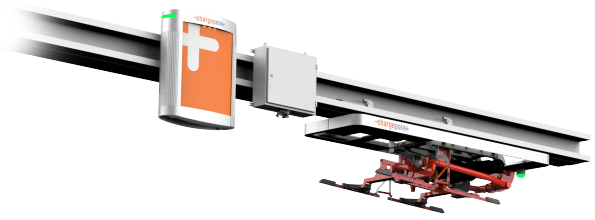
Pantograph Down 2000

Express Plus DC Fast Charging Platform for Electric Buses

Installation Guide



IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for Express Plus that shall be followed during installation, operation and maintenance of Express Plus modular products.

WARNING:

1. **Read and follow all warnings and instructions before servicing, installing, or operating the ChargePoint® product.** Install and operate only as instructed. Failure to do so may lead to death, injury, or property damage, and will void the Limited Warranty.
2. **Only use licensed professionals to install your ChargePoint product and adhere to all national and local building codes and standards.** Before installing the ChargePoint product, consult with a licensed contractor, such as a licensed electrician, and use a trained installation expert to ensure compliance with local building and electrical codes and standards, climate conditions, safety standards, and all applicable codes and ordinances. Inspect the product for proper installation before use.
3. **Always ground the ChargePoint product.** Failure to ground the product can lead to risk of electrocution or fire. The product must be connected to a grounded, metal, permanent wiring system, or an equipment grounding conductor shall be run with circuit conductors and connected to the equipment grounding terminal or lead on the Electric Vehicle Supply Equipment (EVSE). Connections to the EVSE shall comply with all applicable codes and ordinances.
4. **Install the ChargePoint product using a ChargePoint-approved method.** Failure to install on a surface that can support the full weight of the product can result in death, personal injury, or property damage. Inspect the product for proper installation before use.
5. **The product is not suitable for use in Class 1 hazardous locations, such as near flammable, explosive, or combustible vapors or gases.**
6. **Supervise children near this device.**
7. **Do not put fingers into the electric vehicle connector, or touch fingers to charging rails.**
8. **Do not use this product if any cable is frayed, has broken insulation, or shows any other signs of damage.**
9. **Do not use this product if the enclosure or the electric vehicle connector is broken, cracked, open, or shows any other signs of damage.**
10. **Wire and wire terminal information are provided in the ChargePoint product Site Design Guide and Installation Guide.**
11. **Torques for installation of wire terminals are provided in the ChargePoint product Installation Guide.**
12. **The ChargePoint product maximum operating temperature is 50 °C (122 °F).**
13. **Site operator is responsible for making sure that no mechanical damage occurs and the pantograph is installed in a location that doesn't present a safety risk.** If used carelessly, the pantograph could critically injure someone just from the extension force.

IMPORTANT: Under no circumstances will compliance with the information in a ChargePoint guide such as this one relieve the user of the responsibility to comply with all applicable codes and safety standards. This document describes approved procedures. If it is not possible to perform the procedures as indicated, contact ChargePoint. **ChargePoint is not responsible for any damages that may result from custom installations or procedures not described in this document or that fail to adhere to ChargePoint recommendations.**

Document Accuracy

The specifications and other information in this document were verified to be accurate and complete at the time of its publication. However, due to ongoing product improvement, this information is subject to change at any time without prior notice. For the latest information, see our documentation online at chargepoint.com/guides.

Copyright and Trademarks

Symbols

This guide and product use the following symbols:

DANGER: Risk of electric shock

WARNING: Risk of personal harm or death

CAUTION: Risk of equipment or property damage

IMPORTANT: Crucial step for installation success

Read the manual for instructions

Ground/protective earth

Illustrations Used in This Document

The illustrations used in this document are for demonstration purposes only and may not be an exact representation of the product. However, unless otherwise specified, the underlying instructions are accurate for the product.

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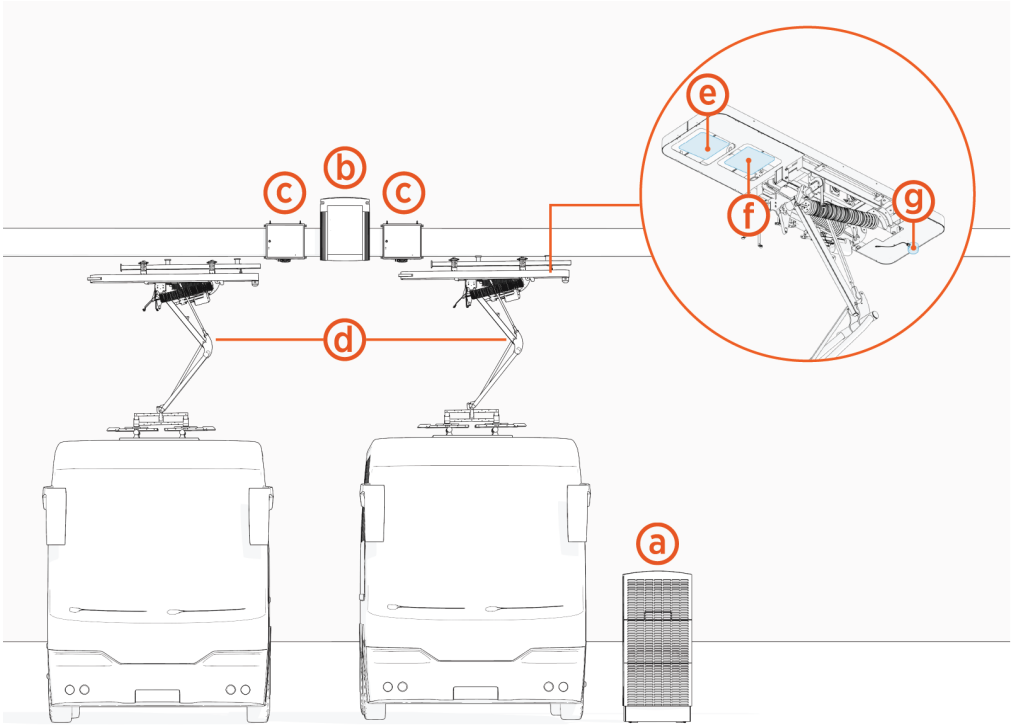
Introduction 1

Pantograph Down 2000 Components

Express Plus Pantograph Down 2000 is a modular solution for scalable fast charging of electric buses in the depot or on route. The solution comprises the following product components:



(a) Power Block: Power cabinet that houses AC to DC power converters called Power Modules. Supplies DC output power to Power Link 2000s. Each Power Block can output up to 200 kW of power.

(b) Power Link 2000: Dispenser that communicates with the bus during charging, connects to the ChargePoint Platform, and dispenses high voltage DC power to the bus through a pantograph connector.

(c) PD Controller: Smart interface that enables a Power Link 2000 to control a pantograph and to monitor the control pilot. Also hosts the Wi-Fi access point and RFID reader that enables wireless charging communication with the bus.

(d) Pantograph: Electromechanical connector that lowers onto bus charging rails and delivers high voltage DC charge power to the bus. Raises out of the way when not in use.

(e) Wi-Fi antenna: Antenna for wireless communication between the bus and the Pantograph Down 2000 system.

(f) RFID antenna: Antenna for bus RFID tag identification.

(g) Status LED: LED status indicator for the Power Link 2000 charging port.

Note: The Wi-Fi antenna, RFID antenna, and status LED are collectively referred to as *auxiliary components*.

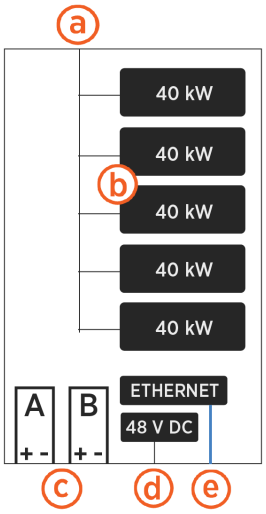
Document Scope

This guide covers installation of the Power Link 2000, PD Controller, pantograph, Wi-Fi antenna, RFID antenna, and status LED. For installation of the Power Block, refer to the *Express Plus Power Block Installation Guide*.

System Overview

Power Block

Power Block block diagram:



(a) Three phase AC power input

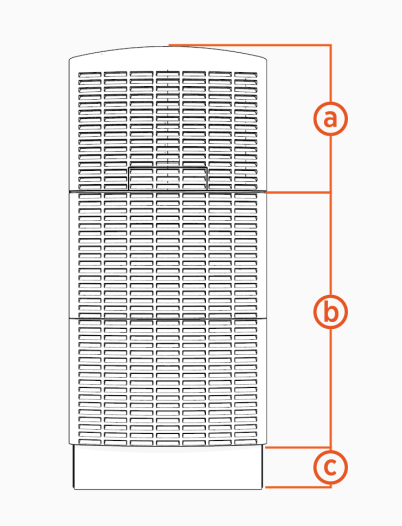
(b) Configurable with up to five 40 kW Power Modules for a maximum total output of 200 kW

(c) Two available HV DC power outputs (A and B)

(d) 48 V DC power output

(e) Ethernet output

The Power Block is a ground-mounted enclosure with the following structure:



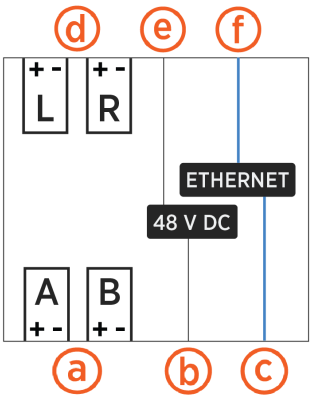
(a) Upper enclosure: Auxiliary power supply and temperature management components

(b) Lower enclosure: Bay for Power Modules and bus bars to land all input and output cables

(c) Pedestal: Secures the Power Block and provides access for either stub-up or surface mount installations on a concrete pad

Power Link 2000

Power Link 2000 block diagram:



(a) Single or dual HV DC input power paths (A and B)

(b) 48 V DC power input

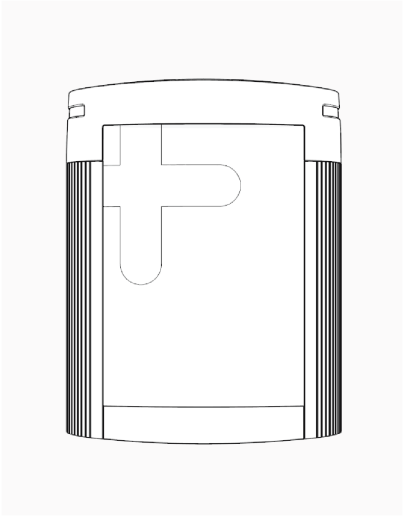
(c) Ethernet input

(d) Single or dual HV DC outputs (L and R)

(e) 48 V DC power output

(f) Ethernet output

Designed for gantry, ceiling, or wall mount, the Power Link 2000 used in the Pantograph Down 2000 system is referred to as the *overhead-mount Power Link 2000*.

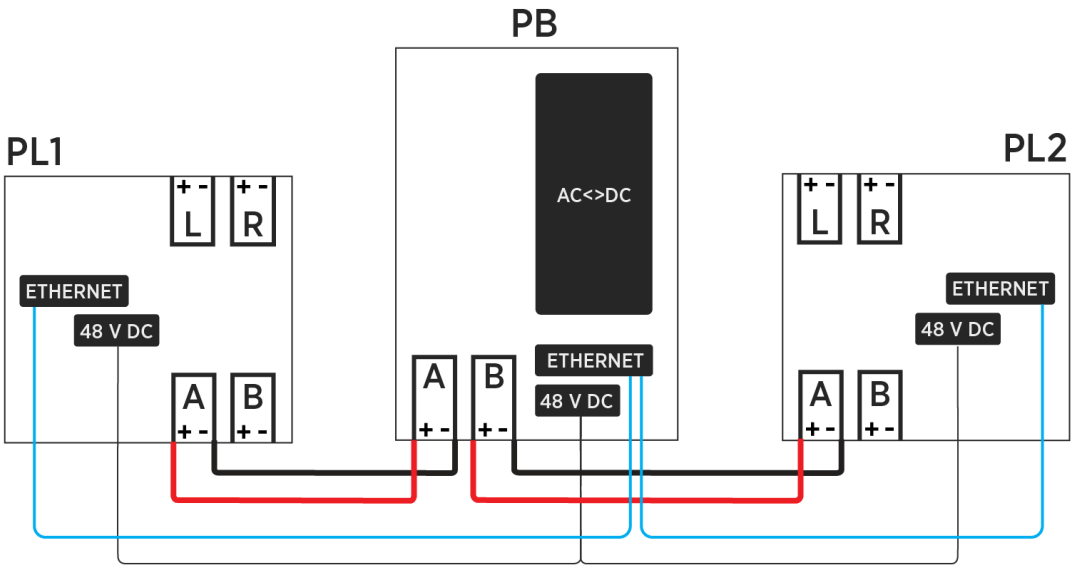


Overhead-mount Power Link 2000:

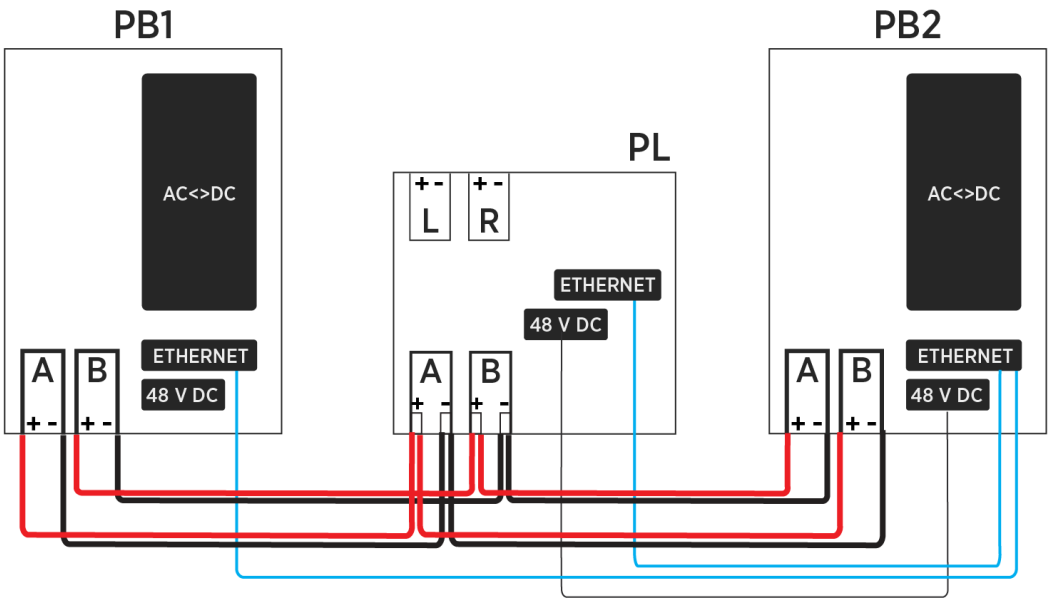
The enclosure is clad with external cosmetic covers. It is available with single or dual outputs, supporting one pantograph per output. Dual output Power Link 2000s support both simultaneous and sequential charging.

Power Block to Power Link 2000 Configuration

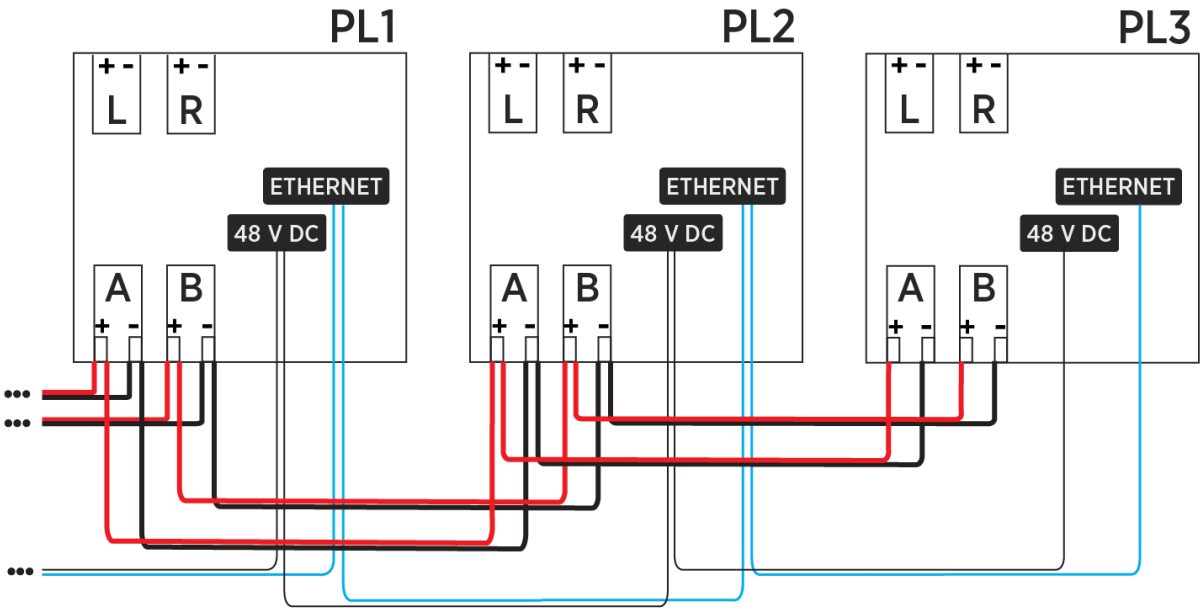
The DC output of the Power Block is the DC input of the Power Link 2000. Each Power Block has two HV DC outputs that can be fed to a single Power Link 2000 or to two different Power Link 2000s. A simplified block diagram of a single Power Block connected to two Power Link 2000s is shown below. The Power Block also feeds 48 V DC power and Ethernet connectivity to the Power Link 2000s.



In turn, for Pantograph Down 2000 applications, the Power Link 2000 can accept high voltage DC input from multiple Power Blocks, as shown in the example below.



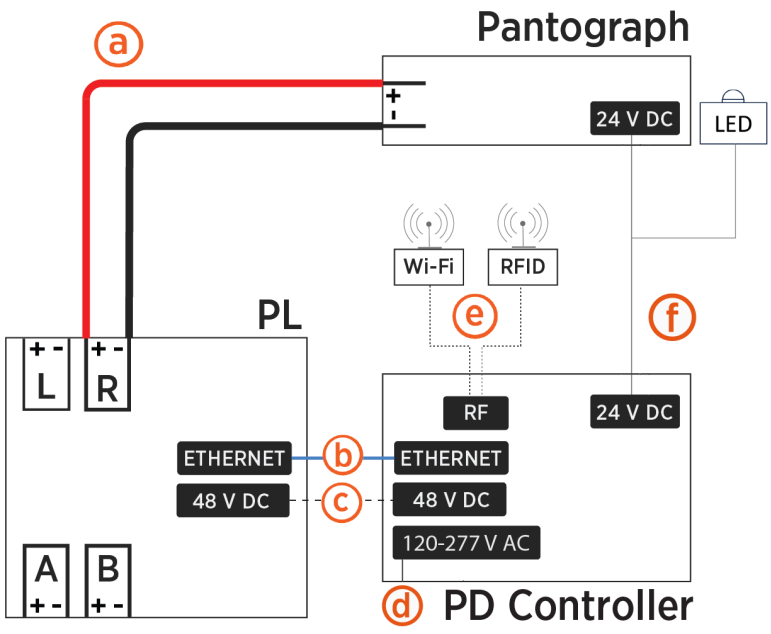
The high voltage DC output, Ethernet, and 48 V DC power output from Power Block(s) can be connected from Power Link 2000 to Power Link 2000, enabling higher port counts in specific sequential charging configurations.



IMPORTANT: The architectures shown above demonstrate only a few of the many supported by Express Plus. The actual architecture for each site will vary depending on the number of stations, the charging capacity required at each charging station, simultaneous or sequential charging requirements, and other criteria. Contact a ChargePoint representative for the ChargePoint -approved wiring architecture for your specific project. Non-approved wiring between Power Blocks and Power Link 2000s may not enable Express Plus to function as expected.

Power Link 2000 to Pantograph Configuration

Each Power Link 2000 HV DC output connects to one pantograph. One PD Controller is required for each pantograph. The PD Controller requires 48 V DC and Ethernet connectivity from the Power Link 2000 as well as single-phase AC power from the site. The PD Controller connects to the status LED, Wi-Fi antenna, and RFID antenna. The PD Controller also connects to the pantograph for control pilot, actuation commands, and other pantograph functions. The block diagram below illustrates the connectivity between a Power Link 2000 and a pantograph/PD Controller pair.



(a) Power Link 2000 HV DC output to pantograph

(b) Ethernet connection between Power Link 2000 and PD Controller

(c) Power Link 2000 48 V DC output to PD Controller

(d) PD Controller 120–277 V AC power input

(e) RF connection from PD Controller to Wi-Fi antenna and RFID antenna

(f) 24 V DC connection from PD Controller to pantograph and status LED

Additional Power Link 2000 Configurations

Sequential Charging Kit

Dual output Power Link 2000s may be configured for sequential charging by field installing a Sequential Charging Kit. This kit allows Power Link 2000 to take a single power input and feed the power to either output in a sequential manner. The Sequential Charging Kit is ordered separately and is field installed.

Ethernet to USB Kit

The Ethernet to USB Kit is an option that can be installed within a single Power Link 2000 within a connected Pantograph Down 2000 cluster. It allows Power Link 2000 to have a hardwired Ethernet connection with an external network server. The installation requires a conduit for the Ethernet cable, which must be run from the customer server or network equipment directly to the Power Link 2000. Only one Ethernet to USB Kit is required per Pantograph Down 2000 cluster. This kit is ordered separately and is field installed.

Soft Shutdown Switch

As an option, the Power Link 2000 can be connected to an external switch for soft shutdown. When the switch is closed, the Power Link 2000 software ends the current charging session with a normal stop, then opens DC contactors in the Power Link 2000. The station stays in this state regardless of station power, not allowing operation. Only a service technician can place the Power Link 2000 back into service after the switch is reset to Open.

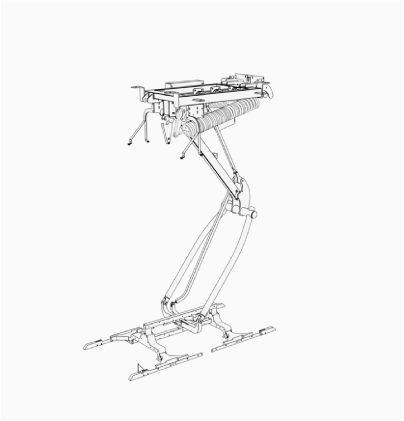
A soft shutdown switch is not meant to safely service the Power Link 2000 or take the place of a HV disconnect switch.

Smart Antenna

The Power Link 2000 is equipped with an internal cellular modem for connectivity with ChargePoint. In areas with poor cellular signal strength, the Power Link 2000 may be additionally equipped with a Smart Antenna for increased strength of connection to the cellular network. The Smart Antenna is ordered separately and is field-installed.

Pantographs

Pantograph Down 2000 integrates with the following pantographs:



Schunk SLS 201.102 - High power charging, fast actuation pantograph. Suitable for mount from a ceiling, gantry, or mast.

Safety Warning

WARNING: Danger of crushing, pinching, and mechanical damage.

Site Operator Responsibilities:

- Ensure the pantograph is installed in a location free from safety hazards and restrict access to the movement area with appropriate safety measures.
- Inspect the equipment regularly for mechanical damage and address any issues promptly.

Operator and Bystander Safety:

- The pantograph moves quickly and has pinch points.
- To avoid serious injury, keep clear of the moving pantograph and ensure bystanders maintain a safe distance.
- Never reach into the mechanism or touch the moving pantograph.
- No one is allowed underneath the equipment during operation.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN SERIOUS INJURY, LOSS OF LIFE OR PROPERTY DAMAGE.

Express Plus Guides

Pantograph Down 2000 is a part of the Express Plus product family.

Access ChargePoint documents at chargepoint.com/guides.

Document	Content	Primary Audiences
Datasheet	Full station specifications	Site designer, installer, and station owner
Site Design Guide	Civil, mechanical, and electrical guidelines to scope and construct the site	Site designer or engineer of record
Concrete Mounting Template Guide	Instructions to embed the charging station template in a concrete pad with anchor bolts and conduit placement (these may also be included in the Site Design Guide)	Site construction contractor
Surface Conduit Entry Kit Guide	Instructions for sites where conduit cannot be run underground	Installer
Construction Signoff Form	Checklists used by contractors to ensure the site is correctly completed and ready for product installation	Site construction contractor
Installation Guide	Anchoring, wiring, and powering on	Installer
Operation and Maintenance Guide	Operation and preventive maintenance information	Station owner, facility manager, and technician
Service Guide	Component replacement procedures, including optional components	Service technician
Declaration of Conformity	Statement of conformity with directives	Purchasers and public

Questions

For assistance, navigate to *chargepoint.com/support* and contact technical support using the appropriate region-specific number.

Prepare for Installation 2

Check Site Readiness

To check site readiness, complete this checklist before you install Pantograph Down 2000:

Pantograph Down 2000 Site Readiness Checklist		
1.	The electrical equipment is installed and labeled in accordance with the National Electrical Code (NEC) and all applicable requirements of the serving electric utility company and the authority having jurisdiction.	☐
2.	Power Blocks are installed at locations proposed in the site drawings.	☐
3.	The installation site (such as a ceiling, gantry, or wall) for each Power Link 2000, PD Controller, and pantograph meets the following requirements: • The site was designed and approved by a structural engineer for the component dimensions and weights given in the *Pantograph Down 2000 Site Design Guide*. • The mount surface is prepped with anchor locations (such as embedded anchor bolts or anchor bolt holes) per instructions given in the site plans. • The wires and conduits meet the requirements given in the site plans.	☐
4.	The installation site meets the drainage, ventilation guidelines, and clearances given in the *Pantograph Down 2000 Site Design Guide*.	☐
5.	Sufficient space is available to use a forklift or other lifting equipment, unpack, remove packing materials, and allow two people to freely move throughout the site.	☐

Electrical Readiness

Refer to the *Pantograph Down 2000 Datasheet* and *Pantograph Down 2000 Site Design Guide* at chargepoint.com/guides for electrical input and output specifications.

Bring These Tools and Resources

Installing Pantograph Down 2000 requires at least two people.

Additionally, the installer must bring the equipment, tools, and materials specified in this section. These are not provided by ChargePoint.

CAUTION: Comply with these guidelines to prevent component damage.

- Use appropriately sized tools to torque fasteners.
- Use the given torque values to tighten the fasteners.
- Ensure that the tools such as torque tool, multimeter, and Ethernet tester are calibrated.

Equipment for Lifting Enclosures and Pantograph

Forklift with anti-slip forks

- Rated for ≥ 300 kg (661 lb)
- Fork max size:
  - Width = 102–127 mm (4–5 in)
  - Thickness ≤ 57 mm (2.25 in)
- If your site has height constraints or heights that exceed the service range of a forklift, use alternative equipment

Mobile elevating work platform (scissor lift), as needed

Equipment and Tools for Installation

Paper towel roll

Industrial vacuum cleaner

Hard hat

Safety glasses

Magnet tray

Wire brush (to remove any residue on anchor bolts)

Cut-resistant gloves

Ladder


Cable ties


Cable puller or fish tape


Level


Multimeter (meter and probes rated for 1000 V)


Conduit cutter (to cut up to 4 in conduits)


Wire cutters, including Ethernet (Cat6 Shielded Twisted Pair (STP)) cable


Lug crimping tool and die


Torque wrench


Hex socket set (including 7 mm, 8 mm, 10 mm, 13 mm, 17 mm, 24 mm deep socket, 9/16 in, 15/16 in)


Wrench set (including 3/4 in, 5/16 in, 13/16 in, 20 mm, 33 mm, 46 mm, and adjustable)


T25 Security screwdriver


Phillips head screwdriver set (including #2)


Box cutter


Measuring tape or other tool to measure height, length, and distance


Lockout/tagout equipment


Ethernet tester such as a Klein Tools VDV526-052 VDV LAN Scout Jr. Tester or similar


Pliers


Wire strippers, including Ethernet (Cat6 STP) cable


Ethernet (RJ45) connector crimping tool


Torque screwdriver


Hex wrench (10 mm)


Torx screwdriver (T25, T30)


Flathead screwdriver set (including 2.5 mm and 3.5 mm tip for terminal blocks)


Torque paint pen


Permanent marker


Weatherproof sealant


Hydraulic hole punch


Smartphone with internet connectivity


ChargePointInstaller app


Anti-oxidant joint compound (to make gastight joint between wire and lug) and wire pulling lubricant


Dielectric grease


Rubber mallet


QR code scanner (usually built into the camera app)


ChargePoint installer login credentials

Wires and Terminations Required for Site

The installer must bring all wires and lugs specified in this section. They are not provided by ChargePoint.

IMPORTANT:

- For AC and DC high voltage (HV), high current wiring, use copper or aluminum wires rated for 90 °C (194 °F).
  - AC high current wires can be THHN/THHW/THW-2/THWN-2 based on site condition (dry or wet) and rated for 600 V.
  - DC HV wires can be XHHW/XHHW-2 based on site condition (dry or wet) and rated for 1000 V.
- For low voltage (LV) DC wiring, use only copper wires (XHHW/XHHW-2 based on site condition, dry or wet) rated for 1000 V and 75 °C (167 °F).
- For PD Controller 120–277 V AC input wires, use only copper wires rated for 600 V AC and 75 °C (167 °F).
- Use copper lugs for copper wires and aluminum lugs for aluminum wires. The lugs must be nickel, tin, or silver plated compression (not mechanical) lugs. Nickel-plated lugs installed with dielectric grease is recommended.

Power Link 2000 input wires

The Power Block DC (HV and LV) and Ethernet outputs are the inputs for the Power Link 2000. In some Express Plus architectures, the Power Link 2000 may receive DC (HV and LV) power from Power Block(s) via a connection to another Power Link 2000. The Power Link 2000 may also be configured with LV DC connection with a soft shutdown switch and/or a hardwired Ethernet connection to a network server.

IMPORTANT: Following are wire specifications for the Power Link 2000, including the maximum quantity and size that the wire terminals can accommodate. All sizing assumes a maximum ambient temperature of 50 °C (122 °F). Where the maximum wire size is listed, the actual wire quantity and size must be chosen based on site-specific wiring requirements and in accordance with the maximum allowed conduit filling rate per local code.

Input Wire	Quantity	Size	Termination
HV DC A and B (Max. 500 A per landing)	Max. 12 wires per Power Path (three per pole on each landing)	Upper landings: Max. 150 mm^2 (300 MCM)*	Lug: Long barrel and tongue with two holes spaced 44.5 mm (1.75 in) apart and sized for M12 (0.5 in) studs. Max. tongue width: 31 mm (1.25 in) for upper landings, 25.9 mm (1 in) for lower landings. Aluminum lug max. tongue thickness: 10 mm (0.4 in) for upper landings, 5 mm (0.2 in) for lower landings.
		Lower landings: Max. 120 mm^2 (4/0 AWG)	
Ground	Max. 6 wires (one per Power Block)	Refer to local code for size; Max. 50 mm^2 (1/0 AWG)	Lug: Short barrel and tongue with single hole and sized for M6 (0.25 in) stud.
LV DC (from Power Block or another Power Link 2000)	Max. 4 wires (two wire pairs; each pair has one wire per pole)	16 mm^2 (6 AWG)	Stripped wire end
Ethernet	Max. 4 cables	Cat6 STP cable, outdoor rated or Paige OSP Shielded Gamechanger**	RJ45 connector
Soft shutdown switch***	2 wires	2.5 mm^2 (14 AWG)	Stripped wire end

*__Note:__ If utilizing both upper and lower landings, the maximum HV DC wire size is 120 mm^2 (4/0 AWG).

**__Note:__ The required Ethernet cable type depends upon the cable run length. See the *Pantograph Down 2000 Site Design Guide* for details.

***__Note:__ Soft shutdown switch is an optional feature.

Power Link 2000 output wires

The Power Link 2000 provides HV DC output to up to two pantographs and provides LV DC and Ethernet outputs to each PD Controller paired with the pantograph(s). In some Express Plus architectures, the Power Link 2000 may provide DC (HV and LV) power from Power Block(s) to other Power Link 2000(s).

IMPORTANT: Following are wire specifications for the Power Link 2000, including the maximum quantity and size that the wire terminals can accommodate. All sizing assumes a maximum ambient temperature of 50 °C (122 °F). Where the maximum wire size is listed, the actual wire quantity and size must be chosen based on site-specific wiring requirements and in accordance with the maximum allowed conduit filling rate per local code.

Output Wire	Quantity	Size	Termination
HV DC L and R*	Max. 12 wires (six per landing, three per pole)	Max. 120 mm^2 (4/0 AWG)	Lug: Long barrel and tongue with two holes spaced 44.5 mm (1.75 in) apart and sized for M12 (0.5 in) studs. Max. tongue width: 31 mm (1.25 in). Aluminum lug max. tongue thickness: 5 mm (0.2 in).
High power ground (to pantograph PE and pantograph frame)	Max. 4 wires (two per pantograph)	Refer to local code for size; Max. 50 mm^2 (1/0 AWG)	Lug: Short barrel and tongue with single hole sized for M6 (0.25 in) stud.
LV DC (to another Power Link 2000)	Max. 4 wires (two wire pairs; each pair has one wire per pole)	16 mm^2 (6 AWG)	Stripped wire end
LV DC (to PD Controller)	Max. 4 wires (one wire pair per PD Controller; each pair has one wire per pole)	1.5 mm^2 (16 AWG)	Stripped wire end or ferrule
Chassis ground (to PD Controller)	Max. 2 wires (one per PD Controller)	4 mm^2 (12 AWG)	Ring terminal: Sized for M6 (0.25 in) stud.
Ethernet	Max. 2 cables (one per PD Controller)	Cat6 STP cable, outdoor rated	RJ45 connector
*__Note:__ Each HV DC output (L and R) can have a maximum of six HV DC wires (three per pole).			

PD Controller Wires

Each PD Controller is configured with AC input from the site as well a LV DC, chassis ground, and Ethernet connection from a Power Link 2000. Allowed quantity, size, and terminations for these wires are listed below. Check the site plan for site specific wire specifications.

IMPORTANT: Following are wire specifications for the PD Controller, including the maximum quantity and size that the wire terminals can accommodate. All sizing assumes a maximum ambient temperature of 50 °C (122 °F). Where the maximum wire size is listed, the actual wire quantity and size must be chosen based on site-specific wiring requirements and in accordance with the maximum allowed conduit filling rate per local code.

Wire	Quantity	Size	Termination
120-277 V AC input	2 wires (one per pole)	Size based on branch circuit breaker; Max. 16 mm^2 (6 AWG)	Stripped wire end
AC ground	1 wire	Size based on branch circuit breaker; Max. 16 mm^2 (6 AWG)	Stripped wire end
LV DC input	See Power Link 2000 output wire specifications		Stripped wire end
Ethernet input	See Power Link 2000 output wire specifications		RJ45 connector, unshielded
Chassis ground	See Power Link 2000 output wire specifications		Stripped wire end

Schunk SLS 201.102 pantograph wires

The Schunk SLS 201.102 pantograph is configured with HV DC input and high power ground connection from a Power Link 2000. Allowed quantity, size, and terminations for these wires are listed below. Check the site plan for site specific wire specifications.

IMPORTANT: Following are wire specifications for the pantograph, including the maximum quantity and size that the wire terminals can accommodate. All sizing assumes a maximum ambient temperature of 50 °C (122 °F). Where the maximum wire size is listed, the actual wire quantity and size must be chosen based on site-specific wiring requirements and in accordance with the maximum allowed conduit filling rate per local code.

Wire	Max. Wire Quantity and Size	Termination
HV DC	See Power Link 2000 output wire specifications.	Lug: Single hole lug and sized for M10 bolt.
High power ground (PE)	See Power Link 2000 output wire specifications.	Lug: Single hole lug and sized for M10 bolt.
Pantograph frame ground	See Power Link 2000 output wire specifications.	Ring terminal: Sized for M8 bolt.

Tightening Torques

Power Link 2000

Component	Component Material	Fastener	Tool	Torque
Soft shutdown switch set screws	-	-	2.5 mm flathead screwdriver	**0.6 Nm (5.3 in-lb)**
LV DC terminal set screws (for output to PD Controller)	-	-	3.5 mm flathead screwdriver	**0.7 Nm (6.2 in-lb)**
LV DC terminal set screws (for output to Power Block or other Power Link 2000)	-	-	3.5 mm flathead screwdriver	**1.5 Nm (13.3 in-lb)**
HV DC external bus bar safety cover screws	Plastic	M4	7 mm socket	**1.7 Nm (15 in-lb)**
Top cap screws, front			T25 Security	
Top cap screws, rear	Plastic	M5	T25 Security	**2.8 Nm (25 in-lb)**
Gland plate screws	Metal	M5	T25 Security	**4.5 Nm (40 in-lb)**
Bottom crown screws			T25 Security	
Side panel screws			T25 Torx	
Ethernet to USB mounting nuts			8 mm socket	
Mounting bracket bolts	Metal	M6	T30 Torx	**5.6 Nm (50 in-lb)**
High power ground wire lug nuts			10 mm socket	
Chassis ground wire nuts				
Sequential charging bus bar mounting nuts	Metal	M8	13 mm socket	**12.2 Nm (108 in-lb)**
HV DC wire lug nuts	Metal	M10	17 mm socket	**19 Nm (14 ft-lb)**

PD Controller

Component	Component Material	Fastener	Tool	Torque
Wi-Fi coaxial cable connector	-	-	5/16 in wrench	**0.45 Nm (4 in-lb)**
RFID coaxial cable connector	-	-		
AC PE terminal set screw	-	-	3.5 mm flathead screwdriver	**1.7 Nm (15 in-lb)**
AC circuit breaker set screws (18-12 AWG wires)	-	-	#2 Phillips screwdriver	**2.4 Nm (21.2 in-lb)**
AC circuit breaker set screws (10-8 AWG wires)	-	-		**2.8 Nm (24.8 in-lb)**
AC circuit breaker set screws (6 AWG wires)	-	-		**4 Nm (35.4 in-lb)**
3/4 in NPT cable gland cap	-	-	33 mm wrench	**4.5 Nm (40 in-lb)**
1-1/4 in NPT cable gland cap	-	-	46 mm wrench	
3/4 in NPT cable gland nut	-	-	33 mm wrench	**7.9 Nm (70 in-lb)**
1-1/4 in NPT cable gland nut	-	-	46 mm wrench	**10.2 Nm (90 in-lb)**

Auxiliary Components

Component	Component Material	Fastener	Tool	Torque
Wi-Fi antenna coaxial cable connector	-	-	13/16 hex wrench	**1.5 Nm (13.3 in-lb)**
RFID antenna coaxial cable connector	-	-		
Status LED mounting nuts	Metal	M5	8 mm socket	**4.5 Nm (40 in-lb)**
Auxiliary component frame, side cover nuts (at cover ends)	Metal			
Auxiliary component frame, front cover	Metal	M6	10 mm socket	**5.6 Nm (50 in-lb)**
Wi-Fi and RFID antenna assembly mounting nuts	Metal			
Auxiliary component frame, ground wire fasteners	Metal			
Auxiliary component frame, rear cover	Metal			
Auxiliary component frame, side cover nuts (along cover length)	Metal			
Auxiliary component frame, side rail mounting nuts	Metal	M16	24 mm deep socket	**94.9 Nm (70 ft-lb)**

Schunk SLS 201.102 Pantograph

Component	Component Material	Fastener	Tool	Torque
Control pilot cable gland	-	-	20 mm wrench	**1.5 Nm (13.3 in-lb)**
Pantograph frame ground wire fasteners	Metal	M8	13 mm socket	**12.2 Nm (108 in-lb)**
HV DC wire fasteners	Metal	M10	13 mm and 17 mm socket	**19 Nm (14 ft-lb)**

Pantograph Down 2000 Packages

WARNING: Component crates are heavy and can cause injury or death if dropped. Do not stand or walk beneath the crate while it is being lifted. Take precautions against the crate tipping or sliding.

IMPORTANT: Leave components in the shipping crate until needed. When removing, protect them from damage (such as scratches) by placing them flat on a blanket or tarp, face up. Do not stand up cover panels, as they may be knocked or blown over. Cover charging connectors to prevent damage or ingress.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Always transport and store components in their original packaging. Use appropriate lifting equipment (forklift or crane, lifting straps, and any corresponding attachments and accessories). Ensure the load rating of all lifting equipment is adequate for the weight of the crated components.

CAUTION: Keep components in original packaging, free of moisture, and protected from damage until you install or service them at the site. Store all shipments of components in a dry covered location and protect from moisture.

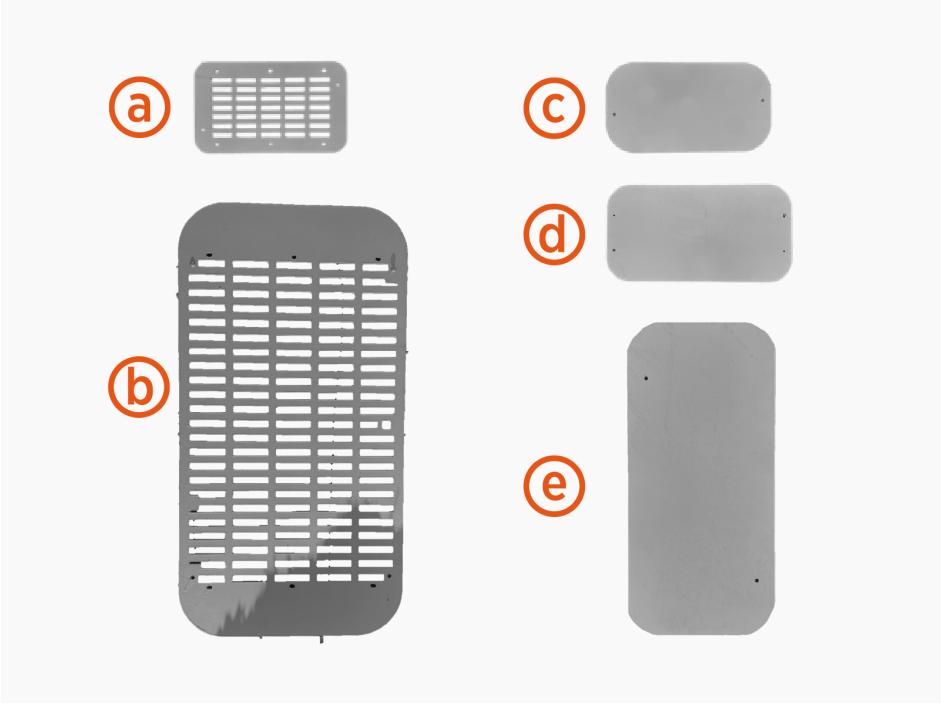
Note: For any missing component, contact ChargePoint support.

Package Dimensions and Weights

Package	Dimensions (LxWxH)	Max. Weight
Power Link 2000	1.52 x 1.14 x 0.51 m (60 x 45 x 20 in)	182 kg (400 lb)
Power Link 2000 Wall Mount Kit	0.49 x 0.29 x .01 m (19.13 x 11.38 x 4.75 in)	9 kg (20 lbs)
PD Controller	0.8 x 0.79 x 0.33 m (31.5 x 31 x 13 in)	37 kg (81 lb)
Schunk SLS 201.102	2.44 x 1.22 x 1.22 m (96 x 48 x 48 in)	340 kg (750 lb)
Schunk SLS 201.102 Auxiliary Components Kit	2.71 x 0.93 x 0.34 m (106.8 x 36.3 x 13.3 in)	75 kg (165 lb)
Ethernet to USB Kit (option)	0.3 x 0.39 x 0.22 m (11.81 x 15.35 x 8.66 in)	1.4 kg (3 lbs)
Sequential Charging Kit (option)	0.27 x 0.18 x 0.05 m (10.6 x 7.0 x 1.8 in)	2.3 kg (5 lbs)

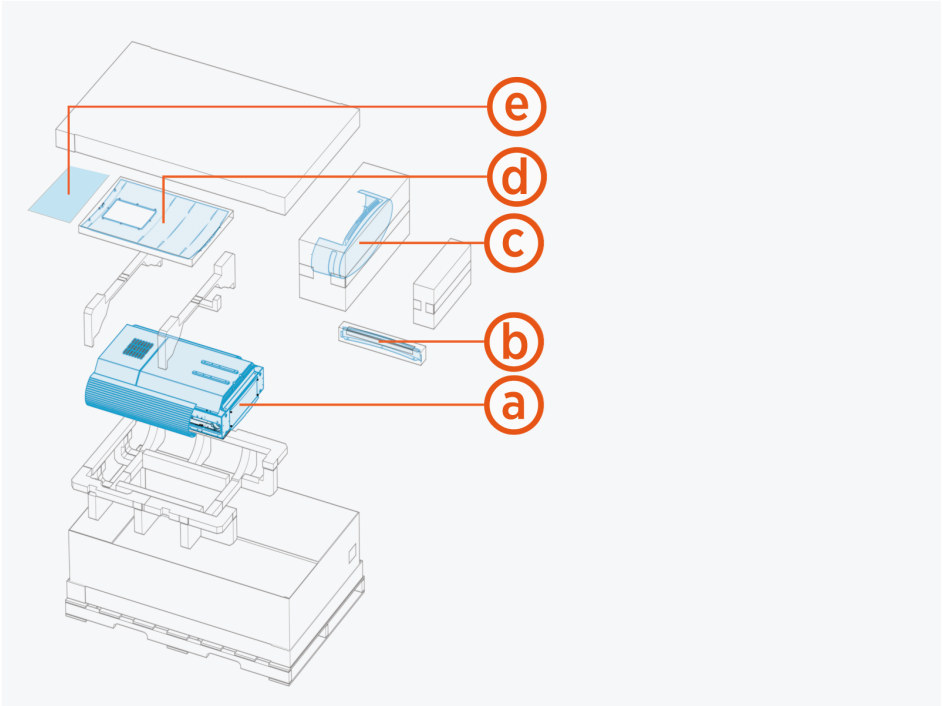
Panels and Covers Crate

Note: Images are not exact to scale.



- **(a)** Upper vent panels (x2)
- **(b)** Lower rear vent panel
- **(c)** Hinge top access cover
- **(d)** Arm end cap
- **(e)** Pantograph top access cover

Power Link 2000 Package



(a) Power Link 2000 assembly

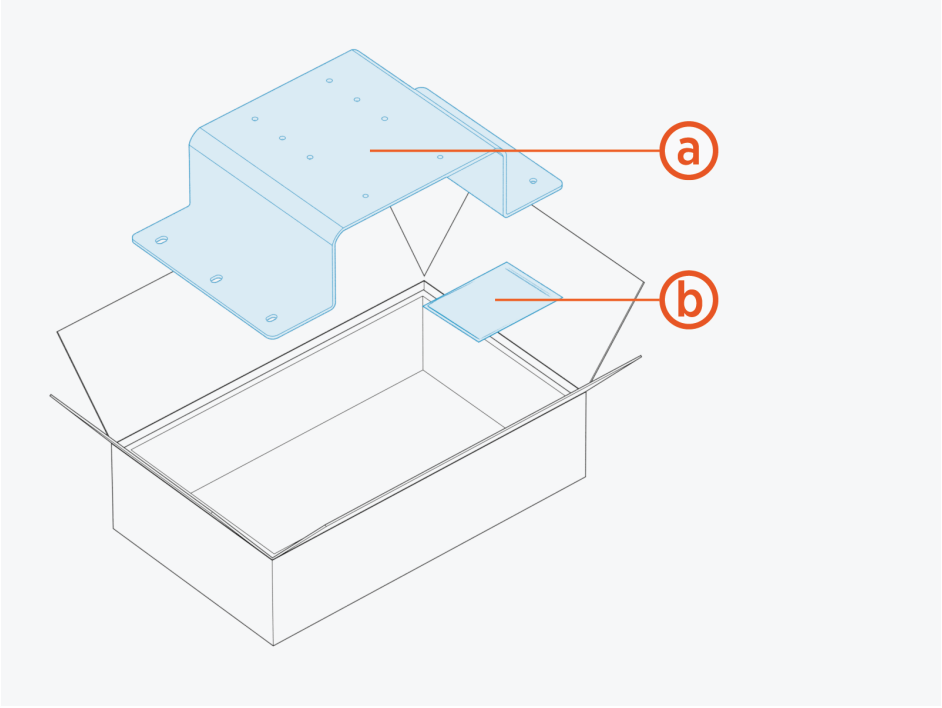
(b) Bottom crown

(c) Top cap

(d) Front cover

(e) Ratings adjustment label sticker sheet

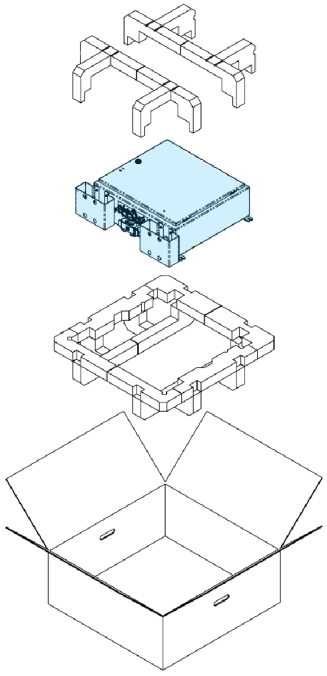
Power Link 2000 Wall Mount Kit



(a) Wall mount bracket

(b) Hardware bag with T30 M6 screws (x8) for attaching bracket to Power Link 2000

PD Controller Package

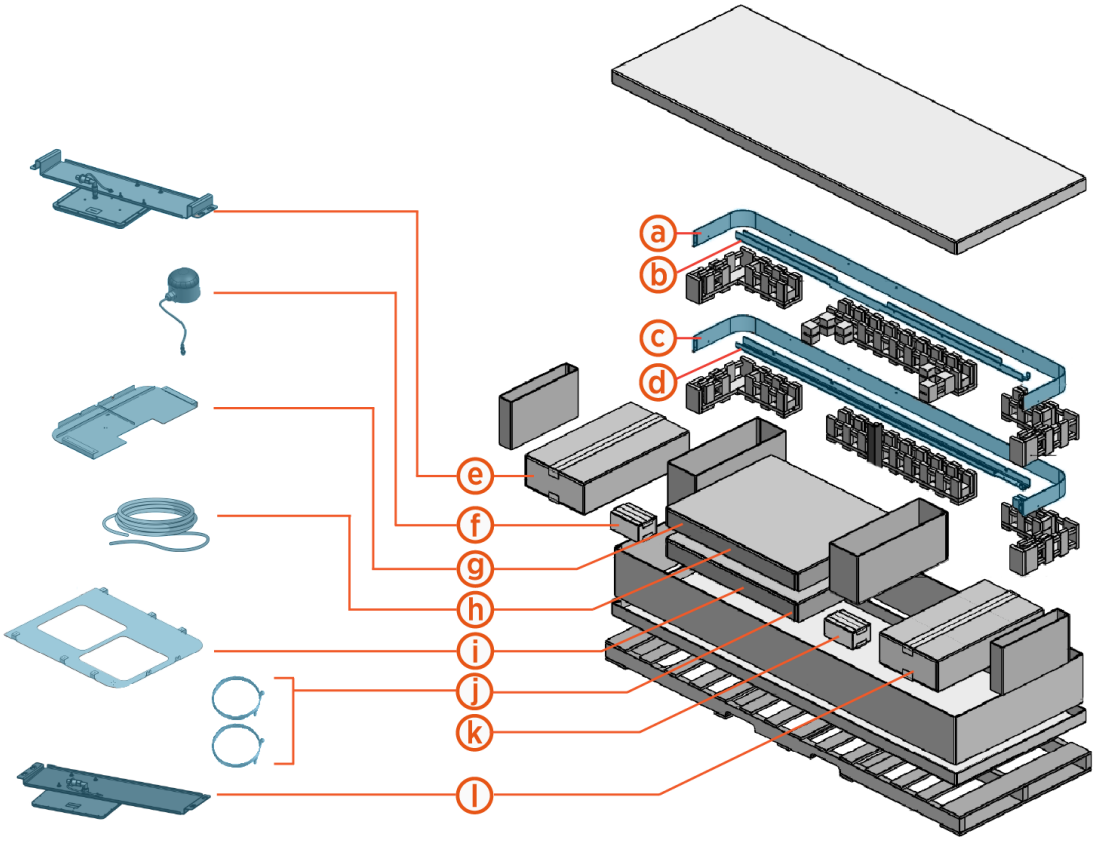


Schunk SLS 201.102 Package

The pantograph ships crated and secured on a pallet.

Schunk SLS 201.102 Auxiliary Components Kit

The Auxiliary Components Kit package ships on a pallet.



- **(a)** Mounting frame side cover, right
- **(b)** Mounting frame rail, right
- **(c)** Mounting frame side cover, left
- **(d)** Mounting frame rail, left
- **(e)** RFID antenna assembly
- **(f)** Status LED and cable
- **(g)** Mounting frame cover, front
- **(h)** Controller interface cable (5 m, 16.4 ft)
- **(i)** Mounting frame cover, rear
- **(j)** Wi-Fi and RFID antenna coaxial cables (x2) (5m, 16.4 ft each)
- **(k)** Hardware box with:
  - Ground wire (0.5 m, 1.6 ft)
  - M8 bolt and M8 nut (x1 each)
  - M10 bolts and M10 flange nuts (x5 each)
  - M16 bolts and M16 nuts (x4 each)
  - Wire terminal operating tool
  - Cable ties (x9)
- **(l)** Wi-Fi antenna assembly

Disconnect Power

To disconnect power, complete the following steps:

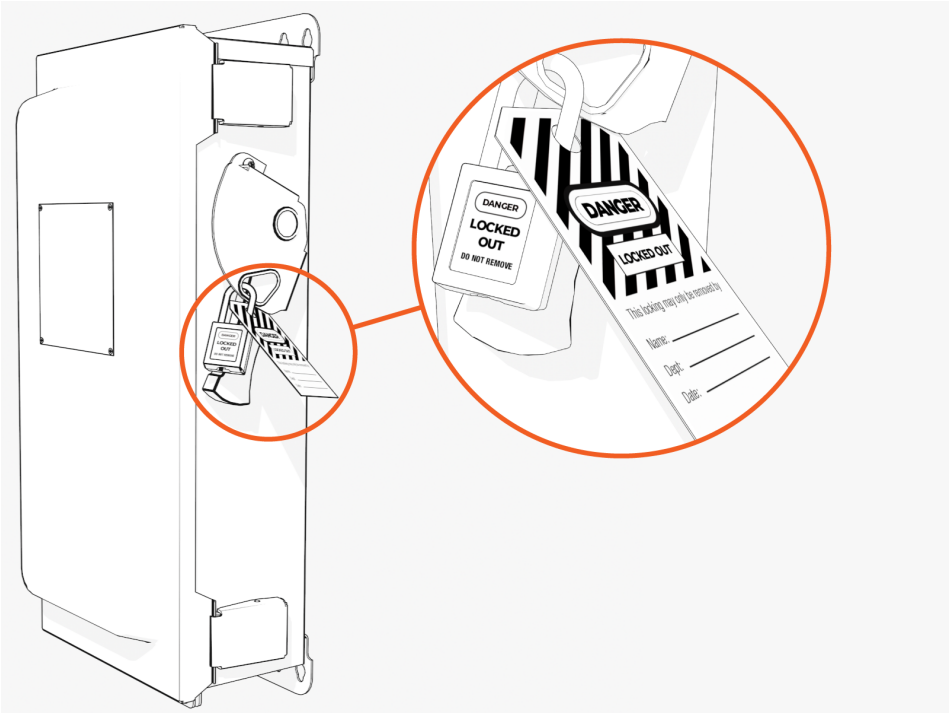
DANGER: RISK OF SHOCK

- Before any procedure, disconnect the power.
- Follow local code and site lockout/tagout procedure to de-energize the station.
- Wait for energy to dissipate (approximately five minutes).
- Keep power off until all covers and panels are reinstalled and the work is complete.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN SERIOUS INJURY, LOSS OF LIFE, OR PROPERTY DAMAGE.

1. Disconnect power at the site electrical panel.

   Note: Follow standard practice and local code to de-energize the applicable circuit and lock out/tag out the disconnect before proceeding.



2. Use a multimeter to test that the unit is de-energized.

Mount Schunk 201 Pantograph 3

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Warranty Limitation

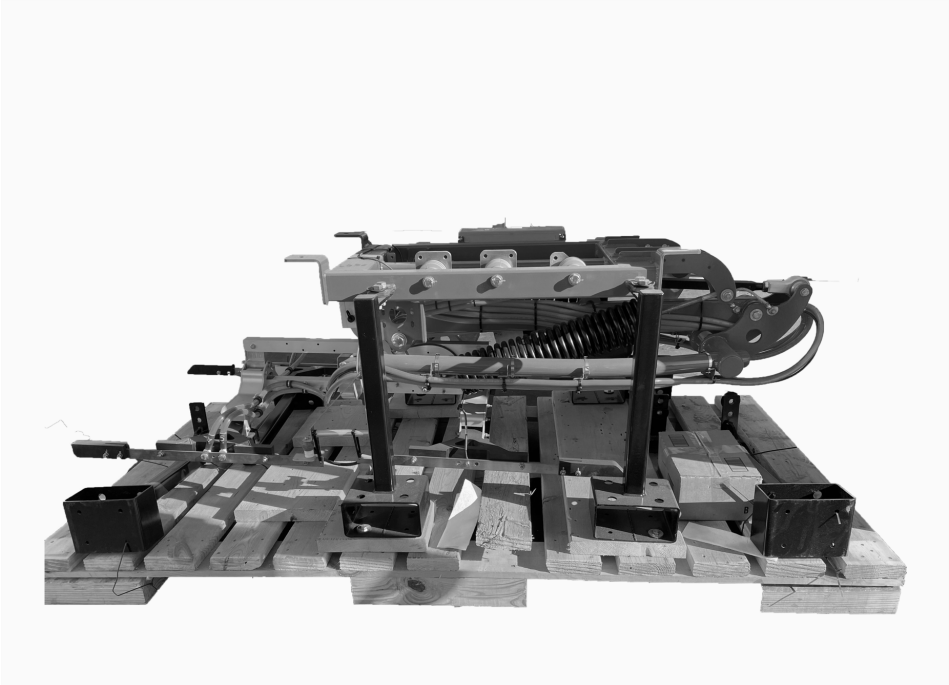
- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

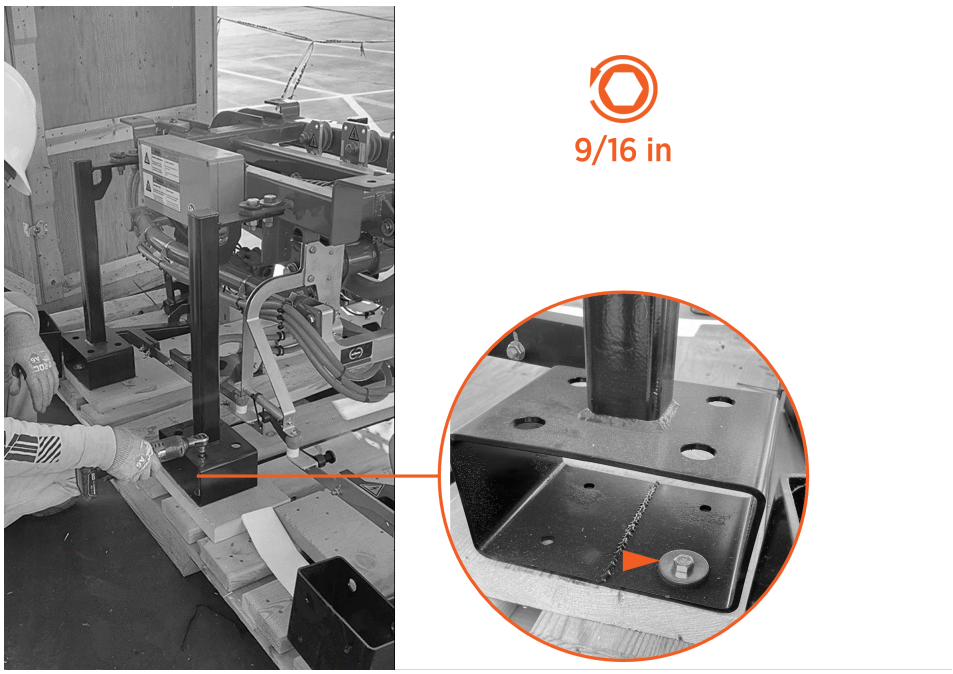
Uncrate and Prepare Pantograph

To uncrate and prepare the pantograph, complete the following steps:

1. Remove protective wrapping and uncrate the pantograph.



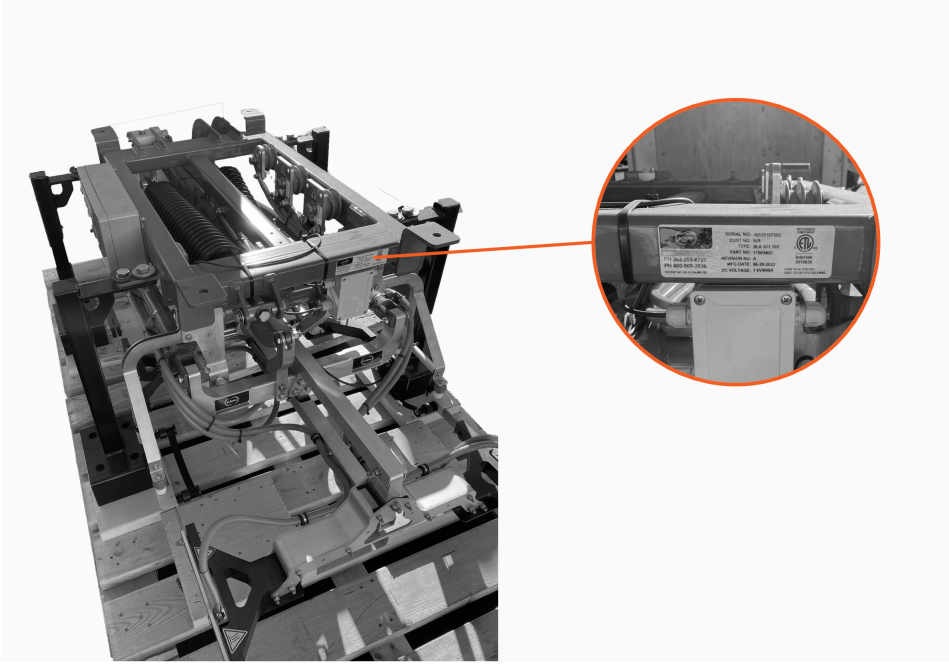
2. Remove the pallet bolts (x4).



3. On the frame of the pantograph, mark the location of the high voltage DC terminals (positive, negative and ground).

4. Photograph the label on the pantograph and submit the photograph to the project manager.

IMPORTANT: If there are multiple pantographs being installed at the site, ensure there is some way to match each photograph to its corresponding pantograph. The label contains information required to complete commissioning, and will be difficult to view after the pantograph is installed at final height.



Prepare Mounting Surface

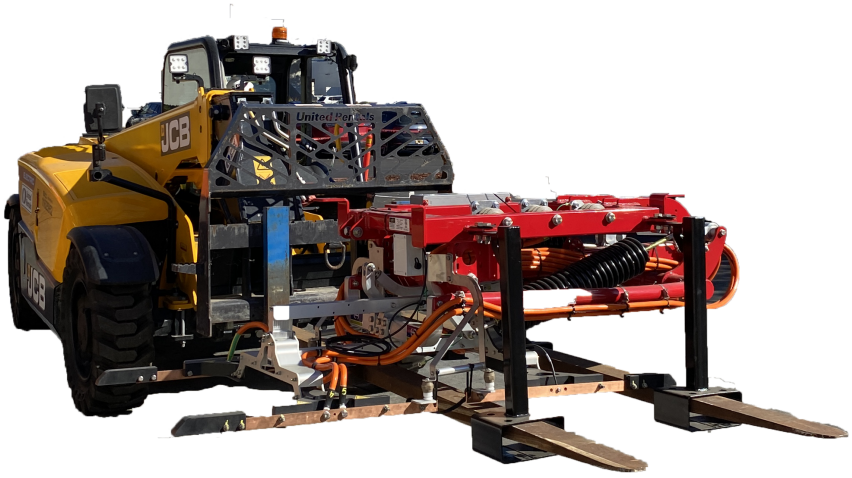
To prepare the mounting surface, follow the instructions below:

1. Identify the pantograph mounting location per the site plan.
2. Mark the locations of the mounting holes or studs.
3. Prepare the mounting holes or studs. Consult the site plan for any site-specific requirements.

Mount Pantograph

To mount the pantograph, complete the following steps:

1. Insert forklift tines into pantograph lifting brackets.

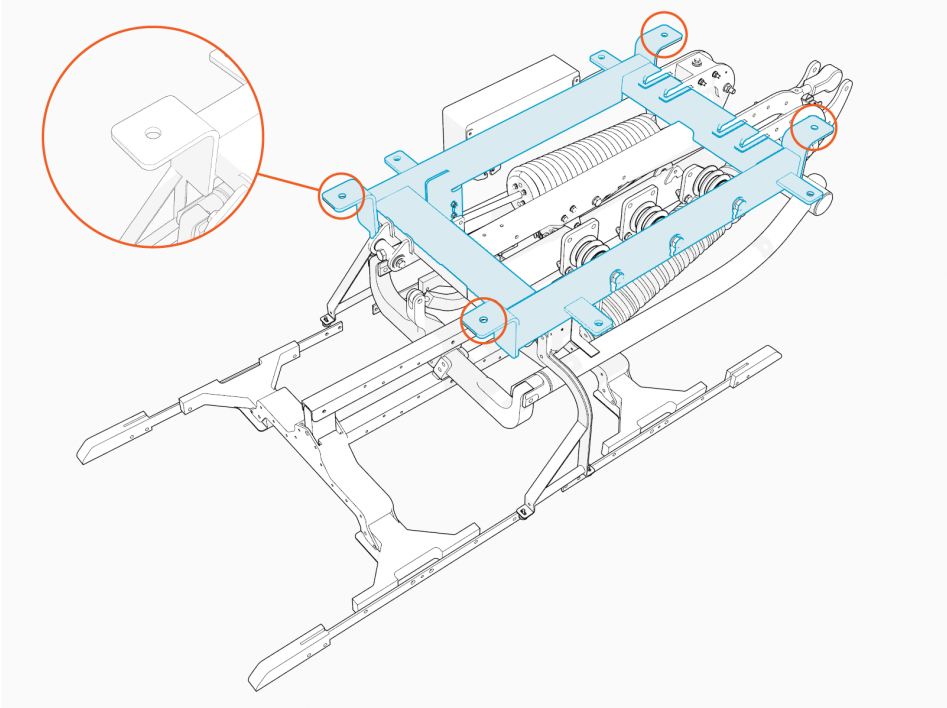


2. Lift and transport the pantograph to its mounting location.

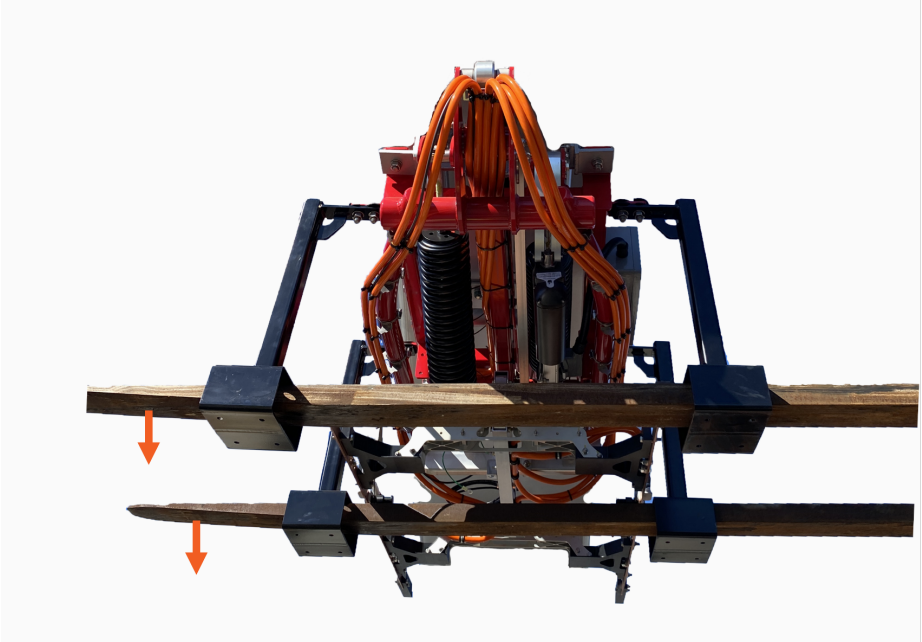
IMPORTANT: Check the site plan to confirm the pantograph installation orientation. Be careful you do not install the pantograph rotated 180 degrees from intended orientation. The system will not operate successfully if the pantograph is incorrectly installed.

3. Attach the pantograph to the mounting platform using the main mounting supports. Install fasteners called for by the site plans. Torque to the specification indicated in the site plans.

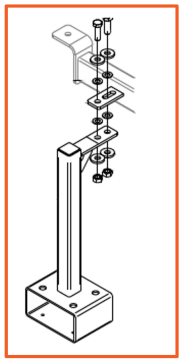
   Note: Contractor provides fasteners. Site plans must specify fasteners appropriate for mounting surface and rated to secure the weight of the pantograph and the auxiliary components.



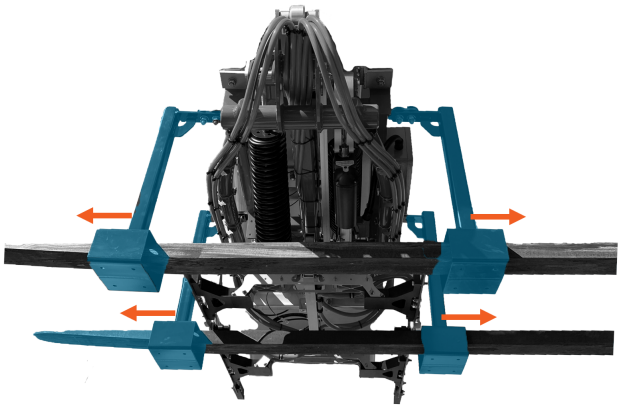
4. Lower the forklift tines slightly to release the weight of the pantograph. Do not remove the forklift from the pantograph lifting brackets.



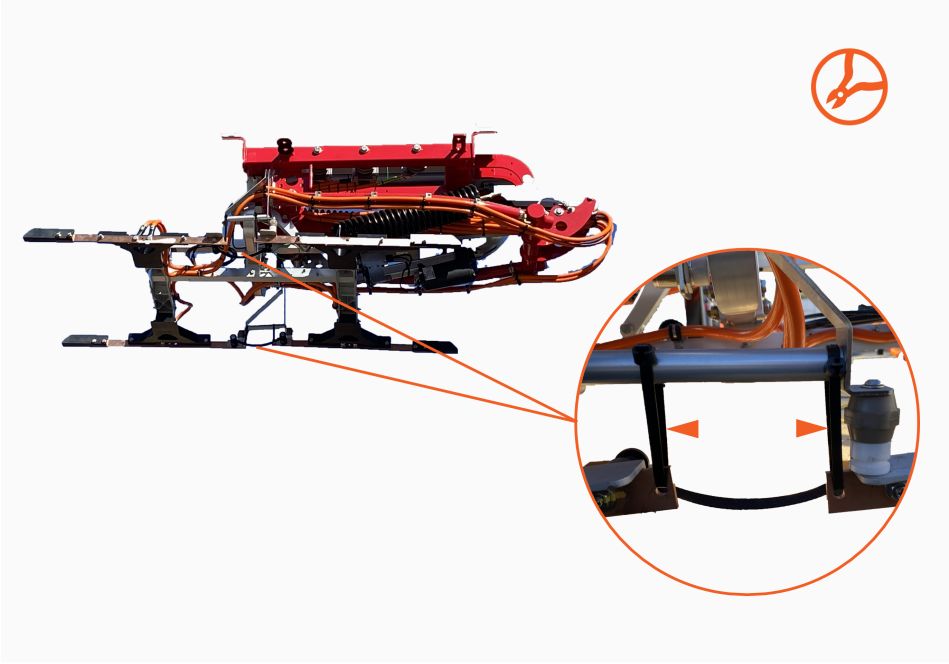
5. Remove fastener to release the pantograph lifting bracket (x4). Slide the brackets off the forklift tines or up against the forklift.



15/16 in



6. Remove the forklift.
7. Cut and remove zipties (x4) to free the pantograph charging rails.



Mount Power Link 2000 4

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Warranty Limitation

- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

CAUTION: While installing fasteners inside enclosures, make sure not to drop the fasteners inside conduit openings. You may use conduit caps or covers to temporarily cover the conduit openings.

Parts Needed

To prepare for Power Link 2000 mount, find the following parts:

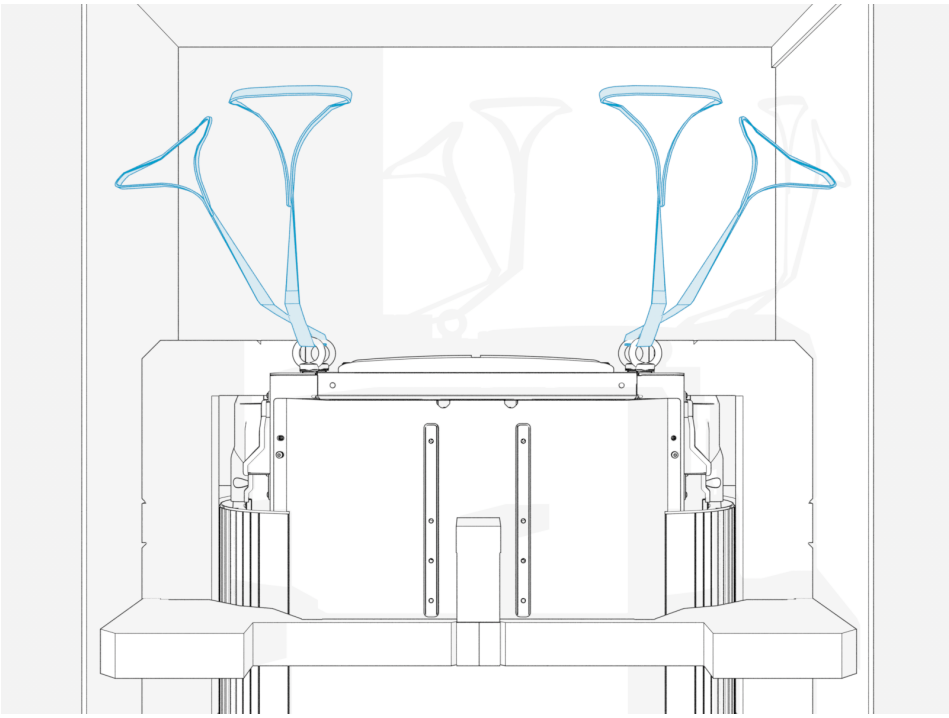
- Power Link 2000 assembly
- Power Link 2000 wall mount kit

Prepare Power Link 2000 Site

1. Identify the Power Link 2000 mounting location per the site plan.
2. Use the mounting bracket as a template to determine placement. Measure position and ensure level placement. Mark the locations of the mounting holes or studs.
3. Prepare the mounting holes or studs. Consult the site plan for any site-specific requirements.

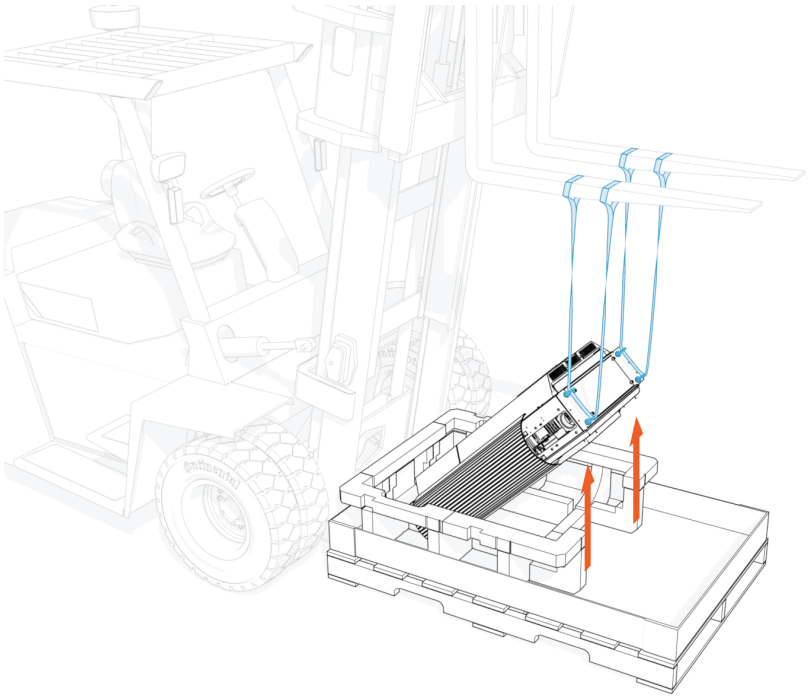
Lift Power Link 2000

1. At the top of the Power Link 2000, locate four preinstalled eye bolts and lifting straps.



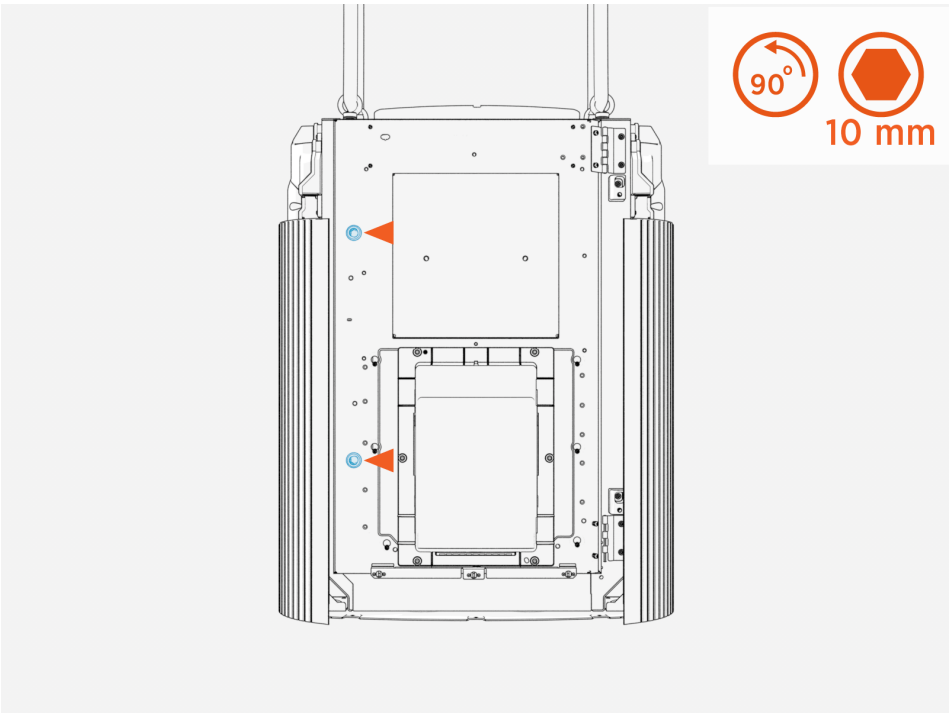
2. Lift up the Power Link 2000 by the lifting straps to eye level.

   Note: Use a forklift or service cart with retaining straps.

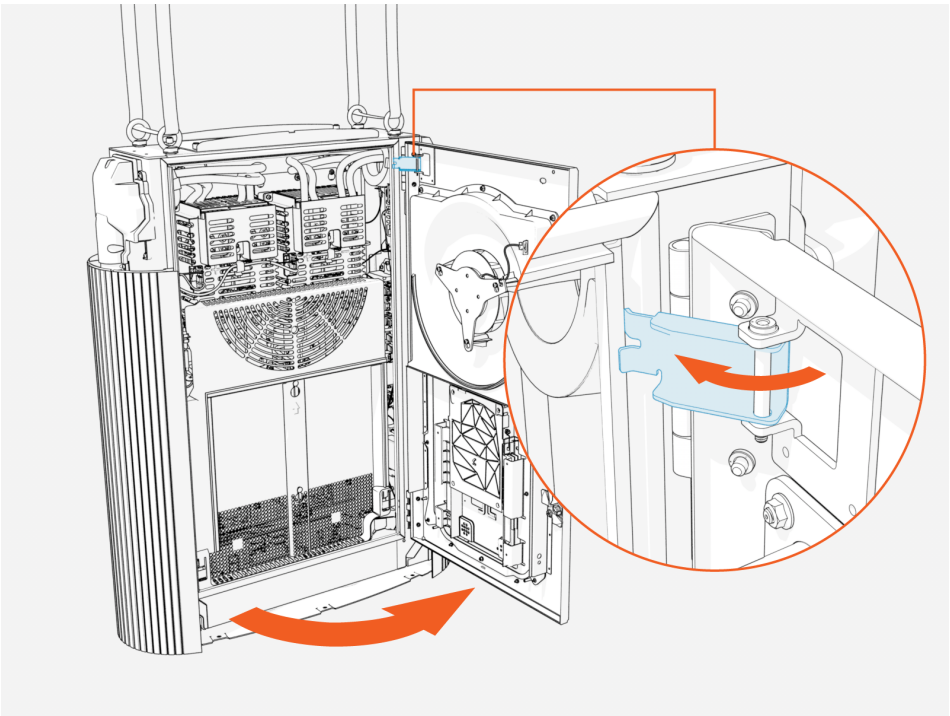


Open Power Link 2000

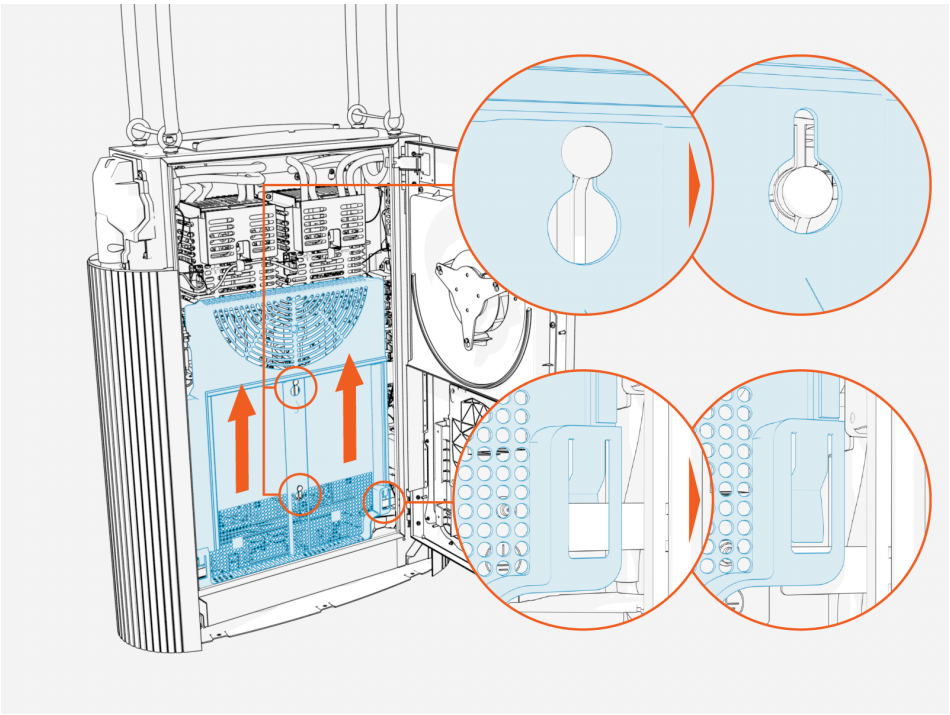
1. Quarter turn the door latches (x2) to unlock the door.



2. Open the door and engage the door stopper.

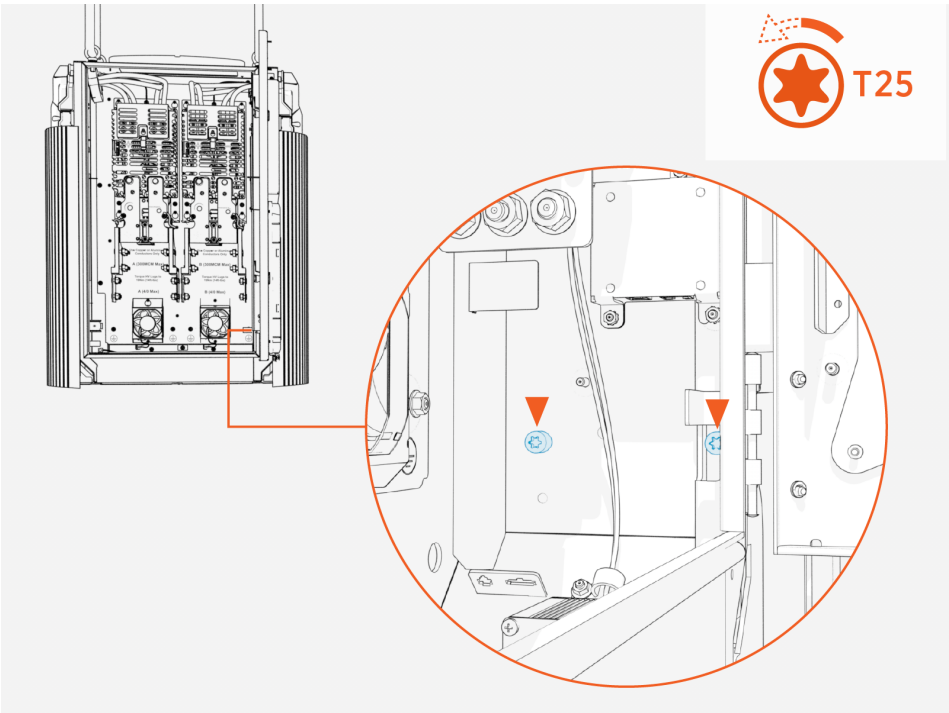


3. Slide the internal bus bar safety cover up to remove from hooks (x2) and latches (x2).

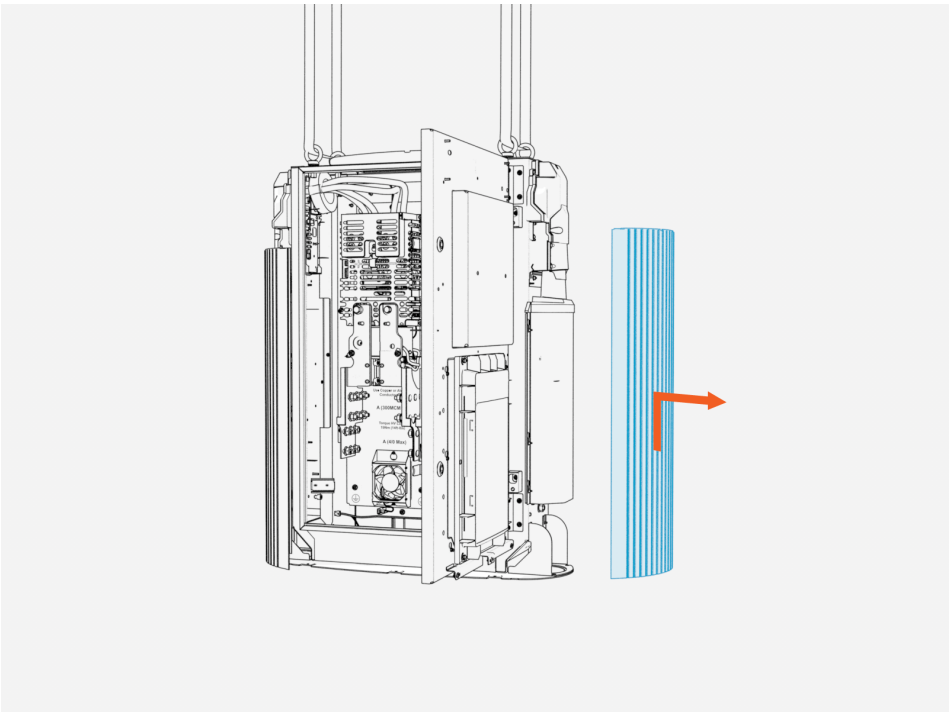


Remove Side Covers

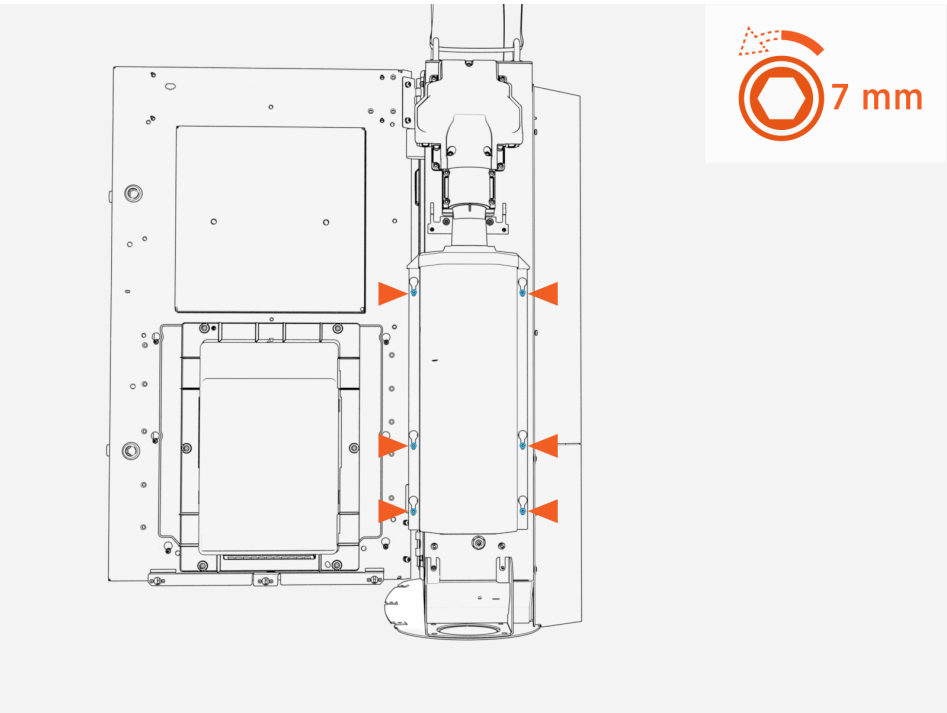
1. Loosen captive screws (x2) on the interior right wall of enclosure.



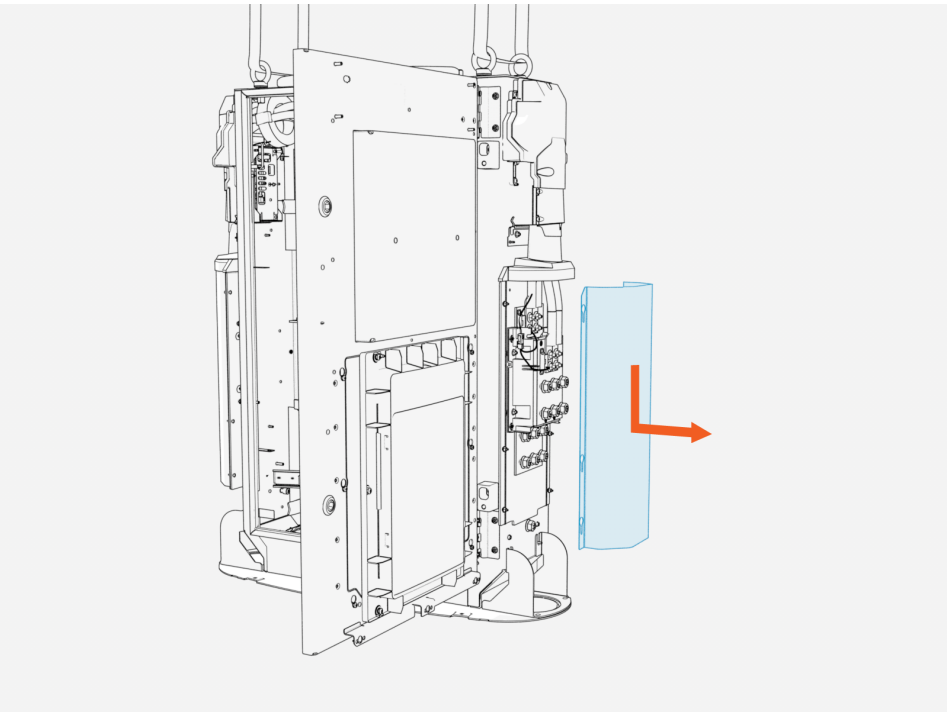
2. Slide the right side panel upward to release it from the Power Link 2000 frame. Remove the panel.



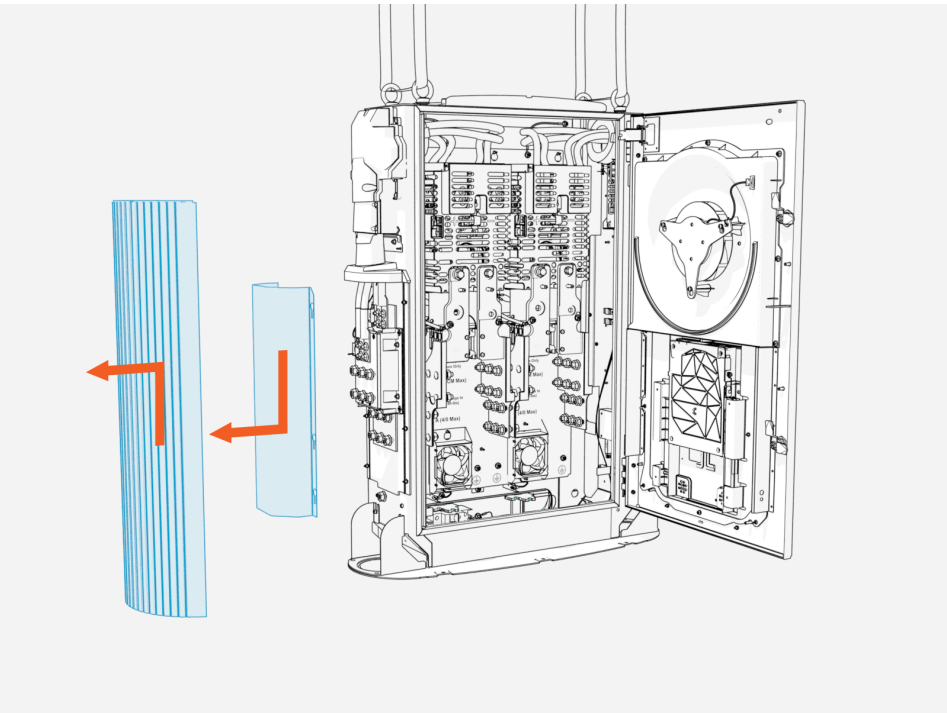
3. Loosen (do not remove) nuts (x6) at the right external bus bar safety cover.



4. Slide the safety cover downward to release it from the Power Link 2000 frame. Remove the cover.

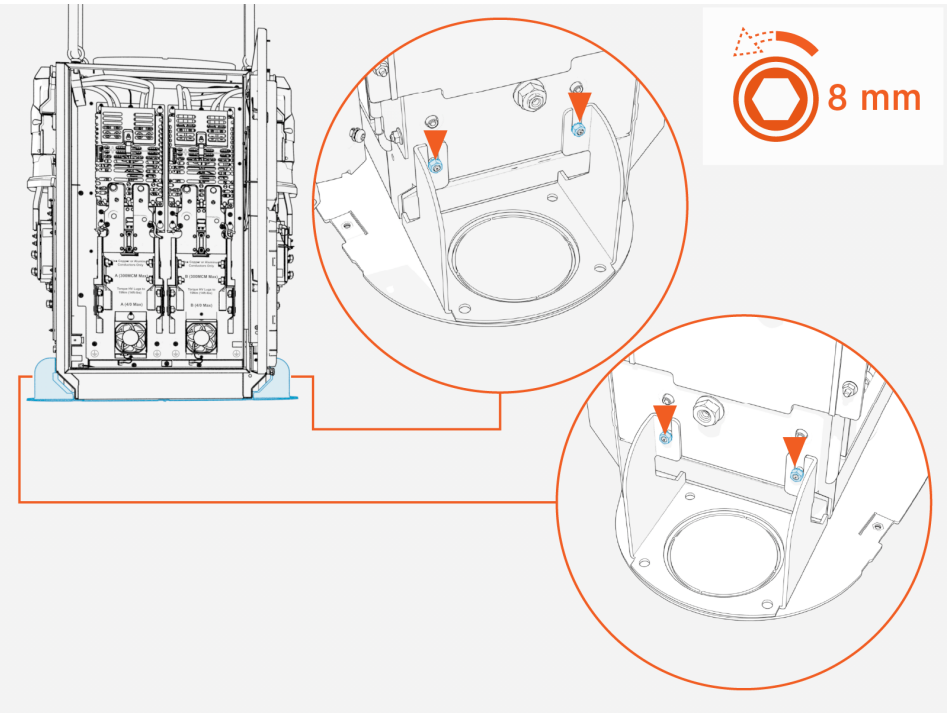


5. Repeat steps above to remove the left side extrusion and safety cover.

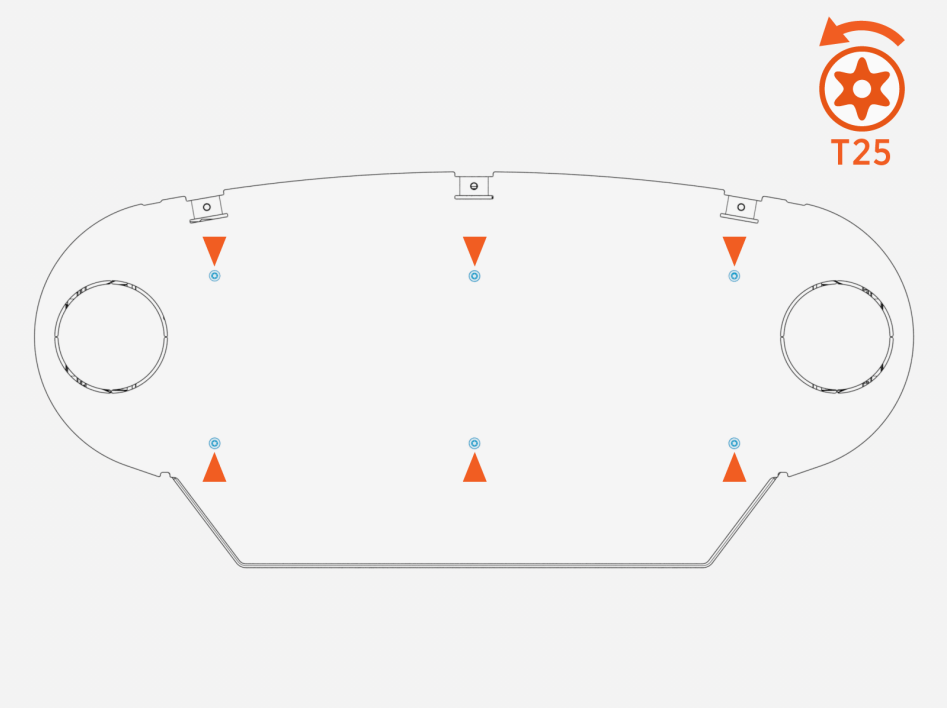


Prepare Gland Plate

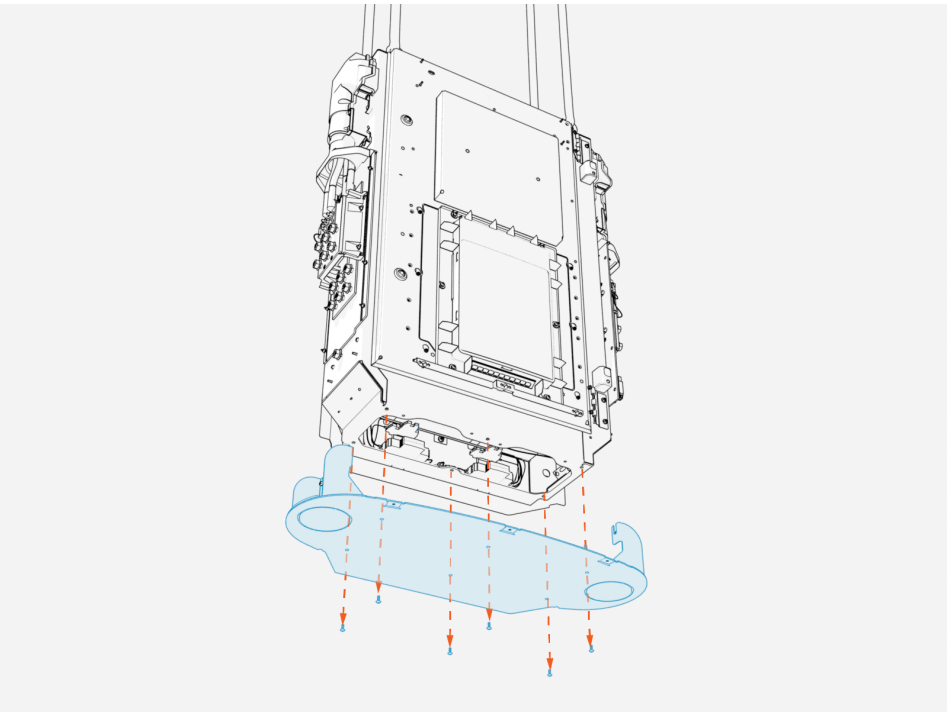
1. Loosen (do not remove) nuts securing the bottom gland plate at the left and right sides of the Power Link 2000 (x2 nuts each side).



2. Remove screws (x6) securing the gland plate at the bottom of the Power Link 2000. Save screws for later reinstall.

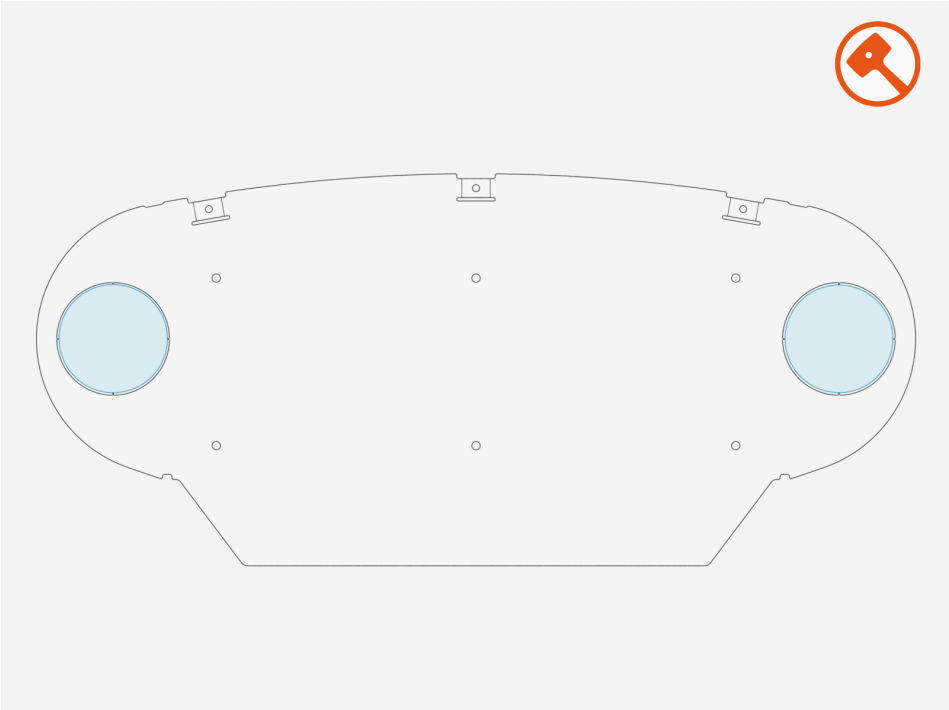


3. Remove the gland plate.



4. Consult the site plan to determine if the Power Link 2000 requires one or two HV DC output conduits for HV DC wires connecting to pantograph(s). Remove the conduit knockouts accordingly.

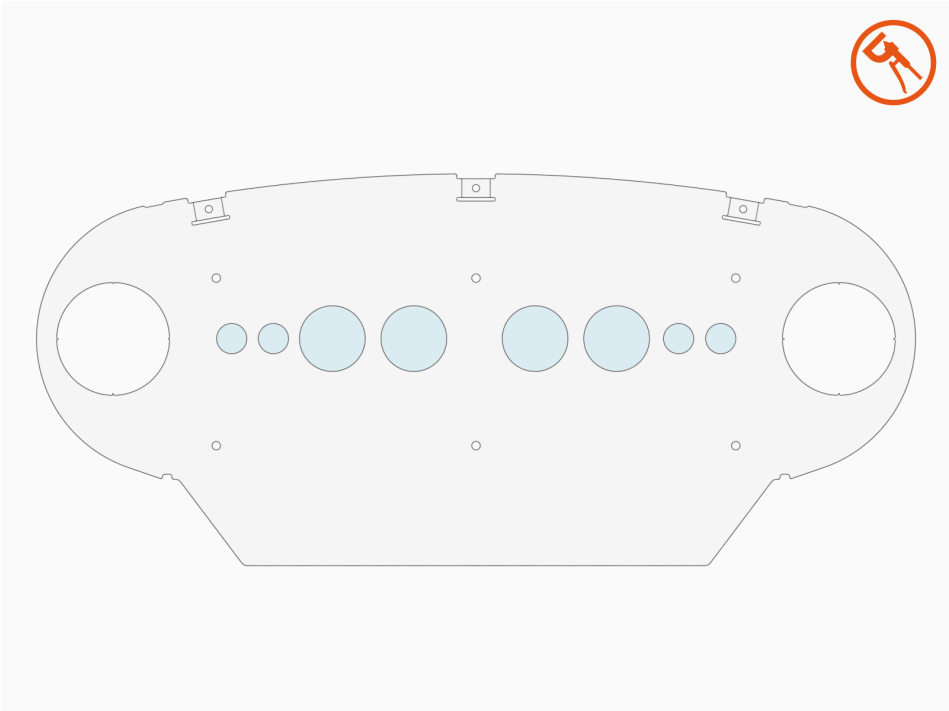
   Note: For single output Power Link 2000, remove only the right-side knockout.



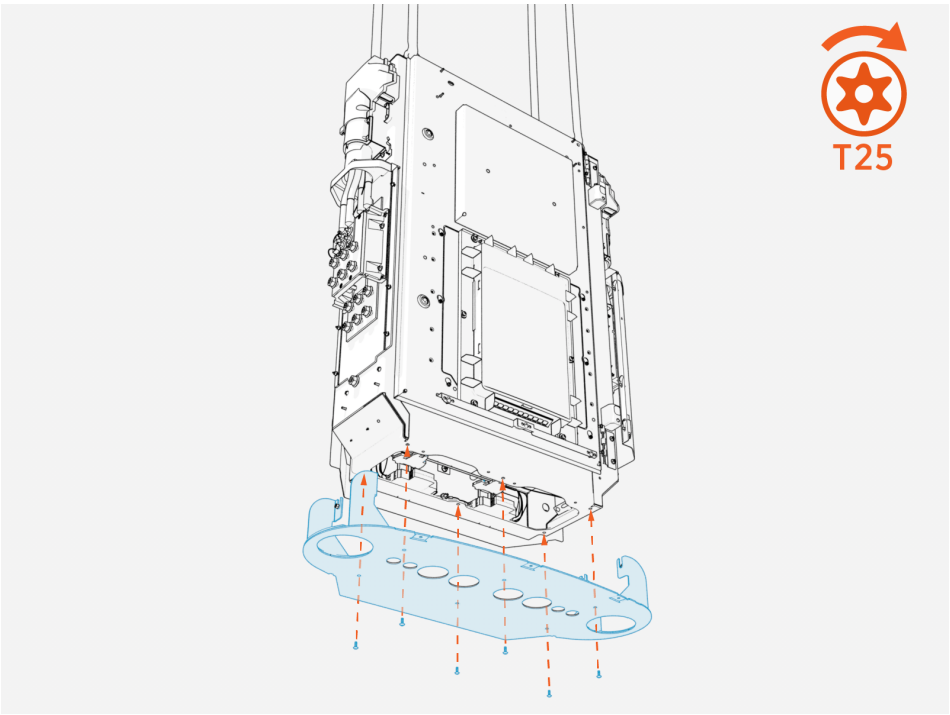
5. Consult the site plan to identify the remaining HV DC and LV DC conduits required for the Power Link 2000. Use a hydraulic hole punch to create the needed conduit openings.

IMPORTANT:

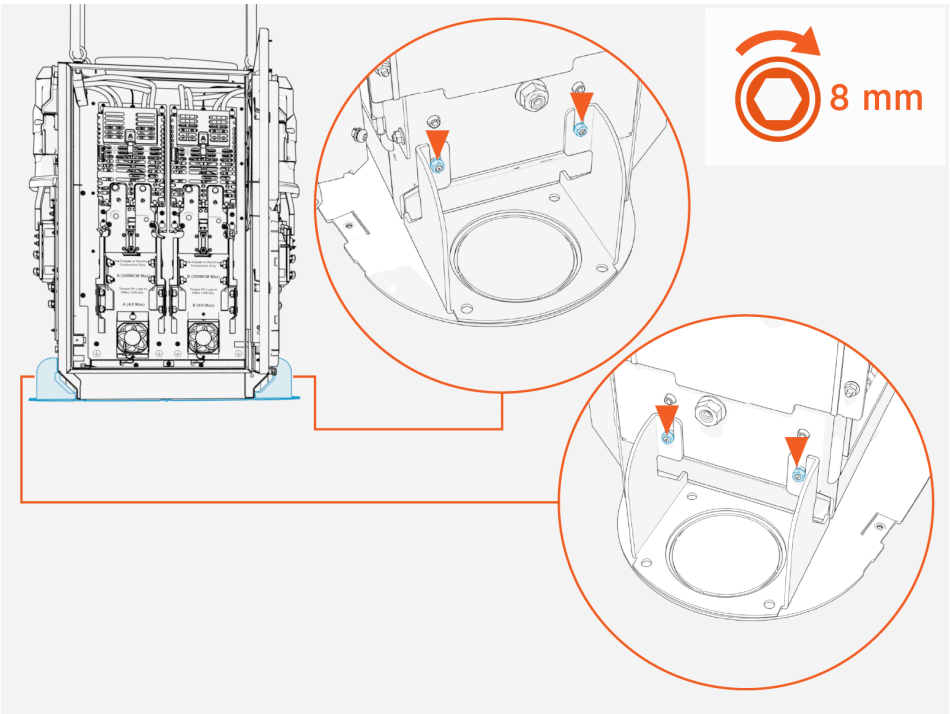
- There is limited space within the Power Link 2000 for bending HV DC wires. HV DC conduit holes must be punched at a location that aligns wire entry with their intended power path landings. See Wiring Overview for more information.
- Illustrations in this guide depict a sample conduit configuration. Actual conduit quantity, size, and position at the gland plate will vary by site.



6. Reinstall the gland plate with bottom screws (x6). Torque to **4.5 Nm (40 in-lb)**.



7. Reinstall nuts to secure the gland plate to the left and right sides of the Power Link 2000 (x2 nuts each side). Torque to **4.5 Nm (40 in-lb)**.

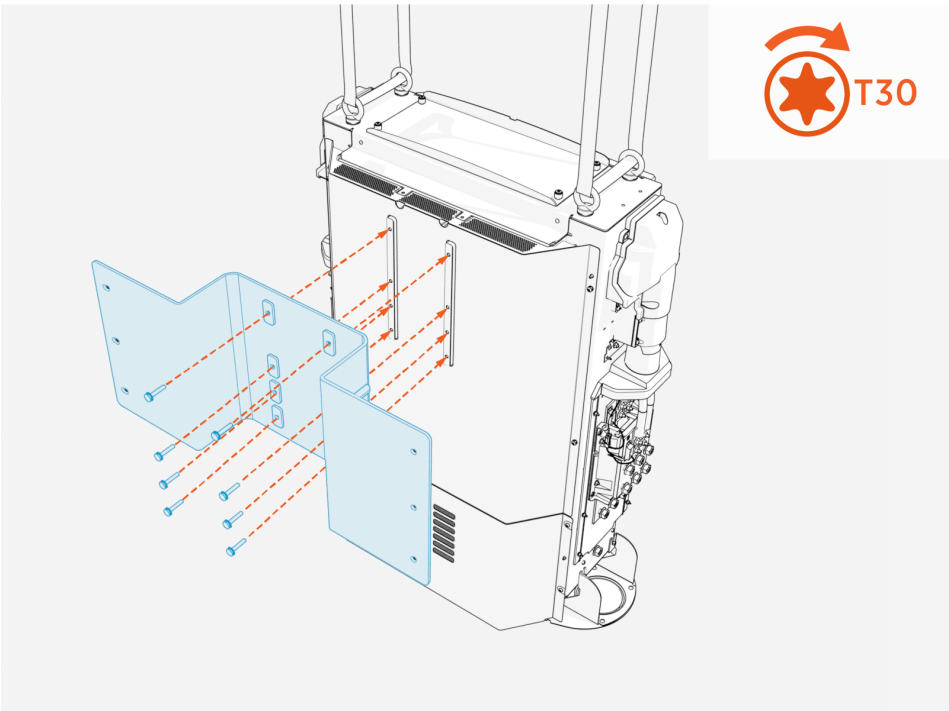


8. Disengage the door stopper and close the Power Link 2000 door.

Mount Power Link 2000

1. Attach the mounting bracket to the back of the Power Link 2000 with M6 screws (x8). Torque to **5.6 Nm (50 in-lb)**.

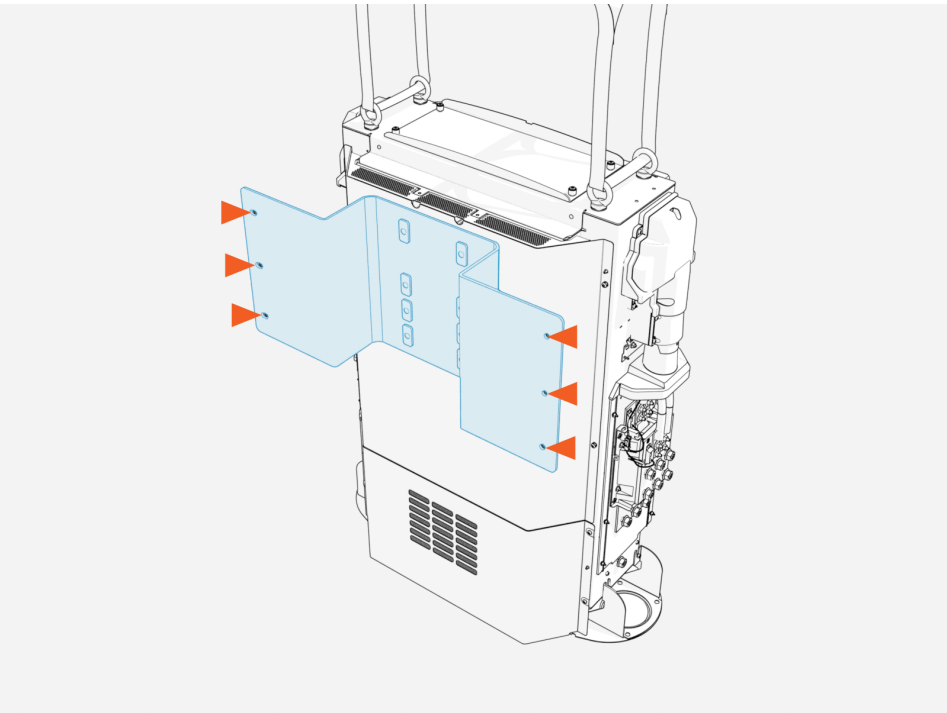
   IMPORTANT: After attaching the bracket, double-check the fasteners to ensure they are torqued to the correct value.



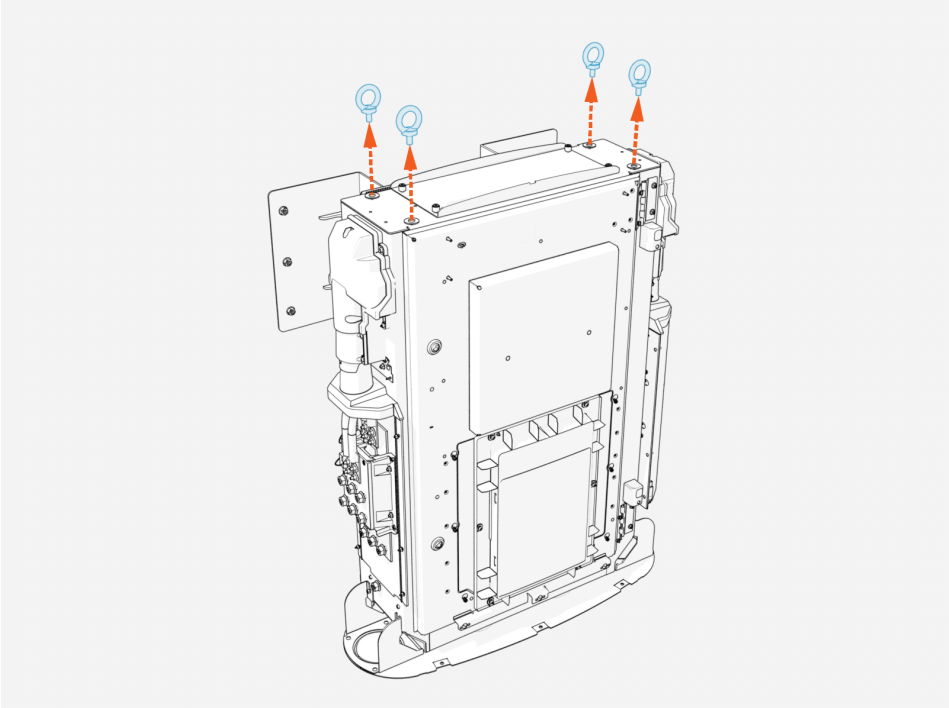
2. If installing Power Link 2000 in a space where the overhead clearance does not meet the minimum requirement (305 mm or 12 in from top of Pantograph Down 2000), install forklift brackets. Contact ChargePoint for details.

3. Mount the Power Link 2000 with fasteners (x6). Use fasteners specified by the site plan. Torque to the specification indicated by the site plan.

IMPORTANT: Contractor provides the fasteners. Site plans must specify fasteners appropriate for the mounting surface and rated to secure the weight of the Pantograph Down 2000. After mounting the enclosure, double-check the fasteners to ensure they are torqued to the correct value.



4. Release the lifting straps and remove the eye bolts (x4) and rubber washers (x4). Use either an adjustable wrench or screwdriver's shaft to loosen the eye bolts.

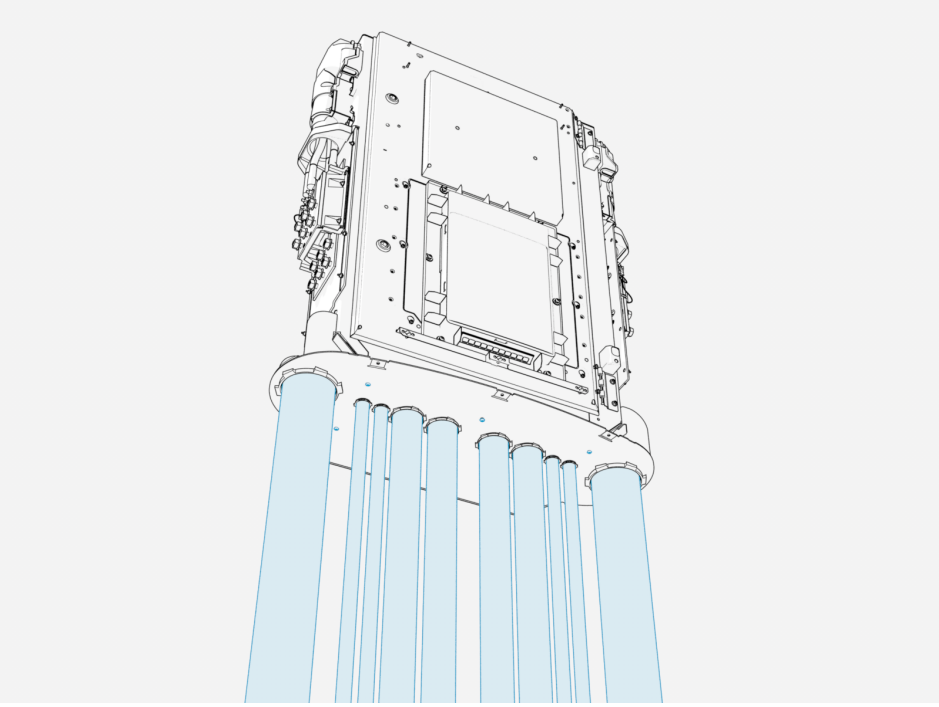


Connect Power Link 2000 Conduits

Connect conduits to the bottom gland plate.

IMPORTANT:

- Use suitable fittings to secure and seal conduits to the enclosure. Conduits must be sealed to maintain a Pollution Degree 2 environment.
- Illustrations in this guide depict a sample conduit configuration at the bottom gland plate. Actual conduit quantity, size, and position at the gland plate will vary by site.



Save Parts

Safely set aside the side covers, external bus bar safety covers, and internal bus bar safety cover. These parts will be reinstalled when completing the Pantograph Down 2000 system install.

Mount PD Controller 5

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Warranty Limitation

- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

CAUTION: While installing fasteners inside enclosures, make sure not to drop the fasteners inside conduit openings. You may use conduit caps or covers to temporarily cover the conduit openings.

Parts Needed

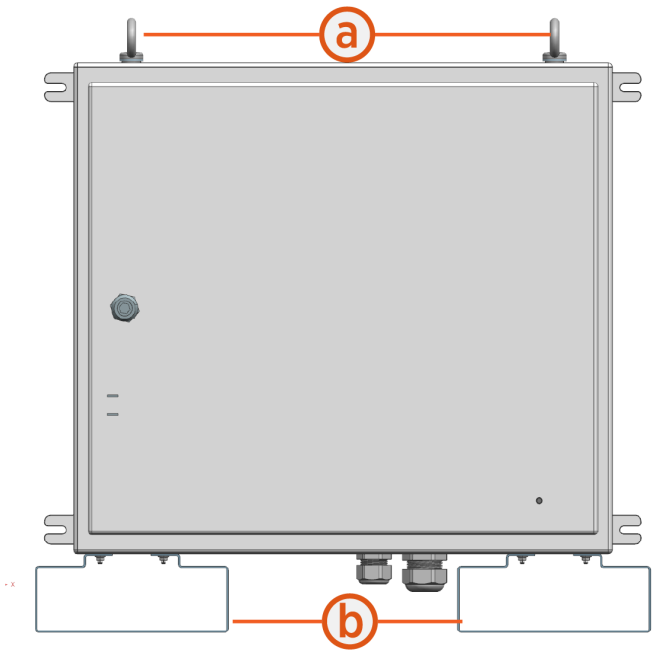
Only one part is needed, the PD Controller.

Prepare PD Controller Site

1. Identify the PD Controller mounting location per the site plan.
2. Mark the locations of the mounting holes or studs. Ensure level placement.
3. Prepare the mounting holes or studs. Consult the site plan for any site-specific requirements.

Mount PD Controller

1. Based on the site configuration and available space, determine a method for lifting and transporting the PD Controller with a forklift. The enclosure can be transported using the hardware components shown below.



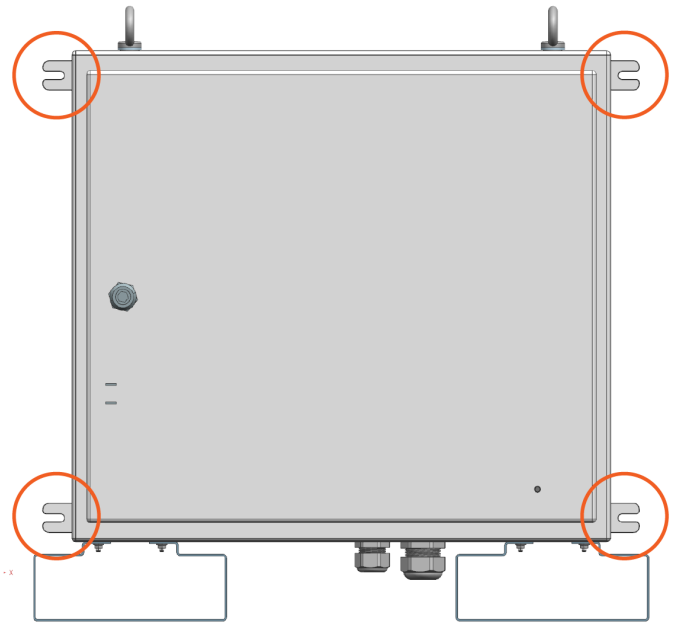
   (a) Eye bolts (x2): May be threaded with the lifting straps previously used to lift the Power Link 2000

   (b) Lifting brackets (x2): May be slotted onto forklift tines

2. Lift and transport the PD Controller to its mounting location.

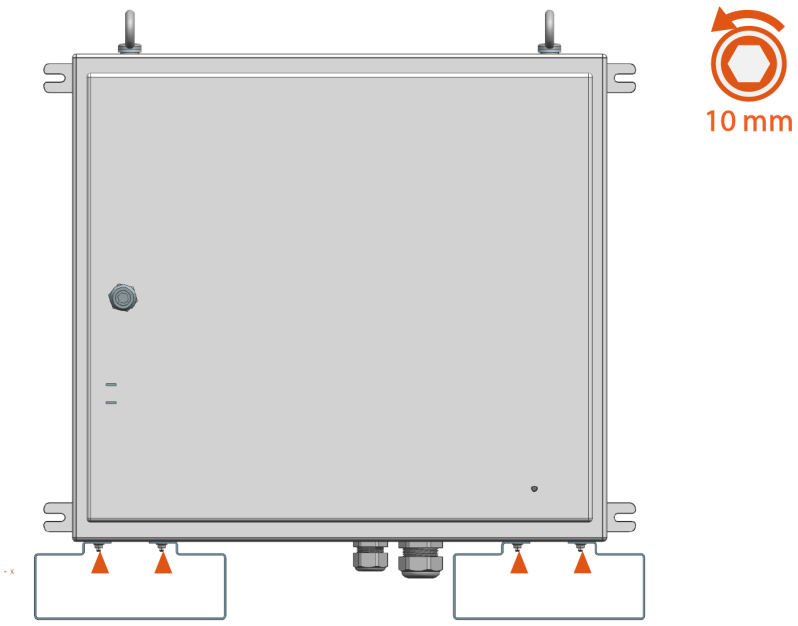
3. Mount the PD Controller with fasteners (x4). Use fasteners specified by the site plan. Torque to the specification indicated by the site plan.

   Note: Contractor provides the fasteners. Site plans must specify fasteners appropriate for the mounting surface and rated to secure the weight of the PD Controller.



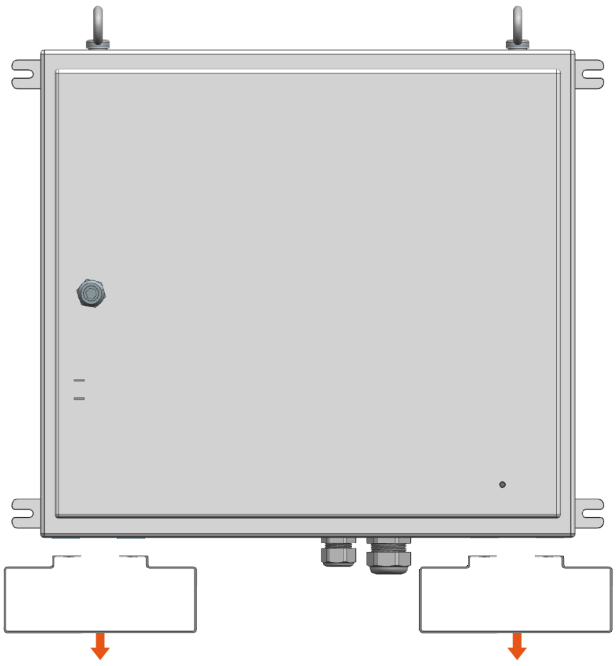
4. Remove the forklift.

5. Remove nuts at lifting brackets (x4 nuts per bracket).

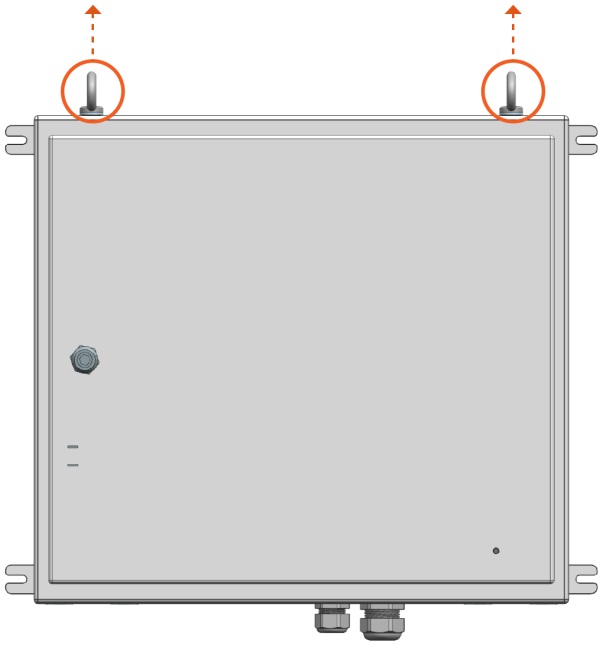


6. Remove lifting brackets.

   Note: Keep lifting brackets for any future removal of the PD Controller (as needed).

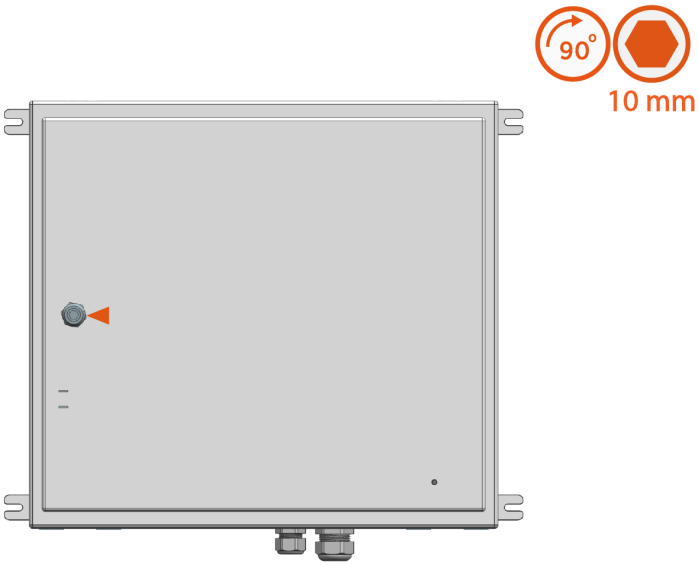


7. Remove the eye bolts and washers (optional). Use either an adjustable wrench or screwdriver's shaft to loosen the eye bolts.

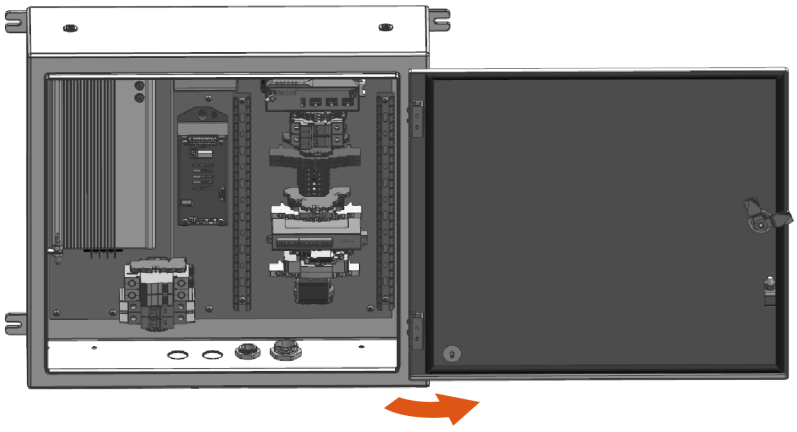


Open PD Controller

1. Quarter turn the door latch to unlock the door.

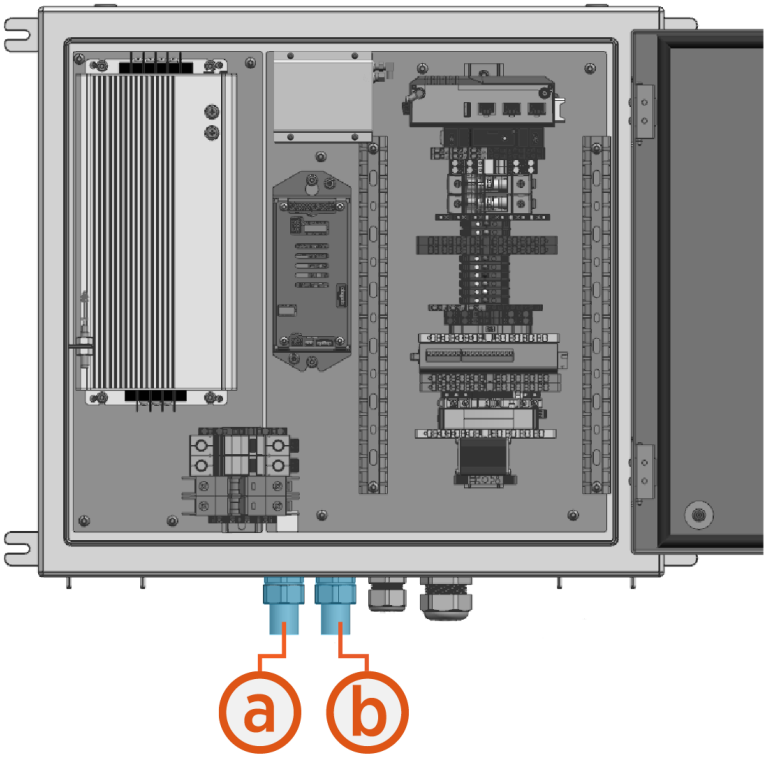


2. Open the enclosure.



Connect PD Controller Conduits

1. Connect AC and LV input conduits to the bottom of enclosure.

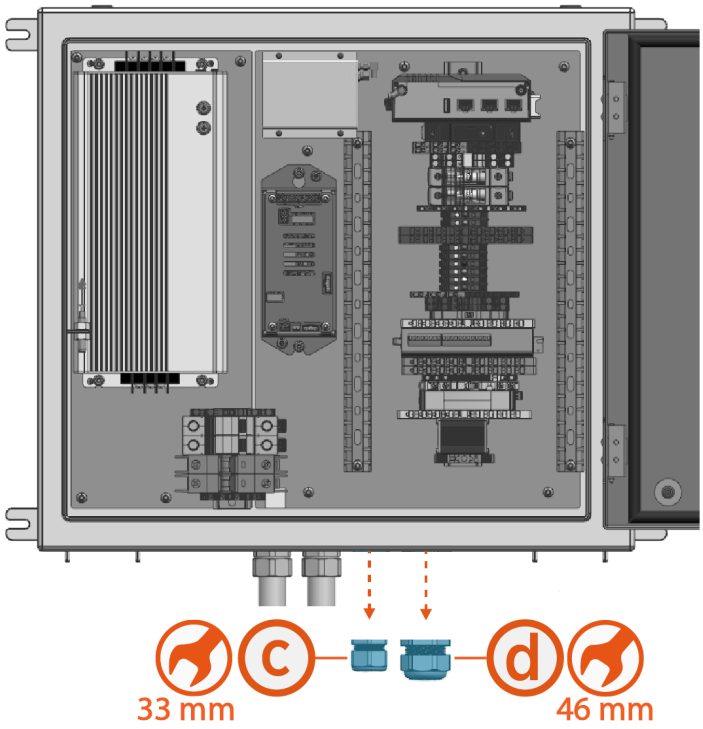


(a) AC input conduit

(b) LV input conduit

2. If the site plan calls for the antenna cables or the controller interface cable to enter the PD Controller through conduit, take the following steps:
    a. Remove the cable gland(s).

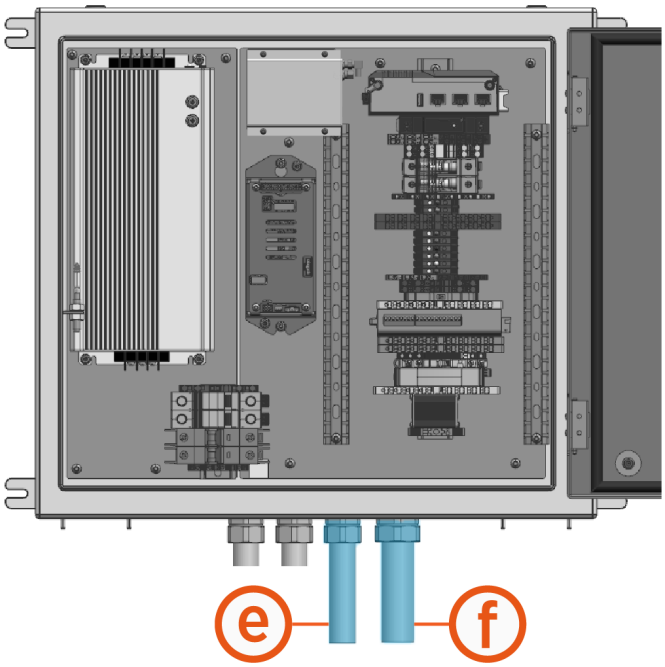
IMPORTANT: Save all conduit gland parts for later reuse. Do not discard.



(c) Wi-Fi and RFID antenna cable gland

(d) Controller interface cable gland

b. Connect conduits to the bottom of enclosure.

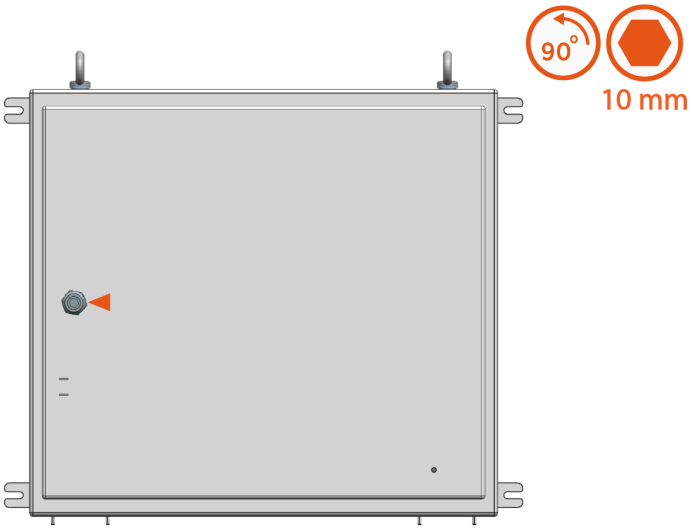


(e) Wi-Fi and RFID antenna cable conduit

(f) Controller interface cable conduit

Close PD Controller

Close the PD Controller and quarter turn to lock door.



Note: The Pantograph Down 2000 system may take more than a single day to install. Close and lock the enclosure if leaving a site for the day.

Connect Power Link 2000 Wires 6

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Warranty Limitation

- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
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CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

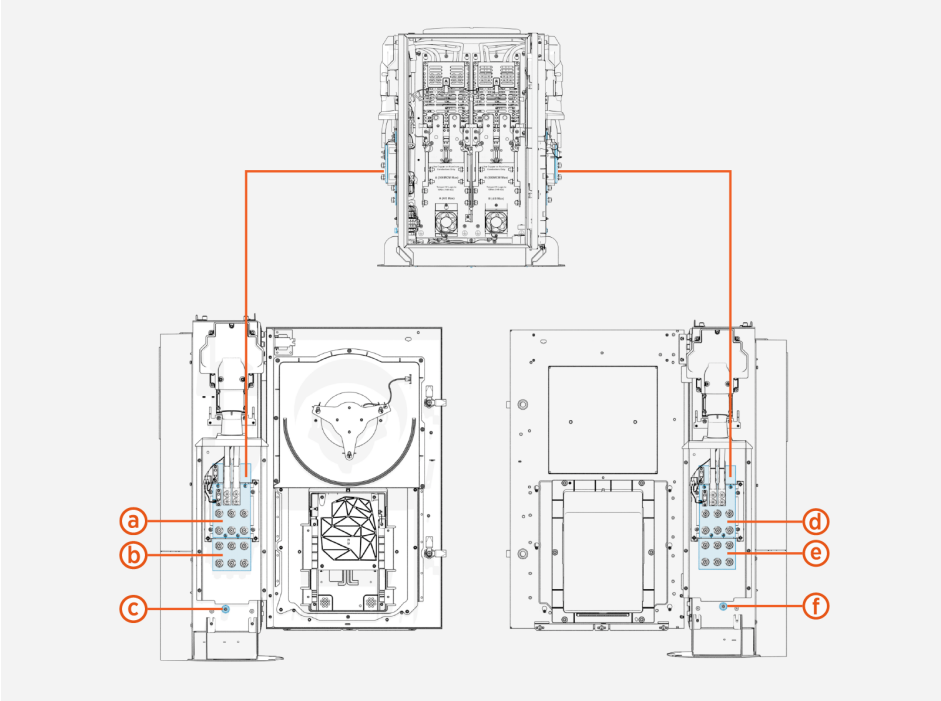
CAUTION: While installing fasteners inside enclosures, make sure not to drop the fasteners inside conduit openings. You may use conduit caps or covers to temporarily cover the conduit openings.

Wiring Overview

In the Pantograph Down 2000 system, the Power Link 2000 has wiring connections to the pantograph, PD Controller, and to Power Block and/or other Power Link 2000s. Before pulling and connecting wires at the Power Link 2000, study and understand the wiring information provided below. For wire quantities, sizes, and terminations, see Wires and Terminations Required for Site and refer to the site drawing.

HV DC Output To Pantograph

Power Link 2000 provides HV DC output power for up to two pantographs, designated Pantograph L and Pantograph R. The HV DC output wires land on the exterior left and right sides of the Power Link 2000 at the terminals shown below.



(a) HV DC out L, positive (+)
(b) HV DC out L, negative (-)
(c) Ground L
(d) HV DC out R, positive (+)
(e) HV DC out R, negative (-)
(f) Ground R

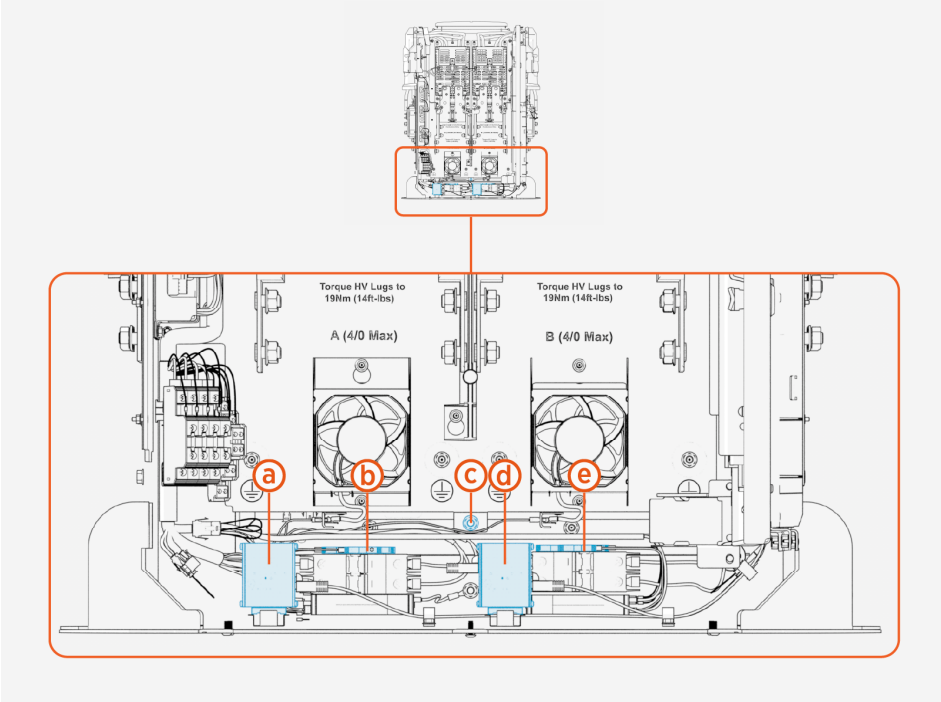
Note: Two grounds wires land at each ground stud **(c)** and **(f)**:

- Ground to the pantograph PE rail
- Ground to the pantograph frame

The ground wire lugs stack one on top of the other at the stud.

LV DC Output to PD Controller

Power Link 2000 is configured with LV DC output, Ethernet, and chassis ground connection to each PD Controller paired with a pantograph. The wires and cables land within the interior of the Power Link 2000 enclosure at the terminals shown below.



(a) Ethernet, L
(b) LV DC out, L
(c) Chassis ground
(d) Ethernet, R
(e) LV DC out, R

IMPORTANT: The LV DC and Ethernet terminals designated L must connect to the PD Controller paired with Pantograph L. The LV DC and Ethernet terminals designated R must connect to the PD Controller paired with Pantograph R.

Note: If the Power Link 2000 powers two pantographs, there are two ground wires installed at stud **(c)** (one wire for each PD Controller). The wires stack one on top of the other at the stud.

HV DC From Power Block or Power Link 2000

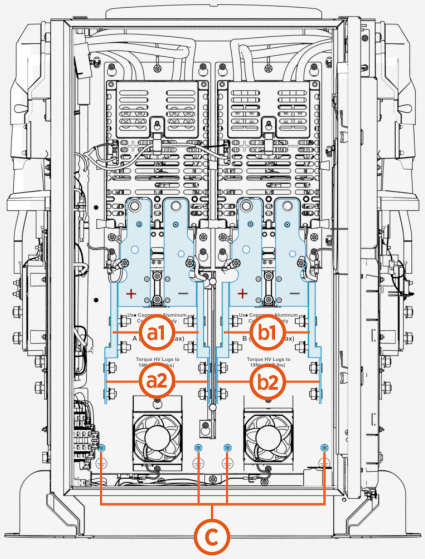
Depending on its configuration, a Power Link 2000 has one or two independent HV DC power paths, Power Path A and Power Path B. Each power path can accept connection from Power Block outputs and/or can be connected to the power path of other Power Link 2000s.

IMPORTANT: Each Power Block has two HV DC power outputs, Output A and Output B. Although the Power Link 2000 power paths and Power Block outputs are similarly named, it does not mean Output A of a Power Block must connect to Power Path A of a Power Link 2000. Output A of a Power Block may connect to either Power Path A or B of a Power Link 2000. Likewise, Output B of a Power Block may connect to either Power Path A or B of a Power Link 2000. The A and B designations serve only to identify distinct power paths and outputs in each product. The same principle applies to the interconnection of power paths between Power Link 2000s.

Consult the site single line diagram carefully to understand the Power Block/Power Link 2000 interconnections specific for your site.

Note: Single output Power Link 2000s (Power Link 2000s that support one pantograph only) ship with Power Path B only.

Wires connecting to Power Link 2000 power paths land within the interior of the Power Link 2000 enclosure at the terminals shown below. Each power path has set of upper landings and a set of lower landings.



(a1) Power Path A, upper landing

(a2) Power Path A, lower landing

(b1) Power Path B, upper landing

(b2) Power Path B, lower landing

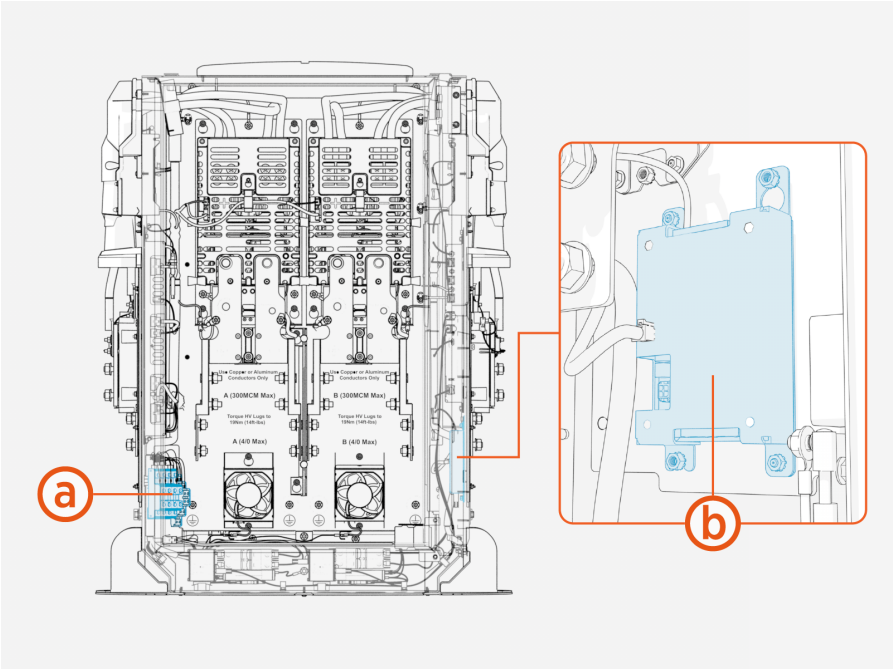
(c) Ground

Note: There are four ground studs **(c)**. In some architectures, a Power Link 2000 may need to accept more than four ground wires. In these cases, two ground wires may stack onto a single stud.

LV DC From Power Block or Power Link 2000

Each Power Link 2000 has two LV DC input ports and two LV DC output ports for connection to Power Blocks and/or other Power Link 2000s. Power Link 2000 also has three Ethernet ports for connection with Power Blocks and/or other Power Link 2000s. At minimum, each Power Link 2000 has one LV DC input and one Ethernet connection to a Power Block or Power Link 2000. Consult the site drawing. Note that Ethernet cables typically share conduit with LV DC connections coming from the same Power Block or Power Link 2000.

LV DC wires and Ethernet cables associated with these types of connections land within the interior of the Power Link 2000 enclosure at the terminals shown below.



(a) LV DC input/output

(b) Ethernet

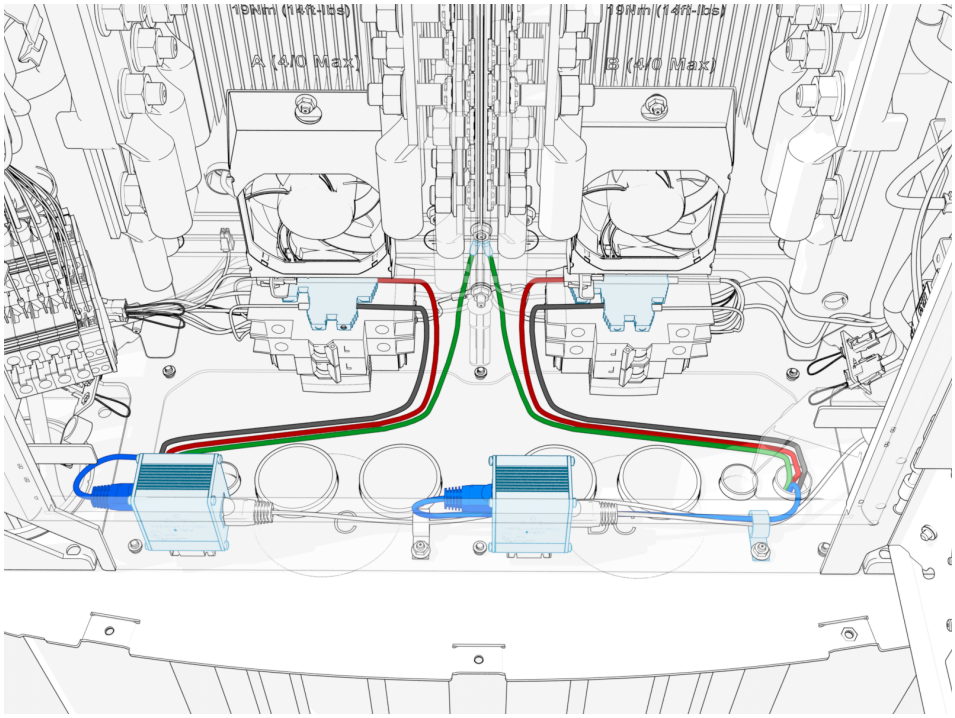
Pull, Cut, and Connect Wires

Note: Illustrations in this guide depict a sample conduit and wire configuration. Actual conduit and wire quantity, size, and placement will vary by site.

LV DC Output to PD Controller

1. Label the LV DC, Ethernet, and chassis ground wires at both ends.
2. Pull the LV DC, Ethernet, and chassis ground wires into the enclosure.

3. Connect the LV DC wires and Ethernet cables. See:
    - How to Connect LV DC Output to PD Controller Wires
    - How to Connect Chassis Ground to PD Controller Wire
    - How to Connect Ethernet Output to PD Controller Cable

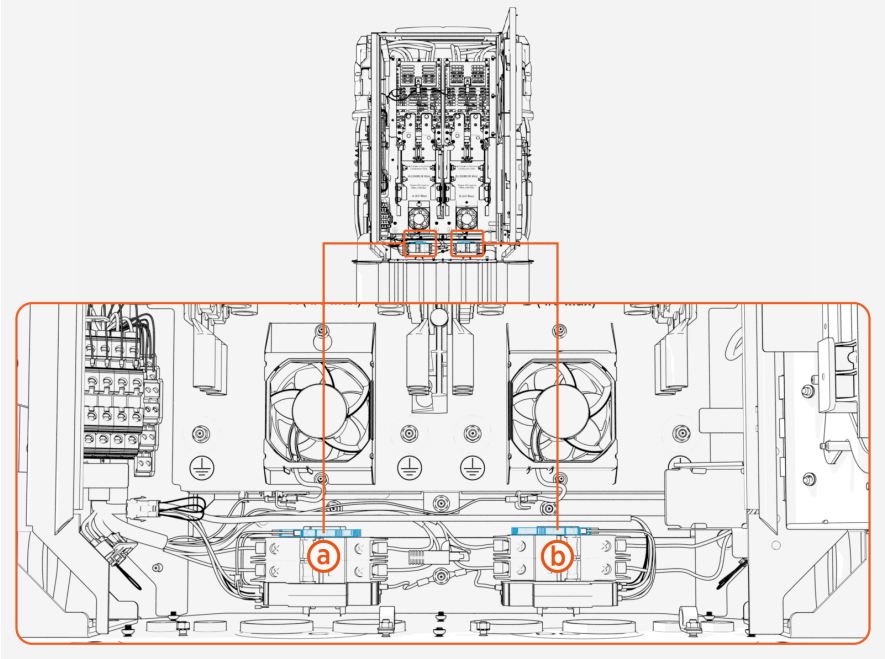


How to connect LV DC output to PD Controller wires

Follow the procedure below for each LV DC wire pair.

1. Identify the target terminal for landing the LV DC wire pair.

> **IMPORTANT:** The LV DC terminal designated L must connect to the PD Controller paired with Pantograph L. The LV DC terminal designated R must connect to the PD Controller paired with Pantograph R.

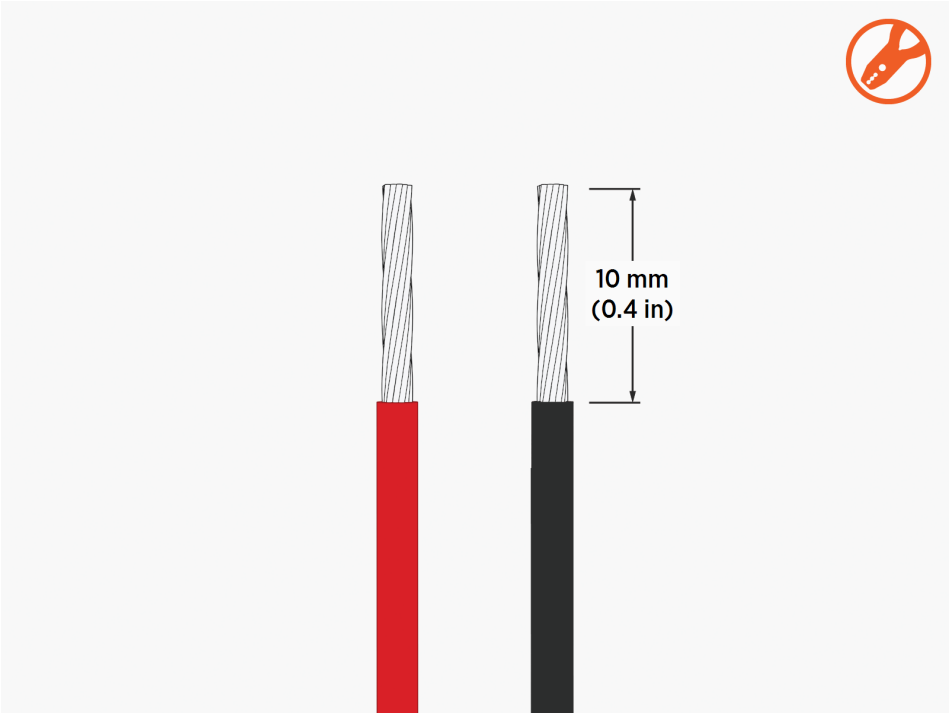


(a) LV DC output, L

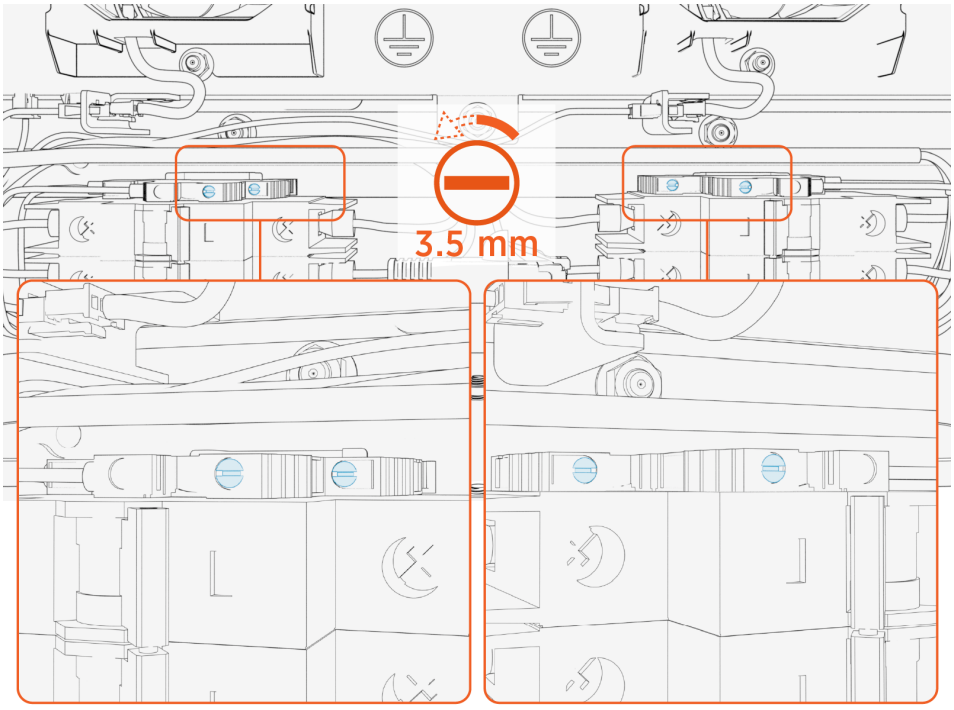
(b) LV DC output, R

2. Cut wires to length for landing at the terminal.

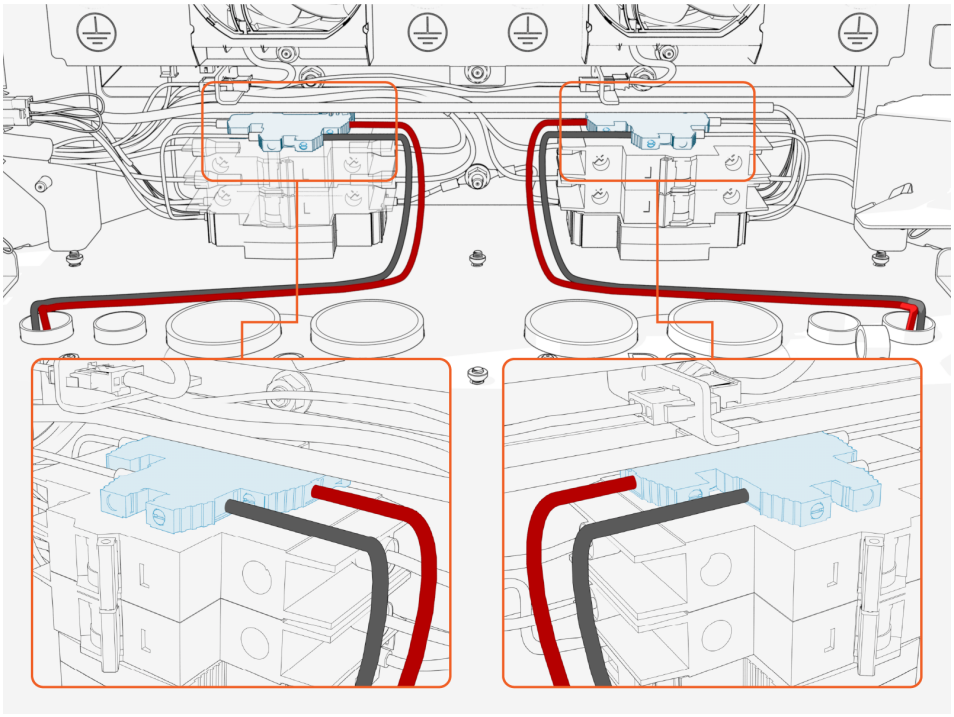
3. Strip the wire jackets.



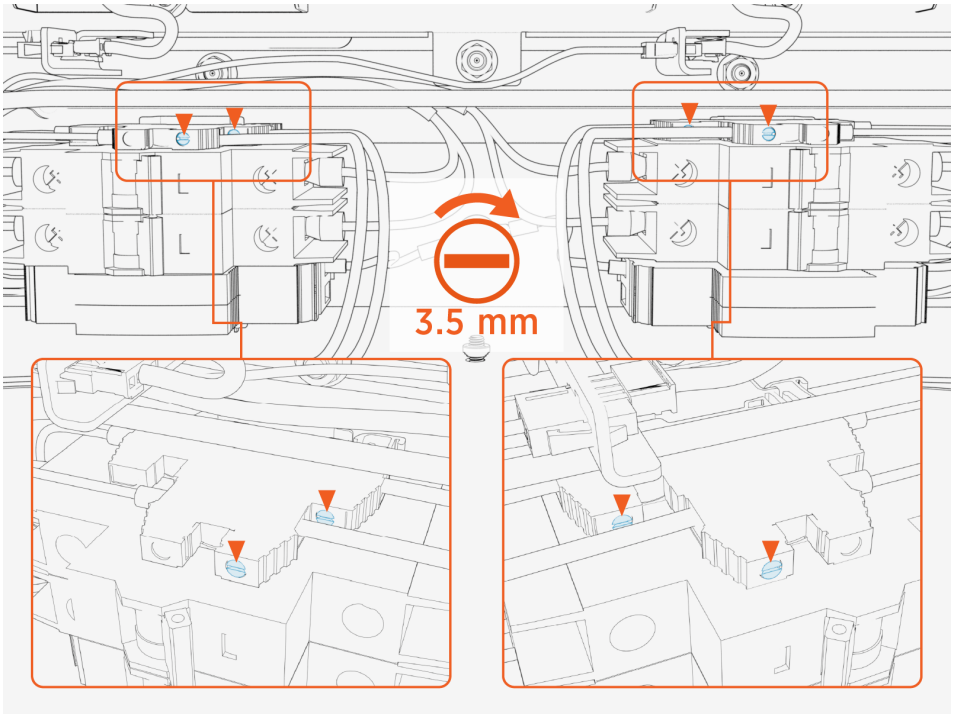
4. Loosen the terminal screws (x2).



5. Insert positive (+) wire into lower terminal (terminal closest to rear of enclosure). Insert the negative (-) wire into upper terminal (terminal closest to front of enclosure).



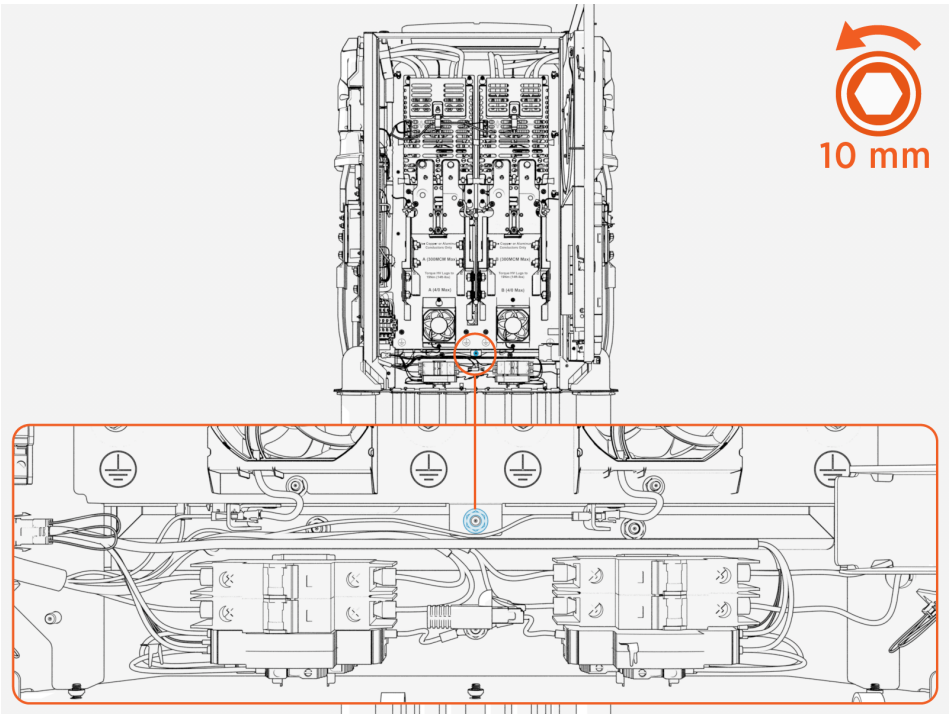
6. Torque the screws (x2) to **0.7 Nm (6.2 in-lb)**. Push-pull to test that both (+ and -) wires are secured.



How to connect chassis ground to PD Controller wire

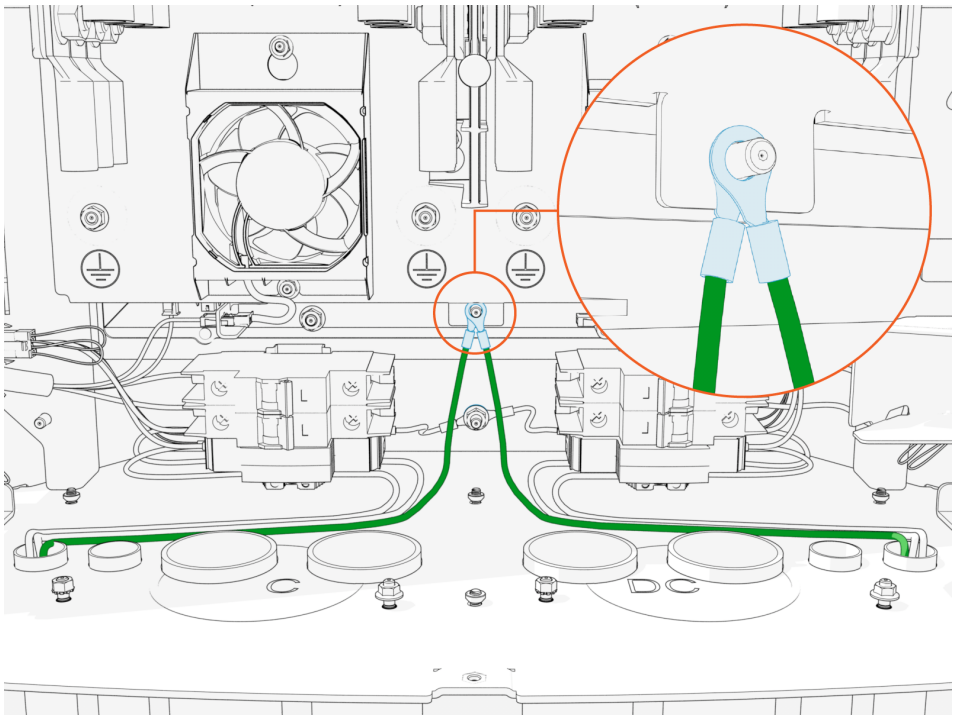
Follow the procedure below for each chassis ground wire.

1. Cut wire to length for landing at the chassis ground stud. Take into account the length of the ring terminal that will terminate the wire.
2. Prepare the wire:
    a. Strip the ground wire for installation of a ring terminal.
    b. Crimp the ring terminal onto the wire end.
3. Remove the lug nut from the chassis ground stud.

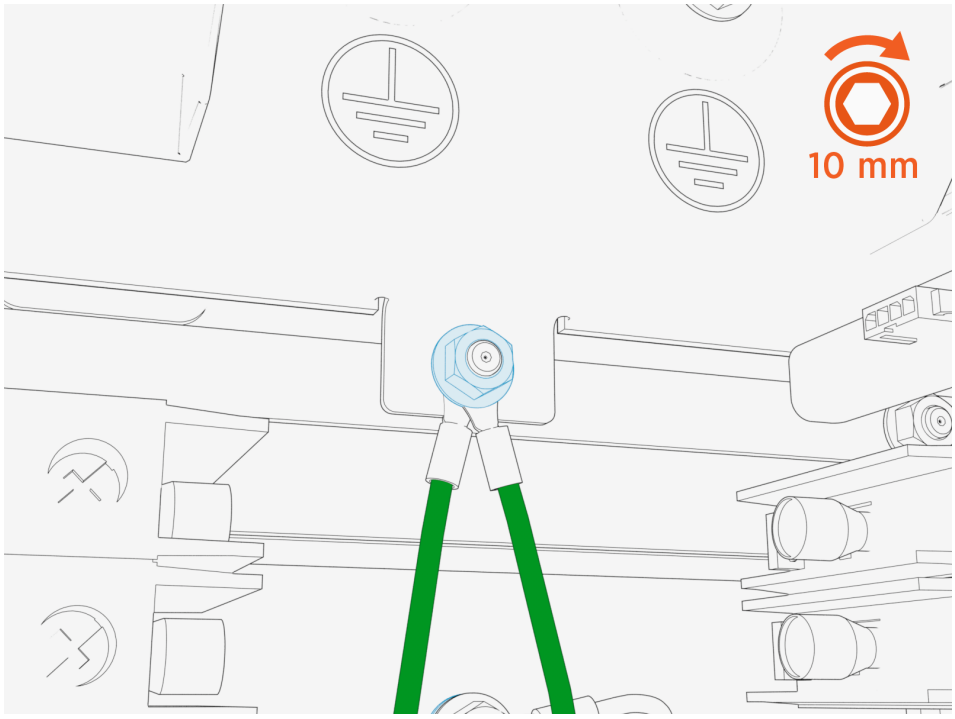


4. Install the prepared wire onto the stud.

   Note: If installing two chassis ground wires, stack both wires onto the stud.



5. Reinstall the lug nut. Torque to **5.6 Nm (50 in-lb)**.

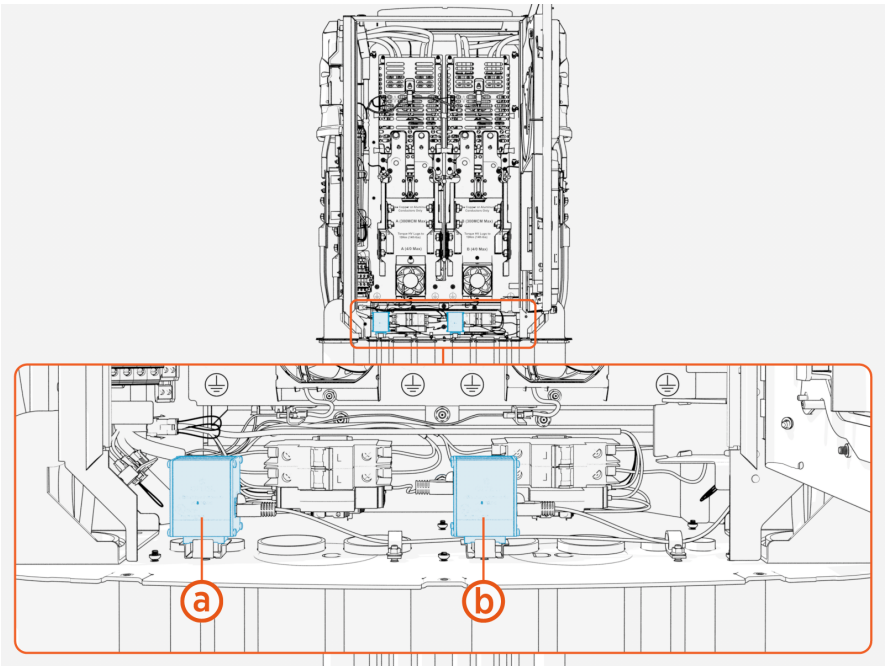


How to connect Ethernet output to PD Controller cable

Follow the procedure below for each Ethernet cable.

1. Identify the target terminal for landing the Ethernet cable.

IMPORTANT: The Ethernet terminal designated L must connect to the PD Controller paired with Pantograph L. The Ethernet terminal designated R must connect to the PD Controller paired with Pantograph R.



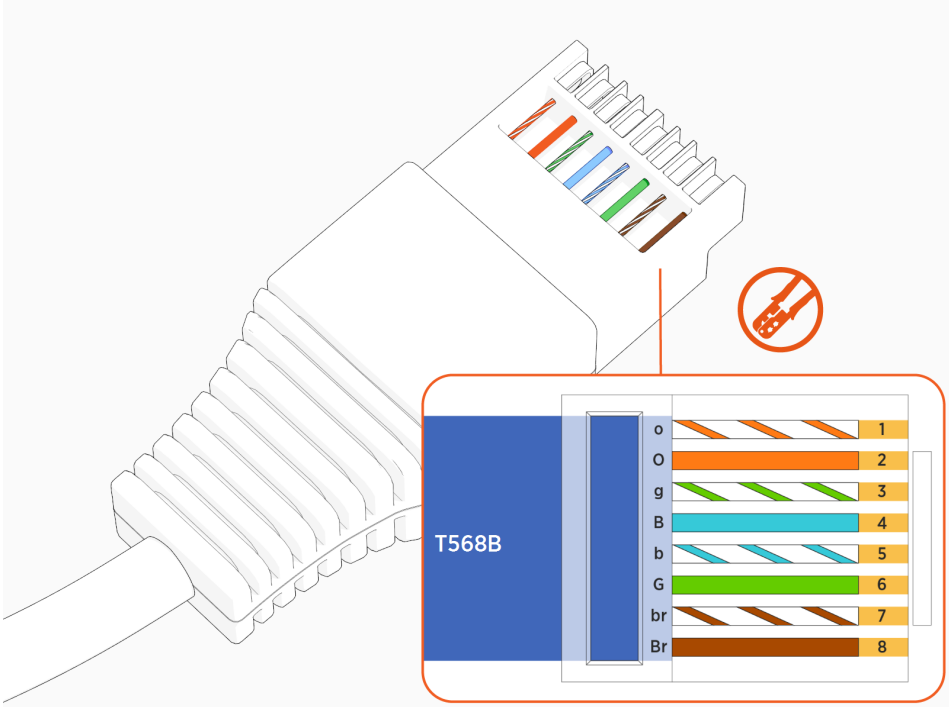
(a) Ethernet output, L

(b) Ethernet output, R

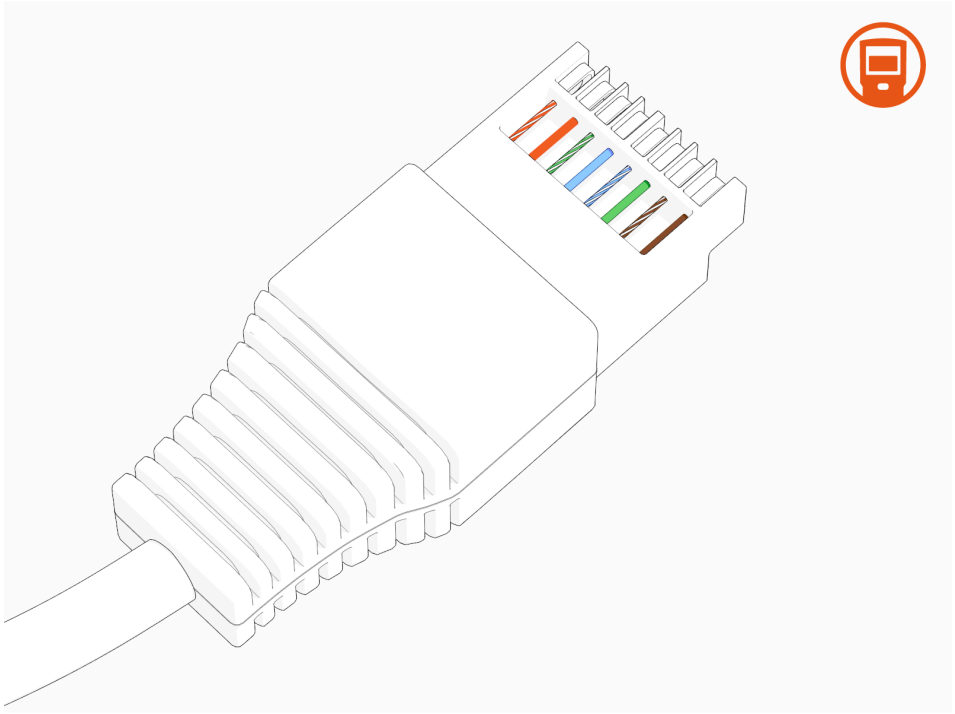
2. Trim Ethernet (Cat6 STP) cable terminal to length, allowing for a service loop.

3. Field crimp a shielded RJ45 connector onto the Ethernet cable. Use straight-through T568B pattern.

IMPORTANT: Ground the shield at this end of the Ethernet cable. Do not ground the shield at the end of the cable that connects to the PD Controller.

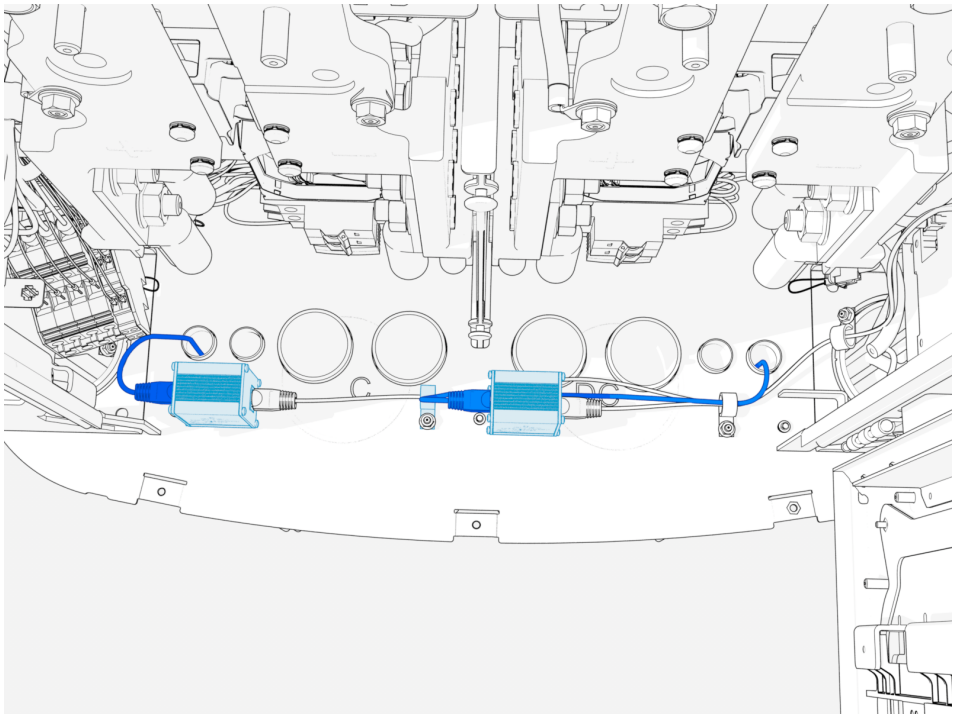


4. Test the Ethernet cable for functionality.



5. Route cable through wireway clamps and connect to the Ethernet surge suppressor.

   Note: To establish a secure connection, the RJ45 connector latch must click into the Ethernet surge suppressor.

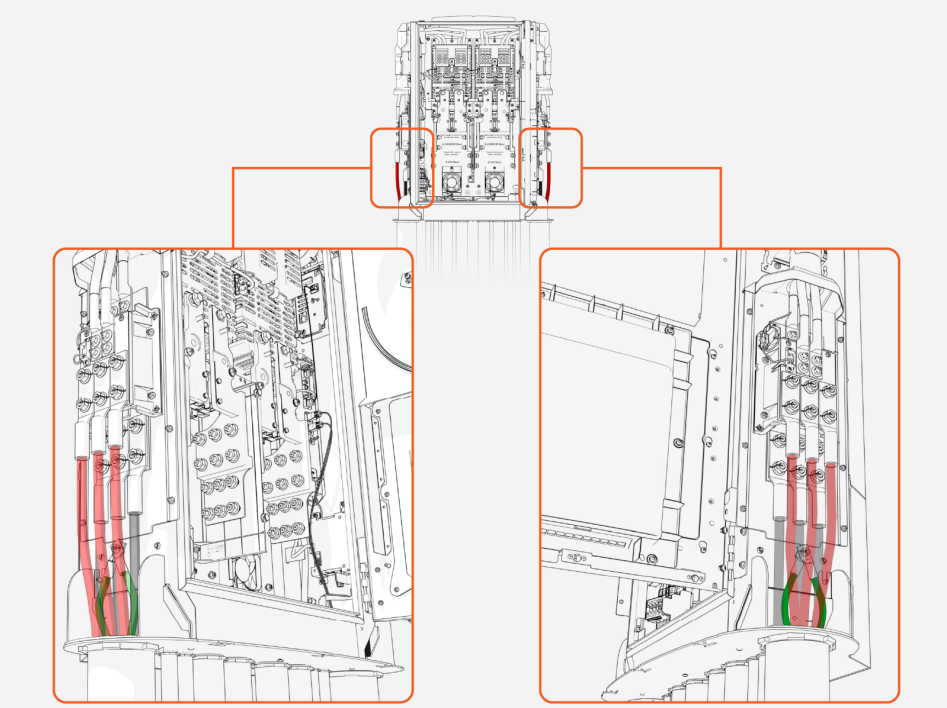


HV DC Output to Pantograph

1. Label the HV DC and high power ground wires at both ends.
2. Pull the wires through conduit. If necessary, apply a non-conductive wire pulling lubricant.
3. Perform insulation resistance test on the HV DC wires. Refer to the *Express Plus High Voltage Wire Insulation Resistance Test Field Guide*.
4. Cut the HV DC wires to length for landing on the HV DC bus bars. See Wiring Overview for landing locations. Take into account the length of the lug that will terminate each wire.
5. Connect the HV DC wires. See How to Connect High Power Ground Wires and How To Connect HV DC Wires.

IMPORTANT: Connect wires in the following order:

a. Ground wires
b. Negative (-) wires
c. Positive (+) wires



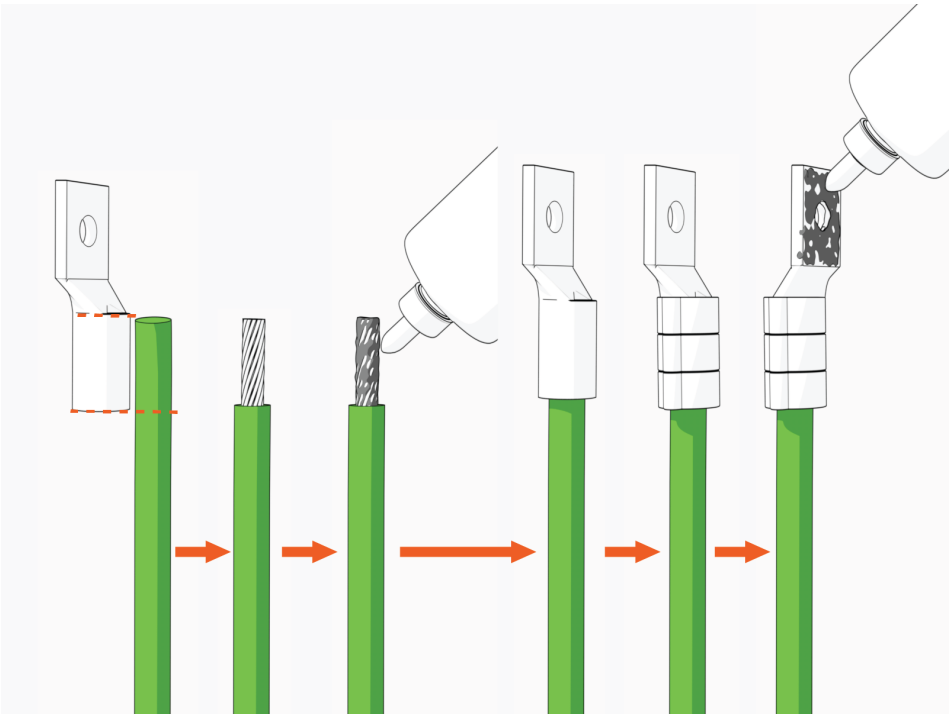
How to connect high power ground wires

Follow the procedure below for each ground wire.

IMPORTANT: Before you begin, make note of the following:

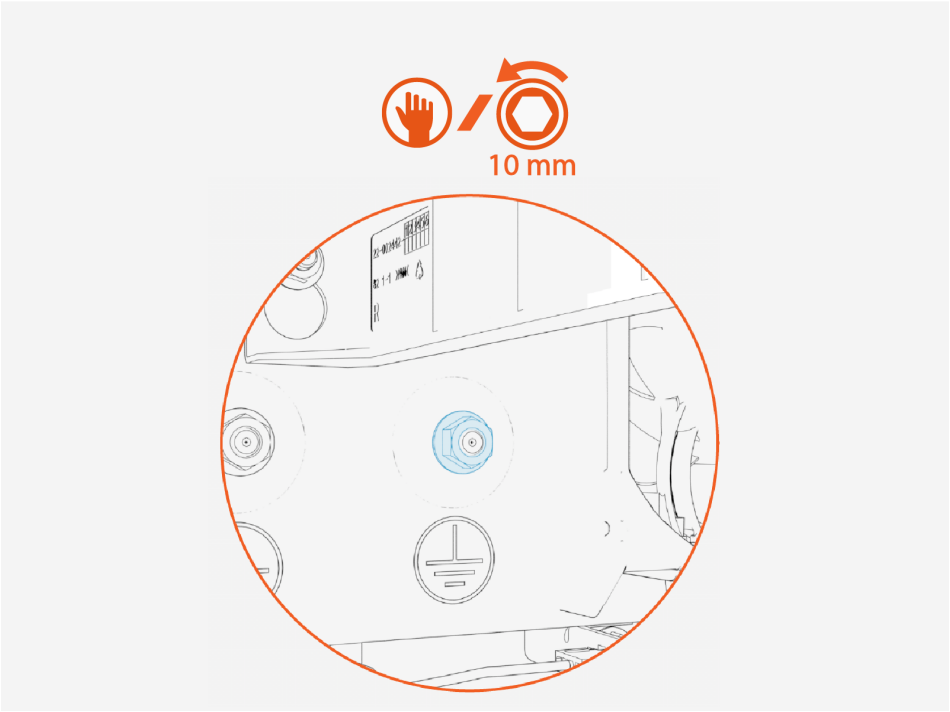
- Make sure no wire material is exposed below the lug barrel. If necessary, heat shrink or tape the exposed area to meet the local code requirements.
- Wipe off any remains of wire pulling lubricant if applied.

1. Prepare the wire:



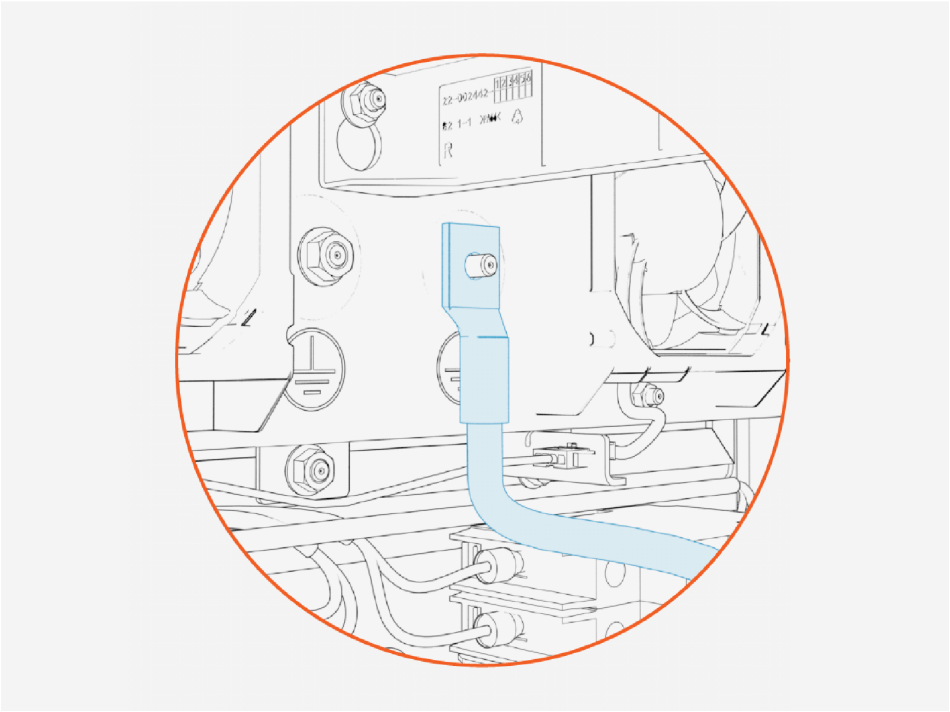
   a. Mark the lug's barrel height on the wire terminal.
   b. Strip the jacket on the marked terminal. Use a suitable wire stripper, such as Klein tool.
   c. If recommended by the wire manufacturer or local code, apply an anti-oxidant joint compound to the stripped wire material to make a gastight joint with the lug.
   d. Insert the stripped terminal into the lug's barrel and crimp it. Use a suitable lug crimping tool and/or die recommended by the lug manufacturer.
   e. Apply dielectric grease to the lug's tongue surface that comes in contact with the bus bars.

2. Remove lug nut from the ground stud.



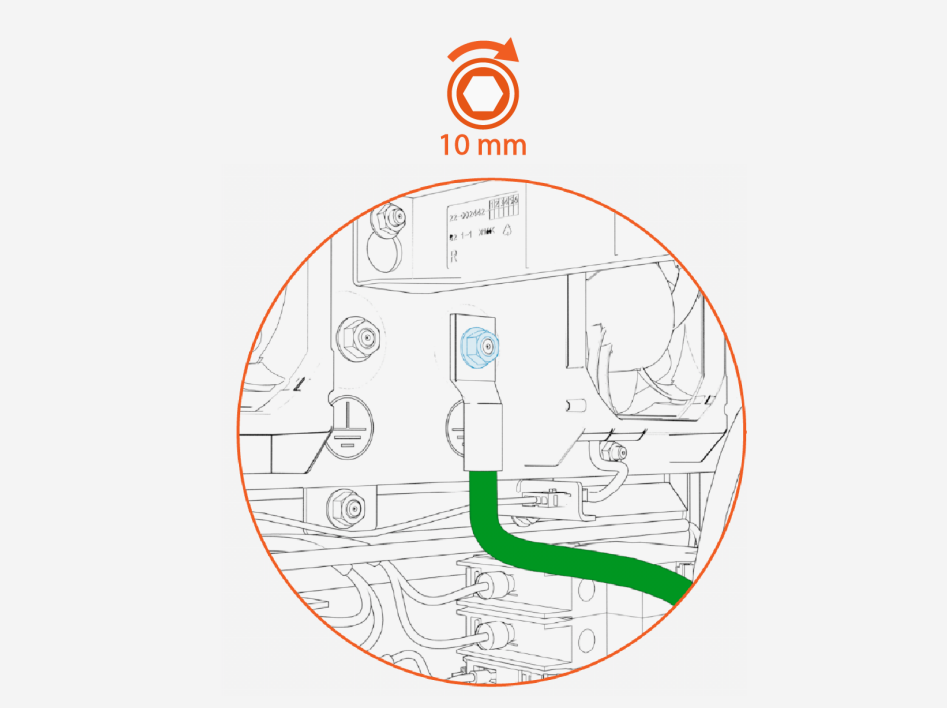
3. Install the prepared wire onto the stud.

   Note: If needed, two ground wires may stack onto a single stud.



4. Reinstall and tighten the lug nut.

IMPORTANT: Torque the ground wire lug nuts to **5.6 Nm (50 in-lb)**.



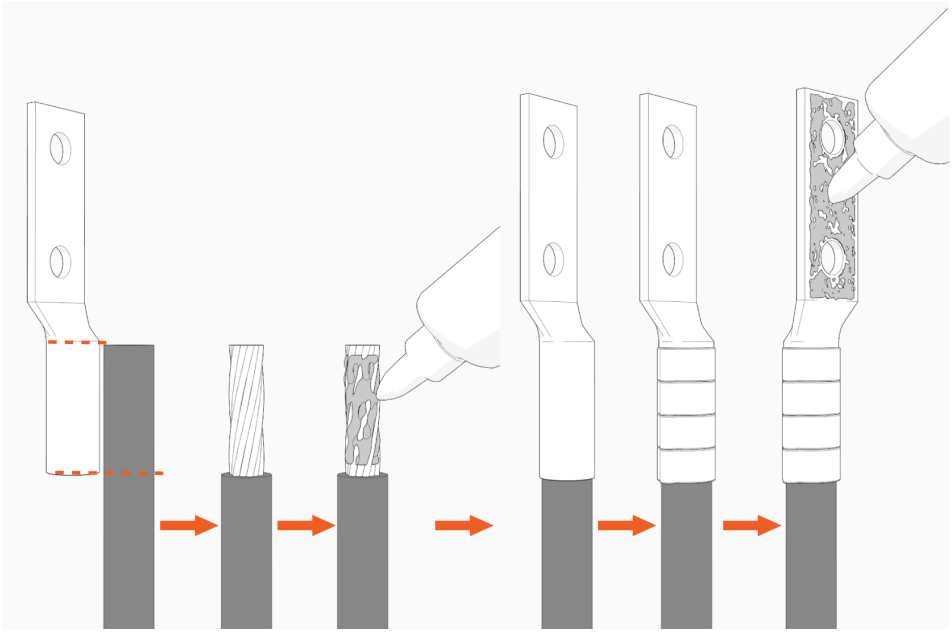
How to connect HV DC wires

Follow the procedure below for each HV DC wire.

IMPORTANT: Before you begin, make note of the following:

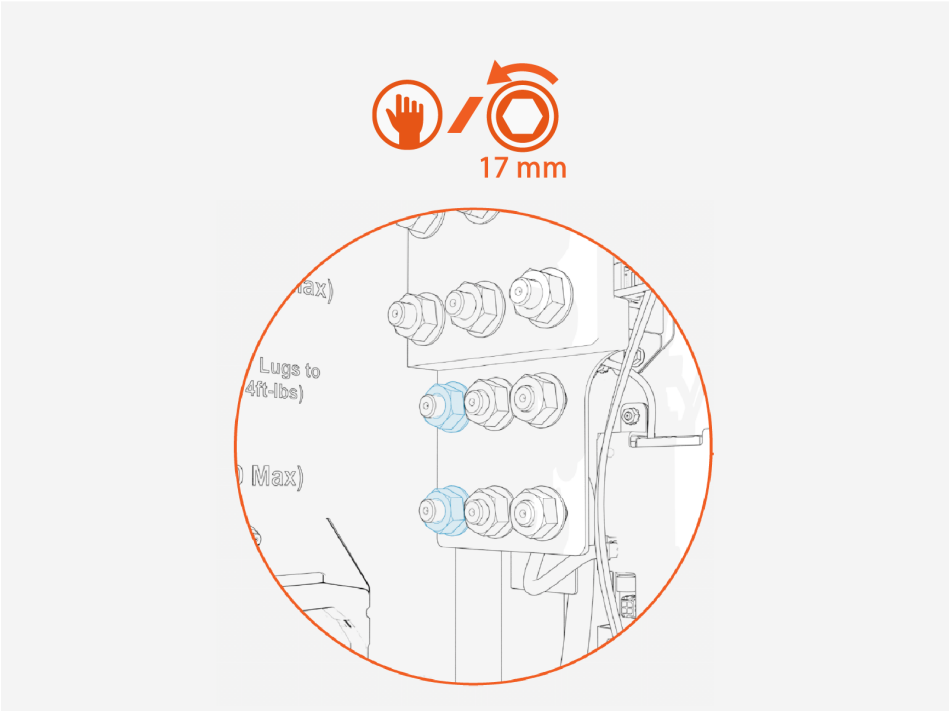
- Make sure no wire material is exposed below the lug barrel. If necessary, heat shrink or tape the exposed area to meet the local code requirements.
- Wipe off any remains of wire pulling lubricant if applied.

1. Prepare the wire:



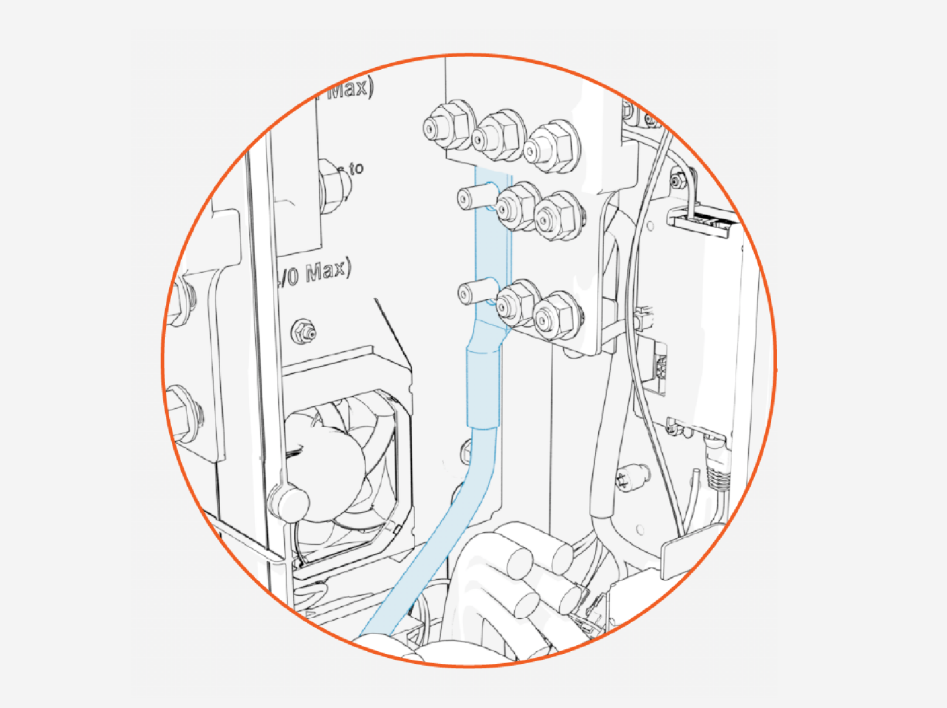
   a. Mark the lug's barrel height on the wire terminal.
   b. Strip the jacket on the marked terminal. Use a suitable wire stripper, such as Klein tool.
   c. If recommended by the wire manufacturer or local code, apply an anti-oxidant joint compound to the stripped wire material to make a gastight joint with the lug.
   d. Insert the stripped terminal into the lug's barrel and crimp it. Use a suitable lug crimping tool and/or die recommended by the lug manufacturer.
   e. Apply dielectric grease to the lug's tongue surface that comes in contact with the bus bars.

2. Remove lug nuts from the landing studs.



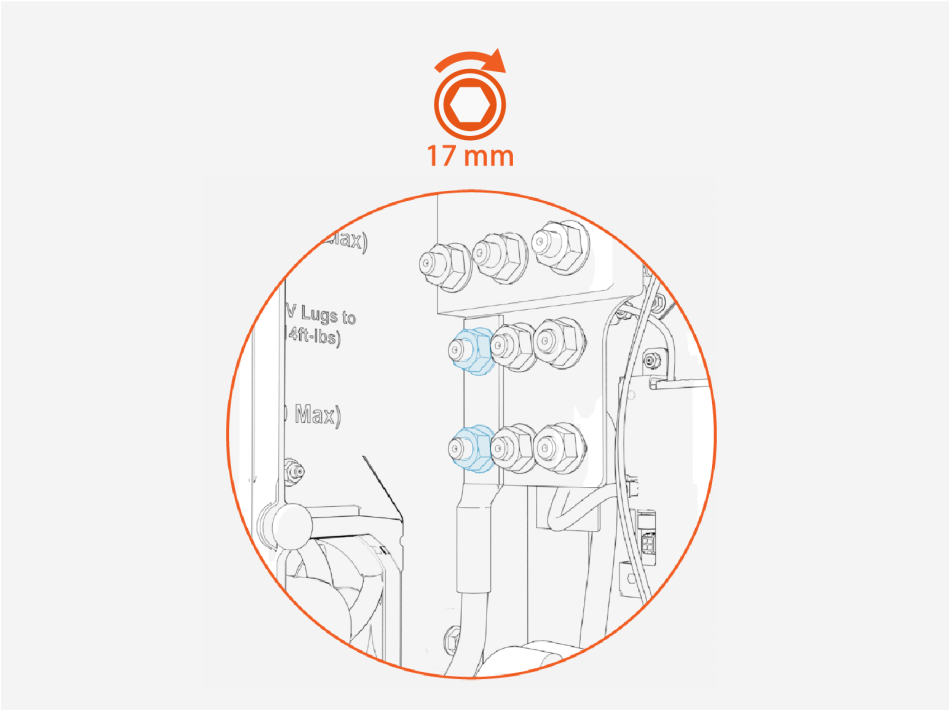
3. Install the prepared wire onto the studs.

IMPORTANT: When connecting the HV DC wires, install the red (+) wire's lug onto the bus bar's positive (+) pole and black (-) wires onto the bus bar's negative (-) pole.

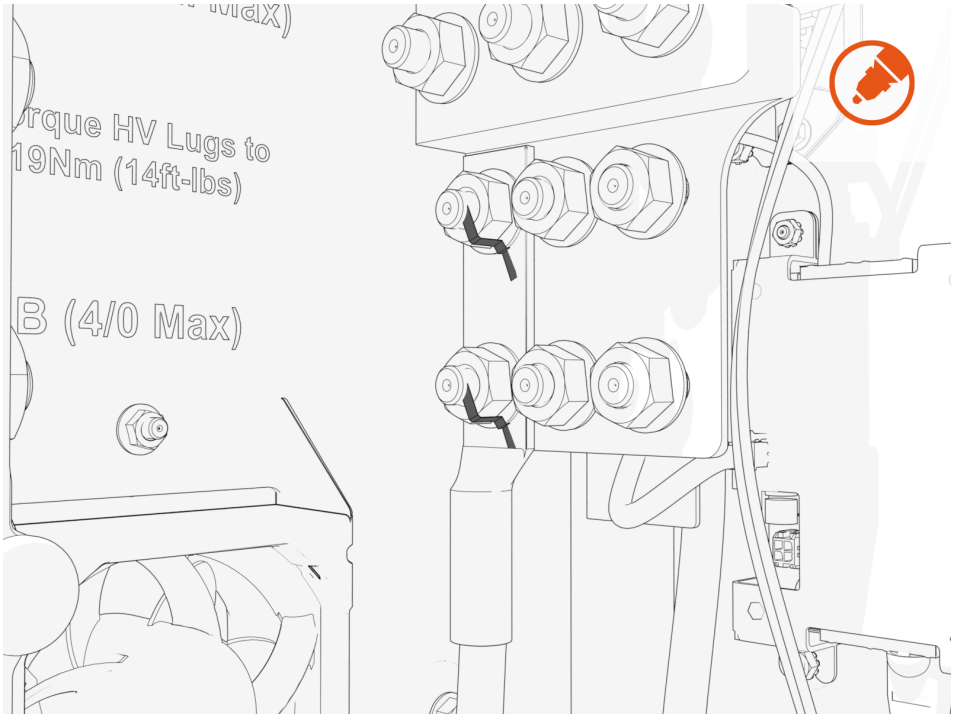


4. Reinstall and tighten the lug nuts.

IMPORTANT: Torque the HV DC wire lug nuts to **19 Nm (14 ft-lb)**.



5. Apply torque marks. Torque marks are required to pass post-installation inspection.

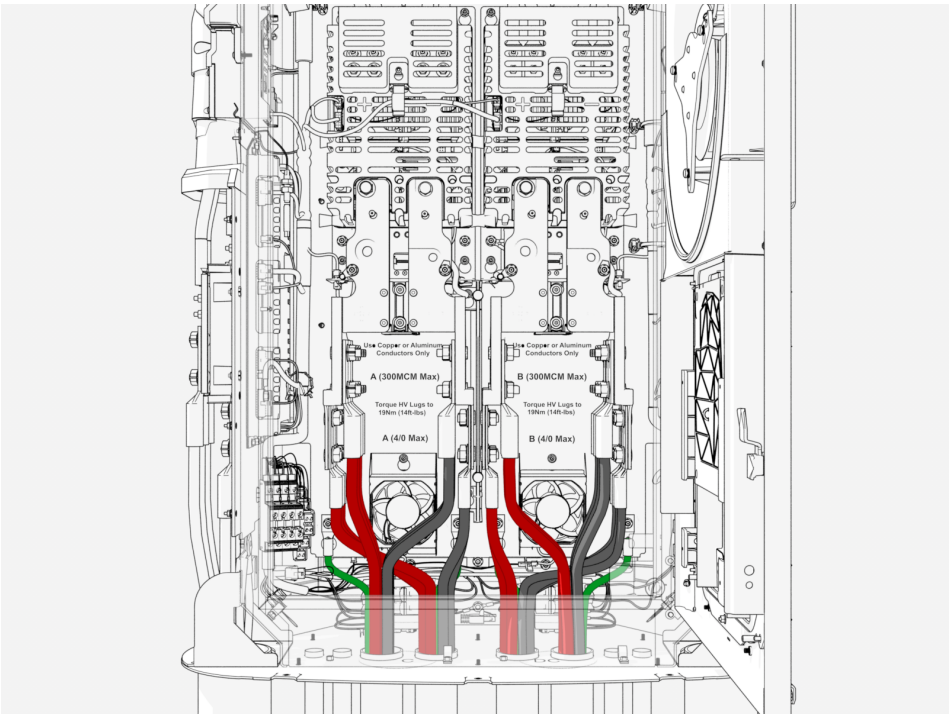


HV DC From Power Block or Power Link 2000

1. Label the HV DC and high power ground wires at both ends.
2. Pull the wires through conduit. If necessary, apply a non-conductive wire pulling lubricant.
3. Perform insulation resistance test on the HV DC wires. Refer to the *Express Plus High Voltage Wire Insulation Resistance Test Field Guide*.
4. Cut the wires to length for landing on their respective terminals. See Wiring Overview for landing locations. Take into account the length of the lug that will terminate each wire.
5. Connect the HV DC wires. See How To Connect HV DC Wires and How to Connect High Power Ground Wires.

IMPORTANT: Connect wires in the following order:

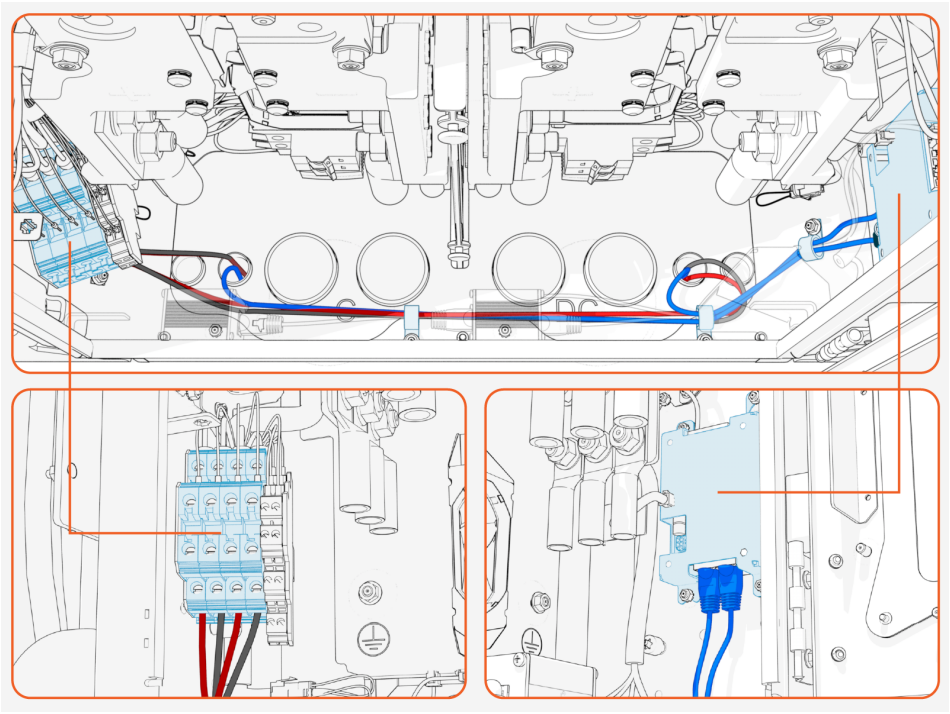
a. Ground wires
b. Lower landing wires
c. Upper landing wires



LV DC From Power Block or Power Link 2000

1. Label the LV DC and Ethernet wires at both ends to allow for wiring to be traced during installation and future servicing.
2. Pull the LV DC and Ethernet wires into the enclosure.

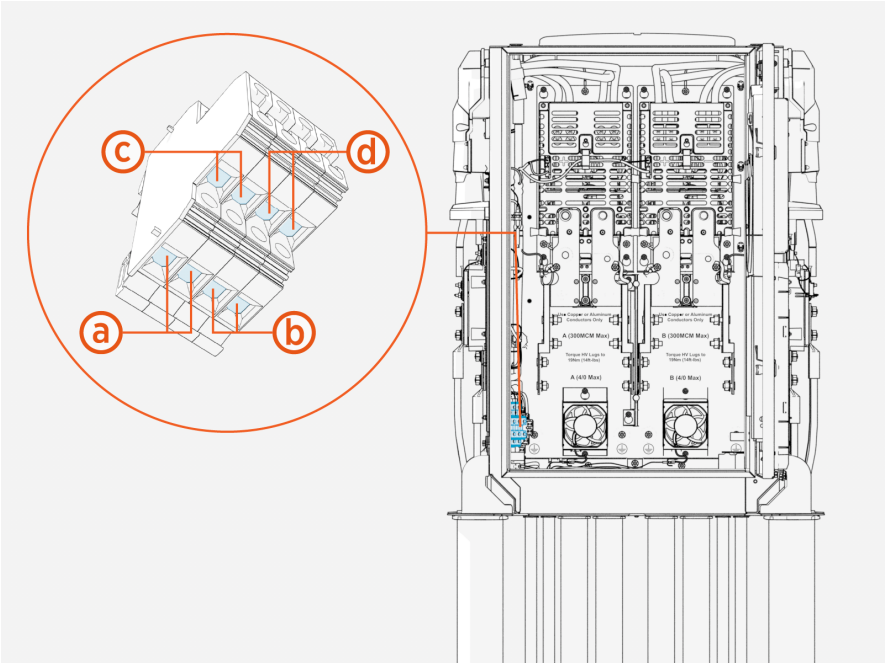
3. Connect the LV DC and Ethernet wires. See:
    - How to Connect LV DC Wires From Power Block or Power Link 2000
    - How to Connect Ethernet Cables From Power Block or Power Link 2000



How to connect LV DC Wires From Power Block or Power Link 2000

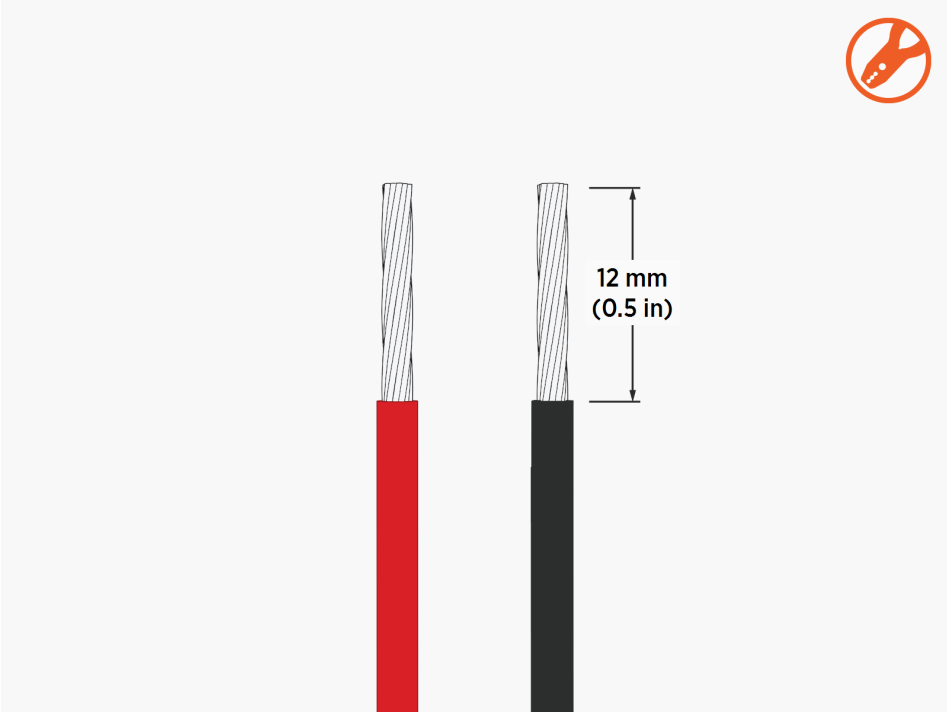
Follow the procedure below for each LV DC wire pair.

1. Identify the target wire insertion points for landing the LV DC input wire pair.

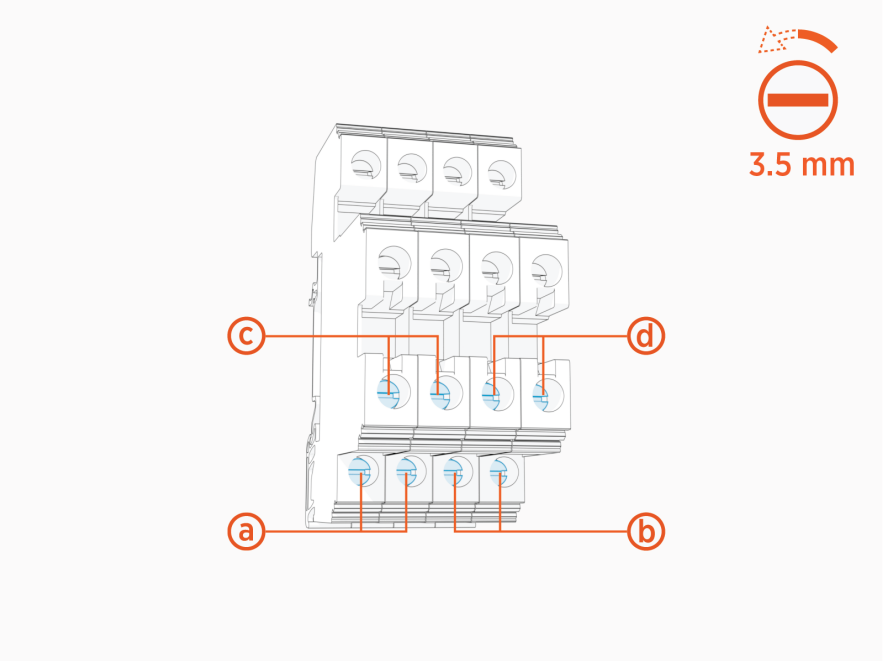


(a) Input, primary
(b) Input, secondary
(c) Output, primary
(d) Output, secondary

2. Cut wires to length for landing at the terminal.
3. Strip the wire jackets.



4. Loosen the wire set screws (x2).

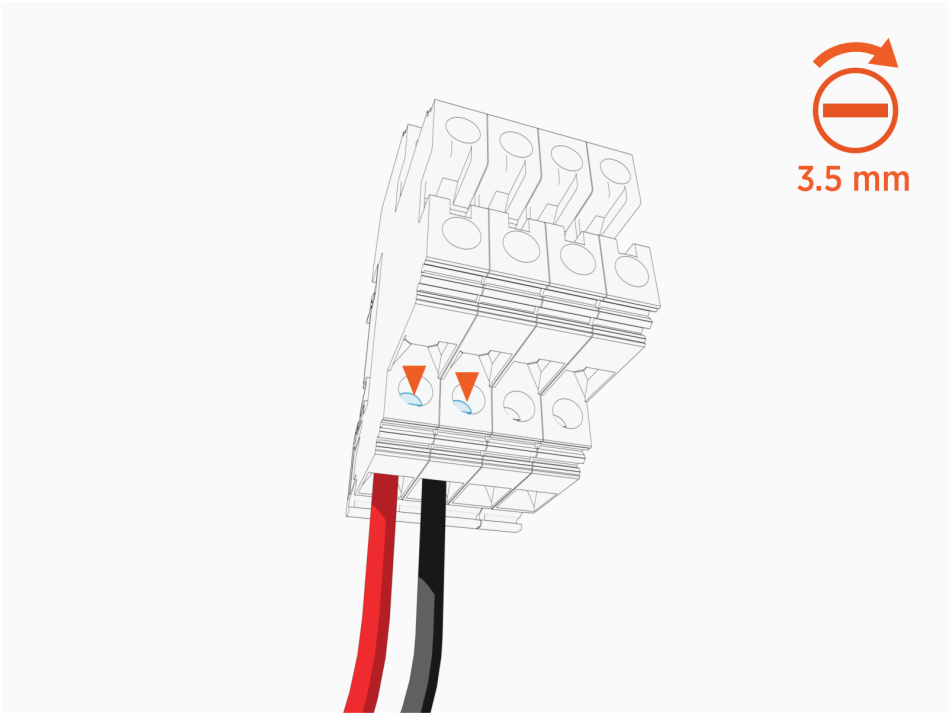


(a) Input, primary
(b) Input, secondary
(c) Output, primary
(d) Output, secondary

5. Route wires (x2) through the wireway clamps (if necessary use cable ties) and insert them into the LV terminal block.

IMPORTANT: For each wire pair, insert the positive (+) wire into the left terminal. Insert the negative (-) wire into the right terminal.

6. Torque the screws (x2) to **1.5 Nm (13.3 in-lb)**. Push-pull to test that both wires (+ and -) are secured.

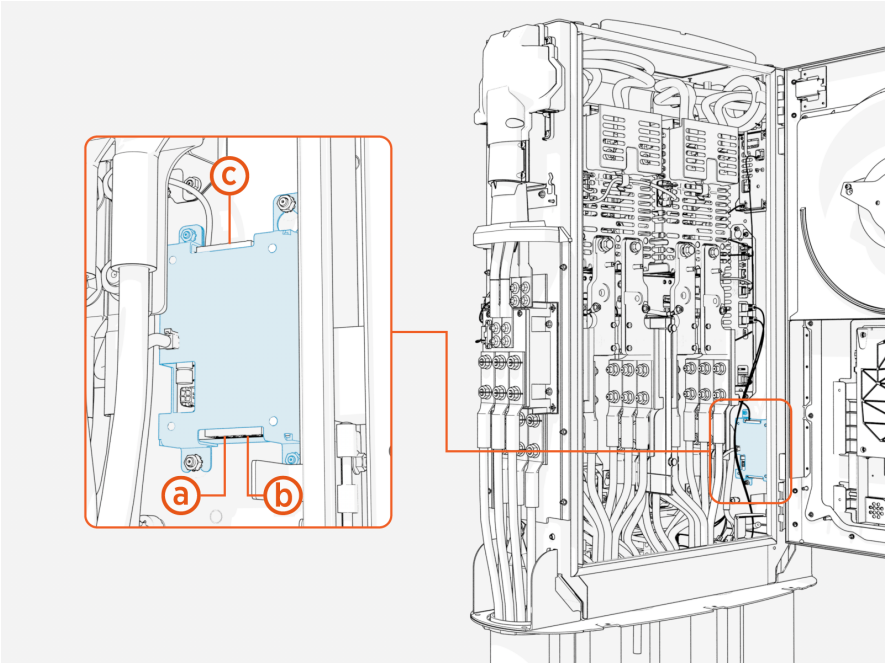


How to connect Ethernet cable from Power Block or Power Link 2000

Follow the procedure below for each Ethernet cable.

1. On the Smart Ethernet Switch, locate three ports for landing Ethernet cables.

   Note: Cables may plug into any available port.



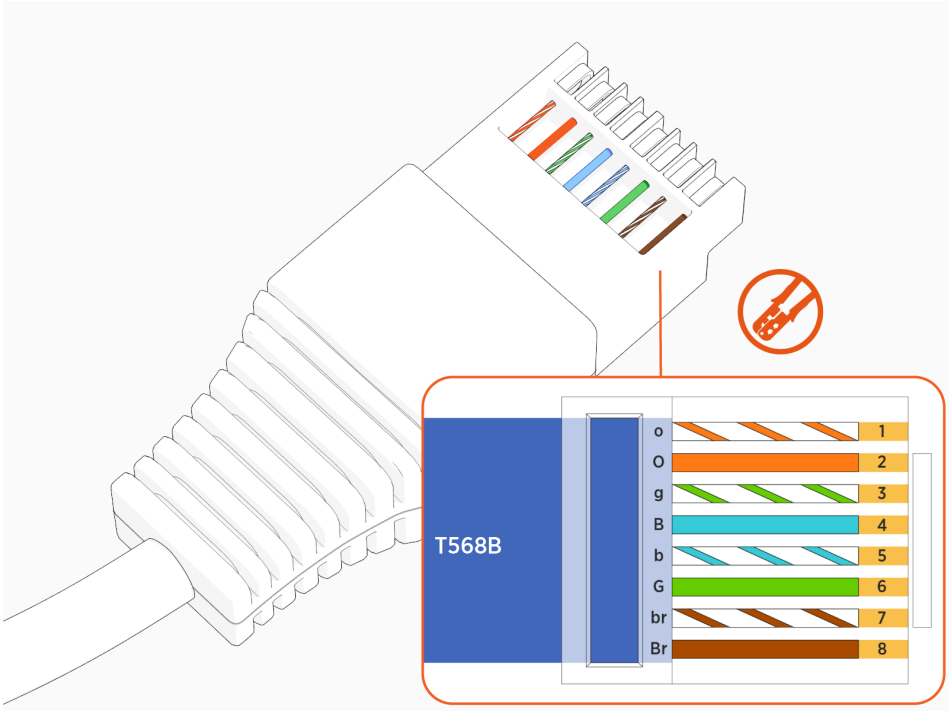
(a) Lower left port
(b) Lower right port
(c) Upper port

2. Trim Ethernet (Cat6 STP) cable terminal to length, allowing for a service loop.

3. Field crimp a shielded RJ45 connector onto the Ethernet cable. Use straight-through T568B pattern.

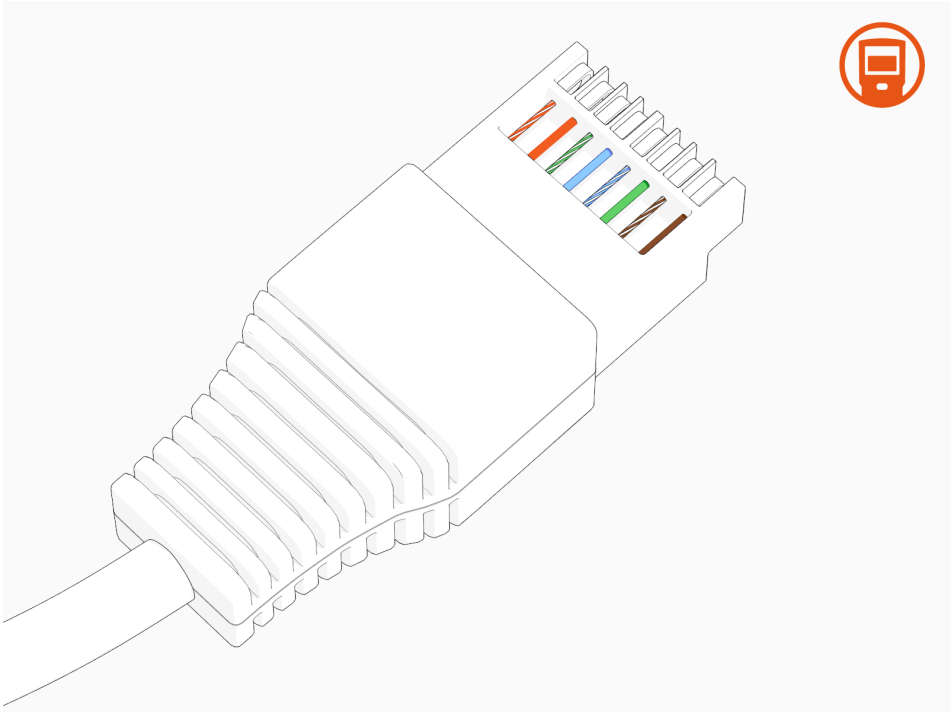
IMPORTANT:

- For an Ethernet cable connecting from Power Block to Power Link 2000, do not ground the shield at this end of the cable. Ground the shield at the end of the cable that connects to the Power Block.
- For an Ethernet cable connecting between Power Link 2000s, ground the shield at the cable end nearer to the Power Block (per Ethernet topology for the Express Plus cluster). Do not ground the shield at the other cable end.



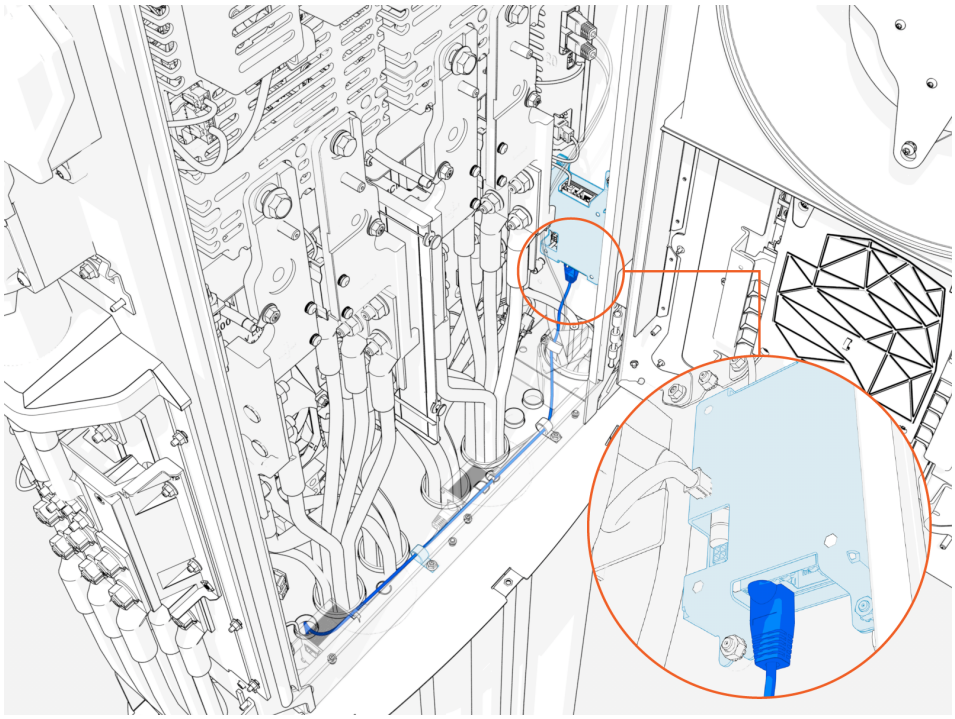
4. Test the Ethernet cable for functionality.

IMPORTANT: If using a Paige OSP Shielded GameChanger cable for a wire run length greater than 100 m (328 ft), follow the test procedure specified by Paige. See Paige GameChanger Resources.



5. Route the cable through the wireway clamps and connect the cable at the Smart Ethernet Switch.

   Note: To establish a secure connection, the RJ45 connector latch must click into the Smart Ethernet Switch port.



Install Power Link 2000 Options 7

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Warranty Limitation

- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

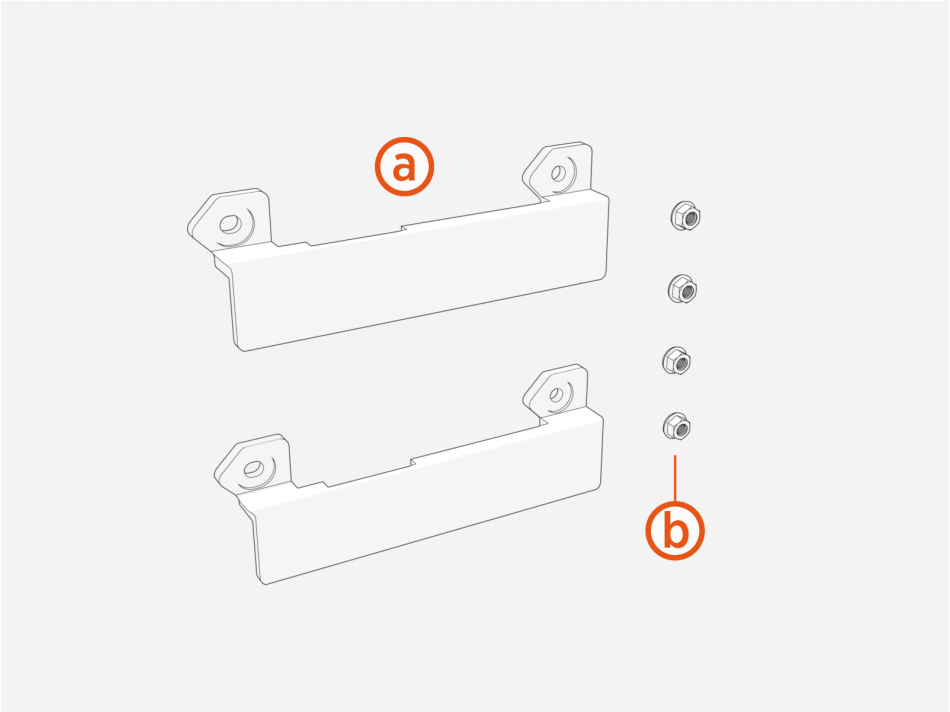
CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

CAUTION: While installing fasteners inside enclosures, make sure not to drop the fasteners inside conduit openings. You may use conduit caps or covers to temporarily cover the conduit openings.

Sequential Charging Kit

If the site plan indicates the Power Link 2000 must be configured for sequential charging (one HV DC input for two power paths), follow procedures below to install the Sequential Charging Kit.

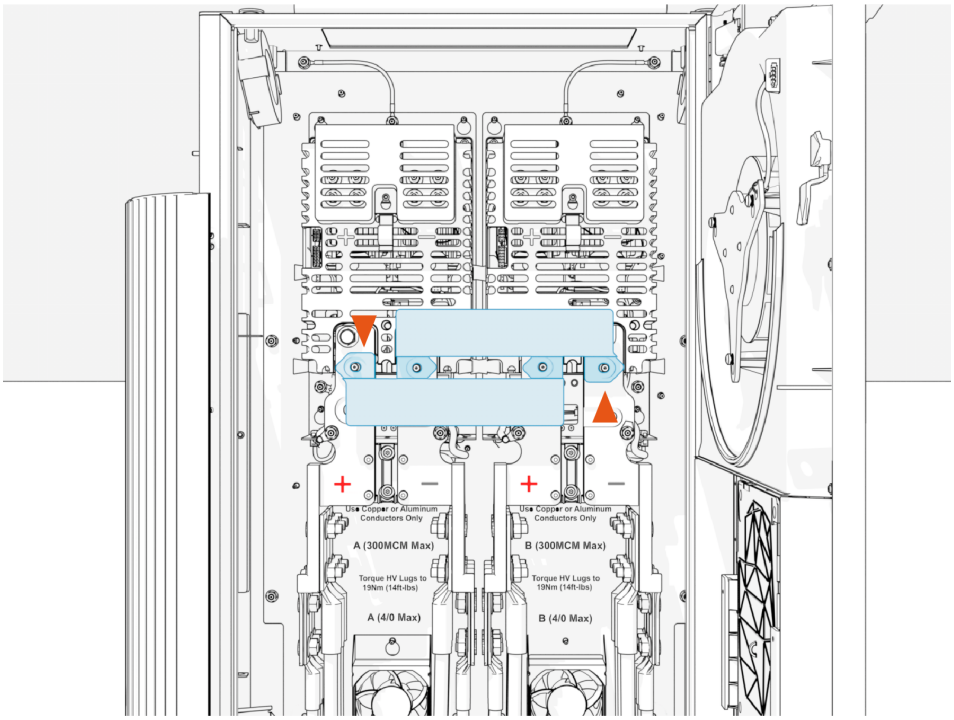
1. Unpack the Sequential Charging Kit. Confirm all parts listed below are present.



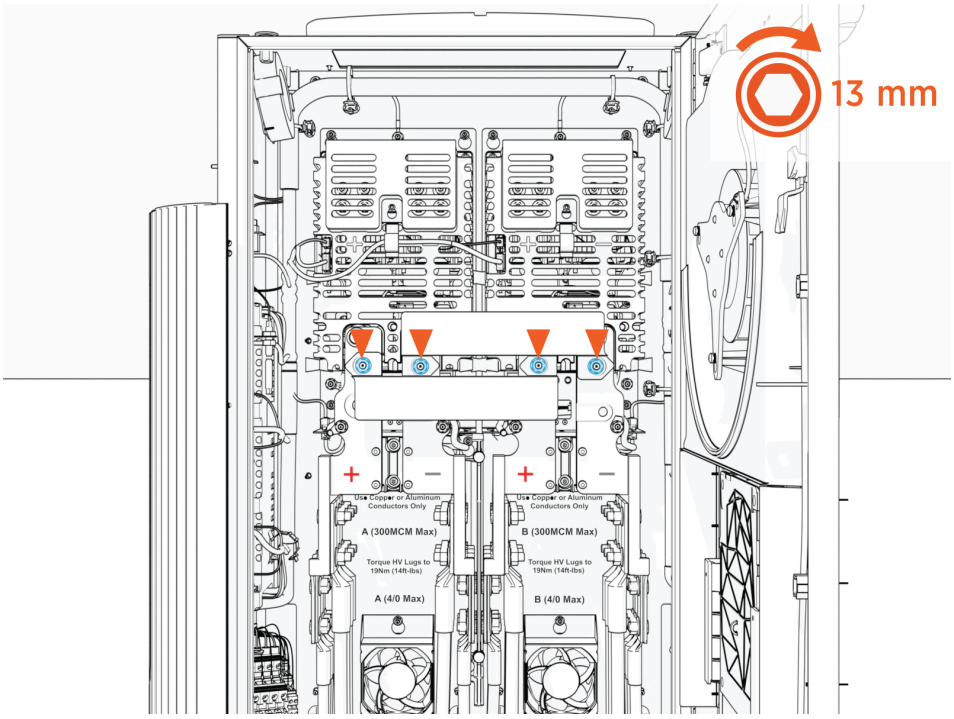
(a) Bus bar bridges (x2)

(b) M8 captive washer nuts (x4)

2. Install the bus bar bridges (x2). The bridges mount onto studs located on the HV DC bus bars.



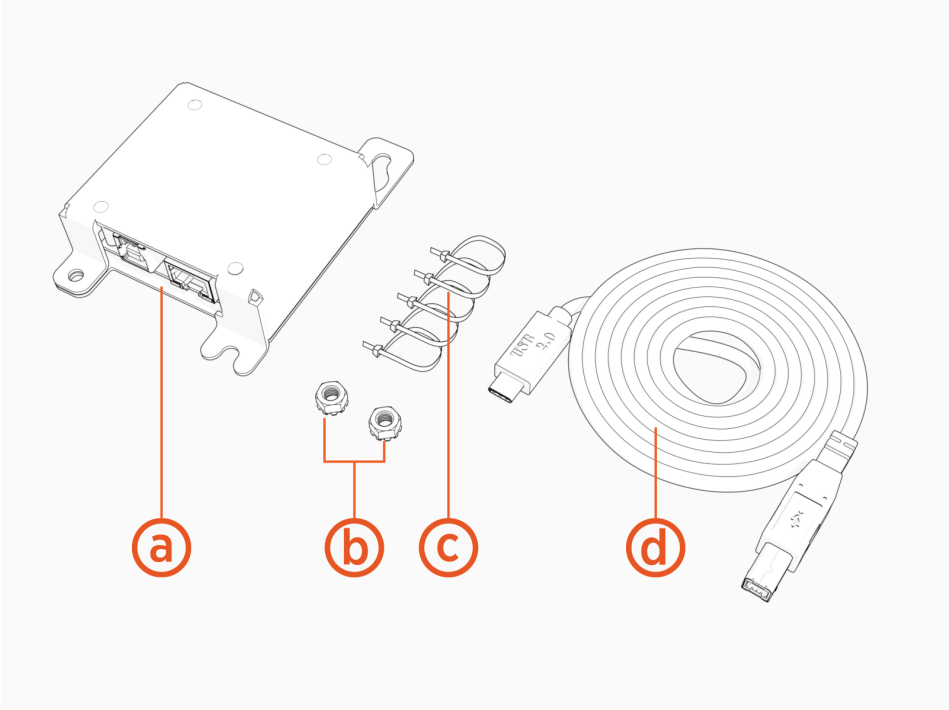
3. Fasten with concentric washer nuts (x4). Torque to **12.2 Nm (108 in-lb)**.



Ethernet to USB Kit

If the site plan indicates the Power Link 2000 must be configured with a hardwire Ethernet connection to a network server, follow procedures in this section to install the Ethernet to USB Kit and the hardwire connection.

1. Unpack the Ethernet to USB Kit. Confirm all parts listed below are present.



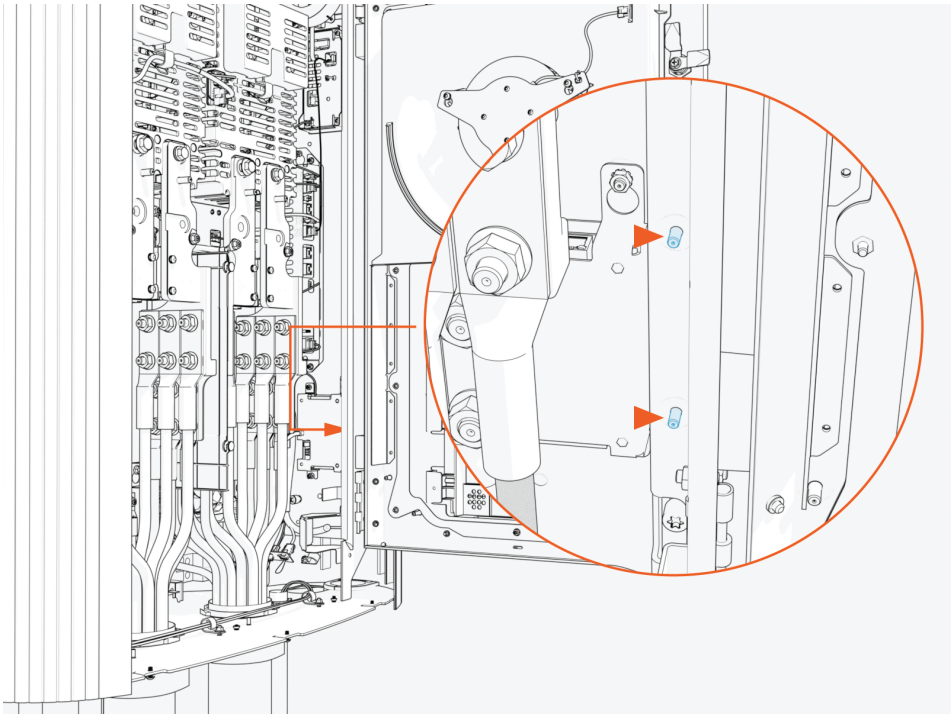
(a) Ethernet to USB module

(b) M5 star washer nuts (x2)

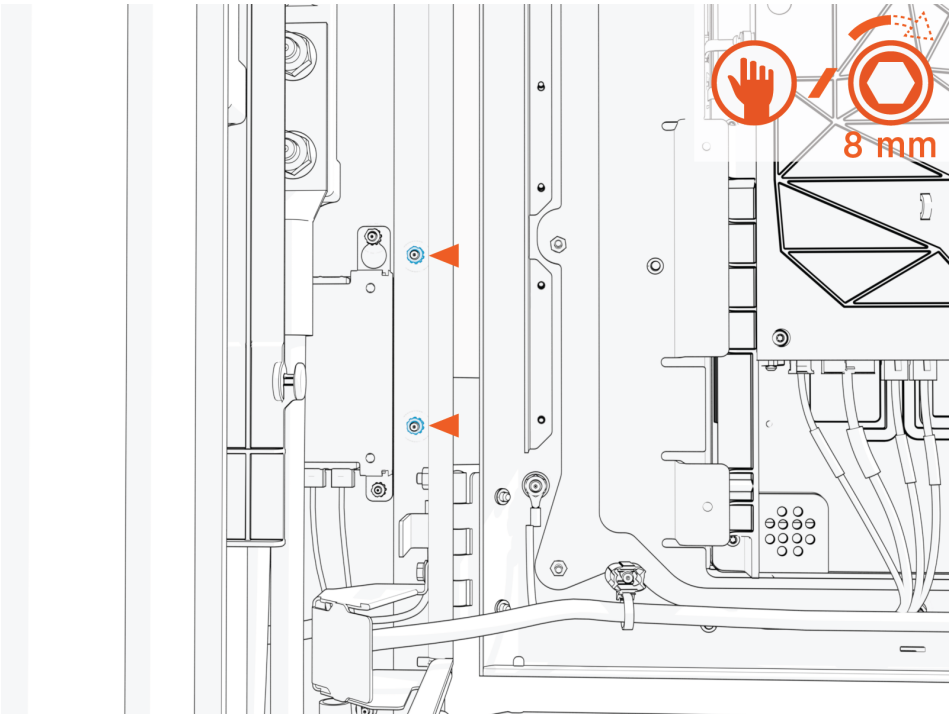
(c) Zip ties (x5)

(d) USB 3.0 Type B to Type C cable

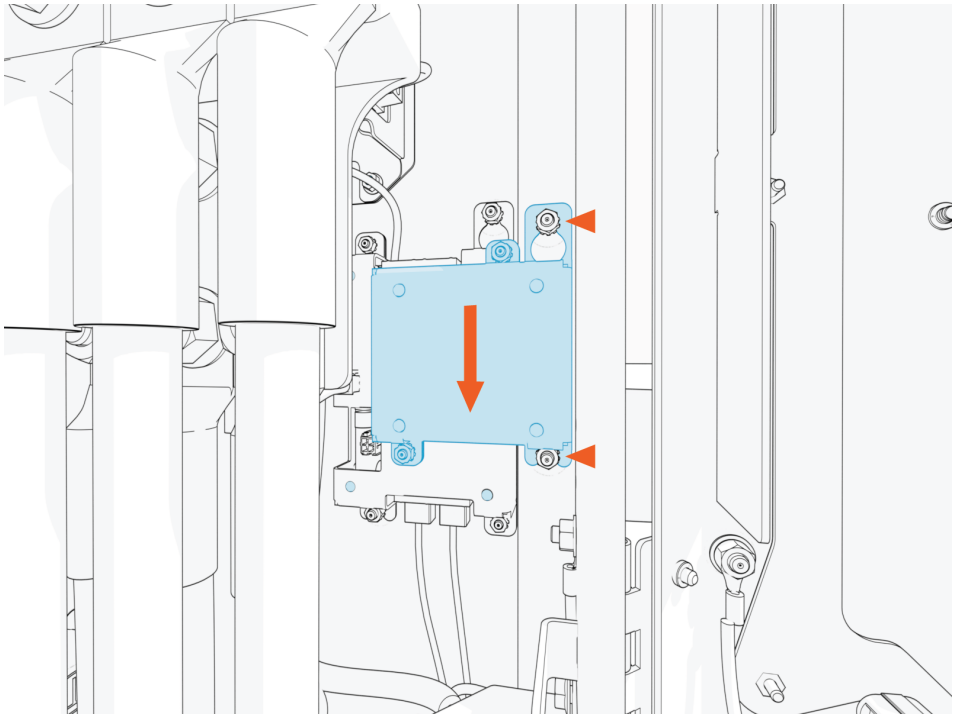
2. Locate the mounting studs (x2).



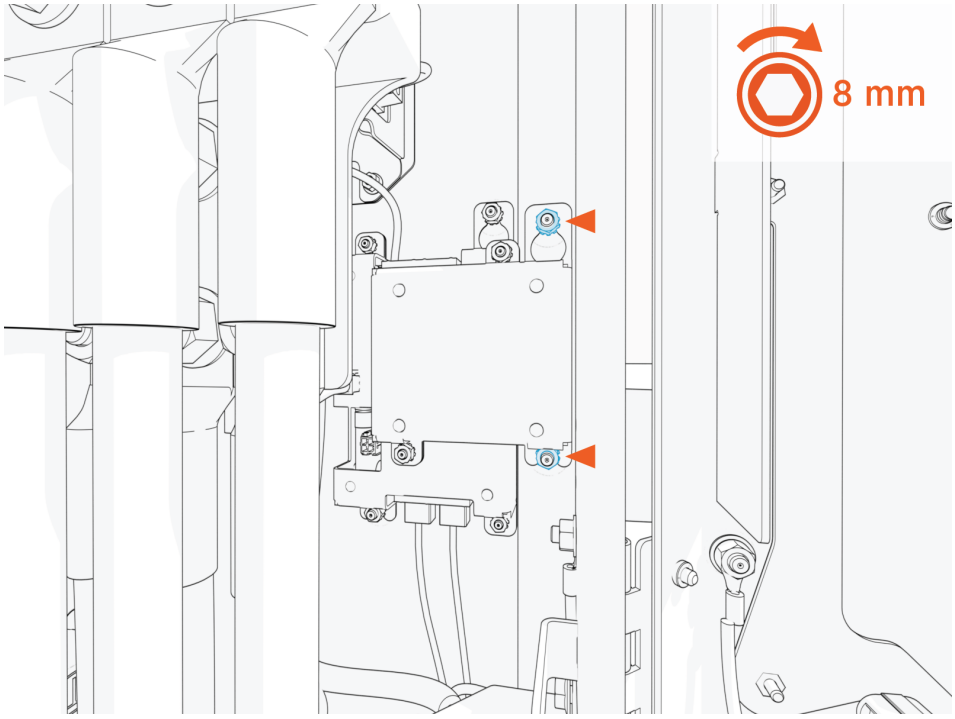
3. Install M5 star washer nuts (2) partially onto the studs. Thread the nuts only halfway onto each stud.



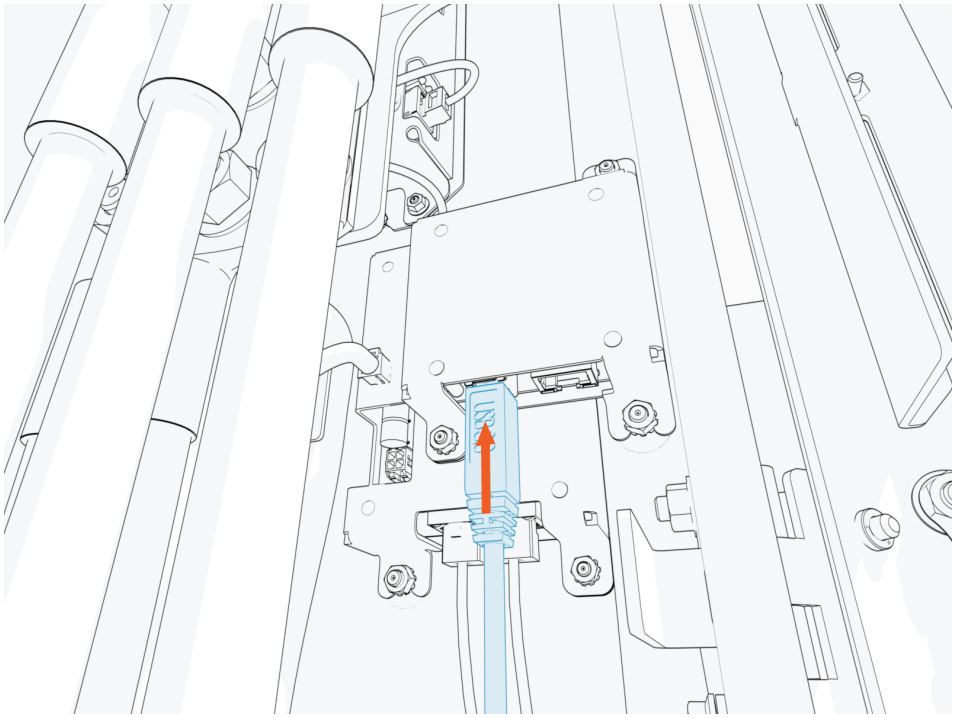
4. Mount the Ethernet to USB module onto the studs. Slide the module down to seat the notched tabs onto the studs.



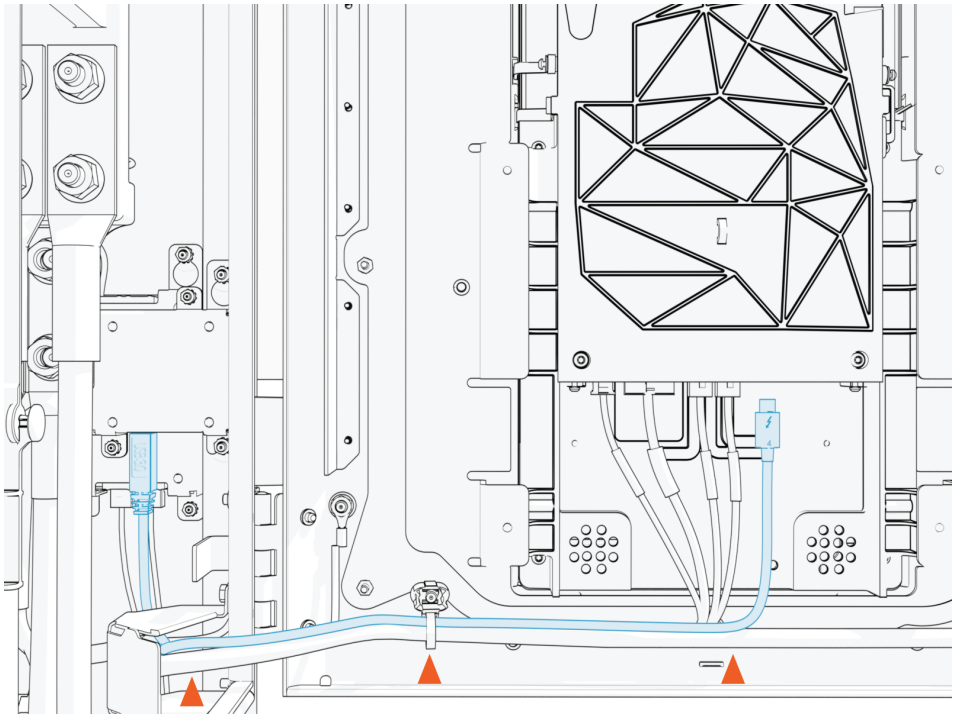
5. Torque nuts (x2) to **4.5 Nm (40 in-lb)**.



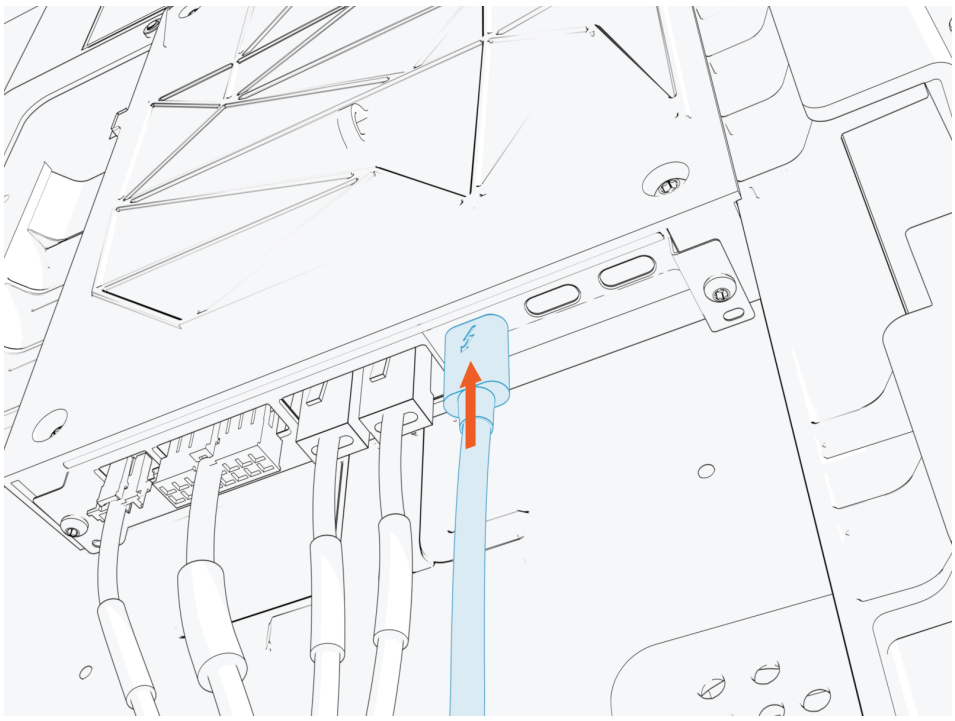
6. Plug the USB-B end of the USB cable into the module.



7. Route the cable through the door cable guide and along the main cable harness to the Control and Communication Module (CCOM) located on the Power Link 2000 door.



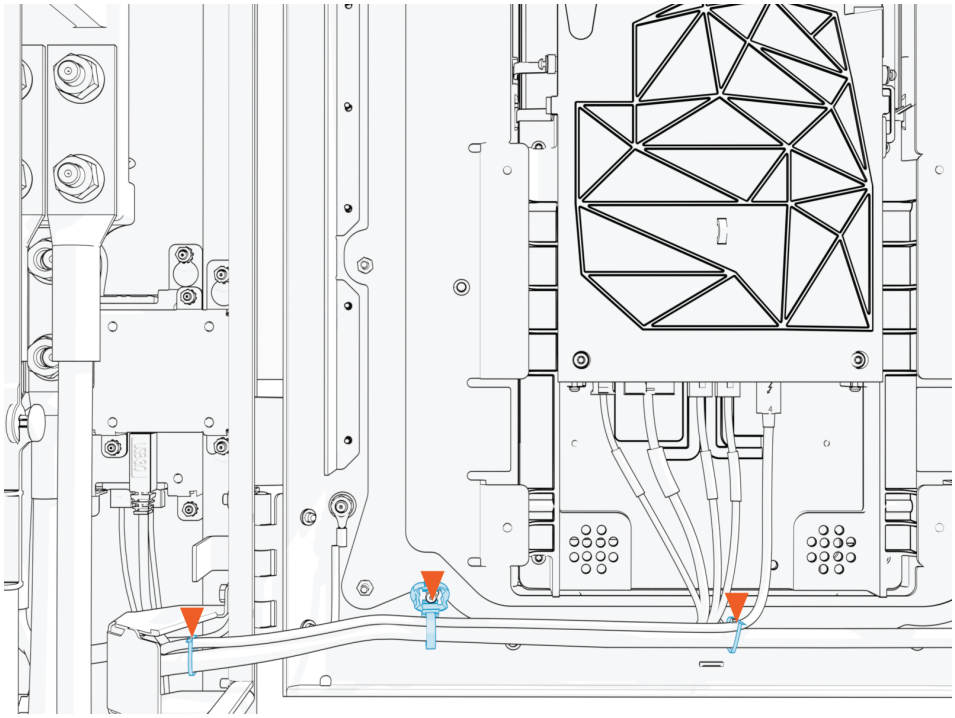
8. Connect the cable to the CCOM in any of the three USB-C ports.



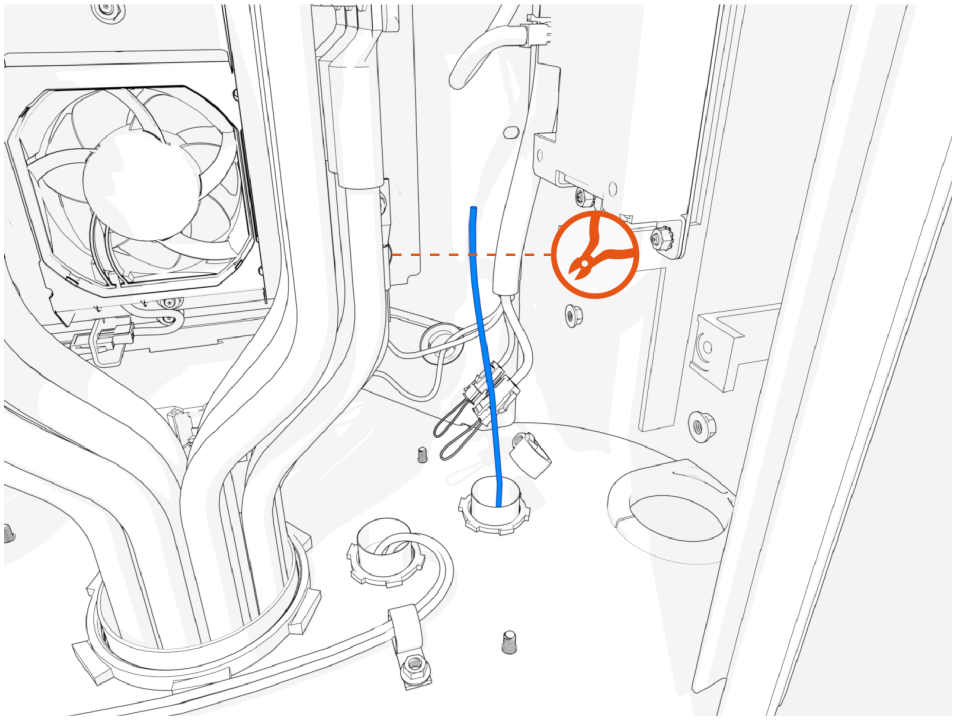
9. Zip tie the USB cable to the main cable harness.

CAUTION:

- Ensure the door can open and close without pinching or pulling of any cables.
- Ensure the USB cable does not touch the HV DC wires when the door is closed.

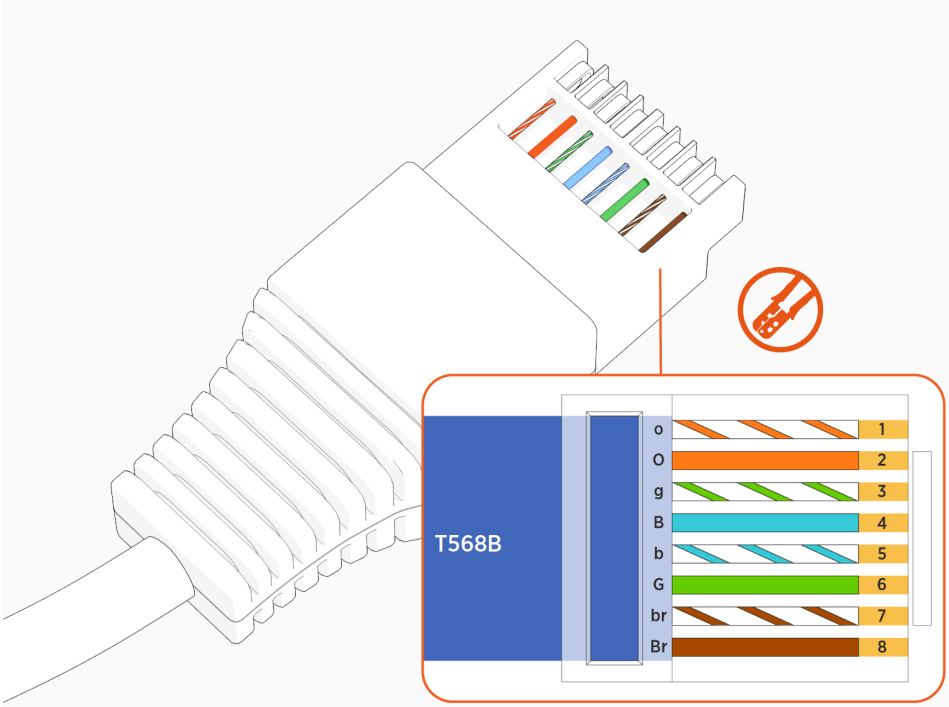


10. Pull the hardwire Ethernet cable (Cat6 STP) and cut to length for landing at the Ethernet to USB module. Allow for a service loop.



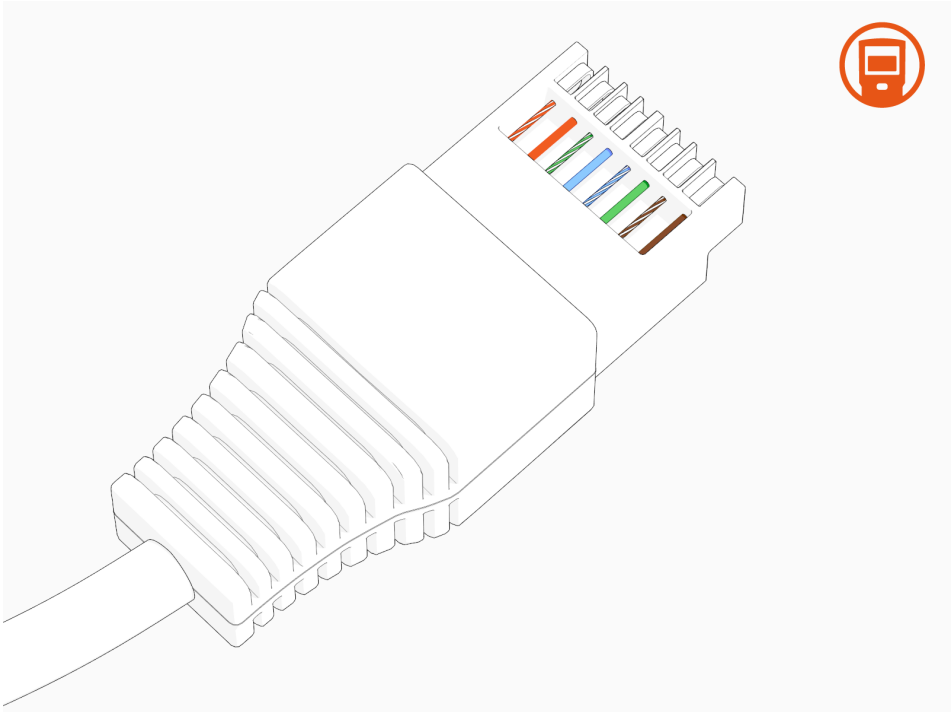
11. Field crimp an RJ45 connector onto the Ethernet cable. Use straight-through T568B pattern.

IMPORTANT: Do not ground the shield at this end of the Ethernet cable. Ground the shield at the end of the Ethernet cable that connects to the network server.



12. Test the Ethernet cable for functionality.

IMPORTANT: If using a Paige OSP Shielded GameChanger cable for a wire run length greater than 100 m (328 ft), follow the test procedure specified by Paige. See Paige GameChanger Resources.



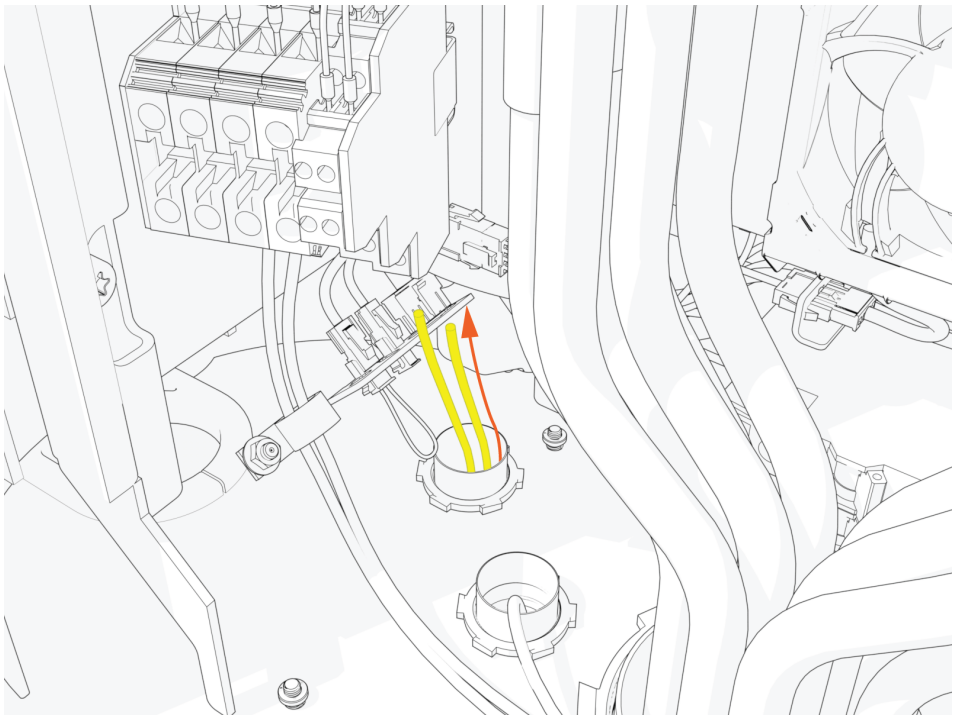
13. Route the Ethernet cable through wireway clamps and connect it to the Ethernet to USB module.

14. Route and connect the other end of the Ethernet cable to the network server.

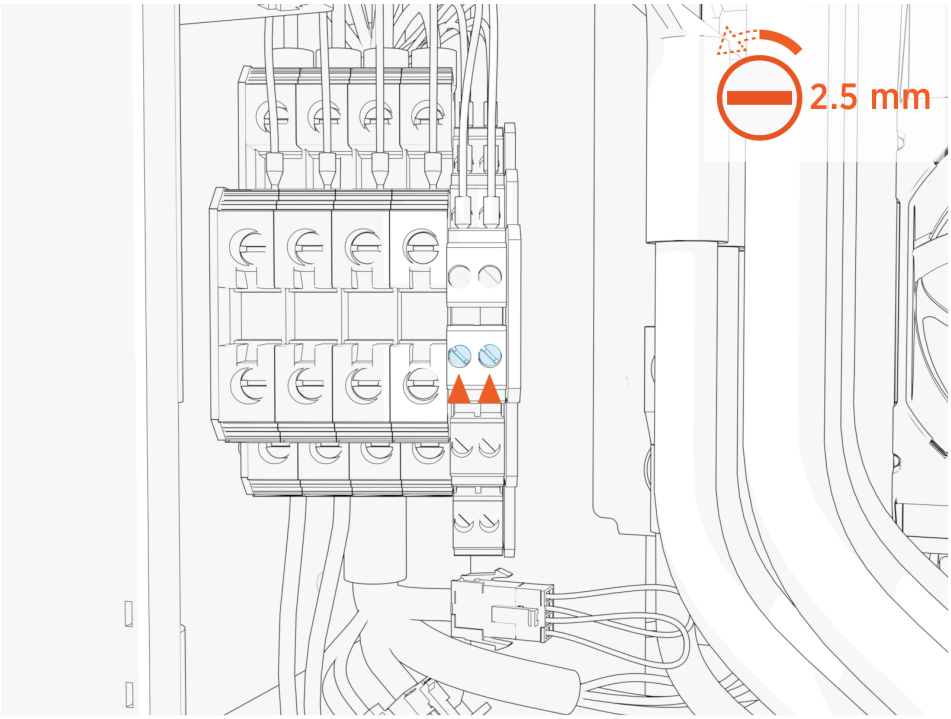
Soft Shutdown Switch

If the site plan indicates the Power Link 2000 must be configured with a soft shutdown switch, follow procedures below to install the soft shutdown switch.

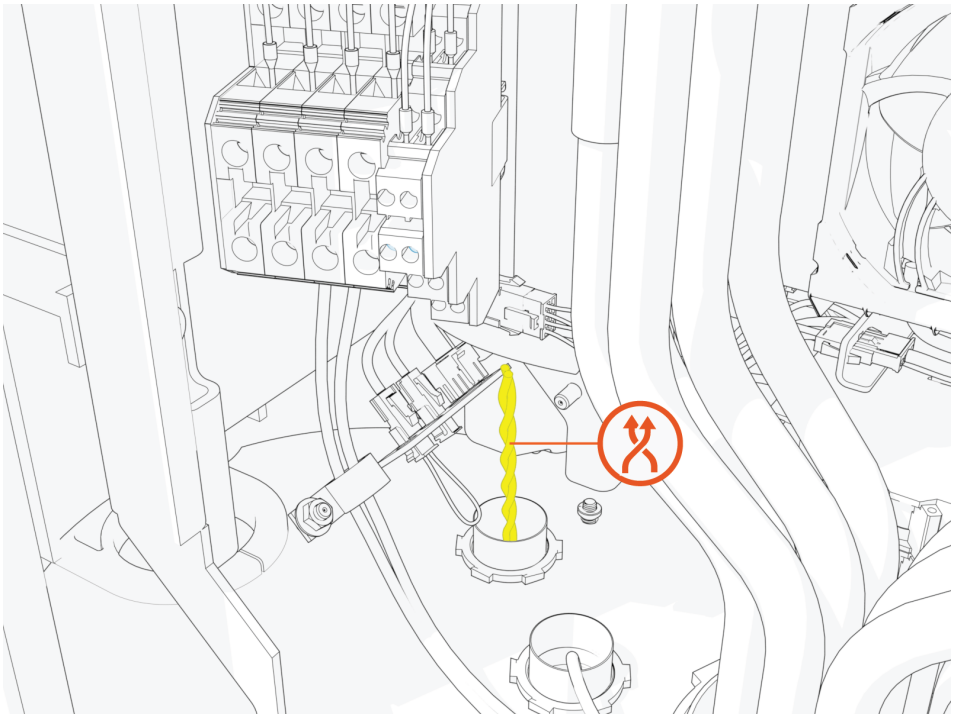
1. Pull the soft shutdown switch wiring through the conduit.



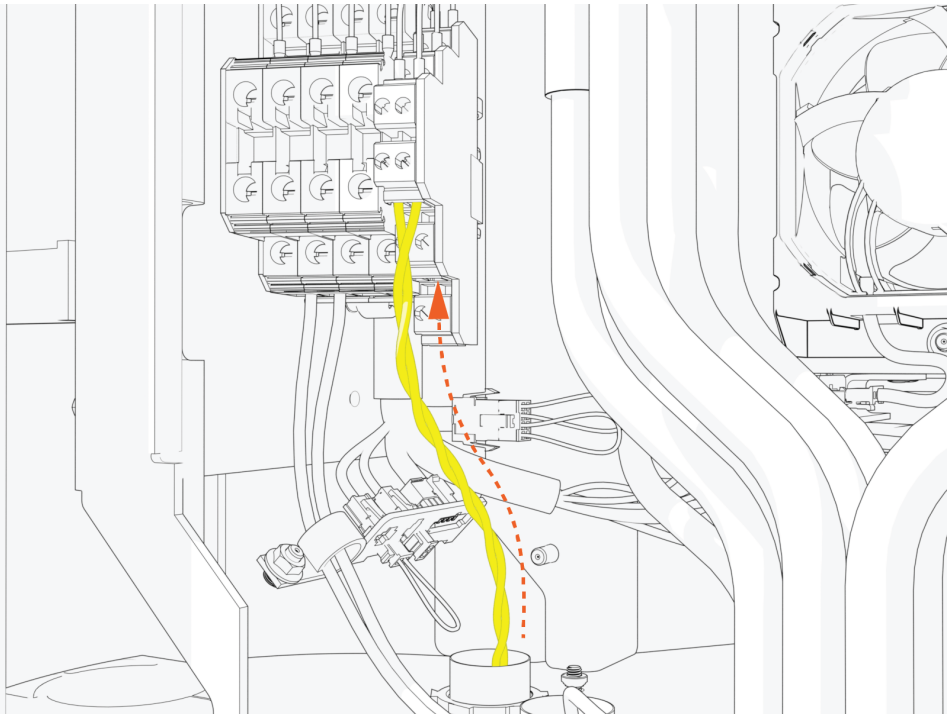
2. Loosen set screws (x2) at the soft shutdown terminal.



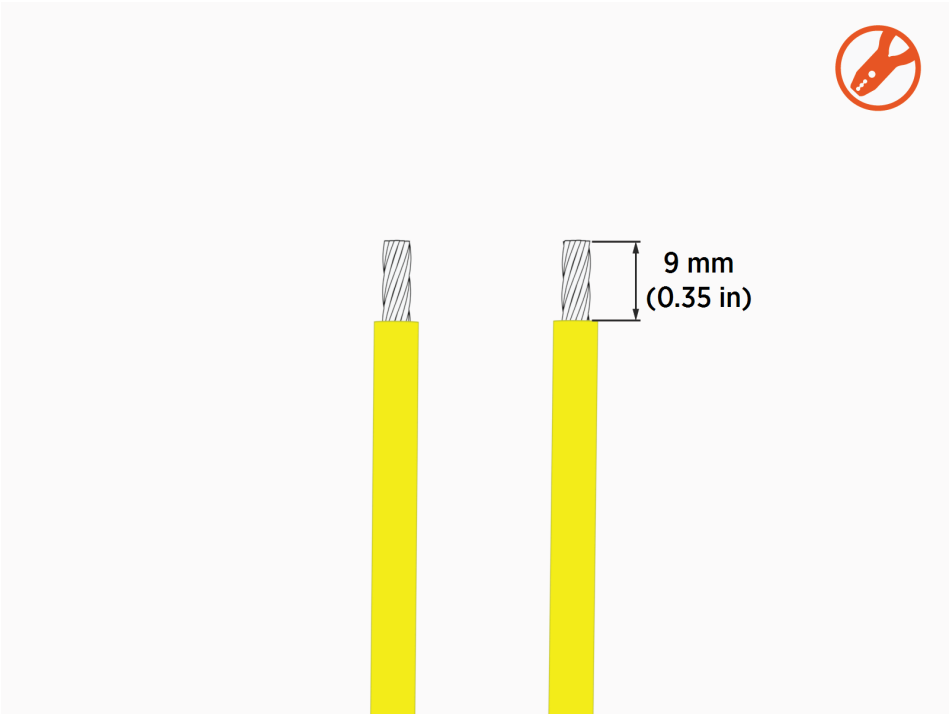
3. Twist the soft shutdown switch wires together, using a minimum of five twists per foot.



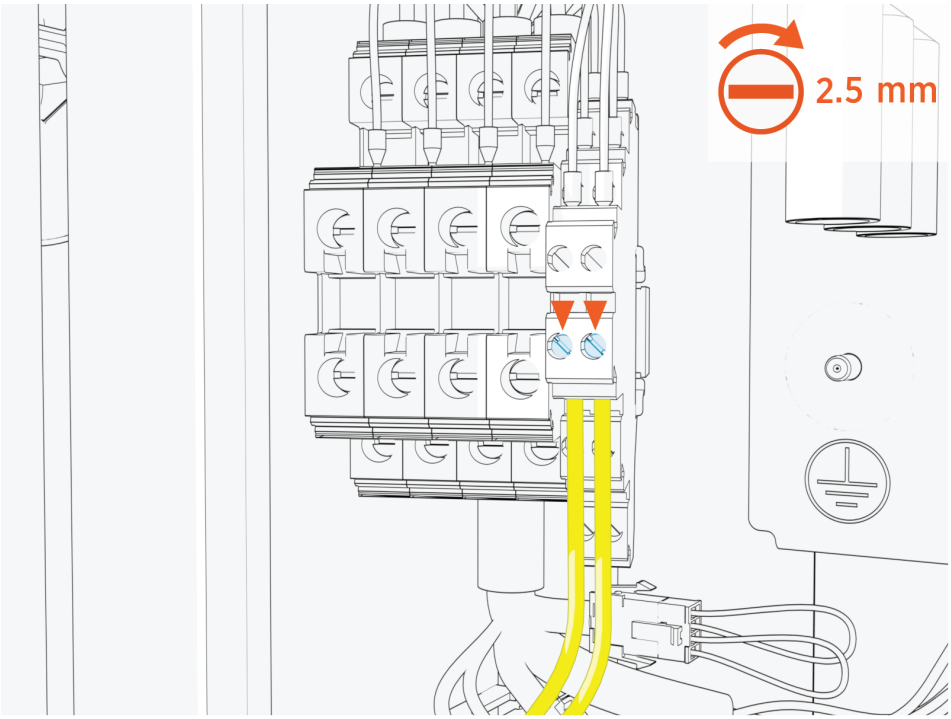
4. Route the twisted wires through the wireway clamps (if necessary, use cable ties) towards the soft shutdown terminal. Cut the wires to length for landing at the terminal.



5. Strip the wire ends.



6. Insert the wires into the soft shutdown terminal. Torque set screws (x2) to **0.6 Nm (5.3 in-lb)**.



Connect Schunk SLS 201.102 Wires 8

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

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- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

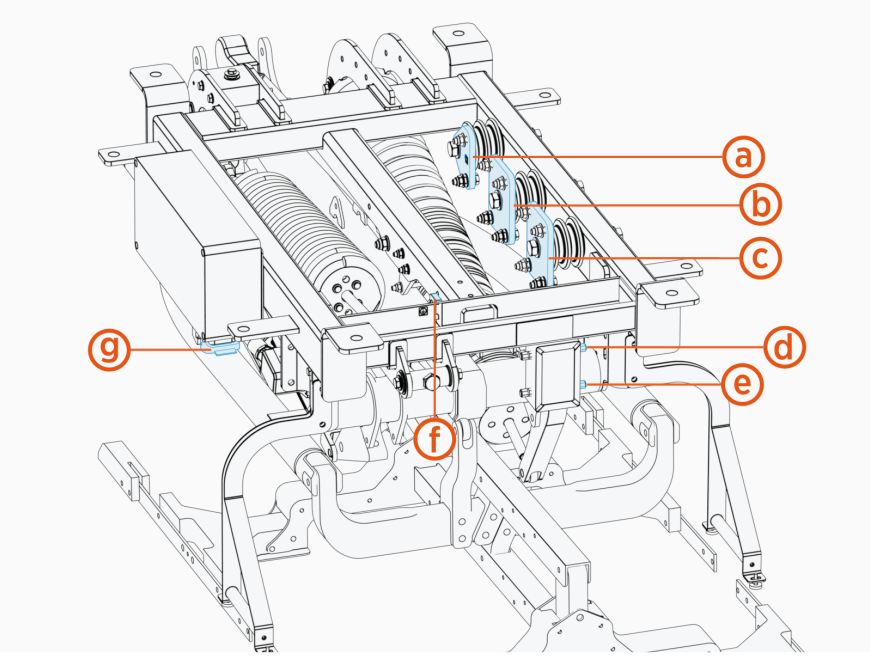
Wiring Overview

Before connecting wires at the pantograph, study and understand the wiring information provided below. For wire quantities, sizes, and terminations, see Wires and Terminations Required for Site and refer to the site drawing.

The Schunk SLS 201.102 is configured with the following wiring:

- HV DC and high power ground power wires connecting from Power Link 2000.
- Three sub-cables within the Controller Interface Cable, connecting from the PD Controller:
  - Control pilot
  - Rest sensor
  - Pantograph control
- A ground wire connecting between the pantograph frame and the auxiliary mounting frame

The wires land on the pantograph at the locations shown below.



(a) High power ground (PE)
(b) HV DC input, positive (+)
(c) HV DC input, negative (-)
(d) Control pilot
(e) Rest sensor
(f) Pantograph frame ground
(g) Pantograph control

Note: There are two high power ground wires connecting from Power Link 2000:

- One ground wire connecting to pantograph PE that lands at terminal **(a)**.
- One ground wire connecting to the pantograph frame that lands at terminal **(f)**.

The wire that grounds the auxiliary mounting frame to the pantograph frame also lands at terminal **(f)**.

Parts Needed

To prepare for Schunk SLS 201.102 wiring, find the following parts from the Auxiliary Components Kit:

- M10 bolt and flange nut (x5 each)
- Ground wire (0.5 m, 1.6 ft)
- M8 bolt and flange nut (x1 each)
- Controller interface cable (5 m)
- Zip ties

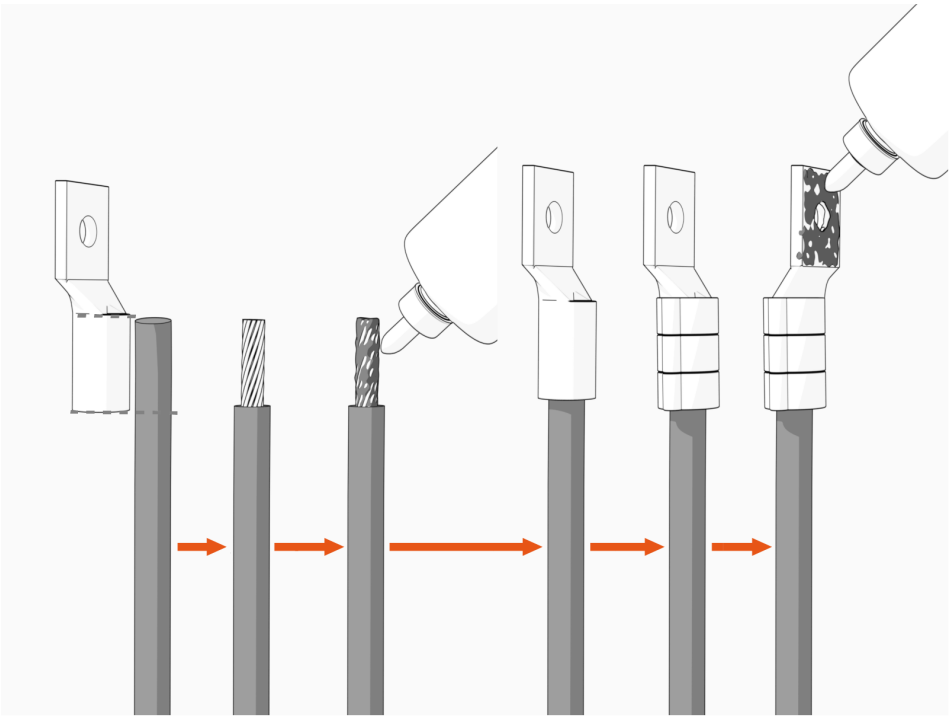
Connect HV DC Wires

Prepare Wires

1. Cut the HV DC and high power ground wires to length for reaching the bus bars on the pantograph. Account for the length of the lug that will terminate each wire.

   Note: The positive (+) and negative (-) bus bars each have two holes for fastening wire lugs. One bolt at each hole can secure two wires, with one wire on each side of the bus bar.

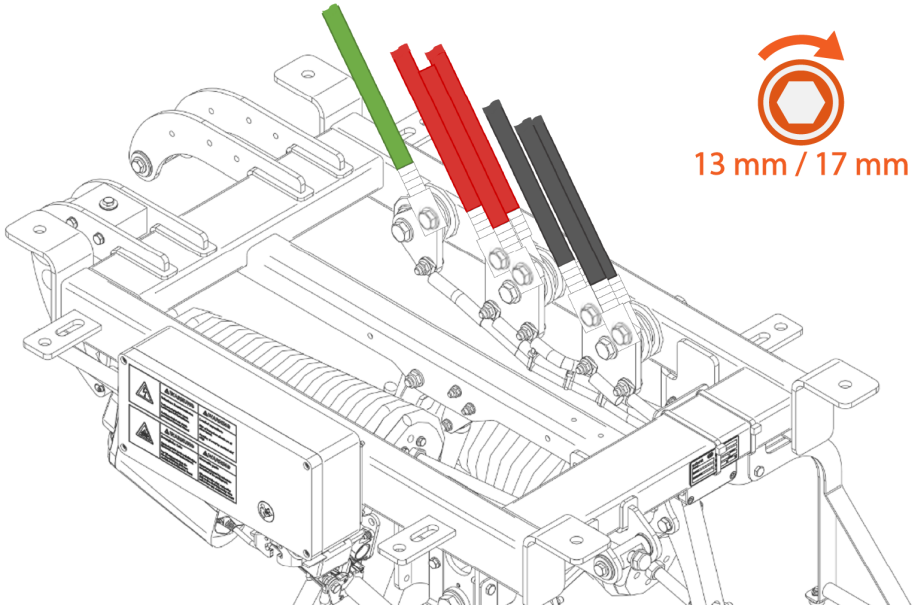
2. Install wire lugs.



a. Mark the lug's barrel height on the wire terminal.
b. Strip the jacket on the marked terminal. Use a suitable wire stripper, such as Klein tool.
c. If recommended by the wire manufacturer or local code, apply an anti-oxidant joint compound to the stripped wire material to make a gastight joint with the lug.
d. Insert the stripped terminal into the lug's barrel and crimp it. Use a suitable lug crimping tool and/or die recommended by the lug manufacturer.
e. Apply dielectric grease to the lug's tongue surface that comes in contact with the bus bars.

Connect Wires

1. Connect HV DC wires (positive, negative, and PE). Use provided M10 bolts and flange nuts. Torque to **19 Nm (14 ft-lb)**.



2. Mark all torqued connections. Torque marks are required to pass post-installation inspection.

Connect Pantograph Frame Ground Wires

Prepare Auxiliary Mounting Frame Ground Wire

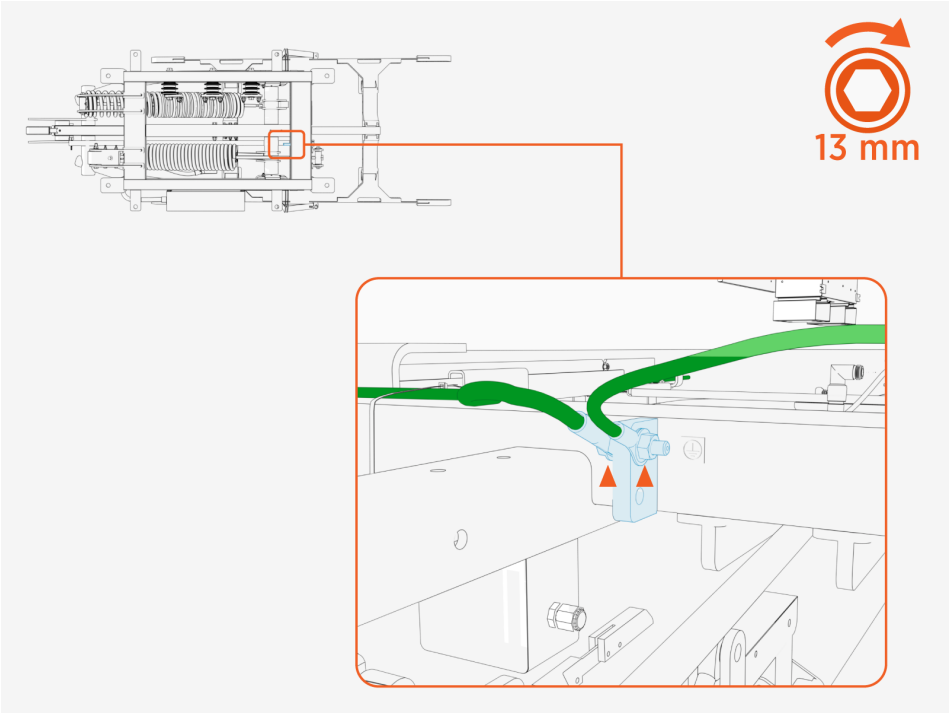
1. Familiarize yourself with the ground cable from the Auxiliary Components Kit. See Pantograph Frame to Auxiliary Frame Ground Wire.
2. Mark the cable end with the larger ring terminal (sized for M8 (0.31 in) bolt). This is the end that installs at the pantograph.

Prepare Ground Wire From Power Link 2000

1. Identify the high power ground wire connecting from the Power Link 2000.
2. Route the wire to the pantograph frame ground landing and cut wire to length. Take into account the length of the lug that will terminate the wire.
3. Strip the wire end and install a lug.

Connect Ground Wires

1. Connect the two ground wires to the pantograph frame ground landing. Use M8 bolt and flange nut. Torque to **12.2 Nm (108 in-lb)**.



2. Use a zip tie to secure the wires so that they are clear of the pantograph during operation. The wires must be kept away from the pantograph arms and charging rails.

Connect LV DC Cables

Route Controller Interface Cable

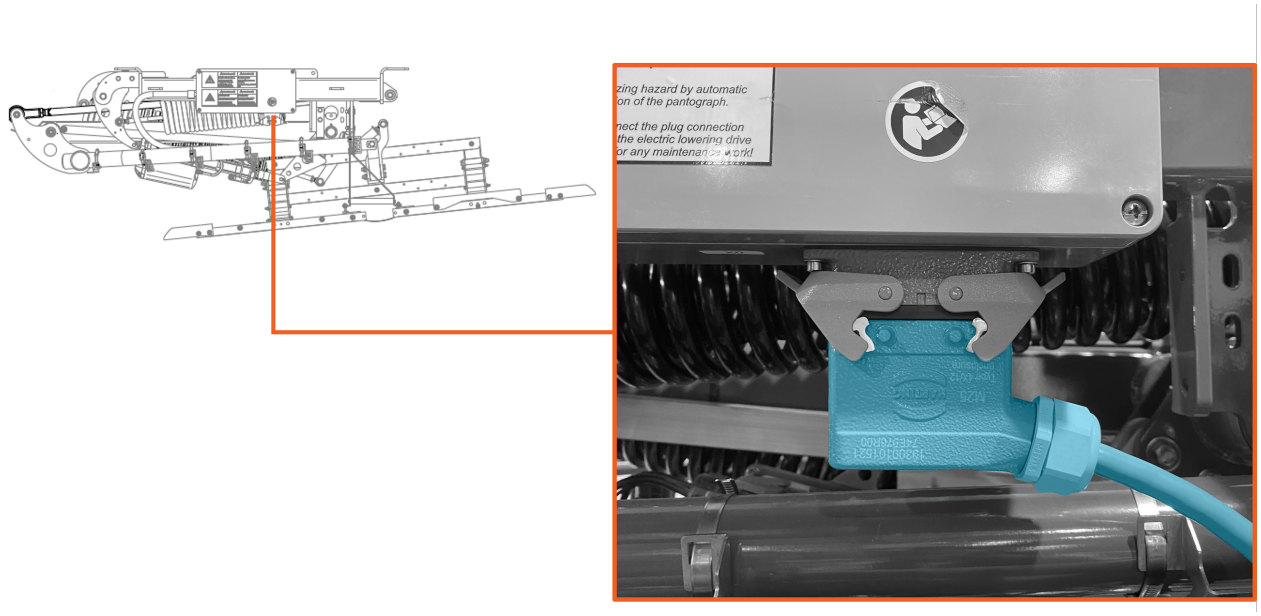
1. Familiarize yourself with the controller interface cable. See Controller Interface Cable Schunk SLS 201.102.
2. If the site plan calls for the controller interface cable to run within conduit, and the 1-1/4 in NPT cable gland (provided with PD Controller) is used to seal the end of the conduit nearest to the pantograph, thread the cable gland onto the conduit using a 46 mm hex wrench. Torque to **10.2 Nm (90 in-lb)**.
3. Route or pull (through conduit) the controller interface cable from the pantograph to the PD Controller.

   Note: The cable can be pulled through conduit in only one direction, from the pantograph to the PD Controller.

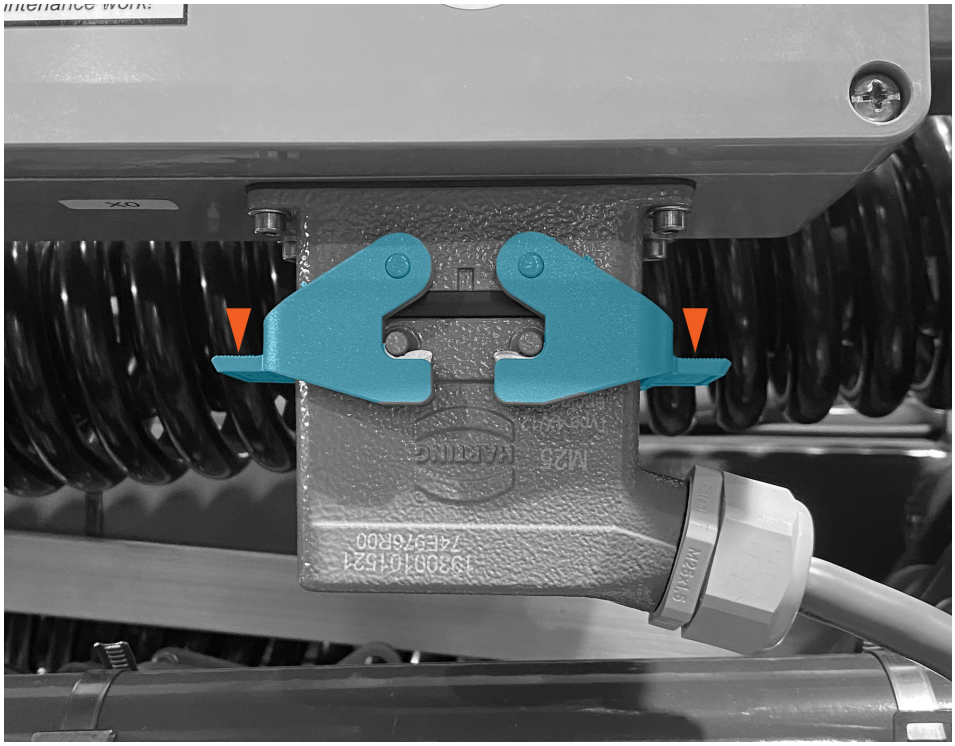
   Note: Ensure there is sufficient cable length to land the cable wires inside of the PD Controller. See Connect PD Controller Wires.

Connect Pantograph Control Cable

1. Route the pantograph control cable to the pantograph electric control unit. Ensure the cable is kept clear of high voltage exposed conductors and the pantograph arms through their full movement range.
2. Connect the pantograph control cable.



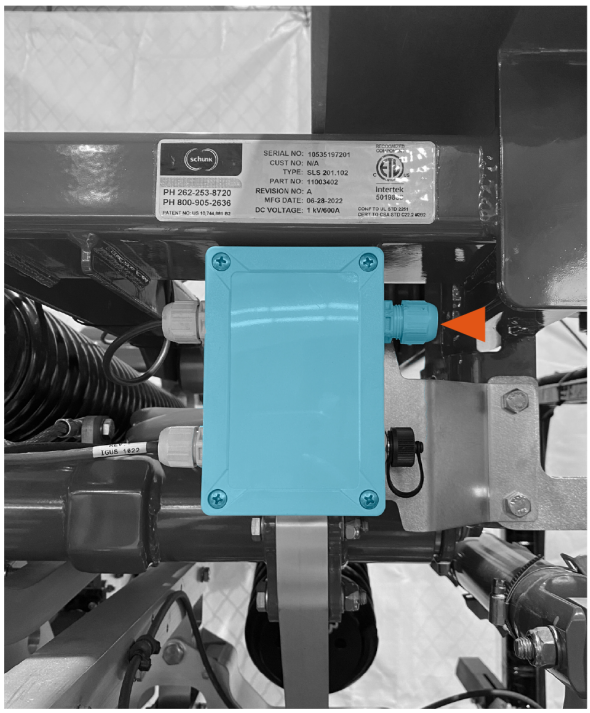
3. Push down on the latch tabs to secure the connector.

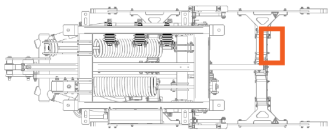


4. Use a zip tie to secure the cable so that it is clear of the pantograph during operation. The cable must be kept away from the pantograph arms and charging rails.

Connect Control Pilot Cable

1. Route the pantograph control pilot cable to reach the pantograph control box. Ensure the cable is kept clear of high voltage exposed conductors and the pantograph arms through the entire movement range.



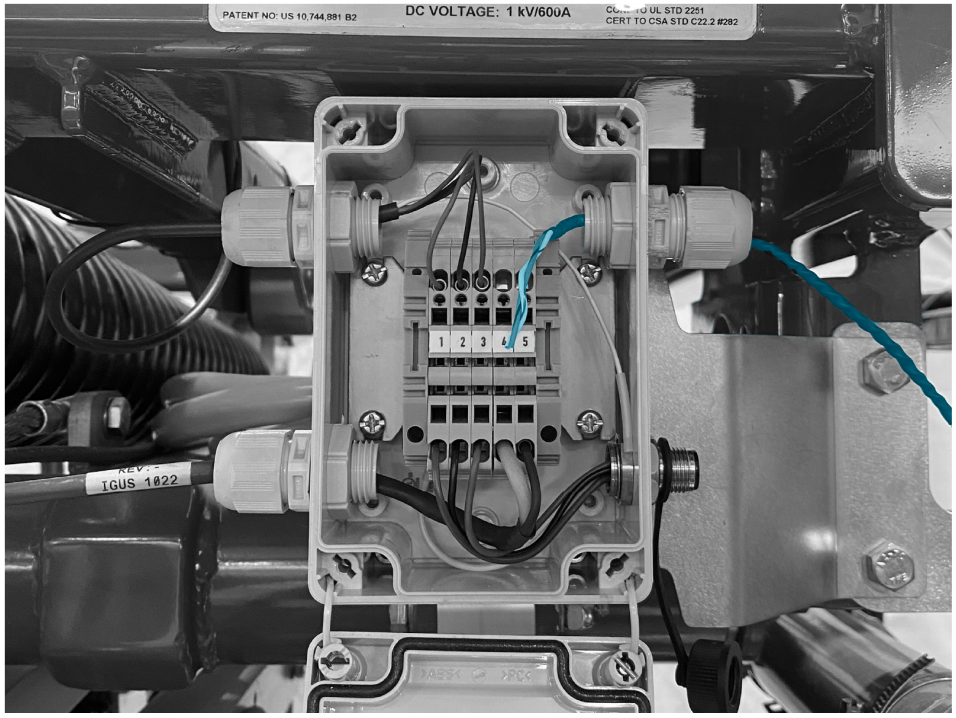


2. Quarter turn spring latches (x4) to open the pantograph control box.

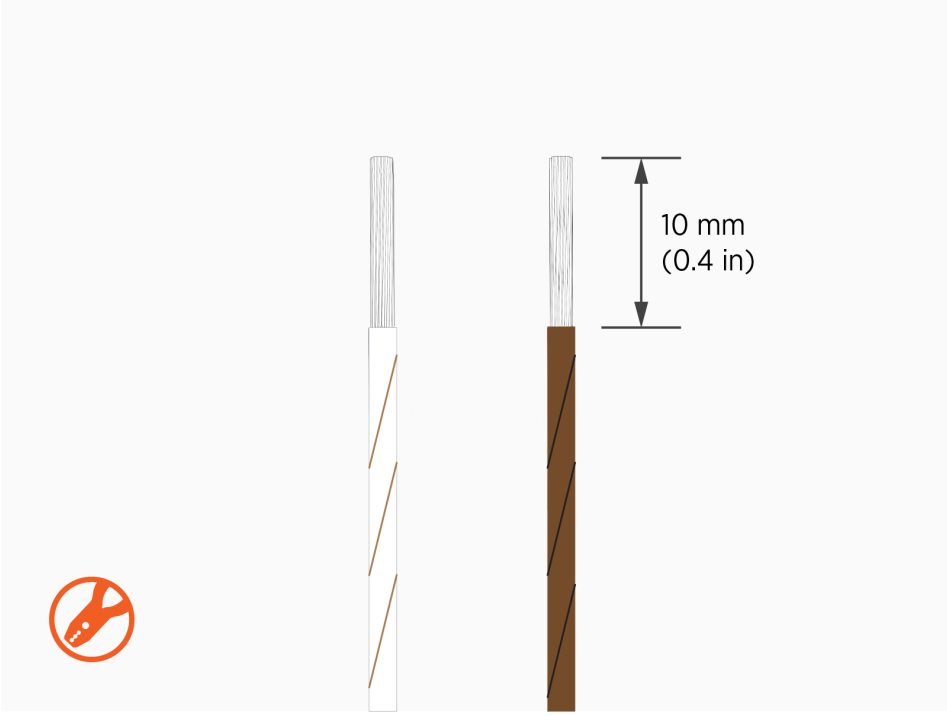
   Note: The latches are operated with a Phillips head screwdriver but they are not screws. Gently push the latch head inwards with the screwdriver and initiate the turn. Part way through the turn, keep the screwdriver in contact with the latch, but discontinue application of inward pressure. Continue turning until the latch pin pops out.

   IMPORTANT: Be gentle when operating the latches. The latches can break if the screwdriver applies significant torque.

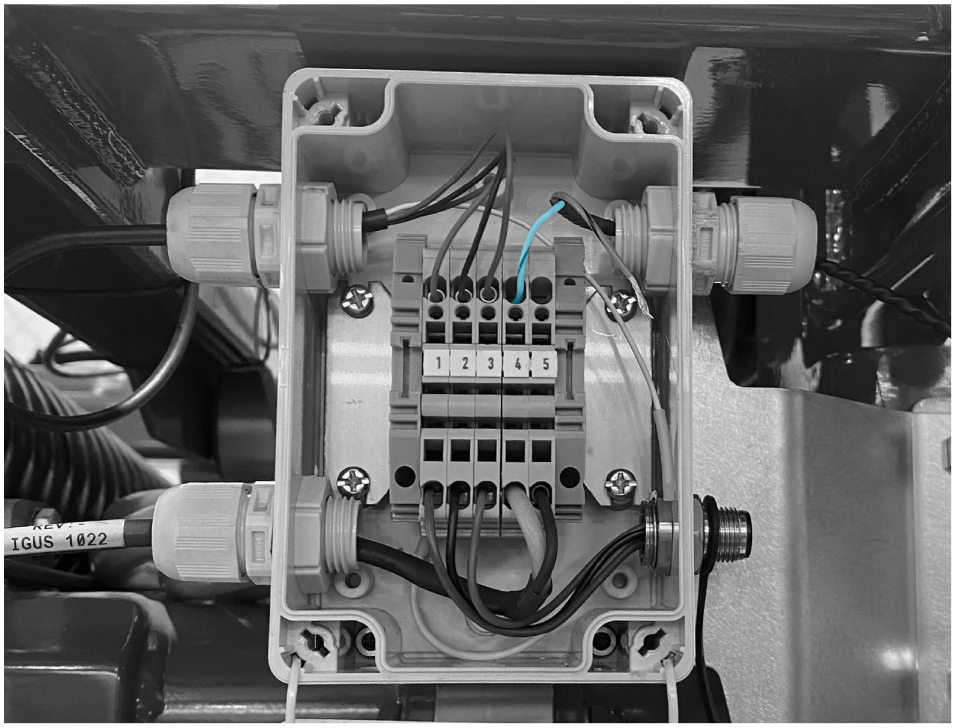
3. Route the control pilot cable though the cable gland.



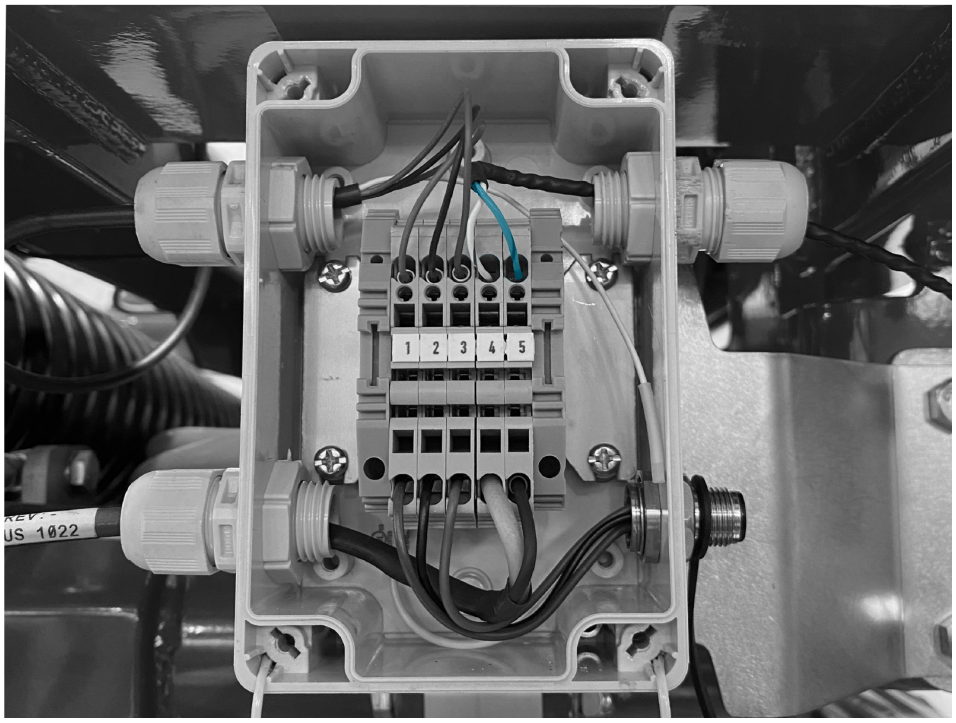
4. Strip the wire jackets.



5. Insert the control pilot wire (white/brown) into terminal 4. Use the provided wire terminal operating tool or a flat head screwdriver to open the terminal port. Push-pull to test the wire is secured.



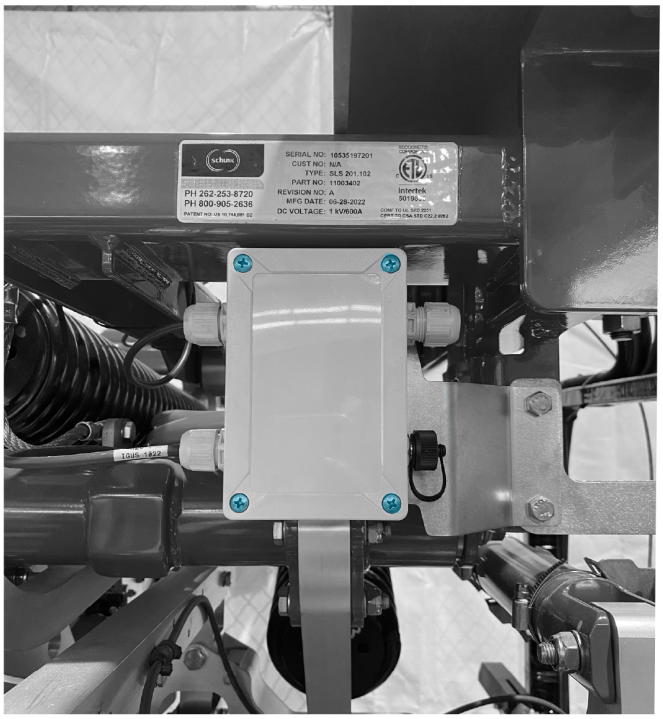
6. Insert the control pilot shield wire (brown/black) into terminal 5. Use the provided wire terminal operating tool or a flat head screwdriver to open the terminal port. Push-pull to test the wire is secured.



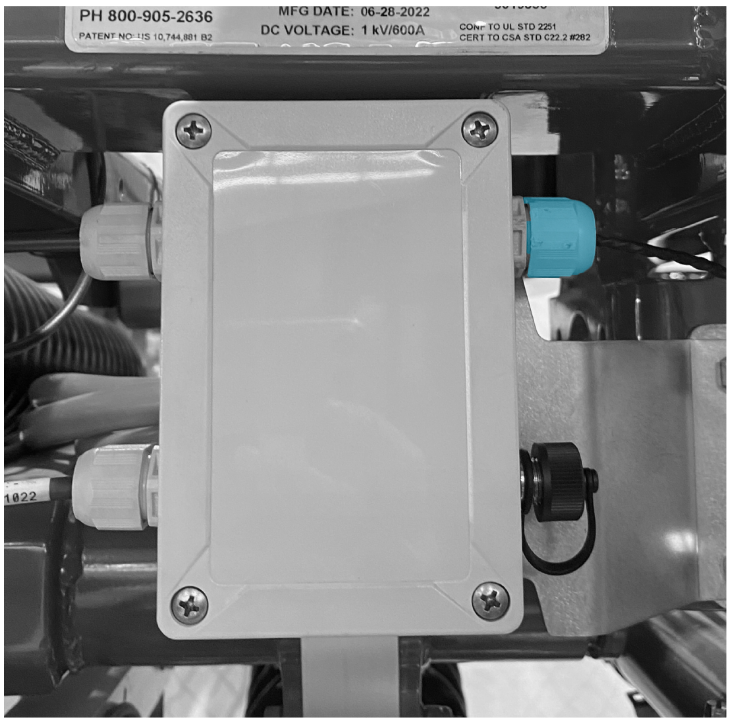
7. Close the box. Quarter turn spring latches (x4).

   Note: The latches are operated with a Phillips head screwdriver but they are not screws. Gently push the latch head inwards with the screwdriver and initiate the turn. Part way through the turn, keep the screwdriver in contact with the latch, but discontinue application of inward pressure. Continue turning until the latch pin latches into a locking groove.

IMPORTANT: Be gentle when operating the latches. The latches can break if the screwdriver applies significant torque.



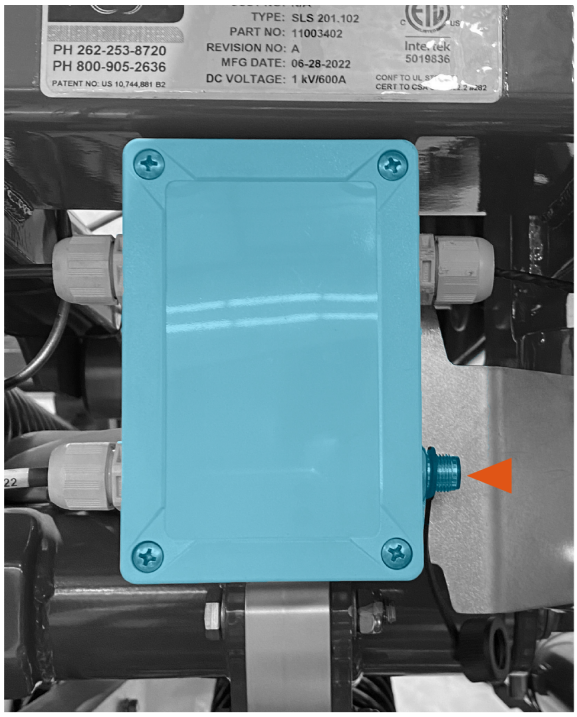
8. Tighten the cable gland. Torque to **1.5 Nm (13.3 in-lb)**.

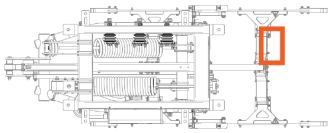


9. Use a zip tie to secure the cable so that it is clear of the pantograph during operation. The cable must be kept away from the pantograph arms and charging rails.

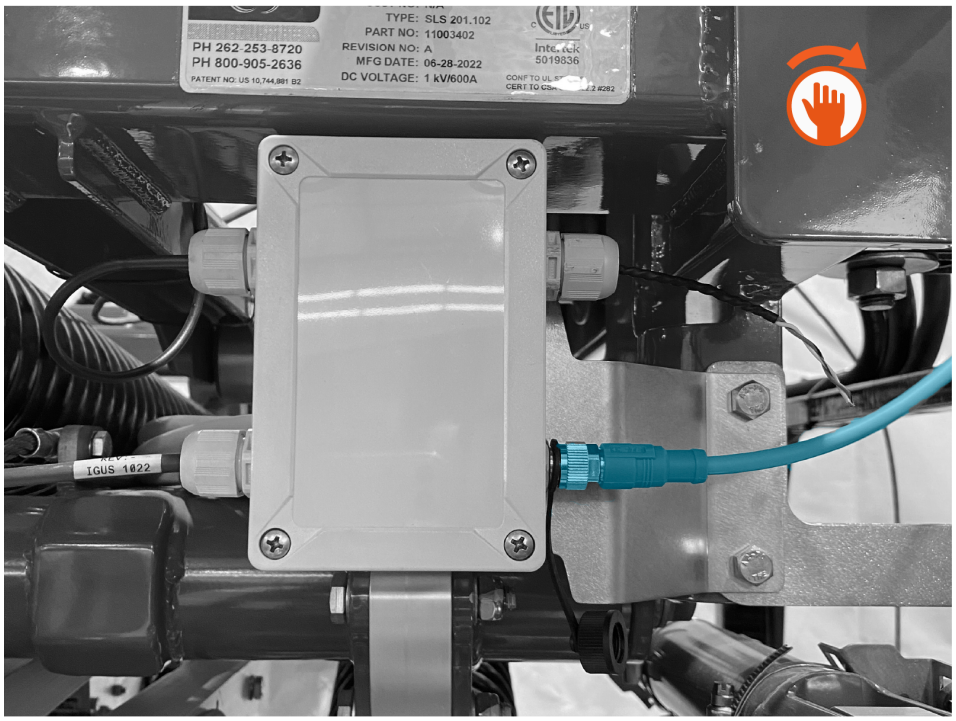
Connect Rest Sensor Cable

1. Route the pantograph rest sensor cable to the pantograph control box. Ensure the cable is kept clear of high voltage exposed conductors and the pantograph arms through their full movement range.





2. Connect the rest sensor cable. Hand-tighten.



3. Use a zip tie to secure the cable so that it is clear of the pantograph during operation. The cable must be kept away from the pantograph arms and charging rails.

Mount Auxiliary Components to Schunk SLS 201 9

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

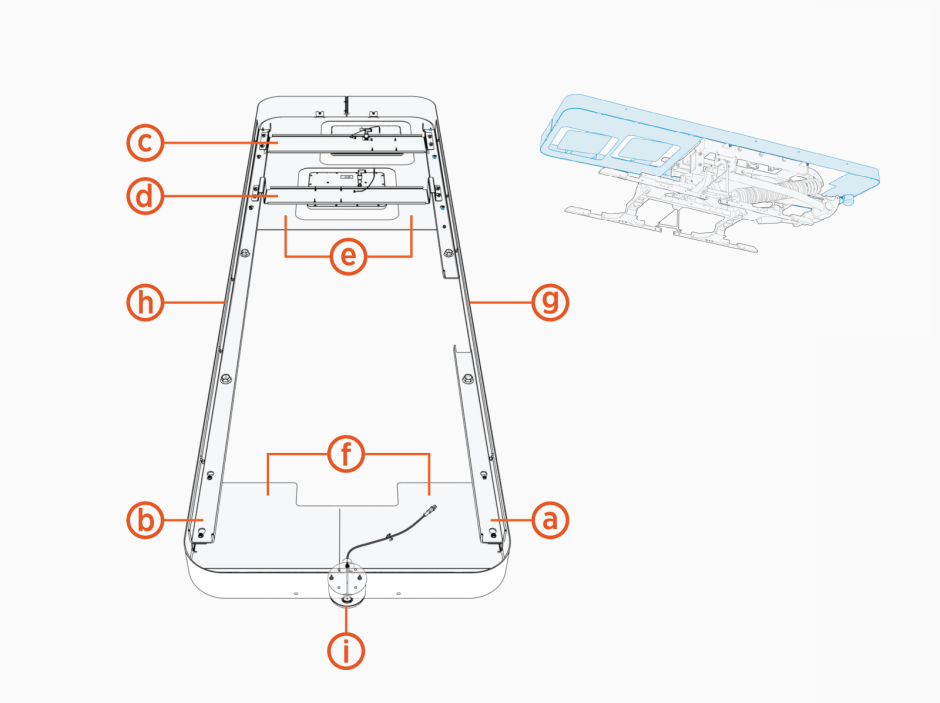
CAUTION: Warranty Limitation

- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

Overview and Parts Needed

A mounting frame attaches the Wi-Fi antenna, RFID antenna, and status LED to the Schunk SLS 201 pantograph.



- **(a)** Mounting frame rail, right
- **(b)** Mounting frame rail, left
- **(c)** Wi-Fi antenna assembly
- **(d)** RFID antenna assembly
- **(e)** Mounting frame cover, rear
- **(f)** Mounting frame cover, front
- **(g)** Mounting frame side cover, right
- **(h)** Mounting frame side cover, left
- **(i)** Status LED

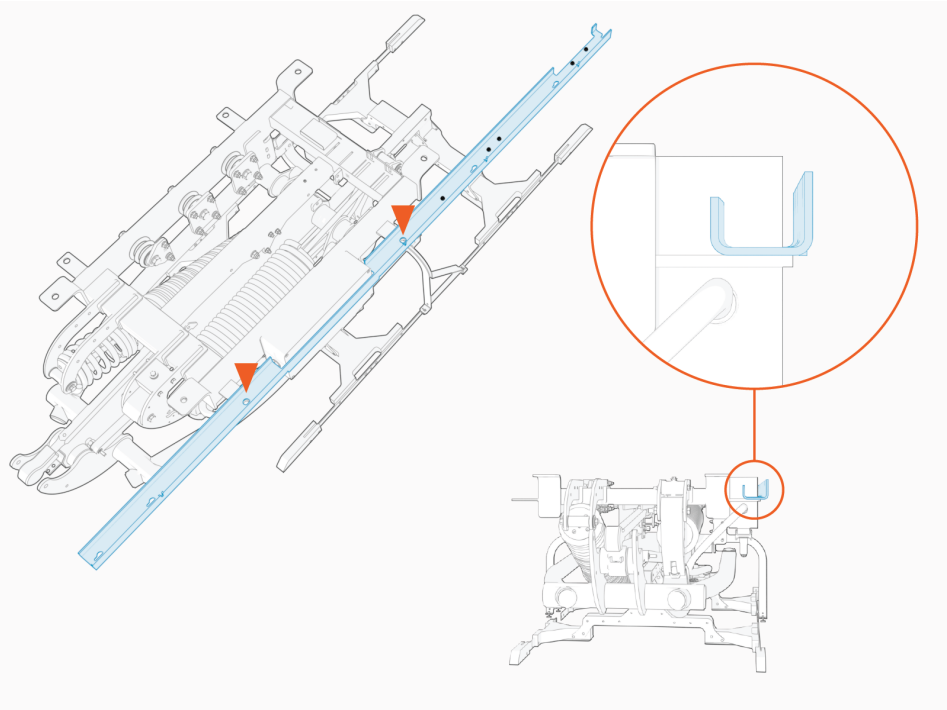
To prepare for auxiliary components installation, find the following parts from the Auxiliary Components Kit:

- All parts listed above
- M16 bolt and flange nut (x4 each)

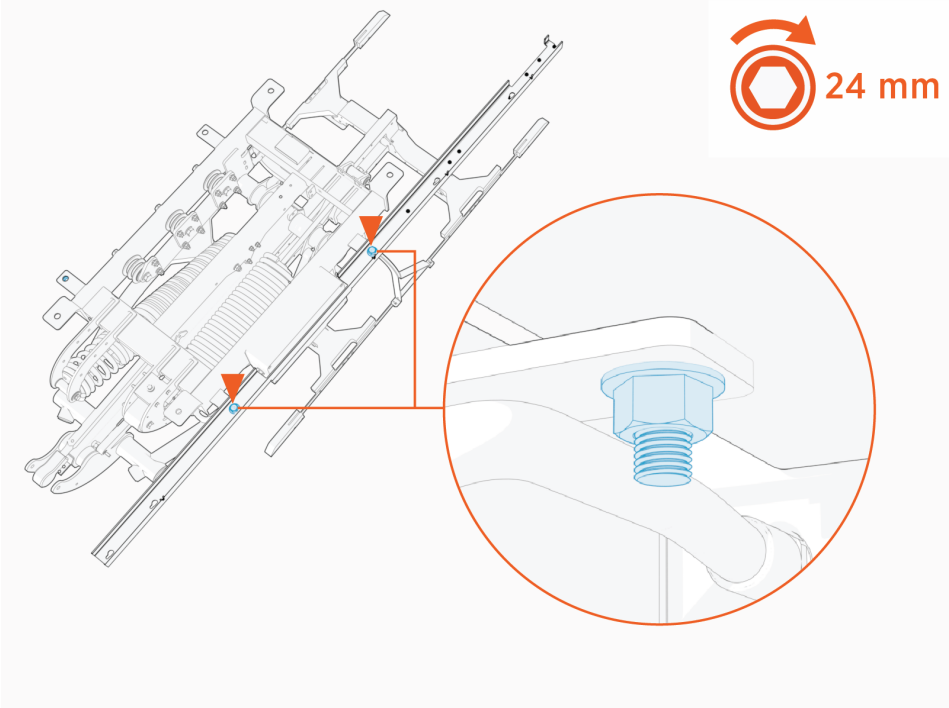
Install Side Rails

1. Align the right side rail to the pantograph aid mounting supports.

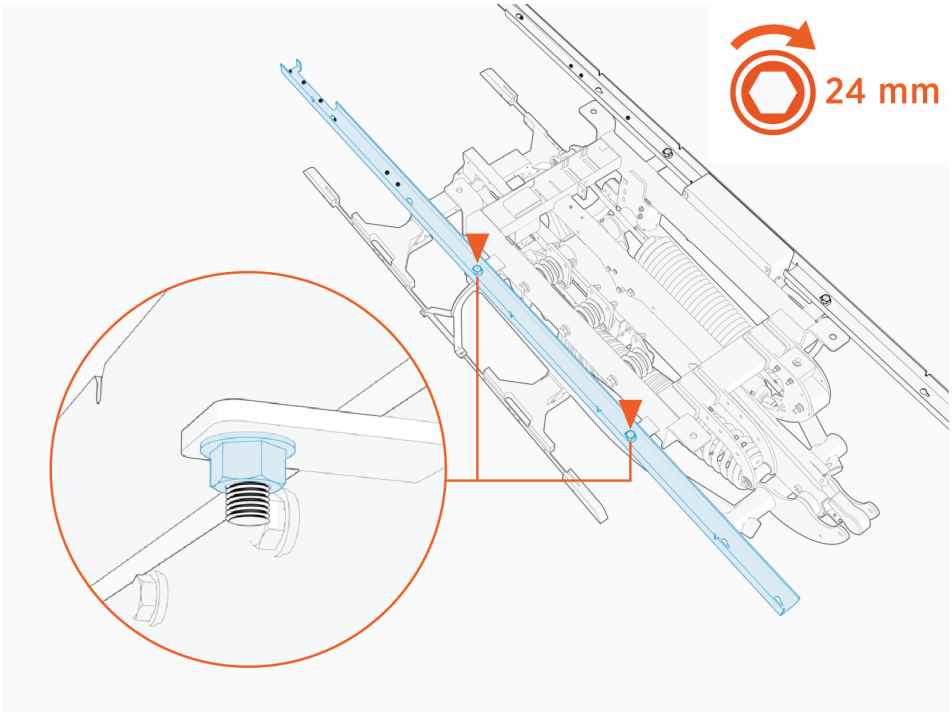
   Note: The right side rail has a cutout notch to accommodate the pantograph electric control unit. The left side rail does not.



2. Install M16 bolt and flange nut at mounting supports (x2 fastener sets total) to fasten rail. Torque to **94.9 Nm (70 ft-lb)**.

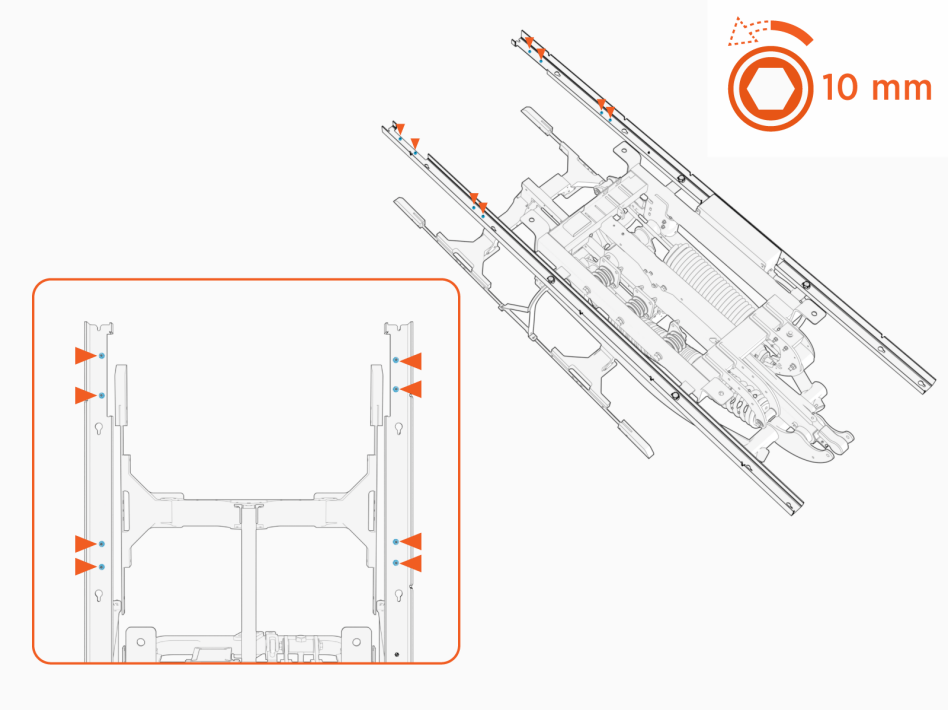


3. Repeat above steps to install the left side rail on the pantograph.

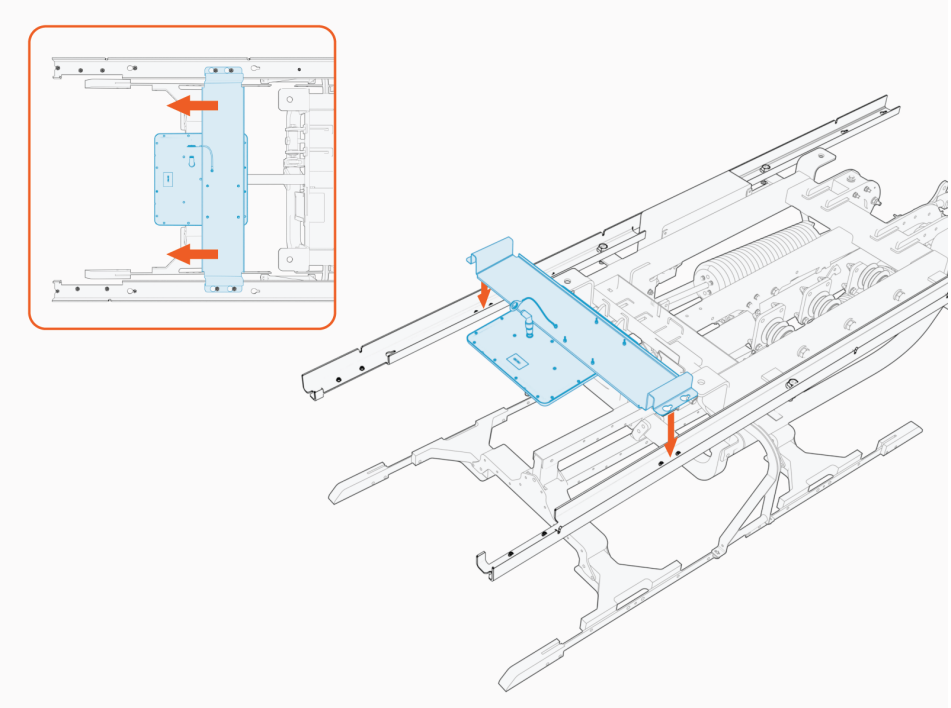


Install Wi-Fi and RFID Antenna Assemblies

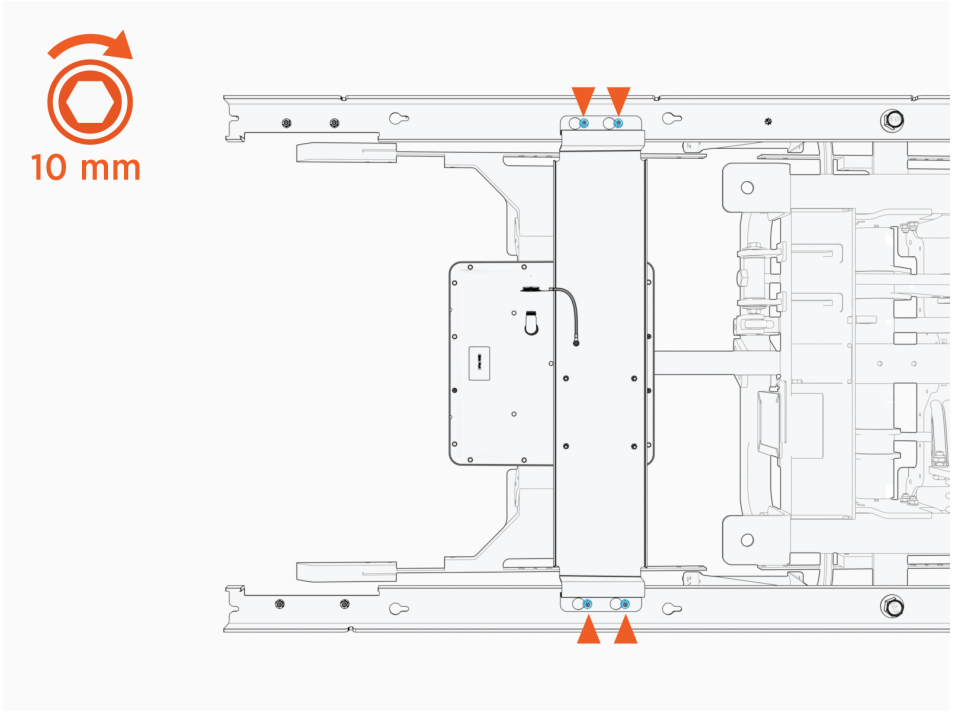
1. Loosen (do not remove) the M6 nuts (x8) at the rear of the left and right rails.



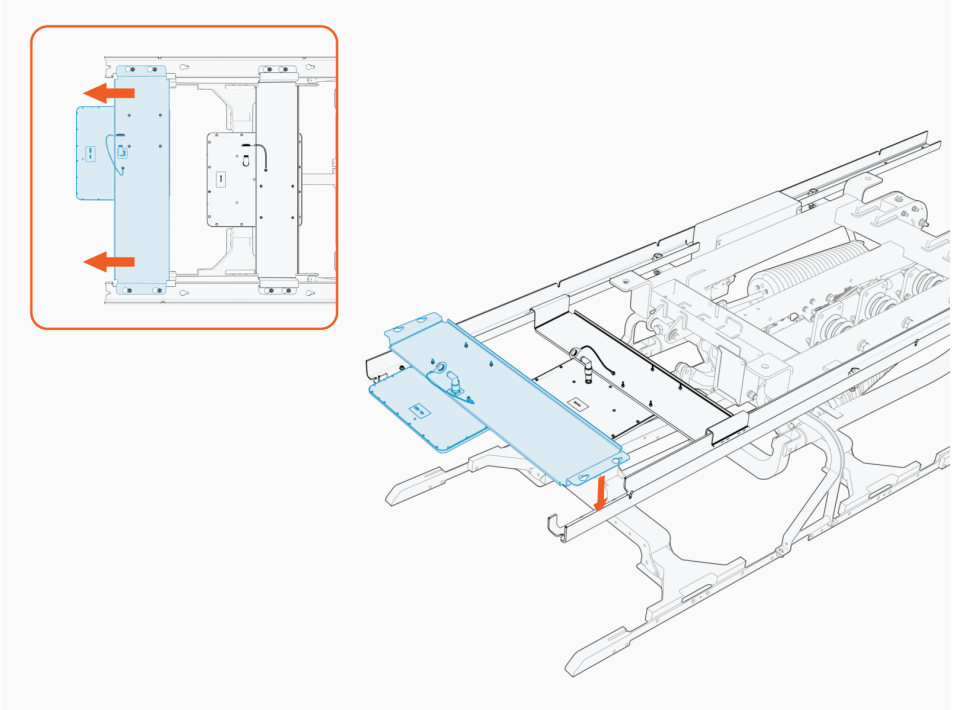
2. Install the RFID assembly onto the left and right rails. Slide the assembly until the keyholes lock on the mounting studs.



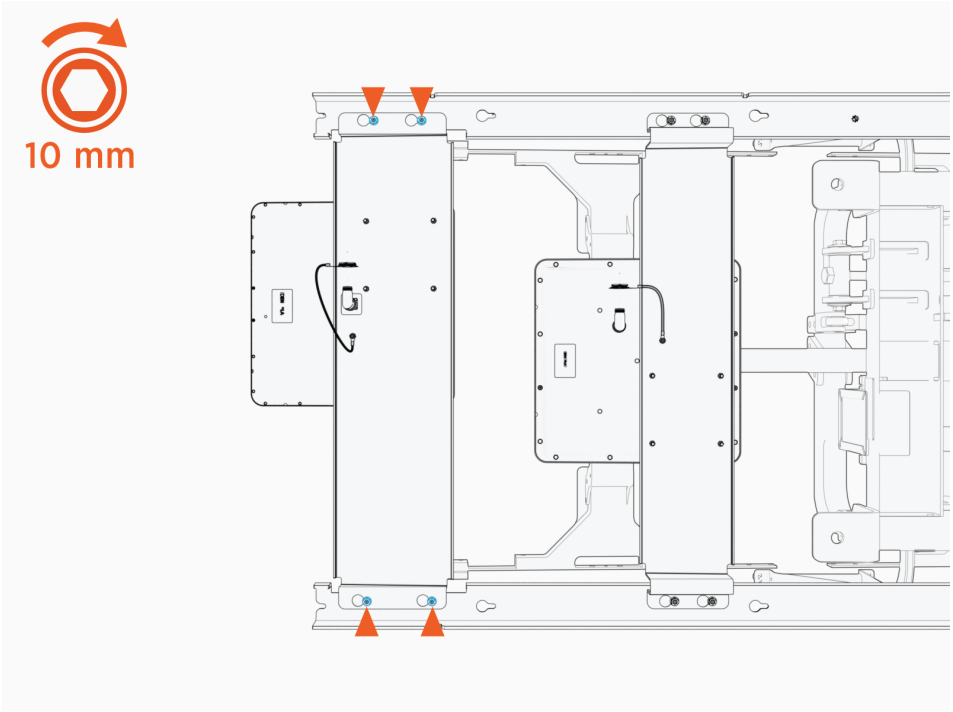
3. Tighten the M6 nuts (x4). Torque to **5.6 Nm (50 in-lb)**.



4. Install the Wi-Fi assembly onto the left and right rails. Slide the assembly until the keyholes lock on the mounting studs.



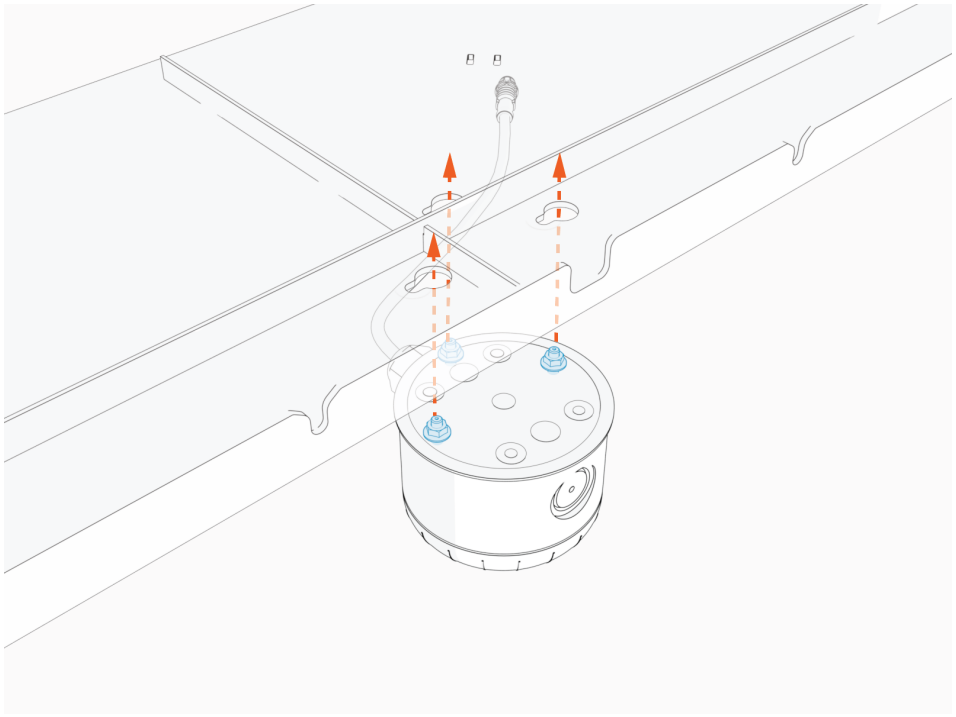
5. Tighten the M6 nuts (x4). Torque to **5.6 Nm (50 in-lb)**.



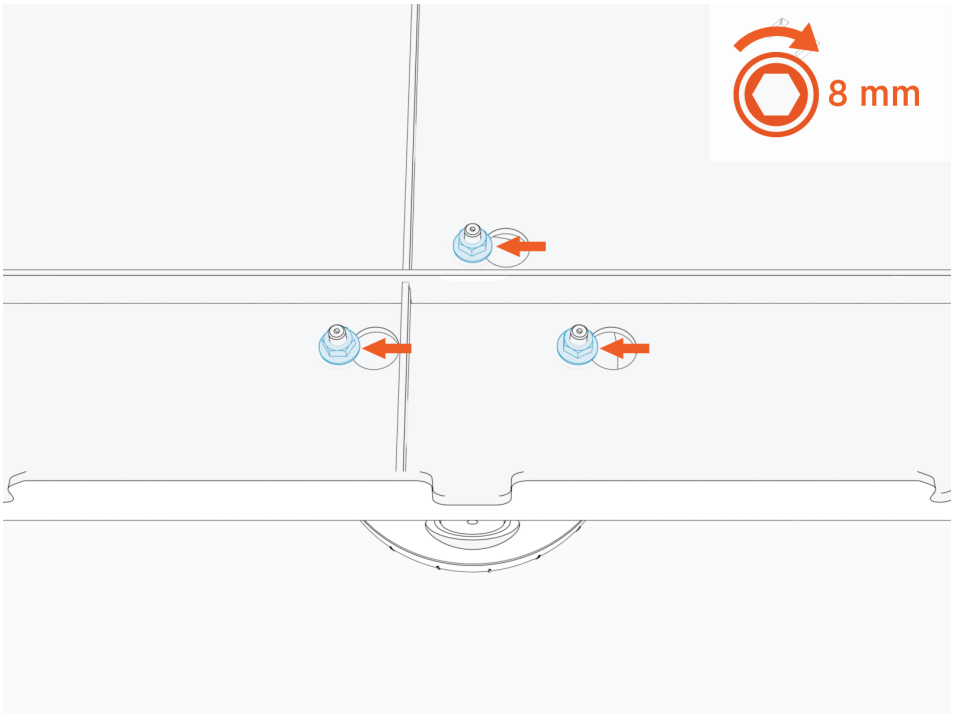
Install Front Cover And Status LED

1. Loosen (do not remove) M5 nuts (x3) on the status LED.

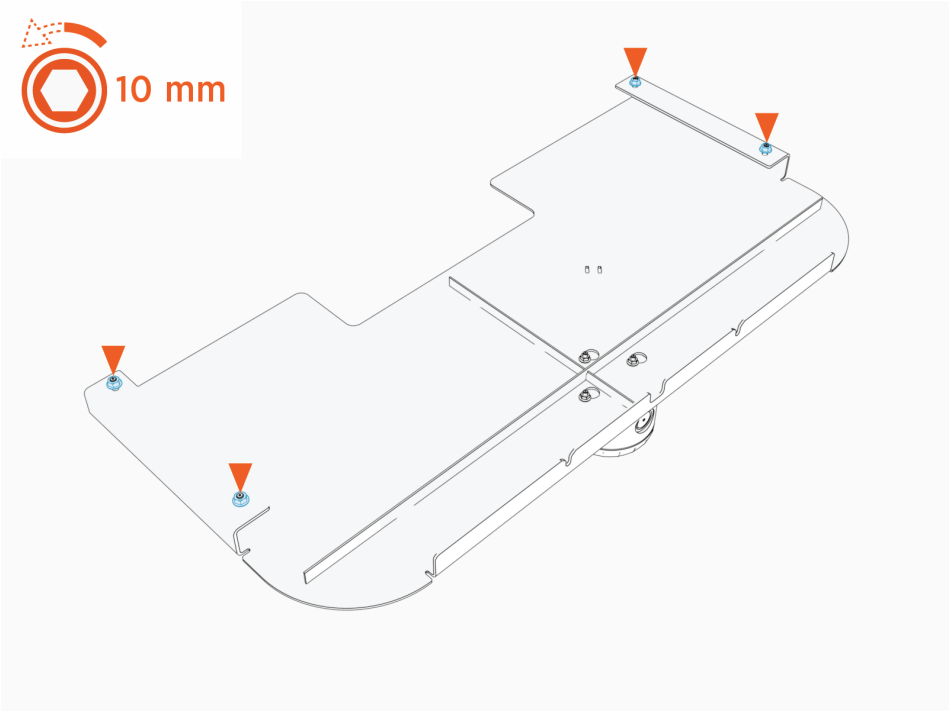
2. Install the status LED on the front cover at keyholes.



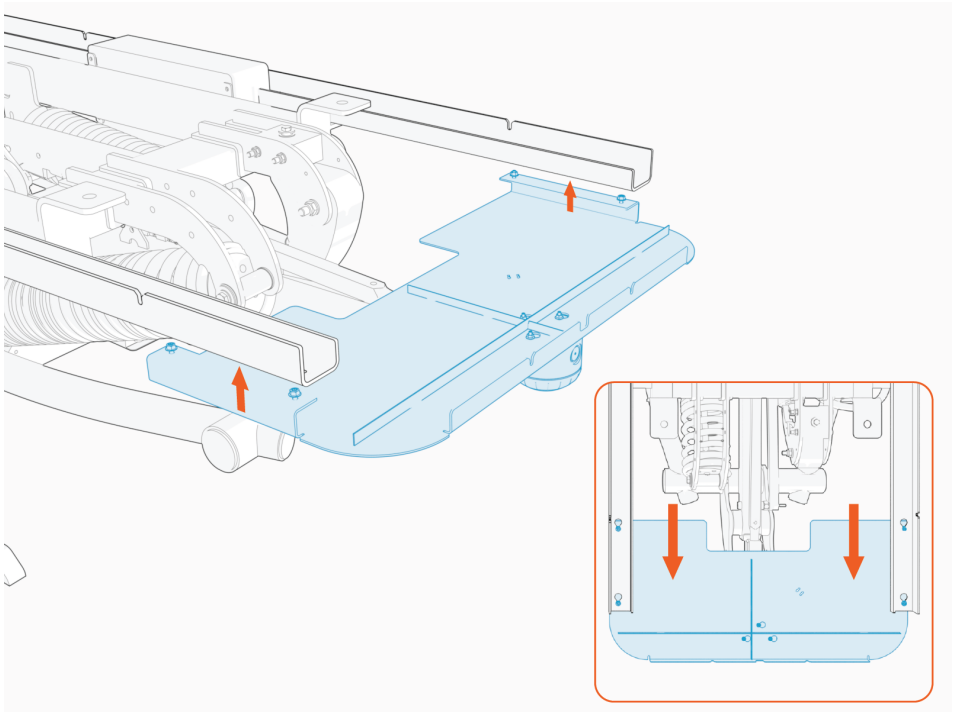
3. Slide the status LED until the mounting studs lock in the keyholes. Torque M5 nuts (x3) to **4.5 Nm (40 in-lb)**.



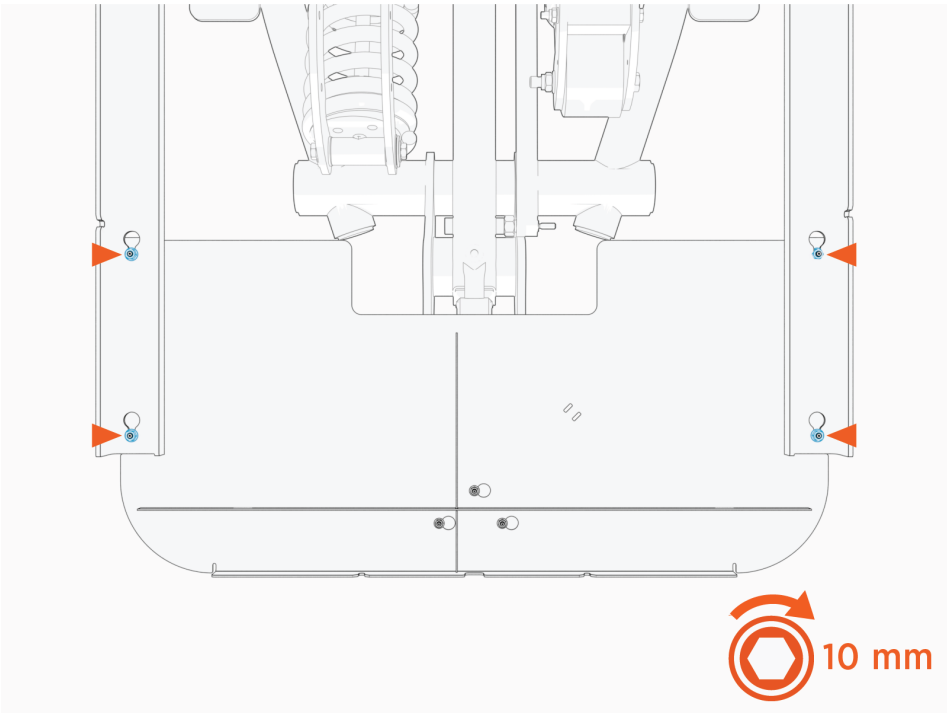
4. Loosen (do not remove) M6 nuts (x4) on the front cover.



5. Install the front cover assembly onto the left and right rails. Slide the cover until it locks into the keyholes.



6. Tighten the M6 nuts (x4). Torque to **5.6 Nm (50 in-lb)**.



Save Parts

Save the following parts of the auxiliary components mounting frame for later installation:

- Rear cover
- Side covers

These parts will not install until after cables are connected to the antennas. See Complete Schunk SLS 201.102 Auxiliary Components Frame.

Connect Auxiliary Component Cables 10

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Warranty Limitation

- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

Parts Needed

To prepare for auxiliary component cable connection, find the following parts from the Auxiliary Components Kit:

- Wi-Fi antenna cable
- RFID Antenna cable
- Status LED cable
- M6 bolt and nut

Prepare Antenna Cables

IMPORTANT: The LMR-240 antenna cables shipped with Pantograph Down 2000 have a one-time bend radius of 19 mm (0.75 in) and repeated bend radius of 63 mm (2.5 in). Do not exceed the bend radius or the cable may be damaged and the system may not operate. If using an LMR-240 equivalent, do not exceed the bend radius of the cable type used. Ensure the cable does not kink when handling or pulling the cable.

1. Familiarize yourself with the RFID and Wi-Fi antenna cables. See Appendix: RFID and Wi-Fi Antenna Cable Reference.
2. Before uncoiling the antenna cables, label both ends of each cable.

   Note: The antenna cables shipped with the system are identical and interchangeable. However if one or both cables are custom ordered for the site, the cables may be different in length and/or type. Be sure the cables are labeled accurately.
3. If the site plan calls for the antenna cables to run within conduit, and the 3/4 in NPT cable gland (provided with the PD Controller) is being used to seal the end of the conduit nearest to the pantograph, thread the cable gland onto the conduit using a 33 mm wrench. Torque to **7.9 Nm (70 in-lb)**.
4. Route or pull (through conduit) the cables between the antennas and the PD Controller.

   Note: Ensure there is appropriate cable length to terminate the cables inside of the PD Controller. See Connect PD Controller Wires.

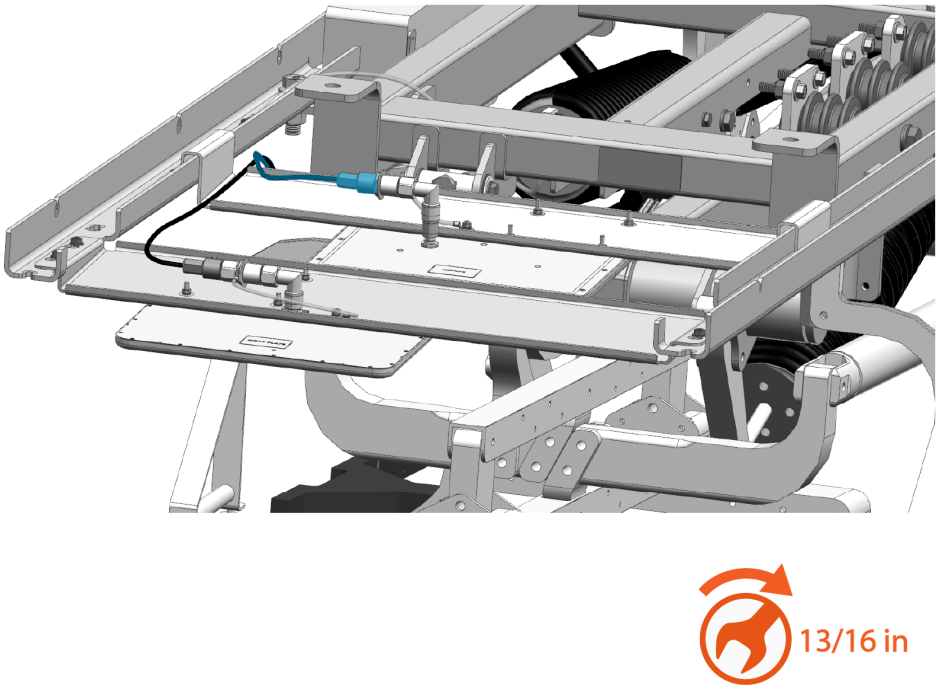
   Note: The cables can be pulled through the conduit in only one direction, from the antennas to the PD Controller. If the conduit end is sealed with a cable gland, feeding the RP-SMA connectors through the cable gland may require care due to a snug fit. See Appendix: RFID and Wi-Fi Antenna Cable Reference for recommended technique.

Connect RFID Antenna Cable

1. Route the RFID cable end to the RFID antenna. Keep the cable clear of high voltage exposed conductors and the pantograph arms through the entire movement range.

> **CAUTION:** You may coil the cable to take up excess slack. However, note the LMR-240 cable shipped with Pantograph Down 2000 has a one-time bend radius of 19 mm (0.75 in) and repeated bend radius of 63 mm (2.5 in). Do not exceed the bend radius or the cable may be damaged and the system may not operate. If using an LMR-240 equivalent cable, do not exceed the bend radius limits for the cable type used.

2. Connect the RFID antenna cable. Torque to **1.5 Nm (13.3 in-lb)**. The connection to the RFID antenna assembly may be oriented at any angle to fit the site cabling routing needs. Check that all connections between adapters are torqued after cable is installed.



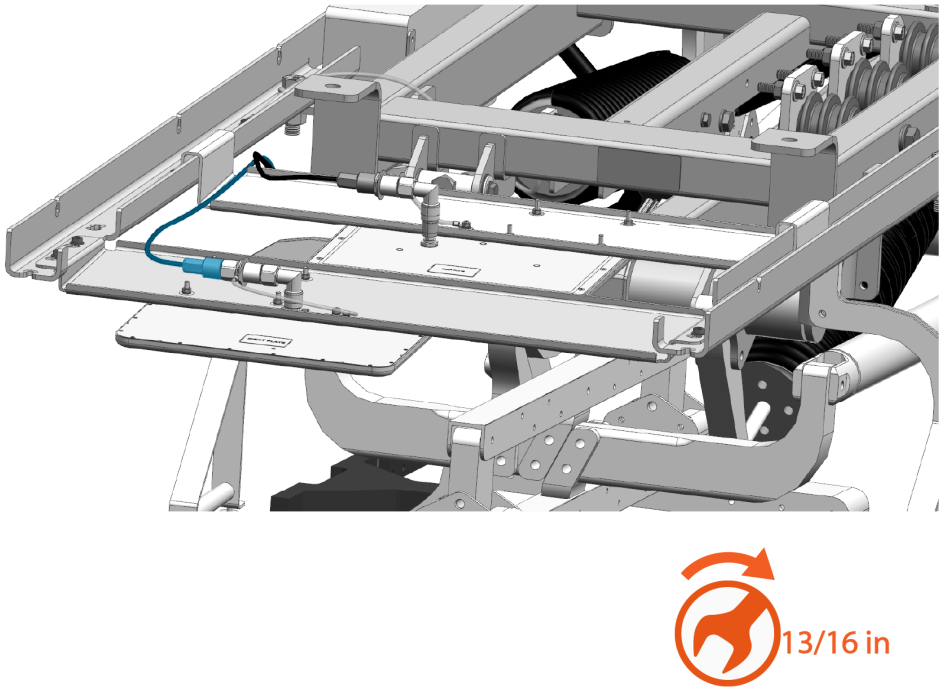
3. Use zip ties to secure the antenna cable so that it is clear of the pantograph during operation.

Connect Wi-Fi Antenna Cable

1. Route the Wi-Fi cable end to the Wi-Fi antenna. Keep the cable clear of high voltage exposed conductors and the pantograph arms through the entire movement range.

> **CAUTION:** You may coil the cable to take up excess slack. However, note the LMR-240 cable shipped with Pantograph Down 2000 has a one-time bend radius of 19 mm (0.75 in) and repeated bend radius of 63 mm (2.5 in). Do not exceed the bend radius or the cable may be damaged and the system may not operate. If using an LMR-240 equivalent cable, do not exceed the bend radius limits for the cable type used.

2. Connect the Wi-Fi antenna cable. Torque to **1.5 Nm (13.3 in-lb)**. The connection to the Wi-Fi antenna assembly may be oriented at any angle to fit the site cabling routing needs. Check that all connections between adapters are torqued after cable is installed.



3. Use zip ties to secure the antenna cable so that it is clear of the pantograph during operation.

Connect Status LED Cable

1. Familiarize yourself with the status LED cable. See Status LED Cable.
2. Route the status LED cable end to the status LED. Keep the cable clear of high voltage exposed conductors and the pantograph arms through the entire movement range. Coil the cable as needed to take up excess slack.

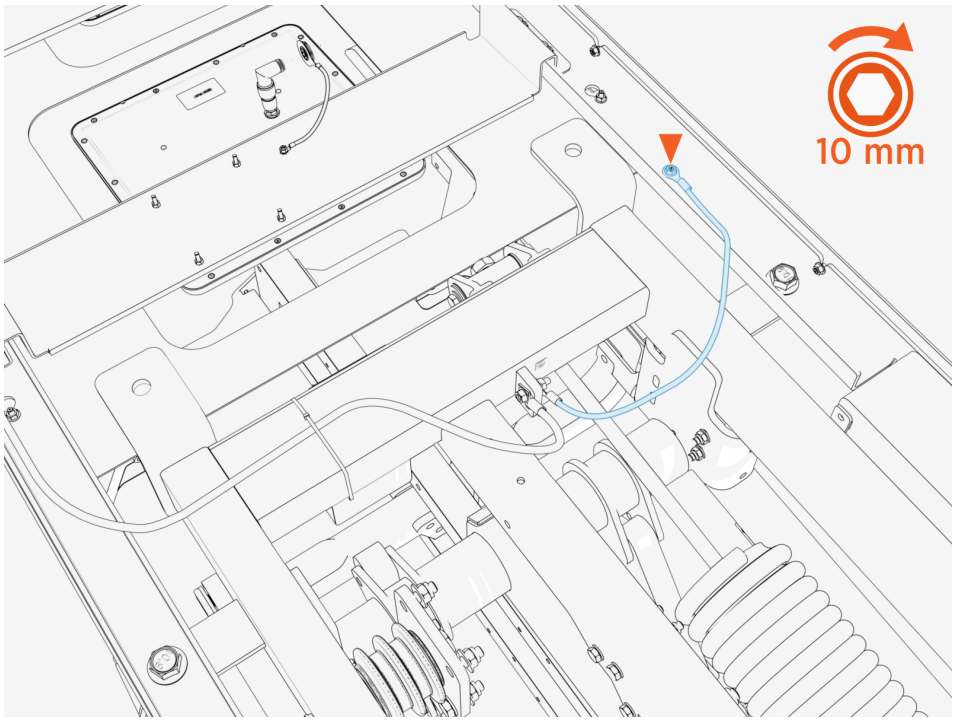
3. Connect the status LED cable to the short cable attached to the status LED. Hand-tighten.

4. Use a zip tie looped through a hole in the front cover to secure the cable.

5. Use zip ties to secure the cable so that it is clear of the pantograph during operation.

Connect Auxiliary Frame Ground Wire

1. Identify the ground wire connecting from the pantograph frame ground landing.
2. Connect the ground wire to the auxiliary component frame using M6 bolt and nut. Torque to **5.6 Nm (50 in-lb)**.



3. Use zip ties to secure the wire so that it is clear of the pantograph during operation. The cable must be kept away from the pantograph arms and charging rails.

Connect PD Controller Wires 11

WARNING: Do not install or service the charging station in inclement weather. If you work in snow, rain, or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: Ensure that the installation complies with all applicable codes and ordinances.

IMPORTANT: Keep components out of direct sunlight in a cool area until you install them.

CAUTION: Warranty Limitation

- If the charging station is not installed, commissioned, or serviced by a ChargePoint certified technician using a ChargePoint-approved method, it is *excluded* from all ChargePoint and other warranties and ChargePoint is not responsible.
- You must be a licensed electrician and complete training at chargepoint.com/installers to become ChargePoint certified and to access ChargePoint's web-based installer tools or ChargePoint Installer app.

CAUTION: Use low torque settings when working with power tools during installation or servicing. Over-torquing can damage the equipment.

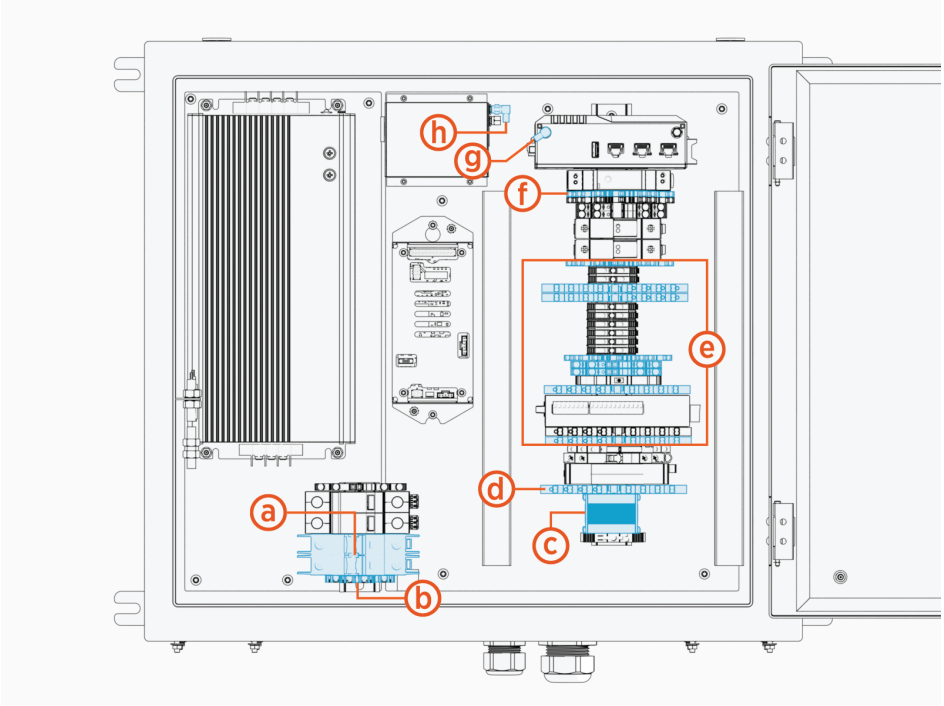
Wiring Overview

The PD Controller is configured with the following wire connections:

- 120-277 V AC input from the site
- LV DC input, chassis ground, and Ethernet connection from a Power Link 2000
- RF coaxial connection to a Wi-Fi Antenna
- RF coaxial connection to an RFID Antenna

For AC and LV DC input wire quantities, sizes, and terminations, see Wires and Terminations Required for Site.

Wire landing locations within the PD Controller are shown below.



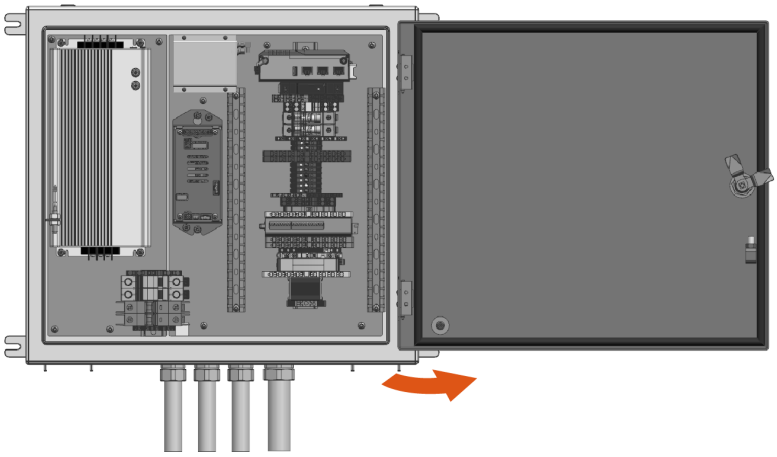
(a) 120-277 V AC input
(b) AC PE
(c) Ethernet input
(d) LV DC input
(e) Controller interface cable
(f) Chassis ground
(g) Wi-Fi antenna
(h) RFID antenna

Parts Needed

To prepare for wiring, find the wire terminal operating tool (shipped in the Auxiliary Components Kit).

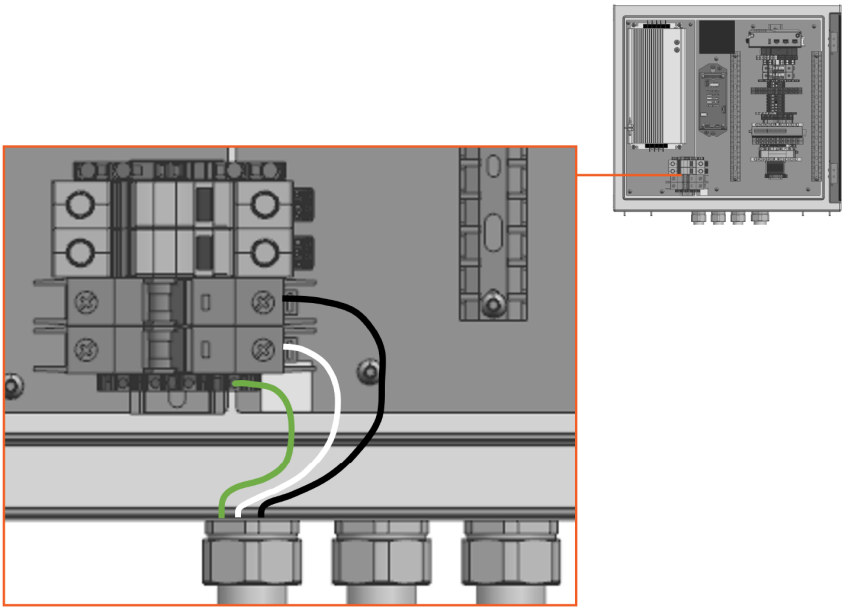
Connect AC Input Wires

1. Open the PD Controller enclosure.

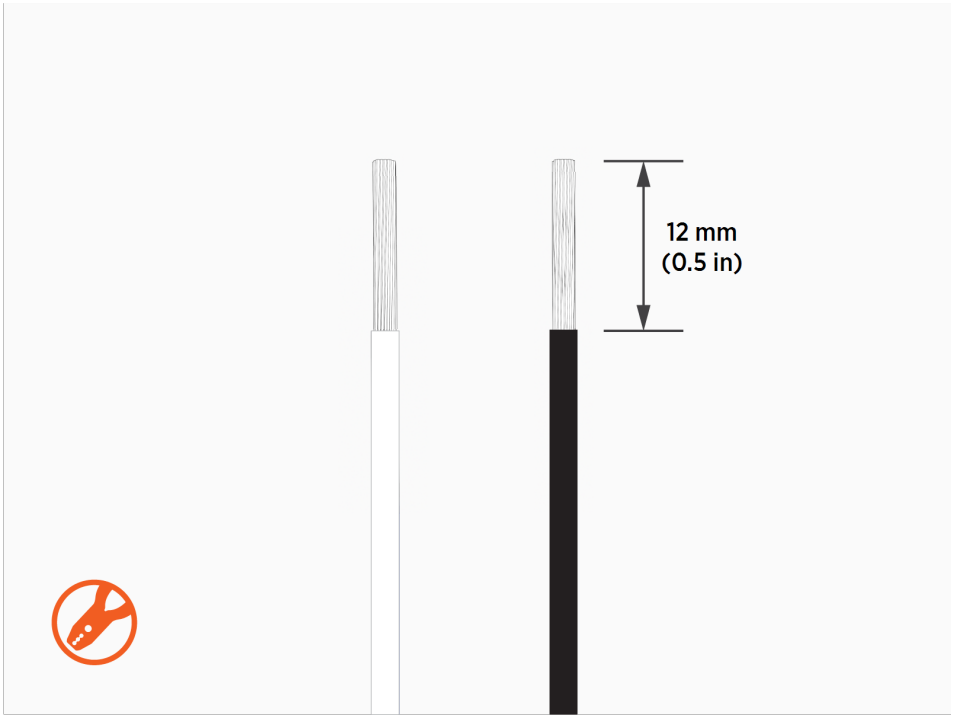


2. Pull and cut the 120-277 V AC wires to length for landing on the AC circuit breaker and ground terminal.

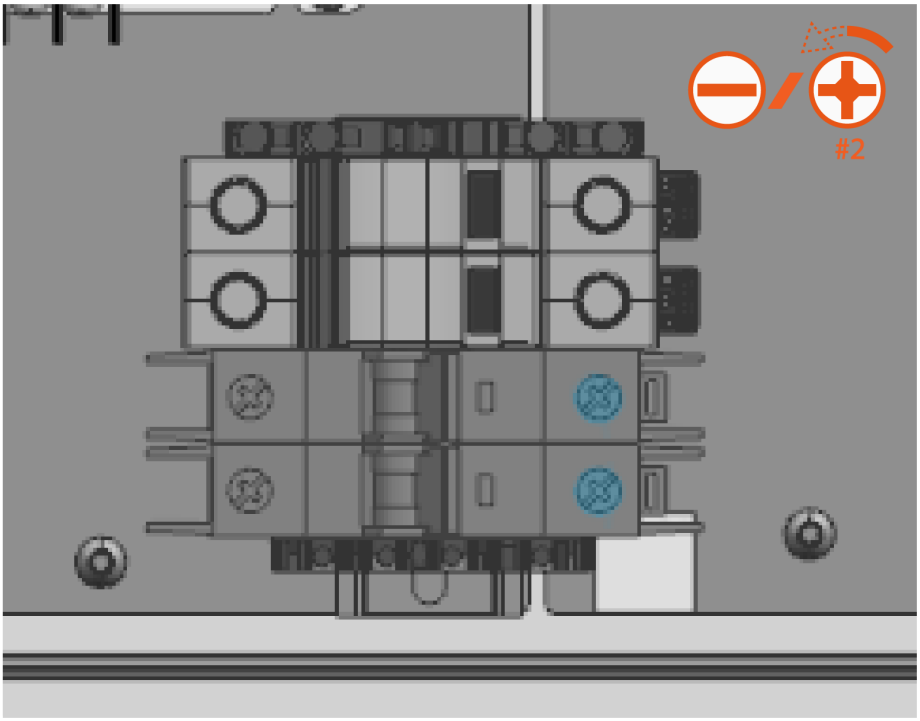
WARNING: The AC wire length inside the enclosure must not exceed 127 mm (5 in). Allowing a longer wire length inside the enclosure leaves a potential for protection circuitry failure and introduces a potential electrical hazard.



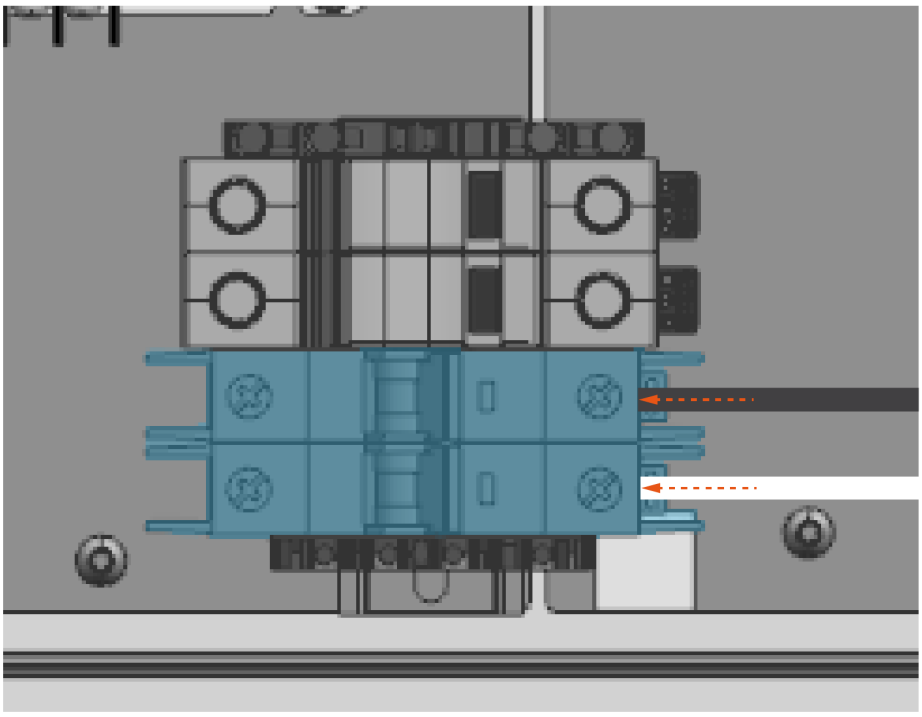
3. Strip the AC wire jackets.



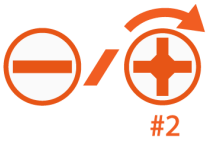
4. Loosen the AC circuit breaker set screws (x2).

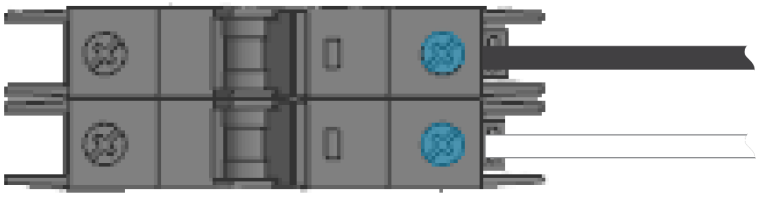


5. Insert the AC wires into the terminals. Insert the live wire into the upper terminal. Insert the neutral wire into the lower terminal.

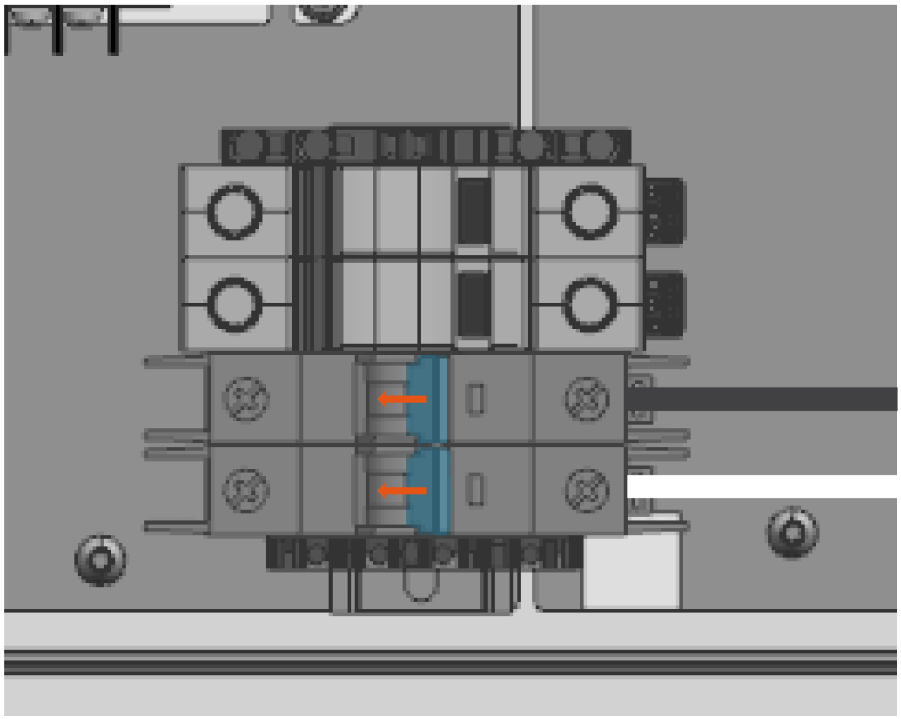


6. Torque the AC circuit breaker set screws (x2) to **2.4 Nm (21.2 in-lb)** for 18-12 AWG wires, **2.8 Nm (24.8 in-lb)** for 10-8 AWG wires, or **4 Nm (35.4 in-lb)** for 6 AWG wires. Push-pull to test the wires are secured.

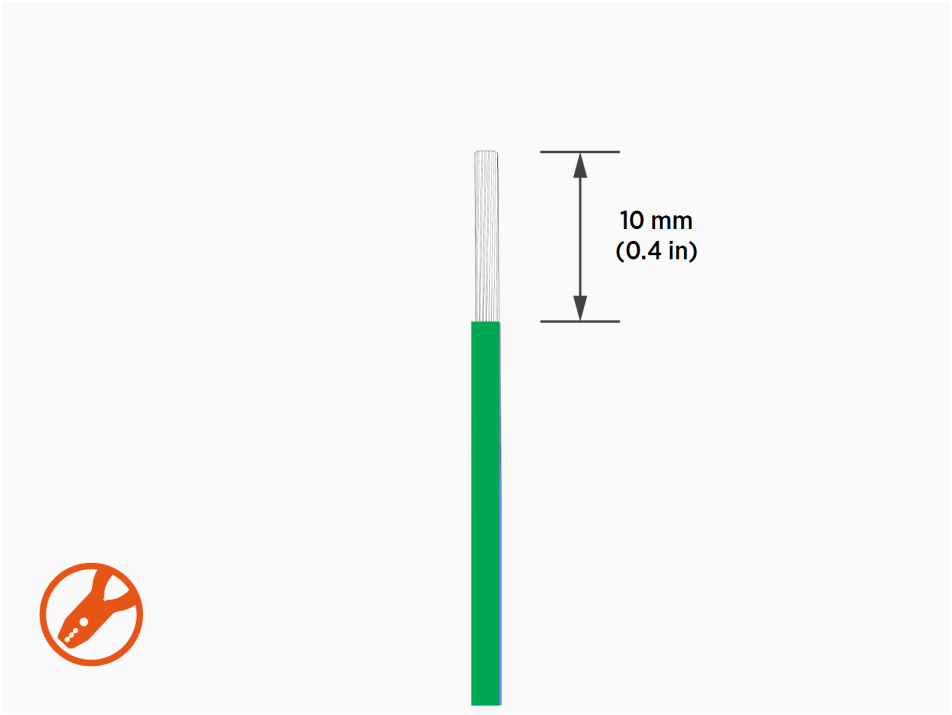




7. Flip the AC circuit breaker switches (x2) to the ON position. The indicator window should display red.

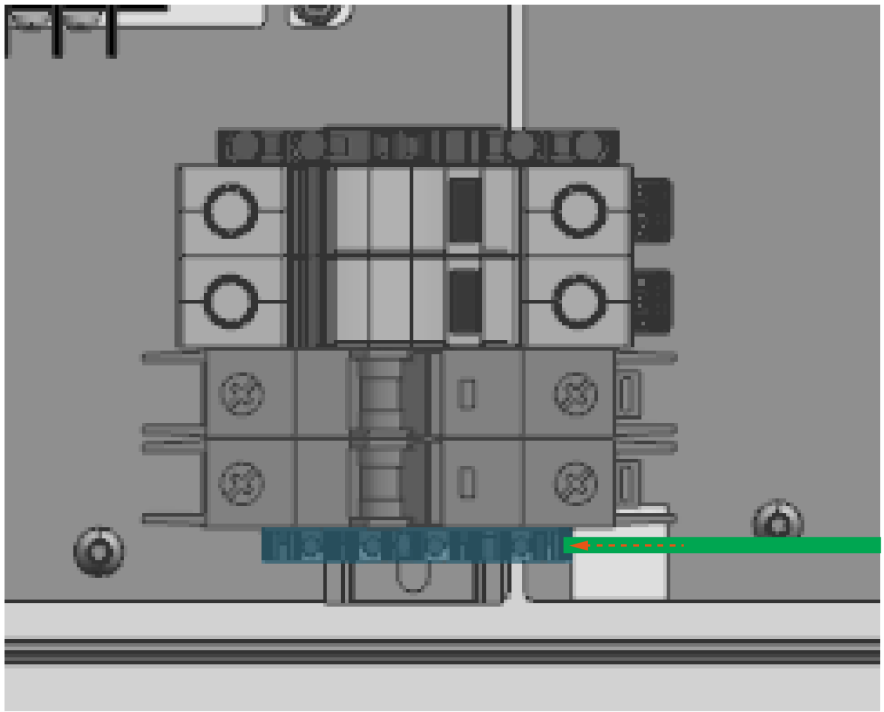


8. Strip the AC PE wire jacket.



9. Loosen the AC PE terminal set screw.

10. Insert the AC PE wire into the terminal.

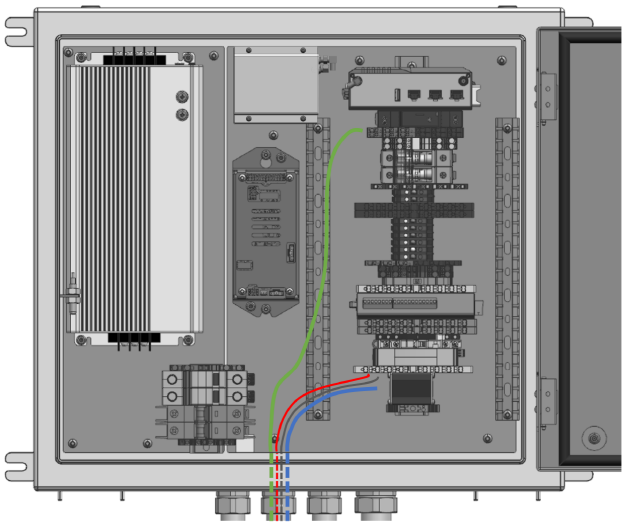


11. Torque the terminal set screw to **1.7 Nm (15 in-lb)**. Push-pull to test the wire is secure.

Connect LV DC and Ethernet Wires

Pull Wires

If not already done, pull the 48 V DC wires, Ethernet cable, and chassis ground wire into the enclosure. These wires connect from the Power Link 2000.

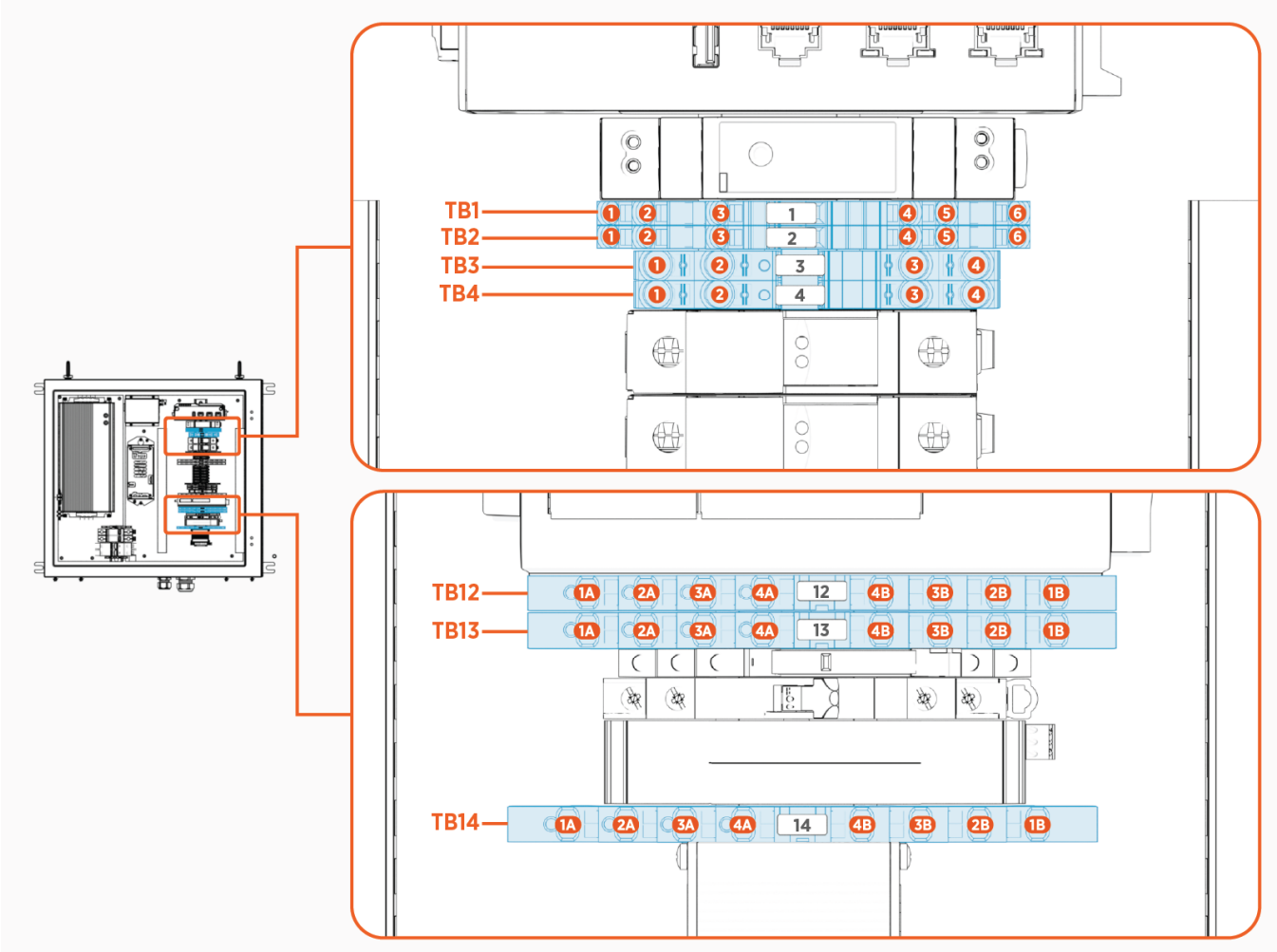


Cut and Connect 48 V DC and Ground Chassis Wires

Wire landing locations

Study the table and diagram below to identify wire landing locations. Also note the wire strip length given.

Wire	Terminal Block ID	Port Number	Wire Strip Length
48 V DC positive (+)	TB14	1A	10 mm (0.4 in)
48 V DC negative (-)	TB14	2A	
Chassis ground	TB2	3	12 mm (0.5 in)



Connect wires

Follow the procedure below to connect each 48 V DC and chassis ground wire:

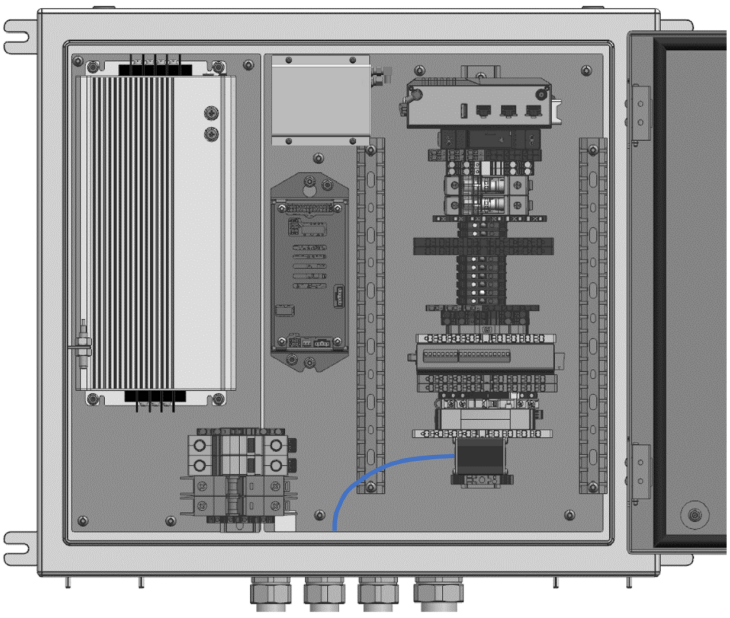
1. Route and cut the wire to length for landing on its designated terminal.
2. Strip the wire end.
3. Insert the wire into its designated terminal port.
    - For TB14, use the wire terminal operating tool to facilitate wire insertion.

      CAUTION: Before inserting a wire into the terminal, the operating tool must be fully inserted to release the latch mechanism. Otherwise the terminal block may be damaged.

    - For TB2, use a 3.5 mm or smaller flathead screwdriver to release the port clamp for wire insertion.
4. Push-pull to test the wire is secure.

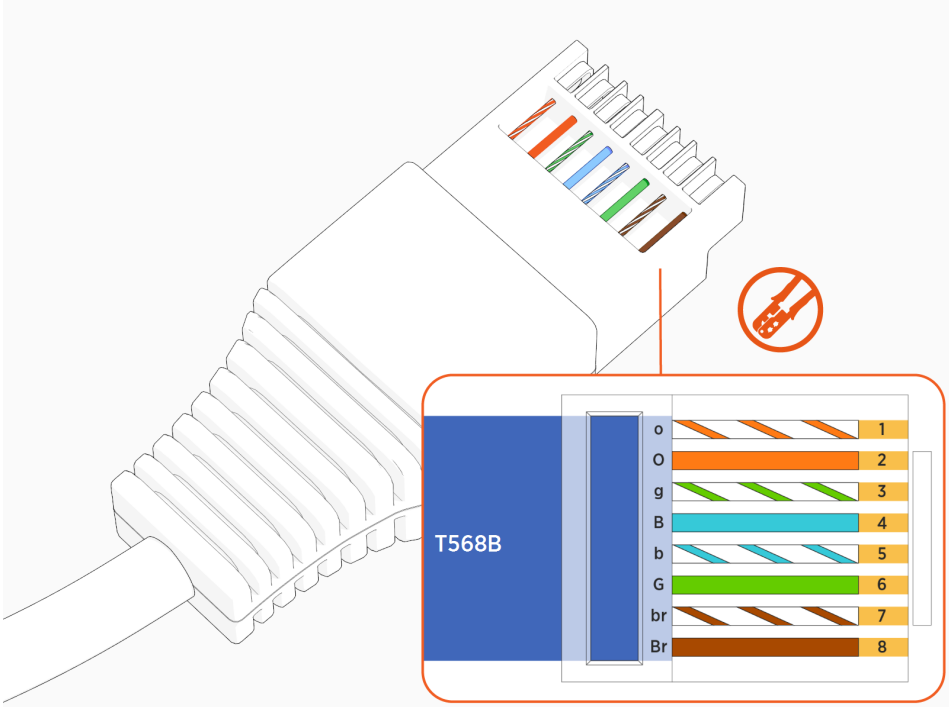
Connect Ethernet Cable

1. Route the Ethernet (Cat6 STP) cable to the Ethernet surge suppressor and trim to length. Allow for a service loop.

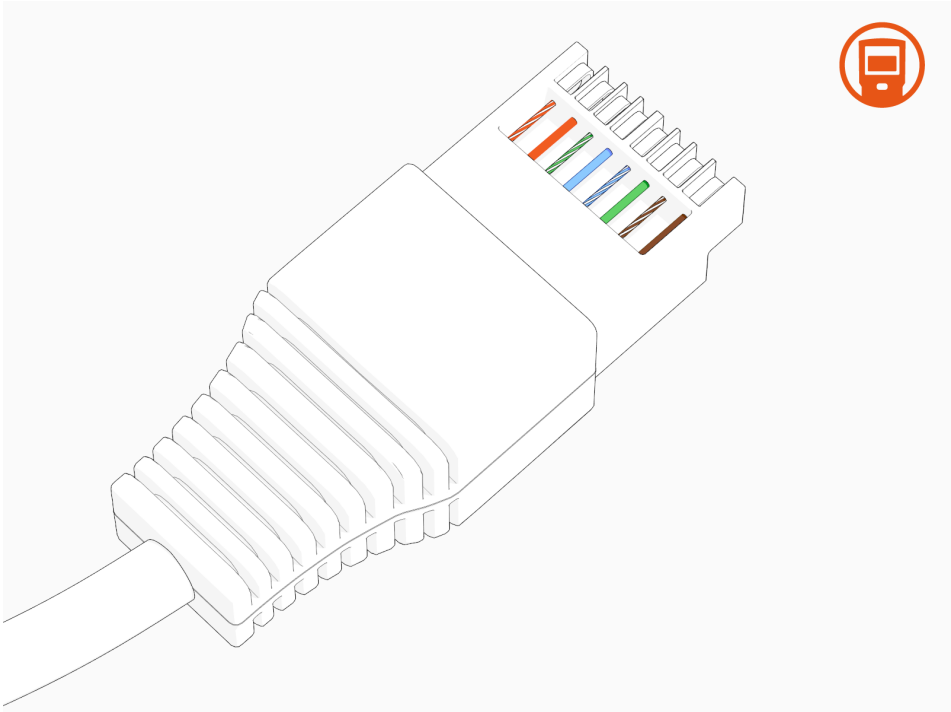


2. Field crimp a shielded RJ45 connector onto the Ethernet cable. Use straight-through T568B pattern.

IMPORTANT: Do not ground the shield at this end of the cable. Ground the shield at the end of the cable that connects to the Power Link 2000.

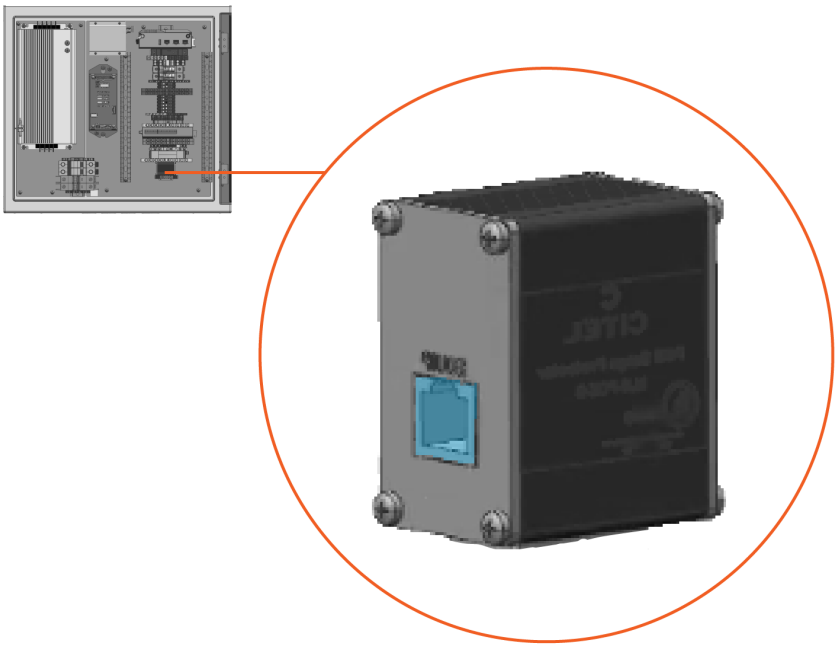


3. Test the Ethernet cable for functionality.



4. Connect the cable to the Ethernet surge suppressor.

   Note: To establish a secure connection, the RJ45 connector latch must click into the surge suppressor port.

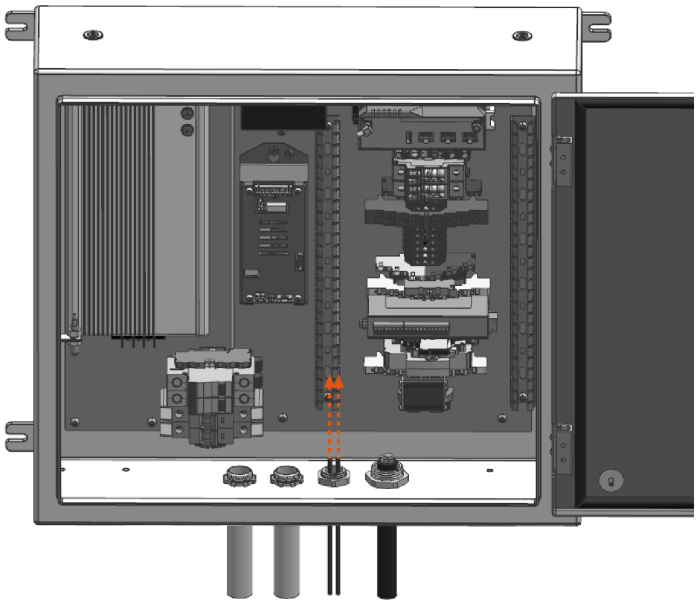


Connect Antenna Cables

1. Route the Wi-Fi and RFID antenna cables into the PD Controller enclosure.
    - **For cables run without conduit:**

      Route the cables into the PD Controller through the 3/4 in NPT cable gland.

      Note: Feeding the RP-SMA connectors through the cable gland may require care due to a snug fit. See Appendix: RFID and Wi-Fi Antenna Cable Reference for recommended technique.



    - **For cables specified to run with conduit:**

      Pull the cables through the conduit into the PD Controller (if not already done).

      Note: The cables can be pulled through the conduit in only one direction, from the antennas to the PD Controller.

      Note: If the 3/4 in NPT cable gland (provided with PD Controller) is used to seal the end of the conduit nearest to the pantograph, feeding the RP-SMA connectors through the cable gland may be snug. See Appendix: RFID and Wi-Fi Antenna Cable Reference for recommended technique.

- **For cables run with or without conduit:**

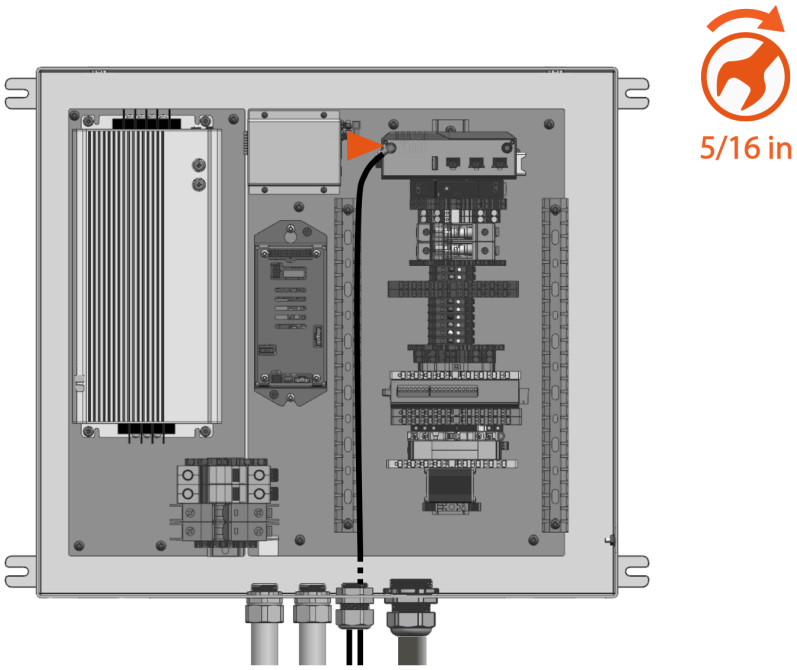
  Coil the cables outside the enclosure as needed to take up excess slack.

IMPORTANT:

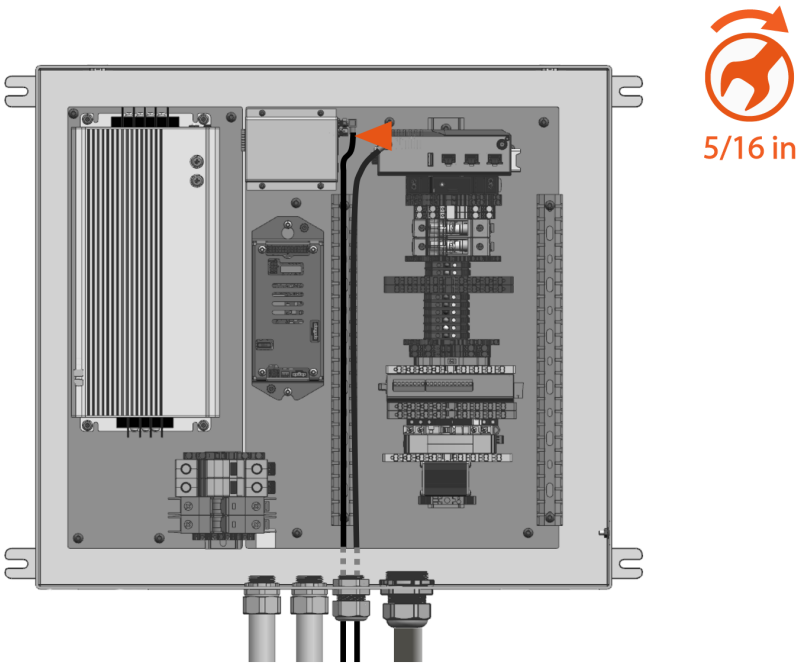
- Do not coil the antenna cables within the PD Controller.
- If the cables are already connected at the antennas, you may need to disconnect the cables from the antennas to take up excess cable slack at the antennas and then reconnect the cables. See Connect Auxiliary Component Cables.

CAUTION: The LMR-240 antenna cables shipped with Pantograph Down 2000 have a one-time bend radius of 19 mm (0.75 in) and repeated bend radius of 63 mm (2.5 in). Do not exceed the bend radius or the cable may be damaged and the system may not operate. If using an LMR-240 equivalent cable, do not exceed the bend radius limits for the cable type used.

2. Connect the Wi-Fi cable to the Wi-Fi Access Point. Rotate the right-angle adapter as needed to facilitate the connection. Torque to **0.45 Nm (4 in-lb)**.



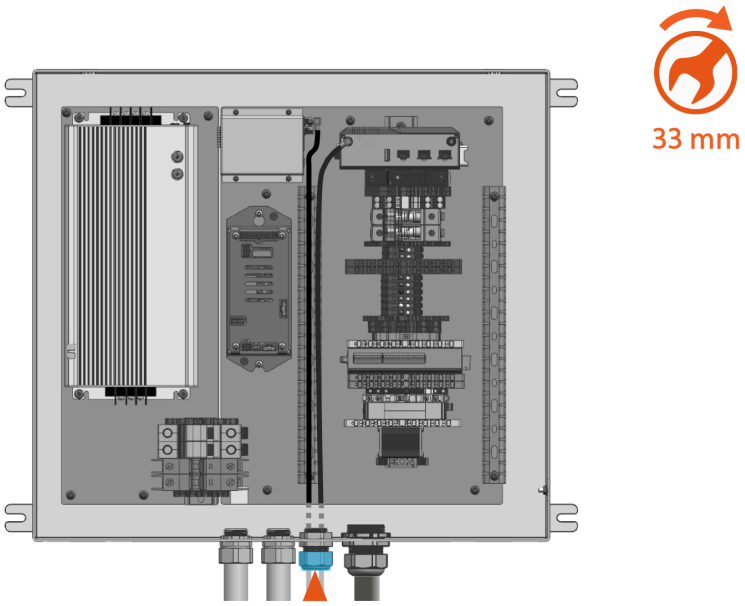
3. Connect RFID cable to the RFID Reader. Rotate the right-angle adapter as needed to facilitate the connection. Torque to **0.45 Nm (4 in-lb)**.



4. Torque the right-angle adapters to **0.45 Nm (4 in-lb)**.

5. Seal the wire entry.
    - **For cables run without conduit:**

      The cable gland is located at the PD Controller. Torque the cap to **4.5 Nm (40 in-lb)**. Torqe the nut to **7.9 Nm (70 in-lb)**.



    - **For cables run with conduit:**

      If the 3/4 in NPT cable gland was relocated to the end of the conduit near the antennas, torque the cable gland cap to **4.5 Nm (40 in-lb)**. Use a 33 mm wrench. Otherwise apply duct seal compound to seal the conduit end.
6. If the antenna cables are not run through conduit, use zip ties to secure and support the cables along the full length of the cables outside of the PD Controller.

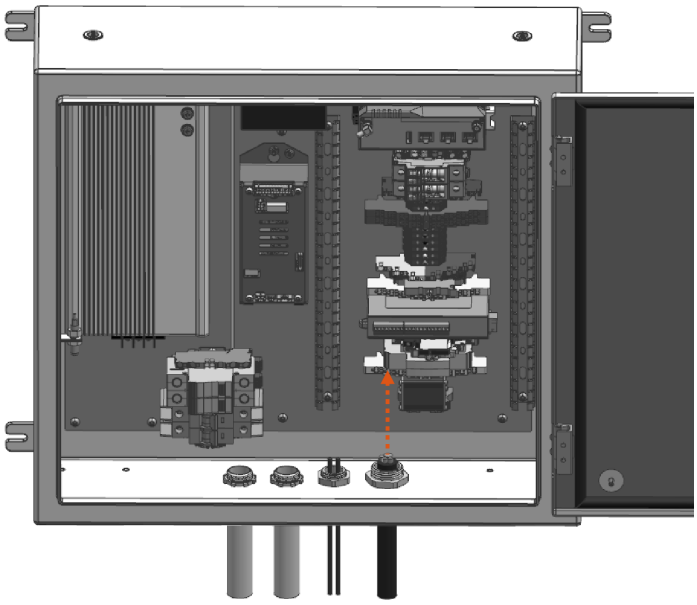
Connect Controller Interface Cable Wires

Prepare for Wire Connection

1. Familiarize yourself with the controller interface cable wires that terminate at the PD Controller. See Controller Interface Cable Schunk SLS 201.102.

2. Route the controller interface cable into the PD Controller enclosure.
    - **For cable run without conduit:**

      Route the cable to enter the PD Controller through the 1-1/4 in NPT cable gland.



    - **For cable specified to run with conduit:**

      Pull the cable through the conduit into the PD Controller (if not already done).

      Note: The cable can be pulled through the conduit in only one direction, from the pantograph to the PD Controller.
    - **For cable run with or without conduit:**

      The controller interface cable may not coil or bunch within the enclosure. In the following steps, cable wires must be cut to length for routing directly to the landing terminals, without excess wire length.

3. Familiarize yourself with the system cables bundled within the controller interface cable. See cable cross-section provided below. For more detail see Controller Interface Cable Schunk SLS 201.102.

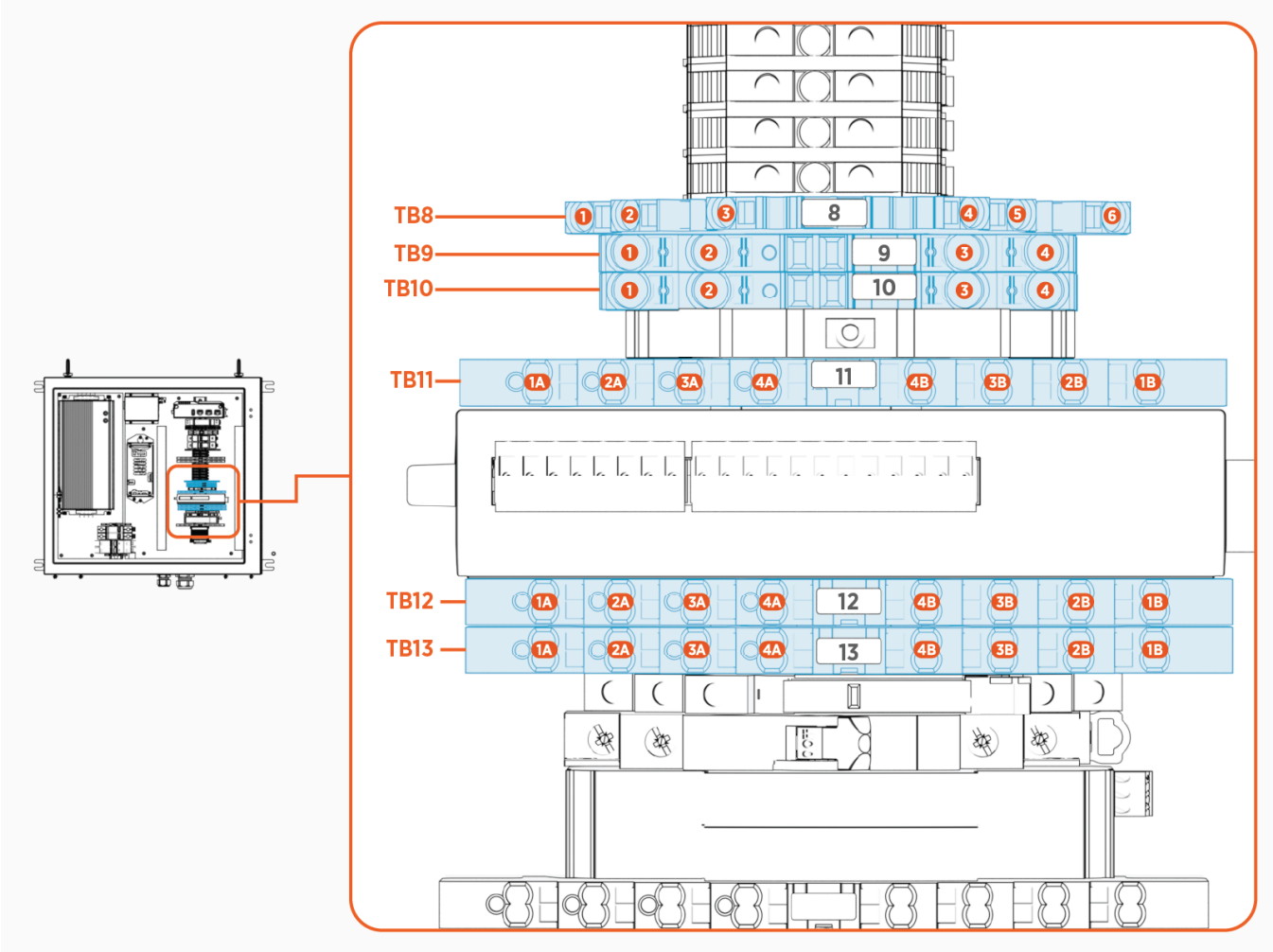
(a) Pantograph rest sensor cable
(b) Pantograph control pilot cable
(c) Pantograph control cable
(d) Status LED cable

Connect Pantograph Control Cable Wires

Wire landing locations

Study the table and diagram below to identify wire landing locations. Also note the wire strip length given.

Wire	Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Pantograph low current 24 V	Red/white	20 AWG (0.5 mm^2)	TB9	4	13 mm (0.5 in)
Pantograph motor GND	Black	14 AWG (2.5 mm^2)	TB8	6	12 mm (0.5 in)
Pantograph high current GND	Black	16 AWG (1.5 mm^2)	TB8	5	12 mm (0.5 in)
Pantograph low current GND	Black	20 AWG (0.5 mm^2)	TB8	4	12 mm (0.5 in)
Pantograph high current 24 V	Red	14 AWG (2.5 mm^2)	TB10	4	13 mm (0.5 in)
Raised	Blue	20 AWG (0.5 mm^2)	TB11	4B	10 mm (0.4 in)
Lowered	Yellow	20 AWG (0.5 mm^2)	TB11	3B	10 mm (0.4 in)
Request raise	Blue/white	20 AWG (0.5 mm^2)	TB13	4B	10 mm (0.4 in)
Request lower	Yellow/white	20 AWG (0.5 mm^2)	TB13	3B	10 mm (0.4 in)



Note: Each terminal ships with wires that are factory-installed on one half of the terminal. The field-installed wires shall install on the opposite half of the terminal, mirroring the factory-installed wires in terms of port position and wire color.

Connect wires

Follow the procedure below to connect each individual pantograph control cable wire:

1. Route and cut the wire to length for landing on its designated terminal.
2. Strip the wire end.
3. Install wire ferrule (option).

4. Insert the wire into its designated terminal port.
    - For TB11 and TB13, use the wire terminal operating tool to facilitate wire insertion.

      CAUTION: Before inserting a wire or ferrule into the terminal, the operating tool must be fully inserted to release the latch mechanism. Otherwise the terminal block may be damaged.

    - For TB8, TB9, and TB10, use a 3.5 mm or smaller flathead screwdriver to release the port clamp for wire insertion, or push ferrule termination into the terminal block port.
5. Push-pull to test the wire is secure.

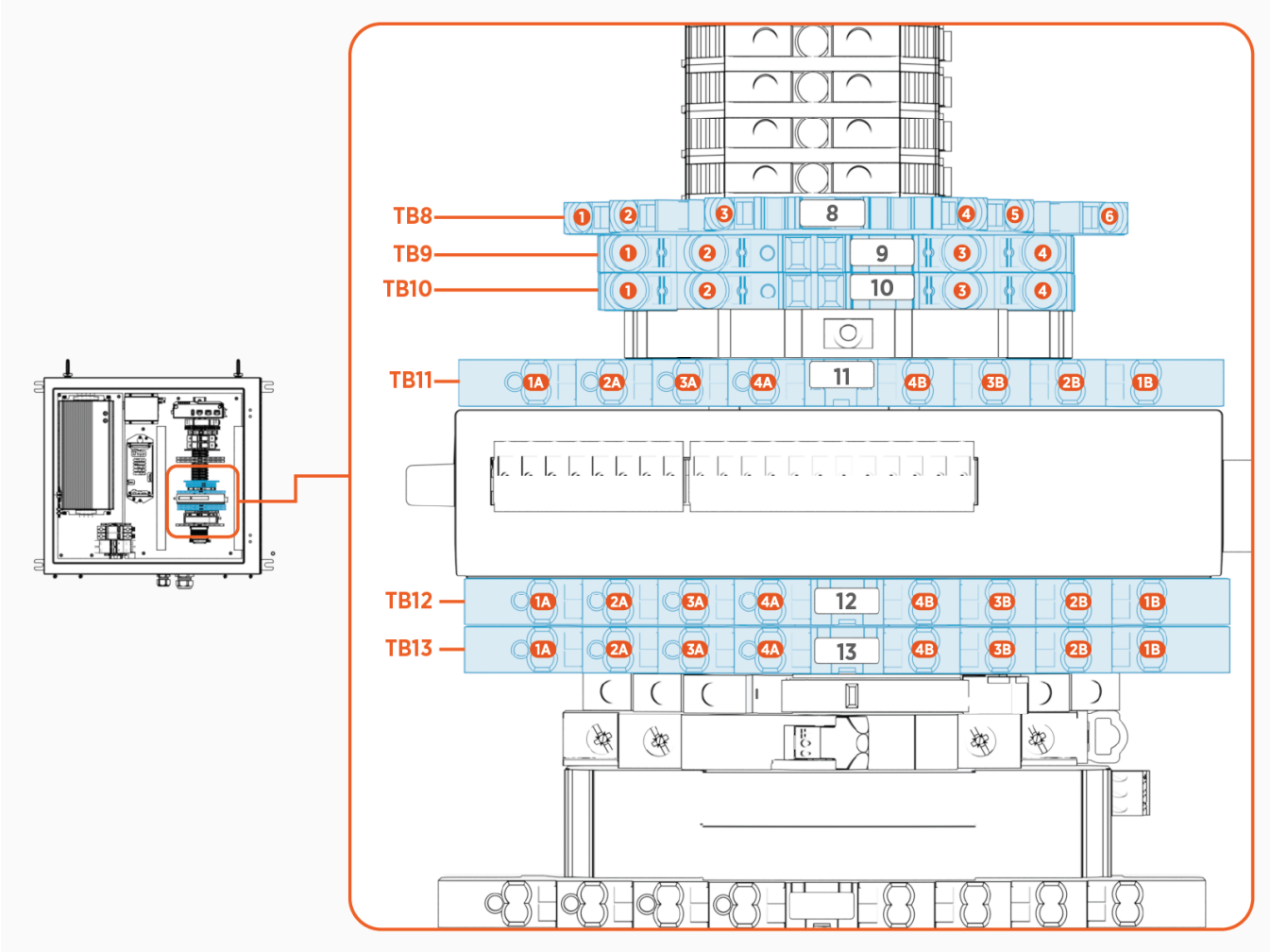
IMPORTANT: After completing the connection of all wires, visually inspect the wiring at each of the terminals. Field-installed wires at a given terminal should mirror the factory-installed wires in terms of port position and wire color.

Connect Pantograph Rest Sensor Cable Wires

Wire landing locations

Study the table and diagram below to identify wire landing locations. Also note the wire strip length given.

Wire	Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Rest signal	Green/blue	20 AWG (0.5 mm^2)	TB11	1B	10 mm (0.4 in)
Rest 24 V	Red/white	20 AWG (0.5 mm^2)	TB9	3	13 mm (0.5 in)
Rest GND	Black	20 AWG (0.5 mm^2)	TB8	3	12 mm (0.5 in)



Note: Each terminal ships with wires that are factory-installed on one half of the terminal. The field-installed wires shall install on the opposite half of the terminal, mirroring the factory-installed wires in terms of port position and wire color.

Connect wires

Follow the procedure below to connect each individual rest sensor cable wire:

1. Route and cut the wire to length for landing on its designated terminal.
2. Strip the wire end.
3. Install wire ferrule (option).
4. Insert the wire into its designated terminal port.
    - For TB11, use the wire terminal operating tool to facilitate wire insertion.

      CAUTION: Before inserting a wire or ferrule into the terminal, the operating tool must be fully inserted to release the latch mechanism. Otherwise the terminal block may be damaged.

    - For TB8 and TB9, use a 3.5 mm or smaller flathead screwdriver to release the port clamp for wire insertion, or push ferrule termination into the terminal block port.
5. Push-pull to test the wire is secure.

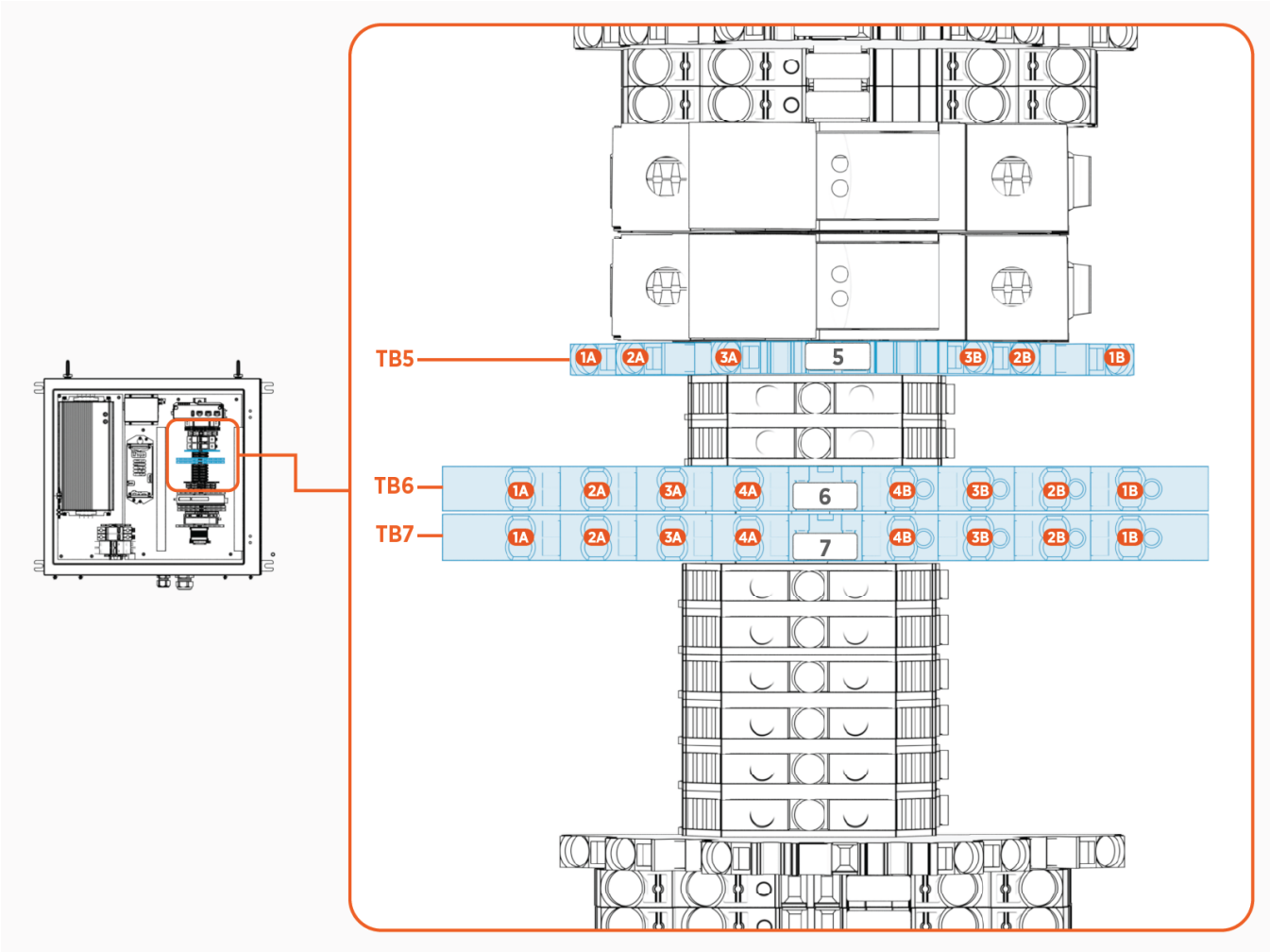
IMPORTANT: After completing the connection of all wires, visually inspect the wiring at each of the terminals. Field-installed wires at a given terminal should mirror the factory-installed wires in terms of port position and wire color.

Connect Pantograph Control Pilot Cable Wires

Wire landing locations

Study the table and diagram below to identify wire landing locations. Also note the wire strip length given.

Wire	Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Control pilot	White/brown	20 AWG (0.5 mm^2)	TB5	1B	12 mm (0.5 in)
Control pilot shield	Brown/black	20 AWG (0.5 mm^2)	TB5	2B	12 mm (0.5 in)



Note: Each terminal ships with wires that are factory-installed on one half of the terminal. The field-installed wires shall install on the opposite half of the terminal, mirroring the factory-installed wires in terms of port position and wire color.

Connect wires

Follow the procedure below to connect each individual control pilot cable wire:

1. Route and cut the wire to length for landing on its designated terminal.
2. Strip the wire end.
3. Install wire ferrule (option).
4. Insert the wire into its designated terminal port. Use a 3.5 mm or smaller flathead screwdriver to release the port clamp for wire insertion, or push ferrule termination into the terminal block port.
5. Push-pull to test the wire is secure.

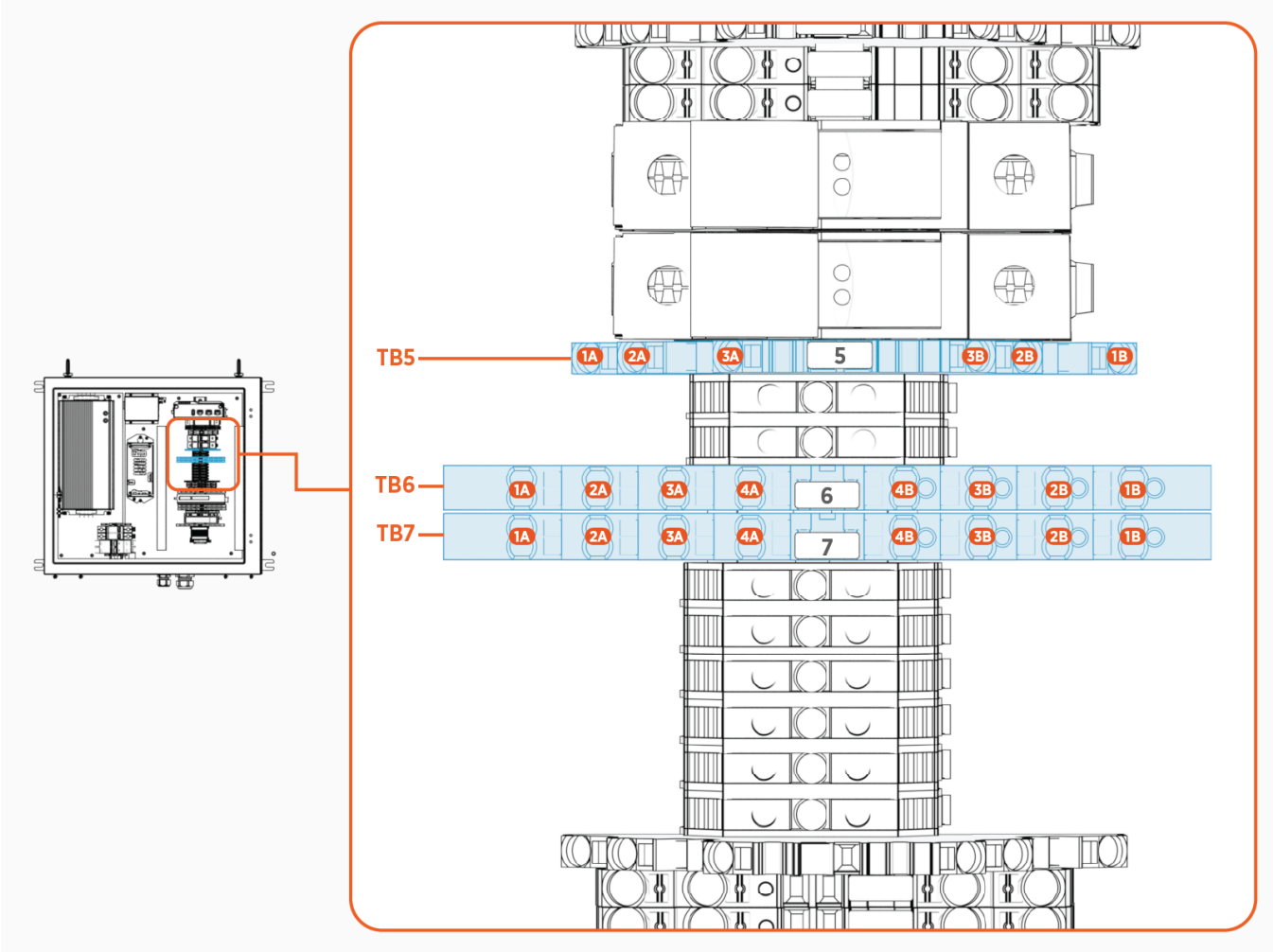
IMPORTANT: After completing the connection of all wires, visually inspect the wiring at each of the terminals. Field-installed wires at a given terminal should mirror the factory-installed wires in terms of port position and wire color.

Connect Status LED Cable Wires

Wire landing locations

Study the table and diagram below to identify wire landing locations. Also note the wire strip length given.

Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Orange	24 AWG (0.2 mm^2)	TB6	1B	10 mm (0.4 in)
White/orange	24 AWG (0.2 mm^2)	TB6	2B	10 mm (0.4 in)
Brown	24 AWG (0.2 mm^2)	TB6	3B	10 mm (0.4 in)
White/brown	24 AWG (0.2 mm^2)	TB6	4B	10 mm (0.4 in)
Blue	24 AWG (0.2 mm^2)	TB7	1B	10 mm (0.4 in)
White/blue	24 AWG (0.2 mm^2)	TB7	2B	10 mm (0.4 in)
Green	24 AWG (0.2 mm^2)	TB7	3B	10 mm (0.4 in)
White/green	24 AWG (0.2 mm^2)	TB7	4B	10 mm (0.4 in)



Note: Each terminal ships with wires that are factory-installed on one half of the terminal. The field-installed wires shall install on the opposite half of the terminal, mirroring the factory-installed wires in terms of port position and wire color.

Connect wires

Follow the procedure below to connect each individual status LED cable wire:

1. Route and cut the wire to length for landing on its designated terminal.
2. Strip the wire end.
3. Install wire ferrule (option).
4. Insert the wire into its designated terminal port. Use the wire terminal operating tool to assist wire insertion.

> **CAUTION:** Before inserting a wire or ferrule into the terminal, the operating tool must be fully inserted to release the latch mechanism. Otherwise the terminal block may be damaged.

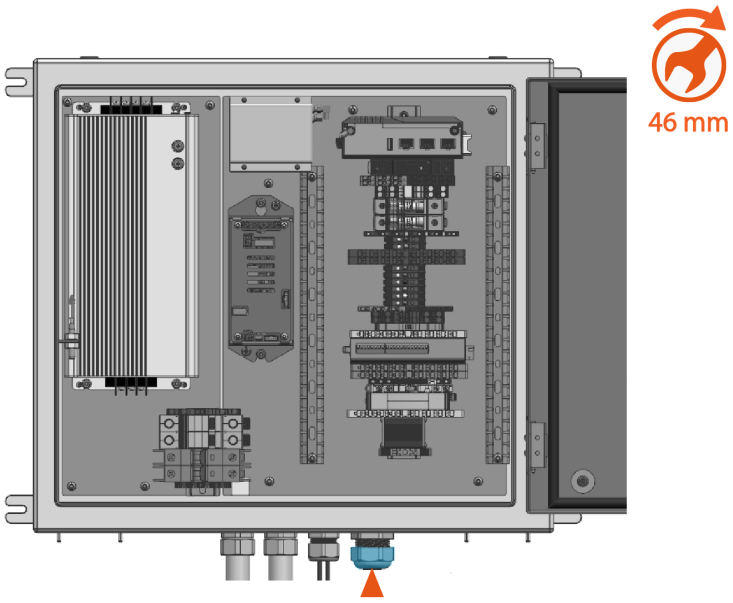
5. Push-pull to test the wire is secure.

IMPORTANT: After completing the connection of all wires, visually inspect the wiring at each of the terminals. Field-installed wires at a given terminal should mirror the factory-installed wires in terms of port position and wire color.

Secure Controller Interface Cable

1. Seal the wire entry.
   - **For cable run without conduit:**

     The cable gland is located at the PD Controller. Torque the cap to **4.5 Nm (40 in-lb)**. Torque the nut to **10.2 Nm (90 in-lb)**.



   - **For cable run with conduit:**

     If the 3/4 in NPT cable gland was relocated to the end of the conduit near the pantograph and status LED, torque the cap to **4.5 Nm (40 in-lb)**. Use a 46 mm wrench. Otherwise apply duct seal compound to seal the conduit end.
2. Use zip ties to secure and support the cable along its full length outside of the PD Controller. Skip this step if the cable is run through conduit.

Complete the Install 12

IMPORTANT: Do not reconnect the power after completing the installation (after installing the covers). An Authorized Commissioning Partner will commission, power on, pinpoint, and configure Pantograph Down 2000 after installation.

Complete Schunk SLS 201.102 Auxiliary Components Frame

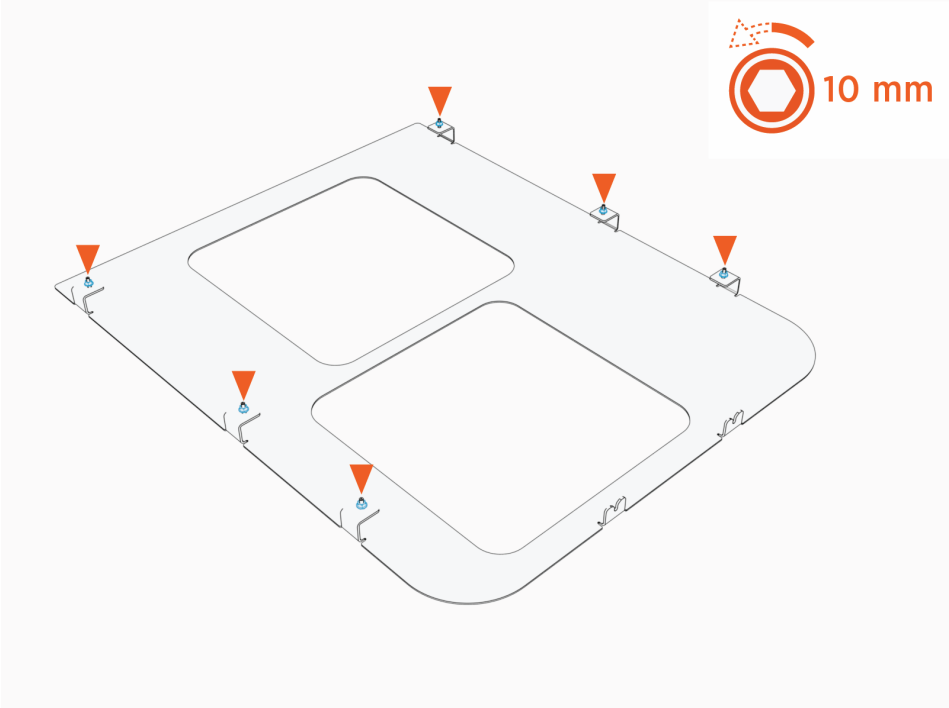
Parts Needed

The following parts are needed from auxiliary components mounting frame install:

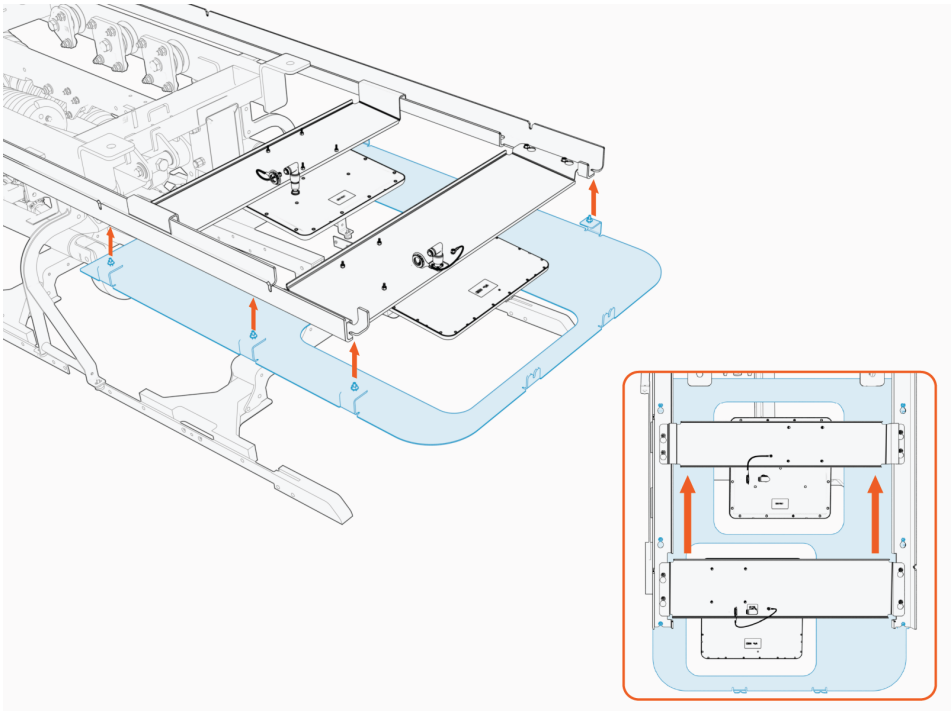
- Rear cover
- Side covers

Install Rear Cover

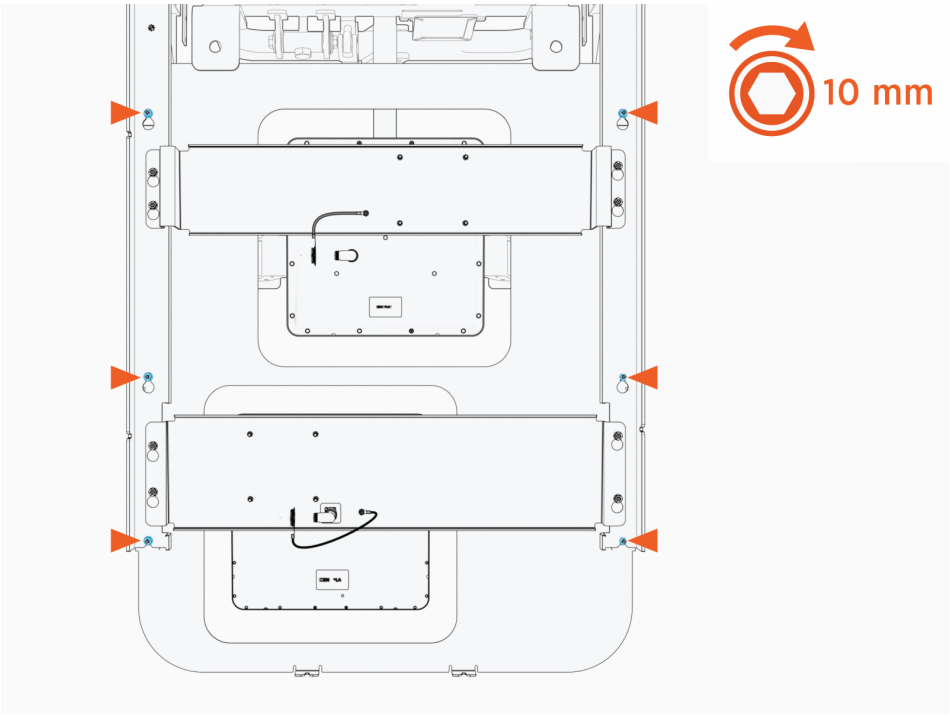
1. Loosen (do not remove) M6 nuts (x6) on the rear cover.



2. Install the rear cover onto the left and right rails. Slide the cover until it locks into the keyholes.

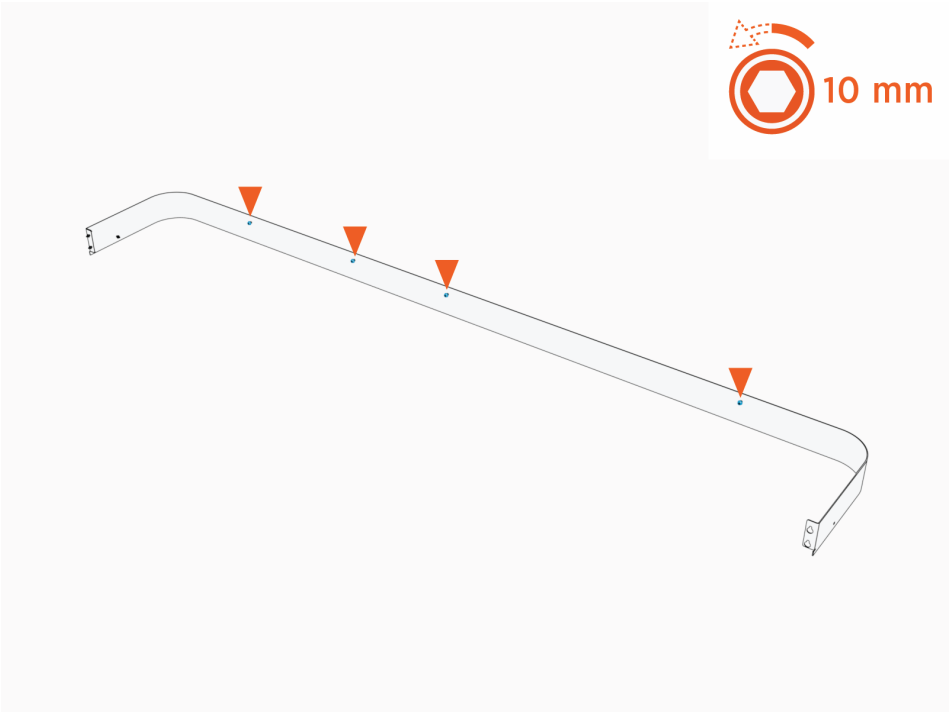


3. Tighten the M6 nuts (x6). Torque to **5.6 Nm (50 in-lb)**.

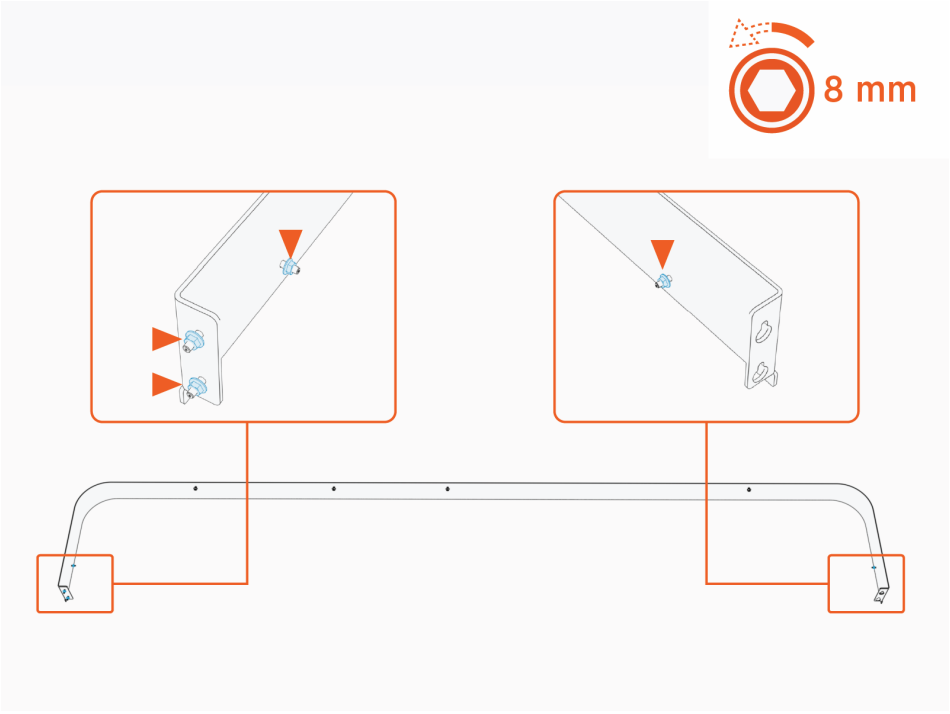


Install Side Covers

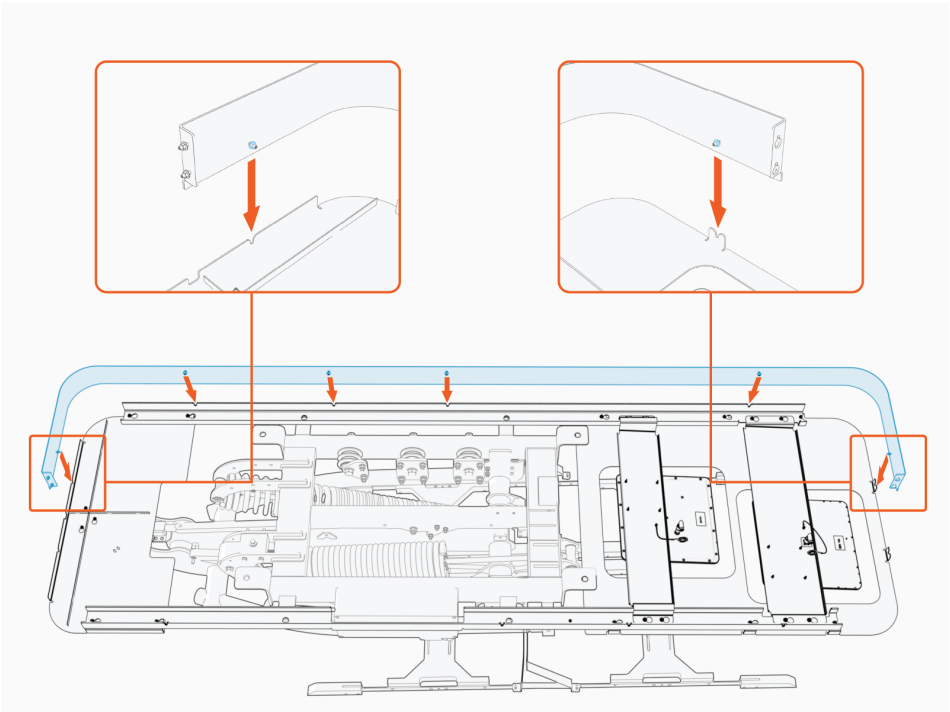
1. Loosen (do not remove) the M6 nuts (x4) on the length of the left side cover.



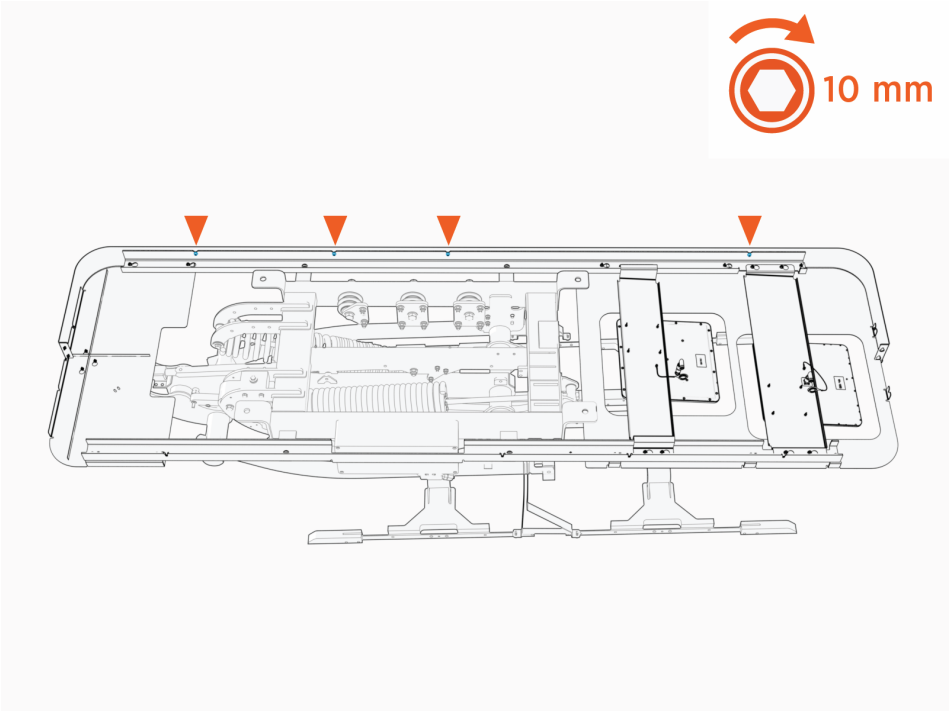
2. Loosen (do not remove) M5 nuts (x4) on the side cover.



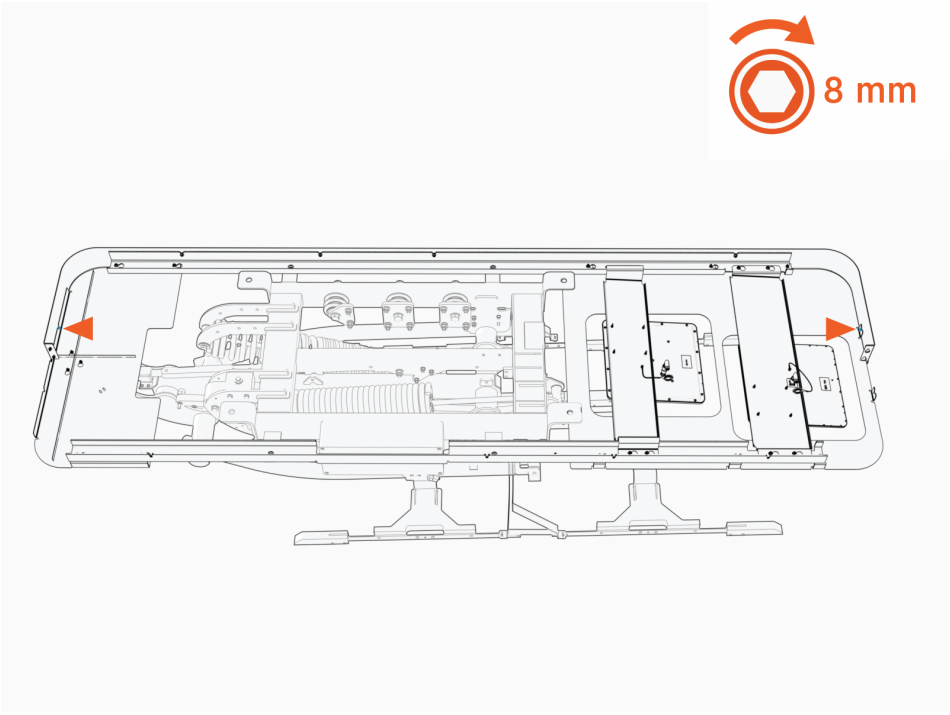
3. Install the left side cover. Make sure the cover seats into slots (x6).



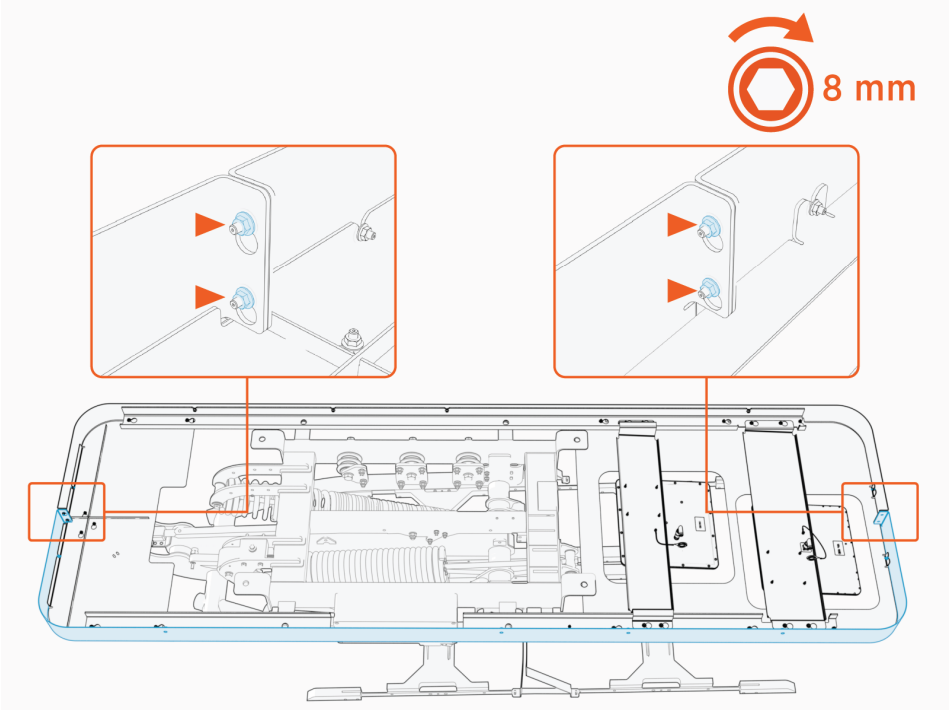
4. Tighten M6 nuts (x4) to fasten the side cover. Torque to **5.6 Nm (50 in-lb)**.



5. Tighten M5 nuts at each end of the side cover (x1 nut per end). Torque to **4.5 Nm (40 in-lb)**.



6. Repeat above steps to install the right side cover. At the front and rear ends of the frame, align and fasten the left and right side cover together with nuts (x2 each end).



Close Power Link 2000

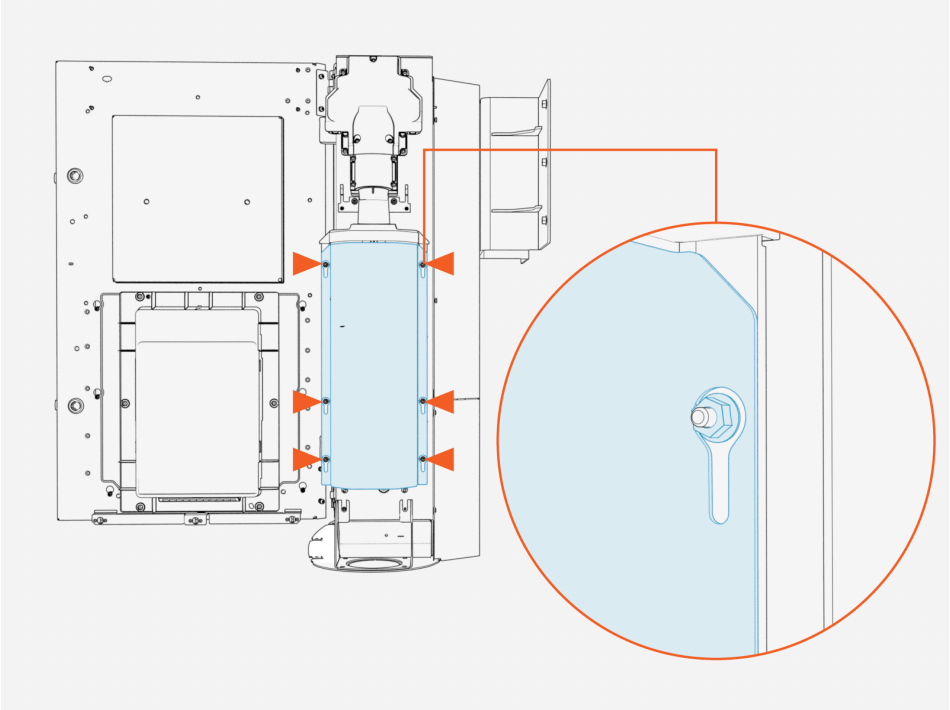
Parts Needed

The following parts, saved from Power Link 2000 mount, are needed:

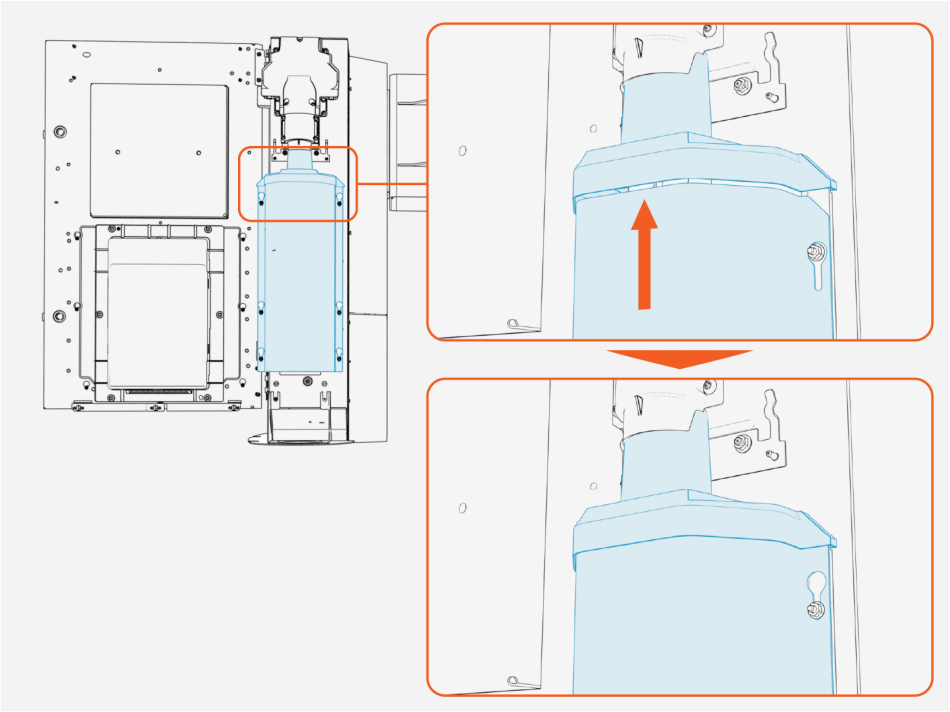
- External bus bar safety covers
- Side panels
- Internal bus bar safety cover

Reinstall External Bus Bar Safety Covers

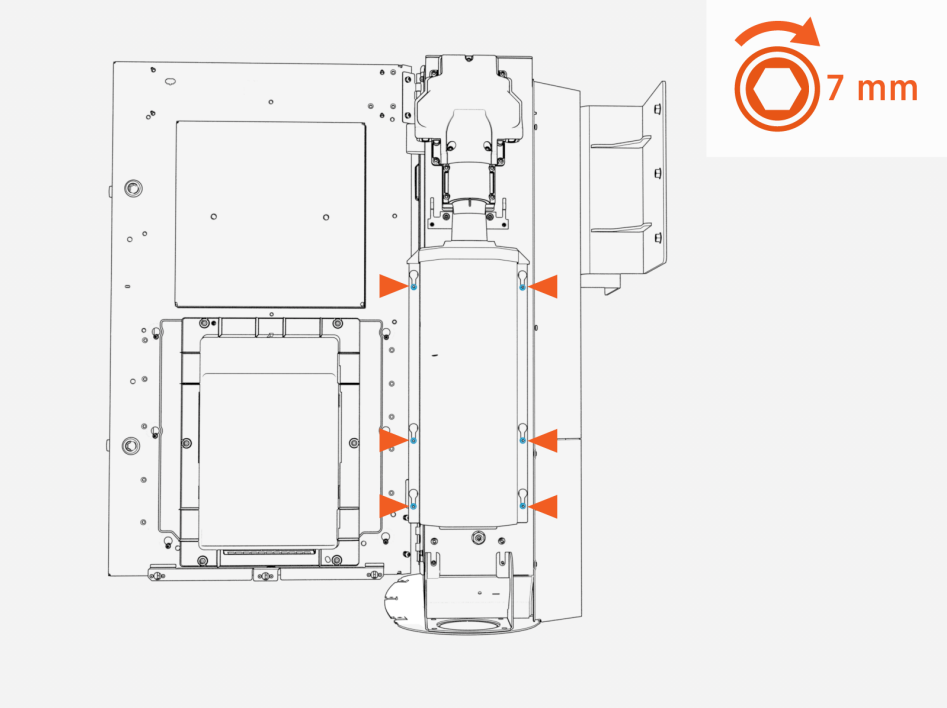
1. Align the right external bus bar safety cover keyholes over nuts (x6).



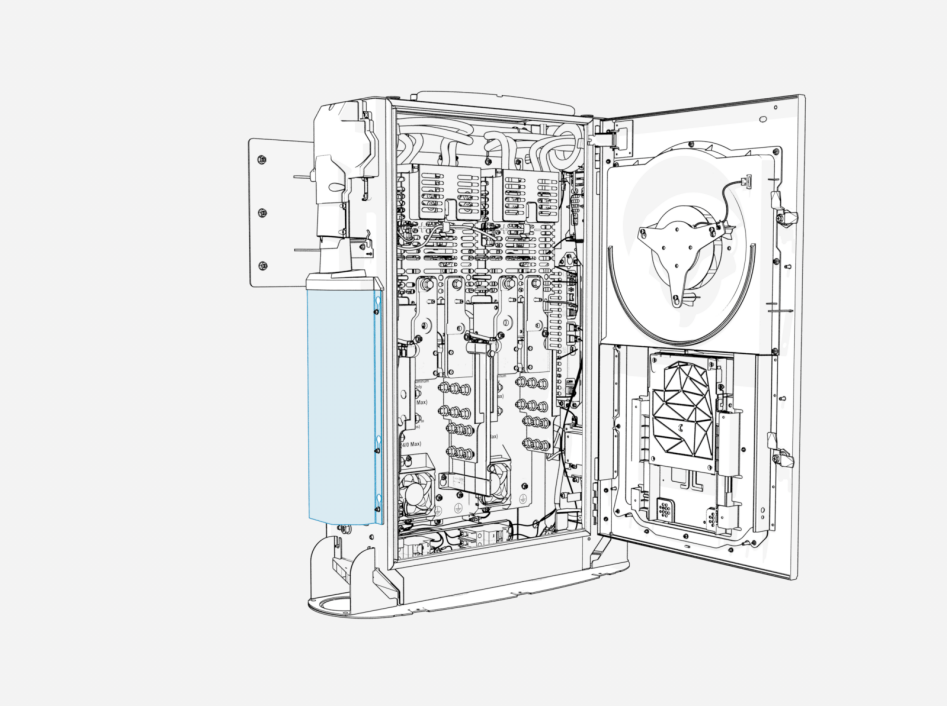
2. Slide the safety cover up. Ensure the top edge of the safety cover is inserted into the grommet groove above it.



3. Tighten nuts (x6). Torque to **1.7 Nm (15 in-lb)**.

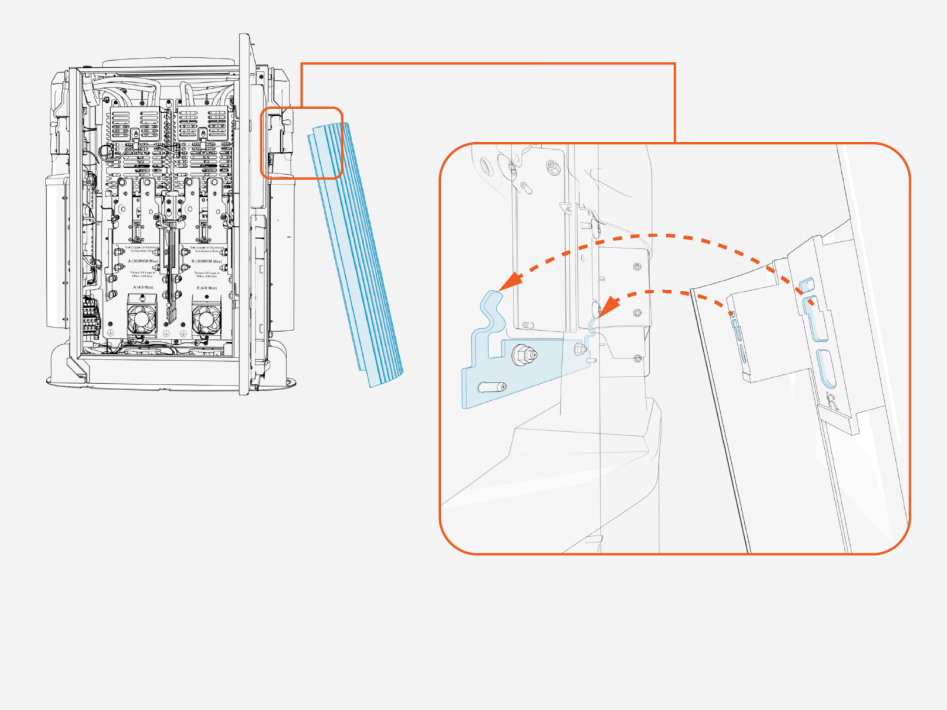


4. If applicable, repeat to install the left external bus bar safety cover.

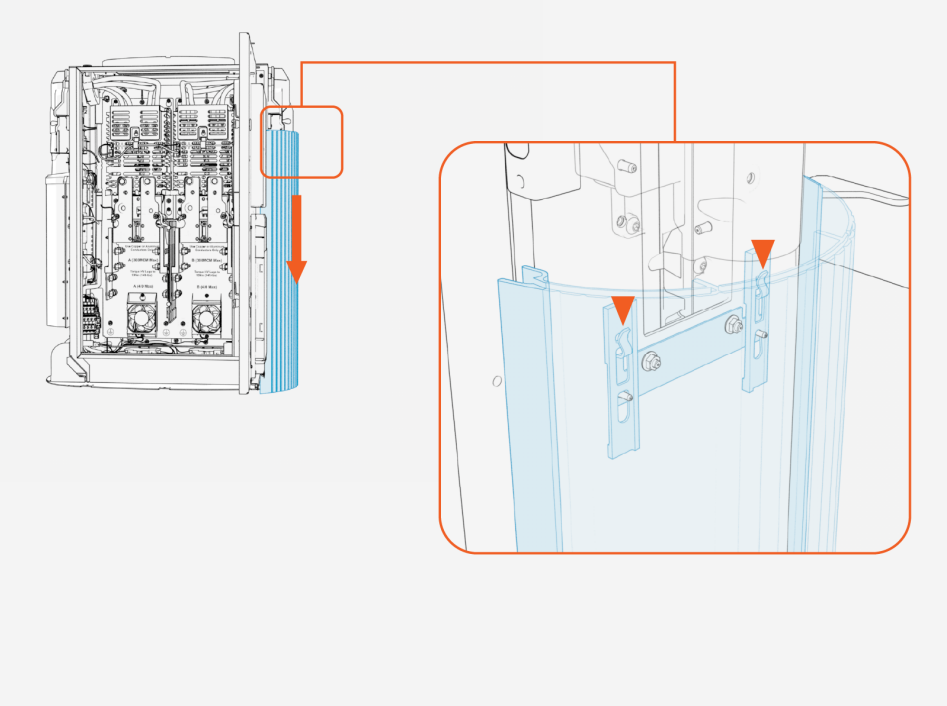


Reinstall Side Panels

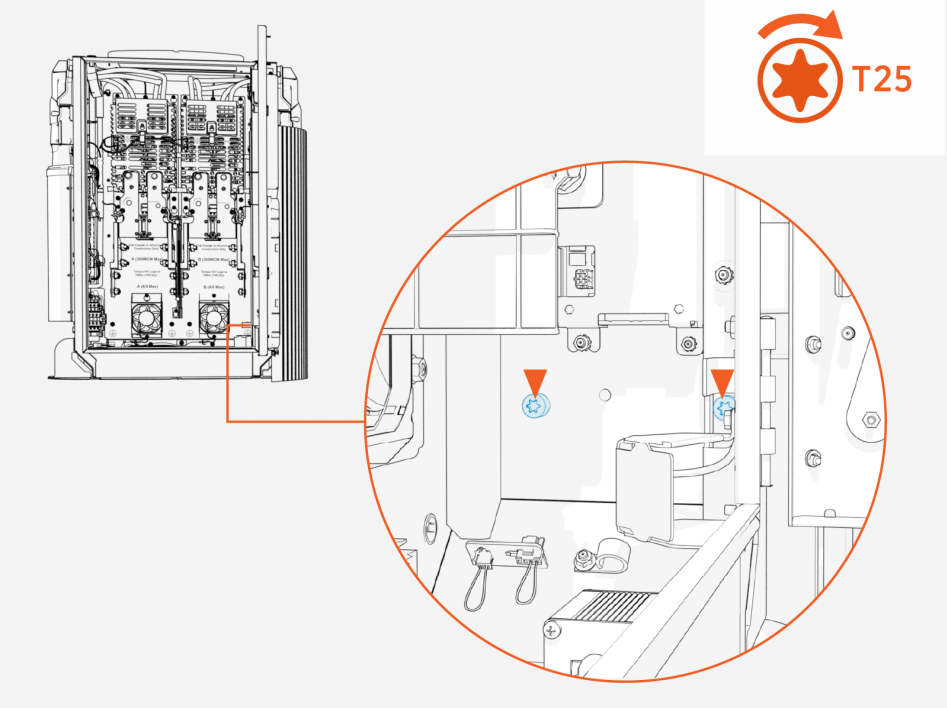
1. Align the right side panel to the hooks (x2) and alignment pins (x2) on the Power Link 2000 frame.



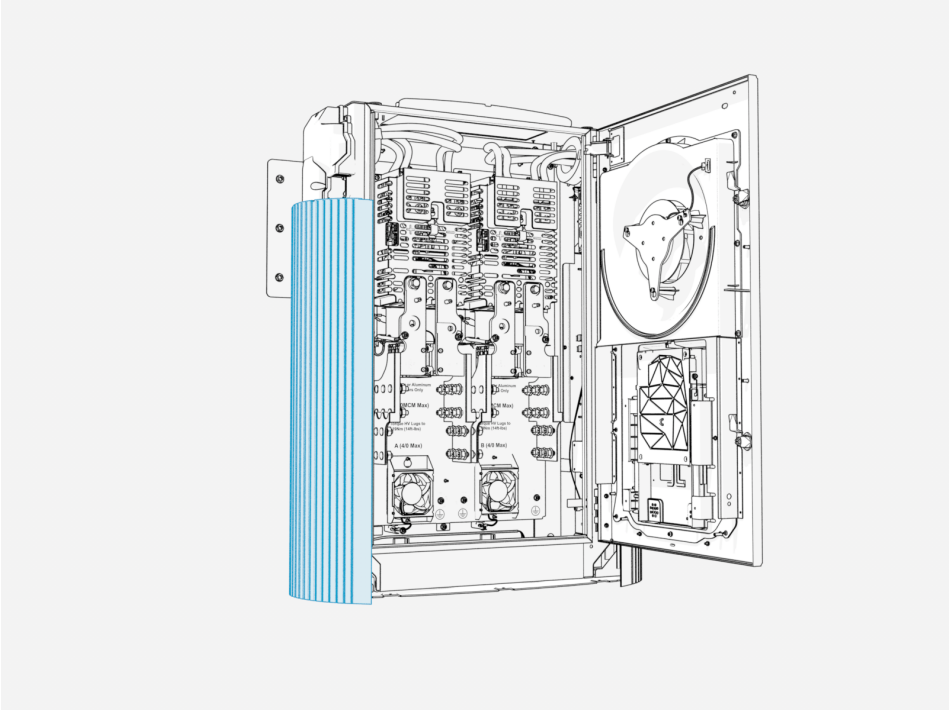
2. Firmly slide the side panel downward until it engages with the hooks (x2) on the frame.



3. Fasten the side panel to the frame with captive screws on interior left wall of enclosure. Torque to **4.5 Nm (40 in-lb)**.

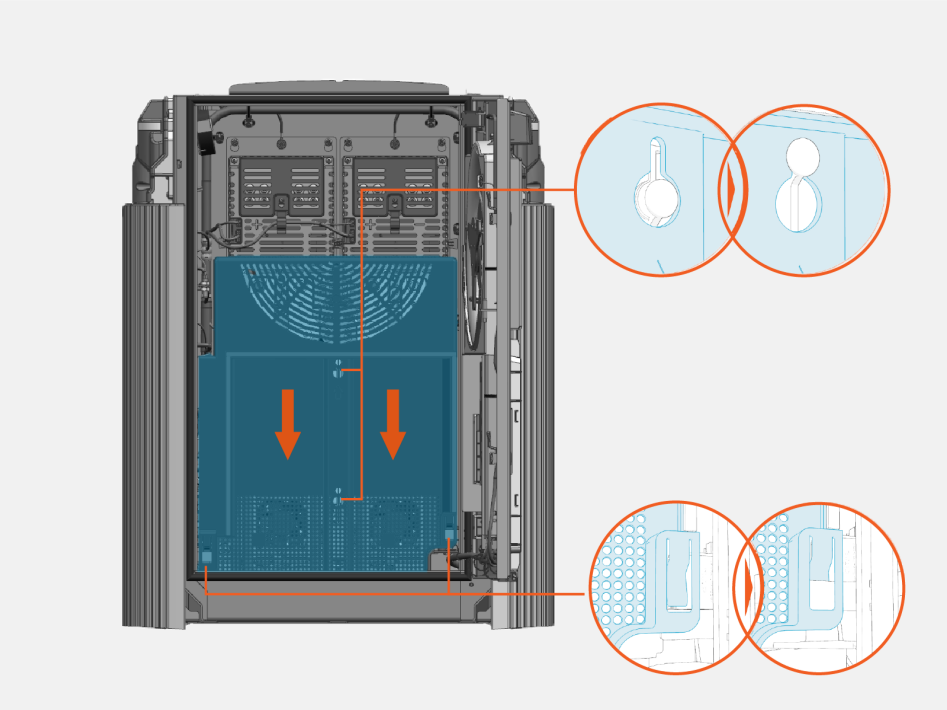


4. Repeat to install the left side panel (as needed).



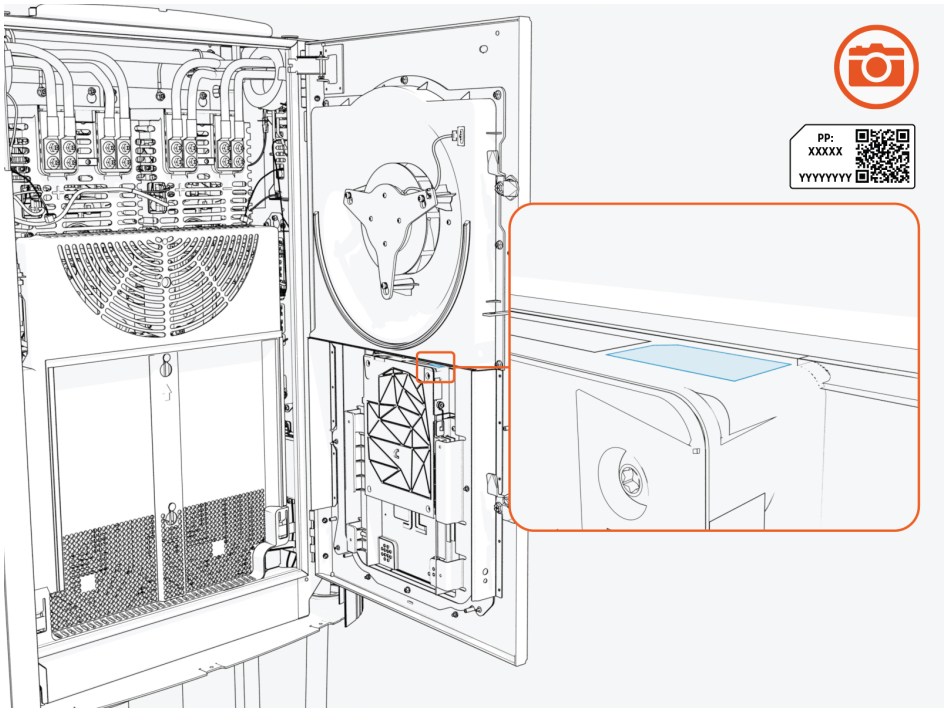
Reinstall Internal Bus Bar Safety Cover

1. Vacuum any residue from the bottom of the enclosure.
2. Install internal bus bar safety cover onto the hooks (x2) and latches (x2). Slide the cover down to engage the latch.



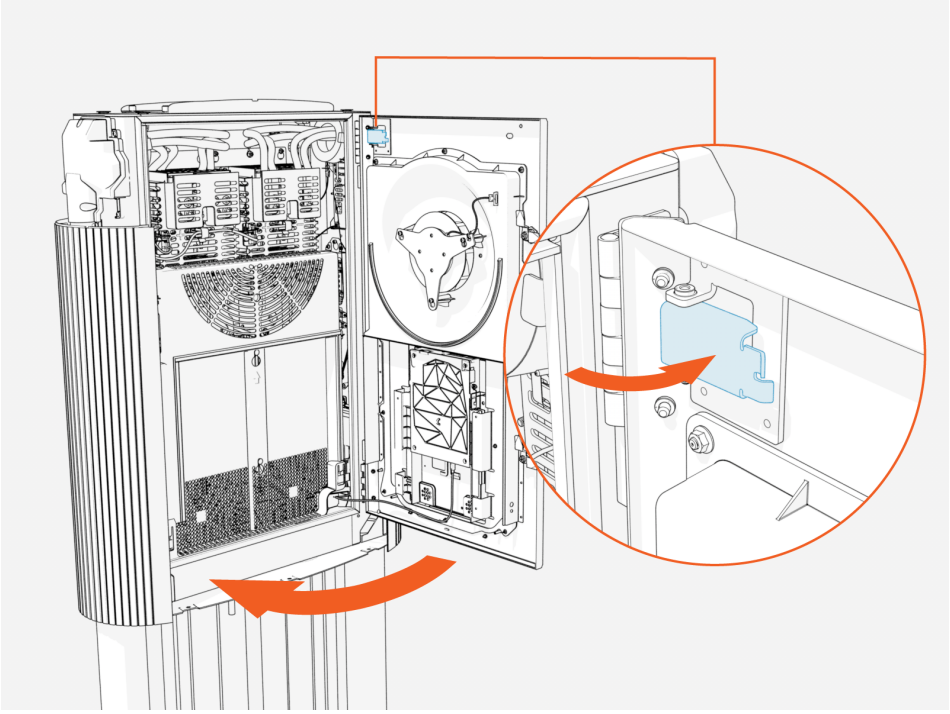
Record MAC Address

Take a photograph of the Power Link 2000 activation QR code and MAC address, which can be found on the label affixed to the top of the Control and Communications Module (CCOM). This information is used at Power Link 2000 setup.

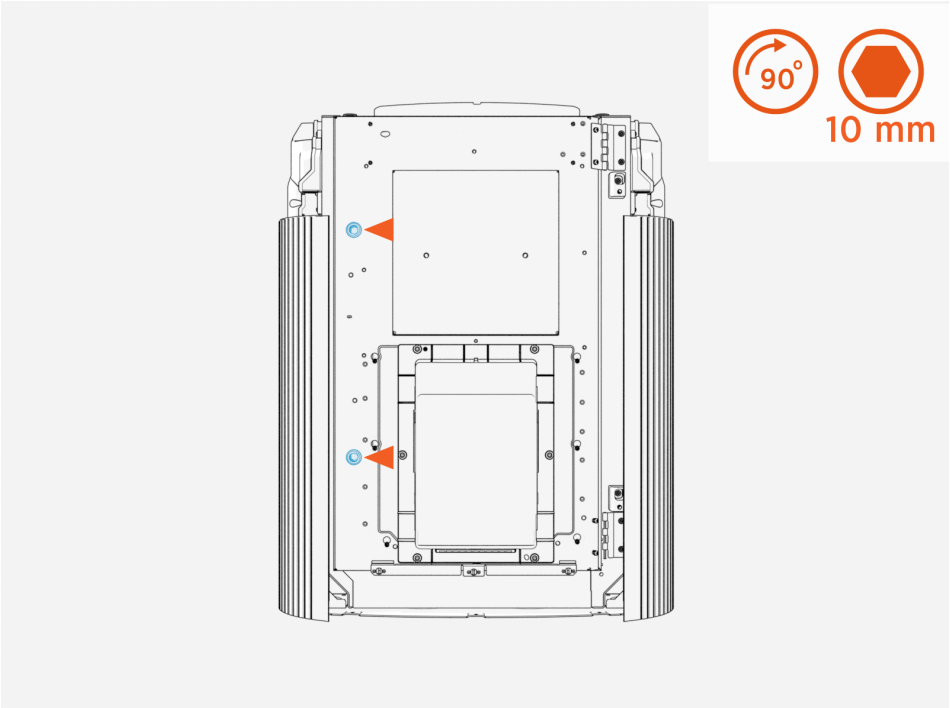


Close and Lock Door

1. Disengage the windstop and close the door.



2. Quarter turn the door latches (x2).



Install Power Link 2000 Covers

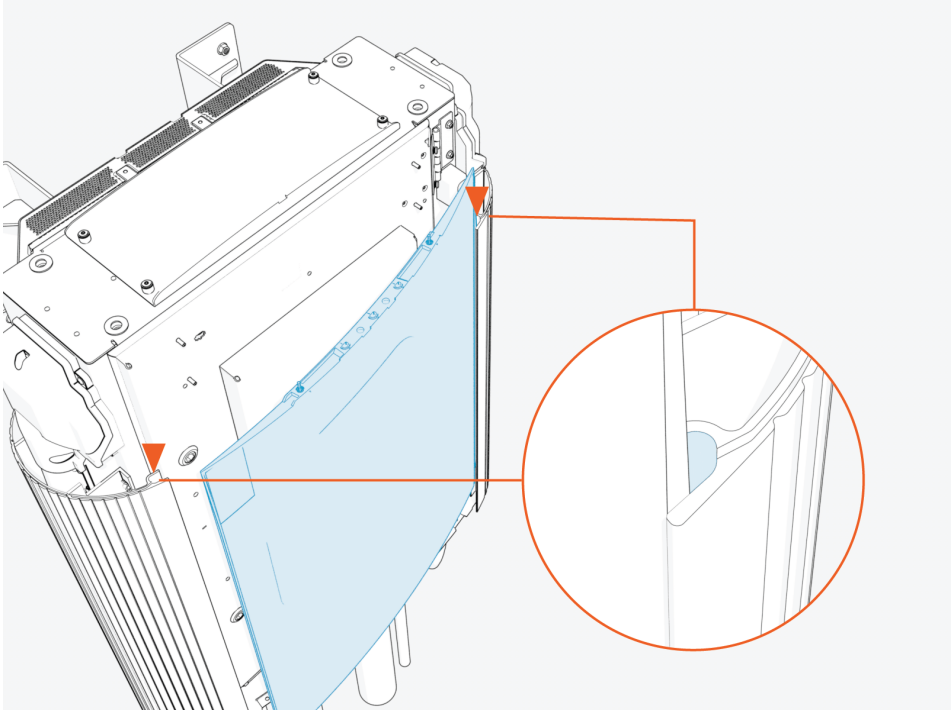
Parts Needed

The following parts from the Power Link 2000 package are needed:

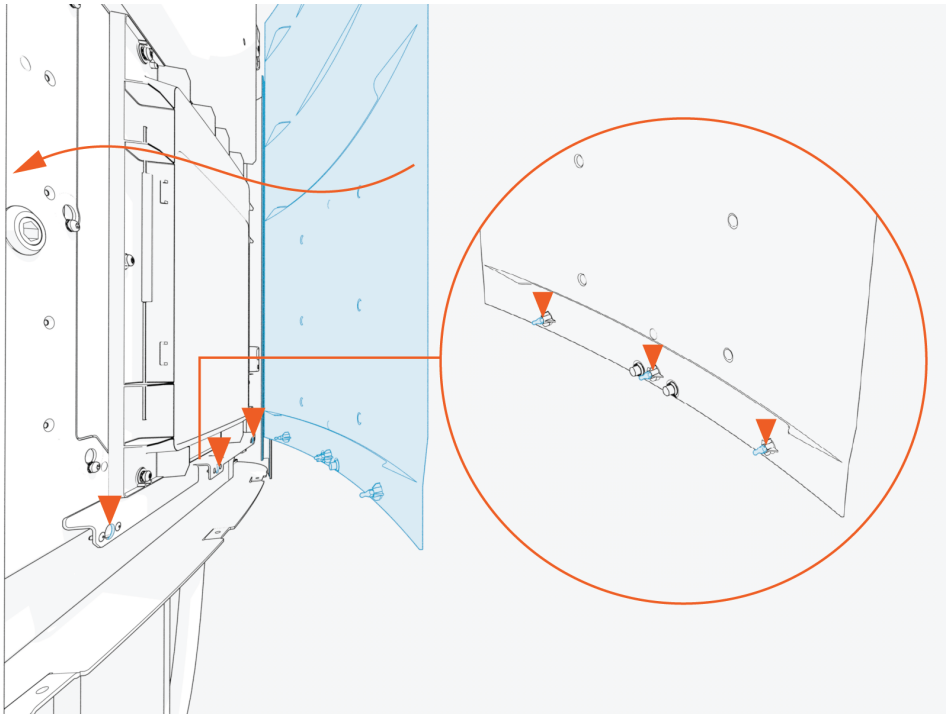
- Front cover
- Bottom crown
- Top cap

Install Power Link 2000 Front Cover

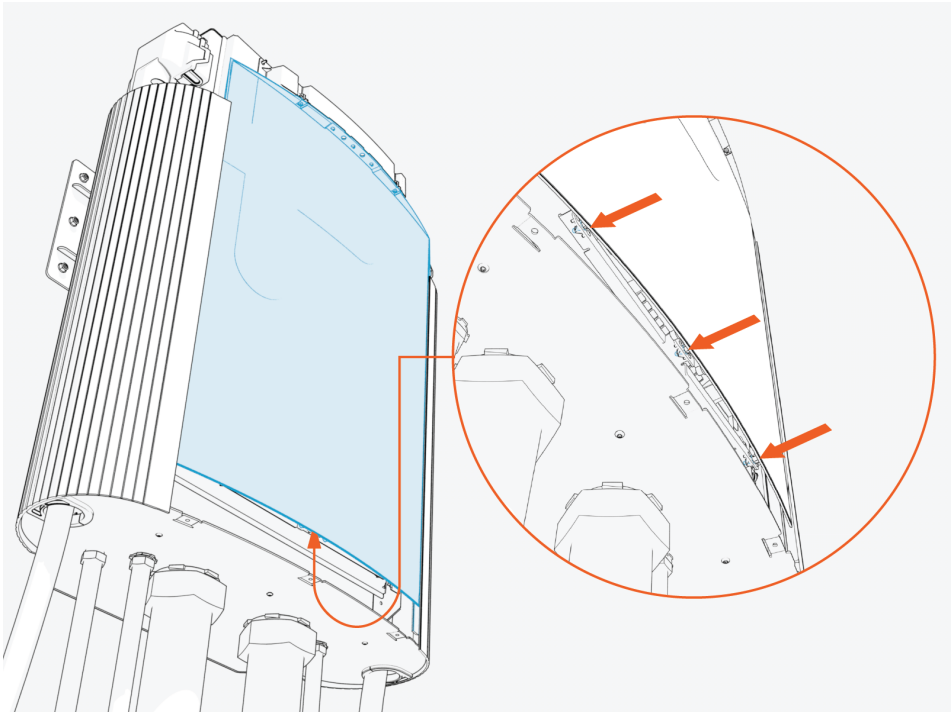
1. Insert any one side of the cover into the groove on the side cover.



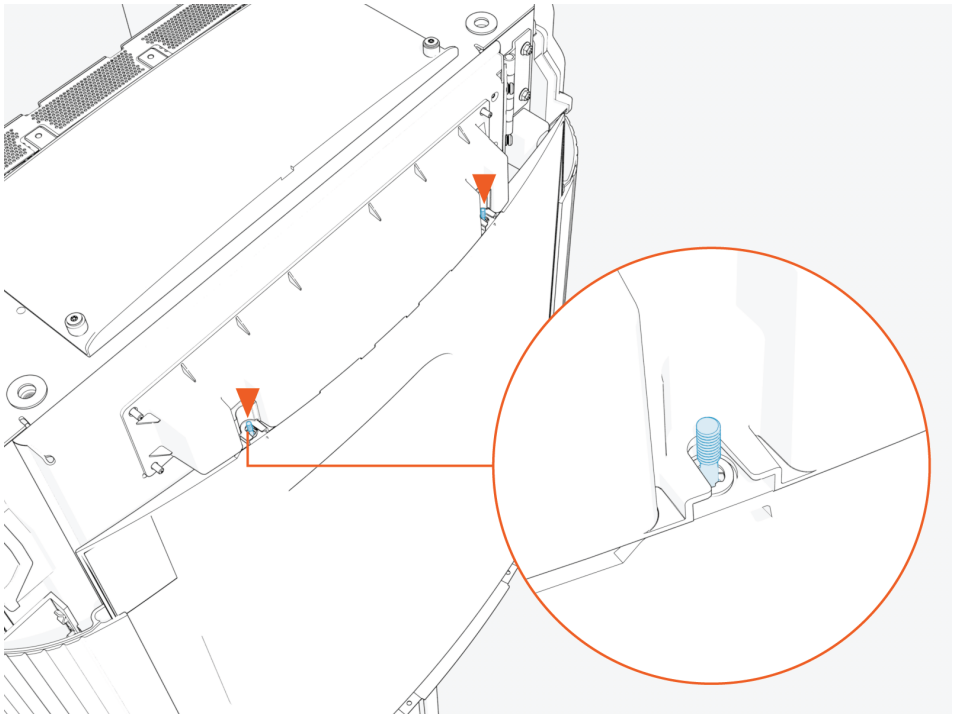
2. Gently flex the cover to insert its other side into the groove on the other side panel. At the same time, align and hook the ball studs (x3) behind the cover into the holes (x3) in a bracket on the upper door.



3. Alternatively, you can hold and flex lower side of the cover slightly outward. While flexed, align the ball studs (x3) behind the cover with the holes (x3) in the bracket on the upper door and press in.

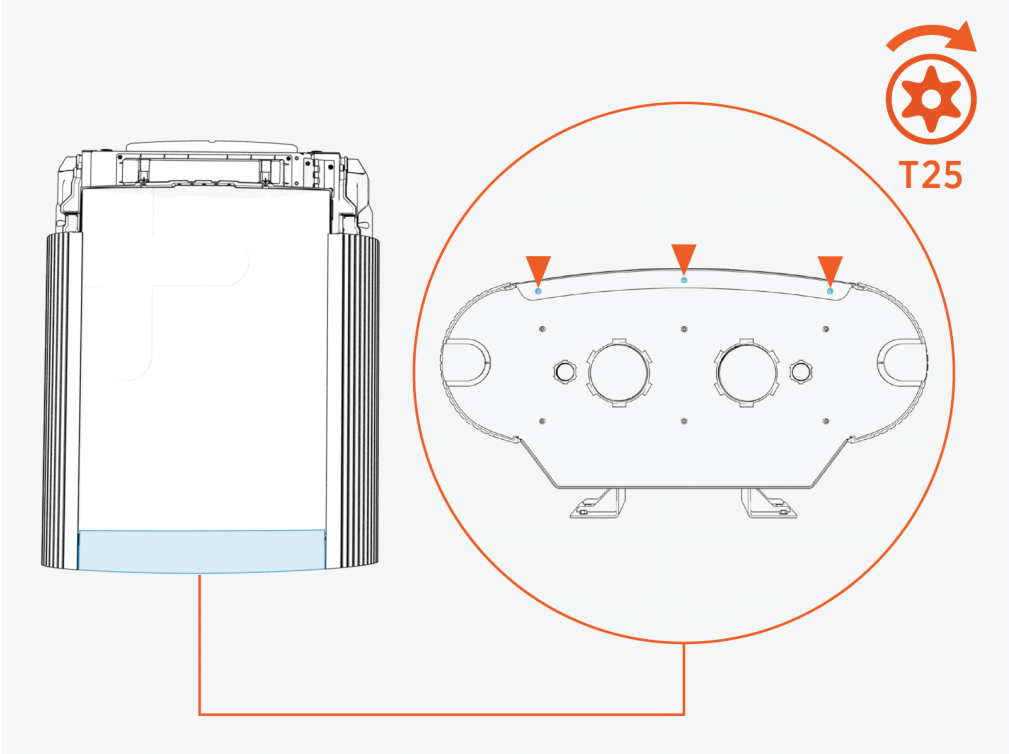


4. Make sure that the screws (x2) on the front upper cover are seated in their slots in the area light housing.



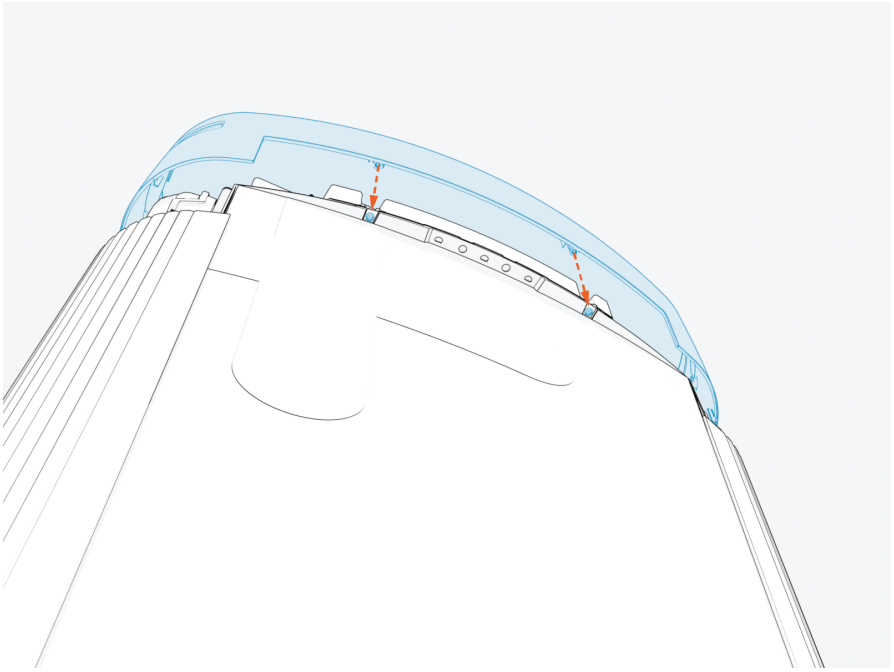
Install Power Link 2000 Bottom Crown

Install the bottom crown. Torque captive screws (x3) to **4.5 Nm (40 in-lb)**.

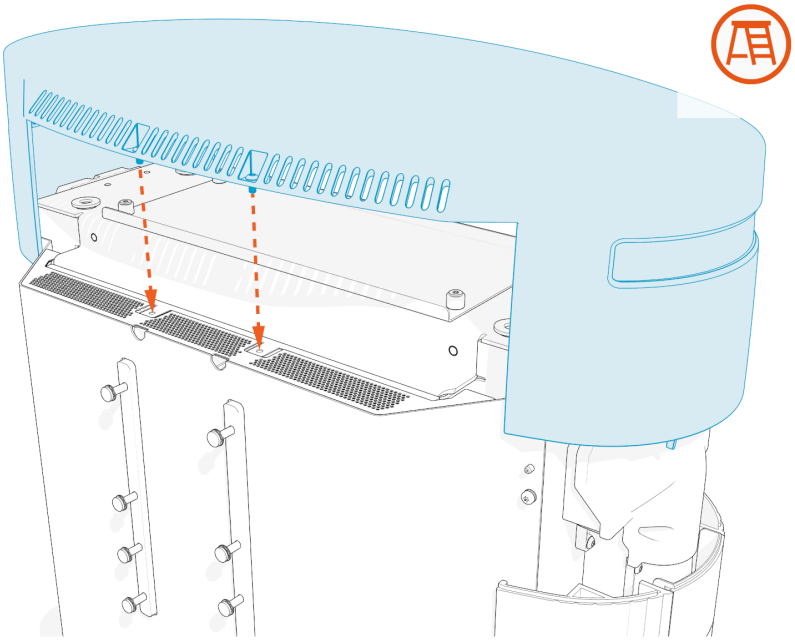


Install Power Link 2000 Top Cap

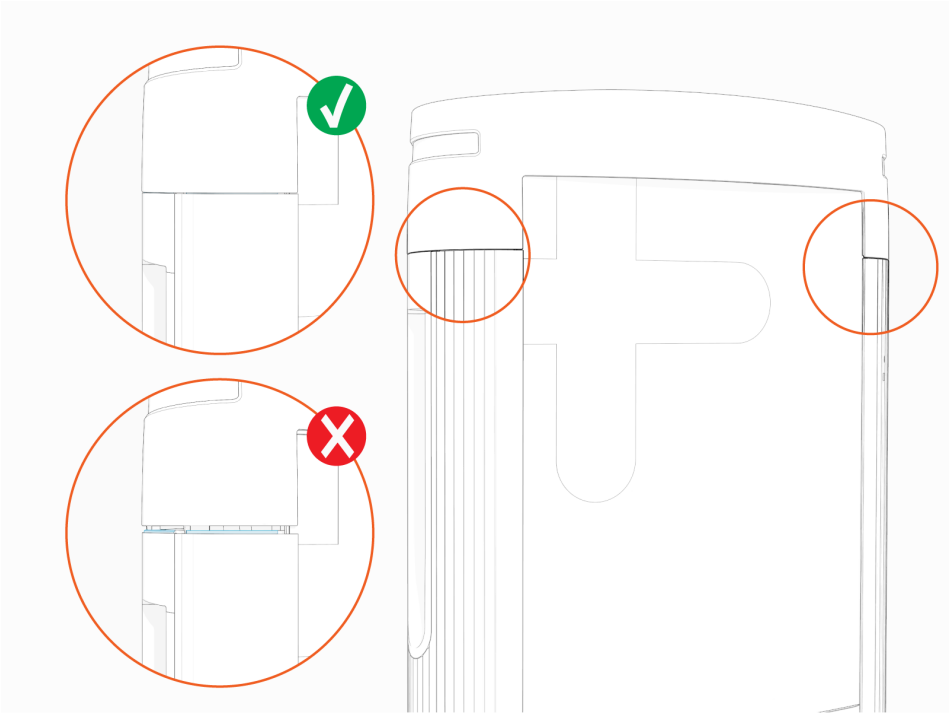
1. Align the screws (x4) and install the top cap.
    - Front screws (x2)



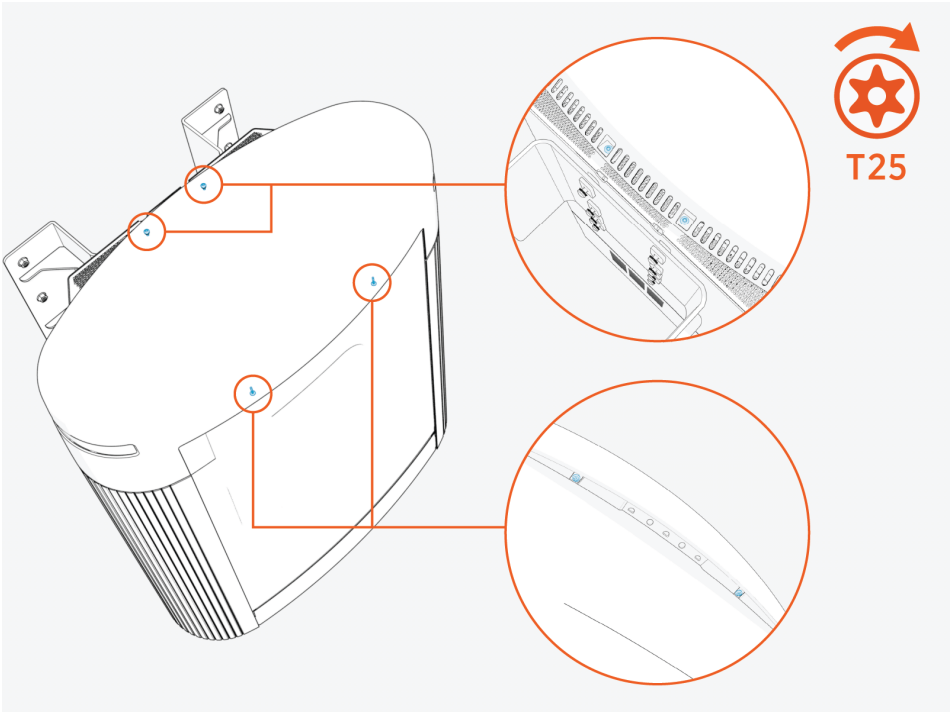
    - Rear screws (x2)



2. Make sure that the top cap sides are seated on edges on top of the side panels (x2).



3. Torque the rear screws (x2) to **2.8 Nm (25 in-lb)** and front screws (x2) to **1.7 Nm (15 in-lb)**.



Adjust Power Link 2000 Ratings Label

Power Link 2000 units ship from the factory with a 500 A output current ratings label. If the installed Power Link 2000 is configured for an output rating of value other than 500 A, an adjustment ratings label must be applied.

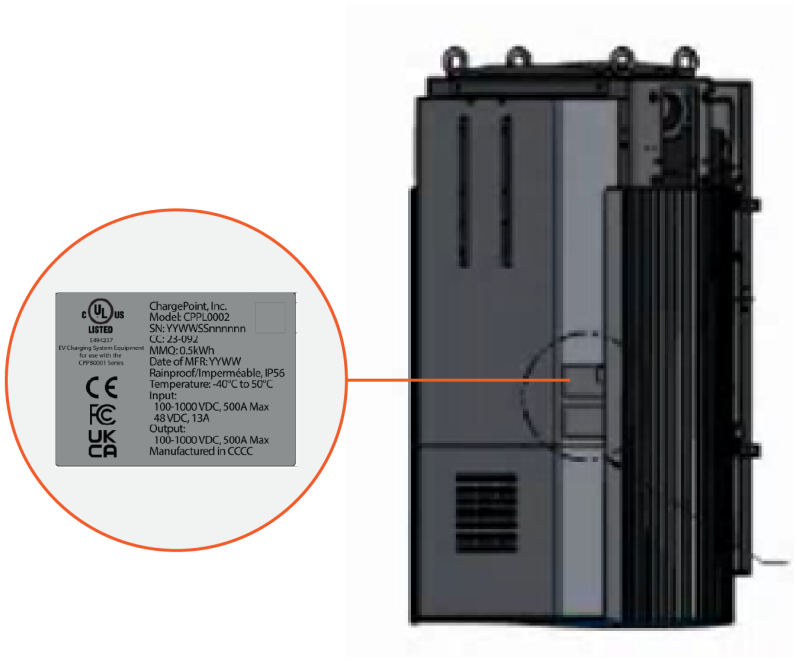
Parts Needed

The following part is needed, from the Power Link 2000 package:

- Ratings adjustment label sticker sheet

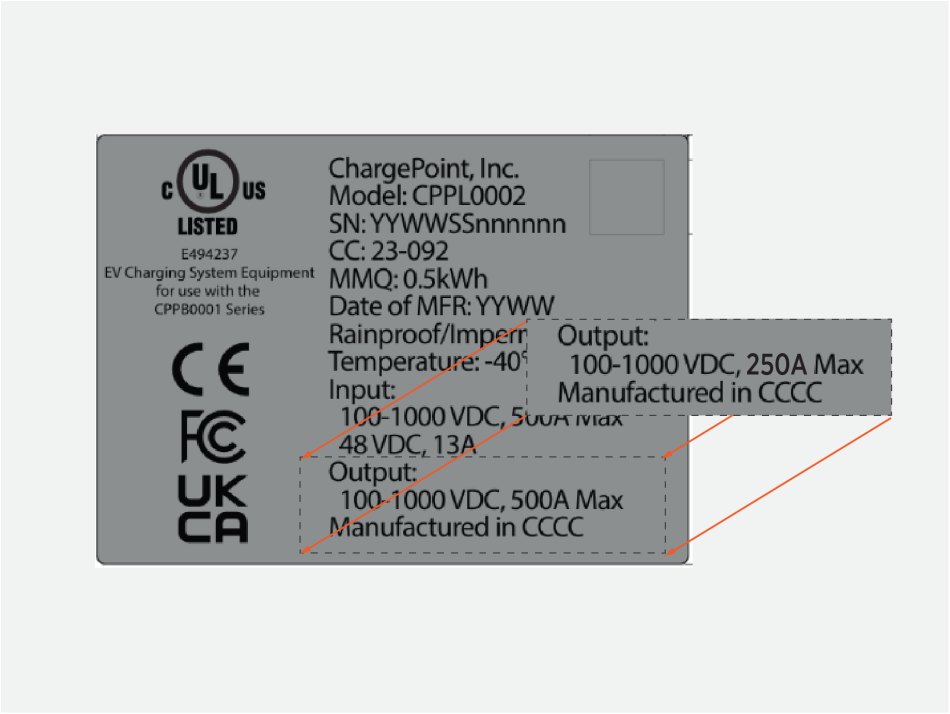
Check and Adjust Label

1. Verify the Power Link 2000 output rating per the site plan. If the rating is 500 A, skip this section. Otherwise proceed through the next steps.
2. Locate the ratings label on the rear of the Power Link 2000.



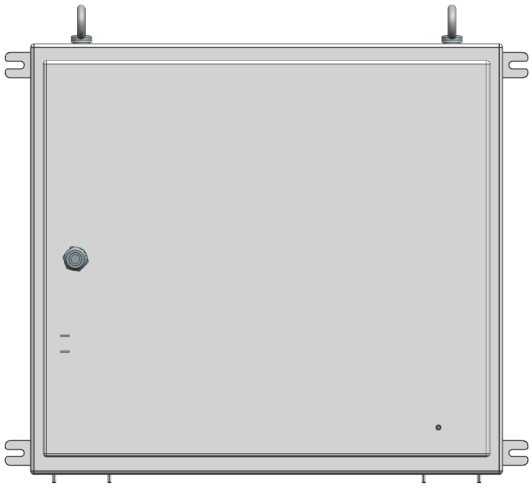
3. Choose the appropriate ratings adjustment label from the label sticker sheet.

4. Adhere the ratings adjustment label over the existing ratings label.

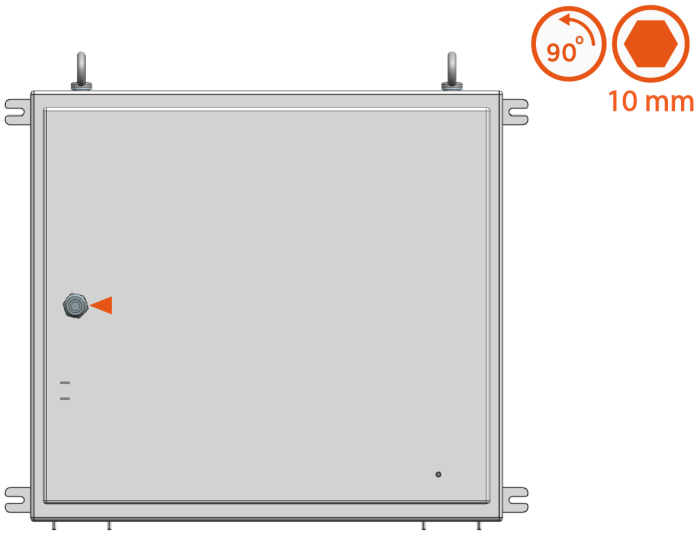


Close and Lock PD Controller

1. Vacuum any residue from the bottom of the enclosure.
2. Close the door.



3. Quarter turn to lock the door.



Recommended Checklist 13

To adhere to ChargePoint best practices, complete this checklist before you leave the site.

Express Plus Pantograph Down 2000 Post-Installation Checklist		
1.	Verify the site is energized by utility.	☐
2.	Ensure site AC voltage measurements are within acceptable range (480 V AC +/- 10% (Phase-Phase).	☐
3.	Ensure all ground and earth connections are made, including those to ground lugs. See Connect Power Link 2000 Wires , Connect PD Controller Wires, and Connect Pantograph Wires.	☐
4.	Ensure all Power Link 2000 wire connections have correct polarity and are installed on the correct bus. See Connect Power Link 2000 Wires.	☐
5.	Ensure all Schunk SLS 201.102 wire connections have correct polarity and are installed on the correct bus. See Connect Pantograph Wires.	☐
6.	Within the Power Link 2000, ensure all service wires are inserted into their designated terminal blocks, and ensure all electrical connections are clean and snug (not pinched or trapped). See Connect Power Link 2000 Wires.	☐
7.	Within the PD Controller, ensure all service and system wires are inserted into their designated terminal blocks, and ensure all electrical connections are clean and snug (not pinched or trapped). Perform a visual inspection on all controller interface cable wires at their landing terminals to ensure field-installed wires mirror factory-installed wires in terms of terminal port position and wire color. See Connect PD Controller Wires.	☐
8.	At the Schunk SLS 201.102 pantograph, ensure all system cables are installed and secure. At the pantograph control box, verify all wires are inserted into their designated terminals and all electrical connections are clean and snug (not pinched or trapped). See Connect Schunk SLS 201.102 Pantograph Wires.	☐
9.	Ensure all electrical enclosures are cleaned and vacuumed and are free of wire strands, metal shavings, debris, packaging material, or all other foreign objects.	☐
10.	Ensure all clearance requirements for service and ventilation of the Power Link 2000, PD Controller, and pantograph are met. Refer to the Clearances and Ventilation sections of the *Express Plus Pantograph Down 2000 Site Design Guide*.	☐

Express Plus Pantograph Down 2000 Post-Installation Checklist		
11.	Ensure Power Link 2000, PD Controller, and pantograph(s) are fully secured and do not rock or move at their mounting points.	☐
12.	Ensure the Power Link 2000 mounting nuts are torqued per site plan specifications. See Mount Power Link 2000.	☐
13.	Ensure the PD Controller mounting nuts are torqued per site plan specifications. See Mount PD Controller.	☐
14.	Ensure the pantograph mounting fasteners are torqued per site plan specifications. See Mount Pantograph.	☐
15.	Ensure the conductors, cables, and lugs meet the specifications listed in Wires and Terminations Required for Site.	☐
16.	All Power Link 2000 cables (HVDC, LVDC) are labeled correctly and clearly identified. See Connect Power Link 2000 Wires.	☐
17.	Ensure that all fasteners on the field-installed components are properly torqued. See Tightening Torques.	☐
18.	Ensure Power Link 2000 input and output HV DC wires have undergone wire insulation resistance test and have test results ready to present at system commissioning See Pull, Cut, and Connect Power Link 2000 Wires.	☐
19.	Ensure an electrical installer will be on site during commissioning.	☐
20.	Verify all site construction work is complete.	☐
21.	Ensure the site is inspected by authority having jurisdiction (AHJ).	☐
22.	Ensure all enclosure doors are closed, and all covers and panels are installed. See Complete the Install.	☐
23.	Ensure that any twists in charging cables are removed and straightened.	☐
24.	Ensure the parking area is clean and free of all packaging, debris, and anything that could damage vehicle tires.	☐
25.	Ensure all local required forms are prepared.	☐

Third-Party Service Providers

Services Performed

Details	Complete the following:
Description of Service Provided	
Location	
Unit	
Panel ID	
Breaker	

Contact Information

Service Provider	Complete the following:
Technician Name	
Service Company Name	
Address	
Contact Person	
Phone	

Site Owner/Customer	Complete the following:
Contact Person	
Business Name	
Site Address	
Phone	

Questions

For assistance, navigate to *chargepoint.com/support* and contact technical support using the appropriate region-specific number.

Appendix: Low Voltage Wire Reference A

RFID and Wi-Fi Antenna Cable

Pantograph Down 2000 ships with two RF coaxial cables for connection to the Wi-Fi and RFID antennas. Each cable is 5 m (16.4 ft) long and cannot be cut to length. Custom cables of different length may be ordered for the site and must meet the cable specifications listed below. There is no minimum length bound.

Cable	Max. Length	Cable Type	Termination A*	Termination B*
Wi-Fi antenna	10 m (32.8 ft)	LMR-240 or equivalent, 6.1 mm (0.24 in) outer diameter, and low loss operating up to 5.8 GHz or higher.	RP-SMA male	N-type male
RFID antenna	10 m (32.8 ft)	LMR-240 or equivalent, 6.1 mm (0.24 in) outer diameter, and low loss operating up to 1 GHz or higher.	RP-SMA male	N-type male
*Termination A lands at the PD Controller. Termination B lands at the antenna.				

IMPORTANT:

- The LMR-240 cable has a one-time bend radius of 19 mm (0.75 in) and repeated bend radius of 63 mm (2.5 in). If these are exceeded, the cable may be damaged and the system may not operate. If using an LMR-240 equivalent, do not violate the bend radius of that cable type.
- The RF coaxial cables may not be coiled within the PD Controller.

The PD Controller ships with a pre-installed 3/4 in NPT multi-hole cable gland for the secure entry of the antenna cables at the enclosure. Alternatively, the antenna cables may enter the PD Controller by conduit. In the latter case, the cable gland may be removed from the PD Controller and installed at the end of the conduit terminating at the antennas. The cable gland must have a water-tight connection to the conduit.

The antenna cables can be fed through the gland in only one direction, from the antennas towards the PD Controller. Feeding the RP-SMA connectors through the gland may be snug and should be done using the following steps:

1. Remove the gland insert from the gland housing.
2. Slide gland cap over both cables.
3. Insert the cables through the gland insert.

CAUTION: Push the RP-SMA connector head through the gland insert by holding the connector itself to avoid the risk of kinking the cable.

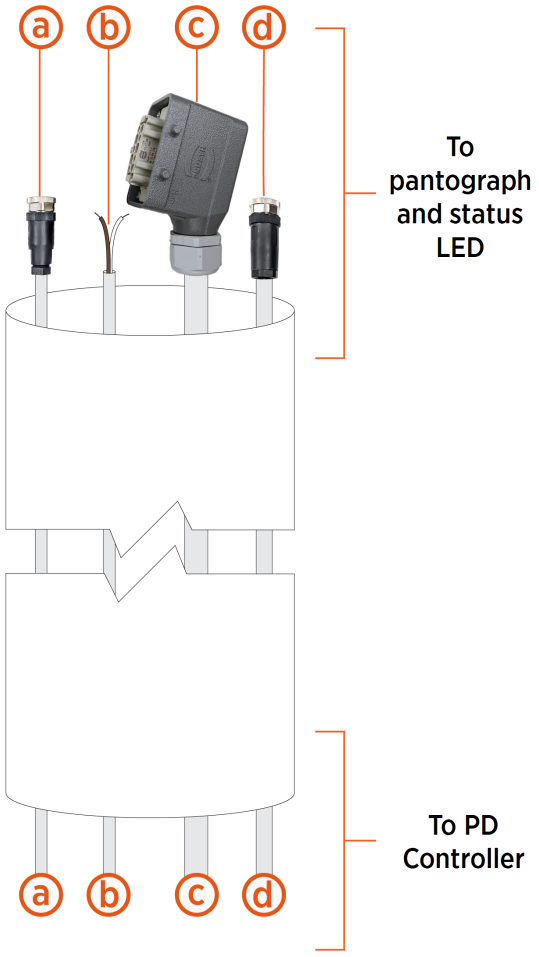
4. Reinstall the gland insert fully into the gland body.

When routing the antenna cables between the PD Controller and the antennas, keep in mind the following three factors:

1. The RF coaxial cables may not be coiled within the PD Controller.
2. The RF coaxial cables may not be cut. (They may be ordered to custom length.)
3. The RF coaxial cables may not be bent beyond the bend radius limits discussed above.

Controller Interface Cable Schunk SLS 201.102

The controller interface cable is a single cable that bundles four system cables.



- **(a)** Pantograph rest sensor cable (4-pin connector)
- **(b)** Pantograph control pilot cable
- **(c)** Pantograph control cable
- **(d)** Status LED cable (8-pin connector)

Cable cross-section:

Cable Terminations at PD Controller

One end of the controller interface cable terminates at the PD Controller. The system cables at this end are unterminated. The wires at this end of the cable are landed within the PD Controller by wire color. For locations of the landing terminals within the PD Controller, see Connect Controller Interface Cable Wires.

Pantograph Control Cable

Wire	Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Pantograph low current 24 V	Red/white	20 AWG (0.5 mm^2)	TB9	4	13 mm (0.5 in)
Pantograph motor GND	Black	14 AWG (2.5 mm^2)	TB8	6	12 mm (0.5 in)
Pantograph high current GND	Black	16 AWG (1.5 mm^2)	TB8	5	12 mm (0.5 in)
Pantograph low current GND	Black	20 AWG (0.5 mm^2)	TB8	4	12 mm (0.5 in)
Pantograph high current 24 V	Red	14 AWG (2.5 mm^2)	TB10	4	13 mm (0.5 in)
Raised	Blue	20 AWG (0.5 mm^2)	TB11	4B	10 mm (0.4 in)
Lowered	Yellow	20 AWG (0.5 mm^2)	TB11	3B	10 mm (0.4 in)
Request raise	Blue/white	20 AWG (0.5 mm^2)	TB13	4B	10 mm (0.4 in)
Request lower	Yellow/white	20 AWG (0.5 mm^2)	TB13	3B	10 mm (0.4 in)

Pantograph Rest Sensor Cable

Wire	Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Rest signal	Green/blue	20 AWG (0.5 mm^2)	TB11	1B	10 mm (0.4 in)
Rest 24 V	Red/white	20 AWG (0.5 mm^2)	TB9	3	13 mm (0.5 in)
Rest GND	Black	20 AWG (0.5 mm^2)	TB8	3	12 mm (0.5 in)

Pantograph Control Pilot Cable

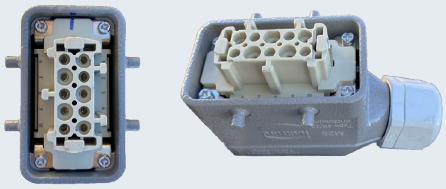
Wire	Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Control pilot	White/brown	20 AWG (0.5 mm^2)	TB5	1B	12 mm (0.5 in)
Control pilot shield	Brown/black	20 AWG (0.5 mm^2)	TB5	2B	12 mm (0.5 in)

Status LED Cable

Wire Color	Wire Gauge	Terminal Block ID	Port Number	Wire Strip Length
Orange	24 AWG (0.2 mm^2)	TB6	1B	10 mm (0.4 in)
White/orange	24 AWG (0.2 mm^2)	TB6	2B	10 mm (0.4 in)
Brown	24 AWG (0.2 mm^2)	TB6	3B	10 mm (0.4 in)
White/brown	24 AWG (0.2 mm^2)	TB6	4B	10 mm (0.4 in)
Blue	24 AWG (0.2 mm^2)	TB7	1B	10 mm (0.4 in)
White/blue	24 AWG (0.2 mm^2)	TB7	2B	10 mm (0.4 in)
Green	24 AWG (0.2 mm^2)	TB7	3B	10 mm (0.4 in)
White/green	24 AWG (0.2 mm^2)	TB7	4B	10 mm (0.4 in)

Cable Terminations at Pantograph and Status LED

One end of the controller interface cable terminates at the pantograph and status LED. The pantograph rest sensor cable, pantograph control cable, and status LED cables at this end are terminated with connectors. The control pilot cable is unterminated.

System Cable	Connector Type	Reference Image
Pantograph rest sensor	M12, A-code, 4-pin, female	
Pantograph control	Harting, female	
Status LED	M12, A-code, 8-pin, female	

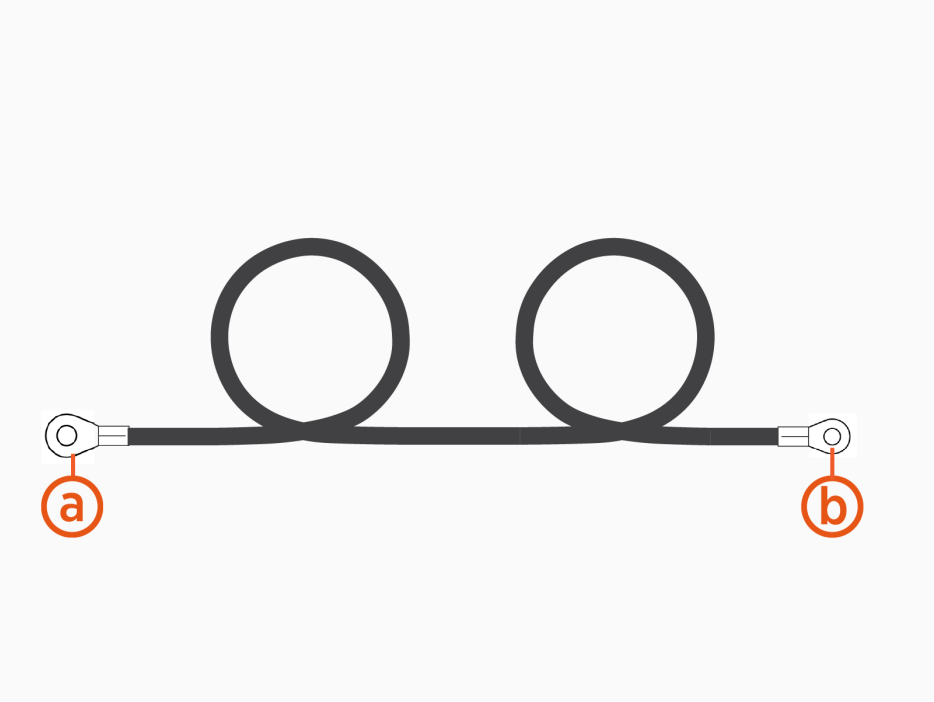
Routing Through Conduit and Cable Gland

The PD Controller ships with a pre-installed 1-1/4 in NPT cable gland for the secure entry of the controller interface cable at the enclosure. Alternatively, the cable may enter the PD Controller by conduit. In the latter case, the cable gland may be removed from the PD Controller and installed at the end of the conduit terminating at the pantograph. The cable gland must have a water-tight connection to the conduit.

Due to the size of the terminating connectors on one end of the cable, the controller interface cable can be fed through the cable gland and through the conduit in only one direction, from the pantograph towards the PD Controller.

Pantograph Frame to Auxiliary Frame Ground Wire

Pantograph Down 2000 ships with a 0.5 m (1.6 ft) x 16 mm^2 (6 AWG) ground wire for connection between the pantograph frame and the auxiliary component mounting frame. The wire is pre-terminated at one end with a ring terminal sized for an M8 bolt. This end of the wire lands at the pantograph frame. The other end of the wire is pre-terminated with a ring terminal sized for an M6 bolt. This end of the wire lands at the auxiliary mount frame.



(a) M8 ring terminal (lands at pantograph)

(b) M6 ring terminal (lands at auxiliary mounting frame)

Appendix: Set Up Power Link 2000 B

IMPORTANT: Do not power on Pantograph Down 2000 after completing the installation. An Authorized Commissioning Partner will commission, power on, pinpoint, and configure Pantograph Down 2000 after installation. If you are authorized to do so, complete the following procedures:

Power On

Note: Pantograph Down 2000 must pass commissioning before power on, or warranty limitations apply.

1. Ensure all doors and panels, covers, vinyl signs, and all other parts have been correctly installed and the work is complete.
2. Turn on power at the same points that you turned it off.

   Note: If the site has a remote shunt trip switch, ensure that the switch is in the operating position.
3. Wait for self-diagnostics to run. The system may take several minutes to initiate. You may see messages intermittently until the system fully boots up.

Self-Diagnostic	After Installation	After Service or Power Outage
Electrical safety checks	✓	✓
Lighting checks	✓	✓
Display panel checks	✓	✓
Component operation checks	✓	✓
Network connectivity checks	✓	✓

Set Up Power Link 2000

After you power on the Pantograph Down 2000 system at the breaker panel, you must set up and activate the Power Link 2000. To do so, you need:

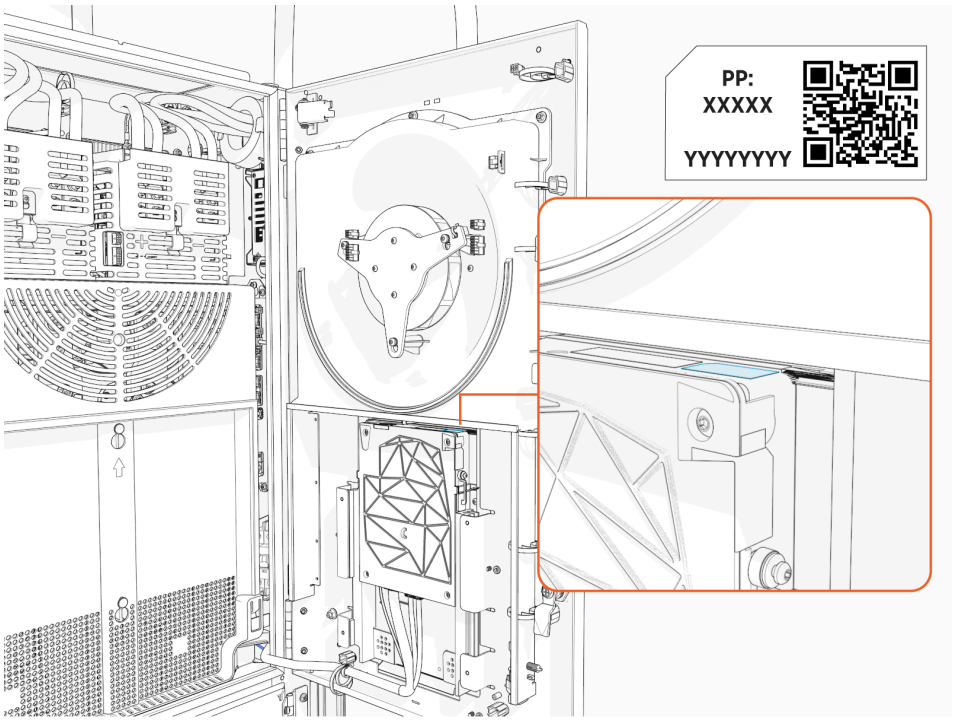
- ChargePoint installer login credentials.
- Activation label (QR code label including the MAC address and activation password).
- The exact location (to the parking space) where the Pantograph Down 2000 is installed.
- A smartphone with ChargePoint Installer app, Internet connectivity, and QR code scanner (usually built into the camera app).

  Scan the QR code to download the Installer app, and sign up if necessary.

Follow the steps below to set up Power Link 2000:

1. Open the ChargePoint Installer app and log in.
2. Follow the onscreen prompts.

   Note: To connect to Power Link 2000 and complete setup, you need to scan the QR code or manually enter the MAC address and password of Power Link 2000. You can find them on the activation label affixed on top of the display or non-display unit.



Limited Warranty Information and Disclaimer

The Limited Warranty you received with your charging station is subject to certain exceptions and exclusions. For example, your use of, installation of, or modification to, the ChargePoint® charging station in a manner in which the ChargePoint® charging station is not intended to be used or modified will void the limited warranty. You should review your limited warranty and become familiar with the terms thereof. Other than any such limited warranty, the ChargePoint products are provided "AS IS," and ChargePoint, Inc. and its distributors expressly disclaim all implied warranties, including any warranty of design, merchantability, fitness for a particular purposes and non-infringement, to the maximum extent permitted by law.

Limitation of Liability

CHARGEPOINT IS NOT LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION LOST PROFITS, LOST BUSINESS, LOST DATA, LOSS OF USE, OR COST OF COVER INCURRED BY YOU ARISING OUT OF OR RELATED TO YOUR PURCHASE OR USE OF, OR INABILITY TO USE, THE CHARGING STATION, UNDER ANY THEORY OF LIABILITY, WHETHER IN AN ACTION IN CONTRACT, STRICT LIABILITY, TORT (INCLUDING NEGLIGENCE) OR OTHER LEGAL OR EQUITABLE THEORY, EVEN IF CHARGEPOINT KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY OF SUCH DAMAGES. IN ANY EVENT, THE CUMULATIVE LIABILITY OF CHARGEPOINT FOR ALL CLAIMS WHATSOEVER RELATED TO THE CHARGING STATION WILL NOT EXCEED THE PRICE YOU PAID FOR THE CHARGING STATION. THE LIMITATIONS SET FORTH HEREIN ARE INTENDED TO LIMIT THE LIABILITY OF CHARGEPOINT AND SHALL APPLY NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY.

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Important: Changes or modifications to this product not authorized by ChargePoint, inc., could affect the EMC compliance and revoke your authority to operate this product.

Exposure to Radio Frequency Energy: The radiated power output of the 802.11 b/g/n radio and cellular modem (optional) in this device is below the FCC radio frequency exposure limits for uncontrolled equipment. The antenna of this product, used under normal conditions, is at least 20 cm away from the body of the user. This device must not be co-located or operated with any other antenna or transmitter by the manufacturer, subject to the conditions of the FCC Grant.

ISED (formerly Industry Canada)

This device complies with the licence-exempt RSS standard(s) of Innovation, Science and Economic Development Canada (ISED). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux flux RSS exemptés de licence d'Innovation, Sciences et Développement économique Canada (ISDE). L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter.

Radiation Exposure Statement: This equipment complies with the IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Énoncé d'exposition aux rayonnements: Cet équipement est conforme aux limites d'exposition aux rayonnements ioniques RSS-102 Pour un environnement incontrôlé. Cet équipement doit être installé et utilisé avec un Distance minimale de 20 cm entre le radiateur et votre corps.

FCC/IC Compliance Labels

Visit chargepoint.com/labels.

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