

# Installation Manual

## Pika Islanding Inverter

X7601/X7602/X11402

Part of the Pika Energy Island™





**Islanding Inverter**

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Serial Number:

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RCP Number:

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Check the resources tab at [www.pika-energy.com](http://www.pika-energy.com) for the latest specifications and manuals.

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## **Section 1: Introduction**

### **About This Manual**

This Installation Manual provides instructions and recommendations for installing and commissioning Pika Grid Supporting Utility Interactive Islanding Inverters (X7601/X7602/X11402) for simplified solar-plus-storage. Pika Islanding Inverters are storage-ready inverters that connect to Pika PV Link™ DC optimizers and smart batteries to form a Pika Energy Island™ system.

This Installation Manual includes full details on mounting, wiring, safety, battery integration, and other key aspects of installing Islanding Inverters. The companion document to this Installation Manual is the Pika Islanding Inverter Operation Manual. Please reference the Operation Manual for complete information on user-configurable features including Device Settings and Operational Modes. Some information on user-configurable features is included here, but is comprehensively detailed in the Operation Manual.

### **Symbols used in this Manual**

	<b>WARNING:</b> This indicates a fact or feature very important for the safety of the user to prevent injury or death and/or which can cause serious hardware damage if not applied appropriately.
	<b>CAUTION:</b> Presents information to prevent damage to this product
	<b>EARTH GROUND SYMBOL</b>



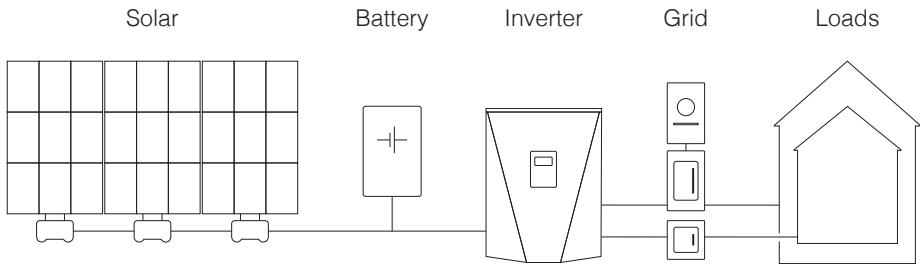
## About Pika Islanding Inverters: X7601/X7602/X11402

Islanding Inverters connect to the Pika PV Link optimizers to form the Pika Energy Island system for grid-tie solar-plus-storage. Upon the loss of grid power, Islanding Inverters disconnect from the grid and provide AC power to support critical loads. The inverter provides islanding power without an external autotransformer. High voltage smart-batteries connect to Islanding Inverters with no additional storage interface.

All Pika Energy products use the REbus™ 380VDC nanogrid to connect energy sources, storage, loads and the grid. The REbus nanogrid automates the flow of power to enable plug-and-play setup and operation of Pika Energy equipment. For more information about REbus, visit [pika-energy.com](http://pika-energy.com).

In the diagram below, an X7601 is directly connected to PV Link optimizers and high voltage lithium ion storage on the DC (REbus) line, shown to the left of the inverter. To the right of the inverter are AC lines: 240VAC for grid and home loads, and critical load support up to 50A.

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*Fig 1. Example Energy Island*

For project-specific one-line diagrams, contact Pika Energy.

## **Section 2: Safety Specifications**

**IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS!**

### **General Warnings**



**WARNING:** DO NOT ATTEMPT TO SELF-INSTALL INVERTER. A QUALIFIED SOLAR INSTALLATION PROFESSIONAL OR ELECTRICIAN MUST INSTALL AND COMMISSION PIKA ENERGY EQUIPMENT. CONTACT PIKA ENERGY FOR A LIST OF AUTHORIZED INSTALLERS IN YOUR REGION.

**SHOCK RISK: HIGH VOLTAGE ELECTRICITY**

**WARNING:** Before installing the Pika Energy Island, read all instructions and caution markings in this guide and installation manual. Consult installation documentation for all other REbus devices on the system.

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

**WARNING:** Electrical installation in Canada shall be done in accordance with all local electrical codes and/or the Canadian Electrical Code.

**WARNING:** Connecting the Pika Energy Island 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).

**WARNING:** This equipment is NOT intended for use with life support equipment or other medical equipment or devices.

**WARNING:** Disconnect all smart batteries and turn their Battery Disconnect switches to OFF before servicing the inverter or touching electrical terminals. Refer to smart battery documentation for complete safety instructions.

## Safety Shutdown

The Pika Energy Island system can signal to connected devices on REbus to shut down and limit output voltage to a safe level. The red Safety Shutdown button on the front of X7601/X7602/X11402 activates a Safety Shutdown. An external shutdown button may also be installed, given appropriate labeling. See "External Safety Shutdown Switch" on page 23 of this manual

**To enter a Safety Shutdown, press and hold the red button on the front of the inverter. The Safety Shutdown LED will illuminate and the LCD screen will indicate a Safety Shutdown has been initiated.**

In a system configured to provide backup power, the DC bus will remain energized on loss of AC grid power. Upon entering a Safety Shutdown, a shutdown signal will be transmitted to all devices connected to REbus. In Safety Shutdown, X7601/X7602/X11402 will disconnect from the grid, stop sourcing power to REbus, and immediately disable all sources on REbus by sending a global shutdown signal. All PV Link optimizers will disconnect their output. The Safety Shutdown LED will be illuminated to show that the inverter has entered a Safety Shutdown. DC bus voltage will be displayed on the inverter screen.



**WARNING:** UNLESS THE SYSTEM IS IN A SAFETY SHUTDOWN, LIVE VOLTAGE MAY BE PRESENT, EVEN WHEN THE POWER GRID HAS FAILED AND THERE IS NO SOURCE OF POWER FROM THE SOLAR PANELS. TO ENSURE THE DC BUS IS NOT POWERED, ALWAYS ACTIVATE SAFETY SHUTDOWN BEFORE PERFORMING EMERGENCY OR SERVICE WORK.

## **Section 3: Installing The Inverter**

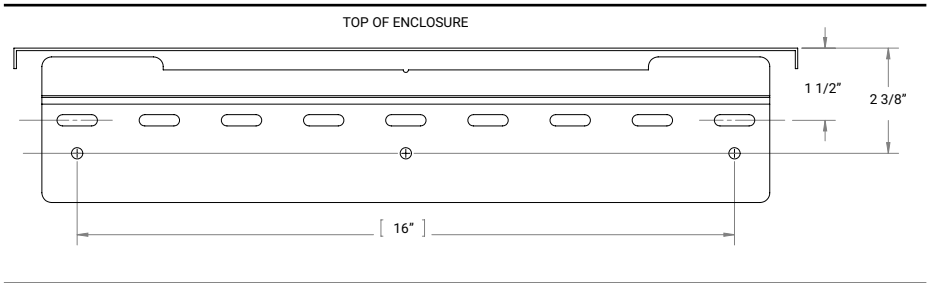
### **Mounting and Clearances**

The Islanding Inverter weighs 31.6 kg (70 lbs). Use appropriate fasteners to hold the mounting bracket to a strong surface. Engage screws with at least two studs or other structural members. The mounting bracket has clearance holes for 0.25" fasteners with slots to accommodate different stud spacings.



**CAUTION:** Mount the inverter to a strong, stable surface. Never mount to drywall, plaster, or other non-structural wall treatments. Always engage fasteners with at least two studs or other structural members.

With an assistant, lift the inverter, center it over the bracket, and lower gently. Align the tabs on the wall bracket with the slots on the back of X7601/X7602/X11402. Immediately secure the inverter to the wall with two fasteners through the back wall of the wiring compartment.



*Fig 6. X7601/X7602/X11402 Mounting Bracket and Clearances*

Pika Islanding Inverters are designed to be mounted upright on a vertical wall only. Observe all minimum airspace clearances as shown. Never obstruct the inverter exhaust louvers. Do not allow splashing water to enter through the louvers.

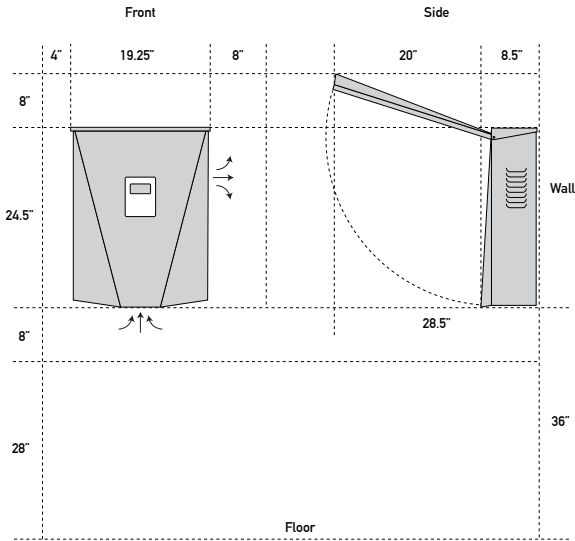


Fig 5. X7601/X7602/X11402 Mounting Clearances

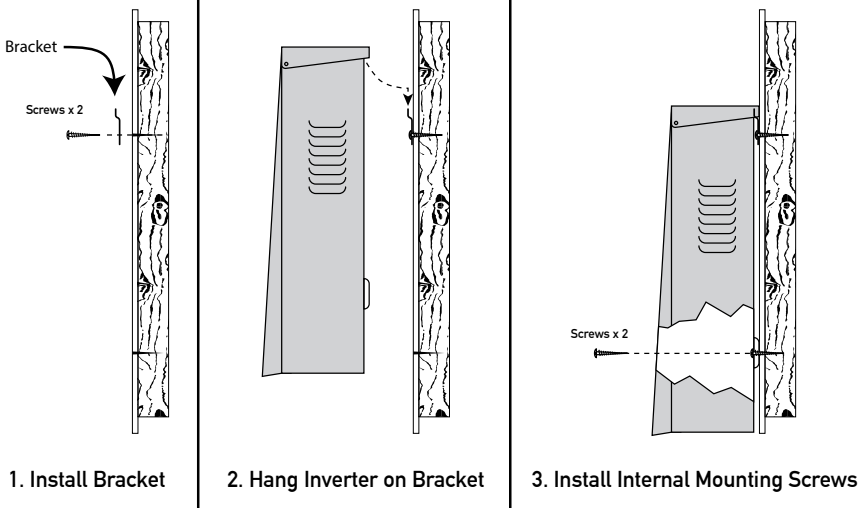


Fig 7. X7601/X7602/X11402 Hanging Bracket

## Electrical Connections

Wiring methods in accordance with National Electrical Code, ANSI/NFPA 70 are to be strictly followed when installing X7601/X7602/X11402:

1. X7601/X7602/X11402 includes an integrated AC and DC wiring compartment. As such, proper installation techniques should be employed to restrain service loops and to separate AC, DC and isolated circuits.
2. All pressure terminals are factory-installed and securely fastened. Field terminals are intended for copper conductors only.
3. Do not use field wiring leads smaller than 18 AWG.
4. All permanently-installed conductors within the X7601/X7602/X11402 are sized in compliance with NEC Table 310.15(B)(16) (formerly Table 310.16).
5. All installed conductors must be rated for at least 420V.
6. Torque all terminals as specified in “Section 10: Technical Reference” on page 50.

## Overview of Wiring Connections

Below is an example of a Pika Energy Island system consisting of the X7601 inverter, four S2501 PV Links and an advanced high voltage battery (380VDC storage).

Connect all equipment grounding conductors to the ground bar in the center of the wiring compartment. See “Grounding” on page 18 for detailed instructions.

Connect AC wiring to the AC terminals on the right side of the wiring compartment. See “AC Wiring” on page 20 for detailed instructions.

Connect all DC wiring to the REbus terminals on the left side of the wiring compartment at the bottom of the DC breaker panel. See “DC Wiring” on page 19 for detailed instructions.



**WARNING:** Verify all system voltages are safe before wiring. Always disconnect all AC and DC sources of power before touching terminals. Ensure no dangerous voltages are present on conductors and terminals before wiring.

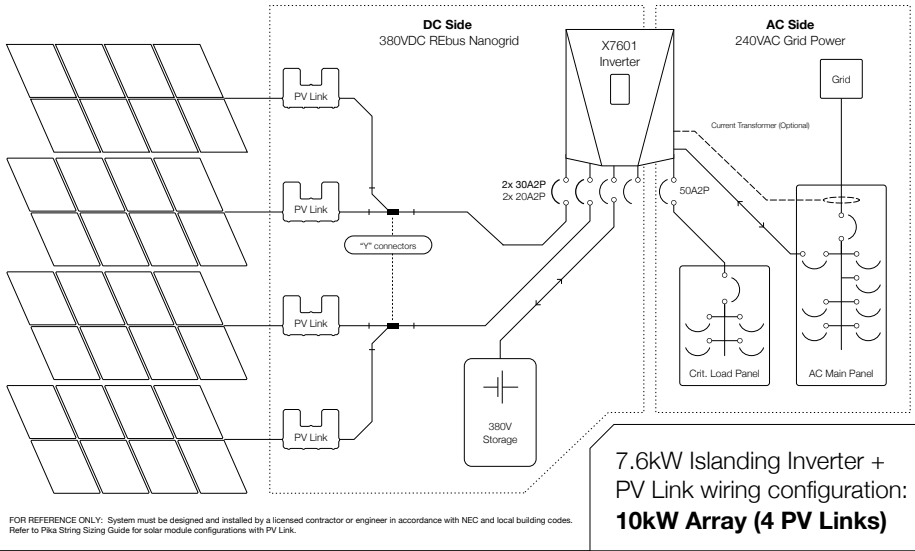


Fig 8. Example of 10kW Energy Island with HVDC storage and critical loads

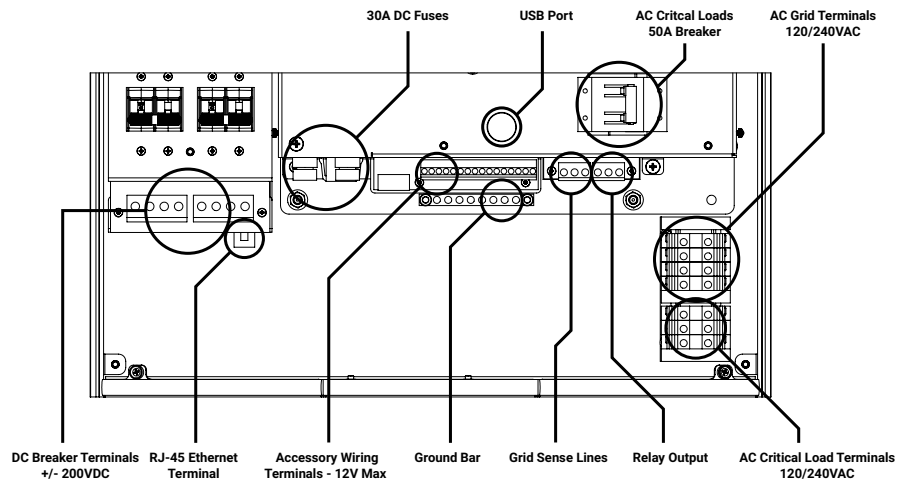


Fig 9. X7601/X7602/X11402 Islanding Inverter wiring compartment

## Knockout Dimensions and Locations

There are nine knockouts located on the bottom of the enclosure, three in the back, and one on the left hand (DC) side of the wiring compartment. You may use reducing washers to accommodate smaller conduit sizes.

To maintain the integrity of X7601/X7602/X11402's NEMA 3R enclosure, use raintight or wet locations hubs that comply with the requirements in the standard for conduit, tubing, and cable fittings (UL514B).

Reference the table below and the accompanying diagram for available knockout sizes and quantities. All knockouts are combination knockouts to allow the installer to select the correct size for their application.

Combination Knockout Size	Quantity
$\frac{3}{4}'' \times 1''$	6
$\frac{1}{2}'' \times \frac{3}{4}''$	7





## Grounding



Grounding means are provided by a grounding bar located in the back of the wiring compartment for up to 8 conductors. Minimum 10AWG to 4AWG maximum wire is permitted for installation to the grounding bar.



For proper REbus communication, bond the Islanding Inverter enclosure to ground and bond all PV Link and REbus device enclosures to the Islanding Inverter ground bar.

Input and output circuits from X7601/X7602/X11402 are isolated from the enclosure. The neutral line is not bonded to ground within the enclosure. System grounding, when required by Sections 690.41, 690.42, and 690.43 of the National Electric Code, ANSI/NFPA 70, is the responsibility of the installer.

Wire Size (AWG)	Torque (Nm)	Torque (lb-in)
4 - 6	5	45
8	4.5	40
10 - 14	4	35



**WARNING:** All REbus circuits are ungrounded. Never connect REbus conductors to ground.

Connect the equipment grounding conductors for all REbus devices to the ground bar. Ensure a good connection for proper REbus communication.

## DC Wiring

Connect all REbus devices to the DC wiring terminals inside the Islanding Inverter.

X7601/X7602/X11402's DC wiring terminals connect to four two-pole DC circuit breakers. DC terminals and breakers are labeled RE1-RE4. DC wiring terminals are rated for -40 to +130°C and accept 6-18AWG (0.75mm-10.00mm) conductors. DC breakers indicate state and are accessible behind a tool-less hinged cover. Torque DC terminals to 1.35 Nm (12 Lb-In).

Conductors must be rated for 90°C or higher.



**WARNING:** Connect only REbus-compatible devices. Do not connect PV directly to the inverter. PV must be connected via PV Link.



**WARNING:** Do not connect raw, unregulated battery output to the inverter. Connect only REbus-compatible smart batteries. Contact Pika Energy for a list of compatible smart batteries.

## DC Breakers

Four two-pole 600VDC rated Carling CX DC (magnetic-hydraulic) circuit breakers (UL489, UL489B listed) are included in the X7601/X7602/X11402 enclosure. These breakers serve as means of disconnect as well as overcurrent protection devices (OCPD) for DC circuits connected to Islanding Inverters. Provided DC circuit breakers indicate ON and OFF positions. DC breakers disconnect both ungrounded (+/-) DC conductors simultaneously. The DC circuit breakers are connected to the DC wiring terminals via a PC board.

All DC system components must connect to the DC bus through a provided DC breaker.

Breaker configurations vary between Islanding Inverter models.

Breaker Rating	QTY. per X7601	QTY. per X7602	QTY. per X11402
30A	2	4	4
20A	2	0	0

## AC Wiring



**WARNING:** To reduce the risk of fire, do not connect to an AC load center with multiwire branch circuits.

All AC wiring terminals accept a minimum of 14 AWG (2.08 mm<sup>2</sup>) to maximum 6 AWG (16 mm<sup>2</sup>) wire and are rated for up to 120°C. Seven AC terminals are provided, including both grid and critical load connections. Torque all AC connections to a minimum of 1.5 Nm (13.3 lb-in), not exceeding 1.8 Nm (15.9 lb-in). Conductors must be rated for 90°C or higher.

It is the responsibility of the installer to provide sufficient overcurrent protection for the main AC panel wiring terminals. Breaker size is not to exceed ampacity of installed conductors. Refer to all applicable codes and regulations when connecting the AC output of X7601/X7602/X11402 to AC distribution equipment.



**WARNING:** The Critical Loads terminals are to be wired to a separate subpanel. Never connect critical load lines directly to main service panel, as this will bypass the anti-islanding protection of the inverter and may result in damage to X7601/X7602/X11402.

By default, the Critical Loads output is connected by internal relays to the AC grid terminals of the inverter. In this state, the Critical Loads output is powered by the grid. In the event of a grid outage, the internal relays isolate the Critical Loads output from the AC grid connection and the inverter provides power to the Critical Loads terminals. The Critical Loads terminals are protected by a factory installed (50A 277VAC rated) breaker.

The Islanding Inverter cannot provide full three-phase power at the Critical Loads terminals. Contact Pika Energy for design assistance when using the X11400-series to provide backup power.

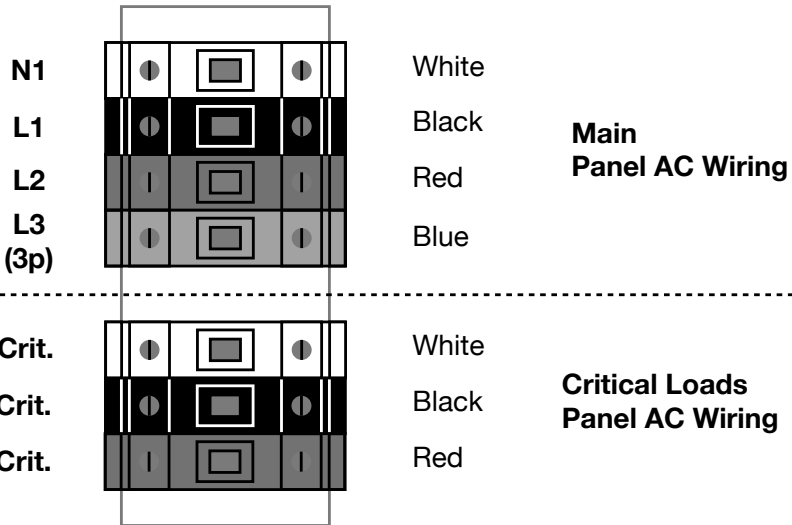


Fig 11. AC Terminal Block

## Connecting Ethernet

You must connect the inverter to the internet to enable online system monitoring. An internet connection also allows Pika Energy to perform remote service, troubleshooting, and software updates. No data is logged onboard Islanding Inverters when internet connectivity is unavailable.

The inverter's RJ45 ethernet jack is located inside the wiring compartment. When running ethernet cable without a conduit, use a cord grip to strain-relieve the ethernet cable through a knockout on the bottom of the inverter enclosure.

The inverter should usually be connected to a router and settings will be automatically detected (for networks using DHCP). For manual IP setup, refer to the Operation Manual.

*Note: Pika Energy does not recommend or support connection to the internet using a wifi bridge or router set up in "bridge" mode. The Islanding Inverter does not communicate reliably through this type of device. Use these devices at your own discretion.*

## Accessory Wiring

### Accessory Terminal Block

A 16-position accessory wiring block provides connections for external current transformers, external transfer switches, and other accessories. The 16-position wiring block accommodates 30 AWG minimum to 12 AWG maximum wires and has a temperature rating of -50 to 100°C. Torque all accessory terminal block connections to a minimum of 0.4Nm (3.5 lb-in) not exceeding 0.5Nm (4.4 lb-in).

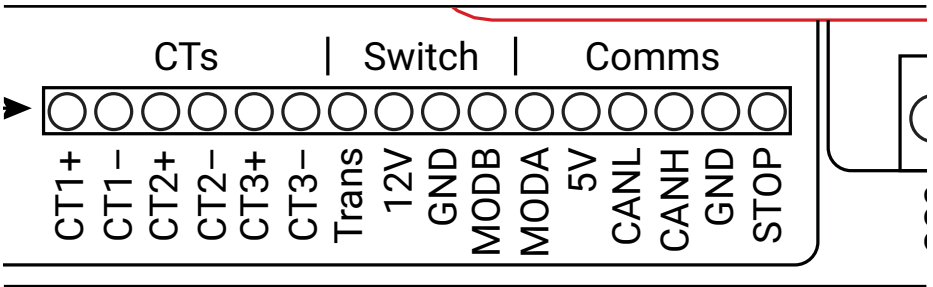


Fig 12. X7601/X7602/X11402 Accessory Terminal Block

### Accessory Supply Voltages

X7601/X7602/X11402 includes isolated 12V (0.5A max) and 5V (0.5A max) lines for powering and driving accessory devices such as transfer switches or external communication modules. One terminal is provided for each supply and several ground connections are available on the accessory terminal block.

*NOTE: Both outputs may not operate at maximum ratings. An aggregate of 6W is available from both accessory power output lines. (eg. 4W on 12V and 2W on 5V).*

### Transfer Switch Output

Do not attempt to use the TRANS terminal to drive a transfer switch coil. See “External Transfer Switches” on page 34 for instructions on connecting transfer switch control lines.

### CAN Bus and Modbus

At this time, the CAN bus and Modbus terminals are not supported. Using the REbus Beacon, an optional accessory, you may communicate with your inverter over Modbus using the SunSpec standard. Contact Pika Energy for more information on the REbus Beacon.

## Current Transformers

Current transformers are connected to CT1+/-, CT2+/- and CT3+/- terminals on the accessory wiring terminal block. Current transformers are required for Self Supply operational mode, and are optional for all other operational modes.

Terminals CT1 and CT2 are used in split phase operation, one for each hot line of a split phase service. CT1, CT2, and CT3 are used in three phase operation. For multiple inverter installations, contact Pika Energy for guidance on installing CTs.

Install CTs between the inverter point of interconnection and the grid. Connect leads from each sensor to the corresponding CT +/- terminals. The inverter will automatically detect the polarity and orientation of the current transformers. At least two current transformers must be installed for configuration of Self Supply mode.

## External Safety Shutdown Switch

Connections for an external Safety Shutdown switch are supplied on the accessory terminal block. Installation of an external switch does not disable the switch mounted on the front cover. If the external switch requires an indicator, the 12V output line may be used to supply the indicator.

SAFETY SHUTDOWN STATE: NOT ACTIVE

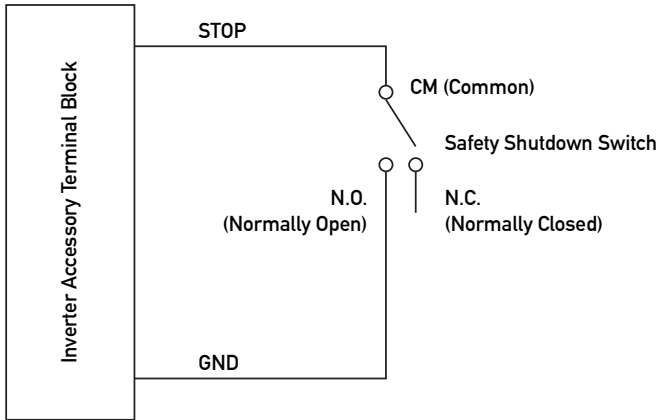


Fig 14.

If the external Safety Shutdown switch is a locking type switch, be aware that the system will not exit the Safety Shutdown until the switch has been reset.

## Grid Sense and Auxiliary Relay

Grid sense and auxiliary relay connections are terminated via a 3-position connector. The connector accepts 30 AWG minimum and 12 AWG maximum wire. Torque grid sense and auxiliary relay terminations to a minimum of 0.4Nm(3.5 lb-in), not exceeding 0.6Nm (5.3 lb-in).



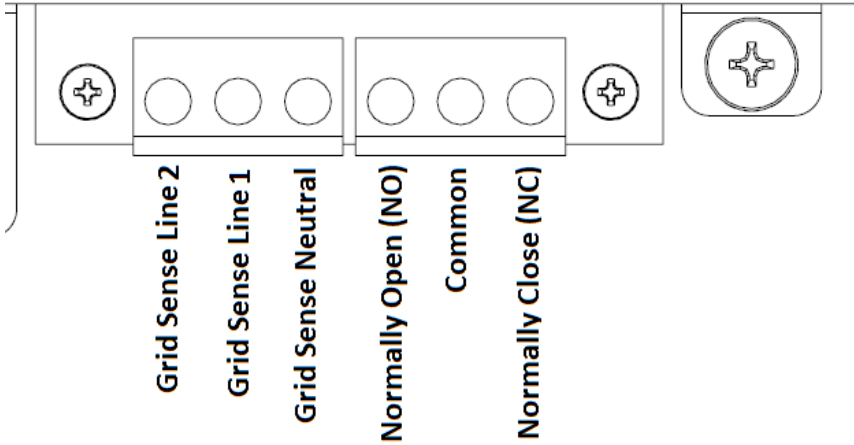


Fig 15.

## Relay Output

A relay output provides normally closed, normally open and common dry contacts via a 3-position connector. The relay output toggles on a grid fault and operates in tandem with the Transfer switch output.

If grid voltage is present on the grid sense lines, power will be provided to the relay coil. Relay state is described by the table below. A delay occurs once grid voltage is established with minimum on and off times defined in seconds by setpoints "ExtTransMinON" and "ExtTransMinOFF".

Relay State Table

Relay Function	Grid Voltage Present	Grid Voltage Below Threshold
NC Output	Open	Closed
NO Output	Closed	Open

## Grid Sense Lines

Grid sense lines are installed in conjunction with a transfer switch to sense the state of the grid during islanded operation. Install grid sense lines on the grid side terminals of the transfer switch.

## USB Connection

A USB type B jack is provided for use by Pika Energy service personnel. No data logging or other software is accessible by the user from the USB port.

## **Section 4: Compliance**

### **Note on DC Wiring and NEC**

Some electricians or installers may be unfamiliar with DC wiring in a residential setting. Please note the following:

1. NEC 690.31(G) for DC PV circuits in buildings:
2. NEC 215.12(C)(2) for correct DC wiring coloring.
3. NEC 210.5(C)(2) for identification of DC conductors more than 50V.
4. REbus wiring conventions.

For all REbus DC wiring please observe the following coloring convention. Mark or flag all conductors as appropriate. It is recommended that REbus (+) conductors NOT be green, white, gray or black. It is recommended REbus (-) conductors NOT be green, white, gray or red.

<b>Wire</b>	<b>Color</b>
REbus + (RE+)	Red
REbus - (RE-)	Black or Blue
Ground (GND)	Green or bare wire

### **Safety Shutdown**

X7601/X7602/X11402 is equipped with a Safety Shutdown function, intended for use in rapid shutdown (NEC 690.12) systems. Pressing and holding the “Safety Shutdown” button located on the front cover of the inverter will initiate a Safety Shutdown. Upon entering a Safety Shutdown, the inverter sends a shutdown signal to all connected devices on the REbus DC nanogrid until DC power to the inverter is lost. A Safety Shutdown may also be initiated by an external shutdown switch. See “External Safety Shutdown Switch” on page 23<?>. The inverter will not resume operation until the user exits the Safety Shutdown using the controls on the front of the X7601/X7602/X11402.

To exit the Safety Shutdown, press the center button on the keypad. Select “Confirm” to confirm that you want to exit Safety Shutdown, and then press any key to dismiss the message that appears.

Note: If there is an external Safety Shutdown switch installed, the inverter will not recover from the Safety Shutdown until the external switch is released. See the X7601/X7602/X11402 Operation Manual for details on Safety Shutdown.

## Voltage and Frequency Trip Thresholds

This unit or system is provided with fixed trip limits and shall not be aggregated above 30 kW on a single Point of Common Connection.

### Voltage Trip Thresholds

The following is a table of the default "As Shipped" fixed voltage trip setpoints. All over voltage and under voltage trip conditions result in a 300-second restart delay time after the trip threshold has been exceeded for the listed number of cycles.

### Frequency Trip Thresholds

The following is a table of the default "As Shipped" fixed frequency trip setpoints. All over frequency and under frequency trip conditions result in a 300-second restart delay time after the trip threshold has been exceeded for the listed number of cycles.

Voltage Trip Thresholds			Frequency Trip Thresholds		
Threshold	Threshold (% of nominal)	Default # of Cycles	Threshold	Hz Over/ Under Nominal	# of cycles
OV1	110	120	OF1	0.5	120
OV2	120	10	OF2	2	6
OV3	130	1	OF3	1.3	0
OV4	999*	1	OF4	0 <sup>†</sup>	1
UV1	88	120	UF1	0.5	120
UV2	50	10	UF2	2	10
UV3	0	1	UF3	0*	1
UV4	0	1	UF4	0*	1

\*Value of 999 indicated a disabled threshold for voltage trips

<sup>†</sup>Value of zero indicates a disabled threshold for frequency trips

## **Section 5: Energy Storage**

The Pika Energy Island is compatible with certain high voltage smart batteries, including the Harbor series of lithium-ion smart batteries and the Coral smart battery, both from Pika Energy. Contact Pika Energy for an up to date list of all REbus-compatible energy storage devices.

### **Connecting Energy Storage Devices to the Islanding Inverter**



**WARNING:** Connect only approved, REbus-compatible energy storage devices to REbus. Never connect any unapproved storage device to REbus.

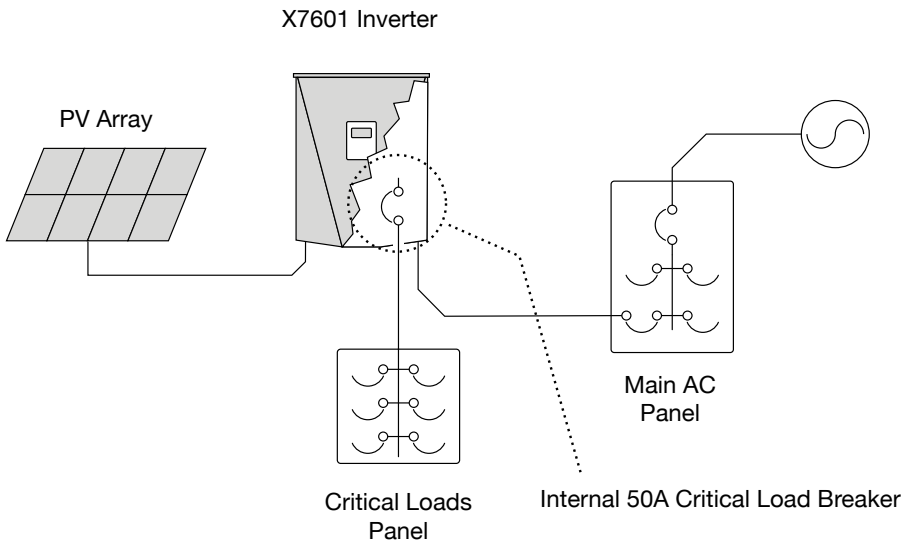
Connecting a storage device, such as a REbus-compatible smart battery, to your Islanding Inverter allows you to use Storage Interactive system operational modes, including Clean Backup, Priority Backup, and Self Supply.

Connect REbus compatible energy storage to the DC breakers inside the Islanding Inverter. Follow all wiring instructions in this manual and in the product manual for your storage device.

## **Section 6: System Configurations**

### **Grid Connect Mode**

In Grid Connect Mode, Islanding Inverters may be installed to either a 240V (split-phase) service or 208V three-phase service depending on model. In a 240V configuration, a X7601/X7602 can output 7.6kW of AC power. In a 208V three-phase configuration, a X11402 can output 11.4kW of AC power.



*Fig 19. Single-Inverter Grid Connect (add batteries later) Installation*

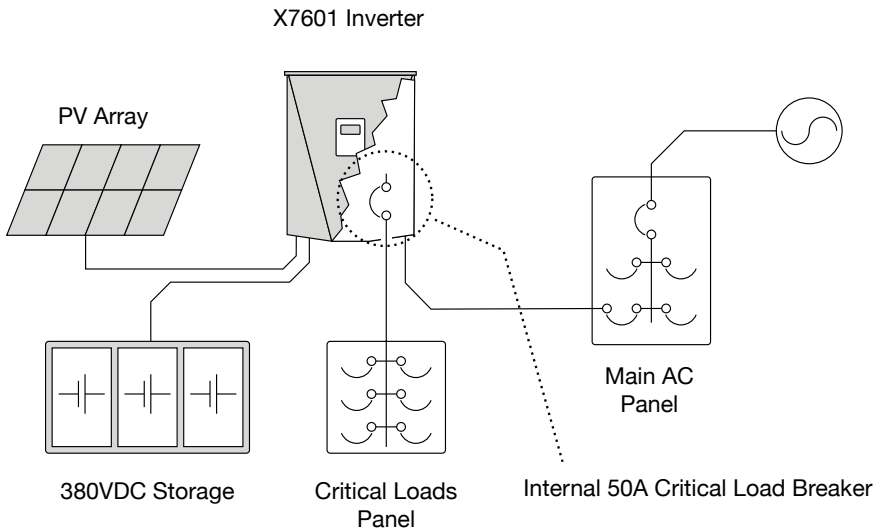
### **Storage Interactive Modes**

Clean Backup Mode, Priority Backup Mode, and Self Supply Mode all use REbus enabled Smart Batteries to provide backup power during grid outages. Each of these modes places different priorities on where power is allowed to flow to, and where it is sourced from.

The different storage interactive modes require the use of additional equipment. Equipment may include a dedicated protected loads panel, an external transfer switch, or current transformers.

See "Required Equipment" on page 33 for more information on what additional equipment you need for your installation.

All storage interactive modes are available by default for 240V grids only and require battery storage. Contact Pika Energy for considerations on installing a storage interactive system where only three-phase 208V service is available. See the X7601/X7602/X11402 Operation Manual for more information on selecting the correct Operational Mode for your situation.



*Fig 20. Single Inverter Backup Installation*

## Protected Loads Panel

A protected loads panel may be installed at the same time as an X7601/X7602/X11402. In a grid connected system, the protected loads panel is optional, but allows for the easy addition of a smart battery at a later date. To enable backup modes without the use of a protected loads panel refer to "External Transfer Switches" on page 34.

If batteries are installed and the system has been configured in a backup mode, in the event of a grid outage the critical loads will remain energized. The critical loads output will supply 120/240V loads only.

A critical loads panel is not required for grid connected configurations.



**WARNING:** Critical load terminals are to be wired to a separate subpanel. Never connect critical load lines directly to the main service panel without use of an external transfer switch. Direct connection of critical loads output to the grid will result in damage to the inverter.



**CAUTION:** Critical loads output is only to supply 120/240V loads and will NOT support three phase 208V loads.



**CAUTION:** Do not connect critical loads output in parallel with the grid!

## Notes on Current Transformers

Current transformers allow measurement of the power to and from the grid. Installation of current transformers is only required in self-supply mode but is optional for all other modes. Do not attach current transformers to critical loads output. Install current transformers on the hot lines of a 120/240V or 208V 3-phase service. See "Current Transformers" on page 23 for wiring and installation details.



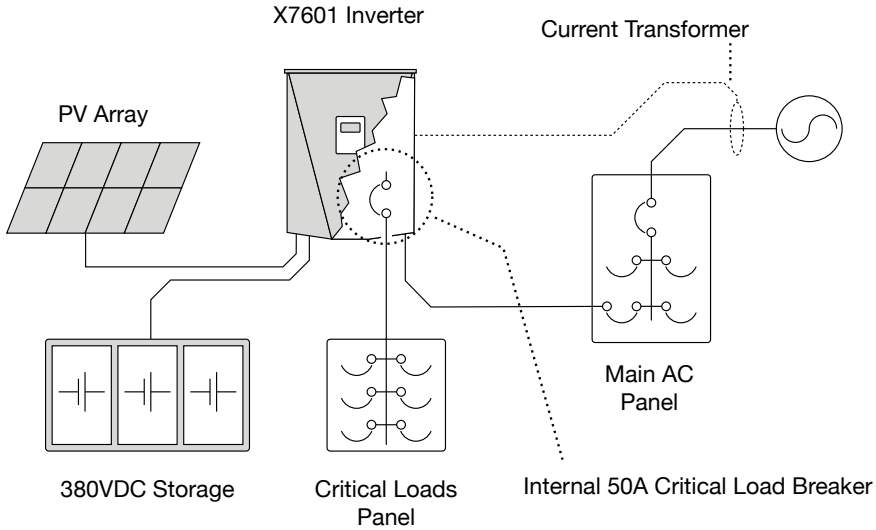


Fig 21. Single-Inverter Self Supply Installation

## Required Equipment

Each operational mode requires different configurations of batteries and current transformers. Use the table below to determine what additional equipment (beyond the Pika Islanding Inverter and Pika PV Link ) is required to install a given system.

Mode	Batteries	Current transformers	Protected Loads Panel
<b>Grid Connect</b>	Not Required	Optional	Optional
<b>Clean Backup</b>	Required	Optional	Required
<b>Priority Backup</b>	Required	Optional	Required
<b>Self Supply</b>	Required	Required	Optional

When installing a Pika Energy Island in Grid Connect Mode with the intent to add batteries later, consider including a critical load panel as part of the original installation. This will facilitate later conversion to one of the storage interactive configurations. An integrated 50A breaker is incorporated into X7601/X7602/X11402 to support the critical loads panel. Alternatively, an external transfer switch may be used to backup an existing panel. See "External Transfer Switches" on page 34<?>, for more information.

## External Transfer Switches

In situations where an entire main panel requires backup power, you may install an external transfer switch. This allows the critical loads output to power the entire main panel. During a grid outage, the system enters Islanding Mode and signals the transfer switch to change state. The Critical Loads output on the X7601/X7602/X11402 will supply power to the main panel. When grid service returns, the inverter will toggle the transfer switch and resume grid-tied operation.

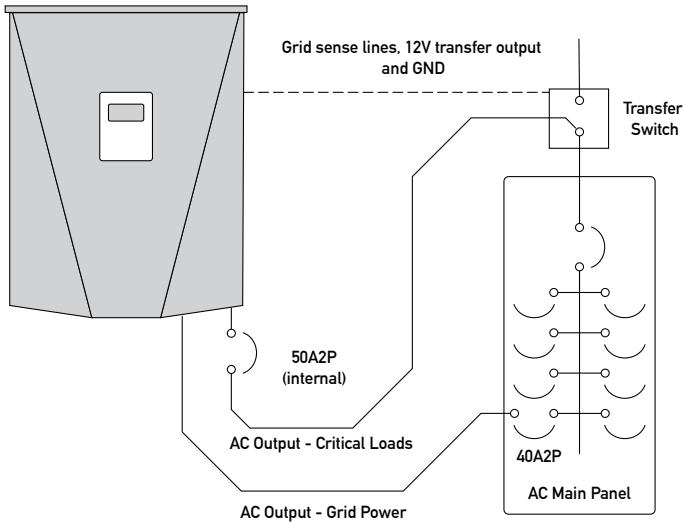


Fig 55. Main panel backup configuration using external transfer switch



**WARNING:** Critical load terminals are to be wired to a separate subpanel. Never connect critical load lines directly to the main service panel without use of an external transfer switch. Direct connection of critical loads output to the grid will result in damage to the X7601/X7602/X11402.

You may use either a manual or automatic transfer switch to provide main panel backup. Islanding Inverters are compatible with most manual transfer switches. For a list of approved automatic transfer switches, see “Approved Accessories for X7601/X7602/X11402” on page 39.

## Controlling an Automatic Transfer Switch (ATS)

*Note: The inverter must be configured for use with an automatic transfer switch. Before installing an automatic transfer switch, contact Pika Energy to request remote configuration.*

Connect transfer switch control and grid sense lines exactly as shown below.

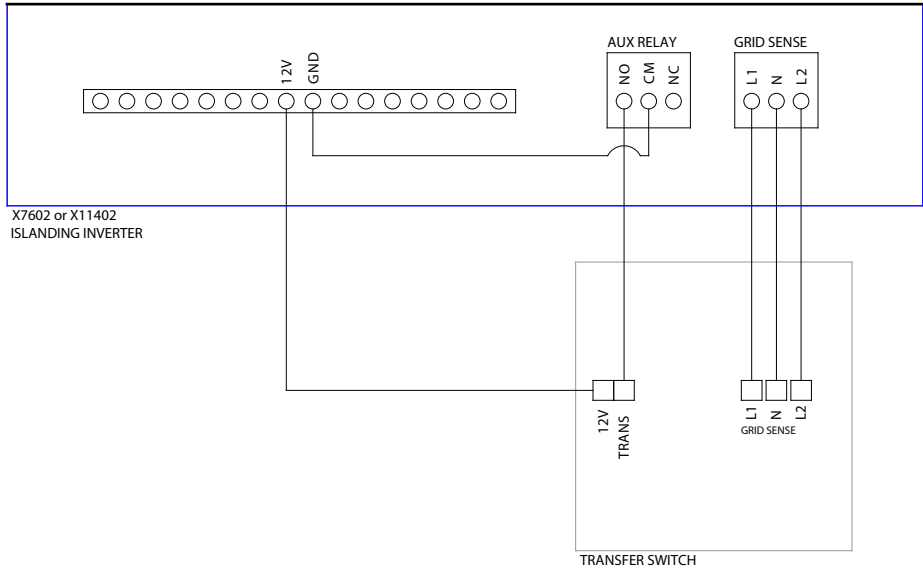


Fig 13: ATS control wiring

*Note: If you are using CTs, you must install them on the Grid side of the transfer switch.*

In the event of a grid outage, the Islanding Inverter will immediately toggle the transfer switch to provide power to the main panel from the Critical Loads output. The Critical Loads breaker must be ON in order for the switch to toggle; if the Critical Loads breaker is OFF, then the switch will not change positions.

Once grid power returns after an outage, there is a one-minute delay before the inverter will toggle the transfer switch back to grid power. (Note that the inverter has a five minute delay before exporting power to the grid.) Minimum On and Off times are defined in seconds by the setpoints "ExtTransMinON" and "ExtTransMinOFF".

## Multiple Inverter Installations

You may install more than one Islanding Inverter in the same building or on the same service, as permitted by code. Depending on the system configuration and site layout there are many ways to connect multiple inverters within the same building.

### Backup Modes (Priority and Clean Backup)

For configuring a system in backup modes with multiple inverters, contact Pika Energy for application-specific support.

### Using REview with Multiple Inverters

Any combination of REbus devices may be registered to a single online REview profile. This may include multiple Energy Island systems at a single site, or devices from several locations. See “Registering Your System on REview” on page 44 for more information on REview.

### REbus Cross Talk

When more than one Energy Island system is installed in the same building, the systems must be configured to prevent cross talk. Cross talk is a phenomenon where separate REbus systems pick up and receive REbus data from each other without being physically connected. Cross talk is not harmful and will not effect system performance, but it can cause an inverter to display information for devices that are not connected to it.

To prevent cross talk, you must assign each system in the building a different PLM channel. There are twelve channels available. Channel 0 is a “catch-all” channel; devices on channel 0 will broadcast their data to all other channels, and will receive data from all other channels. Use channel 0 to communicate with a device when you don’t know what PLM channel it is using, but don’t set a system to use channel 0 permanently. Use channels other than channel 0 to prevent cross talk.

For each system, set the same channel on each device, including all PV Links, smart batteries, and the inverter. Assign a different channel to each system. For example, if you have two systems, you can assign all the devices on one system to channel 1, and all the devices on the other system to channel 2.

For more information on using the inverter control panel and changing settings, see the X7601/X7602/X11402 Operation Manual.

**To set PLM channels and prevent REbus cross talk:**

1. Commission each system separately.
2. Power on the first system and follow the commissioning procedure given in “Section 7: Commissioning and Setup” on page 40.
3. Set the inverter PLM channel to 0. This will allow you to communicate with all connected devices, even if some of them have been set to a different channel.
  - i. Use the left and right arrow buttons to navigate to the correct device screen and press the center button to bring up the menu.
  - ii. Highlight ‘Mod. Settings’ and press the center button to select.
  - iii. Highlight ‘PLM Channel’ and press the center button to select.
  - iv. Use the up and down arrows to change the channel number to 0. Press the center button to confirm your choice.
  - v. Arrow down to highlight ‘Commit’. Press the center button, then confirm your selection.
4. Follow the same steps to set the PLM channel for each connected device (PV Link and smart battery) to any channel other than channel 0. Set all devices to the same channel. For each device:
  - i. Navigate to the correct device page.
  - ii. Enter the ‘Mod. Settings’ menu.
  - iii. Change the PLM Channel, commit and confirm your changes.
5. Once all connected devices are set to the new channel number, follow the same steps to change the inverter PLM channel to the new channel number.
  - i. Navigate to the inverter device page.
  - ii. Enter the ‘Mod. Settings’ menu.
  - iii. Change the PLM Channel, commit and confirm your changes.
6. The first system now has a new PLM Channel. Power this system down, then power up and commission the next system. Follow this procedure again to change the PLM channel to a different number. Repeat for every system in the building.
7. Once every system has its own channel, you can power on all systems without cross talk.

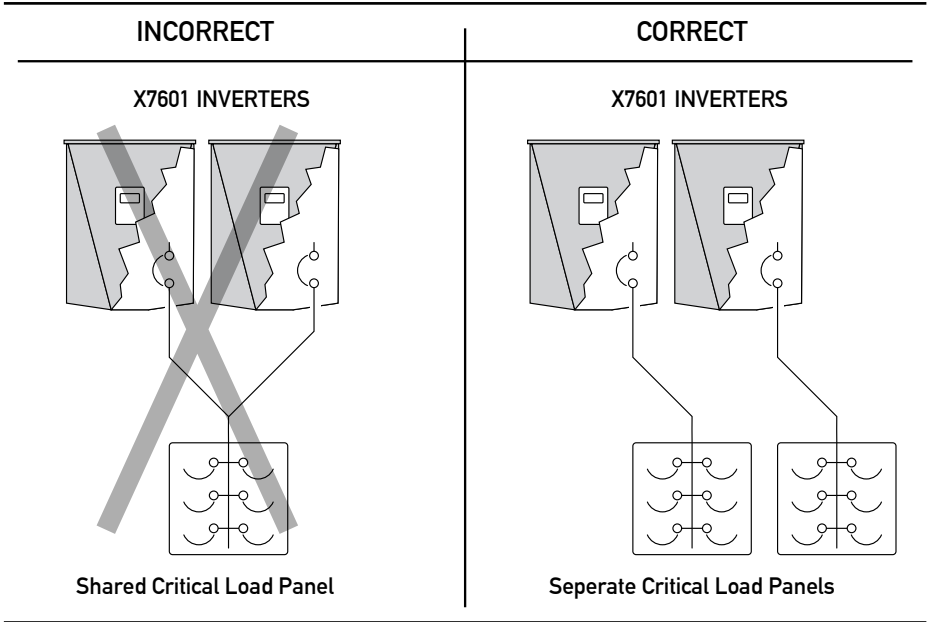


Fig 23. Do not parallel critical loads output



**Caution:** Do not connect the critical loads output from multiple inverters in parallel. Damage to X7601/X7602/X11402 will result!

## Connecting Third Party Equipment

REbus is designed to integrate Pika Energy equipment. All Pika Energy devices can connect to each other on REbus. Pika Energy inverters and converters can be AC-coupled and DC-coupled to many other manufacturers' equipment. However, all third party DC power sources or storage devices, including DC optimizers, battery chargers, smart batteries, and wind turbines, must be approved by Pika Energy as REbus-compatible.

Before attempting to connect any third party inverters or converters to your Pika Energy equipment, please contact Pika Energy for design assistance and approval.

## Approved Accessories for X7601/X7602/X11402

Some system applications require additional accessories and parts. You can find approved and recommended parts here. Contact Pika Energy if you have questions about selecting accessory parts.

### Revenue Grade Metering

Islanding Inverters are compatible with multiple revenue grade metering options. Contact Pika Energy for recommended equipment based on the size and location of the installation.

### Current Transformers

Most current transformers with a 1:3000 turns ratio will work, but accuracy may vary. Use one transformer on each leg of the service.

Approved Current Transformers (CTs)
LEM 100A 50-60Hz TT 100-SD
TDK CCT354571-300-24-02
TDK CCT406393-600-36-02

### Automatic Transfer Switches

You may use an automatic transfer switch (ATS) with X7601/X7602/X11402 to provide automatic backup power to an entire main panel. Be sure to select a transfer switch with the correct amperage and service entrance rating for your application. See “External Transfer Switches” on page 34 for instructions on connecting to an ATS.

Approved Automatic Transfer Switches (ATS)
Generac RTSW series

### Smart Batteries

See “Section 5: Energy Storage” on page 29 for more information on energy storage devices, including Smart Batteries. Contact Pika Energy for an up-to-date list of approved energy storage devices.

Approved Energy Storage Devices
Pika Energy Harbor series smart battery (HSBK-Plus and HSBK-Flex)
Pika Energy Coral smart battery (SB14A)

## Section 7: Commissioning and Setup

After successful installation and wiring of X7601/X7602/X11402 and the Pika PV Link optimizers, the Pika Energy Island system is ready to be commissioned.

All REbus devices are configured and controlled through the X7601/X7602/X11402. Connected devices will appear on the LCD display.

### Commissioning the System

*Note: If your installation includes more than one inverter at the same site, read and follow the instructions in "Multiple Inverter Installations" on page 36 before you continue.*

Commissioning consists of four steps:

1. Inverter Power-Up
2. Select an Operational Mode
3. Enable REbus Devices
4. Enable Ethernet

Before powering up your system for the first time, complete the following system checks:

1. AC voltage within specified range for system configuration (240V split-phase or 208V 3-phase)
2. All wiring terminations are tight and secure.
3. DC wiring field terminations are secure and polarity is correct.
4. DC breakers are OFF.

### Step 1: Inverter Power-Up

Power on the inverter by turning on the main AC breaker. The inverter screen will light up. You will see the home screen. The Operational Mode is listed at the top of the home screen above a power flow diagram. Once the home screen appears, you are ready to continue.

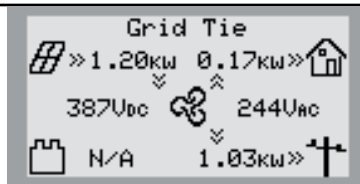


Fig 39. The inverter home screen



Note: If there is no grid power at the site and the system includes a REbus-compatible smart battery, you may also “blackstart” the system from the smart battery. Refer to your battery documentation for information on blackstarting your system..

## Step 2: Select an Operational Mode

Consult X7601/X7602/X11402 Operation Manual and “Section 6: System Configurations” on page 30 of this manual for guidance on selecting the correct operational mode.

To select an operational mode:

1. While viewing the home screen, press the center button.
2. The screen will display a list of operational modes. The current operational mode will have an asterisk (\*) next to it. (The list of modes may not include all those shown here. Not all modes are available for all situations.)
3. Use the up and down arrows to highlight the desired operational mode. Press the center button to select it.
4. Arrow right and press the center button to select “Confirm.”
5. The X7601/X7602/X11402 will now be in the new operational mode. Confirm that the mode listed at the top of the ICM screen is the desired mode.

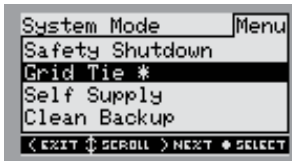


Fig. 40

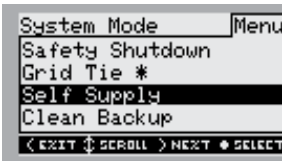


Fig. 41



Fig. 43

## Step 3: Enable Devices

All Pika Energy Island devices are enabled and configured individually through the inverter control panel. First, enable the inverter. Then follow the same steps to enable your other REbus devices, such as PV Links and smart batteries. Make sure to enable each REbus device.

To enable:

1. Press the right arrow button on the inverter LCD until the inverter device is displayed. The inverter device page display will read “Disabled.”
2. Press the center button.



## Step 4: Enable Ethernet

Press the left arrow button on X7601/X7602/X11402 until the Ethernet Status page appears. The MAC address is listed at the top of the screen. If the screen reads "Ethernet Disabled", follow steps 2 through 4 to Enable ethernet capability.

1. Press the center button to open the settings menu.
2. Use the up and down arrows and the center button to select "Enable Ethernet" [Fig. 45]. For advanced settings select "IP Settings" from Ethernet setting main menu.
3. Press the right Arrow, then the center button to select "Confirm" [Fig. 46].
4. The Pika Energy Island system is now Ethernet-enabled and can send and receive data. The blue Internet LED should now be illuminated [Fig. 56].

Don't forget to log on to [profiles.pika-energy.com](https://profiles.pika-energy.com) to sign up and register your REbus devices.



Fig. 45



Fig. 46



Fig. 56

## Registering Your System on REview

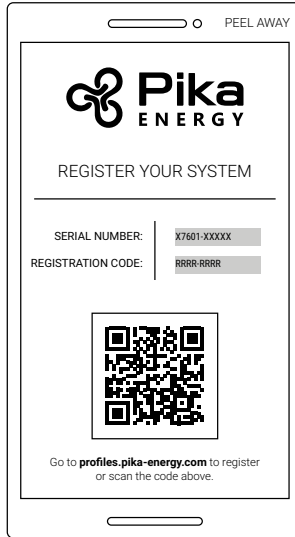


Fig 47. Example Pika Device Serial Number Sticker included with inverter

All Pika Energy products use REview, a performance monitoring program developed by Pika Energy and embedded in all REbus nanogrid systems. Each Pika Energy Island has its own REview dashboard that collects and reports system performance data at 20-second intervals.

Follow the instructions on the Registration sticker on the front of the Islanding Inverter to register your system. Keep all device serial number stickers and save them for future reference by attaching them to a single piece of paper or keeping them in a folder. This will accelerate any troubleshooting needed in the event of a call to the technical service team. Refer to the REview setup guide for complete instructions.

## **Section 8: Service and Maintenance**



**WARNING:** These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

### **Removing wiring compartment cover**

The wiring box cover is attached by 5 screws. Initiate a Safety Shutdown and allow the DC voltage to drop to a safe level. Power down inverter and disconnect all sources of AC and DC power. Remove all 5 screws to release the cover.

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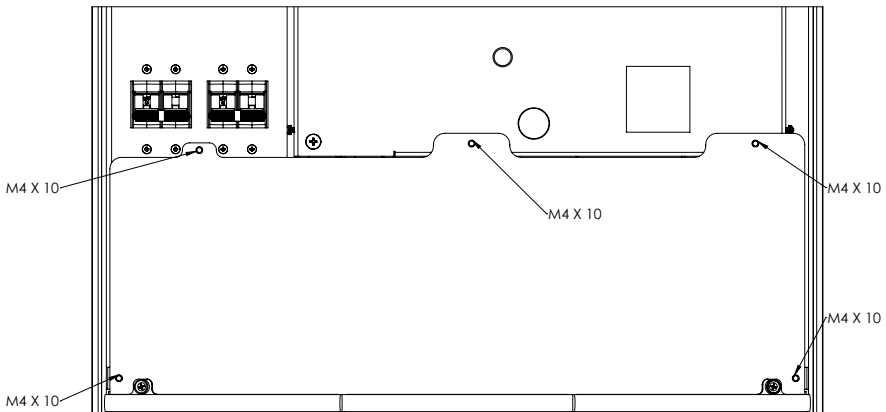


Fig 49.

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## Replacing fuses



**WARNING:** DO NOT REMOVE DC FUSES UNDER LOAD!

Two main fuses are installed between the Power Core and the DC breakers. The fuses can be accessed behind the wiring compartment cover. If a main fuse has blown, consult an installer or technical support to determine the root cause of the issue before replacing a fuse.

Pika Inverter Model	Fuse Rating	Fuse Model Number
X7601	30A 500V DC	Littelfuse: 0505030.MXP
X7602	40A 600V AC/DC	Ferraz: A60Q40-2
X11402	40A 600V AC/DC	Ferraz: A60Q40-2

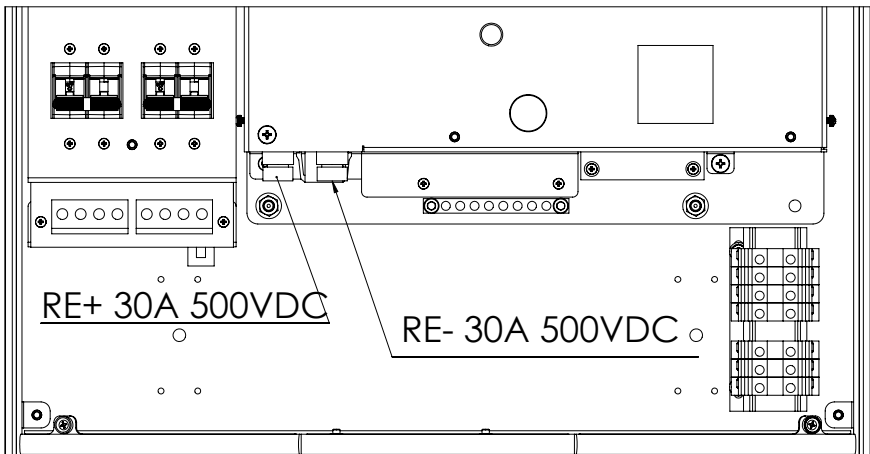


Fig 54. X7601 DC fuse locations

**To replace a fuse:**

1. Initiate a Safety Shutdown and disconnect all sources of DC and AC power.
2. Remove the wiring cover as described on page 45.
3. The DC fuses are located in the upper-left corner of the main compartment.
4. Press up and turn the fuse holder to remove the fuse. Insert a new fuse and press up on the fuse holder and screw in until it is firmly in place.



**CAUTION:** Never replace the fuse with a different size or style. Failure to follow these instructions could void X7601/X7602/X11402's warranty. See either the table on "Replacing fuses" on page 46 or the fuse label on your inverter's Power Core cover for required fuse specifications

## Battery Maintenance

Consult the battery manufacturer's specifications on battery maintenance schedules. Islanding Inverters are not equipped to warn the user of scheduled battery maintenance.

## **Section 9: Troubleshooting**

### **Inverter States and Events**

Islanding Inverters will cycle through a number of states during normal operation. States may vary depending on the configured operational mode. Additionally, events may occur on Islanding Inverters. Some of these events are normal, while some indicate a fault or error.

### **Events and Errors**

Events are created to save data during certain times of interest. Some events are created under normal operation while others are created on a fault or error condition. Events are displayed in a user profile under “Events” for each device.

### **Recovery From an Error State**

Error events will force X7601/X7602/X11402 into a error state where no DC power is exported, voltage may still be present on REbus from connected devices. Recovery from an error state can be accomplished by a manual or remote “Enable” and “Disable” command from the LCD screen. If the unit is unable to be accessed, but is connected to the internet, call Pika Technical support at (207) 887-9105 for assistance in resetting an error state.

### **Service**



**WARNING:** UNLESS THE SYSTEM IS IN A SAFETY SHUTDOWN, LIVE VOLTAGE MAY BE PRESENT, EVEN WHEN THE POWER GRID HAS FAILED AND THERE IS NO SOURCE OF POWER FROM THE SOLAR PANELS. TO ENSURE THE DC BUS IS NOT POWERED, ALWAYS ACTIVATE SAFETY SHUTDOWN BEFORE PERFORMING EMERGENCY OR SERVICE WORK.



**WARNING:** Users should not attempt to service X7601/X7602/X11402. Only an authorized technician should attempt to service Islanding Inverters.



Islanding Inverters feature a replaceable fan and technician-replaceable fuses and capacitor board. No other parts of X7601/X7602/X11402 are intended for technician replacement.

If X7601/X7602/X11402 fails, first contact Pika customer service at (207) 887-9105 for troubleshooting help. Refer to your product warranty for complete warranty terms. You must obtain a Returned Merchandise Authorization (RMA) number prior to returning a unit. Obtain the assistance of a skilled and qualified installer to safely disconnect the inverter for shipment.

## **Technical Support Information**

Support department hours: 9AM to 5PM Eastern Standard Time Zone, Monday – Friday  
(excluding holidays)

Phone: (207) 808-0362

Email: [support@pika-energy.com](mailto:support@pika-energy.com)

## Section 10: Technical Reference

### Terminal Torques

Torque specifications are derived from manufacturer recommendations.

Wiring Terminal	Torque
AC Terminals	Min: 1.5Nm (13.3 lb-in) Max: 1.8Nm (15.9 lb-in)
DC Terminals	1.35 Nm (12 Lb-In)
Ground Bar	4-6 AWG: 5 Nm (45 lb-in) 8 AWG: 4.5 Nm (40 lb-in) 10-14 AWG: 4 Nm (35 lb-in)
Accessory Terminal Block	Min: 0.4Nm (3.5 lb-in) Max: 0.5Nm (4.4 lb-in).
Grid Sense and Aux. Relay	Min: 0.4Nm(3.5 lb-in) Max: 0.6Nm (5.3 lb-in).

### Wire Sizing

Table of Recommended Max One-way REbus DC Run Distances (lengths in feet)

AWG	Ampacity	@ 2kW	@ 4kW	@ 6kW	@ 8kW	@ 10kW	@ 12kW	@ 14kW
8	40A	1512 ft	756 ft	504 ft	378 ft	302 ft	252 ft	216 ft
10	30A	951 ft	476 ft	317 ft	238 ft	190 ft	-	-
12	20A	597 ft	299 ft	199 ft	-	-	-	-
14	15A	377 ft	188 ft	-	-	-	-	-

## **Section 12: Specifications**

### **Quick Reference**

<b>Specification</b>	<b>X7600 Series</b>	<b>X11400 Series</b>	<b>Units</b>
<b>Max. cont. AC power @ 50°C</b>	7.6	11.4	kW
<b>Grid voltage (AC)</b>	240 (1-ph)	120/208 (3-ph)	VAC
<b>Max cont. REbus current (peak)</b>	20	30	A
<b>Max cont. grid current (peak)</b>	32		A
<b>AC terminals wire size</b>	14 - 6		AWG
<b>DC terminals wire size</b>	18 - 6		AWG
<b>Acc. terminal block wire size</b>	30 - 12		AWG
<b>Aux relay/grid sense wire size</b>	30 - 12		AWG
<b>Weight</b>	29		kg
<b>Thermal Management</b>	forced convection		-
<b>Temperature Range</b>	-20 to +50		°C
<b>Weatherization rating</b>	NEMA 3R		-
<b>Enclosure Material</b>	Powder-Coated Steel		-
<b>Size (H x W x D)</b>	622 x 489 x 203, (24.5 x 19.25 x 8)		mm, (in)
<b>Warranty</b>	10 years standard		-

## Detailed Ratings

Rating Type	Alt Rating Name	Min	Nominal	Max	Units
Maximum Input Voltage	Maximum nanogrid voltage			420	V
Range of Input Operating Voltage	Nanogrid operating voltage range	360		400	V
Maximum input current	Maximum nanogrid input current			20	A
Maximum input short circuit current	Maximum nanogrid short circuit current			30	A
Maximum input source backfeed current to input source	Maximum nanogrid output current			30	A
Output power factor rating	AC power factor rating			1	-
Operating Voltage range (ac) 2ph		108		130	V <sub>rms</sub>
Operating Voltage range (ac) 3ph		106		132	V <sub>rms</sub>
Operating frequency range or single frequency		59.6		60.4	Hz
Nominal output voltage (ac)	Nominal AC voltage		120/240 & 208V 3ph		V <sub>rms</sub>
Normal output frequency	Nominal AC frequency		60		Hz
Maximum continuous output current (ac)	Maximum continuous AC current			32	A, rms
Maximum output overcurrent protection	Maximum AC overcurrent protection			50	A
Max output fault current and duration			50 / 17		A/ms
Utility interconnection voltage and frequency trip limits and trip times	See "Voltage and Frequency Trip Thresholds" on page 28 of this manual				
Trip voltage and frequency limits					
Trip Voltage Accuracy					
Trip Time Accuracy			2% +/-2 cycles		-
Normal operation temperature range		-20		+50	C
Output power temperature derating and maximum full power operating ambient		-20		+50	C
Peak Efficiency				97.5	%
CEC Weighted Efficiency				97	%



## Notes

Use the following pages to record notes about your system or to document phone calls with our service department, available M-F 9AM-5PM ET at 207-808-0362.

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[www.pika-energy.com](http://www.pika-energy.com)

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