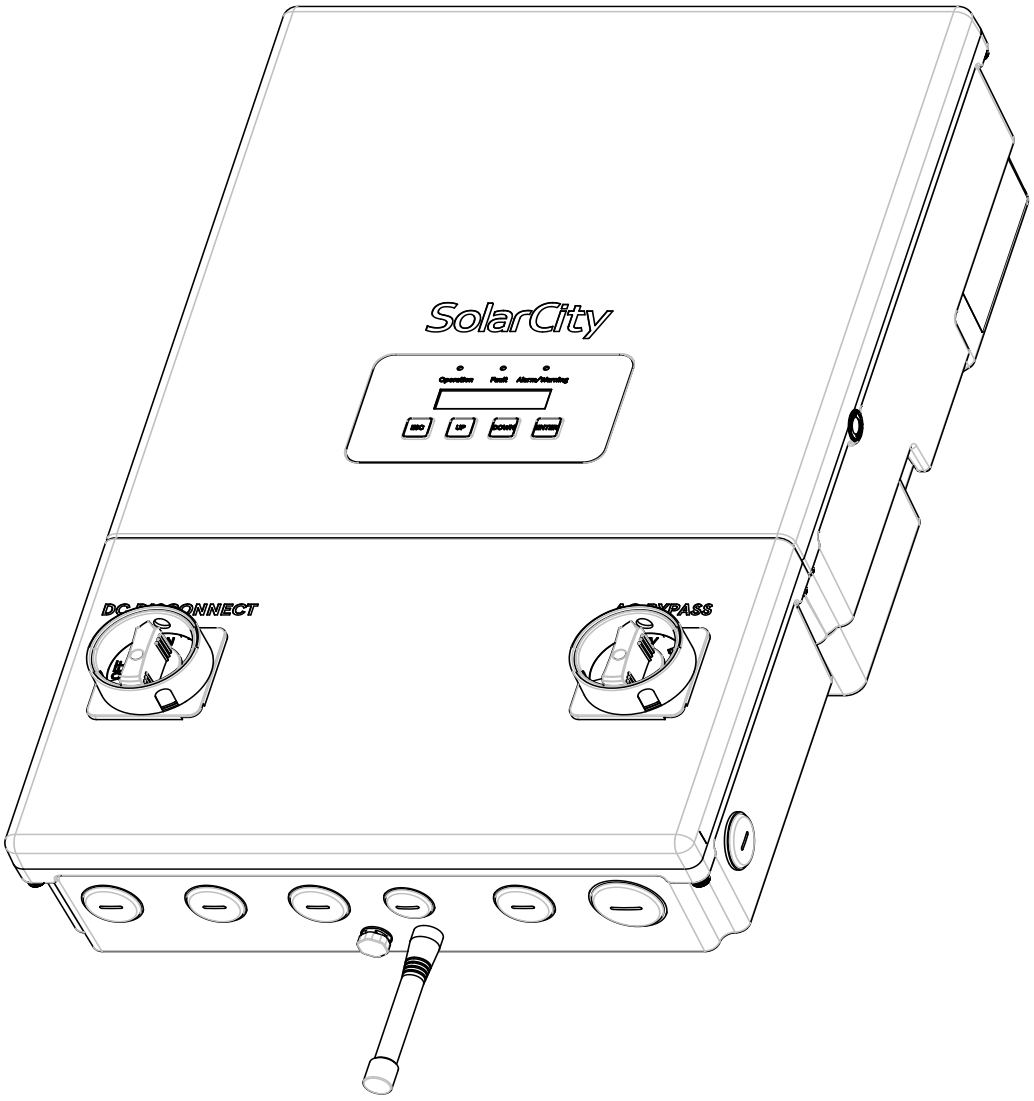
SolarCity
Power forever.



H6 Hybrid Inverter

Installation & Operation Guide

COPYRIGHT NOTICE

SolarCity H6 Inverter Installation & Operation Manual, v1.1 (02/2017)

©2017 by SolarCity Corporation, 3055 Clearview Way, San Mateo, CA 94402
phone: (650) 638-1028, **fax:** (650) 560-6460; *www.solarcity.com*.

No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, be it electronic, mechanical, photographic, magnetic or otherwise, without the prior written permission of SolarCity Corporation.

SolarCity Corporation makes no representations, express or implied, with respect to this documentation or any of the equipment and/or software it may describe, including (with no limitation) any implied warranties of utility, merchantability, or fitness for any particular purpose. All such warranties are expressly disclaimed. SolarCity Corporation shall not be liable for any indirect, incidental, or consequential damages under any circumstances.

(The exclusion of implied warranties may not apply in all cases under some statutes, and thus the above exclusion may not apply.)

Specifications are subject to change without notice. Every attempt has been made to make this document complete, accurate and up-to-date. Readers are cautioned, however, that SolarCity Corporation reserves the right to make changes without notice and shall not be responsible for any damages, including indirect, incidental or consequential damages, caused by reliance on the material presented, including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the content material.

All trademarks are recognized even if these are not marked separately. Missing designations do not mean that a product or brand is not a registered trademark.

Copyright 2017 SolarCity Corporation. All rights reserved.

Table of Contents

1 - Welcome 1
1.1 - Qualification of Skilled Workers 5
1.2 - General H6 Features 5
1.3 - Package Contents 6
1.4 - Additional Tools 6
1.5 - About This Manual 7
1.5.1 - Formatting Conventions 7
1.5.2 - Safety Symbols 8
1.5.3 - Layout 9
1.6 - Related Documentation 10
1.7 - Additional Resources 10
1.8 - Technical Support 10

2 - Safety Instructions 11
2.1 - General 11
2.2 - SolarCity H6 Inverter 12
2.3 - Safety Labels 14
2.4 - Battery Pack Safety 15

3 - Overview 17
3.1 - Layout 17
3.2 - Dimensions & Clearances 20
3.2.1 - Inverter Dimensions 20
3.2.2 - Clearances 21
3.3 - Inverter Mounting Bracket 22
3.3.1 - Standard 16″ Wall 23
3.3.2 - 24″ Wall 24
3.3.3 - Single Pillar 24
3.3.4 - Masonry or Concrete Walls 24
3.4 - DC and AC Switches 25
3.4.1 - DC Disconnect Switch 25
3.4.2 - AC Bypass Switch 26
3.5 - Inverter Wiring Box 27
3.5.1 - PV Interface 28
3.5.2 - Battery Pack Interface 31
3.5.3 - Communications 31
3.5.4 - Backup/Protected Loads Panel 32
3.5.5 - AC Grid Point of Interconnection 34

Copyright 2017 SolarCity Corporation. All rights reserved.

3.6 - Whole-Home Backup at the Main Panel 35
3.6.1 - Mechanical Interlock Kit on the Main Panel 35
3.6.2 - Mechanical Interlock Kit on a Separate Manual Transfer Switch 36
3.6.3 - Sources for MIK and MTS Products 37
3.7 - External Components 37
3.7.1 - PV Array 37
3.7.2 - Battery Pack 38
3.7.3 - Back-up Electrical Panel 39
3.7.4 - Main Electrical Panel 41
3.8 - Fireman Switch and Rapid Shutdown 42
3.8.1 - Components 42
3.8.2 - System Diagram 43
3.8.3 - Fireman Switch Sequence 44
3.8.4 - DC Disconnect Switch Sequence 45

4 – Installation 47
4.1 - Visual Inspection 48
4.2 - Selecting a Location 48
4.3 - Mounting the Inverter 50
4.3.1 - Installing the Inverter Mounting Bracket 51
4.3.2 - Hanging the Inverter 52

5 – Electrical Connections 55
5.1 - System Wiring Diagrams 57
5.2 - Wiring Box Cover 59
5.2.1 - Remove Wiring Box Cover 59
5.2.2 - Refit Wiring Box Cover 60
5.3 - Conduit Plugs and Fittings 61
5.4 - Grounding Connections 62
5.5 - Using the Spring Clamp Connectors 62
5.6 - PV Connections 63
5.6.1 - Limitations 64
5.6.2 - Wiring 64
5.7 - Battery Pack Connections 65
5.7.1 - Wiring 65
5.7.2 - Fuses 66
5.7.3 - Communications 66
5.8 - AC Voltage 67
5.8.1 - Output to Grid 67
5.8.2 - Utility Back-Feed (OCPD) Circuit Breaker 68
5.8.3 - Output to Backup Load Center 68
5.9 - Communications 69
5.9.1 - ZigBee & Gateway 69
5.9.2 - Integrated Revenue Grade Meter (RGM) 69
5.9.3 - PV-Only Charging 69

Copyright 2017 SolarCity Corporation. All rights reserved.

5.9.4 - Rapid Shutdown (RSD) 70
5.9.5 - Dark-Start Feature 70
5.9.6 - Fireman Switch 71

6 - User Controls 73
6.1 - Displays and Buttons 73
6.1.1 - Status LEDs 75
6.1.2 - LCD Display 76
6.1.3 - Push Buttons 76
6.2 - Menu Structure 77
6.2.1 - System Overview Menu 77
6.2.2 - Current Status Menu 79
6.2.3 - External Messages Menu 79
6.2.4 - Software Versions Menu 79
6.2.5 - Clear Fault Menu 80
6.2.6 - Soft Shutdown Menu 80
6.2.7 - Grid Settings Menu 80
6.2.8 - ZigBee (Xbee) Information Menu 81

7 - Commissioning 83

8 - Basic Operation 85
8.1 - Powering On the Inverter 85
8.2 - Powering Off the Inverter 86
8.3 - Bypassing the Inverter 86
8.4 - Opening/Closing the Inverter 86
8.5 - Power Flow Modes 87
8.5.1 - PV to Battery Pack 87
8.5.2 - PV to AC Grid Output 87
8.5.3 - PV to Protected Home Loads 87
8.5.4 - Battery Pack to AC Grid Output 87
8.5.5 - Battery Pack to Protected Home Loads 88
8.5.6 - AC Grid to Protected Home Loads 88
8.5.7 - AC Grid to Battery Pack 88
8.5.8 - On-Grid to Off-Grid Status 89
8.5.9 - Off-Grid to On-Grid Status 89

9 - Product Information 91
9.1 - Specifications 91
9.1.1 - General 91
9.1.2 - Mechanical 92
9.1.3 - PV Input 92
9.1.4 - AC Output 93
9.1.5 - Battery Pack Interface 93

Copyright 2017 SolarCity Corporation. All rights reserved.

9.2 - Protection Features 94
9.2.1 - Arc Fault Circuit Interrupter 94
9.2.2 - Anti-Islanding Protection 94
9.2.3 - Reverse Polarity 94
9.2.4 - Residual Current Detection (RCD) 94
9.2.5 - Fireman Switch 94
9.2.6 - RISO (PV Insulation Resistance Monitor) 95
9.3 - Standards & Directives 95
9.4 - Communication 95
9.5 - Thermal, Voltage, and Efficiency Charts 96
9.5.1 - Thermal De-rating 96
9.5.2 - PV Voltage and AC Output Power 97
9.5.3 - PV Input Voltage and Efficiency 98
9.5.4 - Battery Pack Round-Trip (Charging & Discharging) Efficiency 99
9.6 - Regulatory Approvals 100
9.6.1 - FCC Compliance 100
9.6.2 - UL Certificate 101

10 - Troubleshooting and Maintenance 103
10.1 - Intended Uses 103
10.2 - General Troubleshooting 103
10.3 - Alarms, Faults, and Warnings 105
10.3.1 - Alarms 105
10.3.2 - Faults 106
10.3.3 - Warnings 108
10.4 - Replacing the Inverter 109
10.4.1 - Inverter (Remove) 109
10.4.2 - Inverter (Refit) 110
10.5 - Replacing Internal Components 113
10.5.1 - Fuses 115
10.5.2 - Fan 116
10.5.3 - PLC Transmitter 116
10.5.4 - ZigBee Chip 118
10.5.5 - 9-Volt Battery 120
10.6 - Warranty and Returns 121

A - Glossary 123

Copyright 2017 SolarCity Corporation. All rights reserved.

B - SMART Rapid Shutdown Slave 127
B.1 - Dimensions and Clearances 128
B.1.1 - SMART RSS Dimensions 128
B.1.2 - Clearances 129
B.2 - Installing the SMART RSS 130
B.3 - Removing the SMART RSS 132
B.4 - Grounding the SMART RSS 133
B.5 - Warning Label 133
B.6 - Self-Test 133
B.7 - Specifications 134
B.7.1 - Mechanical 134
B.7.2 - Ratings 134
B.7.3 - Compliance 135

Copyright 2017 SolarCity Corporation. All rights reserved.

This page intentionally left blank.

Copyright 2017 SolarCity Corporation. All rights reserved.

List of Figures

Figure 1-1: Typical PV installation with a SolarCity H6 inverter 3
Figure 1-2: Block diagram of a complete SolarCity H6 inverter installation 4
Figure 1-3: Ratchet wrench, long-shank screwdriver, and chip puller 7
Figure 2-1: SolarCity H6 safety labels 14
Figure 3-1: SolarCity H6 inverter with callouts 17
Figure 3-2: SolarCity H6 inverter dimensions (front view) 20
Figure 3-3: SolarCity H6 inverter dimensions (bottom view) 20
Figure 3-4: Minimum clearances (below) 21
Figure 3-5: SolarCity H6 Inverter Mounting Bracket with hooks 22
Figure 3-6: Installing the Inverter Mounting Bracket on various wall types 23
Figure 3-7: DC Disconnect Switch in ON position 25
Figure 3-8: DC Disconnect Switch in OFF position 25
Figure 3-9: AC Bypass Switch in the INV position 26
Figure 3-10: AC Bypass Switch in the BYP position 26
Figure 3-11: SolarCity H6 inverter wiring box connections 27
Figure 3-12: Wiring box label 27
Figure 3-13: Parallel string connections 29
Figure 3-14: Fireman Switch connections 30
Figure 3-15: Fireman Switch operation (below) 30
Figure 3-16: DC Disconnect Switch operation (below) 30
Figure 3-17: High-voltage battery pack connections 31
Figure 3-18: Communications connections (colors may vary) 32
Figure 3-19: Backup load connections 33
Figure 3-20: AC grid POI output connections 34
Figure 3-21: Mechanical Interlock Kit (MIK) Installed on a Main Panel 35
Figure 3-22: Mechanical Interlock Kit (MIK) Installed on a Manual Transfer Switch (MTS) 36
Figure 3-23: RSS components and wiring 43
Figure 4-1: Inverter orientation 49

Copyright 2017 SolarCity Corporation. All rights reserved.

Figure 4-2: Hanging the SolarCity H6 inverter on the mounting bracket 53
Figure 5-1: SolarCity H6 installation wiring diagram (1 of 2) 57
Figure 5-2: SolarCity H6 installation wiring diagram (2 of 2) 58
Figure 5-3: Removing the wiring box cover and close-up of screw head..... 60
Figure 5-4: Rain-tight compression connector 61
Figure 5-5: Using the spring clamp connectors 63
Figure 5-6: Fireman Switch 71
Figure 6-1: SolarCity H6 inverter LEDs, LCD display, and buttons 73
Figure 6-2: Interpreting the SolarCity H6 inverter LEDs 75
Figure 9-1: Temperature de-rating graph 96
Figure 9-2: AC Output power vs. PV input voltage range 97
Figure 9-3: CEC Efficiency vs. PV input voltage 98
Figure 9-4: Battery pack charging efficiency 99
Figure 9-5: Battery pack discharging efficiency..... 99
Figure 10-1: Removing the SolarCity H6 inverter top section 110
Figure 10-2: Wires from inverter top section to wiring box 112
Figure 10-3: Internal components (with separate PLC, top; with integrated PLC, bottom) 113
Figure 10-4: ZigBee chip with circuit breaker cover removed..... 119
Figure 10-5: 9-Volt Battery (unit with separate PLC, top; with integrated PLC, bottom) ...120
Figure B-1: SMART RSS dimensions 128
Figure B-2: Minimum SMART RSD clearances..... 129
Figure B-3: Installing the SMART RSS (below)..... 131
Figure B-4: Removing the SMART RSS 132

Copyright 2017 SolarCity Corporation. All rights reserved.

1 - Welcome

This guide describes the safety, installation, commissioning, operation, troubleshooting and maintenance of the SolarCity H6 inverter. The inverter may or may not include a pre-installed Power Line Communication (PLC) Transmitter.

WARNING: THIS MANUAL IS FOR USE BY QUALIFIED PERSONNEL ONLY. QUALIFIED PERSONNEL ARE THOSE WHO HAVE RECEIVED TRAINING AND HAVE DEMONSTRATED SKILLS AND KNOWLEDGE IN THE COMMISSIONING AND OPERATION OF THIS DEVICE, AND WHO ARE TRAINED IN MITIGATING THE DANGERS AND HAZARDS INVOLVED IN INSTALLING ELECTRICAL DEVICES.

Note: This guide includes general information about third-party accessory devices that are connected to the H6 inverter. Please refer to the third-party device documentation for detailed information and specifications for those devices.

Note: Store this guide in a readily accessible location.

The H6 inverter is a bidirectional, multi-mode (hybrid) inverter that can:

Convert direct current (DC) from both PV modules (photovoltaic modules, also called solar panels) and batteries into alternating current (AC) that is synchronized to interface with the utility grid voltage.

- Charge an external battery pack with power harvested from the PV modules.
- Discharge battery pack power to operate home loads.
- Supply PV-generated power to the utility grid.
- Pass through utility power to selected home loads via the backup electrical panel.
- Charge an external battery pack with power supplied by the electrical grid (only if permitted by the local utility).

The SolarCity H6 inverter is a transformer-less multi-mode inverter that meets all UL 1741 and IEEE 1547 requirements that uses efficient Maximum Power Point (MPP) tracking to achieve maximum power output. The wide MPP range supports a variety of PV modules from a variety of manufacturers, with a maximum no-load (open circuit) voltage of 570V. Maximum

Copyright 2017 SolarCity Corporation. All rights reserved.

no-load voltage occurs at the lowest-anticipated temperatures. Please refer to the PV module documentation for detailed temperature dependency information.

The SolarCity H6 inverter contains an internal automatic transfer relay that enables off-grid operation. Protected home loads (also called protected loads) are loads extended from an existing electrical panel and placed into a new electrical panel called the "backup panel." Protected home loads operate with standby PV and/or battery pack power when grid power is not available.

Power from the solar array charges the battery pack during the day. The operating voltage of the battery pack must correspond to the battery pack input voltage range on the battery pack interface of the SolarCity H6 inverter. The battery pack management system (BMS) records critical information (DC current, voltage, power, SOC, temperature, faults, etc.) when charging and discharging the battery pack and reports to the inverter on a continuous basis.

Note: Balance of Systems (BOS) refers to hardware that is used in the installation of this system, including but not limited to wires, conduits, boxes, etc.

Note: The combination of PV arrays, SolarCity H6 inverter, battery pack, backup electrical panel, any accessories, BOS, and main electrical panel is referred to as an Energy Storage System (ESS).

WARNING: INSTALLATION OF ANY OTHER BATTERY PACK THAN THE TYPE SPECIFICALLY SUPPORTED BY THE H6 INVERTER WILL VOID THE INVERTER WARRANTY.

Figure 1-1 on the next page depicts a typical home installation.

Copyright 2017 SolarCity Corporation. All rights reserved.

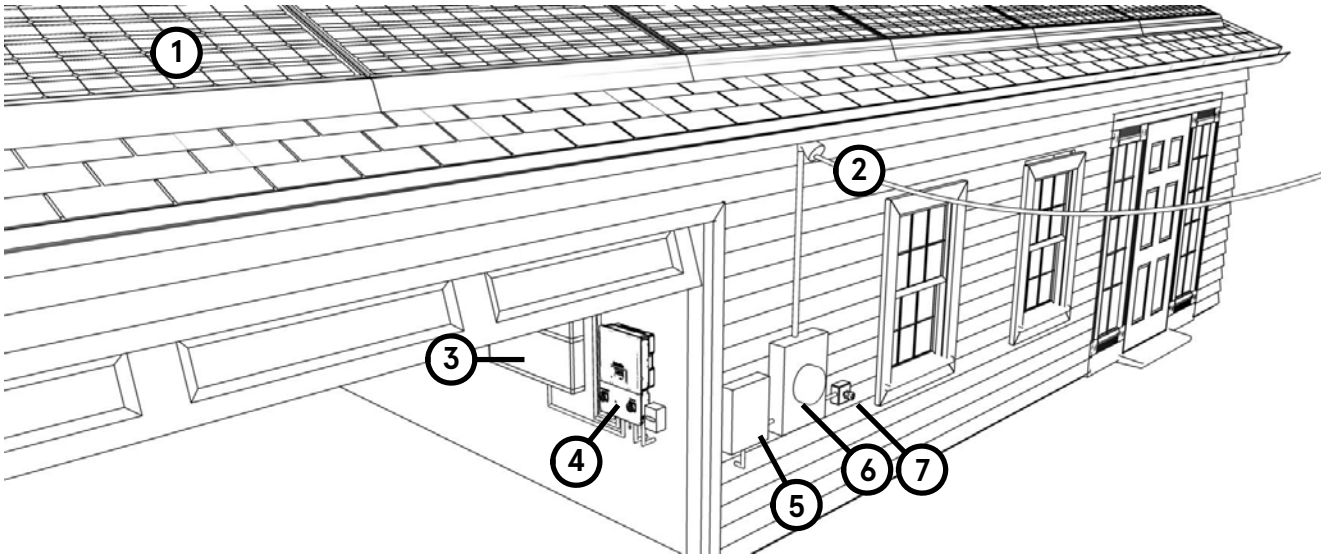


Figure 1-1: Typical PV installation with a SolarCity H6 inverter

The numbered callouts in *Figure 1-1* refer to the following:

- **PV panels (1):** Roof-mounted solar panels.
- **Utility grid (2):** Source of AC power from the utility company.
- **Battery Pack (3):** Stores electrical energy for use by the protected home loads when grid power is offline and PV energy is insufficient to meet demand. The battery pack feeds DC current to the inverter, which converts it to AC current for use by the protected home loads.
- **SolarCity H6 inverter (4):** Converts DC current from the panels/battery pack into AC current for use by the protected home loads and charges the battery pack when there is enough PV energy available to do so.
- **Backup/Protected Loads Panel (5):** Distribution panel for the loads that are protected by the Battery Pack.
- **Main Panel (6):** Main distribution panel for the building. This panel includes a 35A breaker for the PV point of interconnection. If sufficient solar energy is available, the inverter will feed power to the non-protected home loads via this breaker and the main panel.
- **Optional Fireman Switch (7):** Quickly de-energizes all DC circuits in the event of an emergency.

Copyright 2017 SolarCity Corporation. All rights reserved.

Figure 1-2 depicts a block diagram of a completed SolarCity H6 inverter installation.

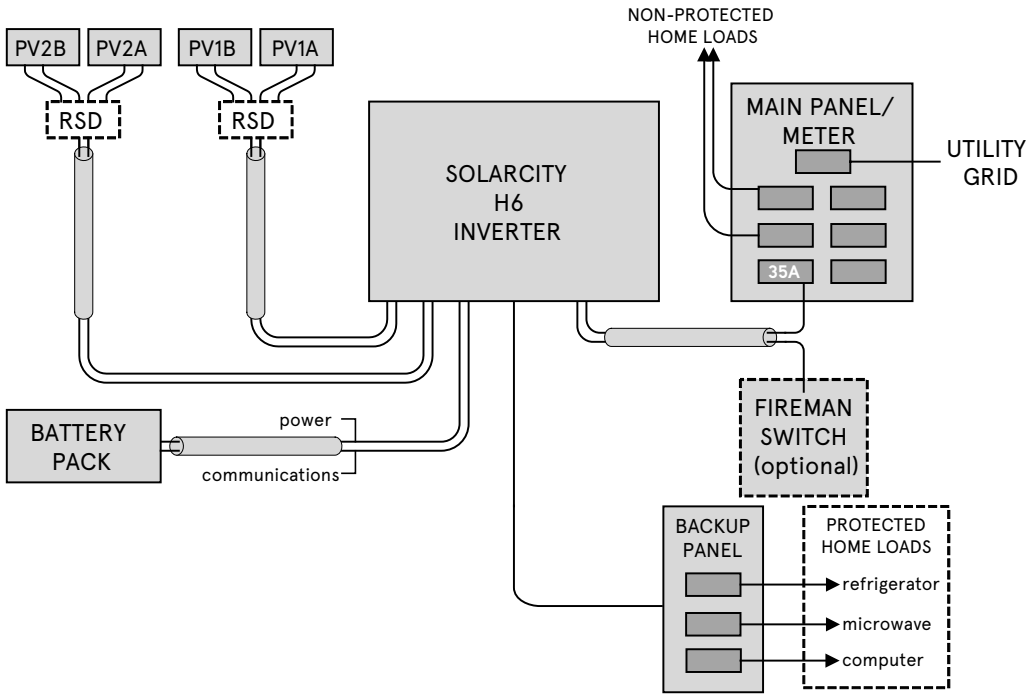


Figure 1-2: Block diagram of a complete SolarCity H6 inverter installation

The SolarCity H6 inverter includes various safety features, such as:

- Integrated DC arc-fault circuit interrupter (AFCI) per NEC 2014 690.11 that complies with UL1699B requirements for Type 1 devices.
- Rapid shutdown (RSD) mechanism per NEC 2014 690.12 is achieved through two parts: One part is the PLC Transmitter that is located in the H6 inverter, and the other part is the RSD boxes that are installed under the PV modules within 10' (3m) of the PV arrays (depending on the number of strings). This RSD functionality is triggered by either:
  - Optional Fireman Switch located beside the main electrical panel, or
  - Optional Fireman Switch located under the inverter DC Disconnect Switch.

  The Fireman Switch will also safely shut down the battery pack and AC outputs. Refer to the RSD datasheet and manual for details.

  If there is no Fireman Switch, then the RSD mechanism can be initiated using the DC Disconnect switch on the SolarCity H6 inverter.

Copyright 2017 SolarCity Corporation. All rights reserved.

The SolarCity H6 inverter may be mounted either indoors or outdoors. Outdoor locations should avoid direct sunlight to help prevent thermal de-rating (temperature-induced reduction in power performance).

WARNING: THE SOLARCITY H6 INVERTER IS NOT INTENDED OR DESIGNED TO SUPPLY ENERGY TO LIFE-SUSTAINING MEDICAL DEVICES. DO NOT USE THE SOLARCITY H6 INVERTER FOR ANY SITUATION WHERE A POWER OUTAGE MIGHT LEAD TO DEATH OR PERSONAL INJURY.

1.1 - Qualification of Skilled Workers

This guide and the tasks and procedures described herein are intended for use by skilled workers only. A skilled worker is defined as a trained and qualified electrician or installer who has all of the following skills and experience:

- Knowledge of the key principles and operation of on-grid and off-grid (backup) systems.
- Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
- Knowledge of the installation of electrical devices
- Knowledge of and adherence to this guide and all safety precautions and best practices.

1.2 - General H6 Features

The SolarCity H6 inverter includes the following general features:

- Wide MPPT operating voltage range of 85V to 550V.
- Flexible MPPT channel power imbalance up to 70% / 30%.
- Supports up to 150% PV to AC ratio.
- Transitions from on-grid to off-grid in less than two (2) seconds.[1]
- Support for smart inverter features (power factor, reactive power, etc.).
- PV to AC Peak efficiency of 97.5%.
- NEMA 4X die-cast aluminum construction.
- Metal fins on back provide natural convection cooling more reliably than an external fan
- Operating temperature range between -20°C and 60°C (-4°F and 140°F); power de-rating occurs above 45°C/113°F.

1 In night mode, it may take up to eight (8) seconds to transition from on-grid to off-grid.

Copyright 2017 SolarCity Corporation. All rights reserved.

- Wall bracket that fits two studs as 16" spacing or a single stud at 24" stud spacing, as well as concrete and masonry walls.
- Easy inverter replacement without needing to shut off power to the whole home.
- Smooth enclosure edges with handle grooves to facilitate easy lift and carry.
- Three LEDS that indicate power (green), alarms (yellow), and faults (red).
- Two-line LCD with 16 characters per line for status display.
- Four push buttons for menu navigation and adjusting parameters.
- Integrated ZigBee communications for wireless status reporting and inverter/battery pack firmware upgrades using the SolarCity Communication Protocol.
- Over-the-air (OTA) status updates of all critical information.
- Built-in battery pack compatibility checking.

1.3 - Package Contents

The H6 inverter ships with one (1) each of the following items:

- Inverter unit
- I-shaped Inverter Mounting Bracket
- ZigBee antenna
- SolarCity H6 Hybrid Inverter – Quick Installation Guide

The following items ship separately:

- Rapid Shutdown Box (SMART RSS) with PV module Zep mounting bracket

1.4 - Additional Tools

The following additional tools are needed to complete installing and commissioning the SolarCity H6 inverter:

- Allen wrench, ratchet type, with 5mm bit (such as the Great Neck 51063, Neiko Tools 03044A, or the Husky Tools 66604). See *Figure 1-3*, below.
- 1/8" flat screwdriver with a long shank. See *Figure 1-3*, below.
- Chip puller to replace the ZigBee chip.

Copyright 2017 SolarCity Corporation. All rights reserved.

- Mounting screws, as follows:
  - **16" or 24" wood studs:** 6mm x 89mm (1/4" x 3 ½" lag screws)
  - **Plywood panel (minimum 20mm / 3/4" thick):** 6mm x 25mm (1/4" x 1" wood screws)
  - **16" steel studs:** 6mm (1/4") self-drilling sheet metal screws
  - **Masonry:** 6mm x 32mm (1/4" x 1-1/4") concrete anchor screws

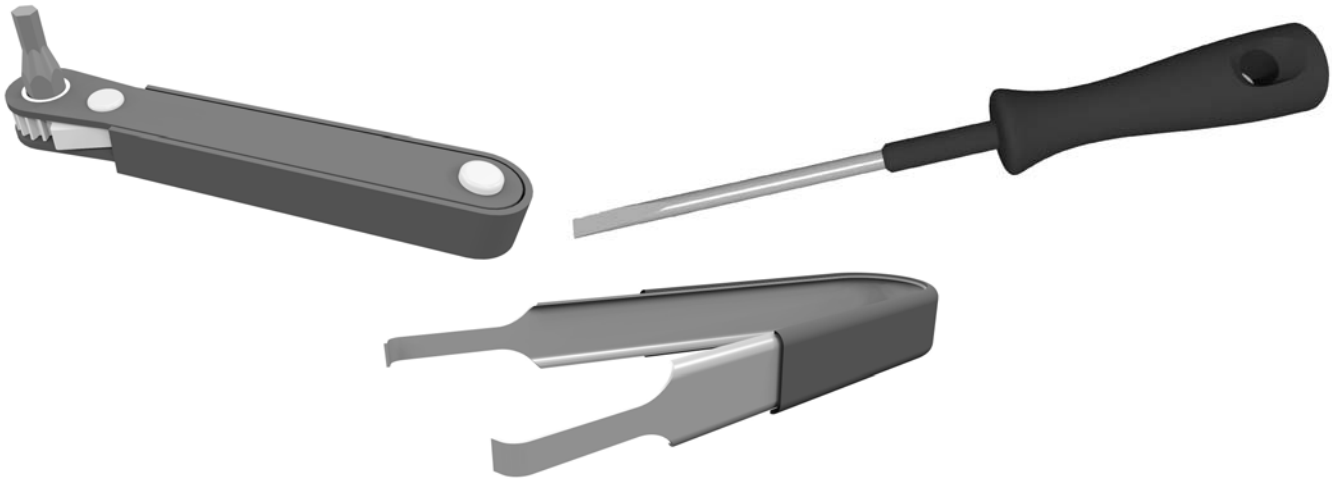


Figure 1-3: Ratchet wrench, long-shank screwdriver, and chip puller

1.5 - About This Manual

This section describes the formatting conventions and information contained in this manual.

1.5.1 - Formatting Conventions

This manual uses several formatting conventions to present information of special importance.

Lists of items, points to consider, or procedures that do not need to be performed in a specific order appear in bullet format:

- Item 1
- Item 2

Procedures that must be followed in a specific order appear in numbered steps:

1. Perform this step first.
2. Perform this step second.

Interface elements such as document titles, fields, windows, tabs, buttons, commands, options, and icons appear in bold text.

Copyright 2017 SolarCity Corporation. All rights reserved.

Specific commands/values appear in standard `Courier` font. Sequences of commands appear in the order in which you should execute them and include horizontal or vertical spaces between commands.

1.5.2 - Safety Symbols

This manual also contains important safety information and instructions in specially formatted callouts with accompanying graphic symbols:

SHOCK HAZARD: SHOCK HAZARD WARNINGS ALTERT YOU TO THE POSSIBILITY OF DEATH OR PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK IF THESE INSTRUCTIONS ARE NOT FOLLOWED.

WARNING: WARNINGS ALERT YOU TO THE POSSIBILITY OF DEATH OR PERSONAL INJURY FROM CAUSES OTHER THAN ELECTRICAL SHOCK IF THESE INSTRUCTIONS ARE NOT FOLLOWED.

HOT SURFACE: HOT SURFACE CALLOUTS ALERT YOU TO SURFACES THAT COULD BECOME HOT ENOUGH TO POSE A BURN HAZARD DURING NORMAL OPERATION.

CAUTION: CAUTIONS ALERT YOU TO THE POSSIBILITY OF EQUIPMENT OR PROPERTY DAMAGE IF THESE INSTRUCTIONS ARE NOT FOLLOWED.

Note: Notes provide helpful information.

This icon highlights equipment grounding conductor operations.

Copyright 2017 SolarCity Corporation. All rights reserved.

1.5.3 - Layout

This guide contains the following chapters:

- **Chapter 1 – Welcome:** Introduces this guide and describes worker qualifications, package contents, and tools, and provides references to additional documentation and resources. See *"Welcome" on page 1*.
- **Chapter 2 – Safety Instructions:** Provides general safety instructions that must be observed at all times. See *"Safety Instructions" on page 11*.
- **Chapter 3 – Overview:** Describes the SolarCity H6 inverter including dimensions, clearances, mounting options, controls, connections, and external components/ accessories. See *"Overview" on page 17*.
- **Chapter 4 – Installation:** Describes installing the Inverter Mounting Bracket and then hanging the SolarCity H6 inverter the bracket. See *"Installation" on page 47*.
- **Chapter 5 – Electrical Connections:** Describes making the electrical connections between the SolarCity H6 inverter and the other components in the installation. See *"Electrical Connections" on page 55*.
- **Chapter 6 – User Controls:** Describes the LEDs, LCD display, and keyboard controls of the SolarCity H6 inverter and describes the menu structure and user-controllable functions of the inverter. See *"User Controls" on page 73*.
- **Chapter 7 – Commissioning:** Describes how to commission the SolarCity H6 inverter for use. See *"Commissioning" on page 83*.
- **Chapter 8 – Basic Operation:** Covers routine procedures, such as powering the SolarCity H6 inverter on and off and how power flows to and from the inverter under a variety of operating conditions. See *"Basic Operation" on page 85*.
- **Chapter 9 – Product Information:** Lists the specifications, protection features, standards, performance, and regulatory approvals that apply to the SolarCity H6 inverter. See *"Product Information" on page 91*.
- **Chapter 10 – Troubleshooting and Maintenance:** Describes how to troubleshoot the SolarCity H6 inverter and perform basic maintenance tasks. See *"Troubleshooting and Maintenance" on page 103*.
- **Appendix A – Glossary:** Lists and defines the key terms and abbreviations used in this guide. See *"Glossary" on page 123*.
- **Appendix B - SMART RSD:** Information and instructions for the Rapid Shutdown (RSD) equipment. See *"SMART Rapid Shutdown Slave" on page 127*.

Copyright 2017 SolarCity Corporation. All rights reserved.

1.6 - Related Documentation

The following additional documentation is available for your SolarCity H6 inverter:

- H6 Datasheet
- SMART RSS Datasheet
- UL Certificate
- RGM Certificate
- FCC Certificate

These documents are available on the SolarCity Intranet (Grid).

1.7 - Additional Resources

Additional installer resources are available on the SolarCity Intranet (Grid).

1.8 - Technical Support

For technical and other support related to customer care, please contact Delta as follows:

15700 Don Julian Road
City of Industry, CA 91745

Support Email: *inverter.support@deltaww.com*

Fax: 1-626-709-5896

Support Hotline: 1-877-442-4832 (toll free)

Support (International): 1-626-369-8019

Mondays to Fridays from 9:30am to 8:30pm Eastern time (except national and company holidays)

Copyright 2017 SolarCity Corporation. All rights reserved.

2 – Safety Instructions

THIS CHAPTER CONTAINS IMPORTANT SAFETY INSTRUCTIONS THAT MUST BE READ, UNDERSTOOD, AND ADHERED TO AT ALL TIMES. SAVE THESE INSTRUCTIONS FOR FUTURE USE.

SHOCK HAZARD: FAILURE TO FOLLOW ALL OF THE SAFETY INSTRUCTIONS IN THIS CHAPTER, GUIDE, AND ALL OTHER APPLICABLE DOCUMENTATION CAN RESULT IN ACCIDENTAL CONTACT WITH LIVE ELECTRICAL CONDUCTORS THAT CAN CAUSE DEATH OR SERIOUS INJURY.

WARNING: FAILURE TO FOLLOW ALL OF THE SAFETY INSTRUCTIONS IN THIS CHAPTER, GUIDE, AND ALL OTHER APPLICABLE DOCUMENTATION CAN RESULT IN DEATH OR SERIOUS INJURY FROM A VARIETY OF NON-ELECTRICAL HAZARDS.

WARNING: FAILURE TO FOLLOW ALL OF THE SAFETY INSTRUCTIONS IN THIS CHAPTER, GUIDE, AND ALL OTHER APPLICABLE DOCUMENTATION CAN RESULT IN EQUIPMENT DAMAGE AND CAN VOID YOUR WARRANTY OR WARRANTIES.

2.1 – General

The following general safety instructions apply to all portions of the installation at all times:

- This guide is an integral part of the SolarCity H6 inverter product. It contains important instructions that must be followed when commissioning and maintaining the inverter. Read this entire guide, paying particular attention to all SHOCK HAZARD, WARNING, CAUTION, and Note callouts, before installing or commissioning the SolarCity H6 inverter. Keep this guide and all other documentation in a convenient place for future reference.
- Read all of the instructions for all PV modules and all other components used in every installation, paying particular attention to all safety-related information.
- This document does not and is not intended to replace any local, state, provincial, federal, or national laws, regulations, or codes applicable to the installation and use of the product, including without limitation applicable electrical safety codes.

Copyright 2017 SolarCity Corporation. All rights reserved.

- All installations must conform to all applicable laws, regulations, codes, and standards for the jurisdiction where the SolarCity H6 inverter is being installed. SolarCity assumes no responsibility for any compliance or non-compliance with such laws or codes in connection with the installation of the product.
- All US electrical installations must be performed by an authorized electrician in compliance with both National Electrical Code ANSI/NFPA 70 and OSHA requirements, in addition to all local jurisdiction requirements.
- PV solar arrays produce hazardous voltages and currents when exposed to light, which can create an electrical shock hazard.
- The SolarCity H6 inverter can produce high-voltage AC output when the utility grid is lost.

2.2 - SolarCity H6 Inverter

The following safety instructions apply to the SolarCity H6 inverter at all times:

- The SolarCity H6 inverter is designed and tested to meet all applicable North American safety standards. However, like all electrical and electronic equipment, safety precautions must be observed and followed when installing and operating this inverter in order to reduce the risk of personal injury by ensuring a safe installation.
- The SolarCity H6 inverter contains no user-serviceable parts. Always return the inverter to an authorized Delta Service Center for any maintenance or repair.
- Only use the SolarCity H6 inverter in accordance with both the information provided in this guide and all locally applicable standards and directives. Any other use or application may cause death, personal injury, and/or property damage.
- Altering the SolarCity H6 inverter, such as (but not limited to) modifications or conversions, is only permitted with the express written permission of SolarCity Corporation. Unauthorized alterations will void all guarantee and warranty claims and will usually void the operation permit. In no event shall SolarCity be held liable for any damage caused by such changes.
- Any use of the SolarCity H6 inverter other than that described in this guide does not qualify as appropriate.
- The appropriate local utility must grant all approvals required by national and state interconnection regulations before connecting the SolarCity H6 inverter back feed to the AC distribution grid, and this commissioning must be performed by qualified personnel.
- All wiring and connections may have hazardous voltages and currents at any time. Only qualified and authorized personnel may install and/or maintain the SolarCity H6 inverter and associated components.
- The SolarCity H6 inverter chassis may become hot enough to create a burn hazard during normal operation.

Copyright 2017 SolarCity Corporation. All rights reserved.

- The SolarCity H6 inverter may only be operated when it is technically faultless and in an operationally safe state. Check the inverter and all components for visible damage during unpacking and installation. Ensure that all external safety equipment is freely accessible and in good working order at all times.
- All labels must remain permanently attached to the SolarCity H6 inverter (see *"Safety Labels" on page 14*).

WARNING: THE SOLARCITY H6 INVERTER IS NOT INTENDED OR DESIGNED TO SUPPLY ENERGY TO LIFE-SUSTAINING MEDICAL DEVICES. DO NOT USE THE SOLARCITY H6 INVERTER FOR ANY SITUATION WHERE A POWER OUTAGE MIGHT LEAD TO DEATH OR PERSONAL INJURY.

SHOCK HAZARD: ALL AC AND DC DISCONNECT DEVICES MUST BE SHUT OFF BEFORE ATTEMPTING ANY MAINTENANCE OR REPAIR.

Copyright 2017 SolarCity Corporation. All rights reserved.

2.3 - Safety Labels

The SolarCity H6 inverter includes a safety and type labels, as shown in *Figure 2-1*:

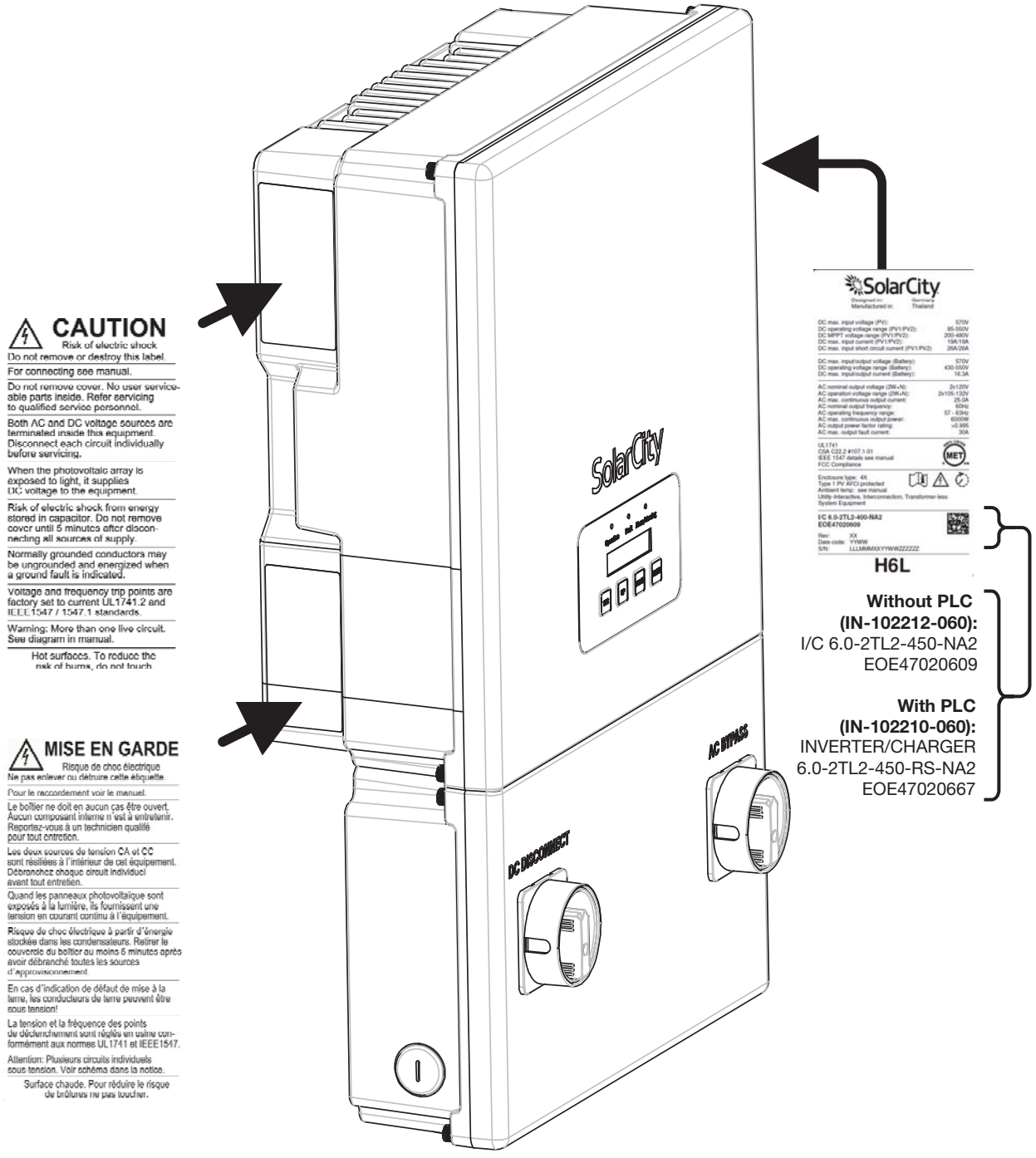


Figure 2-1: SolarCity H6 safety labels

Copyright 2017 SolarCity Corporation. All rights reserved.

2.4 – Battery Pack Safety

The following safety instructions apply to the SolarCity H6 inverter at all times:

SHOCK HAZARD: THE SAFETY INSTRUCTIONS IN THIS GUIDE ARE PROVIDED FOR GENERAL INFORMATIONAL PURPOSES ONLY. THEY ARE NOT INTENDED TO OVERRIDE OR SUBSTITUTE FOR THE SAFETY INSTRUCTIONS CONTAINED WITHIN THE BATTERY PACK DOCUMENTATION. FAILURE TO FOLLOW ALL SAFETY INSTRUCTIONS IN THE BATTERY PACK DOCUMENTATION CAN LEAD TO DEATH OR INJURY FROM ELECTROCUTION.

WARNING: THE SAFETY INSTRUCTIONS IN THIS GUIDE ARE PROVIDED FOR GENERAL INFORMATIONAL PURPOSES ONLY. THEY ARE NOT INTENDED TO OVERRIDE OR SUBSTITUTE FOR THE SAFETY INSTRUCTIONS CONTAINED WITHIN THE BATTERY PACK DOCUMENTATION. FAILURE TO FOLLOW ALL SAFETY INSTRUCTIONS IN THE BATTERY PACK DOCUMENTATION CAN LEAD TO DEATH OR INJURY FROM A VARIETY OF NON-ELECTRICAL HAZARDS.

WARNING: USE ONLY THE SPECIFIC MAKE AND MODEL OF BATTERY PACK THAT IS SPECIFICALLY RATED FOR USE WITH THE SOLARCITY H6 INVERTER. THE USE OF ANY OTHER BATTERY PACK TYPE OR MODEL COULD DAMAGE THE INVERTER AND/OR THE BATTERY PACK AND COULD RESULT IN DEATH OR PERSONAL INJURY.

CAUTION: THE SAFETY INSTRUCTIONS IN THIS GUIDE ARE PROVIDED FOR GENERAL INFORMATIONAL PURPOSES ONLY. THEY ARE NOT INTENDED TO OVERRIDE OR SUBSTITUTE FOR THE SAFETY INSTRUCTIONS CONTAINED WITHIN THE BATTERY PACK DOCUMENTATION. FAILURE TO FOLLOW ALL SAFETY INSTRUCTIONS IN THE BATTERY PACK DOCUMENTATION CAN LEAD TO EQUIPMENT DAMAGE AND CAN VOID YOUR WARRANTY OR WARRANTIES.

- The battery pack must be installed, operated, maintained, and disposed of in accordance with all manufacturer specifications and directions.
- For indoor installations, install the battery pack in a room with sufficient ventilation. Maintain all recommended clearances around the battery pack. Never place or store anything on top of the battery pack. Refer to the battery pack manufacturer instructions.
- For outdoor installations, install the battery pack under a shade or roof to avoid any direct contact with rain, snow, hail, or other falling objects. Refer to the battery pack manufacturer instructions.

Copyright 2017 SolarCity Corporation. All rights reserved.

- Do not open, disturb, modify, or damage the battery pack.
- The battery pack connection includes high-voltage conductors that may cause death or serious injury by electrocution.
- Deep discharges and/or repeated charge-discharge cycles that exceed warranty regulations can prematurely degrade the battery pack capacity.
- The battery pack requires energy to perform various internal monitoring and auxiliary functions, which can drain the battery pack if not recharged.

Copyright 2017 SolarCity Corporation. All rights reserved.

3 - Overview

This section introduces you to the SolarCity H6 inverter.

3.1 - Layout

The SolarCity H6 inverter is laid out as follows:

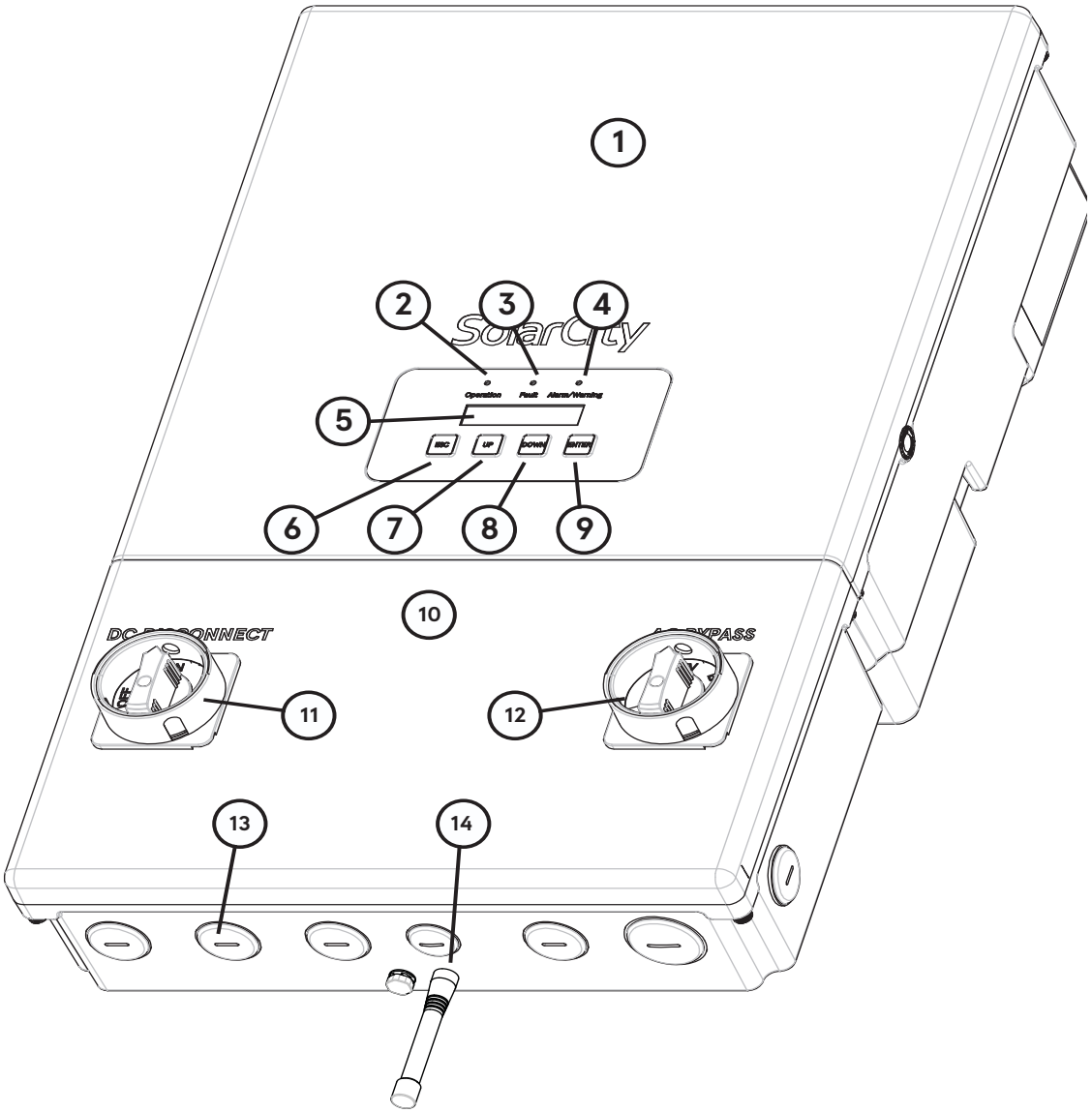


Figure 3-1: SolarCity H6 inverter with callouts

Copyright 2017 SolarCity Corporation. All rights reserved.

The numbered callouts in *Figure 3-1* correspond to the following:

1) SolarCity H6 inverter top section
2) Operation LED (green)
3) Fault LED (red)
4) Alarm Warning LED (amber)
5) LCD display
6) ESC button
7) UP button
8) DOWN button
9) ENTER button
10) Wiring box (with cover)
11) DC Disconnect Switch
12) AC Bypass Switch
13) Conduit plugs
14) ZigBee antenna

This list describes the numbered callouts from *Figure 3-1* in detail:

- **H6 inverter top section (1):** This is the inverter section of the assembly that contains various electronic components. This section is factory sealed on both the left and right sides and contains no user-serviceable parts. All wiring to install the inverter and external connections takes place in the wiring box (#10, below). The top section is fastened to the wiring box using three (3) M6 nuts. See *"Wiring Box Cover" on page 59* for instructions on removing and refitting the top section.
- **Operation LED (2):** This LED lights up green to indicate that the SolarCity H6 inverter is functioning. See *"Status LEDs" on page 75*.
- **Fault LED (3):** This LED lights up red when a fault condition occurs. See *"Faults" on page 106*.
- **Alarm/Warning LED (4):** This LED lights up amber when an alarm or warning condition occurs. See *"Alarms" on page 105* and *"Warnings" on page 108*.
- **LCD display (5):** This display includes two lines with 16 characters per line that show important messages regarding system status and performance. You can also use this display to adjust various parameters. See *"LCD Display" on page 76* and *"Menu Structure" on page 77*.
- **ESC button (6):** This buttons exits the currently-selected function. See *"Push Buttons" on page 76*.
- **UP button (7):** This button either moves up the menu or increases the currently-selected parameter value. See *"Push Buttons" on page 76*.
- **DOWN button (8):** This button either moves down the menu or decreases the currently-selected parameter value. See *"Push Buttons" on page 76*.
- **ENTER button (9):** This button selects the current menu option or inputs the specified parameter value. See *"Push Buttons" on page 76*.

Copyright 2017 SolarCity Corporation. All rights reserved.

- **Wiring Box – with cover (10):** This is the cover for the wiring box compartment. The inside of the wiring box cover includes a label with a wiring diagram. All of the following must be shut off before removing the cover:
  - Breaker(s) in the Backup Load Panel
  - Back-feed breaker in the main panel
  - DC Disconnect Switch (11)

  See *"Wiring Box Cover" on page 59*.
- **DC Disconnect Switch (11):** This switch allows DC power from both the PV array and battery pack to be cut off from the inverter. The DC Disconnect is lockable in the OFF position. See *"DC Disconnect Switch" on page 25*.
- **AC Bypass Switch (12):** By default, when set to the INV position, the AC Bypass Switch connects backup loads to the utility grid via the SolarCity H6 inverter; however, you can bypass the inverter and directly connect protected loads to the utility grid during service/maintenance by switching to the BYP position. There is no OFF position for this switch, so for AC grid isolation, the back-feed breaker in the main panel must be disconnected. See *"AC Bypass Switch" on page 26*.
- **Conduit plugs (13):** The SolarCity H6 inverter includes a single 1" conduit opening, six (6) 3/4" conduit openings, and a single ½" conduit opening. Each conduit opening includes a watertight rubber or plastic plug that must be removed before installing conduit fittings. Conduit fittings must be watertight. See *"Conduit Plugs and Fittings" on page 61*.
- **ZigBee antenna (14):** The ZigBee antenna uses the 2.4GHz to 3.5GHz frequency range and connects to the SolarCity H6 inverter using the standard SolarCity RP plug. *Figure 3-1* shows the antenna mounting only; the antenna itself is not shown. The antenna is rated for use in both indoor and outdoor installations. See *"ZigBee & Gateway" on page 69*.
- **Inverter Mounting Bracket (not shown):** The Inverter Mounting Bracket is used to secure the SolarCity H6 inverter to the wall. See *"Inverter Mounting Bracket" on page 22* and *"Installing the Inverter Mounting Bracket" on page 51*.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.2 - Dimensions & Clearances

This section displays the physical dimensions of the SolarCity H6 inverter and provides minimum clearance requirements.

3.2.1 - Inverter Dimensions

Figure 3-2 and *Figure 3-3* display the physical dimensions of the SolarCity H6 inverter.

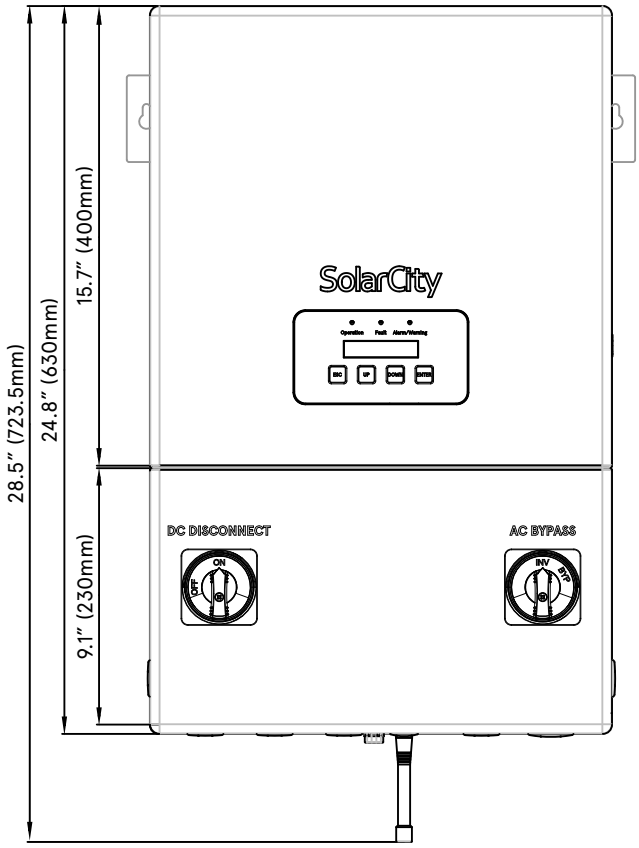


Figure 3-2: SolarCity H6 inverter dimensions (front view)

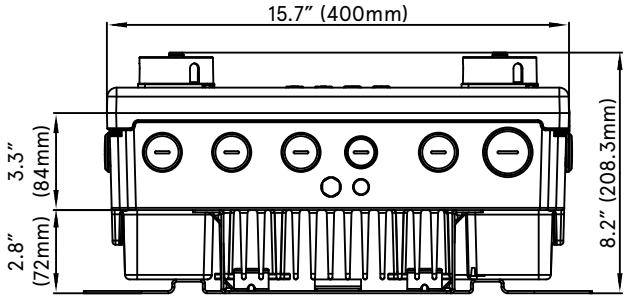


Figure 3-3: SolarCity H6 inverter dimensions (bottom view)

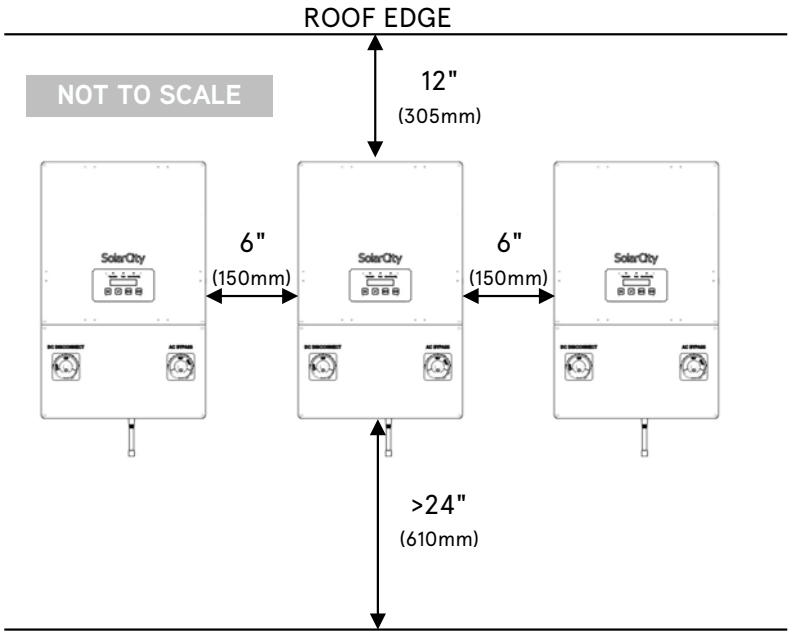
Copyright 2017 SolarCity Corporation. All rights reserved.

3.2.2 - Clearances

The minimum clearance requirements (see *Figure 3-4*) for mounting one or more SolarCity H6 inverters are:

- **Between inverters:** 6" (150mm)
- **Below overhanging roof surface:** 12" (305mm)
- **From ground:** More than 24" (610mm)

Figure 3-4: Minimum clearances (below)



Note: The SolarCity H6 inverter will go into power de-rating as described in "Thermal De-rating" on page 96. If ambient temperate exceeds the maximum rating, the SolarCity H6 inverter will automatically shut off.

CAUTION: THE SOLARCITY H6 INVERTER MAY OVERHEAT IF MOUNTED TOO CLOSE TO AN OVERHANGING ROOF AND/OR TOO CLOSE TO SURROUNDING ELECTRICAL EQUIPMENT.

CAUTION: AVOID INSTALLING AN INVERTER ABOVE ANOTHER INVERTER AS THIS COULD CAUSE THE TOP-MOST INVERTER TO OVERHEAT.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.3 - Inverter Mounting Bracket

Figure 3-5 displays the Inverter Mounting Bracket for the SolarCity H6 inverter, with arrows displaying the locations of the top and bottom inverter hooks.

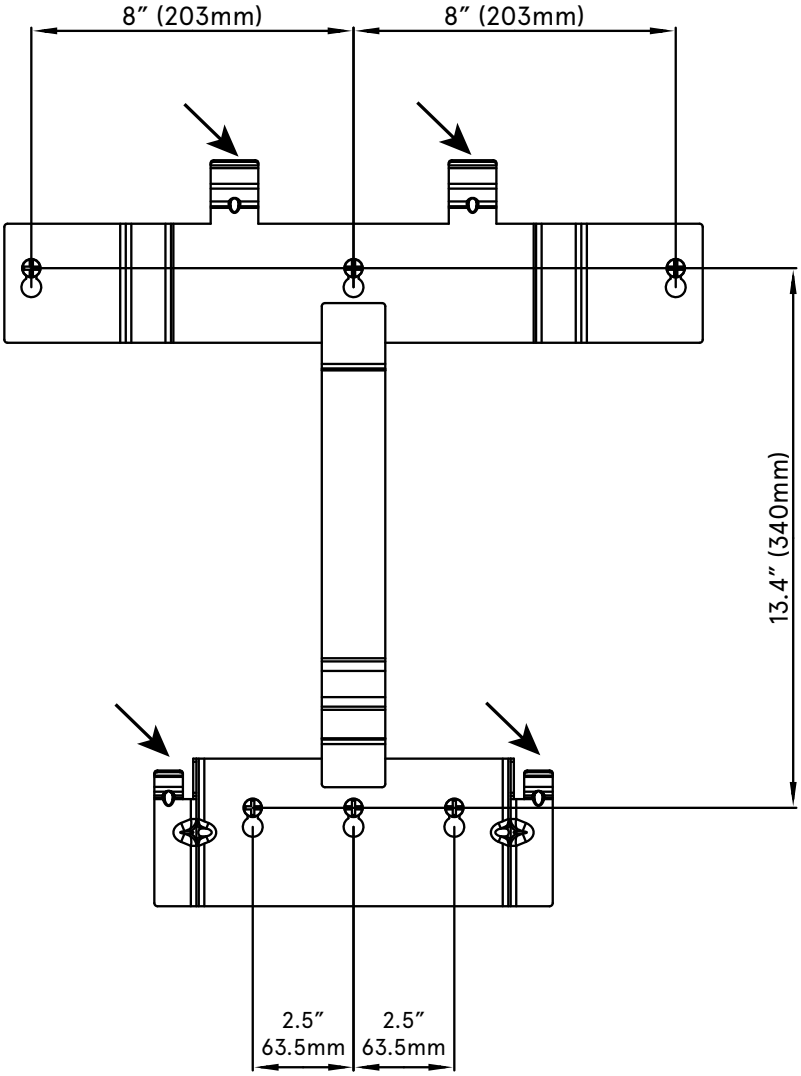


Figure 3-5: SolarCity H6 Inverter Mounting Bracket with hooks

The Inverter Mounting Bracket includes the following features:

- Horizontal mounting holes spaced 16" (406mm) apart on center. Use these holes when mounting the SolarCity H6 inverter on a standard wall with 16" stud spacing.
- Top and bottom center holes for use when mounting the SolarCity H6 inverter to a wall with 24" stud spacing.

Copyright 2017 SolarCity Corporation. All rights reserved.

- Additional horizontal mounting holes spaced 2.5″ (63.5mm) left and right of center at the bottom of the Inverter Mounting Bracket are provided for additional bracket and inverter stability.

1. The two top hooks slide into back of the SolarCity H6 inverter slots and hold most of the weight. The two bottom hooks slide into back of the wiring box slots and are useful when replacing the inverter top section because they hold the wiring box in place.

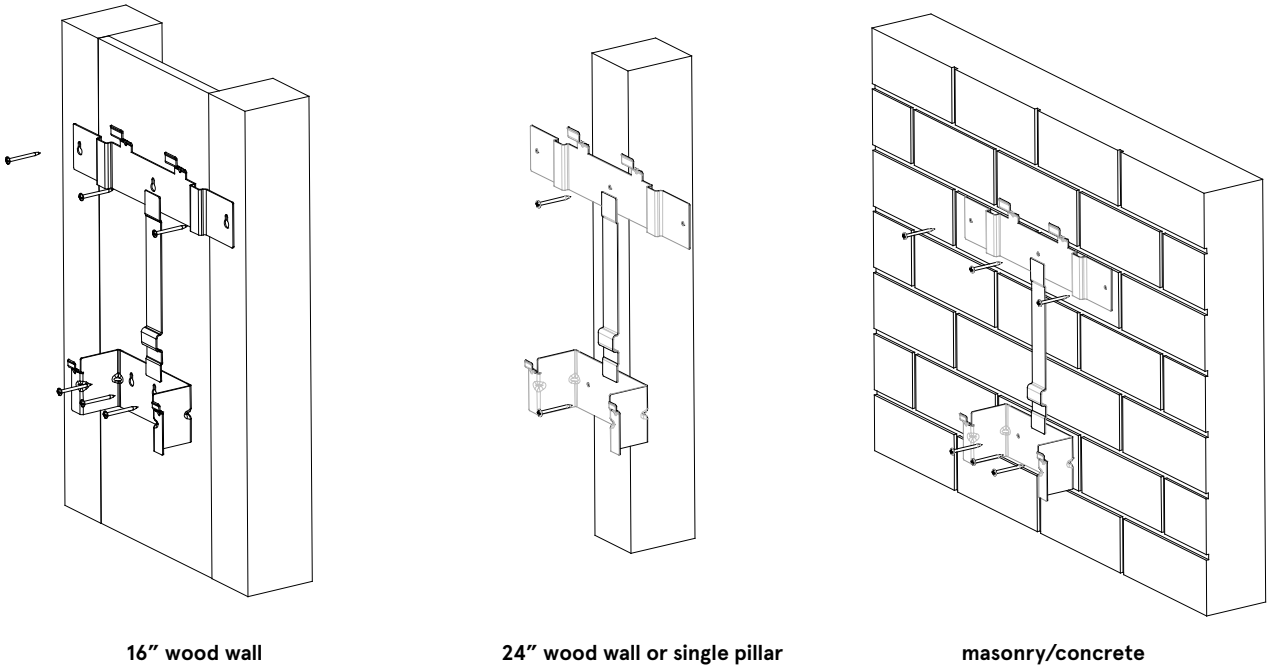


Figure 3-6: Installing the Inverter Mounting Bracket on various wall types

3.3.1 - Standard 16″ Wall

When installing the Inverter Mounting Bracket on a standard wall with 16″ stud spacing:

- Use one (1) screw in the upper left side into a stud.
- Use one (1) screw in the upper right side into a stud.
- Use one (1) screw with a suitable wall anchor in any of the lower holes (center hole preferred).

Mount the Inverter Mounting Bracket as described in *"Installing the Inverter Mounting Bracket" on page 51*.

CAUTION: THE WALL ANCHOR(S) ARE TO BE USED ONLY TO STEADY THE INVERTER MOUNTING BRACKET AGAINST THE WALL. THEY ARE NOT INTENDED TO BE WEIGHT BEARING.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.3.2 - 24" Wall

When installing the Inverter Mounting Bracket on a wall with 24" stud spacing:

- Use one (1) in the upper middle into the stud.
- Use one (1) screw in the lower middle into the stud.
- Use one (1) screw in either off-center lower hole. Use a suitable wall anchor if needed.

Mount the Inverter Mounting Bracket as described in *"Installing the Inverter Mounting Bracket" on page 51*.

CAUTION: THE WALL ANCHOR(S) ARE TO BE USED ONLY TO STEADY THE INVERTER MOUNTING BRACKET AGAINST THE WALL. THEY ARE NOT INTENDED TO BE WEIGHT BEARING.

3.3.3 - Single Pillar

When installing the Inverter Mounting Bracket on a wall with a single pillar:

- Use one (1) screw in the upper left with a suitable wall anchor.
- Use one (1) screw in the upper middle into the pillar.
- Use one (1) screw in the upper right with a suitable wall anchor.
- Use one (1) screw in the lower middle into the pillar.

Mount the Inverter Mounting Bracket as described in *"Installing the Inverter Mounting Bracket" on page 51*.

CAUTION: THE WALL ANCHOR(S) ARE TO BE USED ONLY TO STEADY THE INVERTER MOUNTING BRACKET AGAINST THE WALL. THEY ARE NOT INTENDED TO BE WEIGHT BEARING.

3.3.4 - Masonry or Concrete Walls

When installing the Inverter Mounting Bracket on a concrete or masonry wall:

- Use one (1) screw in the upper left with a suitable wall anchor.
- Use one (1) screw in the upper right with a suitable wall anchor.
- Use one (1) or two (2) screw(s) in the lower center or lower left/right with a suitable wall anchor or anchors.

Copyright 2017 SolarCity Corporation. All rights reserved.

Mount the Inverter Mounting Bracket as described in *"Installing the Inverter Mounting Bracket" on page 51*.

CAUTION: THE WALL ANCHOR(S) MUST BE RATED FOR THE TYPE OF WALL ON WHICH THE INVERTER MOUNTING BRACKET IS BEING INSTALLED. THE CONCRETE OR MASONRY MUST BE STRUCTURALLY SOUND AND ABLE TO SECURELY CARRY THE ENTIRE WEIGHT OF THE SOLARCITY H6 INVERTER WITHOUT RISK OF FAILURE.

3.4 - DC and AC Switches

The SolarCity H6 inverter includes switches that allow you to:

- Disconnect DC power to the inverter.
- Bypass AC power around the inverter.

3.4.1 - DC Disconnect Switch

The DC Disconnect Switch turns DC power from the PV array and battery pack to the SolarCity H6 inverter ON or OFF. The DC Disconnect Switch includes a hole for a padlock to prevent inadvertently turning power ON or OFF. The DC Disconnect Switch must be set to OFF in order to remove the wiring box cover. The SolarCity H6 inverter includes a position-detecting mechanism that reports DC disconnect status.

Figure 3-7: DC Disconnect Switch in ON position

Figure 3-8: DC Disconnect Switch in OFF position

Copyright 2017 SolarCity Corporation. All rights reserved.

3.4.2 - AC Bypass Switch

The AC Bypass Switch connects home loads to the utility grid either:

- Directly, when set to the BYP position (used when servicing/maintaining the SolarCity H6 inverter).
- Via the SolarCity H6 inverter, when set to the INV position (default).

Figure 3-9: AC Bypass Switch in the INV position

Figure 3-10: AC Bypass Switch in the BYP position

SHOCK HAZARD: WHEN REPLACING THE SOLARCITY H6 INVERTER TOP SECTION, THE BACK-FEED CIRCUIT BREAKER IN THE MAIN ELECTRICAL PANEL MUST BE IN THE OFF POSITION; OTHERWISE, THE AC BYPASS SWITCH TERMINALS WILL REMAIN HOT REGARDLESS OF THE POSITION OF THE AC BYPASS SWITCH (INV OR BYP).

Copyright 2017 SolarCity Corporation. All rights reserved.

3.5 - Inverter Wiring Box

Do not remove or disturb the connections between the SolarCity H6 inverter top section and the wiring box, except when replacing the inverter top section. All wiring must be performed only by qualified personnel. *Figure 3-11* shows the SolarCity H6 inverter wiring box connections. The inside of the wiring box cover also includes a colored label (see *Figure 3-12*) that depicts the connections. The actual communication wire colors may vary from those shown on the label.

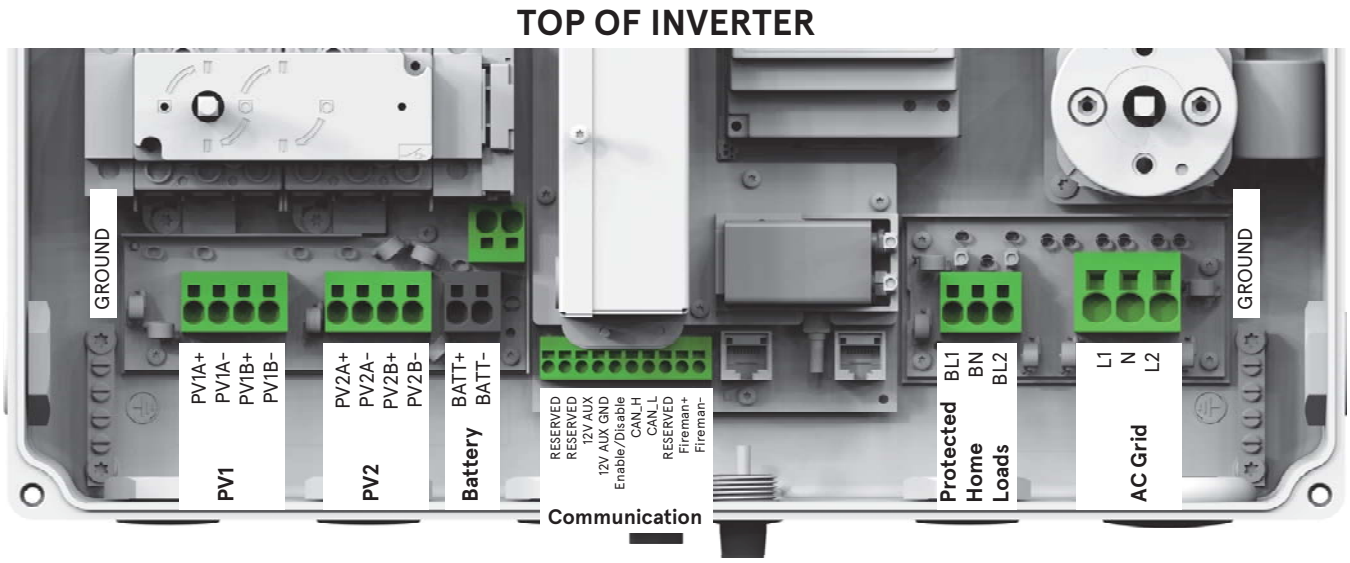


Figure 3-11: SolarCity H6 inverter wiring box connections

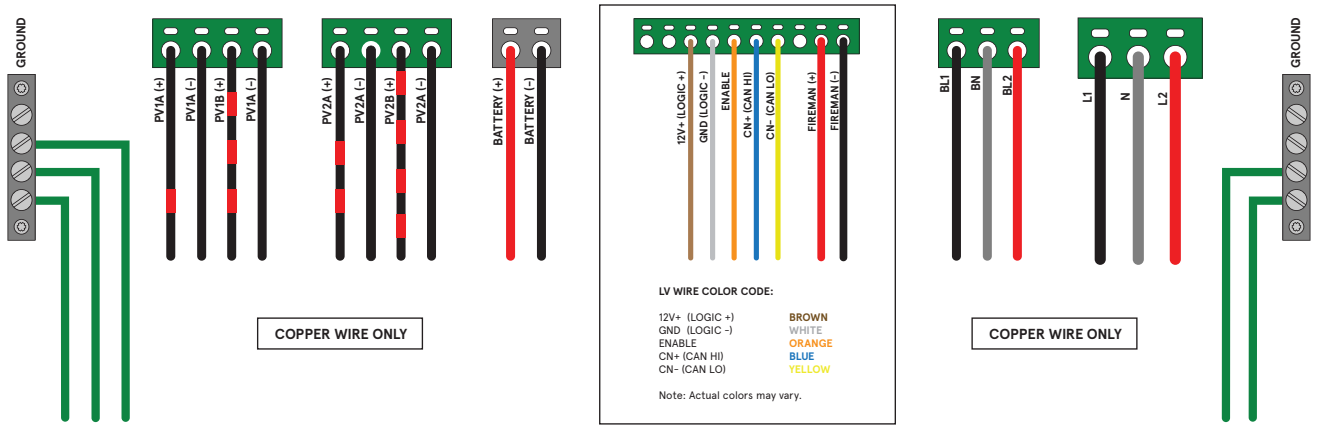


Figure 3-12: Wiring box label

Note: Communication conductor colors may vary from those shown on the label.

Copyright 2017 SolarCity Corporation. All rights reserved.

The wiring box connections themselves are divided into five sections:

- **PV interface:** See *"PV Interface" on page 28*.
- **Battery Pack:** See *"Battery Pack Interface" on page 31*.
- **Communications:** See *"Communications" on page 31*.
- **Backup Panel:** See *"Backup/Protected Loads Panel" on page 32*.
- **AC Grid:** See *"AC Grid Point of Interconnection" on page 34*.

3.5.1 - PV Interface

The SolarCity H6 inverter can accommodate up to four (4) PV strings, as follows:

- PV1A(+) and PV1A(-) = MPPT 1, String 1
- PV2A(+) and PV2A(-) = MPPT 2, String 1
- PV1B(+) and PV1B(-) = MPPT 1, String 2
- PV2B(+) and PV2B(-) = MPPT 2, String 2

Note: PV1A and PV1B may be combined on the roof such that only two lines are connected to PV1+ and PV1-. This can also happen with PV2A and PV2B combined to PV2+ and PV2-. This helps minimize long cable runs from the strings on the roof to the SolarCity H6 inverter; it is required when installing multiple strings with an RSD box.

The SolarCity H6 inverter combines string inputs in parallel into MPPT channels as follows:

- The inputs from PV1A and PV1B combine for MPPT channel 1.
- The inputs from PV2A and PV2B combine for MPPT channel 2.

CAUTION: ONLY CONNECT STRINGS WITH IDENTICAL VOLTAGE (SAME NUMBER AND TYPE OF PANELS) IN PARALLEL. IF STRINGS OF DIFFERENT VOLTAGES ARE AVAILABLE, THEN YOU MUST USE MULTIPLE MPPT CHANNELS TO KEEP THE STRINGS INDEPENDENT.

The two (2) 3/4" conduit holes on the bottom left side of the wiring box are each dedicated to an MPPT channel. The wiring box also includes an optional 3/4" conduit hole on the left side. See *Figure 3-13*.

Note: Maintain minimum bending radius requirements, per NEC table 312.6(A).

Copyright 2017 SolarCity Corporation. All rights reserved.

The SolarCity H6 inverter does not use positive or negative grounding; however, a floating ground that connects the chassis of each component must be included in the installation. For example, each string or array may bring in both high-voltage lines and a ground wire that must be connected to the grounding bus inside the wiring box, as may the battery pack, main panel, etc. For clarity, the wiring diagrams in this manual do not depict the grounding conductors. These grounding conductors are referred to as Equipment Grounding Conductors, or EGCs.

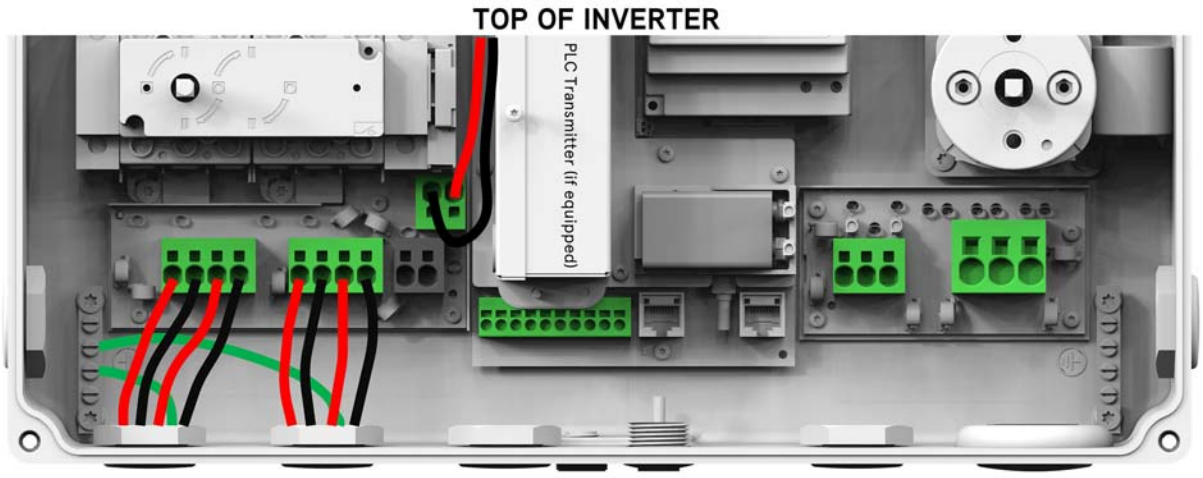


Figure 3-13: Parallel string connections

The wiring box may include a Rapid Shutdown Master (Power Line Communication or PLC Transmitter) that sends a simultaneous wireless PLC signal to the RSD boxes connecting all of the strings in the PV array via the high-voltage DC lines connected to the PV+ and PV- connections, as shown in *Figure 3-13*.

CAUTION: THE PLC TRANSMITTER MUST BE WIRED AS SHOWN IN FIGURE 3.13. REVERSING THE POLARITY COULD CAUSE AN EQUIPMENT FAULT.

Copyright 2017 SolarCity Corporation. All rights reserved.

The Rapid Shutdown Slaves (PLC receivers) that receive these PLC signals are embedded in the RSD boxes on the roof. An RSD signal initiates a rapid shutdown function when triggered by the Fireman Switch located either beside the main panel or by the DC Disconnect Switch. See *Figure 3-14* and *Figure 3-15* for mounting and operation, respectively.

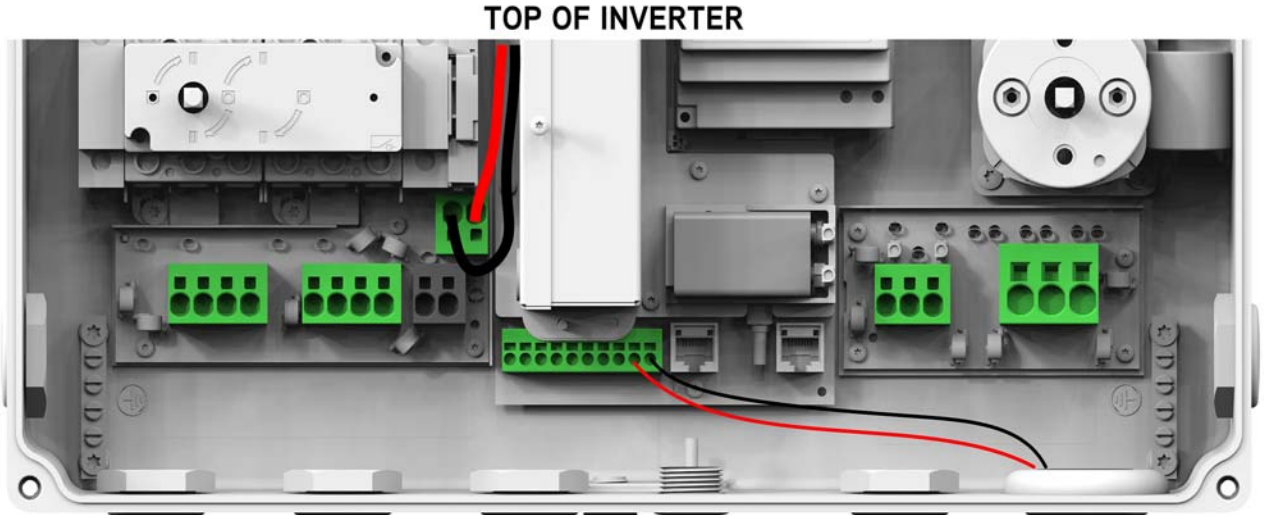


Figure 3-14: Fireman Switch connections

Note: The Fireman Switch may be mounted near the main panel, and the lines from the Fireman Switch will often share the same 1" conduit with the AC Grid lines, as shown in Figure 3-14. If the Fireman Switch is mounted underneath the wiring box, then it may use a dedicated 1/2" conduit.

Figure 3-15: Fireman Switch operation (below)

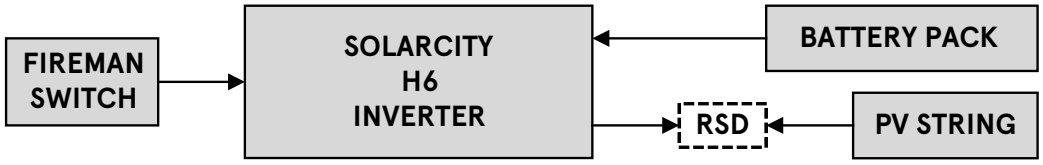
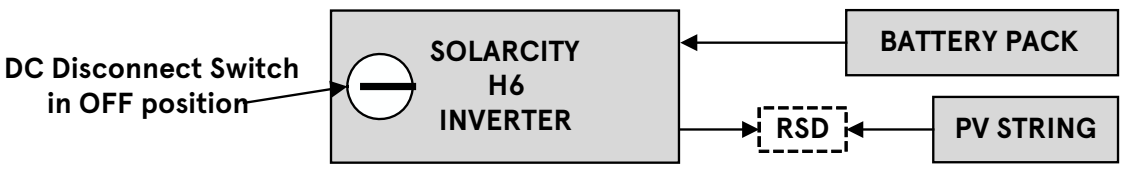


Figure 3-16: DC Disconnect Switch operation (below)



Copyright 2017 SolarCity Corporation. All rights reserved.

3.5.2 - Battery Pack Interface

The SolarCity H6 inverter connects directly to the battery pack output via two high-voltage lines (BATT+ and BATT-). The battery pack is an un-grounded/floating system, meaning that there must also be a ground connection between the battery pack chassis and the inverter (bonding bushing not required). *Figure 3-17* displays the battery pack connection to the inverter.

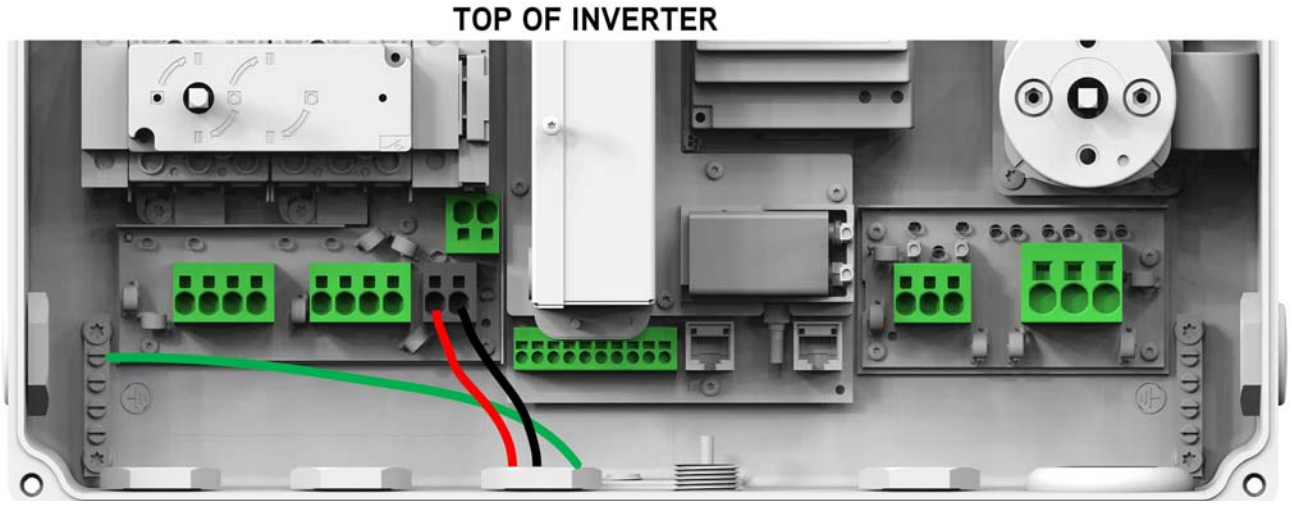


Figure 3-17: High-voltage battery pack connections

3.5.3 - Communications

The SolarCity H6 inverter also includes multiple communication lines for the battery pack and the fireman switch. Two sets of low-voltage lines enable communications between battery pack and the inverter.

- Set 1 includes the communication wires that connect to the following Communication connectors (16-24 AWG; colors may vary):
  - 12V AUX
  - 12V AUX GND
  - Enable/Disable
  - CAN_H
  - CAN_L

Set 2 includes the 14-22AWG Fireman Switch connectors that may run either through the same conduit as the AC grid wiring or through a separate 1/2" conduit:

- Fireman +
- Fireman –

Copyright 2017 SolarCity Corporation. All rights reserved.

Note: The SolarCity H6 inverter ships with a jumper wire across the Fireman + and Fireman – connections. If you are not installing a Fireman Switch with the inverter, then leave the jumper in place; otherwise, remove it before connecting the lines from the Fireman Switch.

Figure 3-18 displays the communications connections to the inverter wiring box and Fireman Switch. Actual wire colors may vary from those shown here.

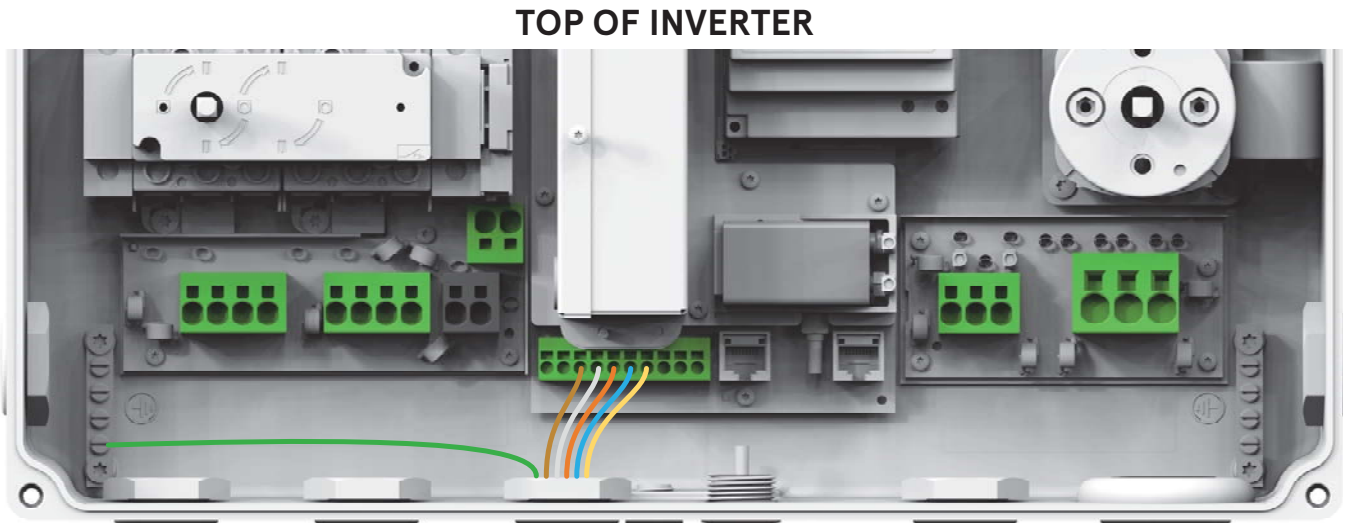


Figure 3-18: Communications connections (colors may vary)

3.5.4 - Backup/Protected Loads Panel

The off-grid/standalone AC output to the protected home loads has two (2) high-voltage lines labeled BL1 and BL2, plus a neutral line labeled BN. The SolarCity H6 inverter includes a dedicated 3/4" conduit opening for the backup output connections on the bottom center, as shown in *Figure 3-19*.

Copyright 2017 SolarCity Corporation. All rights reserved.

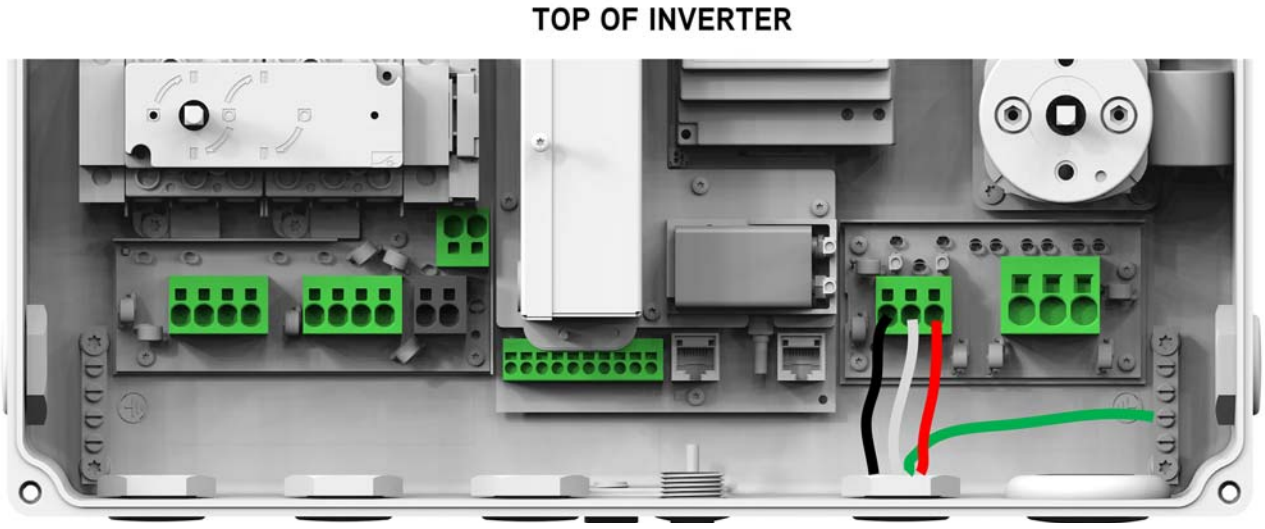


Figure 3-19: Backup load connections

Note: You may be able to route the backup panel and AC grid wiring together using the 1″ conduit opening on the bottom right of the wiring box.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.5.5 - AC Grid Point of Interconnection

The SolarCity H6 inverter output to the utility grid is a typical back-feed connection that connects the inverter to the public grid via the overcurrent protection (circuit breaker) located in the main electrical panel. The inverter includes a dedicated 1" conduit hole for the AC grid output. There is an additional optional 3/4" conduit hole on the right side of the inverter wiring box. If the Fireman Switch is installed, then those lines will typically share the 1" conduit with the AC grid connections. A bonding bushing is required at both ends of this connection, per NEC 690.47(C)(3). *Figure 3-20* shows the AC grid output connections.

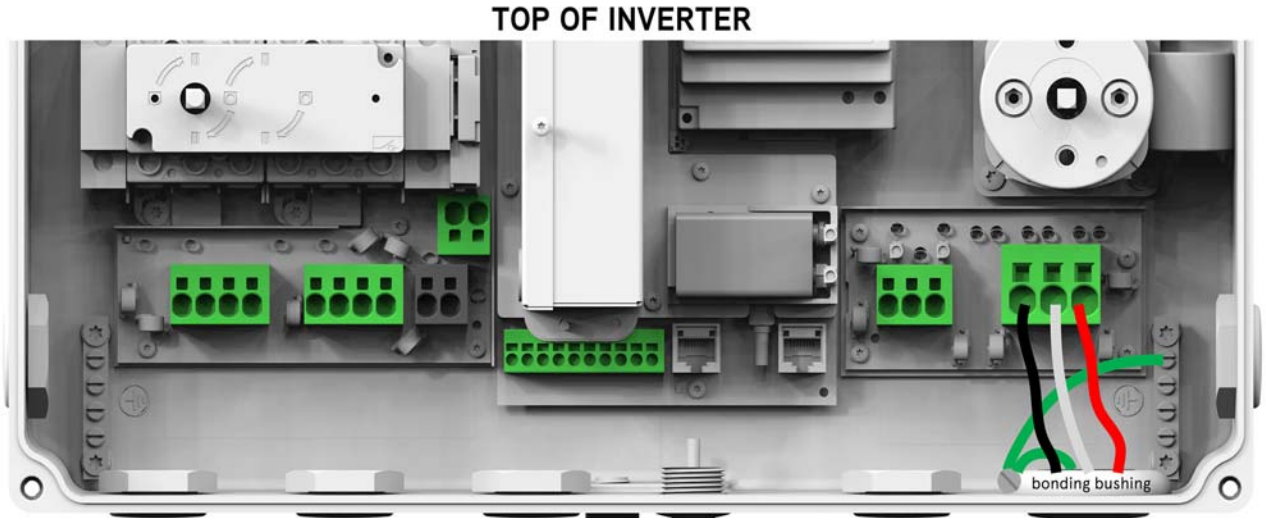


Figure 3-20: AC grid POI output connections

Copyright 2017 SolarCity Corporation. All rights reserved.

3.6 - Whole-Home Backup at the Main Panel

This section provides an overview of systems for manually switching between the grid and the backup AC output of the SolarCity H6 inverter. A mechanical interlock kit (MIK) is placed on the main panel to ensure that only one of two circuit breakers can be in the ON position at the same time. In situations where a mechanical interlock kit cannot be used on the main panel, a separate manual transfer switch (MTS) panel is installed, and the MIK is placed on the MTS panel.

Note: When a panel with an MIK installed has the breaker for the H6 standalone output in the ON position, the H6 AC grid POI breaker should be OFF. If it is not, a voltage ON-OFF situation may occur.

3.6.1 - Mechanical Interlock Kit on the Main Panel

When it is possible to install the mechanical interlock kit (MIK) directly on the main panel, the SolarCity H6 inverter AC grid POI goes to the main panel. The H6 inverter back-up/ standalone AC output also goes to the main panel, on a separate, standalone breaker as shown in *Figure 3-21*.

The MIK is installed directly on the main panel so the homeowner can manually switch either the main breaker or the H6 inverter standalone breaker ON, but can never have both breakers set to ON.

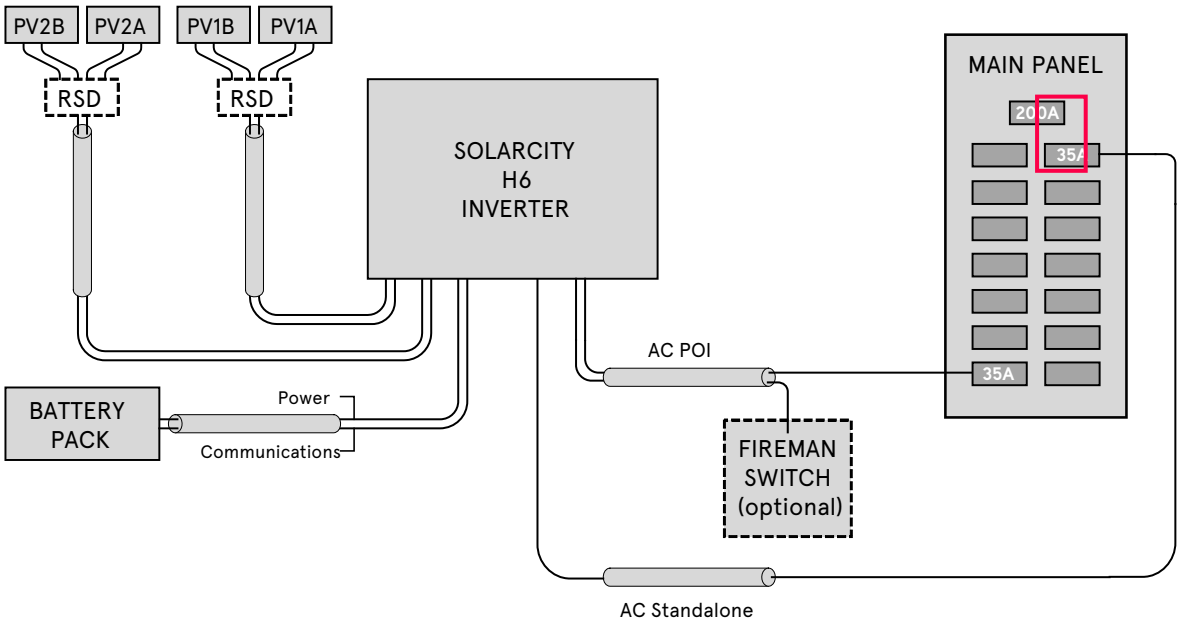


Figure 3-21: Mechanical Interlock Kit (MIK) Installed on a Main Panel

Copyright 2017 SolarCity Corporation. All rights reserved.

3.6.2 - Mechanical Interlock Kit on a Separate Manual Transfer Switch

When a mechanical interlock kit (MIK) cannot be installed directly on the main panel, a separate manual transfer switch (MTS) is installed on the main breaker, and the MIK is then installed on the MTS, as shown in *Figure 3-22*.

The MIK is installed on the MTS panel, allowing either the main MTS breaker or the H6 inverter standalone breaker to be switched ON, but never both.

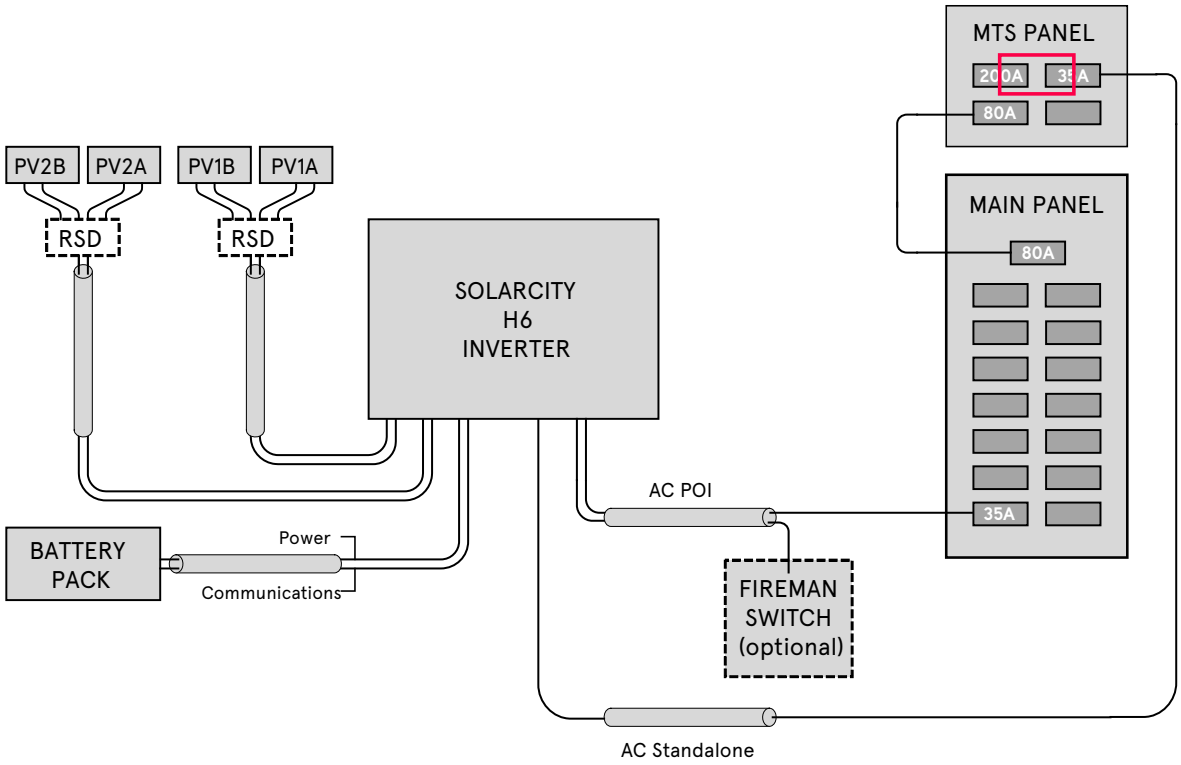


Figure 3-22: Mechanical Interlock Kit (MIK) Installed on a Manual Transfer Switch (MTS)

Copyright 2017 SolarCity Corporation. All rights reserved.

3.6.3 - Sources for MIK and MTS Products

Mechanical Interlock Kits (MIKs) are available from:

- GenInterlock
- Interlockkit

Manual Transfer Switches are available from:

- Reliance

3.7 - External Components

This section provides additional details about the key external components that connect to the SolarCity H6 inverter.

3.7.1 - PV Array

The SolarCity H6 inverter supports a number of PV string combinations for optimal performance, which include:

- Wide full power MPP voltage range of 200V to 480V.
- Ability to begin functioning at voltage ranges of 120V to 550V.
- Ability to operate to as low as 85V.

Note: Inverter output power is limited by both input current and voltages that are above or below the full MPP range.

Each MPPT channel can accommodate up to two (2) strings with a maximum continuous current input of 19A and a short circuit current of 26A. Guaranteed 6kW AC output power from PV energy requires connecting PV strings to both MPPT channels because each channel is only rated for 4.5kW (up to 75% imbalance), with the rest on the other MPPT channel. The total power of the PV array can range up to 150% (9kW) of the SolarCity H6 inverter maximum AC rating of 6kW.

Note: System wiring voltage losses should not exceed one (1) to two (2) percent for optimal system efficiency and performance.

Copyright 2017 SolarCity Corporation. All rights reserved.

Note: NEC 310.15 specifies the wiring AWG to use.

Note: These values are subject to change. Please refer to the SolarCity H6 Inverter Datasheet for updated values.

CAUTION: FOLLOW THE TEMPERATURE MULTIPLICATION FACTORS PROVIDED IN NEC 690.7 TABLE ALONG WITH THE VOLTAGE/TEMPERATURE COEFFICIENT PROVIDED BY THE PV MODULE MANUFACTURER TO ENSURE THAT PV STRING VOLTAGE REMAINS BELOW 570VDC UNDER ALL POSSIBLE WEATHER CONDITIONS AT THE INSTALLATION LOCATION.

CAUTION: ALL WIRING MUST BE SIZED TO AT LEAST 167°C (75°F) PER NEC TABLE 310.15(B)(16) AND RATED TO AT LEAST 194°F (90°).

3.7.2 - Battery Pack

The SolarCity H6 inverter is designed for use with the Tesla Powerwall 2 battery only.

WARNING: USE ONLY THE SPECIFIC MAKE AND MODEL OF BATTERY THAT IS SPECIFICALLY RATED FOR USE WITH THE SOLARCITY H6 INVERTER. THE USE OF ANY OTHER BATTERY TYPE OR MODEL COULD DAMAGE THE INVERTER AND/OR THE BATTERY AND CAUSE DEATH OR PERSONAL INJURY.

SolarCity recommends installing the battery pack within 35’ (10m) of the SolarCity H6 inverter to minimize any circuit noise pickup or voltage loss along the lines. Only install and connect lithium-ion (Li-ion) battery packs that are specifically recommended for the SolarCity H6 inverter. All wiring must be routed through conduit. The inverter includes a dedicated 3/4” conduit hole for both battery pack high-voltage and communication (low voltage) lines. The high-voltage connections are rated to 600VDC with a maximum current rating of 25A and requires wiring that conforms to 310.15 ratings. The low-voltage lines must also be rated to 600VDC in order to be grouped together in the same conduit. A shield wire within the battery cable must be connected to a grounding terminal in order to prevent electromagnetic noise from interfering with the communication wires. This shield wire must terminate at the inverter end only. The battery pack may come with a 10’ (3m) low-voltage communication cable for use when the distance between H6 and the battery pack is less than 10’.

SolarCity recommends the following wiring gauges for the battery pack connections:

Copyright 2017 SolarCity Corporation. All rights reserved.

- **High Voltage:** 8-12AWG
- **Communications (Set 1):** 16-24AWG (see *"Battery Pack Interface" on page 31*)

Note: NEC 310.15 specifies the wiring AWG to use.

Note: These values are subject to change. Please refer to the SolarCity H6 Inverter Datasheet for updated values.

SHOCK HAZARD: VERIFY THAT ALL EXTERNAL CABLES ARE PROPERLY PROTECTED. INSUFFICIENT PROTECTION ON HIGH-VOLTAGE DC WIRES CAN CAUSE DEATH OR SERIOUS INJURY FROM ELECTROCUTION.

SHOCK HAZARD: DO NOT CONNECT THE INTERNAL HIGH-VOLTAGE BATTERY PACK WIRES TO THE BATTERY PACK UNTIL ALL INSTALLATION WORK HAS BEEN COMPLETED AND FULLY VERIFIED IN ACCORDANCE WITH THIS GUIDE, ALL OTHER RELEVANT DOCUMENTATION, NEC AND OTHER APPLICABLE CODES AND REGULATIONS FOR THE INSTALLATION LOCATION, AND BEST PRACTICES.

The DC Disconnect Switch (see *"DC Disconnect Switch" on page 25*) contained within the SolarCity H6 inverter disconnects both the PV array and the battery pack at the same time. In addition, some battery packs may have a separate disconnect switch that is either integrated into the battery pack or installed close to the battery pack externally.

3.7.3 - Back-up Electrical Panel

The back-up electrical panel should generally be installed close to the main electrical panel. Loads requiring backup functionality (the protected home loads) are moved from the main electrical panel to the back-up electrical panel.

Each of the split phases (BL1-BN and BL2-BN) of the split single-phase AC output functions independently, and the protected home loads should be accordingly balanced between the split single phases. Select only loads that will not cause the circuit breakers to trip from

Copyright 2017 SolarCity Corporation. All rights reserved.

overloading. Refer to *"Intended Uses" on page 103*. The SolarCity H6 inverter is rated to a continuous maximum of 3kW (25A@120V)/single-phase or 6kW (25A@240V) for split phase.

Note: The SolarCity H6 inverter transitions from an on-grid inverter to an off-grid (or backup) situation if utility grid power is lost. This transition may take one (1) to two (2) second(s) and may cause some inconveniences, such as the need to reset appliance clocks or restart some appliances. Consider adding an additional Uninterruptible Power Supply (UPS) for loads such as computers that can lose data or other important functionality when power is lost.

Note: In night mode, the SolarCity H6 inverter may take up to eight (8) seconds to transition from on-grid to off-grid.

IEEE 1547 and ANSI regulations specify the following default operating ranges

- **Voltage range for 120V:** 105V (-12%) to 132V (+10%)
- **Frequency range for 60Hz:** 59.3Hz to 60.5Hz

CAUTION: ALL WIRING MUST BE SIZED TO AT LEAST 167° F (75° C) PER NEC TABLE 310.15(B)(16) AND RATED TO AT LEAST 194° F (90° C).

Note: NEC 310.15 specifies the wiring AWG to use.

Note: These values are subject to change. Please refer to the SolarCity H6 Inverter Datasheet for updated values.

Please see *Figure 1-2* for general wiring options.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.7.4 - Main Electrical Panel

The SolarCity H6 inverter can only be tied to the 240V, 60Hz North American split single-phase public grid. Configuration can be performed using either the built-in LCD display or a remote connection (see *"Menu Structure" on page 77*) to specify settings such as voltage, frequency, and trip times per local regulations.

IEEE 1547 specifies the following default operating ranges

- **Voltage range for 240V:** 211V (-12%) to 264V (+10%)
- **Frequency range for 60Hz:** 59.3 to 60.5Hz

CAUTION: THE SOLARCITY H6 INVERTER IS NOT COMPATIBLE WITH 208V OR 277V GRIDS.

Note: These values are subject to change per local requirements. Please refer to the SolarCity H6 Inverter Datasheet for adjustable ratings.

One can determine potential voltage loss in AC wiring based on both the wiring cross section and distance between the inverter and the grid interconnection. In general, you should select wire size and length to limit voltage losses to between 1% and 2%.

CAUTION: ALL WIRING MUST BE SIZED TO AT LEAST 167°C (75°F) PER NEC TABLE 310.15(B)(16) AND RATED TO AT LEAST 194°F (90°).

Note: NEC 310.15 specifies the wiring AWG to use.

Note: These values are subject to change. Please refer to the SolarCity H6 Inverter Datasheet for updated values.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.8 - Fireman Switch and Rapid Shutdown

NEC 690.12 specifies the requirements for a rapid shutdown function that allows the PV system to be shut down in the event of an emergency in order to prevent shock hazards to responders and other persons.

3.8.1 - Components

The Rapid Shutdown System (RSS) consists of the following components:

- **RSS Box:** This is small UL-listed box that is installed on the roof under the PV panel. This box contains a disconnect that receives signals sent from the PLC Transmitter inside the SolarCity H6 inverter via the PV power cables. See *"Rapid Shutdown (RSD)" on page 70* and *"SMART Rapid Shutdown Slave" on page 127*.
- **PLC Transmitter:** This is a small box or PCB with integrated circuit that is installed inside the SolarCity H6 inverter Wiring Box. This box communicates with the RSS box(es) using signals sent via the PV power cables. This part is UL-listed as part of the inverter assembly.
- **Fireman Switch:** This is an emergency switch that is closed during normal operation. Activating this switch initiates the rapid shutdown sequence. See *"Fireman Switch" on page 71*.
- **DC Disconnect Switch:** This six-pole switch in the inverter disconnects both the PV array and battery pack power cables from the internal inverter voltages. See *"DC Disconnect Switch" on page 25*. This switch also has an auxiliary contact to detect its position.
- **Battery Pack Switch:** This is a small switch located on the right side of the battery pack with clearly-indicated ON/OFF positions. Before any commissioning or maintenance work, this switch must be in the OFF position.

Note: See the battery pack Owner's Manual for the location of the battery pack ON/OFF switch.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.8.2 - System Diagram

Figure 3-12 displays the RSS components and wiring.

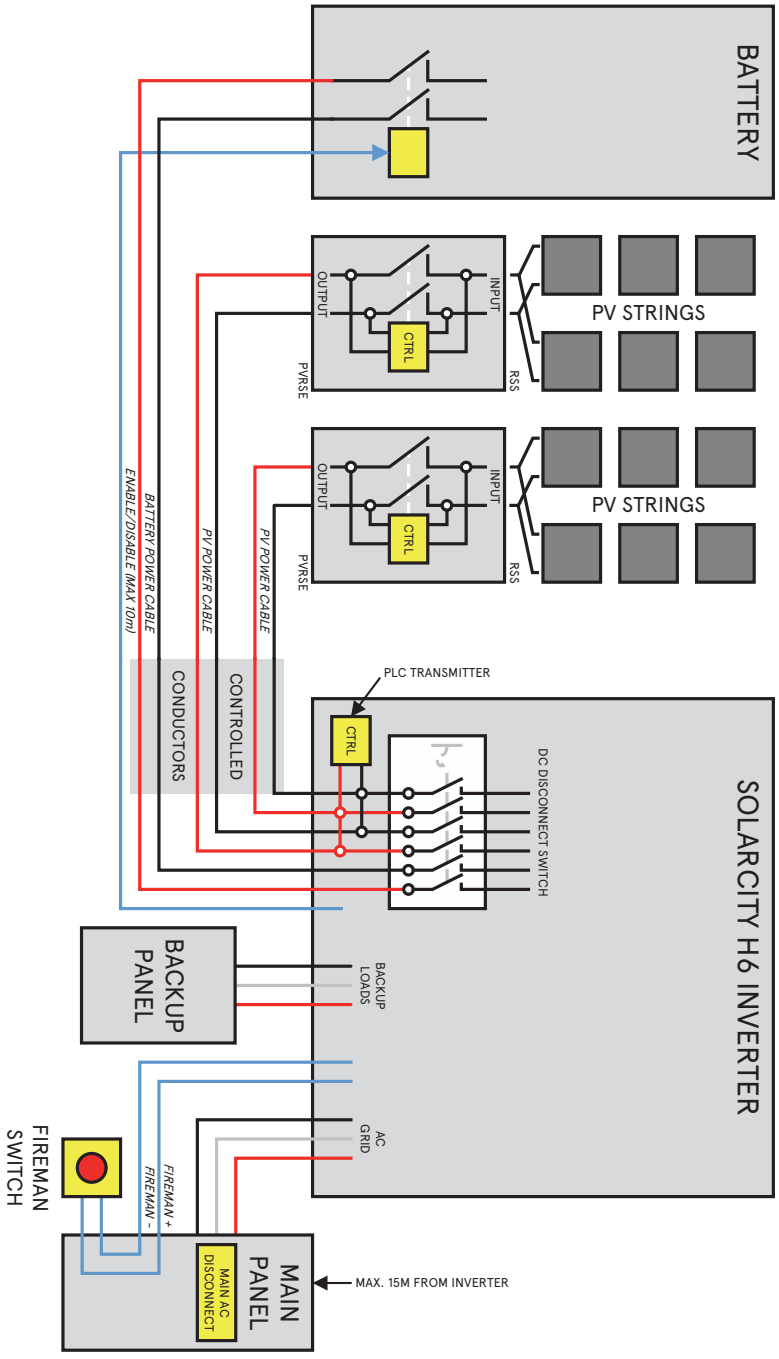


Figure 3-23: RSS components and wiring

Copyright 2017 SolarCity Corporation. All rights reserved.

3.8.3 - Fireman Switch Sequence

Personnel responding to an emergency must press the Fireman Switch. When the Fireman Switch is used, then the rapid shutdown sequence proceeds as follows:

1. The SolarCity H6 inverter detects the activation of the Fireman Switch and:
   - Illuminates the red LED.
   - Displays the message "Fireman Switch Activated" on the LCD Display.
   - Disables the AC Inverter stage and opens the AI relays.
   - Switches off the power supply to the PLC Transmitter.
2. The PLC Transmitter stops PLC communications with the RSS box(es).
3. The RSS box(es) disconnect the PV panels from the PV power cables. Any remaining voltage on the PV power cables between the RSS box(es) and the SolarCity H6 inverter will discharge below 30V within less than ten (10) seconds.
4. Concurrently with Steps 2 and 3, the inverter sends the disable signal for the battery pack.
5. The battery pack shuts off and brings its output voltage down to 0V within ~500ms. The remaining voltage on the battery pack power cable remains because it is still connected to the bulk voltage of the Inverter.
6. The inverter activates the active discharge circuit of the inverter bulk voltage after 9.5s. The remaining battery pack power cable and inverter bulk voltage will be discharged within 100ms.

After 9.6s, all voltages on the PV power and battery pack power cables will be below 30V.

The LCD screen may display the following message(s) related to the Fireman Switch:

- Fireman Switch Activated
- Fireman Switch Error (may be due to incorrect installation)

Note: If the Fireman Switch is engaged when the inverter is off-grid and when there is no PV power, then you will need to follow the procedure described in "Dark-Start Feature" on page 70 to resume normal operation.

Copyright 2017 SolarCity Corporation. All rights reserved.

3.8.4 - DC Disconnect Switch Sequence

Personnel responding to an emergency must turn the DC Disconnect Switch in the SolarCity H6 inverter to the OFF position. If the Fireman Switch is not available and/or not used, then the then the rapid shutdown sequence proceeds as follows:

1. The SolarCity H6 inverter detects the activation of the DC Disconnect Switch and:
   - Illuminates the red LED.
   - Displays the message "DC Disconnect Activated" on the LCD Display.
   - Disables the AC Inverter stage and opens the AI relays.
   - Switches off the power supply to the PLC Transmitter.
2. The PLC Transmitter stops PLC communications with the RSS box(es).
3. The RSS box(es) disconnect the PV panels from the PV power cables. Any remaining voltage on the PV power cables between the RSS box(es) and the SolarCity H6 inverter will discharge below 30V within less than ten (10) seconds. The open DC Disconnect switch means that these cables are not connected to the inverter bulk voltage.
4. Concurrently with Steps 2 and 3, the inverter sends the disable signal for the battery pack.
5. The battery pack shuts off and brings the output voltage down to 0V within ~500ms.

After 9.5s, all voltages on the PV power and battery pack power cables should be below 30V.

Note: The open DC Disconnect Switch means that it is not necessary to actively discharge the inverter bulk voltage.

Copyright 2017 SolarCity Corporation. All rights reserved.

Copyright 2017 SolarCity Corporation. All rights reserved.

4 – Installation

This section covers installing the SolarCity H6 inverter, including:

- Installing the Inverter Mounting Bracket on the wall.
- Hanging the inverter on the wall.

SHOCK HAZARD: ENSURE THAT NO LIVE VOLTAGES ARE PRESENT ON PV INPUT AND AC OUTPUT CIRCUITS, AND VERIFY THAT THE DC DISCONNECT, AC DISCONNECT, AND DEDICATED AC BRANCH CIRCUIT BREAKER ARE IN THE "OFF" POSITION BEFORE INSTALLING THE SOLARCITY H6 INVERTER.

WARNING: READ THIS ENTIRE GUIDE AND ALL INSTRUCTIONS, CAUTIONS, AND WARNINGS FOR THE SOLARCITY H6 INVERTER AND ALL INSTALLATION COMPONENTS, PAYING PARTICULAR ATTENTION TO SHOCK HAZARD AND WRANING CALLOUTS.

WARNING: INSTALLATION AND COMMISSIONING MUST BE PERFORMED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH LOCAL, STATE, AND NATIONAL ELECTRICAL CODE ANSI/NFPA 70 REQUIREMENTS.

WARNING: THE METHODS USED TO INSTALL AND WIRE THE SOLARCITY H6 INVERTER IN THE UNITED STATES MUST COMPLY WITH ALL US NATIONAL ELECTRIC CODE REQUIREMENTS (NEC) AND LOCAL AHJ INSPECTOR REQUIREMENTS. IN CANADA, THE INSTALLATION AND WIRING METHODS USED MUST COMPLY WITH PARTS I AND II OF THE CANADIAN ELECTRIC CODE, AS WELL AS ALL LOCAL AHJ INSPECTOR REQUIREMENTS. THE INSTALLER IS RESPONSIBLE FOR ALL SYSTEM GROUNDING REQUIRED BY PART I OF THE CANADIAN ELECTRICAL CODE.

WARNING: ALL SERVICING INSTRUCTIONS ARE INTENDED FOR USE BY QUALIFIED PERSONNEL ONLY. TO REDUCE THE RISK OF ELECTRIC SHOCK, REFER ALL SERVICING TO FACTORY QUALIFIED SERVICE PERSONNEL. THE SOLARCITY H6 INVERTER CONTAINS NO USER-SERVICEABLE PARTS.

Copyright 2017 SolarCity Corporation. All rights reserved.

CAUTION: THE SECONDARY SHORT-CIRCUIT CURRENT RATING IS INCREASED AT THE TRANSFER CONNECTION POINT TO THE PUBLIC ELECTRICITY SUPPLY SYSTEM BY THE NOMINAL CURRENT OF THE CONNECTED SOLAR INVERTER.

CAUTION: TO REDUCE THE RISK OF FIRE, ONLY CONNECT PROTECTED HOME LOADS TO A CIRCUIT THAT INCLUDES OVERCURRENT PROTECTION IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, ANSI/NFPA70.

CAUTION: THE SOLARCITY H6 INVERTER IS PROVIDED WITH FIXED TRIP LIMITS AND SHALL NOT BE AGGREGATED ABOVE 30KW ON A SINGLE POINT OF COMMON CONNECTION, PER IEEE 1547 REGULATIONS.

4.1 – Visual Inspection

Every SolarCity H6 inverter is individually tested, packaged in a heavy-duty cardboard shipping carton, and visually inspected before leaving the manufacturing facility. If you receive the inverter in a damaged shipping carton, please reject the shipment and notify the shipping company. Upon opening the shipping carton, verify that it contains all of the items listed in *"Package Contents" on page 6*.

Visually inspect the SolarCity H6 inverter for any physical damage such as a bent heatsink fin and/or a dented chassis. If the inverter appears to be damaged or if the inverter needs to be returned, please contact your local SolarCity representative.

SHOCK HAZARD: THE SOLARCITY H6 INVERTER CONTAINS NO USER-SERVICEABLE PARTS. THE TOP SECTION IS FACTORY SEALED TO MAINTAIN ITS NEMA 4X RATING. DO NOT ATTEMPT TO OPEN OR REPAIR THE INVERTER AS DOING SO WILL VOID THE WARRANTY AND CREATE A RISK OF DEATH OR SERIOUS INJURY FROM ELECTROCUTION.

4.2 – Selecting a Location

The location that you select for installing the SolarCity H6 inverter must meet all of the following requirements:

The selected location may be indoors or outdoors.

The wall supporting the inverter must be non-flammable and be structurally capable of supporting the full weight of the inverter (28kg/62lbs) and any other installed component(s) around.

Copyright 2017 SolarCity Corporation. All rights reserved.

The inverter must be mounted plumb and level when viewed from the front and may be tilted up to five (5) degrees when viewed from the side. The wiring box must always face down.

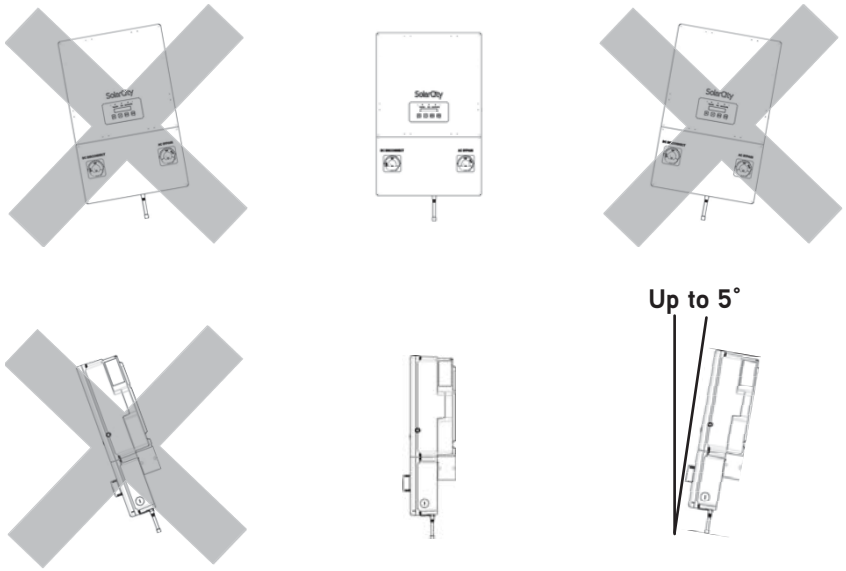


Figure 4-1: Inverter orientation

All clearances specified in *"Clearances" on page 21* or greater must be available once the inverter is mounted.

CAUTION: FAILURE TO ENSURE ADEQUATE CLEARANCE ON ALL SIDES MAY CAUSE THE INVERTER TO OVERHEAT.

All mounting hardware must meet applicable building codes and be capable of supporting the full weight of the inverter.

Avoid installation on resonating surfaces (light construction walls, etc.).

Avoid exposure to direct sunlight to eliminate thermal de-rating caused by high temperatures.

Avoid exposing the inverter to ambient temperature exceeding -4°F to +113°F (-20°C to +45°C) for optimal PV system efficiency. Temperatures beyond this range may cause thermal de-rating or loss of inverter function.

Avoid exposure to water or heavy soiling, even though the inverter conforms to NEXA 4X and IP67 requirements.

Choose a mounting height that allows easy viewing and access to the LED lights, LCD display, and buttons on the inverter while meeting all clearance requirements.

Copyright 2017 SolarCity Corporation. All rights reserved.

Seal all unused conduit opening with the plastic conduit plugs included with the inverter.

WARNING: THE SOLARCITY H6 INVERTER WEIGHS 62LBS (28KG). ALL LIFTING MUST BE PERFORMED BY TWO PEOPLE. ALWAYS LIFT WITH YOUR LEGS AND FOLLOW ALL OTHER APPLICABLE BEST PRACTICES FOR AVOIDING INJURY WHEN LIFTING HEAVY LOADS.

4.3 - Mounting the Inverter

Refer to the following instructions before installing the SolarCity H6 inverter:

- *"Qualification of Skilled Workers" on page 5*
- *"Safety Instructions" on page 11*
- *"Overview" on page 17*
- *"Selecting a Location" on page 48*

Note: For optimal structural integrity, the SolarCity H6 inverter should be inclined at no more than 5 degrees relative to the wall.

The general installation procedure consists of:

1. Installing the Inverter Mounting Bracket on the wall. See *"Installing the Inverter Mounting Bracket" on page 51*.
2. Hanging the SolarCity H6 inverter on the Inverter Mounting Bracket. See *"Hanging the Inverter" on page 52*.

Copyright 2017 SolarCity Corporation. All rights reserved.

4.3.1 - Installing the Inverter Mounting Bracket

To install the Inverter Mounting Bracket on the wall (see *Figure 3-6*):

1. See *"Inverter Mounting Bracket" on page 22* for Inverter Mounting Bracket dimensions and select a location that meets all of the requirements contained in that section and in *"Selecting a Location" on page 48* to selecting a location.

SHOCK HAZARD: THE WALL AT THE INSTALLATION LOCATION MAY CONTAIN HIDDEN ELECTRIC WIRES THAT COULD BE DAMAGED WHEN MOUNTING THE INVERTER AND CAUSE DEATH OR SERIOUS INJURY FROM ELECTROCUTION. VERIFY THAT NO ELECTRIC WIRES ARE LOCATED BEHIND THE INSTALLATION POINTS.

2. Secure the Inverter Mounting Bracket to the wall using at least 3 screws and anchors, in accordance with *"Inverter Mounting Bracket" on page 22*. You can use the Inverter Mounting Bracket as a template for marking the locations of any holes that require pre-drilled pilot holes.
3. After marking the screw hole locations, drill the pilot holes as appropriate for the screws/anchors being used. The diameter of the pilot holes must be appropriate to the type(s) screws and/or anchors being used, in accordance with the instructions supplied with those screws/anchors, building codes, and best practices.

CAUTION: VERIFY THAT BOTH THE SHEAR AND PULL-OUT STRENGTH OF ALL SCREWS AND ANCHORS USED TO INSTALL THE INVERTER MOUNTING BRACKET ARE SUFFICIENT TO BEAR THE WEIGHT OF THE SOLARCITY H6 INVERTER.

Note: Stainless steel screws are recommended, especially for outdoor locations.

4. Align the Inverter Mounting Bracket over the pilot holes and then install the mounting hardware until it is 3/16" distant from the wall. Once all screws are in place, tighten them to the recommended torque for that screw type.

Copyright 2017 SolarCity Corporation. All rights reserved.

4.3.2 - Hanging the Inverter

Refer to the numbered callouts in *Figure 4-2*. To hang the SolarCity H6 inverter:

WARNING: THE SOLARCITY H6 INVERTER WEIGHS 62LBS (28KG). ALL LIFTING MUST BE PERFORMED BY TWO PEOPLE. ALWAYS LIFT WITH YOUR LEGS AND FOLLOW ALL OTHER APPLICABLE BEST PRACTICES FOR AVOIDING INJURY WHEN LIFTING HEAVY LOADS.

1. With at least one person on either side of the inverter, grasp it by the handles (1).
2. Lift the inverter up until the mounting slots on the back of the inverter are just above the level of the tabs (2) on the Inverter Mounting Bracket.

WARNING: KEEP LEGS, FEET, AND OTHER BODY AREAS AWAY FROM THE AREA DIRECTLY UNDERNEATH THE INVERTER UNTIL IT IS SECURELY INSTALLED ON THE INVERTER MOUNTING BRACKET AND YOU HAVE VERIFIED THAT THE INVERTER MOUNTING BRACKET IS CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE INVERTER WITH NO DEFORMATION OR MOVEMENT.

3. Move the inverter horizontally back until it is flush against the Inverter Mounting Bracket.
4. Slide the inverter directly down onto the mounting tabs, and ensure that both the top section and wiring box are fully engaging with all of the tabs.
5. Verify that the Inverter Mounting Bracket tabs are fully engaged on the back side of the wiring box.
6. Gently press on the inverter to verify that it is securely seated and cannot displace vertically or horizontally.
7. Gradually release the inverter, taking care to ensure that the Inverter Mounting Bracket is taking the weight with no movement or deformation.

Copyright 2017 SolarCity Corporation. All rights reserved.

8. Wire the inverter as described in *"Electrical Connections" on page 55*.

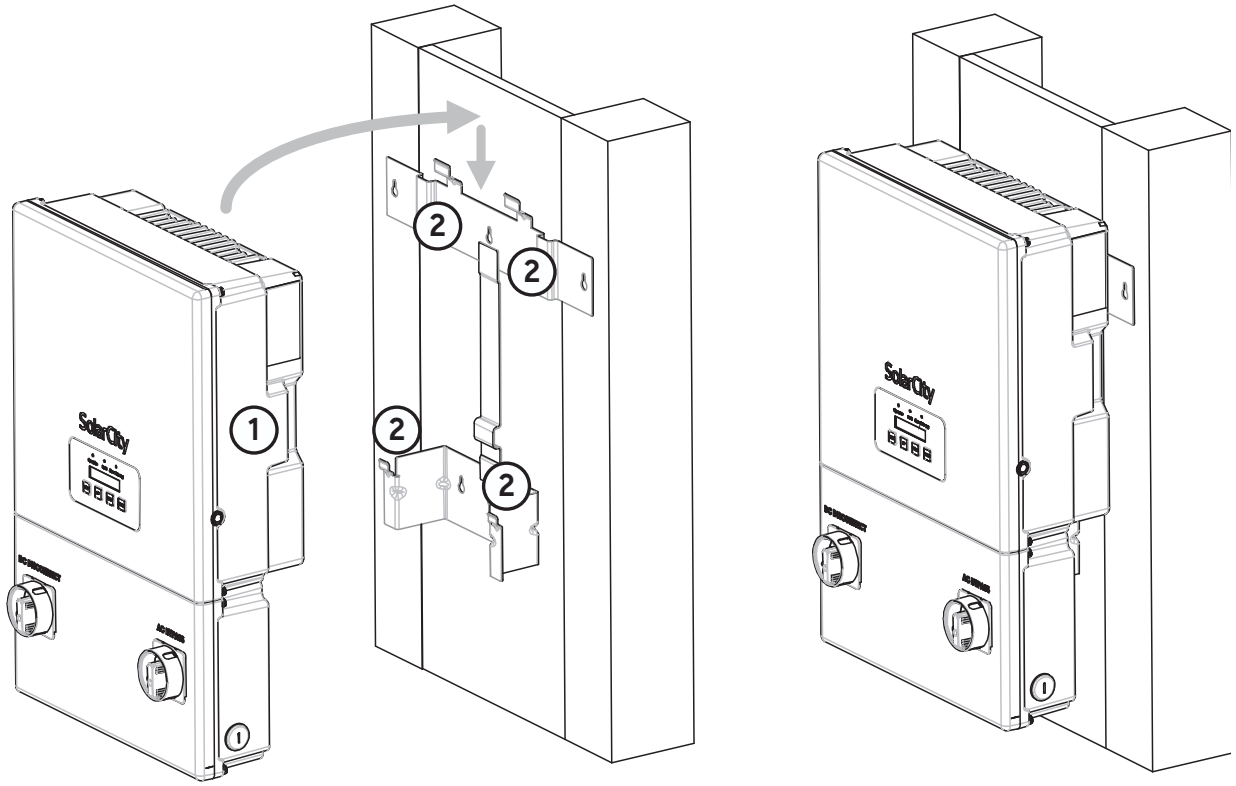


Figure 4-2: Hanging the SolarCity H6 inverter on the mounting bracket

Copyright 2017 SolarCity Corporation. All rights reserved.

Copyright 2017 SolarCity Corporation. All rights reserved.

5 – Electrical Connections

This section provides instructions for making the electrical connections to the SolarCity H6 inverter.

WARNING: READ ALL OF THESE INSTRUCTIONS, CAUTIONS, AND WARNINGS FOR THE H6 INVERTER AND ASSOCIATED PV ARRAY DOCUMENTATION.

SHOCK HAZARD: POWER MAY BE FED FROM MORE THAN ONE SOURCE AND/OR VIA MORE THAN ONE LIVE CIRCUIT. PLEASE NOTE THAT ALL DC AND AC CONNECTORS MAY CARRY CURRENT EVEN WITHOUT CONNECTED WIRES.

SHOCK HAZARD: ENSURE THAT NO LIVE VOLTAGES ARE PRESENT ON PV INPUT AND AC OUTPUT CIRCUITS, AND VERIFY THAT THE DC DISCONNECT, AC DISCONNECT, AND DEDICATED AC BRANCH CIRCUIT BREAKER ARE IN THE "OFF" POSITION BEFORE INSTALLING THE SOLARCITY H6 INVERTER.

SHOCK HAZARD: PV SOLAR ARRAYS PRODUCE HAZARDOUS VOLTAGES AND CURRENTS WHEN EXPOSED TO LIGHT WHICH CAN CREATE AN ELECTRICAL SHOCK HAZARD.

WARNING: THE METHODS USED TO INSTALL AND WIRE THE SOLARCITY H6 INVERTER IN THE UNITED STATES MUST COMPLY WITH ALL US NATIONAL ELECTRIC CODE REQUIREMENTS (NEC) AND LOCAL AHJ INSPECTOR REQUIREMENTS. IN CANADA, THE INSTALLATION AND WIRING METHODS USED MUST COMPLY WITH PARTS I AND II OF THE CANADIAN ELECTRIC CODE, AS WELL AS ALL LOCAL AHJ INSPECTOR REQUIREMENTS. THE INSTALLER IS RESPONSIBLE FOR ALL SYSTEM GROUNDING REQUIRED BY PART I OF THE CANADIAN ELECTRICAL CODE.

Copyright 2017 SolarCity Corporation. All rights reserved.

WARNING: THE APPROPRIATE LOCAL UTILITY MUST PROVIDE APPROVAL BEFORE CONNECTING THE SOLARCITY H6 INVERTER TO THE AC DISTRIBUTION GRID, AS REQUIRED BY NATIONAL AND STATE INTERCONNECTION REGULATIONS. THE INTERCONNECTION MUST BE PERFORMED BY QUALIFIED PERSONNEL.

CAUTION: THE INVERTER IS FACTORY SEALED TO MAINTAIN ITS NEMA 4X / IP67 RATING AND CONTAINS NO USER-SERVICEABLE PARTS. ANY ATTEMPT TO OPEN OR REPAIR THE INVERTER WILL VOID THE INVERTER WARRANTY.

CAUTION: THE INVERTER MUST BE PERMANENTLY MOUNTED BEFORE ANY ELECTRICAL WIRING CAN BE CONNECTED TO THE INVERTER.

CAUTION: ALL ELECTRICAL INSTALLATIONS MUST BE CARRIED OUT ACCORDING TO THE APPLICABLE ELECTRICAL STANDARDS ON SITE AND THE NATIONAL ELECTRICAL CODE ANSI/NFPA 70.

Copyright 2017 SolarCity Corporation. All rights reserved.

5.1 – System Wiring Diagrams

Figure 5-1 and *Figure 5-2* display wiring diagrams for a complete SolarCity H6 inverter installation.

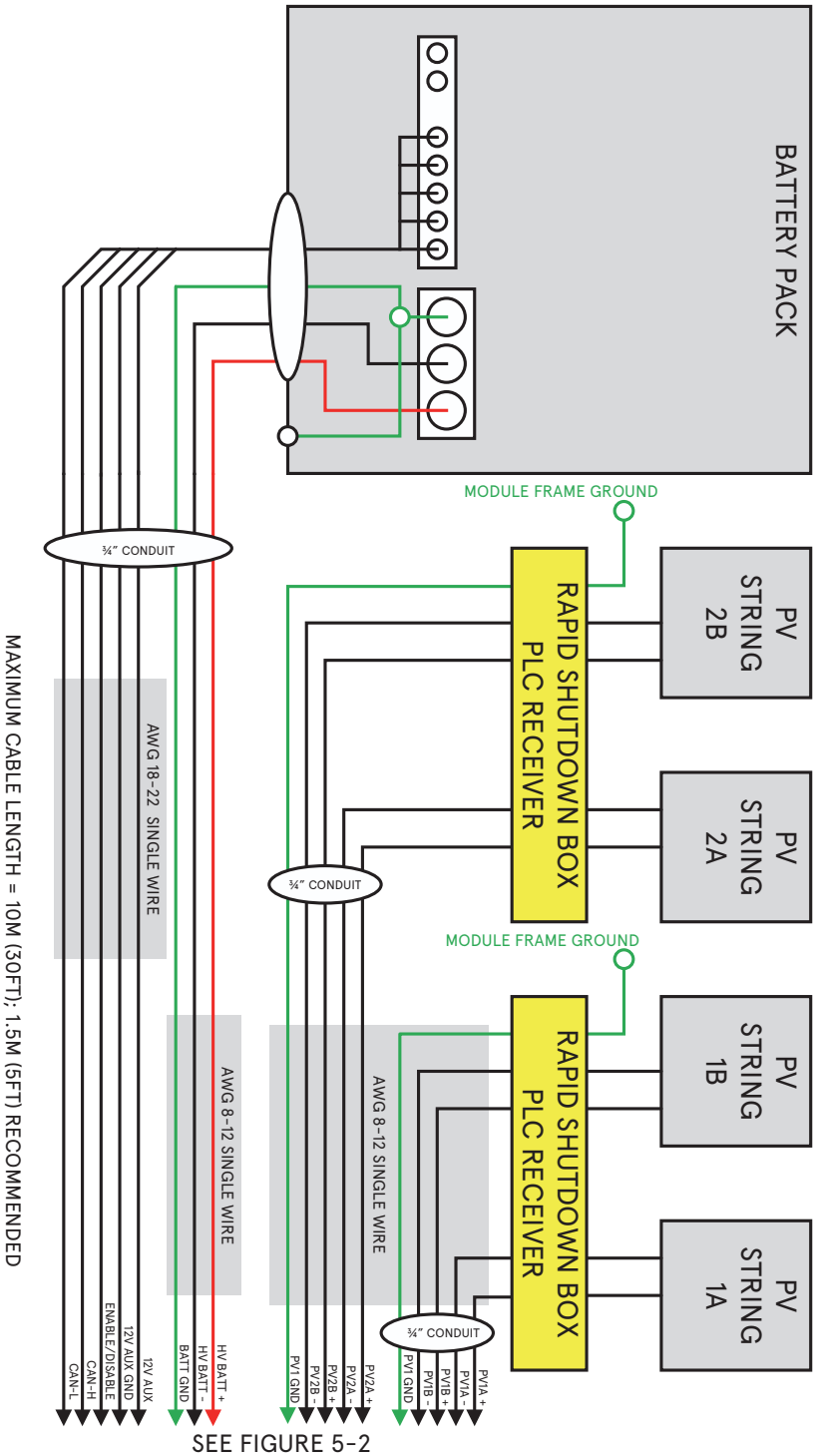


Figure 5-1: SolarCity H6 installation wiring diagram (1 of 2)

Copyright 2017 SolarCity Corporation. All rights reserved.

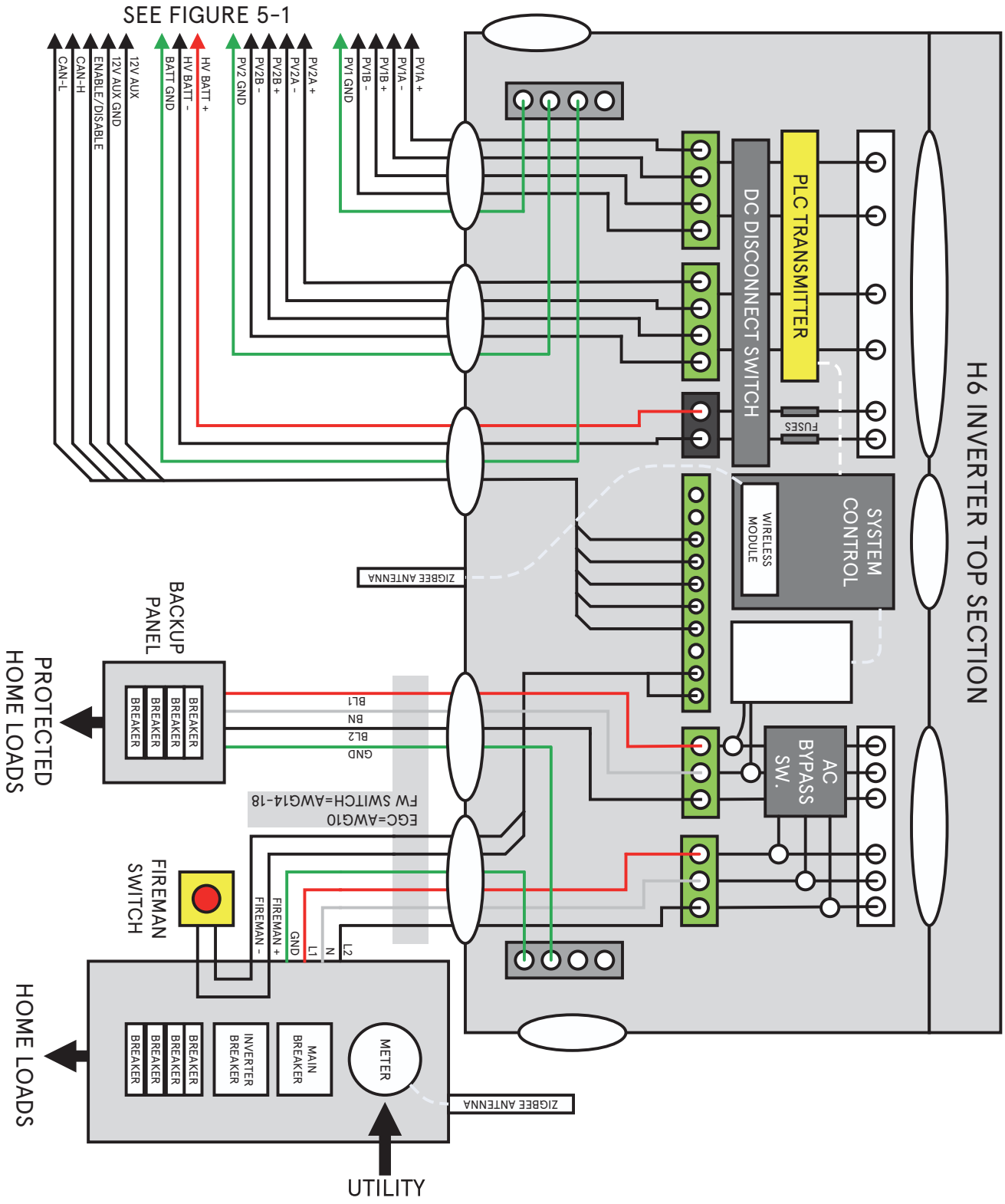


Figure 5-2: SolarCity H6 installation wiring diagram (2 of 2)

Copyright 2017 SolarCity Corporation. All rights reserved.

5.2 - Wiring Box Cover

This section describes removing and refitting the wiring box cover on the SolarCity H6 inverter.

SHOCK HAZARD: HIGH VOLTAGES ARE PRESENT IN THE SOLARCITY H6 INVERTER DURING OPERATION THAT CAN CAUSE DEATH OR SERIOUS INJURY FROM ELECTROCUTION. ONLY OPEN THE WIRING BOX COVER IN THE ORDER AS DESCRIBED BELOW AFTER ENSURING THAT THE DC DISCONNECT IS IN THE OFF POSITION AND THE AC GRID BREAKER IS IN THE OFF POSITION.

CAUTION: DO NOT OPEN THE SOLARCITY H6 INVERTER DURING RAIN, WHEN RELATIVE HUMIDITY EXCEEDS 95%, OR WHEN THE AMBIENT TEMPERATURE IS BELOW -20°C (-4°F).

CAUTION: AVOID DAMAGING THE WATER SEAL TO PREVENT MOISTURE FROM LEAKING INTO THE INVERTER.

CAUTION: GROUND YOURSELF BEFORE TOUCHING ELECTRONIC COMPONENTS TO PREVENT POSSIBLE DAMAGE FROM STATIC DISCHARGE.

5.2.1 - Remove Wiring Box Cover

To remove the wiring box cover from the SolarCity H6 inverter:

1. If the SolarCity H6 inverter is already installed and operating, then power it OFF as described in *"Powering Off the Inverter" on page 86*.
2. Place the DC Disconnect Switch in the OFF position. The cover cannot be removed when the DC Disconnect switch is in the ON position.
3. Place the external AC disconnect or back-feed circuit breaker in the main panel (as applicable) leading to the inverter in the OFF position.
4. Use a 5mm Allen ratchet to remove the four (4) cover screws, as shown in *Figure 5-1* (callout 1). Do not remove the screws all the way.

Copyright 2017 SolarCity Corporation. All rights reserved.

5. Lift the bottom of the cover up and then move the cover outward and place in a safe location.

CAUTION: DO NOT OPEN THE WIRING BOX DURING RAIN, WHEN THE AMBIENT HUMIDITY EXCEEDS 95%, OR AT TEMPERATURES BELOW -20 °C (-4 °F).

CAUTION: GROUND YOURSELF BEFORE TOUCHING ANY ELECTRONIC COMPONENTS WITHIN THE INVERTER.

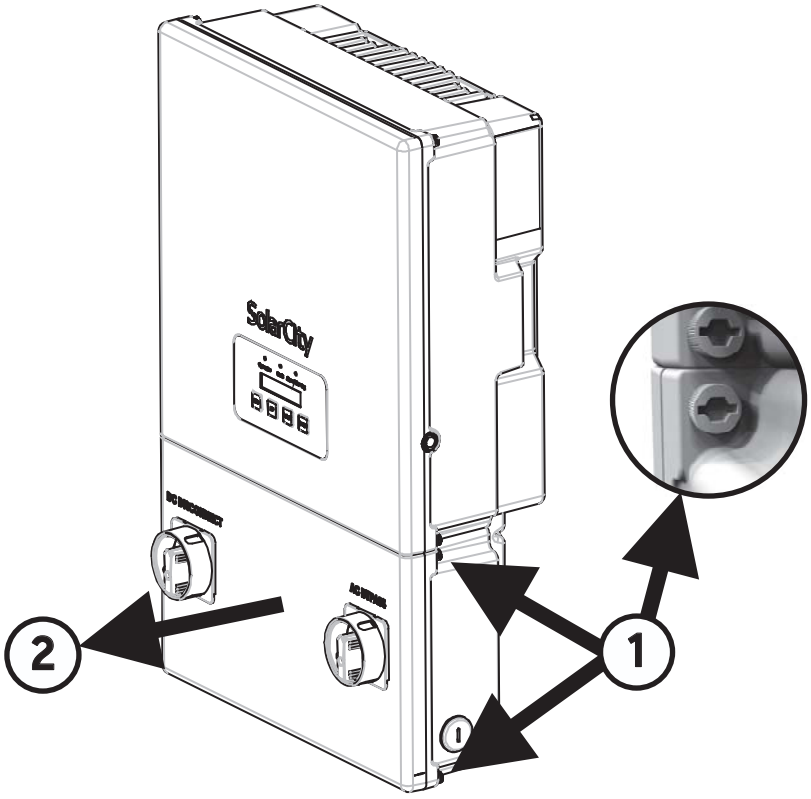


Figure 5-3: Removing the wiring box cover and close-up of screw head

5.2.2 - Refit Wiring Box Cover

To replace the wiring box cover on the SolarCity H6 inverter:

1. Place the cover in position against the inverter, making sure that the DC Disconnect Switch is in the OFF position.
2. Place the AC Bypass Switch in the INV position.

Copyright 2017 SolarCity Corporation. All rights reserved.

3. Use a 5mm Allen ratchet screwdriver to install the four (4) cover screws (see *Figure 5-3*). Torque the screws until the cover is tight and securely fastened. Do not over-tighten the screws.
4. Turn the inverter output AC circuit to the ON position.
5. Place the DC Disconnect Switch in the ON position.
6. Proceed as follows:
   - If you are installing the inverter, then continue with the installation/connections beginning with *"Conduit Plugs and Fittings" on page 61*.
   - If the SolarCity H6 inverter is already installed and operating, then power it ON as described in *"Powering On the Inverter" on page 85*.

5.3 - Conduit Plugs and Fittings

The SolarCity H6 inverter includes pre-installed conduit plugs for all 1", 3/4" and 1/2" conduit fittings. To remove the conduit plugs, use a large-bladed flat screwdriver, coin, or similar implement and turn counterclockwise.

CAUTION: ATTEMPTING TO ENLARGE THE WIRING COMPARTMENT CONDUIT OPENINGS WILL DAMAGE THE WIRING BOX ENCLOSURE AND VOID THE INVERTER WARRANTY. THIS MAY ALSO DAMAGE ELECTRONIC COMPONENTS LOCATED NEAR THE CONDUIT OPENINGS.

Use rain-tight compression connectors or other approved connectors to ensure a weatherproof connection between the conduits and the wiring box. *Figure 5.4* displays an example of such a connector.

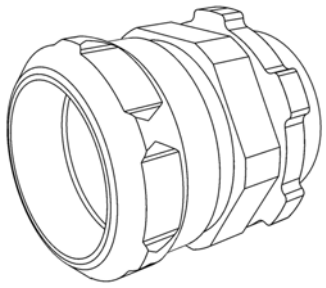


Figure 5-4: Rain-tight compression connector

Copyright 2017 SolarCity Corporation. All rights reserved.

5.4 - Grounding Connections

Equipment grounding must be connected to the grounding buses within the SolarCity H6 inverter:

- The SolarCity H6 Inverter operates with ungrounded PV source and output circuits in accordance with NEC 690.35.
- Size the Grounding Electrode Conductor and Equipment Grounding Conductors per 2014 NEC690.47(C)(3)
- PV array grounding conductor(s).
- Battery pack
- Main electrical panel
- Backup electrical panel

The SolarCity H6 inverter is designed and certified to meet the lightning and surge requirements contained in UL 1741, IEEE 1547, and ANSI/ IEEE 62.41/62.42 AC.

WARNING: THE SOLARCITY INPUT AND OUTPUT CONNECTIONS ARE ELECTRICALLY ISOLATED FROM THE ENCLOSURE. THE INSTALLER IS RESPONSIBLE FOR INCLUDING SYSTEM GROUNDING THAT COMPLIES WITH NEC AND ANSI/NFPA 70.

5.5 - Using the Spring Clamp Connectors

The PV array, battery pack, communications, backup panel, and AC grid connections use spring-clamp connectors.

SHOCK HAZARD: ENSURE THAT NO LIVE VOLTAGES ARE PRESENT ON ANY WIRE THAT YOU ARE CONNECTING TO THE INVERTER.

Figure 5-5 displays the general process of connecting an insulated wire to a spring clamp connector. The detailed procedure is as follows:

1. Trim at least 3/8" (10mm) off the end of the wire to remove any damaged or corroded conductor material.
2. Strip 3/4" (20mm) of insulation off the end of the wire, being sure not to break or damage the conductor(s).
3. Route the wire to the correct connector, as shown in *Figure 1-2*, *Figure 3-11*, *Figure 5-1*, and in *"Inverter Wiring Box" on page 27*.

Copyright 2017 SolarCity Corporation. All rights reserved.

4. See *Figure 5-5*. Connect the wire to the connector as follows:
   - To connect a wire, push a 1/8" flat screwdriver into the connector contact on the spring-clamp connector, and then push the wire into the connector as far as it will go. Verify that there no strands left out or pushed into another connector.
   - To connect a solid wire, simply push the wire into the connector.

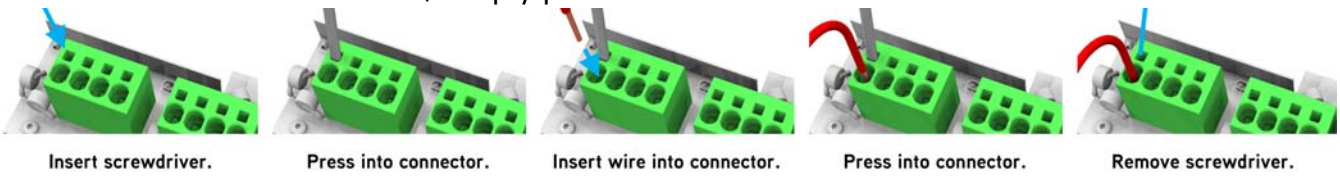


Figure 5-5: Using the spring clamp connectors

5.6 - PV Connections

SHOCK HAZARD: PV ARRAYS PRODUCE HAZARDOUS VOLTAGES AND CURRENTS WHEN EXPOSED TO LIGHT, WHICH CAN CREATE AN ELECTRICAL SHOCK HAZARD.

SHOCK HAZARD: ENSURE THAT NO LIVE VOLTAGES ARE PRESENT ON ANY PV INPUT WIRE.

SHOCK HAZARD: ENSURE MAXIMUM PROTECTION AGAINST HAZARDOUS CONTACT VOLTAGES WHILE ASSEMBLING PHOTOVOLTAIC INSTALLATIONS BY STRICTLY ISOLATING BOTH THE POSITIVE AND THE NEGATIVE LEADS FROM ANY GROUNDING.

SHOCK HAZARD: THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED.

SHOCK HAZARD: THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED BUT WILL BECOME INTERMITTENTLY GROUNDED WITHOUT INDICATION WHEN THE INVERTER MEASURES THE PV ARRAY ISOLATION.

SHOCK HAZARD: RISK OF ELECTRIC SHOCK AND FIRE. USE ONLY WITH PV MODULES WITH A MAXIMUM SYSTEM VOLTAGE OF 570V OR LOWER.

Copyright 2017 SolarCity Corporation. All rights reserved.

CAUTION: DC INPUT VOLTAGE THAT EXCEEDS THE MAXIMUM INVERTER RATING OF 570 VDC WILL VOID THE INVERTER WARRANTY.

CAUTION: BE SURE THAT THE POLARITY IS CORRECT WHEN YOU MAKE THE CONNECTION. REVERSING THE POLARITY MAY DAMAGE THE INVERTER.

5.6.1 - Limitations

The following requirements may apply when selecting the wire size and type:

- For all DC copper wire connections, use size 8-12AWG that is rated for +194°F (+90°C).
- Do not coil the PV wires.
- Use conductors rated for at least 600V.

5.6.2 - Wiring

To connect the PV array wires to the SolarCity H6 inverter:

1. Connect one 3/4" conduit to the SolarCity H6 inverter for each MPPT channel (up to two channels supported) using watertight conduit fittings, as described in *"Conduit Plugs and Fittings" on page 61*.
2. Pull the wiring from the PV array through the conduit to the inverter, leaving at least 6" (152mm) of exposed wire to ensure adequate strain relief. The wiring must comply with the requirements listed in *"PV Array" on page 37*.
3. Use the procedure described in *"Using the Spring Clamp Connectors" on page 62* to connect the PV array wires from the first string to the PV1A+ and PV1A- connectors in the SolarCity H6 inverter as described in *"PV Interface" on page 28* and *"PV Array" on page 37*. When making the connections:
   - Connect the positive wire to the correct positive connector first.
   - Connect the negative wire to the correct negative connectors next.
4. Repeat Step 3 for the PV1B, PV2A, and PV2B connection(s), as appropriate for the installation. The following combinations are supported, subject to the limitations specified in *"PV Array" on page 37*:
   - PV1A and PV2A
   - PV1A, PV1B, and PV2A

Copyright 2017 SolarCity Corporation. All rights reserved.

- PV1A, PV2A, and PV2B
- PV1A, PV1B, PV2A, and PV2B

Note: While you may use only one MPPT channel, SolarCity does not recommend this because the inverter will only put out 70% of output power on each MPPT channel (4.2kW).

Note: SolarCity does not recommend connecting more than two strings on a single MPPT channel.

5. Use a voltmeter or other testing device to ensure that all wires have been connected with the correct polarity to the wiring box compartment connections DC wiring board assembly:

5.7 - Battery Pack Connections

This section describes connecting the battery pack to the SolarCity H6 inverter, selecting the correct fuse for service and maintenance, and how the battery pack firmware can be upgraded via the inverter.

5.7.1 - Wiring

To connect the high-voltage battery pack wiring to the SolarCityH6 inverter:

1. Run and connect one 3/4" conduit to the SolarCity H6 inverter for the combined battery pack voltage and communications wires using a watertight conduit fitting, as described in *"Conduit Plugs and Fittings" on page 61*.
2. Pull the positive wire, negative wire, ground wire, and communications wires from the battery pack through the conduit to the inverter, leaving at least 6" (152mm) of exposed wire to ensure adequate strain relief. The wiring must comply with the requirements listed in *"Battery Pack" on page 38*.
3. Use the procedure described in *"Using the Spring Clamp Connectors" on page 62* to spring connectors to connect the high-voltage battery pack wires to the BATT+ and BATT- connectors in the SolarCity H6 inverter as described in *"Battery Pack Interface" on page 31* and *"Battery Pack" on page 38*. When making the connections:
   - Connect the positive wire to the correct positive connector next.
   - Connect the negative wire to the correct negative connectors last.

Copyright 2017 SolarCity Corporation. All rights reserved.

4. Connect both sets of communications lines to the following connectors, as described in *"Communications" on page 31*:
   - 12V AUX
   - 12V AUX GND
   - Enable/Disable
   - CAN_H
   - CAN_L

Note: Actual wiring colors may vary from those shown on the wiring box label and/or this Guide.

5.7.2 - Fuses

The SolarCity H6 inverter accepts a maximum battery pack fuse rating of 25A.

CAUTION: LARGER FUSES WILL VOID THE WARRANTY.

CAUTION: FUSES THAT ARE TOO FAST MAY OPEN TOO EARLY AND INTERRUPT NORMAL OPERATION. FUSES THAT ARE TOO SLOW MAY OPEN TOO LATE, THEREBY NOT PROVIDING THE REQUIRED LEVEL OF PROTECTION.

SolarCity recommends the 25A LittleFuse KLKD025 or Bussman KLM-25 fuses.

Note: These values are subject to change. Please refer to the SolarCity H6 Inverter Datasheet for updated values.

5.7.3 - Communications

Updates to the battery pack firmware are sent via the ZigBee communication interface. The inverter receives the firmware and passes it on to the battery pack via the CAN interface. During the firmware upgrade process, the system may either continue to operate or may go into boot mode until the upgrade is completed and then restart automatically. SolarCity normally upgrades firmware at night when grid power is present. Any loss of grid power during the upgrade reverts to the previous version and restarts the system. Failure to upgrade firmware automatically schedules another attempt.

Copyright 2017 SolarCity Corporation. All rights reserved.

5.8 - AC Voltage

This section describes how to wire the AC grid and backup panel connections.

SHOCK HAZARD: ENSURE THAT NO LIVE VOLTAGES ARE PRESENT ON PV INPUT AND AC OUTPUT CIRCUITS, AND VERIFY THAT THE DC DISCONNECT, AC DISCONNECT, AND DEDICATED AC BRANCH CIRCUIT BREAKER ARE IN THE "OFF" POSITION BEFORE INSTALLING THE SOLARCITY H6 INVERTER.

SHOCK HAZARD: VERIFY THAT THE DEDICATED 2-POLE 240 VAC BACK-FEED CIRCUIT BREAKER IN THE MAIN ELECTRICAL PANEL IS TURNED OFF.

Note: The AC output (neutral) is not bonded to ground in the SolarCity H6 inverter.

5.8.1 - Output to Grid

Note: Stranded copper wire should be checked to ensure that all strands go into the connector opening. Do not use fine-stranded wire.

To connect the AC grid wiring to the SolarCityH6 inverter:

1. Run and connect one (1) 1" conduit to the SolarCity H6 inverter for the AC output wires to the main panel using a watertight conduit fitting, as described in *"Conduit Plugs and Fittings" on page 61*.
2. Pull the wires from the main electrical panel through the conduit to the inverter, leaving at least 6" (152mm) of exposed wire to ensure adequate strain relief and wire end strip length. The wiring must comply with the requirements listed in *"Main Electrical Panel" on page 41*. If you are installing a Fireman Switch (see *"Fireman Switch" on page 71*), then these wires will usually share the same conduit.
3. Use the procedure described in *"Using the Spring Clamp Connectors" on page 62* to connect the AC output wires to the L1, L2, N, and ground connectors in the SolarCity H6 inverter as described in *"AC Grid Point of Interconnection" on page 34* and *"Main Electrical Panel" on page 41*:
   - Connect the black L1 wire to the "L1" connector.
   - Connect the white Neutral wire to the "N" screw connector.

Copyright 2017 SolarCity Corporation. All rights reserved.

- Connect red L2 wire to the "L2" connector.

4. Insert the grounding conductor into the grounding bus and torque the fastening screw to 21 foot-pounds (28Nm).

Note: The SolarCity H6 inverter does not bond the neutral connections to ground. The inverter checks for grid power by measuring the voltage difference between the L1 and N connectors and between the L1 and L2 connectors. A loose neutral connection is interpreted as loss of grid power, and the inverter will stop feeding power to the AC grid.

5.8.2 - Utility Back-Feed (OCPD) Circuit Breaker

A dedicated back-feed circuit breaker must be installed in the main electrical panel for each SolarCity H6 inverter in the installation. Each L1 and L2 AC line must have a circuit breaker or disconnect in order to isolate the AC grid connection when needed. The circuit breaker must be rated for the maximum output voltage and current of the inverter. The recommended AC branch protection for the SolarCity H6 inverter is 2-pole, 35A 120/240Vac.

5.8.3 - Output to Backup Load Center

To connect the AC backup load center wiring to the SolarCityH6 inverter:

1. Pull the wires from the backup electrical panel through the conduit to the SolarCity H6 inverter, leaving at least 6" (152mm) of exposed wire to ensure adequate strain relief. The wiring must comply with the requirements listed in *"Main Electrical Panel" on page 41*.
2. Use the procedure described in *"Using the Spring Clamp Connectors" on page 62* to connect the AC output wires to the BL1, BL2, and BN connectors as described in *"Backup/Protected Loads Panel" on page 32* and *"Back-up Electrical Panel" on page 39*.
3. Insert the grounding conductor into the grounding bus.

Copyright 2017 SolarCity Corporation. All rights reserved.

5.9 - Communications

This section describes the communications connections to the SolarCity H6 inverter.

5.9.1 - ZigBee & Gateway

SolarCity uses the ZigBee protocol for communications between the SolarCity H6 inverter and the SolarCity server. The gateway may be connected to the home Internet Wi-Fi system using either a wired or wireless Ethernet connection. The server establishes a connection to the inverter via the gateway based on the ZigBee serial number and other details. The inverter searches for the gateway connection and, once established, displays the signal strength and other details about the ZigBee. See *"ZigBee (Xbee) Information Menu" on page 81* to view ZigBee information.

This communication interface is used for performing over-the-air (OTA) firmware upgrades to the inverter, battery pack, and the ZigBee processor itself. It can also be used to remotely control the adjustable parameters. The SolarCity H6 inverter stores firmware upgrades in local memory and then loads the updates into the appropriate processor(s). During this process, the inverter may remain operational or go into a boot mode until the upgrade is complete before restarting automatically. Updates may affect some or all processors. See *"Communications" on page 66*.

To install the ZigBee antenna, screw the antenna into the connector on the bottom of the SolarCity H6 inverter wiring box until it is hand tight

5.9.2 - Integrated Revenue Grade Meter (RGM)

The SolarCity H6 inverter includes integrated high-precision components that can measure AC output current, voltage, and power fed into the AC grid and then report this information via ZigBee to the SolarCity server. This precision is revenue-grade ANSI C12.1, 1% class.

5.9.3 - PV-Only Charging

The SolarCity H6 inverter is primarily intended to act as a PV inverter that also provides backup power to protected home loads. Utility restrictions prevent the inverter from using grid power to charge the battery pack, meaning that all battery pack power must come from the PV array and that the battery pack can only discharge to the protected home loads. The inverter is set to do this by default; however, it includes software-enabled features that will allow it to bypass these restrictions upon receipt of approval or permission from the local authorities and utilities.

Copyright 2017 SolarCity Corporation. All rights reserved.

- The H6 inverter is factory configured with AC Grid charging disabled. It can only charge from PV.
- The Grid charging setting is password-protected and cannot be modified by the end user.
- You can verify that the inverter has not grid charged by viewing the LCD display and looking at the grid charging register.

5.9.4 - Rapid Shutdown (RSD)

The wiring box includes a Rapid Shutdown Master (Power Line Communication or PLC Transmitter) that sends a simultaneous wireless PLC signal to the RSD boxes connected to all of the strings in the PV array via the high-voltage DC lines connected to the PV+ and PV- connections. The Rapid Shutdown Slaves (communication receivers) that receive these wireless PLC signals are embedded in the RSD boxes on the roof. This RSD signal initiates a rapid shutdown when triggered by the Fireman Switch located either beside the main panel or by the DC Disconnect Switch. See *Figure 3-14* and *Figure 3-15* for mounting and operation, respectively. See also *"PV Interface" on page 28*.

When the Fireman Switch is pressed or the DC Disconnect Switch is set to OFF, the DC feeders between the SMART RSD device and the SolarCity H6 inverter becomes de-energized below 30V, 8A, 240VA within less than ten (10) seconds. The SolarCity H6 inverter will not export AC power to the grid or to protected home loads and also disables the battery pack at the same time. Please see *"Fireman Switch and Rapid Shutdown" on page 42* for detailed operation information.

5.9.5 - Dark-Start Feature

When there is no PV energy, no AC grid, and if the inverter and battery disconnects are in the OFF positions, then you can restart the system by turning the inverter and battery pack disconnects to the ON position, waiting for one (1) minute, and then pressing and holding both the [UP] and [DOWN] buttons simultaneously for five (5) seconds. This operation causes the SolarCity H6 inverter to send an ENABLE signal to the Battery Pack and come online within eight (8) seconds. The system can turn on automatically if there is AC grid or PV energy, or if the inverter and battery disconnects are in the ON position.

Copyright 2017 SolarCity Corporation. All rights reserved.

5.9.6 - Fireman Switch

The Fireman Switch is typically located near the main electrical panel to allow emergency responders to shut down all power to the PV system from the panels on. It may also be mounted directly under the SolarCity H6 inverters through a 1/2" conduit. The switch is located beside the main electrical panel for easy access to firefighters during an emergency situation. Please see *"Fireman Switch and Rapid Shutdown" on page 42*.

The Fireman Switch is typically wired to the SolarCity H6 inverter through the conduit carrying the AC grid connections; however it can also be wired using a dedicated 1/2" conduit. The inverter wiring box includes the Fireman + and Fireman – terminals. By default, the inverter contains a jumper that shorts these terminals pre-installed from the factory.

Note: SolarCity recommends using 14-22AWG wire for the Fireman Switch connection.

- **To use the Fireman Switch:** Push the red button. This holds the button close to the housing and sends a signal to the SolarCity H6 inverter, which in turn sends a wireless PLC signal through the PV array lines to the RSD boxes on the roof, which respond by isolating the PV array from the rest of the system. This system also shuts off the battery pack and all AC outputs.
- **To reset the Fireman Switch:** Rotate the button clockwise. You will hear a click, and the button will pop back out, ready for normal operation.

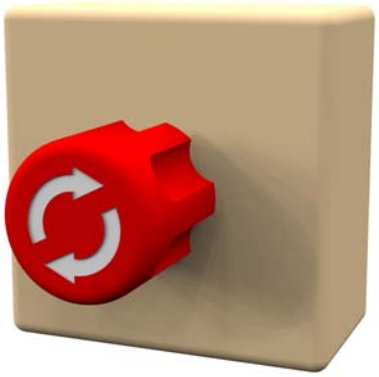


Figure 5-6: Fireman Switch

Note: Make sure that both the DC Disconnect Switch on the inverter and the switch on the Battery Pack are in the ON position when resetting the Fireman Switch in order to resume normal operation.

Copyright 2017 SolarCity Corporation. All rights reserved.

Copyright 2017 SolarCity Corporation. All rights reserved.

6 – User Controls

The LCD display and LED lights provide important information about both the SolarCity H6 inverter and battery pack, including system status, errors, faults, and warnings.

6.1 – Displays and Buttons

The SolarCity H6 inverter includes the following displays and buttons:

- Three (3) LEDs (one each green, red, and amber) that display basic system status.
- LCD display with two (2) lines of 16 characters each.
- Four (4) push buttons.

Figure 6-1 displays the locations of these items and controls.

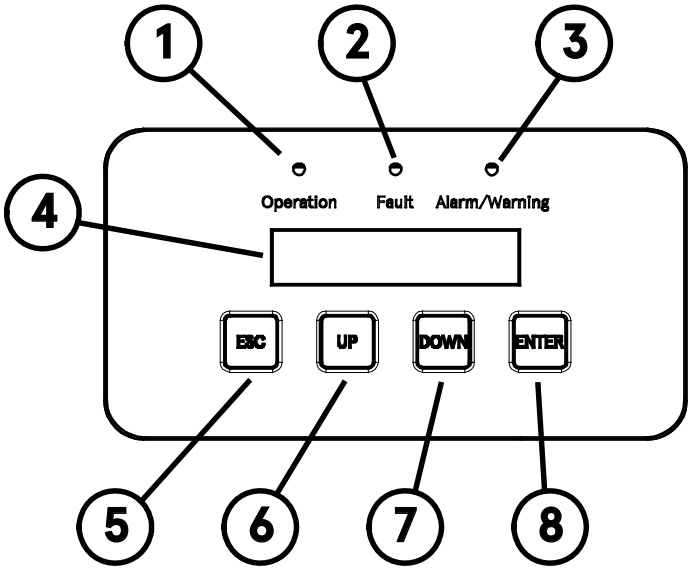


Figure 6-1: SolarCity H6 inverter LEDs, LCD display, and buttons

The numbered callouts in *Figure 6-1* correspond to the following:

- **Operation LED (1):** This LED lights up green to indicate that the SolarCity H6 inverter is functioning. See *"Status LEDs" on page 75*.
- **Fault LED (2):** This LED lights up red when a fault condition occurs. See *"Status LEDs" on page 75* and *"Faults" on page 106*.

Copyright 2017 SolarCity Corporation. All rights reserved.

- **Alarm/Warning LED (3):** This LED lights up amber when an alarm or warning condition occurs. See *"Status LEDs" on page 75*, *"Alarms" on page 105*, and *"Warnings" on page 108*.
- **LCD display (4):** This display includes two lines with 16 characters per line that show important messages regarding system status and performance. You can also use this display to adjust various parameters. See *"LCD Display" on page 76*.
- **ESC button (5):** This buttons exits the currently-selected function. See *"Push Buttons" on page 76*.
- **UP button (6):** This button either moves up the menu or increases the currently-selected parameter. See *"Push Buttons" on page 76*.
- **DOWN button (7):** This button either moves down the menu or decreases the currently-selected parameter. See *"Push Buttons" on page 76*.
- **ENTER button (8):** This button selects the current menu option or inputs the specified parameter. This button either moves up the menu or increases the currently-selected parameter. Pressing this button while viewing a scrolling menu pauses the scrolling. Pressing ENTER again resumes scrolling. See *"Push Buttons" on page 76*.

Copyright 2017 SolarCity Corporation. All rights reserved.

6.1.1 - Status LEDs

As shown in *Figure 6-1*, the SolarCity H6 inverter includes the following three LEDs:

Label	Designation	Color
Operation	Operation	Green
Fault	Error	Red
Alarm/Warning	Warning	Yellow

The LEDs will either remain off, illuminate steadily, or blink to indicate various system statuses. See *Figure 6-2*.

LABEL	CONDITION	COLOR/ACTION
	Normal operation	Green LED illuminated solid. Other LEDs are off.
	Firmware upgrade	Green LED blinking rapidly (0.5s). Other LEDs are off.
	Waiting for sun/ Night mode/ Sleep time	Green LED blinking slowly (10.0s). Other LEDs are off.
	Arc Fault, Ground Fault, or Fireman Switch activated	Red LED illuminated solid. Other LEDs are off.
	Warning	Amber LED illuminated solid. Other LEDs are off.
	Lost communications	Amber LED blinking. Other LEDs are off.

Figure 6-2: Interpreting the SolarCity H6 inverter LEDs

Note: The SolarCity H6 inverter can display additional LED combinations that are beyond the scope of this Guide. Please contact Technical Support if you see one of these combinations.

Copyright 2017 SolarCity Corporation. All rights reserved.

6.1.2 - LCD Display

As shown in *Figure 6-1*, the SolarCity H6 inverter includes a two (2) line LCD display with 16 characters per line. In this display:

- The first row names the currently-displayed menu.
- The second row displays the menu/parameter elements.

6.1.3 - Push Buttons

As shown in *Figure 6-1*, the SolarCity H6 inverter includes the following four (4) push buttons:

Label	Menu Function	Parameter Function
ESC	Exits the current menu.	Cancels setting the current value.
UP	Move upward in a menu.	Increase the current value.
DOWN	Move downward in a menu.	Decrease the current value.
ENTER	Select the indicated menu entry or open a configurable parameter for editing, as appropriate. Can also be used to pause/resume menu scrolling.	Save the value with its current setting

For example, to change the grid voltage:

1. Press the [UP] and/or [DOWN] buttons in the main menu to highlight **Grid Voltage**, and then press [ENTER] to select that menu.
2. Use the [UP] and/or [DOWN] buttons to select **Grid Voltage Level1**.
3. Press [ENTER] to select this option.
4. Use the [UP] and/or [DOWN] buttons to select **Yes**.
5. Press [ENTER] to confirm the change.

Copyright 2017 SolarCity Corporation. All rights reserved.

6.2 - Menu Structure

The SolarCity H6 inverter contains the following menu structure:

- **System Overview:** Scrolling display of current system metrics. See *"System Overview Menu" on page 77*.
- **Current Status:** Current system status. See *"Current Status Menu" on page 79*.
- **External Messages:** Up to four (4) messages sent from SolarCity. See *"External Messages Menu" on page 79*.
- **Software Versions:** Firmware versions running on various components. See *"Software Versions Menu" on page 79*.
- **Clear Fault:** Allows you to clear arc, ground, and other faults. See *"Clear Fault Menu" on page 80*.
- **Soft-Shutdown:** Allows a technician to power OFF the SolarCity H6 inverter. See *"Soft Shutdown Menu" on page 80*.
- **Grid Settings:** Allows a technician to specify various grid parameters. See *"Grid Settings Menu" on page 80*.
- **ZigBee Information:** Information about the ZigBee wireless communications status. See *"ZigBee (Xbee) Information Menu" on page 81*.

6.2.1 - System Overview Menu

This automatic scrolling menu can be paused and resumed by pressing the ENTER button. It displays the following system metrics and information:

- **Runtime**: Number of hours of operation since the SolarCity H6 inverter was first powered on.
- **Active power:** Watts
- **Reactive power:** Vars
- **Day energy:** Total number of kilowatt hours (kWh) processed by the system on the current day.
- **Total energy**: Total number of kilowatt hours (kWh) processed by the system since commissioning.
- **PV day energy:** Total number of kilowatt hours (kWh) produced by the PV array over the current day.
- **PV total energy:** Total number of kilowatt hours (kWh) produced by the PV array since commissioning.
- **Grid voltage L1:** Voltage of the grid L1 connection.

Copyright 2017 SolarCity Corporation. All rights reserved.

- **Grid voltage L2:** Voltage of the grid L2 connection.
- **Grid current:** Current in amperes (A) being supplied to the grid.
- **Grid frequency:** Frequency of the grid, in Hz.
- **Power factor:**
  - **On-grid:** 0.80 ... >0.99 (inductive/capacitive)
  - **Off-grid:** 0.20 ... >0.99 (inductive/capacitive), current limited
- **System state:** Current state of the system. This can be one of the following:
  - **Grid-tied:** If on-grid and producing power.
  - **Off-grid:** If off-grid and producing power.
  - **System error:** If there is an error or fault in the system.
- **PV 1 voltage:** Voltage being produced by the PV modules on the MPPT 1 channel.
- **PV 2 voltage:** Voltage being produced by the PV modules on the MPPT 2 channel.
- **PV 1 current:** Current being produced by the PV modules on the MPPT 1 channel, in amperes (A).
- **PV 2 current:** Current being produced by the PV modules on the MPPT 2 channel, in amperes (A).
- **Battery current:** Current battery pack output current at the interface.
- **Battery voltage:** Current battery pack output voltage at the interface.
- **Battery state of charge:** Current battery pack SOE capacity, in percent (0-100% in 1% increments).
- **Battery status:** Current battery status (such as *charging*, *discharging*, or *standby*).
- **Battery SN:** Serial number of the battery
- **Charge/Discharge power:** Amount of power being used to charge or discharge the battery pack, in watts.
- **R isolation:** PV array impedance, in mega ohms (MOhm).
- **Temperature:** Current temperature in degrees Celsius.
- **Software revision vers:** SolarCity H6 inverter firmware version package number.
- **Date:** Current month, day, and year (received from the SolarCity server and adjusted for geographical location).
- **Time:** Current time received from the SolarCity server and adjusted for geographical location).
- **Type:** Inverter type.
- **SN:** Serial number of the SolarCity H6 inverter, as displayed on the name plate ratings label.

Copyright 2017 SolarCity Corporation. All rights reserved.

6.2.2 - Current Status Menu

This menu presents messages about the current system status. This will be one of the following:

- **Operation Mode: Auto or System Control:** This is normal. The green LED is lit.
- **Operation Mode: Forced Charge:** This is normal. The green LED is lit.
- **Operation Mode: Forced Discharge:** This is normal. The green LED is lit.
- **Operation Mode: PFC:** This is normal. The green LED is lit.
- **Grid under frequency:** Grid frequency has dropped below the specified minimum. The green LED blinks once per second.
- **Grid over frequency:** Grid frequency has increased above the specified maximum. The green LED blinks once per second.
- **Grid underVolt:** Grid voltage has dropped below the specified minimum. The green LED blinks once per second.
- **Grid overVolt:** Grid voltage has increased above the specified maximum. The green LED blinks once per second.
- **System Fault in Inverter:** There is a system fault within the SolarCity H6 inverter.
- **Battery Fault:** There is a fault within the Battery Pack.

6.2.3 - External Messages Menu

This menu displays up to four (4) text messages sent from SolarCity to the inverter via the wireless ZigBee connection. Each message can contain up to 16 characters.

6.2.4 - Software Versions Menu

This menu presents a scrolling list of the firmware versions installed in the SolarCity H6 inverter and battery pack. Versions are available for the following:

- Software Revision (inverter) for the complete package
- Battery System
- BiDcDc Controller
- Power 1 Controller
- Power 2 Controller
- Safety Controller
- System Controller

Copyright 2017 SolarCity Corporation. All rights reserved.

- ZigBee (Xbee) Module

6.2.5 - Clear Fault Menu

This menu allows you to clear arc, ground, and other faults. To clear a fault:

1. Select the **Clear Fault** menu.
2. Use the [UP] and [DOWN] buttons to find the type of fault to clear, and then press [ENTER].
3. User the [UP] and [DOWN] buttons to select **Yes**, and then press [ENTER].

The available options are:

- **Clear ARC:** Clear arc fault.
- **Clear Ground:** Clear ground fault.
- **Clear Other:** Clear other faults.

6.2.6 - Soft Shutdown Menu

This menu allows you to shutdown the SolarCity H6 inverter. You may select either **Yes** to proceed with the soft shutdown or **No** to cancel.

6.2.7 - Grid Settings Menu

This menu displays the following grid settings:

- **Hi AC Volt (%):** 110%
- **Low AC Volt (%):** 79%
- **High Frequency:** 61.0Hz
- **Low Frequency:** 58.0Hz
- **Grid rec – time:** 300sec
- **HV time (ms):** 0.2sec
- **LV time (ms):** 1.2sec
- **HF time (ms):** 0.2sec
- **LF time (ms):** 9.2sec
- **Reactive PWR (KW):** 100.00%
- **CosPhi:** 80.00 @ 0.80 (Range 0.8 to 1.00 [0.01] negative [Capacity])

Copyright 2017 SolarCity Corporation. All rights reserved.

- **CosPhi:** -0.80 to -1.00 (Inductive)
- **Store and accept:** Select either **Yes** or **No**.

Note: Grid settings are password protected. Contact Technical Support or the SolarCity Hotline for this information. Utility approval may be required to adjust these settings.

6.2.8 - ZigBee (Xbee) Information Menu

This menu displays the following information about ZigBee communications:

- **Current status:** This can be one of the following:
  - Searching for Comm Network
  - Authorizing Communication
  - Connected to Server
- **Xbee Channel:** Wireless channel being used by the ZigBee antenna, such as 0C10.
- **MAC Address:** Hardware address of the ZigBee controller, such as 0013A20040C559F0.
- **Xbee PAN-ID:** ID of the ZigBee unit, such as 1AB7
- **Radio signal:** Displays signal strength in a bar graph, text indication, and signal strength in decibels per meter (dBm). The text indication will display one of the following:
  - **Excellent:** When dBm is >= -70dBm (three bars).
  - **Good:** When dBm >= -90dBm and is less than -70dBm (two bars).
  - **Poor:** When dBm is less than -90dBm (one bar).

Copyright 2017 SolarCity Corporation. All rights reserved.

This page intentionally left blank.

Copyright 2017 SolarCity Corporation. All rights reserved.

7 – Commissioning

This section describes how to commission the SolarCity H6 inverter:

1. Check all connections and cables for damage and correct seating. Correct any issues found.
2. Power ON the inverter as described in *"Powering On the Inverter" on page 85*.
   - The SolarCity H6 inverter begins powering up and performs an automatic self-test. The LCD screen displays the normal menu options once this process is complete. Inverter startup normally takes up to five (5) minutes to complete, depending on grid status, PV voltage, etc.
3. Verify the following items using the **System Overview** menu as described in *"Push Buttons" on page 76* and *"System Overview Menu" on page 77*:
   - 240VAC grid voltage, frequency, and power
   - Riso (array impedance)
   - PV voltages, current, and power
   - Battery pack voltage, SOE, and power
   - Battery pack hardware to software compatibility
   - System state
4. Verify the ZigBee communication signal strength using the Xbee Information menu as described in *"Push Buttons" on page 76* and *"ZigBee (Xbee) Information Menu" on page 81*.

If the SolarCity H6 inverter detects an AC overload during off-grid operation, it will attempt to restart up to three times and will then display an alarm message notifying you to remove/shed some of the loads that may have caused the overload. Resolve the issue and then press any button to restore normal operation.

Copyright 2017 SolarCity Corporation. All rights reserved.

This page intentionally left blank.

Copyright 2017 SolarCity Corporation. All rights reserved.

8 – Basic Operation

This section describes how perform basic SolarCity H6 inverter operations (power on/off, bypass) and provides basic information about the various power flow modes in which the inverter can operate.

8.1 – Powering On the Inverter

To power on the SolarCity H6 inverter:

1. At the main electrical panel, turn the dedicated back-feed circuit breaker and/or external AC disconnect to the ON (closed) position.
2. Remove the padlock from the DC Disconnect Switch (if any).
3. Turn the DC Disconnect Switch to the ON position.
4. Verify that all three (3) LEDs illuminate for a moment.
5. At the inverter, place the AC Bypass Switch in the INV position.
6. Move the breaker(s) in the backup load panel to the ON (closed) position.
7. Follow the directions in *"Commissioning" on page 83* to complete the setup process that will allow the SolarCity H6 inverter to begin feeding power to the grid and/or charging the battery pack.

Copyright 2017 SolarCity Corporation. All rights reserved.

8.2 - Powering Off the Inverter

To power off the SolarCity H6 inverter:

1. Turn the DC Disconnect Switch to the OFF position.
2. Place the padlock on the DC Disconnect Switch, if needed.
3. Move the breaker(s) in the backup load panel to the OFF (open) position.
4. At the main electrical panel, turn the dedicated back-feed circuit breaker and/or external AC disconnect to the OFF (open) position.

SHOCK HAZARD: FAILURE TO PLACE THE PADLOCK ON THE DC DISCONNECT SWITCH MAY RESULT IN THIS SWITCH BEING TURNED ON, WHICH CAN FEED CURRENT INTO THE PROTECTED HOME LOADS AND LEAD TO DEATH OR SERIOUS INJURY FROM ELECTROCUTION.

8.3 - Bypassing the Inverter

If the SolarCity H6 inverter is damaged and is not functioning, then the AC Bypass Switch can be turned to the BYP position. This will directly connect the protected home loads to the AC grid, bypassing the inverter. SolarCity recommends that the homeowner do this first and then report the issue to SolarCity Customer Service.

8.4 - Opening/Closing the Inverter

See *"Wiring Box Cover" on page 59*.

Copyright 2017 SolarCity Corporation. All rights reserved.

8.5 - Power Flow Modes

The SolarCity H6 inverter operates in several power modes, as described in the following sections.

8.5.1 - PV to Battery Pack

This is a factory-default mode that the inverter can automatically select when appropriate. If the inverter is receiving power from both the grid and PV array, then it will use that PV energy to charge the battery pack first. Any power left over from charging the battery pack will be fed back to the AC grid. If the inverter is not receiving power from the grid but is receiving enough PV energy to support the protected home loads, then it will support those loads first and use any leftover energy to charge the battery pack.

8.5.2 - PV to AC Grid Output

This is a factory-default mode that the inverter can automatically select when appropriate. If the inverter is receiving power from both the grid and PV array, then it will use that PV energy to charge the battery pack first. Any power left over from charging the batteries will be fed back to the AC grid. If the inverter is not receiving power from the grid, then it will not feed any power to AC grid output.

8.5.3 - PV to Protected Home Loads

This is a factory-default mode that the inverter can automatically select when appropriate. During the day, if there is enough PV energy available, the inverter will power the protected home loads first and use any leftover power to charge the battery pack. At night, or if PV power alone is not sufficient to support the protected home loads, then the inverter may draw power from the battery pack to supply the protected home loads.

8.5.4 - Battery Pack to AC Grid Output

This is a special mode that can only be activated remotely via the ZigBee communications channel because it requires approval from the local jurisdiction and/or utility. The inverter can only supply battery pack power to the AC grid when grid power is available. The amount of battery pack energy fed back to the grid can be controlled. If the inverter loses

Copyright 2017 SolarCity Corporation. All rights reserved.

communication with the SolarCity server, then it will revert to automatic modes and cancel this mode.

Note: This mode is only available when approved by the local utility and can be enabled or disabled via software remotely in the SolarCity H6 inverter.

8.5.5 - Battery Pack to Protected Home Loads

This is a factory-default mode that the inverter can automatically select when appropriate. During the day, if there is enough PV energy available, the inverter will power the protected home loads first and use any leftover power to charge the battery pack. At night, or if PV power alone is not sufficient to support the protected home loads, then the inverter may draw power from the battery pack to supply the protected home loads.

8.5.6 - AC Grid to Protected Home Loads

This is a factory-default mode that the inverter can automatically select when appropriate. If the inverter is receiving grid power, then the protected home loads can be powered from the AC grid. If the inverter is undergoing maintenance, then the AC Bypass Switch can be turned to the BYP position to bypass the inverter by diverting AC grid power directly to the protected home loads, which then function like normal home loads until the AC Bypass Switch is returned to the INV position.

8.5.7 - AC Grid to Battery Pack

This is a special mode that can only be activated remotely via the ZigBee communications channel because it requires approval from the local jurisdiction and/or utility. The inverter can supply AC grid power to the battery pack when grid power is available and when there is insufficient PV energy to charge the battery pack (such as at night). If the inverter loses communication with the SolarCity server, then it will revert to automatic modes and cancel this mode.

Note: This mode is only available when approved by the local utility and can be enabled or disabled via software remotely in the SolarCity H6 inverter.

Copyright 2017 SolarCity Corporation. All rights reserved.

8.5.8 - On-Grid to Off-Grid Status

The SolarCity H6 inverter transitions from on-grid to off-grid (backup) status if utility grid voltage is lost. This transition can take from one (1) to two (2) second(s) and may cause some inconveniences, such as the need to reset appliance clocks or restart some appliances. Consider adding an additional Uninterruptible Power Supply (UPS) for loads such as computers that can lose data or other important functionality when power is lost.

WARNING: THE SOLARCITY H6 INVERTER IS NOT INTENDED OR DESIGNED TO SUPPLY ENERGY TO LIFE-SUSTAINING MEDICAL DEVICES. DO NOT USE THE SOLARCITY H6 INVERTER FOR ANY SITUATION WHERE A POWER OUTAGE MIGHT LEAD TO DEATH OR PERSONAL INJURY.

8.5.9 - Off-Grid to On-Grid Status

During off-grid operation, if the grid voltage comes back, then the SolarCity H6 inverter will continue to operate using available PV and/or battery pack power while it performs a smooth transition to on-grid operation; however, if PV and/or battery pack power is not sufficient, it may take a period of more than five (5) minutes (300 seconds).

Copyright 2017 SolarCity Corporation. All rights reserved.

This page intentionally left blank.

Copyright 2017 SolarCity Corporation. All rights reserved.

9 - Product Information

This section lists the specifications, protection features, standards, and efficiency of the SolarCity H6 inverter.

9.1 - Specifications

This section lists the specifications of the SolarCity H6 inverter.

Note: These values are subject to change. Please refer to the SolarCity H6 Inverter Datasheet for updated values.

9.1.1 - General

The general specifications of the SolarCity H6 inverter are:

- **Peak Efficiency:** 97.5%
- **CEC Efficiency:** 97%
- **Temperature Range (Operating):** -20°C to 60°C (-4°F to 140°F); power de-rating occurs above 45°C/113°F
- **Temperature Range (Storage):** -20°C to 70°C (-4°F to 158°F)
- **Humidity:** 2% to 98%
- **Acoustic Noise:** <50dBA @ 1m (3.2ft)
- **Max. Operating Altitude:** 2,000m (6,560 feet) above sea level

Copyright 2017 SolarCity Corporation. All rights reserved.

9.1.2 - Mechanical

The mechanical specifications of the SolarCity H6 inverter are:

- **Height:** 630mm (~24 7/8") with wiring box and no ZigBee antenna; 400mm (15.75") without wiring box
- **Width:** 400mm (~15 3/4")
- **Depth:** 196mm (~7 3/4") without switch handle
- **Weight:** 28kg (~62lbs)
- **Cooling:** Natural convection
- **AC Connectors:** Spring clamp connectors (in wiring box)
- **DC Connectors:** Spring clamp connectors (in wiring box)
- **Communication Interface:** CAN (local) and ZigBee (external)
- **Firmware Upgrade:** ZigBee
- **Display:** Three (3) LEDs, two (2)-line LCD with 16 characters per line
- **Enclosure Material:** Die-cast aluminum
- **Revenue Grade Meter:** ANSI C12.1, 1% Class

9.1.3 - PV Input

The PV input specifications of the SolarCity H6 inverter are:

- **Nominal Voltage:** 380V
- **Max. System Voltage:** 570V
- **MPPT Operating Voltage Range:** 85V to 550V (120V startup)
- **Full Power MPPT Voltage Range:** 200V-480V
- **Max. Allowed DC to AC ratio:** 150%
- **Max. Continuous Current:** 19A per MPP channel
- **Max. Short Circuit Current:** 26A per MPP channel
- **Integrated Manual DC Disconnect:** 600V, 30A UL-listed switch
- **MPP tracker/channels:** two (2)
- **Total input strings possible:** four (4)
- **Conduit Size:** 2 x 3/4" (1x 3/4" optional)
- **Wire Size:** 8-12AWG supported

Copyright 2017 SolarCity Corporation. All rights reserved.

9.1.4 - AC Output

The AC output specifications of the SolarCity H6 inverter are:

- **Nominal/Continuous Output Power (L-N / L-L):** 3000W/6000W
- **Max. Surge Power (L-N / L-L):** 3400W/6800W for 10 seconds
- **Utility Grid Support:** Split-phase, three (3) wire connection
- **Operating Voltage Range:** 105V to 132V / 211V to 264V (ANSI C84.1)
- **Nominal/Continuous Output Current:** 25A
- **Peak Output Current:** 28.3A (surge)
- **Nominal Frequency:** 60Hz
- **Frequency Range (adjustable):** 59.3Hz-60.5Hz (44Hz-65Hz)
- **Nighttime (standby) Consumption:** <6W
- **Total Harmonic Distortion:** I_{THD}, V_{THD} <5% (at nominal power)
- **Power Factor:** >0.995 (0.8ind-0.8cap; at nominal power)
- **AC Overcurrent Protection:** 35A
- **Off-Grid Transition Time:** <2 seconds
- **Conduit and Wire Size:** Two (2) 3/4" conduit; 8-10AWG

9.1.5 - Battery Pack Interface

The battery pack interface specifications of the SolarCity H6 inverter are:

- **Operating Battery Pack Voltage Range:** 430-550V
- **Max. Battery Pack Voltage @ Interface:** 570V
- **Nominal/Surge Current:** 14.3A / 20A
- **DC Disconnect:** Internal (same as the PV disconnect)
- **Internal Fuses (for Battery Pack):** Two (2) 25A
- **Max. Continual Charge Power:** Up to 5000W
- **Max. Continual Discharge Power:** 5000W
- **Surge Power:** 7,000W (for 10 seconds)
- **Communication Interface to the Inverter:** CAN
- **Dark Start Functionality:** Yes
- **Conduit and Wire Size:** 1 x 3/4" (plus 1 x 1/2" optional); 8-12AWG HV; 16-24AWG comms

Copyright 2017 SolarCity Corporation. All rights reserved.

9.2 - Protection Features

This section describes the protection features of the SolarCity H6 inverter.

9.2.1 - Arc Fault Circuit Interrupter

NEC 690.11 requires all PV systems attached to a building to include a means of detecting and interrupting serial electric arcs (Arc Fault Circuit Interrupter, or AFCI) on the PV side. The AFCI must interrupt an electric arc with a power of 300 W or greater within the time by UL1699B. Once triggered, the AFCI must be reset manually by selecting **Clear Fault>Clear Arc Fault** on the inverter.

9.2.2 - Anti-Islanding Protection

The SolarCity H6 inverter includes an active safety algorithm that protects against islanding, per IEEE 1547 and UL 1741.

9.2.3 - Reverse Polarity

Reversing the PV input positive (+) and negative (-) connections causes the inverter to either conduct maximum current at 0V or incur damage. Be sure to check the polarity of the PV array connections before turning ON the SolarCity H6 inverter.

Reversing the battery pack positive (+) and negative (-) connections causes the inverter to detect an installation error and display an error message on the LCD screen, as described in *"Alarms, Faults, and Warnings" on page 105*. Be sure to check the polarity of the battery pack connections before turning on the SolarCity H6 inverter.

9.2.4 - Residual Current Detection (RCD)

The RCD continually checks for and detects any leakage through the AC side or DC side during normal inverter operation. Any error is displayed if it exceeds the threshold specified by UL 1741. This feature can also detect a ground fault situation. See *"Alarms, Faults, and Warnings" on page 105*.

9.2.5 - Fireman Switch

See *"Fireman Switch" on page 71*.

Copyright 2017 SolarCity Corporation. All rights reserved.

9.2.6 - RISO (PV Insulation Resistance Monitor)

Per NEC, every morning (24 hours) or upon restarting, the SolarCity H6 inverter checks the PV impedance to verify that it exceeds the threshold set by UL 1741. This check can also detect a ground fault situation.

9.3 - Standards & Directives

The SolarCity H6 inverter conforms to the following standards and directives:

- **Enclosure Protection Rating:** NEMA 4X
- **Safety approval:** UL 1741 (second edition) /SA /PVRSS, CSA 22.2 #107.1-01, UL 9540
- **Software approval:** UL 1998
- **Isolation Monitor Interrupt (IMI):** NEC 480, 690, and 705
- **Grid Interconnection Standards:** IEEE 1547, Rule 21, HECO (Rule 14H)
- **EMC:** FCC part B, ICES-003
- **AFCI:** UL 1699B (second edition), NEC 690.11
- **PV Rapid Shutdown:** NEC 690.12

9.4 - Communication

The SolarCity H6 inverter can be remotely monitored, upgraded, and programmed by SolarCity via the ZigBee antenna. The inverter can also pass firmware upgrades to the battery pack via the CAN interface.

Copyright 2017 SolarCity Corporation. All rights reserved.

9.5 - Thermal, Voltage, and Efficiency Charts

This section contains charts that depict thermal de-rating, voltage vs. power, and 3D efficiency characteristics of the SolarCity H6 inverter.

9.5.1 - Thermal De-rating

The SolarCity H6 inverter can be operated in ambient temperatures ranging from -20°C to 60°C (-4°F to 140°F); however, power de-rating occurs above 45°C (113°F). *Figure 9-1* illustrates how increasing the temperature of the inverter and/or PV array reduces power output.

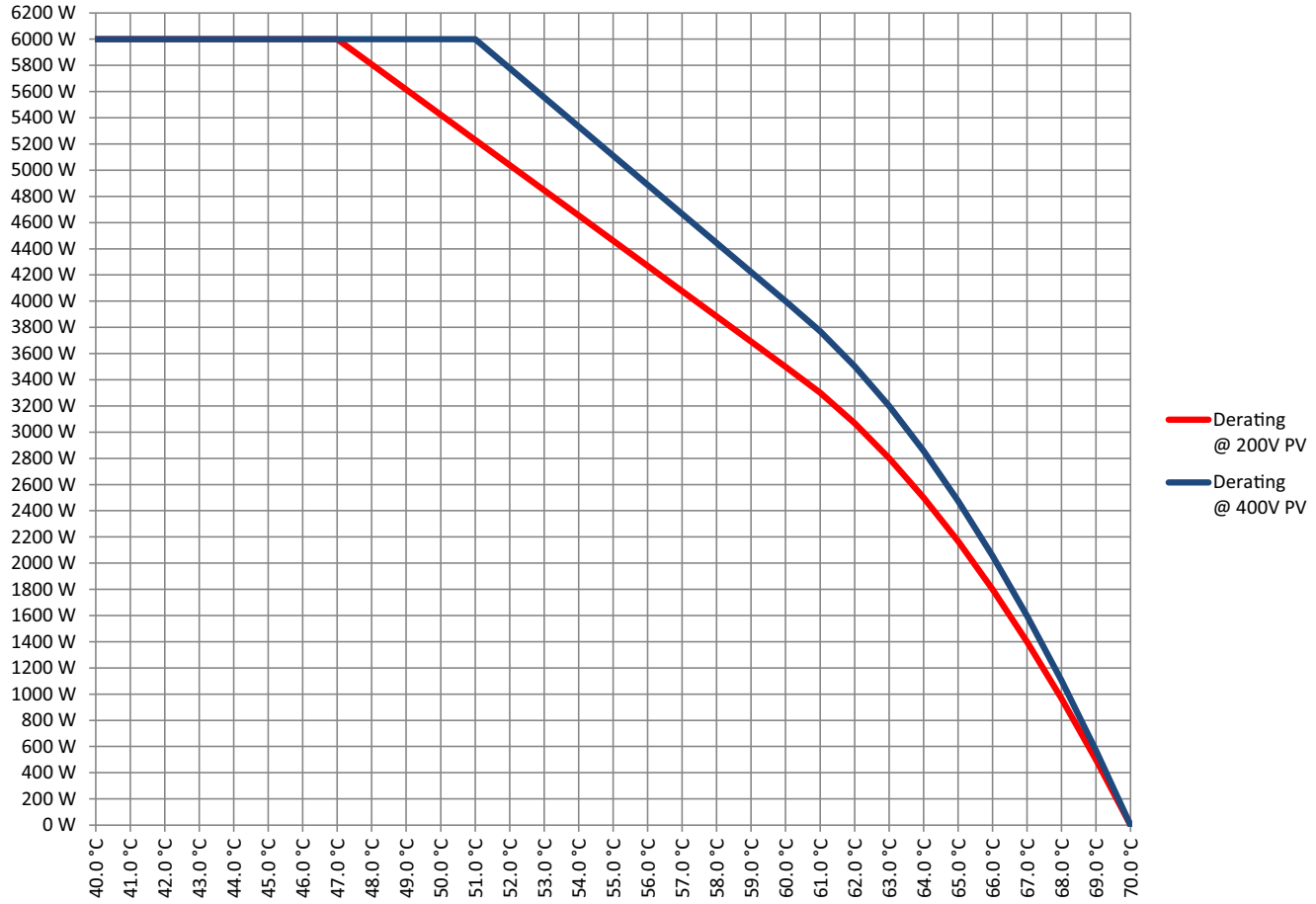


Figure 9-1: Temperature de-rating graph

Note: Temperature sensor tolerances and varying efficiencies under different PV voltage mean that Figure 9-1 may not precisely represent the actual behavior of the SolarCity H6 inverter under all foreseeable conditions.

Copyright 2017 SolarCity Corporation. All rights reserved.

Note: SolarCity H6 inverter thermal de-rating may also be affected by thermal de-rating of the battery pack. Please see the thermal guidelines for the battery pack.

9.5.2 - PV Voltage and AC Output Power

"AC Output power vs. PV input voltage range" on page 97 displays how changes in PV input voltage affect AC power output based on current input limitations.

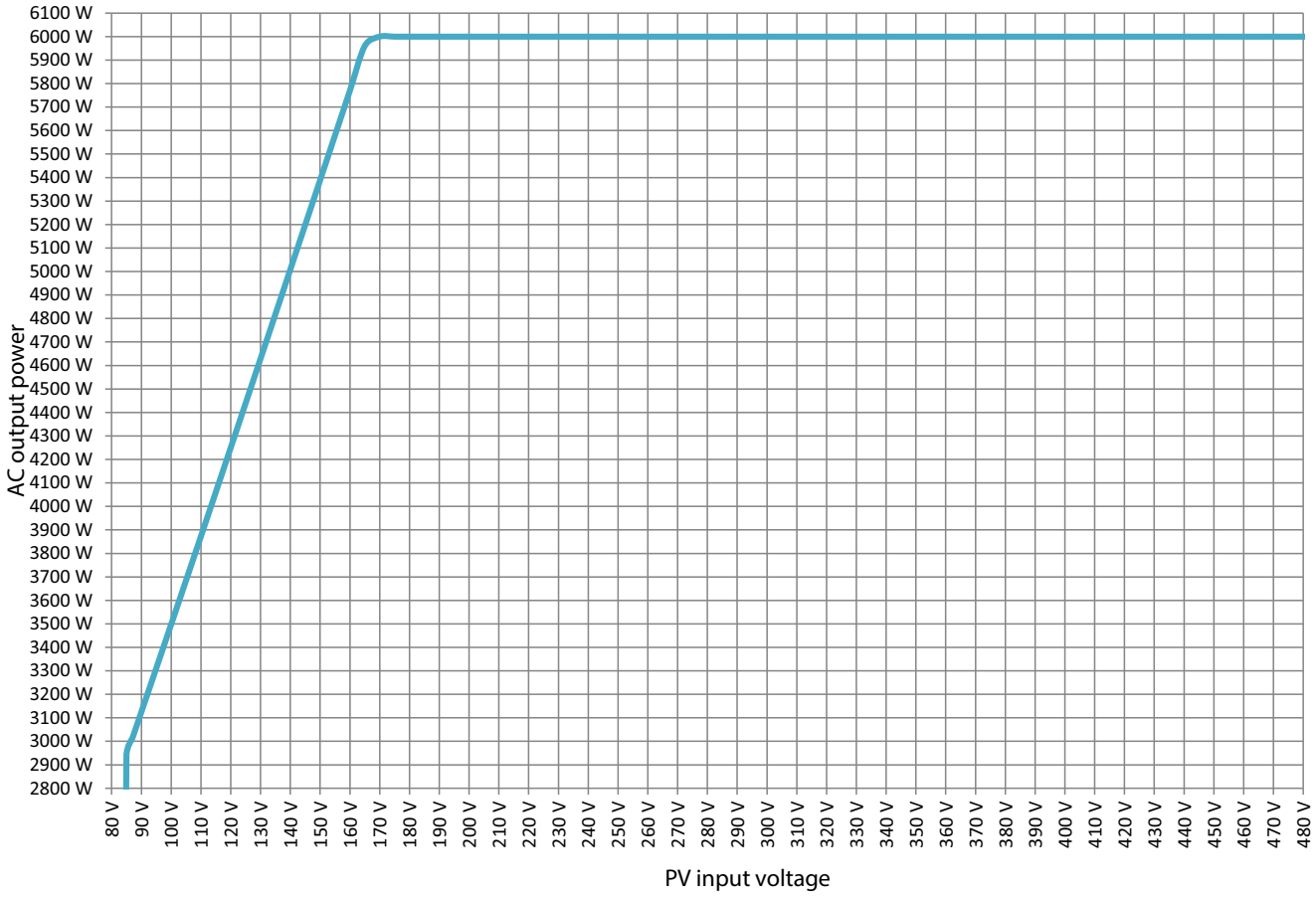


Figure 9-2: AC Output power vs. PV input voltage range

Copyright 2017 SolarCity Corporation. All rights reserved.

9.5.3 - PV Input Voltage and Efficiency

The SolarCity H6 inverter achieves maximum efficiency at PV input voltages ranges between 380VDC and 420VDC, as shown in *Figure 9-3*.

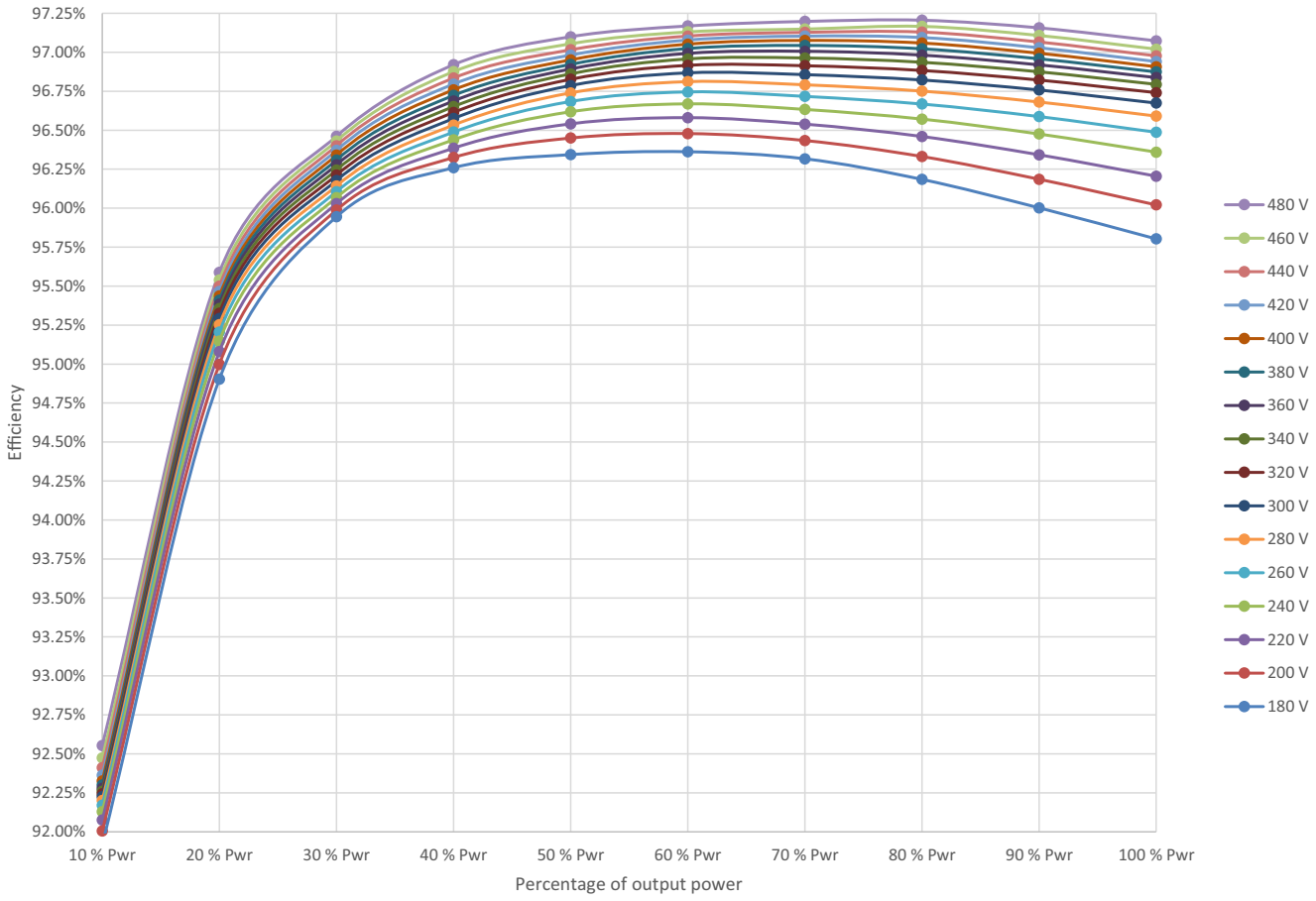


Figure 9-3: CEC Efficiency vs. PV input voltage

Copyright 2017 SolarCity Corporation. All rights reserved.

9.5.4 - Battery Pack Round-Trip (Charging & Discharging) Efficiency

The battery pack manufacturer provides the round-trip efficiency related to battery pack output; however, the SolarCity H6 inverter includes electronics that contribute to RF efficiency, as shown in *Figure 9-4* and *Figure 9-5*.

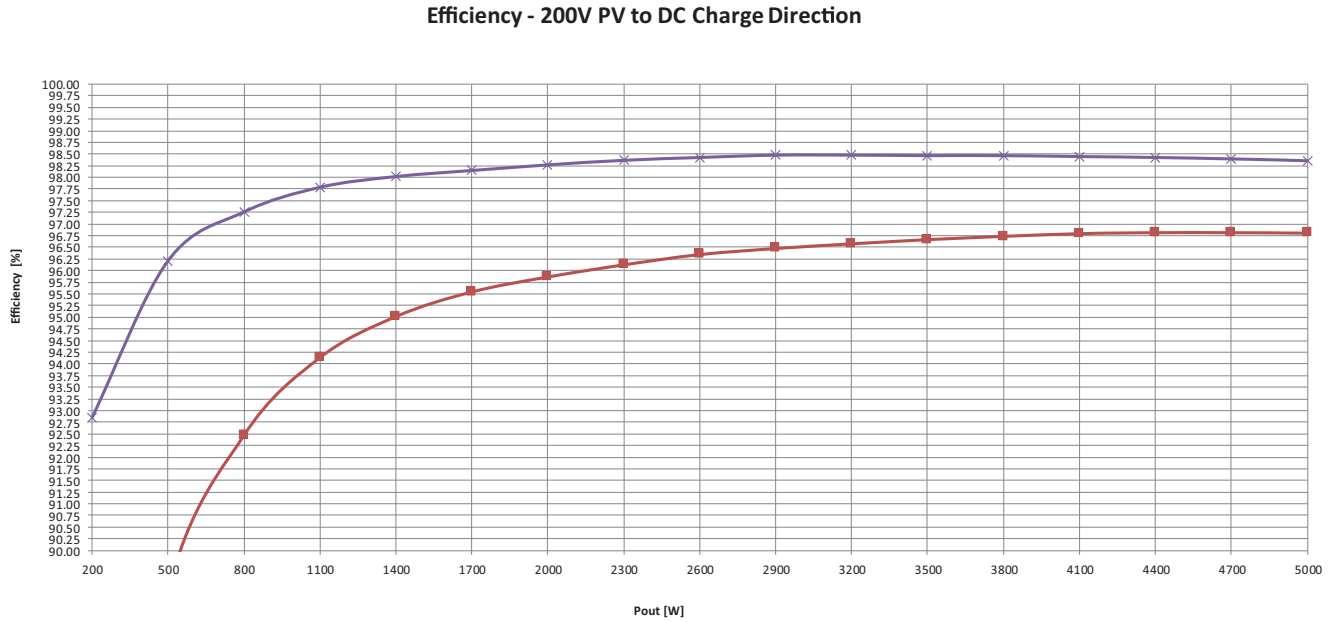


Figure 9-4: Battery pack charging efficiency

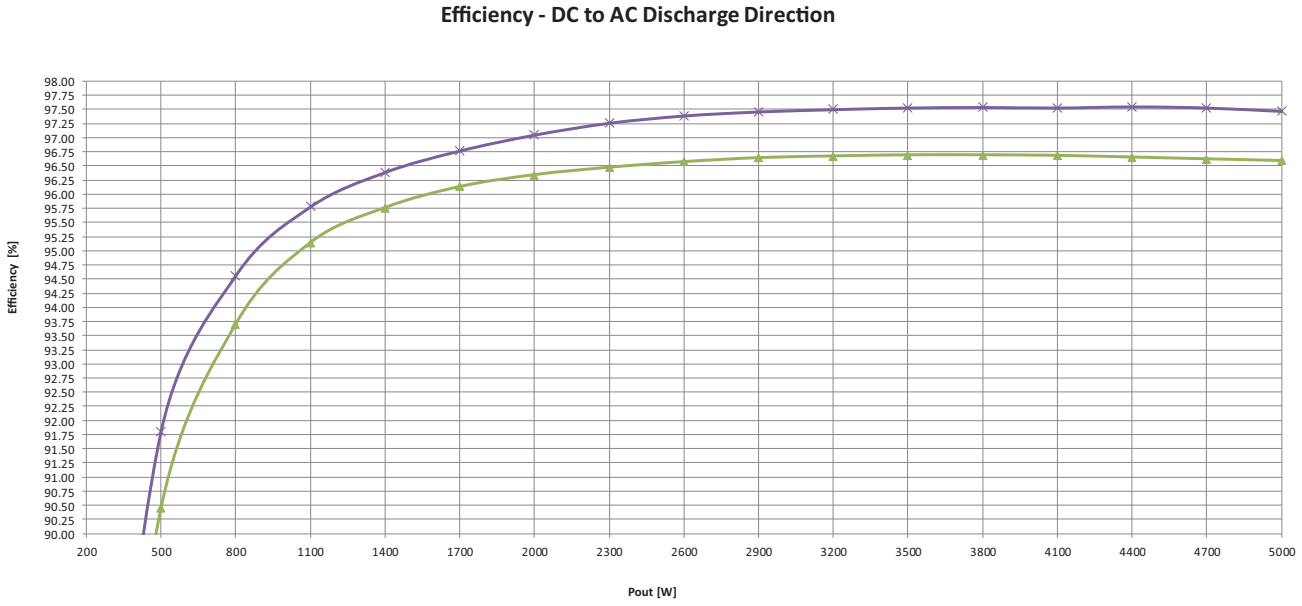


Figure 9-5: Battery pack discharging efficiency

Copyright 2017 SolarCity Corporation. All rights reserved.

9.6 - Regulatory Approvals

The SolarCity H6 inverter has received the following regulatory approvals:

- UL 1741, UL 1699B, and UL 9540
- IEEE 1547
- NFPA 70
- NEC 480, 690, 702, and 705
- Rule 21- Smart Inverters
- HECO/Rule 14H
- CSA C22.2 - 107.1-01
- ASTM 4169-09

9.6.1 - FCC Compliance

The SolarCity H6 inverter complies with Part 15, Subclass B of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

Copyright 2017 SolarCity Corporation. All rights reserved.

9.6.2 - UL Certificate

Certification Record

Listing# E114218
Original Certification: May 2, 2016
Revised Certification: N/A

MET Laboratories, Inc.
First in Certification

This Certification is issued to:
DELTA Energy Systems Gmbh
45, Coesterweg
59494 Soest
Germany

For the product(s):
Split phase transformerless solar inverter,
SolarCity H6T (Delta code EOE 47020593)
SolarCity H6L (Delta code EOE 47020609)

Have been certified to the following standard(s):

UL1741 2nd edition: Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy resource, Rev. January 28, 2010

CSA C22.2 No. 107.1: General Use Power Supplies (Reaffirmed 2011)

Keith Greenway
Baltimore Safety Lab Manager
Safety Laboratory

All changes proposed in the previously identified product that affects the above information must be submitted to MET for evaluation prior to implementation to assure continued MET Certification status.

The covered product(s) shall be subject to follow-up inspections to ensure that the Certified product(s) are identical to the product sample evaluated by MET Laboratories, Inc. and that all manufacturer's responsibilities are being fulfilled as specified in the Manufacturer's Responsibility section of the Certification report. The applicant named above has been authorized by MET Laboratories, Inc. to represent the product(s) listed in this record as "MET Certified" and to mark this/these product(s) according to the terms and conditions of the MET Applicant Contract, MET Listing Reports, and the applicable marking agreements. Only the product(s) bearing the MET Mark and under a follow-up service are considered to be included in the MET Certification program. This certification has been granted under a System 3 program as defined in ISO Guide 67.

MET Laboratories, Inc. is accredited by OSHA and the Standards Council of Canada.
The Nation's First Nationally Recognized Testing Laboratory

NRTL

SAFJ TEMP-130-0, NRTLC Certification Record 4-21-14

Page 1 of 1

Copyright 2017 SolarCity Corporation. All rights reserved.

Copyright 2017 SolarCity Corporation. All rights reserved.

10 - Troubleshooting and Maintenance

This chapter describes troubleshooting and maintenance procedures for the SolarCity H6 inverter and also discusses the intended uses and recommended/non-recommended home loads.

10.1 - Intended Uses

The SolarCity H6 inverter operates as a typical PV inverter and is also used to operate (charge/discharge) a battery pack. It can serve many common applications such as back-up, peak shaving, load sharing, demand response, and economic energy dispatch. It can also operate in off-grid mode for longer times as needed.

Each SolarCity H6 inverter is rated for up to 6kW@240V or 3kW@120V. Extreme care must therefore be taken to select protected home loads that will not overload the inverter. See *"General Troubleshooting" on page 103* and *"General Troubleshooting" on page 103*.

Properly balancing the protected home loads between the BL1-N and BL2-N split phases is essential for ensuring maximum power availability. When off-grid, the homeowner needs to be aware of how many breakers can be ON in the backup panel at any one time, as well as the mix of options by phase to help ensure balance.

10.2 - General Troubleshooting

A fault or warning message on the H6 inverter LCD display can be acknowledged by selecting CURRENT STATUS on the menu. This may not clear the condition, and you must still perform the troubleshooting described in this chapter starting with the following general procedure:

1. Immediately check for any issues, such as (but not necessarily limited to):
   - Excessive heat at the inverter or battery pack causing power de-rating.
   - Too many protected home loads ON at the same time causing an overload situation.
2. Make a note of the specific fault, warning, or alarm message that is appearing on the LCD display of the SolarCity H6 inverter.

Copyright 2017 SolarCity Corporation. All rights reserved.

3. Write down as much information as possible about all of the following:
   - Specific message appearing on the LCD display. Alternatively, if no message is appearing, describe the inverter behavior in as much detail as possible.
   - Operating protected home loads at the instance.
   - Battery pack condition (voltage, power, state of charge, etc.).
   - Recent events (such as if the AC grid failed and the inverter failed to power the protected home loads).
   - Any known anomalies in the AC grid, such as low voltage or brownouts.
   - Any extreme temperatures, humidity, and/or weather that could be a factor.
4. Check for any tripped AC breakers in all of the following locations:
   - Back-feeder Main electrical panel.
   - Backup load panel
   - AFCI/GFCI/standard breakers in the Backup panel.
5. Verify that the Fireman Switch has not been pushed in. If needed, see *"Fireman Switch" on page 71* for reset instructions.
6. Contact Delta Customer Service for further assistance as described in *"Technical Support" on page 10*. Please be prepared to provide all pertinent information, including the model and serial number of the SolarCity H6 inverter.

Copyright 2017 SolarCity Corporation. All rights reserved.

10.3 - Alarms, Faults, and Warnings

This section lists the SolarCity H6 inverter alarms, faults, and warnings along with their causes and solutions.

10.3.1 - Alarms

The SolarCity H6 inverter can display the following alarms, which can be corrected as described below:

#	LED	Display	Cause	Solution
1	Yellow LED on	Battery Sys Fault	BiDCDC boost in battery pack has failed.	Check the battery pack and correct any problem(s).
2	Yellow LED on	Battery Sys Fault	Battery pack or CAN communication fault.	Check the connection cable between the battery pack and the inverter.
3	Yellow LED blinking once per second	Grid under frequency	Grid under-frequency fault detected. System is idle because no PV or battery pack energy is available.	N/A
4	Yellow LED blinking once per second	Grid over frequency	Grid over-frequency fault detected. System is idle because no PV or battery pack energy is available.	N/A
5	Yellow LED blinking once per second	Grid underVolt	Grid under-voltage fault detected. System is idle because no PV or battery pack energy is available.	N/A

Copyright 2017 SolarCity Corporation. All rights reserved.

#	LED	Display	Cause	Solution
6	Yellow LED blinking once per second	Grid overVolt	Grid over-voltage fault detected. System is idle because no PV or battery pack energy is available.	N/A
7	Yellow LED blinking once per second	Fireman connection weak.	Fireman Switch voltage is out of range.	Replace the Fireman Switch.

10.3.2 - Faults

The SolarCity H6 inverter can display the following faults, which can be corrected as described below:

#	LED	Display	Cause	Solution
1	Red LED on	AC overload	AC overload in off-grid due to excessive load or insufficient available energy.	Press [ESC] to clear the fault.
2	Red LED on	RCD-Fault	N/A	N/A
3	Red LED on	ARC Fault	N/A	N/A
4	Red LED on	Isolation Fault	N/A	N/A
6	Red LED on	Over temp. protection	N/A	N/A
9	Red LED on	PV over voltage fault	N/A	N/A
10	Red LED on	Error internal communication	N/A	N/A
11	Red LED on	System fault in inverter	HvDc OVP.	N/A
12	Red LED on	System fault in inverter	PFC mode fault.	N/A

Copyright 2017 SolarCity Corporation. All rights reserved.

#	LED	Display	Cause	Solution
13	Red LED on	FIREMAN SWITCH ACTIVATED	Fireman Switch has been pressed.	Reset Fireman Switch when safe and appropriate to do so.
14	Red LED on	DC-Disconnect switch activated	DC Disconnect Switch has been set to OFF.	Turn DC Disconnect Switch to ON when safe and appropriate to do so.
15	Red LED on	System fault in inverter	DC injection.	N/A
16	Red LED on	System fault in inverter	HW over-current protection in inverter.	N/A
17	Red LED on	System fault in inverter	Internal auxiliary power unit fault.	N/A
18	Red LED on	System fault in inverter	Inverter system variant is incompatible with the battery pack.	N/A
19	Red LED on	Error: Configuration	Configuration failure.	N/A
20	Red LED on	N/A	Inverter SW incompatible.	Error during software update.
21	Red LED on	Int. Com Fault	Communications error.	N/A
22	Red LED on	N/A	PWR2 HW incompatible.	N/A
23	Red LED on	System fault in inverter	RAM ROM check failure.	N/A
24	Red LED on	System fault in inverter	Digital IO plausibility fail.	N/A
25	Red LED on	Error system initialization	Arc Fault Self Test.	N/A
26	Red LED on	Error system initialization	Inverter relay test failure.	N/A

Copyright 2017 SolarCity Corporation. All rights reserved.

#	LED	Display	Cause	Solution
27	Red LED on	Error system initialization	RCD self-test failure.	N/A

10.3.3 - Warnings

The SolarCity H6 inverter can display the following warnings, which can be corrected as described below:

#	LED	Display	Cause	Solution
1	Green LED blinking once per second	N/A	Night mode (PV power not available).	N/A
2	Yellow LED blinking once per second	No connection	No wireless (WiFi) connection.	Check the ZigBee connection, Device ID, and PAN.

Copyright 2017 SolarCity Corporation. All rights reserved.

10.4 - Replacing the Inverter

This section describes how to remove and replace the SolarCity H6 inverter top section.

10.4.1 - Inverter (Remove)

If needed, the SolarCity H6 inverter can be replaced entirely. Alternatively, the top section can be removed and replaced while leaving the wiring box in place.

To remove the SolarCity H6 inverter top section:

1. Power down the inverter as described in *"Powering Off the Inverter" on page 86*.
2. Turn the back-feed breaker in the main electrical panel to the OFF position.
3. Move the AC Bypass Switch to the BYP position.
4. Move the DC Disconnect Switch to the OFF position and secure it with a padlock.
5. Remove the wiring box cover as described in *"Remove Wiring Box Cover" on page 59*.

SHOCK HAZARD: DO NOT TOUCH ANY OF THE AC OR DC ELECTRICAL CONNECTIONS INSIDE THE BOTTOM OF THE INVERTER WIRING BOX. FATAL OR SERIOUS ELECTRIC SHOCK MAY OCCUR.

6. Remove all of the wires (1) from the top section spring-clamp connectors, as shown in *Figure 10-1*.
7. Using a 10mm wrench, remove the three nuts (2) holding the top section of the inverter to the wiring box section.
8. Position one person on either side of the SolarCity H6 inverter and lift it straight up and off the mounting tabs.

WARNING: THE SOLARCITY H6 INVERTER WEIGHS 62LBS (28KG). ALL LIFTING MUST BE PERFORMED BY TWO PEOPLE, PER OSHA REQUIREMENTS. ALWAYS LIFT WITH YOUR LEGS AND FOLLOW ALL OTHER APPLICABLE BEST PRACTICES FOR AVOIDING INJURY WHEN LIFTING HEAVY LOADS.

WARNING: KEEP LEGS, FEET, AND OTHER BODY AREAS AWAY FROM THE AREA DIRECTLY UNDERNEATH THE INVERTER UNTIL IT IS SECURELY INSTALLED ON THE MOUNTING BRACKET AND YOU HAVE VERIFIED THAT THE MOUNTING BRACKET IS CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE INVERTER WITH NO DEFORMATION OR MOVEMENT.

Copyright 2017 SolarCity Corporation. All rights reserved.

9. Set the inverter top section down in a safe place.
10. If you are not immediately replacing the top section with a new one, then replace the wiring box cover as described in *"Refit Wiring Box Cover" on page 60*.

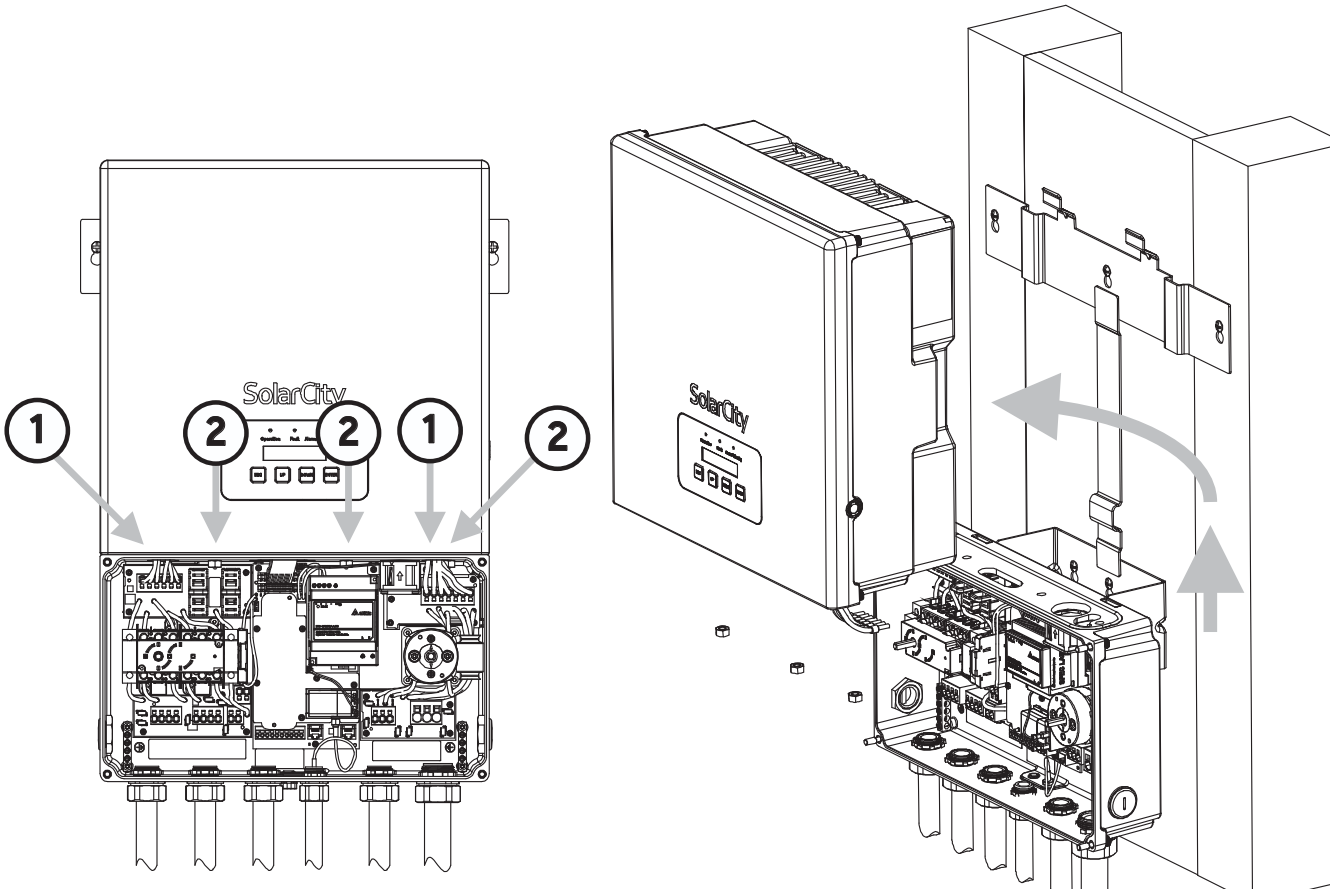


Figure 10-1: Removing the SolarCity H6 inverter top section

10.4.2 - Inverter (Refit)

To refit the SolarCity H6 inverter top section:

1. Ensure that the DC Disconnect Switch is in the OFF position.
2. Ensure that the AC Bypass Switch is in the BYP position.
3. Remove the wiring box cover as described in *"Remove Wiring Box Cover" on page 59*.
4. Ensure that there are no objects or obstructions on top of or inside the wiring box.

Copyright 2017 SolarCity Corporation. All rights reserved.

5. Position one person on either side of the SolarCity H6 inverter top section and lift it straight up until it is flush against the mounting bracket and can be lowered into position.

WARNING: THE SOLARCITY H6 INVERTER WEIGHS 62LBS (28KG). ALL LIFTING MUST BE PERFORMED BY TWO PEOPLE, PER OSHA REQUIREMENTS. ALWAYS LIFT WITH YOUR LEGS AND FOLLOW ALL OTHER APPLICABLE BEST PRACTICES FOR AVOIDING INJURY WHEN LIFTING HEAVY LOADS.

WARNING: KEEP LEGS, FEET, AND OTHER BODY AREAS AWAY FROM THE AREA DIRECTLY UNDERNEATH THE INVERTER UNTIL IT IS SECURELY INSTALLED ON THE MOUNTING BRACKET AND YOU HAVE VERIFIED THAT THE MOUNTING BRACKET IS CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE INVERTER WITH NO DEFORMATION OR MOVEMENT.

6. Lower the inverter top section into position in the reverse of what is shown in *Figure 10-1* while verifying all of the following:
   - The inverter top section is engaging with both of the tabs on the mounting bracket.
   - The three screw posts extending from the bottom of the inverter top section are going through the proper holes into the wiring box.
   - Both sets of wires extending from the bottom of the inverter top section are going through the proper holes into the wiring box.

SHOCK HAZARD: VERIFY THAT ALL WIRES EXTENDING FROM THE BOTTOM OF THE INVETER TOP SECTION ENTER THE WIRING BOX. ONE OR MORE WIRE(S) LEFT EXPOSED BETWEEN THE TOP SECTION AND WIRING BOX CAN CAUSE A POTENTIALLY FATAL ELECTROCUTION HAZARD.

7. Using a 10mm wrench, secure the three nuts (2) holding the top section of the inverter to the wiring box section. Torque to 21 foot-pounds (28Nm).
8. Connect the wires (1) to the spring-clamp connectors, following the color codes and instructions printed on the wiring box printed circuit board (PCB). See *Figure 10-2*.

WARNING: FAILURE TO PROPERLY CONNECT ALL WIRES TO THE CORRECT SPRING-CLAMP CONNECTORS COULD CAUSE A FIRE OR OTHER HAZARDOUS CONDITION.

CAUTION: FAILURE TO PROPERLY CONNECT ALL WIRES TO THE CORRECT SPRING-CLAMP CONENCTORS COULD DAMAGE THE SOLARCITY H6 INVERTER AND WILL VOID THE WARRANTY.

Copyright 2017 SolarCity Corporation. All rights reserved.

9. Replace the wiring box cover as described in *"Refit Wiring Box Cover" on page 60*.
10. Power on the inverter as described in *"Powering On the Inverter" on page 85*.

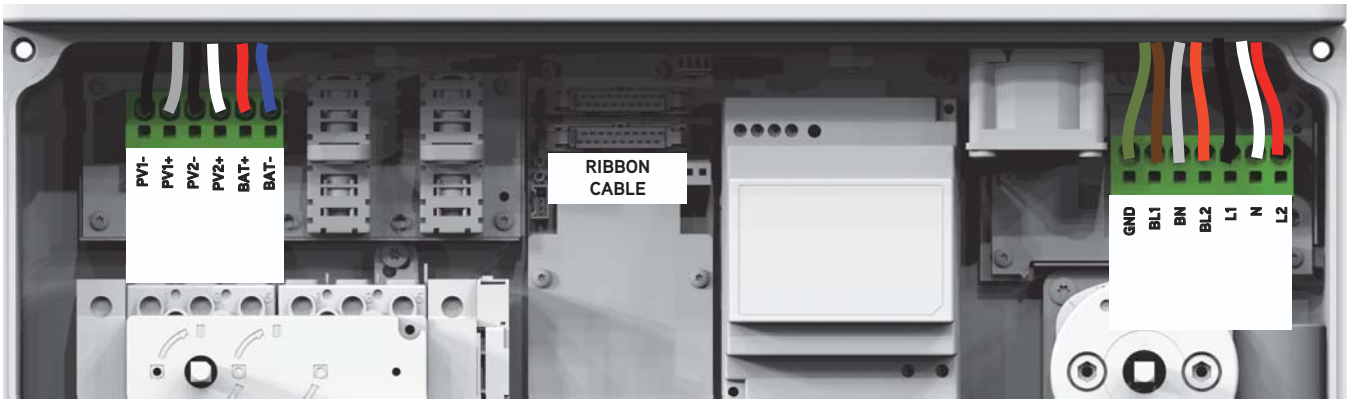


Figure 10-2: Wires from inverter top section to wiring box

Copyright 2017 SolarCity Corporation. All rights reserved.

10.5 - Replacing Internal Components

This section describes how to remove and replace fuses, fan, and 9V battery inside the SolarCity H6 inverter wiring box. *Figure 10-3* displays these components for units that have a separate PLC Transmitter box and for units with an integrated PLC Transmitter.

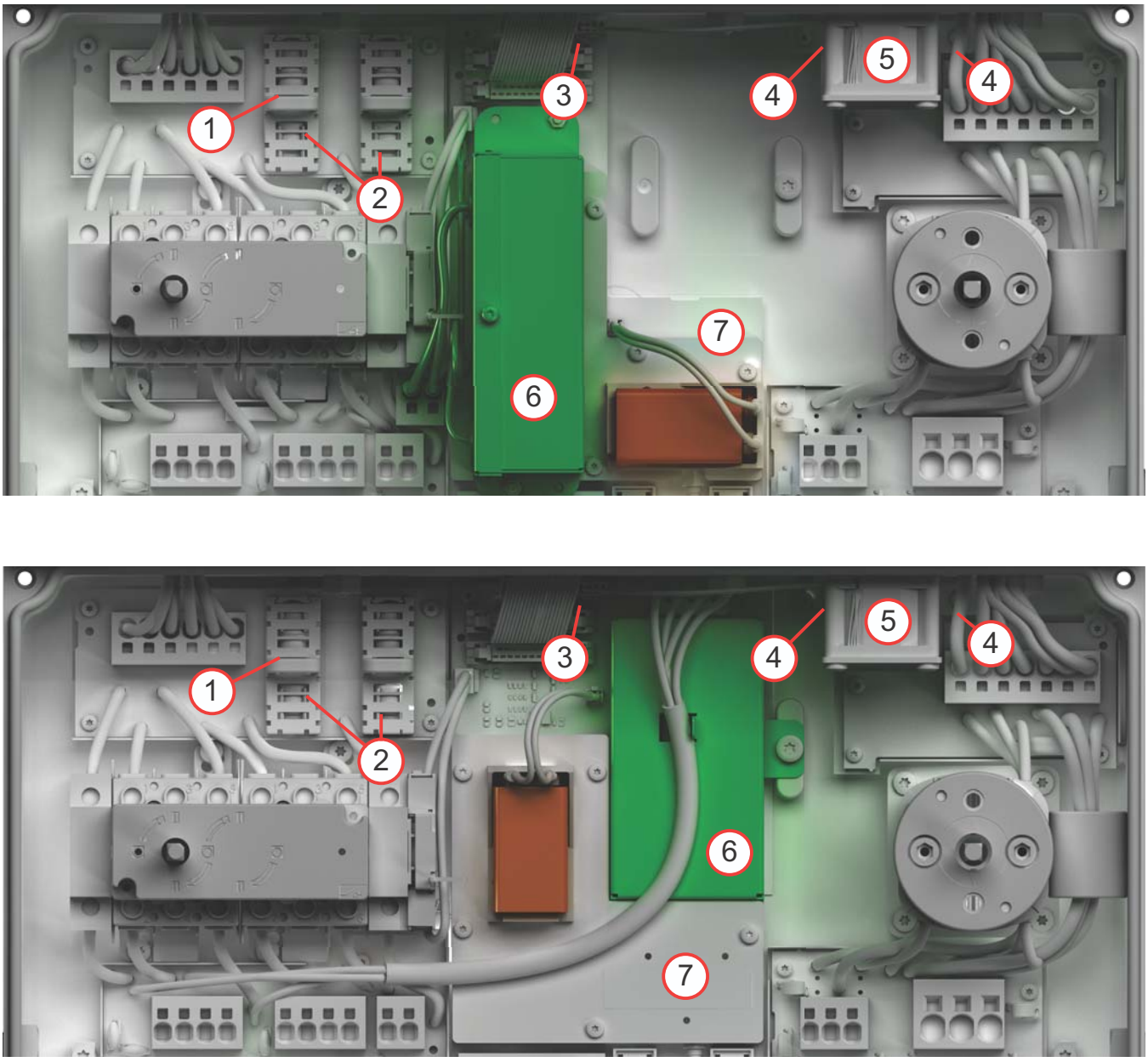


Figure 10-3: Internal components (with separate PLC, top; with integrated PLC, bottom)

Copyright 2017 SolarCity Corporation. All rights reserved.

The numbered callouts in *Figure 10-3* correspond to the following:

- **Fuse cover (1):** Each of the two fuses is protected by a fuse cover. For clarity, only one of the two fuse covers is shown.
- **Fuses (2):** The SolarCity H6 inverter uses two fuses. See *"Fuses" on page 66* for the correct type of fuses to use.
- **Fan connector (3):** The fan power cable connects to the inverter here.
- **Fan screws (4):** These Torx head screws hold the fan in place.
- **Fan (5):** Removing the Torx head screws (#4) allows you to remove the fan assembly.
- **PLC Transmitter (6):** If the PLC Transmitter is a separate box and not integrated with the inverter, it can be replaced. See *"PLC Transmitter" on page 116* for PLC replacement instructions.
- **Circuit board cover (7):** Removing the six (6) Torx head screws allows you to access the ZigBee chip.

Copyright 2017 SolarCity Corporation. All rights reserved.

10.5.1 - Fuses

The SolarCity H6 inverter includes two (2) fuses inside the wiring box for the high-voltage battery pack connections. Prompt replacement of damaged or broken fuses is critical to restore battery pack operation. To replace the fuses:

1. Turn the DC Disconnect Switch to the OFF position. If the battery pack includes a DC disconnect, then turn that switch OFF as well.
2. Move the external AC disconnect / back-feed breaker in the main electrical panel to the OFF position.
3. Remove the wiring box cover as described in *"Remove Wiring Box Cover" on page 59*.
4. Removing the fuse covers (#1 in *Figure 10-3*) by grasping them and pulling them straight out.
5. Remove the old fuses (#2).
6. Verify that the new fuses you about to install meet the requirements in *"Fuses" on page 66*.

WARNING: USE OF LARGER FUSES CAN ALLOW A DANGEROUS OVERLOADING CONDITION TO PERSIST AND LEAD TO POTENTIALLY SERIOUS CAUSES INCLUDING BUT NOT LIMITED TO ARCING, SPARKS, FIRE OR HAZARDOUS CHEMICAL SPILL.

CAUTION: USE OF ANY TYPE OR RATING OF FUSE OTHER THAN THAT SPECIFIED IN THIS GUIDE FOR THE SPECIFIC INVERTER MODEL CAN DAMAGE THE INVERTER AND/OR OTHER INSTALLATION COMPONENTS AND WILL VOID YOUR WARRANTY.

7. Use an ohmmeter to verify that the new fuses are good.
8. Install the new fuses.
9. Replace the fuse covers by pushing them directly down on top of the fuses.
10. Replace the wiring box cover as described in *"Refit Wiring Box Cover" on page 60*.
11. Close the wiring box cover by tightening the four (4) screws.
12. Move the external AC disconnect / back-feed breaker in the main electrical panel to the ON position.
13. Turn the DC Disconnect Switch to the ON position. If the battery pack includes a DC disconnect, then turn that switch ON as well.
14. Verify that the SolarCity H6 inverter and battery pack are functioning normally.

Copyright 2017 SolarCity Corporation. All rights reserved.

10.5.2 - Fan

The SolarCity H6 inverter includes an internal fan for stabilizing hot air within the inverter. This fan is secured inside the wiring box with four (4) screws. This fan must be replaced as soon as reasonably practical if it is not working properly in order to prevent possible inverter overheating. To replace the fan:

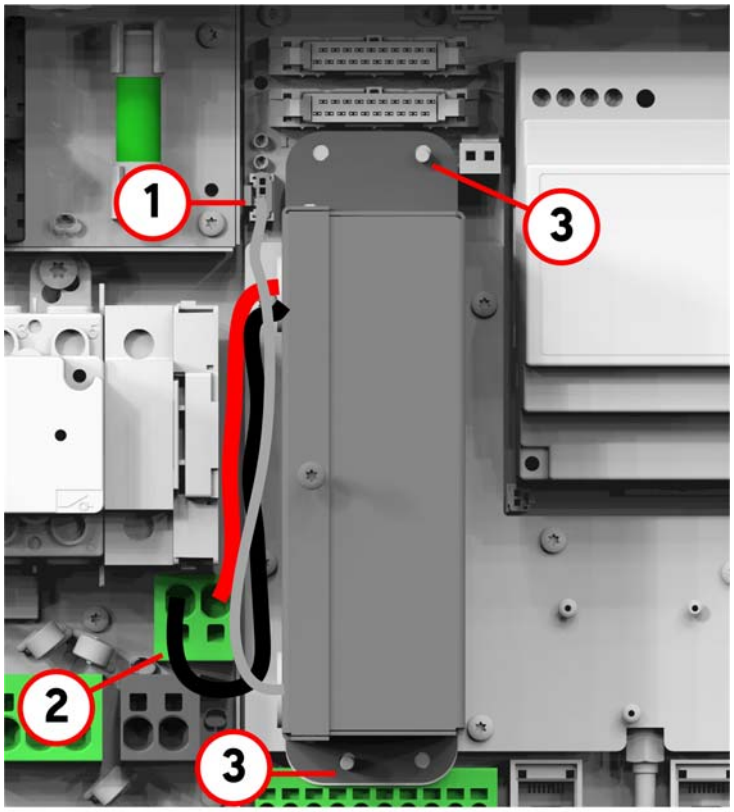
1. Turn the DC Disconnect Switch to the OFF position. If the battery pack includes a DC disconnect, then turn that switch OFF as well.
2. Move the external AC disconnect / back-feed breaker in the main electrical panel to the OFF position.
3. Remove the wiring box cover as described in *"Remove Wiring Box Cover" on page 59*.
4. Unplug the fan power cable from the fan connector (#3 in *Figure 10-3*).
5. Use a Torx head screwdriver to remove the two fan screws (4).
6. Remove the old fan (5) and bracket.
7. Remove the screws securing the old fan to the bracket.
8. Secure the new fan to the bracket using the screws you removed in Step 8.
9. Hold the fan and bracket in position inside the wiring box, and then use a Torx head screwdriver to replace the two fan screws (#4). Do not over-tighten.
10. Pug the fan power cable into the fan connector.
11. Replace the wiring box cover as described in *"Refit Wiring Box Cover" on page 60*.
12. Close the wiring box cover by tightening the four (4) screws
13. Move the external AC disconnect / back-feed breaker in the main electrical panel to the ON position.
14. Turn the DC Disconnect Switch to the ON position. If the battery pack includes a DC disconnect, then turn that switch ON as well.
15. Verify that the SolarCity H6 inverter and battery pack are functioning normally.

10.5.3 - PLC Transmitter

The SolarCity H6 inverter may include a separate PLC Transmitter box (as shown below) or a PLC Transmitter that is integrated in the inverter. The PLC Transmitter sends shutdown commands to the Remote Shutdown Slaves (RSS) when the Fireman Switch is activated.

Copyright 2017 SolarCity Corporation. All rights reserved.

If the inverter has a separate PLC Transmitter box, it can be replaced.



To install or replace the PLC Transmitter:

1. Turn the DC Disconnect Switch to the OFF position. If the battery pack includes a DC disconnect, then turn that switch OFF as well.
2. Move the external AC disconnect / back-feed breaker in the main electrical panel to the OFF position.
3. Remove the wiring box cover as described in *"Remove Wiring Box Cover" on page 59*.
4. If you do not need to remove an existing PLC Transmitter, then skip to Step 9.
5. Disconnect the data cable from the connector (1).
6. Disconnect the DC wires from the spring clamp connectors (2).
7. Remove the two M3 hex nuts (3), and then lift the PLC Transmitter out of the SolarCity H6 inverter.
8. Place the PLC Transmitter into position over the two threaded studs, and then secure the PLC Transmitter using two (2) M3 hex nuts (3).
9. Connect the DC wires to the spring clamp connectors (2), making sure that the red wire is on the left and the black wire is on the right.
10. Connect the data cable to the connector (1).

Copyright 2017 SolarCity Corporation. All rights reserved.

11. Replace the wiring box cover as described in *"Refit Wiring Box Cover" on page 60*.
12. Close the wiring box cover by tightening the four (4) screws.
13. Move the external AC disconnect / back-feed breaker in the main electrical panel to the ON position.
14. Turn the DC Disconnect Switch to the ON position. If the battery pack includes a DC disconnect, then turn that switch ON as well.
15. Verify that the SolarCity H6 inverter and battery pack are functioning normally.

10.5.4 - ZigBee Chip

The ZigBee chip may need replacing if communication between the SolarCity H6 inverter and the SolarCity server fails. To replace the ZigBee chip:

1. Turn the DC Disconnect Switch to the OFF position. If the battery pack includes a DC disconnect, then turn that switch OFF as well.
2. Move the external AC disconnect / back-feed breaker in the main electrical panel to the OFF position.
3. Remove the wiring box cover as described in *"Remove Wiring Box Cover" on page 59*.
4. Disconnect the PLC box from the inverter.
5. Remove the six (6) Torx head screws securing the circuit board cover (#6 in *Figure 10-3*) to the inverter.
6. Carefully disconnect the coaxial cable (#1 in *Figure 10-4*) from the ZigBee chip (#2 in *Figure 10-4*) using either your fingers or a small wrench.
7. Use a chip puller to grasp the ZigBee chip and lift it straight out of its socket.
8. Write down the MAC address of the new ZigBee chip. The MAC address is printed on a label on the underside of the ZigBee chip.
9. Grasp the new ZigBee chip in the chip puller and align it over the socket.
10. Gently press the new ZigBee chip into the socket, being sure to press straight down.

CAUTION: MISALIGNING THE ZIGBEE CHIP AND/OR PRESSING DOWN AT AN ANGLE CAN DAMAGE THE CHIP AND/OR SOCKET.

11. Connect the coaxial cable to the new ZigBee chip using either your fingers or a small wrench. Do not over-tighten.
12. Replace the circuit board cover.
13. Reconnect the PLC box.

Copyright 2017 SolarCity Corporation. All rights reserved.

14. Replace the wiring box cover as described in *"Refit Wiring Box Cover" on page 60*.
15. Close the wiring box cover by tightening the four (4) screws.
16. Move the external AC disconnect / back-feed breaker in the main electrical panel to the ON position.
17. Turn the DC Disconnect Switch to the ON position. If the battery pack includes a DC disconnect, then turn that switch ON as well.
18. If needed, configure the network for the MAC address of the new ZigBee chip.
19. Verify that the ZigBee chip is communicating properly with the SolarCity server.

Verify that the SolarCity H6 inverter and battery pack are functioning normally.

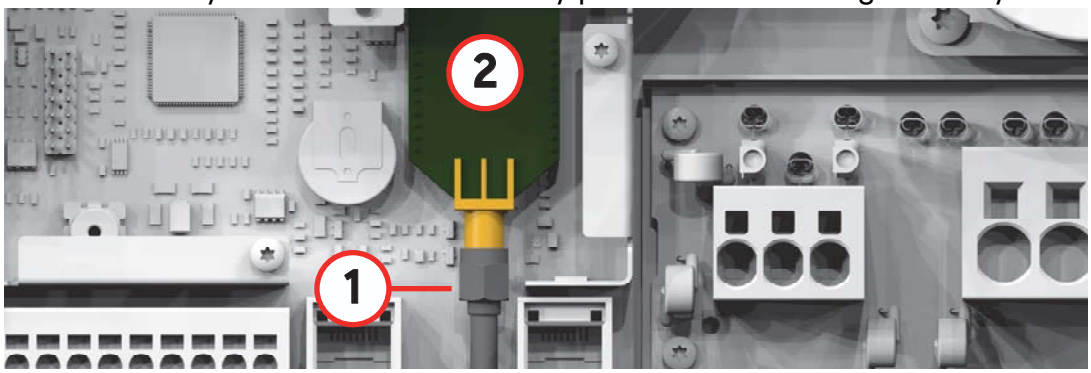


Figure 10-4: ZigBee chip with circuit breaker cover removed

Copyright 2017 SolarCity Corporation. All rights reserved.

10.5.5 - 9-Volt Battery

To replace the 9-Volt Battery:

1. Turn the DC Disconnect Switch to the OFF position. If the battery pack includes a DC disconnect, then turn that switch OFF as well.
2. Move the external AC disconnect / back-feed breaker in the main electrical panel to the OFF position.
3. Remove the wiring box cover as described in *"Remove Wiring Box Cover" on page 59*.
4. Disconnect the old battery and remove it from its clip (1).
5. Connect the new battery and place it in the clip.
6. Replace the wiring box cover as described in *"Refit Wiring Box Cover" on page 60*.
7. Close the wiring box cover by tightening the four (4) screws.
8. Move the external AC disconnect / back-feed breaker in the main electrical panel to the ON position.
9. Turn the DC Disconnect Switch to the ON position. If the battery pack includes a DC disconnect, then turn that switch ON as well.

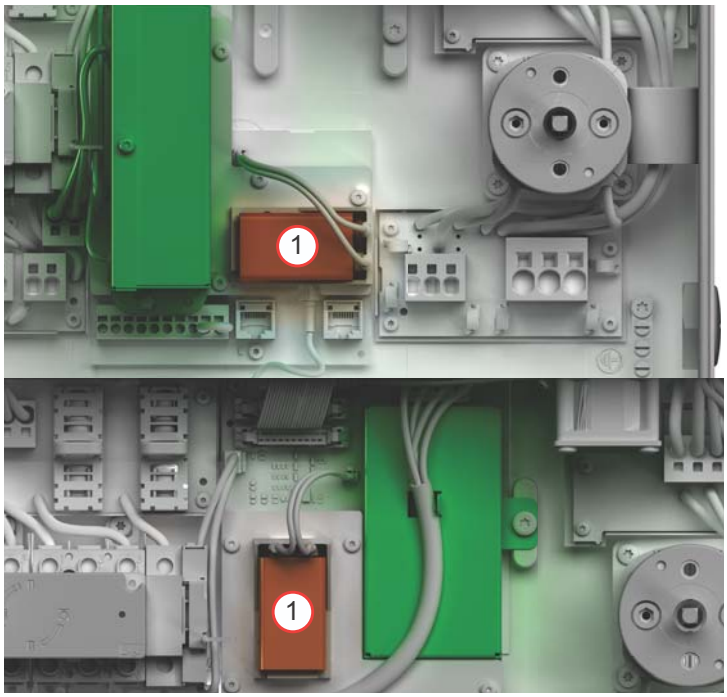


Figure 10-5: 9-Volt Battery (unit with separate PLC, top; with integrated PLC, bottom)

Copyright 2017 SolarCity Corporation. All rights reserved.

10.6 - Warranty and Returns

The standard warranty for the SolarCity H6 inverter is ten (10) years. This warranty can be extended to fifteen (15) or twenty (20) years. For assistance with warranty repairs or returns you may contact our North America support hotline at 1-877-442-4832 or via email at *inverter.support@deltaww.com*.

Copyright 2017 SolarCity Corporation. All rights reserved.

Copyright 2017 SolarCity Corporation. All rights reserved.

Appendix A – Glossary

This guide uses the following terms:

- **AC:** Abbreviation for Alternating Current.
- **AFCI:** Abbreviation for Arc-Fault Circuit Interrupters.
- **Ah:** Abbreviation for "ampere-hour". Unit of electrical charge, one ampere-hour is the charge provided by a constant current of 1 A over a period of one hour.
- **AHJ:** Abbreviation for Authority Having Jurisdiction.
- **AI:** Abbreviation for Anti-islanding.
- **Anti-islanding protection:** This is for AC grid monitoring and is an automatic isolation point distributed energy resources.
- **Backup panel:** A separate panel other than main electrical panel which has the protected home loads
- **Backup loads:** are also called protected home loads which are moved from main electrical panel to back-up panel for operating when in grid blackout state.
- **BOS (Balance of System):** All the equipment used in the installation other than inverter and battery pack are called BOS. Typically it is referred to conduits, wiring, panels etc.
- **Basic Insulation:** Insulation to provide basic protection against electric shock.
- **Battery Pack:** A battery pack is an electrochemical energy storage device that can release previously stored chemical energy as electrical energy.
- **Battery Pack Backup System:** Battery pack backup systems are power supply systems that provide power under utility grid blackout.
- **Battery Pack Charge Mode:** Operating mode of the inverter in which the inverter takes energy from the PV array and/or AC grid to recharge the battery pack in a controlled way.
- **C rate:** The nominal capacity specification is always provided with the discharge time on which the capacity is based.
- **Capacity:** Describes the storage capability of a battery, specified in Wh (Watt-hour). The capacity of a battery is heavily dependent on the State of Charge (SOC), operating power and the temperature.
- **CAN:** Controller Area Network; communications standard that allows communication between microcontrollers and other devices without the need for a host computer.
- **CEC:** Abbreviation for the California Energy Commission.

Copyright 2017 SolarCity Corporation. All rights reserved.

- **CEC Efficiency:** CEC Efficiency is the California Energy Commission Efficiency rating, a performance rating for inverters based on the real environment that a system will be in.
- **CSA:** Abbreviation for the Canadian Standards Association.
- **CT:** Abbreviation for current transformer.
- **DC:** Abbreviation for Direct Current.
- **De-rating:** A controlled reduction in performance, usually dependent on component temperatures. De-rating is initiated in order to avoid the shutting down of the complete system.
- **EMC:** The Electro-Magnetic Compatibility (EMC) concerns the technical and legal basics of the mutual influencing of electrical devices through electromagnetic fields caused by them in electrical engineering.
- **ESS (Energy Storage System):** The complete combination of inverter, battery pack, panels, and BOS is called an Energy Storage System.
- **FCC:** Abbreviation for Federal Communications Commission.
- **Firmware:** Firmware is software that is stored in a processor in various electronic devices, such as H6. Firmware is stored in Flash memory or an EEPROM chip.
- **Floating system:** If the main electrical connections are not grounded in the system then it is considered as floating. There could be grounding of the chassis to avoid electrical shock.
- **GET:** Abbreviation for Grounding Electrode Connector.
- **GND:** Abbreviation for Ground.
- **Grid-Tied:** A PV system that is connected to the utility grid. Also called On-grid.
- **Hybrid Inverter:** an inverter that can function as PV inverter and storage inverter. Also called multi-mode inverter.
- **IEEE:** The Institute of Electrical and Electronics Engineers is an international non-profit, professional organization for the advancement of technology related to electricity.
- **IMI:** Abbreviation for Isolation Monitor Interrupter.
- **Initialization:** Under initialization is the part of the loading process of a program with initial values.
- **ISC:** Abbreviation for Short Circuit Current.
- **Inverter:** A device for converting the direct current (DC) from the PV array or battery pack into alternating current (AC), which is necessary for the connection of most devices and especially for the feed-in of green energy into an existing transmission line. Inverters for PV systems usually include one or more MPP trackers, store operating data and monitor the grid connections of the PV system.

Copyright 2017 SolarCity Corporation. All rights reserved.

- **Inverter mode:** Operating mode of a inverter where it supplies the stand-alone grid from the PV array and/or battery pack energy. In this operating mode, the inverter is especially responsible for the control of frequency and voltage in the stand-alone grid.
- **Lithium-ion (Li-ion) Battery:** Type of rechargeable battery where lithium ions flow from the negative electrode to the positive electrode when the battery is being discharged and back when the battery is recharging.
- **Local utility company:** A local utility company is a company under which the installation belongs to.
- **Maximum Power Point:** The operating point (current/voltage characteristic curve) of a PV array where the maximum power can be drawn. The actual MPP changes constantly depending e.g. on the level of solar irradiation and the temperature.
- **MPPT:** Maximum Power Point Tracking.
- **MPPT Channel:** Regulation of the power drawn so that a PV field remains as close as possible to the MPP. Multiple strings of same type could be connected on the same MPPT channel.
- **NEC:** The National Electrical Code (NEC), or NFPA 70, is a United States standard for the safe installation of electrical wiring and equipment.
- **Nominal Energy Throughput of the Battery:** A nominal energy throughput is the calculated result of one full charge and discharge of the battery.
- **Nominal power:** Nominal power is the maximum permissible continuous power output indicated on name plate ratings.
- **Nominal current:** Nominal current is the max. continuous current. Typically, if the device is supplied with the nominal voltage and yields its nominal power.
- **Overload / Surge Capacity:** The overload capacity of an inverter describes its ability to supply short-term (seconds) that loads can significantly draw higher than the nominal power at start-up. The overload capacity is necessary in order to be able to also start electronic machines that have a nominal power similar to the nominal power of the inverter in the stand-alone grid, since these machines typically need 2-6x times more current during start than in steady-state.
- **Standalone:** This happens when the utility grid is lost. Also called Off-grid.
- **Photovoltaic (PV):** The conversion of PV energy into electrical energy. The name is composed of the component parts: Photos: the Greek word for light - and Volta - after Alessandro Volta, a pioneer in electrical research.
- **Power dissipation:** Power dissipation is designated as the difference between absorbed power and power of a device or process yielded. Power dissipation is released mainly as heat.
- **PV Array:** Technical device for the conversion of solar energy into electrical energy. All electrically connected (in series and in parallel) PV modules of a PV system are referred to as the PV array.

Copyright 2017 SolarCity Corporation. All rights reserved.

- **PV System:** Describes the totality of devices required for the exploitation and utilization of solar energy. Sometimes, it includes not only the PV array, but also the SolarCity H6 inverter.
- **Self-Discharge:** Loss of battery charge while it is stored or not used. A higher ambient temperature has a strong influence on self-discharge.
- **SOC:** State of Charge (also called State of Energy). It describes the current amount of charge that can be drawn from the battery pack, in percent of the nominal capacity (e.g., 100% = battery full, 0% = battery empty).
- **Split-Phase:** A split-phase system is a three-conductor single-phase distribution system, commonly used in North America, for residential and light commercial applications. Its primary advantage is that it saves conductor material since a single-phase system with one neutral conductor is used, while on the supply side of the grid configuration only one line conductor is necessary. Since there are two live conductors in the system, it is sometimes incorrectly referred to as "two-phase system". To avoid confusion with split-phase applications, it would be correct to call this power distribution system a three-conductor, single-phase, mid-point, neutral system.
- **String:** Describes a group of electrical series-connected PV modules. A PV system usually consists of a number of strings, which avoids yield losses due to variations in shading over different modules.
- **UL:** Abbreviation for Underwriters Laboratory, a non-profit organization that sets standards for different product categories and tests products to make sure they meet the safety standards.
- **VOC:** Open Circuit Voltage.
- **ZigBee:** Open, global wireless communication standard used for communications between the SolarCity H6 inverter and the SolarCity monitoring infrastructure.

Copyright 2017 SolarCity Corporation. All rights reserved.

Appendix B – SMART Rapid Shutdown Slave

The Smart Rapid Shutdown Slave (SMART RSS) provides automatic disconnect functionality for residential PV systems of 600VDC or less that full complies with the Rapid Shutdown requirements of NEC 2014 Article 690.12 when installed according to these instructions. The SMART RSS is compatible with the SolarCity H6 inverter.

The SMART RSS may be mounted either to the top of a standard mounting rail beneath a PV module or indoors. NEC 690.12 requires the SMART RSS to be installed either:

- **Outdoors:** Within 10’ (3m) of the PV array.
- **Indoors:** With 5’ (1.5m) after entering the building.

The SMART RSS includes a single un-fused PV string input that can accept two (2) strings of PV modules if a certified combiner box, appropriate UL/CSA listed 2-in-1 T-branch connector, or equivalent is needed. The SMART RSS also include a single output with PV connectors. From there, the DC output conductors are routed to the input terminal of the SolarCity inverter. See *Figure 1-2*.

Copyright 2017 SolarCity Corporation. All rights reserved.

B.1 – Dimensions and Clearances

This section displays the physical dimensions of the SMART RSS and provides minimum clearance requirements.

B.1.1 – SMART RSS Dimensions

Figure B-1 displays the physical dimensions of the SMART RSS. It also displays the input cables, output cables, SMART RSS box, and mounting bracket. The polarity of the input and output also appear in the figure.

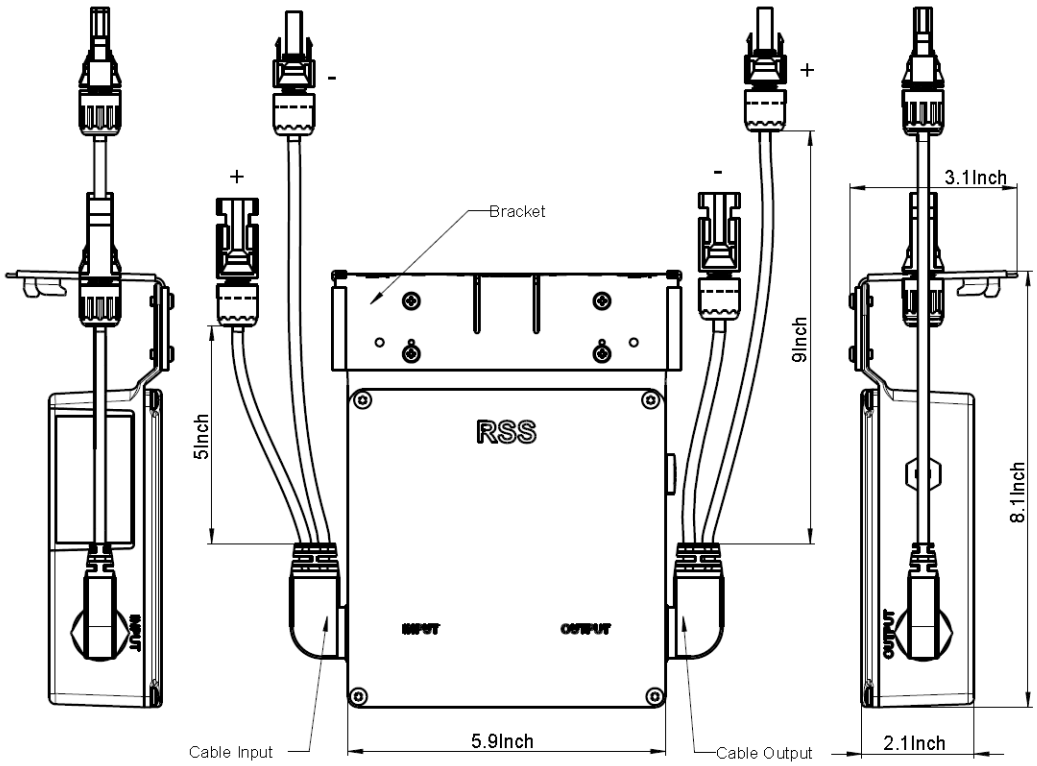


Figure B-1: SMART RSS dimensions

Copyright 2017 SolarCity Corporation. All rights reserved.

B.1.2 - Clearances

The minimum clearance requirements (see *Figure B-2*) for mounting the SMART RSS are:

- **Between bottom of PV module surface and top of SMART RSS:** 0.6” (15mm)
- **Between roof surface and bottom of SMART RSS:** 0.6” (15mm)
- **Between roof surface and back of PV module laminate:** 2.6” (66mm))

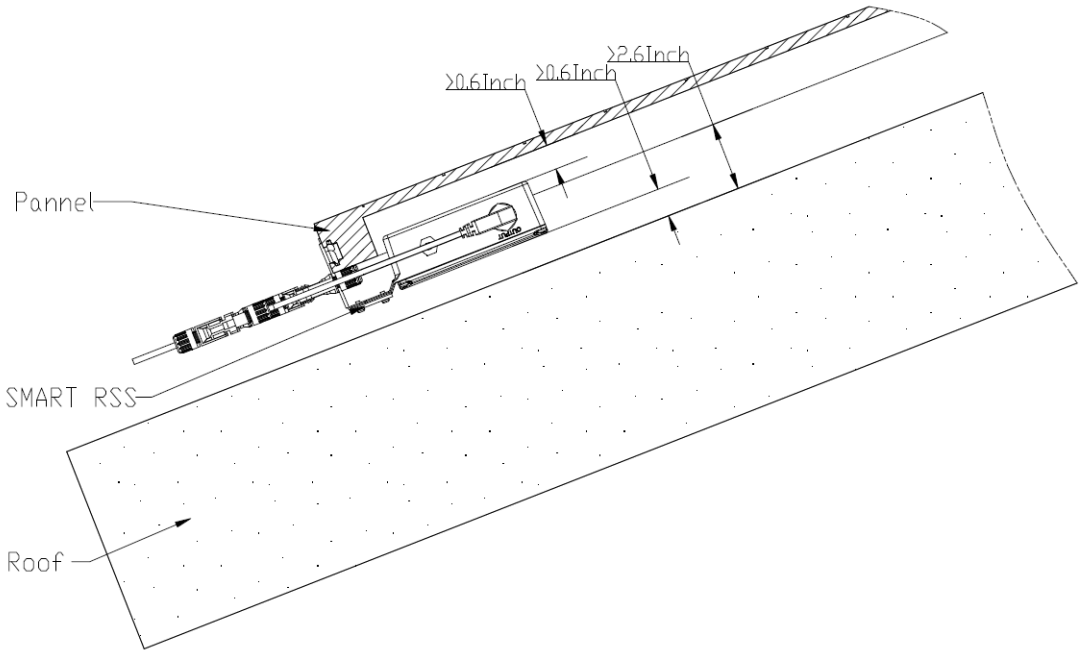


Figure B-2: Minimum SMART RSD clearances

Copyright 2017 SolarCity Corporation. All rights reserved.

B.2 – Installing the SMART RSS

SHOCK HAZARD: BOTH THE POSITIVE AND THE NEGATIVE LEADS MUST BE STRICTLY ISOLATED ELECTRICALLY FROM BOTH GROUND AND EACH OTHER IN ORDER TO ENSURE MAXIMUM PROTECTION AGAINST HAZARDOUS VOLTAGES DURING SYSTEM ASSEMBLY.

SHOCK HAZARD: THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED.

WARNING: INSTALLATION AND COMMISSIONING MUST BE PERFORMED BY A QUALIFIED PERSONNEL IN ACCORDANCE WITH LOCAL, STATE, AND NATIONAL ELECTRICAL CODE ANSI/NFPA 70 REQUIREMENTS. IN CANADA, THE INSTALLATION AND WIRING METHODS USED MUST COMPLY WITH THE CANADIAN ELECTRIC CODE.

WARNING: ALWAYS DE-ENERGIZE THE AC BRANCH CIRCUIT BEFORE SERVICING. NEVER DISCONNECT THE DC CONNECTORS UNDER LOAD.

WARNING: PRESS THE FIREMAN SWITCH AFTER DISCONNECTING AC POWER TO THE INVERTER AT THE MAIN ELECRICAL PANEL, AND THEN PRESS THE FIREMAN SWITCH TO INITIATE A RAPID SHUTDOWN.

To install the SMART RSS:

1. Press the bracket into the groove on the module frame until the bracket is flush with the module frame. See *Figure B-3*.
2. Press on the ground tab to lock the SMART RSS into the groove. Make sure that the tab is flush with the front face of the bracket. If needed, use a rubber mallet to gently tap the SMART RSS into place.

Note: The SMART RSS bracket provides both a UL-listed bonding path to ground and a mechanical connection to the PV panel frame.

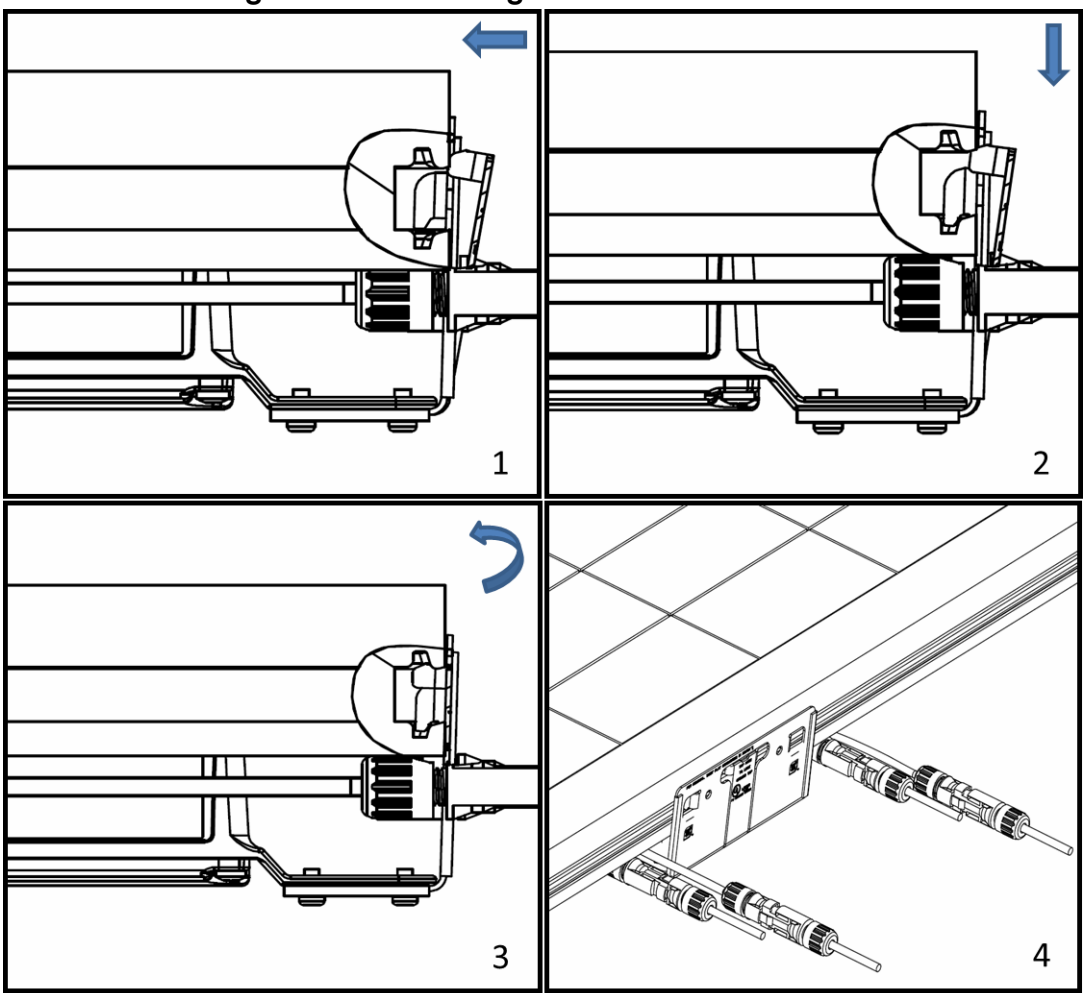
3. Connect the PV strings directly to the SMART RSS inputs.

Copyright 2017 SolarCity Corporation. All rights reserved.

Route the DC output conductors from the SMART RSS to the SolarCity H6 inverter PV interface connections as described in *"PV Interface" on page 28*, *"PV Array" on page 37*,and *"PV Connections" on page 63*.If the SMART RSS is installed under the module or on racking, there must be more than 2.6 inch (65 mm) from the back of the module laminate to the roof's surface.

4. Verify that the minimum clearances specified in *"Clearances" on page 129* are present.

Figure B-3: Installing the SMART RSS (below)



CAUTION: VERIFY THAT THE POLARITY AND VOLTAGE LEVEL ARE CORRECT WHEN MAKING THE CONNECTIONS. INCORRECT CONNECTIONS MAY DAMAGE THE SMART RSS AND/OR PV MODULES.

CAUTION: FIELD WIRING CONDUCTORS MUST HAVE AN AMPACITY BASED ON TABLE 310.16 OF NEC 2014. CALCULATE CIRCUIT SIZING AND CURRENT ACCORDING TO NEC 2014 ARTICLE 690.8. USE CABLES WITH A MINIMUM MINIMUM SIZE OF 12AWG AND A MAXIMUM LENGTH OF 100FT (30.5M).

Copyright 2017 SolarCity Corporation. All rights reserved.

B.3 – Removing the SMART RSS

To remove the SMART RSS:

1. Use a screwdriver to unlock the tooth of the bracket.
2. Lift the RSS and pull it out.

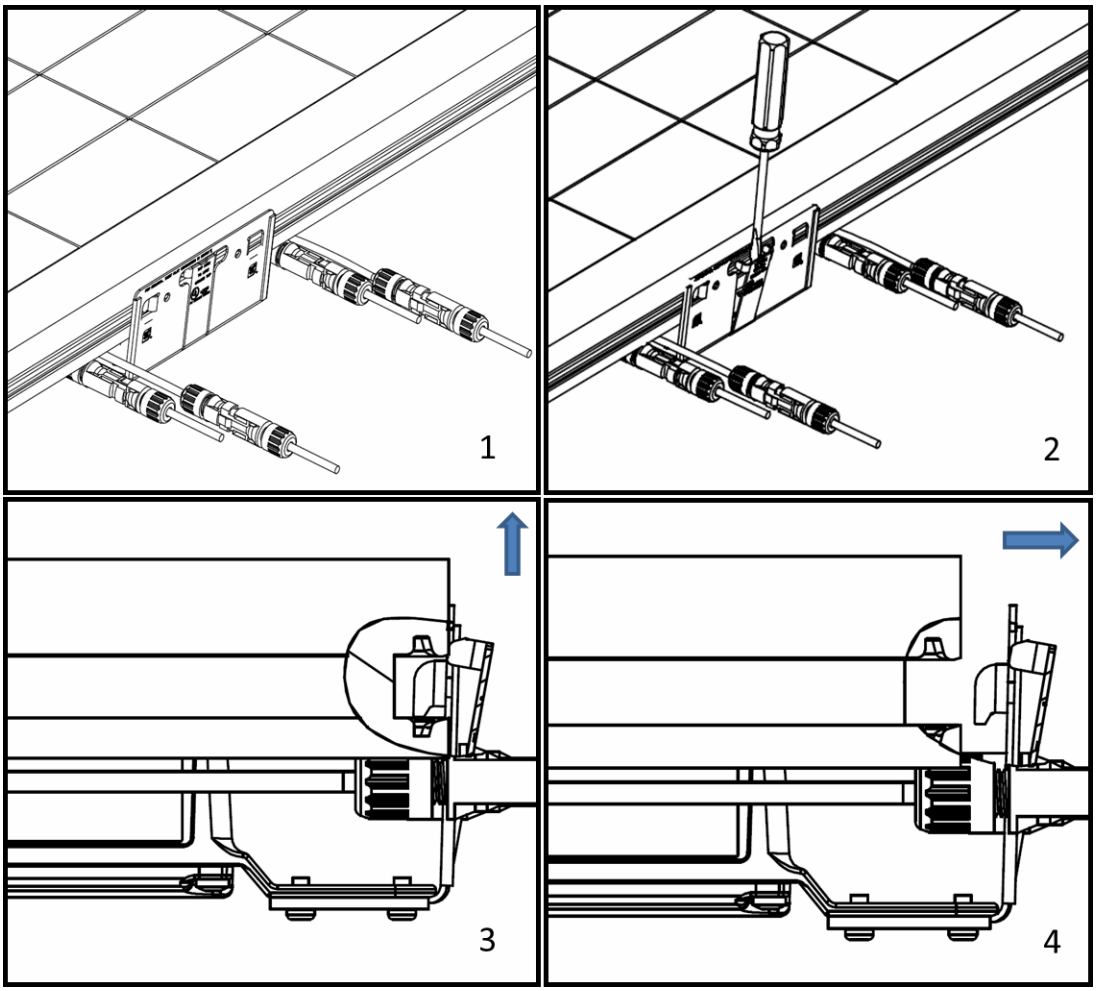


Figure B-4: Removing the SMART RSS

CAUTION: BE CAREFUL TO AVOID BENDING THE SMART RSS BRACKET.

Copyright 2017 SolarCity Corporation. All rights reserved.

B.4 - Grounding the SMART RSS

The SMART RSS includes built-in ground fault protection (GFP). No additional grounding is required if the bracket is securely mounted on the PV track. The bracket also includes a threaded hold for equipment grounding if the bracket is not used, such as when mounting the SMART RSS on an interior wall. If you are using a grounding conductor, be sure that it meets the following minimum size requirements per UL 1741 clause 18:

- **Copper:** 12AG (3.3mm2)
- **Aluminum or copper-clad aluminum:** 10AWG (5.3mm2)

The M4 wire-binding grounding screw must have a green-colored head that is either hexagonal, slotted, or both. You may also use a UL/CSA listed grounding lug/kit to bond to the rack. Torque the lug according to the manufacturer's instructions.

B.5 - Warning Label

According to NEC 690.56 (B) and (C), a system that uses an AC or DC disconnect device to initiate Rapid Shutdown must include a permanent reflective red plaque that includes the following wording or equivalent in all-capital white lettering with a minimum height of 3/8" (9.5mm):

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN. OPERATION OF THIS SYSTEM DISCONNECT DEVICE WILL RESULT IN SHUTDOWN OF THE PHOTOVOLTAIC ARRAY IN ADDITION TO INTERRUPTION OF SYSTEM POWER.

Note: The term "PHOTOVOLTAIC" may be replaced with "PV".

B.6 - Self-Test

SMART RSS devices have an automatic self-test function. Under normal operating condition, self-testing occur each day during start-up. Failure of the self-test will initiate a continuous alarm, and the SMART RSS will continue conducting the self-test until successfully completed. Devices that fail to complete their self-test must be replaced by a qualified service technician.

Copyright 2017 SolarCity Corporation. All rights reserved.

B.7 - Specifications

This section presents the specifications of the SMART RSS.

B.7.1 - Mechanical

The mechanical specifications of the SMART RSS are:

- **Height:** 200mm (7.87”)
- **Width:** 150mm (5.91”)
- **Depth:** 53mm (2.09”)
- **Weight:** 0.5 lbs (0.22kg)
- **DC input/output connectors:** Amphenol Helios H4 or MC4 PV
- **Bracket:** Groove Adapter Bracket
- **Operating temperature:** -40°F to 158°F (-40°C to 70 °C)
- **Storage temperature:** -40°F to 185°F (-40°C to 85 °C)
- **Humidity:** 0% to 100%
- **Max. altitude:** 2,000m (6,561 feet)

B.7.2 - Ratings

The SMART RSS is rated as follows:

- **Max. system voltage:** 600V DC
- **Rated input current:** 20A DC
- **Rated input operating voltage:** 85~550V DC
- **Rated input operating current:** 0~20A DC
- **Fuse Rating:** N/A
- **Max. number of controlled circuits:** 1

Copyright 2017 SolarCity Corporation. All rights reserved.

B.7.3 - Compliance

The SMART RSD complies with all of the following standards:

- **Enclosure protection rating:** NEMA 4X
- **Safety:** UL 1741, UL 1741 CRD PVRSS, CSA-C22.2 No. 107.1-01
- **Rapid shutdown:** NEC 2014 Article 690.12
- **EMC:** FCC Part 15 B

Note: These values are subject to change. Please refer to the SMART RSS Datasheet for updated values.

Copyright 2017 SolarCity Corporation. All rights reserved.

H6 Hybrid Inverter
Installation & Operation Guide

SolarCity Corporation
3055 Clearview Way
San Mateo, CA 94402

phone: (650) 638-1028
fax: (650) 560-6460
www.solarcity.com

Version 1.1 (02/2017)
PREVIOUS VERSIONS OBSOLETE

SolarCity
Power forever.