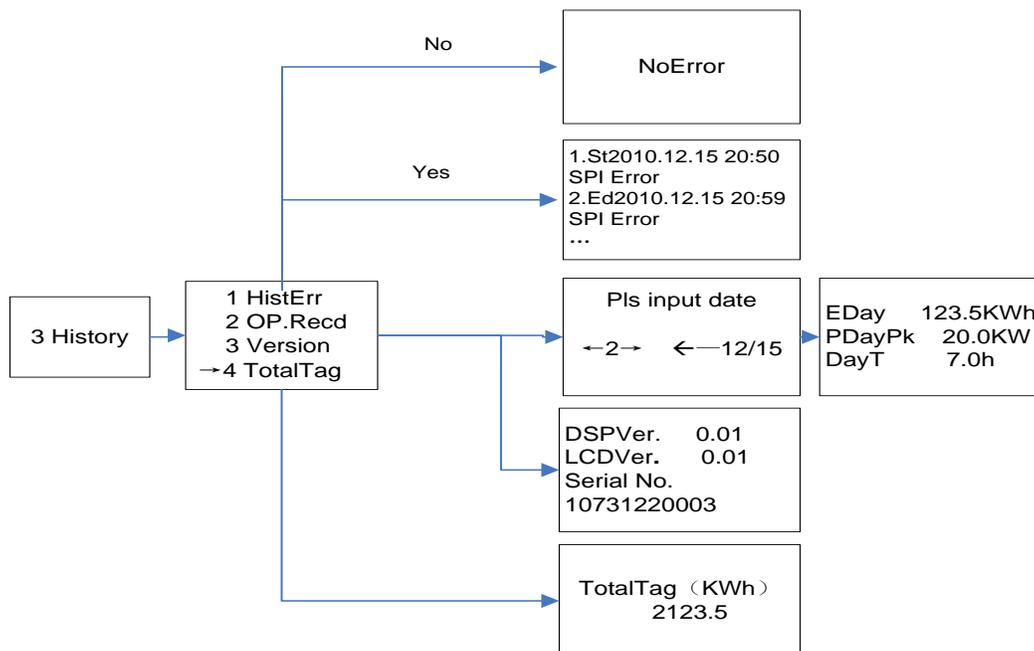


Figure 9.6 History Menu and Submenu

## Settings Menu

The inverter parameters can be adjusted by using commands in the settings menu as shown in the figure 9.7 below:

Options such as Power On/off, Language, Sounds, Date, Communications, Arc Fault protection and MPPT can simply be change/ set from the setting menu.

**Note:** When prompt for a password, enter the following: **UP, DOWN, UP, DOWN** then **ENT**.

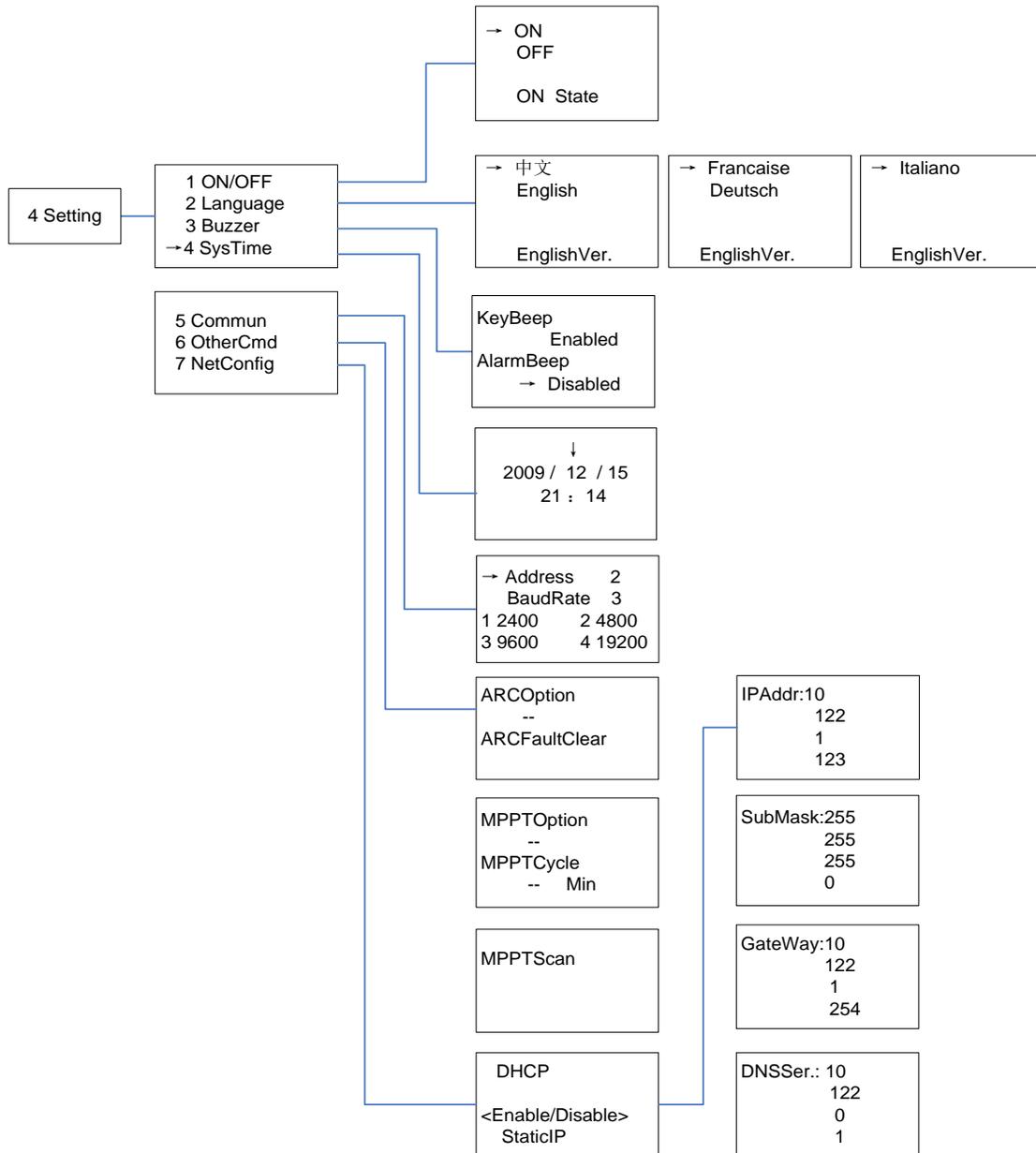
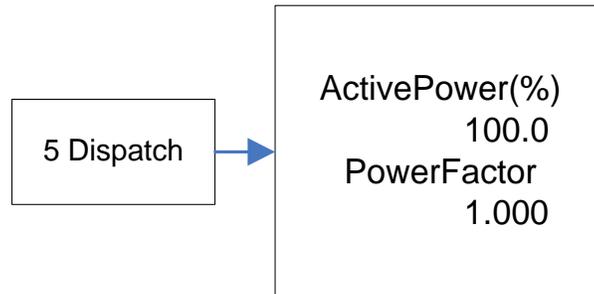


Figure 9.7 System setup menu and submenu

**Note:** The inverter and SolrenView (see section 7.7) must have the same **Baud Rate** (9600) and **Address (Inverter ID)** for proper communication.

### Power Dispatch

“Active Power” and “PowerFactor” parameters can be set up through the LCD keys as well as remotely. **Note: Only adjustable with permission of the local utility**



**Figure 9.8 Active Power and Power Factor Settings**

### Grid Support Features:

PVI 23-28TL inverters come with several Grid Support features such as:

- 1- Multiple voltage and frequency trip point settings.
- 2- Low voltage Ride through.
- 3- Slow power ramp up and Down.
- 4- Power factor control.

If you are interested in enabling these features or further understanding there capabilities please contact us [inverters@solectria.com](mailto:inverters@solectria.com) for more details.

## 10. Troubleshooting and Inverter Messages

Although the inverter is designed for many years of power production there may be instances where error messages may be displayed on the LCD screen. This table can be used to help identify the error and resolve it.

Type	Name	Definition	Possible causes	Recommended solutions
Alarm	1- TempSensorErr	Abnormal temperature reading	1- Internal temperature sensor is making poor contact	1- Verify temperature reading off of the display
				2- Switch off the inverters internal disconnects
			2-Temperature sensor is damaged	3- Switch the Inverter back on
				4- If error does not clear, contact Solectria Customer Service
Alarm	2- SPICommErr	Inverters internal communication failure	1-Poor connection of the inverters internal communication connector	1- Observe for 5 minutes and see whether the alarm is cleared automatically
				2- Switch off the inverters internal disconnects
				3-Switch the Inverter back on
				4-If error does not clear, contact Solectria Customer Service.
Alarm	3- IntFanErr	Inverters internal fan (can't be seen externally) is not operating properly	1-Fan service life has expired	1- Observe for 5 minutes and see whether the alarm is cleared automatically
				2- Switch off the inverters internal disconnects
			2-Fan connector is making a poor connection	3-Switch the Inverter back on
				4-If error does not clear, contact Solectria Customer Service.

<b>Alarm</b>	4-ExtFanErr	One of the three external fans is not operating properly	1- Fan is blocked	1- Observe for 5 minutes and see whether the alarm is cleared automatically
				2- Switch off the inverters internal disconnects
			2- Fan service life has ended	3- Check the fan blades for debris
			3- Fan socket connector is making a poor connection	4- Switch the Inverter back on
				5- If error does not clear, contact Solectria Customer Service
<b>Alarm</b>	5-EepromErr	Incorrect memory reading	1- A problem with the inverters internal memory	1- Observe for 5 minutes and see whether the alarm is cleared automatically
				2- If error does not clear, contact Solectria Customer Service
<b>Protect</b>	1- Arc Board Error	Internal Arc board self-check error	1-Possible communication error between Arc board and Inverter	1-Observe for 5 minutes and see whether the alarm is cleared automatically
			2- Abnormal reading within the Arc board	2- If error does not clear, contact Solectria Customer Service

<b>Protection</b>	2- OverTemp	Ambient temperature or temperature inside inverter is too high	1- Ambient temperature outside the inverter is too high	1- Confirm that external ambient temperature is within the specified range of operating temperature
				2- Verify air inlet and outlet are not blocked
			2- Fan is blocked	3- Verify fan is not blocked
				4- Verify proper spacing was followed during installation
			3- Poor cooling due to improper installation	5- Observe for 30 minutes and see whether the alarm is cleared automatically
				6- If error does not clear, contact Solectria Customer Service
<b>Protection</b>	3- GridV.OutLim	Grid voltage exceeds the specified range	1- Grid voltage is abnormal	1- Observe for 10 minutes and see whether the alarm is cleared automatically
			2- No AC voltage at the inverter	2- Verify Grid Voltage is within range
			3- Improper AC wiring. (see section 6.1)	3- Verify proper AC wiring
			4- Loose AC connections	4- If error does not clear, contact Solectria Customer Service

<b>Protection</b>	4- GridF.OutLim	Grid voltage frequency is abnormal	1- Grid frequency is out of range	1- Observe for 10 minutes and see whether the alarm is cleared automatically
				2- Verify grid frequency is within range
			2- Loose AC connections.	3- Verify proper AC wiring
				4- If error does not clear, Contact Solectria Customer Service
<b>Protection</b>	5- PV1 (2) VoltOver	DC input voltage exceeds the specified value	1-DC over-voltage	1- Observe for 30 minutes and see whether the alarm is cleared automatically
				2- Verify DC open circuit input voltage is within specified range
				3- Switch off the inverters internal disconnects
				4- Switch the Inverter back on
				5- If error does not clear, contact Solectria Customer Service
<b>Protection</b>	6- PV1 (2) Reverse	DC inputs connected with incorrect polarities	1- PV positive pole and negative pole are connected in reverse	1- Verify DC voltage polarity is correct on all inputs
				2- If error does not clear, contact Solectria Customer Service

<b>Protection</b>	7- GFCI.Err	DC leakage current is above recommend value	1- Excessive parasitic capacitance on PV module due to insulation failure	1- Observe for 10 minutes and see whether the alarm is cleared automatically
			2- Abnormal grounding conditions	2- Contact System installer to check installation for possible Ground Fault
				3- If error does not clear, contact Solectria Customer Service
<b>Protection</b>	8-IsolationErr	DC insulation impedance to ground	Insulation to ground is below recommended value	1-Contact System installer to check installation for possible Ground Fault
<b>Protection</b>	9- IntProtect 0010-0260	Internal problem within the inverter	1- One of the inverters internal protection features was triggered causing the inverter to shut down	1- Observe for 10 minutes and see whether the alarm is cleared automatically
				2- If error does not clear, contact Solectria Customer Service
<b>Protection</b>	10-Arc Protect	Inverter shuts down due to a possible Arc fault concern	1- An internal Arc fault occurred on the DC side	1-Have Electrical qualified Personnel inspect wiring section of Inverter
			2-Fault with the Arc board	2- If no issues are found, contact Solectria Customer Service
<b>Fault</b>	1- IntFault0010-150	Internal noncritical fault within the inverter	1 -A fault occurred internally within the inverter	1- The inverter will restart once the fault is cleared.
				2- If error does not clear, contact Solectria Customer Service

**Table 10.1 Troubleshooting**

## 11. Product Maintenance

Regular maintenance helps expand product lifetime and performance

### 11.1 Check the electrical connection

Check all the cable connections once every 6 months.

- 1- Turn off DC disconnect of the inverter.
- 2- Turn off AC disconnect of the inverter
- 3- Lock out all DC and AC sources to the inverter.
- 5- Verify absence of DC and AC voltages at the wiring box.
- 6- Check for loose or untighten cables, follow torque and safety instructions in the manual.
- 7- Check for cable damage, especially whether the cable surface is scratched or smooth.  
Repair or replace the cables if necessary.

### 11.2 Clean the air vent filter

On average it is recommended to check the air vent of the fans once every 6 months.

- 1- Turn off DC disconnect of the inverter.
- 2- Turn off AC disconnect of the inverter
- 3- Lock out all DC and AC sources to the inverter.
- 5- Verify absence of DC and AC voltages at the wiring box.
- 6- Use Philips Screw driver to remove Vent covers.
- 7- Clean vents using dry cloth.
- 8- Return Screws (Torque: 10 in-lbs)

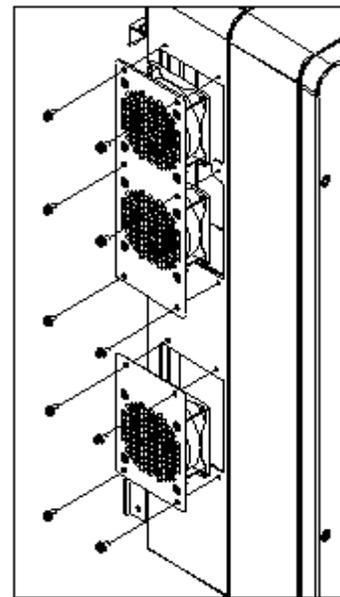


Figure 11.1 shows location of the Fan Vents

## 12 Product Warranty and RMA Policy

### 12.1 Warranty

#### Warranty Registration:

It is important to have updated information about the inverter location. Please visit <http://www.solectria.com/registration> and complete the information requested for each inverter.

The Solectria Renewables Warranty Policy is stated below.

#### Definitions:

Standard Limited Warranty: The initial warranty period provided for the product.

Extended Limited Warranty: A purchased warranty for a number of years after the expiration of the Standard Limited Warranty. Coverage is the same as the Standard Limited Warranty. The maximum number of years for entire warranty period is 20 years for certain products.

Parts Only Limited Warranty: A purchased warranty for a number of years after the expiration of the Standard Limited Warranty, includes Parts Only, additional charges apply for travel, labor, shipping.

#### Solectria Renewables Warranty Coverage:

Solectria Renewables Limited Warranties are provided by Solectria Renewables, LLC. ("Solectria Renewables") and cover defects in workmanship and materials. Solectria Renewables' price for the products is based on inclusion of these limited warranty provisions and disclaimers. In the event of a conflict between the terms of this Limited Warranty and any terms and conditions proposed by purchasers of Solectria Renewables' products, these Limited Warranty provisions shall govern the parties' obligations with respect to warranty coverage for defective products.

Product Description	Standard Limited Warranty	Extended Limited Warranty	Parts Only Limited Warranty
PVI1800, PVI2500	5 years (60 months)	Not Available	Not Available
PVI3000S, PVI4000S, PVI5000S, PVI5300, PVI6500, PVI7500	10 years (120 months)	Up to additional 5 years available	Not Available
PVI10KW, PVI13KW, PVI15KW	5 years (60 months)	Up to additional 15 years available	Up to additional 15 years available
PVI14TL, PVI20TL, PVI23TL, PVI28TL	10 years (120 months)	Up to additional 10 years available	Not Available
PVI50KW, PVI60KW, PVI75KW, PVI85KW, PVI100KW	5 years (60 months)	Up to additional 15 years available	Up to additional 15 years available
SGI225, SGI250, SGI266, SGI300, SGI500, SGI500PE, SGI500XT	5 years (60 months)	Up to additional 15 years available	Up to additional 15 years available

#### Warranty start date:

Solectria Renewables warranty begins on the date of shipment to the end user, or no later than 4 months from the date of shipment by Solectria Renewables.

**Duration of Solectria Renewables Extended Warranty Period:**

If a warranty extension has been purchased, the term is defined as an extension beyond the initial Standard Warranty period 5 years (60 months). For example, if a 5 year extension is purchased, the term becomes 10 years (120 months) from date of shipment.

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 repair of the inverter or replacement shipment to the customer, whichever is greater.

Solectria Renewables' obligation to repair or replace a defective product under this warranty is contingent upon Solectria Renewables receiving full and timely payment for the warranted products and associated shipping charges. Solectria Renewables Warranty Coverage is voidable, at Solectria Renewables' sole option, if full payment for products and associated shipping charges 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.

**Standard or Extended Limited Warranty Coverage:**

Solectria Renewables will, at its sole option, repair or replace the defective product free of charge, provided that Solectria Renewables is notified of the product defect within the Warranty Period for the 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 sole option, use new and/or reconditioned parts in performing warranty repair and/or replacements. Solectria Renewables reserves the right to use parts or products of original or improved design in the repair or replacement of the product. 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. No provision will be made for reimbursement of lost energy production.

**Parts Only Limited Warranty Coverage:**

The parts only warranty includes parts needed to provide repairs to the product. Solectria Renewables will, at its sole option, use new and/or reconditioned parts in performing warranty repair and/or replacements. Solectria Renewables reserves the right to use parts or products of original or improved design in the repair or replacement of the product. All replaced products and all parts removed from repaired products become the property of Solectria Renewables. All labor, travel, expenses and shipping are excluded from this warranty and an estimate must be paid prior to the dispatching of a Solectria Renewables technician.

**For three-phase isolated inverters 10kW and higher:**

Within the Continental United States and Canada: Solectria Renewables warranty on three – phase inverters 10kW and higher (excluding TL products) covers parts, travel and labor necessary to repair the product and shipment of parts to and from the customer via a Solectria Renewables-selected non-expedited surface freight.

Outside of the Continental US: For Alaska, Hawaii and all other installation locations Solectria Renewables will supply necessary parts and labor as needed for warranty repairs; however, travel is not included. Solectria Renewables will only provide non-expedited freight shipping of parts. The warranty does not include customs fees, broker fees or other taxes that may be imposed by any government agency.

**For three-phase inverters PVI14TL, PVI20TL, PVI23TL PVI28TL and single-phase inverters 7.5kW and lower:**

Solectria Renewables warranty covers replacement inverters or parts necessary to repair the product and shipments of parts or replacement inverters to and from the customer via a Solectria Renewables-selected non-expedited surface freight within the contiguous United States and Canada. For Alaska, Hawaii and all other installation locations Solectria Renewables will cover the cost of return shipment of product one way from the customer. The warranty does not include customs fees, broker fees or other taxes that may be imposed by the government agency. The warranty does not cover travel and/or labor necessary to repair the product.

**Obtaining Service:**

If your product requires troubleshooting or warranty service, contact the installer or place of purchase. If you are unable to contact the installer/place of purchase or they are 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 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. There is a flat rate for inverter replacements.

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 technical assistance Monday-Friday, 8:30am-7pm EST and on-call technical support is provided outside normal business hours.

**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 or lightning strikes;
- c) The product, if repairs have been made to it other than by Solectria Renewables or its 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 SolectriaRenewables);
- g) The product, if damaged by customer connections or any items installed by customer or installation company including third party monitoring;
- h) Any installation and operation beyond the scope covered by relevant safety regulations(UL1741, NFPA 70, etc.);
- i) Third party monitoring equipment;
- j) Failure to perform Preventative Maintenance may void the warranty.

**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 OF MERCHANTABILITY OR CONDITION OR QUALITY OF THE PRODUCT, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY OF DISTRIBUTOR OR DEALER/INSTALLER ABILITY, ALL OF WHICH ARE EXPRESSLY DISCLAIMED TO THE FULLEST EXTENT PERMITTED BY LAW.**

**ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY OF DISTRIBUTOR OR DEALER / INSTALLER ABILITY, 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, TO THE FULLEST EXTENT PERMITTED BY LAW.**

**IN NO EVENT WILL SOLECTRIA RENEWABLES, 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, INCLUDING LOSS OF USE AND INTANGIBLE HARM OF ANY KIND, AND ANY PHYSICAL DAMAGE OR OTHER DAMAGE ARISING FROM OR AS A RESULT OF ANY USE, MISUSE OR ABUSE OF THE PRODUCT, OR THE INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT, REGARDLESS OF WHETHER SUCH INSTALLATION, INTEGRATION OR OPERATION WAS PERFORMED PROPERLY OR IMPROPERLY.**

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

**Exclusions of the Policy:**      Installation and Operation Manual

If your product is a consumer product, the applicable law may not permit exclusion of implied warranties. To the extent permitted by the applicable law such warranties are limited to the duration of this Limited Warranty. Some jurisdictions do not allow any limitations on the duration of an implied warranty, or exclusions on implied warranties, 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 USERS' 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.

## **12.2 Return Material Authorization Policy**

Please review our Return Merchandise Authorization Policy below.

**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. Refer to the terms and conditions statement provided when the item was purchased for details Restocking fees may apply.

**Information Solectria Renewables needs when you are obtaining service:**

- 1) The model name and serial number of your product
- 2) The reason for return

**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 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.

## 13. Technical Data

### 13.1 Output AC Specifications

The inverters are designed to feed power into a standard 60Hz, three-phase AC utility service provided within a facility with a rating of not less than the rating of the inverter(s) connected to it.

The inverter is designed to work with the range of AC voltages for a three-phase service defined by IEEE 1547-2003 and ANSI C84.1.

	PVI 23TL	PVI 28TL	Unit
Nominal Output Voltage	480	480	VAC
Operating AC Voltage range	88 – 110%		VAC
Operating frequency	55-66		Hz
Power Factor	Unity, >0.99 (Adjustable ±0.8)		
Total Harmonic Distortion(THD)	< 3%		
Continuous Output Power	23	28	kW
Continuous Output Current	32	39	Amps

**Table 13.1 – AC Output Specifications**

	PVI 23TL	PVI 28TL
Peak Efficiency	98.6%	98.5%
CEC Weighted Efficiency	98.0%	98.0%

**Table 13.2 –Efficiency of Inverters**

### 13.2 Other Specifications

Integrated String Combiner Option	8 string Inputs , 12-15A (4 per MPPT)
Operational Ambient Temperature	-13° to 140°F (-25° to 60°C) Derating occurs above 45°C
Storage Temperature	-22° to 158 °F (-30° to 70°C)
Inverter Enclosure	Type 4

**Table 13.3 – Other Specifications**

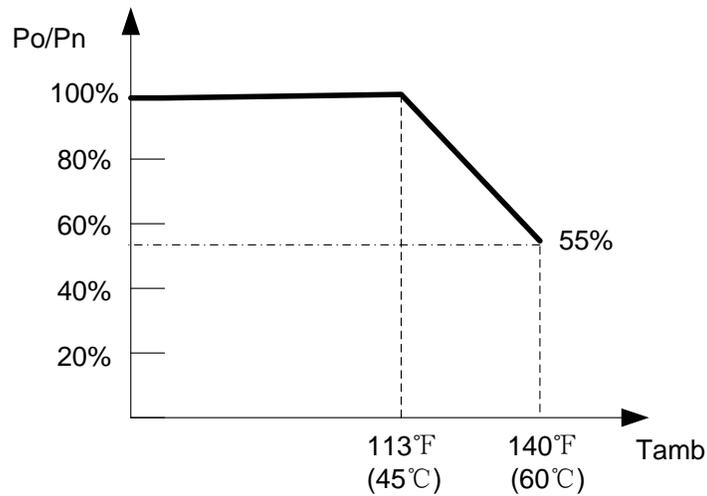
### 13.3 Input DC (PV) Specifications

	PVI23TL	PVI 28TL	Units
Absolute Maximum Input Voltage	1000		VDC
Maximum PV Power	31	38	kW
Operating Input Voltage	300-900		VDC
Strike (startup Voltage/power)	330VDC/300W		
MPPT Input Voltage Range	480-800	500-800	VDC
MPPT Trackers	2 with 4-Fused Inputs per Zone		
Maximum Operating Input Current	25 per MPP tracker (2 trackers)	29 per MPP tracker (2 trackers)	Amps

**Table 13.4 – DC Input Specifications**

### 13.4 Temperature Derating Curve

Figure 13.1 shows the standard power derating curve for a PVI 23-28TL inverter, the inverter operates at full power up to 45°C and derates linearly till 60°C where it shuts down to protect itself.



**Figure 13.1 Temperature Derating Curve**

### 13.5 Power Derating curve out of MPPT Zone

Figure 13.2 below shows the standard derating curve outside of the MPPT zone. Inverters derate linearly outside their rated MPPT range.

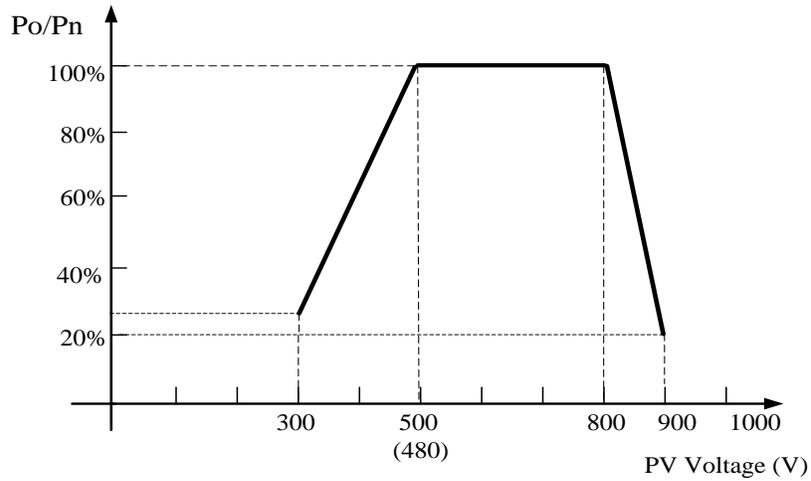


Figure 13.2 Power derating outside of MPPT range

### 13.6 Internal Circuit Diagram

The basic power flow within the PVI 23TL-28TL series of inverters is below. Note that the GFDI circuit is not depicted.

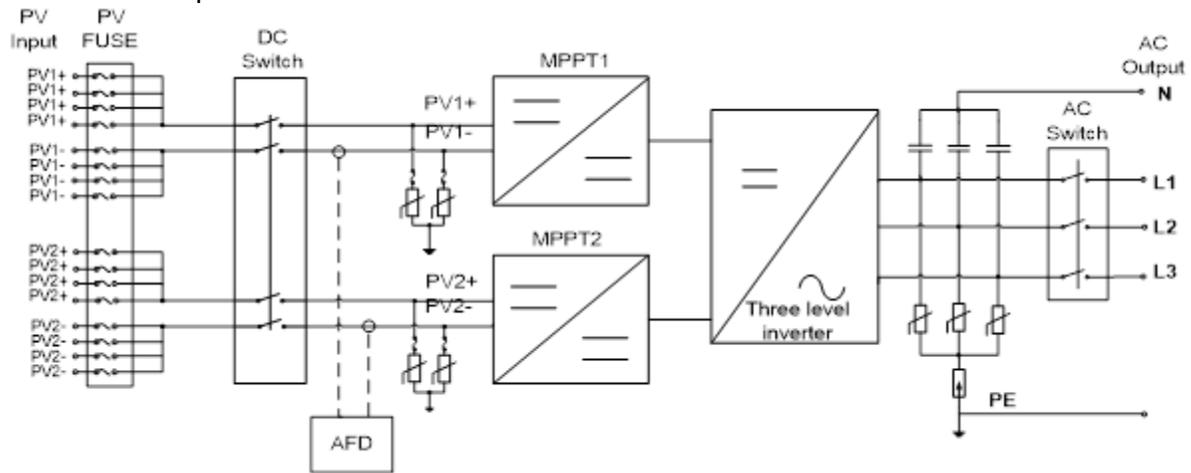


Figure 13.3 – Simplified Internal Circuit Diagram for PVI 23TL-28TL Series Inverters

## 14. Appendices

### Appendix A – PVI 23TL-28TL datasheet

[http://www.solren.com/datasheets/PVI\\_14-28TL\\_Datasheet.pdf](http://www.solren.com/datasheets/PVI_14-28TL_Datasheet.pdf)

### Appendix B – String Sizing Tool

<http://www.solectria.com/stringSizing.html>

### Appendix C – Contact Information

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

Tel: 978.683.9700  
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Sales Support: [inverters@solectria.com](mailto:inverters@solectria.com)  
Customer Support: [service@solectria.com](mailto:service@solectria.com)  
Website: [www.solectria.com](http://www.solectria.com)

### Appendix D – Authorized Distributors

See website for complete and updated listing: <http://www.solectria.com/distributors>

### Appendix E – UL1741 / IEEE 1547 / CSA22.2#107.1 Authorization to Mark



# Certificate of Compliance

Certificate: 2665124

Master Contract: 259363

Project: 2665124

Date Issued: September 26, 2013

Issued to: Solectria Renewables, LLC.  
360 Murrinack St. Bldg 9,  
Lawrence,  
MA, 01843,  
USA

Attention: Mr. James Worden

*The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only*



Issued by: Kyle Song  
Kyle Song

## PRODUCTS

CLASS 5311 09 - POWER SUPPLIES - Distributed Generation Power Systems Equipment  
CLASS 5311 89 - POWER SUPPLIES - Distributed Generation Power Systems Equipment  
- Certified to U.S. Standards

Utility Interactive Inverter, Model PVI 23TL-480 and PVI 28TL-480, permanently connected.

For details related to rating, size, configuration, etc., reference should be made to the CSA Certification Record, Certificate of Compliance Annex A, or the Descriptive Report.

## APPLICABLE REQUIREMENTS

CSA-C22.2 No. 107.1-01 - General Use Power Supplies  
UL Std. No. 1741-Second Edition - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources (January 28, 2010)

Note: Conformity to UL 1741-Second Edition (January 28, 2010) includes compliance with applicable requirements of ANSI/IEEE 1547 (2003) and ANSI/IEEE 1547.1 (2005). This product's software for isolation monitor interrupter has been evaluated to the requirements of UL Standard No. 1998