

Savant Power Storage 20 Installation Guide

Document Number: 009-2401-02
Document Date: May 2025
Document Supports daVinci 10.2.3 and Higher

This document guides the installer through the complete installation process for the following products:

- **Savant Power Storage 20 (PS20-12.5KW-100A-xx)** composed of:
 - Savant Power Inverter (PS-INV-12.5KW-100A-xx)
 - Savant Power Storage 20 Battery Cabinet (PS20-BATT-ENCL-xx / PS20-BATT-ENCL-LEFT-xx)
 - Savant Power Storage 20 Battery Modules (PS20-BATT-20KWH-xx)

OR

- **Savant Power Storage 20 (PS20-10KW-100A-xx)** composed of:
 - Savant Power Inverter (PS-INV-10KW-100A-xx)
 - Savant Power Storage 20 Battery Cabinet (PS20-BATT-ENCL-xx / PS20-BATT-ENCL-LEFT-xx)
 - Savant Power Storage 20 Battery Modules (PS20-BATT-20KWH-xx)

 The following model numbers are interchangeable throughout this Installation Guide

Model Number	Model Number used for Certification Purposes
PS20-12.5KW-100A-xx	PS20-12.5KW-100A-; followed by two characters
PS20-10KW-100A-xx	PS20-10KW-100A-; followed by two characters
PS-INV-12.5KW-100A-xx	PS-INV-12.5KW-100A-; followed by two characters
PS-INV-10KW-100A-xx	PS-INV-10KW-100A-; followed by two characters

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Important Safety Information - Read First

Before installing, configuring, or operating any equipment, Savant recommends that each dealer, integrator, installer, etc. access and read all relevant technical documentation. Savant Power technical documentation can be located by visiting savant.com/power. Vendor documentation is supplied with the equipment.

Read and understand all safety instructions, cautions, and warnings in this document and the labels on the equipment.

Safety Classifications In this Document

NOTE:	Provides special information for installing, configuring, and operating the equipment.
 DANGER!	Indicates a potentially hazardous situation which, if not avoided, could result in injury, death, or damage to Savant Power Storage 20.
 IMPORTANT!	Indicates potentially hazardous situation which, if not avoided, could result in medium/slight injury or damage to Savant Power Storage 20.
 CAUTION!	Provides special information for avoiding situations that may cause damage to equipment.

Safety Statements

Read this entire document before installing or using Savant Power Storage 20. Failure to read or follow any of the instructions or warnings in this document can result in personal harm, including death, or damage to the product, potentially rendering it inoperable.

DANGER!

- A battery can present a risk of electrical shock, fire, or explosion from vented gases. Observe proper precautions.
- Savant Power Storage 20 must be installed by only Savant authorized persons who have been trained in working with high voltage electricity.
- Use Savant Power Storage 20 only as directed.
- Do not handle the device or its components with wet hands, otherwise electric shock or death may occur.
- Do not use Savant Power Storage 20 if it is defective, appears cracked, broken, (or otherwise damaged) or fails to operate.
- Never work on the system without first entirely powering down the system and shutting off and locking out any power supplies to the inverter.
- To protect the product and its components from damage when transporting, handle with care. Do not impact, pull, drag, or step on Savant Power Storage 20. Do not subject Savant Power Storage 20 to any high forces. To help prevent damage, leave Savant Power Storage 20 in its shipping packaging until it is ready to be installed.
- All installations must comply with The National Electric Code (NEC) and local codes.
- Do not insert foreign objects into any part of the Savant Power Storage 20.
- All installations must comply with specifications for wire types, conductor sizes, electrical and thermal insulation, branch circuit protection, grounding, and disconnect devices.

CAUTION!

- Do not paint any part of Savant Power Storage 20, including any internal or external components such as the exterior shell or casing.
- When installing Savant Power Storage 20 in a garage or near vehicles, keep it out of the driving path.
- Ensure installation is compliant with local and national electrical codes.

Electronic Waste Information



This symbol on the product or on its packaging indicates that this product must not be disposed of with normal household waste. It is your responsibility to dispose of electrical waste in a manner that is consistent with local guidelines.

For more information about where you can drop off waste equipment for recycling, please contact your local city office, waste disposal service, or the shop where you purchased the product.

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

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



DANGER! Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Warning Statement

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure conditions without restriction.

1. Before You Begin

This document assumes the installer has read all documentation associated with Savant Power Storage systems and relevant equipment. Read this document in its entirety before starting deployment of any product listed within.

Savant Documentation

This document assumes the installer has read and completed the applicable steps within the following Savant documentation for any installation. Review and complete all steps listed in the documentation that applies to the equipment being installed:

Deployment Guides	Quick Reference Guides
Savant Power Storage Deployment Guide - Savant Power & Light App	Savant Power Storage 20 Quick Reference Guide
Savant Power Storage App Setup Guide	Savant Power Director Quick Reference Guide
Savant Power Storage Generator Installation and ATS Integration Guide	

System Commissioning

The Savant Power System is commissioned using the Savant Power Storage app while integration with the Savant Power Director occurs through the Savant Power and Light App. Create a Savant Power Storage account, then request permissions at support.savant.com/power/s/contactsupport before the day of installation. More details on utilizing SP&L can be found in the [Savant Power System Deployment Guide - Savant Power & Light App](#).

Tools and Products Checklists

The following items are required for deploying a Savant Power Storage 20 system:

Tools Checklist

- Rotary Hammer with 10mm or 12mm Drill Bit.....☐
- Rubber Hammer.....☐
- Socket Wrench (17mm).....☐
- Philips Screwdriver (6mm).....☐
- Flathead Screwdriver (2.5mm).....☐
- Hex Screwdriver (4mm).....☐
- Cable Cutter.....☐
- Measuring Tape.....☐
- Leveling Instrument.....☐
- Vacuum.....☐
- Multimeter.....☐
- Insulated Gloves.....☐
- Safety Goggles.....☐

- Safety Shoes.....☐
- Dust Mask.....☐
- Marker.....☐

Hardware Checklist

- Mobile Device Running iOS 14.0 or Higher or Android 8.0 or Higher.....☐
- Battery Cables for Battery Management System (BMS) Wiring.....☐
- See [Internal Wiring](#)
- Network Switch (Required for Parallel Configurations).....☐

Optional Tools and Hardware

- Hotspot.....☐
- Acrel Meter (Required for Meter Zero Mode).....☐

2. Introduction

The Savant Power Storage 20 (PS20) is an all-in-one energy solution that acts as a power control system to manage a variety of interconnected power sources alongside an energy storage system to enable energy resiliency in the event of grid disruptions and significant costs savings during every-day operation.

A PS20 system is composed of the parts below.

For Savant Power Storage 20 Inverter and battery parts and features, see the [Savant Power Storage 20 - 100A Quick Reference Guide](#) on the [Savant Customer Community](#) or support.savant.com/power.



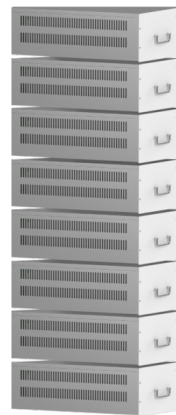
Savant Power Inverter
(PS-INV-12.5KW-100A-xx)

- (1) Savant Power Inverter
- (1) Power Storage Inverter Accessories Kit*



Savant Power Storage 20 Battery Enclosure
(PS20-BATT-ENCL-xx / PS20-BATT-ENCL-LEFT-xx)

- (1) Battery Enclosure
- (1) Accessories Kit
 - (3) Rubber Gasket
 - (1) M8 Lock Nut
 - (4) M5x16 Hex Screws
 - (1) Quick Reference Guide
 - (1) Positioning Plate
 - (1) Large Mounting Bracket
 - (1) Small Mounting Bracket
 - (1) Cable Tube
 - (1) Cable Tube Nut
 - (1) BCMS Comm Cable
 - (1) BCMS Power Cable
 - (1) M14 Drill Bit
 - (4) Washer
 - (4) M10x70 Expansion Screw
 - (10) M5 Flange Nut
 - (4) 30A Fuse
 - (3) M6x16 Hex Screw
 - (6) M6 Expansion Anchor Screw



Savant Power Storage 20 Battery
(PS20-BATT-20KWH-xx)

- (8) Power Storage 20 Battery
- (5) M4x10 Hex Screw



Savant Power Director
(HST-DIRECTOR-xx) OR
Panel Bridge Controller
(PBC-P1000-xx)

- (1) Savant Power Director or Panel Bridge Controller

***Power Storage Inverter Accessories Kit**

- (1) Savant Power Accessories Kit Guide
- (1) Savant Power Director/ Panel Bridge Controller
- (1) Netgear Range Extender (EX6120-100NAS)
- (1) Shared Battery Cable (CAN-INV-BATT-02)
- (1) Arc Fault Circuit Interrupter (PS-INV-AFCI)

2.1. Installation Quick Steps

To successfully deploy a PS20 system, follow the steps listed below. This page can be used as a checklist to track progress as items are completed.

Install PS20 System

Plan the PS20 install location..... ☐

See [Installation Location](#)

Mount the PS20 Inverter and Battery Cabinet..... ☐

See [Mounting the System](#)

Wire Inverter to BCMS..... ☐

See [Internal Wiring](#)

Install the battery modules..... ☐

See [Battery System Installation](#)

Wire External Connections to Grid and Ground..... ☐

See [External Wiring](#)

(OPTIONAL) Wire Photovoltaic Systems..... ☐

See [Photovoltaic \(PV\) Wiring](#)

(OPTIONAL) Install Accessories such as an Emergency Stop Button, Acrel Meter, and Antennas..... ☐

See [Appendix C: Optional Accessories](#)

Integrate Savant Power Director..... ☐

See [Network and Power Director Integration](#)

(OPTIONAL) Integrate Additional Power Equipment..... ☐

See [Optional Power Equipment Integration and Wiring](#)

Parallel System Installation Steps ONLY..... ☐

See [Standard Parallel Configurations](#)

Shared Battery System Installation Steps ONLY..... ☐

See [Shared Battery Configurations](#)

Check and Test System

Perform Safety Check..... ☐

See [Safety Check](#)

Perform First Start Up..... ☐

See [System Boot-up](#)

Deploy Savant Power Storage System with Savant Power Storage (SPS) App..... ☐

See [System Commissioning](#)

2.2. System Specifications

Power Storage Inverter		Lifecycle		Physical Specifications	
Continuous Inverter Output	12.5 kW / 10 kW *	Rated Cycles	6000	Total Unit Dimensions (HxWxD)	85.4 x 25.6.4 x 13 in
Maximum Surge Output	On Grid: 30 kW, 300 ms / 28 kW, 25 s	Warrantied Capacity	75 %	Inverter Dimensions (HxWxD)	24.4 x 25.6 x 11 in
	Off Grid: 24 kW, 400 ms / 19.1 kW , 1 s / 16 kW, 10 s	Warranty	10 Years	Battery Cabinet Dimensions (HxWxD)	61 x 25.6 x 13 in
		Savant Power System		Total Unit Weight	600 lbs (272 kg)
Maximum Output Current (Off Grid)	52 A	Load Management Platform	Included	Battery Cabinet Weight (Empty)	221 lbs (100 kg)
Maximum Pass-through Per Inverter	100 A	Connectivity	Wi-Fi, Wired	Battery Cabinet Weight (Full)	494 lbs (224 kg)
Interconnection Voltage	120/240 V	Deployment	Savant Power & Light App Savant Power Storage App	Battery Module Weight	47.4 lbs (21.5 kg)
Interconnection Frequency	60 Hz	Power Source Compatibility		Inverter (PCS) Weight	106 lbs (48.08 kg)
Grid Transfer Time	< 70 ms	Maximum Solar Input (DC)	17 kW	Enclosure Type	NEMA4X
Split Phase Load Imbalance	100 %	Solar MPPTs	2	Inverter/Battery Installation	Stacked or Separate
Power Factor	0.9 +/-	Strings/MPPT	2	Operating Temperature	32 - 113 °F
Total Harmonic Distortion	< 3 %	Max Solar Input/MPPT (DC)	8.5 kW	Recommended Temperature	50 - 95 °F
CEC Round Trip Efficiency	93.8 %	Rated MPPT Power (kW)	6.25 kW	Altitude	< 9842 ft
Max Round Trip Efficiency	94.8 %	MPPT Operating Voltage, Vmp	175 - 380 V	Noise Level	< 55 dB
Max Paralleled Inverters	8	Maximum Solar Voc	450 V	Relative Humidity	0-95 %
Arc Fault Circuit Protection (AFCI)	Type: 1	Rated Solar Input, Imp	26 A per MPPT	Battery Entry	RIGHT OR LEFT (separate SKUs)
Power Storage 20 Battery		Maximum Solar Current, Isc	37 A per MPPT	Physical Specifications	
Rated Energy Capacity	20 kWh	MPPT Efficiency	99 %	INTEGRATED AP SMART SUNSPEC RSD XMTR	
Battery Voltage, Nominal	409.6 V	Integrated RSD Transmitter	APsmart PLC-1P Sunspec Compliant	AP Smart	RSD-S-PLC - No additional Equipment
Recommended Max Depth of Discharge (DOD)	90 %	AC Coupled Solar Support	Yes	TIGO	TS4-A-F - No Additional Equipment
Maximum Discharge Current	34 A	Automatic Generator Support	Yes		TS4-A-M - TAP & CCA Required
Maximum Charging Current	34 A	Max Generator Power Support per Unit	24 kW		TS4-A-O - TAP & CCA Required
		Standards Compliance			
Battery Operating Voltage	384 - 467.2 V	EMC Certifications	FCC Part 15 Class B		
Battery Chemistry	LiFePO4	Interconnection Standards	IEEE-1547:2018, IEEE-1547:2020.1, CA Rule 21, HECO SRD-IEEE-1547.1		
* Dependent on inverter model number		Safety Standards	UL 1741 SA, UL 1741 SB, UL 1741, UL 1741 PCS, UL 1699B, UL 9540, UL 1973, UL 1642, C22.2 No. 107.1 and 330		

* Dependent on inverter model number

2.3. Connection Requirements

Minimum Copper Wire Sizing and Ratings

	Voltage	Temperature Class	Gauge
AC	600 V	75°C/167°F	#6 - 2 AWG
Ground	600 V	75°C/167°F	#10 - 6 AWG
PV/Battery	600 V	75°C/167°F	#10 - 6 AWG
RSD Option 2 / 12Vdc / AFCI Communication	30 V	60°C/140°F	#24 AWG
CAT5 Ethernet	30 V	60°C/140°F	Standard Ethernet cable

Maximum External Circuit Breaker Wire Sizing and Ratings

	Voltage	Current Rating
AC	600 V	100 A
PV	600 V	30 A
Rapid Shutdown Devices (RSD)	30 V	1 A

NOTE: If smaller-size wires and breakers are to be used for AC connection, grid output current can be configured via the Savant Power Storage app. Please contact Savant Support to confirm configurations.

2.4. Voltage and Frequency Ride-through

The Savant Power Inverter has voltage and frequency limits for utility interaction according to the following ranges per IEEE 1547:2018 and IEEE 1547.1:2020

Voltage Ride-through

Shall Trip Function	Default Settings		Ranges of Allowable Settings	
	Voltage (p.u. of nominal voltage)	Clearing Time (sec)	Voltage (p.u. of nominal voltage)	Clearing Time (sec)
OV2	1.20	0.16	fixed at 1.20	fixed at 0.16
OV1	1.10	13.0	1.10-1.20	1.0-13.0
UV1	0.88	21.0	0.0-0.88	21.0-50.0
UV2	0.50	2.0	0.0-0.50	2.0-21.0

Frequency Ride-through

Shall Trip Function	Default Settings		Ranges of Allowable Settings	
	Frequency (Hz)	Clearing Time (sec)	Frequency (Hz)	Clearing Time (sec)
OF2	62	0.16	61.8-66.0	0.16-1000.0
OF1	61.2	300.0	61.0-66.0	180.0-1000.0
UF1	58.5	300.0	50.0-59.0	180.0-1000.0
UF2	56.5	0.16	50.0-57.0	0.16-1000.0

NOTE:

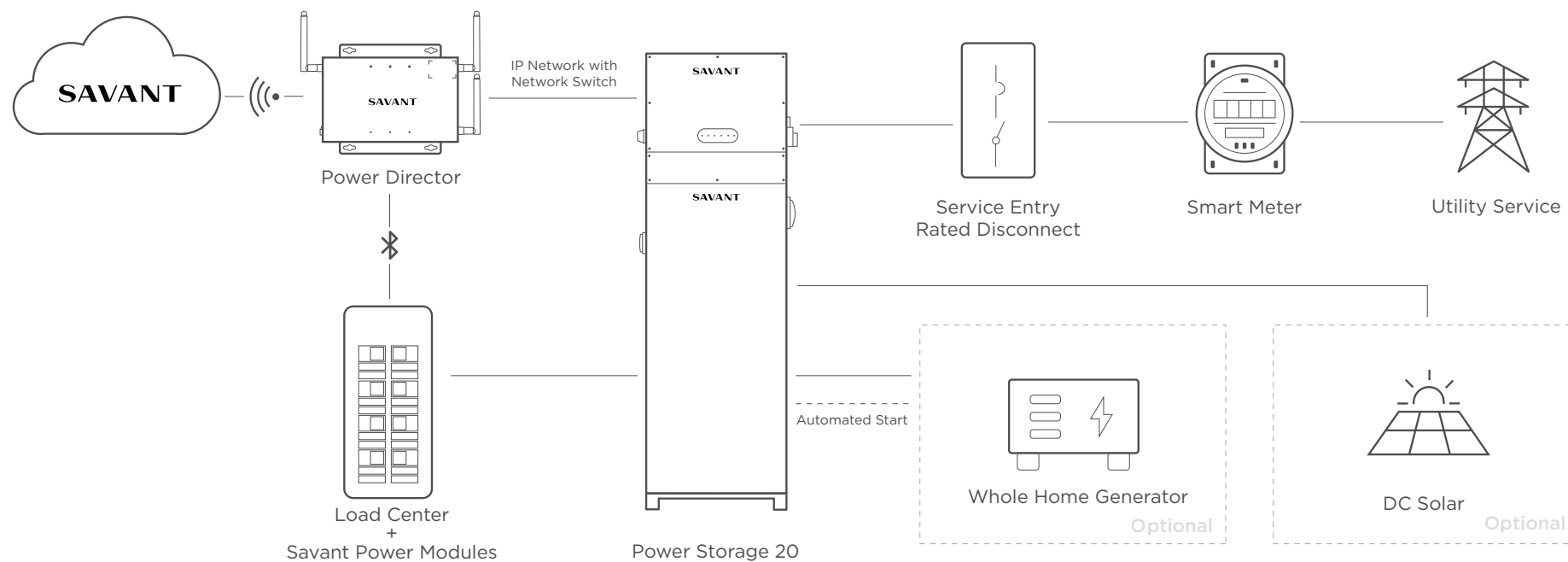
Trip limit and trip time accuracy	Voltage	1 %
	Frequency	0.01 Hz
	Time	1 % of measured duration, but not less than 50 ms
	Active Power	+/- 5 % rated
	Reactive Power	+/- 5 % rated

2.5. Configuration Types

PS20 systems are configured for partial home or whole home energy backup using a single Inverter and Battery Cabinet with 8 Battery Modules for partial, and a single or multiple Inverter(s) and Battery Cabinet with 8 Battery Modules for whole home. Supported configurations include Standalone, Parallel and Shared Battery installation types. Review below to determine the configuration type before installing. For additional examples of each supported configuration type, see [Appendix A: Supported Configurations](#).

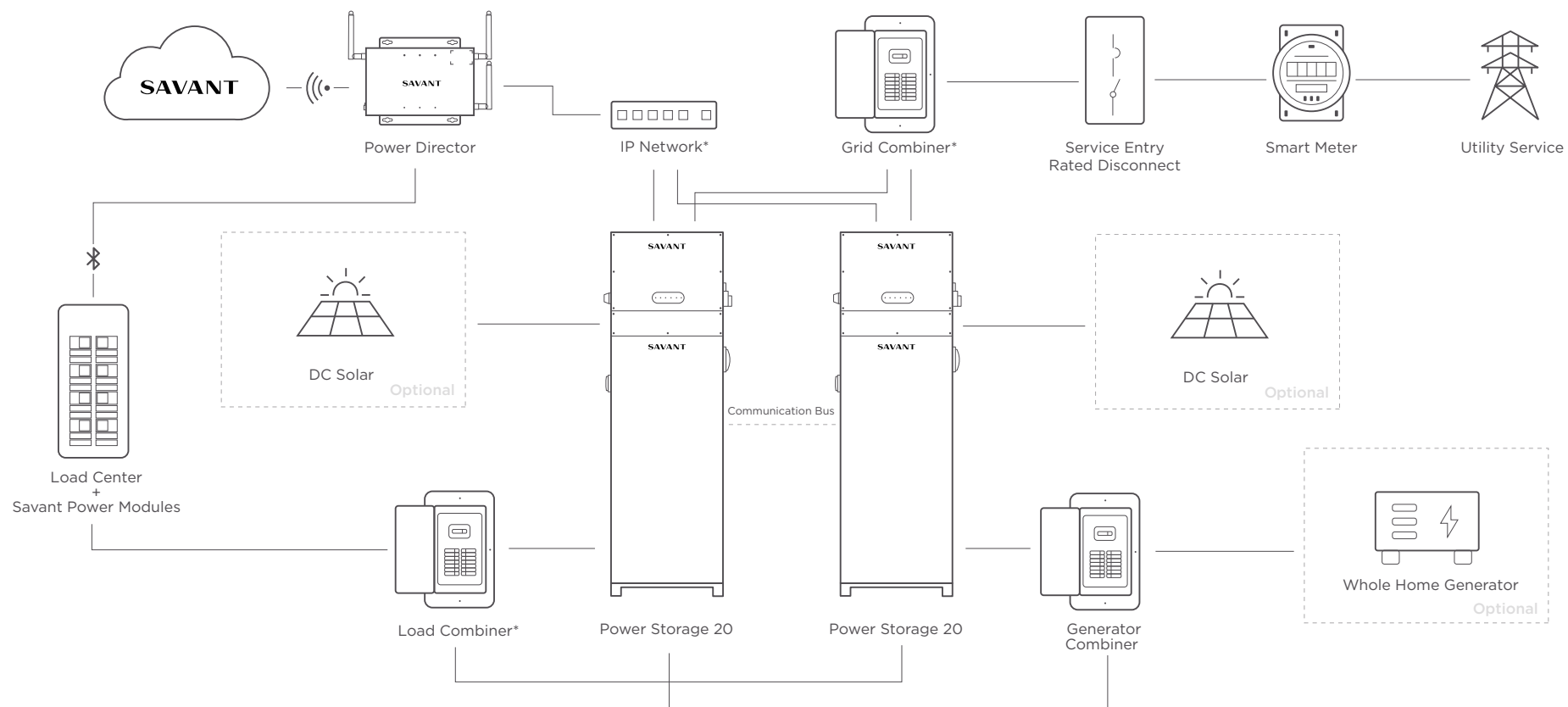
Standalone Configuration

Standalone PS20 system configurations consist of a single Inverter and a Battery Cabinet with 8 Battery Modules. The diagram below is an example of a standalone configuration for partial home backup.



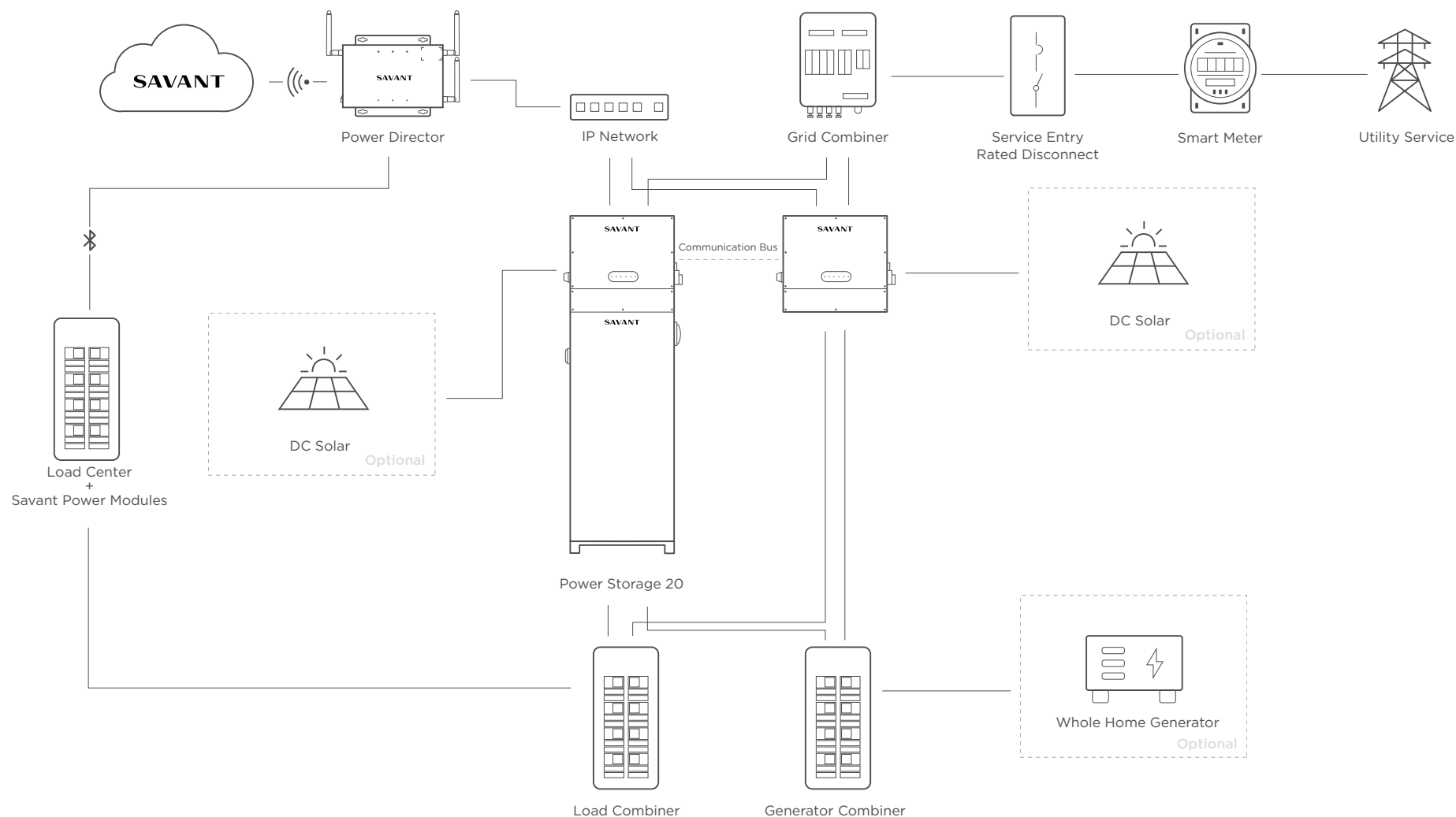
Standard Parallel Configuration

Parallel configurations consist of two or more Inverters, each with a Battery Cabinet with 8 Battery Modules. The diagram below is an example of a standard parallel configuration for whole home backup.



Shared Battery Configuration

Shared battery configurations consist of two Inverters utilizing a single Battery Cabinet with 8 Battery Modules. Multiple shared battery PS20 units can be installed in a single system. (e.g. Two full Battery Cabinets, each with two Inverters installed.) This configuration gives flexibility to increase the total rated power the system can handle which increase the total installed solar capacity and solar output or to pre-wire for future expansion. The diagram below is an example of a shared battery configuration with two Inverters sharing a single Battery Cabinet with 8 Battery Modules for whole home backup.



3. Installation

Refer to the [Tools Checklist](#) before continuing installation steps below.

⚠ IMPORTANT! Do not power on the PS20 BCMS or Inverter until all necessary internal wiring (sections 3.2 - 3.6.2) and external wiring (sections 4 - 4.2) has been completed.

3.1. Installation Location

All components of the Savant Power Storage 20 shall be installed in a location that is suitable for use. Installing the system in a manner inconsistent with the guidance given below may void system warranty. The following items should be considered when installing the Savant Power Storage 20:

- The Savant Power Storage 20 is designed for both indoor and outdoor installation. Please refer to your local AHJ for local installation location requirements.
- The PS20 is built with NEMA 4X enclosure, enabling outdoor installations. Choose an installation area where ambient temperature remains between 32°F to 113°F (0°C to 45°C) and out of direct sunlight. Exposing the system to temperatures outside of this range can negatively impact the longevity of the equipment and will void the warranty.
- Choose a flat, horizontal foundation against a wall without potential exposure to overhead water sources, snow accumulation or flooding.

⚠ IMPORTANT! Concrete anchors are included with each system to allow the system to be secured to the foundation.

- Reserve enough space for maintenance requirement for each side of the unit.
- Ensure enough clearance around the system and space between multiple Savant Power Storage 20 units to correspond with National Electric Code (NEC) and local requirements.

3.1.1 Maintenance Space Requirements

Example shows the maintenance space requirements for a PS20. Actual maintenance space requirements may vary.

NOTE: Minimum clearance supported for **any** installation is 11.8in (30cm) opposite battery-entry side of the cabinet to allow future additional battery storage. Additionally, depending on adopted code, a minimum clearance of 3 feet may be required between each Power Storage 20 unit..

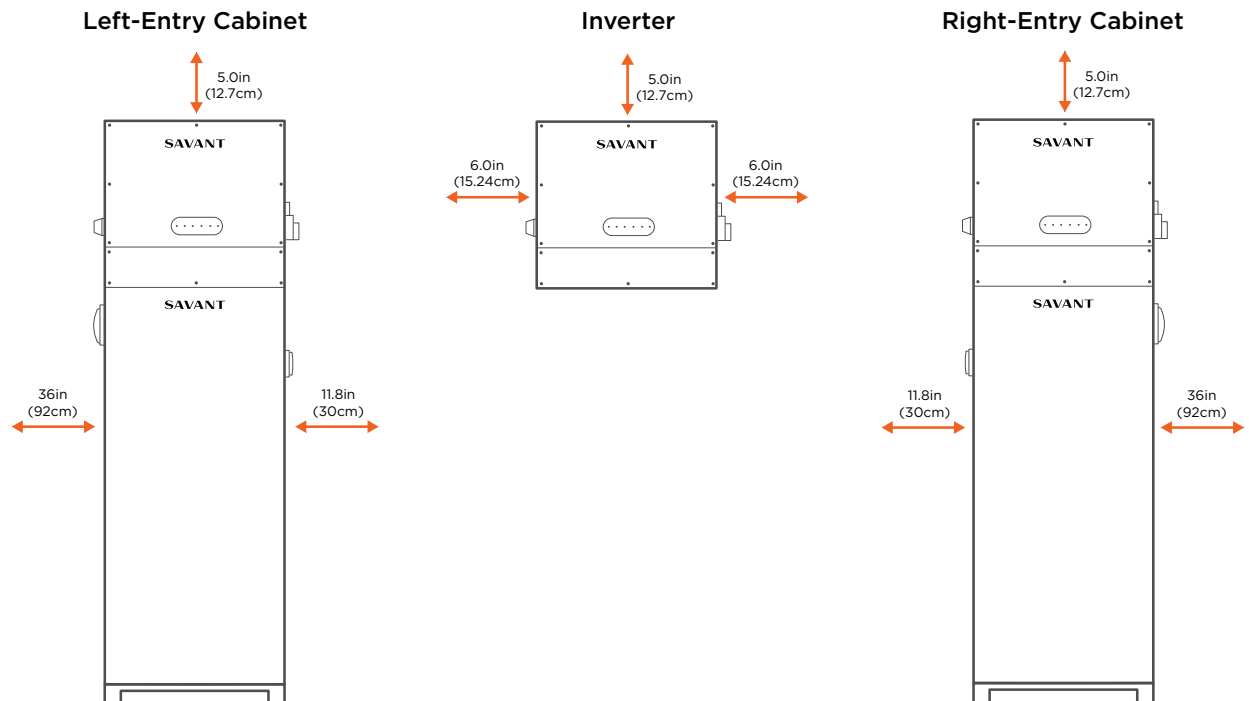


Figure 1: PS20 System Maintenance Space Requirements

3.2. Mounting the System

The following installation instructions are for a right-entry (PS20-BATT-20KWH-ENCL-XX) cabinet. For parallel systems, a left-entry (PS20-BATT-20KWH-LEFT-xx) cabinet may be used where batteries are inserted from the opposite side. Inverter may be mounted on top of the Battery Cabinet or wall mounted separately.



CAUTION!

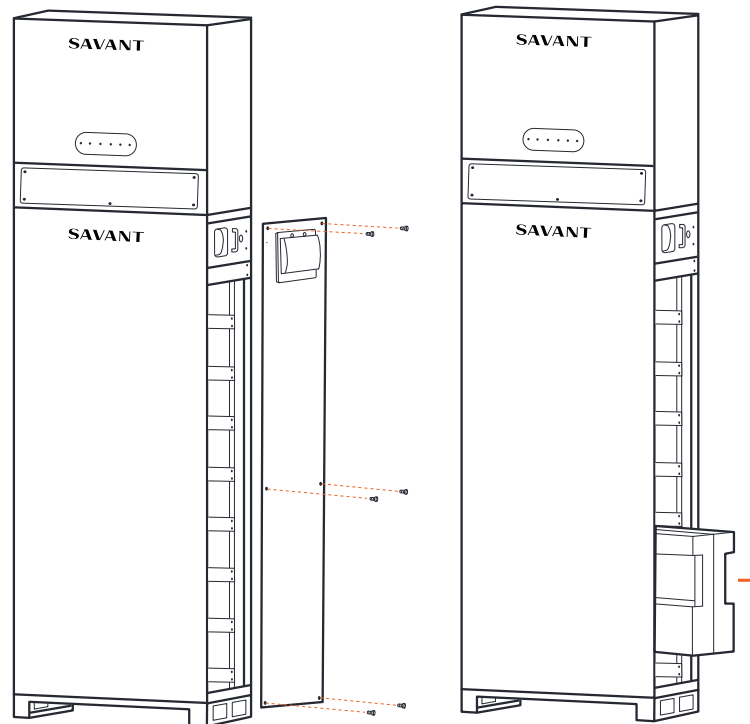
- Dust collection required during drilling.
- Make sure the cabinet is firmly on the floor. The wall bracket is only designed to keep the battery system from tipping forward and cannot support the weight of the battery.

3.2.1 Inverter Installed with Battery Cabinet

If Inverter is installed with the Battery Cabinet, the bracket for Battery Cabinet, located inside of the accessories kit, is required.

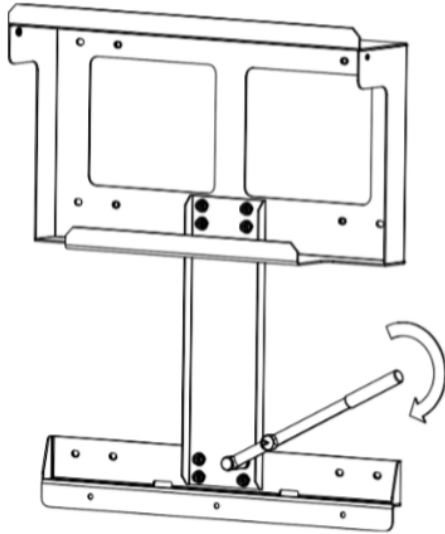
NOTE: The maximum recommended conductor distance between Savant Power Inverter and Battery is 100 ft with #8AWG battery conductor wiring. Additionally the 12V voltage sensor will need to be up-sized to maintain system reliability. The 12V terminal supports #16-28AWG gauge wires. Savant recommends up-sizing the standard #24AWG voltage sense cable to #16AWG for installations up to 100ft. Savant will not provide excess cable lengths for the #8AWG battery conductor wiring or the #16AWG 12V voltage sense wiring.

1. Open the battery enclosure with a 4mm hex screwdriver and remove the accessories kit to access the mounting bracket.

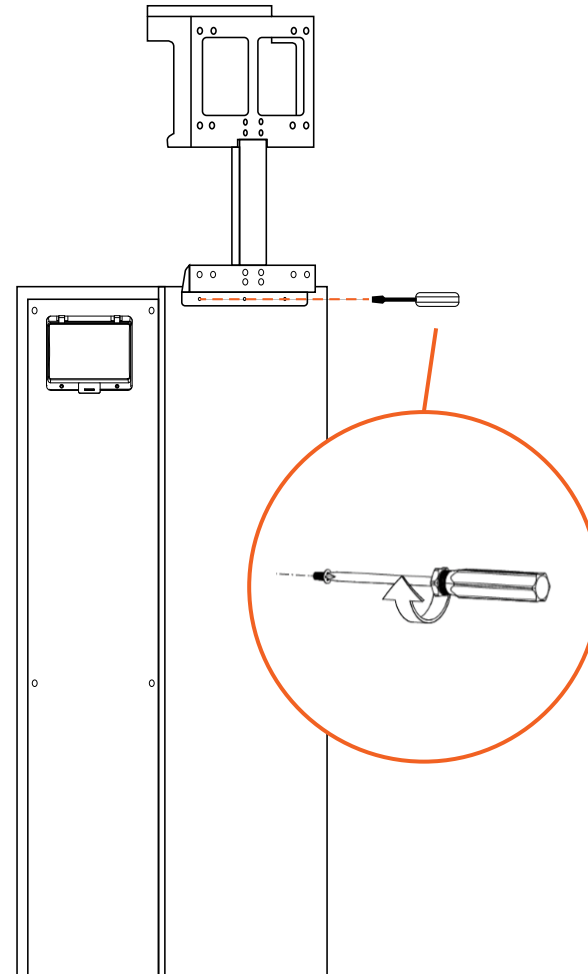


2. Assemble the bracket as shown using M5 flange nuts from the kit.
3. Attach the bracket to the back side of the battery system with the M8x16 screws. Torque: 44 lb-in (5 N*m).

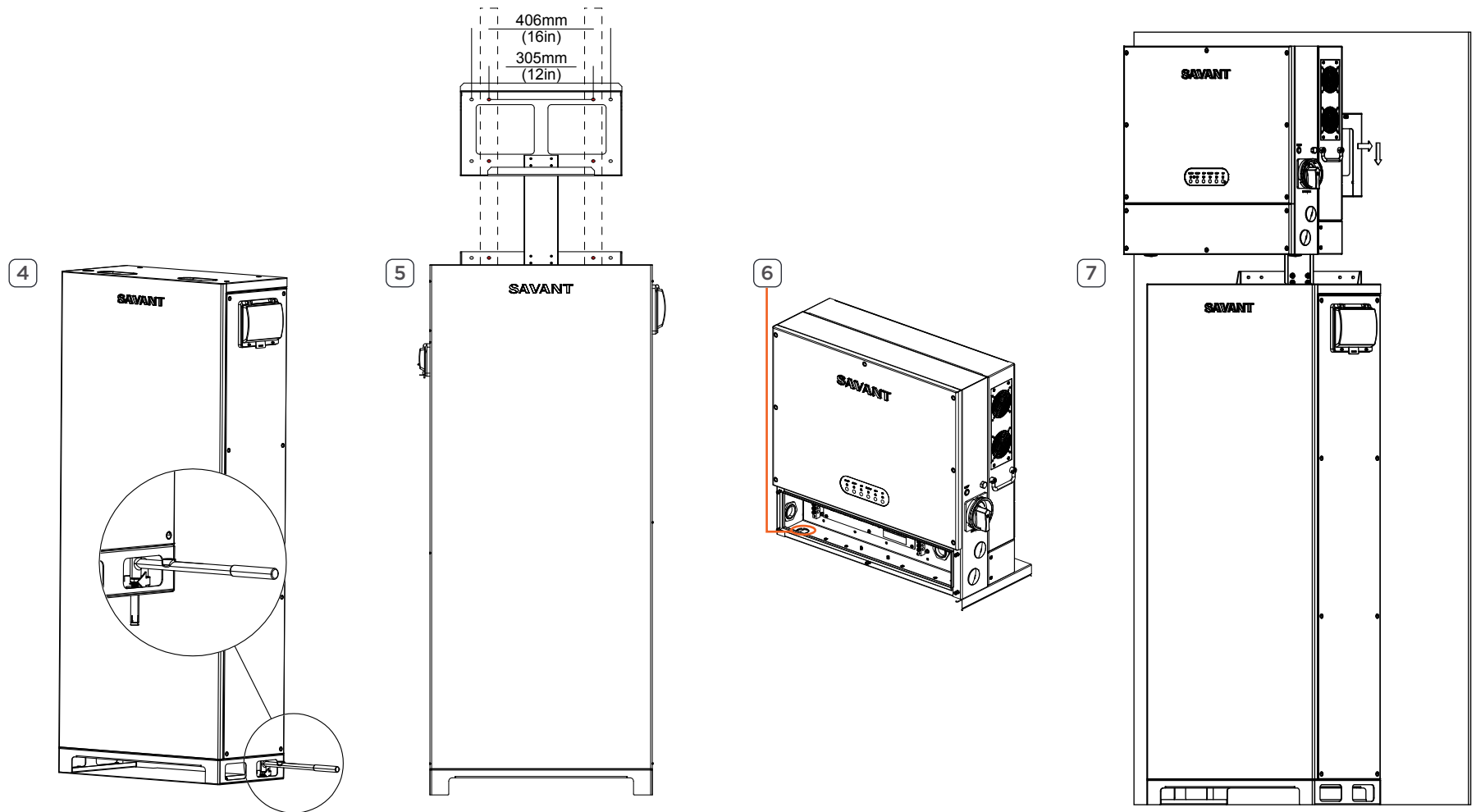
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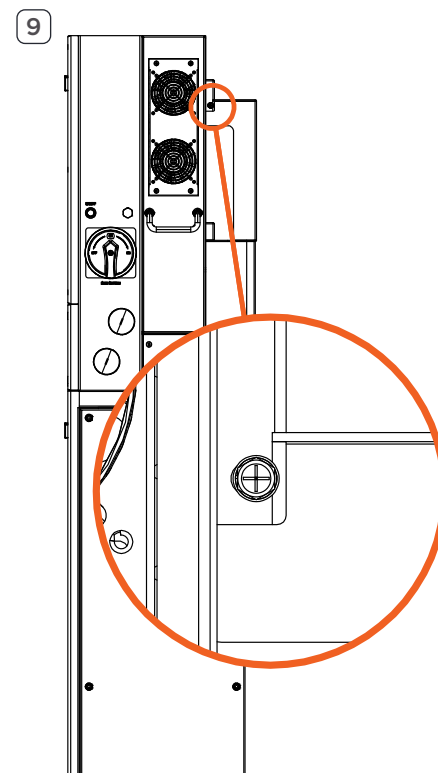
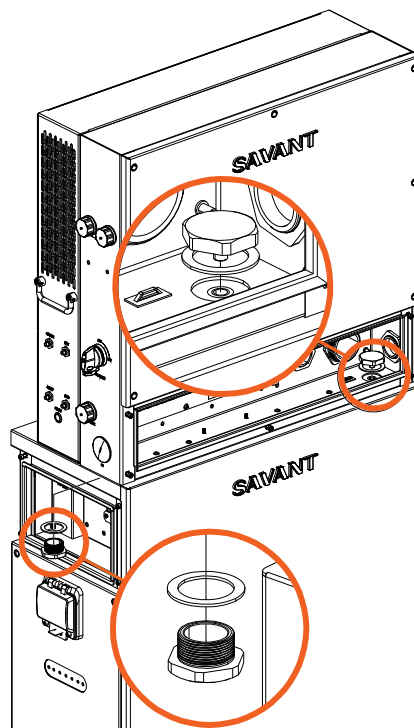
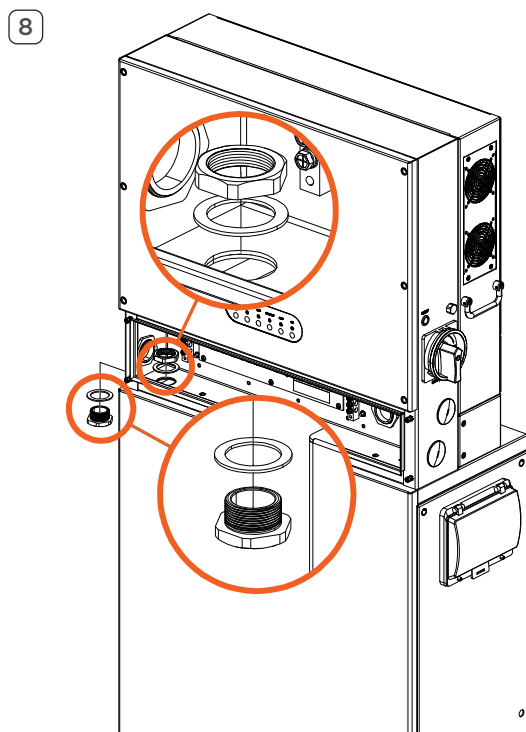
3



4. (OPTIONAL, Per Local Code) Drill a 0.5 in hole with a 2.75 in (70mm) depth. Embed the anchor expansion bolts and affix the cabinet to the ground. Use included cardboard template and take note of spacing between unit and wall to allow for the bracket.
5. Install bracket and Battery Cabinet on the wall, attaching to studs or using wall anchors.
6. Remove the wire closet cover then remove the battery seal cap (BAT/COM) on the bottom of the Savant Power Inverter.
7. Hang the Inverter on the bracket.



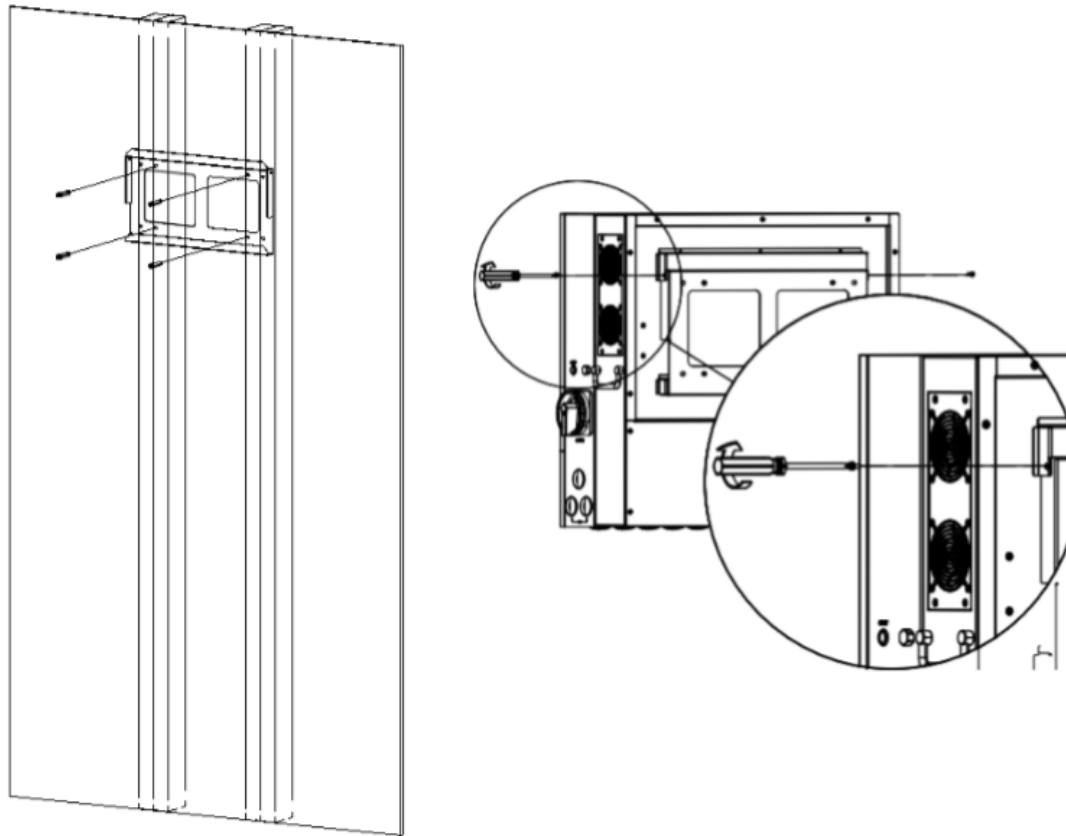
8. Fasten Inverter and Battery Cabinet with contents from conduit nipple kit and installation kit.
9. Fasten the Inverter and the bracket with the included M5x12 screws. Torque: 26.5 lb-in (3 N*m).



3.2.1 Inverter Mounted on Wall

If Inverter is installed separately from the **Battery Cabinet**, use the bracket included with the Inverter to mount Inverter on a wall with M6x50 tapping screws. Hang Inverter on bracket and fasten with M5x12 screws.

NOTE: If installing Inverter on a concrete wall, drill into the wall and attach with wall anchors.



3.3. Internal Wiring

1. Remove Battery Cabinet cover and Inverter Panel cover using a 4mm hex screwdriver from the PS20 unit.
2. Connect the Inverter to the Battery Cabinet with ground wire, Torque: 26.5 lb-in (3 N*m) feeding the ground wire through the BAT/COM to the battery storage wiring panel.
3. Connect power, 12V DC and communication cables from the battery system to the Inverter. Insert the wires according to the corresponding colors of the silkscreen on the terminal.

NOTE: Conductor colors of the 60A unit will differ from the installation guide.

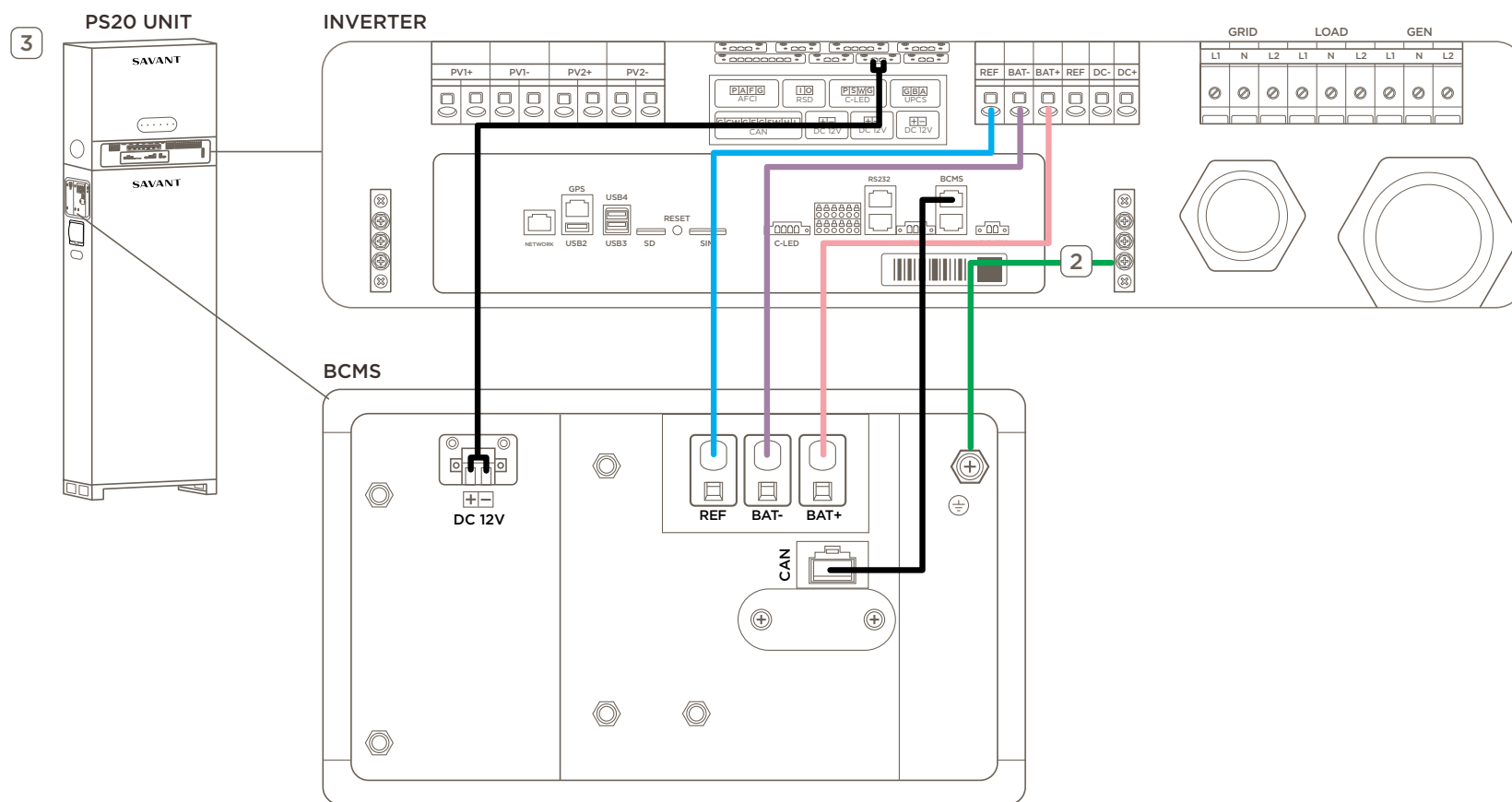
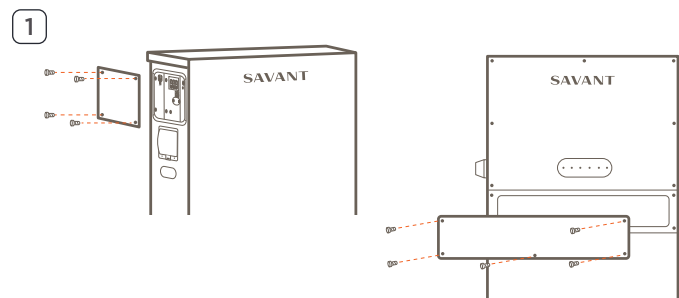


Figure 2: PS20 Inverter to BCMS Internal Wiring

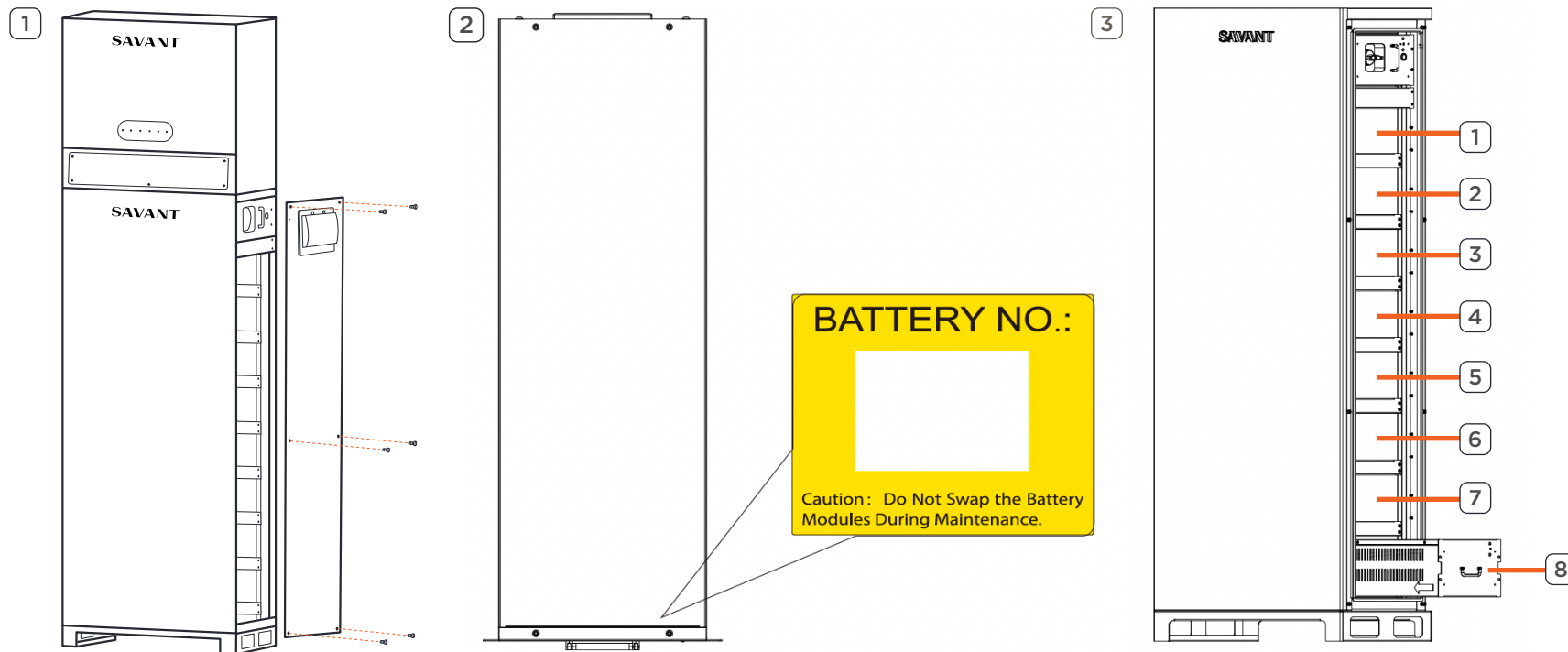
3.4. Battery System Installation

1. Open the Battery Access Panel cover with a 4mm hex screwdriver.
2. Number all battery labels with a number 1-8.
3. Install Battery Module 8 in the bottom battery slot. Continue to install batteries in ascending slots in reverse numerical order; with Battery Module 8 on the bottom and Battery Module 1 on the top. See the diagram below for reference.

NOTE: If this is not the first time installing batteries, keep the batteries connected in the order that they were originally installed.

4. Fasten Battery Modules on both sides using M4x8 screws. Torque: 10 lb-in (1.2 N*m).

NOTE: Do not install the Battery Access Panel cover on the Battery Cabinet until installation has been completed and the system has been tested for proper function.



3.5. External Wiring

This section describes external wiring steps for a PS20 system. Depending on the configuration being installed (Standalone, Standard Parallel, and Shared Battery), steps may vary. Review [section 2.5](#) to determine the configuration and continue onto the appropriate steps.

 **CAUTION!** All cables shall be connected in sequence as listed in this guide.

 **CAUTION!** In areas with frequent lightning storms, a Class 2 SPD (Surge Protection Device) shall be installed in front ends of both Solar and Grid inputs.

1. Refer to the table below for **minimum** copper wire sizing and ratings.

	Voltage	Temperature Class	Gauge
AC	600V	75°C/167°F	#6 - 2AWG
Ground	600V	75°C/167°F	#10 - 6AWG
PV/Battery	600V	75°C/167°F	#10 - 6AWG
RSD / 12Vdc / AFCI Communication	30V	60°C/140°F	#24AWG
CAT5 Ethernet	30V	60°C/140°F	Standard Ethernet cable

2. Refer to the table below for **maximum** external circuit breaker sizing and ratings.

	Voltage	Current Rating
AC	600V	100A
PV	600V	30A
RSD	30V	1A

NOTE: If smaller-size wires and breakers are to be used for AC connection, grid output current can be configured via the Savant Power Storage app. Please contact Savant Support to confirm your configurations.

3. Connect Inverter to ground. (Torque 3 N*m).

4. Connect Inverter to the grid. (Torque 4 N*m)

NOTE for Parallel Installs: When installing AC wire between the upstream breakers in the Grid Combiner Panel to its respective Savant Power Storage 20 GRID input; the combined wire length from the Grid Distribution Panel to the Load Combiner Panel needs to be approximately equal across the PS20 units. See [Figure 14](#) in [Appendix D: Single Line Diagrams](#).



WARNING! For Parallel Installs: Improper wiring of L1 and L2 will permanently damage the Inverter.

Verify grid connection. With All power OFF and Grid breakers ON, validate the Grid parallel connections are wired correctly:

1. Verify L1 to L1 connections are connected to each other using an ohm meter.
2. Verify L1 is **NOT** connected to L2.
3. Verify L2 to L2 connections are connected to each other using an ohm meter.

5. Connect output of generator or AC coupled solar inverter to GEN terminals of Inverter. Follow the instructions on the Savant Power Storage app for wiring and setting of generator automatic control. (Torque 4 N*m)

NOTE for Parallel Installs with a Generator: When installing AC wire between the upstream breakers in the Gen Combiner Panel to its respective Savant Power Storage 20 GEN input; the combined wire length from the Generator Distribution Panel to the Load Combiner Panel needs to be approximately equal across the PS20 units. See [Figure 14](#) in [Appendix D: Single Line Diagrams](#).

NOTE: System must be programmed for appropriate connected power source. Programming details can be found in the [Savant Power Storage App Setup Guide](#) on the [Savant Customer Community](#) or support.savant.com/power.

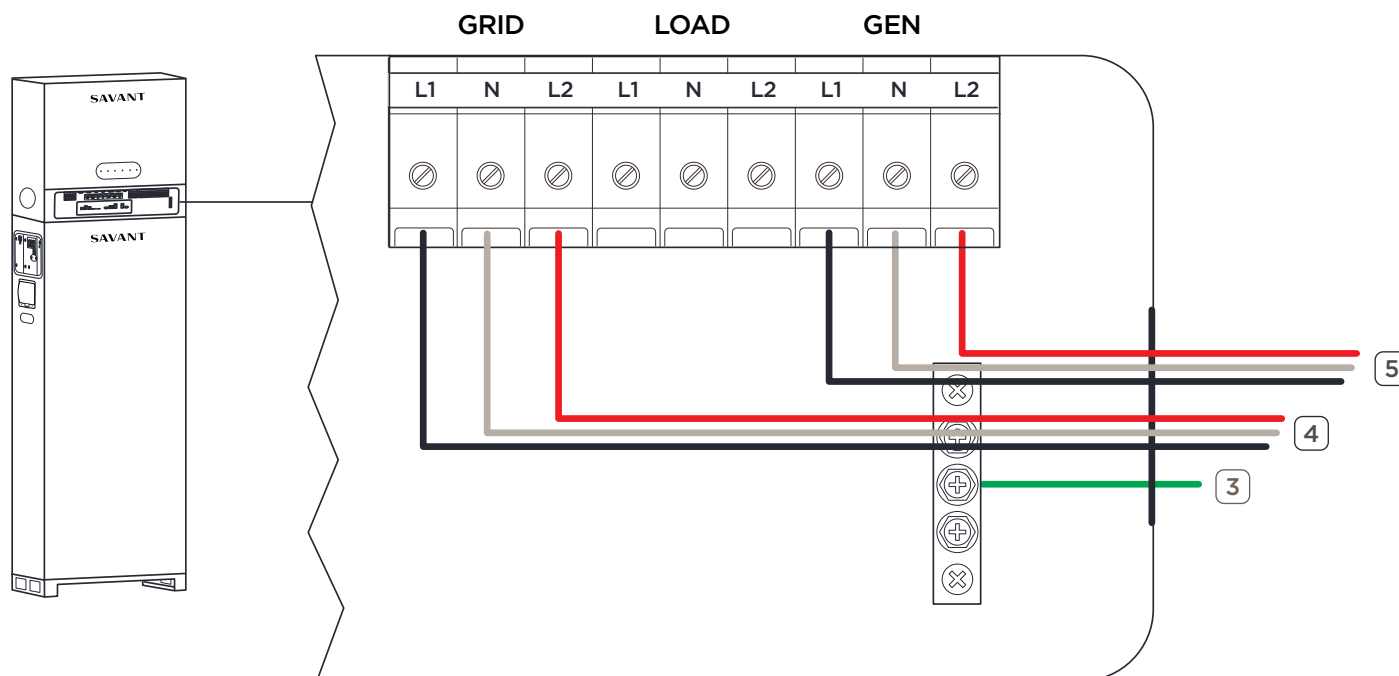


Figure 3: PS20 Inverter External Connections

- Wire LOAD connections from Inverter to load.

⚠ WARNING! For Parallel Installs: Improper wiring of L1 and L2 will permanently damage the Inverter.

Verify AC Parallel System. With All power OFF and Inverter Load breakers ON, validate the Load parallel connections:

- Verify L1 to L1 connections are connected to each other using an ohm meter.
- Verify L1 is **NOT** connected to L2.
- Verify L2 to L2 connections are connected to each other using an ohm meter.

- Connect Inverter to a router or Savant Power Director using a CAT5 or higher Ethernet cable.

NOTE: Use waterproof port where required.

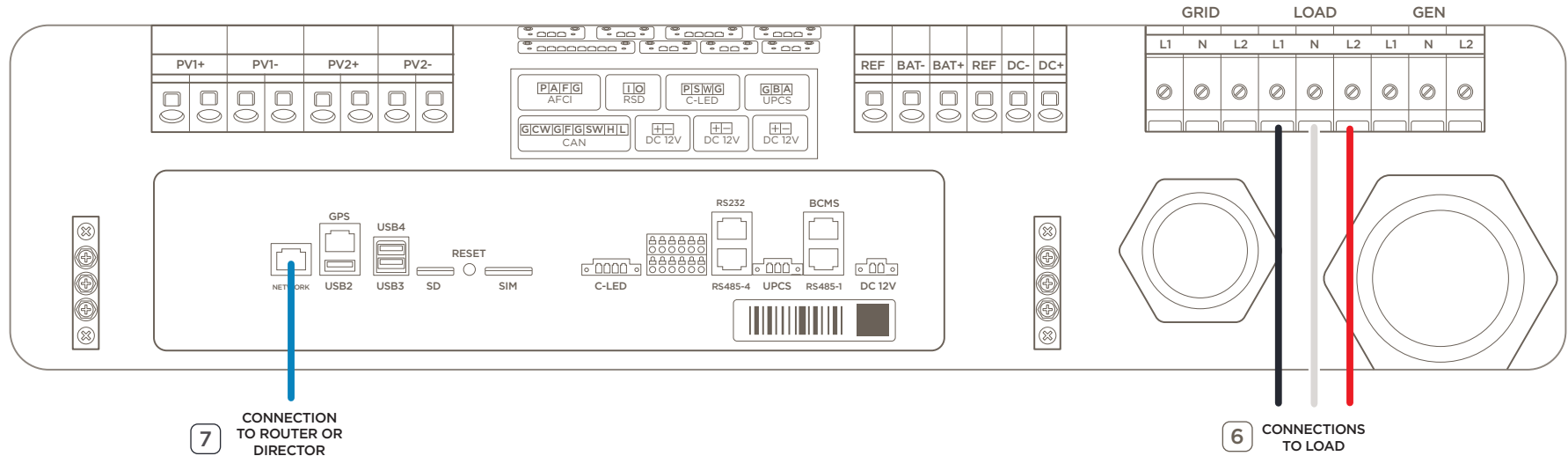
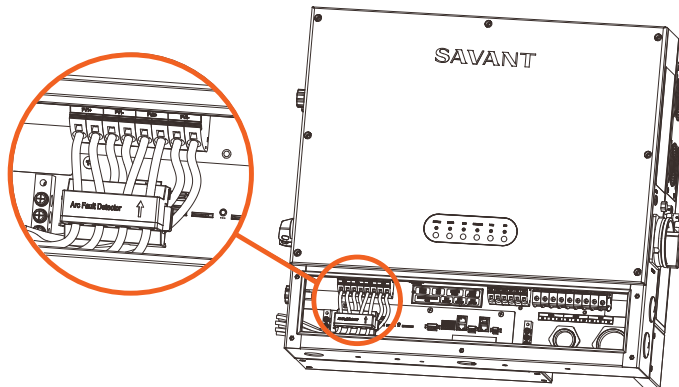


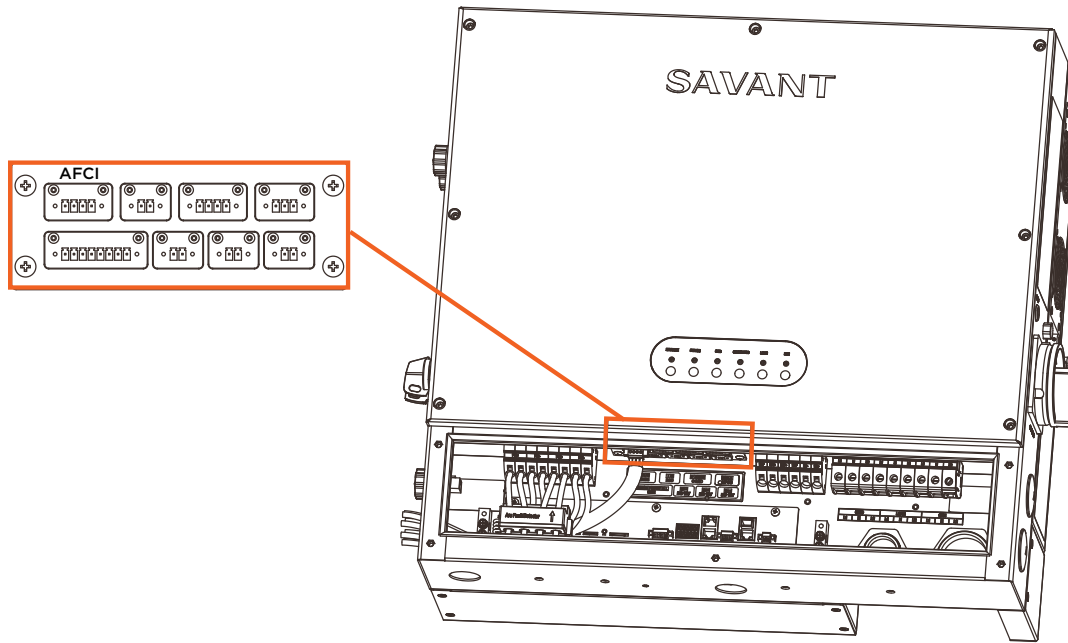
Figure 4: PS20 Inverter External Connections to Load and Network

- (OPTIONAL) If installing with DC coupled solar, install Arc Fault Circuit Interrupter (AFCI) Module by wiring them as follows:



Channel	Port
1	PV1+ Port 1
2	PV1+ Port 2
3	PV2+ Port 1
4	PV2+ Port 2

9. Connect communication port of the AFCI module to the AFCI input of the Savant Power Inverter wiring cabinet.



10. For systems with connections to AC coupled PV Inverter, and/or multiple parallel applications, [see section 3.6](#).
11. For systems with additional accessories (generator auto-start, E-Stop Button, etc), see [Appendix C: Optional Accessories](#).

3.6. Photovoltaic (PV) Wiring

The Savant Power Storage 20 System can integrate photovoltaic systems both as direct DC feeds into the Savant Power Storage Inverter or through AC coupling a third-party inverter's output into the system. DC coupling provides improved control, efficiency, and system size of connected PV.

While solar is not required with any Savant Power Storage 20 System installation, it will provide additional resiliency in the event of a grid outage.

3.6.1 DC Coupled PV

⚠ CAUTION! Before installing PV into Savant Power Inverter, confirm the PV Disconnect is switched to the OFF position. Savant recommends the PV input be as balanced as possible across DC solar MPPT inputs, across all Inverters.

DC Coupled solar can land directly into the two integrated Max Power Point Trackers (MPPTs) of the Savant Power Inverter.

NOTE: Savant Power Inverter includes a built-in RSD transmitter. If the Savant Power Storage 20 is placed near the main panel, the PV disconnect (PV switch) on the Savant Power Inverter can be used as an RSD Initiation Device.

If the PS20 is placed far from the main panel, it is recommended to use the Emergency Switch as an RSD Initiation Device. See [Appendix B](#).

If using external transmitter, the RSD I/O jumper in the wiring cabinet shall be removed to disable the internal RSD transmitter.

1. String the appropriate number of PV modules in series to achieve the MPPT operating voltage, while ensuring the max Voc rating of the inverter is not exceeded.

NOTE: Only panels of the same make and model and installed with the same angle and orientation should be wired into a common MPPT.

2. Land positive and negative conductors of PV string into appropriate inputs of MPPT, paying close attention to markings of each terminal.
3. Ground PV Module frames and racking **only** at the nearest available grounding location.

⚠ CAUTION! Grounding negative and positive PV Conductors can damage the Inverter.

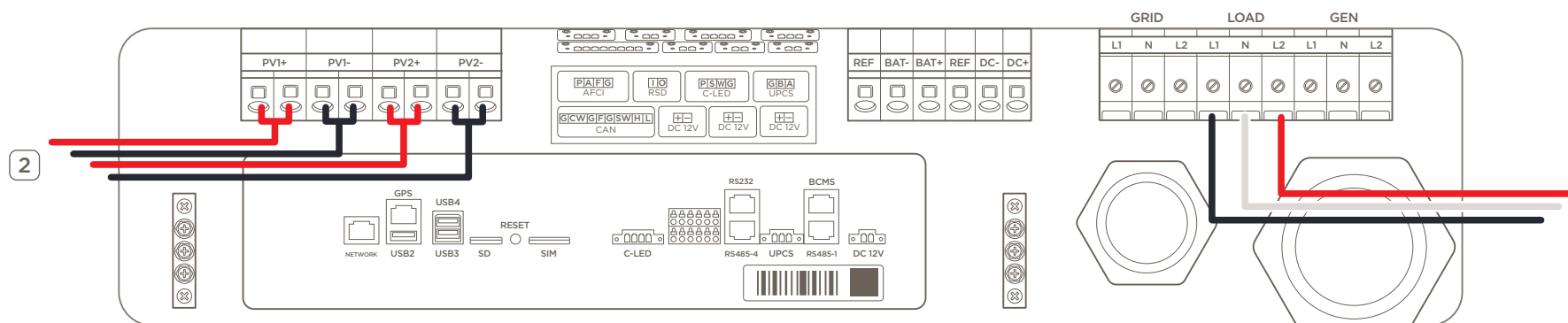


Figure 5: PS20 Inverter PV Connections

3.6.2 AC Coupled PV

The PS20 enables easy integration of a grid tied solar installation to enable continued solar production in a grid down scenario. A UL1741SA compliant inverter is **required** when AC coupling into the PS20. The AC Coupled inverter must be compliant with all local regulations and approved for operation. Contact Savant Support for design guidance on systems with AC coupled solar.

3.7. Network and Power Director Integration

The Savant Power Director is the controller that enables the full Smart Energy Experience offered by the Savant Power Storage System. The Director acts as the communication hub for the Savant Power Storage 20, Savant Flexible Load Management (FLM) and the Savant app experience. The Savant Power Director and Savant Power Inverter communicate over IP network, thus a local network must be present to integrate the two components together.

3.7.1 Network Integration

While a continuous internet connection is not required with the system, an internet connection will be required during install and commissioning of the system. A cellular hotspot is recommended for sites with no internet connection.

It is strongly recommended to utilize a wired network connection when installing the PS20. Where a wired connection is unavailable a wireless internet connection can be utilized.

NOTE: Each Inverter ships with a wireless range extender for use cases where a wireless network is unstable when connecting to the PS20. In those instances it is recommended to connect the range extender to the wireless network and utilize a wired connection between the PS20 and wireless extender.

Refer to the [Savant Power Storage App Setup Guide](#) in the [Savant Customer Community](#) or support.savant.com/power for step by step instructions on connecting the Savant Power Storage 20 to a wireless internet connection.

3.7.2 Power Director Installation

Refer to [Savant Power System Deployment Guide - Savant Power & Light App](#) and [Savant Power Director Quick Reference Guide](#) on the [Savant Customer Community](#) or support.savant.com for detailed instructions regarding installing and configuring a Savant Power Director.

3.8. Optional Power Equipment Integration and Wiring

3.8.1 Generator Integration

The PS20 is designed to integrate seamlessly with an on-site generator to provide additional resilience. Additional instructions for integrating a generator to a PS20 system can be found in the [Savant Power Storage 20 Generator Installation and ATS Integration Guide](#) on the [Savant Customer Community](#) or [support.savant.com](#).

1. Land the AC output of the generator into the GEN input of the Inverter (L1/L2/N/G).
2. If using a whole home generator with two-wire start, wire the GEN 2-wire to the Inverter as shown as shown below.
NOTE: Other generators are supported with different wiring configurations; contact Savant support for more information.

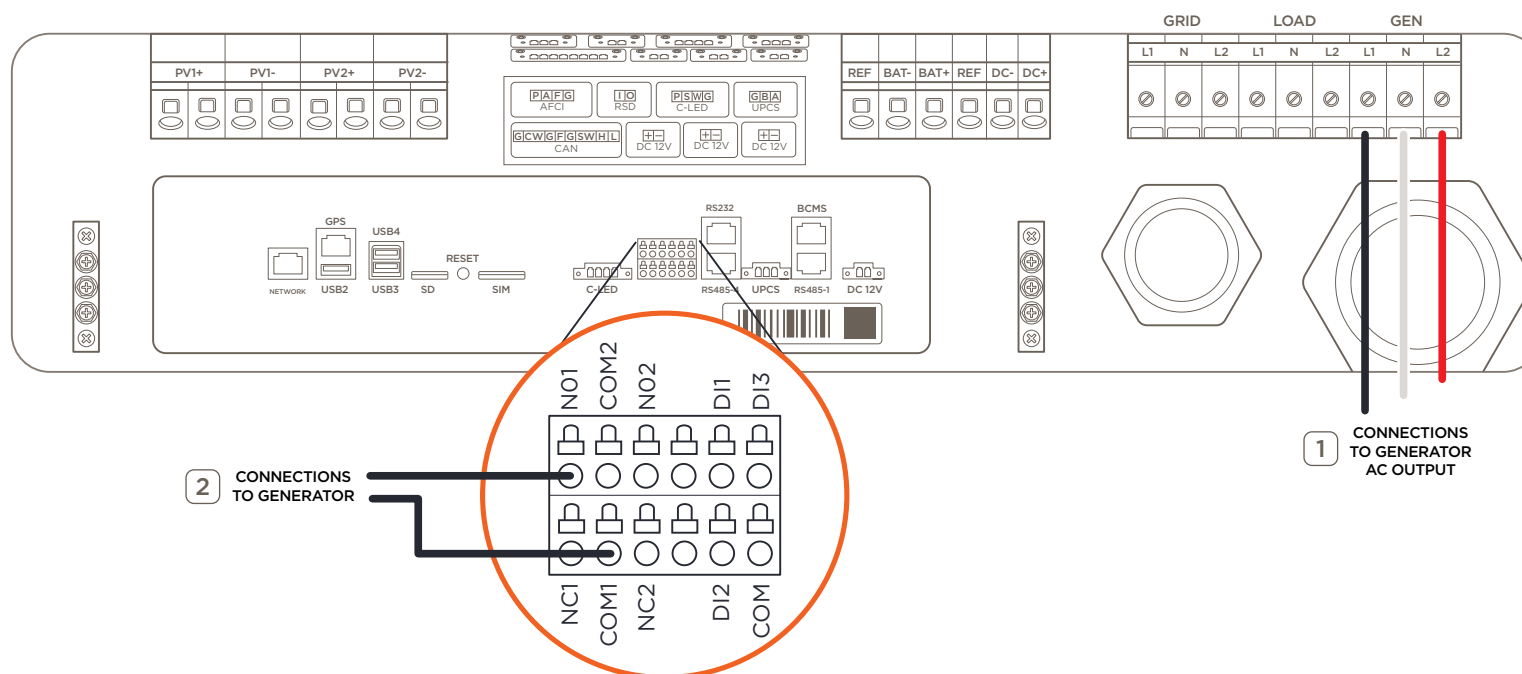


Figure 6: PS20 Inverter Generator Connections

3. Use the Savant Power Storage app to program the auto-start and stopping parameters of the connected generator.

4. Parallel and Shared Battery Configurations

The Savant Power Storage 20 can support multi-unit installs with all units operating in parallel to increase the available power and storage for a single site installation. The Appendix provides single line diagrams giving a high level overview of parallel system configurations.

NOTE: Systems with a model number ending in 'NS' do not support parallel configuration. Please contact Savant support for more information.

Systems with multiple Leader units in the same building require a separate VLAN or subnetwork for each Leader, their respective Follower units, and all components communicating with said Leader. (i.e. Savant Host or Director).

4.1. Traditional Parallel Installation

The most common parallel system installation involves one Power Storage Inverter to each Power Storage 20 (20 kWh) battery with one Inverter assigned as the "Leader". See [Figure 7](#).

1. Wire internal components for all units in system in alignment with [section 3.3](#).
2. Wire DC coupled solar to each unit independently.
NOTE: It is recommended to balance solar input across the systems used in a parallel configuration for optimal performance.
3. AC coupled solar inverter(s) can alternately be wired directly to individual Savant Power Storage Inverters (to help balance overall power flow through the system) or combined at a single point and shared equally between all Savant Power Storage 20 Inverters in the system.
4. Combine the Load Output of all units at a single location before landing in the backed-up loads panel.
5. Connect CAT5 or CAT6 cable between the external RJ45 ports marked 'Parallel' between each Inverter in the system.
NOTE: External Parallel ports are equivalent and can be used interchangeably.

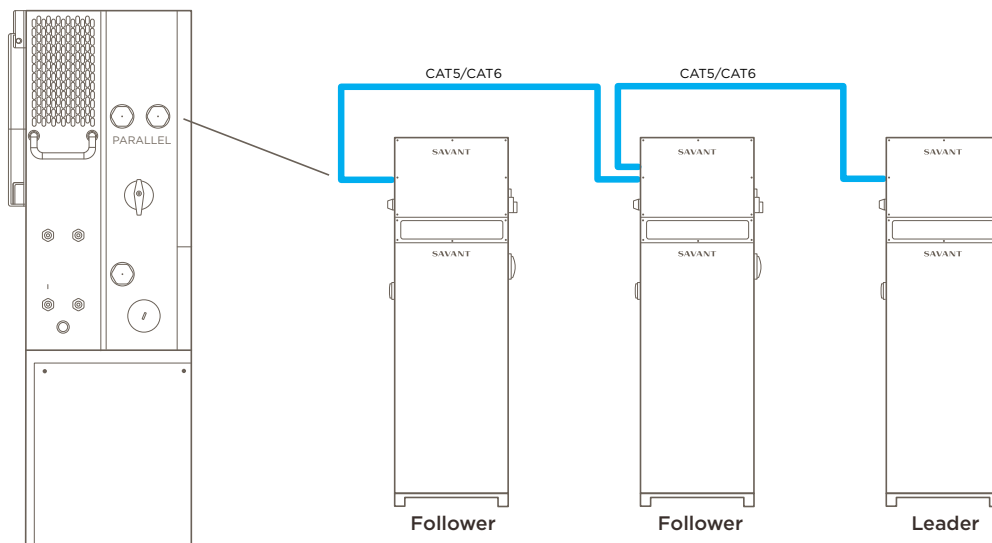


Figure 7: Standard Parallel Communication Connections

6. Install the included RJ45 termination connectors in the un-used RJ45 port in the first and last inverter of the parallel install. Make sure to tighten the RJ45 port where resistors are installed.
7. Assign one of the units in the system as the “Leader” of the system. Additional units are designated as “Followers”.
8. Wire all optional accessories (generator auto-start, E-Stop Button, etc) to the Leader of each parallel installation. See more about accessories in [section 3.8](#).
9. Use a network switch to wire the Power Director to each unit in the parallel system.
10. Follow the instructions in the [Savant Power Storage App Setup Guide](#) for guidance on programming for parallel installations.

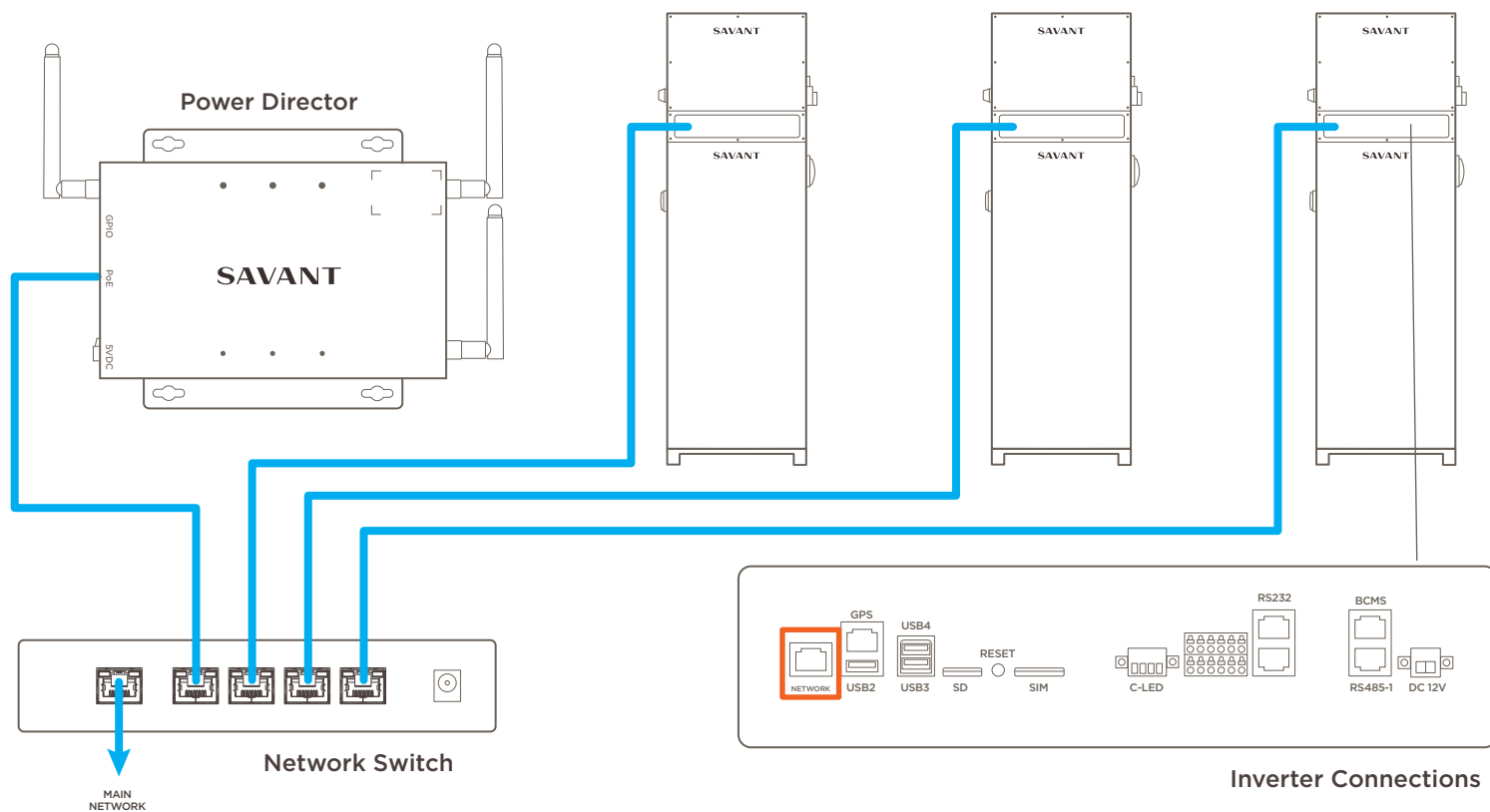
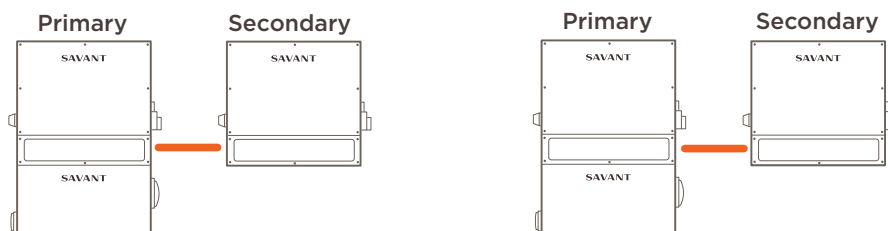


Figure 8: Standard Parallel Network Connections to Director and Network Switch

4.2. Shared Battery Parallel Installation

Certain project or site considerations may require two Inverters to a single Power Storage 20 (20 kWh) battery. This configuration gives flexibility to increase the total rated power the system MID can handle, to increase the total installed solar capacity and solar output or to pre-wire for future expansion.

1. For each unit of two Inverters to one battery, one Inverter will be directly connected to the battery as normal, referred to as the "Primary" Inverter, with a second Inverter daisy chained into the Primary, referred to as "Secondary" Inverter.



2. Wire internal components for the Leader inverter in alignment with [section 3.3](#).
3. Wire the Battery Inputs of Follower inverter directly into the DC terminals of the Leader.
NOTE: Alternatively, wire taps can be used to tap off of battery conductors into the Leader directly into the Battery Inputs of the Follower.
4. Use the shared battery cable included with Inverter Install kit (CAB-INVBATT-xx) ([Figure 9](#)) to enable battery data communication between Inverters. Insert Ethernet connector end of CAB-INVBATT-xx cable into RS485-1 port of the Primary Inverter and run a CAT5 or CAT6 cable from the adapter BCMS port of CAB-INVBATT-xx into the BCMS port of the Secondary Inverter. (See [Figure 9](#)).

NOTE: The PS20 will come with either CAB-INVBATT-01 ([Figure 9a](#)) or CAB-INVBATT-02 ([Figure 9b](#)). The CAB-INVBATT-02 has an additional RS485 ACREL/RECT connector that is reserved for installations with an Acrel Meter. See [Appendix C: Acrel Meter Switch Installation](#) for additional steps.



CAUTION! Proceeding to update firmware with incorrect parallel system communication wiring will lead to system issues. Do not proceed without appropriate adapter cables.



Figure 9a: CAB-INVBATT-01

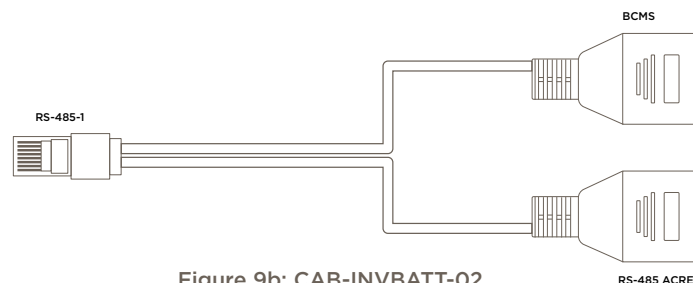
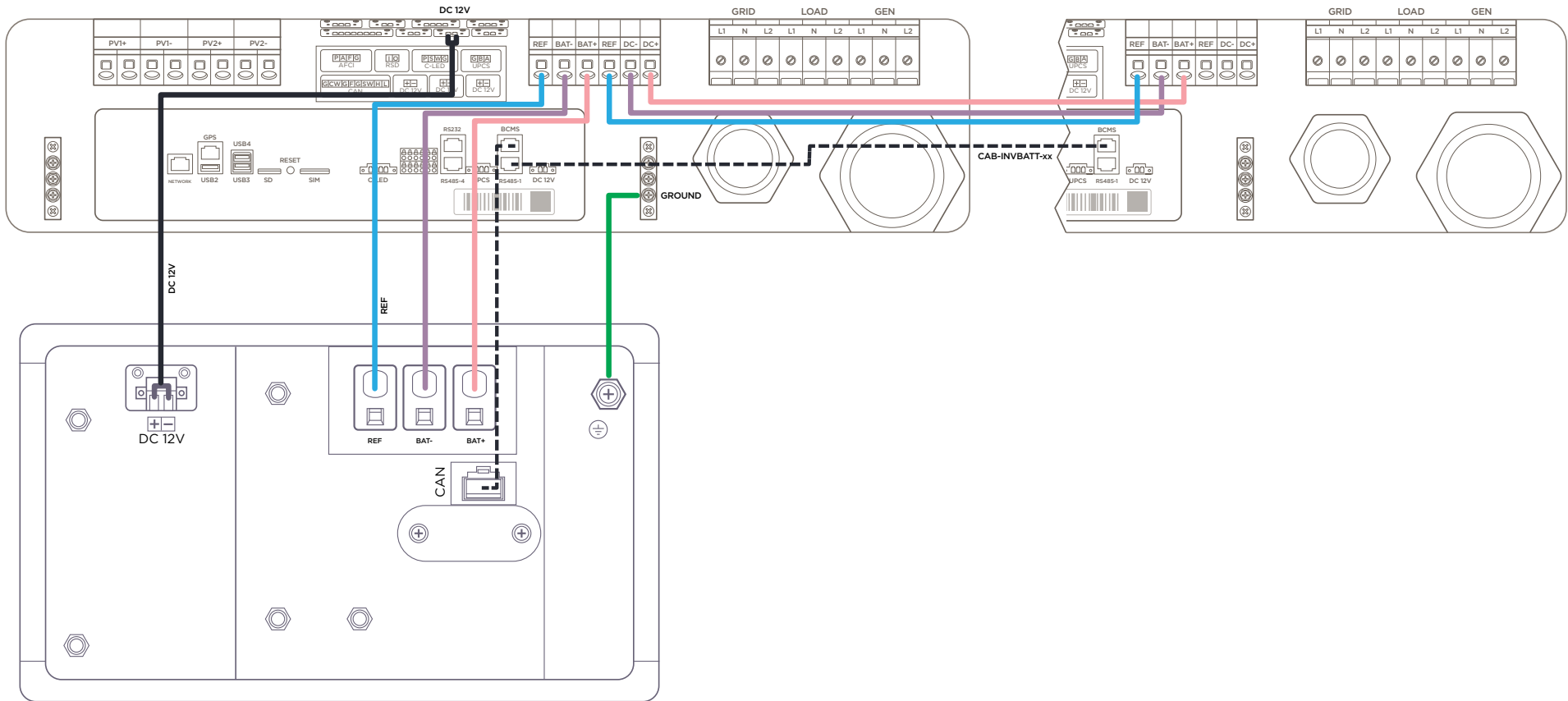


Figure 9b: CAB-INVBATT-02

Figure 9: Ethernet Cables

PRIMARY INVERTER CONNECTIONS

SECONDARY INVERTER CONNECTIONS



PRIMARY BMS CONNECTIONS

Figure 10: Primary and Secondary Inverter Connections to BCMS

5. Repeat steps 3 and 4 for each unit of two Inverters deployed in the total system.
6. Wire DC coupled solar to each unit independently.
NOTE: It is recommended to balance solar input across the units of two inverters used in a parallel configuration for optimal performance.
7. Single Inverters may be directly wired from AC Coupled solar to the GEN port as long as it remains <12.5kW. Multiple Inverter systems, MUST use an AC combiner to connect each Inverter's GEN port to the AC Coupled solar through appropriately sized breakers.
8. Combine the Load Output of all units at a single location before landing in the backed-up loads panel.

9. Connect CAT5 or CAT6 cable between the external RJ45 ports marked "Parallel" between each Inverter in the system.
NOTE: External Parallel ports are equivalent and can be used interchangeably.

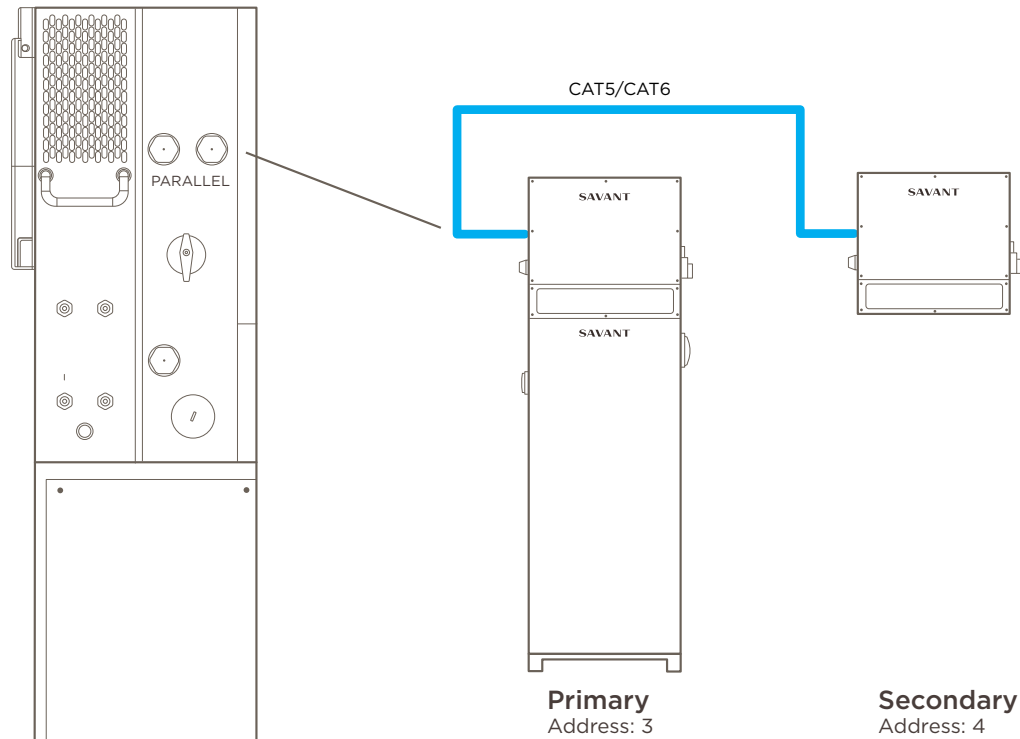


Figure 11: Shared Battery Communication Connections

10. Install the included terminators in the un-used RJ45 port of the first and last Inverter of the parallel install. Ensure RJ45 port where resistors are installed are tightened.
11. Assign one of the units in the system for as the "Leader" of the system. Additional systems will be designated as "Followers".
NOTE: When assigning addresses, the Primary of each shared configuration MUST have an odd number for its address (1,3,5,7 or 9).
12. Wire all optional accessories (generator auto-start, E-Stop button, etc.) to the Primary of each shared battery installation. See more about accessories in [section 3.8](#).
13. Use a network switch to wire the Power Director to each unit in the shared battery system. Alternatively, a wireless connection can be utilized where a wired connection is not available.
14. Follow the instructions in the [Savant Power Storage App Setup Guide](#) for guidance on programming for shared battery installations.

5. Safety Check and Basic Operations



CAUTION! Before first boot up and commissioning of the Power Storage 20 System, perform the following safety checks. Failure to perform relevant safety checks could lead to unsafe conditions or system damage. .

5.1. Safety Check

PV Connection

- PV Disconnect is in OFF position.....☐
- Polarity of incoming PV conductors are correct.....☐
- PV Conductors are ungrounded.....☐
- Non-current carrying PV equipment is properly grounded.....☐
- Open Circuit Voltage of PV array does not exceed 450V☐

Battery Connection

- Battery Disconnect is in OFF position.....☐
- Positive, Negative and Reference polarities are correct☐
- No measured voltage at Battery inputs of inverter.....☐

Grid Connection

- External Breaker or Disconnect installed☐
- Measured voltage at inverter is correct☐
 - L-L voltage is 240V.....☐
 - L-N voltage is 120V.....☐
- Grid switch is in OFF position☐

Load Connection

- External breaker is installed.....☐
- External breaker is off☐

Parallel Systems

- Phasing between systems consistent.....☐
 - L1 - L1 between systems measures 0V.....☐
 - L1-L2 between systems measures 240V.....☐
- Load output of all systems combined with correct phasing☐

General

- All wiring connections torqued to required values.....☐
- Conduits are tightly installed and sealed.....☐
- AC and DC Conductors do not share conduit.....☐
- Ampacity rating of conductors appropriate for installation.....☐
- All wires protected from damage.....☐
- All ESS covers installed.....☐

5.2. System Boot-Up



CAUTION! Failure to follow the instructions given below may result in damage to the ESS.

1. Switch the BMS power switch to the ON position.
2. Press START button. BMS status LED will flicker yellow then transition to blinking blue. The first module will flicker yellow then transition to blinking blue (power on self test) then to solid green. Each module will perform the same process. BMS status LED will transition to solid green after all 8 modules have successfully booted.
3. Once battery has booted, the Savant Power Inverter will begin the boot sequence. Wait until status LED is solid green, the RUN indicator is blinking yellow, and the network LED is solid green.
4. (First time system boot-up only) Configure system using the Savant Power Storage app. Refer to [section 6](#) for additional details.



For parallel systems, parallel configuration MUST be completed in the Savant Power Storage app before powering the Inverters. Failure to do so will permanently damage the Inverters.

5. Press ON/OFF button of Savant Power Inverter. Wait 60 seconds for system to initialize.
6. Verify LED lights on inverter:
 - Status indicator solid green.
 - Grid indicator off.
 - Generator indicator off.
 - Load indicator solid green.
 - Run indicator blinking yellow, indicating PV disconnected.



CAUTION! Do not turn on PV until step 10!

7. Close external breaker for Load output. Verify backed up loads are powered by system.
8. Close external breaker for Grid connection and turn Grid switch to ON position. Grid LED indicator should turn green.
9. Wait for inverter to make connection to grid.
10. Switch PV Disconnect to ON position. Run indicator should turn green and system should start producing PV power.

5.3. System Shut Down



CAUTION! Failure to follow the instructions given below may result in damage to the ESS.

1. Before shutting down, switch all external disconnects to OFF position or bypass Savant Power Storage 20 using on-site equipment.
2. Turn PV Disconnect to OFF position. Run indicator should turn yellow.
3. Turn Grid Switch to OFF position. Grid indicator should turn off.
4. Press ON/OFF button of Savant Power Inverter to shut system down.
5. Turn BMS Power Switch to OFF position.
6. All LED indicators should turn off.

5.4. System Reboot

Under certain circumstances it might be necessary to reboot the Savant Power Storage 20. Follow the instructions below to successfully reboot the system.

1. Shut down Savant Power Storage 20 according to procedure in section 5.3 above.
2. Verify all LEDs are off.
3. Wait 15 - 30 seconds to allow internal capacitors to fully discharge.
4. Start Savant Power Storage 20 according to procedure in [section 5.2](#).

6. System Commissioning

The Savant Power Storage 20 is commissioned using the Savant Power Storage App while integration with the Savant Power Director occurs through the Savant Power and Light App. More details on utilizing SP&L can be found in the [Savant Power System Deployment Guide - Savant Power & Light App](#). For further guidance commissioning the Power Storage 20 System refer to [Appendix F: Commissioning Checklist](#).

6.1. Savant Power Storage 20 Commissioning Resources

1. Download the Savant Power Storage app. Search “Savant Power Storage” in Apple App Store or Google Play, or scan the QR code below or on the packing box to download the app from Apple App Store or Google Play.



Apple App Store



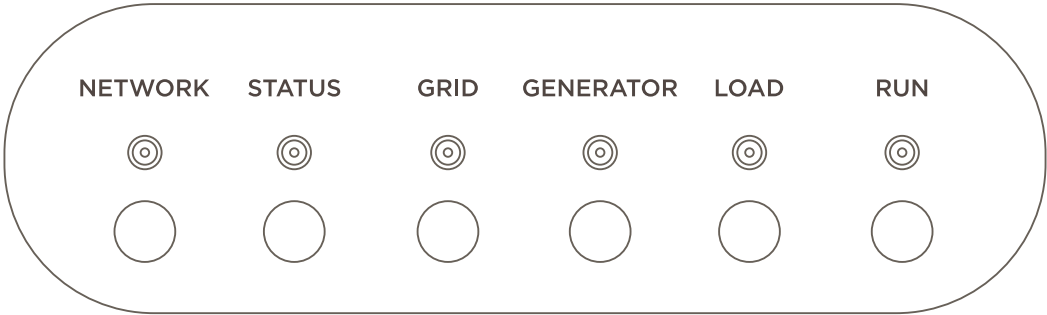
Google Play

2. Continue to the [Savant Power Storage App Guide](#) for complete instructions deploying and configuring a PS20.

7. Troubleshooting

In any cases of device failure, please check alarms on the Savant Power Storage app and proceed as instructed. If the Savant Power Storage app fails to connect to the device, check the status of each indicator and possible reasons and solutions as follows.

7.1. Savant Power Inverter Status LED Troubleshooting



LED Indicator	State	Resolution
Network	Solid Red	The Energy Management System may have crashed or be damaged. Reboot the Inverter. If not recovered, shut it down and contact Savant support.
	Blinking Red	- The Wi-Fi is not 2.4G. Select a 2.4G Wi-Fi for Wi-Fi connection. - The indicator was not blinking red before configuring the network. Make sure the indicator is blinking red before configuring the network. Try to re-configure the network. - SIM card failure. Replace with a new SIM card.
	Blinking Green	- Check the router status. Reset the router if necessary. - The Wi-Fi password entered was incorrect. Try to re-configure the network. - Wi-Fi unit was changed. Re-configure the network. - Ethernet cable disconnected (if applicable). Double check and reconnect Ethernet cable. - 4G network abnormal. Check if there are enough credits for the SIM card and the carrier’s network is working normally. Go to “Network Configuration” on the Savant Power Storage app to check if 4G network configuration shown is in accordance with provided carrier information.
	Solid White	- Something is wrong with the router or Internet. Check internet status. Reset the router if necessary.

LED Indicator	State	Resolution
Run	Solid Red	- Inverter unit fault, including overload, short circuit, grid over voltage, over frequency, etc. Check if the load is abnormal. Reboot Savant Power Inverter. If it does not recover, shut it down and contact us. - Abnormal connection/voltage of batteries. Check battery connection and battery voltage. Reboot Savant Power Inverter. If it does not recover, shut ESS down and contact Savant support.
	Solid Yellow	- PV charging unit fault, e.g., PV input over-voltage. Check PV input voltage. Reboot Savant Power Inverter. If it does not recover, shut it down and contact Savant support. - Abnormal connection/voltage of batteries. Check battery connection and voltage. Reboot Savant Power Inverter. If it does not recover, shut it down and contact Savant support.
Run and Status	Blinking Green (Run) Blinking Blue(Status)	Inverter unit/PV charging unit is updating. Wait until update is finished. If the blinking blue persists, reboot Savant Power Inverter. If it does not recover, shut it down and contact Savant support.
Grid, Generator and Load	LED Off	There is no power input from the grid, generator or load. Check connections.
	Blinking LED	Grid, generator or load is operating outside of nominal parameters. Check status in Savant Power Storage app and proceed as instructed.
Status	Blinking Red	- Communication fault between Energy Management System and battery system. Reboot Savant Power Inverter, then reboot battery system. If it is not recovered, shut it down and contact Savant support. - Communication fault between Energy Management System and Inverter unit/PV unit. Reboot Savant Power Inverter. If it does not recover, shut it down and contact Savant support.
	Solid Red	- Energy Management System internal communication fault. Reboot Savant Power Inverter. If it does not recover, shut it down and contact Savant support.
	Blinking Green	- System is turned off by Energy Management System, which might be caused by low battery, over temperature, low temperature, or over current of battery. Reboot battery system. If it does not recover, shut it down and contact Savant support.

7.2. Savant Power Battery BCMS Module/Battery System and Battery Module LED Troubleshooting

State	Resolution
The Status Indicator on BCMS module/battery system is solid red and the Status Indicator on at least one Battery Module is solid red.	The battery system is in the most critical level protection mode. Charge the battery, or reboot the battery system. If it does not recover, shut ESS down and contact Savant support.
The Status Indicator on BCMS module/battery system is solid red and the Status Indicator on every Battery Module is solid green.	Battery system over-current/ short circuit protection. Disconnect output switch of battery system, check if there is an external short circuit, and reboot the battery system. If it does not recover, shut ESS down and contact Savant support.
The Status Indicator on BCMS module/battery system is solid red and the Status Indicator on at least one Battery Module is solid yellow or off.	- The battery system is in low voltage protection mode. Charge the battery. - The battery system is in high voltage protection mode. Check if the communication cable for BCMS and EMS is disconnected; Leave it switched ON for 30 minutes. If it does not recover, shut it down and contact Savant support.
The Status Indicator on BCMS module/battery system keeps blinking blue for over 60 seconds.	Battery system failed in self-inspection. Reboot the battery system.
The Status Indicator on at least one Battery Module keeps blinking blue for over 30 seconds.	Failure in CAN communication. Reconnect communication cable between BCMS and battery module, then reboot the system.
The Status Indicator on BCMS module/battery system/Battery Module is solid yellow while SOC is 0%.	Low battery. Charge the battery.

8. Warranty and Service

POWER DIRECTORS - WARRANTY

Savant Power Directors have a two (2) year limited warranty as described in more detail in the New [Savant Product Limited Warranty](#). Savant's warranty does not cover any product that is not maintained in accordance with Savant's maintenance recommendations, is operated in a manner other than that specified by Savant, is damaged from misuse, abuse, accidental damage, modifications, improper wiring, improper repair or operation outside of specified operating temperatures, or is damaged from outside forces such as humidity, weather, or electrical surges.

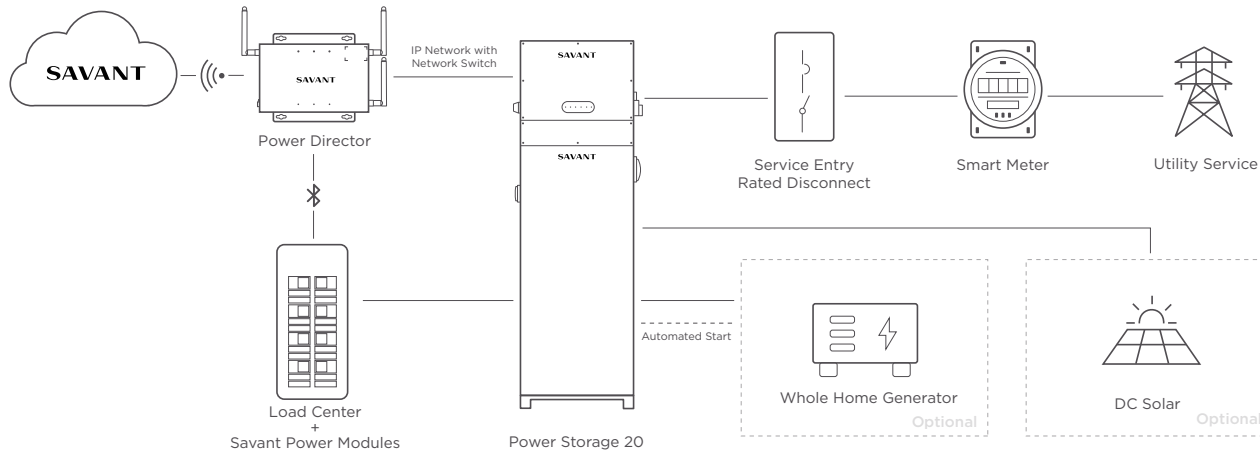
POWER STORAGE - WARRANTY

Savant Power Storage has a ten (10) year or 73 MWh of throughput (equivalent to 3,650 cycles), whichever is sooner, limited warranty period for products that do not substantially conform to the applicable specifications. Products with a valid warranty claim within the warranty period will, at Savant's election, be repaired, replaced with an equivalent product, or returned for an account credit, equivalent to the initial cost of product minus depreciation based on the amount of the warranty period remaining (i.e., if a valid warranty claim occurs with one year remaining in the ten year warranty period, customer is entitled to a ten percent account credit). Savant Power Storage is otherwise subject to the warranty exclusions and processes located in the New [Savant Product Limited Warranty](#). Savant's warranty does not cover any product that is not maintained in accordance with Savant's maintenance recommendations, is operated in a manner other than that specified by Savant, is damaged from misuse, abuse, accidental damage, modifications, improper wiring, improper repair or operation outside of specified operating temperatures, or is damaged from outside forces such as humidity, weather, or electrical surges.

Appendix A: Supported Configurations

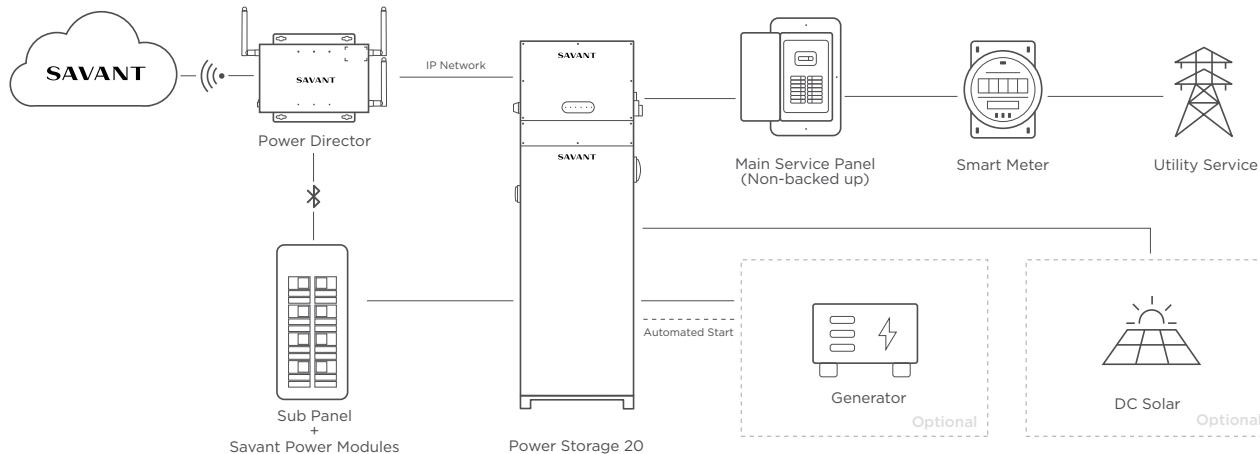
Utility Connected Whole Home Backup

Offsets power consumption while providing backup power for the whole home during a utility disruption. Requires enough battery and inverter capacity to power all backed up loads or be paired with a Savant Power Energy Management System. Can be installed with or without solar sell back (“Net-Metering”) enabled.



Utility Connected Partial Home Backup

Offsets power consumption while providing backup power for the most critical loads during a utility disruption. May enable a smaller system to be installed. Can be installed with or without solar sell back (“Net-Metering”) enabled.

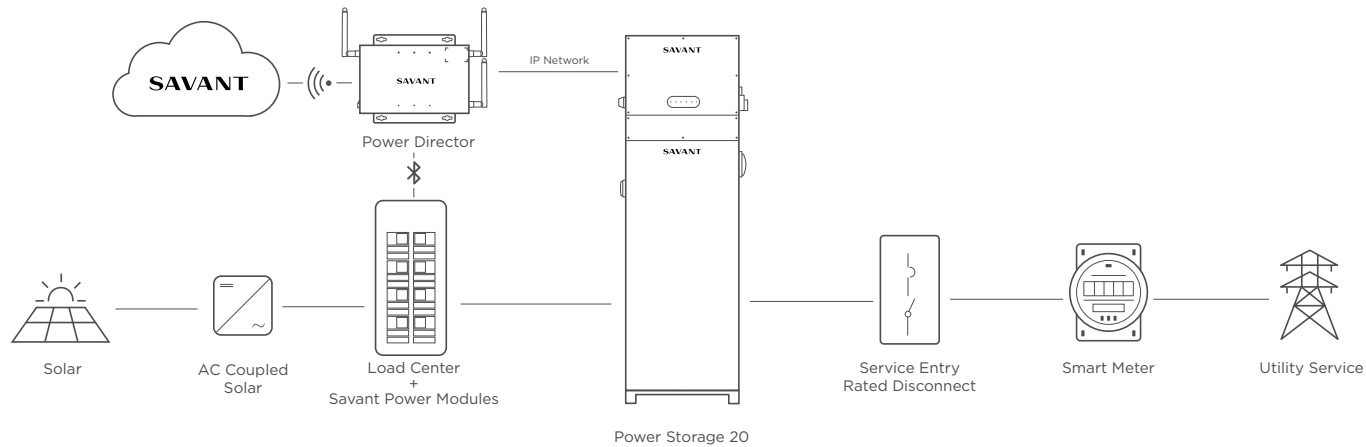


Appendix A: Supported Configurations

Integrating (AC Coupling) Existing Solar

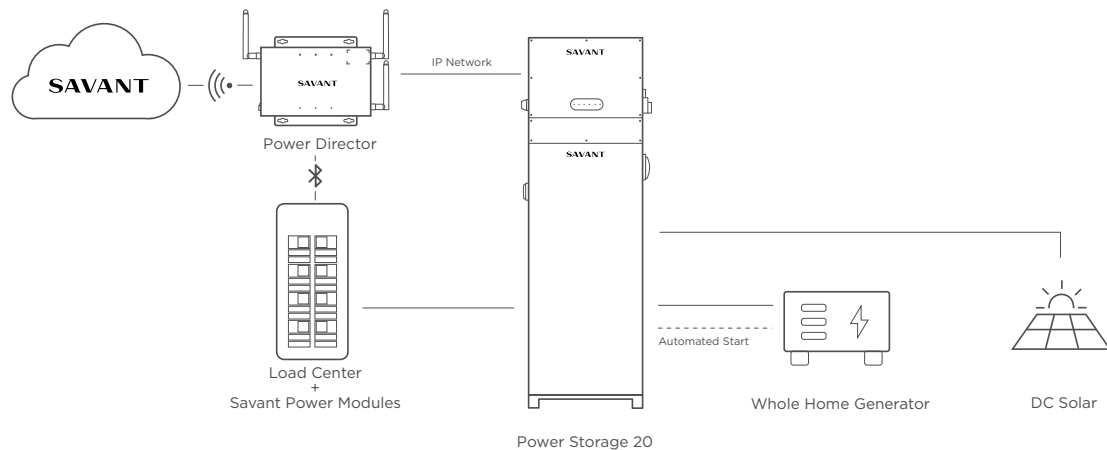
Easily integrate existing grid tied solar installations with off-grid resiliency and time-of-use optimization.

NOTE: AC Coupled solar may land in the load center as pictured in the diagram below, or directly into the GEN input of the Savant Power Inverter. Contact Savant engineering for more information about how to integrate a generator with an AC Coupled system.



Off Grid Installation

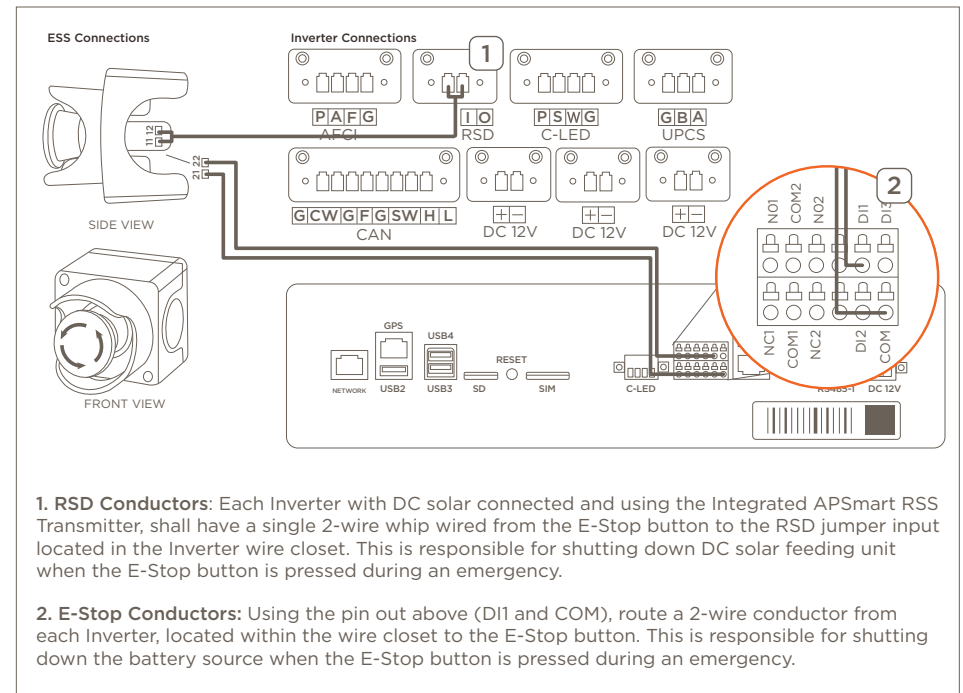
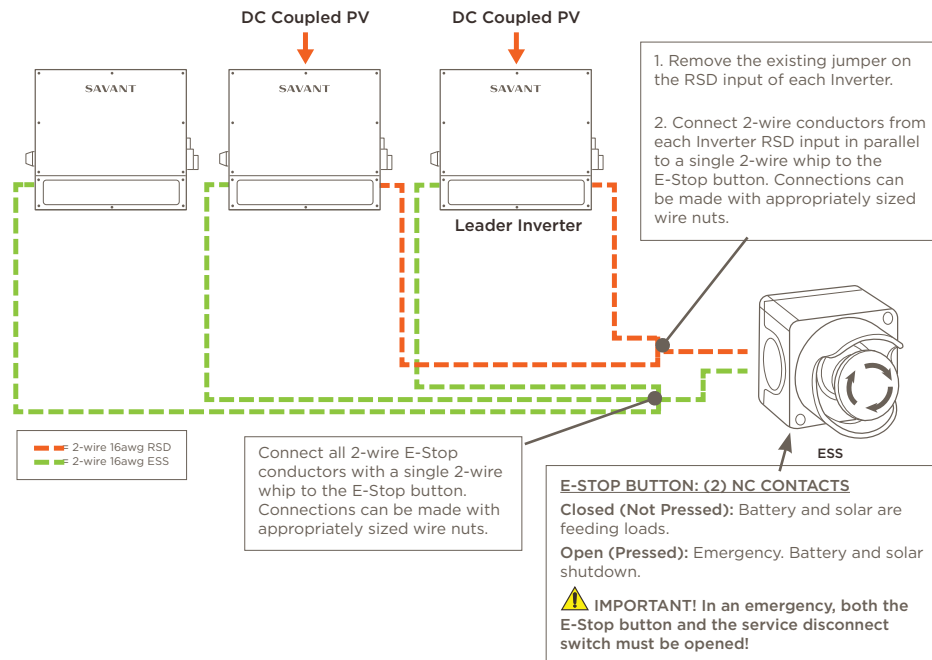
Generate 100% of energy consumed on-site. Ideal for scenarios where utility is not available, or interconnection is not possible.



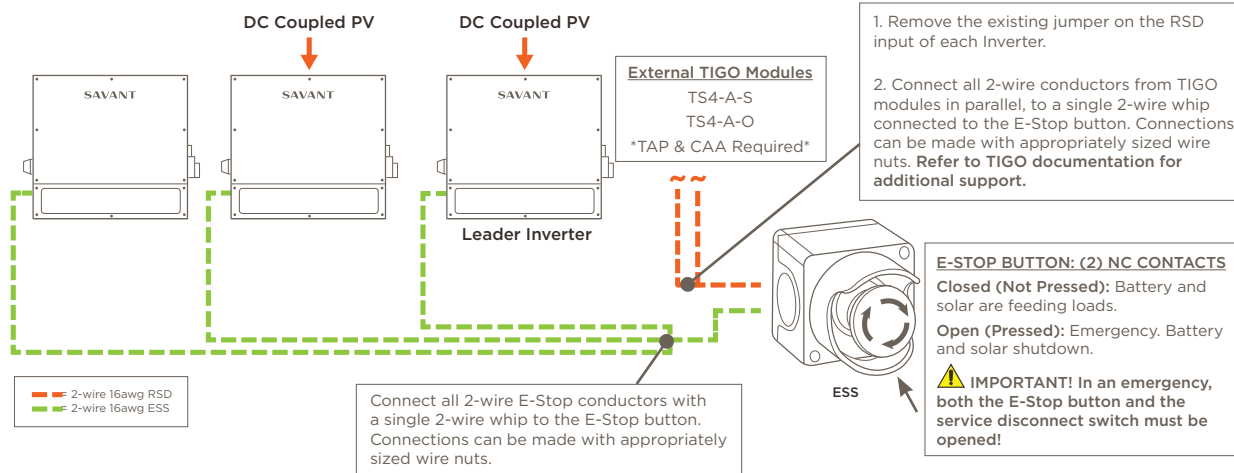
Appendix B: Emergency Stop Switch (E-Stop) / Rapid Shutdown (RSD) Details

An Emergency Stop (E-Stop) functionality within a PS20 system is a critical safety feature designed to provide immediate shutdown of the Inverter, PVs, and battery in emergency situations. Installation guidance for Rapid Shutdown Devices (RSDs) and Emergency Stop Buttons (E-Stop) are described below.

Parallel Installation Using Integrated APSmart RSS Transmitter with "RSD-S-PLC" or TIGO "TS4-A-F" Receivers



Parallel Installation Using External TIGO "TS4-A-S" or "TS4-A-O" Modules



Rapid Shutdown Manufacture Compatibility

APSmart

- All Savant Inverters have integrated APSmart sunspec compliant transmitters.
- APSmart "RSD-S-PLC" Receiver: No additional equipment required.

TIGO

- TIGO "TS4-A-F" Receiver (RSD only module): fully supported by communicating with internal APSmart RSD transmitter within the Savant Inverter.
 - TIGO "TS4-A-S": TAP & CCA transmitter required.
 - TIGO "TS4-A-O": TAP & CCA transmitter required.
- TAP = TIGO access point
CCA = Cloud connect advanced transmitter

RSD Notes:

- Each Savant Inverter has an RSD jumper installed in the wire closet out of the box. If RSD is required within the local AHJ, this jumper needs to be removed. The installer then must either:
 - Wire the system Using Integrated APSmart RSS Transmitter with "RSD-S-PLC" or TIGO "TS4-A-F" Receivers as shown in the graphic.
 - OR, wire the system Using External TIGO "TS4-A-S" or "TS4-A-O" Modules as shown in the graphic.

The Savant Inverter does not require an RSD connection if AC coupled PV is installed elsewhere in the system. The third-party AC coupled inverter is responsible for safely shutting down its AC output to the Savant system in the event of an emergency with its own RSD.

E-Stop Notes:

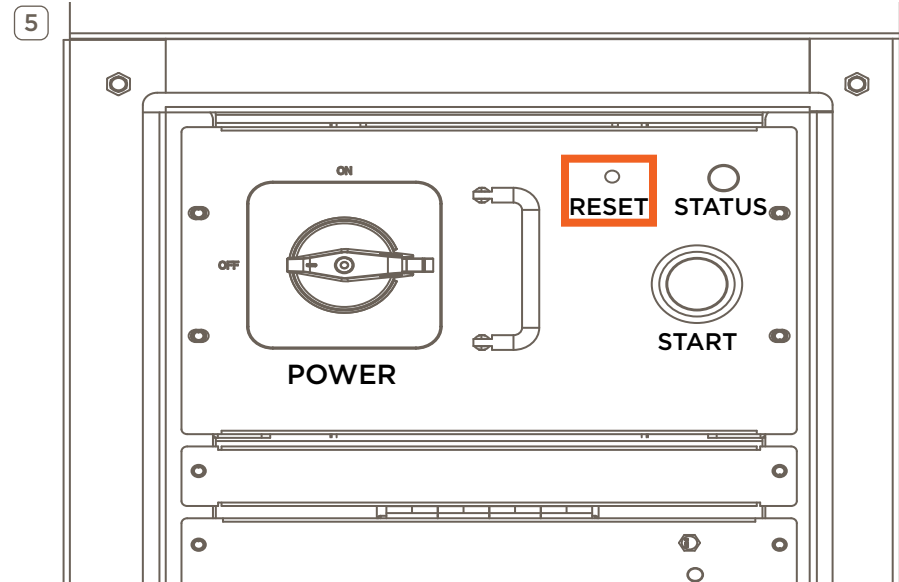
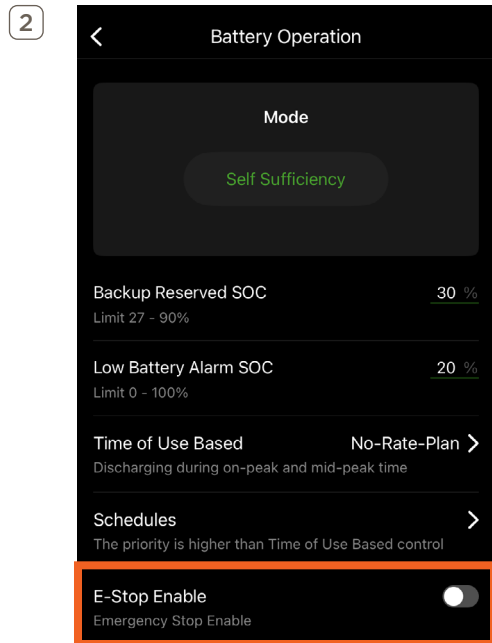
For parallel installations (Full Stack or Shared Battery) with BESS ONLY, a 2-wire E-Stop connection to each Inverter is required to shut down all batteries from feeding downstream house loads in the event of an emergency.

Appendix B: Emergency Stop Button (E-Stop) / Rapid Shutdown Details (RSD)

Enable E-Stop

⚠️ IMPORTANT! If the E-Stop is enabled before the E-Stop wiring is connected to the PS20, the system will automatically enter E-Stop mode. To return the system to normal operation, install a jumper cable in the Inverter to act as an E-Stop then continue to disable the E-Stop in the Savant Power Storage (SPS) app. Reset the BCMS. The E-Stop button will only function if E-Stop mode is activated on the Savant Power Storage app.

1. Turn off the Grid breaker of the PS20 Inverter.
2. Enable the E-Stop mode through the **Battery Operation** settings in the Savant Power Storage app. For more information see the [Savant Power Storage App Setup Guide](#).
3. Press the E-Stop button on the PS20 to open the NC. The Inverter and battery will enter E-Stop mode, shutting down the Inverter, PVs, and battery.
4. Reset the E-Stop again to short the NC.
5. Reset the BCMS by pressing 'Reset' button to restore battery power.
6. The Inverter should return to power running mode.

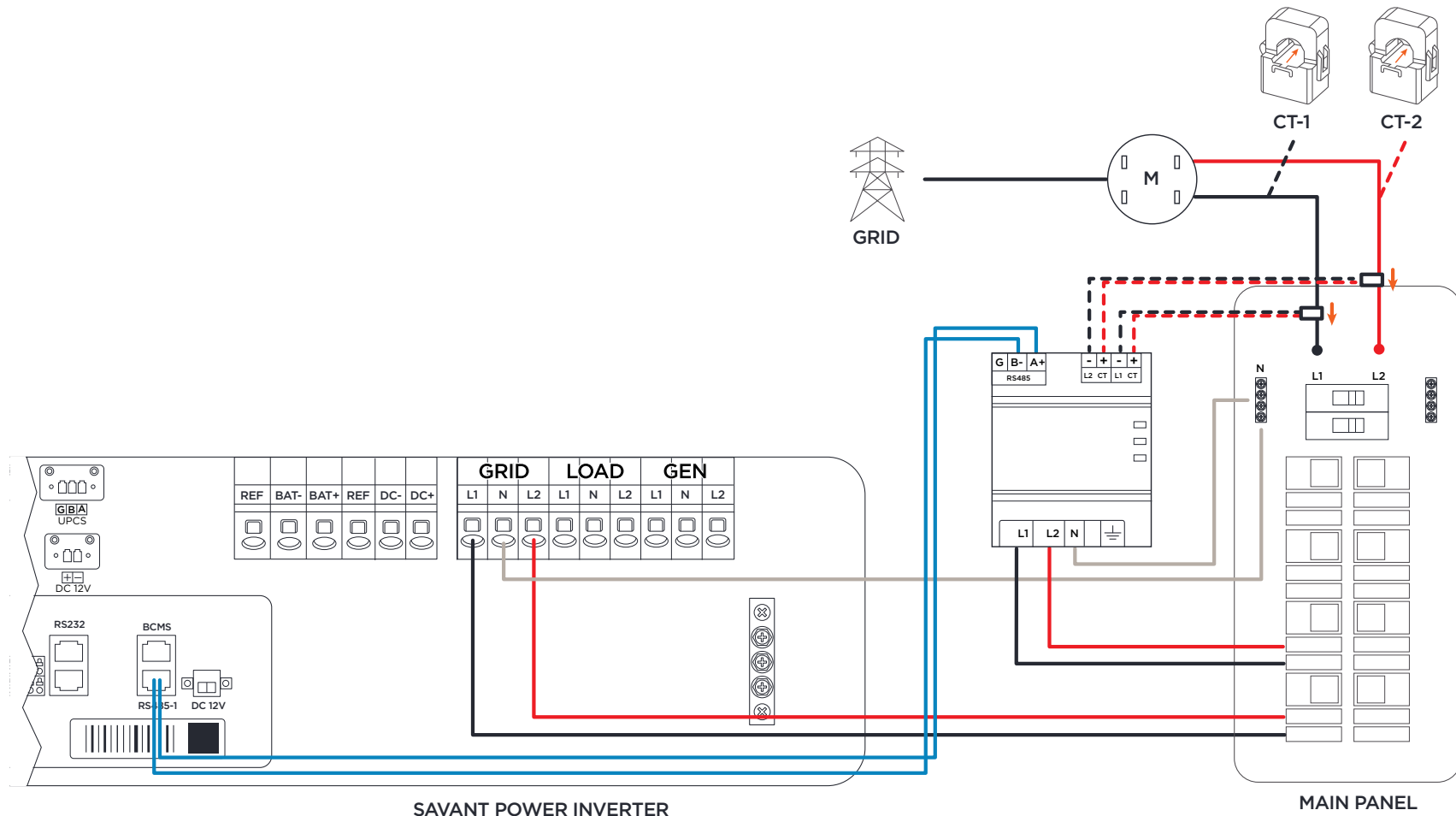


Appendix C: Optional Accessories

Acrel Meter Switch Installation

The Meter Zero mode in the Savant Power Storage 20 enables the offset of non-backed up load consumption while grid connected. This mode requires an external power meter, the Acrel AGF-AE-D/200, which must be purchased separately. When an Acrel Meter is installed and the PS20 is integrated with a host or Director, then the mode **must** be set to either Meter Zero or Excess Solar to Grid. For activating the Meter Zero Mode, refer to the [Savant Power Storage App Setup Guide](#). For purchasing information, contact Savant Support.

1. Identify a suitable location in the non-backed up loads center or the Meter Main Combination Service Panel for the Acrel meter unit.
2. Secure the meter using a 35mm DIN rail for stable mounting.
3. Ensure the space allows for a 15 amp, 240 volt, two-pole circuit breaker in the non-backup load center or the Meter Main Combination Service Panel for voltage measurement.



Appendix C: Optional Accessories

4. Install the split-core CTs on the mains feeding the load center or Meter Main Combination Service Panel.
NOTE: Connect CT1 (black sleeve) to Line 1 and CT2 (red sleeve) to Line 2. The arrow on CTs must point towards the loads on the non-backup load center for accurate measurement.
5. After installing CTs, connect them to their respective inputs on the Acrel meter, ensuring correct phasing.
NOTE: CT1 with a black sleeve connects to Line 1 and terminates on the CT1 input of the Acrel meter. CT2 with a red sleeve connects to Line 2 and terminates on the CT2 input.

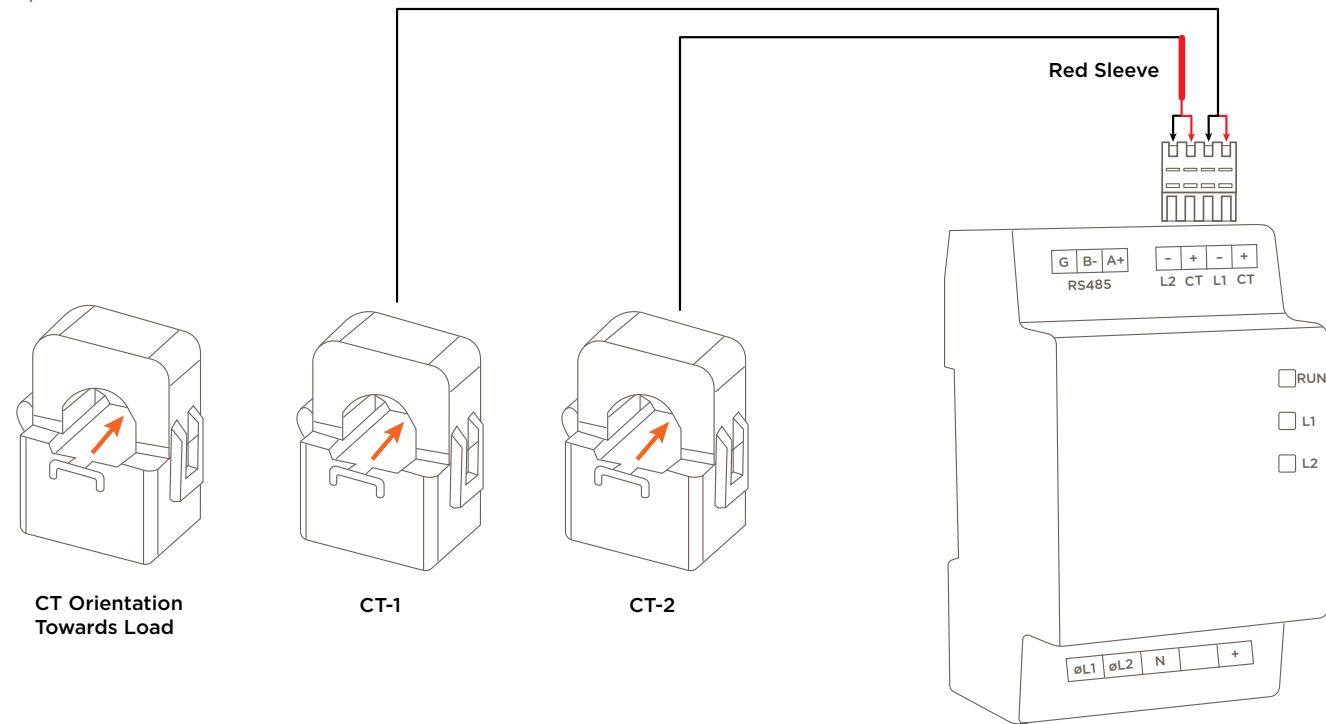
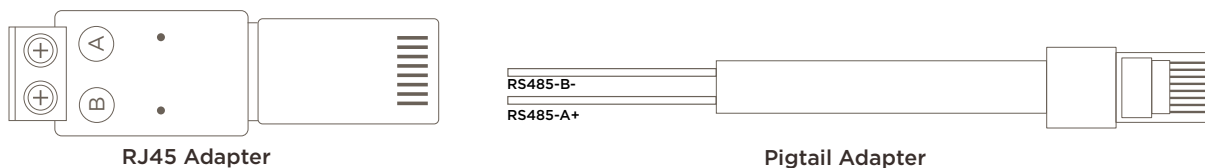


Figure 12: CT Connections to Acrel Meter

6. Install a 15-amp, 240 volt, two-pole breaker in the non-backup load center and connect conductors to L1/L2/N of Acrel meter.
NOTE: The phasing powering the meter should match the CT placements for each phase.
7. Identify the adapter included with Acrel Meter, and install with the appropriate instructions.



Appendix C: Optional Accessories

RJ45 Adapter Install

1. Utilize a CAT5 cable to connect A+ and B- terminals on the RJ45 Terminal Adapter to the corresponding terminals on the Acrel Meter. (See [Figure 13a](#))
2. Connect RJ45 Terminal Adapter to the RS485-1 input on the Power Storage Inverter. (See [Figure 13a](#))

NOTE: The RJ45 Terminal Adapter is pre-wired to Pins 7 and 8.

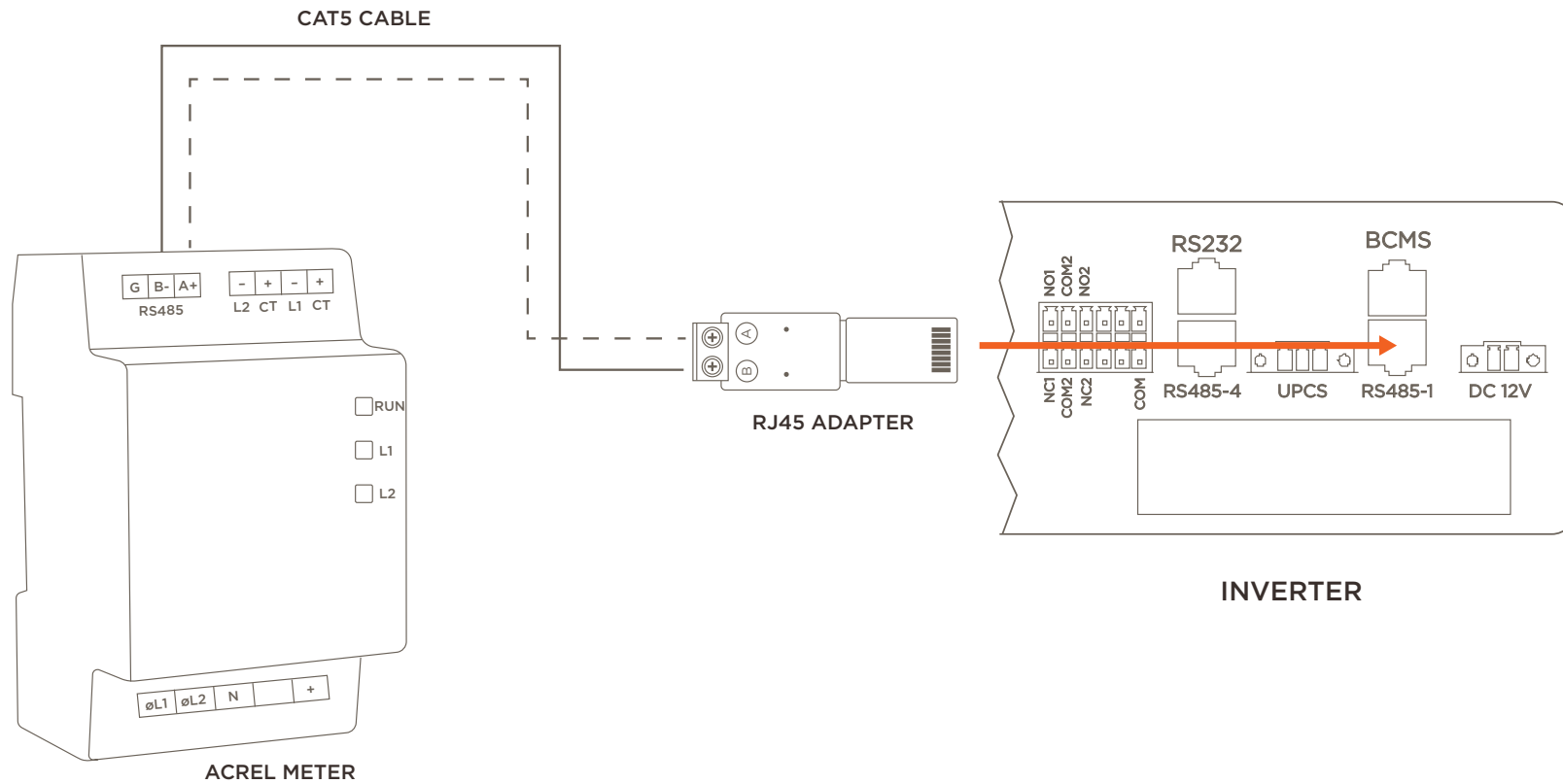


Figure 13a: RJ45 Adapter Connections

Appendix C: Optional Accessories

Pigtail Adapter Install

1. Remove the RS485 terminal block from the Acrel Meter. Make connections to the RS485 A+ and B- terminals using included Pigtail Adapter (CAB-INV485-00). Replace RS485 terminal block into Acrel Meter. (See [Figure 13b](#)).
2. Use CAB-INVBATT-02 to make connection from the CAB-INV485-00 to the RS485-1 terminal of the Inverter. (See [Figure 13b](#)).

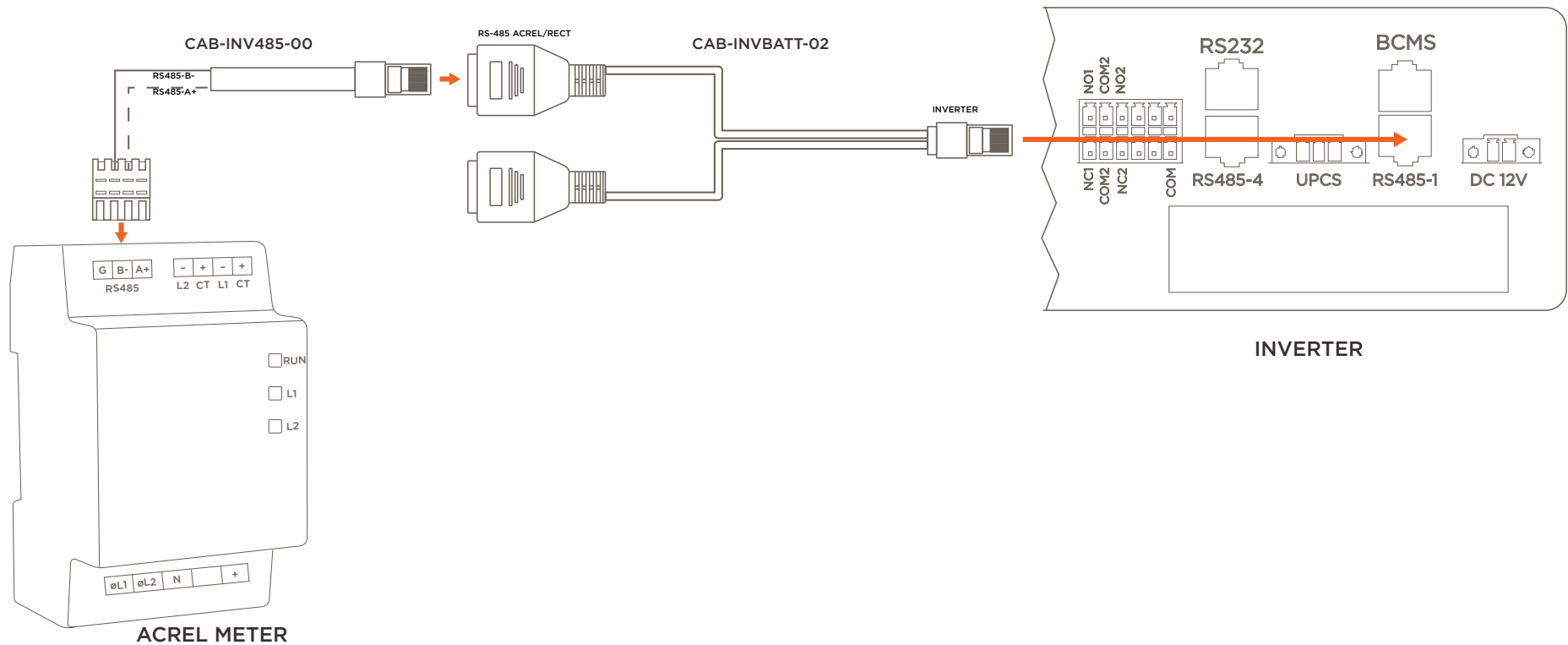


Figure 13b: Pigtail Adapter Connections

Appendix C: Optional Accessories

9. Ensure the Power Storage 20 is correctly commissioned and in standby mode (not charging, discharging, or producing solar power) before activating the breaker for the meter.
10. After turning on the breaker for the Acrel meter, wait up to 2 minutes for the meter to establish communication with the PS20. Verify there are no issues with the Acrel meter using the three LED indicators on the meter front. Refer to the chart below for indicator statuses.

Indicator	Description	Status	Troubleshooting
RUN	Flashing Green	Normal Operation	
	Flashing Yellow	No Communication	Checking communication wires to PS20
	Red > 3s	Internal Fault	Contact Savant Support
L1/L2	Solid Green > 3s	No Current	
	Flashing Green	Export to Grid	
	Flashing Red	Import from Grid	Check for reversed CTs if not in line with expectation
	Flashing Red and Green	High Voltage (>130V)	Check line voltage and for sources of noise
	Flashing Red and Yellow	Low Voltage (<70V)	
	Flashing Yellow	No Voltage (<30V)	
	Solid Yellow	Frequency out of Range	

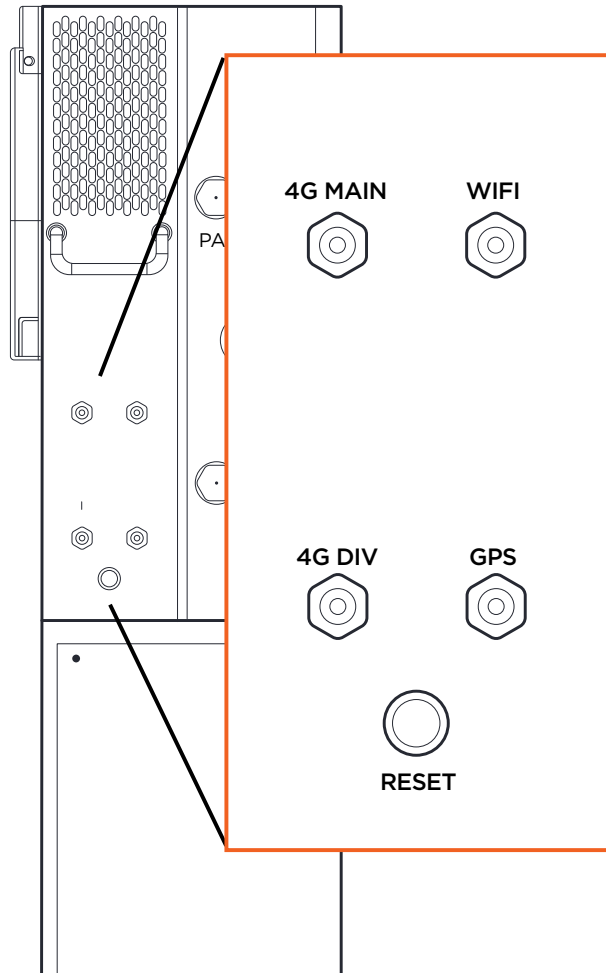
Appendix C: Optional Accessories

Antennas

1. Install antennas into the relevant antenna inputs corresponding to planned use of the system. Refer to image below for antenna input labels.

NOTE: Antennas are only required if using the functionality supported by the antenna.

NOTE: While 4G and GPS antenna ports are available and may function, they are not supported in a PS20 system.



Appendix D: Single Line Diagrams

This appendix gives example single line diagrams (SLDs) for different configurations of the Savant Power Storage 20. Please contact Savant Support for additional information or if your desired installation is not shown.

NOTE for Parallel Installs: When installing AC wire between the upstream breakers in the Grid Combiner Panel to its respective Savant Power Storage 20 Grid input; the combined wire length from the Grid Distribution Panel to the Load Combiner Panel needs to be approximately equal across the PS20 units.

NOTE for Parallel Installs with a Generator: When installing AC wire between the upstream breakers in the Generator Combiner Panel to its respective Savant Power Storage 20 GEN input; the combined wire length from the Grid Distribution Panel to the Load Combiner Panel needs to be approximately equal across the PS20 units.

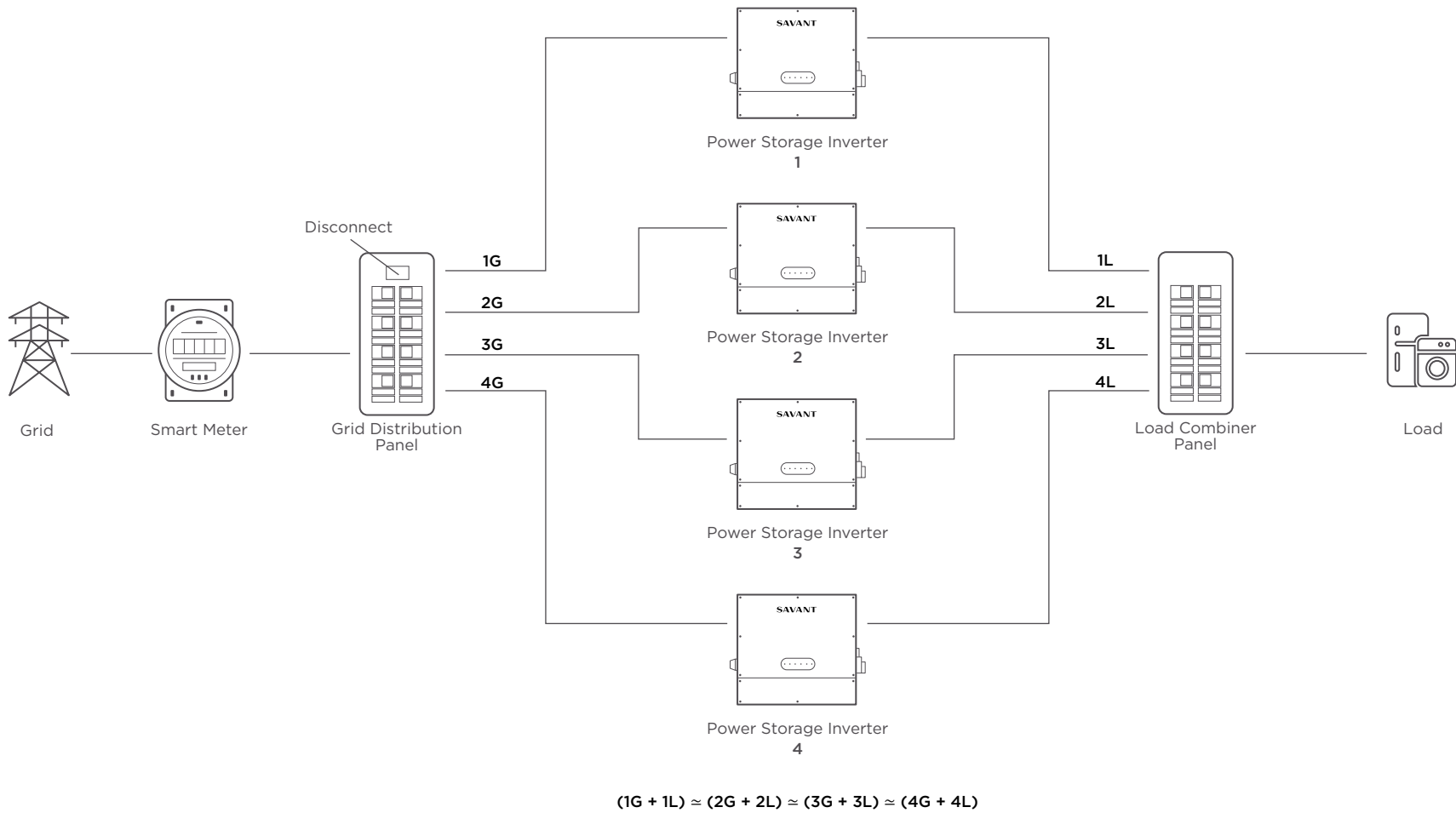
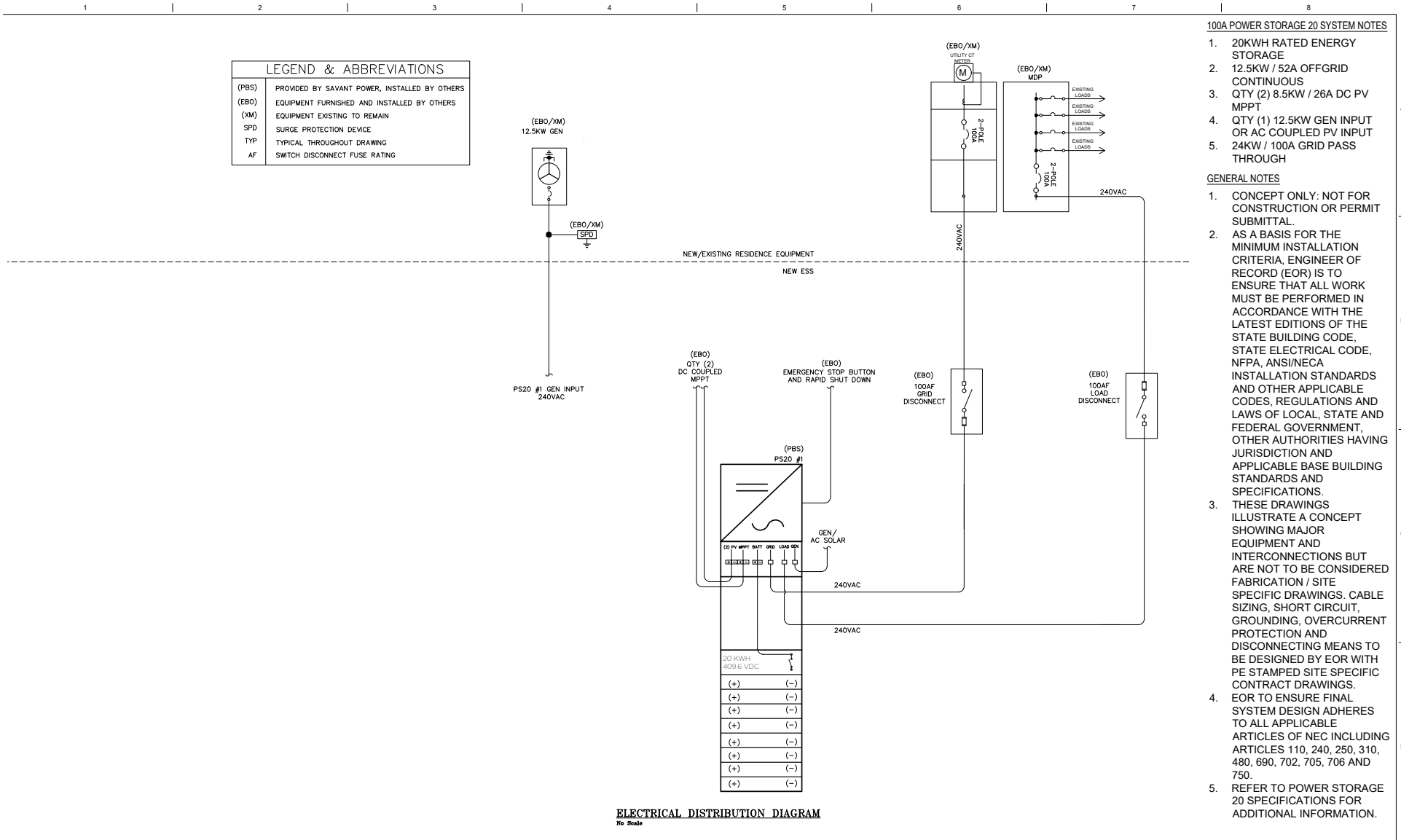


Figure 14: Grid Distribution Panel to Load Combiner Panel Lengths

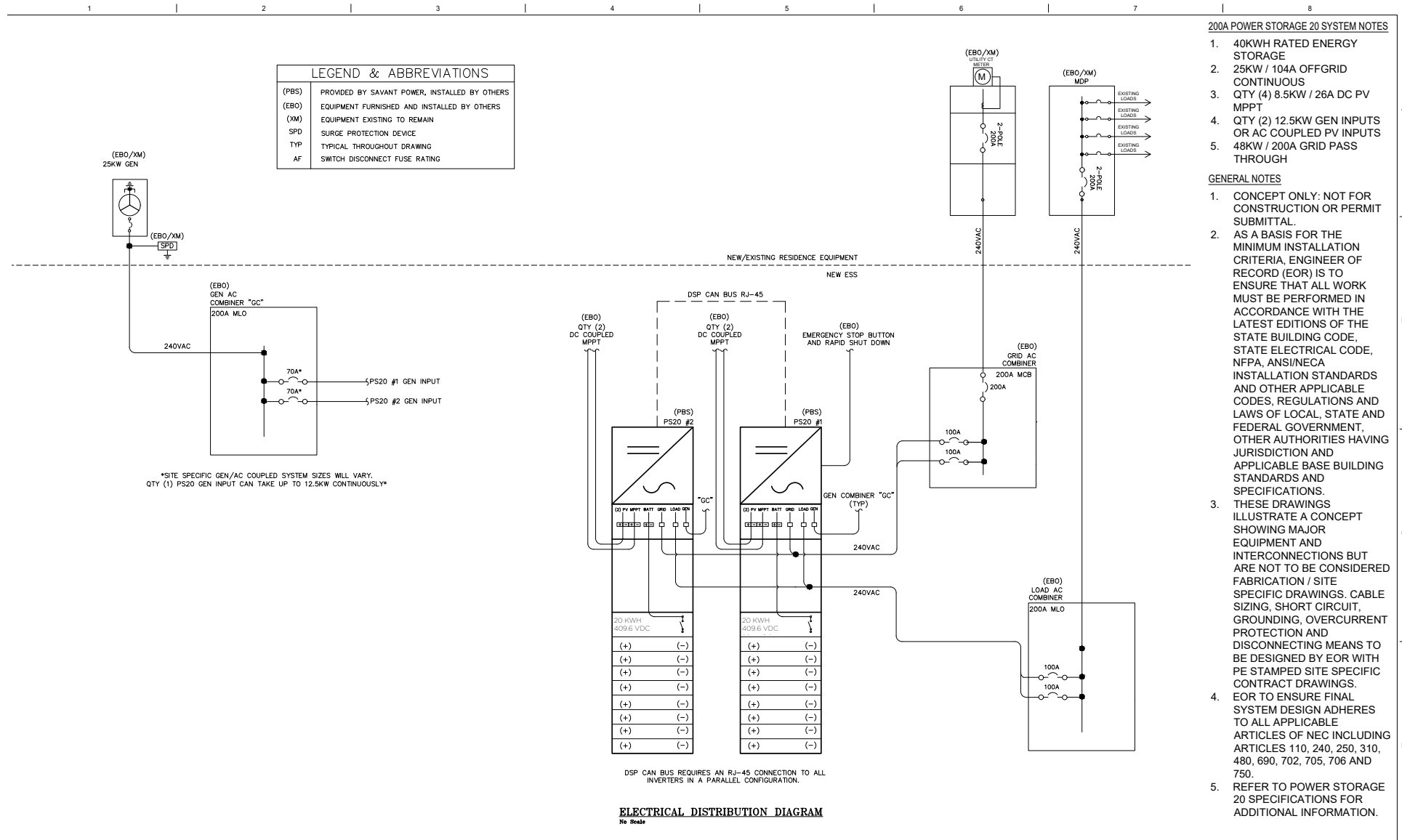
Appendix D: Single Line Diagrams

Home Back-Up using Single PS20 (12.5 kVA | 20 kWh)



Appendix D: Single Line Diagrams

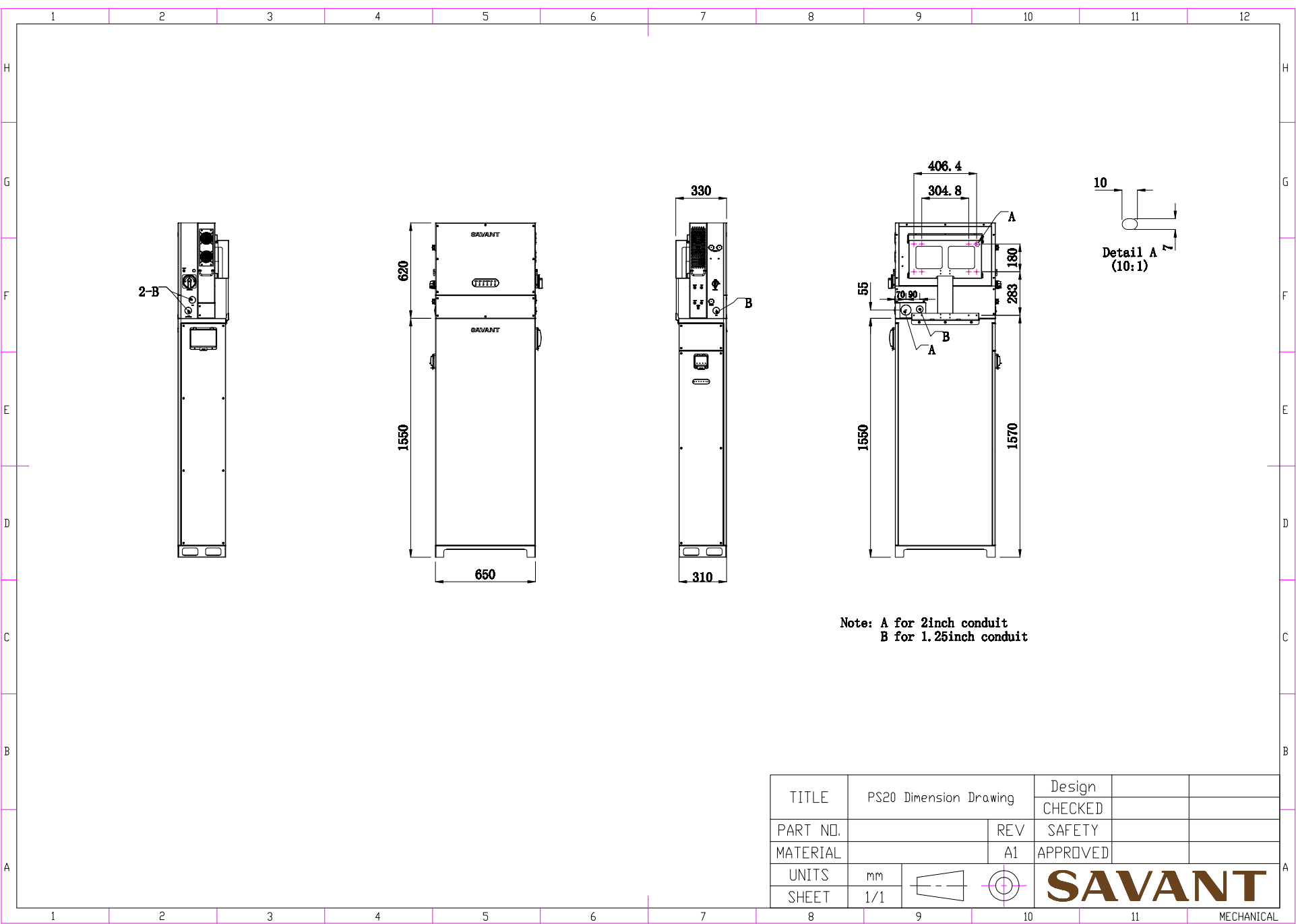
Home Back-Up Using Parallel Systems (25 kVA | 40 kWh)



Home Back-Up Using Parallel Systems (25 kVA | 20 kWh)

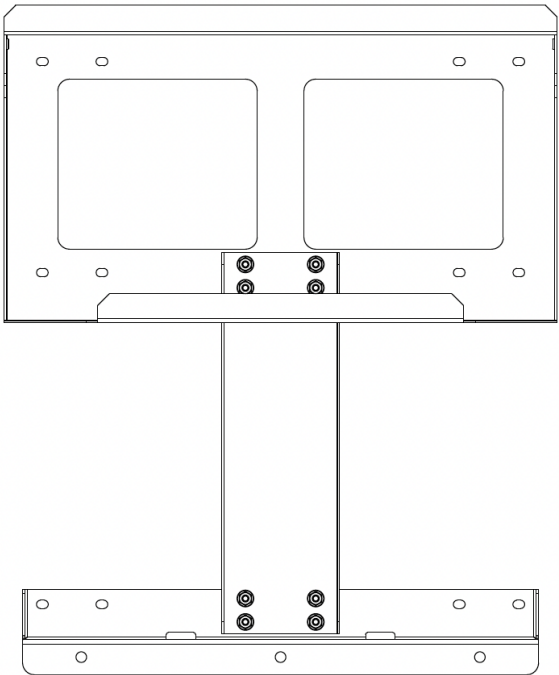
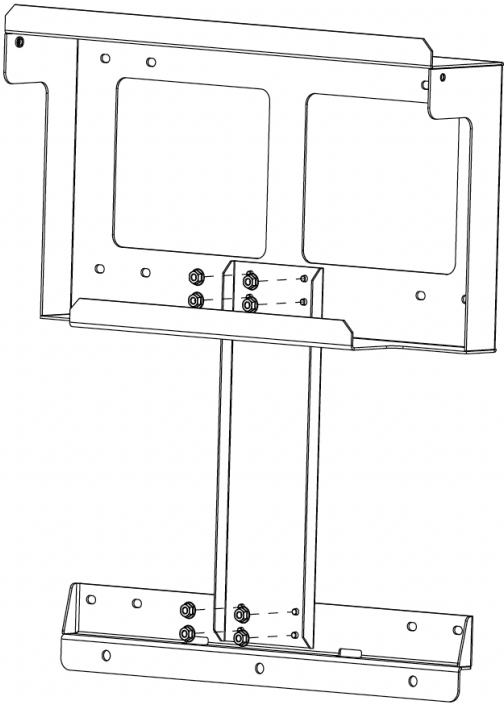


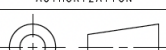
Appendix D: Single Line Diagrams



TITLE	PS20 Dimension Drawing		Design		
			CHECKED		
PART NO.		REV	SAFETY		
MATERIAL		A1	APPROVED		
UNITS	mm				
SHEET	1/1				

Appendix E: Inverter Mounting Bracket



FINISH:	SAVANT SYSTEMS LLC PROPRIETARY & CONFIDENTIAL	SAVANT		45 PERSEVERANCE WAY HYANNIS, MA 02601		
	THIS DOCUMENT CONTAINS COMPANY PROPRIETARY INFORMATION AND IS NOT TO BE REPRODUCED OR DISTRIBUTED WITHOUT PRIOR AUTHORIZATION					TITLE PS20 BRACKET
MATERIAL:		SIZE	UNITS	DWG NO		REV
		/	mm			
		SCALE	DO NOT SCALE DRAWING		SHEET	1 OF 1

Appendix F: Commissioning Checklist

Upon first boot up and commissioning of the Power Storage 20 System, the checklist below can be used as guidance to ensure a successful installation.

Physical Wiring Checklist

- All wiring connections torqued to required values per installation guide.....☐
- Ampacity and Voltage rating of conductors appropriate for installation.....☐
- All wires protected from damage.....☐
- Conduits are tightly installed and sealed.....☐
- AC and DC conductors do not share conduit.....☐
- External OCPD used to interconnect grid input of each inverter.....☐
 - L-L Voltage is 240V.....☐
 - L-N Voltage is 120V.....☐
- External OCPD used at output of load of each inverter.....☐
 - L-L Voltage is 240V.....☐
 - L-N Voltage is 120V.....☐
- All non-current carrying equipment is properly grounded.....☐
- Polarity of incoming DC coupled PV and battery conductors are correct.....☐
- Voltage of DC coupled solar strings does not exceed 450 Voc.....☐
- PV conductors are ungrounded.....☐
- Communication cable from BMS to Inverter lands in the BCMS port.....☐
- NOTE:** Only the lead inverter in a shared battery configuration will be directly connected to the BMS.
- 12V conductor connected between BMS and Inverter.....☐
- Inverter(s) and Savant Power Director are on same network.....☐
- (Recommended) Inverter(s) are hardwired to network.....☐
- (Optional) E-Stop wired into Inverter at Inverter GPIO.....☐
- (Optional) Acrel meter installed per installation guide and LEDs showing expected power flow and behavior.....☐
- (Optional) Generator 2-wire start wired into Inverter GPIO.....☐

Physical Wiring Checklist (Parallel Systems Only)

- Phasing between systems (both load and grid sides) consistent.....☐
 - L1-L1 between systems measures 0V.....☐
 - L1-L2 between systems measures 240V.....☐
- CAT5 or CAT6 cable used between parallel ports of all units in system.....☐
- Included RJ45 terminators installed and tightened into all un-used parallel RJ45 ports (first and last inverters).....☐
- (Shared Battery Systems ONLY) Conductors connecting DC terminals of leader Inverter to BATT terminals of follower Inverter with correct polarity.....☐
- (Shared Battery Systems ONLY) Y Cable (CAB-INVATT-XX) CAN Output or custom cable used to connect RS485-1 port of Leader inverter of shared configuration to Follower inverter BCMS port.....☐

Commissioning Process Checklist

Before starting the commissioning, ensure all interconnection overcurrent protective devices (OCPD) on load and grid connections is in an OFF position and all Power Storage Inverter switches are in the OFF position. These steps should be followed in a sequential order to avoid issue with commissioning.

Turn rotary switch inside BMS to ON position and press Start button of BMS	☐
Battery module LEDs go from amber to blue then solid green.....	☐
BMS Status LED showing solid green.....	☐
Wait for inverter boot sequence to be completed successfully.....	☐
NOTE: Inverter boot sequence will start automatically upon BMS start up.	
Status LED goes from blinking green to solid green.....	☐
RUN LED solid yellow.....	☐
Press START button on Inverter to turn Inverter on.....	☐
LOAD LED turns to solid green.....	☐
(Parallel Systems Only) Repeat start up process for all batteries and Inverter in system.....	☐
All batteries and inverters in system successfully turned on.....	☐
Configure Power Storage 20 using Savant Power Storage App	☐
Inverter(s) added to device by scanning QR Code or inputting S/N.....	☐
Inverter(s) added to network and show solid green network LED.....	☐
NOTE: Hardwired inverters will automatically connect to network with no app setup.	
(Parallel Systems Only) Program leader inverter with Primary Control and address 1	☐
(Parallel Systems Only) Program additional inverter(s) with Secondary Control and address N, where N is 2-10	☐
NOTE: Shared battery configurations must use appropriate addresses. Refer to section 3.9.2 of for more details.	
Inverter(s) programmed with intended battery operation mode.....	☐
(Optional) Inverter(s) programmed with Time-of-Use (ToU) schedule.....	☐
(Optional) Generator Port programmed for intended application for inverter(s)	☐
(Optional) Inverter(s) programmed for AC Coupled solar.....	☐
(Optional) Inverter(s) programmed for DC Coupled solar.....	☐
Inverter(s) programmed with interconnection settings under Engineering Configuration.....	☐

Add Inverter to Savant Power & Light (SP&L) App.....☐

Connect Load Output OCPD.....☐

Savant Power Storage app shows value for on-site load.....☐

Connect grid side OCPD and turn inverter Grid Switch to ON position and wait two to five minutes for inverter to connect to grid,
depending on interconnection settings used☐

NOTE: Depending on Backup Reserve SOC programmed into system, inverter will likely start charging batteries from grid
upon connection.

Grid LED on inverter shows solid green☐

Savant Power Storage app shows Voltage and Frequency > 0 when selecting Grid icon on app.....☐

Verify all front panel LEDs.....☐

Network LED green☐