# Galaxy VM

## 160–200 kVA 400 V UPS Marine

## Installation

2/2019

www.schneider-electric.com

Schneider Electric

# Legal Information

# Table of Contents

# Important Safety Instructions — SAVE THESE INSTRUCTIONS

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

The addition of this symbol to a “Danger” or “Warning” safety message 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 with this symbol to avoid possible injury or death.

## ⚠ DANGER

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

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

## ⚠ WARNING

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

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

## ⚠ CAUTION

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

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

## *NOTICE*

**NOTICE** is used to address practices not related to physical injury. The safety alert symbol shall not be used with this type of safety message.

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

## Please Note

Electrical equipment should only be installed, operated, serviced, and maintained 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.

## Electromagnetic Compatibility

**NOTICE**

**RISK OF ELECTROMAGNETIC DISTURBANCE**

This is a product Category C3 according to IEC 62040-2. This is a product for commercial and industrial applications in the second environment - installation restrictions or additional measures may be needed to prevent disturbances. The second environment includes all commercial, light industry, and industrial locations other than residential, commercial, and light industrial premises directly connected without intermediate transformer to a public low-voltage mains supply. The installation and cabling must follow the electromagnetic compatibility rules, e.g.:

- the segregation of cables,
- the use of shielded or special cables when relevant,
- the use of grounded metallic cable tray and supports.

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

## Safety Precautions

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

All safety instructions in this document must be read, understood and followed.

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

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Read all instructions in the Installation Manual before installing or working on this UPS system.

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

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not install the UPS system until all construction work has been completed and the installation room has been cleaned.

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

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- The product must be installed according to the specifications and requirements as defined by Schneider Electric. It concerns in particular the external and internal protections (upstream breakers, battery breakers, cabling, etc.) and environmental requirements. No responsibility is assumed by Schneider Electric if these requirements are not respected.
- After the UPS system has been electrically wired, do not start up the system. Start-up must only be performed by Schneider Electric.

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

## ⚠DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

The UPS system must be installed according to local and national regulations. Install the UPS according to:

- IEC 60364 (including 60364–4–41- protection against electric shock, 60364–4–42 - protection against thermal effect, and 60364–4–43 - protection against overcurrent), **or**
- NEC NFPA 70, **or**
- Canadian Electrical Code (C22.1, Part 1)

depending on which one of the standards apply in your local area.

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

## ⚠DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Install the UPS system in a temperature controlled indoor environment free of conductive contaminants and humidity.
- Install the UPS system on a non-flammable, level and solid surface (e.g. concrete) that can support the weight of the system.

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

## ⚠DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

The UPS is not designed for and must therefore not be installed in the following unusual operating environments:

- Damaging fumes
- Explosive mixtures of dust or gases, corrosive gases, or conductive or radiant heat from other sources
- Moisture, abrasive dust, steam or in an excessively damp environment
- Fungus, insects, vermin
- Salt-laden air or contaminated cooling refrigerant
- Pollution degree higher than 2 according to IEC 60664-1
- Exposure to abnormal vibrations, shocks, and tilting
- Exposure to direct sunlight, heat sources, or strong electromagnetic fields

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

## ⚠DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not drill or cut holes for cables or conduits with the gland plates installed and do not drill or cut holes in close proximity to the UPS.

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

## ⚠WARNING

**HAZARD OF ARC FLASH**

Do not make mechanical changes to the product (including removal of cabinet parts or drilling/cutting of holes) that are not described in the Installation Manual.

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

## NOTICE

**RISK OF OVERHEATING**

Respect the space requirements around the UPS system and do not cover the product's ventilation openings when the UPS system is in operation.

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

## NOTICE

**RISK OF EQUIPMENT DAMAGE**

Do not connect the UPS output to regenerative load systems including photovoltaic systems and speed drives.

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

## Electrical Safety

## ⚠DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Electrical equipment must be installed, operated, serviced, and maintained only by qualified personnel.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- Turn off all power supplying the UPS system before working on or inside the equipment.
- Before working on the UPS system, check for hazardous voltage between all terminals including the protective earth.
- The UPS contains an internal energy source. Hazardous voltage can be present even when disconnected from the mains supply. Before installing or servicing the UPS system, ensure that the units are OFF and that mains and batteries are disconnected. Wait five minutes before opening the UPS to allow the capacitors to discharge.
- The UPS must be properly earthed/grounded and due to a high leakage current, the earthing/grounding conductor must be connected first.

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

## ⚠DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

In systems where backfeed protection is not part of the standard design, an automatic isolation device (backfeed protection option or other device meeting the requirements of IEC/EN 62040–1 **or** UL1778 5th Edition – depending on which of the two standards apply to your local area) must be installed to prevent hazardous voltage or energy at the input terminals of the isolation device. The device must open within 15 seconds after the upstream power supply fails and must be rated according to the specifications.

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

When the UPS input is connected through external isolators that, when opened, isolate the neutral or when the automatic backfeed isolation is provided external to the equipment or is connected to an IT power distribution system, a label must be fitted at the UPS input terminals, and on all primary power isolators installed remote from the UPS area and on external access points between such isolators and the UPS, by the user, displaying the following text (or equivalent in a language which is acceptable in the country in which the UPS system is installed):

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Risk of Voltage Backfeed. Before working on this circuit: Isolate the UPS and check for hazardous voltage between all terminals including the protective earth.

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

## Battery Safety

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Battery circuit breakers must be installed according to the specifications and requirements as defined by Schneider Electric.
- Servicing of batteries must only be performed or supervised by qualified personnel knowledgeable of batteries and the required precautions. Keep unqualified personnel away from batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Do not dispose of batteries in a fire as they can explode.
- Do not open, alter, or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

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

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Batteries can present a risk of electric shock and high short-circuit current. The following precautions must be observed when working on batteries

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear protective glasses, gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect the charging source prior to connecting or disconnecting battery terminals.
- Determine if the battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electric shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

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

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

When replacing batteries, always replace with the same type and number of batteries or battery packs.

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

## *NOTICE*

**RISK OF EQUIPMENT DAMAGE**

- Wait until the system is ready to be powered up before installing batteries in the system. The time duration from battery installation until the UPS system is powered up must not exceed 72 hours or 3 days.
- Batteries must not be stored more than six months due to the requirement of recharging. If the UPS system remains de-energized for a long period, Schneider Electric recommends that you energize the UPS system for a period of 24 hours at least once every month. This charges the batteries, thus avoiding irreversible damage.

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

# Specifications

## Input Specifications

| | 160 kVA | | | | 200 kVA | | | |
|---|---|---|---|---|---|---|---|---|
| **Input Voltage (V)** | **380** | **400** | **415** | **440** | **380** | **400** | **415** | **440** |
| Connections | 4–wire (L1, L2, L3, PE) | | | | | | | |
| Voltage range (V) | 320–600[1] | | | | | | | |
| Frequency range (Hz) | 40 - 70 | | | | | | | |
| Nominal input current (A) | 230 | 219 | 211 | 199 | 288 | 273 | 263 | 250 |
| Maximum input current (A) | 278 | 262 | 253 | 238 | 345 | 328 | 316 | 298 |
| Input current limitation (A) | 278 | | | | 347 | | | |
| Input power factor | > 0.99 at load > 40%<br>> 0.97 at load > 25% | | | | | | | |
| Total harmonic distortion (THDI) | <3% at 100% load<br><4% at 50% load<br><6% at 25% load | | | | | | | |
| Maximum input short-circuit withstand (kA) Icc | Rated conditional short–circuit current Icc: 65 kA<br>Rated peak withstand current Ipk: Icc x 2.2<br>Device: Refer to *Required Upstream Breakers, page 14* | | | | | | | |
| Protection | Built-in backfeed contactor | | | | | | | |
| Ramp-in | Adaptive 1 - 40 sec | | | | | | | |

## Bypass Specifications

**NOTE:** Bypass is inoperable when the system is configured as a frequency converter.

| | 160 kVA | | | | 200 kVA | | | |
|---|---|---|---|---|---|---|---|---|
| **Bypass Voltage (V)** | **380** | **400** | **415** | **440** | **380** | **400** | **415** | **440** |
| Connections | 5–wire (L1, L2, L3, N, PE)<br>4–wire (L1, L2, L3, PE) | | | | | | | |
| Voltage range (V) | 342–457 | | | | | | | |
| Frequency (Hz) | 50 or 60 | | | | | | | |
| Frequency range (Hz) | Programmable: +/-0.1, +/-3, +/-10. Default is +/-3. | | | | | | | |
| Nominal bypass current (A) | 243 | 231 | 223 | 210 | 304 | 289 | 278 | 262 |
| Thyristor $I^2t$ ($kA^*s^2$) | 305.8[2] | | | | | | | |
| Protection | Built-in backfeed contactor | | | | | | | |

1. The system can operate at 600 V for 1 minute.
2. If this value is exceeded, the thyristors can short.

# Output Specifications

| | 160 kVA | | | | 200 kVA | | | |
|---|---|---|---|---|---|---|---|---|
| **Output Voltage (V)** | **380** | **400** | **415** | **440** | **380** | **400** | **415** | **440** |
| Connections | 5–wire (L1, L2, L3, N, PE)<br>4–wire (L1, L2, L3, PE) | | | | | | | |
| Overload capacity[3] | 150% for 1 minute (normal operation) at 40 °C<br>125% for 10 minutes (normal operation) at 40 °C<br>150% for 1 second (battery operation) at 40 °C<br>125% for 1 minute (battery operation) at 40 °C<br>1000% for 100 ms (bypass operation) at 40 °C | | | | | | | |
| Output voltage tolerance | Symmetric load (0–100%):<br>+/- 1% static<br>+/- 5% after 2 ms<br>+/- 1% after 50 ms | | | | | | | |
| Output power factor | 0.9 | | | | | | | |
| Nominal output current (A) | 243 | 231 | 223 | 210 | 304 | 289 | 278 | 263 |
| Total harmonic distortion (THDU) | <2% at 100% linear load<br><3% at 100% non–linear load | | | | | | | |
| Output frequency (Hz) | 50/60 (sync to bypass)<br>50/60 Hz +/-0.1% (free-running) | | | | | | | |
| Slew rate (Hz/sec) | Programmable: 0.25, 0.5, 1, 2, 4, 6 | | | | | | | |
| Output performance classification (according to IEC/EN62040-3) | Double-conversion: VFI-SS-111 | | | | | | | |
| Load crest factor | Up to 3 (THDU < 5%) | | | | | | | |
| Load power factor | 0.7 leading to 0.5 lagging without derating | | | | | | | |

# Battery Specifications

| | 160 kVA | 200 kVA |
|---|---|---|
| Connections | DC+, DC-, PE | |
| Charging power in % of output power | 40% charge ≤ 80% load<br>20% charge ≤ 100% load | |
| Nominal battery voltage (VDC) | 480 | |
| Nominal float voltage (VDC) | 545 | |
| End of discharge voltage (full load) (VDC) | 384 | |
| End of discharge voltage (no load) (VDC) | 420 | |
| Battery current at full load and nominal battery voltage (A) | 314 | 393 |
| Battery current at full load and minimum battery voltage (A) | 393 | 491 |
| Recharge time to 90% charge | < 20 hours for a 4 hour battery bank | |
| Temperature compensation | -3.3 mV per °C for T ≥ 25 °C<br>0 mV per °C for T < 25 °C | |
| Ripple current | < 5% C20 (5 minutes backup time) | |
| Battery test | Programmable: Manual/automatic | |
| Deep discharge protection | Yes | |

3. Overload capabilities are not available when the system is configured as a frequency converter

| | 160 kVA | 200 kVA |
|---|---|---|
| Recharge according to battery temperature | Yes | |
| Cold start | Yes | |

## Requirements for a Third Party Battery Solution

Battery breaker boxes from Schneider Electric are recommended for the battery interface. Please contact Schneider Electric for more information.

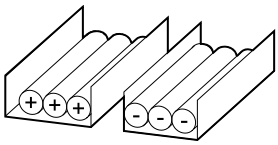
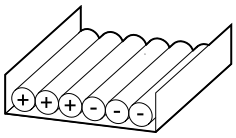
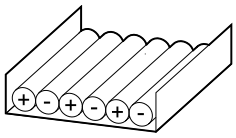
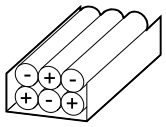
**NOTE:** The battery breaker box is not covered by the DNV type approval.

## Guidance for Organizing Battery Cables

**NOTE:** For 3rd party batteries, use only high rate batteries for UPS applications.

**NOTE:** When the battery bank is placed remotely, the organizing of the cables is important to reduce voltage drop and inductance. The distance between the battery bank and the UPS must not exceed 200 m (656 ft). Contact Schneider Electric for installations with a longer distance.

**NOTE:** To minimize the risk of electromagnetic radiation, it is highly recommended to follow the below guidance and to use grounded metallic tray supports.

| **Cable Length** |  |  |  |  |
|---|---|---|---|---|
| <30 m | Not recommended | Acceptable | Recommended | Recommended |
| 31–75 m | Not recommended | Not recommended | Acceptable | Recommended |
| 76–150 m | Not recommended | Not recommended | Acceptable | Recommended |
| 151–200 m | Not recommended | Not recommended | Not recommended | Recommended |

# Recommended Cable Sizes

Cable sizes in this manual are based on table 52–C2 of IEC 60364–5–52 with the following assertions:

- 90 °C conductors
- An ambient temperature of 30 °C
- Use of copper conductors

If the ambient temperature is greater than 30 °C, larger conductors are to be selected in accordance with the correction factors of the IEC.

## 160 kVA System

| **Installation Method** | **B1 (mm)²** | **B2 (mm)²** | **C (mm)²** |
|---|---|---|---|
| Input | 2 x 70 $mm^2$ | 2 x 95 $mm^2$ | 2 x 50 $mm^2$ |
| Bypass | 2 x 70 $mm^2$ | 2 x 70 $mm^2$ | 1 x 95 $mm^2$ |
| Output | 2 x 70 $mm^2$ | 2 x 70 $mm^2$ | 1 x 95 $mm^2$ |
| Battery | 2 x 70 $mm^2$ | 3 x 70 $mm^2$ | 2 x 70 $mm^2$ |

## 200 kVA System

| Installation Method | B1 (mm)² | B2 (mm)² | C (mm)² |
|---|---|---|---|
| Input | 2 x 95 mm² | 2 x 120 mm² | 2 x 70 mm² |
| Bypass | 2 x 70 mm² | 2 x 95 mm² | 1 x 120 mm² |
| Output | 2 x 70 mm² | 2 x 95 mm² | 1 x 120 mm² |
| Battery | 2 x 120 mm² | 3 x 95 mm² | 2 x 95 mm² |

# Required Upstream Breakers

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

The specified upstream breakers below are required to obtain the conditional short–circuit current rating, Icc at 65 kA symmetrical rms.

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

| | 160 kVA | | 200 kVA | |
|---|---|---|---|---|
| | **Input** | **Bypass[4]** | **Input** | **Bypass[4]** |
| Breaker | NSX400H Mic2.3 | NSX400H Mic2.3 | NSX400H Mic2.3 | NSX400H Mic2.3 |
| Rating (A) | 400 | 400 | 400 | 400 |
| Io (A) | 280 | 250 | 360 | 320 |
| Ir (x Io) | 1 | 1 | 1 | 1 |
| Isd (X Ir) | 1.5–10 | 8 | 1.5–10 | 8 |

# Torque Specifications

| Bolt size | Torque |
|---|---|
| M4 | 1.7 Nm (1.25 lb-ft) |
| M5 | 2.5 Nm (1.84 lb-ft) |
| M6 | 5 Nm (3.69 lb-ft) |
| M8 | 17.5 Nm (12.91 lb-ft) |
| M10 | 30 Nm (22 lb-ft) |
| M12 | 50 Nm (36.87 lb-ft) |
| M14 | 75 Nm (55.31 lb-ft) |

4. Only applicable to dual mains systems.

# Environment

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

- Install the UPS system in a temperature controlled environment free of conductive contaminants and humidity.
- Install the UPS system on a non-flammable, level and solid surface (e.g. concrete) that can support the weight of the system.
- No responsibility is assumed by Schneider Electric if these requirements are not respected.

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

| | Operation | Storage |
|---|---|---|
| Temperature | 0 °C to 40 °C | -15 °C to 40 °C for systems with batteries<br>-25 °C to 55 °C for systems without batteries |
| Relative humidity | 0-95% non-condensing | 0-95% non-condensing |
| Altitude derating according to IEC 62040–3 | 1000 m: 1.000<br>1500 m: 0.975<br>2000 m: 0.950<br>2500 m: 0.925<br>3000 m: 0.900 | ≤ 5000 m above sea-level (or in an environment with equivalent air pressure) |
| Audible noise (1 meter from surface) | 55 dBA at 70% load and 40 °C<br>65 dBA at 100% load and 40 °C | |
| Protection class | IP32 | |
| Color | RAL 9003 White | |

## Heat Dissipation

**NOTE:** The maximum air flow through the UPS at highest fan speed is 3600 m³/h.

### Heat Dissipation for 160 kVA Systems

| Operation Mode | Normal Operation | | ECO Mode | | ECOnversion | | Battery Operation | |
|---|---|---|---|---|---|---|---|---|
| | W | BTU/hr | W | BTU/hr | W | BTU/hr | W | BTU/hr |
| Heat dissipation at 100% load | 6157 | 21006 | 1015 | 3464 | 1308 | 4462 | 6000 | 20472 |
| Heat dissipation at 75% load | 4149 | 14158 | 871 | 2972 | 1201 | 4099 | 4033 | 13761 |
| Heat dissipation at 50% load | 2689 | 9174 | 801 | 2732 | 1096 | 3741 | 2611 | 8910 |
| Heat dissipation at 25% load | 1618 | 5519 | 623 | 2124 | 999 | 3408 | 1190 | 4061 |

### Heat Dissipation for 200 kVA Systems

| Operation Mode | Normal Operation | | ECO Mode | | ECOnversion | | Battery Operation | |
|---|---|---|---|---|---|---|---|---|
| | W | BTU/hr | W | BTU/hr | W | BTU/hr | W | BTU/hr |
| Heat dissipation at 100% load | 8088 | 27595 | 1269 | 4329 | 1818 | 6204 | 7500 | 25590 |
| Heat dissipation at 75% load | 5333 | 18195 | 1089 | 3715 | 1364 | 4653 | 5042 | 17202 |
| Heat dissipation at 50% load | 3361 | 11468 | 817 | 2789 | 1278 | 4360 | 3264 | 11138 |
| Heat dissipation at 25% load | 1924 | 6564 | 639 | 2180 | 1107 | 3776 | 1488 | 5076 |

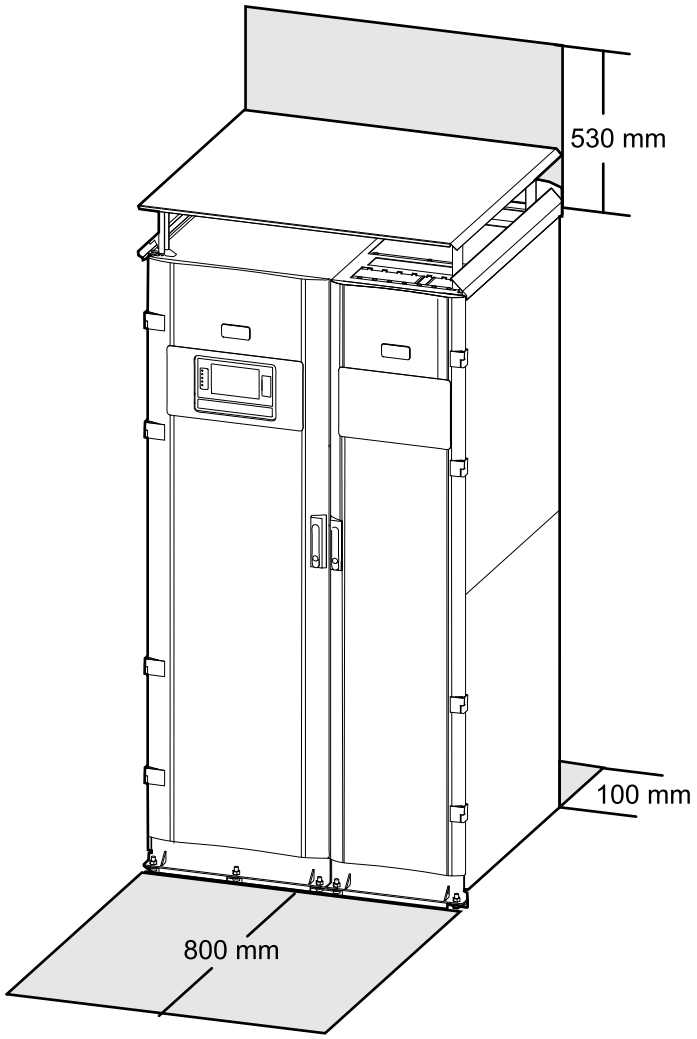
## UPS Weights and Dimensions

| | Weight kg | Height mm | Width mm | Depth mm |
|---|---|---|---|---|
| 160 kVA UPS (GVMSB160KHS+GVMKHS32KIT)<br>Power cabinet<br>I/O cabinet | <br>469<br>230 | 2200 | 1060 | 870 |
| 200 kVA UPS (GVMSB200KHS+GVMKHS32KIT)<br>Power cabinet<br>I/O cabinet | <br>494<br>230 | 2200 | 1060 | 870 |
| 160 kVA parallel UPS (GVMPB160KHS +GVMKHS32KIT)<br>Power cabinet<br>I/O cabinet | <br>469<br>230 | 2200 | 1060 | 870 |
| 200 kVA parallel UPS (GVMPB200KHS +GVMKHS32KIT)<br>Power cabinet<br>I/O cabinet | <br>494<br>230 | 2200 | 1060 | 870 |

# Clearance

**NOTE:** Clearance dimensions are published for airflow and service access only. Consult with the local safety codes and standards for additional requirements in your local area.

**NOTE:** Rear clearance is only required for systems with rear cable entry.



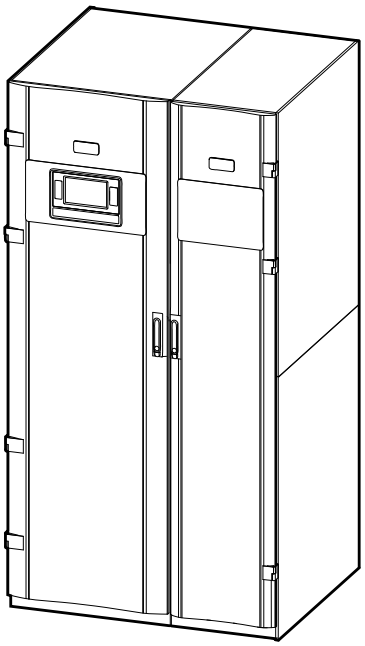
# Introduction

The UPS consists of two cabinets:

- An I/O cabinet for field wiring which contains system breakers/switches.
- A power cabinet which contains power electronics and the user interface.

The cabinets must be placed with the I/O cabinet to the right.

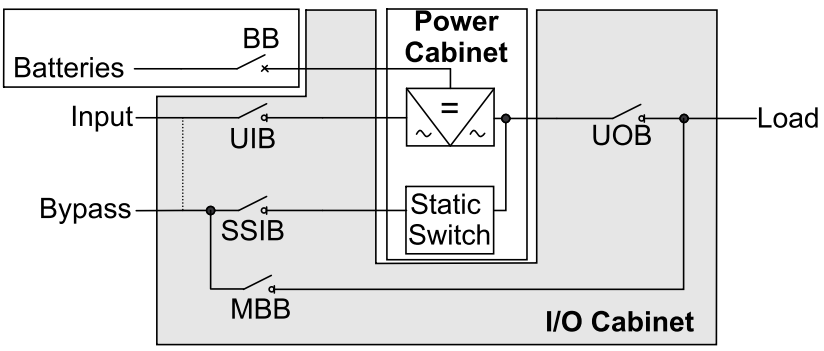
**Front View of the UPS**



## Overview of Configurations

| | |
|---|---|
| UIB | Unit input switch |
| SSIB | Static switch input switch |
| BB | Battery breaker |
| MBB | Maintenance bypass breaker |
| UOB | Unit output switch |
| SIB | System isolation breaker |

### Single System



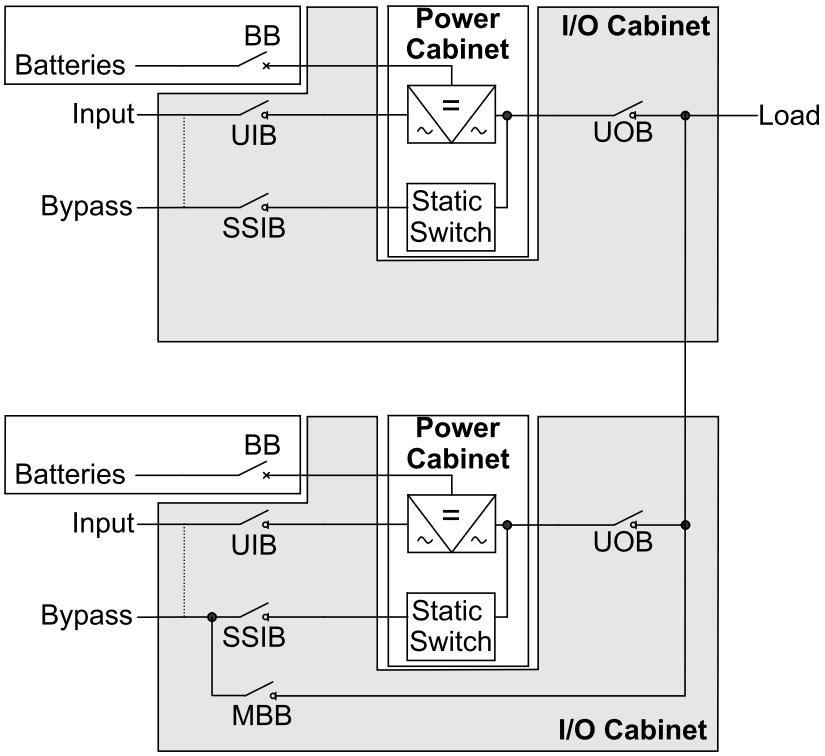
## 1+1 Redundant Parallel System

**NOTICE**

**HAZARD OF EQUIPMENT DAMAGE**

The cable length for bypass cables and output cables must be the same for all parallel UPS units to ensure correct load sharing in bypass operation. In parallel systems with single mains all input cables must be the same length.

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



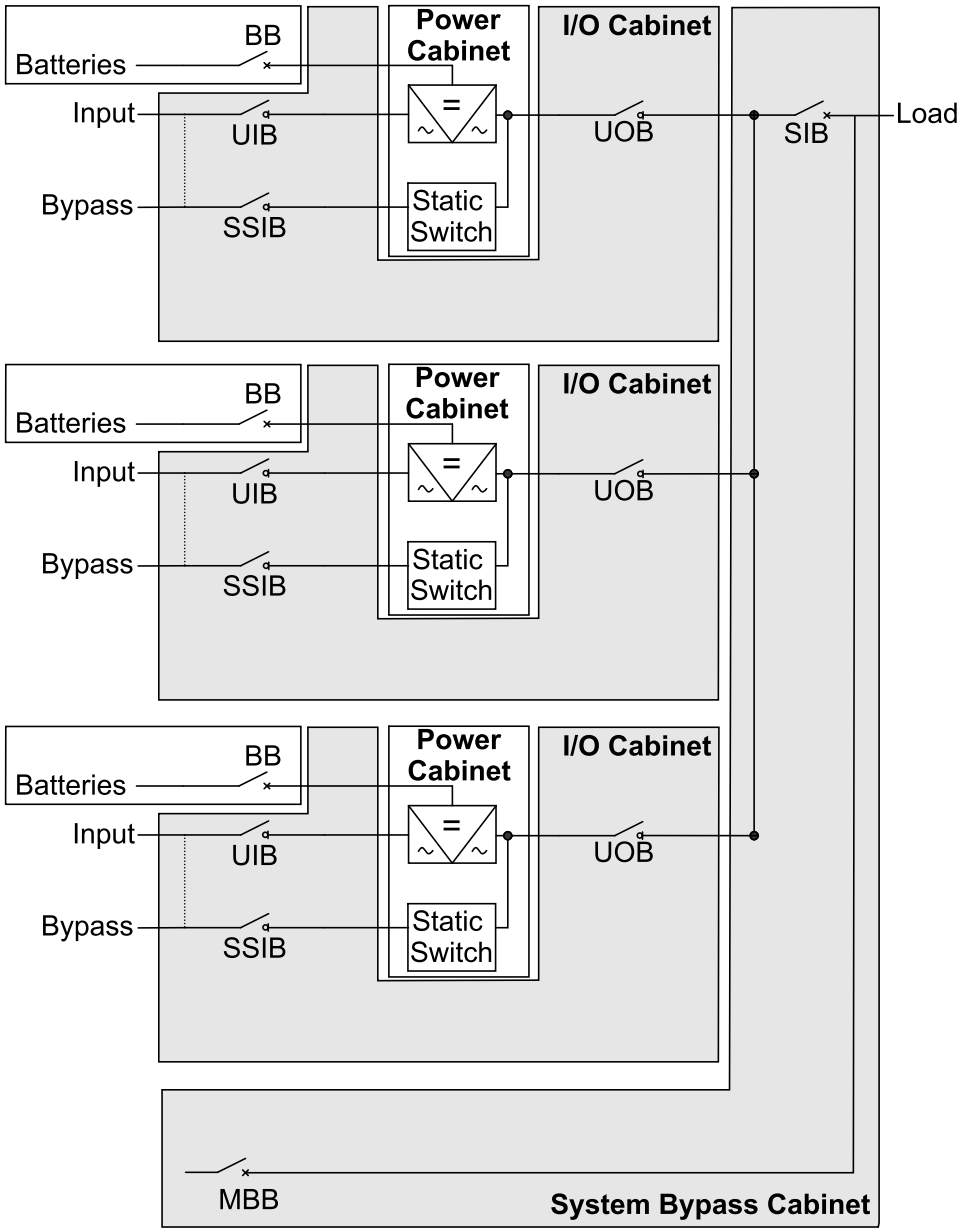

## Parallel System

**NOTICE**

**HAZARD OF EQUIPMENT DAMAGE**

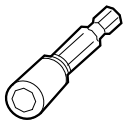
The cable length for bypass cables and output cables must be the same for all parallel UPS units to ensure correct load sharing in bypass operation. In parallel systems with single mains all input cables must be the same length.

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

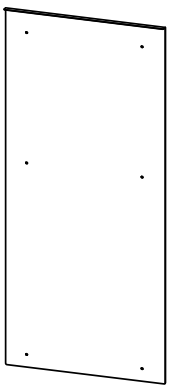
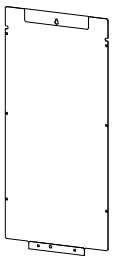
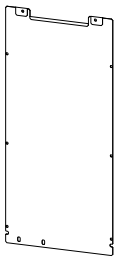



# Overview of Supplied Installation Kits

## Installation Kit 0M-816661

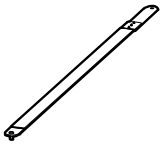
| Part | Used in | Number of units |
|---|---|---|
| Jack | *Remove the Cabinets from the Pallet, page 29* | 1  |
| Floor protection plate | | 1  |
| Hexagonal socket for drilling machine | | 1  |

## Installation Kit 0M-97296

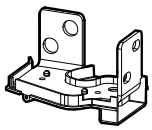
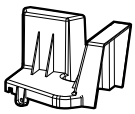
| Part | Used in | Number of Units |
|---|---|---|
| Rear cover for power cabinet | *Prepare the Power Cabinet and the I/O Cabinet for the IP32 Cover, page 39* | 1  |
| Rear upper cover for I/O cabinet | | 1  |
| Rear lower cover for I/O cabinet | | 1  |
| Top plate | *Install the IP32 Cover, page 96* | 1  |
| Corner bracket | | 4  |
| Right frame part | | 1  |
| Left frame part | | 1  |
| Extension piece | | 2  |
| Rear frame part | | 1  |

| Part | Used in | Number of Units |
|---|---|---|
| M6 x 16 mm torx screw with washer | | 16  |
| Polycarbonate plate | | 1  |

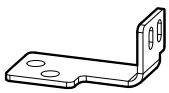
## Installation Kit 0M-816662

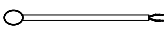
| Part | Used in | Number of Units |
|---|---|---|
| Crossbar 0M-815835 | *Install the I/O Cabinet, page 44* | 1  |

## Installation Kit 0M-816653

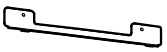
| Part | Used in | Number of Units |
|---|---|---|
| Interconnection busbar | *Install the Power Cabinet, page 62* | 12  |
| Busbar protection | | 12  |

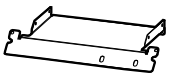
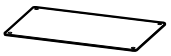
## Installation Kit 0M-816654

| Part | Used in | Number of Units |
|---|---|---|
| Top baying bracket | *Install the Power Cabinet, page 62* | 1  |
| M8 nut with washer | | 2  |
| M6 x 16 mm torx screw with washer | | 2  |
| Grounding busbar | | 1  |
| Tolerance busbar | | 13 |

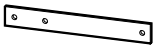
| Part | Used in | Number of Units |
|---|---|---|
| | |  |
| 10 mm threaded torx screw | | 12  |
| M8 x 20 mm hexagonal torx with washer | | 28  |
| 1 mm leveling shims | *Mount the Rear Anchoring Brackets for the UPS, page 38*, *Position the I/O Cabinet, page 44*, and *Install the Power Cabinet, page 62* | 20  |
| PBUS 1 cable 0W7980 | *Connect the Communication and Signal Cables between the Power Cabinet and the I/O Cabinet, page 70* | 1  |
| PBUS 2 cable 0W7982 | | 1  |
| ABUS cable 0W7989 | | 1  |
| Temperature sensor 0M-1160 | Refer to the installation manual for your specific battery solution for information on how to install and connect the temperature sensor. | 1  |
| Auxiliary switch | *Connect Signal Cables for Monitoring the MBB in a 1+1 Redundant Parallel System, page 80* | 1  |

## Installation Kit 0M–97293

| Part | Used in | Number of Units |
|---|---|---|
| Left side plate | *Prepare the I/O Cabinet for Rear Cable Entry, page 41* | 1  |
| Right side plate | | 1  |
| Cover plate | | 1  |
| Top and middle conduit plate | | 2  |

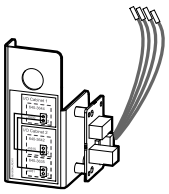
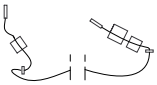
| Part | Used in | Number of Units |
|---|---|---|
| Bottom conduit plate | | 1  |
| Gland plates | | 3  |
| M6 x 12 mm torx screw with washer | | 36  |
| Door handle | *Replace the Door Handles of the Power Cabinet and the I/O Cabinet, page 43* | 2  |

## Installation Kit 0N-9763

| Part | Used in | Number of Units |
|---|---|---|
| Cable ties for signal cables | *Connect the Communication and Signal Cables between the Power Cabinet and the I/O Cabinet, page 70* | 50  |
| Cable reliefs | *Connect Power Cables in a Single Mains System, page 53* or *Connect Power Cables in a Dual Mains System, page 56* | 16  |
| Cable ties for power cables | | 100  |
| Jumper busbar | *Install Jumper Busbar in 5–Wire Systems, page 50* | 1  |
| M8 nut with washer | | 3  |

## Installation Kit 0H-1497

**NOTE:** This kit is supplied with parallel UPSs only.

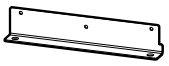
| Part | Used in | Number of Units |
|---|---|---|
| Bracket assembly | *Connect Signal Cables for Monitoring the MBB in a 1+1 Redundant Parallel System, page 80* | 1  |
| Jumper cable 0W98737 | | 1  |

## Installation Kit 0H-0889

**NOTE:** This kit is supplied with parallel UPSs only.

| Part | Used in | Number of Units |
|---|---|---|
| PBUS 1 cable 0W7995 | *Connect PBUS Cables Between Parallel UPS Units, page 77* | 1  |
| PBUS 2 cable 0W7996 | | 1  |

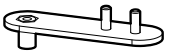
## Installation Kit 0M-96507

| Part | Used in | Number of Units |
|---|---|---|
| Front anchoring bracket for I/O cabinet | *Mount the Front Anchoring Bracket and Install the Door Locks, page 67* | 1  |

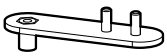
## Installation Kit 0M-96506

| Part | Used in | Number of Units |
|---|---|---|
| Front anchoring bracket for power cabinet | *Mount the Front Anchoring Bracket and Install the Door Locks, page 67* | 1  |

## Installation Kit 0M-97056

| Part | Used in | Number of Units |
|---|---|---|
| Holder for door arm | *Mount the Front Anchoring Bracket and Install the Door Locks, page 67* | 1  |
| Short door arm | | 1  |
| Long door arm | | 1  |
| M6 nut | | 1  |
| M6 x 12 mm torx screw with washer | | 1  |
| M4 x 8 mm torx screw with washer | | 1  |
| M4 nut | | 2  |

## Installation Kit 0M-97057

| Part | Used in | Number of Units |
|---|---|---|
| Holder for door arm | *Mount the Front Anchoring Bracket and Install the Door Locks, page 67* | 1  |
| Short door arm | | 1  |
| Long door arm | | 1  |
| M6 nut | | 1  |
| M6 x 12 mm torx screw with washer | | 1  |
| M4 x 8 mm torx screw with washer | | 1  |
| M4 nut | | 2  |

# Installation Procedure

For the installation procedures below, these symbols have been used:

Power cables

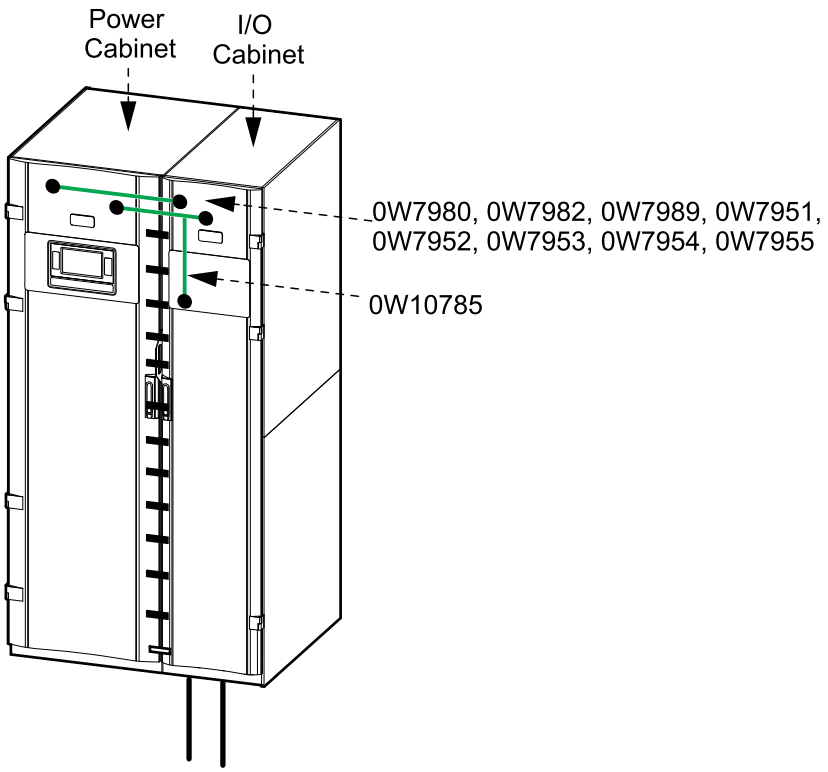
Signal cables

Busbar connection

Protective earth (PE) busbar connection

## Installation Procedure for UPS

**Overview of Busbar, Signal Cable and Power Cable Connections**




1. *Remove the Cabinets from the Pallet, page 29*.
2. *Mount the Rear Anchoring Brackets for the UPS, page 38*.
3. *Prepare the UPS for Installation, page 39*.
4. *Install the I/O Cabinet, page 44*.
5. Prepare for cables. Follow one of the procedures:
   - *Prepare for Cables in a Bottom Cable Entry System, page 48*.
   - *Prepare for Cables in a Rear Cable Entry System, page 49*.
6. In 5–wire systems only: *Install Jumper Busbar in 5–Wire Systems, page 50*.
7. In TN-C systems only: *Convert to a TN-C System, page 52*.

8. Connect power cables. Follow one of the procedures:
   – *Connect Power Cables in a Single Mains System, page 53*.
   – *Connect Power Cables in a Dual Mains System, page 56*.
9. *Install the Power Cabinet, page 62*.
10. *Mount the Front Anchoring Bracket and Install the Door Locks, page 67*.
11. *Connect the Communication and Signal Cables between the Power Cabinet and the I/O Cabinet, page 70*.
12. *Connect PBUS Cables Between Parallel UPS Units in Bottom Cable Entry Systems, page 77*.
13. In 1+1 systems only: *Connect Signal Cables for Monitoring the MBB in a 1+1 Redundant Parallel System, page 80*.
14. Option: *Connect Signal Cables between the I/O Cabinet and Optional Equipment, page 86*.
15. *Install the IP32 Cover, page 96*.

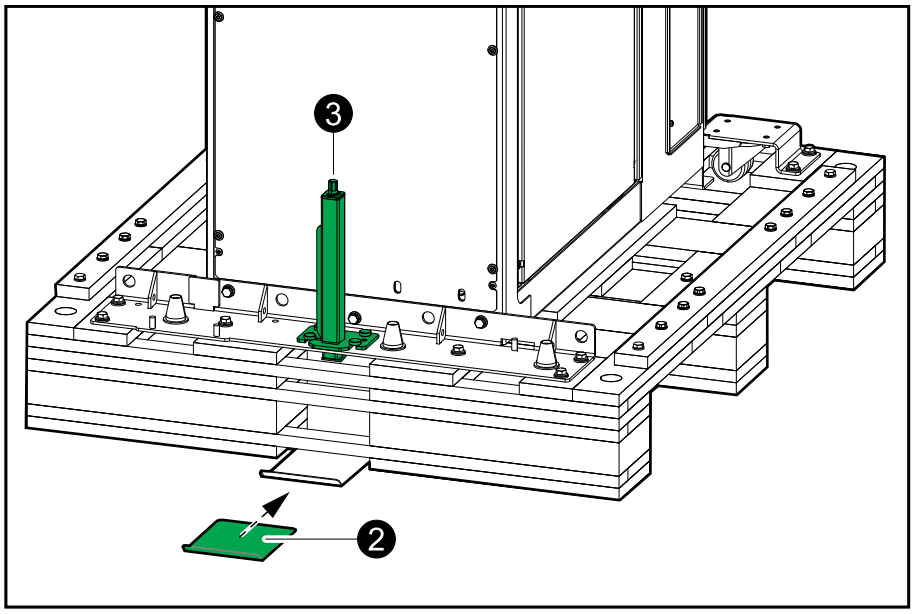
# Remove the Cabinets from the Pallet

## Remove the I/O Cabinet from the Pallet

| NOTICE |
| --- |
| **HAZARD OF EQUIPMENT DAMAGE**<br>Ensure that the floor is level and can support the weight of the jack when it carries the cabinet.<br>**Failure to follow these instructions can result in equipment damage.** |

1. Take the installation kit 0M-816661 shipped on the I/O cabinet pallet.
2. Place the floor protection plate under the pallet on the rear of the cabinet.

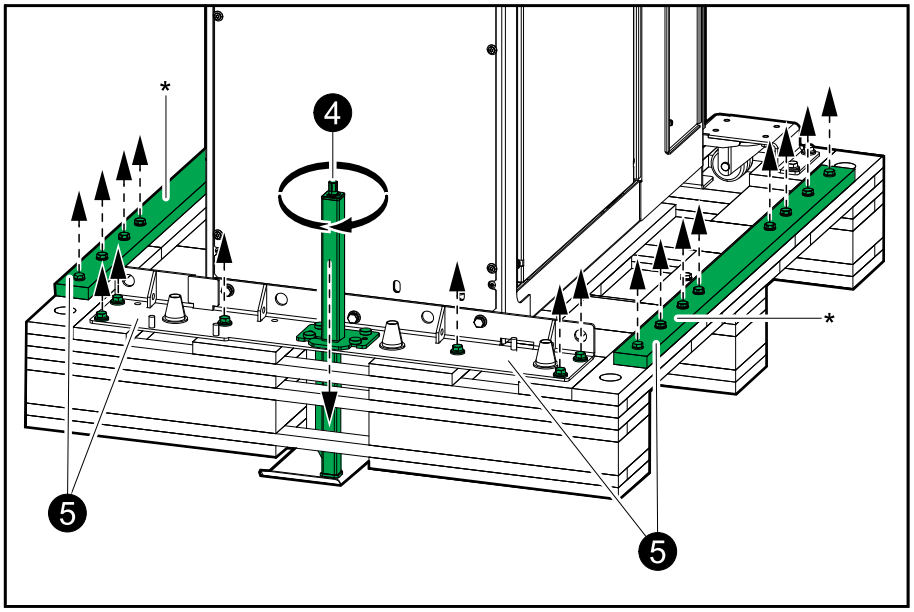
**Rear View of the I/O Cabinet**




3. Place the jack from the installation kit in the hole in the transport bracket on the rear of the cabinet.

4. Use a drilling machine with the provided hexagonal socket to activate the jack, slide it into position in the bracket, and to lift the pallet to the top position.

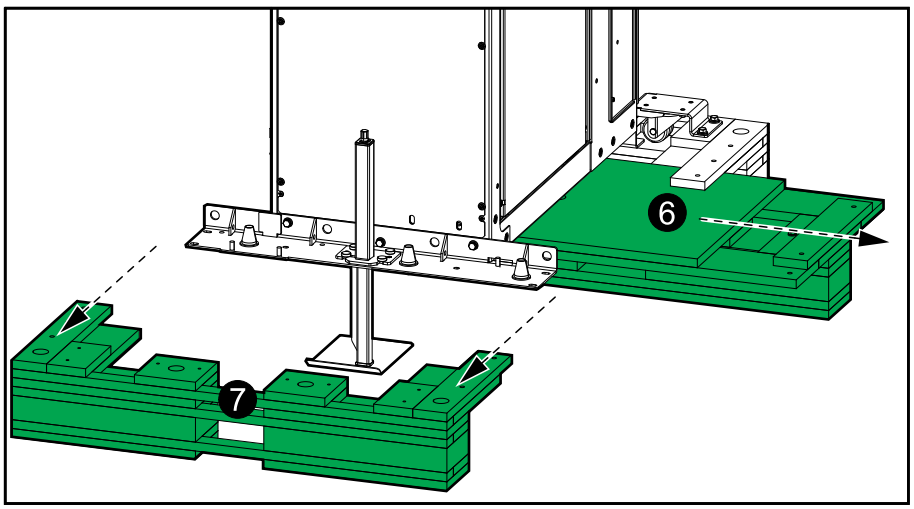
**Rear View of the I/O Cabinet**




5. Loosen and remove the bolts shown on the drawing that attach the transport bracket and the wooden plates to the pallet. Save the pallet parts marked with * for step 8.

6. Remove the middle pallet part.

**Rear View of the I/O Cabinet**




## ⚠WARNING

**HAZARD OF SERIOUS INJURY**

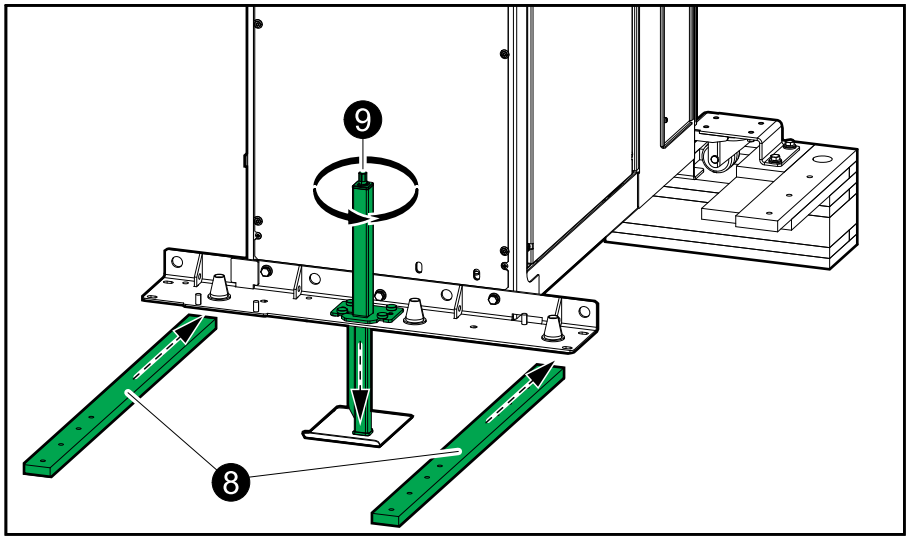
Do not put your hands or feet under the pallet while removing the wooden side part.

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

7. Remove the rear pallet part.

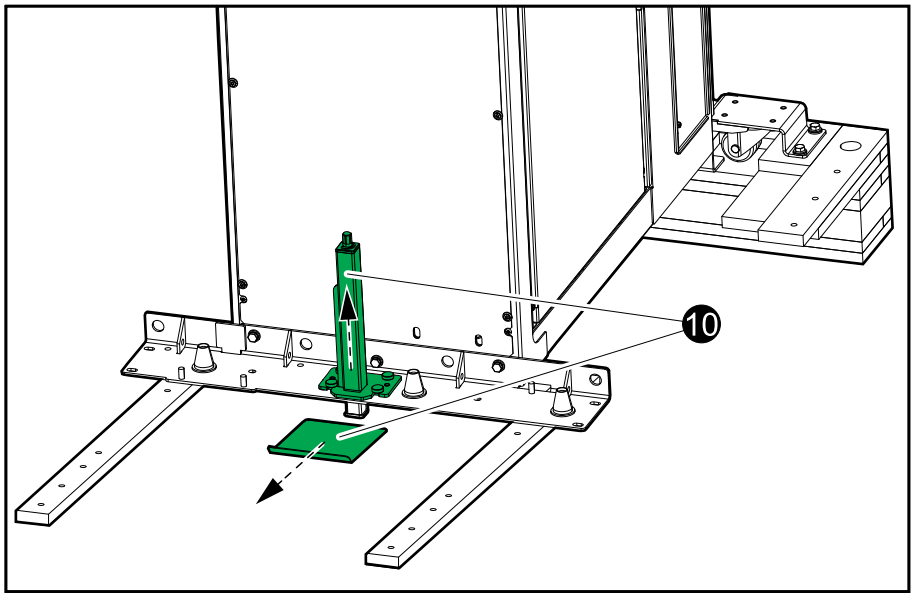
8. Place the pallet parts from step 5 as a support under the metal bracket.

**Rear View of the I/O Cabinet**



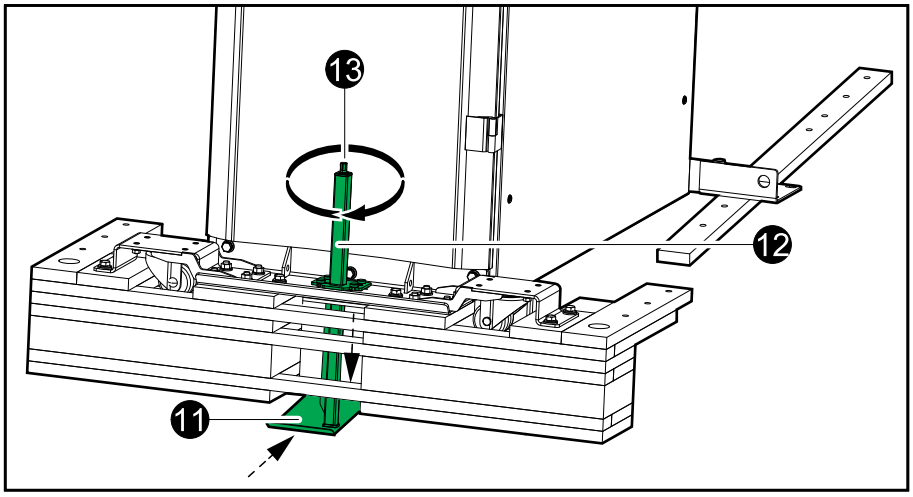

9. Lower the cabinet down onto the support using the jack and the drilling machine.
10. Remove the floor protection plate and the jack.

**Rear View of the I/O Cabinet**



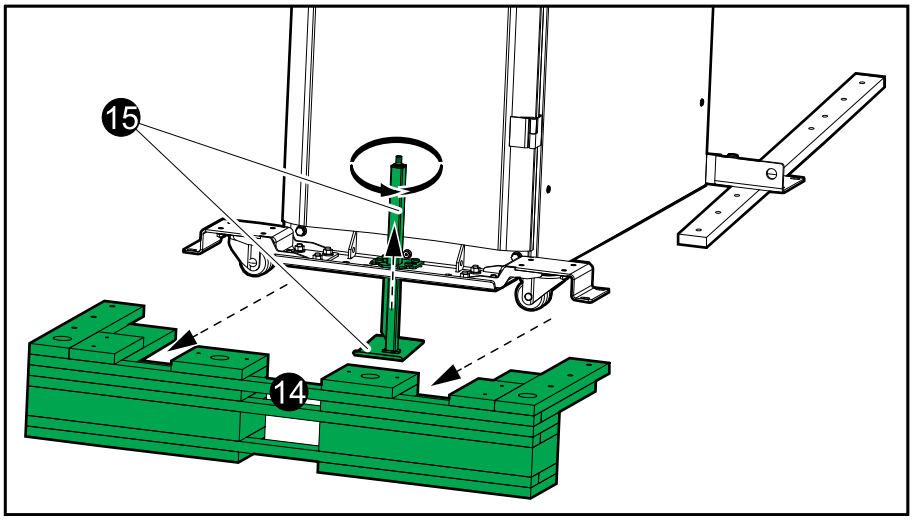
11. Place the floor protection plate under the pallet on the front of the cabinet.

**Front View of the I/O Cabinet**




12. Place the jack in the hole in the transport bracket on the front of the pallet.
13. Use a drilling machine with the provided hexagonal socket to activate the jack, slide it into position in the bracket, and to lift the pallet to the top position.
14. Loosen the bolts that attach the transport bracket to the pallet and remove the front pallet part.

**Front View of the I/O Cabinet**




**⚠WARNING**

**HAZARD OF SERIOUS INJURY**

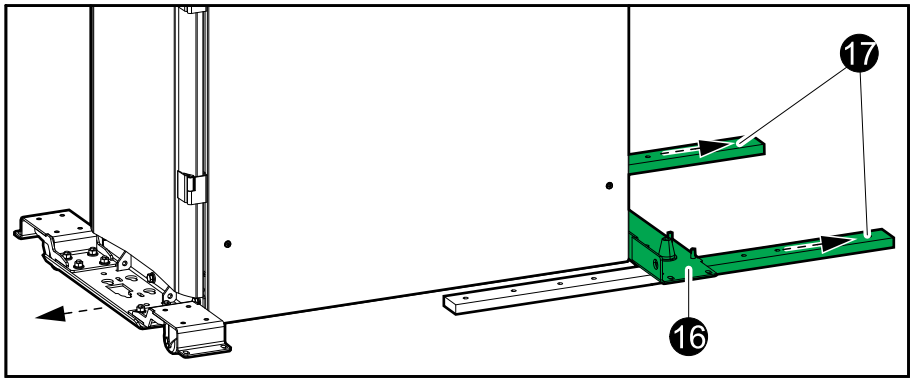
Do not put your hands or feet under the pallet while removing the wooden side part.

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

15. Use the jack to lower the cabinet onto the floor until the wheels connect with the floor. Remove the jack and the floor protection plate.

16. Remove the rear anchor.

**Side View of the I/O Cabinet**




17. Wheel the cabinet away and remove the remaining pallet parts. The cabinet can now be moved on the built-in wheels to the installation area.

**⚠WARNING**

**HAZARD OF SERIOUS INJURY**

Be carefully of uneven floors and doorsteps when moving the cabinet on its wheels to avoid overbalancing and tipping the cabinet.

## Remove the Power Cabinets from the Pallet

**⚠CAUTION**

**HAZARD OF EQUIPMENT DAMAGE**

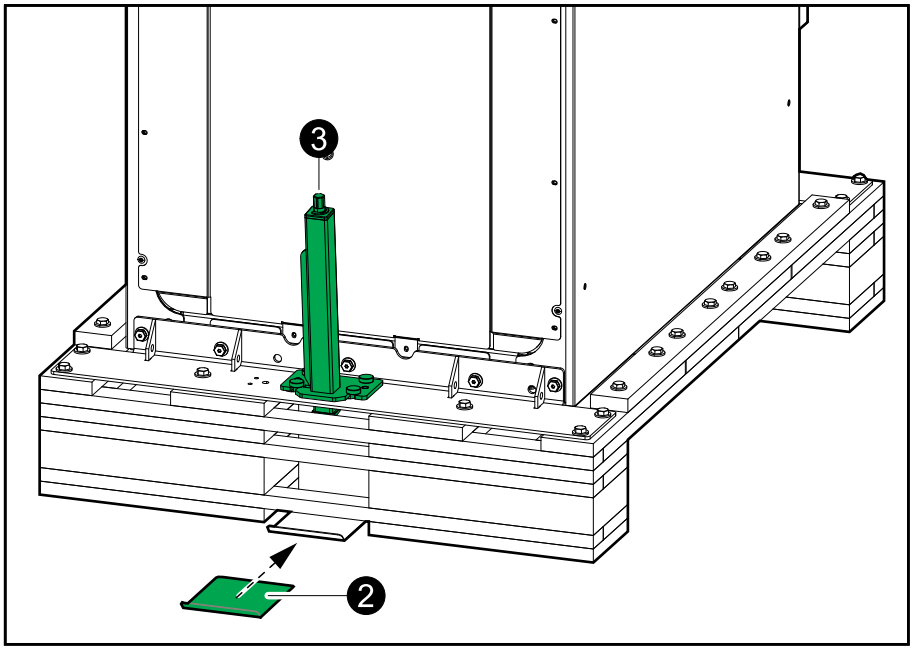
Ensure that the floor is level and can support the weight of the jack when it carries the cabinet.

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

1. Take the installation kit 0M-816661 shipped on the I/O cabinet pallet. Use the jack and the floor protection plate in the kit for all cabinets in this procedure.

2. Place the floor protection plate under the pallet on the rear of the cabinet.

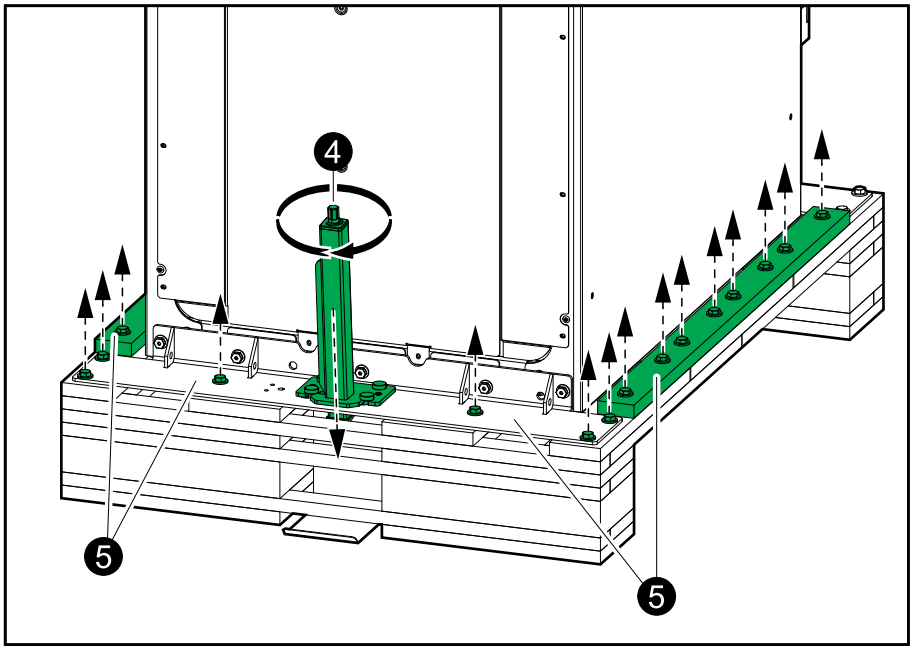
**Rear View of the Power Cabinet**




3. Place the jack from the installation kit in the hole in the transport bracket on the rear of the cabinet.
4. Use a drilling machine with the provided hexagonal socket to activate the jack, slide it into position in the bracket, and to lift the pallet to the top position.

   **NOTE:** Reduce the drill torque to minimum to prevent kickback.

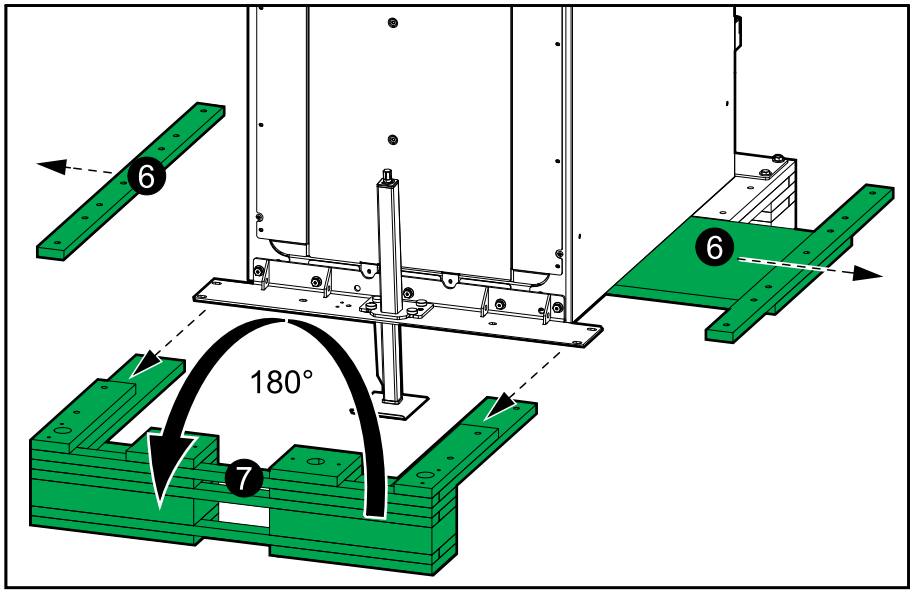
**Rear View of the Power Cabinet**




5. Loosen and remove the bolts shown on the drawing that attach the transport bracket and the wooden plates to the pallet.

6. Remove the wooden side parts of the pallet and the bottom plate.

**Rear View of the Power Cabinet**




**⚠WARNING**

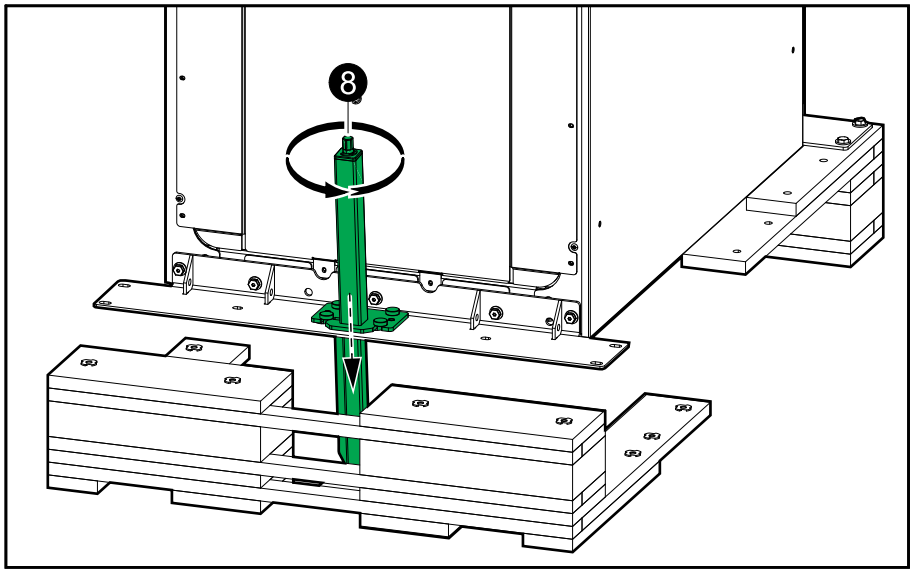
**HAZARD OF SERIOUS INJURY**

Do not put your hands or feet under the pallet while removing the wooden side part.

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

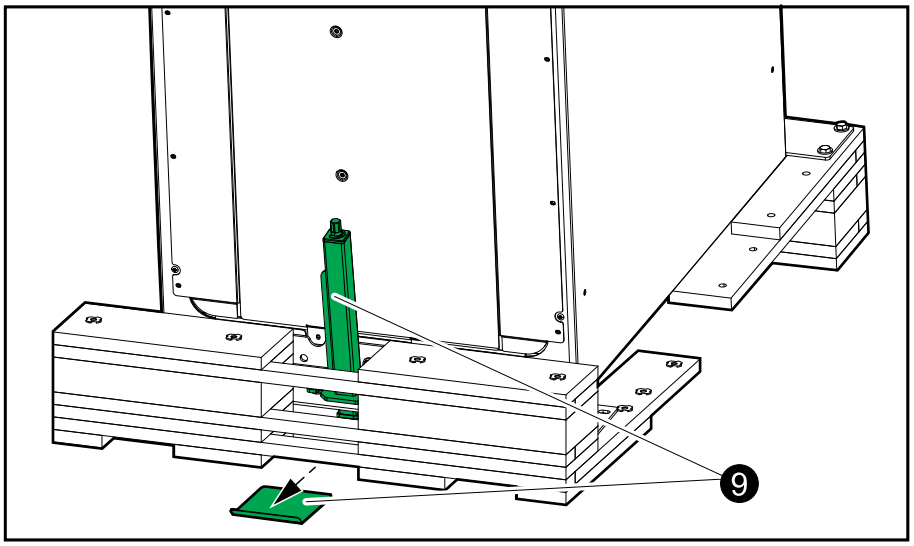
7. Turn the wooden part 180 degrees and place it under the metal bracket as a support.
8. Lower the cabinet down onto the support using the jack and the drilling machine.

**Rear View of the Power Cabinet**



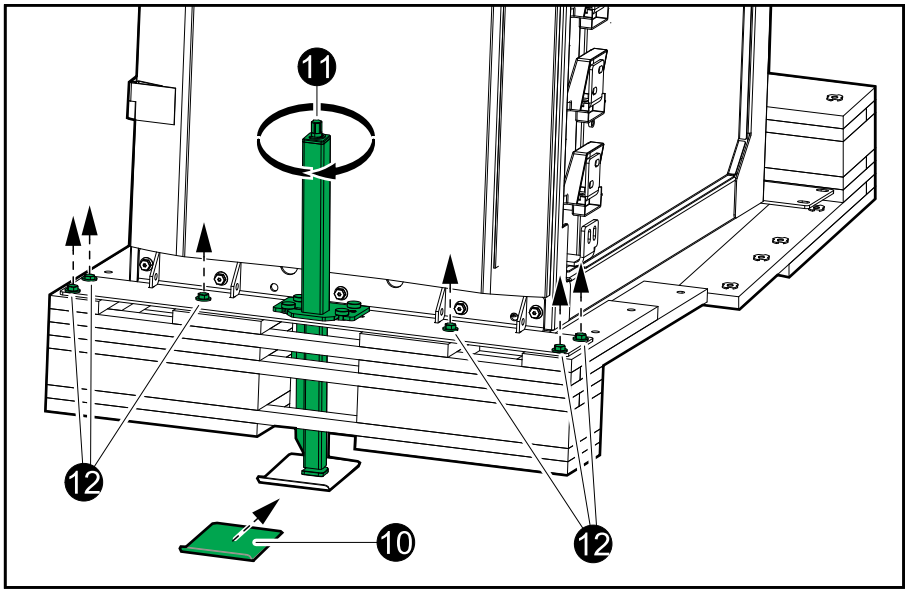
9. Remove the floor protection plate and the jack.

**Rear View of the Power Cabinet**




10. Place the floor protection plate under the pallet on the front of the cabinet.

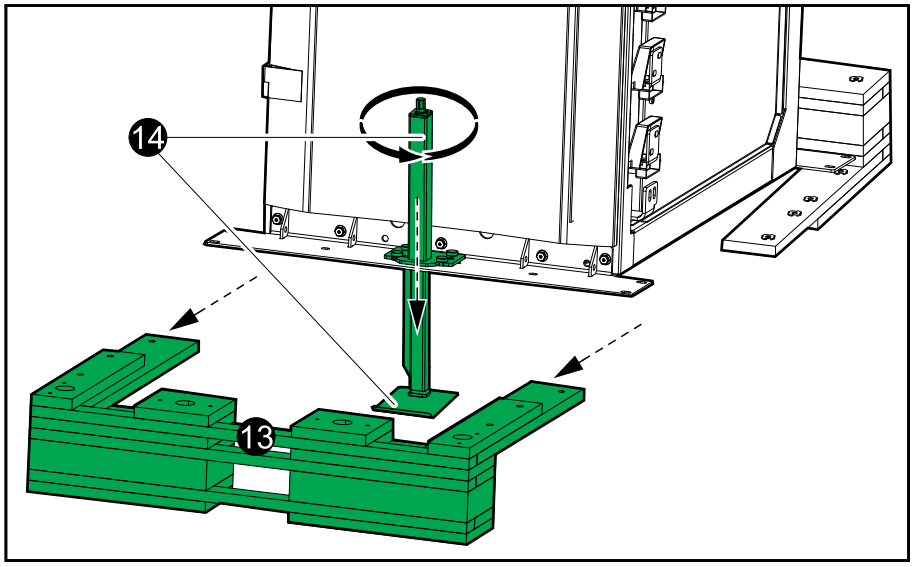
**Front View of the Power Cabinet**




11. Place the jack in the hole in the transport bracket on the front of the pallet. Use a drilling machine with the provided hexagonal socket to activate the jack, slide it into position in the bracket, and to lift the pallet to the top position.
12. Loosen and remove the bolts that fasten the transport bracket to the pallet. The number of bolts depends on the cabinet type.

13. Remove the front pallet.

**Front View of the Power Cabinet**




**⚠WARNING**

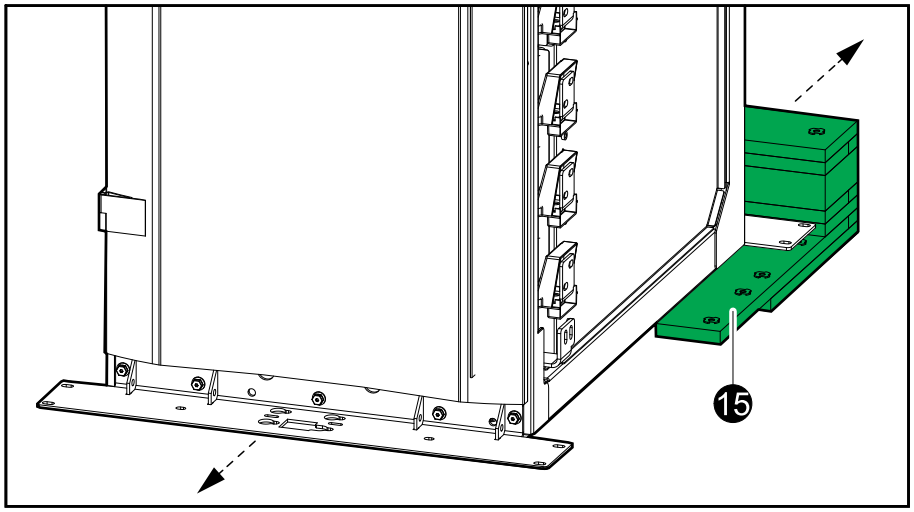
**HAZARD OF SERIOUS INJURY**

Do not put your hands or feet under the pallet while removing the wooden plate.

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

14. Use the jack to lower the cabinet onto the floor until the wheels connect with the floor. Remove the jack and the floor protection plate.
15. Wheel the cabinet away and remove the remaining pallet parts. The cabinet can now be moved on the built-in wheels to the installation area.

**Front View of the Power Cabinet**




**⚠WARNING**

**HAZARD OF TILTING**

Be carefully of uneven floors and doorsteps when moving the cabinet on its wheels to avoid overbalancing and tipping the cabinet.

# Mount the Rear Anchoring Brackets for the UPS

**NOTE:** Before this installation procedure is started, the mounting skid must be welded to the ship as described in the submittal drawing GVMMARINE 160–200KHS. Schneider Electric takes no responsibility for incorrect alignment, welding, surface protection, or installation of the mounting skid.

**⚠DANGER**

**HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH**

Leave the UPS system covered while preparing the mounting skid to prevent dust or other conductive parts in the system.

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

**⚠WARNING**

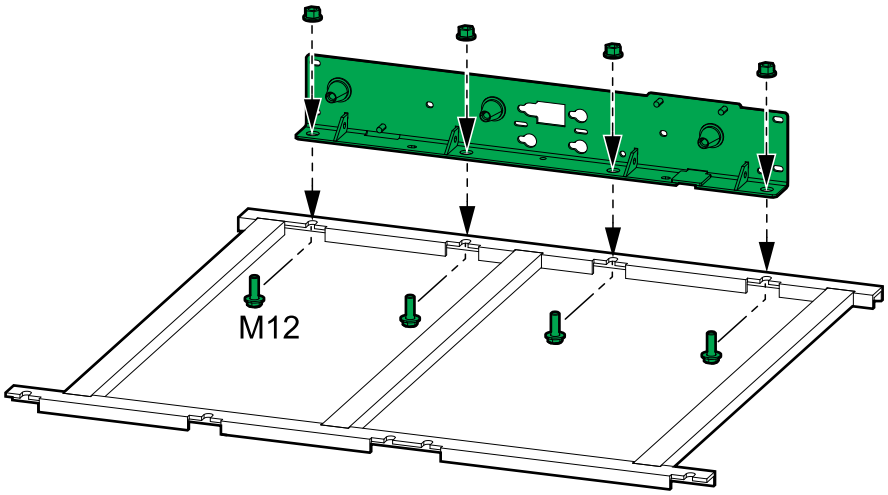
**HAZARD OF TILTING**

All front and rear anchoring brackets must be installed.

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

1. Mount the rear anchoring bracket that was attached to the rear pallet of the I/O cabinet on the mounting skid.

**Front View of the Mounting Skid and the Rear Anchoring Bracket**



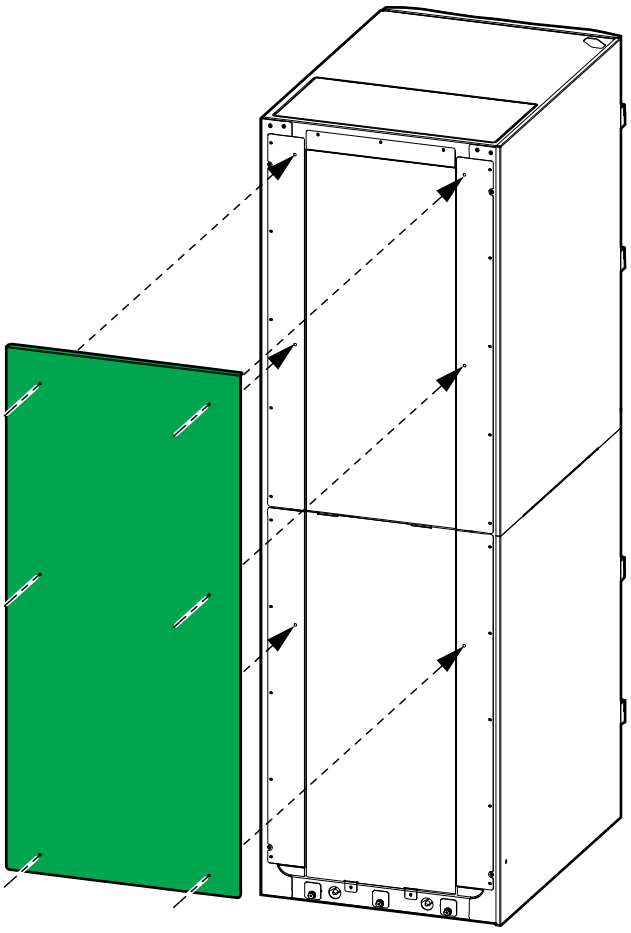

2. Torque to 88 Nm (65 lb-ft).

# Prepare the UPS for Installation

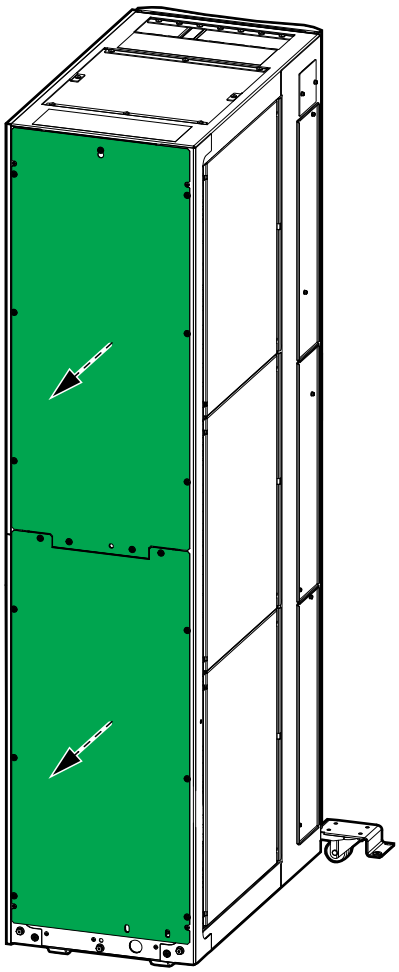
## Prepare the Power Cabinet and the I/O Cabinet for the IP32 Cover

1. Install the rear cover from the installation kit 0M-97296 on the power cabinet on top of the rear covers already present and fasten with screws.

**Rear View of the Power Cabinet**



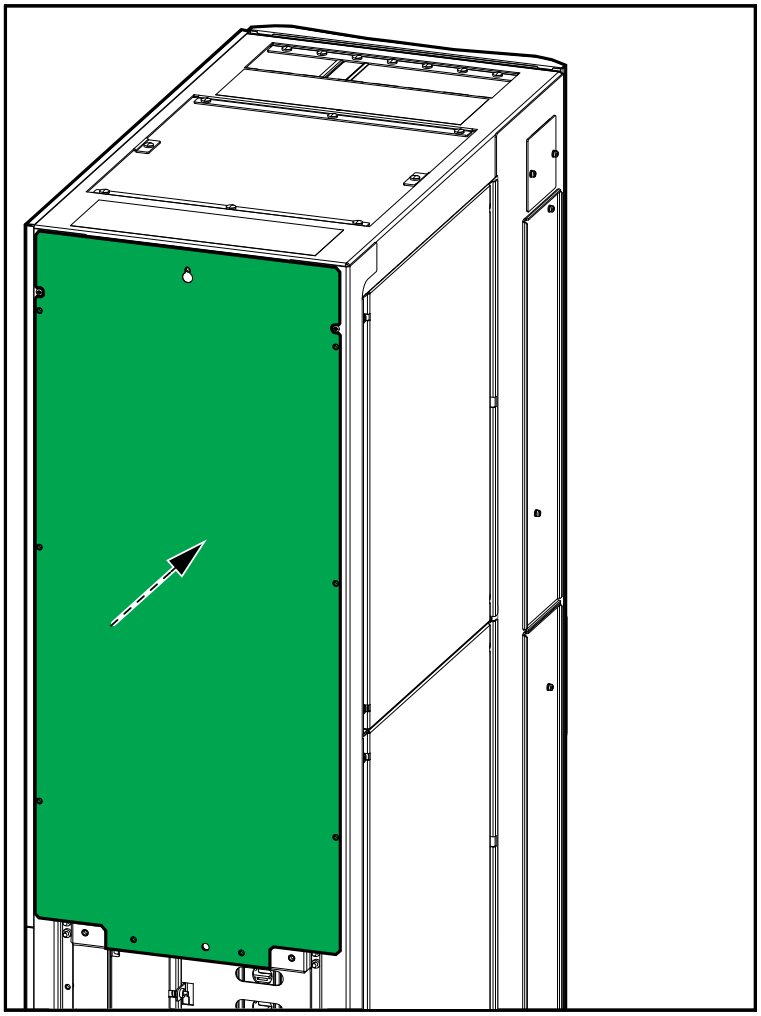
**Rear View of the I/O Cabinet**



2. Remove the upper and lower rear cover from the I/O cabinet.

3. Install the upper rear cover from the installation kit on the I/O cabinet and fasten with screws.

**Rear View of the I/O Cabinet**

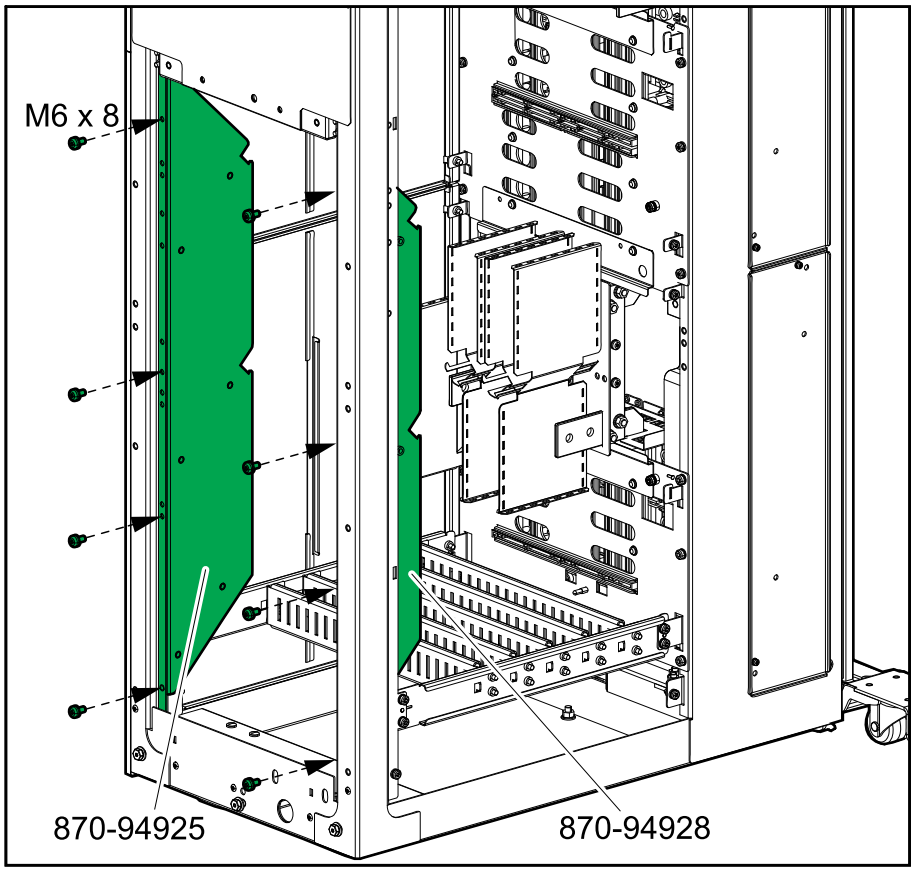


4. Depending on your installation, do one of the following:
   - In rear cable entry systems: Proceed to *Prepare the I/O Cabinet for Rear Cable Entry, page 41*.
   - In bottom cable entry systems: Install the lower rear cover from the IP32 kit on the I/O cabinet and fasten with screws. Then proceed to *Replace the Door Handles of the Power Cabinet and the I/O Cabinet, page 43*.

# Prepare the I/O Cabinet for Rear Cable Entry

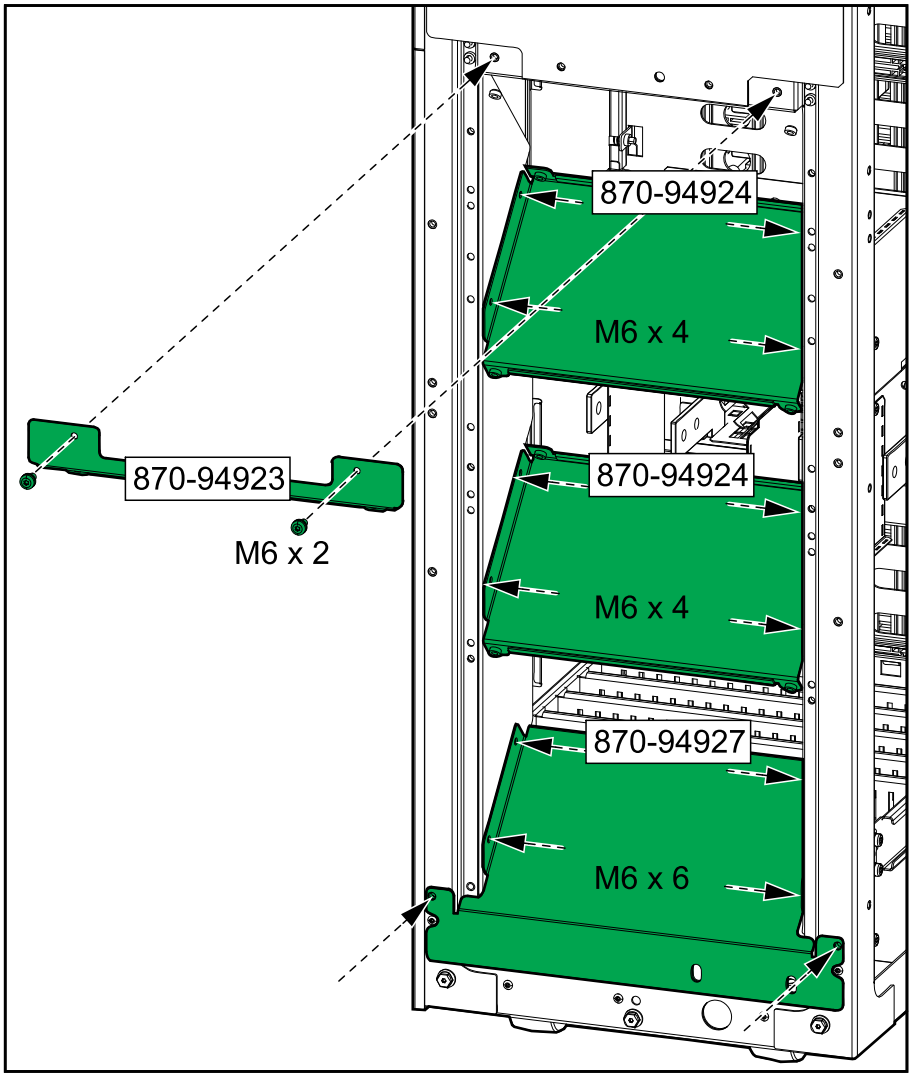
1. Install the two side panels from the installation kit 0M-97293 and fasten with the provided screws.

**Rear View of the I/O Cabinet**



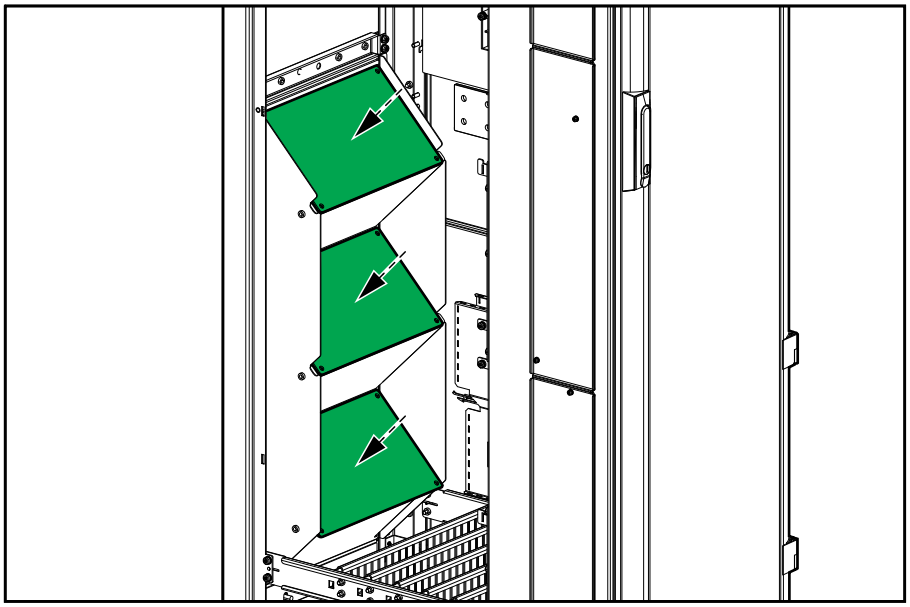
2. Install the four indicated panels and fasten with the provided screws.

**Rear View of the I/O Cabinet**



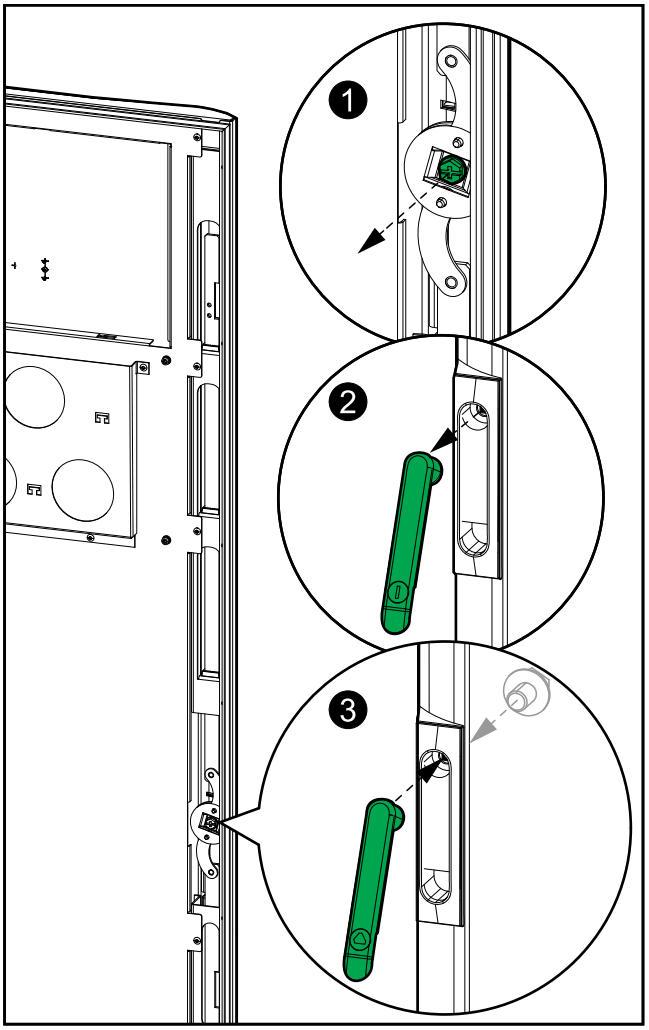

3. From the front install the three gland plates and fasten with the provided screws.

**Front View of the I/O Cabinet**



# Replace the Door Handles of the Power Cabinet and the I/O Cabinet

1. From the rear of the front doors, loosen the screw that holds the door handle.




2. Slide out the door handle.
3. Install the door handle from the installation kit 0M-97293 and fasten the bolt.

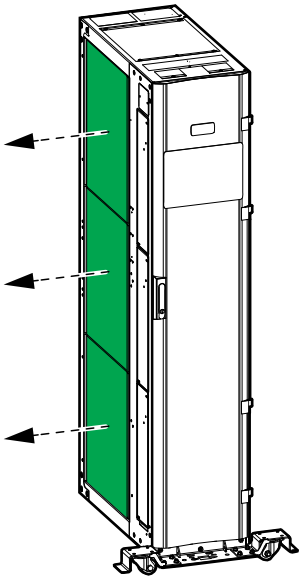
# Install the I/O Cabinet

## Position the I/O Cabinet

The parts used in this procedure are provided in the installation kits 0M-816654 and 0M-816662.

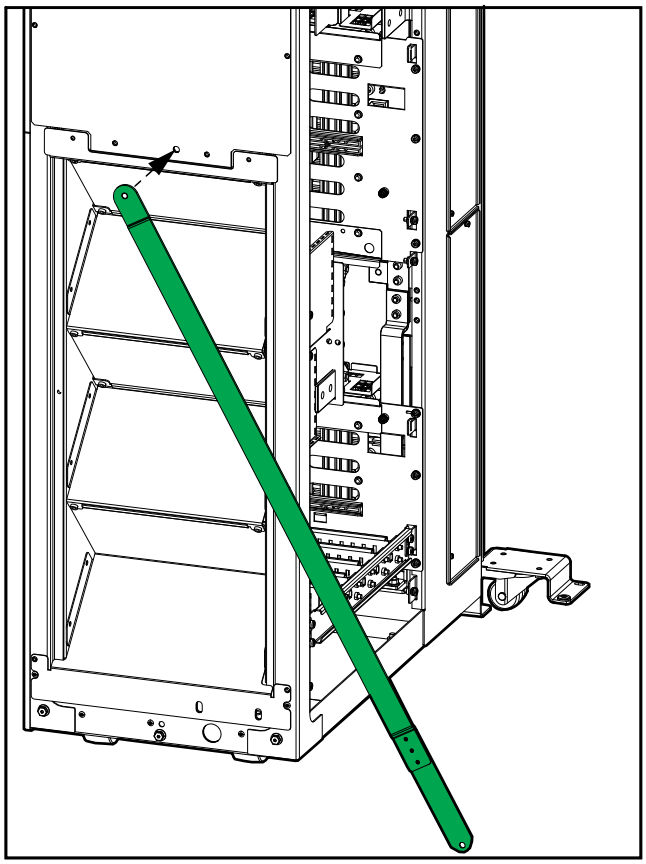
1. Remove the three side covers from the left side of the I/O cabinet and save for later use.

**Front View of the I/O Cabinet**



2. Install the crossbar shipped inside the I/O cabinet on the rear of the I/O cabinet. Guide the crossbar bolt through the rear of the I/O cabinet and secure it with the provided M8 nut on the inside of the I/O cabinet.

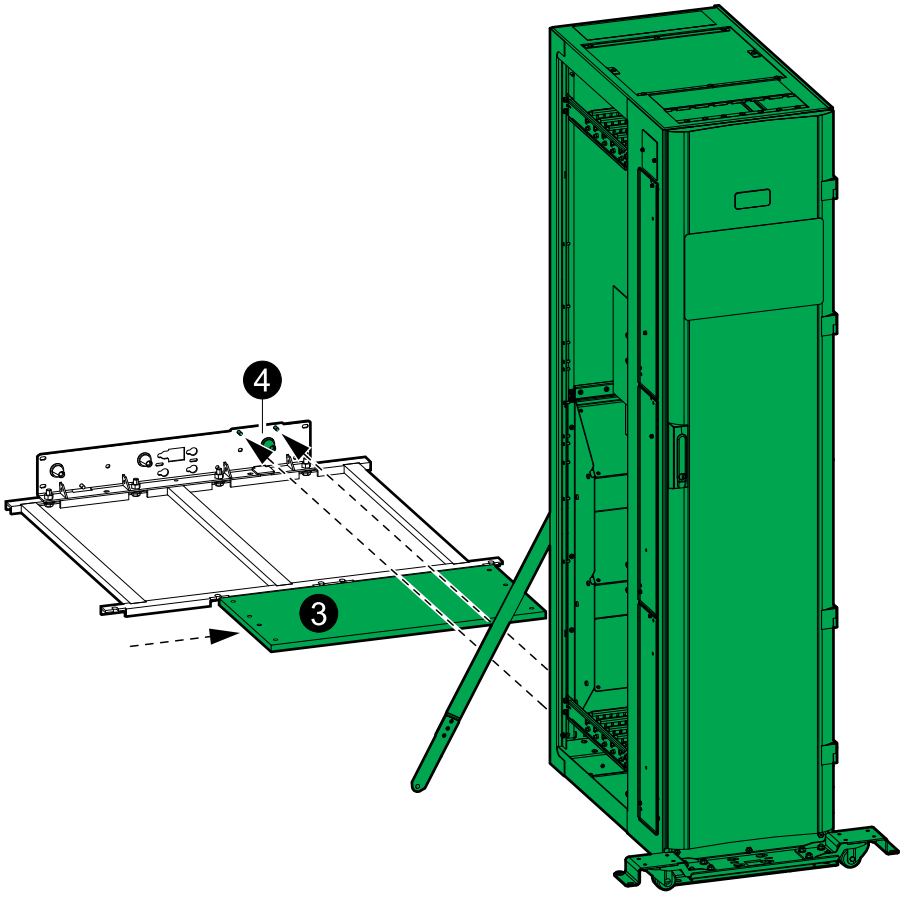
**Rear View of the I/O Cabinet**



3. Place the wooden part of the pallet in front of the socket and use it as a ramp.

   **NOTE:** If the I/O cabinet is placed up against a wall on the right side, the right wheel on the front bracket can be rotated 90 degrees.

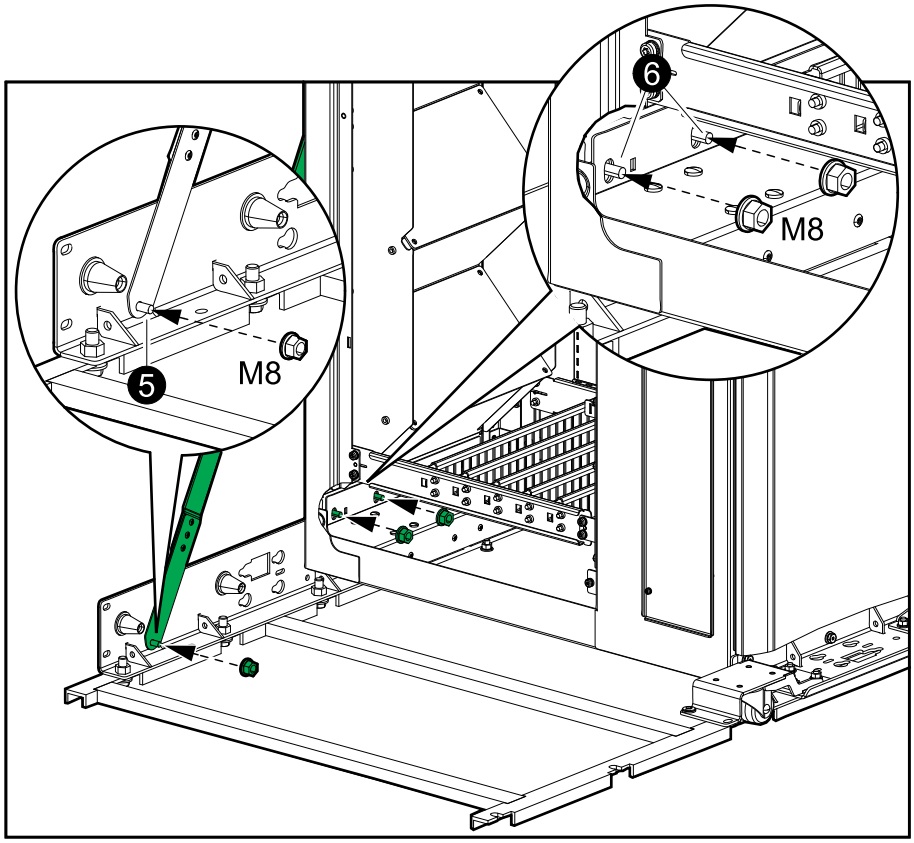
**Front View of the I/O Cabinet**




4. Push the I/O cabinet into position against the rear anchoring bracket – the I/O cabinet will connect to the conic outcroppings on the bracket.

5. Fasten the crossbar to the anchoring bracket using the provided M8 nut.

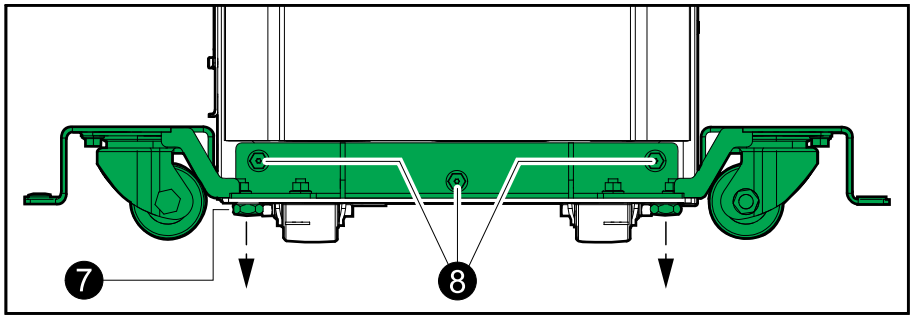
**Front View of the I/O Cabinet**




6. Fasten the I/O cabinet with the provided M8 nuts to the rear anchoring bracket through the side of the I/O cabinet.
7. Lower the two cabinet front feet until they connect with the floor – use a bubble-leveler to ensure that the I/O cabinet is level. Use the provided levelling shims if necessary.

   **NOTE:** If the I/O cabinet is placed up against a wall on the right side, lower the left foot and then remove the right wheel to get access to the right foot.

**Front View of the I/O Cabinet**




8. Remove the front bracket with wheels from the I/O cabinet.

# Connect Power Cables to the I/O Cabinet

## Prepare for Cables in a Bottom Cable Entry System

**⚠DANGER**

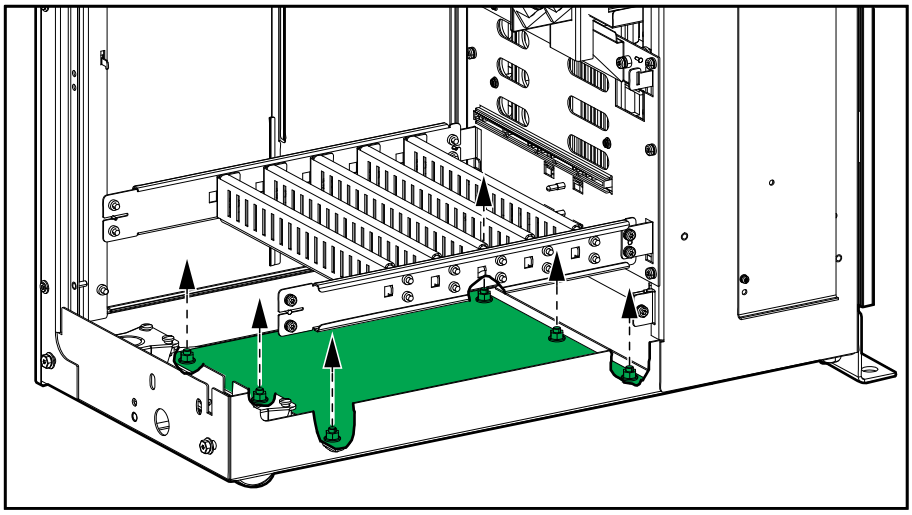
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not drill or cut holes for cables or conduits with the gland plates installed and do not drill or cut holes in close proximity to the UPS.

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

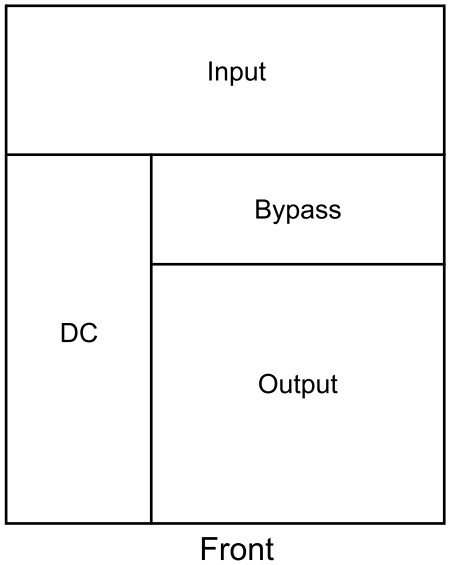
1. Loosen the bolts from the bottom gland plate of the I/O cabinet and remove the bottom gland plate.

**Side View of the I/O Cabinet**



2. Drill or cut holes for cables/conduits in the bottom gland plate according to the guidelines shown below.

**Top View of the Bottom Gland Plate**



3. Install conduits and reinstall the bottom gland plate.

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Ensure that there are no sharp edges that can damage the cables.

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

4. Route the cables through the ladder in the following order from front to back: battery cables (if present), output cables, bypass cables (if present), and input cables.

## Prepare for Cables in a Rear Cable Entry System

**⚠ DANGER**

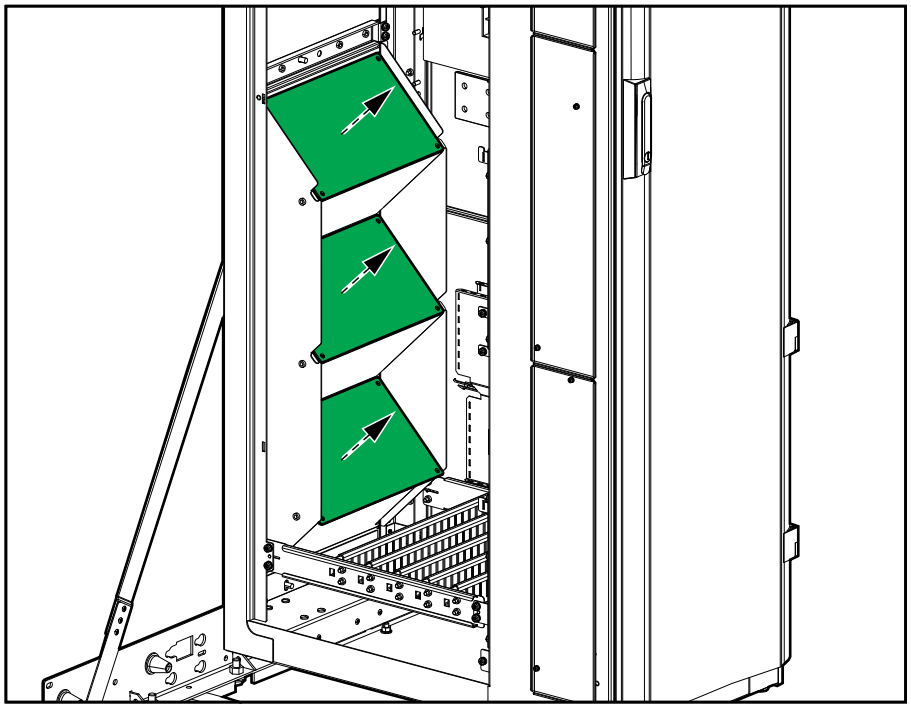
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not drill or cut holes for cables or conduits with the gland plates installed and do not drill or cut holes in close proximity to the UPS.

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

1. Remove the three gland plates.

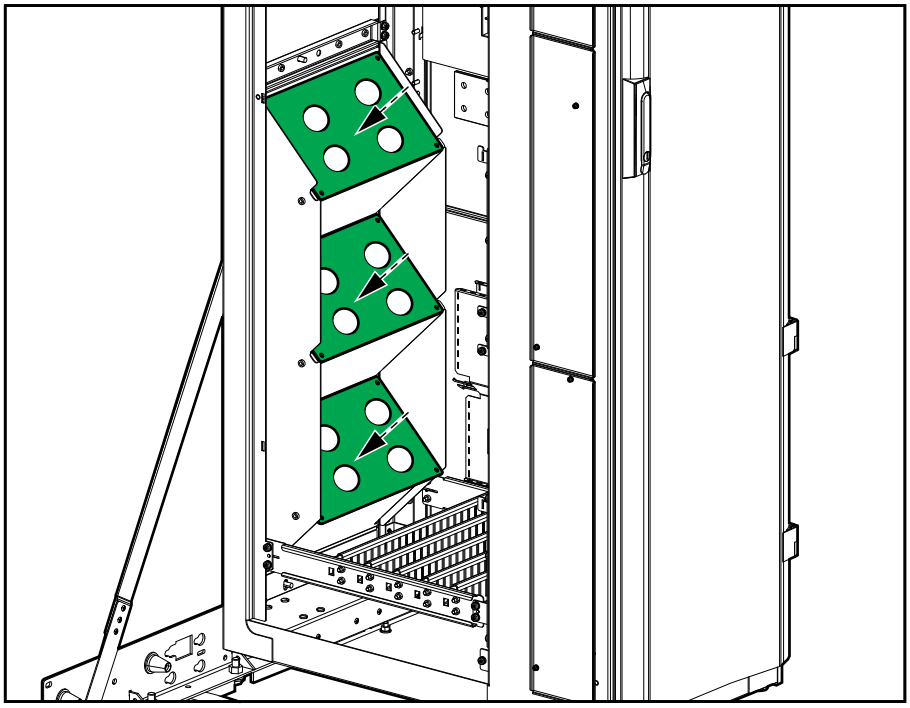
**Side View of the I/O Cabinet**



2. Drill or cut holes for cables/conduits in the gland plates.

3. Install conduits and reinstall the gland plates.

**Side View of the I/O Cabinet**



**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Ensure that there are no sharp edges that can damage the cables.

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

4. Route the power cables through the rear of the cabinet.

## Install Jumper Busbar in 5–Wire Systems

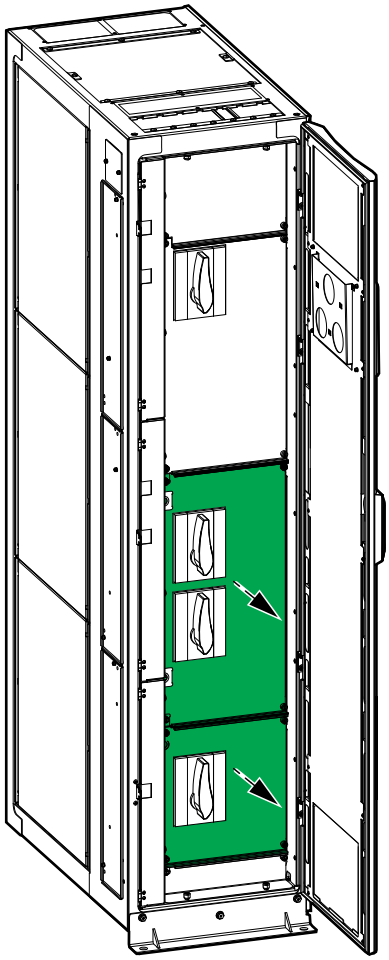
**NOTE:** This procedure is only applicable to 5–wire systems. The jumper must be installed when required by the local regulations.

**NOTE:** The jumper is making a bolted connection of the neutral so that the neutral is not disconnected when the 4–pole switches are opened.

The parts used in this procedure are provided in the installation kit 0N-9763.

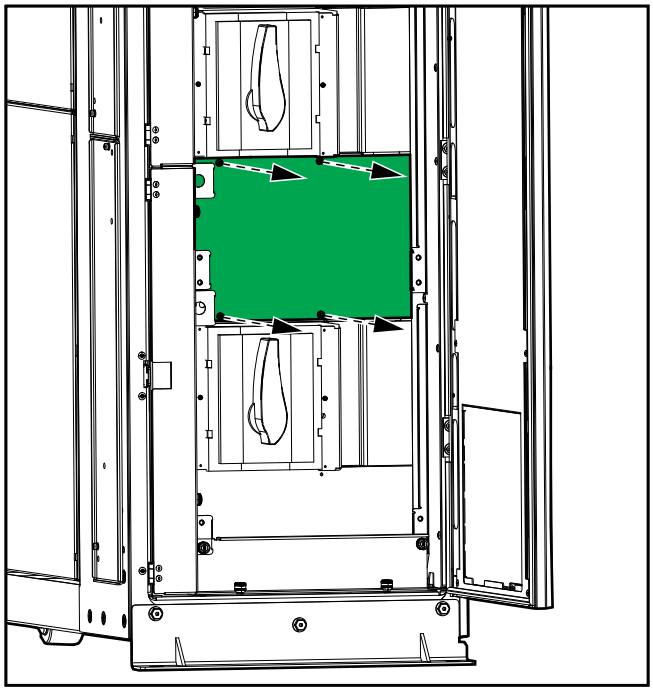
1. Remove the two bottom dead front panels from the I/O cabinet.

**Front View of the I/O Cabinet**



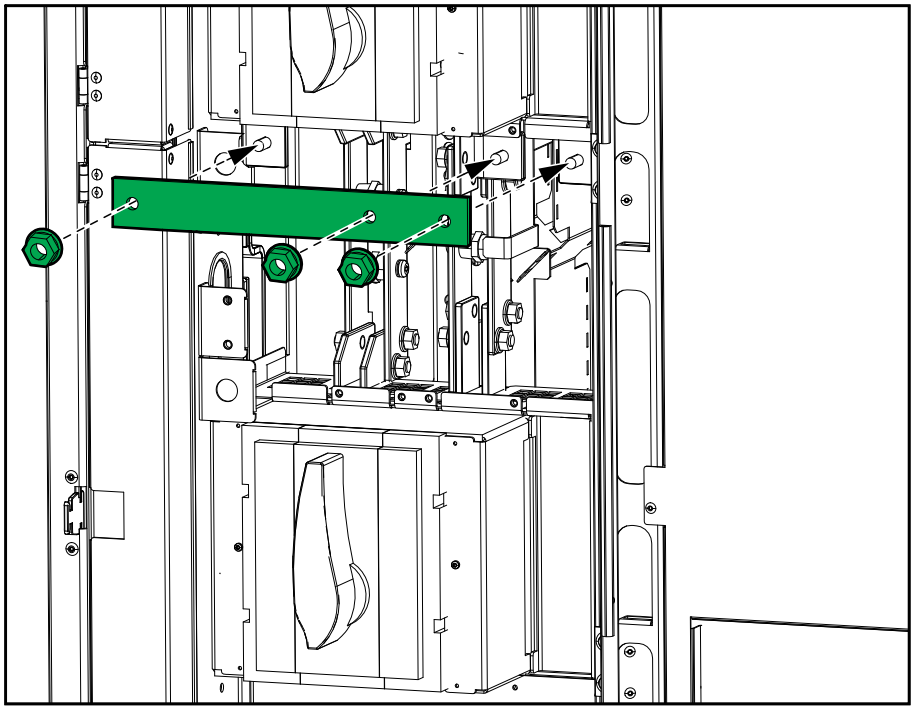
2. Remove the isolation cover.

**Front View of the I/O Cabinet**



3. Slide the provided jumper busbar over the studs of the busbars and secure the jumper busbar using the provided M8 nuts.

**Front View of the I/O Cabinet**

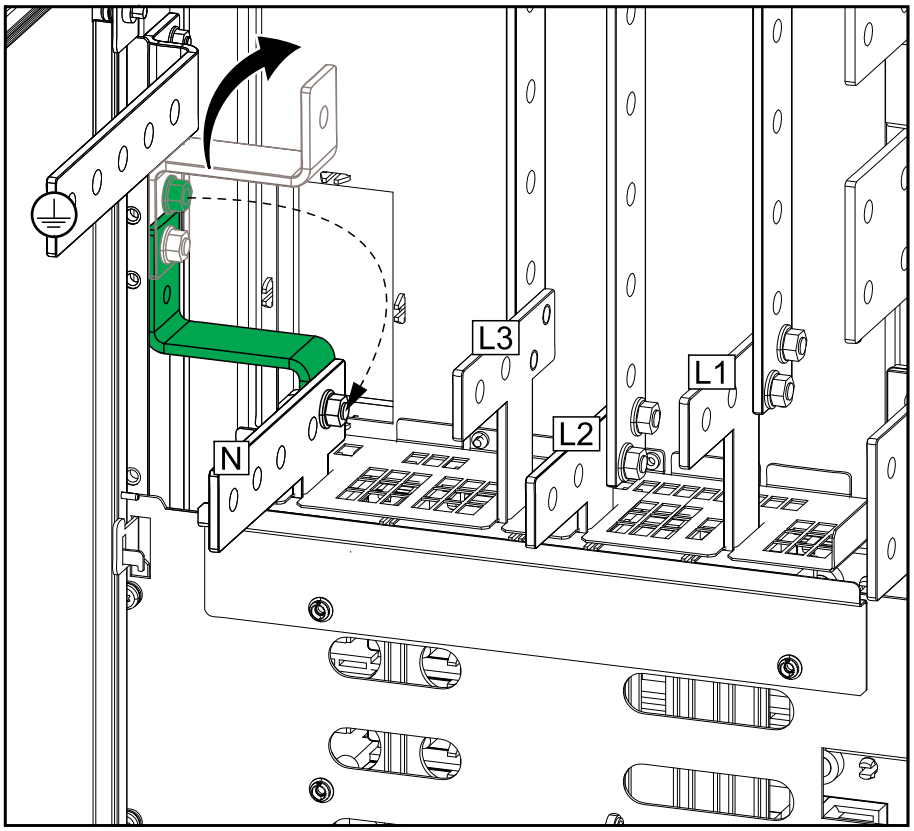


4. Reinstall the isolation cover and the dead front panels.

## Convert to a TN-C System

1. Loosen the screw holding the jumper busbar.

**Rear View of the I/O Cabinet**



2. Rotate the jumper busbar and connect it to the PE busbar and the neutral busbar.

## Connect Power Cables in a Single Mains System

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

For TT and TN systems each stand alone cabinet of the system must be individually connected to the protective earthing terminal in the distribution board that supplies the system.

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

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not remove the isolation covers between the busbars. The isolation covers are not shown on the drawings.

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

**⚠CAUTION**

**HAZARD OF EQUIPMENT DAMAGE**

When the system is configured as a frequency converter:

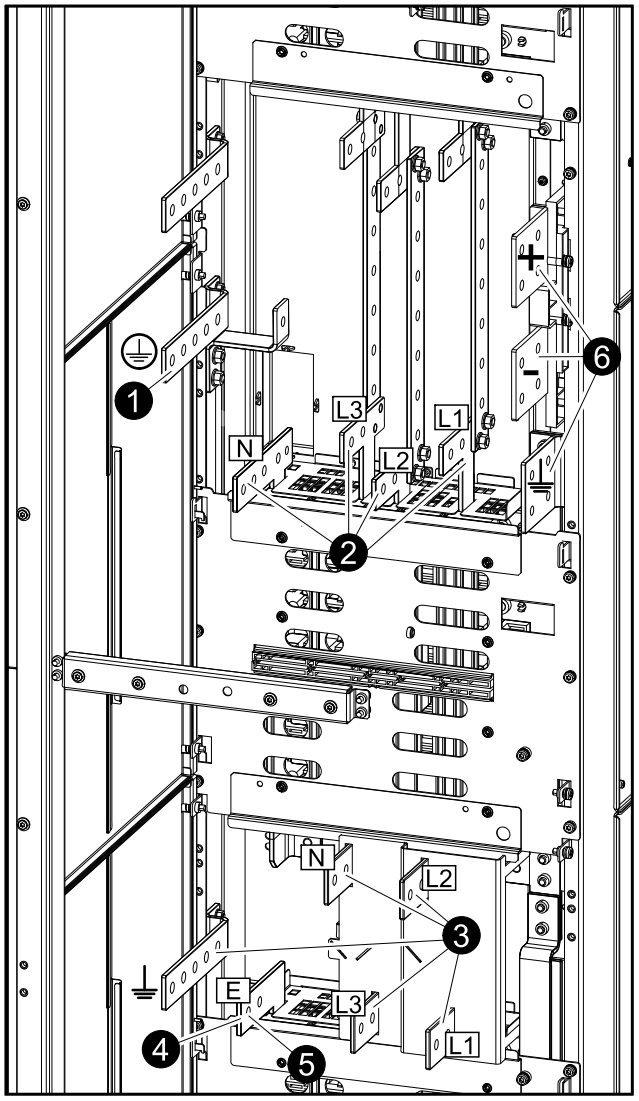
- Only use the single I/O cabinet.
- Remove the three single mains busbars.
- Do not use the bypass terminals.
- Lock or remove the handle on SSIB and MBB in the open position. Padlock is not provided.

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

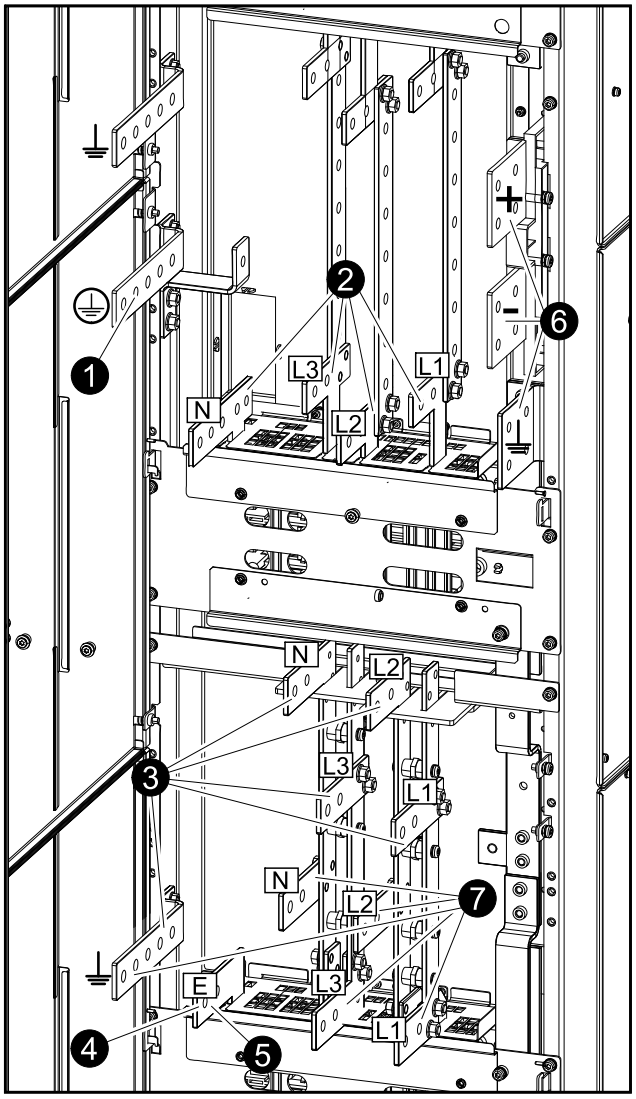
1. Connect the equipment earthing conductor/PE cable to the PE busbar.

   **NOTE:** The same earthing must be used for all UPSs in a parallel system.

**Rear View of the Single I/O Cabinet**




**Rear View of the Parallel I/O Cabinet**



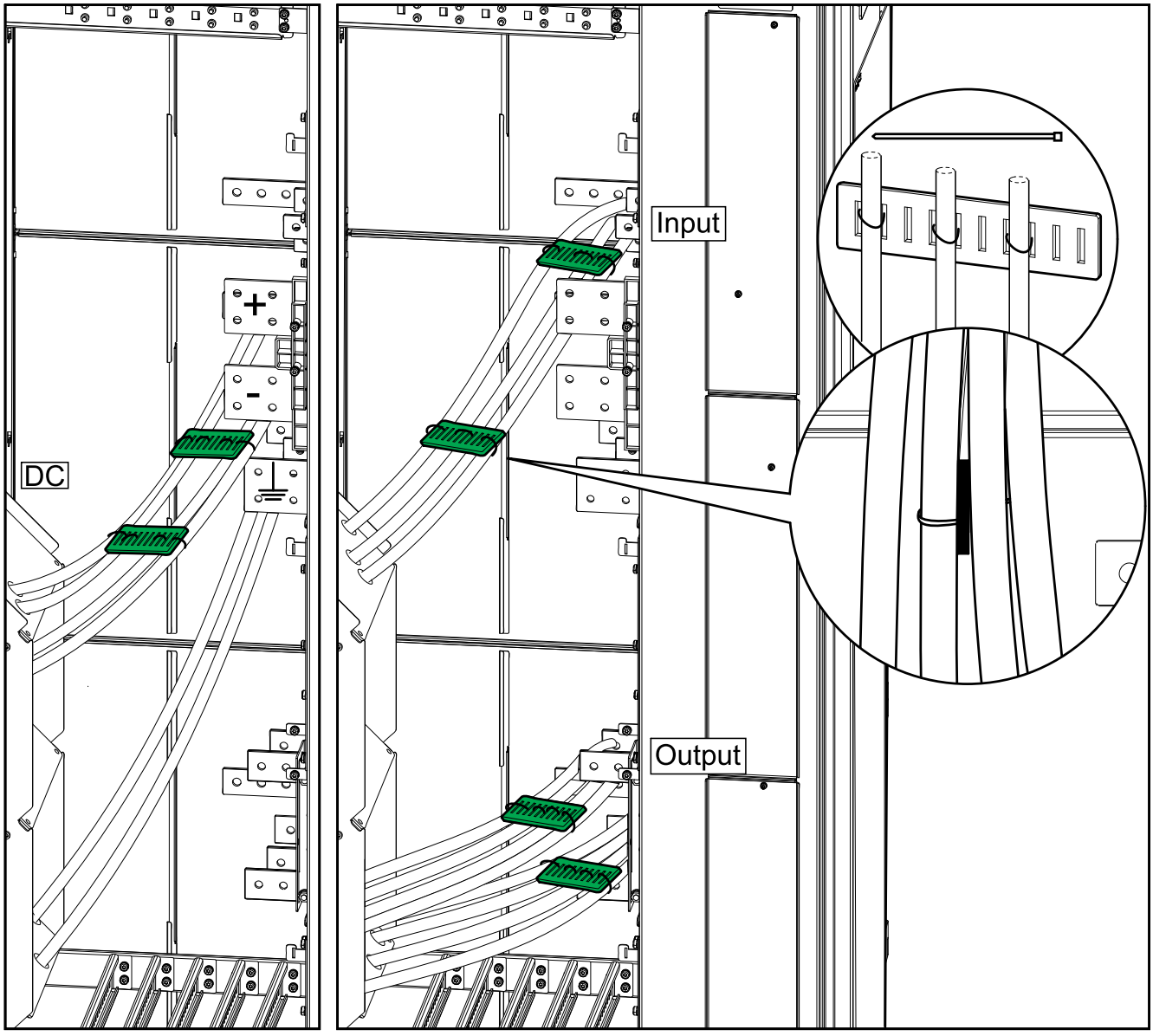

2. Connect the input cables to the input terminals in the I/O cabinet.
3. Connect the output cables to the output terminals in the I/O cabinet.
4. Only applicable to 4–wire systems: In an IT system, connect an external impedance between the “E” terminal and the output earthing terminal.

   **NOTE:** For IT systems, the installation must include a earth-fault detection circuitry.

5. Only applicable to 5–wire systems: In a TN-S system, connect the functional earthing conductor to the “E” terminal according to local regulation. The size of the cable must be the same as the input cable.
6. Only applicable to systems with remote batteries or a battery breaker box: Connect the battery cables to the battery terminals in the I/O cabinet.
7. Only applicable to parallel systems:
   - In parallel systems with system bypass cabinet: Connect the UPS output cables to the terminals in the system bypass cabinet.
   - In 1+1 parallel systems: Connect the output cables from the single I/O cabinet to the terminals in the parallel I/O cabinet.

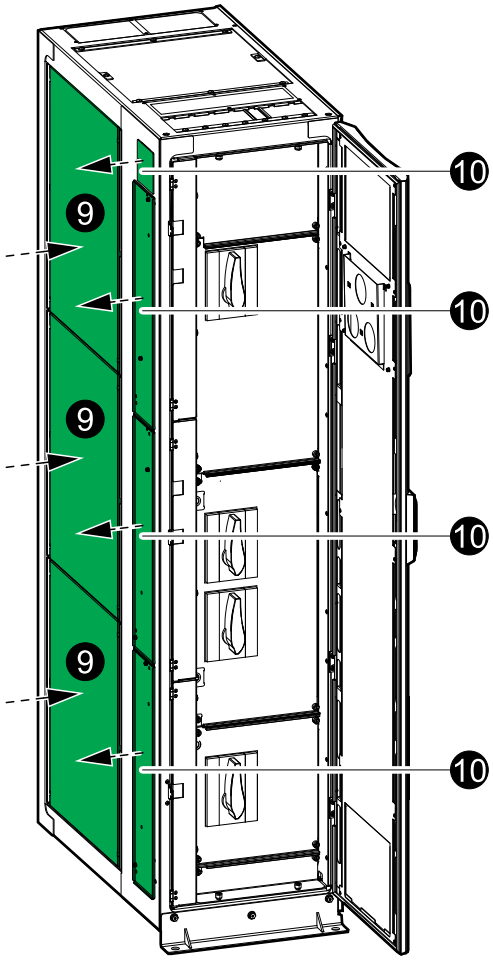
8. Secure the cables to the provided cable reliefs using the cable ties. Use:
   - **Bottom cable entry system:**
     - Two cable reliefs for input cables
     - Six cable reliefs for output cables
     - Three cable reliefs for battery cables
     - In 1+1 systems: Six cable reliefs for 1+1 output cables
   - **Rear cable entry system:**
     - Two cable reliefs for input cables
     - One cable relief for output cables
     - Two cable reliefs for battery cables
     - In 1+1 systems: One cable relief for 1+1 output cables

**Side View of the I/O Cabinet in a Rear Cable Entry System**



9. Reinstall the three side covers on the left side of the I/O cabinet.

**Front View of the I/O Cabinet**




10. Remove the four covers protecting the busbars.
11. Lock out/tag out the UIB, SSIB, and UOB in the I/O cabinet using the built-in locking device.
12. Lock out/tag out the MBB with the built-in locking device.
13. Lock out/tag out the battery breakers in the selected battery solution.

## Connect Power Cables in a Dual Mains System

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

For TT and TN systems each stand alone cabinet of the system must be individually connected to the protective earthing terminal in the distribution board that supplies the system.

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

**⚠DANGER**

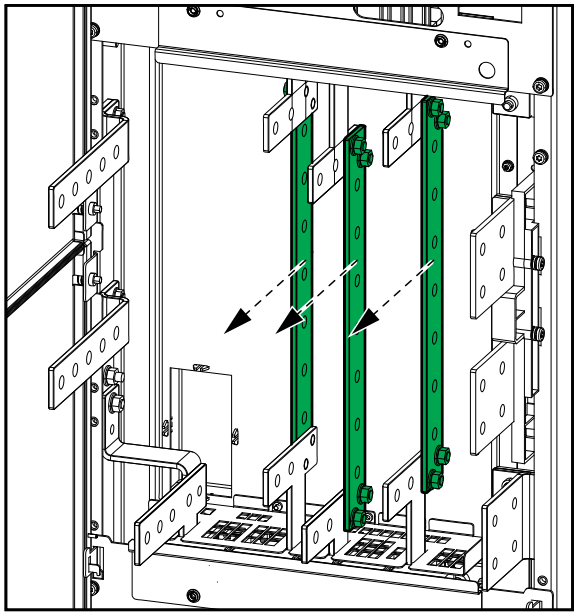
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not remove the isolation covers between the busbars. The isolation covers are not shown on the drawings.

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

1. Remove the single mains busbars.

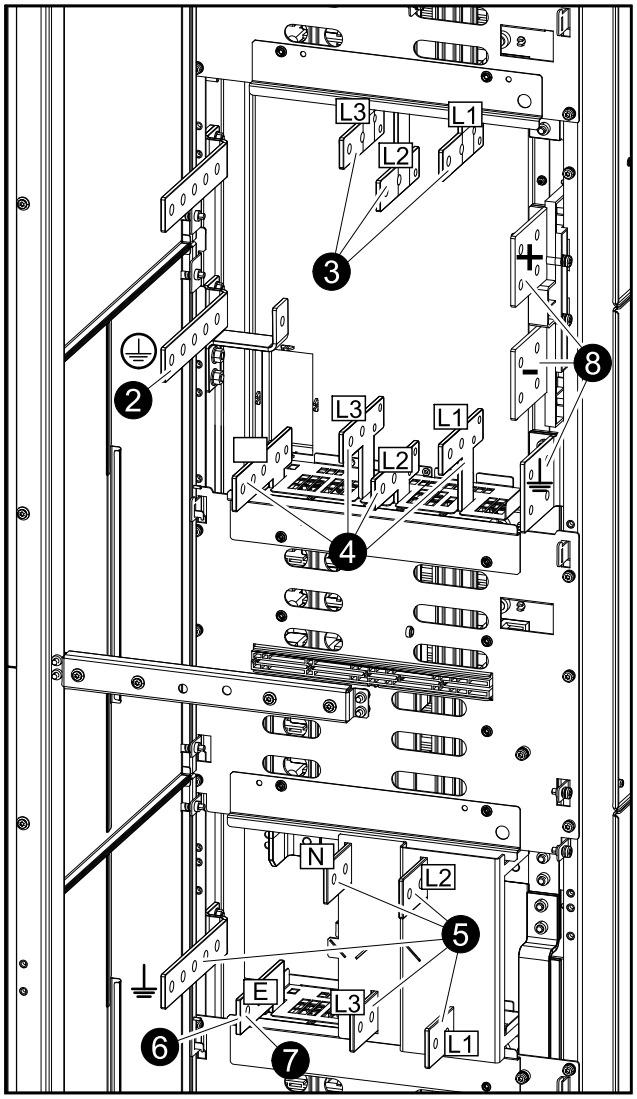
**Rear view of the I/O Cabinet**



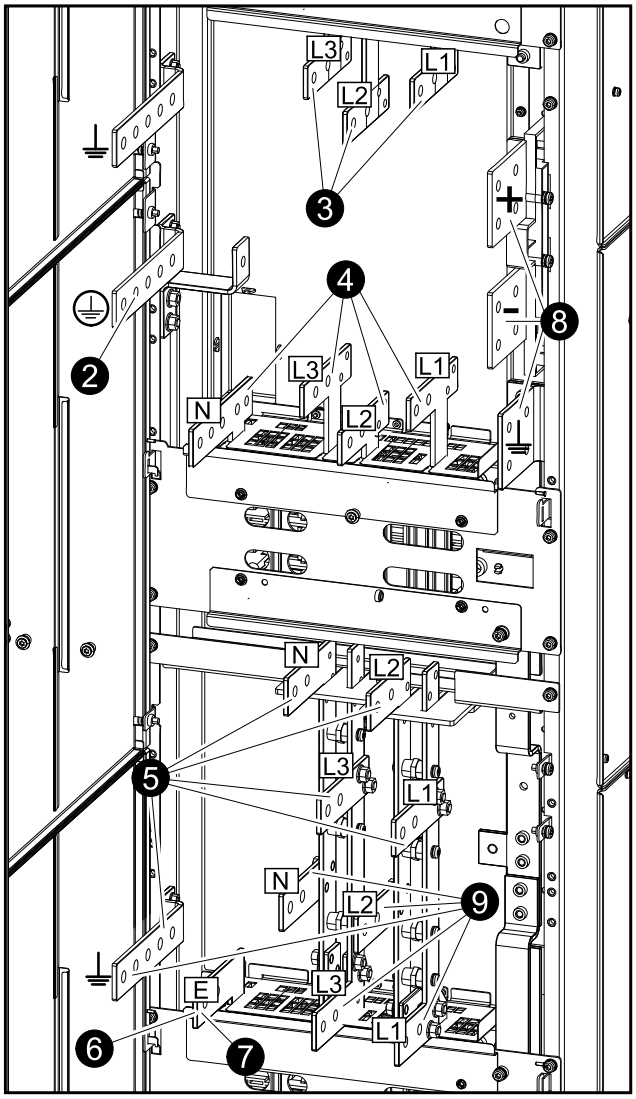
2. Connect the equipment earthing conductor/PE cable to the PE busbar.

   **NOTE:** The same earthing must be used for all UPSs in a parallel system.

**Rear View of the Single I/O Cabinet**




**Rear View of the Parallel I/O Cabinet**



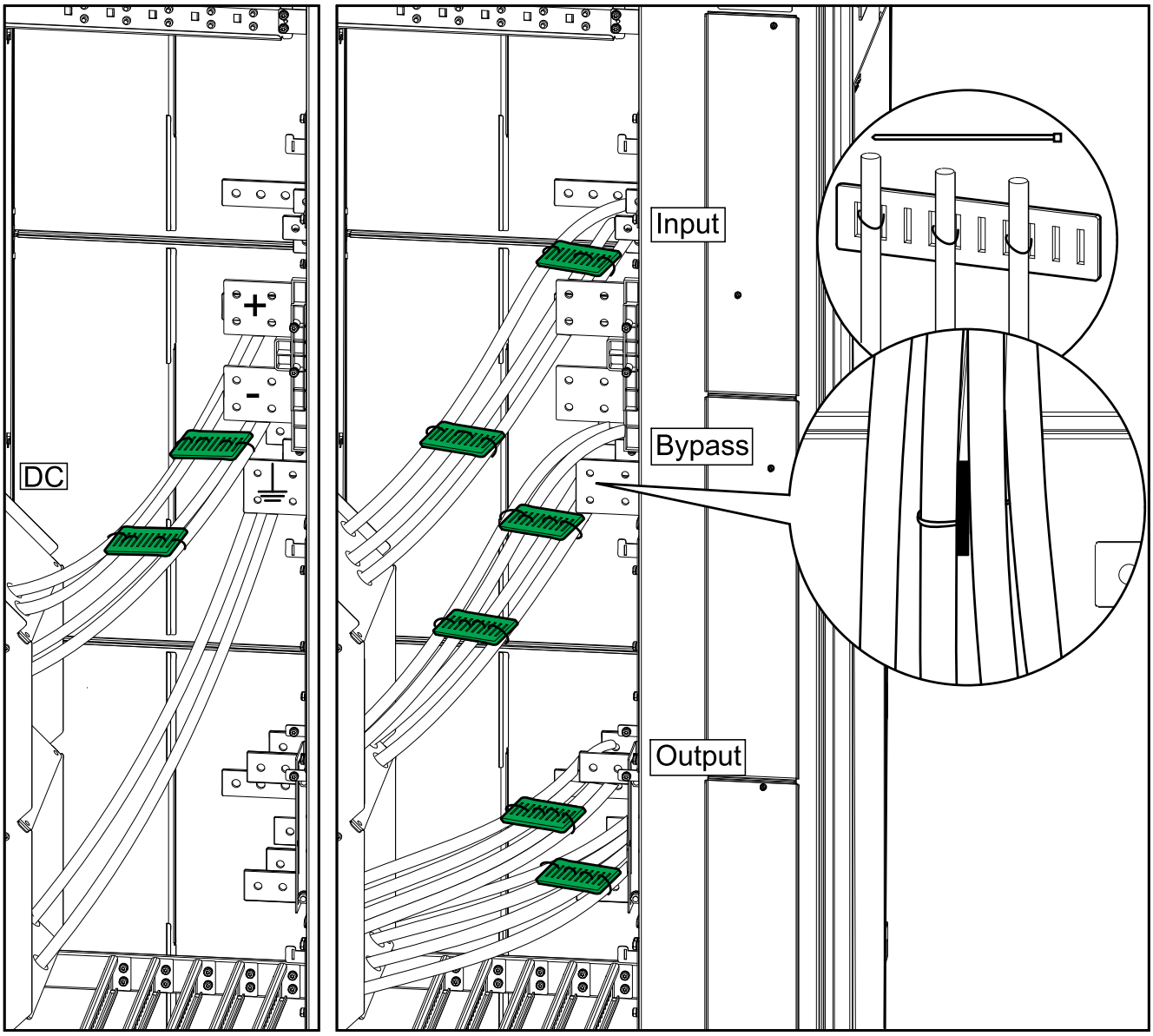

3. Connect the input cables to the input terminals in the I/O cabinet.
4. Connect the bypass cables to the bypass terminals in the I/O cabinet.
5. Connect the output cables to the output terminals in the I/O cabinet.
6. Only applicable to 4–wire systems: In an IT system, connect an external impedance between the “E” terminal and the output earthing terminal.

   **NOTE:** For IT systems, the installation must include a earth-fault detection circuitry.
7. Only applicable to 5–wire systems: In a TN-S system, connect the functional earthing conductor to the “E” terminal according to local regulation. The size of the cable must be the same as the input cable.
8. Only applicable to systems with remote batteries or a battery breaker box: Connect the battery cables to the battery terminals in the I/O cabinet.

9. Only applicable to parallel systems:
   - In parallel systems with system bypass cabinet: Connect the UPS output cables to the terminals in the system bypass cabinet.
   - In 1+1 parallel systems: Connect the output cables from the single I/O cabinet to the terminals in the parallel I/O cabinet.

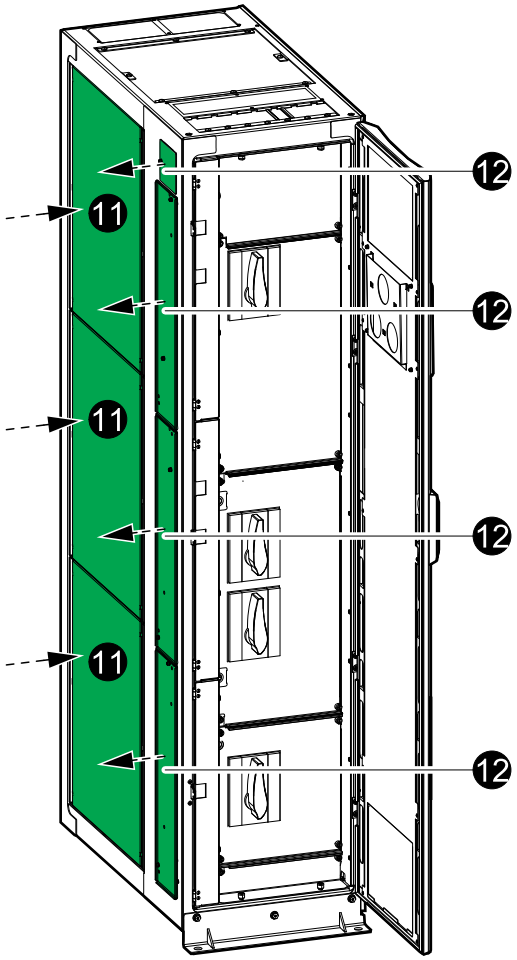
10. Secure the cables to the provided cable reliefs using the cable ties. Use:
    - **Bottom cable entry system:**
        - Two cable reliefs for input cables
        - Two cable reliefs for bypass cables
        - Six cable reliefs for output cables
        - Three cable reliefs for battery cables
        - In 1+1 systems: Six cable reliefs for 1+1 output cables
    - **Rear cable entry system:**
        - Two cable reliefs for input cables
        - Two cable reliefs for bypass cables
        - One cable relief for output cables
        - Two cable reliefs for battery cables
        - In 1+1 systems: One cable relief for 1+1 output cables

**Side View of the I/O Cabinet in a Rear Cable Entry System**



11. Reinstall the three side covers on the left side of the I/O cabinet.

**Front View of the I/O Cabinet**




12. Remove the four covers protecting the busbars.
13. Lock out/tag out the UIB, SSIB, and UOB in the I/O cabinet using the built-in locking device.
14. Lock out/tag out the MBB with the built-in locking device.
15. Lock out/tag out the battery breakers in the selected battery solution.

# Install the Power Cabinet

**⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

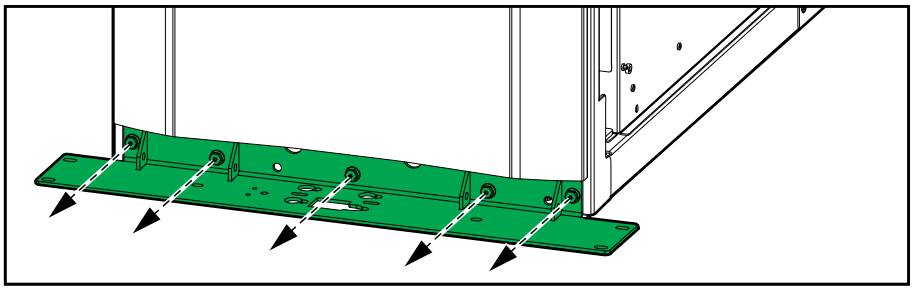
Do not install the power cabinet until all construction work has been completed and the installation room has been cleaned.

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

The parts used in this procedure are provided in the installation kits 0M-816653 and 0M-816654.

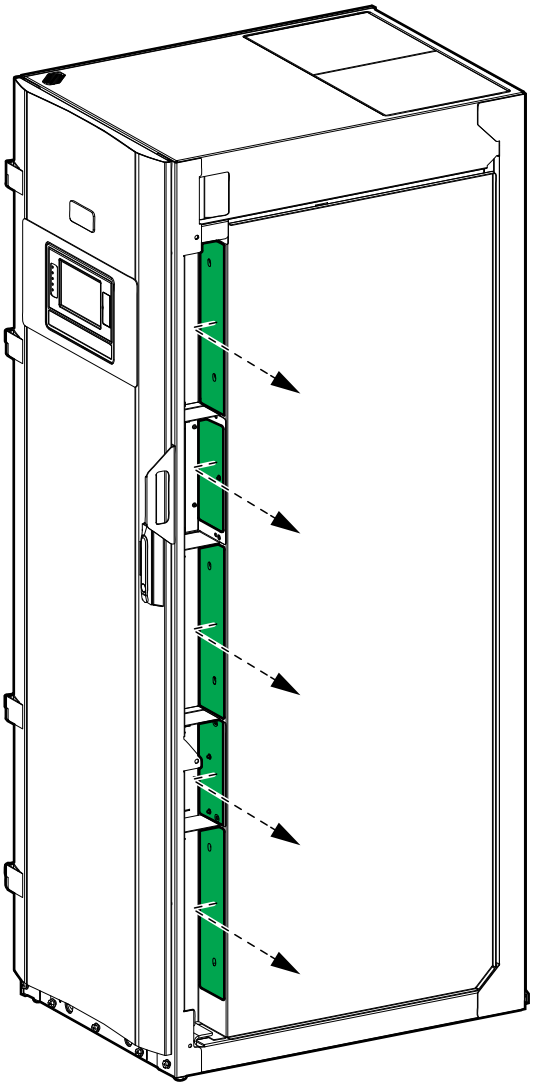
1. Remove the brackets from the bottom of the power cabinet.

**Front View of the Power Cabinet**



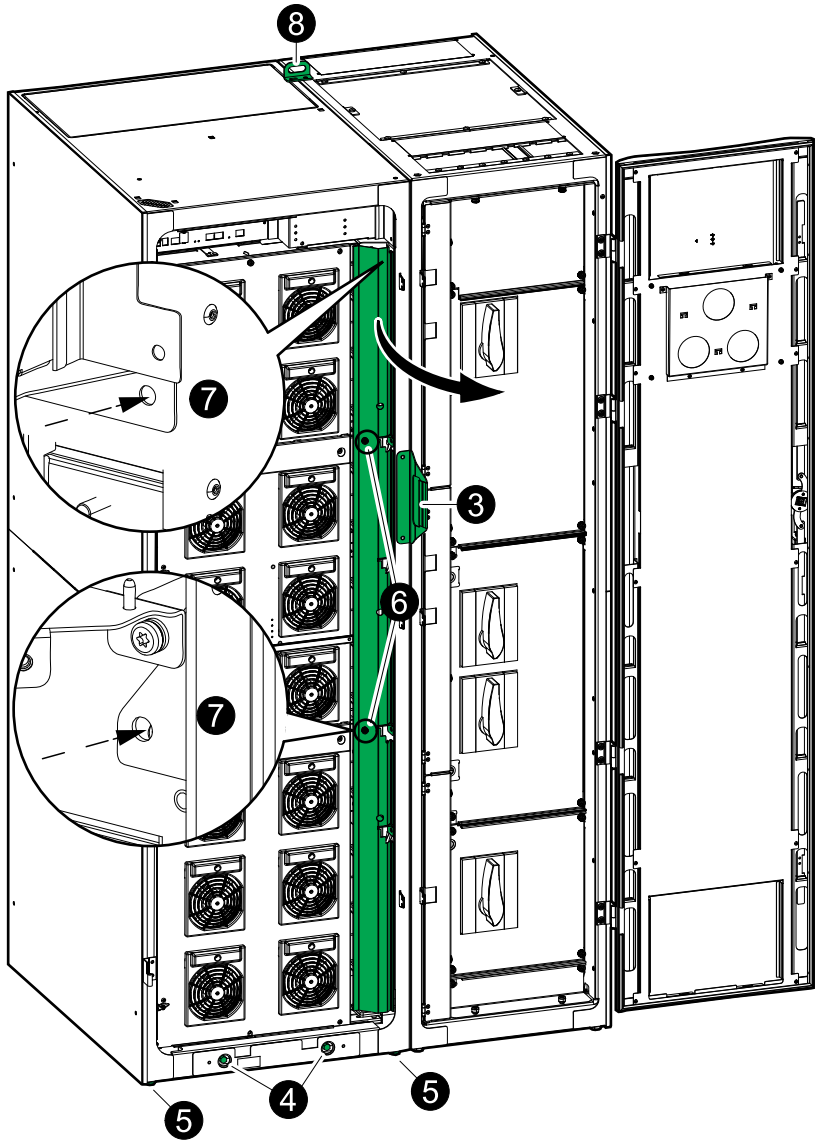
2. Remove the protection covers to get access to the busbars.

**Front Right View of the Power Cabinet**



3. Using the handle on the front of the power cabinet, push the power cabinet into position against the rear anchoring bracket to the left (front view) of the I/O cabinet. The cabinet will connect to the conic outcroppings on the bracket. Remove the handle from the power cabinet by loosening the two screws that hold the handle.

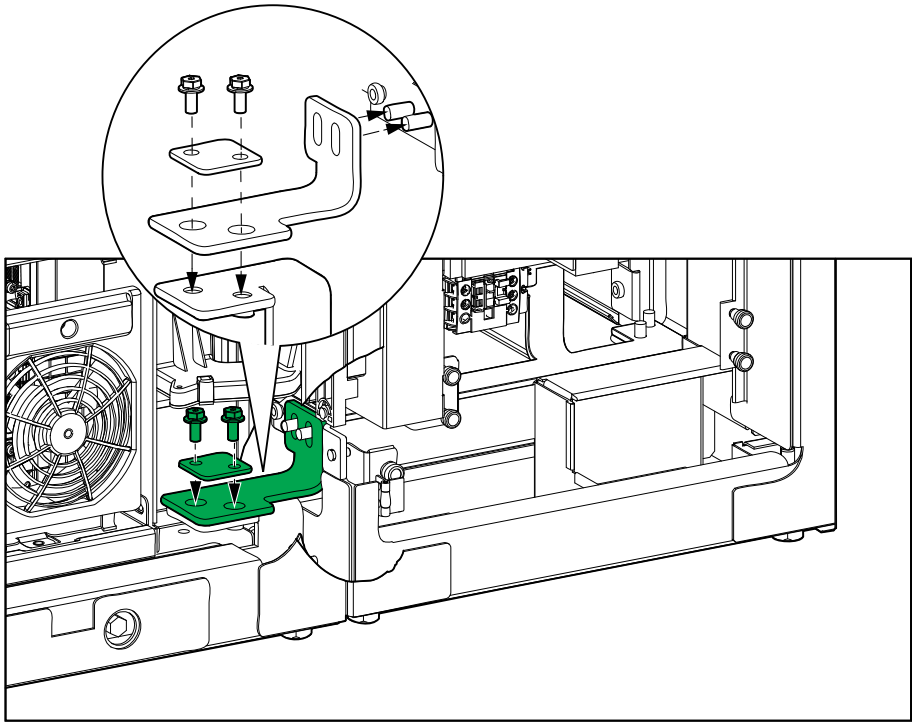
**Front View of the Power Cabinet and the I/O Cabinet**




4. Fasten the power cabinet to the rear anchoring bracket by tightening the two bolts on the front of the power cabinet.
5. Lower the two front feet of the power cabinet until they connect with the floor – use a bubble-leveler to ensure that the cabinets are level. Use the provided levelling shims if necessary.
6. Open the cover in the right side of the power cabinet. The cover can also be lifted off during installation for better access.
7. Mount two M8 screws from the installation kit in the two marked positions to tighten the I/O cabinet and power cabinet together.
8. Install the top baying bracket on the top of the cabinets and fasten with the two provided M6 x 16 screws.

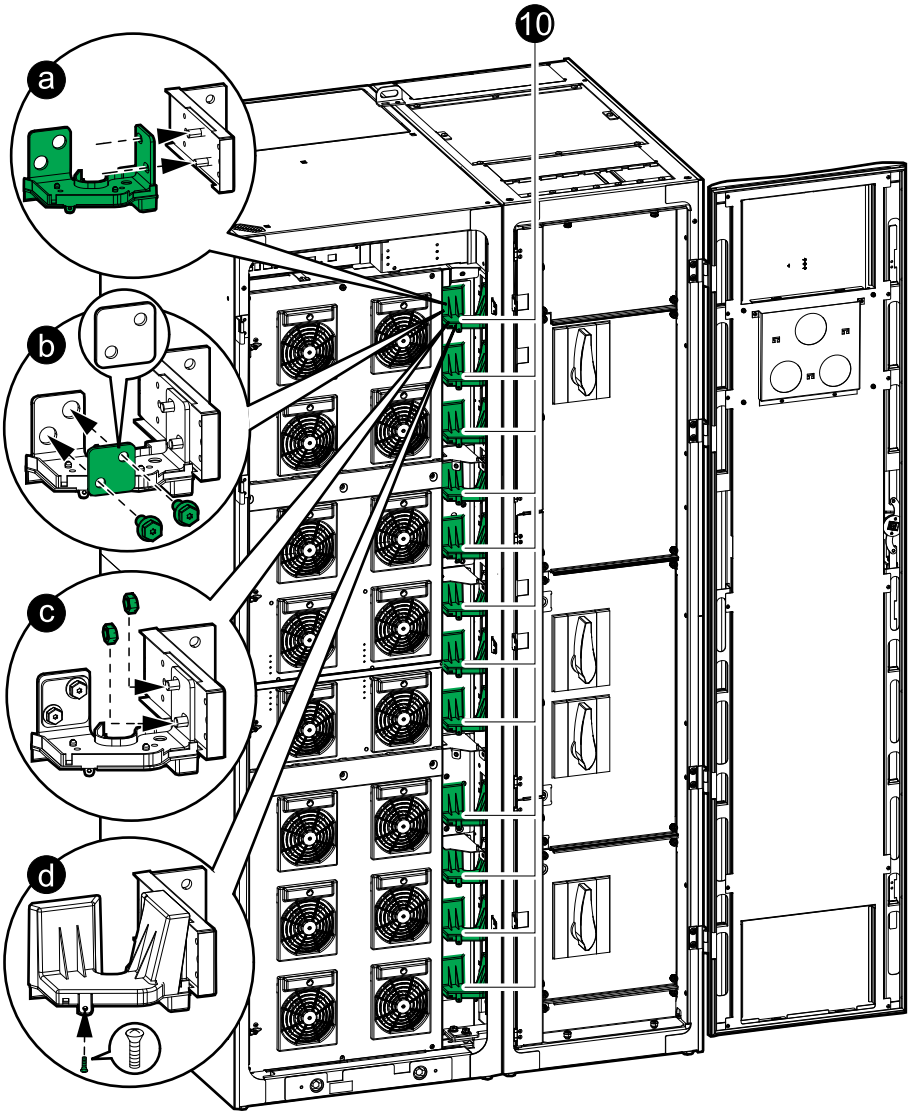
9. Install the PE busbar assembly between the power cabinet and the I/O cabinet.

**Front View of the Power Cabinet and the I/O Cabinet**



10. Install interconnection busbars between the I/O cabinet and the power cabinet.

**Front View of the Power Cabinet and the I/O Cabinet**




a. Through the side of the power cabinet, slide the busbar onto the stays in the
I/O cabinet.

b. Place the tolerance busbar up against the busbar in the power cabinet.

c. Fasten the busbars with the provided screws and nuts.

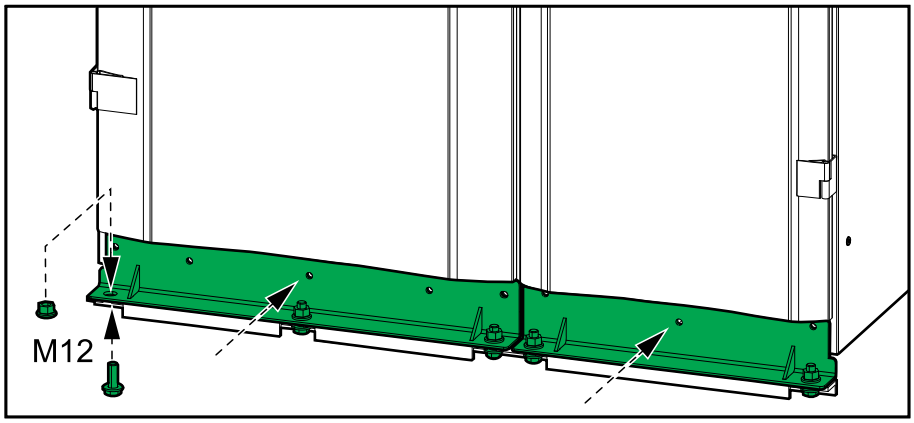
d. Place the top busbar protection over the busbar and fasten with the provided 10 mm torx screws in the front left corner of the busbar protection.

11. Reinstall all plates and covers removed.

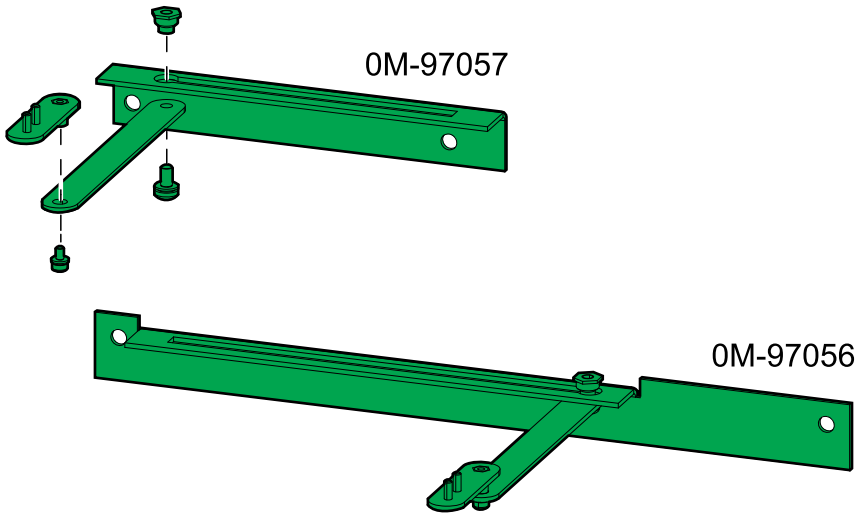
# Mount the Front Anchoring Bracket and Install the Door Locks

1. Place the front anchoring bracket in front of the power cabinet and the I/O cabinet and fasten the bracket to the socket.

**Front View of the Power Cabinet and the I/O Cabinet**

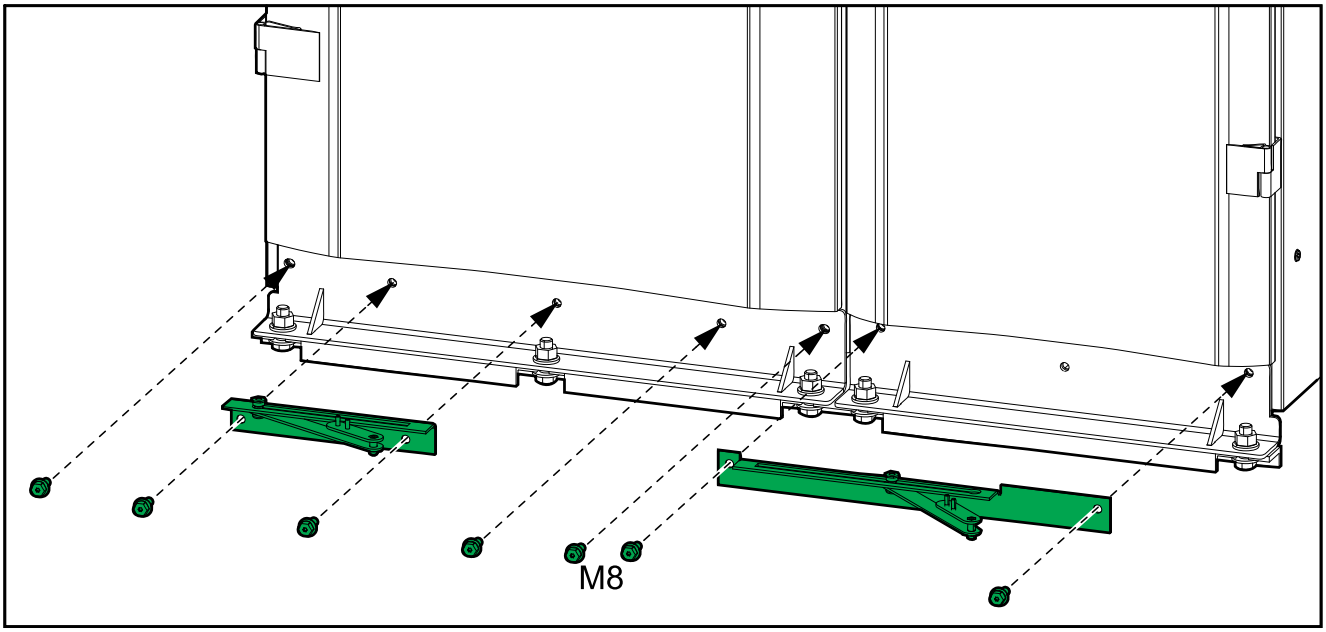



2. Torque to 88 Nm (65 lb-ft).
3. Assemble the shown parts for the door lock from the two installation kits 0M-97056 and 0M-97057.



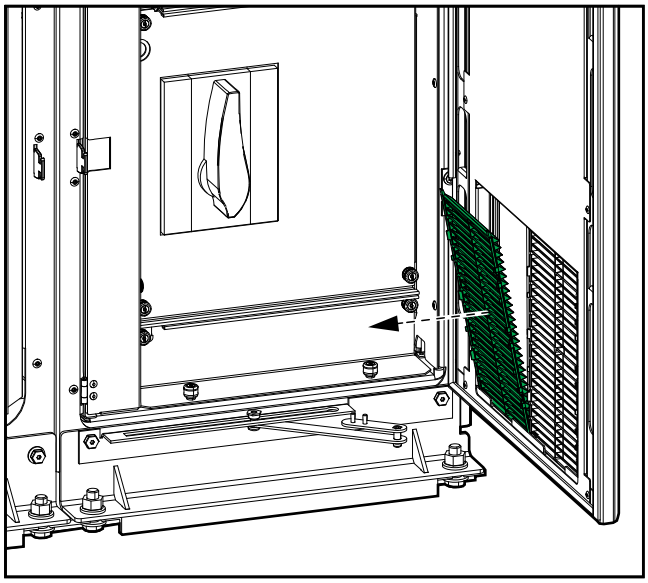
4. Fasten the 0M-97056 assembly to the front anchoring bracket of the I/O cabinet and fasten the 0M-97057 assembly to the front of the power cabinet.

**Front View of the Power Cabinet and the I/O Cabinet**



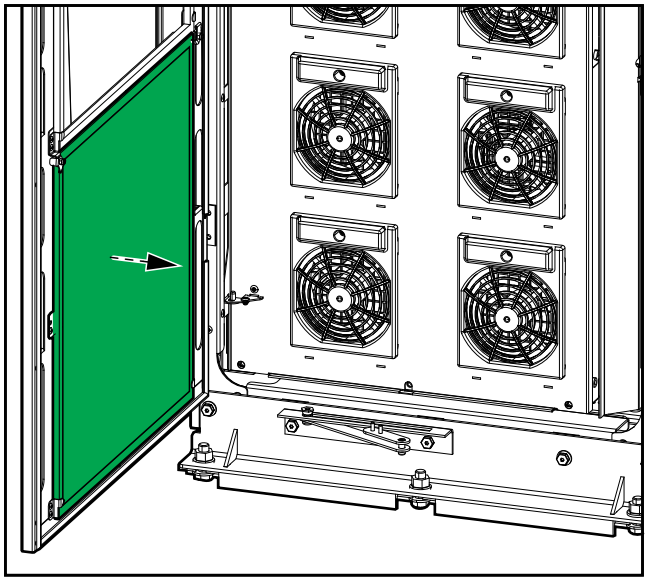

5. Open the doors of the power cabinet and the I/O cabinet.
6. Remove the indicated plastic part from the I/O cabinet.

**Front View of the I/O Cabinet**



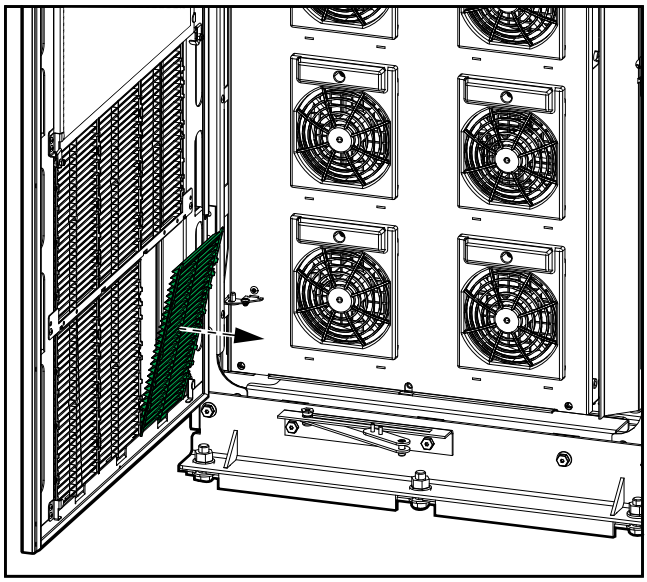
7. Remove the indicated door filter from the power cabinet.

**Front View of the Power Cabinet**



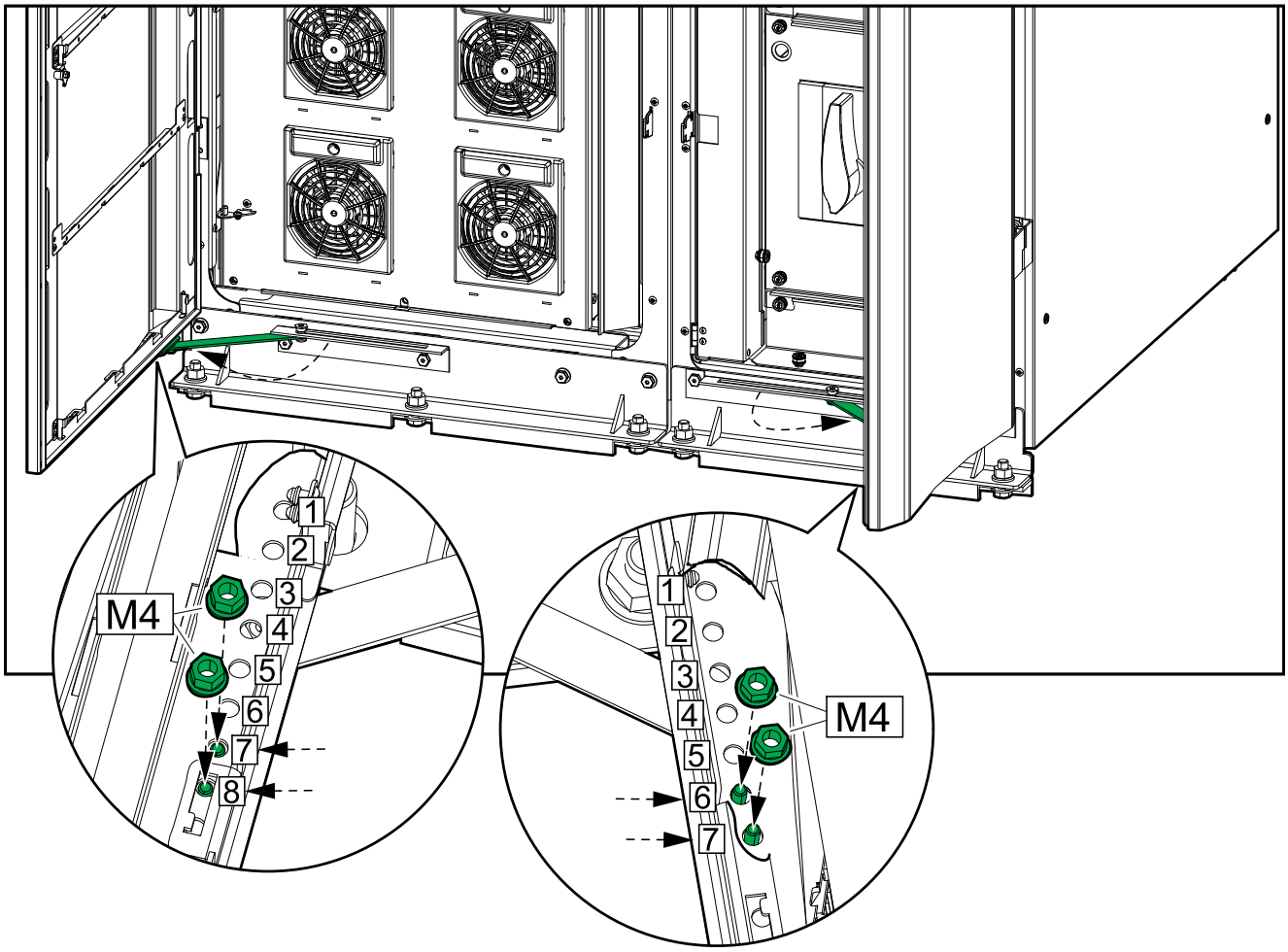
8. Remove the indicated plastic part from the power cabinet.

**Front View of the Power Cabinet**



9. Guide the door lock arms to the doors and fasten to the doors. Use holes seven and eight in the power cabinet and use holes six and seven in the I/O cabinet.

**Front View of the Power Cabinet and the I/O Cabinet**

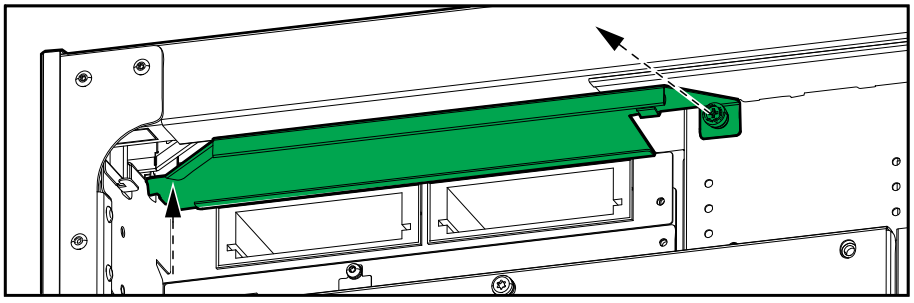



10. Reinstall the plastic parts and the door filter in the power cabinet and the I/O cabinet.

## Connect the Communication and Signal Cables between the Power Cabinet and the I/O Cabinet

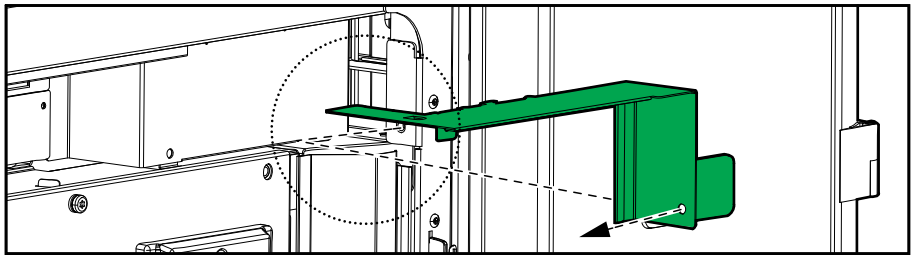
1. Remove the cover plate in the top left side of the power cabinet to get access to the terminals.

**Front View of the Power Cabinet**



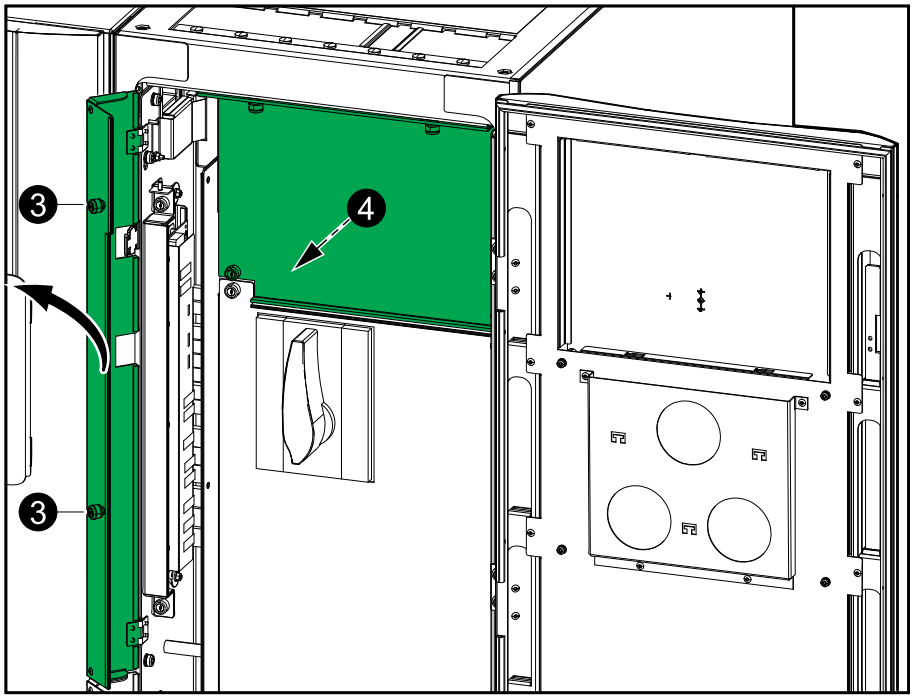
2. Remove the cover plate in the top right side of the power cabinet.

**Front View of the Power Cabinet**



3. Open the cover in the left side of the I/O cabinet.

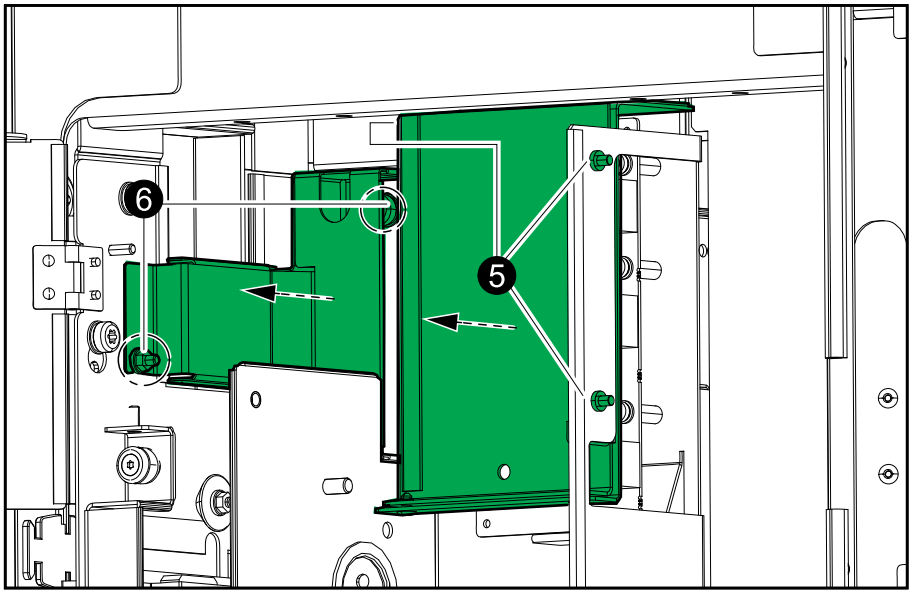
**Front View of the I/O Cabinet**




4. Remove the cover plate in the top of the I/O cabinet to get access to the ABUS and PBUS terminals.

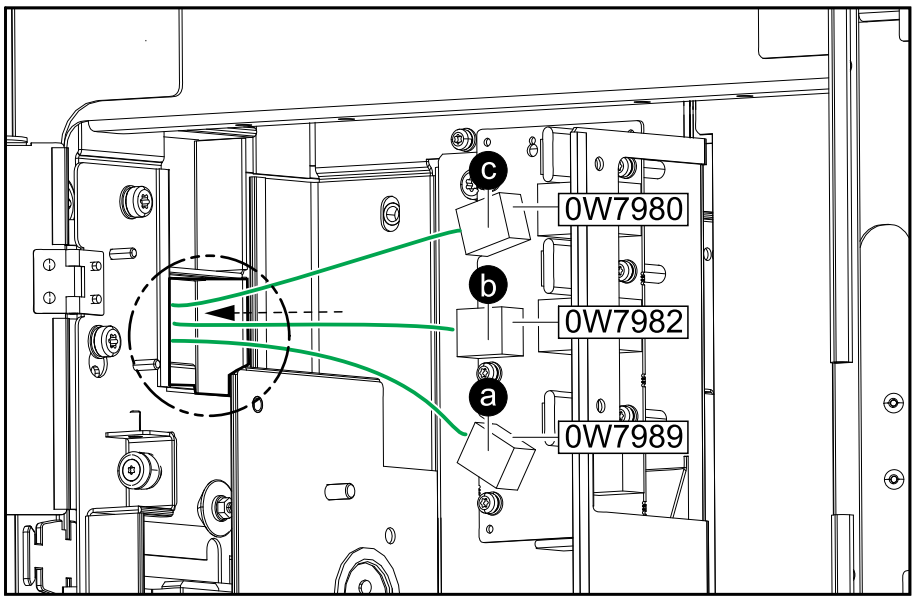
5. Loosen the screws and remove the indicated cover.

**Front View of the I/O Cabinet**



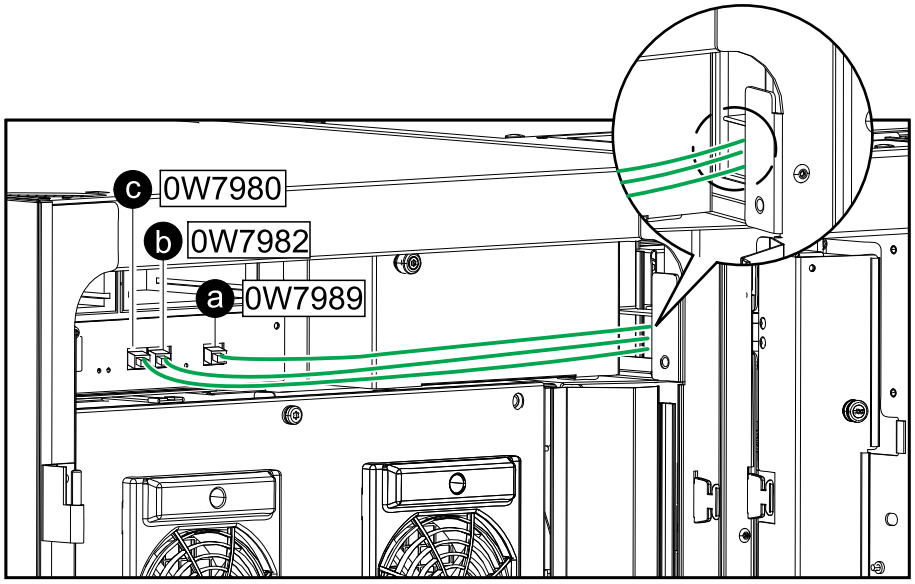

6. Loosen the screw and the hex nut and remove the indicated plate to get access to the power cabinet.
7. Use the ABUS and PBUS cables 0W7989, 0W7980, and 0W7982 from the installation kit 0M-816654:
   a. Connect the ABUS cable 0W7989 to the ABUS terminal in the I/O cabinet.
   b. Connect the PBUS 2 cable 0W7982 to the PBUS 2 terminal in the I/O cabinet.
   c. Connect the PBUS 1 cable 0W7980 to the PBUS 1 terminal in the I/O cabinet.

**Front View of the I/O Cabinet**



8. Route the ABUS and PBUS cables through the bottom opening between the I/O cabinet and the power cabinet:
   a. Connect the ABUS cable 0W7989 to the ABUS terminal in the power cabinet.
   b. Connect the PBUS 2 cable 0W7982 to the PBUS 2 terminal in the power cabinet.
   c. Connect the PBUS 1 cable 0W7980 to the PBUS 1 terminal in the power cabinet.

**Front View of the Power Cabinet**



9. Reinstall the plate and fasten it using the screw and the hex nut.

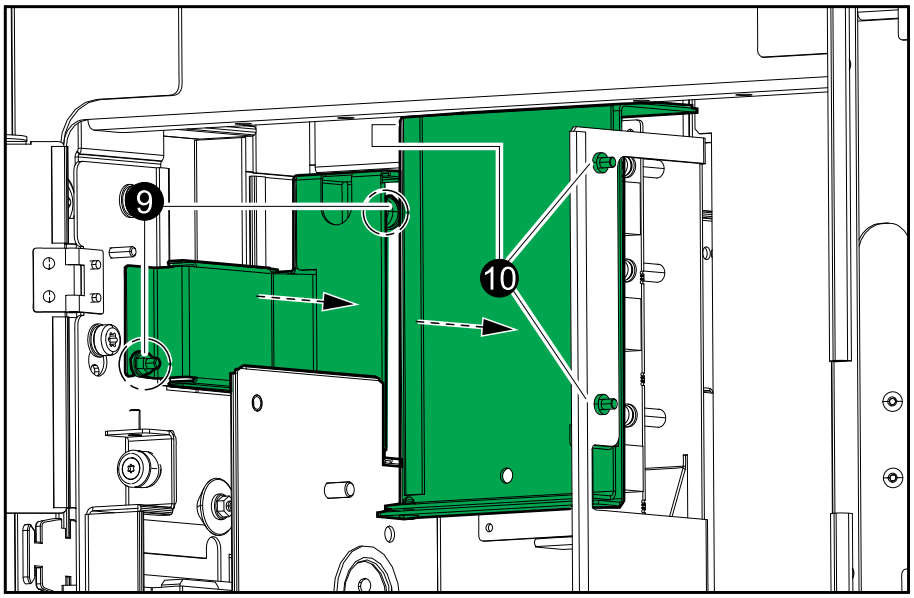
**⚠CAUTION**

**HAZARD OF EQUIPMENT DAMAGE**

Ensure that the cables are routed in the channel behind the cover and be careful not to squeeze the cables.

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

**Front View of the I/O Cabinet**

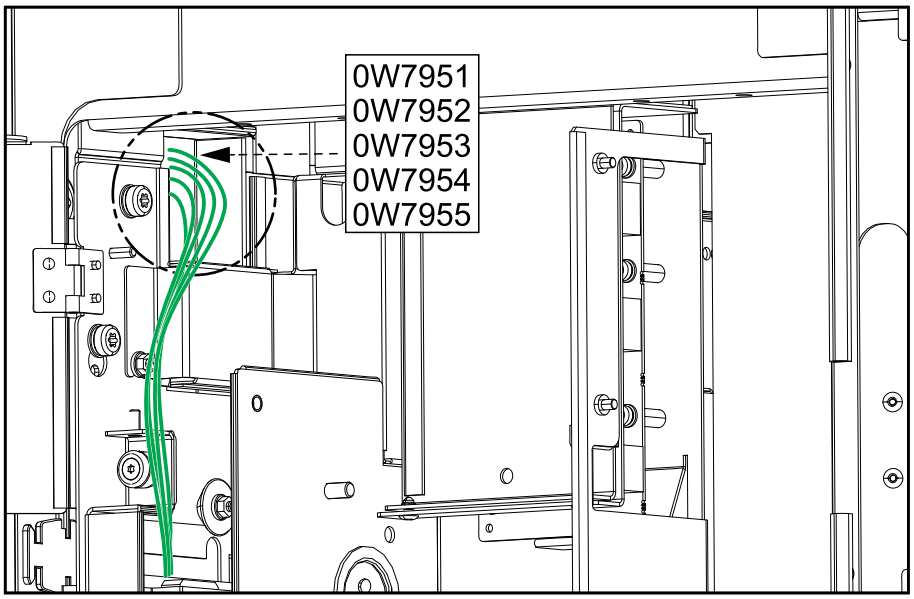



10. Reinstall the cover and fasten it using the screws.

    **NOTE:** For parallel systems, do not install the cover until the PBUS cables between the parallel units have been connected.

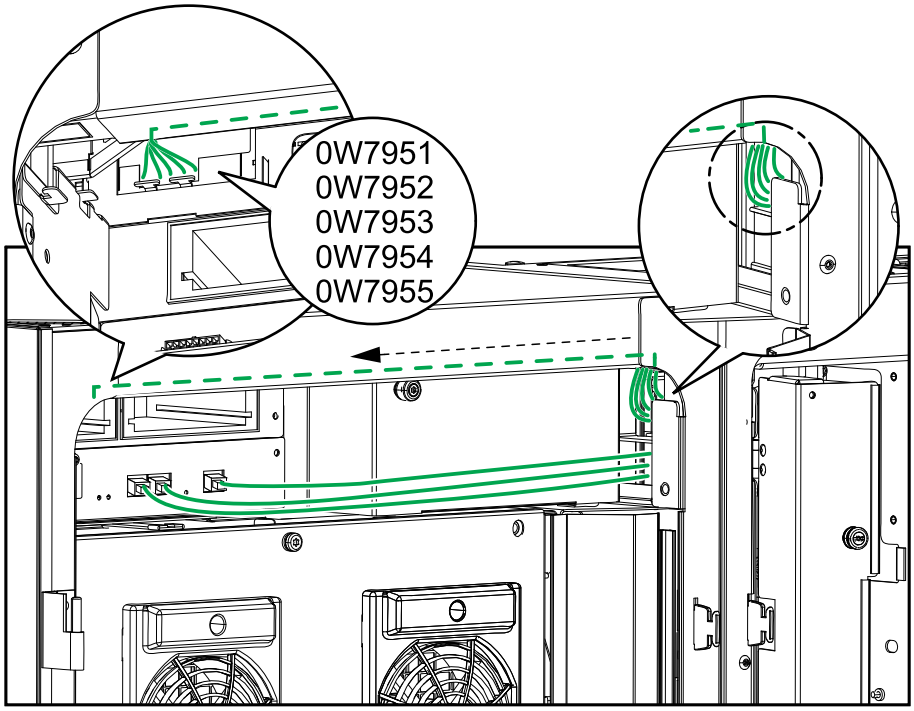
11. Route the signal cables 0W7951, 0W7952, 0W7953, 0W7954, and 0W7955 that are connected in the I/O cabinet through the top opening between the I/O cabinet and the power cabinet.

**Front View of the I/O Cabinet**



12. Connect the signal cables to the terminals in the top left corner of the power cabinet.

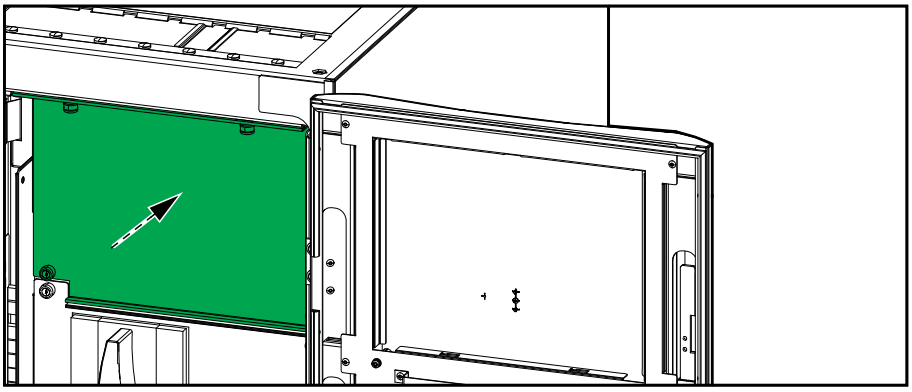
**Front View of the Power Cabinet**




13. Reinstall the cover plate removed in the top of the I/O cabinet in step 4.

    **NOTE:** For parallel systems, do not install the cover removed in step 4 until the PBUS cables between the parallel units have been connected.

**Front View of the I/O Cabinet**

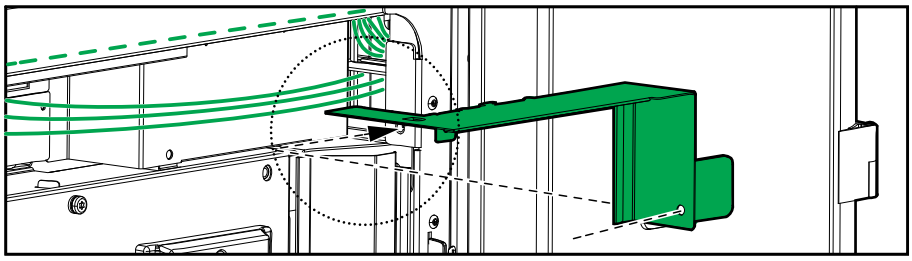


14. Close the cover that was opened in step 3 in the left side of the I/O cabinet.

15. Reinstall the cover plate in the right side of the power cabinet.

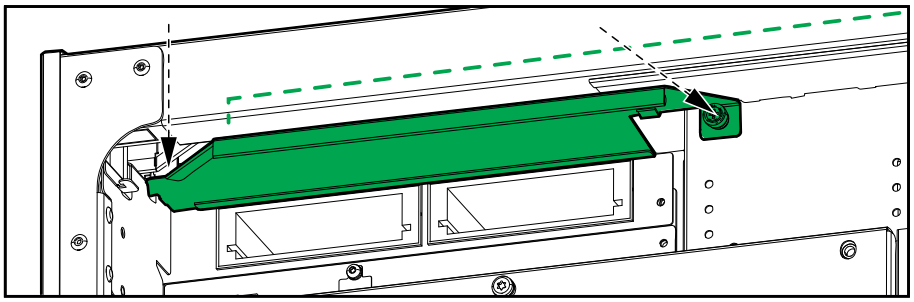
> **⚠CAUTION**
>
> **RISK OF EQUIPMENT DAMAGE**
>
> Ensure that the cables are routed in the cable channel behind the cover and be careful not to squeeze the cables.
>
> **Failure to follow these instructions can result in injury or equipment damage.**

**Front View of the Power Cabinet**



16. Reinstall the cover plate in the left side of the power cabinet.

**Front View of the Power Cabinet**



# Connect PBUS Cables Between Parallel UPS Units

**NOTE:** PBUS cables must be connected in both 1+1 redundant parallel systems and parallel systems with a system bypass cabinet.

## Connect PBUS Cables Between Parallel UPS Units in Bottom Cable Entry Systems

**⚠DANGER**

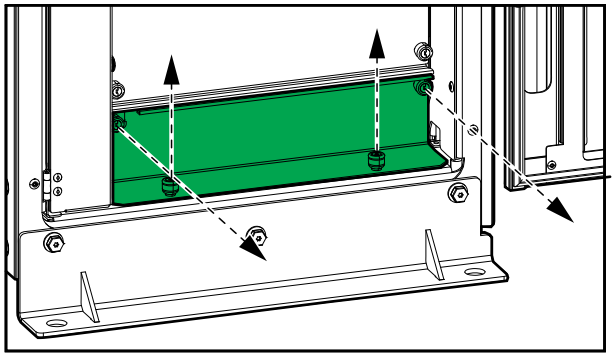
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not drill or cut holes for cables or conduits with the covers installed and do not drill or cut holes in close proximity to the UPS.

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

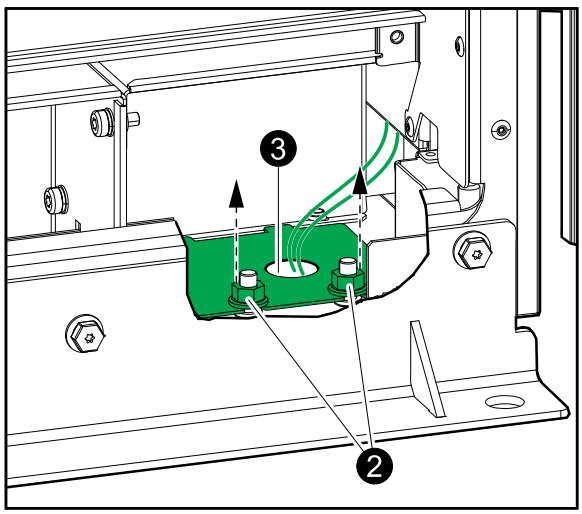
1. Loosen the thumb screws and remove the gland plate in the bottom of the I/O cabinet.

**Front View of the I/O Cabinet**



2. Loosen the screws and remove the cover in the front right corner of the bottom plate.

**Front View of the I/O Cabinet**

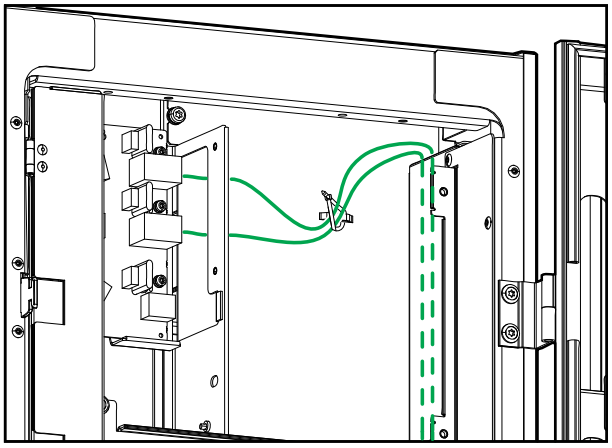



3. Drill or cut holes for cables in the cover and reinstall the cover.

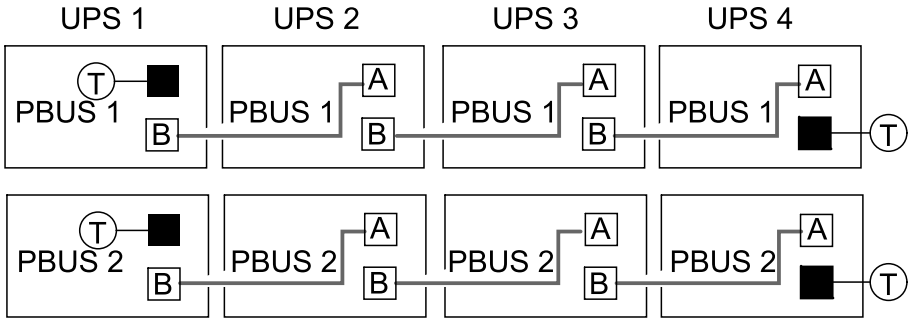
4. Route the PBUS cables through the cover behind the plate in the right side, and connect the PBUS cables from 0H0889 between the I/O cabinets of the parallel system according to the diagram below.

   **NOTE:** The PBUS 1 cables are white and the PBUS 2 cables are red.

**Front View of the I/O Cabinet**

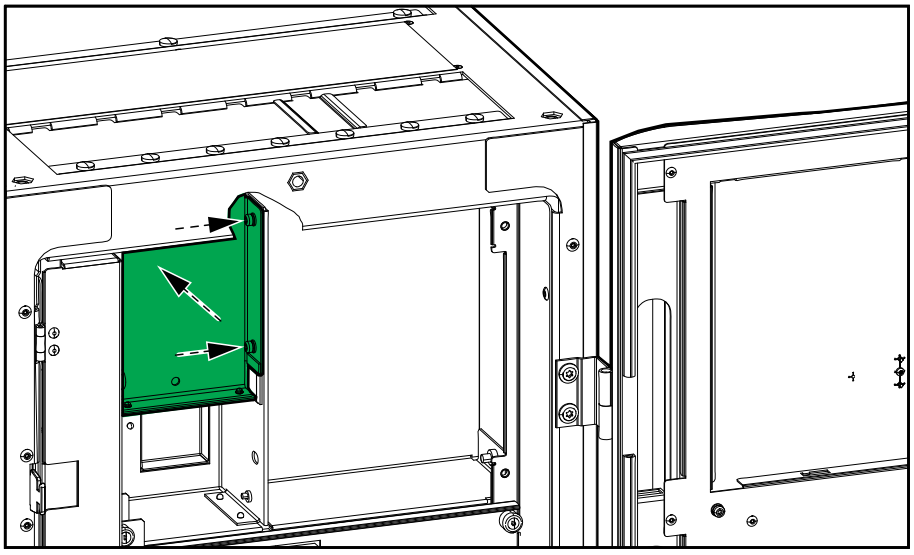


**PBUS Cables Between the I/O Cabinets in a Parallel System**




5. Reinstall the cover in front of the communication board.

**Front View of the I/O Cabinet**



6. Reinstall the cover plate in the top of the I/O cabinet.

# Prepare the I/O Cabinet for Connection of Signal Cables in Bottom Cable Entry Systems

**⚠ DANGER**

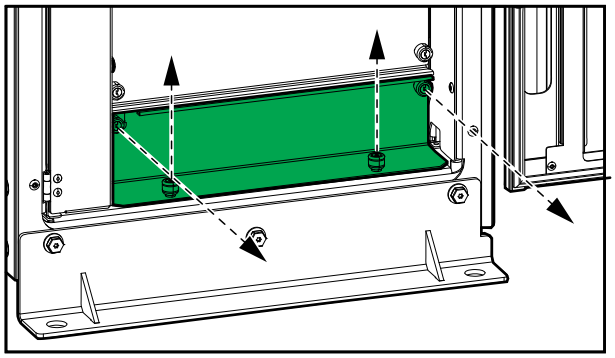
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not drill or cut holes for cables or conduits with the gland plates installed and do not drill or cut holes in close proximity to the UPS.

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

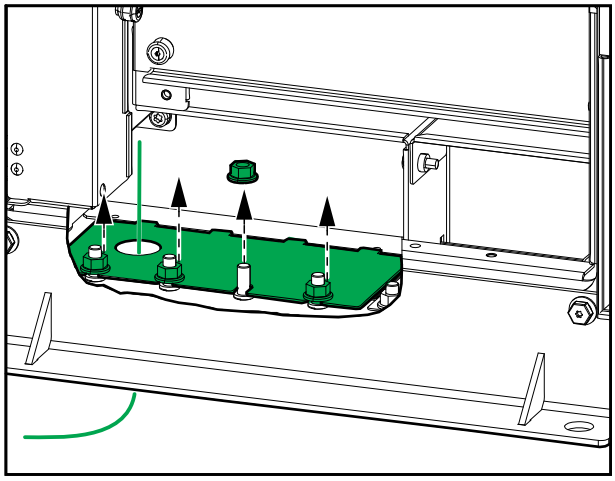
1. Loosen the thumb screws and remove the gland plate in the bottom of the I/O cabinet.

**Front View of the I/O Cabinet**



2. Loosen the screws and remove the gland plate in the front left corner of the I/O cabinet bottom cover. Drill or cut holes for cables/conduits in the gland plate and reinstall the gland plate.

**Front View of the I/O Cabinet**



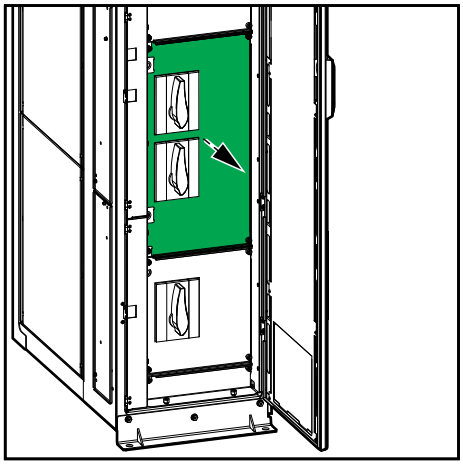
3. Reinstall the gland plate removed in step 1.

# Connect Signal Cables for Monitoring the MBB in a 1+1 Redundant Parallel System

**NOTE:** This procedure is only applicable to 1+1 redundant parallel systems.

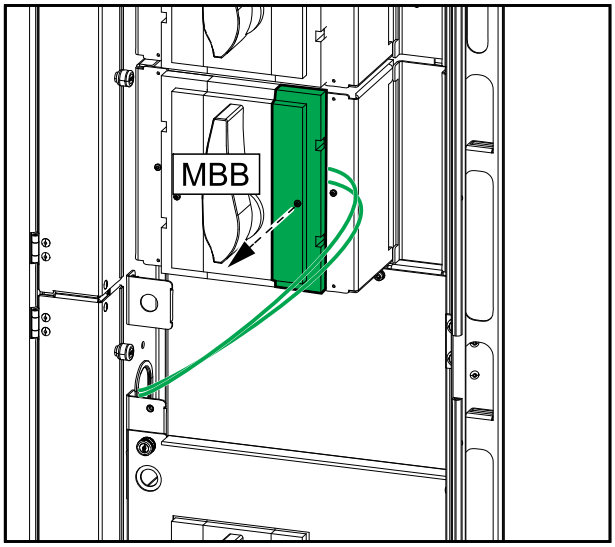
1. Remove the indicated dead front panel of the single I/O cabinet.

**Front View of the Single I/O Cabinet**



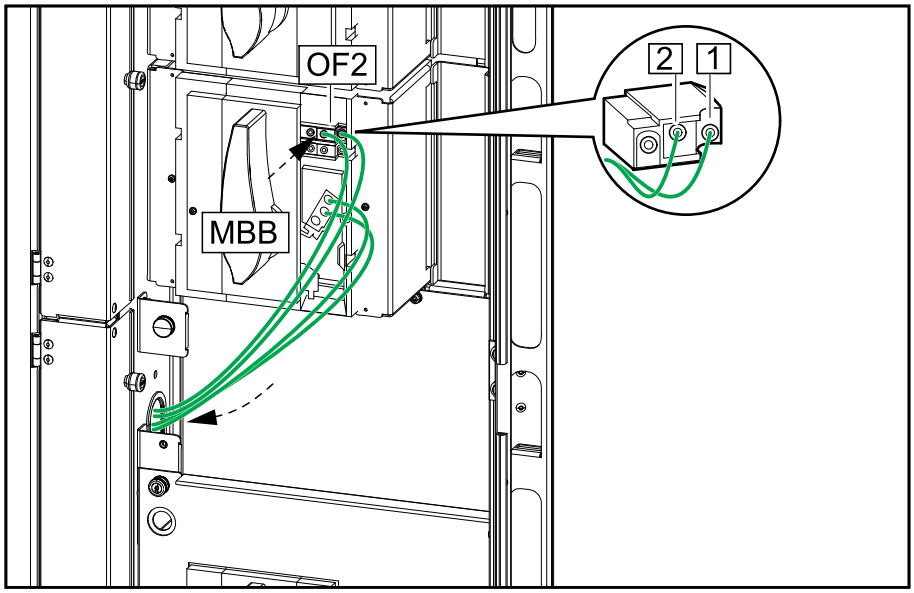
2. Remove the plate on the front of the MBB switch.

**Front View of the Single I/O Cabinet**



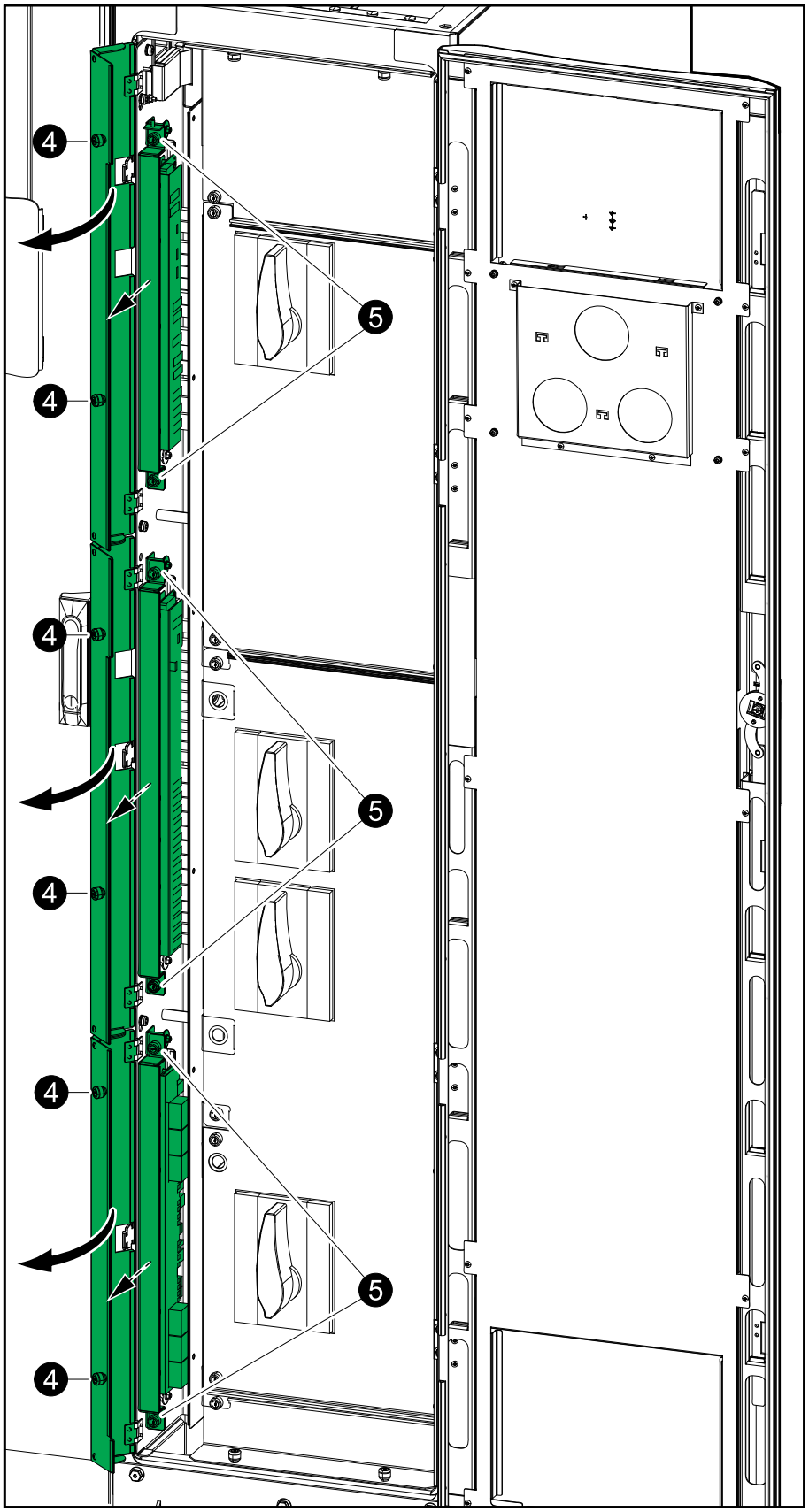
3. Install the auxiliary switch from the installation kit 0M-816654 on the front of the MBB switch in the position OF2.

**Front View of the Single I/O Cabinet**



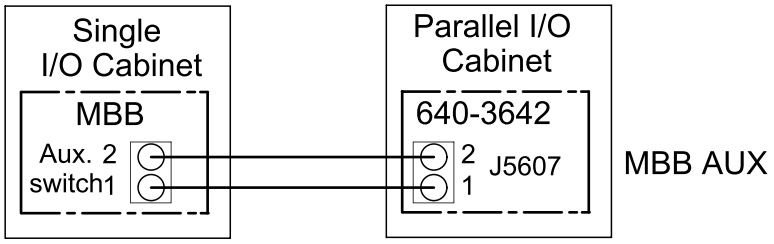
4. Loosen the thumb screws and open the covers in the left side of the single I/O cabinet and the parallel I/O cabinet.

**Front View of the Single I/O Cabinet**



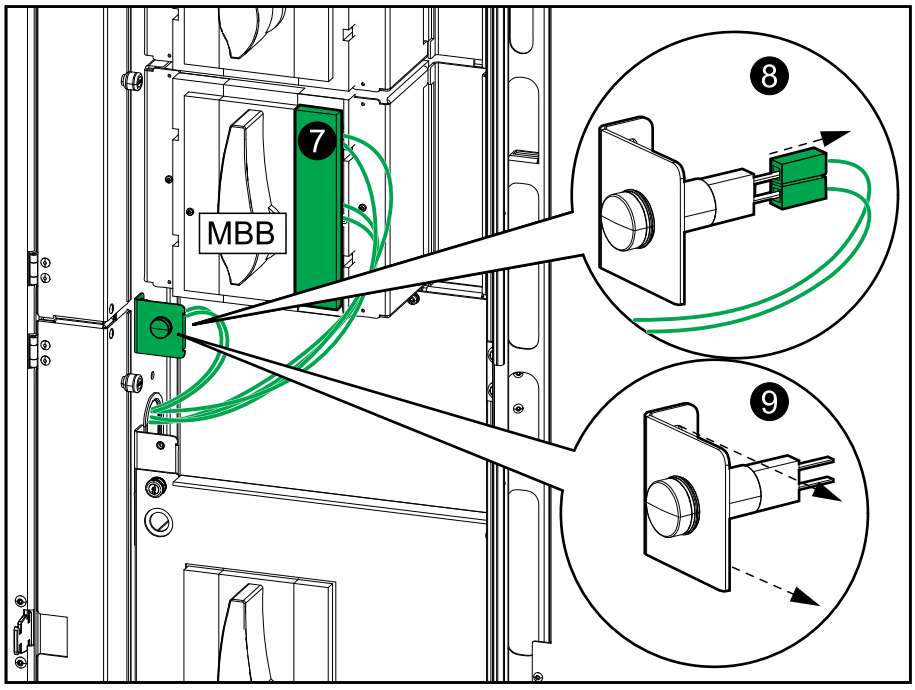

5. Loosen the thumb screws of all interface boards in the single I/O cabinet and the parallel I/O cabinet and pull out the interface boards.

6. Route the signal cables from the auxiliary switch in the single I/O cabinet through the top or bottom gland plate to the bottom interface board in the parallel I/O cabinet. Connect the signal cables from the auxiliary switch to the J5607 terminal on 640-3642.

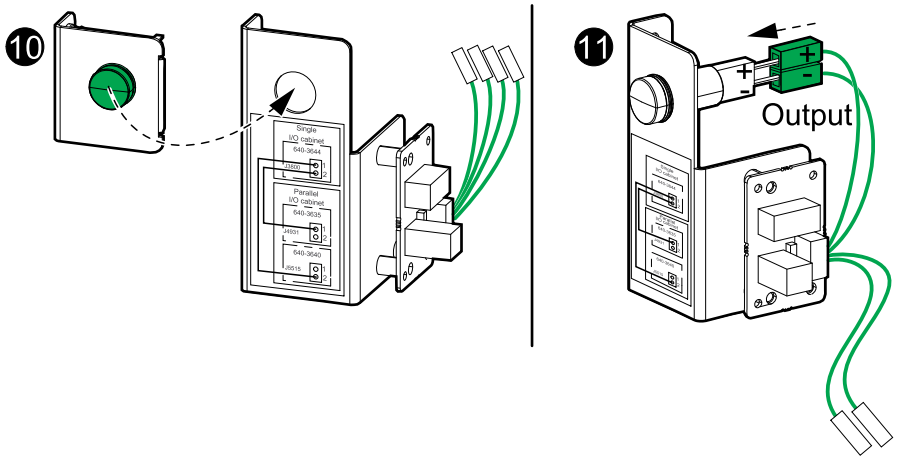



7. Reinstall the plate on the front of the MBB switch.

**Front View of the Single I/O Cabinet**



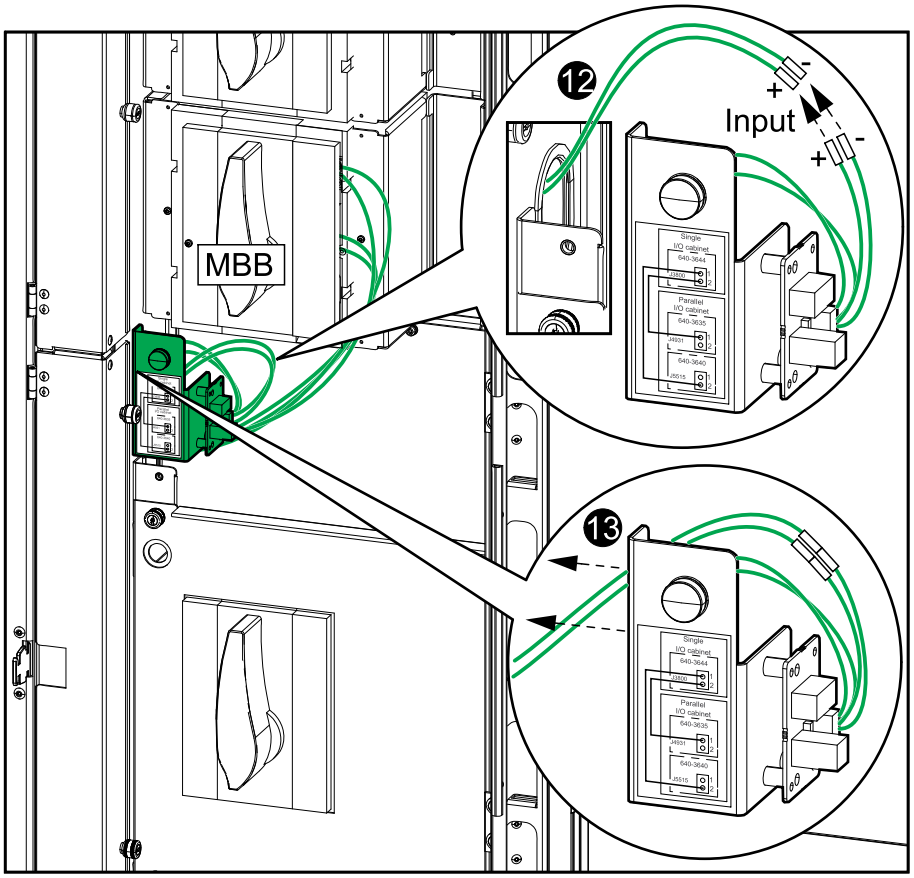

8. Disconnect the signal cable from the diode in the left side of the single I/O cabinet.
9. Loosen the screws and remove the bracket from the single I/O cabinet.
10. Move the diode from the removed bracket to the bracket supplied in the installation kit 0H-1497.




11. Connect the two output signal cables from the cable connected to J3801 and connect to the diode.

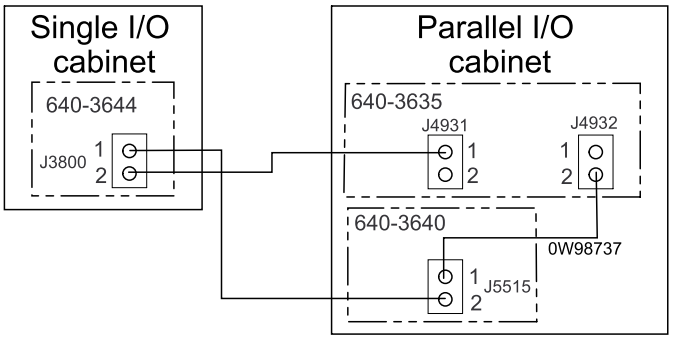
12. Connect the two input signal cables from the cable connected to J3801 and connect to the cables that were disconnected from the diode in step 6.

**Front View of the Single I/O Cabinet**




13. Install the new bracket in the single I/O cabinet and fasten using the two screws from step 9.

14. Route the signal cables from the J3800 terminal on 640–3644 in the single I/O cabinet to the top and middle interface boards in the parallel I/O cabinet.




a. Connect the signal cables to J5515 on 640–3640 and J4931 on 640–3635.

b. In the parallel I/O cabinet, connect the jumper cable 0W98737 from J5515–1 to J4932–2.

**NOTE:** In J4932–2 a cable is already installed. Both this cable and 0W98737 must be installed in J4932–2.

15. Push all interface boards back into position in both the single I/O cabinet and the parallel I/O cabinet and fasten the thumb screws.

16. Close the covers in the left side of both the single I/O cabinet and the parallel I/O cabinet and fasten the thumb screws.

17. Reinstall the dead front panel in the single I/O cabinet.

# Connect Signal Cables between the I/O Cabinet and Optional Equipment

## Connect the Emergency Power Off (EPO)

**⚠DANGER**

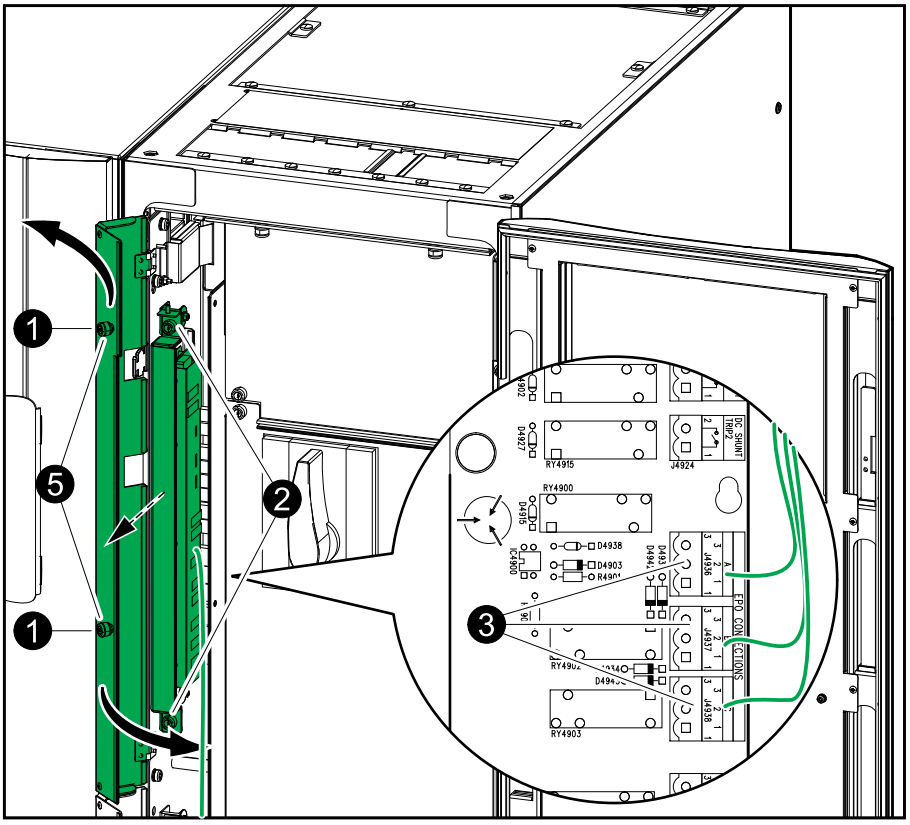
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not drill or cut holes for cables or conduits with the covers installed and do not drill or cut holes in close proximity to the UPS.

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

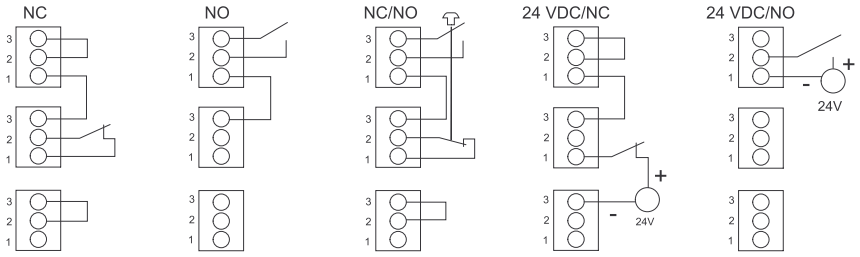
The EPO circuit is considered Class 2 and SELV. Class 2 and SELV circuits must be isolated from the primary circuitry. Do not connect any circuit to the EPO terminal block unless it can be confirmed that the circuit is SELV or Class 2.

**Front View of the I/O Cabinet**




1. Loosen the thumb screws and open the cover in the left side of the I/O cabinet.
2. Loosen the thumb screws of the top interface board and pull out the top interface board.
3. Route the cable from your EPO to the EPO terminals on the top interface board.

4. Connect to the building's EPO system according to one of the options below.




5. Push the top interface board back into position and fasten the thumb screws.
6. Close the cover in the left side of the I/O cabinet and fasten the thumb screws.

## Connect External Synchronization

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not drill or cut holes for cables or conduits with the covers installed and do not drill or cut holes in close proximity to the UPS.

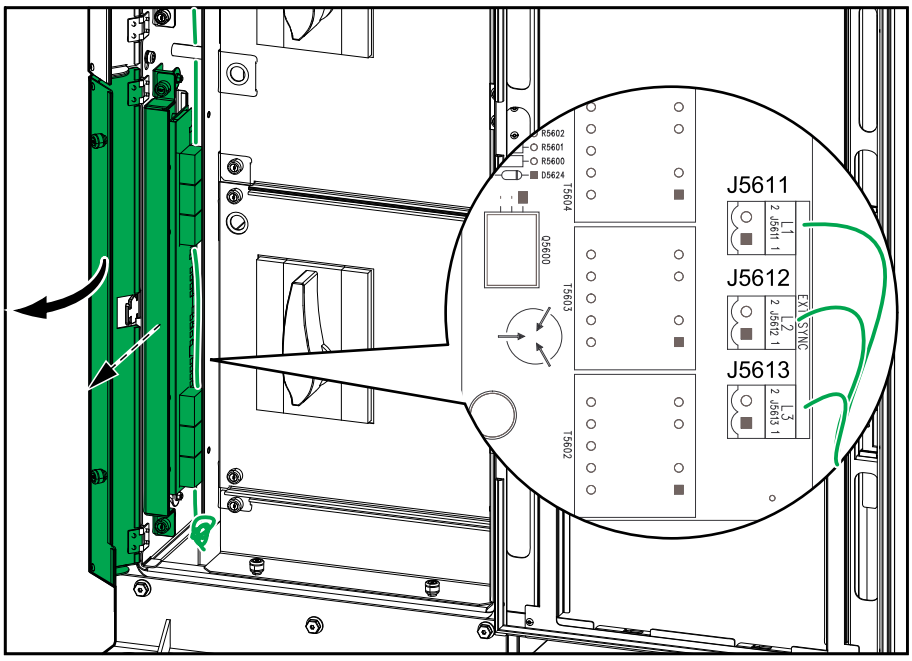
**Failure to follow these instructions will result in death or serious injury.**

1. Loosen the thumb screws and open the cover in the left side of the I/O cabinet.
2. Loosen the thumb screws of the middle and bottom interface board and pull out the interface boards.
3. Route the external synchronization cables in the left side and to the bottom and middle interface boards in the I/O cabinet.
4. Connect the status synchronization cables according to one of the diagrams below.

5. Connect the voltage synchronization cables according to one of the diagrams below:

   **NOTE:** The external synchronization must at a minimum be connected by a 500 V 0.25–2.5 mm² stranded wire that must be protected by a 0.5 A fuse capable of withstanding 65 kA.

   **Front View of the I/O Cabinet**




   a. Connect L1 to J5611 on 640–3642.

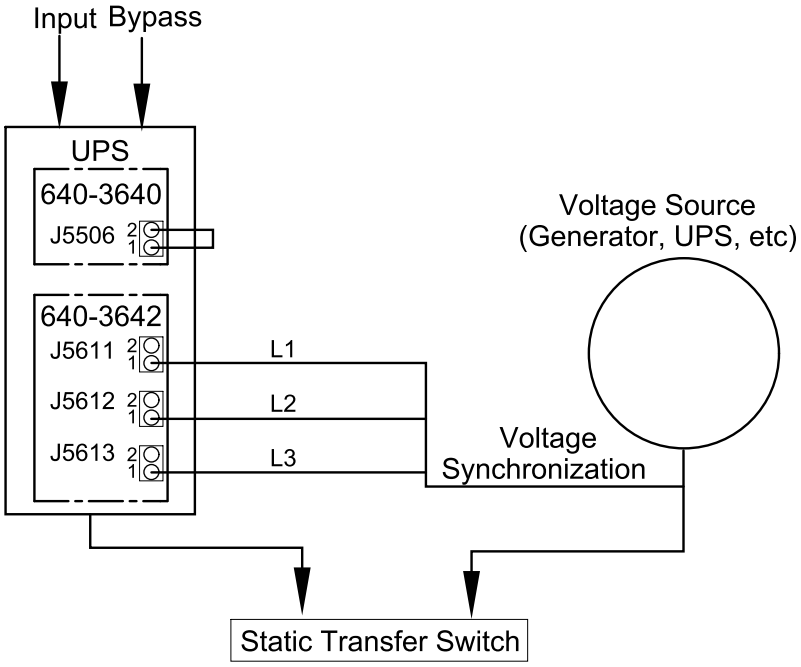
   b. Connect L2 to J5612 on 640–3642.

   c. Connect L3 to J5613 on 640–3642.

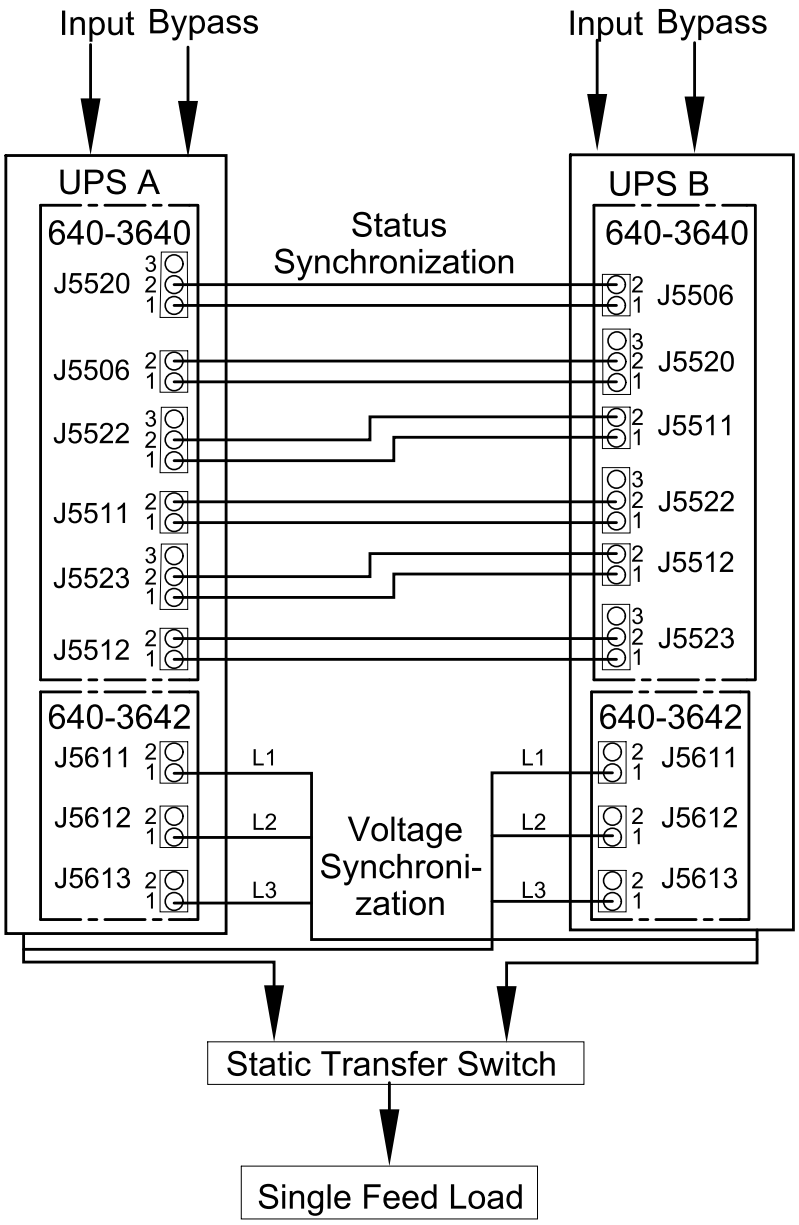
6. Push the interface boards back into position and fasten the thumb screws.

7. Close the cover in the left side of the I/O cabinet and fasten the thumb screws.

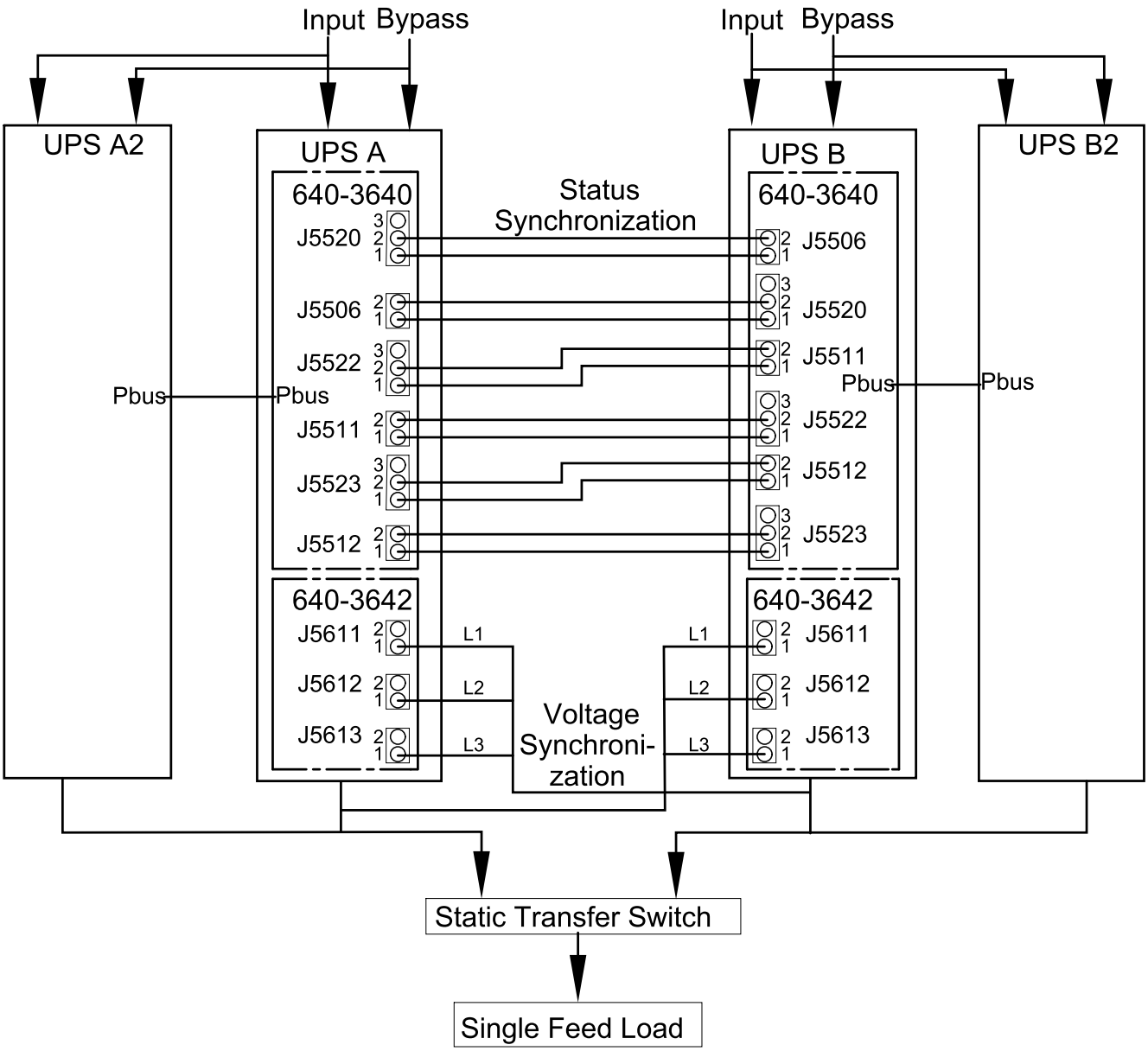
## Basic UPS Synchronization to a Fixed Voltage Source Diagram



## Dual UPS Synchronization with Floating Synchronization Master Diagram



## Fixed Parallel Synchronization Master Diagram




# Connect Equipment to the Input Contacts and the Output Relays

**NOTE:** Max. 250 VAC 5 A must be connected.

Input connections are considered Class 2 and SELV. Class 2 and SELV circuits must be isolated from the primary circuitry. Do not connect any circuit to the contacts unless it can be confirmed that the circuit is SELV or Class 2.

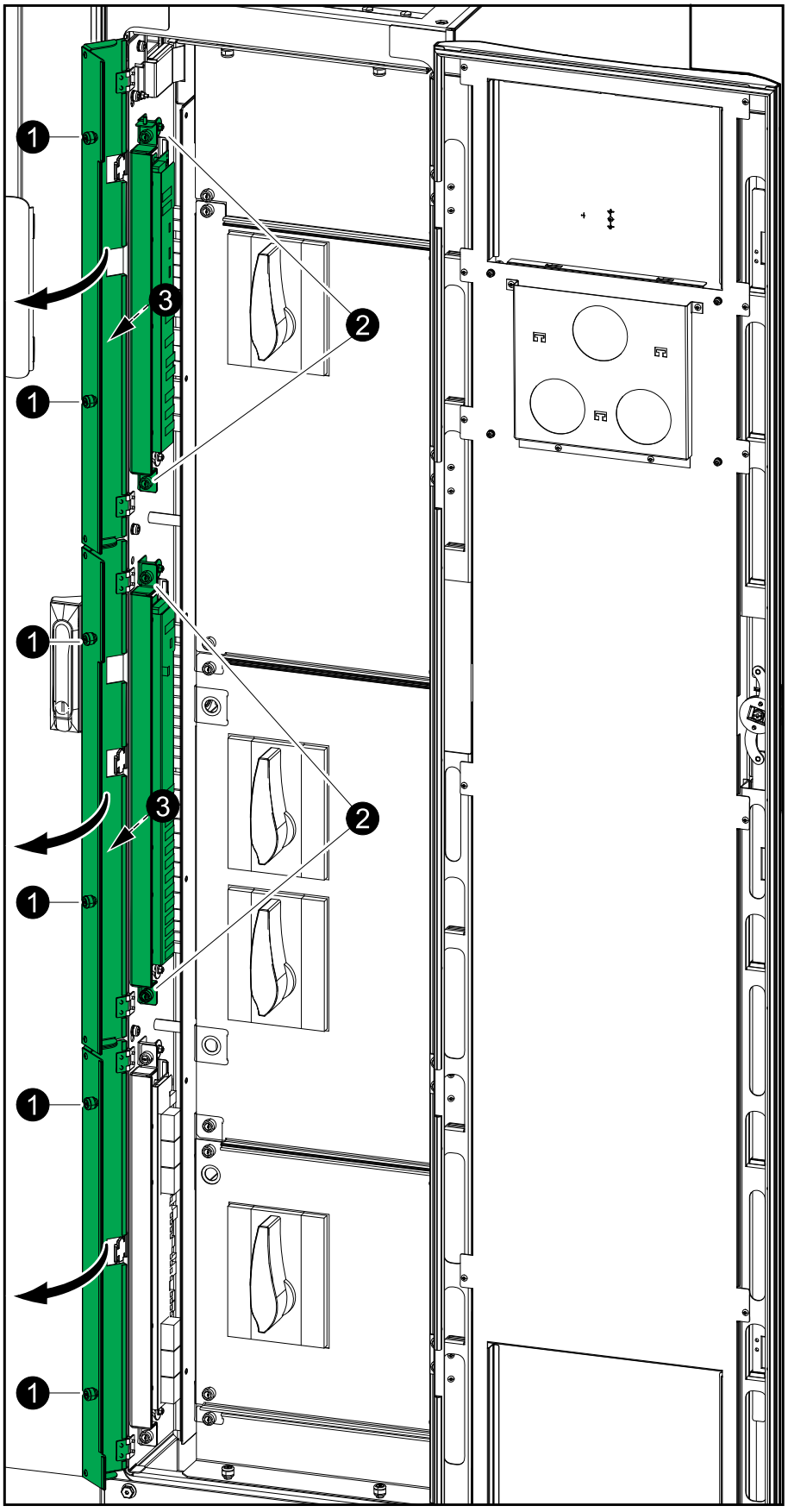
All SELV circuits connected must be grounded.

All external circuitry must be fused with maximum 5 A fast acting fuses.

1. Loosen the thumb screws and open the covers in the left side of the I/O cabinet.
2. Loosen the thumb screws of the top and middle interface boards and pull out the two interface boards.
3. Route the cables from your relays to the top and middle interface boards and connect in the I/O cabinet.
4. Push the interface boards back into position and fasten the thumb screws.

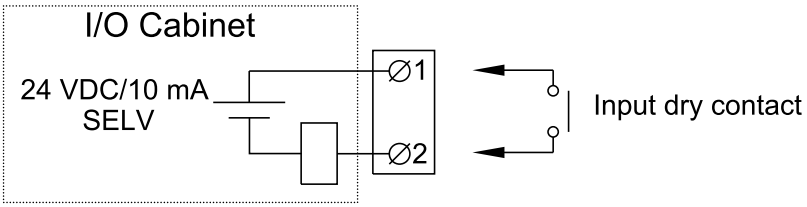
5. Close the covers in the left side of the I/O cabinet and fasten the thumb screws.

**Front View of the I/O Cabinet**



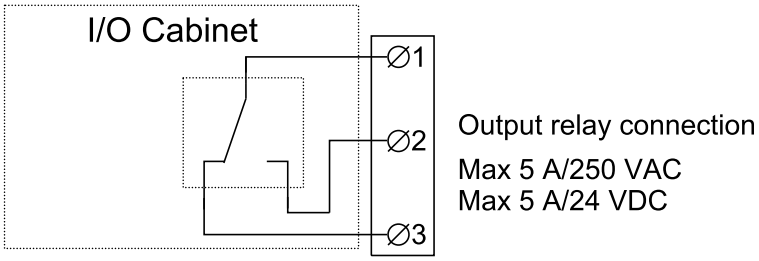
## Overview of Input Contacts and Output Relays

### Input Contacts




| Name | Description | Location |
|---|---|---|
| IN 1 (Contact 1) | Configurable input contact | 640-3640 terminal J5502 |
| IN 2 (Contact 2) | Configurable input contact | 640-3640 terminal J5503 |
| IN 3 (Contact 3) | Configurable input contact | 640-3640 terminal J5504 |
| IN 4 (Contact 4) | Configurable input contact | 640-3640 terminal J5505 |
| IN 5 (Contact 5) | Configurable input contact | 640-3640 terminal J5510 |
| IN 6 (Contact 6) | Configurable input contact | 640-3640 terminal J5509 |
| IN 7 | Transformer temperature switch | 640-3640 terminal J5508 |
| IN 9 | Forced external synchronization input | 640-3640 terminal J5506 |
| IN 10 | External synchronization requested input | 640-3640 terminal J5511 |
| IN 11 | Use static bypass standby | 640-3640 terminal J5512 |

### Output Relays

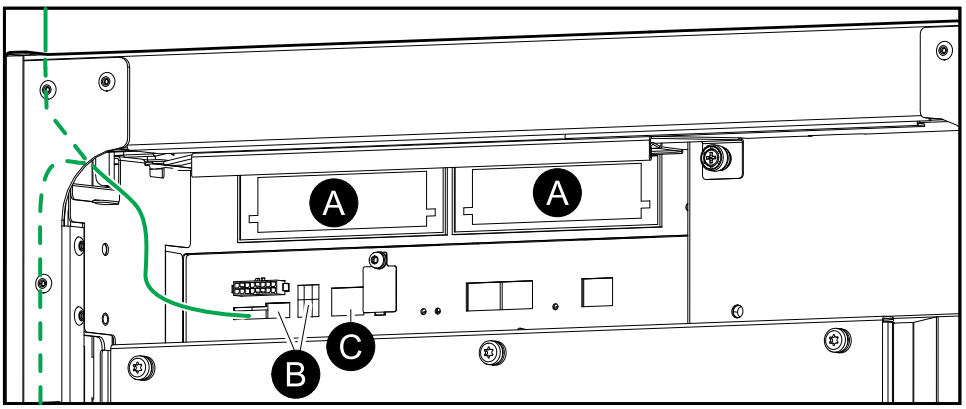



| Name | Description | Location |
|---|---|---|
| OUT 1 (Relay 1) | Configurable output relay | 640–3635 terminal J4939 |
| OUT 2 (Relay 2) | Configurable output relay | 640–3635 terminal J4940 |
| OUT 3 (Relay 3) | Configurable output relay | 640–3635 terminal J4941 |
| OUT 4 | Forced external synchronization output | 640–3640 terminal J5520 |
| OUT 5 | Reserved for future use | 640–3640 terminal J5521 |
| OUT 6 | External synchronization requested output | 640–3640 terminal J5522 |
| OUT 7 | UPS in inverter ON | 640–3640 terminal J5523 |
| OUT 8 (Relay 4) | Configurable output relay | 640–3640 terminal J5524 |
| OUT 9 (Relay 5) | Configurable output relay | 640–3640 terminal J5525 |
| OUT 10 (Relay 6) | Configurable output relay | 640–3640 terminal J5528 |

# External Communication

The following external communication interfaces are supported:

**Front View of the Power Cabinet**




A. Two smart slots for optional network management cards (AP9630, AP9631, or AP9635CH)

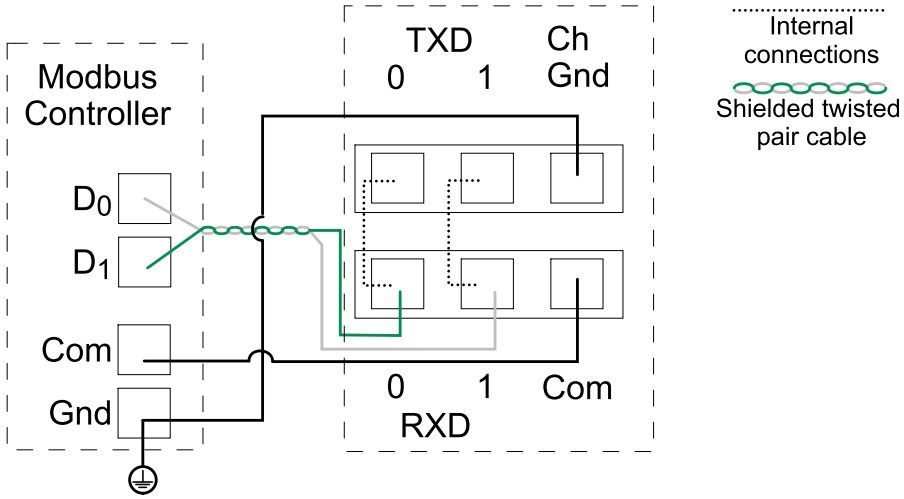
**NOTE:** If the Dry Contact I/O AP9810 is connected to AP9631 or AP9635CH, the total length of cables for connected equipment must not exceed 30 m.

B. Modbus and modbus dip switch settings

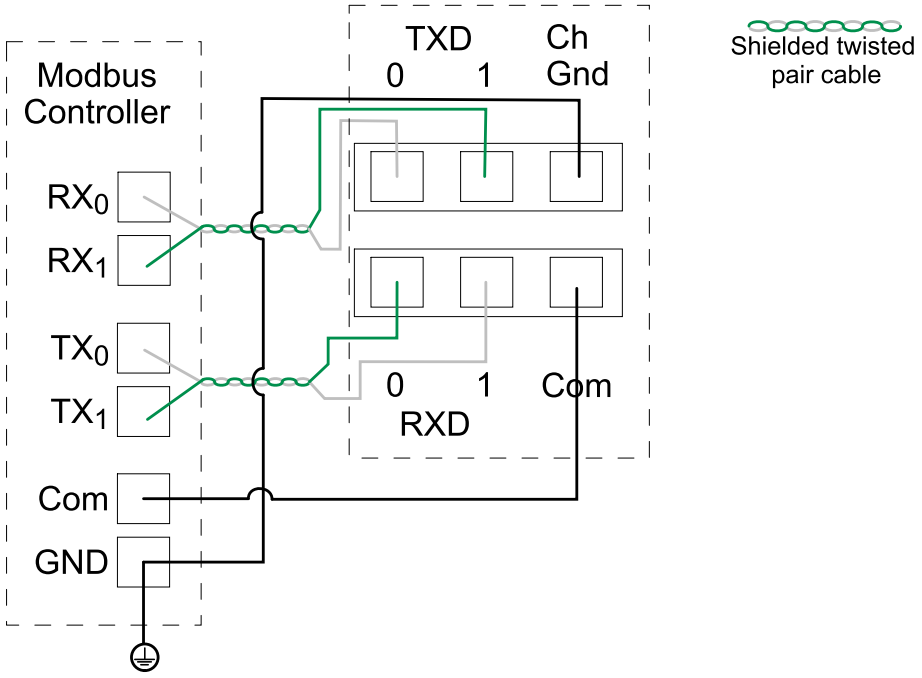
C. Ethernet

## Modbus Wiring

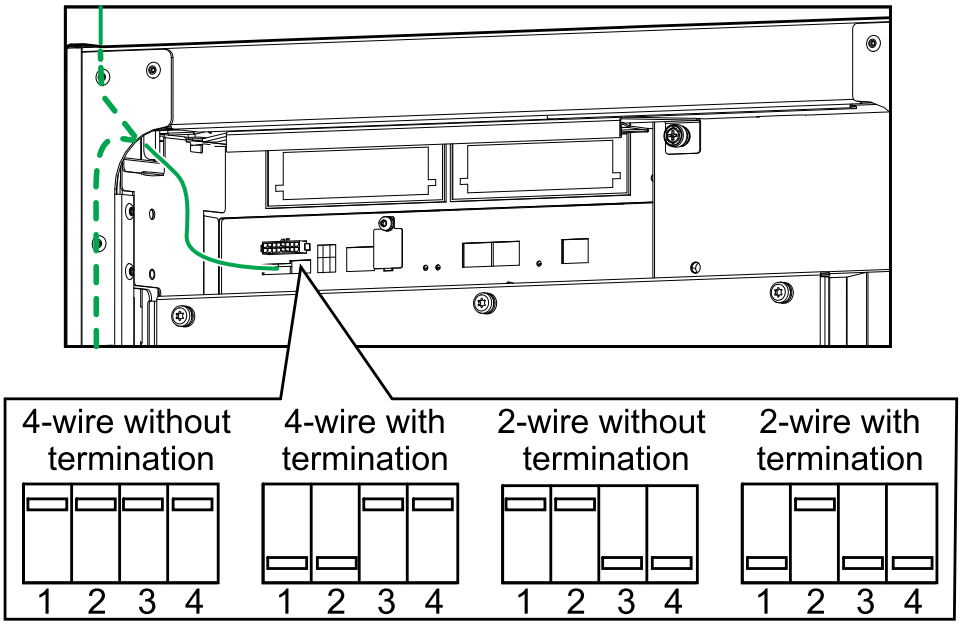
### 2–Wire Configuration



## 4–Wire Configuration




## Modbus Dip Switch Settings

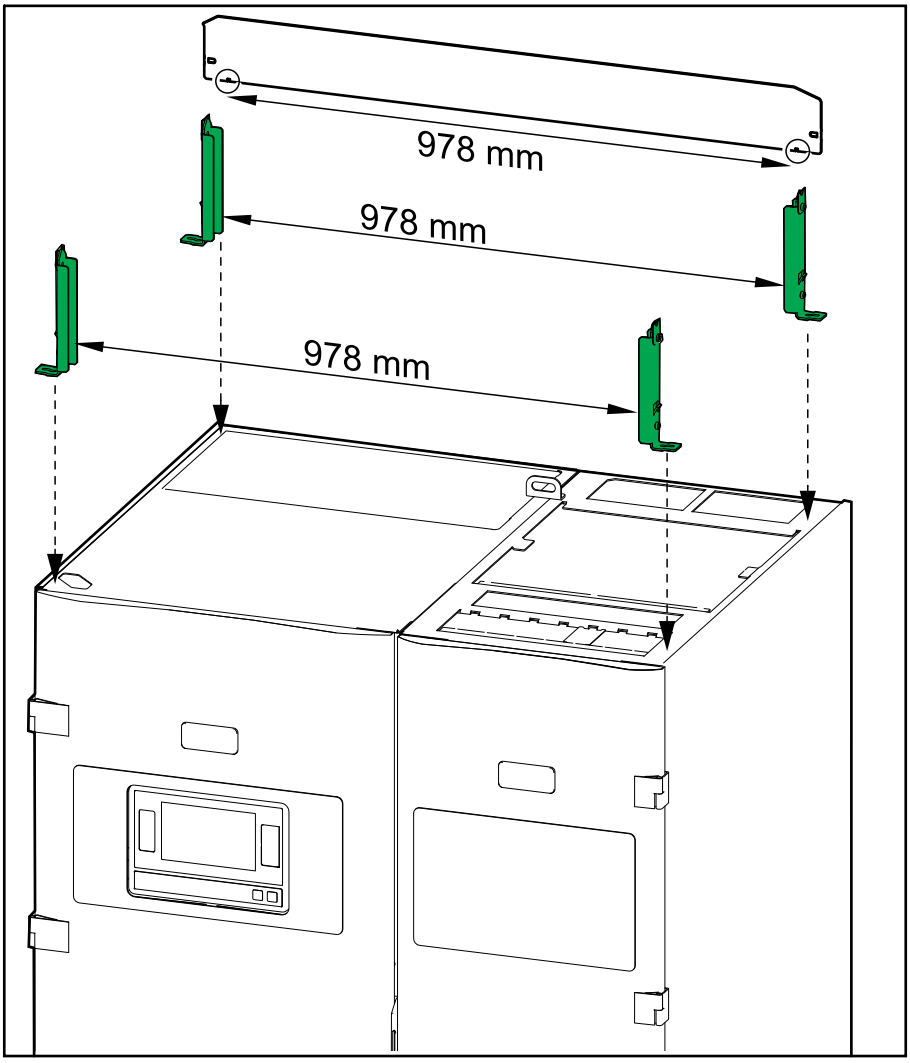


# Install the IP32 Cover

**NOTE:** Top cable entry is not supported when the IP32 kit is installed.

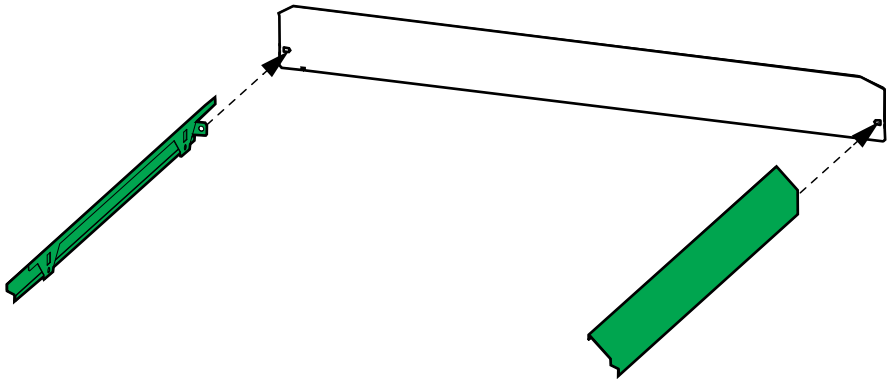
1. Install the four corner brackets on the roof of the UPS. The left to right distance between the brackets must equal 978 mm. You can use the rear frame part to measure the distance between the corner brackets. When the rear part is placed flat, the two corner brackets will fit into the two small measurement cuts.

**Front View of the Power Cabinet and the I/O Cabinet**



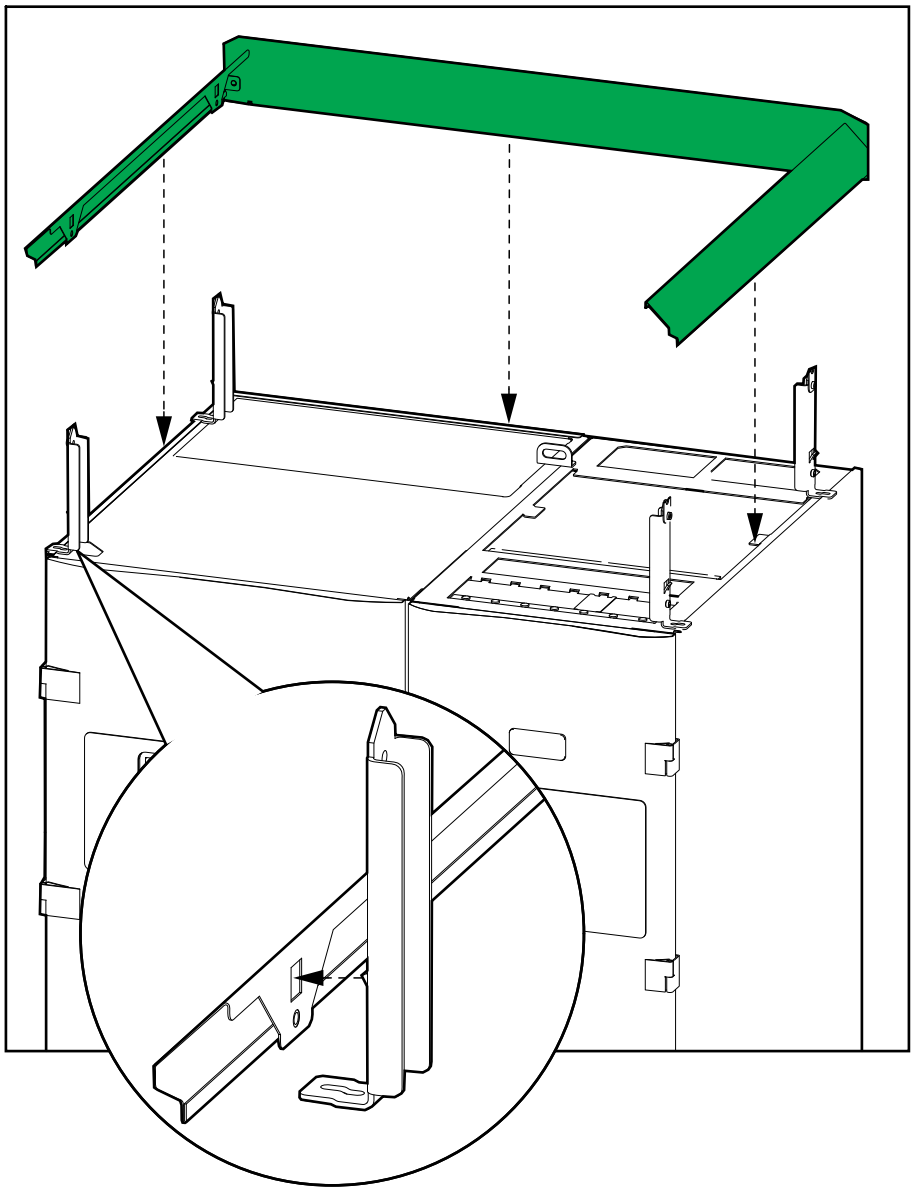
2. Mount the right and left frame parts to the rear frame part and fasten with screws.

**Front View of the Frame Assembly**



3. Install the frame assembly on the top of the UPS. Tabs on the corner brackets will fit into the holes on the right and left frame parts. Mount the frame assembly on the four corner brackets with screws.

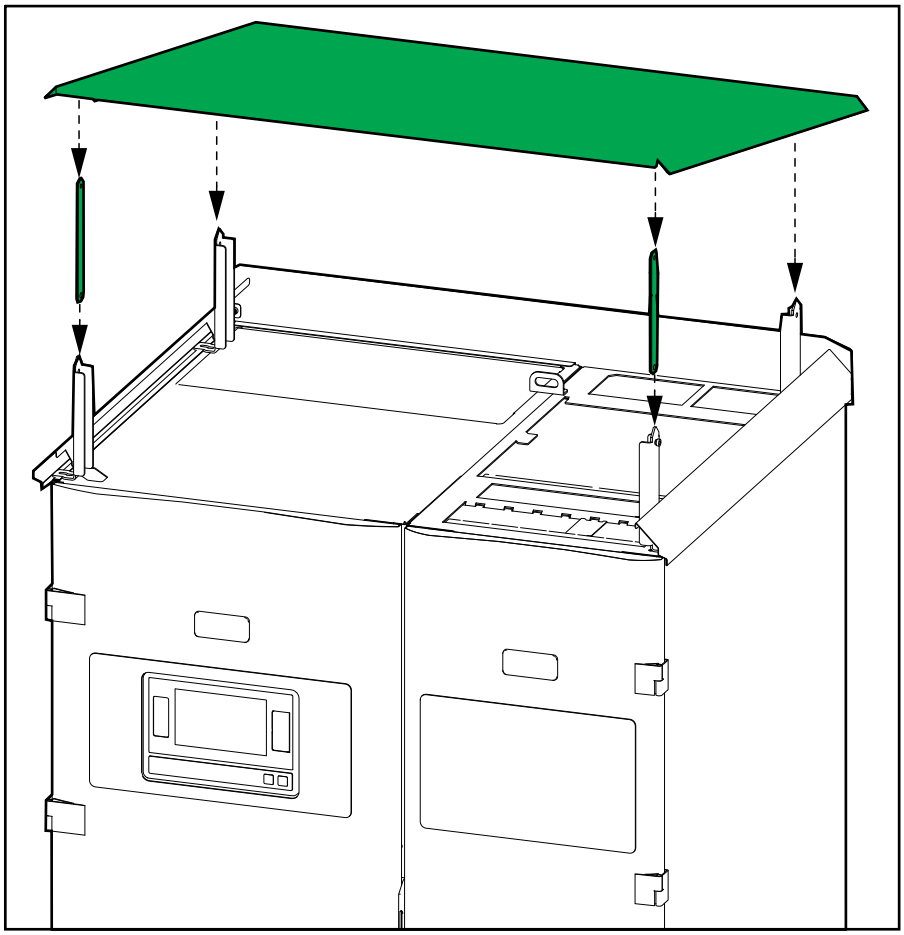
**Front View of the Power Cabinet and the I/O Cabinet**



4. Install the two extension pieces on the two front corner brackets in an upright position.

   **NOTE:** Installing the extension pieces will create easier access to the rear brackets when installing the top plate in systems with front access only. Save the extension pieces for later use when enhanced service access to the top of the cabinet may be needed.

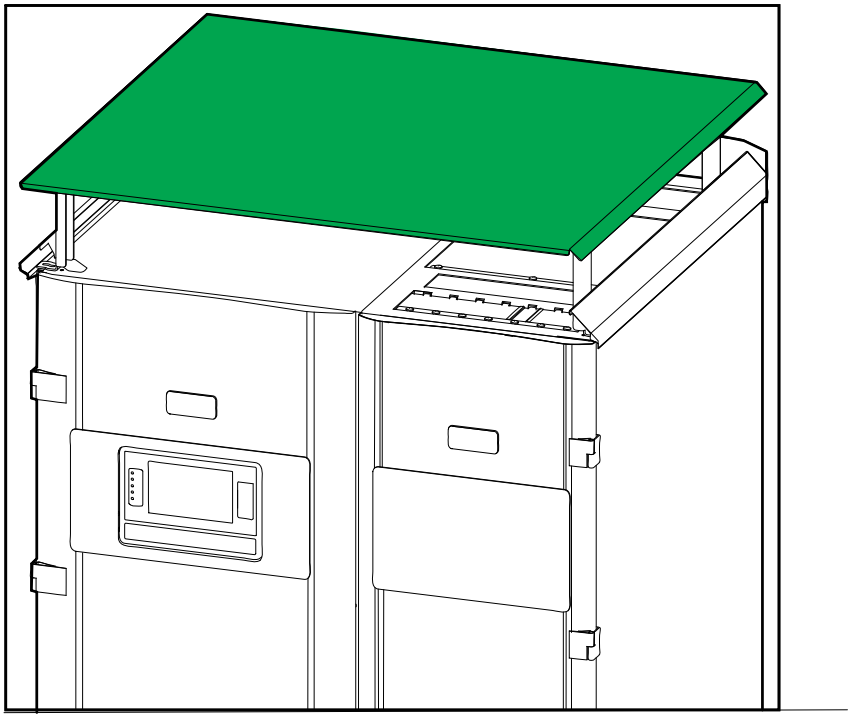
**Front View of the Power Cabinet and the I/O Cabinet with temporary enhanced service access to top**



5. Rest the top plate on the two extension pieces and the two rear corner brackets and fasten the top plate to the rear corner brackets with screws.
6. Remove the two extension pieces from the front brackets.

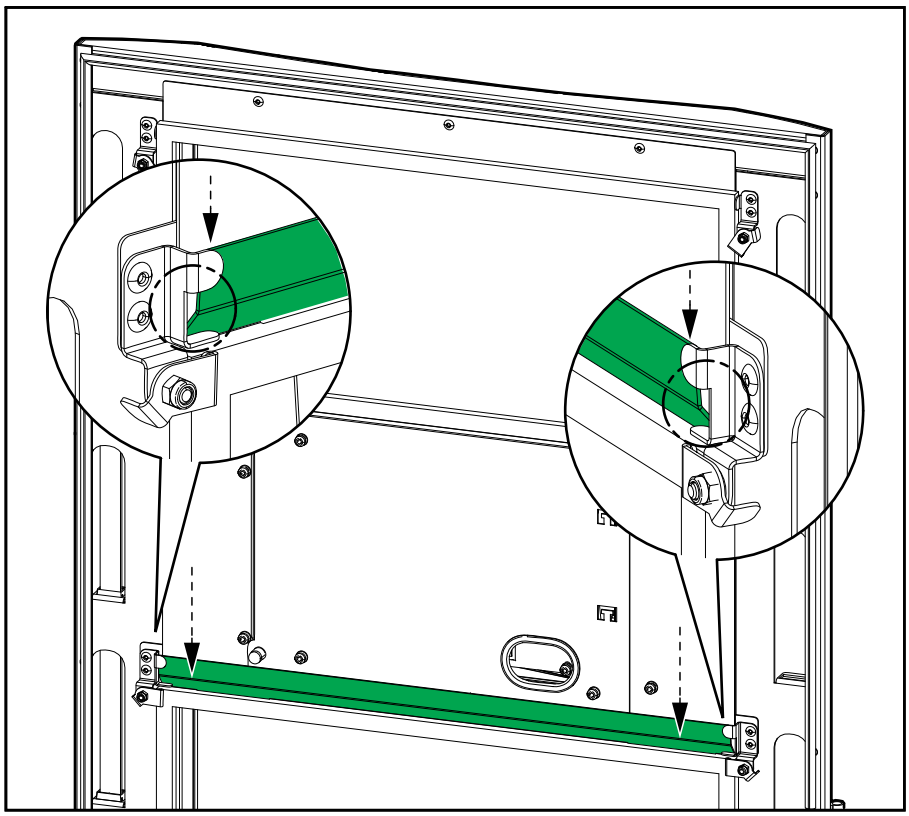
7. Fasten the top plate to the two front corner brackets with screws.

**Front View of the Power Cabinet and the I/O Cabinet with IP32**



8. On the rear side of the power cabinet front door, install the provided polycarbonate plate below the display and behind the filter lock. Note the direction of the polycarbonate plate.

**Rear View of the Power Cabinet Front Door**



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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.



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