



GS Load Center

Installation Manual



About OutBack Power Technologies

OutBack Power Technologies is a leader in advanced energy conversion technology. OutBack products include true sine wave inverter/chargers, maximum power point tracking charge controllers, and system communication components, as well as circuit breakers, batteries, accessories, and assembled systems.

Grid/Hybrid™

As a leader in off-grid energy systems designed around energy storage, OutBack Power is an innovator in Grid/Hybrid system technology, providing the best of both worlds: grid-tied system savings during normal or daylight operation, and off-grid independence during peak energy times or in the event of a power outage or an emergency. Grid/Hybrid systems have the intelligence, agility and interoperability to operate in multiple energy modes quickly, efficiently, and seamlessly, in order to deliver clean, continuous and reliable power to residential and commercial users while maintaining grid stability.

Contact Information

Address:	Corporate Headquarters 17825 – 59 th Avenue N.E. Suite B Arlington, WA 98223 USA	European Office Hansastraße 8 D-91126 Schwabach, Germany
Telephone:	+1.360.435.6030 +1.360.618.4363 (Technical Support) +1.360.435.6019 (Fax)	+49.9122.79889.0 +49.9122.79889.21 (Fax)
Email:	Support@outbackpower.com	
Website:	http://www.outbackpower.com	

Disclaimer

UNLESS SPECIFICALLY AGREED TO IN WRITING, OUTBACK POWER TECHNOLOGIES:

- (a) MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN ITS MANUALS OR OTHER DOCUMENTATION.
- (b) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSS OR DAMAGE, WHETHER DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION. THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER'S RISK.

OutBack Power Technologies cannot be responsible for system failure, damages, or injury resulting from improper installation of their products.

Information included in this manual is subject to change without notice.

Notice of Copyright

GS Load Center Installation Manual © 2012 by OutBack Power Technologies. All Rights Reserved.

Trademarks

OutBack Power, the OutBack Power logo, FLEXpower ONE, and Grid/Hybrid are trademarks owned and used by OutBack Power Technologies, Inc. The ALPHA logo and the phrase "member of the Alpha Group" are trademarks owned and used by Alpha Technologies Inc. These trademarks may be registered in the United States and other countries.

Date and Revision

February 2014, Revision C

Part Number

900-0123-01-00 Rev C



Table of Contents

Introduction	5
Welcome to OutBack Power Technologies.....	5
GSLC – Components	7
GSLC175-120/240 – Components.....	8
GSLC175-230 – Components.....	9
GSLC175-PV-120/240 – Components	10
GSLC175-PV-230 – Components	11
GSLC175PV1-120/240 – Components	12
GSLC175PV1-230 – Components	13
Planning	15
Tools Required.....	15
Materials Required.....	15
Location/Environmental Requirements.....	15
Installation	17
Hardware Options.....	17
Remove Top Cover.....	18
Remove Front Door	18
Remove Interior Cover.....	19
Installing the Internal Hardware	19
Assembling DC Positive (+) Cable Plate (Bus Bar).....	20
Installing Inverter Positive Bus Bars.....	21
Installing Inverter Main DC Disconnects	22
Installing DC Shunts	23
Installing PV and AC Circuit Breakers and GFDI.....	24
Mounting on the Inverter.....	25
Mounting FLEXmax Charge Controller	27
Mounting the HUB Communications Manager	28
Wiring	29
Grounding	29
Bonding.....	30
DC Wiring.....	31
Inverter Wiring.....	31
Battery Wiring	31
Installing the FLEXnet DC.....	33
DC Devices	34
PV and Charge Controller Wiring.....	34
AC Wiring	37
Split-Phase Wiring.....	37
Single-Phase Wiring	39
Wiring the AC Bypass Assembly.....	41
Multiple-Inverter Installations (Stacking Inverters)	42
Bypass Switches.....	42
Wiring Diagrams	45

Table of Contents

Specifications	51
Electrical Specifications.....	51
Mechanical Specifications.....	51
Regulatory Specifications.....	51
Definitions.....	52
Index	53

List of Tables

Table 1	Size and Torque Requirements for Circuit Breakers and Bus Bars.....	19
Table 2	Terminal Bus Bar (TBB) Wire Size and Torque Requirements.....	29
Table 3	Electrical Specifications.....	51
Table 4	Mechanical Specifications.....	51
Table 5	Terms and Definitions	52

List of Figures

Figure 1	GS Load Center (GSLC)	5
Figure 2	GS Load Center with Devices	6
Figure 3	GSLC Components.....	7
Figure 4	GSLC175-120/240 Components.....	8
Figure 5	GSLC175-230 Components.....	9
Figure 6	GSLC175-PV-120/240 Components	10
Figure 7	GSLC175-PV-230 Components	11
Figure 8	GSLC175PV1-120/240 Components	12
Figure 9	GSLC175PV1-230 Components	13
Figure 10	Dimensions.....	15
Figure 11	Knockouts and Mounting Holesfor Devices.....	16
Figure 12	GSLC – Additional Components.....	17
Figure 13	GSLC175-120/240 and GSLC175-230 – Additional Components	17
Figure 14	Removing the Top Cover from the GSLC	18
Figure 15	Removing the Front Door from the GSLC	18
Figure 16	Removing the Interior Cover from the GSLC	19
Figure 17	DC Positive Cable Plate (FW-BBUS)	19
Figure 18	Assembling the DC Positive (+) Cable Plate	20
Figure 19	Inverter Bus Bars	21
Figure 20	Inverter Main DC Disconnects.....	22
Figure 21	DC Shunts	23
Figure 22	Circuit Breakers	24
Figure 23	Mounting the GSLC	25
Figure 24	Mounting the Charge Controller to the GSLC Enclosure.....	27
Figure 25	Mounting the HUB Product to the GSLC Enclosure.....	28
Figure 26	Grounding.....	29
Figure 27	Removing Bonding Connections.....	30
Figure 28	Battery Connections.....	32

Figure 29	FN-DC and Wiring Block.....	33
Figure 30	Installing the FLEXnet DC	33
Figure 31	PV Connections in the GSLC	35
Figure 32	PV Connections in the FLEXmax Charge Controller	35
Figure 33	AC Terminal Bus Bars (split-phase)	37
Figure 34	Inverter AC Connections (split-phase)	38
Figure 35	AC Terminal Bus Bars (single-phase)	39
Figure 36	Inverter AC Connections (single-phase)	40
Figure 37	Maintenance Bypass Wiring (split-phase)	41
Figure 38	Maintenance Bypass Wiring (single-phase).....	42
Figure 39	Bypass Switches.....	43
Figure 40	OutBack Bypass (split-phase)	43
Figure 41	Bypass Switching for Multiple Inverters (split-phase).....	44
Figure 42	Wiring Diagram – GSLC175-120/240	45
Figure 43	Wiring Diagram – GSLC175-PV-120/240 with FNDC	46
Figure 44	Wiring Diagram – GSLC175PV1-120/240 with FNDC	47
Figure 45	Wiring Diagram – GSLC175-230	48
Figure 46	Wiring Diagram – GSLC175-PV-230 with FNDC	49
Figure 47	Wiring Diagram – GSLC175PV1-230 with FNDC	50

Table of Contents

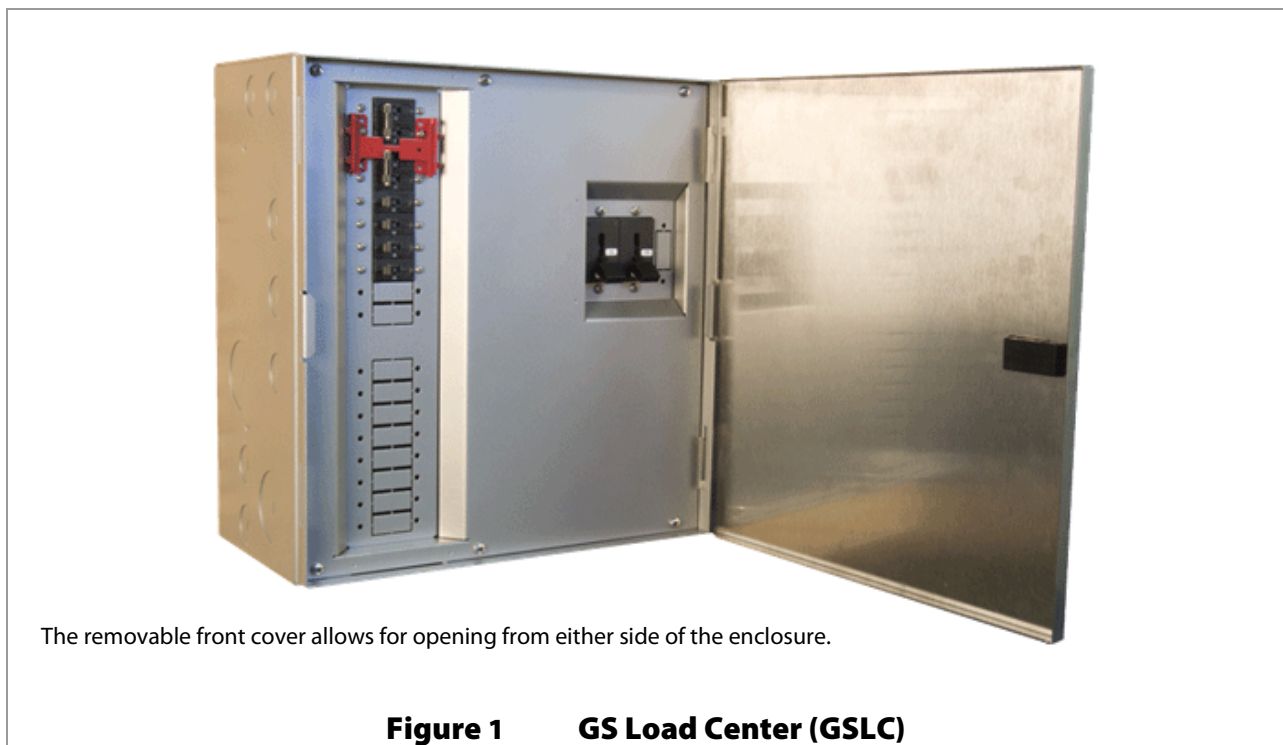
This page intentionally left blank.



Introduction

Welcome to OutBack Power Technologies

Thank you for purchasing a GS Load Center (GSLC) from OutBack Power Technologies. The GSLC is part of an OutBack Grid/Hybrid™ system. It is a balance-of-systems enclosure intended to work with Radian Series (GS) inverter/chargers, FLEXmax Charge Controllers, and an OutBack HUB Communications Manager.

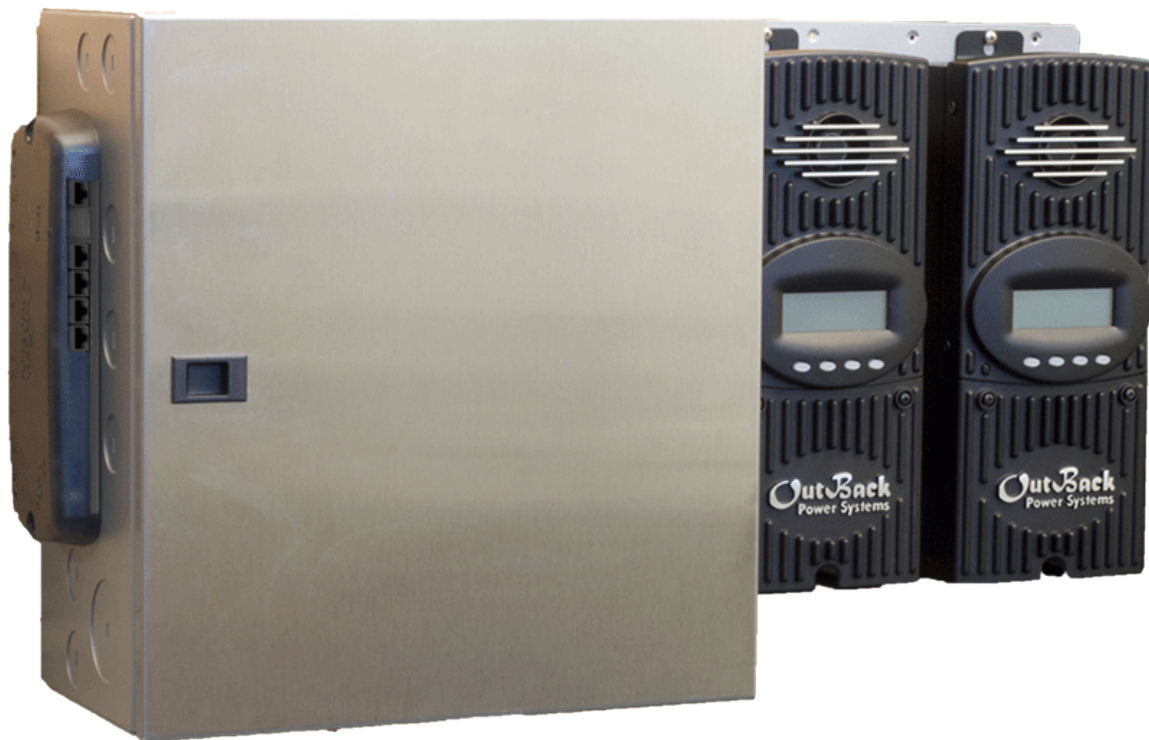


The product is designed in the following configurations:

- **GSLC** – GS Load Center for Radian Series. Recommended for custom-built systems. Recommended for use with multiple Radian inverters (one GSLC per inverter). Can be used with other inverter models. The term “GSLC” is also used to refer generically to the product line.
 - ~ Intended for any Radian model.
- **GSLC175-120/240** – GS Load Center for AC applications (split-phase). Factory-prepared with dual 175 Adc inverter circuit breakers, dual AC inputs, and 120/240 Vac maintenance bypass assembly. Recommended for systems which have a single Radian inverter and an AC source, but can be customized in other ways.
 - ~ Intended for Radian models GS8048 and GS8048A.
- **GSLC175-230** – GS Load Center for AC applications (single-phase). Factory-prepared with dual 175 Adc inverter circuit breakers, dual AC inputs, and 230 Vac maintenance bypass assembly. Recommended for systems which have a single Radian inverter and an AC source, but can be customized in other ways.
 - ~ Intended for Radian model GS7048E.

Introduction

- **GSLC175-PV-120/240** – GS Load Center for PV and AC applications (split-phase). Factory-prepared with dual 175 Adc inverter circuit breakers, dual AC inputs, 120/240 Vac maintenance bypass assembly, PV GFDI, and two PV array inputs, FLEXnet DC battery monitor and three shunts. Intended as a “plug-and-play” solution for systems with a single inverter, two FLEXmax charge controllers, and battery monitoring.
 - ~ Intended for Radian models GS8048 and GS8048A.
- **GSLC175-PV-230** – GS Load Center for PV and AC applications (single-phase). Factory-prepared with dual 175 Adc inverter circuit breakers, dual AC inputs, 230 Vac maintenance bypass assembly, PV GFDI, two PV array inputs, FLEXnet DC battery monitor, and three shunts. Intended as a “plug-and-play” solution for systems with a single inverter, two FLEXmax charge controllers, and battery monitoring.
 - ~ Intended for Radian model GS7048E.
- **GSLC175PV1-120/240** — GS Load Center for PV and AC applications (split-phase). Factory-prepared with one 175 Adc inverter circuit breaker, dual AC inputs, 120/240 Vac maintenance bypass assembly, PV GFDI, one PV array input, FLEXnet DC battery monitor, and two shunts. Intended as a “plug-and-play” solution for systems with a single inverter, one FLEXmax charge controller, and battery monitoring.
 - ~ Intended for Radian model GS4048A.
- **GSLC175PV1-230** — GS Load Center for PV and AC applications (single-phase). Factory-prepared with one 175 Adc inverter circuit breakers, dual AC inputs, 230 Vac maintenance bypass assembly, PV GFDI, one PV array input, FLEXnet DC battery monitor, and two shunts. Intended as a “plug-and-play” solution for systems with a single inverter, one FLEXmax charge controller, and battery monitoring.
 - ~ Intended for Radian model GS3548E.



The enclosure provides mounting holes for the HUB Communications Manager on the left.

On the right, the enclosure has mounting holes for brackets to mount up to two FLEXmax charge controllers.

NOTE: OutBack FLEXmax Extreme charge controllers do not mount directly to the GSLC and do not require additional mounting brackets. They are mounted beside the inverter or the GSLC. See the *Radian Series Installation Manual* for more information.

Figure 2 **GS Load Center with Devices**

GSLC – Components

Legend

- 1 Inverter Negative (-) DC Bus Bars
- 2 Negative (-) Terminal Bus Bar (TBB-WHITE)
- 3 Ground TBB (TBB-GROUND)
- 4 Neutral TBB (TBB-WHITE)
- 5 PV Positive (+) TBB (TBB-RED)
- 6 Shunt (FW-SHUNT500)

NOTE: The installed Neutral TBB has white insulators (TBB-WHITE). A set of blue insulators (TBB-BLUE) is included in the kit for locations where blue is standard.

The DC Positive (+) Bus Plate (FW-BBUS) and the other inverter positive (+) DC bus bars are also included in the kit.

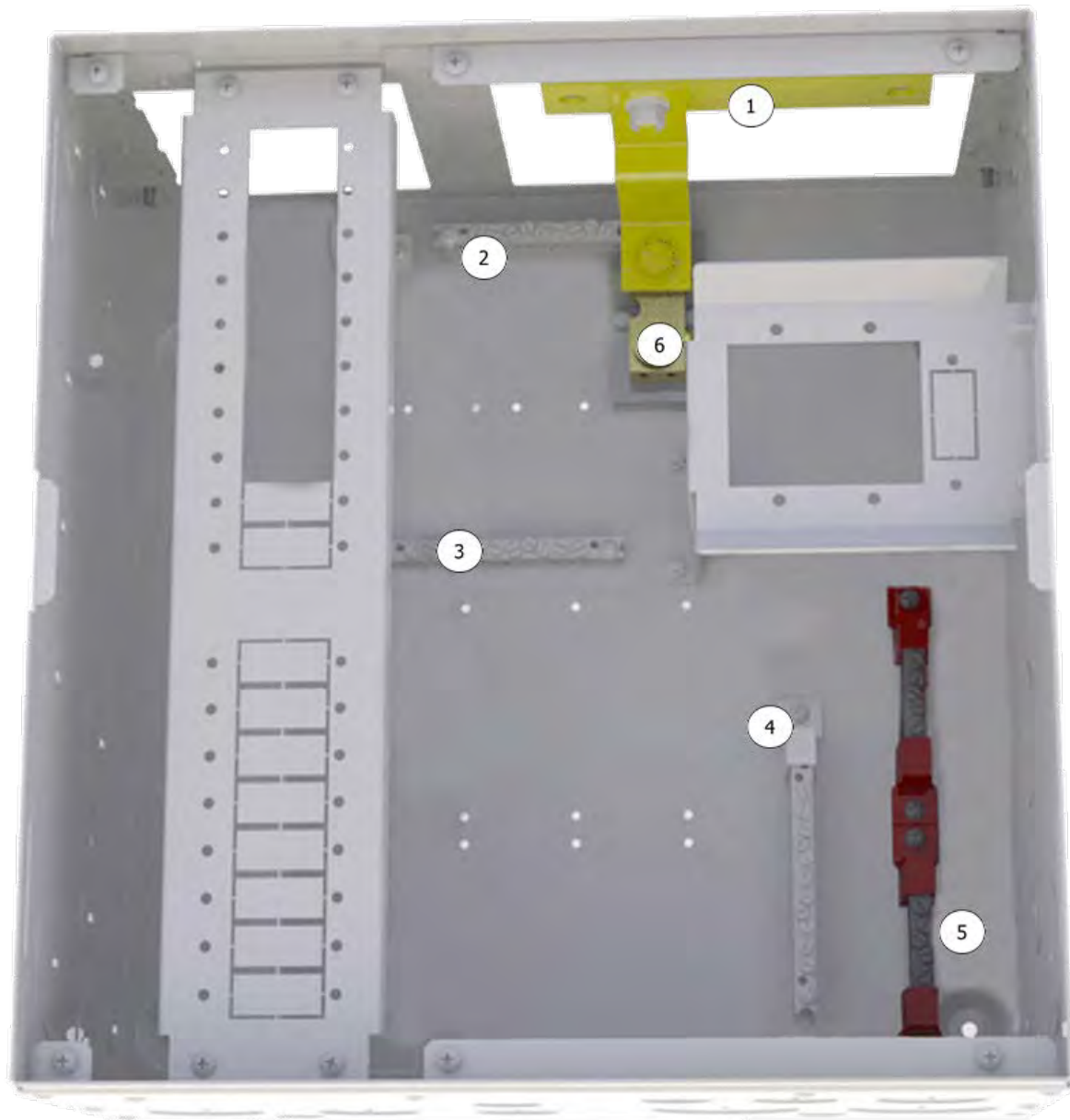
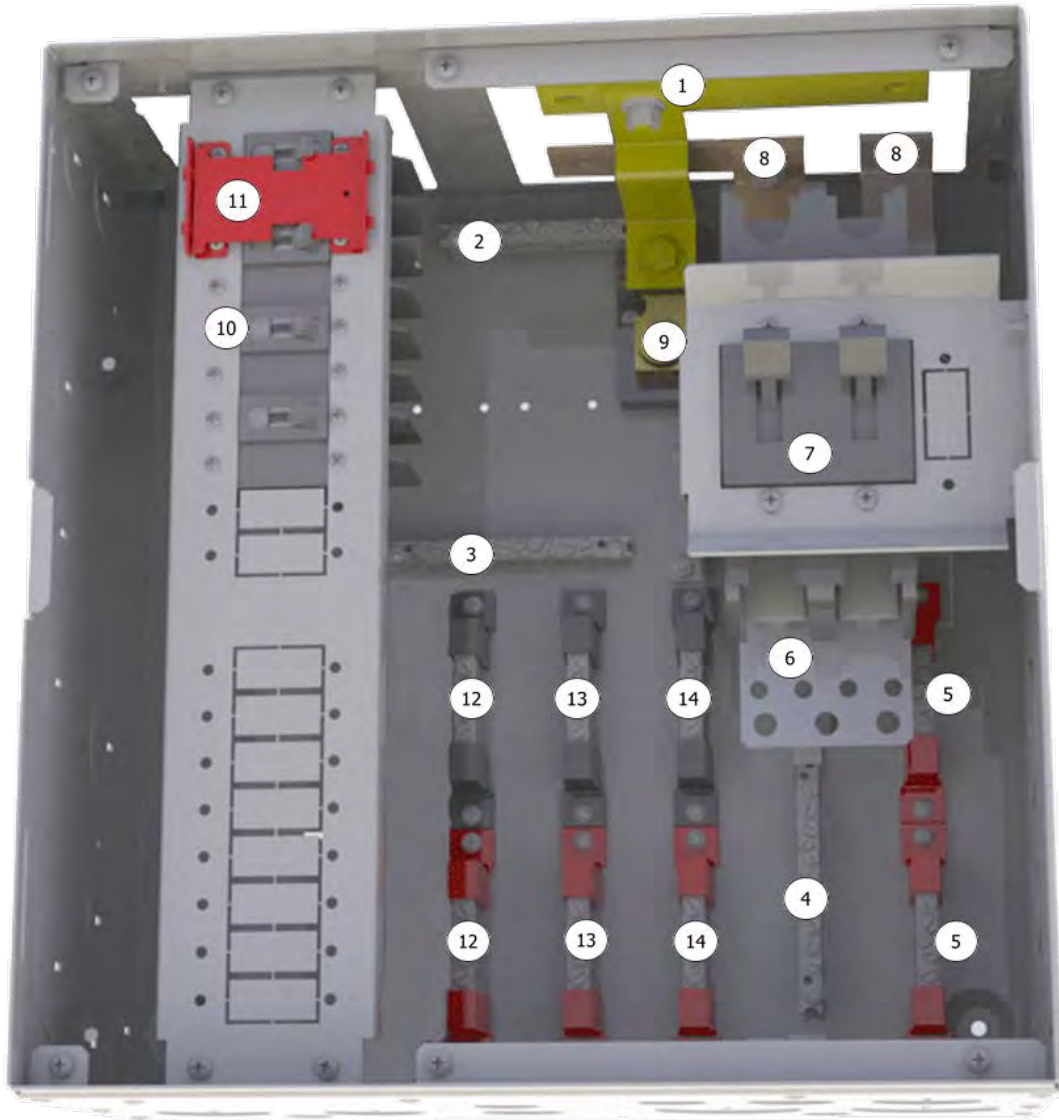


Figure 3 **GSLC Components**

GSLC175-120/240 – Components

Legend

- | | |
|---|---|
| ① Inverter Negative (-) DC Bus Bar | ⑧ Inverter Positive (+) DC Bus Bar |
| ② Negative (-) Terminal Bus Bar (TBB-WHITE) | ⑨ Shunt (FW-SHUNT500) |
| ③ Ground TBB (TBB-GROUND) | ⑩ AC Input Circuit Breakers (PNL-50D-AC-120/240V) |
| ④ Neutral TBB (TBB-WHITE) | ⑪ Maintenance Bypass Interlock |
| ⑤ PV Positive (+) TBB (TBB-RED) | ⑫ AC TBB (Inverter Output) L1, L2 (STBB-RED or BLACK) |
| ⑥ DC Positive (+) Cable Plate (FW-BBUS) | ⑬ AC TBB (Grid) L1, L2 (STBB-RED or BLACK) |
| ⑦ Main Inverter Disconnect(s) (PNL-175-DC) | ⑭ AC TBB (Generator) L1, L2 (STBB-RED or BLACK) |



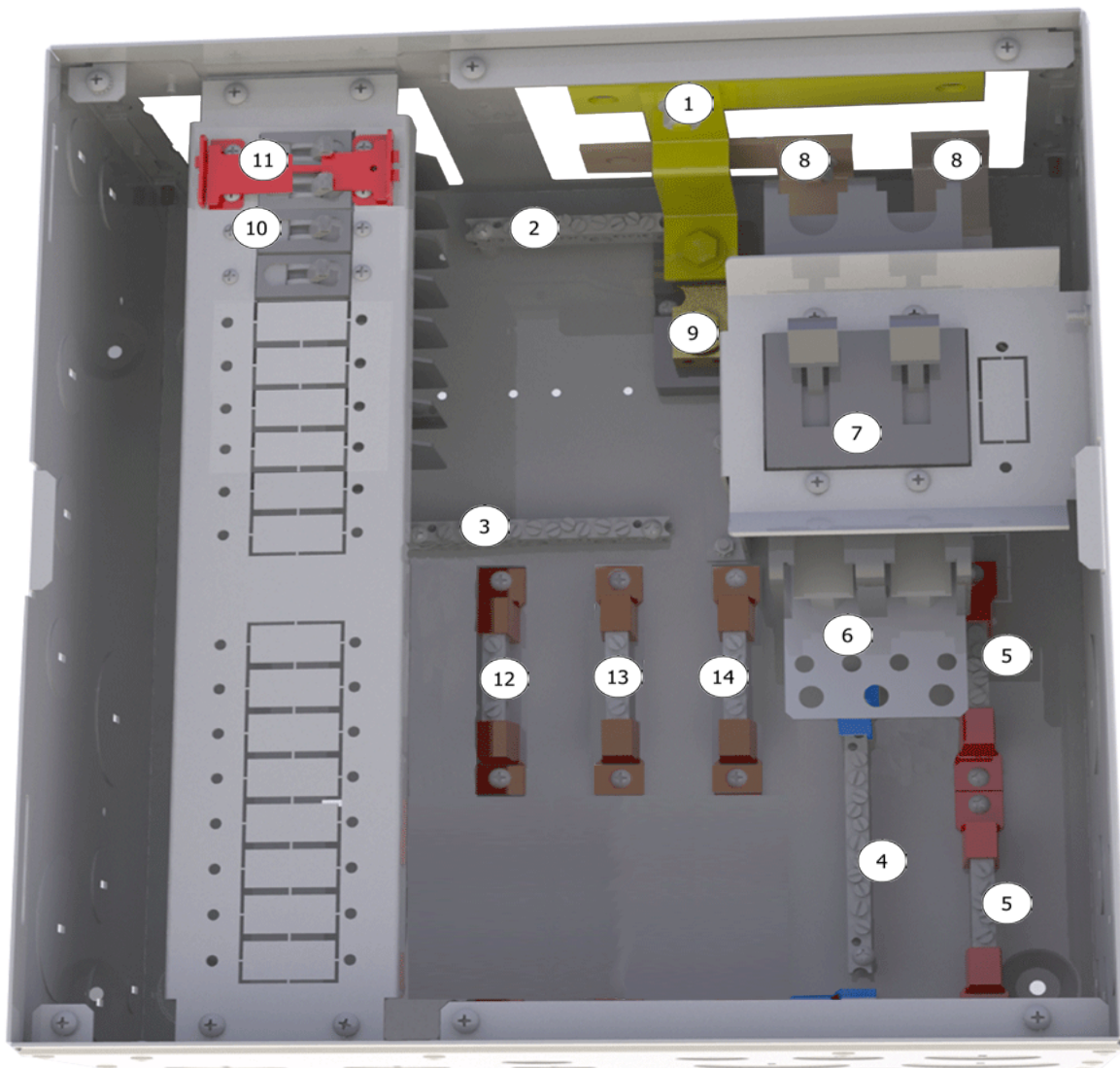
NOTE: The factory wiring has been omitted from this illustration for clarity.

Figure 4 **GSLC175-120/240 Components**

GSLC175-230 – Components

Legend

- | | |
|---|--|
| ① Inverter Negative (-) DC Bus Bar | ⑧ Inverter Positive (+) DC Bus Bar |
| ② Negative (-) Terminal Bus Bar (TBB-WHITE) | ⑨ Shunt (FW-SHUNT500) |
| ③ Ground TBB (TBB-GROUND) | ⑩ AC Input Circuit Breakers (PNL-50-AC-230V) |
| ④ Neutral TBB (TBB-BLUE) | ⑪ Maintenance Bypass Interlock |
| ⑤ PV Positive (+) TBB (TBB-RED) | ⑫ AC TBB (Inverter Output) (TBB-BROWN) |
| ⑥ DC Positive (+) Cable Plate (FW-BBUS) | ⑬ AC TBB (Grid) (TBB-BROWN) |
| ⑦ Main Inverter Disconnect(s) (PNL-175-DC) | ⑭ AC TBB (Generator) (TBB-BROWN) |



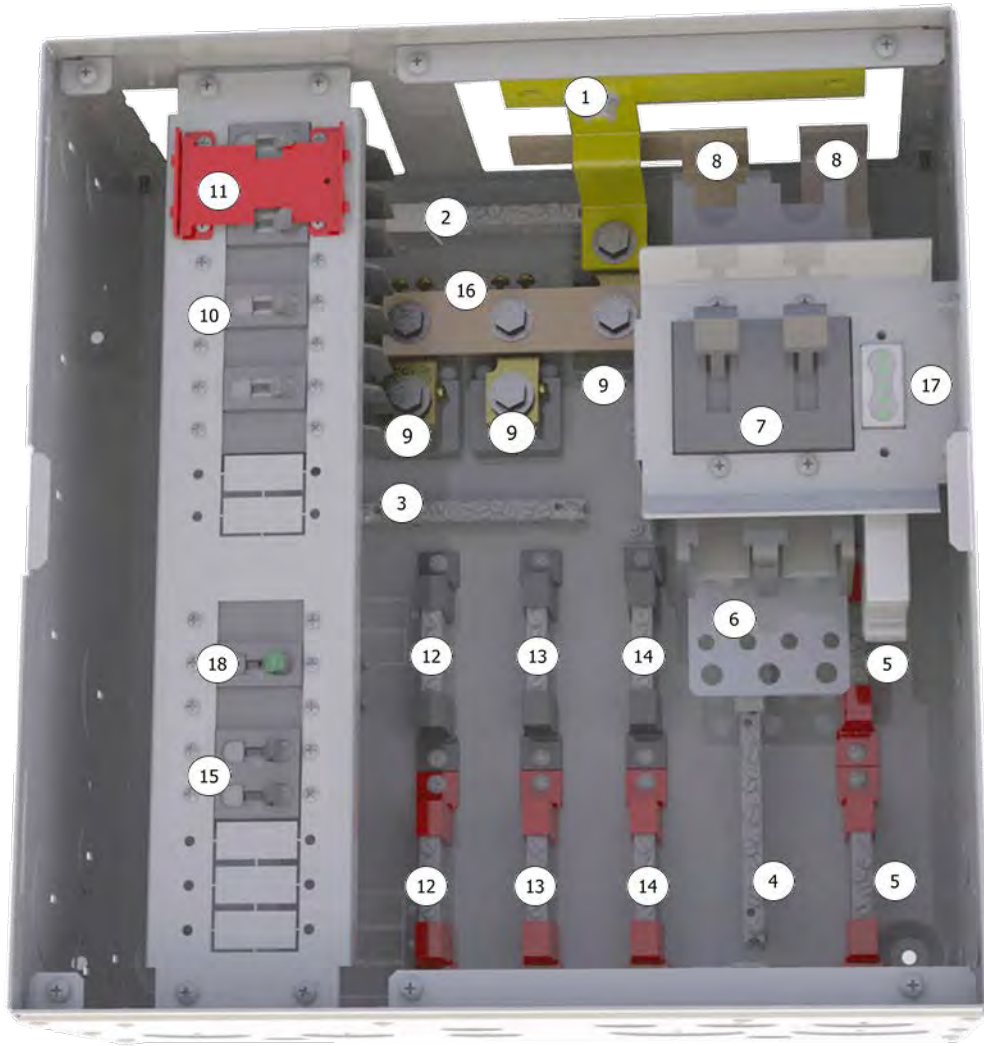
NOTE: The factory wiring has been omitted from this illustration for clarity.

Figure 5 **GSLC175-230 Components**

GSLC175-PV-120/240 – Components

Legend

- | | |
|---|---|
| ① Inverter Negative (-) DC Bus Bar | ⑩ AC Input Circuit Breakers (PNL-50D-AC-120/240V) |
| ② Negative (-) Terminal Bus Bar (TBB-WHITE) | ⑪ Maintenance Bypass Interlock |
| ③ Ground TBB (TBB-GROUND) | ⑫ AC TBB (Inverter Output) L1, L2 (STBB-RED or BLACK) |
| ④ Neutral TBB (TBB-WHITE) | ⑬ AC TBB (Grid) L1, L2 (STBB-RED or BLACK) |
| ⑤ PV Positive (+) TBB (TBB-RED) | ⑭ AC TBB (Generator) L1, L2 (STBB-RED or BLACK) |
| ⑥ DC Positive (+) Cable Plate (FW-BBUS) | ⑮ PV Input Disconnects (PNL-80-DC) |
| ⑦ Main Inverter Disconnect(s) (PNL-175-DC) | ⑯ Shunt Bus (GS-SBUS) |
| ⑧ Inverter Positive (+) DC Bus Bar | ⑰ Battery Monitor (FN-DC) |
| ⑨ Shunt (FW-SHUNT500) | ⑱ PV Ground Fault Detector/Interrupter (PNL-GFDI-80D) |



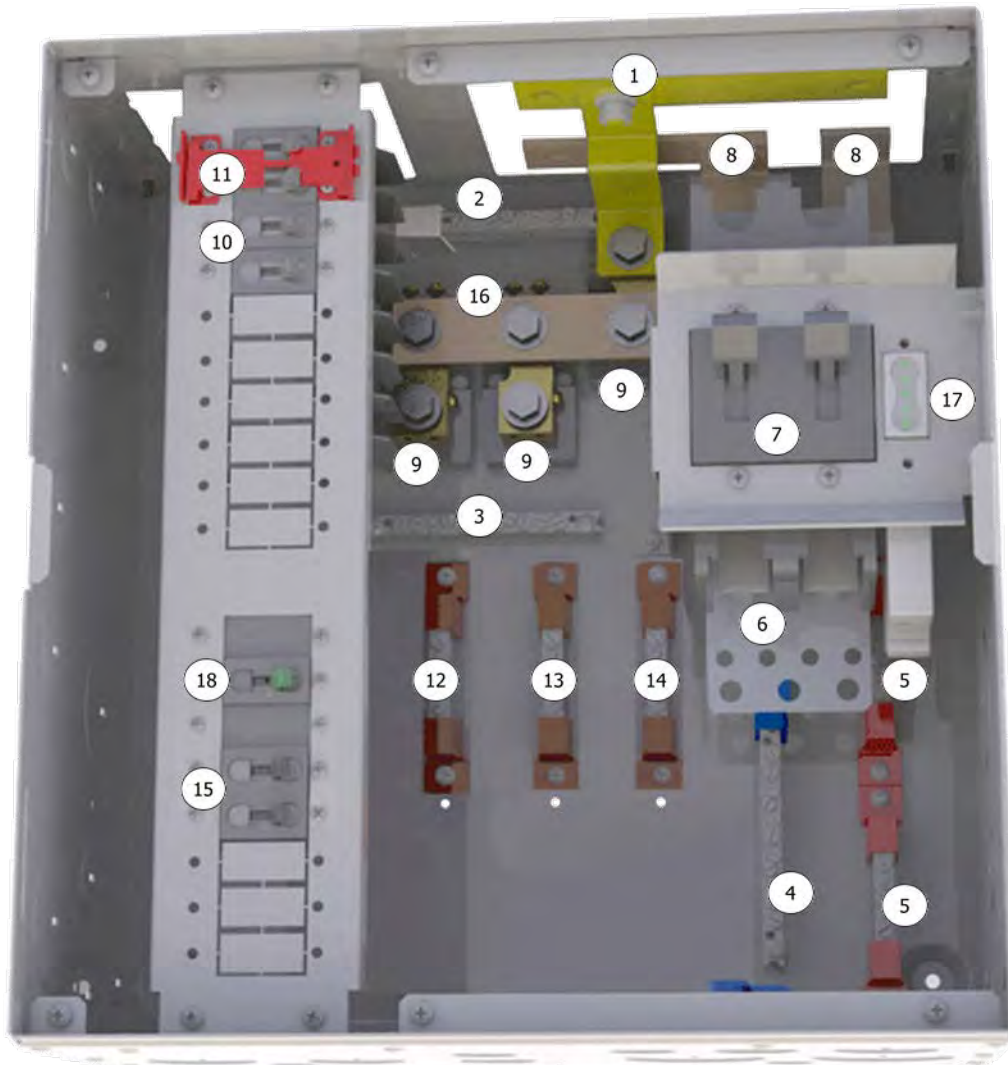
NOTE: The factory wiring has been omitted from this illustration for clarity.

Figure 6 **GSLC175-PV-120/240 Components**

GSLC175-PV-230 – Components

Legend

- | | |
|---|---|
| ① Inverter Negative (-) DC Bus Bar | ⑩ AC Input Circuit Breakers (PNL-50-AC-230V) |
| ② Negative (-) Terminal Bus Bar (TBB-WHITE) | ⑪ Maintenance Bypass Interlock |
| ③ Ground TBB (TBB-GROUND) | ⑫ AC TBB (Inverter Output) (TBB-BROWN) |
| ④ Neutral TBB (TBB-BLUE) | ⑬ AC TBB (Grid) (TBB-BROWN) |
| ⑤ PV Positive (+) TBB (TBB-RED) | ⑭ AC TBB (Generator) (TBB-BROWN) |
| ⑥ DC Positive (+) Cable Plate (FW-BBUS) | ⑮ PV Input Disconnects (PNL-80-DC) |
| ⑦ Main Inverter Disconnect(s) (PNL-175-DC) | ⑯ Shunt Bus (GS-SBUS) |
| ⑧ Inverter Positive (+) DC Bus Bar | ⑰ Battery Monitor (FN-DC) |
| ⑨ Shunt (FW-SHUNT500) | ⑱ PV Ground Fault Detector/Interrupter (PNL-GFDI-80D) |



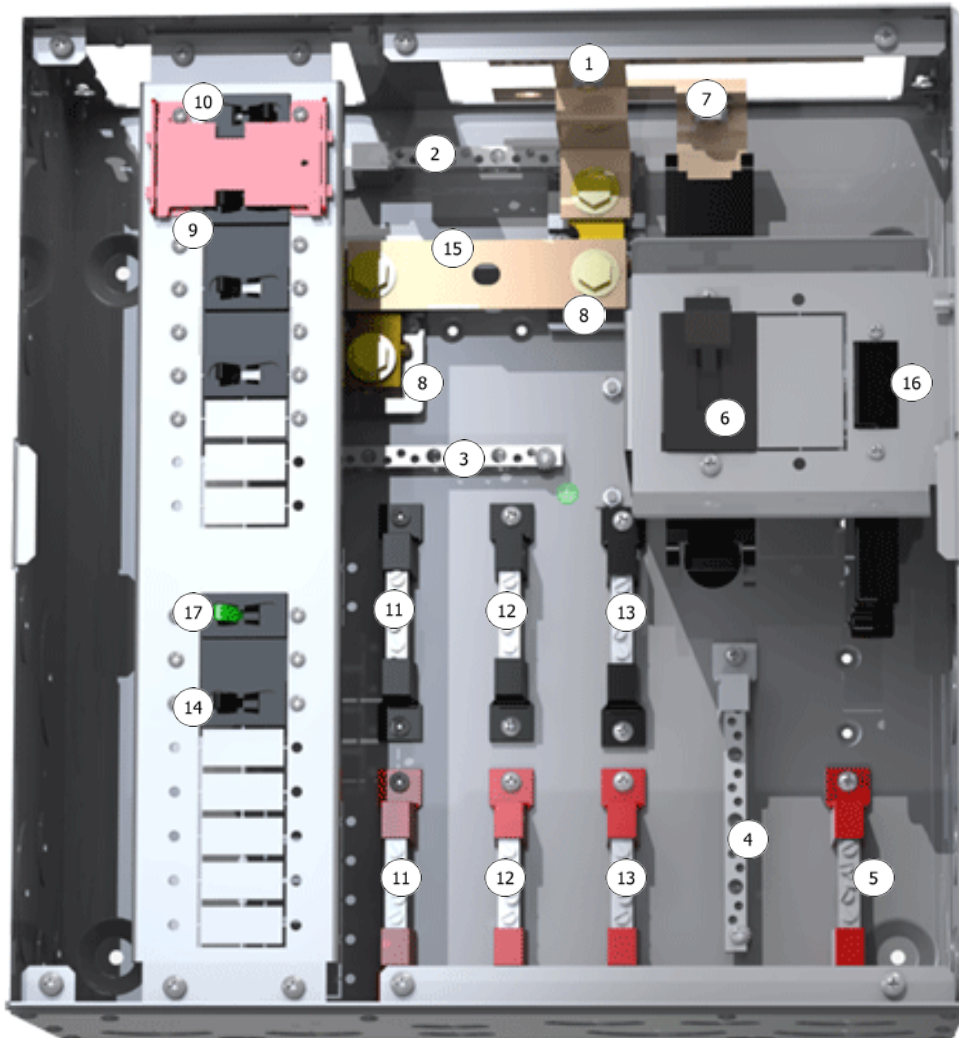
NOTE: The factory wiring has been omitted from this illustration for clarity.

Figure 7 **GSLC175-PV-230 Components**

GSLC175PV1-120/240 – Components

Legend

- | | |
|---|---|
| ① Inverter Negative (-) DC Bus Bar | ⑩ Maintenance Bypass Interlock |
| ② Negative (-) Terminal Bus Bar (TBB-WHITE) | ⑪ AC TBB (Inverter Output) L1, L2 (STBB-RED or BLACK) |
| ③ Ground TBB (TBB-GROUND) | ⑫ AC TBB (Grid) L1, L2 (STBB-RED or BLACK) |
| ④ Neutral TBB (TBB-WHITE) | ⑬ AC TBB (Generator) L1, L2 (STBB-RED or BLACK) |
| ⑤ PV Positive (+) TBB (TBB-RED) | ⑭ PV Input Disconnect (PNL-80-DC) |
| ⑥ Main Inverter Disconnect (PNL-175-DC) | ⑮ Shunt Bus (GS-SBUS) |
| ⑦ Inverter Positive (+) DC Bus Bar | ⑯ Battery Monitor (FN-DC) |
| ⑧ Shunt (FW-SHUNT500) | ⑰ PV Ground Fault Detector/Interrupter (PNL-GFDI-80) |
| ⑨ AC Input Circuit Breakers (PNL-50D-AC-120/240V) | |



NOTE: The factory wiring has been omitted from this illustration for clarity.

Figure 8 **GSLC175PV1-120/240 Components**

GSLC175PV1-230 – Components

Legend

- | | |
|--|---|
| ① Inverter Negative (-) DC Bus Bar | ⑩ Maintenance Bypass Interlock |
| ② Negative (-) Terminal Bus Bar (TBB-WHITE) | ⑪ AC TBB (Inverter Output) (TBB-BROWN) |
| ③ Ground TBB (TBB-GROUND) | ⑫ AC TBB (Grid) (TBB-BROWN) |
| ④ Neutral TBB (TBB-WHITE) | ⑬ AC TBB (Generator) (TBB-BROWN) |
| ⑤ PV Positive (+) TBB (TBB-RED) | ⑭ PV Input Disconnect (PNL-80-DC) |
| ⑥ Main Inverter Disconnect (PNL-175-DC) | ⑮ Shunt Bus (GS-SBUS) |
| ⑦ Inverter Positive (+) DC Bus Bar | ⑯ Battery Monitor (FN-DC) |
| ⑧ Shunt (FW-SHUNT500) | ⑰ PV Ground Fault Detector/Interrupter (PNL-GFDI-80D) |
| ⑨ AC Input Circuit Breakers (PNL-50-AC-230V) | |

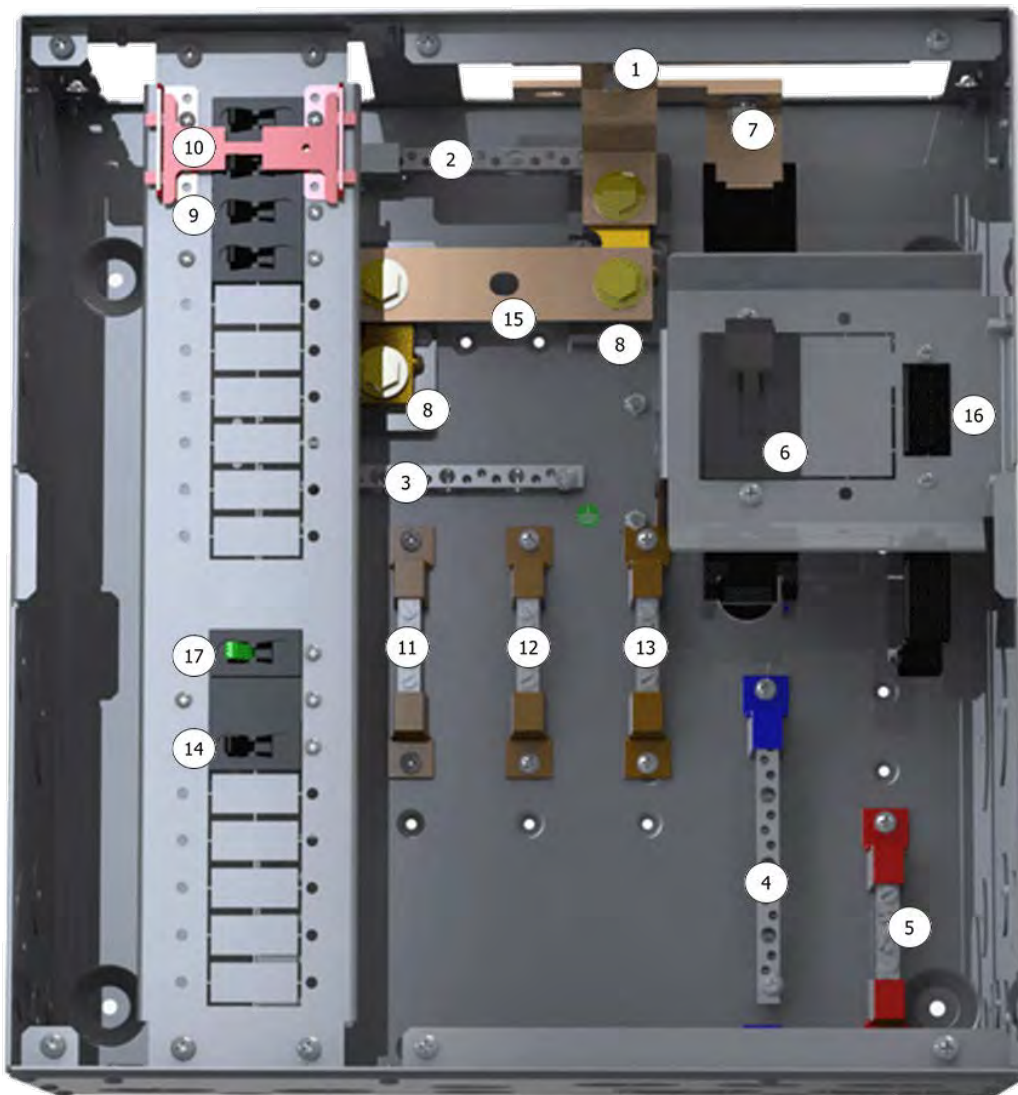


Figure 9 GSLC175PV1-230 Components

This page intentionally left blank.



Planning

Tools Required

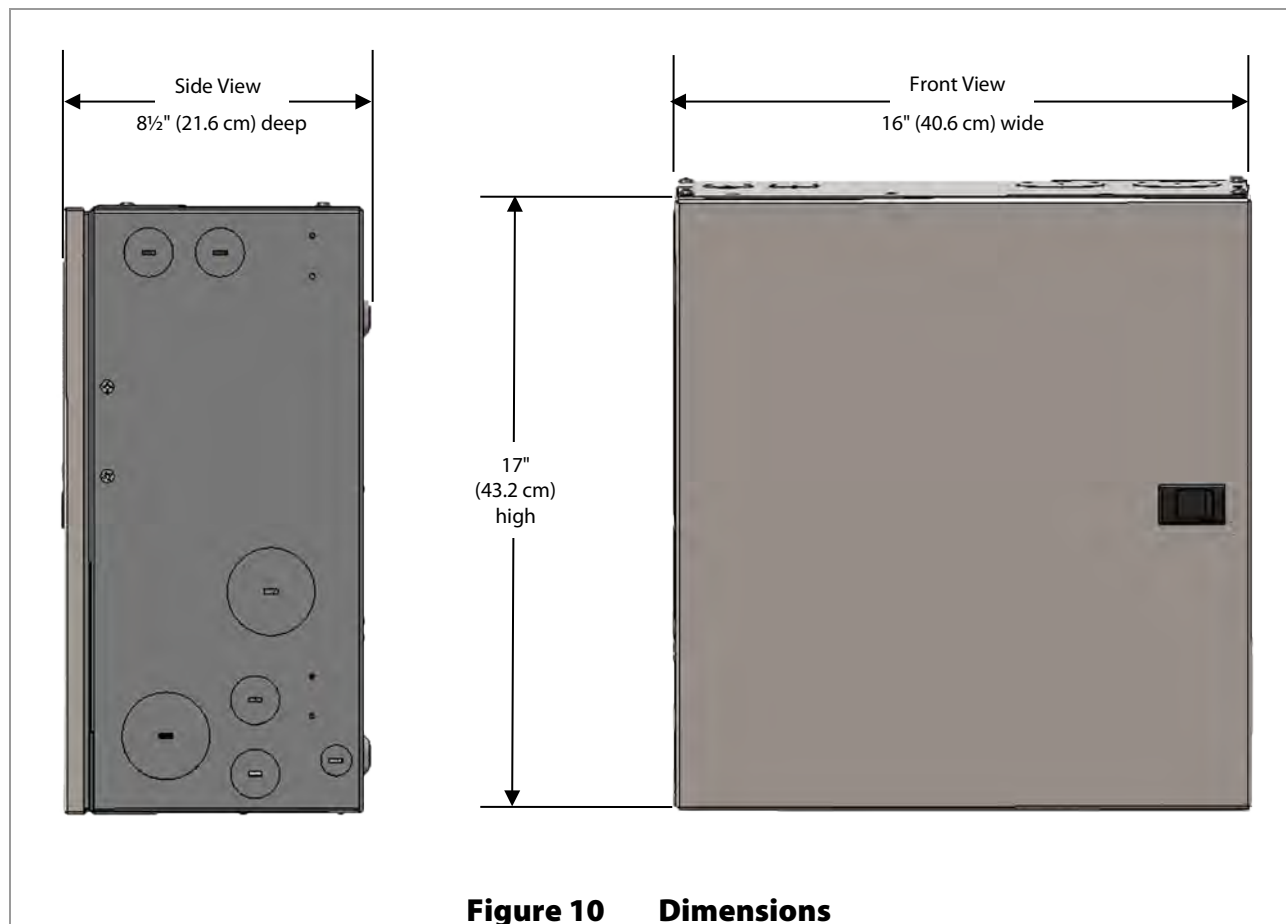
- Open-ended wrenches (9/16" and 13 mm)
- Wire cutters/strippers
- Torque wrenches
- Assorted insulated screwdrivers
- Digital Voltmeter (DVM) or regular voltmeter

Materials Required

- Conductors for wiring
- Conduits

Location/Environmental Requirements

- Indoor mount only



Legend

Cable Knockouts (U.S. Trade Size or Metric Trade Size)

- ① 2" or 63 mm
- ② 1½" or 50 mm
- ③ 1¼" or 40 mm
- ④ 1" or 32 mm
- ⑤ ½" or 20 mm

- ⑦ Mounting holes for HUB product
- ⑧ Mounting holes for FW-CCB and FW-CCB2 brackets

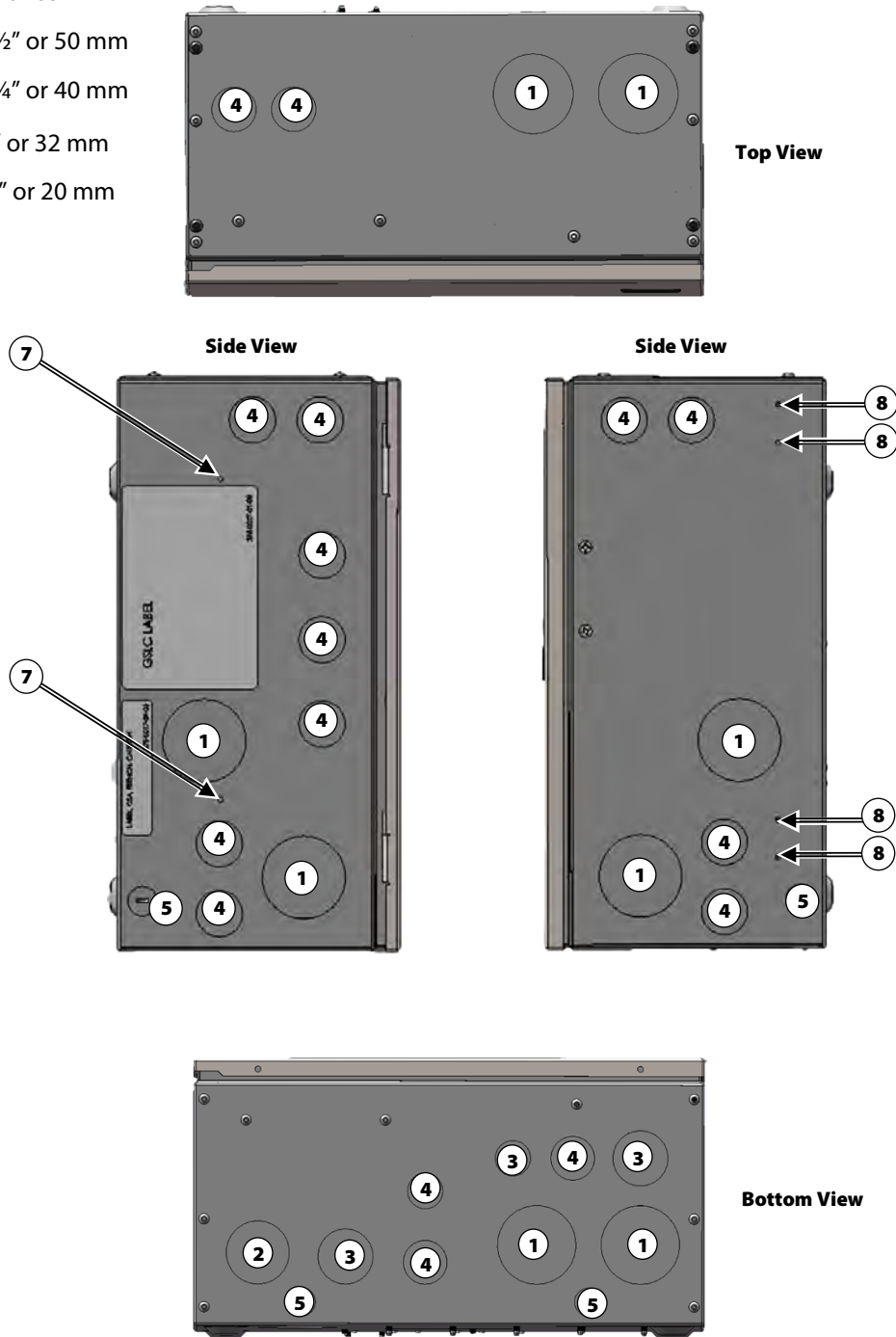


Figure 11 Knockouts and Mounting Holes for Devices



Installation

Hardware Options

The seven versions of the GSLC come with different components already installed.

- **GSLC**, the “basic” or “empty” version, requires almost all components to be installed if they are needed. Instructions for this product begin on page 19.
- **GSLC175-120/240** and **GSLC175-230** are the “inverter only” versions for Radian models GS8048, GS8048A, and GS7048E. They have hardware for Radian inverter AC and DC connections. Battery monitoring or PV capability must be installed as needed. Installation for these items begins with the DC shunts on page 23.
- **GSLC175-PV-120/240** and **GSLC175-PV-230** are the “fully-loaded” versions for Radian models GS8048, GS8048A, and GS7048E. They have all options already present and need only to have external wiring and devices added. Users with either of these versions can skip to the wiring section on page 29.
- **GSLC175PV1-120/240** and **GSLC175PV1-230** are the “fully-loaded” versions for Radian models GS4048A and GS3548E. They have all options already present and need only to have external wiring and devices added. Users with either of these versions can skip to the wiring section on page 29.

Additional AC and DC circuit breakers are available for installation on all models.

The following pages describe the installation of individual items, including the removal of the GSLC covers. Page 19 lists the hardware requirements for these items.

- Instructions for Radian inverter mounting (along with other devices) begin on page 25.
- Instructions for installing the FLEXnet DC battery monitor begin on page 33.
- Instructions for installing the AC input-output bypass (IOB) assembly begin on page 42.

The following components are sold separately for the GSLC:

- Inverter Main Disconnects (required for inverter installations)
- AC Maintenance Bypass Assembly
- AC Terminal Bus Bars (TBB)
- PV Ground Fault Detector-Interrupter (GFDI)
- FLEXnet DC Battery Monitor (FN-DC); see page 32
- Additional DC shunts and GS-SBUS
- PV Disconnect 80-amp circuit breaker (PNL-80-DC)

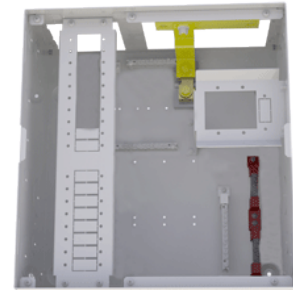


Figure 12 GSLC – Additional Components

The following components are sold separately for the GSLC175-120/240 and GSLC175-230:

- PV Ground Fault Detector-Interrupter (GFDI)
- FLEXnet DC Battery Monitor (FN-DC); see page 32
- Additional DC shunts and GS-SBUS
- PV Disconnect 80-amp circuit breaker (PNL-80-DC)

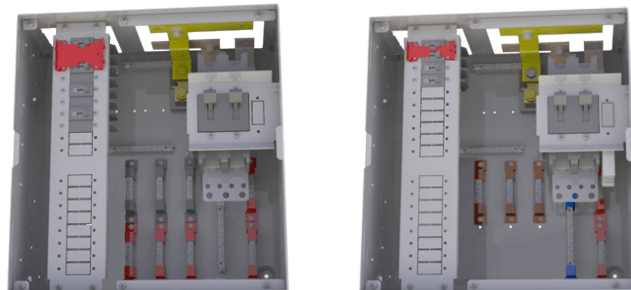
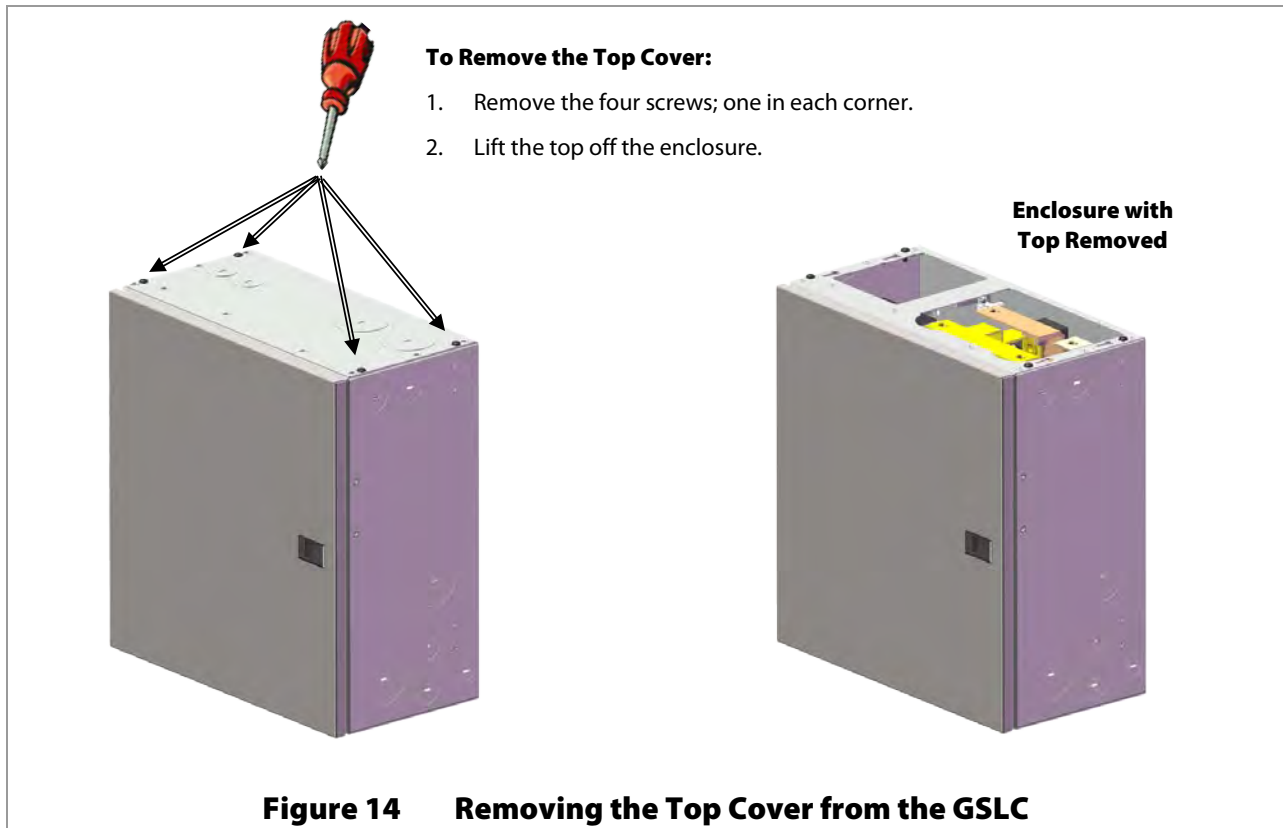
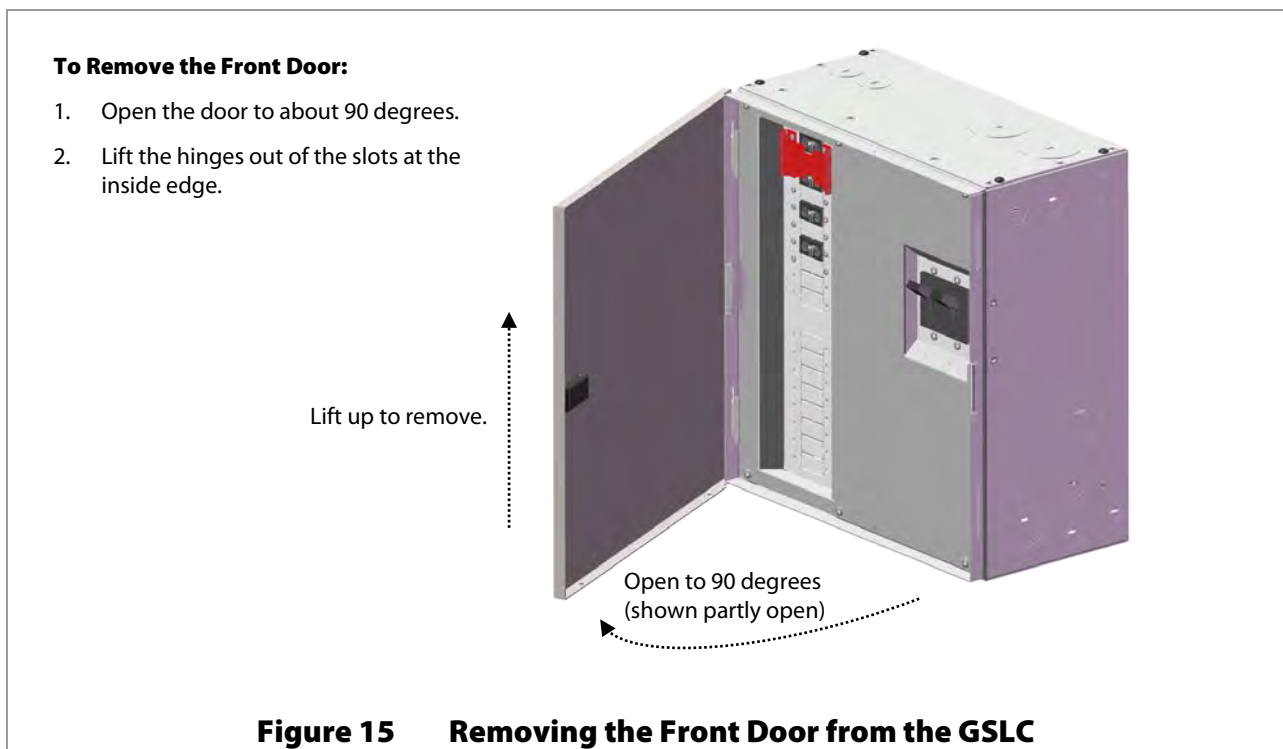


Figure 13 GSLC175-120/240 and GSLC175-230 – Additional Components

Remove Top Cover



Remove Front Door



Remove Interior Cover

In order to make any wiring connections or to install components, the interior cover must be removed to expose the interior of the enclosure. (This cover is sometimes called the “dead front.”)

To Remove the Interior Cover:

1. Remove the three screws along the top of the enclosure (with one star washer).
2. Remove the three screws along the bottom of the enclosure (with one star washer).
3. Lift the front cover off the enclosure.

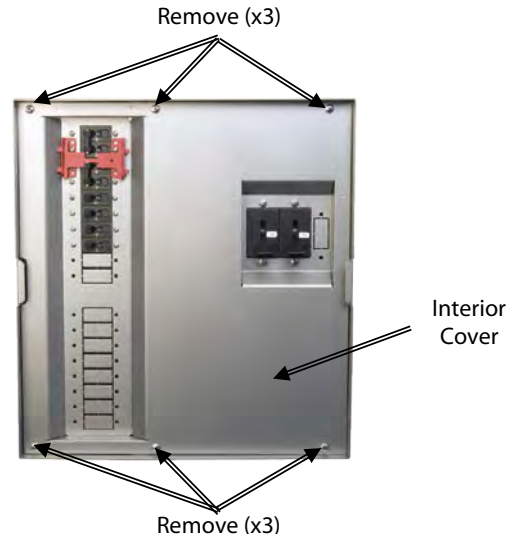


Figure 16 Removing the Interior Cover from the GSLC

Installing the Internal Hardware

Table 1 Size and Torque Requirements for Circuit Breakers and Bus Bars

Item	Terminal/Bolt Size	Torque Requirements
Inverter Positive (+) Bus Bars	M8	60 in-lb (6.8 Nm)
Shunt Bolts	3/8"	60 in-lb (6.8 Nm)
DC Positive (+) Cable Plate	Top Holes (x3)	60 in-lb (6.8 Nm)
	Bottom Holes (x7)	50 in-lb (5.7 Nm)
Circuit Breaker Studs	M8	20 in-lb (2.3 Nm)
	1/4"	35 in-lb (4.0 Nm)
	5/16"	50 in-lb (5.7 Nm)
	3/8"	225 in-lb (25.5 Nm)

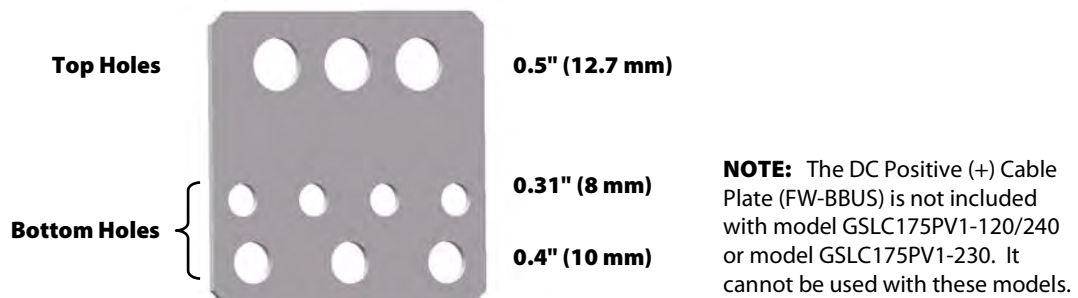


Figure 17 DC Positive Cable Plate (FW-BBUS)

Assembling DC Positive (+) Cable Plate (Bus Bar)

NOTE: These instructions are not used with model GSLCPV1-120/240 and models GSLC175PV1-230. If using either of these models, proceed to page 21 or the next appropriate instruction.

The bottom of each DC disconnect (circuit breaker) is bolted to a metal plate (bus bar) which receives the inverter's positive (+) battery cables.

To assemble the DC Positive Plate:

1. Remove the nuts and other hardware (washer, lock washer, hex nut) from the bottom terminal in the back of each DC disconnect.
2. Place the two DC disconnects side by side.
3. Orient the DC positive plate so that the three largest holes are at the top. These holes have a diameter of 0.50" (1.3 cm). Insert the studs on each disconnect through the first and third holes.
4. Replace the disconnect hardware (washer, lock washer, hex nut). Tighten the nuts to the values shown in Table 1 on page 19. The plate will hold the two circuit breakers together as a set.

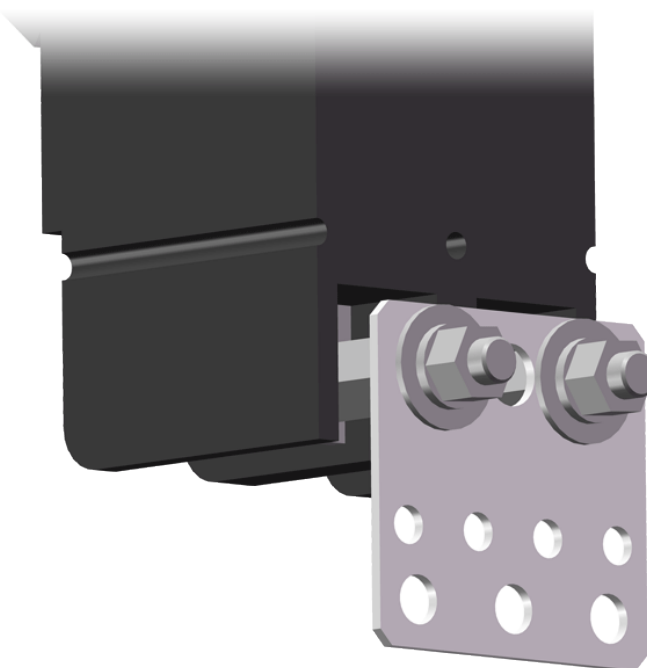
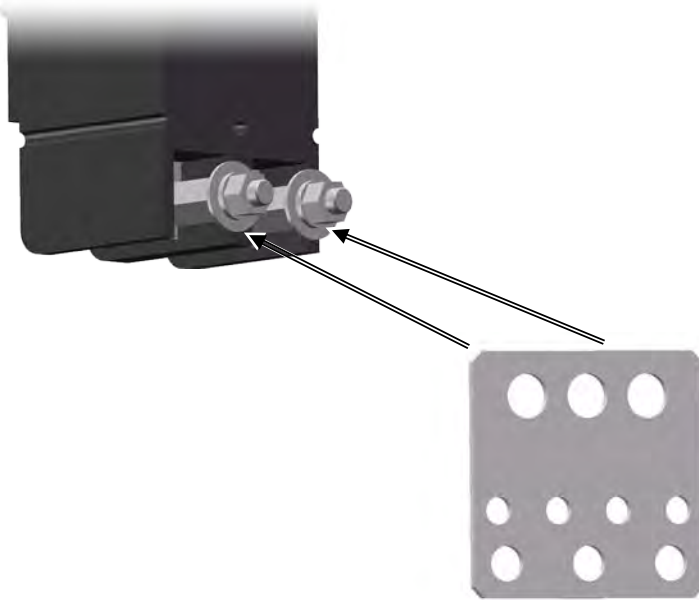
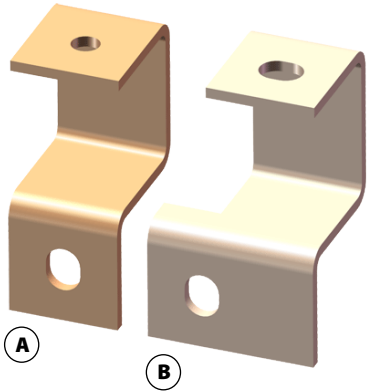


Figure 18 Assembling the DC Positive (+) Cable Plate

Installing Inverter Positive Bus Bars

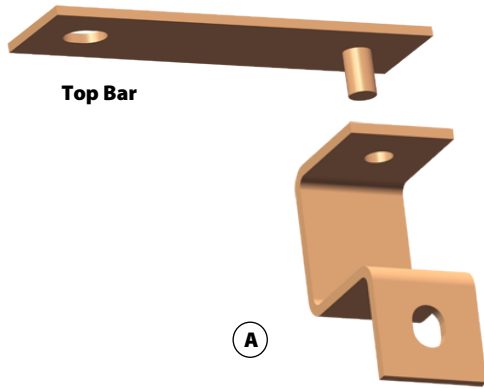
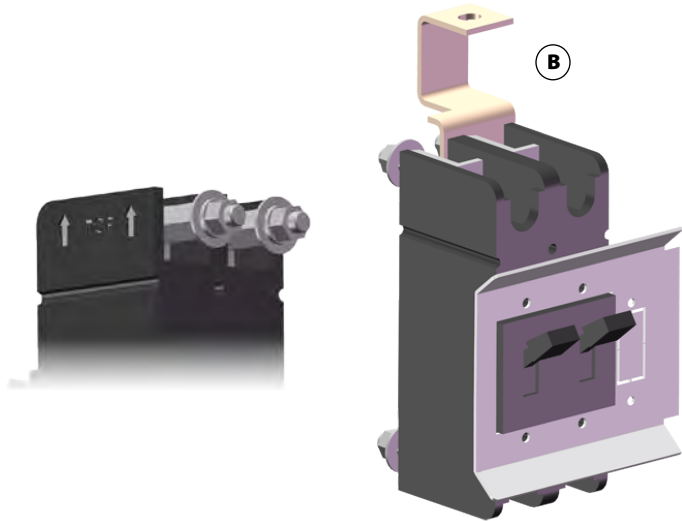


The GSLC parts kit contains two bus bars, **A** and **B**, which attach to the tops of the DC disconnects. These bus bars make the connections with the Radian inverter's positive DC terminals. Although they have similar shapes, the bus bars are not interchangeable.

NOTE: **B** is not included with model GSLC175PV1-120/240 or model GSLC175PV1-230. When these models are in use, begin the instructions with step 2.

To assemble the Inverter Positive (+) Bus Bars:

1. Attach bus bar **B** to the top terminal of the DC disconnect on the right, using the stud and hardware on the back of the DC disconnect. Tighten the nuts to the values shown in Table 1 on page 19.



2. The GSLC's hardware kit contains a top bar which attaches to bus bar **A**. Attach these two bars together using a 5/16" flat washer, a 5/16" lock washer, and an M8 nut (included in hardware kit). Tighten to the value shown in Table 1 on page 19.

3. Mount bus bar **A** and the top bar to the top terminal of the DC disconnect on the left. Tighten to the value shown in Table 1 on page 19.

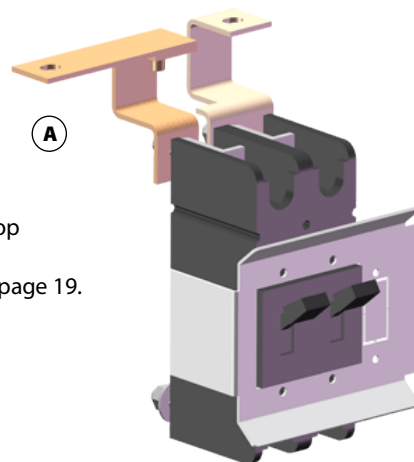
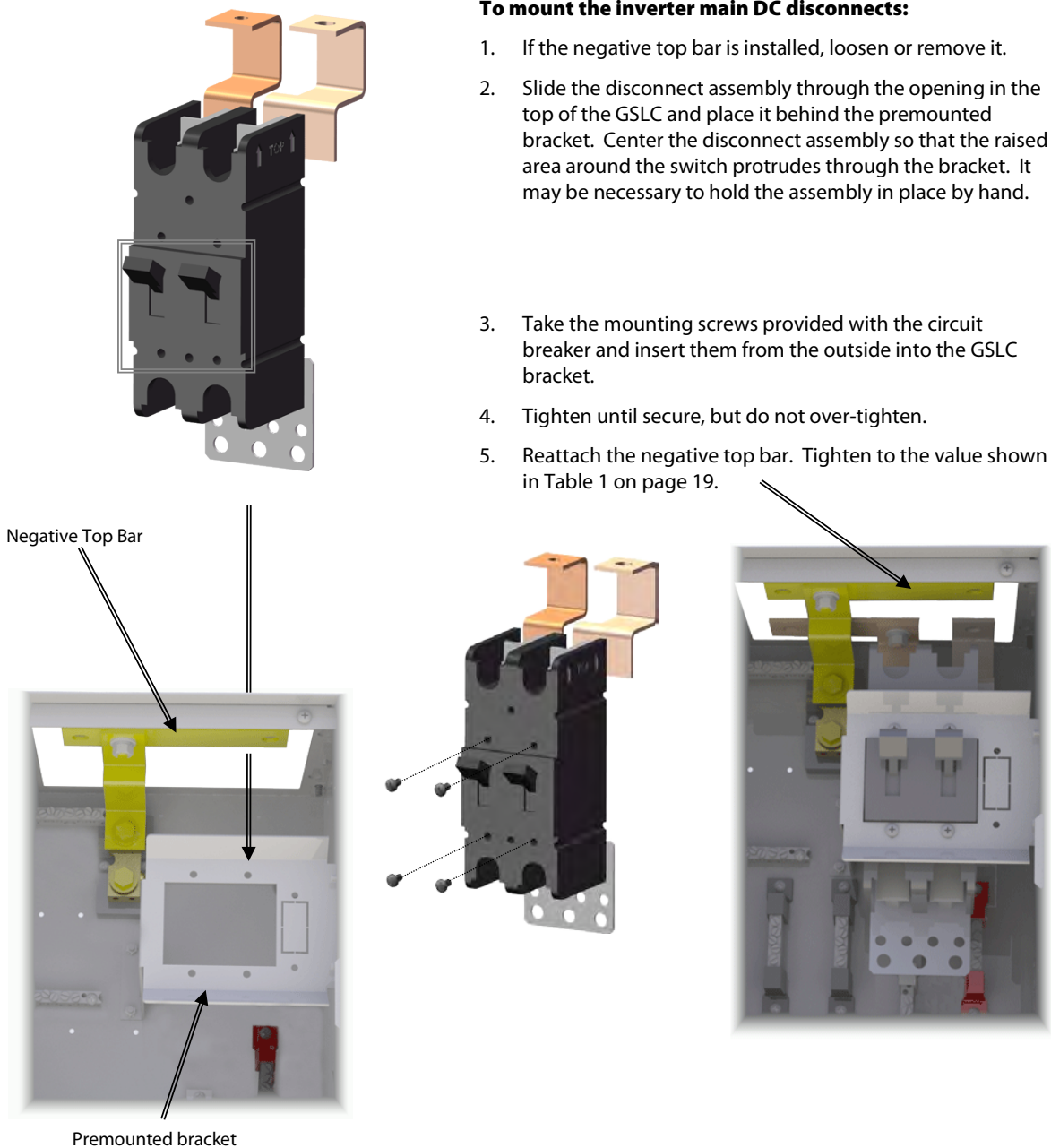


Figure 19 Inverter Bus Bars

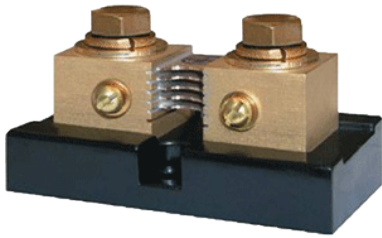
Installing Inverter Main DC Disconnects



These instructions assume that the GSLC has not yet been mounted to the Radian inverter and that the top is open. If the GSLC's top is closed or inaccessible, remove the premounted bracket. Attach the disconnect assembly to it. Finally, re-install the bracket.

Figure 20 Inverter Main DC Disconnects

Installing DC Shunts

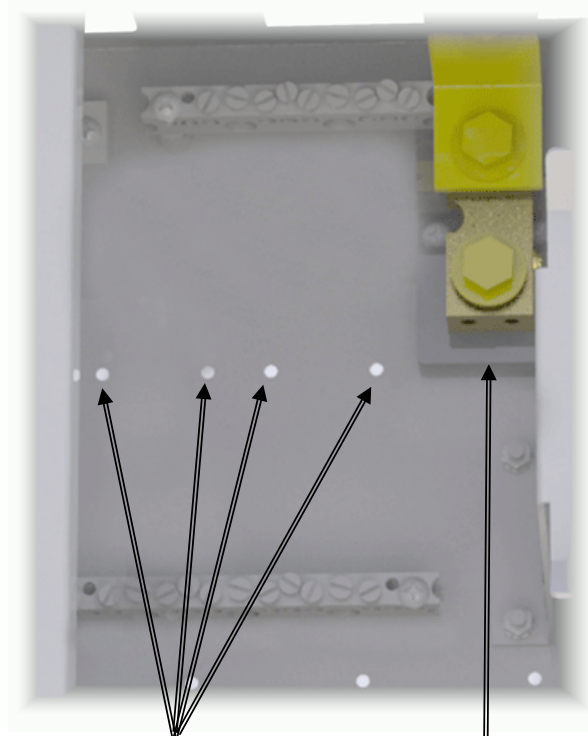


A single 500 Adc/50 mV shunt is included with the GSLC. Up to two more shunts can be installed as needed. These shunts are used in conjunction with the FLEXnet DC battery monitor. See page 31 for more instructions on wiring.

To mount DC Shunts:

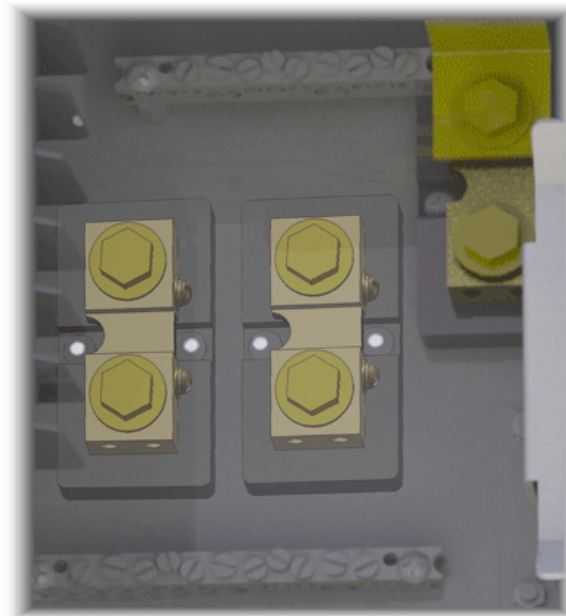
1. Four mounting holes are located to the lower left of the first shunt. Center each shunt across one pair of mounting holes. These should line up with the mounting holes built into each shunt.
2. Using the screws included with the shunt, attach each shunt to the GSLC enclosure.
3. Tighten the screws until secure, but do not over-tighten.

NOTE: The GS-SBUS can be purchased and installed to connect the three shunts together. See Figure 30 on page 33.



Mounting Holes for Additional Shunts

Pre-installed Shunt



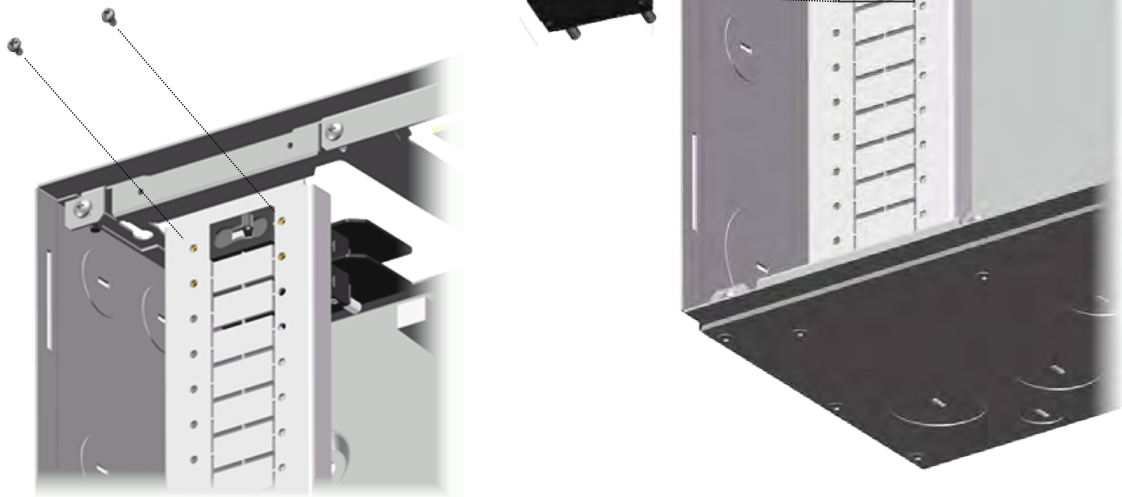
Additional Shunt Placement

Figure 21 DC Shunts

Installing PV and AC Circuit Breakers and GFDI

To mount circuit breakers:

1. It may be necessary to remove the knockout from the location where the circuit breaker is to be placed to make room for the circuit breaker to be installed. Be sure to remove any debris that may occur from removing the knockout.
2. Place each circuit breaker behind the premounted rail. Center the device so that the raised area around the switch protrudes through the bracket. It may be necessary to hold the device in place by hand.
2. When the circuit breaker is in place, insert the screws included with each breaker through the holes in the mounting rail.
3. Tighten the screws until secure, but do not over-tighten.



NOTES

- Although there are no specific designations, the upper end of the mounting rail is generally used for AC devices (including the maintenance bypass). The lower end is generally used for DC devices, including the GFDI. The preassembled GSLC models follow this convention.
- A PV ground-fault device may be required. The OutBack GFDI is pre-installed on some models. With other models it can be purchased separately for manual installation. (See page 17.) The GFDI mounts the same way as other circuit breakers. Once mounted, see page 34 and the GFDI manual for wiring instructions. (Note that the GFDI usually requires multiple rail slots.)
- Some installations may require an AC maintenance bypass. This is referred to as the Input-Output Bypass or IOB. The bypass comes prewired for a single Radian inverter in some GSLC versions. It can also be purchased separately. See page 37 and the GS-IOB manual for mounting and wiring instructions.

Figure 22 Circuit Breakers

Mounting on the Inverter

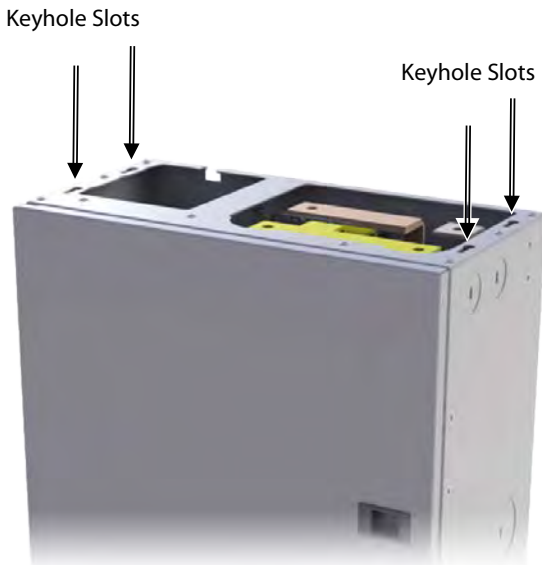


IMPORTANT:

The Radian inverter and GSLC are intended for indoor use only. Ensure that the mounting surface is strong enough to support the full weight of the Radian inverter/charger and the GSLC. Use a minimum 3/4" (19 mm) sheet of plywood to strengthen the wall surface if required.



Bottom Screws



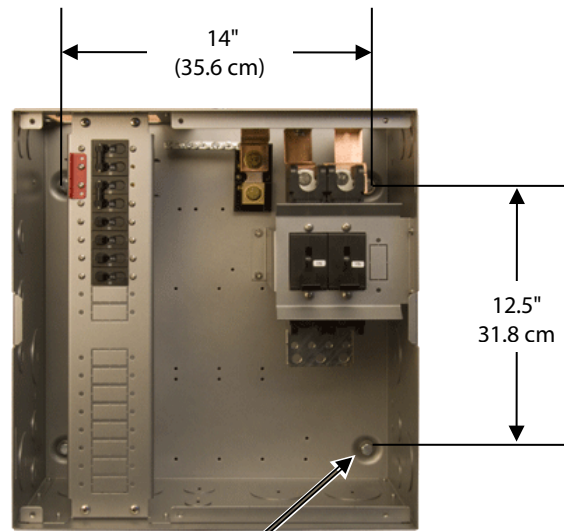
Keyhole Slots

Keyhole Slots

To mount the GSLC to the Radian inverter:



1. Install the Radian inverter on the mounting bracket. Remove knockouts from the bottom of the Radian inverter if necessary and install bushings.
2. Back out bottom screw(s) approximately 1/4" (0.6 cm) to 3/16" (0.5 cm).
3. Remove the front and interior covers from the GSLC if necessary (as described on page 18).
4. Align the GSLC along the bottom of the inverter and slide the bottom screws into the keyhole slots.
5. Hanging the GSLC from the screws and holding it flush against the bottom of the inverter, mark the spots for the holes for the mounting feet. These are located in the rear of the GSLC and are marked below.
6. If using wall anchors (included): Remove the GSLC. Using a 3/8" (10 mm) drill bit, drill leader holes for the hardware to be used to secure the GSLC to the surface. Install the wall anchors. If mounting on a solid surface like plywood, this step can be skipped.



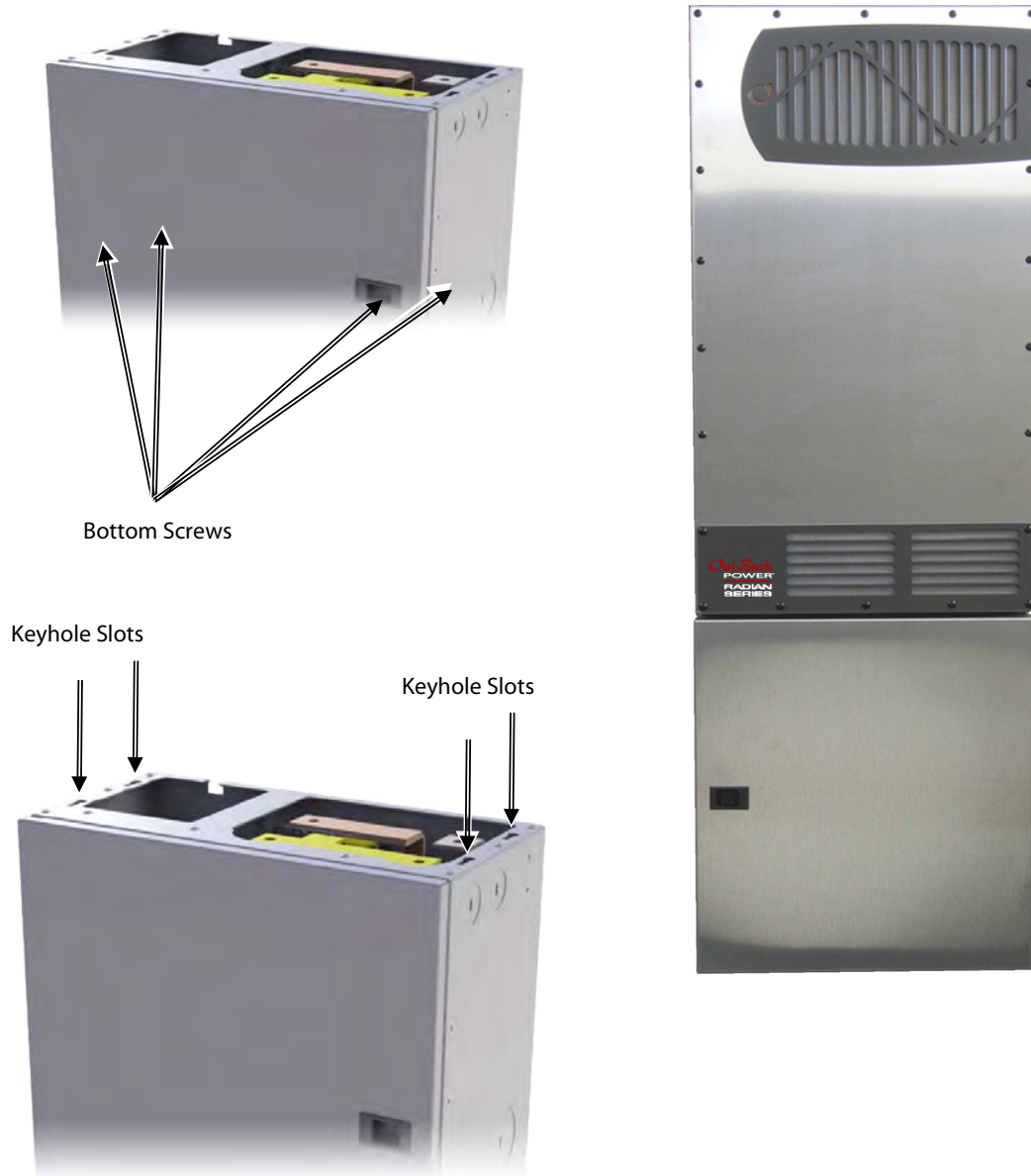
Mounting Feet Holes (x4)

Continued on the next page....

Figure 23 Mounting the GSLC

Installation

...continued from the previous page.



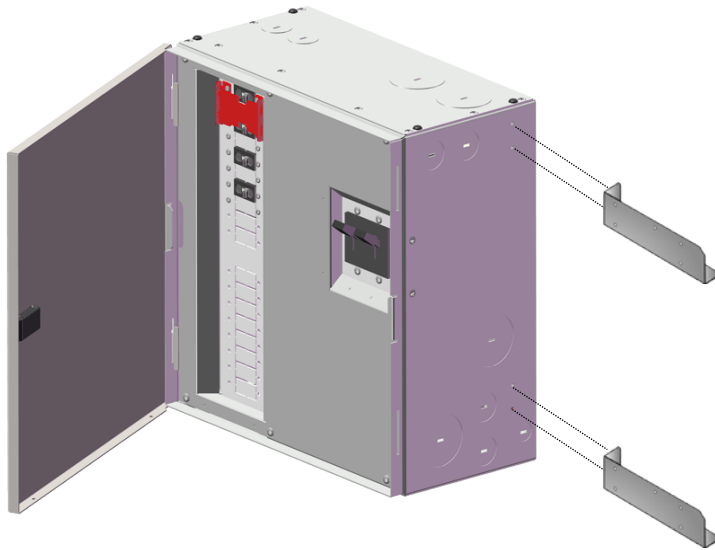
7. Realign the GSLC along the bottom of the inverter and slide the mounting screws into the keyhole slots.
8. Secure the enclosure to the mounting surface using all four mounting feet holes.
9. Using the bolts provided on the Radian inverter's battery terminals, connect the terminals to the GSLC's inverter bus bars. Tighten to the value shown in Table 1 on page 19. For more information on the Radian terminals, see the *Radian Series Inverter/Charger Installation Manual*.)
10. Leave the door and interior cover removed until all components have been installed and all wiring is complete.

Figure 23 Mounting the GSLC (continued)

Mounting FLEXmax Charge Controller

The GSLC enclosure accommodates up to two FLEXmax charge controllers and a HUB Communications Manager.

NOTE: The following instructions are for the FLEXmax 60 or FLEXmax 80 only. The FLEXmax Extreme charge controller connects directly to the wall and does not need additional brackets.



To mount the FLEXmax Charge controller to the side of the GSLC enclosure:

1. Align the brackets to the mounting holes and secure the brackets to the sides of the enclosure with the hardware provided with the brackets.
2. Note the location of knockouts on both the charge controller and the GSLC. (See page 16.) The holes will align when the brackets are used. Remove knockouts if necessary and insert bushings.
3. Align the charge controller with the center hole on each bracket and secure with the hardware provided with the brackets.



4. Secure to the bottom bracket.

NOTE: This illustration shows only brackets for a single charge controller (FW-CCB). Dual charge controller brackets (FW-CCB2) are also available. The installation instructions for FW-CCB and FW-CCB2 are similar.



Dual Charge Controller Bracket (FW-CCB2)

Figure 24 Mounting the Charge Controller to the GSLC Enclosure

Mounting the HUB Communications Manager

The GSLC provides mounting holes to support a HUB Communications Manager.

To mount the HUB Communications Manager to the side of the GSLC enclosure:

1. Locate the mounting holes on the side of the GSLC enclosure as shown in Figure 11 on page 16.
2. Remove the knockouts and add bushings.
3. Align the HUB (vertically) over the mounting holes with the HUB product's ports facing forward.
4. Insert the mounting screws from the outside into the GSLC enclosure. The mounting screws are provided with the HUB product.
5. Tighten until secure, but do not over-tighten.
6. Install CAT5 cabling as needed.
7. Install the protective shield for the HUB product.

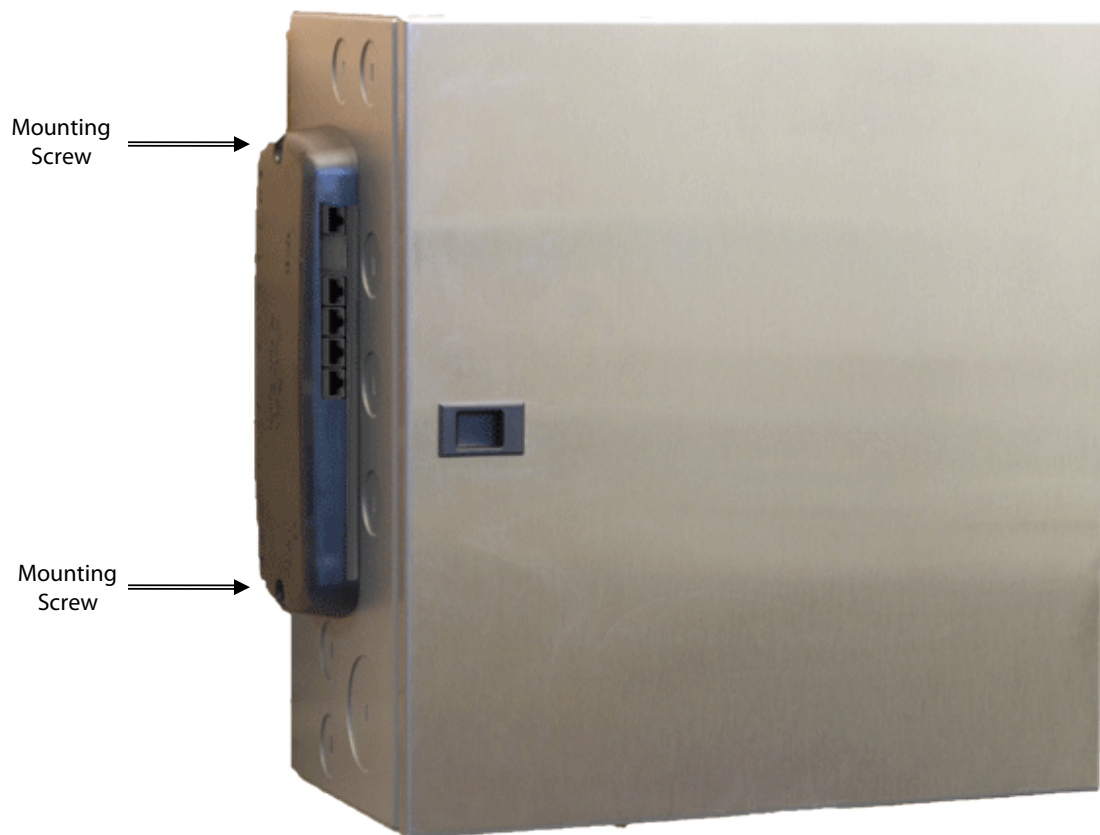


Figure 25 Mounting the HUB Product to the GSLC Enclosure

Wiring

Table 2 Terminal Bus Bar (TBB) Wire Size and Torque Requirements

Conductor Size		Torque Requirements	
AWG	mm ²	In-lb	Nm
#14 – #10	2.5 – 4	20	2.3
#8	6 – 10	25	2.8
#6– #3	16 – 25	35	4.0
#2	35	40	4.5
#1 – 1/0	50	50	5.7

Grounding



WARNING: Shock Hazard

- The unit must be connected to a permanent wiring system that is grounded according to the IEC 60364 TN standard.
- Make sure that no more than one bond is present in the AC system at any time. Some codes require the bond to be made at the main panel only.
- For safety, the neutral and ground conductors should be mechanically bonded. The GS Load Center (GSLC) is equipped with a neutral-ground bond. If bonding is required to be in another location, the bond in the GSLC may need to be removed.
- Some generators have a neutral-ground bond. When establishing a single bond elsewhere, it may be necessary to check for a generator bond.



WARNING: Shock Hazard

For all installations, the negative (–) battery conductor should be bonded to the grounding system at only one point. **The GSLC comes equipped with a negative-ground bond.** This bond may need to be disconnected. If the OutBack GFDI is present, it can provide the bond. See page 30.



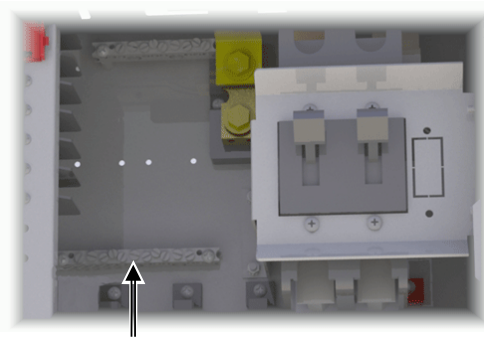
IMPORTANT:

Most OutBack products are not designed for use in a positive-grounded system. If it is necessary to build a positive-grounded system with OutBack products, contact OutBack Technical Support at +1.360.618.4363 before proceeding. Additionally, consult the online forum at www.outbackpower.com/forum/, where this subject has been discussed extensively.

The GSLC's grounding terminal bus bar (TBB), which is bonded to the GSLC chassis, is located to the lower left of the main inverter disconnect. It accepts conductor sizes from 1/0 to #14 AWG (50 mm down to 2.5 mm).

This TBB accepts ground connections from the Radian inverter, FLEXmax charge controllers, the OutBack GFDI, the Grounding Electrode Conductor (GEC) or external earth ground, and other equipment.

See the *Radian Series Inverter/Charger Installation Manual* for recommendations on ground conductor sizing. Once the size is determined, see Table 2 for required torque values.



Ground TBB

Figure 26 Grounding

Bonding

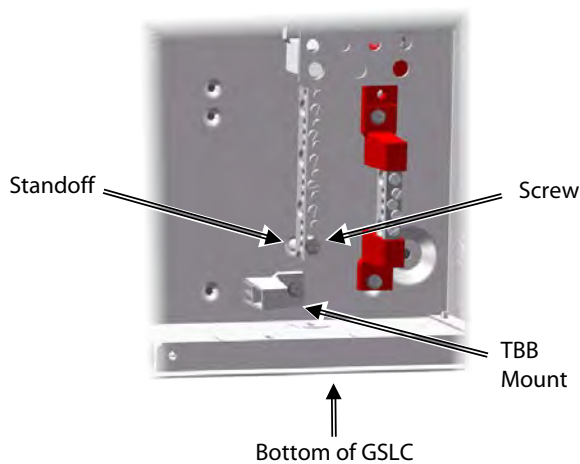
All GSLC models are equipped with a mechanical bond between AC **neutral** and ground. All models that do not include the GFDI are also equipped with a mechanical bond between DC **negative** and ground. These can be useful in stand-alone systems where no other bond is provided. If other bonds are present, or if the GFDI is installed later, the GSLC bonds need to be removed.



WARNING: Shock Hazard

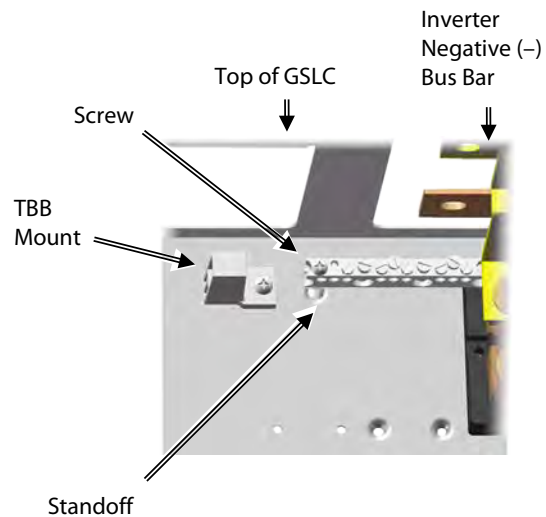
If the GFDI is manually installed (see page 24 and the GFDI manual), the negative-ground bond on the GSLC must be removed. This must also be done if any other PV ground-fault device is present that establishes its own negative-ground bond. GSLC models purchased with the OutBack GFDI do not have a bond between negative and ground.

The GSLC's **neutral bus bar** is located in the lower right portion of the GSLC. The neutral-ground bond is established at one end of the bar, near the base of the GSLC.



Neutral-Ground Bond

The GSLC's **negative (-) bus bar** is located near the top of the GSLC. It is attached to the inverter negative (-) bus and its shunt.



Negative-Ground Bond

To remove either of the bond connections:



1. Using a Phillips screwdriver, remove the screw shown above.
2. Remove the metal standoff beneath the bus bar. The screw and bus bar provide the mechanical bond to the chassis ground.
3. Rotate the TBB mount. Insert the bus bar into the open end of the TBB mount so that the TBB mount supports the bus bar. It may be necessary to loosen the TBB mount screw before rotating it.
4. Retighten the screw to secure the TBB mount.

NOTES:

- If the TBB is connected directly to the enclosure by a screw, then the bond is connected.
If the TBB is held by the TBB mount and the TBB mount is secured to the enclosure, the bond is disconnected.
- The installed Neutral TBB has white insulators. A second Neutral TBB with blue insulators is included in the kit for locations where blue is standard.

Figure 27 Removing Bonding Connections

DC Wiring

	<p>WARNING: Shock Hazard</p> <p>Ensure all circuit breakers or disconnect devices are turned off or disconnected before connecting any wires.</p>
	<p>CAUTION: Fire Hazard</p> <p>Never install extra washers or hardware between the mounting surface and the battery cable lug. When installing multiple ring terminals or lugs, stack them on the mounting surface so that the largest conductor is in direct contact. Smaller ring terminals should be placed next in decreasing size order. Stacking the hardware in any order can result in a loss of contact area for current flow. This may allow dangerous levels of heat to build up.</p>

Inverter Wiring

The DC disconnects are connected directly to the inverter using bus bars during the process of mounting. See page 26 for more information.

Battery Wiring

Consult the *Radian Series Inverter/Charger Installation Manual* for appropriate recommendations for cable number, sizing, and length. When using these recommendations, some models only require one set of battery cables while other models require two sets of cables. (A single set of larger conductors can be used if sized correctly.)

See Table 1 on page 19 for required torque values.

Ensure DC disconnects are turned to the OFF position and **all** DC sources are disconnected (unbolt the battery end of the wires) before proceeding.

See the inverter's installation manual for additional information on battery wiring.

Battery Positive (+) Cable

Follow the instructions below when connecting battery positive (+) cables to these models:

- GSLC175-120/240
- GSLC175-230
- GSLC175-PV-120/240
- GSLC175-PV-230

Connect the positive (+) cables to the DC positive (+) wiring plate. This plate is located directly beneath the main inverter disconnects. It is intended for several ring lugs to be bolted to it.

- ~ The smaller holes have a diameter of 0.31" (8 mm).
- ~ The larger holes have a diameter of 0.4" (10 mm).

See item **B** in Figure 28 for an illustration of hardware installation order on the positive (+) plate.

Follow the instructions below when connecting battery positive (+) cables to these models:

- GSLC175PV1-120/240
- GSLC175PV1-230

Connect the positive (+) cable directly to the DC disconnect, which uses an M8 stud. See item **A** in Figure 28 for an illustration of hardware installation order on the DC disconnect.

Follow the appropriate instructions when connecting to an "empty" GSLC which has been assembled with similar features to one of the models above.

Installation

Battery Negative (-) Cable

The battery negative (-) cables connect to the pre-installed shunt. This shunt is located to the upper left of the main inverter disconnect. It is designed for several ring lugs to be bolted to it, with openings of 3/8" (10 mm) diameter.

See item **C** in Figure 28 for an illustration of hardware installation order on the shunt. The shunt plate (GS-SBUS) may or may not be present.

NOTE: Do not install hardware in a different order from the illustrations in Figure 28. In all cases the battery cable lug must be the first item installed. It must make solid contact with the surface.

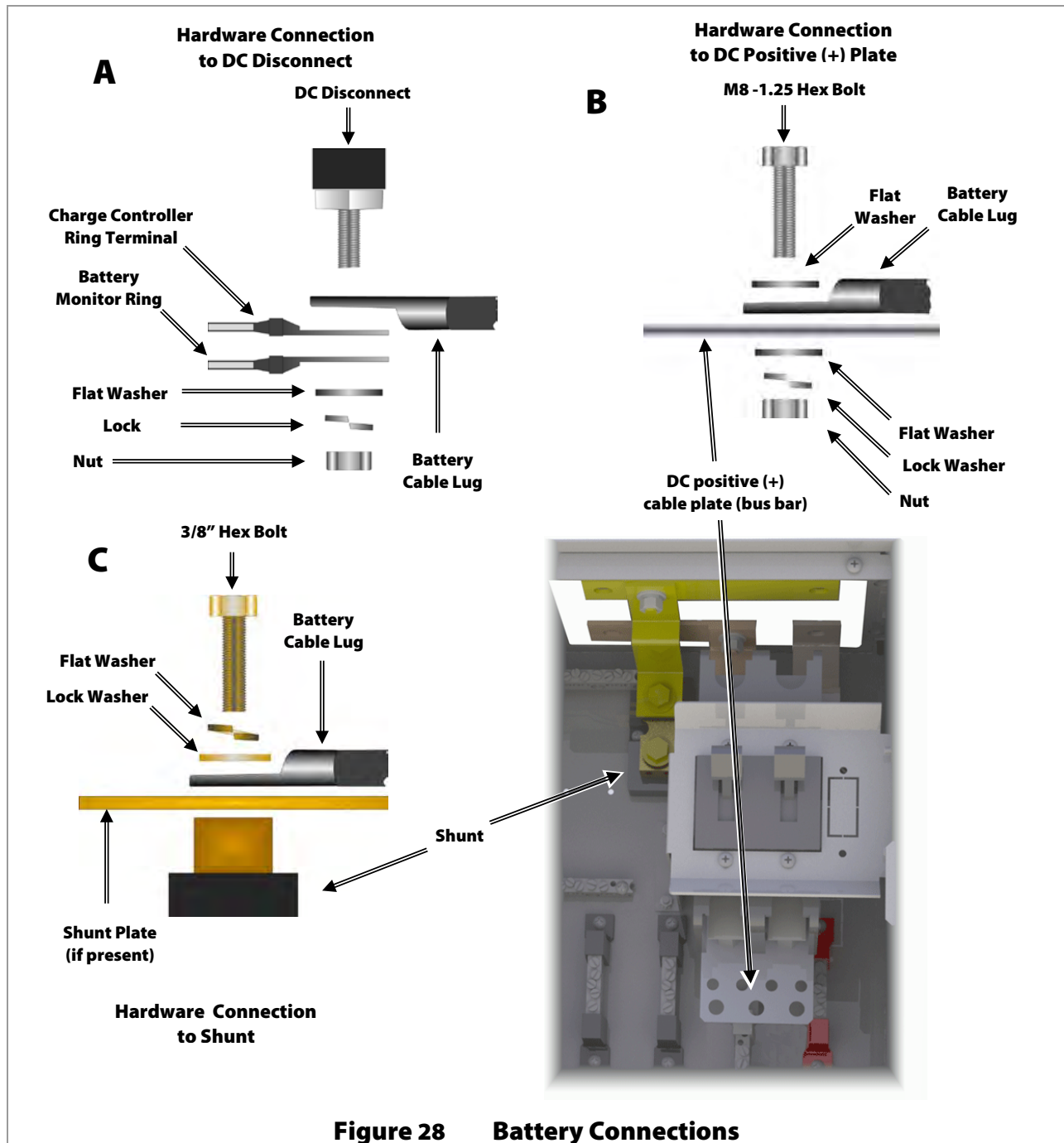
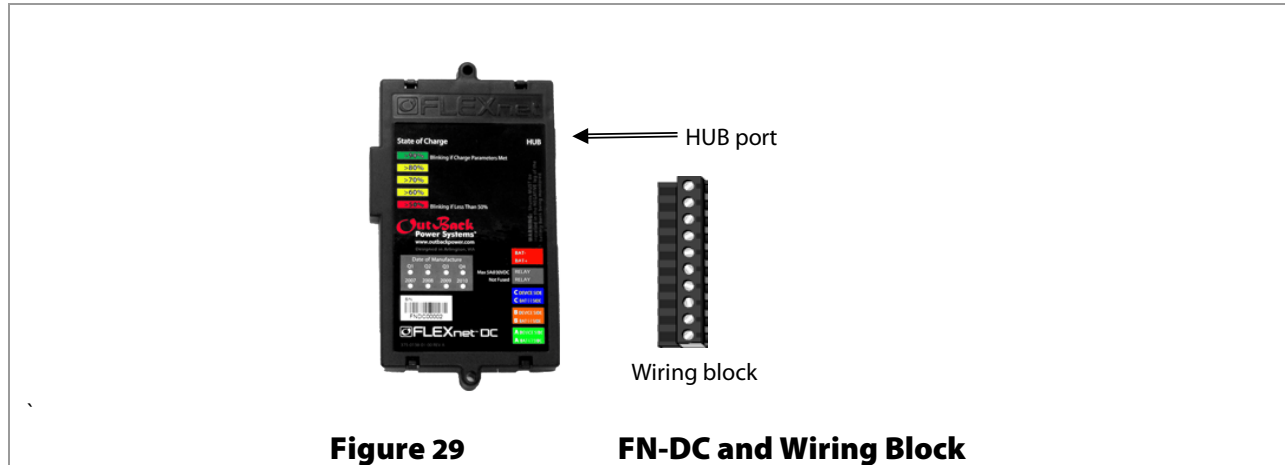


Figure 28 Battery Connections

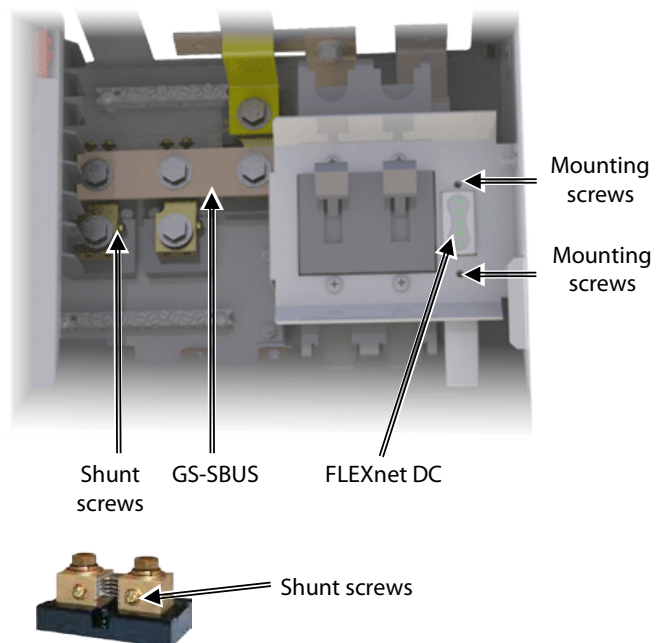
Installing the FLEXnet DC

The OutBack FLEXnet DC (FN-DC), or a similar battery monitor, may be added to the GSLC for observing DC current flow and providing battery state-of-charge information.



To install the FN-DC :

1. Assemble the FN-DC wiring as shown in the manual for the FN-DC.
 - Attach sense wires to FN-DC wiring block and plug it into the FN-DC.
 - Plug the CAT5 cable into the port labeled HUB.
2. Connect FNDC wiring to the GSLC.
 - The positive (+) and negative (-) battery voltage sense conductors should connect directly to the battery bank.
 - The shunt sensing wires should connect to the screws on each shunt. It may be necessary to remove the GS-SBUS to reach the screws.
3. Mount the FN-DC by inserting it into the opening to the right of the inverter disconnects. It may be necessary to hold it in place.
4. Secure the FN-DC with mounting screws above and below. Tighten until secure, but do not over-tighten.



When connecting sensing wires: The end of the shunt connected to the GS-SBUS is the negative (-) battery connection and should be wired accordingly. The other end of the shunt is the "device" or "load" end and should be wired accordingly. See the FLEXnet DC manual for more information on these connections. See Figure 46 on page 49 for an example of typical system wiring.

Figure 30 Installing the FLEXnet DC

DC Devices

In addition to inverter or PV connections, other devices may be connected to the GSLC, such as DC loads or sources. The wiring on these devices will vary with the application. In most cases the device will have a separate circuit breaker which is mounted on the rail as shown on page 24. It will be wired into the battery system using the existing bus bars or shunts. The number and location of these connections will vary with the options or accessories installed.

PV and Charge Controller Wiring

When wiring the FLEXmax, FLEXmax Extreme, or another charge controller to the GSLC, a number of elements are involved. These elements include the PV or RE source, the battery connections, the disconnect circuit breaker, the PV ground-fault device, and the charge controller.

These instructions are written for a PV source which uses the OutBack FLEXmax (or FLEXmax Extreme) charge controller and the GFDI. Other applications will be similar.

NOTE: In GSLC models designated as "PV", many of the connections below are already provided. The only connections necessary are those for external wiring to the charge controller.

To make PV and charge controller connections:

1. Connect the PV positive wire to the GSLC's PV positive (+) TBB (see Figure 31).
2. Connect the PV negative wire to the charge controller's PV negative (-) terminal (see Figure 32).
3. Install a wire from the PV TBB to the PV disconnect circuit breaker (see Figure 31).
4. Install a wire from the PV disconnect to the charge controller's PV positive (+) terminal.
5. Install a wire from the GSLC's DC positive (+) cable plate to one pole of the GFDI.
6. Install a wire from the GFDI to the charge controller's positive (+) battery terminal.
7. Install a wire from the charge controller's negative (-) battery terminal to the GSLC's negative TBB. If the FLEXnet DC or another battery monitor is in use, this wire should connect to the shunt which monitors that charge controller.
8. Repeat all steps for a second charge controller, if necessary.

NOTES:

- Each TBB accepts conductors from 1/0 AWG (70 mm²) to #14 AWG (2.5 mm²) in size. See Table 2 on page 29 for required torque values.
- For other GSLC required torque values (such as shunts and circuit breakers), see Table 1 on page 19.
- For torque values, wire sizes, and other information concerning the FLEXmax charge controller, see the *FLEXmax Series Charge Controllers Owner's Manual*.
- For more information on specific wiring of the GFDI, see the GFDI manual.
- A diagram that shows typical wiring for a PV system, including the FLEXnet DC, GFDI, and other elements of the system, is shown on page 49.
- A fully-assembled GSLC diagram with the elements mentioned above (as well as the AC system) is shown on page 49.

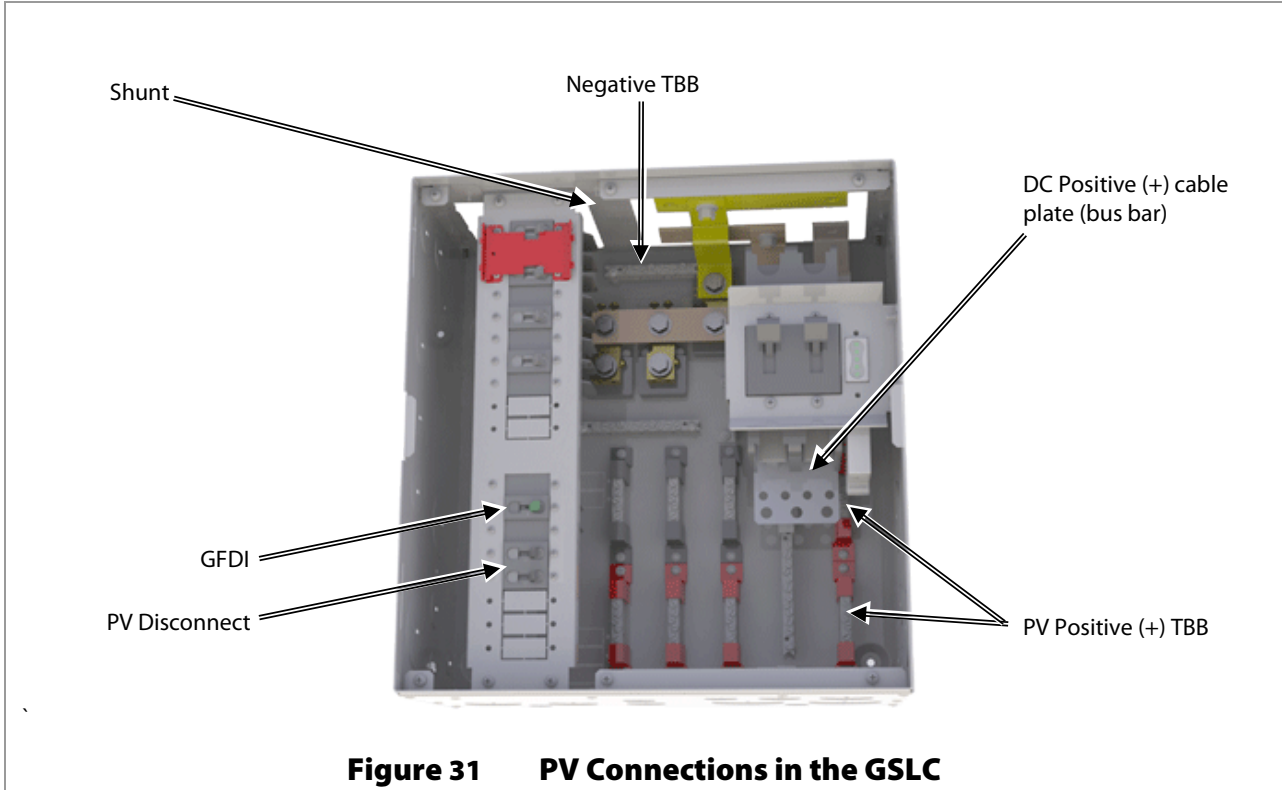


Figure 31 PV Connections in the GSLC

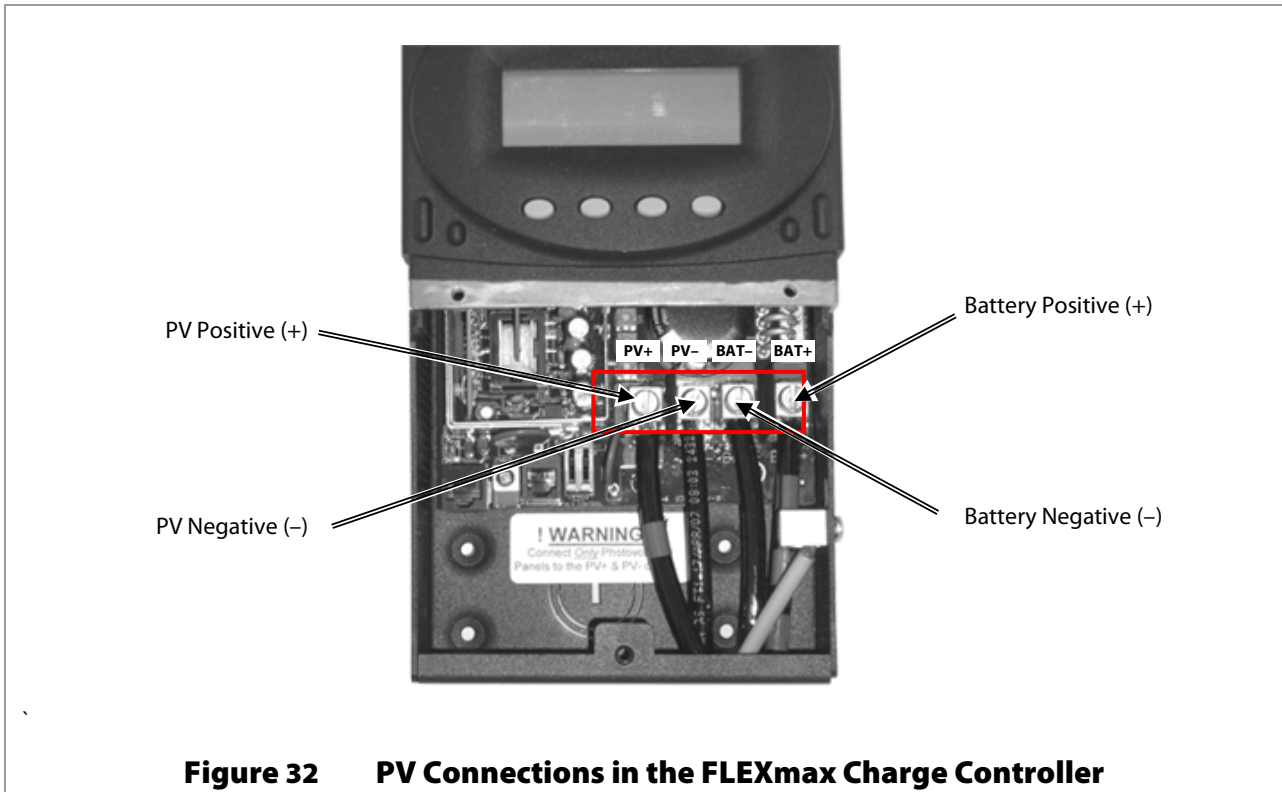


Figure 32 PV Connections in the FLEXmax Charge Controller

AC Wiring



WARNING: Shock Hazard

Ensure all circuit breakers or disconnect devices are turned off or disconnected before wiring. Make certain the inverter and other active devices are turned off or disabled before wiring.

Split-Phase Wiring

The GSLC can have multiple terminal bus bars for multiple AC connections. Because the Radian inverter possesses two sets of AC input connections and one set of output connections, up to three TBB sets are available. Each set of bus bars are paired in red and black, for the 120/240 Vac connections required by the Radian inverter.

The TBB set on the left is generally used for the inverter's AC output connections. The central TBB set is for utility grid connections and the right TBB set is for a generator. The preassembled GSLC models follow this convention.

Each TBB accepts conductors from 1/0 (70 mm²) to #14 AWG (2.5 mm²). See Table 2 on page 29 for required torque values.

If steps are inappropriate for a given system (such as instructions for a generator when none is present), they can be ignored.

To make the external AC connections to the split-phase GSLC:

1. Connect the L1 wire from the AC load panel to black TBB **1** (AC OUT - HOT LEG 1). Connect the L2 wire from the AC load panel to red TBB **2** (AC OUT - HOT LEG 2).
2. Connect the neutral wire from the AC load panel to neutral TBB **3**.
3. Connect the L1 wire from the utility grid panel (if present) to black TBB **4** (GRID IN - HOT LEG 1). Connect the L2 wire from the utility grid panel to red TBB **5** (GRID IN - HOT LEG 2).
4. Connect the neutral wire from the utility grid panel (if present) to neutral TBB **3**.
5. Connect the L1 wire from the generator (if present) to black TBB **6** (GEN IN - HOT LEG 1). Connect the L2 wire from the generator to red TBB **7** (GEN IN - HOT LEG 2).
6. Connect the neutral wire from the generator (if present) to neutral TBB **3**.

NOTE: Remove the neutral-ground bond if necessary. See page 30.

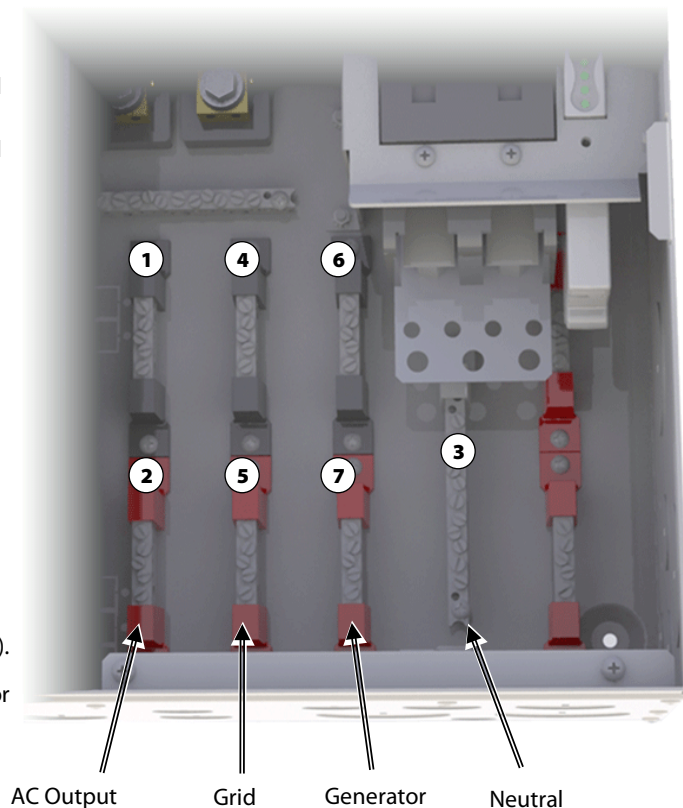


Figure 33

AC Terminal Bus Bars (split-phase)

Bypass Assembly

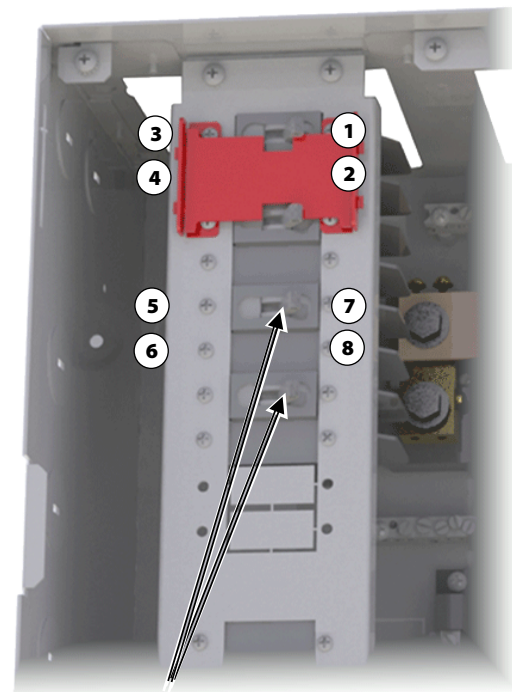
Bypass switching can be used when the inverter is shut down for maintenance. This topic is discussed more beginning on page 42. The GSLC can be equipped with the GS-IOB-120/240VAC bypass assembly. The instructions on this page are for making external connections to the bypass assembly after installation. (The installation wiring for the GS-IOB-120/240VAC is described on page 41.)

If no bypass assembly is used, connections should be made directly to each TBB from the circuit breakers for the inverter, AC sources, and loads. These connections are designated in Figure 33.

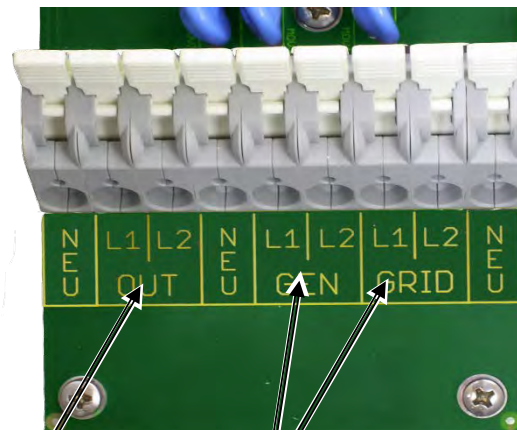
Wiring diagrams for an assembled 120/240 Vac system are shown beginning on page 45.

To make the connections to the Radian inverter:

1. Designate the top AC circuit breaker as the inverter AC output disconnect. Install a wire from the black AC output TBB (as shown in Figure 33. to the disconnect marked by **1**.
2. Install a wire from the red AC output TBB to the disconnect marked by **2**.
3. Install wires on the left side of the disconnect as marked by **3** and **4**. Connect these wires to the appropriate L1 and L2 output terminals on the Radian inverter.
4. Designate the third AC circuit breaker from the top as the disconnect for one AC source (**GRID** or **GEN**). Install a wire from the black source circuit TBB (as shown in Figure 33) to the disconnect marked by **5**.
5. Install a wire from the red source circuit TBB to the disconnect marked by **6**.
6. Install wires on the right side of the disconnect as marked by **7** and **8**. Connect these wires to the appropriate L1 and L2 input terminals on the Radian inverter (the terminals labeled either **GRID** or **GEN**).
7. If a second AC source is present, repeat steps 4 through 6 using the bottom circuit breaker.
8. Install a wire on the inverter's **NEU** terminal and connect it to the GSLC's neutral TBB (as shown in Figure 33). *Only one neutral connection is required.*



Disconnects



AC Output

GRID and **GEN** inputs

Figure 34 Inverter AC Connections (split-phase)

Single-Phase Wiring

The GSLC allows multiple terminal bus bars (TBB) for multiple AC connections. Because the Radian inverter possesses two sets of AC input connections and one set of output connections, three terminal bus bars are available for hot connections, as well as one neutral bus bar. The hot bus bars use brown insulators in 230 Vac models. The neutral bus bar uses blue insulators in 230 vac models.

The TBB on the left is generally used for the inverter's AC output connections. The central TBB is for utility grid connections and the right TBB is for a generator. The preassembled GSLC models follow this convention.

Each TBB accepts conductors from 70 mm² (1/0 AWG) to 2.5 mm² (#14 AWG). See Table 2 on page 29 for required torque values.

If steps are inappropriate for a given system (such as instructions for a generator when none is present), they can be ignored.

To make external AC connections to the single-phase GSLC:

1. Connect the hot wire from the AC load panel to brown TBB **1** (AC Output).
2. Connect the neutral wire from the AC load panel to neutral TBB **2**.
3. Connect the hot wire from the utility grid panel (if present) to brown TBB **3** (Grid).
4. Connect the neutral wire from the utility grid panel (if present) to neutral TBB **2**.
5. Connect the hot wire from the generator (if present) to brown TBB **4** (Generator).
6. Connect the neutral wire from the generator (if present) to neutral TBB **2**.

NOTE: Remove the neutral-ground bond if necessary. See page 30.

The neutral insulator in Figure 35 is in the position which opens the bond.

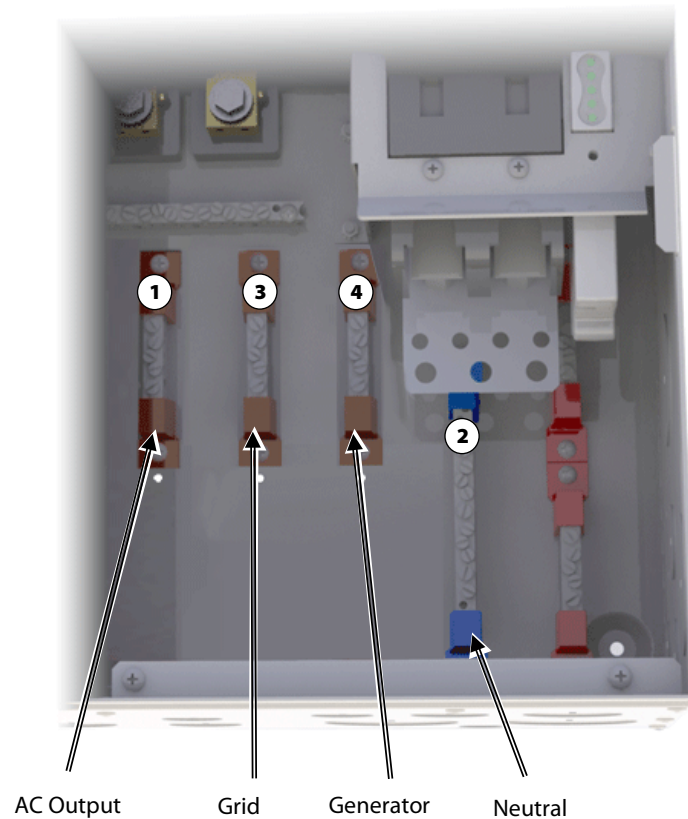


Figure 35 AC Terminal Bus Bars (single-phase)

Bypass Assembly

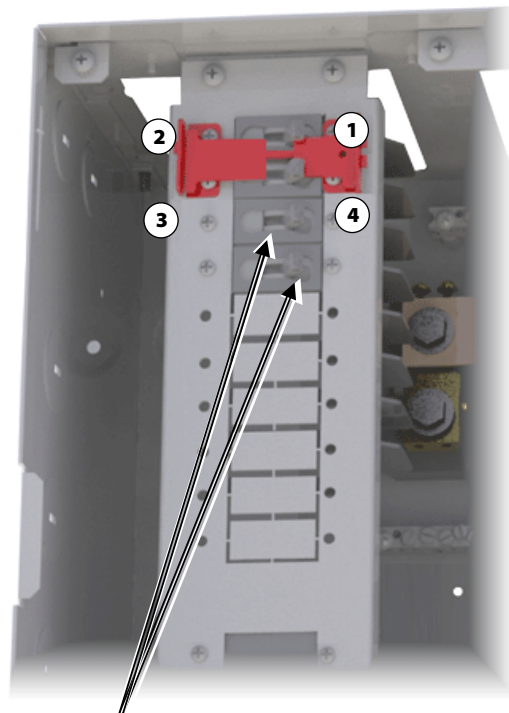
Bypass switching can be used when the inverter is shut down for maintenance. This topic is discussed more beginning on page 42. The GSLC can be equipped with the GS-IOB-230VAC bypass assembly. The instructions on this page are for making external connections to the bypass assembly after installation. (The installation wiring for the GS-IOB-230VAC is described on page 42.)

If the GSLC has no bypass assembly, connections should be made directly to each TBB from the circuit breakers for the inverter, AC sources, and loads. These connections are designated in Figure 35.

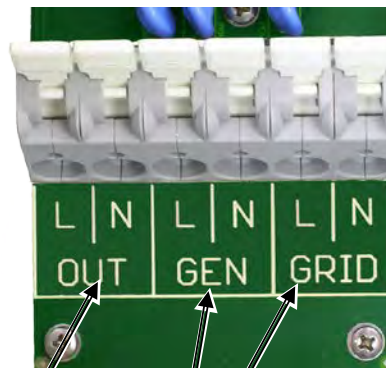
Wiring diagrams for an assembled 230 Vac system are shown beginning on page 48.

To make the connections to the Radian inverter:

1. Designate the topmost AC circuit breaker as the inverter AC output disconnect. Install a wire from the AC output circuit TBB (as shown in Figure 35) to that disconnect as marked by **1**.
2. Install a wire on the left side of the disconnect as marked by **2**. Connect the wire to the appropriate output terminals on the Radian inverter.
3. Designate the third AC circuit breaker as the disconnect for one AC source (**GRID** or **GEN**). Install a wire from the TBB of the appropriate source circuit (as shown in Figure 35) to the left side of that disconnect as marked by **3**.
4. Install a wire on the right side of the source disconnect as marked by **4**. Connect the wire to the appropriate input terminal on the Radian inverter (the terminal labeled either **GRID** or **GEN**).
5. If a second AC source is present, repeat steps 3 and 4.
6. Install a wire on the inverter's **NEU** terminal and connect it to the GSLC's neutral TBB (as shown in Figure 35). *Only one neutral connection is required.*



Disconnects



AC output

GRID and **GEN** inputs

Figure 36 Inverter AC Connections (single-phase)

Wiring the AC Bypass Assembly

All models other than the “empty” GSLC are equipped with a maintenance bypass assembly. As needed, the GSLC can be equipped with a bypass assembly using the GS-IOB-120/240VAC or GS-IOB-230VAC accessory kit as appropriate. The accessory kit should be installed according to its own instructions. Once installed, it can be wired by following the steps shown in Figure 37 or Figure 38.

The operation of the bypass assembly is discussed on page 42. A series of GSLC diagrams with the bypass wiring (as well as the rest of both the AC and DC systems) are shown beginning on page 48.

These drawings show the utility grid circuit connected to the bypass assembly. This is the method used during factory installation. However, either the grid or the generator circuit may be used. A prewired assembly may be changed. Remove the first source from the bypass assembly and then wire the second according to the instructions. Connect the first source directly to the terminals as shown in the drawings beginning on page 45.

NOTE: Only one AC source may be bypassed with this assembly, even if two sources are present.



WARNING: Shock Hazard or Equipment Damage

- Bypassing multiple sources will usually connect the sources to each other, which may damage one or both sources. It can otherwise result in power being routed to inappropriate places.
- The internal GSLC bypass assembly cannot be used if multiple inverters are in use. See page 42.

To wire the GS-IOB-120/240VAC after installation:

1. On the disconnect for the AC source that will be used during bypass, install a wire from the **upper** pole as shown by **1**. Connect it to the **upper** pole of the inverter bypass switch as shown by **2**.
2. From the same disconnect, install a wire on the **lower** pole as shown by **3**. Connect it to the **lower** pole of the inverter bypass switch as shown by **4**.
3. On the right side of the inverter bypass switch, install a wire on the lower pole as shown by **5**. Connect it to the right side of the **lower** pole on the output switch **6**. Install a second wire between the **upper** poles of each switch as shown by **7** and **8**.

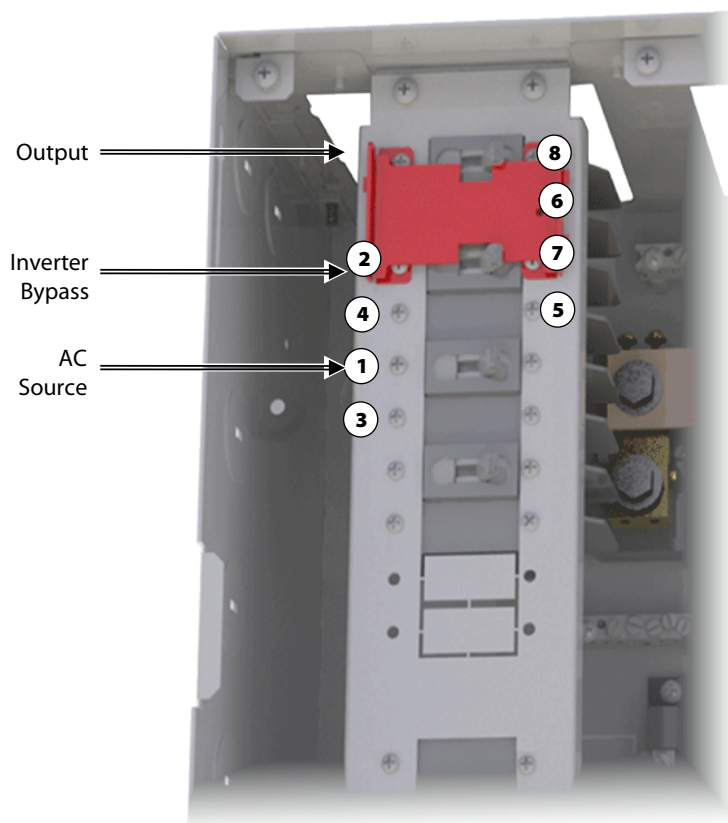


Figure 37 Maintenance Bypass Wiring (split-phase)

Installation

To wire the GS-IOB-230VAC after installation:

1. On the disconnect for the AC source that will be used during bypass, install a wire from the left side as shown by **1**. Connect it to the input bypass switch as shown by **2**.
2. Install a wire on the right side of the input bypass switch as shown by **3**. Connect it to the right side of the output switch as shown by **4**.

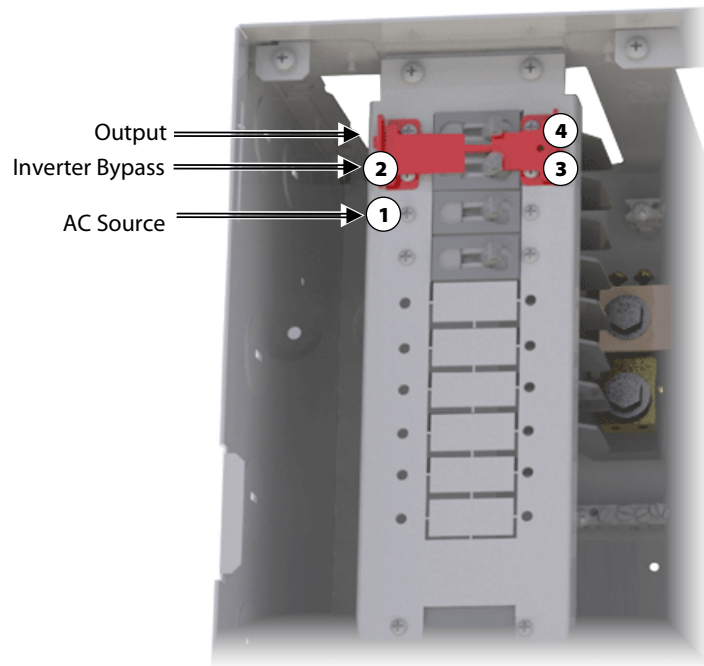


Figure 38 Maintenance Bypass Wiring (single-phase)

Multiple-Inverter Installations (Stacking Inverters)

When multiple Radian inverters are stacked for additional power, the basic wiring is repeated for each inverter. However, several factors need to be considered.

- One GSLC is required for each Radian inverter. A single GSLC cannot be sized to handle the requisite current for multiple Radian inverters.
- If more than two Radian inverters are installed, it is recommended to install a separate distribution panel to distribute incoming power to each GSLC individually. It may be advisable to install separate AC distribution panels to distribute input and output power to each GSLC.
- The GSLC maintenance bypass assemblies cannot be used when more than one Radian inverter is stacked. See the next section.

Bypass Switches

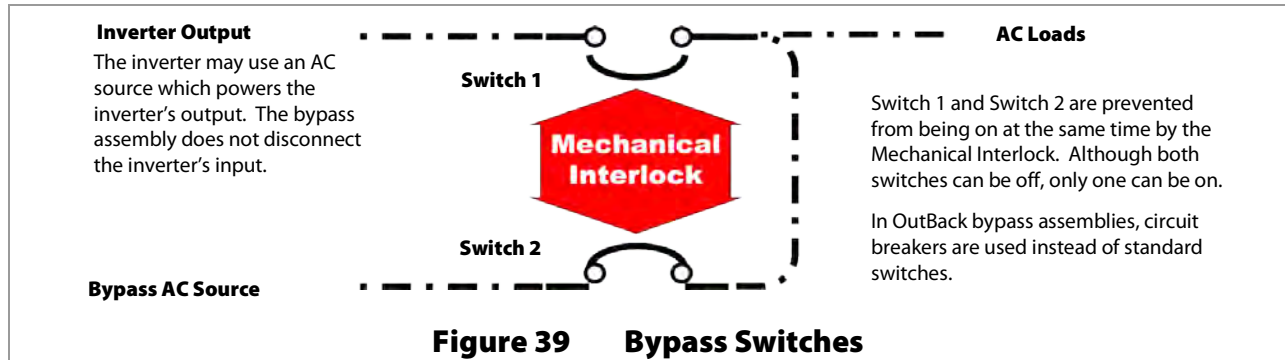
Inverter systems are often equipped with maintenance bypass switches or interlocks. If the inverter system ever needs to be shut down or removed, its AC sources and loads must be disconnected. A bypass device allows the AC source to “bypass” the inverter and deliver power directly to the loads. This can minimize disruption to the system and it avoids the need for extensive rewiring.



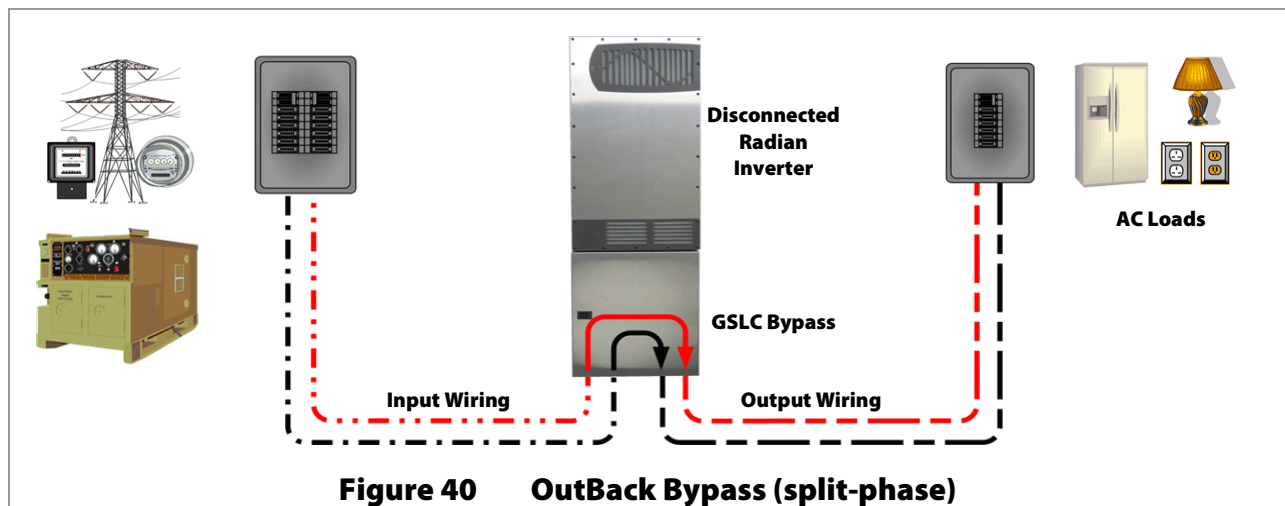
WARNING: Shock Hazard or Equipment Damage

- Bypassing multiple sources will usually connect the sources to each other, which may damage one or both sources. It can otherwise result in power being routed to inappropriate places.
- The bypass assembly does not disconnect the inverter’s AC input. Even with the inverter bypassed, any AC input source may be a shock hazard unless disconnected.

In Figure 39, when Switch 1 is on (normal operation), the inverter's output sends power to the loads. Switch 2 is off, preventing the inverter from sending power back to the AC source (backfeeding). When Switch 2 is on (bypass operation), the AC source sends power directly to the loads. Switch 1 is off, removing the inverter's output from the loads. This also prevents the AC source from backfeeding the inverter. With the inverter removed from the circuit, maintenance can be performed as necessary.



The GSLC can be ordered with bypass circuit breakers for this purpose, or it has a bypass option (the GS-IOB-120/240VAC or GS-IOB-230VAC) which can be installed.



IMPORTANT:

If multiple Radian inverters are stacked in a single system, then these devices cannot be used. The bypass function must be simultaneous for all inverters. The GSLC bypass kits operate independently, not simultaneously.

In a new system with multiple Radian inverters, the basic GSLC should be used in conjunction with an external assembly of this kind, as shown in Figure 41. The GS-IOB kits should not be installed, or if previously installed, should be removed and all wires disconnected.

OutBack does not offer a solution for bypassing multiple inverters. However, electrical suppliers offer both manual and automatic double-pole, double-throw bypass switches in a range of sizes and options. These are highly recommended for systems larger than a single inverter.



WARNING: Shock Hazard or Equipment Damage

Using independent bypass devices on multiple inverters can result in power being routed to inappropriate places. This could lead to an electric shock or to equipment damage.

Installation

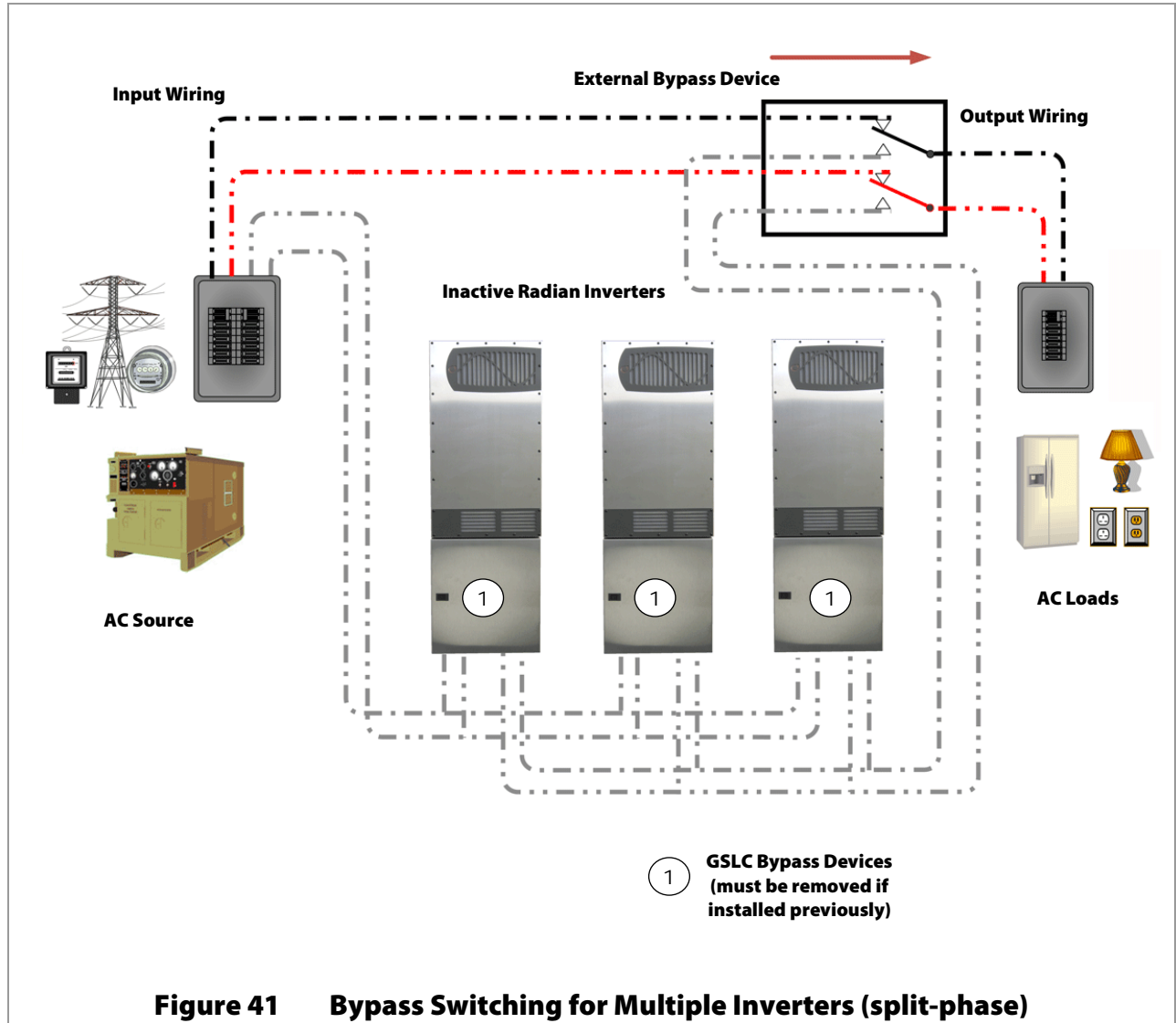


Figure 41 Bypass Switching for Multiple Inverters (split-phase)

Wiring Diagrams

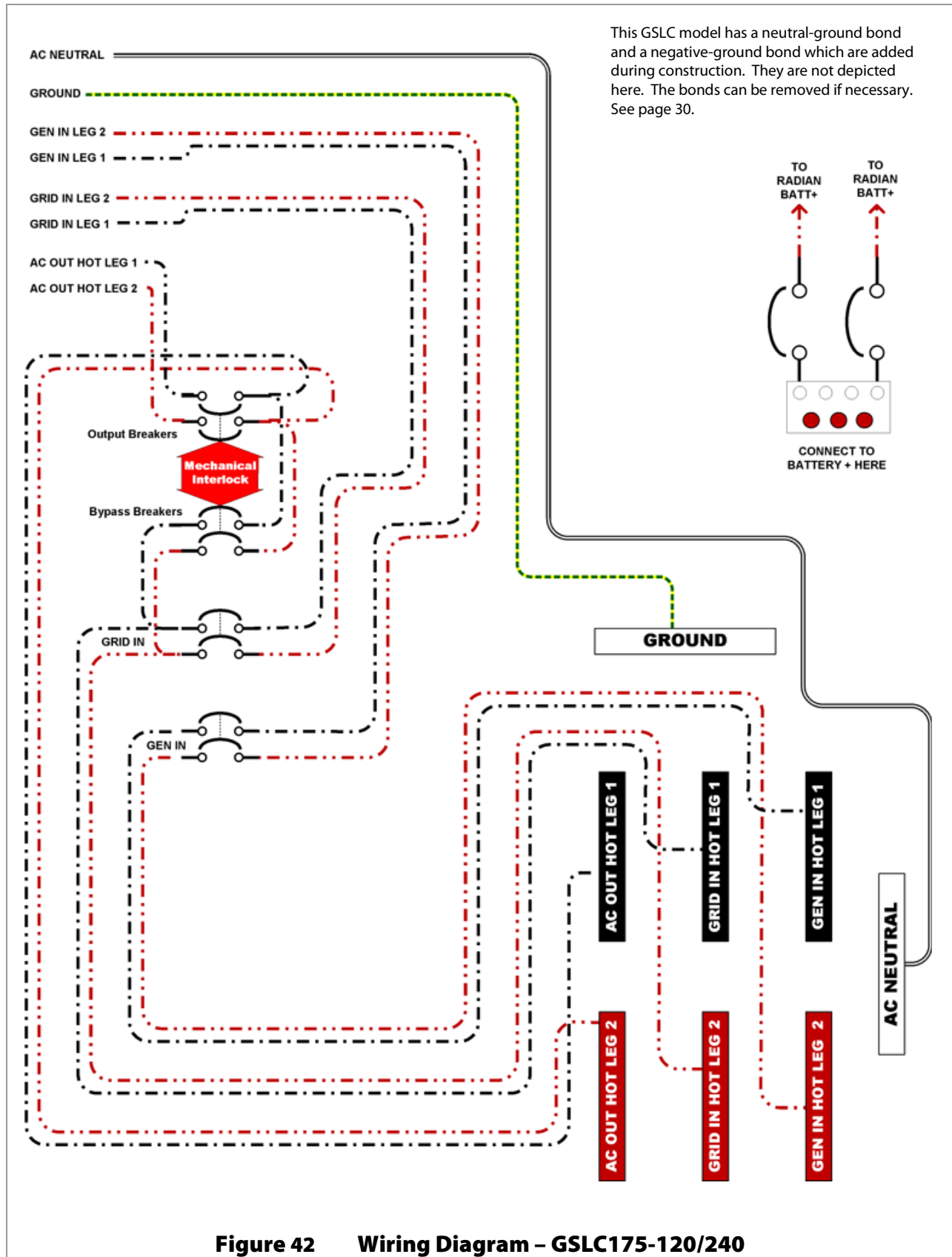


Figure 42 Wiring Diagram – GSLC175-120/240

Installation

This GSLC model has a neutral-ground bond which is added during construction. It is not depicted here. The bond can be removed if necessary. See page 28.

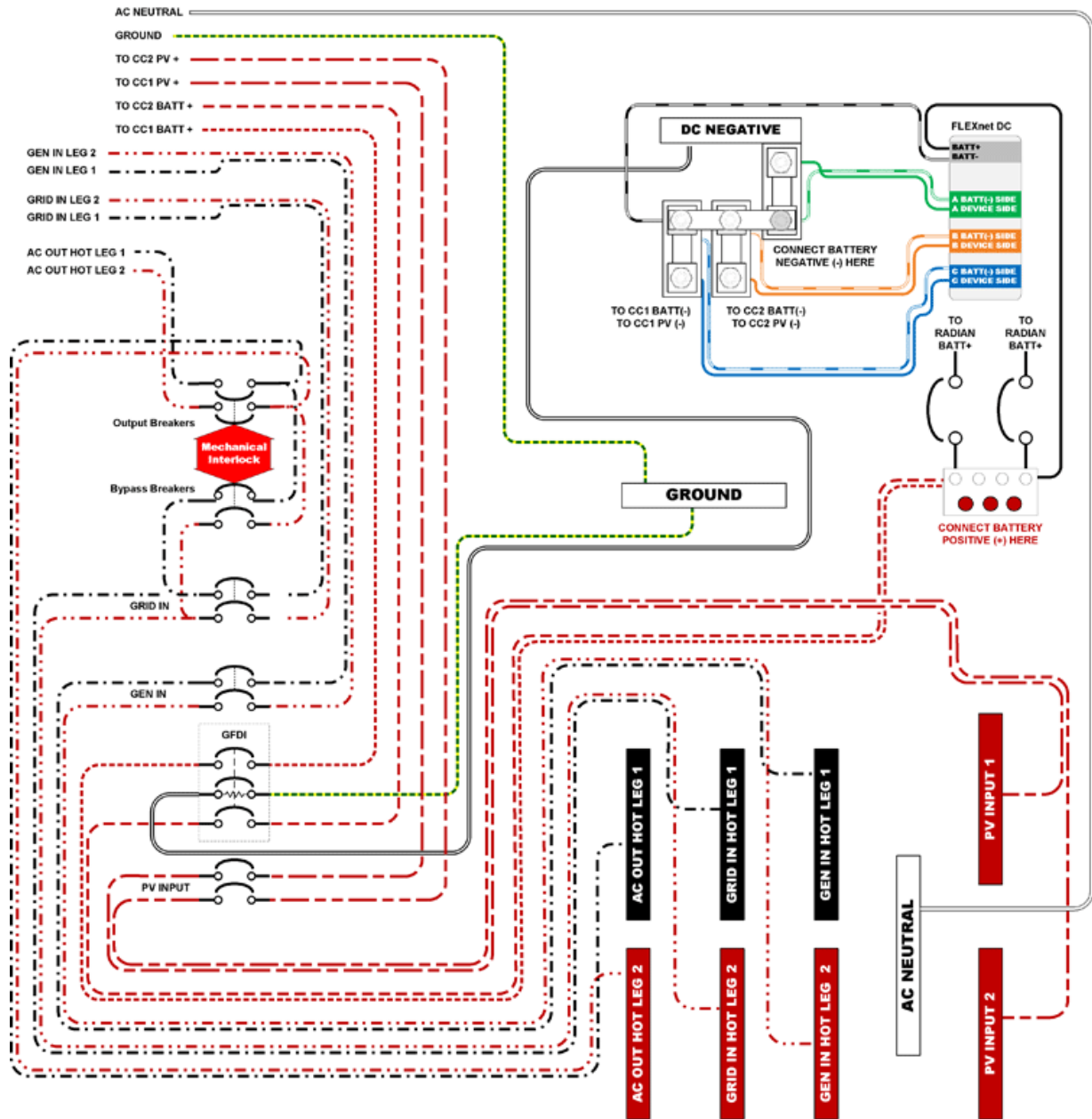


Figure 43 Wiring Diagram – GSLC175-PV-120/240 with FNDC

This GSLC model has a neutral-ground bond which is added during construction. It is not depicted here. The bond can be removed if necessary. See page 28.

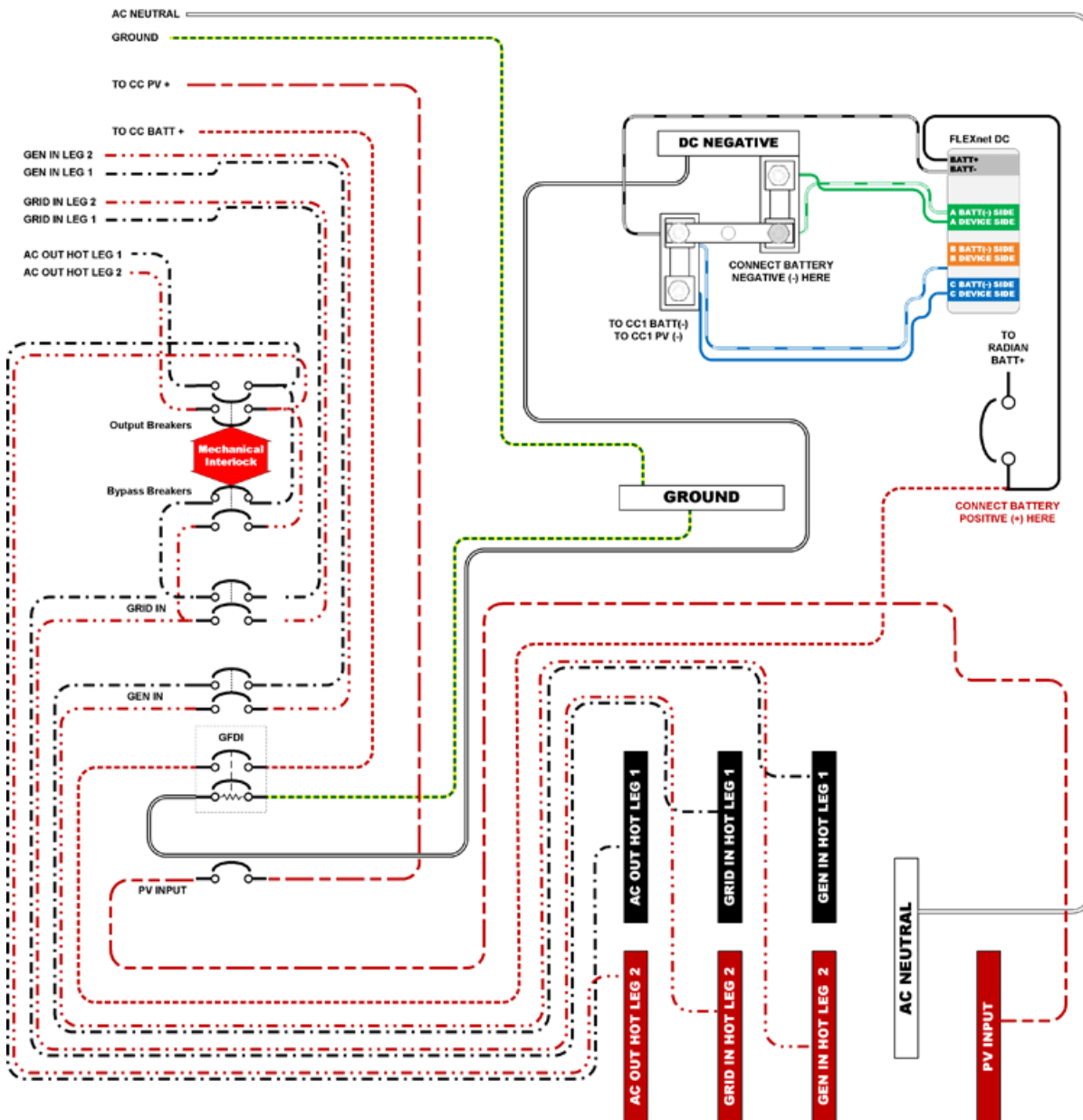


Figure 44 Wiring Diagram – GSLC175PV1-120/240 with FNDC

Installation

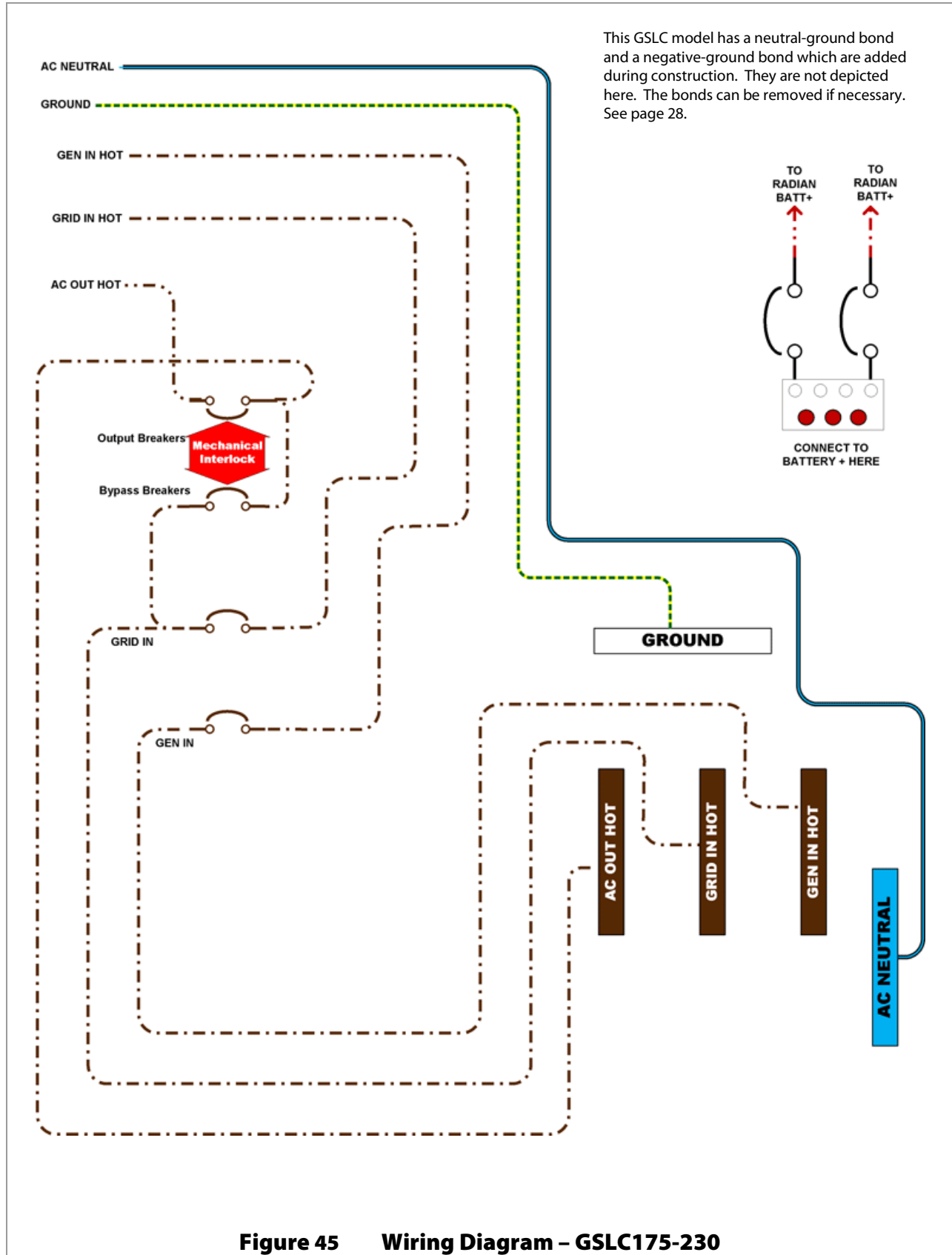


Figure 45 Wiring Diagram – GSLC175-230

This GSLC model has a neutral-ground bond which is added during construction. It is not depicted here. The bond can be removed if necessary. See page 28.

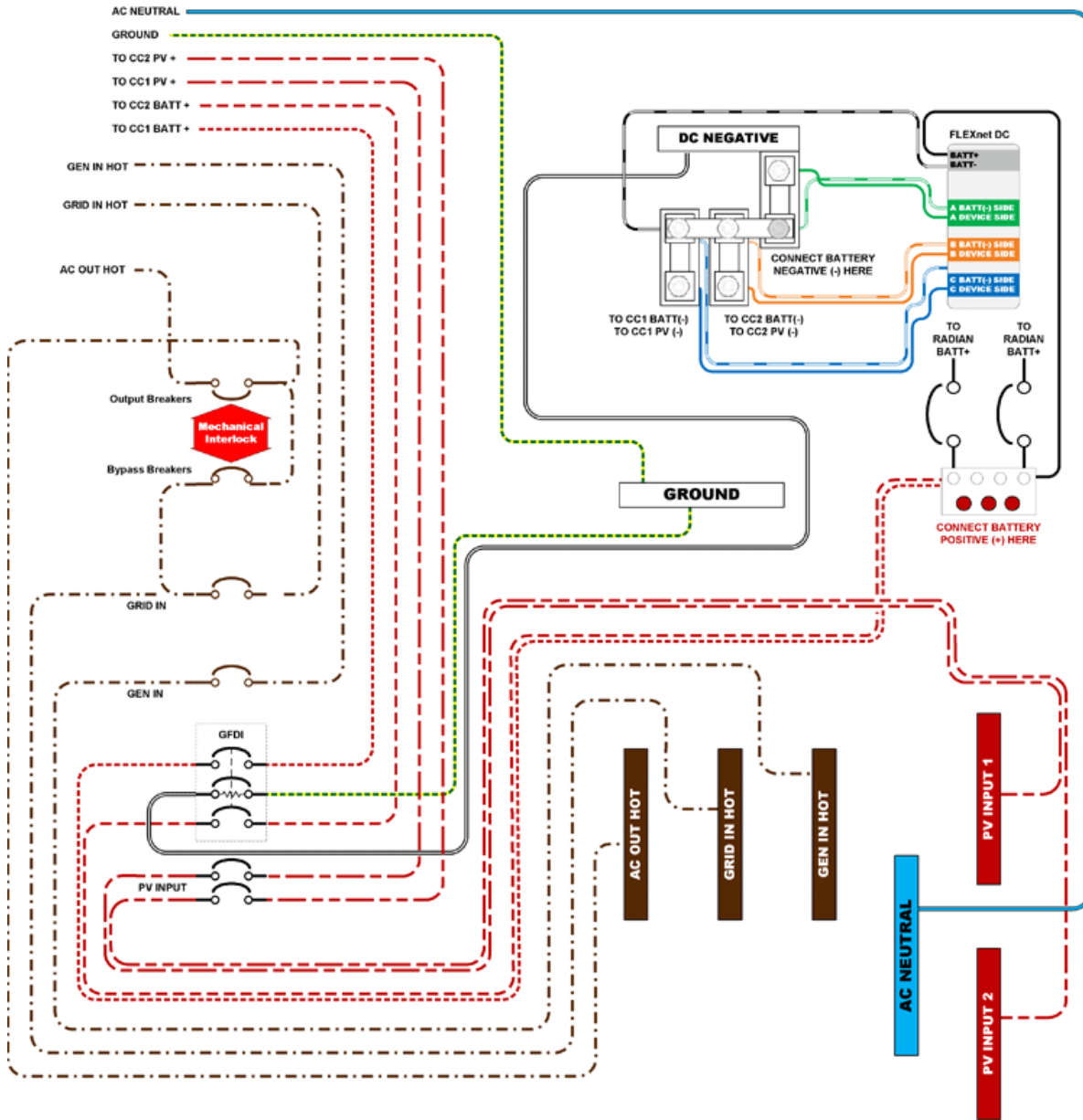


Figure 46 Wiring Diagram – GSLC175-PV-230 with FNDC

Installation

This GSLC model has a neutral-ground bond which is added during construction. It is not depicted here. The bond can be removed if necessary. See page 28.

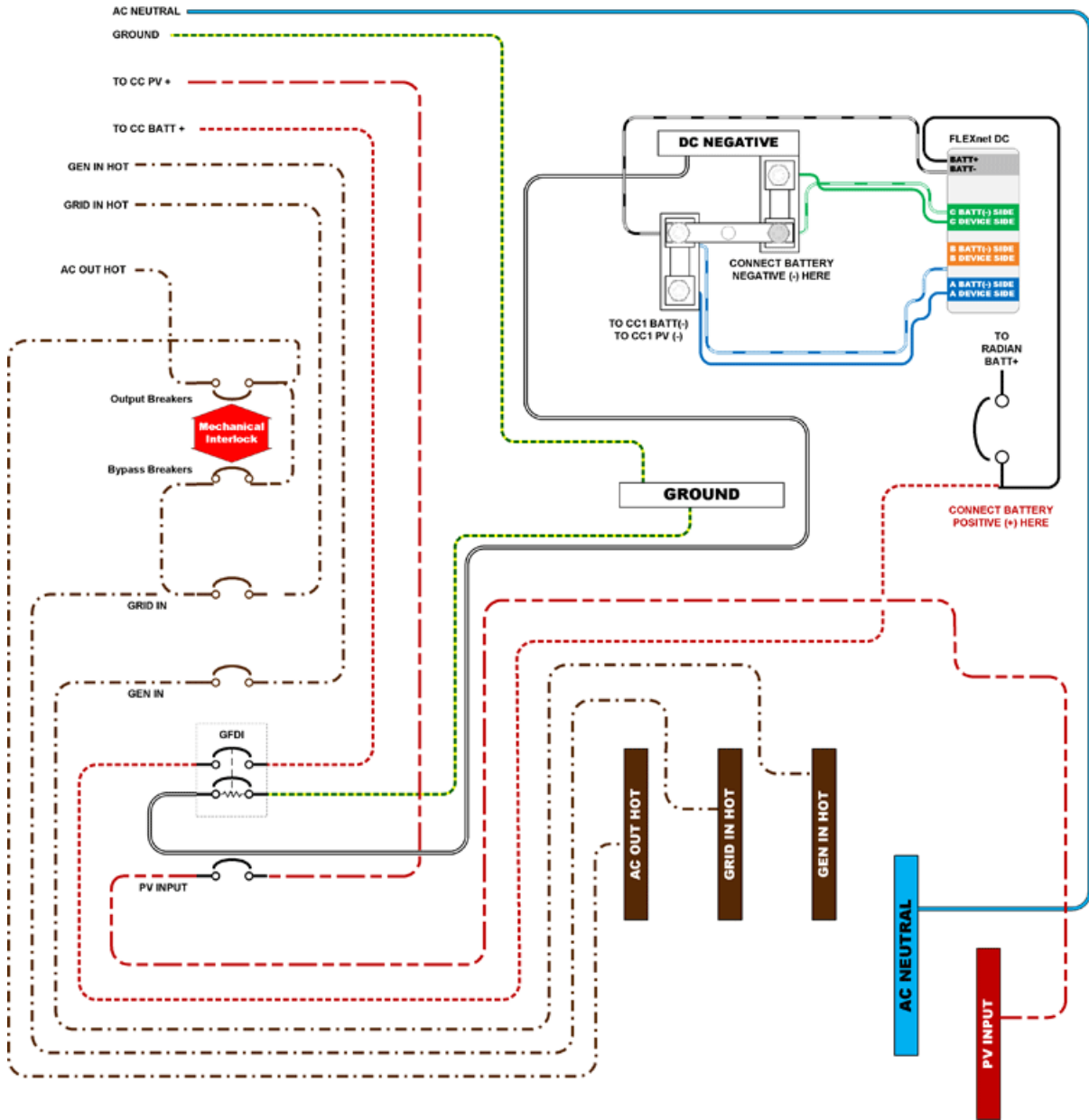


Figure 47 Wiring Diagram – GSLC175PV1-230 with FNDC



Specifications

Electrical Specifications

Table 3 Electrical Specifications

Specification	Measurement
Maximum Input Voltage	600 Volts
Maximum Input Current	500 Amps
Operating Frequency Range	50/60 Hz to DC

Mechanical Specifications

Table 4 Mechanical Specifications

Specification	Measurement
Dimensions (H x W x D)	17" x 16" x 8.5" (43.2 cm x 40.6 cm x 21.6 cm)
Shipping Dimensions (L x W x H)	23.25" x 20.5" x 13.25" (59.1 cm x 52.1 cm x 33.7 cm)
Weight	26 lb (11.8 kg) minimum — varies with options
Shipping Weight	34 lb (15.4 kg) minimum — varies with options
Enclosure Type	Indoor

Regulatory Specifications

- UL 1741, 2nd Edition, Revised January 28, 2010, Static Inverter and Charge Controllers for Use in Photovoltaic Power Systems
- Canadian Electrical Code, Part I (CSA C22.2 No. 107.1-01 (R2006))

Definitions

The following is a list of initials, terms, and definitions used in conjunction with this product.

Table 5 Terms and Definitions

Term	Definition
AC	Alternating Current; refers to voltage produced by the inverter, utility grid, or generator
AUX	One of several auxiliary outputs on the GS inverter/charger.
CSA	Canadian Standards Association; establishes Canadian national standards and the Canadian Electrical Code, including C22.1 and C22.2
DC	Direct Current; refers to voltage produced by the batteries or renewable source
DVM	Digital Voltmeter
FNDC	OutBack battery monitor; used to measure battery state of charge
GFDI	Ground Fault Detector Interrupter; a safety device for PV systems
PV	Photovoltaic
RE	Renewable Energy
UL	Underwriters Laboratories; refers to a set of safety standards governing electrical products



Index

A

AC Bypass Assembly.....	38, 40, 41, 42
AC Circuit Breakers.....	24
AC Terminal Bus Bars	37
AC Wiring.....	37, 45
120/240 Vac	37, 45
Additional Components	17
AUX	52

B

Bonding.....	30
Brackets	16
Bypass Switches	42
Bypass Switching for Multiple Inverters	44

C

Charge Controller.....	6, 27, 34
Components	
Basic GSLC	7
GSLC175-120/240.....	8, 9, 10, 11
GSLC175PV1-120/240	12
GSLC175PV1-230	13
Conduit Sizes.....	16
CSA.....	51

D

DC Devices	34
DC Disconnects	22
DC Positive Cable Plate (Bus Bar)	
Assembling	20
DC Shunts	23
DC Wiring.....	31
Dead Front	19
Definitions.....	52
Dimensions	15
DVM	52

E

Environmental Requirements.....	15
---------------------------------	----

F

Features	5
FLEXmax Charge Controller.....	6, 27, 34
FLEXnet DC.....	33
Front Door	18
Functions.....	5
FW-CCB	16
FW-CCB2.....	16

G

GFDI.....	24
Grid Interface Protection.....	51
Grounding	29

H

HUB Communications Manager	28
----------------------------------	----

I

Input Modes.....	5
Interior Cover.....	19
Internal Hardware.....	19
Inverter Main Disconnects.....	22
Inverter Positive Bus Bars.....	21

K

Knockouts	16
-----------------	----

M

Materials Required.....	15
Model Descriptions	5, 17
Modes.....	5
Mounting	
Charge Controller.....	27
GSLC	25
HUB.....	28
Inverter	25
Mounting Holes	16

Index

N

Negative-Ground Bonding	30
Neutral-Ground Bonding	30

O

Optional Hardware	17
-------------------------	----

P

Positive Bus Hardware	20, 21
PV Circuit Breakers	24
PV Wiring	34

R

Regulatory	51
------------------	----

S

Specifications	
Electrical	51
Mechanical	51
Regulatory	51

Stacking Inverters	42
--------------------------	----

T

Terminal	19
Terms and Definitions	52
Tools Required	15
Top Cover	18
Torque Requirements	19

U

UL	51
----------	----

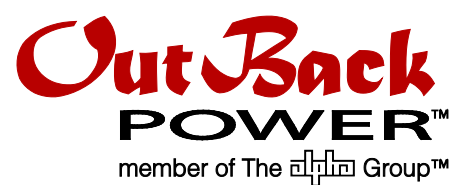
W

Wire Size and Torque Requirements	29
Wiring	
120/240 Vac	37, 45
AC	37, 45
Bonding	30
Charge Controller	34
DC	31
FLEXnet DC	33
Grounding	29
PV	34

This page intentionally left blank.

This page intentionally left blank.

This page intentionally left blank.



Masters of the Off-Grid.™ First Choice for the New Grid.

Corporate Headquarters
17825 – 59th Avenue N.E.
Suite B
Arlington, WA 98223 USA
+1.360.435.6030

European Office
Hansastraße 8
D-91126
Schwabach, Germany
+49.9122.79889.0