

# BCS 2200

## Installation Guide

TME23564

June 2023



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## Contact Information

For country-specific details, please contact your local Schneider Electric Sales Representative or visit the Schneider Electric website at: <https://www.se.com/>

## Information About Your System

As soon as you open your product, inspect the contents and record the following information and be sure to keep your proof of purchase. If any damage is found, contact customer support.

Serial Number \_\_\_\_\_ Purchased From \_\_\_\_\_  
Product Number \_\_\_\_\_ Purchase Date \_\_\_\_\_

**Document Number:** TME23564      **Date:** June 2023

**Model Name:** Backup Control Switch

**Product Part Number:** 865-BCS-2200

# Safety Information

## Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Fire hazard



Protective Earth (grounding) conductor terminal



Refer to the Installation or Operation instructions

### **DANGER**

**DANGER** indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

### **WARNING**

**WARNING** indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

### **CAUTION**

**CAUTION** indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

### **NOTICE**

**NOTICE** is used to address practices not related to physical injury.

## Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any

consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved. For more information, see "Audience" on page 4.

# Audience

This manual is intended for use by qualified personnel installing, configuring, and operating a system involving Schneider Electric Backup Control Switch BCS (865-BCS-2200).

The qualified personnel have training, knowledge, and experience in:

- Installing, operating, and configuring electrical equipment.
- Applying all applicable installation codes.
- Installing service entrance equipment .
- Connecting communication devices into a network.
- Selecting and using Personal Protective Equipment (PPE).
- Analyzing and reducing the hazards involved in performing electrical work.



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# About

## Purpose

This guide provides explanations and procedures for installing Schneider Electric Backup Control Switch (BCS).

For explanations and procedures related to other products, please contact the manufacturer of those products.

## Scope

The guide provides safety guidelines, detailed planning, and procedures for installing the Backup Control Switch (BCS) and related system components. This guide does not provide details about particular brands of batteries, photoelectric cells, or generators. Consult individual battery manufacturers for this information.

## Abbreviations and Acronyms

BCS	Backup Control Switch
LED	Light Emitting Diode
MPPT	Maximum Power Point Tracking
PPE	Personal Protective Equipment
PV	Photovoltaic
VAC	Volts Alternating Current
VDC	Volts Direct Current

## Related Documents

*XW Pro Multi-unit Design Guide (document number 990-91373)*

*XW Pro Operation Guide (document number 990-91227 or 990-91402)*

*XW Pro Installation Guide (document number 990-91228 or 990-91403)*

## Related Information

Find more information about Schneider Electric as well as its products and services at: <https://www.se.com/>.

# Product Safety Information

**IMPORTANT:** Remember to read and follow all product safety information in this document.

## General Safety Instructions

Before using the BCS, read all instructions and cautionary markings on the unit, the batteries, and all appropriate sections of this manual.

- Use of accessories not recommended or sold by the manufacturer may result in a risk of fire, electric shock, or injury to persons.
- The BCS is designed to be permanently connected to your AC electrical systems. The manufacturer recommends that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your jurisdiction.
- To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the BCS with damaged or substandard wiring.
- Do not operate the BCS if it has been damaged in any way.
- Do not disassemble the BCS except where noted for connecting wiring and cabling. See your warranty for instructions on obtaining service. Attempting to service the unit yourself may result in a risk of electrical shock or fire.
- To reduce the risk of electrical shock, disconnect both AC power from the BCS before attempting any maintenance or cleaning or working on any components connected to the BCS.
- The BCS must have a connected equipment-grounding conductor.
- To reduce the chance of short-circuits, always use insulated tools when installing or working with this equipment.
- Remove personal metal items such as rings, bracelets, necklaces, and watches when working with electrical equipment.

 **DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment contains no servicable parts and must only be installed and serviced by qualified electrical personnel.
- Never operate energized with the door opened and the dead front removed.
- Energized from multiple sources. Before removing covers identify all sources, de-energize, lock-out, and tag-out and wait 5 minutes for circuits to discharge.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.
- Do not operate the equipment if it or its wiring has been damaged in any way.
- Do not disassemble the Backup Control Switch except where noted for connecting wiring and cabling.
- Do not use accessories not recommended or sold by the manufacturer.

**Failure to follow these instructions will result in death or serious injury.**



# 1 Overview

## What's in This Chapter?

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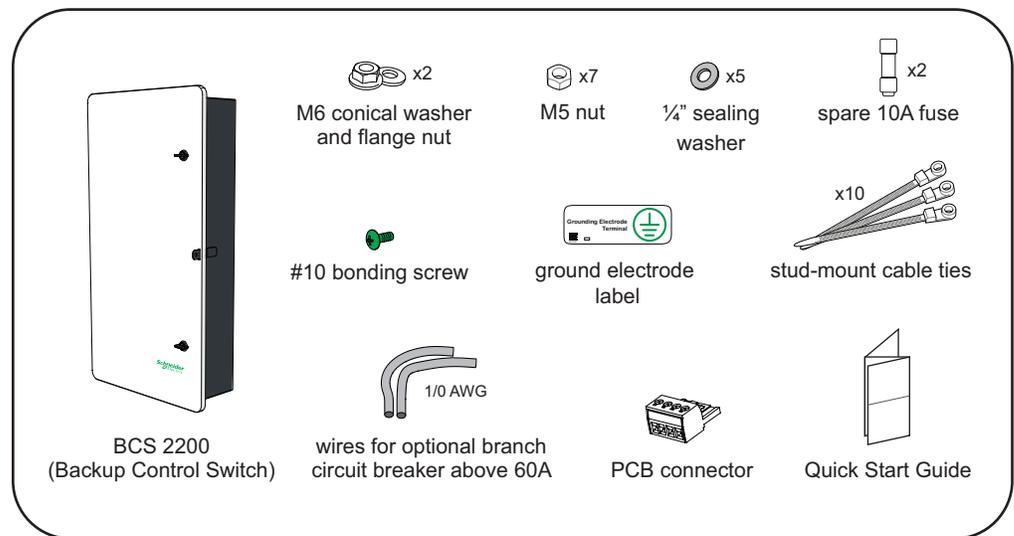
## Introduction

The Backup Control Switch (BCS) provides a way to island a Schneider Electric solar or storage solution from the grid. The BCS can be used with Schneider Electric XW Pro inverters.

For more information about installing and configuring the XW Pro Inverter with the BCS, see the *XW Pro Owner's Guide* (document number 990-91227) and *XW Pro Multi-unit Design Guide* (document number 990-91373) (go to <https://solar.schneider-electric.com/product/xw-pro-na-solar-hybrid-inverter/> > **Downloads** > **Technical Publications**).

## What's in the Box

**IMPORTANT:** Inspect the package for damage. If damage is found, contact Schneider Electric customer service.



## Required Tools and Materials

The following materials and tools are not supplied but are required to complete the installation.

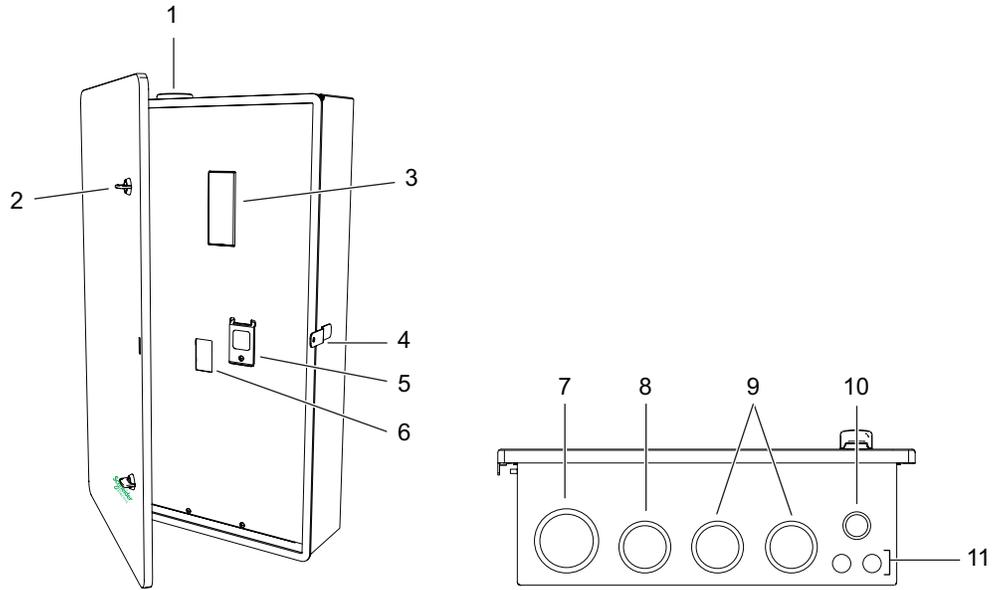
- Appropriate PPE
- Calibrated professional digital multimeter
- AC power cables
- Grounding wires
- RS-485 cable
- Auxiliary wires
- Cable conduits and fittings
- 1/4" (M6) mounting hardware
- Appropriate socket for the mounting hardware
- Adjustable torque wrench
- Power drill set
- Screw driver set (including a #3 Phillips screwdriver)
- 5/16" (8 mm) nut driver
- 3/8" hex key
- Stripper and crimping tool
- Bubble level or spirit level
- High-tension cable tie gun

## Optional Components

For more information, see "Wiring the BCS" on page 22.

- Main AC circuit breaker, as specified
- Non-backup circuit breaker, as specified
- Extension wires for CTs (see WattNode® manual)
- Square D **Series B** conduit hub for top entry wire routing

## Features



1	Grid input wiring entry - Option 1	7	Grid input wiring entry - Option 2 (for 2.5 or 2" conduit fitting)
2	Door latch (×2)	8	Non-backed up load wiring entry (for 2 or 1.5" conduit fitting)
3	Knockout for Main AC circuit breaker	9	Backed-up load wiring entry (for 2 or 1.5" conduit fitting)
4	Lock-out bracket	10	AC sense and control signal wiring entry (for 1 or 0.75" conduit fitting)
5	Manual Grid Connection Switch	11	Ground wiring entry (for 0.5" conduit fitting)
6	Knockout for non-backup circuit breaker		

# 2 Installing

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## Choosing a Location

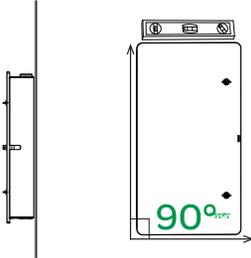
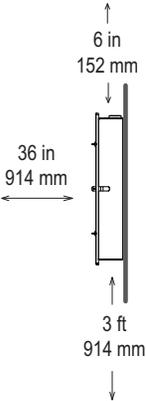
### **WARNING**

#### **IGNITION AND FIRE HAZARD**

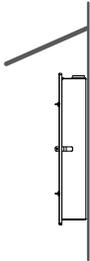
This equipment is not ignition protected. To prevent fire or explosion, do not install this product in locations that require ignition-protected equipment. This includes any confined space containing lead acid batteries or flammable chemicals such as natural gas (NG), liquid petroleum gas (LPG), or gasoline (Benzine/Petrol).

- Do not install in a confined space with machinery powered by flammable chemicals, or storage tanks, fittings, or other connections between components of fuel or flammable chemical systems.
- Do not install the BCS on a flammable surface. If local codes permit installation on a wood surface, ensure that the wood is flame retardant.
- Do not install the BCS near readily flammable materials such as cloth, paper, straw, or plastic sheeting. Keep flammable materials a minimum distance of 24 in (60 cm) from the top surface and 12 in (30 cm) from either side surface and the front of the Backup Control Switch.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**



**Vertical installation**



**NEMA Type 3R - Outdoor**  
shade recommended



**Do not install on or near**  
flammable materials

## Mounting the Backup Control Switch

**NOTE:** Obtain all necessary permits prior to starting the installation. **Installations must meet all applicable local and national codes and standards.**

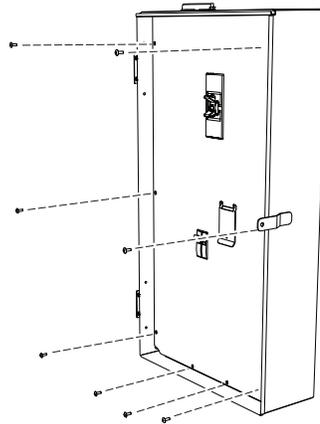
### **⚠ CAUTION**

#### **EQUIPMENT DAMAGE AND PERSONAL INJURY**

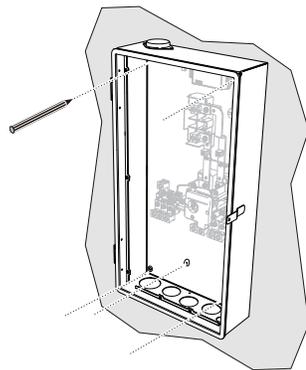
- The BCS weighs approximately 30 lbs (13.6 kg). To prevent personal injury, always use proper lifting techniques during installation.
- The mounting location and anchors must be suitable for the weight of the product. The BCS must be mounted vertically.

**Failure to follow these instructions can result in injury or equipment damage.**

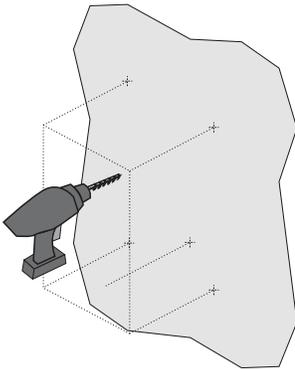
1. Open the BCS's door, remove the eight screws from the dead front panel, and then remove the panel. Save the eight screws and the panel for reinstallation



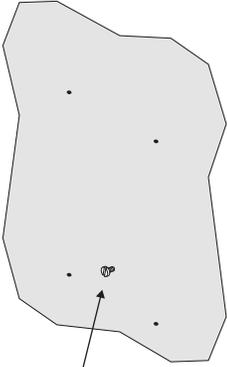
2. Position the BCS on the wall using a level, and then mark the locations for five 1/4" (M6) lag bolts onto an appropriate mounting surface.



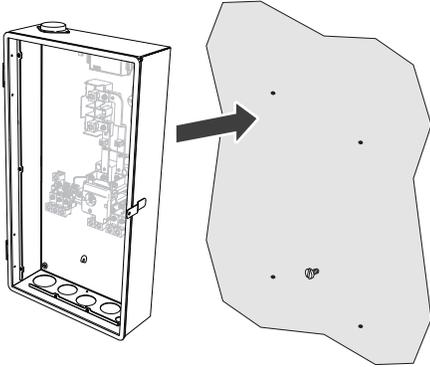
3. Pre-drill holes into the mounting surface.



4. Partially install the middle bottom bolt into the wall.

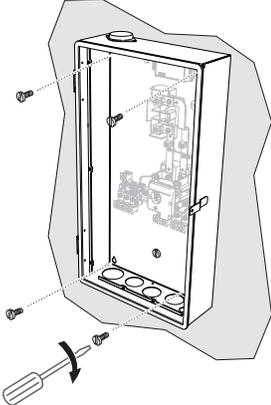


5. Install the unit over the middle bolt that was installed in step 4.



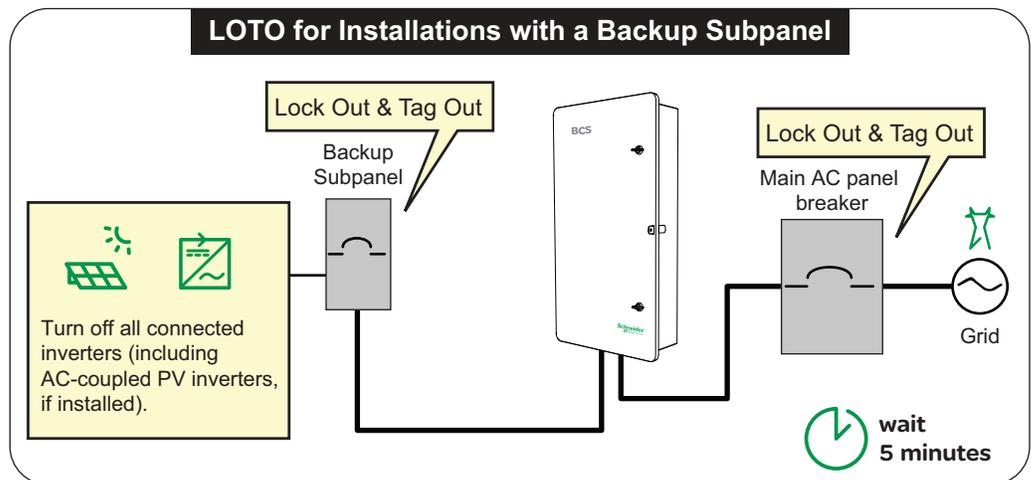
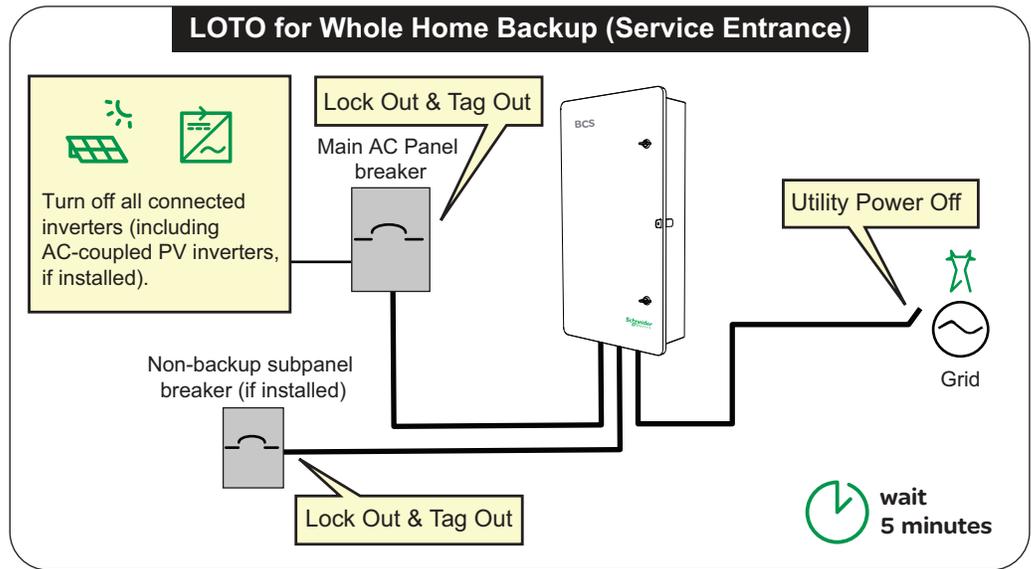
6. Using a manual screwdriver, fasten the BCS to the mounting surface using four additional 1/4" (M6) lag bolts and the supplied sealing washers. Do not overtighten.

1/4" lag bolts and sealing washers



# Lock-out and Tag-out Procedure

De-energize, lock-out and tag-out the BCS from all power sources.



For more information about the two configurations above, see System Diagrams on page 58.

## Wiring the BCS

**Review Lock-out and Tag-out Procedure on page 21 before working.**

**NOTE:** The BCS includes a manual override switch, and an external bypass switch is not required.

### **⚠ ⚠ WARNING**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, AND FIRE**

DO NOT install a bypass switch that bypasses the BCS unless the BCS and all storage inverters are bypassed as a complete sub-system. Refer to the *XW Pro Multi-unit Design Guide (document number 990-91373)* for information.

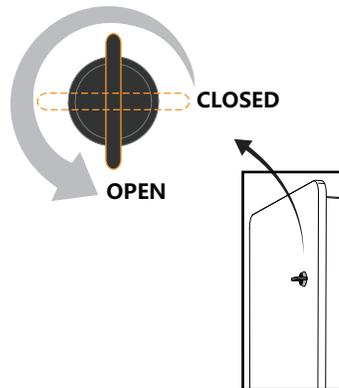
**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

**NOTE:** The top conduit hole is provided as an option for routing cables to the optional Main AC circuit breaker only (L1, L2, N). See Features on page 15 for bottom entry routing.

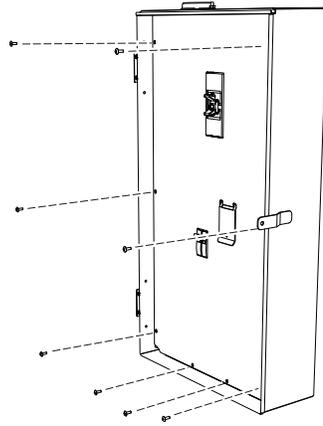
For more information about electrical configuration, see "Electrical Configurations" on page 41.

**To prepare the BCS for wiring:**

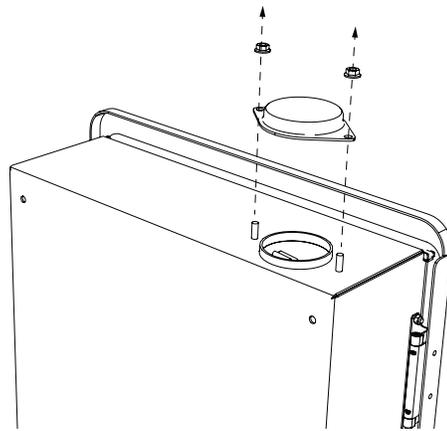
1. Open the two door latches.



2. Remove the 8 Phillips screws from the deadfront panel, and remove the panel.

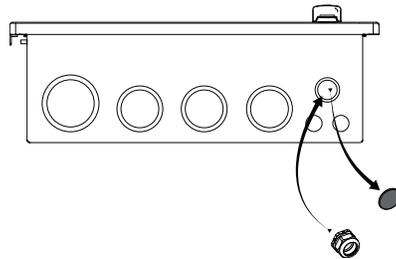


3. If needed, remove the cap and install a Square D Series B conduit hub (see table below).



<b>Hub Catalog Number</b>	B075	B100	B150	B200	B250
<b>Conduit Size</b>	3/4"	1.0"	1.5"	2.0"	2.5"

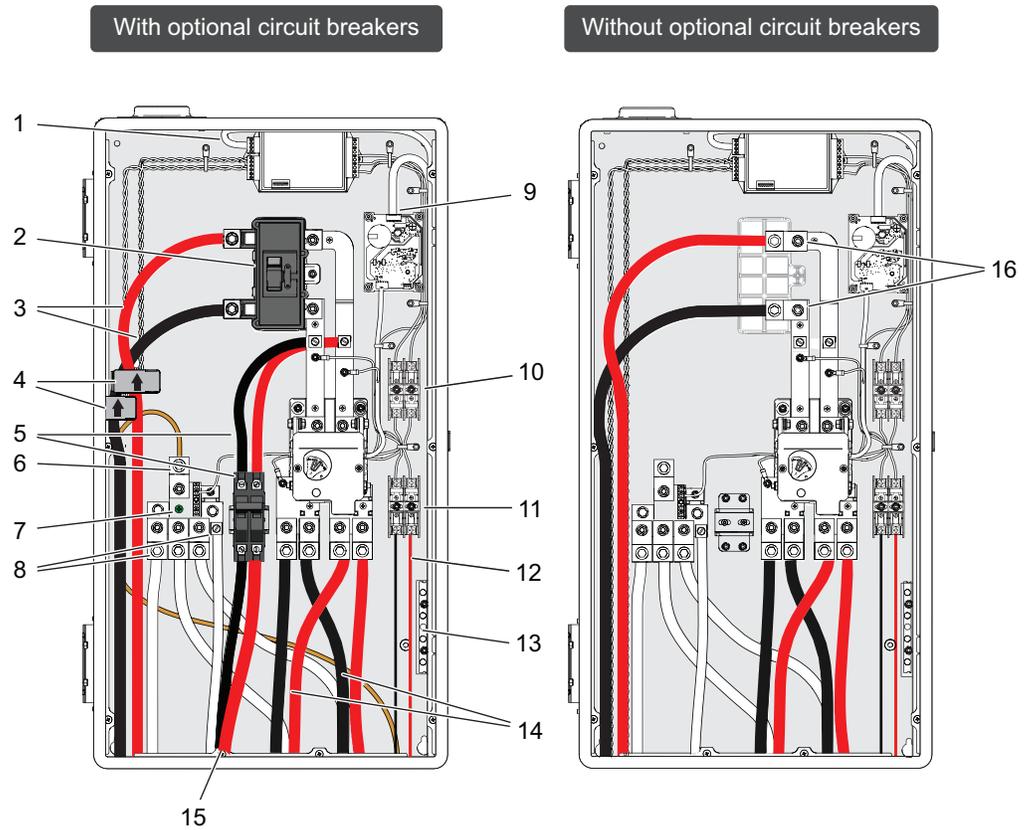
4. Remove the knockouts from the bottom of the BCS. (see "What's in the Box" on page 13).



5. Starting with the far right conduit hole, install conduit fittings (suitable for desired ingress rating).

## Wiring Overview

The figures below show examples of the BCS wiring with and without the optional main and non-backup circuit breakers.



**NOTE:** The illustrations above are only examples, and do not show the optional top entry routing of the AC Grid input wires.

1	RS-485 cable (power meter to InsightHome or InsightFacility)	9	PCB J2 connector and cable
2	Optional Main AC circuit breaker	10	Fuse holders (Power Meter)
3	AC Grid input (L1/L2) wiring	11	Fuse holders (AC voltage sensing)
4	Current Transformer (x2)	12	AC voltage sense wiring
5	Optional non-backup breaker and wiring	13	Ground terminal
6	Neutral terminal for optional Main AC circuit breaker (for top wiring entry)	14	Output (L1/L2) wiring to XW Pro inverter (AC1) and main AC panel
7	Bonding screw (Service Entrance installations only)	15	Non-backup circuit breaker wiring (if installed)
8	Neutral terminals (for bottom wiring entry)	16	Grid input (L1/L2) direct busbar connection (if no main circuit breaker is installed)

## Connecting to Inverter Aux Terminals

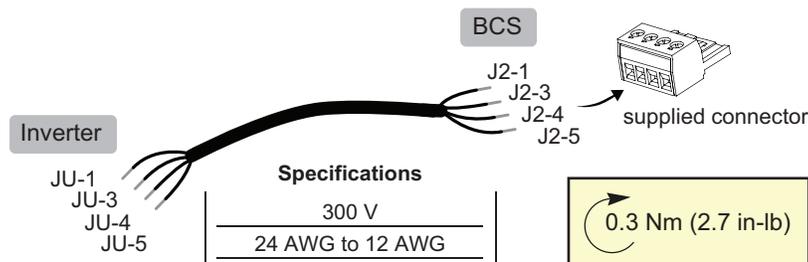
The BCS's auxiliary power is supplied by the XW Pro inverter's auxiliary port. For more information, see the *XW Pro Installation Guide (document number 990-91228)* and *XW Pro Multi-unit Design Guide (document number 990-91373)*.

### XW Pro Network Board AUX Port Connector Terminals and Functions

Table 1 Network board AUX Port Connector Terminals and Functions

Pin	Reference	Name
JU-1	AUX+12V	+12 VDC User Voltage Supply
JU-2	Not used in multi-unit installations. See the <i>XW Pro Multi-unit Design Guide (document number 990-91373)</i> .	
JU-3	AUX-COM	Common Ground Reference
JU-4	EXT_TS_OUT	External Transfer switch: Output signal
JU-5	EXT_TS_IN	External Transfer switch: Input signal

Connect wires from the BCS's PCB J2 terminals (see "Wiring the BCS" on page 22) to the primary inverter's JU terminals. **NOTE:** Max. output is 250 mA.



## Option 1: Service Entrance Installation

### **⚠️ ⚠️ WARNING**

#### HAZARD OF ELECTRIC SHOCK, EXPLOSION, AND FIRE

- For Service Entrance installations, the supplied bonding screw must be installed.
- Verify that only one neutral-to-ground bond exists in the system. Having more than one neutral-to-ground bond in a system may violate local codes, create a shock or fire hazard, or cause sensitive equipment to malfunction.

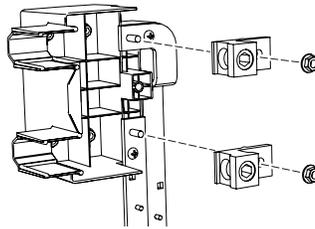
**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

When the BCS is installed as a Service Entrance, a main circuit breaker must be installed in the BCS according to NEC 230 part VII (230.90). The following Square D circuit breakers are recommended (see the *Instruction Bulletin for QOM2 Main Circuit Breaker for QO® Series S\_\_ and HOM® Series S\_\_ Load Centers (document number 48940-014-05)*).

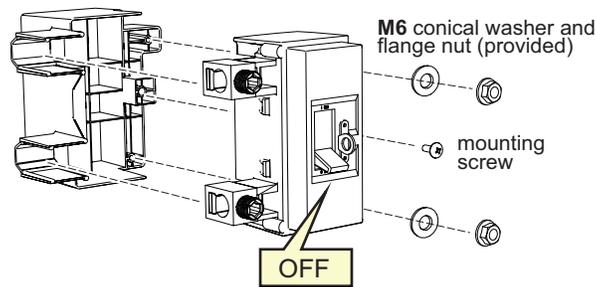
Part Number	Current Rating	Voltage Rating	Interrupting Rating
QOM2100VH	100 A	120/240 VAC	22 kA
QOM2125VH	125 A	120/240 VAC	22 kA
QOM2150VH	150 A	120/240 VAC	22 kA
QOM2175VH	175 A	120/240 VAC	22 kA
QOM2200VH	200 A	120/240 VAC	22 kA

**To install the main circuit breaker:**

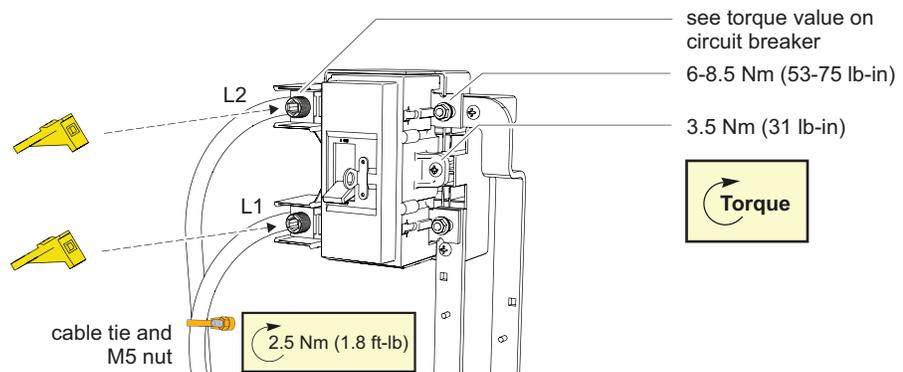
1. Remove the lugs.



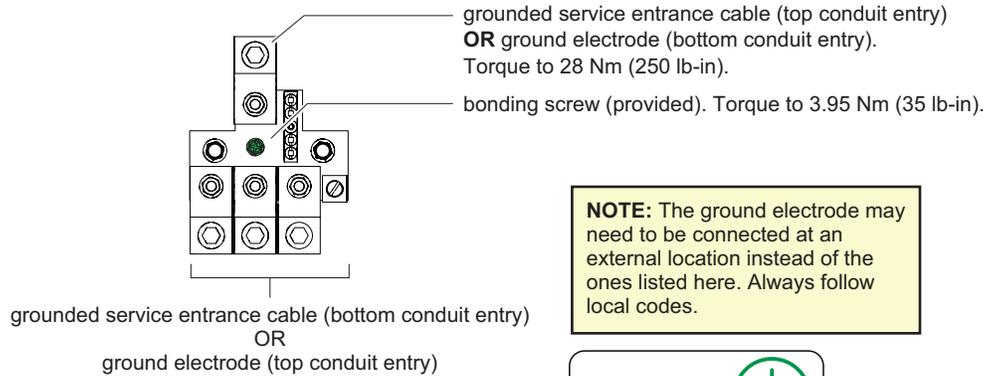
2. Install the circuit breaker.



3. Connect L1/L2, and install Touch Safe Guards (see circuit breaker manual).



4. Connect the grounded service entrance cable/ground electrode, and bonding screw to neutral terminals.



**NOTE:** The ground electrode may need to be connected at an external location instead of the ones listed here. Always follow local codes.



Apply label near ground electrode connection

5. Remove the main circuit breaker knockout from the deadfront panel, and then apply the “Service Disconnect” label (see circuit breaker manual).

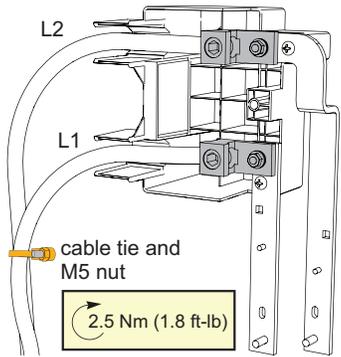
### Option 2: Subpanel Backup Installation

<p><b>⚠ WARNING</b></p> <p><b>RISK OF FIRE AND EQUIPMENT DAMAGE</b></p> <p>For Subpanel Backup Installations, <b>DO NOT</b> install the supplied bonding screw.</p> <p><b>Failure to follow these instructions can result in death, serious injury, or equipment damage.</b></p>
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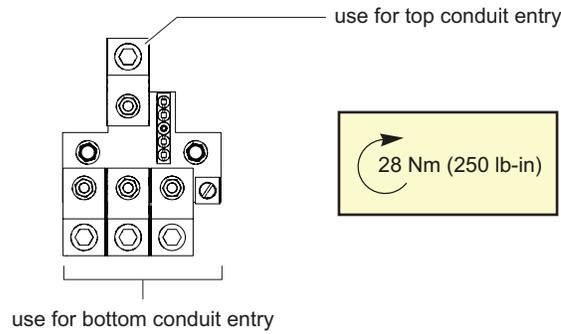
When the BCS is not connected to the grid service entrance, a main circuit breaker is not required. Use the box lug terminals to connect L1 and L2 in the BCS to a main AC (grid) panel.

**To connect the BCS to the main AC panel:**

1. Connect grid L1/L2 cables (4 AWG to 300 kcmil) to the pre-installed box lugs at L1/L2 busbars.



2. Connect the Neutral cable to the neutral terminal.

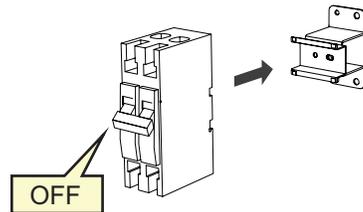


## Install an Optional Non-backup Circuit Breaker

A non-backup subpanel can be connected to the BCS by installing an optional non-backup circuit breaker to feed the subpanel.

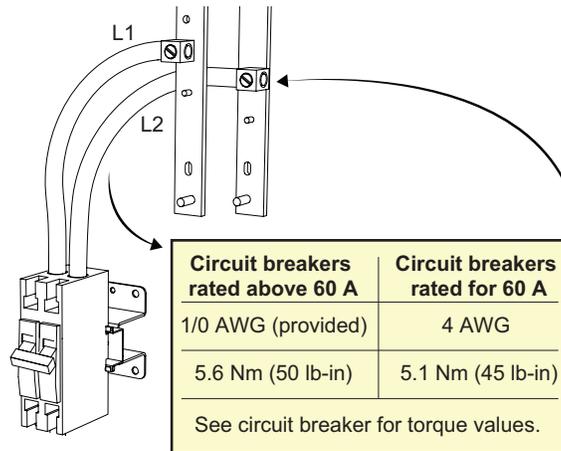
### To install the non-backup circuit breaker:

1. Install the circuit breaker on the DIN rail provided.

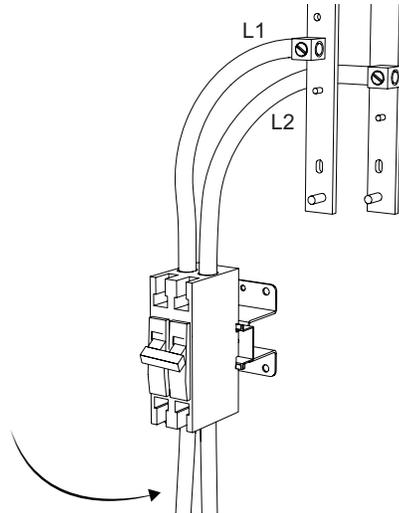


**Schneider Electric QOU series**  
60 to 125 A, 2-pole

2. Install wires from the circuit breaker to the terminals on the L1/L2 busbars.



3. Install L1/L2 and Neutral wires. See "Wiring the BCS" on page 22.



4. Remove the knockout from the deadfront panel.

## Power Meter Connections

The BCS comes with the WattNode® Modbus WND-WR-MB power meter.

## Install Current Transformers

Install the two pre-connected CTs inside the BCS to measure Grid current. For installation instructions and guidelines, see:

- *WattNode Modbus Electric Power Meter Installation Manual*
- *Accu-cT® ACTL-0750 Series Split-Core Current Transformer Installation Guide*

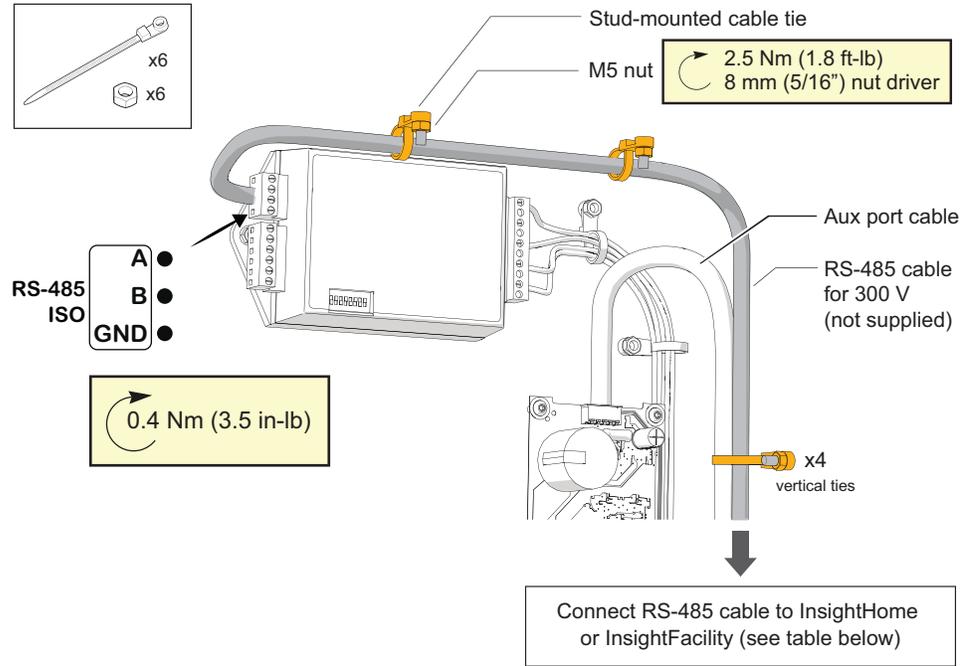
**NOTES:** • Point the "SOURCE" arrow on each CT toward residential loads (see System Diagrams on page 58). If the CT is mounted backwards, the measured power will be negative. • Avoid extending the CT wires beyond 100 ft (30 m). For more information, see the WattNode Installation guide above.

1. Locate the two pre-connected CT's inside the BCS, and install the CTs in one of the following ways:
  - a. For Whole Home Backup (Service Entrance) installations, install the CTs over the AC Grid input cables (L1/ L2) from the Grid (see "Wiring the BCS" on page 22).
  - b. When the BCS is between the Main AC panel and a subpanel (Subpanel Backup), install the CTs over the AC Grid input cables (L1/ L2) between the Grid and the Main AC panel.
2. Fasten the CT to each conductor with a cable tie.

## Install the RS-485 Cable

For more information, see the *WattNode Modbus Electric Power Meter Installation Manual*.

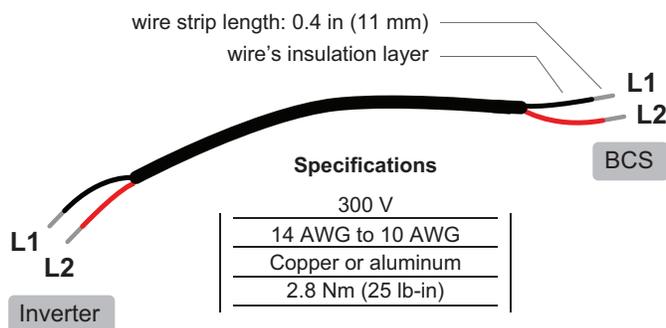
**NOTE:** The Modbus X terminal is not active on the power meter.



Power Meter	InsightHome	InsightFacility (Modbus 1)	InsightFacility (Modbus 2)
Common: C	Pin 7: GND ISO	Pin 16: ISO2 RS-485 GND	Pin 22: ISO2 RS-485 GND
Inverting pin: A-	Pin 11: RS-485 B ISO	Pin 20: ISO2 RS-485 1B	Pin 26: ISO2 RS-485 2B
Non-inverting pin: B+	Pin 9: RS-485 A ISO	Pin 18: ISO2 RS-485 1A	Pin 24: ISO2 RS-485 2A

## Install AC Voltage Sense Wiring

Using the specifications below, connect the AC voltage sense wires from the BCS to the primary inverter's AC2 input terminals (see "Wiring the BCS" on page 22):



## Neutral Connections

These are the required neutral connections. See "System Diagrams" on page 58.

Connection	Qty	Wire Specifications	Torque
Grid/main panel	1	4 AWG to 300 kcmil	28 Nm (250 lb-in)
Backed-up load	1-2*	4 AWG to 300 kcmil	28 Nm (250 lb-in)
Non-backed up load <sup>1</sup>	1	12 AWG to 1/0 AWG	<ul style="list-style-type: none"> <li>• 12 to 4 AWG: 5.1 Nm (45 lb-in)</li> <li>• 3 to 1/0 AWG: 5.6 Nm (50 lb-in)</li> </ul>

<sup>1</sup>When optional non-backup circuit breaker is installed.      \*Install one neutral wire per load.

## Neutral Disconnect Procedure (Service Entrance Installations Only)

This procedure can be used to disconnect the neutral wires when necessary for testing or other procedures.

<b>⚠ DANGER</b>
<p><b>HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE</b></p> <ul style="list-style-type: none"> <li>▪ Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.</li> <li>▪ This equipment must only be installed and serviced by qualified electrical personnel.</li> </ul> <p><b>Failure to follow these instructions will result in death or serious injury.</b></p>

**NOTE:** The grounded service entrance wire, the grounding electrode wire (if present), and the green neutral-ground bonding screw must remain connected to the neutral bus bar.

1. Verify that LOTO for Whole Home Backup (Service Entrance) is still applied.
2. Disconnect the load-side neutral wires from the neutral bus in the BCS:
  - a. Disconnect the 1 to 2 neutral wires for backed-up loads (depending on how many are installed).
  - b. Disconnect the neutral wire for the non-backed up load, if present.
3. Once testing is completed, neutral wires must be reconnected to their original positions.

## Ground Connections

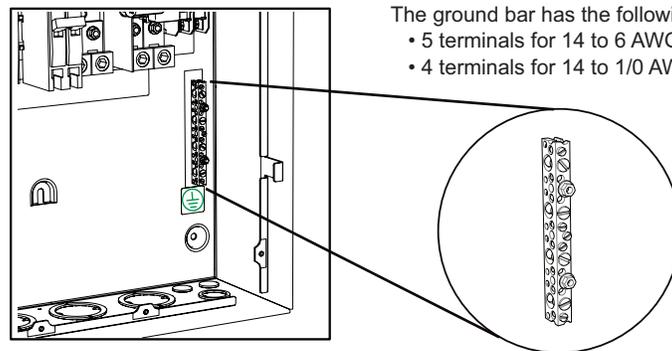
**⚠ WARNING**

**UNGROUNDING EQUIPMENT**

Equipment ground terminals must be reliably connected to ground by appropriately sized grounding conductors. All installations must comply with national and local codes. Consult national and local codes for specific grounding and bonding requirements.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Connect ground wires to the ground terminal bar inside the BCS (shown below).



The ground bar has the following terminals:

- 5 terminals for 14 to 6 AWG
- 4 terminals for 14 to 1/0 AWG

Required Ground Connection	Qty	Torque
Ground Electrode connected to BCS Neutral busbar <sup>2</sup> OR main AC panel connected to ground bar <sup>3</sup>	1	<b>Ground bar (small terminal):</b> <ul style="list-style-type: none"> <li>■ 14-10 AWG : 2.3 Nm (20 lb-in)</li> <li>■ 8 AWG: 2.8 Nm (25 lb-in)</li> <li>■ 6 AWG: 4.0 Nm (35 lb-in)</li> </ul>
Backed-up load	1-2*	<b>Ground bar (large terminal):</b> <ul style="list-style-type: none"> <li>■ 14-10 AWG : 4.0 Nm (35 lb-in)</li> <li>■ 8 AWG: 4.5 Nm (40 lb-in)</li> <li>■ 6-4 AWG: 5.1 Nm (45 lb-in)</li> <li>■ 3-1/0 AWG: 5.6 Nm (50 lb-in)</li> </ul>
Non-backed up load <sup>4</sup>	1	

<sup>2</sup>Service Entrance installations. See "Option 1: Service Entrance Installation" on page 25.

<sup>3</sup>NON-Service Entrance installations. See " Option 2: Subpanel Backup Installation" on page 27

<sup>4</sup>When optional non-backup circuit breaker is installed. See "Install an Optional Non-backup Circuit Breaker" on page 28.

\*Install one ground wire per load

# 3 Commissioning

## What's in This Chapter?

- Commissioning Checklist ..... 34
- Start-Up Procedure ..... 34
  - Inspect System Connections ..... 35
  - Update Firmware ..... 35
  - Configure the System ..... 35
  - Verify System Operation ..... 36
  - Close the BCS ..... 39

## Commissioning Checklist



**Before powering on the inverter, perform the following inspections:**

- All clearances are correct (see Choosing a Location on page 17).
- The BCS is stable and fixed to the wall, per the instructions in this guide.
- There are no objects such as tools or extra screws inside or on top of the BCS.
- The cables are routed through cable glands or conduits and protected against potential mechanical damage. Do not over-tighten the sealing locks, if used.
- The wires are properly and firmly connected.
- There is no damage to the door gasket.
- The product labels, and those described in "Wiring the BCS" on page 22 are installed and affixed permanently.
- Reinstall the deadfront panel using the eight Phillips screws. Torque to 2 Nm (17.7 lb-in).
- XW Pro inverter(s) and InsightHome/InsightFacility are installed and commissioned.
- Verify that you have the latest firmware installed on your gateway device (go to <https://solar.schneider-electric.com/product/insighthome-and-insightfacility-edge-devices/> > **Downloads** > **Firmware**)
- Verify that you have the latest firmware installed on your XW Pro inverters (go to <https://solar.se.com/us/en/product/xw-pro-120-240v> > **Downloads** > **Firmware**)
- Check that you have a laptop with Microsoft® Windows® 7 or later, or Mac OS® X 10.4.8. or later at the commissioning site, and that you have valid login credentials for InsightLocal.

## Start-Up Procedure

### **DANGER**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462EN 50110.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Before energizing the BCS, verify that no tools or materials have been left inside.
- Never operate energized with covers removed.
- Energized from multiple sources. Before removing covers identify all sources, de-energize, lock-out, and tag-out and wait 5 minutes for circuits to discharge
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.

**Failure to follow these instructions will result in death or serious injury.**

## **NOTICE**

### **RISK OF DAMAGE TO THE GENERATOR OR BATTERY INVERTER**

In a system with a BCS and generator acting as AC source (connected to AC1), Grid support, Sell and Load Shave functions must be disabled on primary and secondary XW Pro units. XW Pro inverters will not be able to regulate the power to match AC loads and may backfeed AC power into the generator. In addition, IEEE 1547 - 2003 grid code must be used for 60 Hz to avoid smart grid interactive functions interfering with generator.

**Failure to follow these instructions can result in equipment damage.**

## **Inspect System Connections**

1. Verify that the BCS and XW Pro inverter system is disconnected from any AC and DC sources (Grid and/or Generator and battery), and open all AC and DC breakers.
2. Verify that all the wiring on XW Pro inverter has been properly done.
  - a. **AC1** connected to the BCS.
  - b. **AC2** of the primary XW Pro inverter is connected to the AC source side of the BCS to detect the status of the AC source voltage.
  - c. **AC Out** unterminated (not connected to anything).
  - d. **AUX port** of the Primary unit connected to the BCS PCB (Figure 3 on page 44), connected to the load panel.
  - e. All units (XW Pro, Battery Monitor, MPPT Charge Controller, etc.) are connected through Xanbus in a daisy chain configuration with terminators.
  - f. All AC Sync Cables are connected between the XW Pro units without terminators.
  - g. All Sync Cables are connected between the XW Pro units without terminators.
3. Verify that all AC breakers at the output of the XW Pro inverters (**AC1**) are open.

## **Update Firmware**

1. Verify that all tools are removed and all safety covers/panels on all devices are installed.
2. Verify that the XW Pro inverter is in **Standby** mode.
3. Close the DC breakers for all XW Pro inverters (battery) to power up the system.
4. Verify that the firmware version installed on each Schneider Electric product (XW Pro, InsightHome, MPPT, AGS, etc) corresponds to the latest released version (available on <https://www.se.com/>). If not, download latest firmware from the product web pages, and then update each device. Follow the sequence described in the [online commissioning guide](#).

## **Configure the System**

**To configure the system:**

1. Using InsightLocal, assign proper battery association to match the wiring of the system.
2. Configure the XW Pro settings according to the desired operating mode (see *XW Pro Owner's Guide (document number 990-91227)*).
3. If a generator is used as an AC source, complete the following additional steps for the primary and secondary XW Pro inverters:
  - a. Disable Sell.
  - b. Select IEEE 1547-2003 grid code for 60 Hz. **NOTE:** The region code must be applied even in an off-grid system.

## Configure External Contactor (BCS) Settings

**IMPORTANT:** To verify that the External Contactor has been enabled in InsightLocal, refresh the web page and verify that the toggle switch is still in the Enabled position. If this setting is not enabled properly, the voltage sensing fuses will blow.

- Using InsightLocal, enable the External Transfer Contactor<sup>1</sup> of all units.

## Verify System Operation

### Perform the following operation checks:

1. With the load breakers turned OFF, verify that the output voltage at the AC1 terminals of each XW Pro inverter is within  $\pm 0.5$  VAC range (measured at the AC Load terminal of each inverter, with the XW Pro grid forming and AC source disconnected). To do the verification, you will have to temporarily put the units in **Operating** mode, with the AC source disconnected.
  - a. If the units are not within the range, recalibrate the units using InsightLocal, following the instructions in AC Output Voltage Configuration and Calibration in *XW Pro Multi-unit Design Guide (document number 990-91373)*.
  - b. Return the units to **Standby** mode.
2. Configure one unit as single or split-phase Primary and all the other ones as single or split-phase Secondary units, with different Device ID.
3. Under a **No Load** condition, close every breaker at the output of the XW Pro.
4. Put the units in **Operating** mode.
5. Verify that the system is generating a stable AC output voltage.
6. Load the system and verify that all the units are supplying the correct phase power to the load.

---

<sup>1</sup>This feature controls the external contactor (BCS) according to the status of the power source's AC voltage, detected on AC2. When this feature is Enabled the following occurs:

- When voltage source is qualified at the AC2 port, then the AUX port provides 12V across JU-1 and JU-4.
- When there is no voltage source qualified at the AC2 port, then the AUX port acts as open circuit across JU-1 and JU-4.

7. Turn on the AC source.
8. Verify that the AC source voltage and frequency is within specified range, and the AC1 LED is blinking on the Primary unit.
9. Verify that after the LED starts blinking, the Primary unit's **AUX port** generates a 12 V output which will close the relay inside the BCS or the external contactor and connect the XW Pro units to the AC source. The 12 V output can be verified across JU1(+) and JU4.
10. Verify that once the Primary unit has qualified the AC source, then the Secondary units do the same and the AC1 LED goes solid green.

### Check Voltage and Switch Operation (Service Entrance Installations)

1. Verify that the XW Pro inverter is in **Standby** mode.
2. Verify that the Manual Grid Connection Switch in the BCS is in the "Disconnected from Grid" position.
3. Coordinate with the grid operator to restore grid power to the BCS.
4. In the BCS, close the Main AC circuit breaker.
5. In InsightLocal, confirm the AC2 voltage input of the primary inverter:
  - a. AC2 Voltage: 240 V L-L
  - b. AC2 L1 Voltage: 120 V L1-N
  - c. AC2 L2 Voltage: 120 V L2-N
6. Set the XW Pro inverter to **Operating** mode. Confirm that the Manual Grid Connection Switch moves to "Connected to Grid". **Note:** The relay will change state in approximately 40 s with the default inverter to grid transfer time delay.
7. In the BCS, open the main AC circuit breaker. Confirm that the Manual Grid Connection Switch has moved to "Disconnected from Grid". If applicable, the BCS may be used in a non-service entrance application, in which case a main grid breaker will be located elsewhere up stream.
8. In InsightLocal, confirm that the primary inverter is providing voltage:
  - a. AC1 Voltage: 240 V L-L
  - b. AC1 L1 Voltage: 120 V L1-N
  - c. AC1 L2 Voltage: 120 V L2-N
9. Close the main AC circuit breaker.

### Check Voltage and Switch Operation (Subpanel Backup Installations)

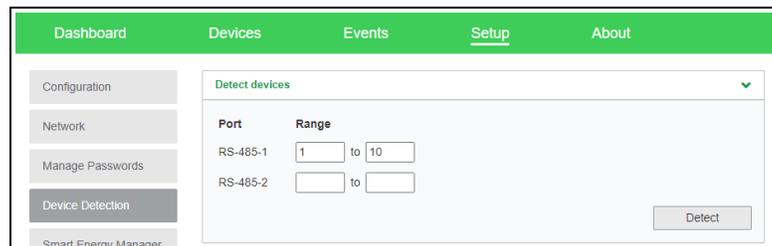
1. Verify that the XW Pro inverter is in **Standby** mode.
2. Verify that the Manual Grid Connection Switch in the BCS is in the "Disconnected from Grid" position.
3. In the Main AC panel, close the breaker for the BCS if applicable.

4. In InsightLocal, confirm the AC2 voltage input of the primary inverter:
  - a. AC2 Voltage: 240 V L-L
  - b. AC2 L1 Voltage: 120 V L1-N
  - c. AC2 L2 Voltage: 120 V L2-N
5. Set the XW Pro inverter to **Operating** mode. Confirm that the Manual Grid Connection Switch moves to "Connected to Grid". **Note:** The relay will change state in approximately 40 s with the default inverter to grid transfer time delay.
6. In the Main AC panel, open the circuit breaker for the BCS. Confirm that the Manual Grid Connection Switch moves to "Disconnected from Grid".
7. In InsightLocal, confirm that the primary inverter is providing voltage:
  - a. AC1 Voltage: 240 V L-L
  - b. AC1 L1 Voltage: 120 V L1-N
  - c. AC1 L2 Voltage: 120 V L2-N
8. Close the circuit breaker for the BCS.

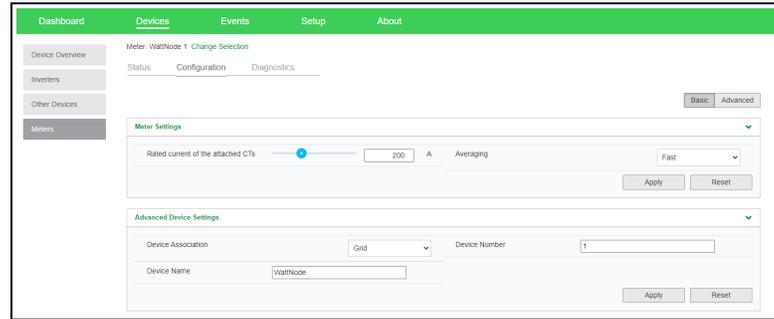
## Verify Power Meter Operation

To establish communication with the InsightHome or InsightFacility:

1. Go to **Setup > Configuration > Modbus Settings** and set the following:
  - a. **Baud rate:** 19200
  - b. **Parity:** none
  - c. **Stop bits:** 1
  - d. **Error Limit:** 1
  - e. **Timeout (ms):** 500
2. Go to **Setup > Device Detection** and then expand the **Detect devices** menu.
3. On the RS-485 Port that is connected to the power meter, enter the Modbus address range. The address is the Modbus secondary address of the meter.



4. Click **Detect**. Once the power meter is detected and online, it will appear as a configurable device.
5. Go to **Devices > [your power meter] > Configuration**.
6. Under **Meter Settings**, enter the **Rated current of attached CTs:** 200 A.



7. Set Averaging to **Fast**.
8. Under **Advanced Device Settings**, configure the **Device Association**, based on the location of the CTs in the system.
9. Check that the power meter is tracking the power flow accurately.

## Close the BCS

**Once all commissioning and voltage checks are complete:**

1. Install the small screw to fasten the Manual Grid Connection Switch cover closed.
2. Close and latch the BCS.



# 4 Electrical Configurations

## What's in This Chapter?

- Electrical Configuration (Single/Split-Phase with BCS) ..... 42
  - Service Entrance Configuration ..... 42
  - Subpanel Backup Configuration ..... 43
  - Power Ratings (Single/Split-Phase with BCS) ..... 45

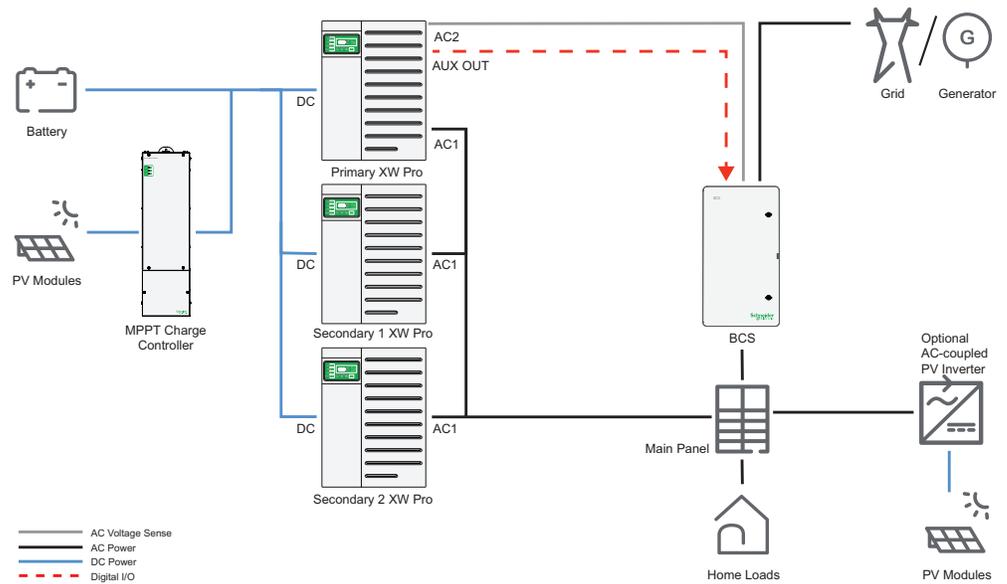
# Electrical Configuration (Single/Split-Phase with BCS)

**NOTE:** For BCS configurations, it is NOT recommended to install a manual bypass switch.

## Service Entrance Configuration

**NOTE:** A main breaker must be installed in the BCS for Service Entrance applications.

Figure 1 Single/split-phase – with BCS service entrance configuration – either AC or DC PV-coupling is supported.



# Subpanel Backup Configuration

Figure 2 Single/split-phase – with BCS subpanel backup configuration – either AC or DC PV-coupling is supported.

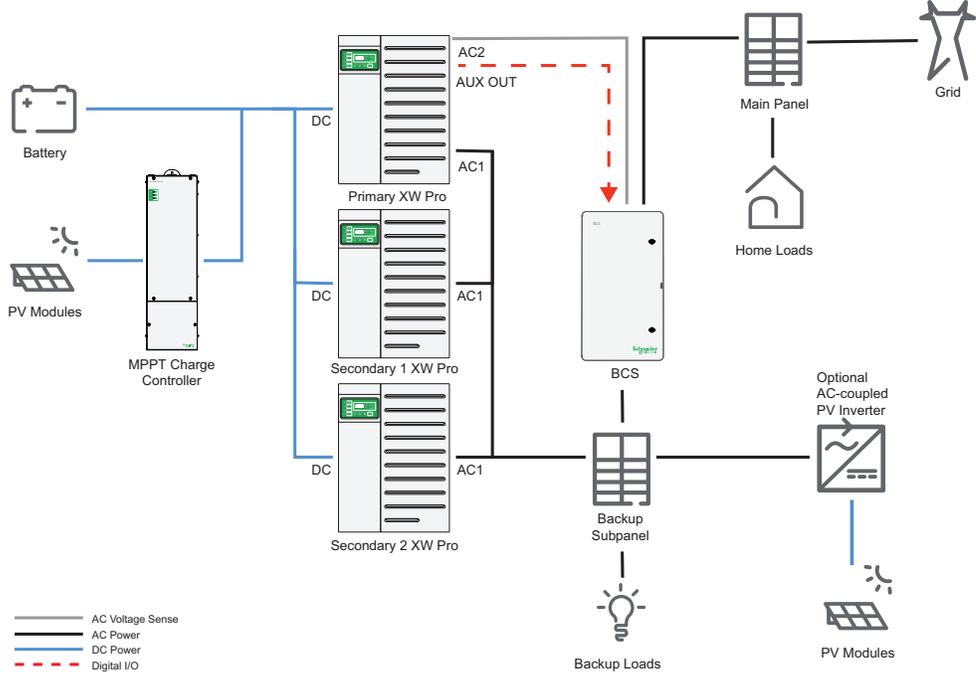
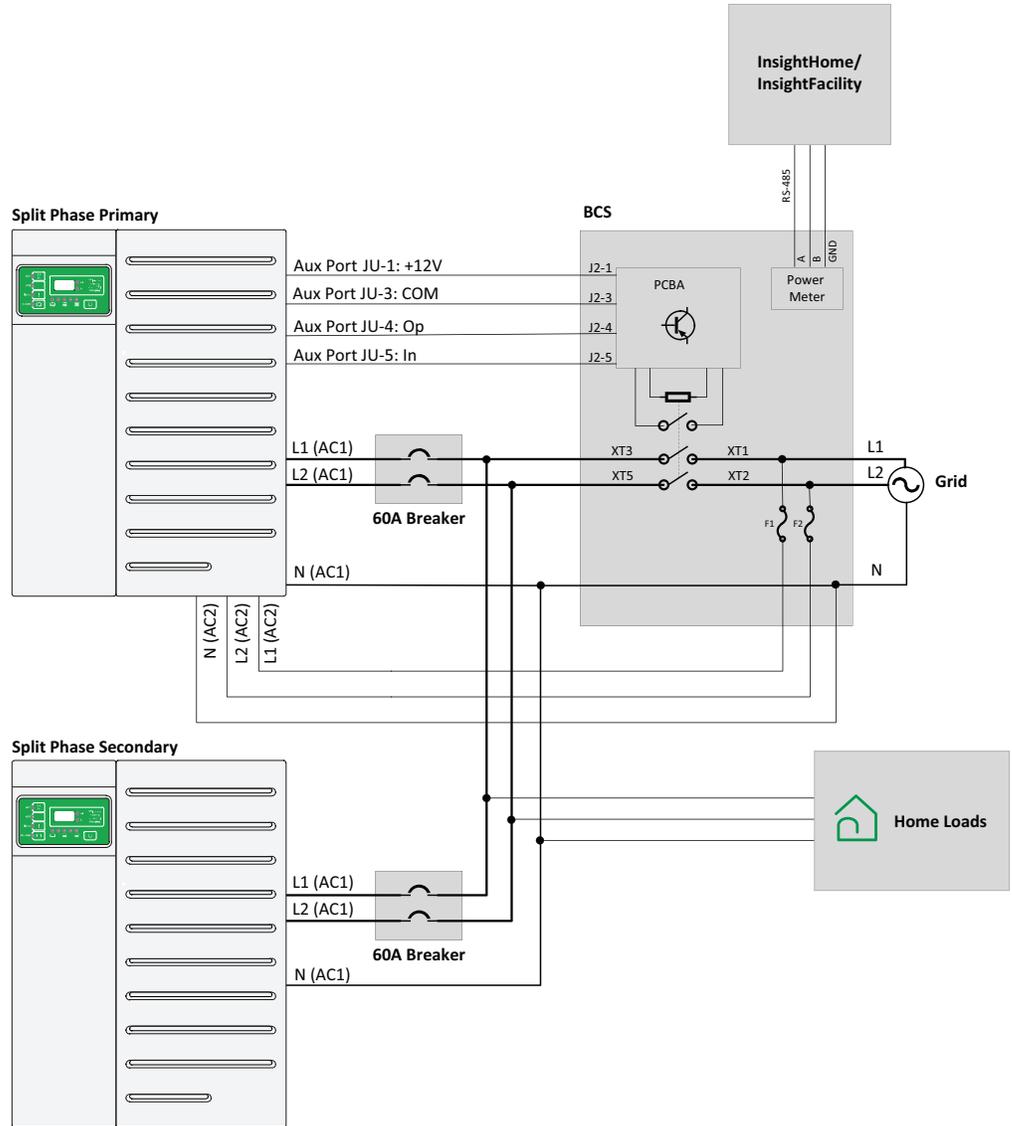


Figure 3 BCS AUX port and mains connection diagram (split-phase 120V/240V configuration shown)



## Power Ratings (Single/Split-Phase with BCS)

When more power is needed than a single XW Pro can provide, multiple units can be connected in parallel to create a multi-unit system with an increased power rating.

If the AC current rating of the load is higher than 60 A and the multi-unit system needs to be connected to an AC source, then a BCS or external contactor is required to collectively connect the system to the AC source instead of relying on the asynchronous nature of the 60 A transfer relays internal to each XW Pro. For specific BCS and contactor part numbers see *XW Pro Multi-unit Design Guide (document number 990-91373)*. Power limitations of this configuration are specified in and Table 2 below.

Table 2 XW Pro multi-unit power system ratings for NA models with BCS or external contactor

Unit	XW Pro 6848 (120V/240V Configuration)			
	Continuous (kVA)		Peak (kVA)	Grid-Sell (kVA)
	@25°C	@40°C	@25°C (30-min)	
2-unit	13.6	12.0	17.0	12.0
3-unit	20.4	18.0	25.5	18.0
4-unit	27.2	24.0	34.0	24.0

\* Continuous and grid-sell power in single- and split-phase systems is limited by 80% breaker derating rule of NEC when using the maximum 60A breaker which is required with all XW Pro models.

\*\* Peak power is limited by the trip characteristics of the maximum 60A breaker .

### Features supported by this configuration

- Off-grid and grid-connected systems
- Backup
- Sell power back to grid
- DC coupled or AC coupled PV
- PV self-supply with grid sell limiting (with compatible power meter)

Refer to Features that are Not Available in Configuration 1 (External Transfer Switch) and Configuration 4 (External Contactor) in *XW Pro Multi-unit Design Guide (document number 990-91373)* for a list of XW Pro limitations for this application.



# 5 Operation

## What's in This Chapter?

- Using the BCS's Manual Grid Connection Switch ..... 48
- Resetting Relay Control to the Backup Control Switch Inverter ..... 49

## Using the BCS's Manual Grid Connection Switch

**IMPORTANT:** The following procedure must only be used to reconnect the home to the grid if grid power is available and the system is offline. This procedure should not be used to manually open the relay.

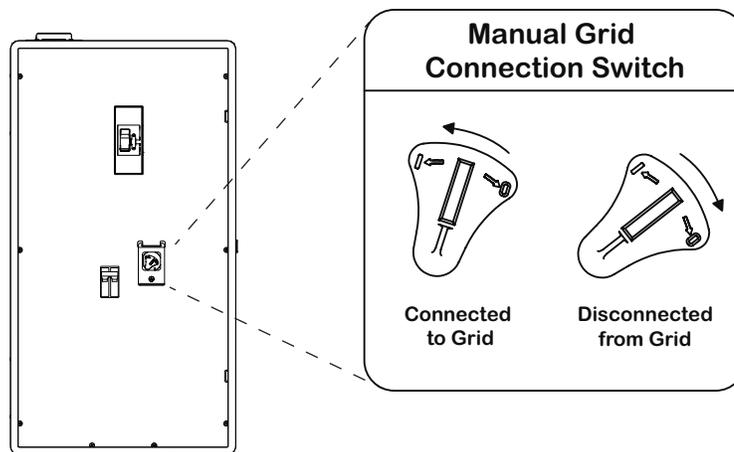
### **DANGER**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE**

- Do not operate the Manual Grid Connection Switch in the BCS while any backup power systems are on.
- Turn off all connected backup power sources, including but not limited to inverters, energy storage systems, and generators before using the Manual Grid Connection Switch to connect to the grid.
- Close and secure the switch cover once manual grid connection is complete.

**Failure to follow these instructions will result in death or serious injury.**

1. Open the AC disconnect devices for all power sources in the home:
  - a. Open the AC disconnect device for each XW Pro inverter.
  - b. If AC-coupled PV inverters are installed in the system, open the disconnect device for each inverter.
  - c. If a generator is installed in the system, open the disconnect for the generator.
2. Open the BCS door, and then remove the small Philips head screw from the plastic cover over the Manual Grid Connection Switch.
3. Lift up the front cover, and then turn the Manual Grid Connection Switch to the "Connected to Grid" position (see image below).



4. Reinstall the Philips head screw to secure the plastic cover over the Manual Grid Connection Switch, and then close the BCS door.
5. Close the disconnect devices described in step 1, as needed.
6. Using InsightLocal, verify that grid power has been restored to the home by confirming the following AC2 voltage input of the primary inverter.

- a. AC2 Voltage: 240 V L-L
- b. AC2 L1 Voltage: 120 V L1-N
- c. AC2 L2 Voltage: 120 V L2-N

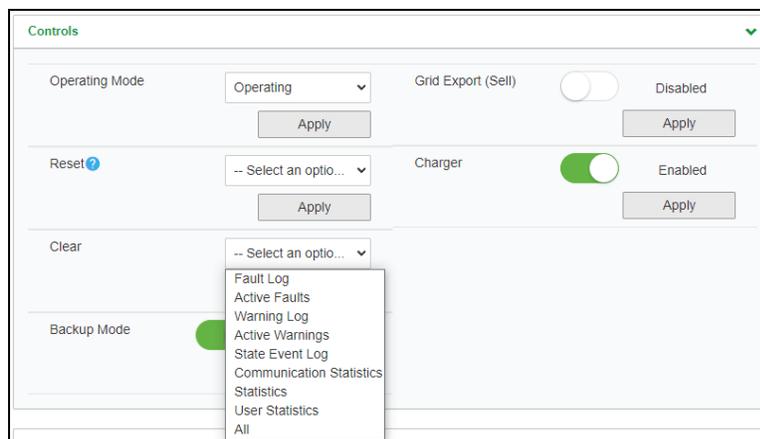
**NOTE:** Fault Id 72 may be present on the primary inverter due to a mismatch between the commanded and feedback state of the relay. For more information, see "Resetting Relay Control to the Backup Control Switch Inverter" below.

## Resetting Relay Control to the Backup Control Switch Inverter

Use this procedure after using the BCS's Manual Grid Connection Switch (see "Using the BCS's Manual Grid Connection Switch" on the previous page), to take the BCS out of manual mode, and return relay control to the Backup Control Switch inverter.

### To reset control of the relay:

1. Using InsightLocal, clear fault 72 on the primary inverter:
  - a. Go to the **Devices** menu and then select the primary inverter.
  - b. Click the **Configuration** tab, and then expand the **Controls** menu.
  - c. Next to **Clear**, select "Active Faults". Verify that fault 72 has cleared.



2. If fault 72 returns, turn the Manual Grid Connection Switch to the "Disconnected from Grid" position, and then repeat step 1.



# 6 Specifications

## What's in This Chapter?

- Regulatory Specifications ..... 52
- Electrical Specifications ..... 52
- Mechanical Specifications ..... 52
- Dimensions ..... 53

## Regulatory Specifications

Specification	BCS
Regulatory approvals	UL 1741, with applicable service entry requirements of UL 67 and UL 869A
The BCS is certified for use in the United States only.	

## Electrical Specifications

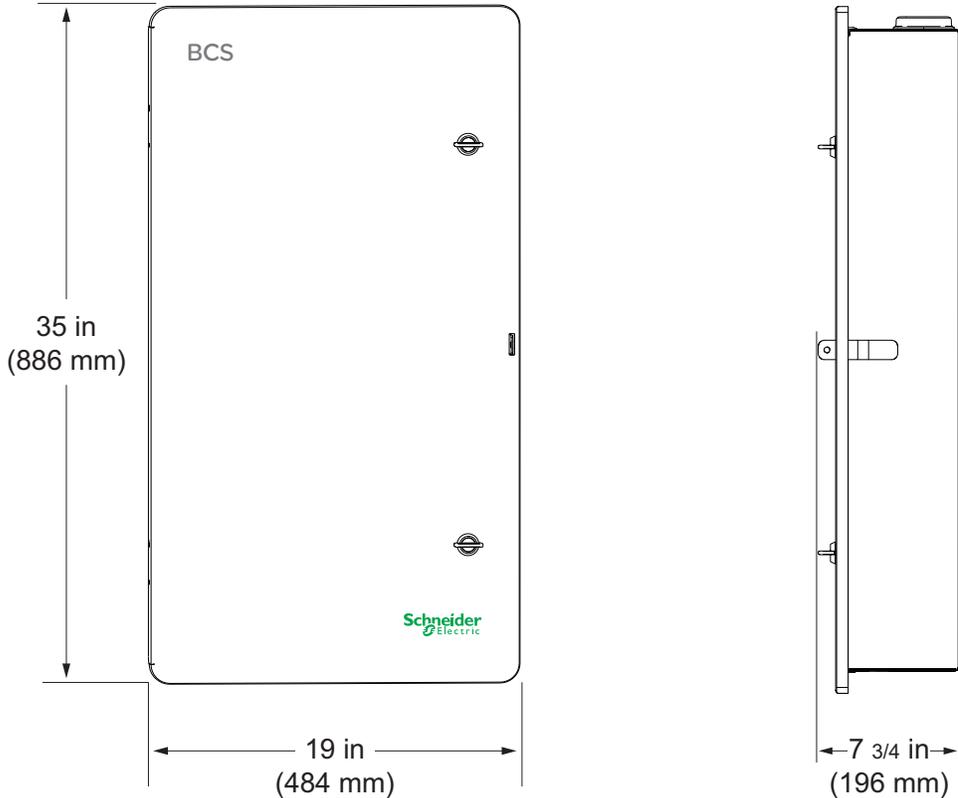
Specification	BCS
Nominal Voltage	120/240 VAC
Frequency	60 Hz
Phase	Split phase
Max. current rating (mains)	200 A
Certified for use with 167°F (75°C) copper and aluminum conductors.	
Suitable for use as Service Equipment when Main AC Circuit Breaker is installed.	

## Mechanical Specifications

Specification	BCS
Regulatory approvals	
Enclosure Type	NEMA Type 3R outdoor
Operating Temperature Range	-40 to 122°F (-40 to 50°C) <sup>5</sup>
Dimensions (H × W × D)	35 × 19 × 7 3/4" (889 × 485 × 196 mm)
Shipping Dimensions (H × W × D)	40 3/4 × 25 1/2 × 17 1/2" (1035 × 645 × 440 mm)
Weight	30 lb (13.6 kg)

<sup>5</sup>Always take into account the specifications for the optional circuit breakers, if installed.

# Dimensions





# 7 Disposal

## What's in This Chapter?

Recycling and Disposal .....56

## Recycling and Disposal

Always follow regional, national, and/or local waste disposal directives concerning disposing, discarding, and recycling of equipment containing electronic and electrical components.

# 8 System Diagrams

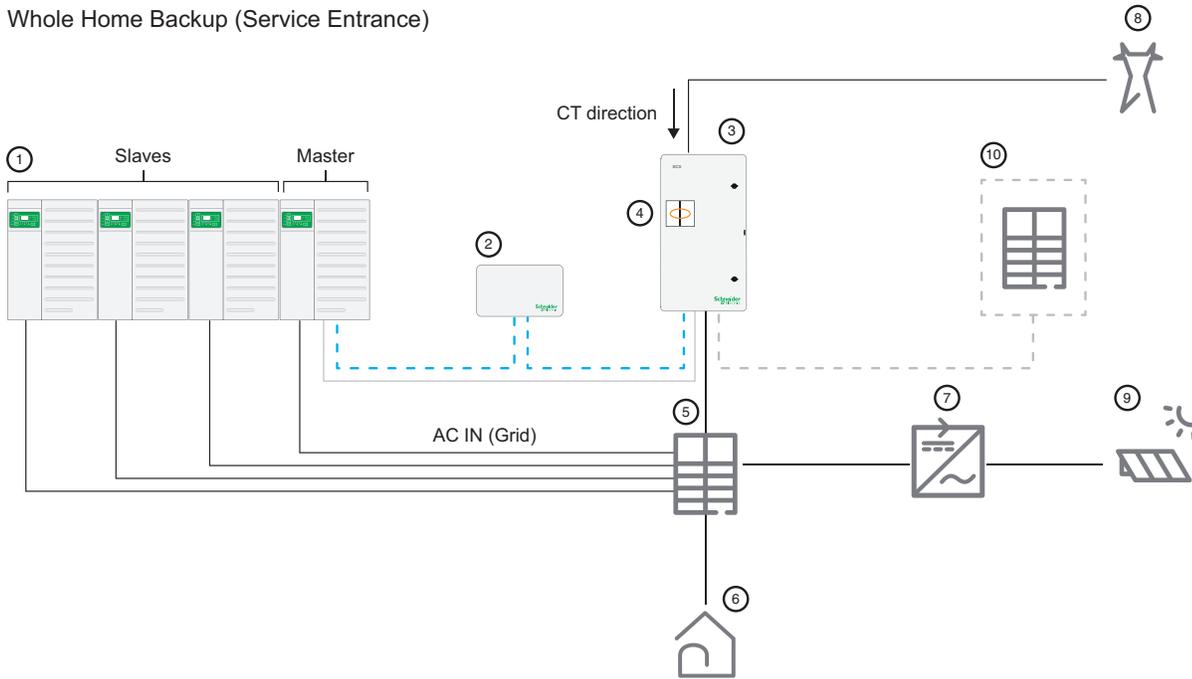
## What's in This Chapter?

System Diagrams .....58

# System Diagrams

The diagrams below illustrate the most basic configurations and are for reference only. Specific installations may require additional equipment to meet national or local electric codes. Ensure that all safety requirements are strictly followed.

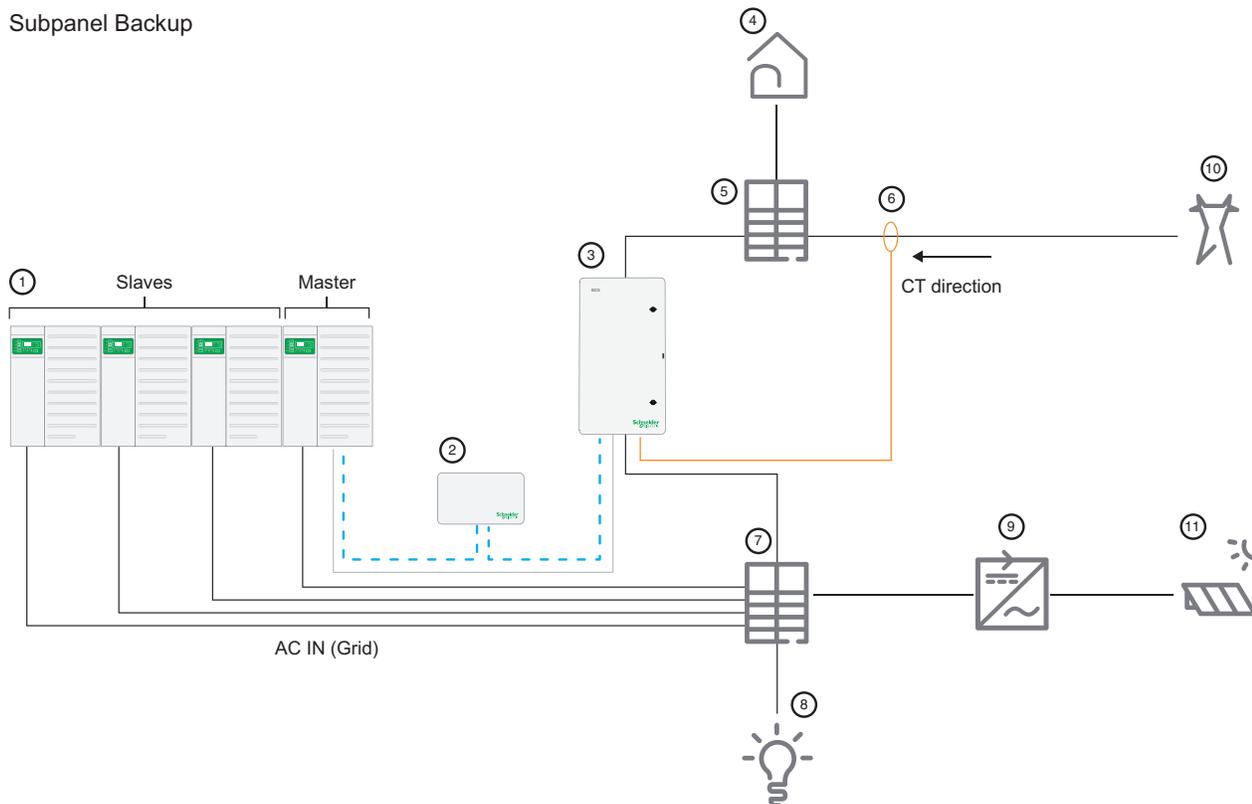
Whole Home Backup (Service Entrance)



## Legend

- ① XW Pro inverters (with optional Conext MPPT Charge Controllers)
  - ② InsightHome or InsightFacility
  - ③ BCS
  - ④ CTs for AC Grid input L1/L2
  - ⑤ Main AC panel
  - ⑥ Residential loads
  - ⑦ Optional AC-coupled PV inverter
  - ⑧ Grid
  - ⑨ PV panels
  - ⑩ Optional non-backup subpanel
- Auxiliary wiring  
 Communication wiring  
 CT wiring

Subpanel Backup



**Legend**

- ① XW Pro inverters (with optional Conext MPPT Charge Controllers)
- ② InsightHome or InsightFacility
- ③ BCS
- ④ Non-backup residential loads
- ⑤ Main AC panel
- ⑥ CT (optional location on AC Grid input cables (L1/ L2))
- ⑦ Backup subpanel
- ⑧ Backup loads
- ⑨ Optional AC-coupled PV inverter
- ⑩ Grid
- ⑪ PV panels

- Auxiliary wiring
- - - Communication wiring
- CT wiring



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As standards, specifications, and designs change from time to time,  
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