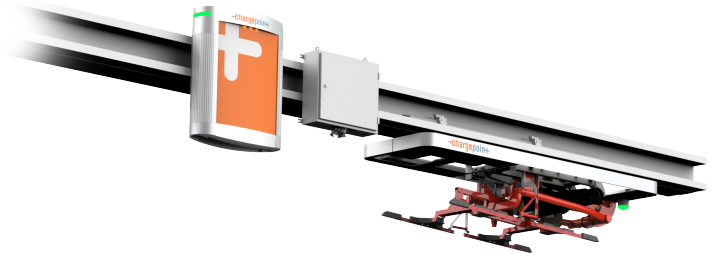
Pantograph Down 2000

Express Plus DC Fast Charging Solution for Electric Buses

Operation and Maintenance Guide



IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for ChargePoint® products that shall be followed during installation, operation, and maintenance of each product.

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.** A touch currrent of >3.5 mA AC RMS is possible in case of a fault condition of loss of electrical continuity of the earthing conductor. 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 connector adapter. Do not 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, the flexible output cable, the vehicle inlet, the electric vehicle connector, or the electric vehicle connector adapter is broken, cracked, open, or shows any other signs of damage. Do not use this product if internal parts are accessible, including wiring.**
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. **Do not use an electric vehicle connector adapter with any charger or EV that is capable of exceeding the adapter's rated voltage of current capacity. Some EVs and EVSE combinations are capable of multiple voltages or limited durations of current overloading designed for normal EVSE-to-EV connections. Use of an electric vehicle connector adapter in these situations could result in unsafe conditions such as fire, burns, or exposure of high voltage.**
14. **Site operator is responsible for making sure that no mechanical damage occurs and the installation is done in a location that doesn't present a safety risk. If used carelessly, the equipment 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.

Product Disposal

Applicable to NA - Do not dispose of as part of unsorted domestic waste. Inquire with local authorities regarding proper disposal. Product materials are recyclable as marked.

Applicable to EU - To comply with Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE), devices marked with this symbol may not be disposed of as part of unsorted domestic waste inside the European Union. Enquire with local authorities regarding proper disposal. Product materials are recyclable as marked.

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 Product Reference Documentation.

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

NOTE: Helpful information to facilitate 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.

Contents

Revision History

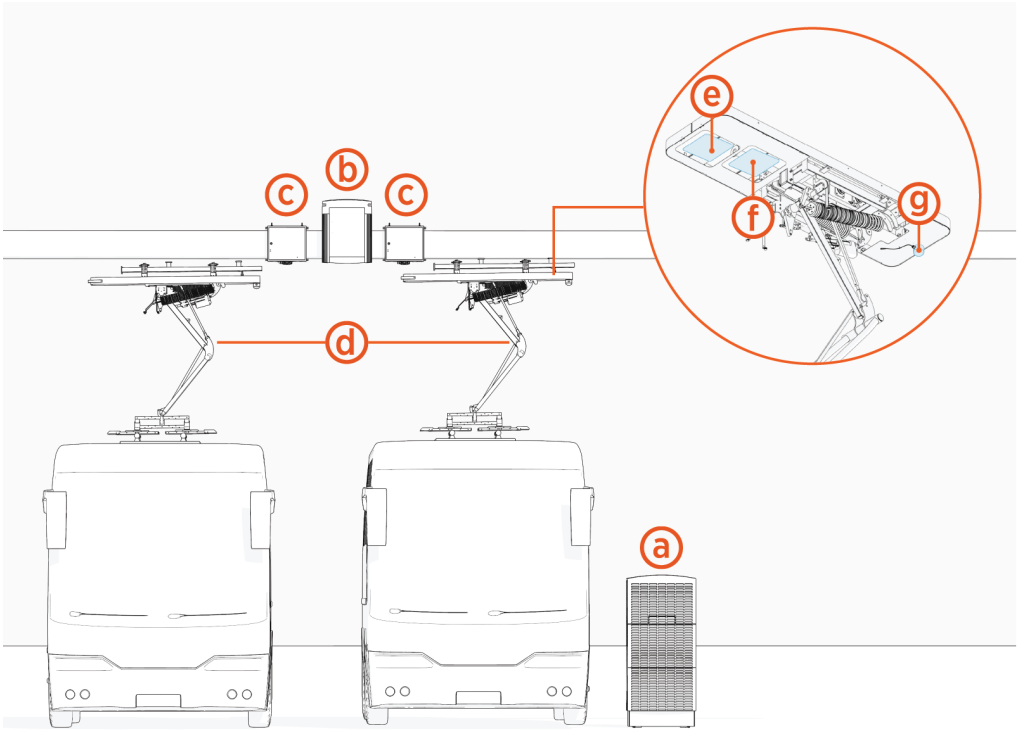
This page provides a summary of revisions made, listing the month and year of each update along with a brief description of the changes made.

Month & Year	Version Number	Description
October, 2025	v1	Initial release.

Introduction 1

Pantograph Down 2000 Serviceable Components

Express Plus Pantograph Down 2000 is a modular solution for scalable fast charging of electric buses. The following list shows its serviceable 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*.

Express Plus Guides

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

Access documents at ChargePoint Product Reference Documentation.

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, go to chargepoint.com/support and contact technical support using the appropriate region-specific number.

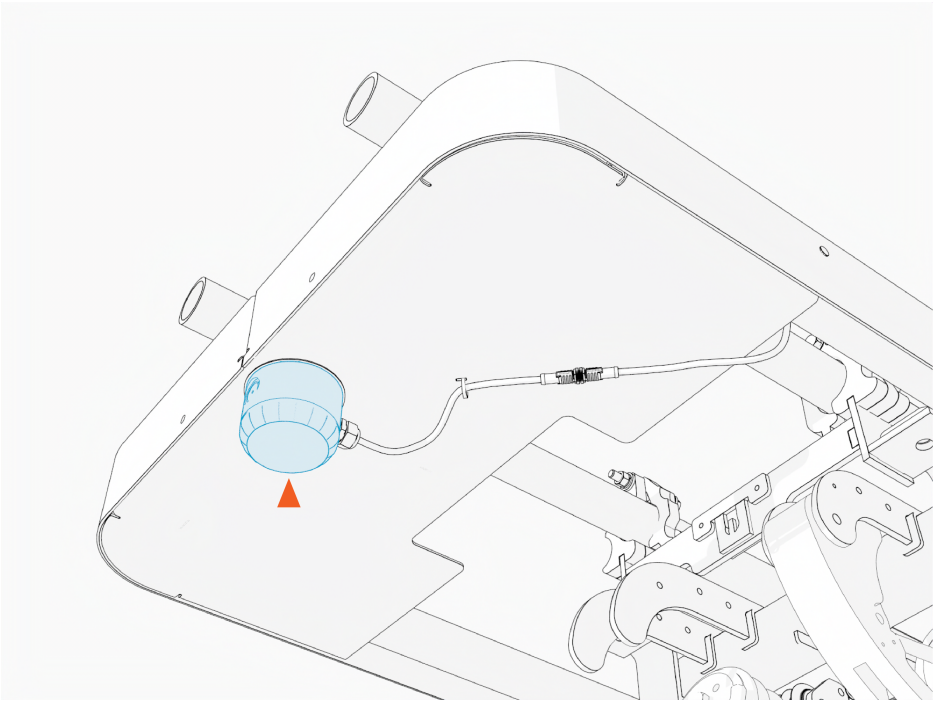
Operation 2

Power Operation

- Power on: Pantograph Down 2000 is powered on by the installation team at the site's electrical panel immediately after completing installation.
- Power off: Pantograph Down 2000 does not need to be powered off except during maintenance or service. Refer to the *Power Block* and/or *Pantograph Down 2000 Service Guide* to power off and de-energize Pantograph Down 2000 components.

Status LED Auxiliary Lights

The Pantograph Status LED indicates the following:



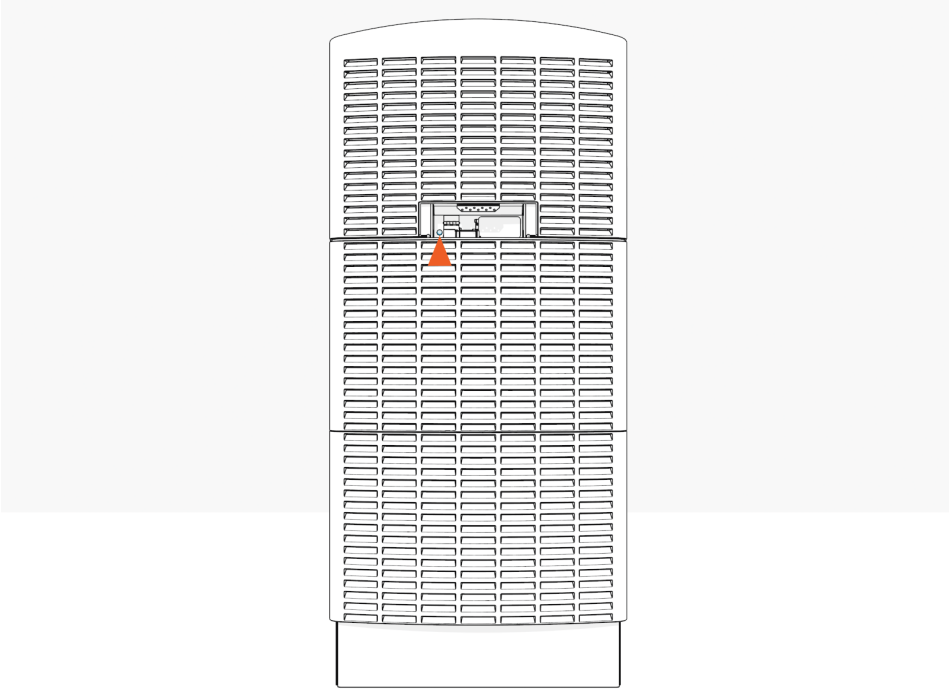
Color	Pantograph Status
GREEN	No ongoing wireless communication with an EV, available and ready to charge.
BLUE, pulsing	Wirelessly communicating with an EV, charging
BLUE	Wirelessly communicating with an EV, not charging or charging complete

Color	Pantograph Status
YELLOW	Reduced charging rate
WHITE	Offline
RED	Fault (see View Station and Diagnostics Information)

Power Block Status Light

To check the Power Block status light, perform the following steps:

1. Open the security panel to check the status light



IMPORTANT: When you power on, the status light should turn on (light up yellow, then green). If the light is red, contact ChargePoint at chargepoint.com/support.

The Power Block status light indicates the following:

Color	Power Block Status
GREEN	Normal operating state
YELLOW, blinking	Self-test ongoing
YELLOW	Not yet activated
RED	Fault (see View Station and Diagnostics Information)

ChargePoint Platform Dashboard

You can configure stations, view station and diagnostics information, generate reports, and manage many functions of Pantograph Down 2000 in the ChargePoint Platform. Log in to the ChargePoint Platform at

na.chargepoint.com using the login credentials created when setting up the station network manager account.

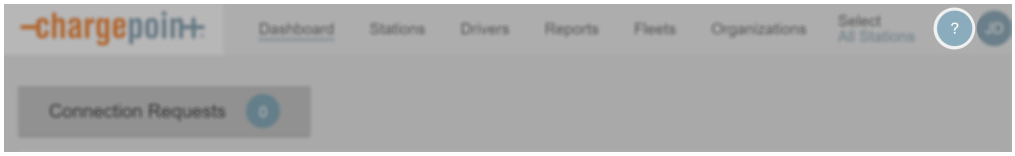
For more information, see ChargePoint Product Reference Documentation.

Set Up and Configure Station Features

You can do one or more of the following:

- Control who can access the stations
- Set up station groups
- Grant station rights to other organizations
- Set up web services API
- Set up and manage your fleet

After logging in, navigate to **(Help)** > **Videos and Manuals** to see the video tutorials and user guides.



To view stations and access diagnostic information, see Stations Overview.

View Station and Diagnostics Information

1. Log in to the ChargePoint Platform at na.chargepoint.com or ca.chargepoint.com or eu.chargepoint.com.
2. Select **Stations**.
3. Apply filters to locate the desired station.
4. Select the station name to view the station-specific information.

IMPORTANT: If a red status alert appears, contact ChargePoint immediately at chargepoint.com/support. A yellow status alert provides you with information that may require action (such as maintenance action) or no action.

Generate Reports

Access a variety of reporting features in the Reports tab:

- Reports by data type (such as Analytics, Financial, Logs).
- Duration slider (by day, week, month, year).
- Advanced filters (such as station name, organization).
- Detailed data view when you hover over a report graph.

For more information, see Reports.

Reports on Alerts

You can view the station error codes and alerts from the ChargePoint Platform and export that information to a report.

1. Log in to the ChargePoint Platform.
2. Navigate to **Reports** > **Alarms**.
3. Choose **Most Recent Only**, **Current Alarms**, **Historical Alarms**, or **All Alarms** from the drop-down menu.
4. Apply filters from the bottom tab.
5. Use the checkboxes on the left to choose specific data.
6. Export as a `CSV` file by choosing either **Visible Columns** or **All Columns** from the drop-down menu.

Maintenance 3

Pantograph Down 2000 needs minimal preventive maintenance over its lifetime. ChargePoint's network connection monitors for system health and sends an alert when corrective maintenance might be required (see View Station and Diagnostics Information).

For pantograph-specific maintenance procedures, refer to Schunk document repository and search for your pantograph model number.

IMPORTANT:

- Follow local code and refer to the site lockout/tagout procedure and *Pantograph Down 2000 Service Guide* to power off and de-energize Pantograph Down 2000.
- If you find any damage, excessive wear, part impairment, or improper functioning, contact ChargePoint for assistance and replacement parts.
- Use only ChargePoint- authorized parts and refer to the Pantograph Down 2000 Service Guide for part replacement instructions.

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 the training at chargepoint.com/installers to become ChargePoint certified and to access the ChargePoint web or app-based installer tools.

Site Manager's Responsibilities

The site or facility manager has a few duties for general site maintenance:

- Establish site lockout/tagout procedure per local code and in compliance with the *Pantograph Down 2000 Service Guide*.
- Maintain an up-to-date copy of the site's as-built and single line diagram (SLD) that includes the naming of all control elements (circuit breakers, fuses, overcurrent devices, and disconnect switches). Documentation to include but not be limited to the localizations, permanent panel schedules, and means or methods required to de-energize the charging station.

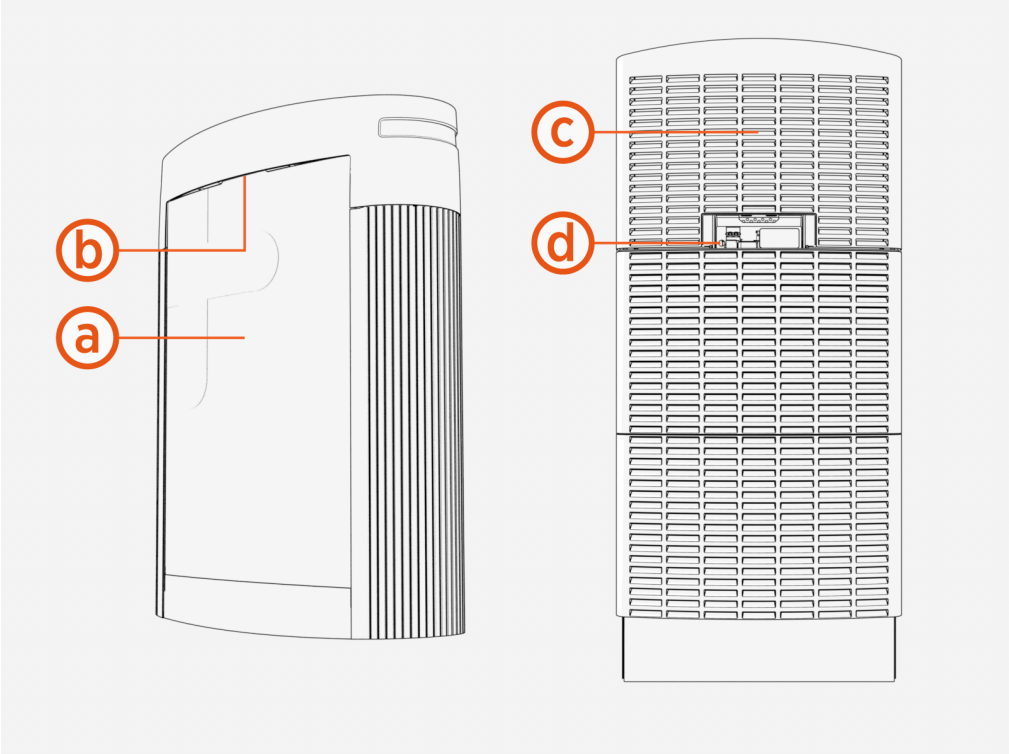
- To ensure proper ventilation, make sure nothing is blocking each station's exterior vents, including any snow buildup (remove if present).
- Regularly clean each station's exterior with a damp and lint-free cloth to prevent the accumulation of debris, dust, or dirt. Perform this maintenance more frequently in high pollution environments.

⚠ **CAUTION:** Do not pressure wash the station. Water pressure can damage the station.

- Check each station (including the charging cable and connector) monthly for vandalism and any signs of wear or damage.

Preventive Maintenance

ChargePoint, or a ChargePoint-certified technician, should perform maintenance checks at the intervals listed below.



Part	Every		Action C = Check, R = Replace
	1 year	5 year	
(a) Vinyls	C		Check if these are vandalized, faded, or peeling off.
(b) Area light	C		Check if it is functioning.
(c) Airflow vents	C		Check for the accumulation of debris, dust, or dirt.
(d) Status lights	C		Check for proper functioning (see Status Lights)
Fans	C		Check for the accumulation of dust.
Mounting anchors		C	Check for the correct torque.
Bus bar lug nuts		C	

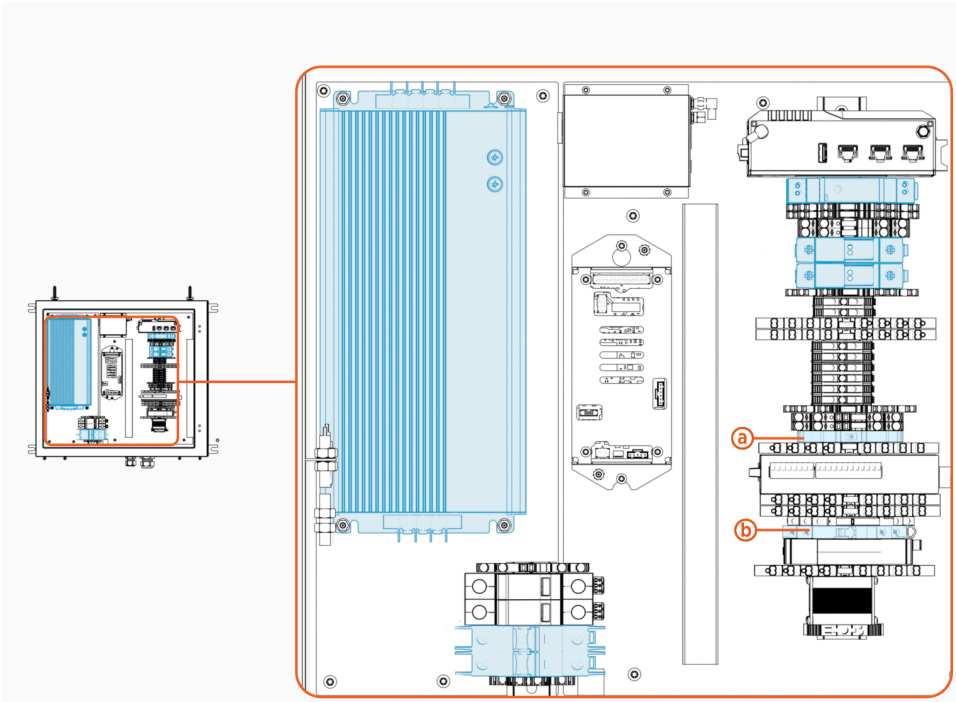
NOTE: Refer to the *Pantograph Down 2000 Service Guide* to locate the parts and their service instructions.

Pantograph Manual Operation

The pantograph may be manually extended or retracted for maintenance purposes.

WARNING: The area beneath and around the Pantograph must be clear during manual operation. No person is allowed around the Pantograph during manual operation. Foreign material, including a bus, may not touch the Pantograph during manual operation. No foreign material may protrude into the extension/retraction area of the pantograph.

Manual operation of the Pantograph is done using a toggle switch and (in some cases) a power override circuit breaker within the PD Controller.



a. Manual operation toggle switch
b. Power override circuit breaker

NOTE: The PD Controller must be powered on a minimum of five minutes before the Pantograph can be operated manually.

To extend or retract the Pantograph, toggle the manual operation switch as follows:

Toggle Switch Direction	Manual Operation of Pantograph
Left	Extend the Pantograph
Right	Retract the Pantograph
Center	Exit manual operation mode, enable normal operating mode

IMPORTANT: Ensure the toggle switch is returned to the center position when done with manual operation.

If the Pantograph Down 2000 is not powered or is rebooting, the PD Controller will not be powered in the normal operating mode. To override this for manual Pantograph operation, switch the power override circuit breaker to the ON position and allow approximately five minutes for the PD Controller to power on. Then use the manual operation toggle switch to raise or lower the Pantograph as described above.

IMPORTANT: The power override circuit breaker must be switched back to the OFF position in order for the system to be able to operate normally.

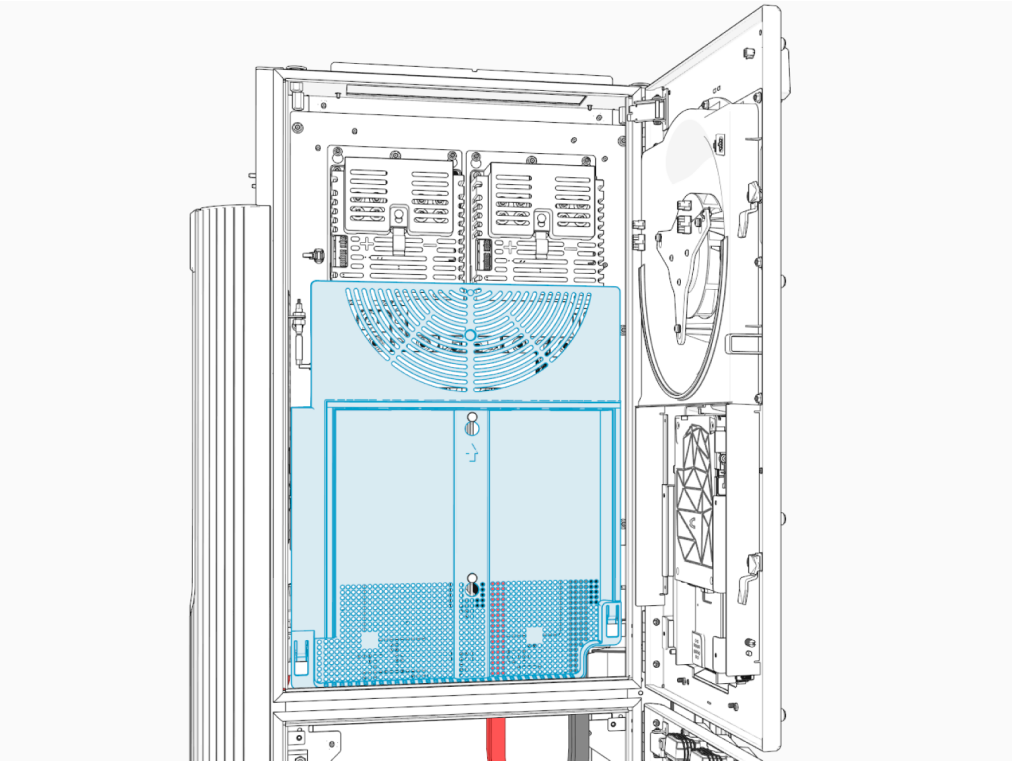
Power Link 2000 Troubleshooting 4

This section is aimed to help Industrial Support Engineers, field technicians, and the Commissioning team in identifying problems and performing initial debug of the problems related to Power Link 2000.

The troubleshooting steps for the following components' faults are included in this section:

- Ethernet switch (SSLAN)
- Control and Communication Module (UCB)
- Metering, distribution, and safety board (MDS)
- Smart cable (SEVB)
- Contactor switch (Proton)
- Power Link 2000 controller
- Cooling controller board (CCB)
- Cable (SEVB)

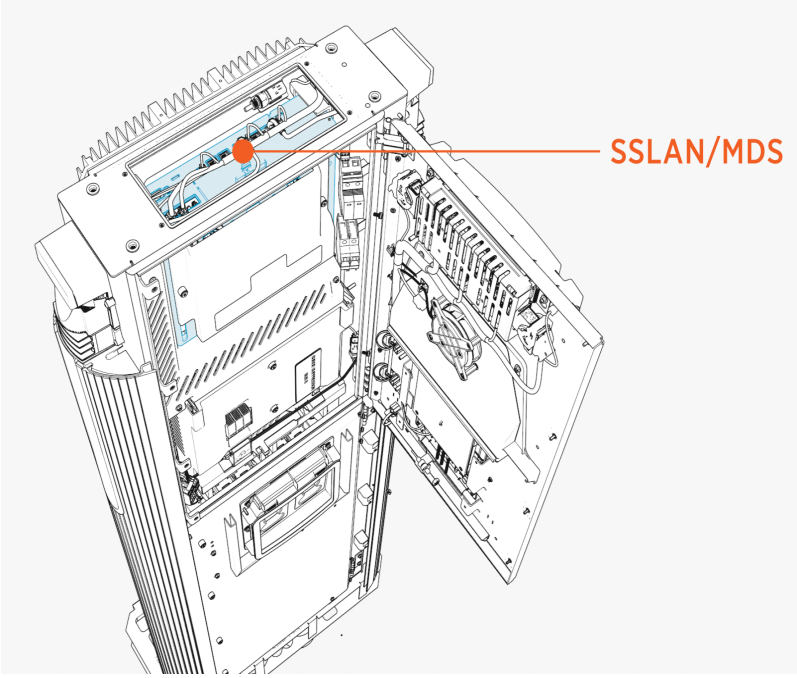
Inside view of Power Link 2000



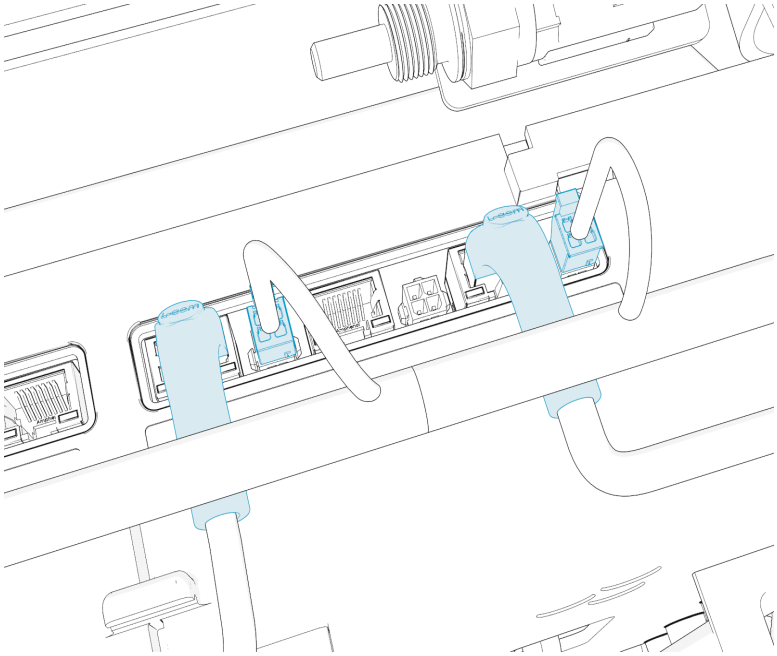
SSLAN Faults Board Location

The following illustrations provide SSLAN faults board location:

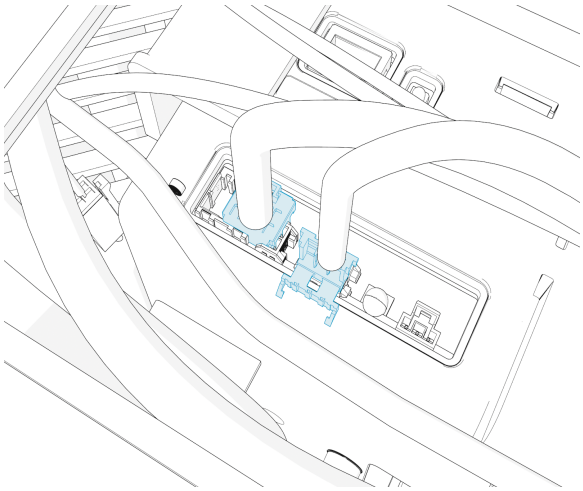
Top View



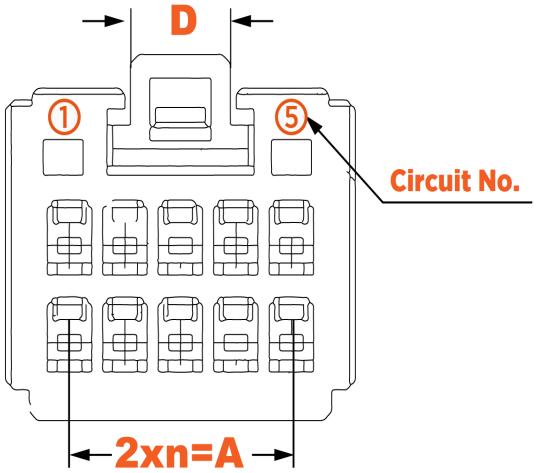
Side View



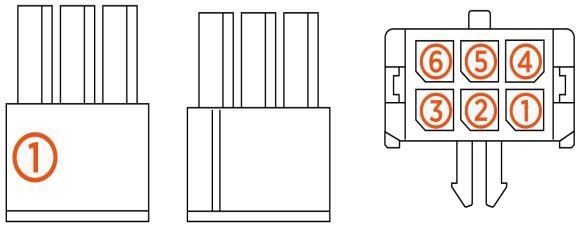
Other Side View



P223-07



P223-02



SSLAN Faults

SSLAN: SEVB_SUPPLY_1_FAULT

Category	Fault Source	Fault Type	Criticality
SEVB Power	SSLAN	Hardware	Critical

Fault Description

This fault is declared when the load switch 1 on SSLAN detects an overcurrent event. This load switch is feeding the SEVB, so the SEVB/output cable will be locked out upon this fault.

Possible Causes

- Short in the harness
- SSLAN failure

Troubleshooting

1. Measure continuity between:
    a. Pin 3 on P238-17 (upper side of MDS) to Pin 3 on P232B-06 (right SEVB).
    b. Pin 4 on P238-17 (upper side of MDS) to Pin 4 on P232B-06 (right SEVB).
2. If the continuity tests fail, then the issue is with the harness and needs replacement. If the harness looks good then SSLAN circuitry failure is possible. Replace MDS box.
3. If the issue persists, then reach out to ChargePoint.

SSLAN: SEVB_SUPPLY_2_FAULT

Category	Fault Source	Fault Type	Criticality
SEVB Power	SSLAN	Hardware	Critical

Fault Description

This fault is declared when load switch 1 on SSLAN detects an overcurrent event. This load switch is feeding the SEVB, so the SEVB/output cable will be locked out upon this fault.

Possible Causes

- Short in the harness
- SSLAN failure

Troubleshooting

1. Measure continuity between:
    a. Pin 3 on P238-18 (upper side of MDS) to Pin 3 on P232A-06 (left SEVB).
    b. Pin 4 on P238-18 (upper side of MDS) to Pin 4 on P232A-06 (left SEVB).
2. If the continuity tests fail, then issue is with the harness and needs replacement. If harness looks good then, see Step 3.
3. SSLAN circuitry failure is possible. Replace MDS box.
4. If the issue persists, then reach out to ChargePoint.

SSLAN: BOARD_TEMPERATURE_WARNING

Category	Fault Source	Fault Type	Criticality
SEVB board	SSLAN	Hardware	Minor

Fault Description

This fault is declared when temperature sensors on SSLAN board goes over 90 °C. The fault clears once the temperature goes below 90 °C.

Troubleshooting

1. No action needs to be taken on this failure. Fault is generated and if temperature goes above 100 °C, then the SSLAN_BOARD_TEMPERATURE_FAULT is generated.

SSLAN:BOARD_TEMPERATURE FAULT

Category	Fault Source	Fault Type	Criticality
SEVB board	SSLAN	Hardware	Critical

Fault Description

This fault is declared when temperature sensors on SSLAN board goes over 100 °C.

Possible Causes

- SSLAN failure

Troubleshooting

1. Replace MDS to resolve the issue.
2. Contact ChargePoint if the issue persists..

UCB: SSLAN_COMMS_FAILURE

Category	Fault Source	Fault Type	Criticality
SSLAN Communication	SSLAN	Hardware/Software	Critical

Fault Description

The fault is generated when we lose communication with SSLAN over ethernet.

Session is ended normally.

If the self-test passes, then Power Link 1000 is allowed to operate normally. If the fault is seen thrice within 24 hours, then the system is locked for a service.

Possible Causes

- Board stuck in unknown boot/SW state
- SSLAN failure

Troubleshooting

1. Try power cycle of the Power Link 1000 - can be a 48 V EXT cycling.
2. If the issue persists after power cycle, the issue could be with SSLAN board. Replace the MDS box to fix the issue.
3. Contact ChargePoint for further debugging on the issue persisting over MDS replacement.

UCB:SSLAN_FW/CHECKSUM_FAILURE

Category	Fault Source	Fault Type	Criticality
SSLAN FW	SSLAN	Hardware/Software	Critical

Fault Description

This fault is shown if SSLAN has an unexpected firmware on it and the fault persists until board swap or firmware update.

Power Link 1000 is locked out if the issue is seen after power cycle and calls for service.

Possible Causes

- Software not updated on system
- Bad FRU if seen on replacement
- Board failure

Troubleshooting

1. Check the software on the system and confirm if it is the latest released version.
2. If software) is correct, check if the fault is seen after a recent FRU replacement (MDS). It is possible the SSLAN/MDS FRU did not pass the Factory test and somehow got released to the field. Reach out to ChargePoint/Factory team to confirm this.
3. If none of the above is true, then try power cycle and clear any unknown state the board is stuck in. If there were disruptions noted during software update, maybe the board froze.
4. Contact ChargePoint for further debugging on the issue and possible MDS replacement and other software) debugging, if any.

UCB: SSLAN_SELFTEST_FAILURE

Category	Fault Source	Fault Type	Criticality
SSLAN	SSLAN	Hardware/Software	Critical

Fault Description

This fault is shown when SSLAN fails the self-test. Power Link 1000 is locked out and needs service/tech visit to bring it back to operation.

Possible Causes

- Software not updated on system
- Bad FRU if seen on replacement
- Board failure

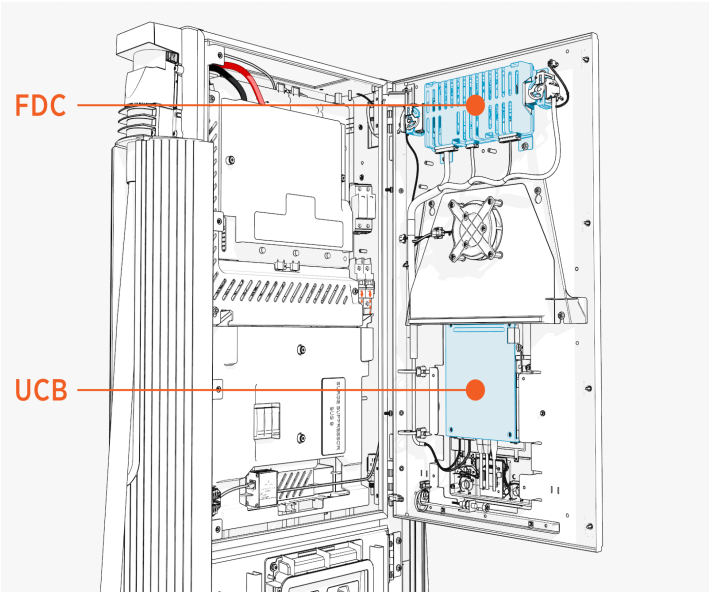
Troubleshooting

1. Check the software on the system and confirm if it is the latest released version.
2. If software is correct, check if the fault is seen after a recent FRU replacement (MDS). It is possible the SSLAN/MDS FRU did not pass the factory test and somehow got released to the field. Reach out to ChargePoint/Factory team to confirm this.
3. If none of the above is true, then try power cycle and clear any unknown state the board is stuck in. If there were disruptions noted during the software update, maybe the board froze.
4. Check the connections if the fault shown during self-test is hardware related. Reach out to ChargePoint for further assistance.

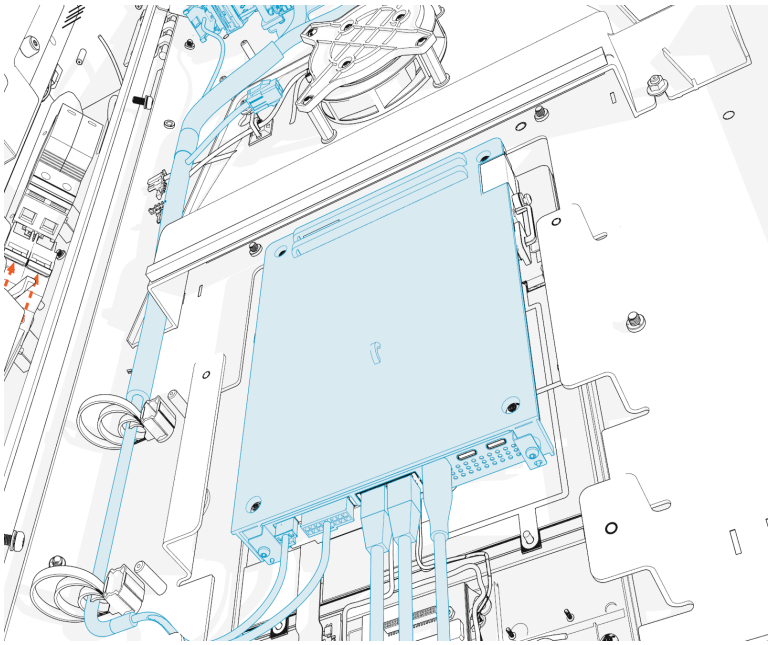
UCB Faults Board Location

The following illustrations provide UCB faults board location:

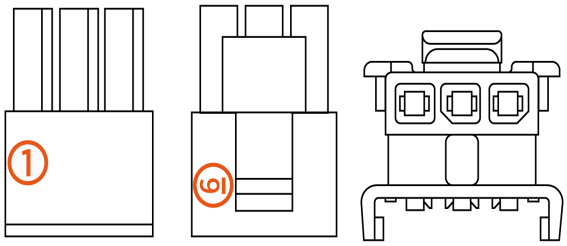
Front View



Inside View



UCB-P197-02



UCB Faults

urn:fault:ucb:48 V_logic_supply_out_of_range

Category	Fault Source	Fault Type	Criticality
UCB Power	UCB	Hardware/Software	Critical

Fault Description

Incoming 48 V to UCB is not within acceptable range (+ or -5 V). The system is locked out until service and only an advanced user can enable it.

Possible Causes

- UCB in unexpected state
- Harness issue
- UCB failure
- Incoming 480 V fluctuation
- AUXPS failure

Troubleshooting

1. Power cycle the system to clear UCB of any unexpected states.
2. Confirm if 48 V is coming on Pin 3 and Pin 1 on P197-02 connector going to UCB. If yes, then the issue might be with UCB. Replace UCB to resolve the issue. If 48 V is not seen, then proceed to the next step:
3. Confirm if there is no intermittent shorts or breaks in the harness. Disconnect the connector P249-02 on FDC prior to this test.
    - Measure continuity between Pin 3 and Pin 1 on connector P197-02 going to UCB. If there is a short detected between these pins, then harness replacement is needed.
    - Measure continuity between Pin 3 on P197-02 (on UCB) connector and Pin A1 on P249-02 connector (on FDC). Also, between Pin 1 on P197-02 connector (on UCB) and Pin B1 on P249-02 connector (on FDC). If there is a break in the harness, then harness replacement is needed.
4. Possible incoming power issue causing AUXPS 48 V to fluctuate. Confirm if 48 V incoming power is in the correct range. If not, then fix the incoming power source. If not, then there might be some AUXPS circuitry failure or a component is not within the tolerance range. Replace AUXPS if this fault is constantly seen.

urn:fault:ucb:holster-comms-failure

Category	Fault Source	Fault Type	Criticality
Holster	UCB	Hardware/Software	Warning

Fault Description

This fault is declared if locking holster loses CAN communication. Warning message is sent to UCB and system is allowed to operate normally.

Possible Causes

- CAN harness issue
- Intermittent noise/packet loss

Troubleshooting

1. Power cycle if issue persists.
2. Contact ChargePoint if unable to resolve with power cycle.

urn:fault:ucb:holster-fw/checksum-failure

Category	Fault Source	Fault Type	Criticality
Holster	UCB	Software	Warning

Fault Description

This fault is declared if Power Link 1000 holster firmware version and checksum does not match expected version after 2 attempts to reflash.

Ideally seen during new install or when software is updated on the system.

Possible Causes

- Bad FDC firmware flash at factory
- Interruption during software update
- Board firmware getting corrupted

Troubleshooting

1. If the UCB board had an issue during Finalizer step, then it is possible it is pushing a bad image on holster board, so login to chassis-shell and confirm if holster is reading correct firmware version.
2. If above is true, then try to flash the UCB again and push firmware manually.
3. If this happened during software update in the field, try to power cycle and see if it recovers.
4. If power cycle does not help, then replace the holster board.

urn:fault:ucb:self-test-failed

Category	Fault Source	Fault Type	Criticality
UCB Board	UCB	Hardware, Software	Critical

Fault Description

This fault is shown when UCB fails the self-test. Power Link 1000 is locked out and needs service/tech visit to bring it back to operation.

Possible Causes

- Software not updated on system
- Bad FRU (if seen on replacement)
- Board failure

Troubleshooting

1. Check the software on the system and confirm if it is the latest released version.
2. If the software is correct, check if the fault is seen after a recent FRU replacement (MDS). It is possible the UCB FRU did not pass Factory test and somehow got released to the field. Reach out to ChargePoint to confirm this.
3. If none of the above is true, then try power cycle and clear any unknown state the board is stuck in. If there were disruptions noted during software update, maybe the board froze.
4. Check the connections if the fault shown during self-test is hardware related. Reach out to ChargePoint for further assistance.

urn:fault:ucb:board-temperature-warning

Category	Fault Source	Fault Type	Criticality
UCB Board	UCB	Hardware	Warning

Fault Description

This warning is shown when UCB board temperature is higher than 80 °C for 10 seconds. The fault is cleared when board temperature goes below 80 °C for 10 seconds.

The system is allowed to operate normally and no action is taken.

Possible Causes

None

Troubleshooting

1. No action needed.

urn:fault:ucb:cpu-temperature-warning

Category	Fault Source	Fault Type	Criticality
UCB Board	UCB	Hardware	Critical

Fault Description

This fault is shown when UCB board temperature is higher than 90 °C for 10 seconds. The fault is cleared when board temperature goes below 90 °C for 10 seconds.

Any ongoing session is stopped normally and system enters 30 minutes cool down period. Power Link 1000 will remain unavailable until cool down period and passing self-test after that. If this repeats 3 times in 24 hours, then Power Link 1000 is locked out for service.

Possible Causes

- Temperature sensor failure on the board

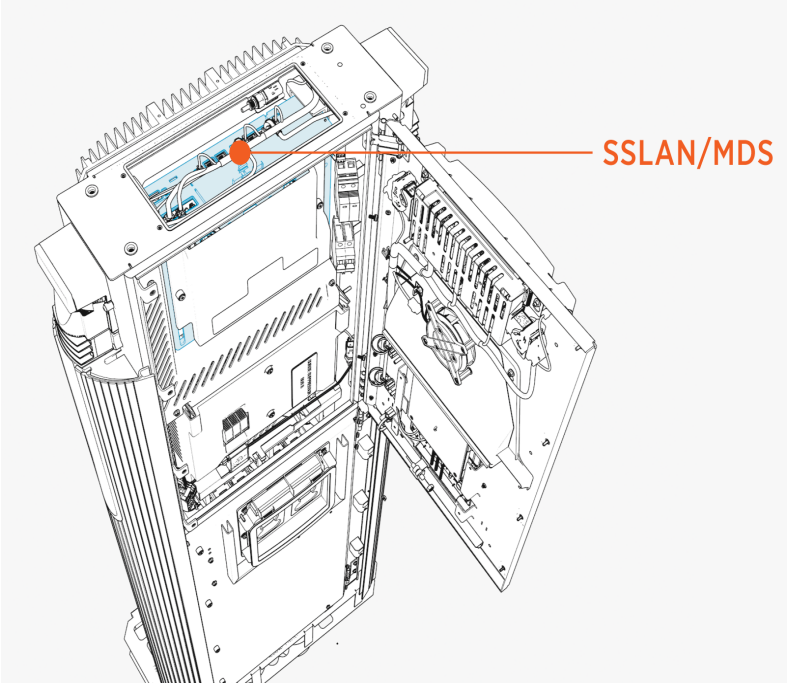
Troubleshooting

1. Possible failure on the board. Replace the UCB and resolve the issue.
2. Contact ChargePoint if the issue persists after UCB swap.

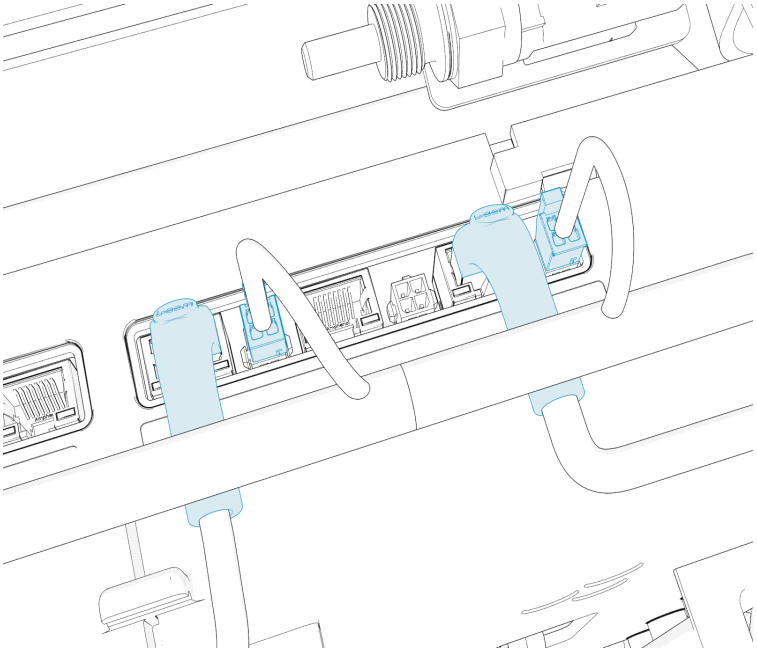
MDS Faults Board Location

The following illustrations provide MDS faults board location:

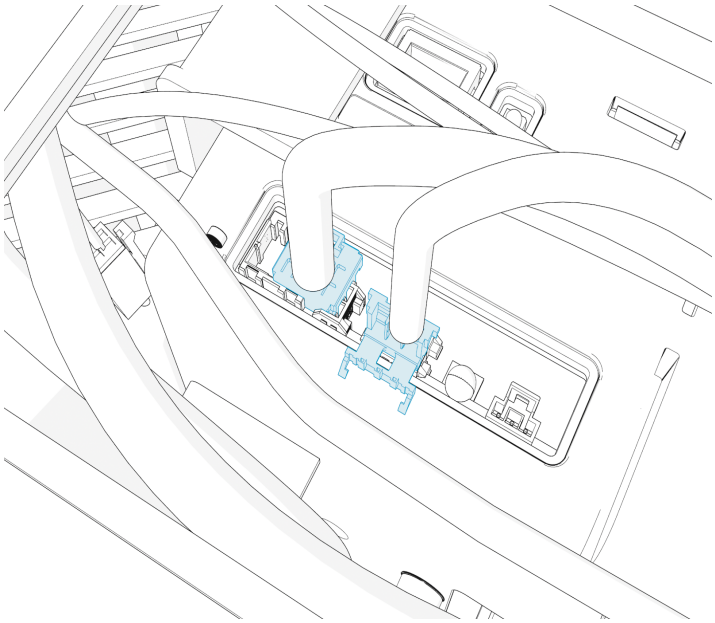
Top View



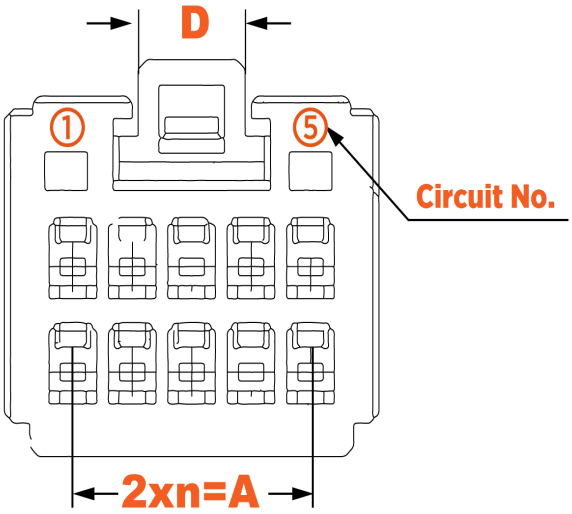
Side View



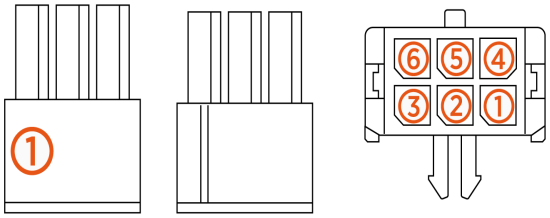
Other Side View



P223-07



P223-02



MDS Faults

urn:fault:ucb:isomon-comms-failure

Category	Fault Source	Fault Type	Criticality
Isomon board	MDS	Hardware	Critical

Fault Description

Fault is described if UCB loses CAN Comms with MDS box for more than 10 seconds. If a session is active, then it is stopped and system is not available until the fault is cleared. If the fault is seen thrice in 24 hours, then the unit is locked for service.

Possible Causes

- Issue with CAN harness
- Isomon board (MDS box)

Troubleshooting

1. Confirm if the harness carrying CAN communication between MDS and UCB is seated correctly on both ends. P223-07 on MDS and P197-08 on UCB.
2. If both are seated correctly, then measure if there is a break in the CANH and CANL wire. Measure continuity on the following pins:
    a. Pin 6 (CANH) on P223-07 (going to MDS)
    b. Pin 2 on P197-08 (going to UCB)
    c. Pin 7 (CANL) on P223-07
    d. Pin 3 on P197-08

    This checks if there is a break in CAN harness going from MDS to UCB.
3. Check if there is short between CANH and CANL. Measure resistance between Pin 6 and Pin 7 of P223-07 going to MDS.

4. If no harness issues are found, then replace the MDS box to resolve the issue.
5. If the issue persists after MDS replacement, then contact ChargePoint for further debugging.

urn:fault:ucb:isomon-fw/checksum-failure

Category	Fault Source	Fault Type	Criticality
Isomon board FW	MDS	FW	Critical

Fault Description

This fault is declared if ISOMON (MDS) firmware version and checksum does not match expected version after 2 attempts to reflash.

Ideally seen during new install or when software is updated on the system. However if this is seen during an ongoing session, then session is immediately terminated and Power Link 1000 is locked out of service.

Possible Causes

- Bad FDC firmware flash at factory
- Interruption during software update
- Board firmware getting corrupted

Troubleshooting

1. If the UCB board had an issue during Finalizer step, then it is possible it is pushing a bad isomon firmware, so login to chassis-shell and confirm if isomon is reading correct firmware version.
2. If above is true, then try to flash the UCB again to see if it pushes isomon firmware to recover.
3. If this happened during software update in the field, try to power cycle and see if it recovers.
4. If power cycle does not help, then replace the MDS.

urn:fault:isomon:board-temperature-warning

Category	Fault Source	Fault Type	Criticality
Isomon board	MDS	Hardware/Software	Major

Fault Description

MDS declared this fault when isomon board temperature is reported >100 °C for 10 s.

The fault clears if temperature is below the threshold for more than 60 s.

Possible Causes

- MDS board in unexpected state
- Failure on the board

Troubleshooting

1. No action needed on over temperature warning.

urn:fault:isomonboard-overtemperature-shutdown

Category	Fault Source	Fault Type	Criticality
Isomon board	MDS	Hardware/Software	Critical

Fault Description

MDS declared this fault when isomon board temperature is reported >115 °C for 10 s.

The fault clears if temperature is below the threshold for more than 60 s.

Possible Causes

- MDS board in unexpected state
- Failure on the board

Troubleshooting

1. Power cycle the system to clear any stuck faults on the board. Confirm if the temperature readings go to normal.
2. If not, replace the MDS box to resolve the issue.
3. Contact ChargePoint if the issue persists after MDS replacement.

urn:fault:loss-of-isolation

Category	Fault Source	Fault Type	Criticality
Isolation Loss	MDS	Hardware	Emergency

Fault Description

Isolation fault is triggered when isolation resistance between DC+/DC- and GND goes below 100 kΩ for more than 8 seconds (sampling time 2 seconds).

The fault clears if isolation resistance goes above the threshold value for 10 seconds.

If fault during ongoing session, then the session is stopped immediately and MDS & DC contactors are opened.

Unit locked out if this fault is seen thrice in 24 hours. If the controller shutdown does not happen within 10 seconds, then MDS relays are forced open and PL is locked out for investigation.

Snapshot of critical parameters are saved on PBC for debugging.

Possible Causes

- Loss of isolation
- Isomon board failure

Troubleshooting

1. Confirm if there is any short between bus bars and GND. Measure resistance between DC+ to GND and DC- to GND. If short is located, then take appropriate actions to fix the issue.
2. If there is no short located between various points, then it could be a failed isomon board. Replace MDS box to fix the issue.
3. Contact ChargePoint for further debugging.

urn:fault:mds-relay-abnormal-open

Category	Fault Source	Fault Type	Criticality
Relay	MDS	Hardware	Critical

Fault Description

This fault is triggered when MDS relays open under higher load current (>200 A and <300 A).

Isomon board clears the fault if there is no welded relays detected at the start of next session.

If there are 100 of these abnormal openings noted in a unit, then the system is locked out for service for futher investigation.

Snapshot of critical parameters are saved on PBC for debugging.

Possible Causes

- Vehicle side issue
- MDS contactor failure
- Isomon failure

Troubleshooting

1. Check if this happened in the middle of the session or at the end of the session.
2. If at the end of the session, then it could be the EV opening its contactor under load after it reached max. SOC. Reach out to engineering with logs and pcap files.
3. If this happened at the middle of the session, the issue could be either EV or EVSE. Reach out to ChargePoint with logs and pcaps for further debugging.

urn:fault:mds-relay-critical-open

Category	Fault Source	Fault Type	Criticality
Relay	MDS	Hardware	Critical

Fault Description

This fault is triggered when MDS relays open under higher load current (>300 A).

Isomon board clears the fault if there is no welded relays detected at the start of next session.

If welded relay is detected, then Power Link 1000 is locked out for service.

Snapshot of critical parameters are saved on PBC for debugging.

Possible Causes

- Vehicle side issue
- MDS contactor failure
- Isomon failure

Troubleshooting

1. Confirm if the EV being charged is opening its contactor under load triggering MDS contactor to open at high current. Check if it is an issue with EV by trying sessions on other Power Link 1000 and other EVs on this Power Link 1000.
2. If issue is seen with multiple vehicles, then issue might be with MDS contactors or isomon board. Replace MDS box to fix the issue.
3. Contact ChargePoint if the issue persists.

urn:fault:mds-relay-welded

Category	Fault Source	Fault Type	Criticality
Relay	MDS	Hardware	Critical

Fault Description

This fault is triggered when MDS relays are welded stuck. The isomon board is monitoring the auxilliary contacts in the MDS contactor to determine if the contactors are welded.

Isomon board tries to clear the fault, but if it cannot then the system is locked out for service.

Possible Causes

- Vehicle side issue
- MDS contactor failure
- Isomon failure

Troubleshooting

1. Check if the contactor is indeed welded shut. Measure resistance across the MDS contactor on the bus bars (on the MDS).
2. If a short is detected when they are supposed to be open, then replace the MDS box to replace the issue.
3. Contact ChargePoint if the issue persists.

urn:fault:mds-thermal-switch-open

Category	Fault Source	Fault Type	Criticality
Thermal Switch	MDS	Hardware	Emergency

Fault Description

This fault is triggered when thermal switch inside MDS reads OPEN for 100 ms. The fault clears if the switch reads good reading for 10 seconds.

If a session is going on at the time of this fault, then the session is stopped normally. The system is derated to 50% of max. available power for the next session.

If the fault is seen thrice in 24 hours, then the unit is locked out for service.

Possible Causes

- Actual thermal event
- MDS thermal switch failure

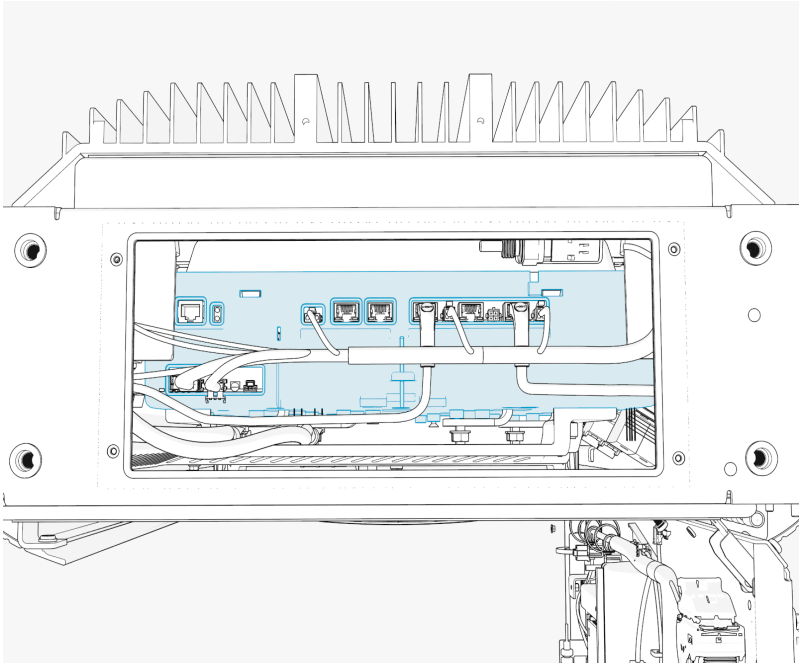
Troubleshooting

1. Replace MDS to resolve the issue.
2. Contact ChargePoint if the issue persists after MDS replacement.

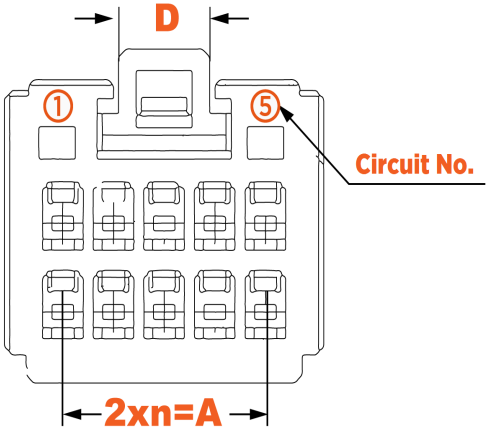
SEVB Faults Board Location

The following illustration provides SEVB faults board location:

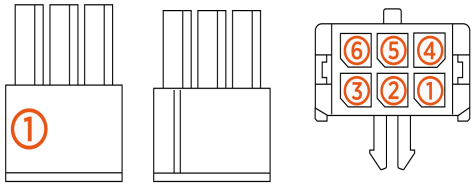
Top View



P223-07



P223-02



SEVB Faults

urn:fault:sevb:comms-failure

Category	Fault Source	Fault Type	Criticality
SEVB Communication	SEVB	Hardware/Software	Critical

Fault Description

This fault is declared when UCB loses communication with SEVB for 5 s.

Any ongoing session is stopped on encountering this fault. Power Link is allowed to operate once communication is reestablished.

3 such events in 24 hours will disable and lock the station.

Possible Causes

- Software issue
- Incorrect connection on SEVB/SSLAN
- Ethernet cable damage
- SEVB failure
- SSLAN failure

Troubleshooting

1. Confirm if the issue started happening after a software update. If yes, revert back to old software and confirm if the issue is resolved. If not, continue with next steps.
2. If this is a new install, confirm the connections between SSLAN and SEVB are correct. Check if the connectors P238-17 along with its ethernet cable are seated on the right most slot on the SSLAN. Check if the P238-18 and its ethernet cable are seated to the left most slot. Confirm that the middle slot is left empty and that the above two are not swapped with each other. Photo added for reference.
3. If the issue persists after the above checks, check if the Ethernet port is damaged on the cable or on the connector. Look for crimping inside the connector, broken locking mechanism, broken connector tab for any damage.

4. Check if the SEVB is losing power occasionally leading to SEVB comms loss. This could be issue with SSLAN board and could use MDS replacement if confirmed. Check logs to confirm the same and reach out to engineering prior to replacement.
5. Replace SEVC if SEVB comms issue continues after the above steps.
6. Replace UCB if comms failure persists after SEVC replacement.
7. Contact ChargePoint if the issue is seen after the UCB replacement.

urn:fault:sevb:invalid-cable-detected

Category	Fault Source	Fault Type	Criticality
Charging cable	SEVB	Hardware/Software	Critical

Fault Description

This fault is declared when SEVB is unable to be detected after a replacement or during new install.

The system won't be able to get into useful state with this fault being active.

Possible Causes

- Software Issue
- SEVB failure

Troubleshooting

1. Confirm if the issue started after a recent Cable Swap or during activation of a newly installed unit. If yes, confirm through chassis-shell if we are able to correctly read SEVB information (in SEVC node). If not, it is possible that provisioning of the SEVB was done correctly. Re-provision SEVB. Contact Engineering for steps.
2. Confirm if the issue started after a software update. If yes, then possibly the configuration files might not have loaded correctly, reflash the software and see if it resolves the issue.
3. If both steps do not resolve the issue, then replace the SEVC.
4. Contact ChargePoint if issue persists after SEVC swap.

urn:fault:sevb:plug-out-detected

Category	Fault Source	Fault Type	Criticality
Charging cable	SEVC	Hardware	Critical

Fault Description

This fault is seen when a plug out is detected in the middle of an ongoing session.

Possible Causes

- Software/Firmware change
- EV side issue
- Damage on the connector latch

Troubleshooting

1. Confirm if this fault is seen on every session end. Check if the fault started occurring after a recent software update or hardware change on the system. Reach out to ChargePoint for further debugging.
2. Confirm if this fault started occurring without changes on our system. If yes, then this could be an interop issue. Reach out to ChargePoint for further debugging.

urn:fault:sevb:plc-not-responding

Category	Fault Source	Fault Type	Criticality
SEVB PLC	SEVB	Hardware/Software	Critical

Fault Description

The fault is seen when PLC chip on the SEVB board stops responding. The system will be operational if there is more than one cable in the system. The port with issue will be nonoperational till resolution.

System will be locked out if this fault is seen 3 times within 24 hours.

Possible Causes

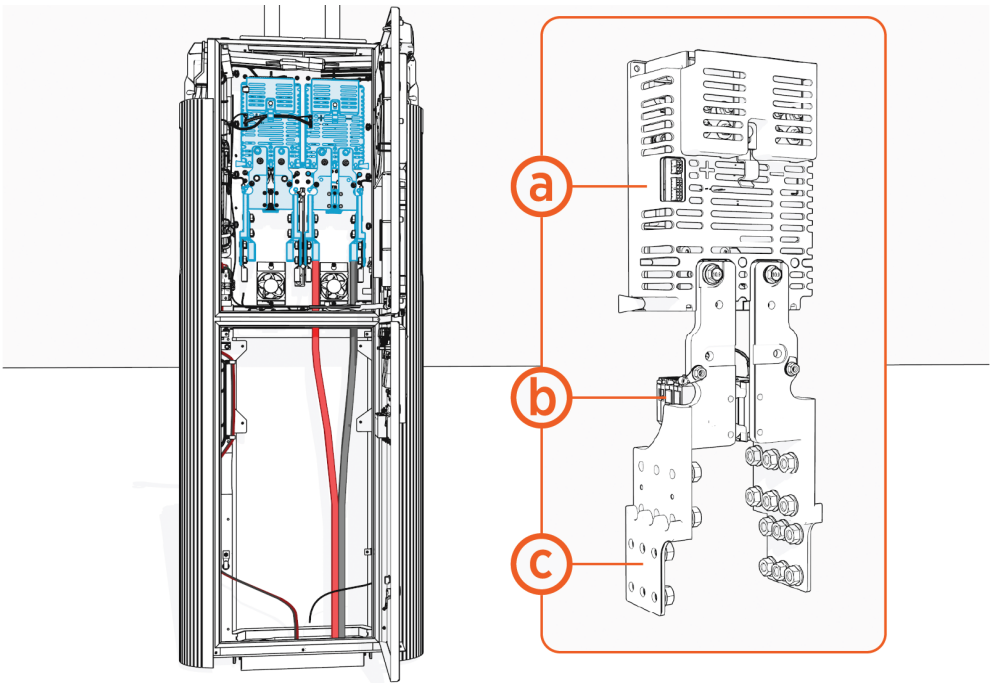
- Software or Firmware issue
- SEVB failure

Troubleshooting

1. Confirm if the issue occurred after a recent bootup, software update, or a hardware change. Power cycle the system to clear any stuck configuration or incomplete software update.
2. Replace SEVC to resolve the issue.
3. Contact ChargePoint if the issue persists after SEVC replacement.

Proton Location

The following illustration provides Proton location:



(a) Contactor switch (proton) module

(b) Surge arrestor

(c) Bus bars (x2)

Proton Faults

urn:fault:proton:primary-proton-isolation-fault

or

urn:fault:proton:optional-proton-isolation-fault

Category	Fault Source	Fault Type	Criticality
Isolation	proton board	Hardware/Software	Emergency

Fault Description

The Proton board monitors the isolation resistance from DC+ to ground and DC- to ground and triggers an isolation fault if the isolation resistance drops below 100 kΩ for 8s. Any ongoing session stops. The fault clears if the isolation resistance goes above 100 kΩ for 10s. If this fault is seen three times in 24 hours, the Power Link 2000 will be disabled and locked out for further investigation.

Possible Causes

- Real Isolation issue.
- Proton board failure.
- Software bug.

Troubleshooting

1. Check if the issue started occurring after a software change on the Power Link 2000. Contact the ChargePoint software team for debugging and troubleshooting steps.
2. Check if this happened after a hardware swap and contact the ChargePoint hardware team for debugging and troubleshooting steps.
3. If the isolation fault was noted without any of the above, follow the steps below:

a. Check if it happened in the middle of the session. If yes, retry the session and see if the issue is resolved. This could be an EV side issue.
b. If the issue persists over multiple session attempts and is independent of the EV, then replace the Proton FRU to resolve the issue.
c. If the issue persists, contact ChargePoint support for further debugging.

urn:fault:proton:primary-proton-contactor-opening

or

urn:fault:proton:optional-proton-contactor-opening

Category	Fault Source	Fault Type	Criticality
Output Contactor	Contactor	Hardware/Software	Critical

Fault Description

The Proton board monitors the DC current as well as Aux witness contact feedback from Proton relays and triggers the fault if the current is >400 A and <450 A. The Proton board clears the fault if, during the start of the next charge session, the relays are not detected to be welded.

Possible Causes

- EV side issue.
- Proton issue.
- Software bug.

Troubleshooting

1. Check if this fault happened at the end of a session. Check the SOC and see if it is near 100%. If yes, then this could be due to the EV opening the output contactor at the end of the session, prior to ramping down the current. Monitor whether this occurs across multiple sessions, and if so, escalate to Engineering for further action and for coordination with the EV manufacturer.
2. If it is happening randomly at various points in the charge cycle, then check if this event started happening after a hardware or software swap. Report to engineering for further steps.
3. If neither, replace the Proton and check if the issue is resolved.
4. Contact engineering if the issue persists after the Proton replacement.

urn:fault:proton:primary-proton-abnormal-opening

or

urn:fault:proton:optional-proton-abnormal-opening

Category	Fault Source	Fault Type	Criticality
Output Contactor	Contactor	Hardware/Software	Critical

Fault Description

The Proton board monitors the DC current as well as Aux witness contact feedback from Proton relays and triggers the fault if the current is >480 A. Power Link 2000 locks out for troubleshooting. The Proton board clears the fault if, during the start of the next charge session, the relays are not detected to be welded.

Possible Causes

- EV side issue.
- Proton issue.
- Software bug.

Troubleshooting

1. Check if this fault happened at the end of a session. Check the SOC and see if it is near 100%. If yes, then this could be due to the EV opening the output contactor at the end of the session, prior to ramping down the current. Observe if this happens on multiple sessions and contact engineering for further steps and to contact the EV manufacturer.
2. If it is happening randomly at various points in the charge cycle, then check if this event started happening after a hardware or software swap. Report to engineering for further steps.
3. If neither, replace the Proton and check if the issue resolves.
4. Contact engineering if the issue persists after the Proton replacement.

urn:fault:proton:primary-proton-welded-contactor

or

urn:fault:proton:optional-proton-welded-contactor

Category	Fault Source	Fault Type	Criticality
Output Contactor	Contactor	Hardware/Software	Critical

Fault Description

This fault triggers when the auxiliary contacts are stuck due to an overcurrent event. Power Link 2000 locks out until the Proton is replaced.

Possible Causes

- EV side issue.
- Proton issue.
- Software bug.

Troubleshooting

1. Replace the Proton to fix the issue.
2. Pull logs and contact engineering if the issue is due to an EV, hardware, or software issue.

urn:fault:proton:primary-proton-ucb-comms-failure

or

urn:fault:proton:optional-proton-ucb-comms-failure

Category	Fault Source	Fault Type	Criticality
CAN Comms	Proton-UCB comms	Hardware/Software	Critical

Fault Description

This fault triggers when UCB loses CAN communication with Proton for 10s. The fault clears when CAN communication is reestablished for 10s. Any ongoing session stops, and Power Link 2000 locks out if the fault is seen three times in 24 hours.

Possible Causes

- Hardware issue.
- Software issue.

Troubleshooting

1. Check if you are able to establish communication with Proton (from UCB) through chassis-shell. If you are able to do so, reboot the cluster and confirm if the issue resolves.
2. If the issue persists, then check if all the connectors are seated on the Proton side. Check for connector P306-15 going to MDS and make sure it is seated correctly. Disconnect the connector and perform a pull test to confirm if the wires are properly sitting in the connector.
3. Locate connector P312-08 on the UCB and make sure it is seated correctly. Also, perform a pull test. Perform continuity tests to make sure there is no break in the harness:
    a. Measure continuity between Pin 2 (CAN_H) on P312-08 and Pin 7 on P306-15.
    b. Measure continuity between Pin 3 (CAN_L) on P312-08 and Pin 8 on P306-15.
    c. Measure continuity between Pin 4 (CAN_GND) on P312-08 and Pin 10 on P306-15.
4. If any break in continuity is located, then reach out to engineering for a harness replacement. If the issue persists after the above continuity tests, then reach out to engineering for further debugging steps.

urn:fault:proton:primary-proton-fw-checksum-failure

or

urn:fault:proton:optional-proton-fw-checksum-failure

Category	Fault Source	Fault Type	Criticality
Board firmware issue	Proton	Hardware/Software	critical

Fault Description

This fault triggers when Proton's firmware version and checksum don’t match the expected version after two attempts to reflash. Proton reboots to force a firmware flash.

Possible Causes

- Hardware issue.
- Software issue.

Troubleshooting

1. Check if this fault happened after a software update. If yes, then try reflashing the software to resolve the issue. If the issue persists, contact engineering for resolution.
2. If the fault randomly shows up and persists after two reboots that are already part of the software, replace the Proton to resolve the issue.
3. Contact engineering if the issue persists after the Proton swap.

urn:fault:proton:primary-proton-board-temp-fault

or

urn:fault:proton:optional-proton-board-temp-fault

Category	Fault Source	Fault Type	Criticality
Board hardware/firmware issue	Proton	Hardware/Software	Critical

Fault Description

This fault triggers when the Proton board temperature exceeds 115 °C for 1s. The fault clears when the temperature drops below 115 °C for 60s. A 30 minute cool-down period is required. Power Link 2000 is allowed to operate after the fault clears and the self-test passes.

Possible Causes

- Hardware issue.
- Software issue.

Troubleshooting

1. Try to cycle power to Proton. Restart chassis-server and check if the fault clears.
2. Check if this fault happened after a software update. If yes, then try reflashing the software to resolve the issue. If the issue persists, replace the Proton to resolve the issue.
3. If the issue persists, contact engineering for further steps.

urn:fault:proton:primary-proton-thermal-switch-fault

or

urn:fault:proton:optional-proton-thermal-switch-fault

Category	Fault Source	Fault Type	Criticality
Thermal switch	Switch or feedback	H	Critical

Fault Description

A thermal switch fault triggers when the proton switch on Proton is reported to be open.

Possible Causes

- Hardware issue.

Troubleshooting

1. Check if there is a break in the feedback wire. Measure the continuity between Pins 9 and 10 on connector P306-14. If there is an optional proton present that is showing the fault, then measure continuity between Pins 11 and 12 on connector P306-14. If it measures open, the thermal switch might have failed. Replace the thermal switch to fix the problem.
2. If it measures a short, contact engineering for further troubleshooting.

urn:fault:proton:primary-proton-charging-voltage-measurement-failure

or

urn:fault:proton:optional-proton-charging-voltage-measurement-failure

Category	Fault Source	Fault Type	Criticality
Proton board	Proton	Hardware/Software	Critical

Fault Description

High voltage DC measurement failure (due to voltage being out of range, or measurement circuit error).

Possible Causes

- Hardware issue.
- Software issue.

Troubleshooting

1. Restart the chassis server and see if the issue resolves. If not, swap the Proton to resolve the issue.
2. If the problem still persists, contact engineering for further steps.

urn:fault:proton:primary-proton-charging-current-measurement-failure

or

urn:fault:proton:optional-proton-charging-current-measurement-failure

Category	Fault Source	Fault Type	Criticality
Proton board	Proton	Hardware/Software	Critical

Fault Description

Charging current measurement failure (due to loss of CAN with LEM or measurement circuit error).

Possible Causes

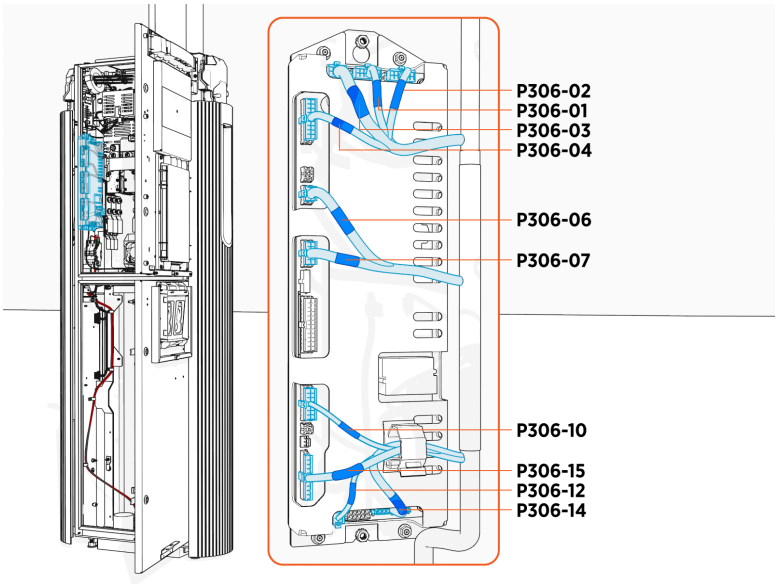
- Hardware issue.
- Software issue.

Troubleshooting

1. Restart the chassis server and see if the issue resolves. If not, swap the Proton to resolve the issue.
2. If the problem still persists, contact engineering for further steps.

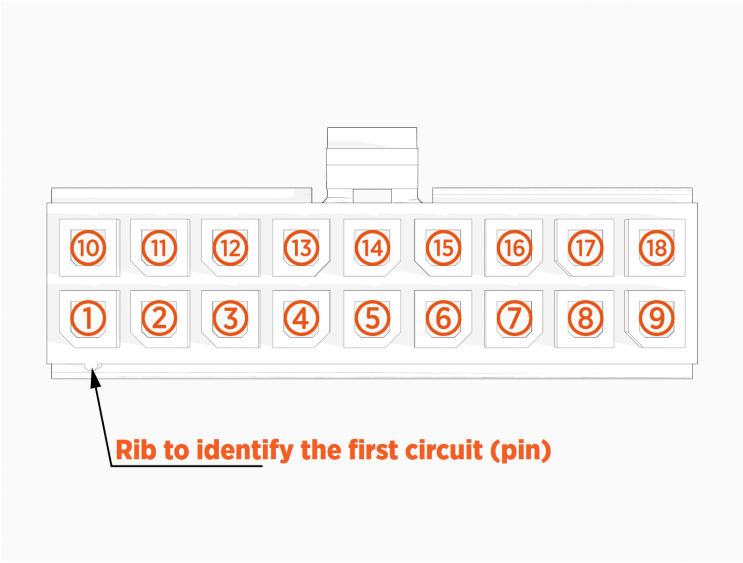
FDC Location

The following illustration provides FDC location for Power Link 2000:

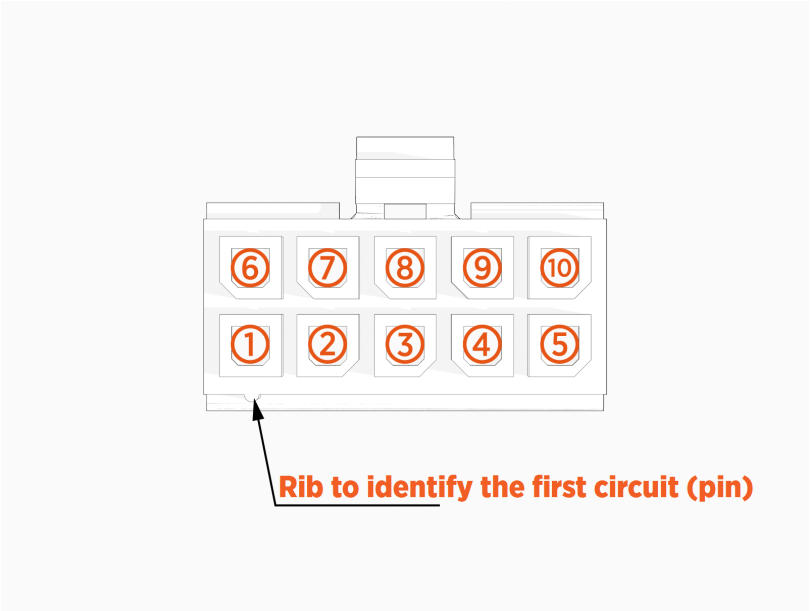


FDC Connectors' Pin Configuration

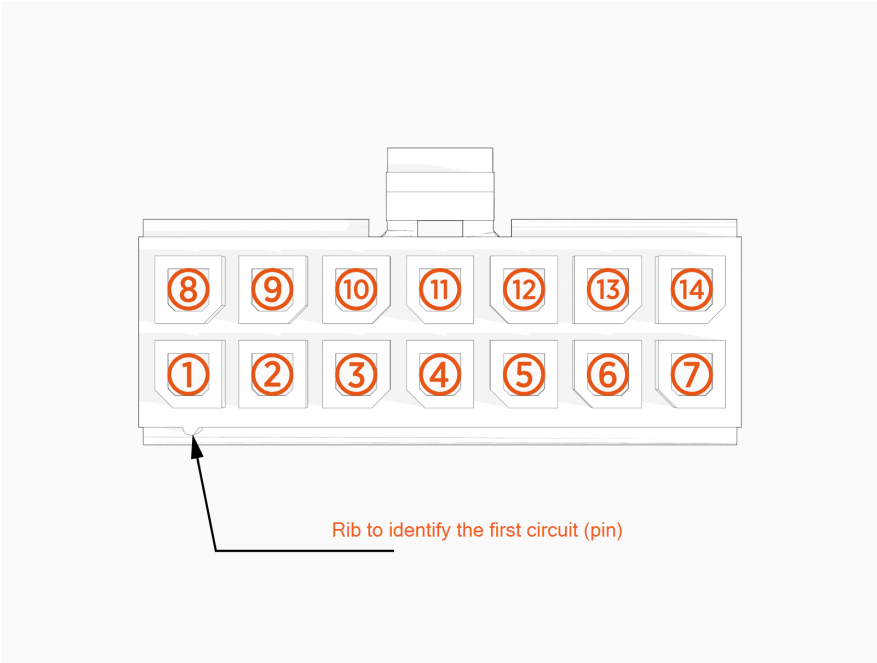
P306-04



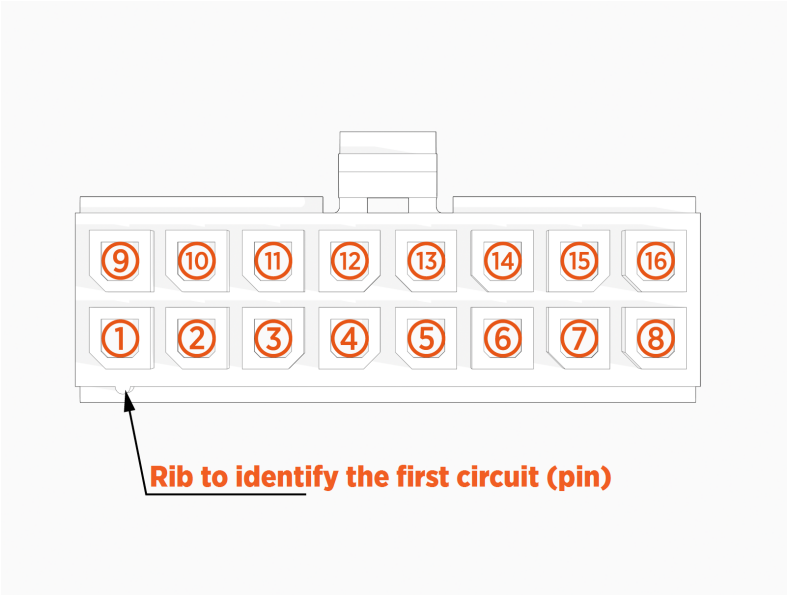
P306-07



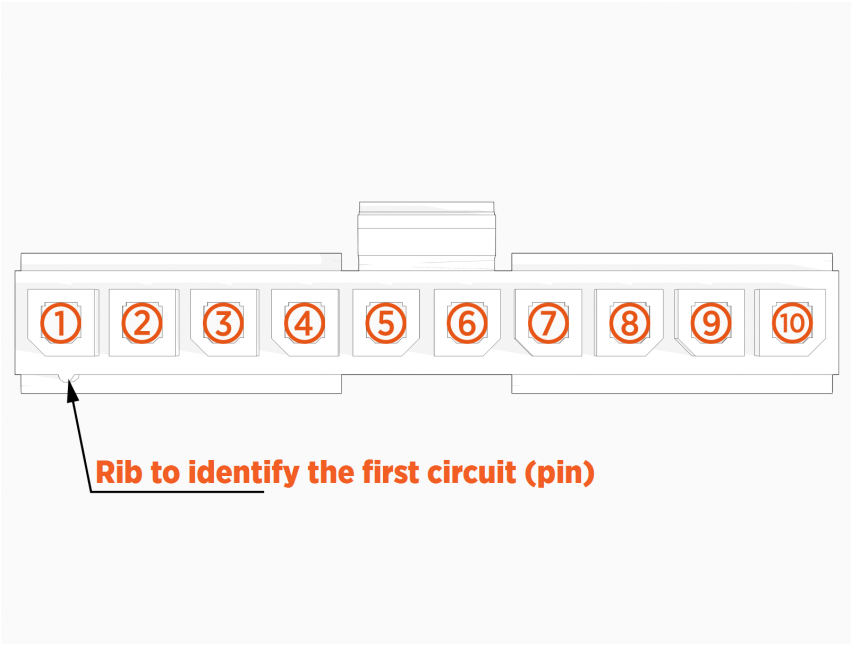
P306-10



P306-14



P306-15



FDC Faults

urn:fault:fdc:loss-comms-with-ucb

Category	Fault Source	Fault Type	Criticality
FDC communication	FDC	Hardware/Software	Emergency

Fault Description

UCB monitors the loss of CAN communications with FDC, monitors the heartbeat signal, and triggers a fault when there is no heartbeat for 5 seconds.

Possible Causes

- Issue with CAN harness (connector, CAN termination, etc.).
- FDC board failure.

Troubleshooting

1. Check if the P306-15 connector that carries CAN signals is seated correctly and locked in. If not, reseat it and confirm if the issue clears.
2. If no connector seating issue is found, then measure continuity between CAN_H (pin 7) and CAN_L (pin 8). Check if there is a short between the CAN H and CAN L lines; if yes, then replace the harness.
3. Confirm if the CAN termination is good; measure resistance across CAN_TERM (pin 4) and CAN_ TERM (pin 5).
4. If no issues are found with the connector and harness, then replace the FDC board due to possible board issues.
5. Contact engineering for further debugging steps.

urn:fault:fdc:checksum-failure

Category	Fault Source	Fault Type	Criticality
FDC Firmware	FDC	Firmware	Critical

Fault Description

This fault triggers when the FDC firmware version and checksum don't match the expected version after two attempts to reflash. Ideally seen during a new install or when software is updated on the system. However, if this is seen during an ongoing session, then the session is immediately terminated and Power Link 2000 is locked out of service.

Possible Causes

- Bad FDC firmware flash at factory.
- Interruption during software update.
- Board firmware getting corrupted.

Troubleshooting

1. If the UCB board had an issue during the finalizer step, then it is possible it is pushing a bad FDC firmware, so login to chassis-shell and confirm if FDC is reading the correct firmware version.
2. If the above is true, then try to flash the UCB again to see if it pushes FDC to recover.
3. If this happened during the software update in the field, try to power cycle it and see if it recovers.
4. If the power cycle does not help, then replace the FDC board.

urn:fault:fdc:vicor-overtemp-shutdown

Category	Fault Source	Fault Type	Criticality
FDC Board	FDC	Hardware/Software	Critical

Fault Description

This warning triggers when one of the modules on the FDC board reports 90 °C for 10s.

The fault occurs when the temperature drops below 100 °C for more than 60s.

Possible Causes

- FDC board failure.

Troubleshooting

No action is required as the system is allowed to operate normally with this warning.

urn:fault:fdc:board-overtemp-shutdown

Category	Fault Source	Fault Type	Criticality
FDC Board	FDC	Hardware	Critical

Fault Description

The fault triggers when one of the modules on the FDC board reports 100 °C for 10s. A 30 minute cooldown period is added after the fault. The fault clears when the temperature drops below 100 °C for more than 60s. Power Link 2000 is locked out if this fault is seen three times within 24 hours. UCB will record critical parameters as part of the snapshot feature.

Possible Causes

- FDC board failure.

Troubleshooting

1. Replace the FDC board if Power Link 2000 is locked out.
2. Contact engineering if replacing the FDC does not resolve the issue.

urn:fault:fdc:top-rtd-overtemp-shutdown

Category	Fault Source	Fault Type	Criticality
PL RTD	FDC	Hardware	Critical

Fault Description

This overtemperature shutdown triggers when the top RTD exceeds 95 °C (<125 °C) for 10s. If the session continues, then it is an emergency. The fault clears when the temperature drops below 95 °C for 60s. Power Link 2000 locks out if the fault appears three times within 24 hours. UCB will record critical parameters as part of the snapshot feature.

Possible Causes

- Issue with the harness.
- Failure of Top RTD (located above MDS - back plane).
- FDC board.

Troubleshooting

1. Check if the wires 1 and 2 on P306-10 are pulled out of the connector with a basic pull test.
2. Measure the resistance across Pins 1 and 2 on connector P306-10 to check if the harness between RTD and FDC is not broken. You will measure 100 Ω if the switch is good. If the switch reads bad, then replace the RTD to resolve the issue.
3. If the issue persists after replacing the switch, confirm that the feedback wire is not broken. Measure continuity across pin 1 (on P306-10), pin 2 (feedback wire on RTD), and continuity across pin 2 (on P306-10) and pin 1 (feedback wire on RTD). If there is a break in the wire, contact engineering for further steps.
4. Once you find the harness is not broken and the switch reads 100 Ω, replace the FDC to resolve the issue.

urn:fault:fdc:top-rtd-shorted

Category	Fault Source	Fault Type	Criticality
PL RTD	FDC	Hardware	Critical

Fault Description

This fault triggers when the Top RTD feedback is detected below -70 °C for 10s.

Possible Causes

- Issue with the harness.
- Failure of Top RTD (located above MDS, back plane).
- FDC board.

Troubleshooting

1. Check if the wires 1 and 2 on P306-10 are pulled out of the connector with a basic pull test.
2. Measure the resistance across Pins 1 and 2 on connector P306-10 to check if the harness between RTD and FDC is not broken. You will measure 100 Ω if the switch is good. If the switch reads bad, then replace the RTD to resolve the issue.
3. If the issue persists after replacing the switch, confirm that the feedback wire is not broken. Measure continuity across pin 1 (on P306-10), pin 2 (feedback wire on RTD), and continuity across pin 2 (on P306-10) and pin 1 (feedback wire on RTD). If there is a break in the wire, contact engineering for further steps.
4. Once you find the harness is not broken and the switch reads 100 Ω, replace the FDC to resolve the issue.

urn:fault:fdc:top-rtd-open

Category	Fault Source	Fault Type	Criticality
PL RTD	FDC	Hardware	Critical

Fault Description

This fault triggers when the Top RTD feedback is detected below 125 °C for 10s.

Possible Causes

- Issue with the harness.
- Failure of Top RTD (located above MDS, back plane).
- FDC board.

Troubleshooting

1. Check if the wires 1 and 2 on P306-10 are pulled out of the connector with a basic pull test.
2. Measure the resistance across Pins 1 and 2 on connector P306-10 to check if the harness between RTD and FDC is not broken. You will measure 100 Ω if the switch is good. If the switch reads bad, then replace the RTD to resolve the issue.
3. If the issue persists after replacing the switch, confirm that the feedback wire is not broken. Measure continuity across pin 1 (on P306-10), pin 2 (feedback wire on RTD), and continuity across pin 2 (on P306-10) and pin 1 (feedback wire on RTD). If there is a break in the wire, contact engineering for further steps.
4. Once you find the harness is not broken and the switch reads 100 Ω, replace the FDC to resolve the issue.

urn:fault:fdc:externalhs-fan-open

Category	Fault Source	Fault Type	Criticality
PL Fan	FDC	-	Critical

Fault Description

This fault triggers when the fan commands more than 30% PWM and fan current drops below 30 mA for 100 ms.

Possible Causes

- Issue with harness.
- Fan failure.
- FDC board.

Troubleshooting

1. Confirm if the connector going to the fan is seated correctly. If not, seat it firmly and check if the fault clears.
2. Check if the wires carrying 48 V are continuous from the FDC connector to the connector at the fan. Measure continuity from Pin 1 on the P306-04 to Pin 2 on the HTSNFN connector, and continuity from Pin 10 on the P306-04 to pin 1 on the HTSNFN connector.
3. If there is no continuity, then find the location of the break and replace the harness accordingly.
4. If no harness issue is found, then there is a possible issue with the fan circuitry internally. Replace the fan to resolve the issue.
5. If the issue persists, then replace the FDC board to resolve the issue.
6. Contact engineering if issue persists.

urn:fault:fdc:primary-proton-fan-open

Category	Fault Source	Fault Type	Criticality
PROTON Fan	FDC	-	Critical

Fault Description

This fault triggers when the fan commands more than 30% PWM and fan current drops below 250 mA for 100 ms.

Possible Causes

- Issue with harness.
- Fan failure.
- FDC board.

Troubleshooting

1. Confirm if the connector going to the fan is seated correctly. If not, seat it firmly and check if the fault clears.
2. Check if the wires carrying 48 V are continuous from the FDC connector to the connector at the fan. Measure continuity from Pin 1 on the P306-04 to Pin 2 on the PROTSTRFAN(P) connector, and continuity from Pin 10 on the P306-04 to pin 1 on the PROTSTRFAN(P) connector.
3. If there is no continuity, then find the location of the break and replace the harness accordingly.
4. If no harness issue is found, then there is a possible issue with the fan circuitry internally. Replace the fan to resolve the issue.
5. If the issue persists, then replace the FDC board to resolve the issue.
6. Contact engineering if issue persists.

urn:fault:fdc:optional-proton-fan-open

Category	Fault Source	Fault Type	Criticality
PL Fan	FDC	-	Critical

Fault Description

This fault triggers when the fan commands more than 30% PWM and fan current drops below 250 mA for 100 ms.

Possible Causes

- Issue with harness.
- Fan failure.
- FDC board.

Troubleshooting

1. Confirm if the connector going to the fan is seated correctly. If not, seat it firmly and check if the fault clears.
2. Check if the wires carrying 48 V are continuous from the FDC connector to the connector at the fan. Measure continuity from Pin 1 on the P306-04 to Pin 2 on the PROTSTRFAN(O) connector, and continuity from Pin 10 on the P306-04 to pin 1 on the PROTSTRFAN(O) connector.
3. If there is no continuity, then find the location of the break and replace the harness accordingly.
4. If no harness issue is found, then there is a possible issue with the fan circuitry internally. Replace the fan to resolve the issue.

5. If the issue persists, then replace the FDC board to resolve the issue.
6. Contact engineering if issue persists.

urn:fault:fdc:stirring-fan-open

Category	Fault Source	Fault Type	Criticality
PL Fan	FDC	-	Critical

Fault Description

This fault triggers when the fan commands more than 30% PWM and fan current drops below 30 mA for 100 ms.

Possible Causes

- Issue with harness.
- Fan failure.
- FDC board.

Troubleshooting

1. Confirm if the connector going to the fan is seated correctly. If not, seat it firmly and check if the fault clears.
2. Check if the wires carrying 48 V are continuous from the FDC connector to the connector at the fan. Measure continuity from Pin 1 on the P306-04 to Pin 2 on the DSTFN connector, and continuity from Pin 10 on the P306-04 to pin 1 on the DSTFN connector.
3. If there is no continuity, then find the location of the break and replace the harness accordingly.
4. If no harness issue is found, then there is a possible issue with the fan circuitry internally. Replace the fan to resolve the issue.
5. If the issue persists, then replace the FDC board to resolve the issue.
6. Contact engineering if issue persists.

urn:fault:fdc:fan-load-switch

Category	Fault Source	Fault Type	Criticality
Fan power	FDC	-	Critical

Fault Description

This fault triggers when the load switch controlling the fan switches off, indicating either an issue with the fan, harness, and/or the FDC board.

Possible Causes

- Issue with harness.
- Fan failure.
- FDC board.

Troubleshooting

Check that there is no short across 48 V and the ground line. Measure continuity across the Pin.

urn:fault:fdc:load-switch-ucb-fault

Category	Fault Source	Fault Type	Criticality
FDC Power	FDC	-	Critical

Fault Description

This fault triggers when the load switch feeding the UCB switches off, indicating either an issue with the UCB, harness, and/or the FDC board.

Possible Causes

- Issue with harness.
- UCB failure.
- FDC board.

Troubleshooting

1. Check that there is no short across 48 V going into UCB. Disconnect P306-07 on the FDC board and P312-02 on the UCB. Measure continuity across Pin 1 and Pin 6 on the P306-07 connector. If there is a short, replace the harness. Contact engineering for further steps.
2. If no short is detected in the harness, replace the UCB to fix the issue.
3. If the issue persists, replace FDC to resolve the problem.
4. Contact engineering if the issue persists after the above steps.

urn:fault:fdc:load-switch-sslan-fault

Category	Fault Source	Fault Type	Criticality
FDC Power	FDC	-	Critical

Fault Description

This fault triggers when the load switch feeding the SSLAN switches off, indicating either an issue with the SSLAN, harness, and/or the FDC board.

Possible Causes

- Issue with harness.
- SSLAN failure.
- FDC board.

Troubleshooting

1. Check that there is no short across 48 V going into UCB. Disconnect P306-07 on the FDC board and P238-20 on the SSLAN. Measure continuity across Pin 1 and Pin 6 on the P306-07 connector. If there is a short, replace the harness. Contact engineering for further steps.
2. If no short is detected in the harness, replace the SSLAN to fix the issue.
3. If the issue persists, replace FDC to resolve the problem.
4. Contact engineering if the issue persists after the above steps.

urn:fault:fdc:Load-Switch-Proton-Fault

Category	Fault Source	Fault Type	Criticality
FDC Power	FDC	-	Critical

Fault Description

This fault triggers when the load switch feeding the Proton switches off, indicating either an issue with the Proton , harness, and/or the FDC board.

Possible Causes

- Issue with harness.
- PROTON failure.
- FDC board.

Troubleshooting

1. Check that there is no short across 48 V going into UCB. Disconnect P306-07 on the FDC board and P285-1-02 on the primary Proton (and P285-2-01 on the optional Proton). Measure continuity across Pin 3 and Pin 7 on P306-07 connector. If there is a short, replace the harness. Contact engineering for further steps.
2. If no short is detected in the harness, replace the Proton to fix the issue.
3. If the issue persists, replace FDC to resolve the problem.
4. Contact engineering if the issue persists after the above steps.

urn:fault:fdc:door-open-pedestal

Category	Fault Source	Fault Type	Criticality
PL door	FDC	-	Critical

Fault Description

UCB detects the status of the door switches and triggers a fault if the top door sensor is detected to be open for more than 300 ms.

Possible Causes

- Door is open.
- Reed sensor feedback is compromised.
- Sensor is misaligned with magnet or missing from its position.

Troubleshooting

1. Check if the pedestal door is open.
2. Find the magnet and the sensor on the door. Check the presence of both and ensure that they are aligned with each other when closing the door. They need not touch each other, but as long as they are in the vicinity.
3. Measure the continuity of the feedback wire from Pin 2 on the pedestal reed switch sensor and Pin 3 on P306-14 on the FDC. Also, measure the continuity between Pin 1 on the sensor and Pin 4 on P306-14.
4. If there is no continuity, then the feedback wire or harness is broken.

5. If continuity is good, use an external magnet and place it around the sensor. Check if the sensor feedback on the chassis-shell changes when the magnet is around the sensor. If the feedback changes, then the sensor is bad and needs replacement.

urn:fault:fdc:door-open-main

Category	Fault Source	Fault Type	Criticality
PL door	FDC	-	Critical

Fault Description

UCB detects the status of the door switches and triggers a fault if the top door sensor is detected to be open for more than 300 ms.

Possible Causes

- Door is open.
- Reed sensor feedback is compromised.
- Sensor is misaligned with magnet or missing from its position.

Troubleshooting

1. Check if the main door is open.
2. Find the magnet and the sensor on the door. Check the presence of both and ensure that they are aligned with each other when closing the door. They need not touch each other, but as long as they are in the vicinity.
3. Measure the continuity of the feedback wire from Pin 2 on the main reed switch sensor and Pin 1 on P306-14 on the FDC. Also, measure the continuity between Pin 1 on the sensor and Pin 2 on P306-14.
4. If there is no continuity, then the feedback wire or harness is broken.
5. If continuity is good, use an external magnet and place it around the sensor. Check if the sensor feedback on the chassis-shell changes when the magnet is around the sensor. If the feedback changes, then the sensor is bad and needs replacement.

urn:fault:fdc:DC-Input-Bus-Bar-Thermal-Switch-Primary-Proton

Category	Fault Source	Fault Type	Criticality
PL thermal switch	FDC	-	Critical

Fault Description

This fault triggers when the thermal switch opens, indicating a thermal event. The system locks out for further inspection.

Possible Causes

- Issue with harness.
- Failed thermal switch.
- Actual thermal event.

Troubleshooting

1. Check if other FRUs reported any over temperature faults around the time of this failure. If yes, report it to engineering for further log debugging and possible internal issues with the system.
2. If no other thermal faults are seen, then measure continuity across Pins 9 and 10 on the P306-14 connector going to the FDC. If there is a short measurement, then the switch is good. Continue to the next step. If the continuity test reads open, then the point of failure could be either the harness or the switch. Since this switch is not easily accessible, contact engineering for further steps.
3. Contact engineering after confirming the harness and switch are good.

urn:fault:fdc:DC-Input-Bus-Bar-Thermal-Switch-Optional-Proton

Category	Fault Source	Fault Type	Criticality
PL thermal switch	FDC	-	Critical

Fault Description

This fault triggers when the thermal switch opens, indicating a thermal event. The system locks out for further inspection.

Possible Causes

- Issue with harness.
- Failed thermal switch.
- Actual thermal event.

Troubleshooting

1. Check if other FRUs reported any over temperature faults around the time of this failure. If yes, report it to engineering for further log debugging and possible internal issues with the system.
2. If no other thermal faults are seen, then measure continuity across Pins 11 and 12 on the P306-14 connector going to the FDC. If there is a short measurement, then the switch is good. Continue to the next step. If the continuity test reads open, then the point of failure could be either the harness or the switch. Since this switch is not easily accessible, contact engineering for further steps.
3. Contact engineering after confirming the harness and switch are good.

urn:fault:fdc:acd-thermal-switch-open

The DC landing buses have exceeded the allowable temperature threshold. This fault is generated on a per-port basis and impacts only the affected port.

Category	Fault Source	Fault Type	Criticality
Thermal Switch	Thermal Switch	Hardware	Critical

Possible Causes

- Sensor connection issue
- Over temperature issue

Troubleshooting

For Pantograph Down 2000 overhead-mount Power Link 2000.

1. If fault is present when no current is being delivered in an active charge session, check if the thermal switch is high impedance at the connector 24-003291. If high impedance across the two pins, replace the Bottom-Exit FRU. If low impedance across the two pins, check for continuity from this connector to FDC J13 (pins 6/7 or 8/9). If continuity fails, the wiring harness needs to be fixed/replaced. Otherwise, if the thermal switch is measured as low impedance across 6/7 and 8/9 at the FDC J13 connector and the connector looks good, replace the FDC.
2. If fault is only present when delivering current in an active charge session, validate correct torque values of the conductors landing onto the lug landing. Visually inspect for any abnormalities. Validate that correct lug and conductor materials and sizes are used. If all of this is validated and the fault is still occuring, replace the Bottom-Exit FRU.

For Pantograph Down 2000 mast-mount Power Link 2000.

1. If fault is present when no current is being delivered in an active charge session, check if the thermal switch is high impedance at the connector closest to the field-landed assembly. If either switch is high impedance at idle, replace the thermal switch/assembly. If both are measuring low impedance, check for continuity from the thermal switches to the FDC J13 pins 6/7. If continuity fails, fix/replace the harness. Otherwise, if the thermal switch is measured as low impedance across 6/7 at the FDC J13 connector and the connector looks good, replace the FDC.
2. If fault is only present when delivering current in an active charge session, validate correct torque values of the conductors landing onto the lug landing. Visually inspect for any abnormalities. Validate that correct lug and conductor materials and sizes are used. If all of this is validated and the fault is still occuring, replace the Top-Exit Landing assembly.

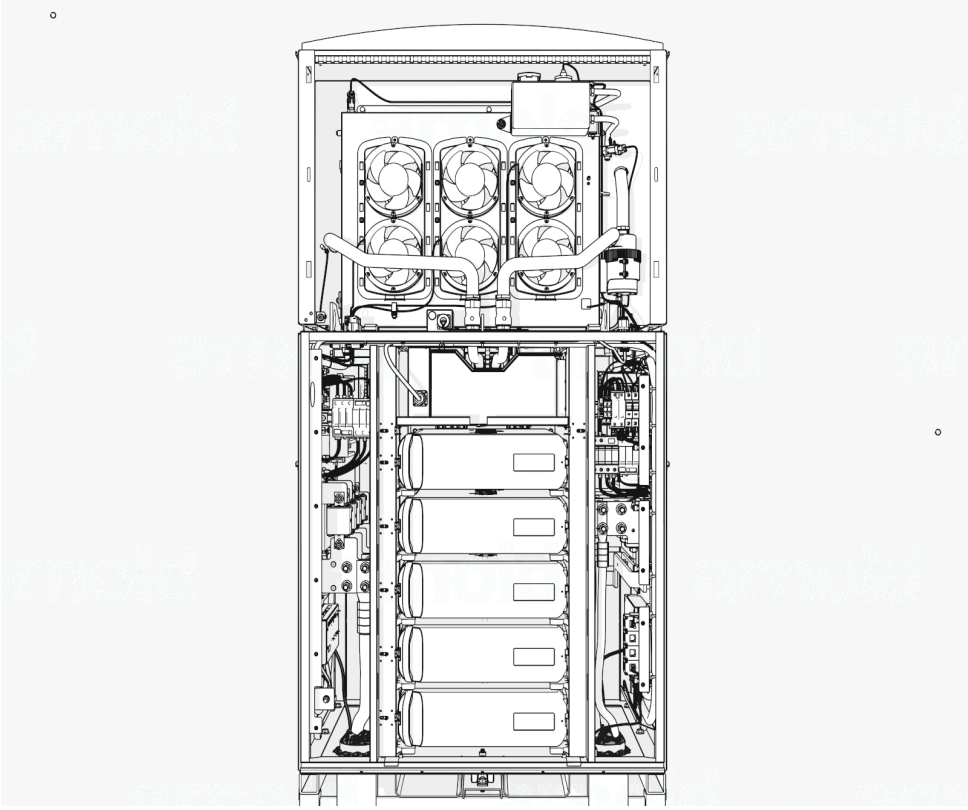
Power Block Troubleshooting 5

This section aims to help Industrial Support Engineers, field technicians, and the Commissioning team in identifying problems and performing initial debug of problems related to Power Block.

The troubleshooting steps for the following components' faults are included in this section:

- Power Block controller (PBC)
- Auxiliary power supply (AUX PS)
- Cooling controller board (CCB)

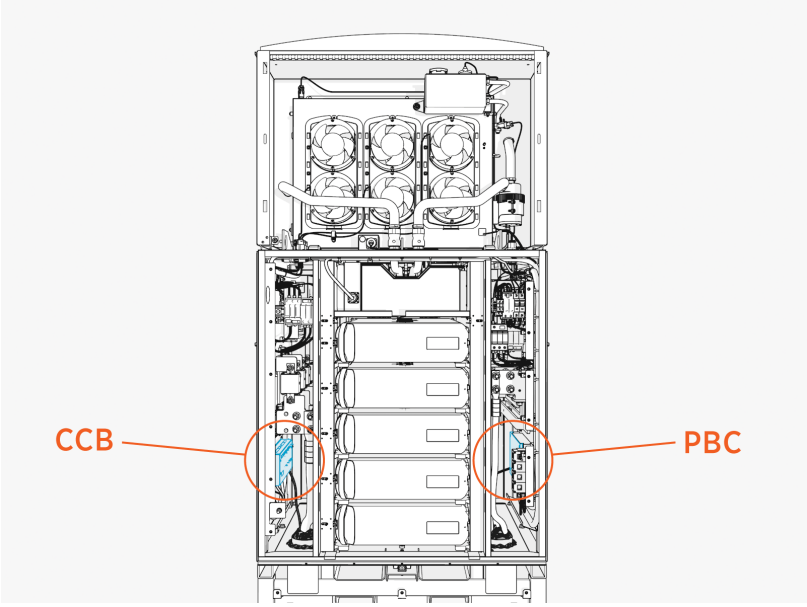
Front View for Locating the Boards for Power Block



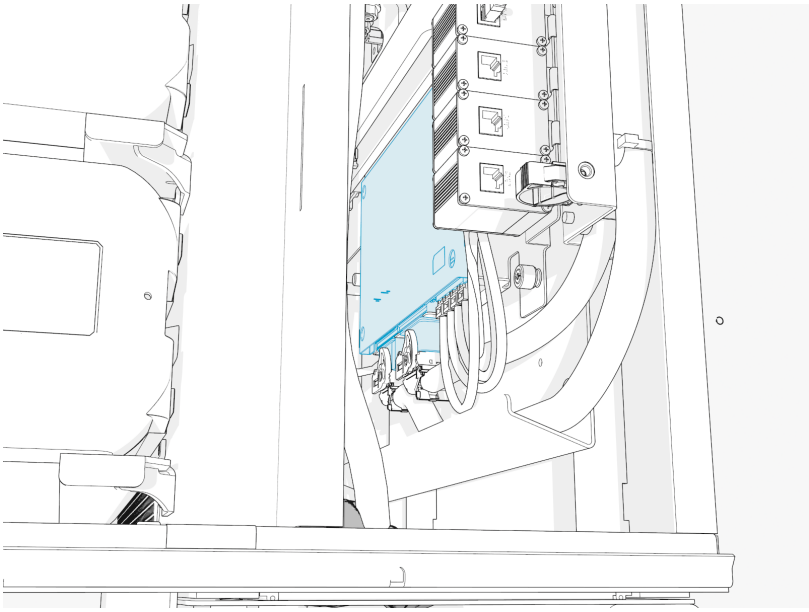
PBC Faults Board Location

The following illustrations provide PBC faults board location:

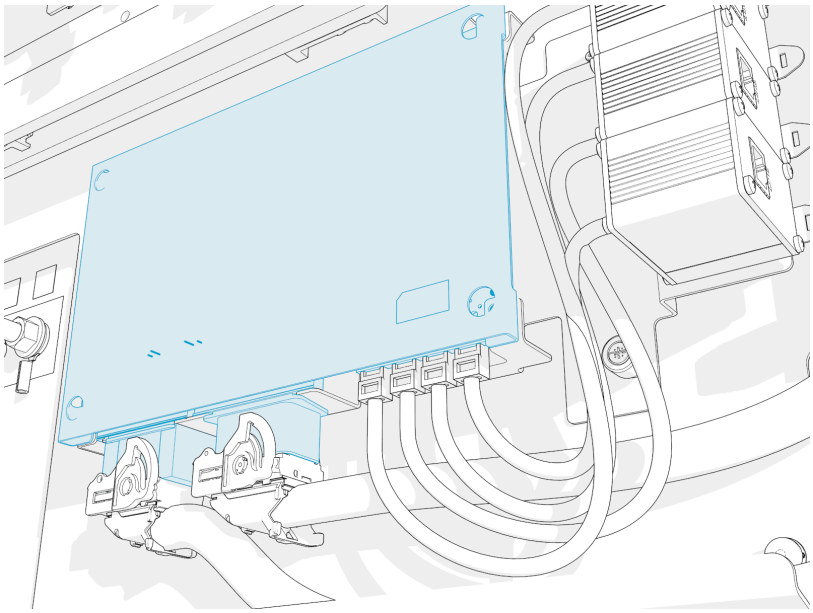
Front View for Locating the Boards for PBC and CCB Faults



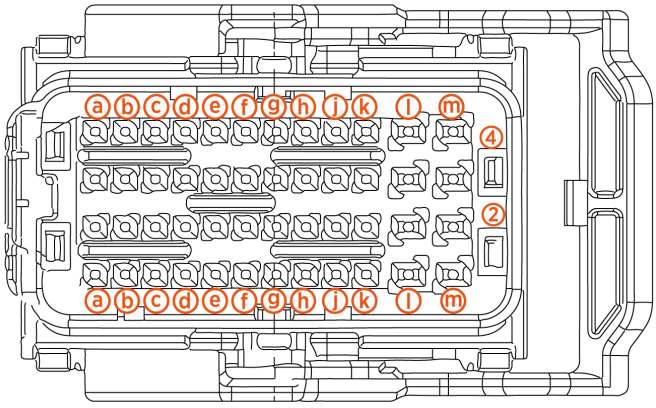
PBC Faults Board Location



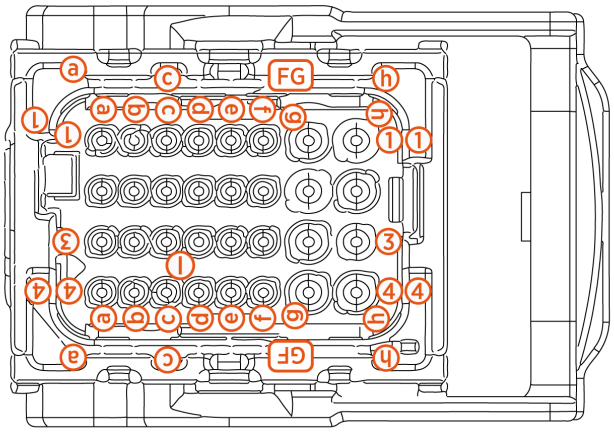
PBC Faults Cable Location



PBC-J108



PBC-J109



PBC Faults

PBC_FAN1_OVERCURRENT

Category	Fault Source	Fault Type	Criticality
Cooling	Dry zone fan bank 1	Hardware	Major

Fault Description

Fan 1 current consumption more than 4 A for 100 ms. Fan 1 is disabled and Power Block is set to derate to 50% of maximum available power.

Possible Causes

- Short between wires due to a slice or a cut in insulation
- Obstruction to fan fins
- Internal fan failure
- Connector broken leading to a short

Troubleshooting

1. Confirm if connectors going to PBC and also to the fans are seated fully.
2. Look for wiring continuity between PBC connector and Fan 1 connector.
    a. Measure continuity between M3 (Fan_PWR) and M4 (Fan_Ret) on P108 connector going to PBC.
3. If there is a short detected between PWR and RET line, then replace the harness.
4. If no short is measured, then replace the Dry zone fans to fix the issue.
5. Contact ChargePoint if the issue still persists.

PBC_FAN2_OVERCURRENT

Category	Fault Source	Fault Type	Criticality
Cooling	Dry zone fan bank 2	Hardware	Major

Fault Description

Fan 1 current consumption more than 4 A for 100 ms. Fan 1 is disabled and Power Block is set to derate to 50% of maximum available power.

Possible Causes

- Short between wires due to a slice or a cut in insulation
- Obstruction to fan fins
- Internal fan failure
- Connector broken leading to a short

Troubleshooting

1. Confirm if connectors going to PBC and also to the fans are seated fully.
2. Look for wiring continuity between PBC connector and Fan 1 connector.
    a. Measure continuity between M1 (Fan_PWR) and M2 (Fan_Ret) on P108 connector going to PBC.
3. If there is a short detected between PWR and RET line, then replace the harness.
4. If no short is measured, then replace the Dry zone fans to fix the issue.
5. Contact ChargePoint if the issue still persists.

PBC_FAN1_OPENCIRCUIT_DETECTED

Category	Fault Source	Fault Type	Criticality
Cooling	Dry zone fan bank 1	Hardware	Major

Fault Description

Fan 1 current consumption less than 0.3 A per 100 s. Fan 1 is disabled and Power Block is operational and will derate if Power Modules report overheating.

Possible Causes

- Break in PWR or GND wires feeding the PBC
- Connector not seated fully

Troubleshooting

1. Confirm if connectors going to PBC and also to the fans are seated fully.
2. Look for wiring continuity between PBC connector and Fan 1 connector.

3. If no short is measured, then replace the Dry zone fans to fix the issue.
    a. Measure between M3 (Fan_PWR) on P108 connector (going PBC) to Pin 1 on P148 (going to DRY-HEX.
    b. Measure between M4 (Fan_Ret) on P108 connector (going to PBC) and Pin 7 on P148 (going to DRY-HEX).

    If continuity test in steps (a) and (b) passes, then replace DRY-HEX for resolution. If steps (a) or (b) fail, then replace the harness.
4. If the issue still persists after replacing DRY-HEX, then contact ChargePoint if the issue still persists.

PBC_FAN1_SPEED_MISMATCH

Category	Fault Source	Fault Type	Criticality
Cooling	Dry zone fan bank 1	Hardware/Software	Major

Fault Description

Fan 1 not running at desired speed. 20% difference between commanded speed and speed feedback.

Power Block is operational and will derate if Power Modules overheat.

Possible Causes

Fan is not receiving responding to speed commands

Troubleshooting

1. If Power Block operates without derating, then no change is necessary.
2. If Power Block is derating, then contact ChargePoint for further steps.

PBC_FAN2_OPENCIRCUIT_DETECTED

Category	Fault Source	Fault Type	Criticality
Cooling	Dry zone fan bank 2	Hardware	Major

Fault Description

Fan 2 current consumption less than 0.3 A for 10 s.

Power Block is operational and will derate if Power Modules report overheating.

Possible Causes

- Break in PWR or GND wires feeding the PBC
- Connector not seated fully

Troubleshooting

1. Confirm if connectors going to PBC and also to fans are seated fully.
2. Look for wiring continuity between the PBC connector and the Fan 2 connector.
    a. Measure between M1 (Fan_PWR) on P1 connector (going to PBC) to Pin 6 on P148 (going to DRY-HEX).
    b. Measure between M2 (Fan_Ret) on P1 connector (going to PBC) and Pin 2 on P148 (going to DRY-HEX).
    c. Measure continuity between Fan_PWR and Fan_Ret.
3. If continuity test in steps (a) and (b) passes, then replace DRY-HEX for resolution. If steps ()a or (b) fail, then replace the harness.
4. If issue persists after replacing DRY-HEX, then contact ChargePoint for further steps.

PBC_FAN2_SPEED_MISMATCH

Category	Fault Source	Fault Type	Criticality
Cooling	Dry zone fan bank 2	Hardware/Software	Minor

Fault Description

Fan 2 not running at desired speed. 20% difference between commanded speed and speed feedback.

Power Block is operational and will derate if Power Modules overheat.

Possible Causes

Fan not receiving or responding to speed commands

Troubleshooting

1. If Power Block operates without derating, then no change is necessary.
2. If Power Block is derating, then contact ChargePoint for further steps.

RTD_DRYZONE_AMB_DISCONNECTED

Category	Fault Source	Fault Type	Criticality
Sensor	Dry zone RTD	Hardware	Major

Fault Description

Dry zone RTD disconnected.

Fault shown when the Dry zone RTD temperature goes above 100 °C for 10 s.

Power Block is allowed to run without any derate, unless power modules report higher temperatures and trigger derate.

Possible Causes

- Break in RTD feedback wire
- Not properly seated PBC connector P108

Troubleshooting

1. Reseat connector P148 and confirm if it fixes the issue.
2. Measure continuity between Pin J3 (T1_OUT) on P108 (going to PBC) and Pin 1 on P149. Also between Pin J4 (T1_RET) on P108 (going to PBC) and Pin 2 on P148.
3. If no continuity, then issue might be a break in the feedback wire.
4. Measure resistance across between Pin J3 and Pin J4 on P108.
5. Contact ChargePoint if the issue persists.

RTD_DRYZONE_AMB_SHORTED

Category	Fault Source	Fault Type	Criticality
Sensor	Dry zone RTD	Hardware	Major

Fault Description

Dry zone RTD Shorted.

If the temperature is reading -40° C for more than 10 s.

Power Block is allowed to run without any derate, unless Power Modules report higher temperatures and trigger the derate.

Possible Causes

- Short in RTD feedback wire
- Slice or cut in wire shorting to GND

Troubleshooting

1. Reseat connector P148 and confirm if it fixes the issue.
2. Measure continuity between Pin J3 (T1_OUT) on P108 (going to PBC) and Pin 1 on P149. Also between Pin J4 (T1_RET) on P108 (going to PBC) and Pin 2 on P148.
3. If there is a short detected, then replace the harness to fix the issue.
4. Measure resistance across between Pin J3 and Pin J4 on P108 to measure zero (if shorted).
5. Contact ChargePoint if the issue persists.

PB_AC-IN_SURGE_OPEN

Category	Fault Source	Fault Type	Criticality
Sensor	Surge Arrestor	Hardware	Critical

Fault Description

AC-IN surge suppressor cartridge is open or failed. Fault reported every 1 s.

Possible surge event if this happens on a unit installed in the field and was operational for some time.

Might be faulty hardware or wiring if it is seen in a brand new install.

Possible Causes

- Feedback wire compromised
- Real surge event in the field

Troubleshooting

1. Do a visual inspection of the surge cartridge - if RED then it's bad - replace the surge arrestor to fix the issue. Investigate if there was an actual surge event and inspect rest of the surge arrestors. If GREEN then it's good, continue to Step 2.
2. To confirm the feedback wiring is good, measure continuity from Pin H4 (SURGE_NC_TRIP2) on P108 (going to PBC) to ACSRG1 (SURGE_NC_TRIP2) underneath the AC surge arrestor cartridge. Also, continuity between J1 (SURGE_NC_TRIP1) on P108 (going to PBC) and ACSRG2 (underneath the surge arrestor).
3. If wiring is confirmed good, then replace the failed surge cartridges.

PB_DC-IN_SURGE_OPEN

Category	Fault Source	Fault Type	Criticality
Sensor	Surge Arrestor	Hardware	Critical

Fault Description

DC-IN surge suppressor cartridge is open/failed. Fault reported every 1 s.

Possible surge event if this happens on a unit installed in the field and was operational for some time.

Might be faulty hardware or wiring if it is seen in a brand new install.

Possible Causes

- Feedback wire compromised
- Real surge event in the field

Troubleshooting

1. Do a visual inspection of surge cartridge - if RED then bad, if GREEN then good.
2. To confirm the feedback wiring is good, measure continuity from Pin K2 (SURGE_COM_TRIP1) on P108 (going to PBC) to DCINSRG2 (underneath the DC-in surge arrestor cartridge). Also, continuity between G3 (SURGE_NC_TRIP1) on P108 (going to PBC) and DCINSRG2 (underneath the surge arrestor).
3. If the wiring is confirmed good, then replace the failed surge cartridges.

PB_DC-OUT-A_SURGE_OPEN

Category	Fault Source	Fault Type	Criticality
Sensor	Surge Arrestor	Hardware	Critical

Fault Description

DC bus bar A surge suppressor cartridge is open or failed. Fault reported every 1 s.

Possible surge event if this happens on a unit installed in the field and was operational for some time.

Might be faulty hardware or wiring if it is seen in a brand new install.

Possible Causes

- Feedback wire compromised
- Real surge event in the field

Troubleshooting

1. Do visual inspection of surge cartridge if RED then it's bad - replace the surge arrestor to fix the issue. Investigate if there was an actual surge event and inspect rest of the surge arrestors. If GREEN then it's good, continue to Step 2.
2. To confirm the feedback wiring is good, measure continuity from Pin K1 (SURGE_COM_TRIP4) on P108 (going to PBC) to DCASRG1 (underneath the DC-out-B surge arrestor cartridge). Also, continuity between L1 (SURGE_NC_TRIP4) on P108 (going to PBC) and DCASRG2 (underneath the surge arrestor).
3. If wiring is confirmed good, then replace the failed surge cartridges.

PB_DC-OUT-B_SURGE_OPEN

Category	Fault Source	Fault Type	Criticality
Sensor	Surge Arrestor	Hardware	Critical

Fault Description

DC bus bar B surge suppressor cartridge is open or failed. Fault reported every 1 s.

Possible surge event if this happens on a unit installed in the field and was operational for some time.

Might be faulty hardware or wiring if it is seen in a brand new install.

Possible Causes

- Feedback wire compromised
- Real surge event in the field

Troubleshooting

1. Do a visual inspection of surge cartridge - if RED then it's bad - replace the surge arrestor to fix the issue. Investigate if there was an actual surge event and inspect rest of the surge arrestors. If GREEN then it's good, continue to Step 2.
2. To confirm the feedback wiring is good, measure continuity from Pin L4 (SURGE_COM_TRIP3) on P108 (going to PBC) to DCBSRG1 (underneath the DC-Out-B surge arrestor cartridge). Also, measure continuity between K4 (SURGE_NC_TRIP3) on P108 (going to PBC) and DCBSRG2 (underneath the surge arrestor).
3. If wiring is confirmed good, then replace the failed surge cartridges.

PB_48V-EXT_SURGE_OPEN

Category	Fault Source	Fault Type	Criticality
Sensor	Surge Arrestor	Hardware	Critical

Fault Description

48V_EXT surge suppressor cartridge is open or failed.

Possible surge event if this happens on a unit installed in the field and was operational for some time.

Might be faulty hardware or wiring if it is seen in a brand new install.

Possible Causes

- Feedback wire compromised
- Real surge event in the field

Troubleshooting

1. Do a visual inspection of the surge cartridge - if RED then it's bad, if GREEN then it's good.
2. To confirm the feedback wiring is good, measure continuity from Pin H3 (SURGE_COM_TRIP5) on P108 (going to PBC) to LVSRG1 (underneath the LV Surge arrestor cartridge). Also, measure continuity between E4 (SURGE_NC_TRIP5) on P108 (going to PBC) and LVSRG2 (underneath the LV surge arrestor cartridge)
3. If wiring is confirmed good, then replace the failed surge cartridges.

PB_AC-IN_THERMAL_SW

Category	Fault Source	Fault Type	Criticality
Sensor	Thermal Switch	Hardware	Critical

Fault Description

Thermal switches on AC-IN terminals are open. Power Block is derated to 50% operation.

If the thermal switches open in derated condition or 3 times within 24 hours, then PBC shall lockout the Power Block.

Possible Causes

- Feedback wire compromised
- The thermal swich might be not making good contact with the bus bar

Troubleshooting

1. To confirm the feedback wiring is good, measure continuity from Pin K3 (THER_SW1_RET) on P108 (going to PBC) to L1IN (ACIN TSWITCH - A15). Also, measure continuity between L3 (THER_SW1) on P108 (going to PBC) and L3OUT(ACIN TSWITCH - A15)
2. If the wiring is confirmed good, then locate the thermal switch and confirm the seating on the bus bar. Also make sure the connectors on the switch are not loose. If everything seems good, then reach out to ChargePoint.
3. If the continuity issue is located, then we might have to replace the harness after locating the exact point of break. Contact ChargePoint.

PB_DC-IN_THERMAL_SW

Category	Fault Source	Fault Type	Criticality
Sensor	Thermal Switch	Hardware	Critical

Fault Description

Thermal switches on DC-IN terminals are open. Power Block is derated to 50% operation.

If the thermal switches open in derated condition or 3 times within 24 hours, then PBC shall lockout the Power Block.

Possible Causes

- Feedback wire compromised
- The thermal switch might not be making good contact with the bus bar

Troubleshooting

1. To confirm the feedback wiring is good, measure continuity from Pin L2 (THER_SW2) on P108 (going to PBC) to P47 (DCIN). Also, measure continuity between H2 (THER_SW2_RET) on P108 (going to PBC) and P51 (DCIN TSWITCH).
2. If the wiring is confirmed good, then locate the thermal switch and confirm the seating on the bus bar. Also make sure the connectors on the switch are not lose. If everything seems good, then reach out to reach out to ChargePoint.
3. If the continuity issue is located, then we might have to replace the harness after locating the exact point of break. Contact ChargePoint.

PB_DC-OUT-A_THERMAL_SW

Category	Fault Source	Fault Type	Criticality
Sensor	Thermal Switch	Hardware	Critical

Fault Description

Thermal switches on DC_OUT-A terminals are open. Power Block is derated to 50% operation.

If the thermal switches open in derated condition or 3 times within 24 hours, then PBC shall lockout the Power Block.

Possible Causes

- Feedback wire compromised
- The thermal switch might be not making good contact with the bus bar

Troubleshooting

1. To confirm the feedback wiring is good, measure continuity from Pin C3 (THER_SW3_RET) on P108 (going to PBC) to J42 (DC_OUT-A). Also, measure continuity between C4 (THER_SW3) on P108 (going to PBC) and P43 (DC_OUT-A).
2. If wiring is confirmed good, then locate the thermal switch and confirm the seating on the bus bar. Also make sure the connectors on the switch are not lose. If everything seems good, then reach out to ChargePoint for further steps.
3. If the continuity issue is located, then we might have to replace the harness after locating the exact point of break. Contact ChargePoint for further steps.

PB_DC-OUT-B_THERMAL_SW

Category	Fault Source	Fault Type	Criticality
Sensor	Thermal Switch	Hardware	Critical

Fault Description

Thermal switches on DC_OUT-B terminals are open. Power Block is derated to 50% operation.

If the thermal switches open in derated condition or 3 times within 24 hours, then PBC shall lockout the Power Block.

Possible Causes

- Feedback wire compromised
- The thermal swich might be not making good contact with the bus bar

Troubleshooting

1. To confirm the feedback wiring is good, measure continuity from Pin D4 (THER_SW4_RET) on P108 (going to PBC) to J45 (DC_OUT-B). Also, measure continuity between E1 (THER_SW4) on P108 (going to PBC) and P44 (DC_OUT-B).
2. If wiring is confirmed good, then locate the thermal switch and confirm the seating on the bus bar. Also make sure the connectors on the switch are not loose. If everything seem good, then reach out to ChargePoint for further steps.
3. If the continuity issue is located, then we might have to replace the harness after locating the exact point of break. Contact ChargePoint for further steps.

PB_DRYZONE_DOOR_OPEN

Category	Fault Source	Fault Type	Criticality
Sensor	Reed Switch	Hardware	Emergency

Fault Description

Dry zone door is open. PBC shuts down the Power Block in controlled manner (if happened during a session). PBC also commands to open the shunt trip breaker through Aux PS.

Possible Causes

- Door is open
- Reed sensor feedback is compromised
- Sensor is misaligned with magnet or missing from its position

Troubleshooting

1. Confirm if the Wetzone Front door is open.
2. Look for the magnet and the sensor on the Wetzone door (Front Top door). Confirm the presence of both and that they are aligned with each other on closing the door. It need not touch each other but, as long as they are in the vicinity - 15 mm.
3. Measuring continuity of the feedback wire from Reed1 Pin SP19 (Sensor wire on Main Door - covering Power Modules) going to Reed1 - Pin C4 on P198-109 on PBC. Also, continuity between SEP20 (on the sensor) and REED1_RET - Pin D4 on P198-109.
4. If there is no continuity, then the feedback wire/harness is broken. Contact ChargePoint if the issue persists.
5. If continuity is good, then use an external magnet and place it around the sensor. Check if the sensor feedback on chassis-shell changes when the magnet is around the sensor. If the feedback changes, then the sensor is bad and needs replacement.

PB_WETZONE_FRONT_DOOR_OPEN

Category	Fault Source	Fault Type	Criticality
Sensor	Reed Switch	Hardware	Emergency

Fault Description

Wet zone door is open. PBC shuts down the Power Block in controlled manner (if happened during a session). PBC also commands to open the shunt trip breaker through Aux PS.

Possible Causes

- Door is open
- Reed sensor feedback is compromised
- Sensor is misaligned with magnet or missing from its position

Troubleshooting

1. Confirm if the Dry zone is open.
2. Look for the magnet and the sensor on the Dry zone door. Confirm the presence of both and that they are aligned with each other on closing the door. It need not touch each other but, as long as they are in the vicinity.
3. Measuring continuity of the feedback wire from Reed2 Pin SP21 (Sensor wire covering Wetzone) going to Reed2 - Pin B2 on P198-109 on PBC. Also, continuity between SEP22 (on the sensor) and REED1_RET - Pin B3 on P198-109.

   If there is no continuity, then the feedback wire/harness is broken.
4. If continuity is good, then use an external magnet and place it around the sensor. Check if the sensor feedback on chassis-shell changes when magnet is around the sensor. If the feedback changes, then sensor is bad and needs replacement.

PB_WETZONE_BACK_DOOR_OPEN_Shutdown

Category	Fault Source	Fault Type	Criticality
Sensor	Reed Switch	Hardware	Emergency

Fault Description

Wet zone door is open. PBC shuts down the Power Block in controlled manner (if happened during a session). PBC also commands to open the shunt trip breaker through Aux PS.

Possible Causes

- Door is open
- Reed sensor feedback is compromised
- Sensor is misaligned with the magnet or missing from its position

Troubleshooting

1. Confirm if the Wetzone Back door is open.
2. Look for the magnet and the sensor on the Wetzone door (Back Top door). Confirm the presence of both and that they are aligned with each other on closing the door. It need not touch each other but as long as they are in the vicinity.
3. Measuring continuity of the feedback wire from Reed3 (Sensor wire covering AUXPS) going to Reed3- Pin F3 on P108 on PBC. Also, continuity between Reed3_Ret and REED3_RET - Pin G1 on P108.

   If there is no continuity, then the feedback wire/harness is broken.
4. If continuity is good, then use an external magnet and place it around the sensor. Check if the sensor feedback on chassis-shell changes when magnet is around the sensor. If the feedback changes, then sensor is bad and needs replacement.

PB_TILT_EXCEEDED_Shutdown

Category	Fault Source	Fault Type	Criticality
Sensor	Tilt Sensor	Hardware/Software	Emergency

Fault Description

Power Block tilted due to seismic effect or vehicle hitting the Power Block. The tilt angle should exceed 30 degrees for system shutdown.

PBC shuts down the Power Block in controlled manner. PBC also commands to open the shunt trip breaker through AUX PS.

Possible Causes

- Actual emergency event
- Miscalibrated sensor
- PBC tilted (due to improper installation)

Troubleshooting

1. Visual inspection should confirm if this is an actual emergency event.
2. If the visual inspection confirms if this is a wrongly reported tilt fault, it might be a non-calibrated/miscalibrated tilt sensor.
3. Inspect if PBC is seated correctly. If tilted and not touching the chassis, then reseat and confirm if the issue goes away.
4. Contact ChargePoint for further debugging the issue.

PBC_OVERTEMP_Warning

Category	Fault Source	Fault Type	Criticality
Sensor	Temperature Sensor	Hardware/Software	Major

Fault Description

PBC will report OverTEMP if PBC_PROCESSOR or PBC_BOARD_TEMP exceeds 100 °C for 10 s. The fault will clear on its own if both the temps are below 100 °C for 10 s.

Possible Causes

- High dry-zone ambient temperature due to improper cooling
- Miscalibrated sensor

Troubleshooting

1. Possible that dry-zone cooling is not circulating the air, thus resulting in over temp around the PBC board. Confirm from logs if the fans and pumps are running fine and also if other FRUs are reporting temperature related faults.
2. Compare with the ambient temperature and max. delta T of +15 °C. Replace the PBC if the difference between calculated versus observed is higher.
3. Contact ChargePoint if this seems to be a spuriously reported over temperature warning.

PBC_48V_LOGIC_SUPPLY_LOSS_Shutdown

Category	Fault Source	Fault Type	Criticality
	Voltage	Hardware	Critical

Fault Description

PBC reports this fault if the voltage drops below 40 V for more than 100 ms. PBC shuts down the Power Block in controlled manner (if happened during a session). PBC stores the snapshot of the failure.

Power Block is disabled if this event occurs 3 times within 24 hours.

Possible Causes

- Issues with incoming 480 V
- AUXPS failure
- Harness failure

Troubleshooting

1. Check if the AUXPS reports any faults. Confirm if the 48 V is seen on the AUXPS (in logs). If AUXPS is still outputting 48 V on its PBC channel, then jump to step 2. If AUXPS reports 48 V failure on PBC channel, then jump to step 3. Power down the system before proceeding to next steps.
2. If 48 V is still seen on the PBC channel (on AUXPS), then there might be a break in the harness/wire carrying 48 V. Measure the continuity between Pin B6 on P195-01 (on AUXPS) and Pin A4 on P198-109 (on PBC). Also measure the continuity from Pin A6 on P195-01 (on AUXPS) and Pin A2 on P198-109 (on PBC). If there is a break in continuity, then we need to replace the harness.
3. If the continuity in harness seems good and AUXPS does report 48 V dropping in the logs, then this might be related to incoming 480 V. Measure the incoming power quality to confirm if the incoming voltage is in +/- 10% of 480 V. Install Power Quality Monitor to confirm issues with 480 V. If any issues were found, then rectify them on the incoming side and then confirm if 48 V is back on the PBC channel.
4. If 480 V looks good, continuity tests confirm good harness but, 48 V is not coming through to PBC, then replace AUXPS.
5. If 480 V looks good, continuity tests confirm good harness and we can measure 48 V across pins G1 and H1 on P198-109 (on PBC), then replace PBC.

Loss_of_Comms_AuxPS

Category	Fault Source	Fault Type	Criticality
Communication	CAN Comms	Hardware/Software	Critical

Fault Description

This fault is reported if CAN communication is lost between AUX PS and PBC. CAN heartbeat signal is monitored every 1 s and this fault is reported when 5 heartbeat signals are lost. PBC will terminate any ongoing session and then disable the Power Block.

Possible Causes

- AUXPS failure
- CAN Harness failure
- PBC failure

Troubleshooting

1. If AUXPS fails, then we might lose CAN communication. Confirm from the logs if there are any AUXPS failures/faults reported. If yes, then replace AUXPS and confirm if CAN comms are back.
2. If AUXPS is confirmed good, then we might have an issue with the harness carrying CAN data. Measure continuity between:
3. If no short is measured, then replace the Dry zone fans to fix the issue.
    a. Pin C3 on P198-109 (on PBC) and Pin 5 on P195-10 ---- looks at CANH.
    b. Pin D3 on P198-109 (on PBC) and Pin 2 on P195-10 ---- looks at CANL.
    c. Pin E3 on P198-109 (on PBC) and Pin 6 on P195-10 ---- looks at CAN_GND.
    d. Measure resistance across Pin 1 and Pin 4 on P195-10 - ideally should measure 120 Ω.

    If any of the above tests fail, then replace the harness.
4. If continuity is good and AUXPS is confirmed good as well, then replacing PBC might resolve the issue. Contact ChargePoint for further steps.

Loss_of_Comms_CCB

Category	Fault Source	Fault Type	Criticality
Communication	CAN Comms	Hardware/Software	Critical

Fault Description

This fault is reported if CAN communication is lost between AUXPS and PBC. CAN heartbeat signal is monitored every 1 s and this fault is reported when 5 heartbeat signals are lost. PBC will terminate any ongoing session and then disable the Power Block.

Possible Causes

- CCB failure
- CAN Harness failure
- PBC failure

Troubleshooting

1. If CCB fails, then we might lose CAN communication. Confirm from the logs if there are any CCB failures/faults reported. If yes, then replace CCB and confirm if CAN comms are back.
2. If CCB is confirmed good, then we might have an issue with the harness carrying CAN data. Measure continuity between:
    a. Pin C3 on P198-109 (on PBC) and Pin 6 on P7 (of CCB) ---- looks at CANH.
    b. Pin D3 on P198-109 (on PBC) and Pin 7 on P7 (of CCB) ---- looks at CANL.
    c. Pin E3 on P198-109 (on PBC) and Pin 8 on P7 (of CCB) ---- looks at CAN_GND.
    d. Measure resistance across Pin 10 and Pin 5 on P7 (on CCB) - ideally should measure 120Ω.

    If any of the above tests fail, then replace the harness.
3. If continuity is good and CCB is confirmed good as well, then contact ChargePoint for further debugging.

Loss_of_Comms_PM

Category	Fault Source	Fault Type	Criticality
Communication	CAN Comms	Hardware	Critical

Fault Description

This fault is reports if CAN communication is lost between one or more Power Modules and PBC. CAN heartbeat signal is monitored every 1 s and this fault is reported when 1 heartbeat signal is lost. PBC will terminate any ongoing session and then disable the Power Block.

Possible Causes

- Power Module failure
- CAN harness failure
- PBC failure

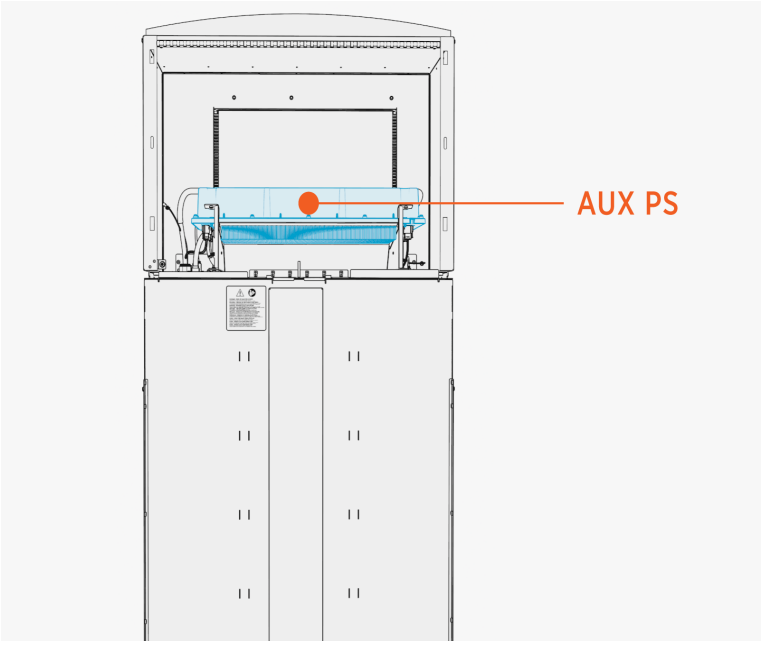
Troubleshooting

1. Power down the system and check if the module is fully seated and making proper connection to the mod-mate on the Power Block side.
2. Confirm from logs or NOS if there are any active critical faults on the Power Modules. If yes, then it is possible that the Power Modules have failed and need to be replaced. Replace the appropriate module and confirm if CAN communication comes back on that slot.
3. If there are no active faults on the Power Module, visually inspect if any of the pins on the data connector are damaged. If any damage is found, then replace the module to resolve the issue.
4. If all the above inspections do not show any obvious issues, then it could be the data connector on the mod-mate side that might have failed. Contact ChargePoint for further resolution steps.

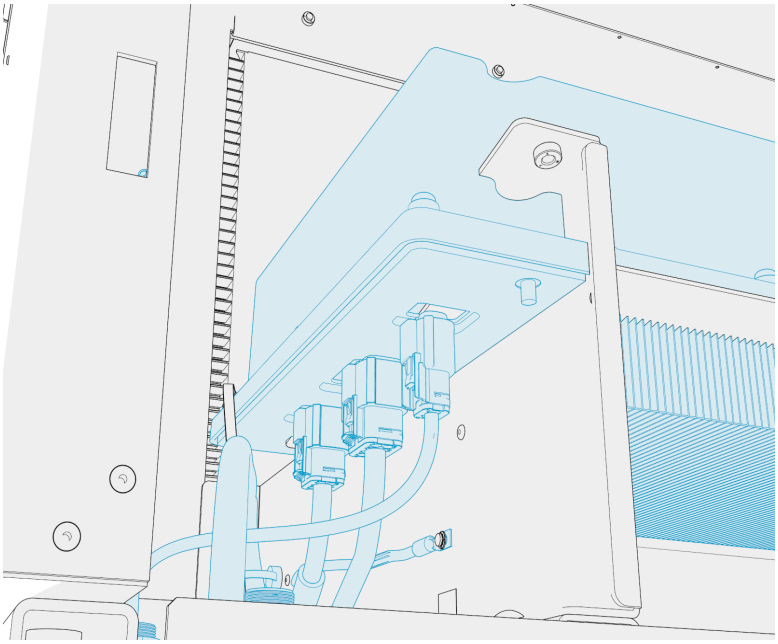
AUX PS Faults Board Location

The following illustrations provide AUX PS faults board location:

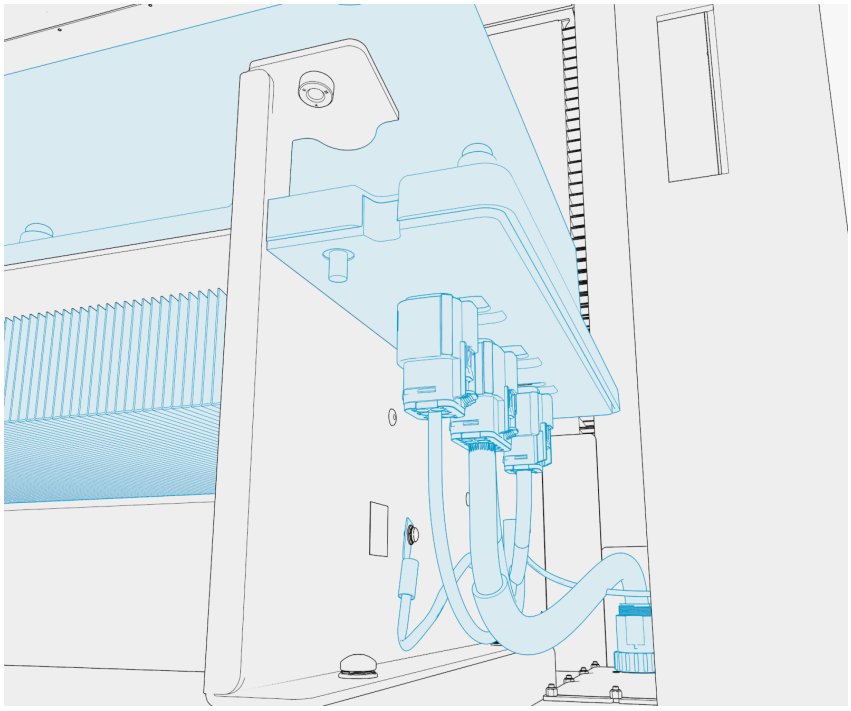
Rear View for Locating the Boards for AUX PS Faults



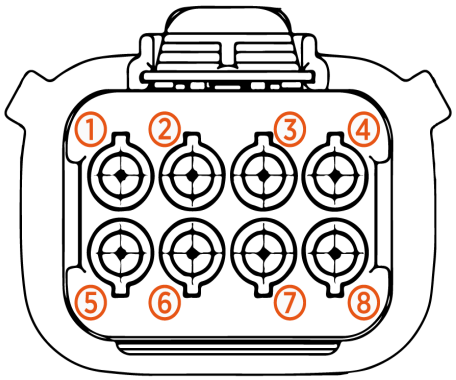
AUX PS Faults Cable Location (Front View)



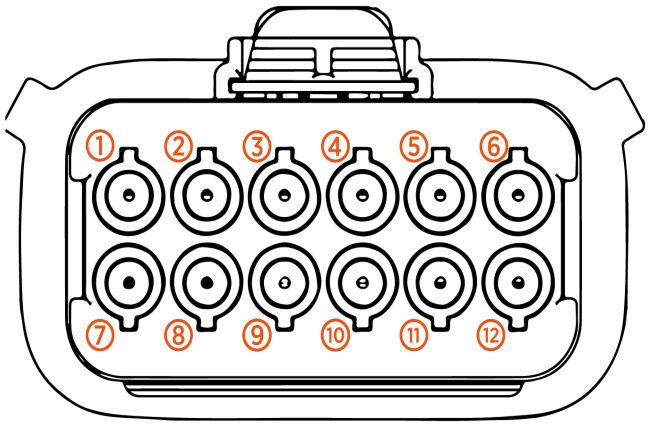
AUX PS Faults Cable Location (Rear View)



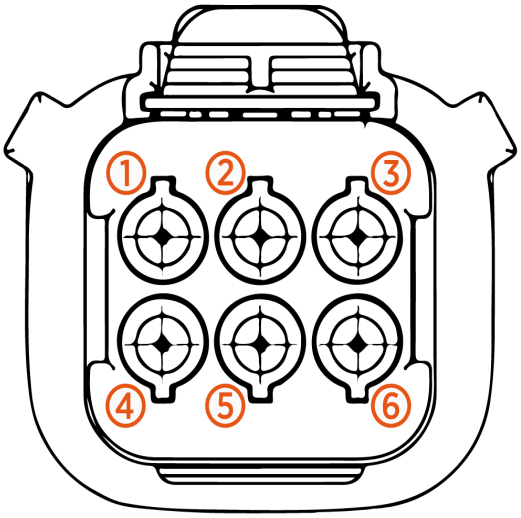
AUXPS-P190-01



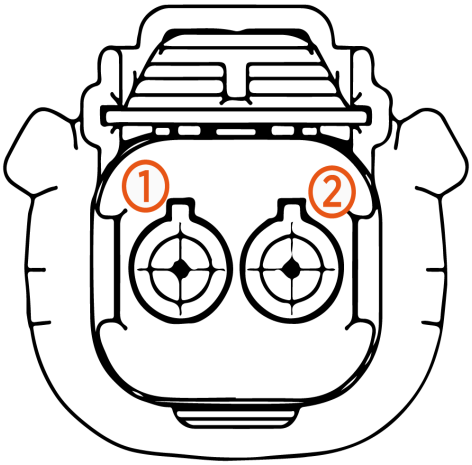
AUXPS-P195-01



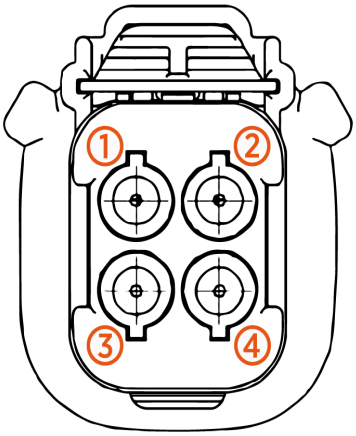
AUXPS-195-10



AUXPS-P190-06



AUXPS-P195-07



AUX PS Faults

48V_OVERVOLTAGE_Fault_Shutdown

Category	Fault Source	Fault Type	Criticality
-	AUX Power Supply	Hardware	Critical

Fault Description

Fault is declared when Auxiliary Power Supply (AUX PS) output voltage (max. of all 3 channels) is >60 V for 30 ms. The fault is cleared if the value is ≤57 V. The fault clears after the reboot, but the fault status is retained within non-volatile memory.

Fault message is sent to PBC as emergency CAN message, including the conditions that triggered the fault. Any ongoing session will be stopped gracefully. Fault information is saved as snapshot on Aux Power Supply. Load switches in Aux supply are disabled and shunt trip is triggered immediately.

Possible Causes

- Possible high 480 V line
- Internal AUX PS circuitry fault

Troubleshooting

1. Inspect the incoming 480 V* and confirm if it is within expected range (+10%).

   * For Europe, 400 V+ 10%.
2. If yes, then replace AUX PS to resolve the issue.
3. Contact ChargePoint if the issue persists.

48V_OVERVOLTAGE_Warning

Category	Fault Source	Fault Type	Criticality
-	AUX Power Supply	Hardware	Major

Fault Description

Warning message shown if any of the three AUX PS channels ≥55 V for 30 ms.

The lower threshold is 52 V for the warning to clear.

Possible Causes

- Internal AUX PS circuitry fault

Troubleshooting

1. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

48V_UNDERVOLTAGE_Warning

Category	Fault Source	Fault Type	Criticality
-	AUX Power Supply	Hardware	Major

Fault Description

Warning message shown if any of the three AUX PS channels <38 V for 60 s.

Possible Causes

- Internal AUX PS circuitry fault

Troubleshooting

1. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

48V_PBC_OVERLOAD_Warning

Category	Fault Source	Fault Type	Criticality
-	AUX Power Supply	Hardware	Major

Fault Description

This warning message is seen when the PBC output current is >1 A for 10 s.

The fault clears if the current <1 A for more than 3 seconds.

The fault snapshot is saved on AUX PS and no other action is taken.

Possible Causes

- Internal AUX PS circuitry fault

Troubleshooting

1. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

48V_CC_OVERLOAD_Warning

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Major

Fault Description

This warning message is seen when CCB output current is >30 A for 10 s.

The fault clears if the current <30 A for more than 3 seconds. The system is derated accordingly till the warning stays.

The fault snapshot is saved on AUX PS and no other action is taken.

Possible Causes

- Internal AUX PS circuitry fault
- Some obstruction to the fan or pump maybe

Troubleshooting

1. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

48V_EXT_OVERLOAD_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This warning message is seen when EXT output current is >27 A for 10 s.

The fault clears if the current <27 A for more than 3 seconds.

Any ongoing session will be stopped and the fault snapshot is saved on AUX PS and no other action is taken.

Possible Causes

- Possible fluctuations on the 480 V line
- Internal AUX PS circuitry fault

Troubleshooting

1. Inspect the incoming 480 V if the warning is seen regularly.
2. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

48V_EXT_PG_STATUS_LOST_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This fault is noted when EXT_PG (Power Good) signal transitions from 1 to 0, indicating that something went wrong on the 48V_EXT line. Fault can be cleared from PBC or rebooting system (PBC, if possible).

This fault will stop any ongoing session and PBC will try to reset the 48V_EXT. PBC also stores the snapshot of the failure and reports failure to NOS. System will be locked if the fault is seen 3 times within 24 hours.

Possible Causes

- Possible fluctuations on the 480 V line
- Internal AUX PS circuitry fault

Troubleshooting

1. Inspect the incoming 480 V if the warning is seen regularly.
2. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

48V_PBC_PG_STATUS_LOST_Warning

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Major

Fault Description

This fault is noted when PBC_PG (Power Good) signal transitions from 1 to 0, indicating that something went wrong on the PBC 48 V line. Fault can be cleared by rebooting system.

This fault will stop any ongoing session. System will be locked if the fault is seen 3 times within 24 hours.

Possible Causes

- Internal AUX PS circuitry fault

Troubleshooting

1. Inspect the incoming 480 V if the warning is seen regularly.
2. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

48V_CC_PG_STATUS_LOST_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Major

Fault Description

This fault is noted when CC_PG (Power Good) signal transitions from 1 to 0, indicating that something went wrong on the CC 48 V line. Fault can be cleared by rebooting system.

This fault will stop any ongoing session. System will be locked if the fault is seen 3 times within 24 hours.

Possible Causes

- Possible fluctuations on the 480 V line
- Internal AUX PS circuitry fault

Troubleshooting

1. Reach out to ChargePoint for further debugging of AUX PS if the issue persists three times in 24 hours.

Shorted_MOSFET_CC _Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This fault indicates 48 V CC load switch MOSFET failed due to short circuit. This is reported if the fault exists for 10 s (1 s sampling time). Snapshot of the failure along with operating conditions are stored on PBC and reported to NOS. The ongoing charging session is derated to 50%.

The self test to determine if the fault is real is performed and if TRUE, the system is disabled until serviced.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

Shorted MOSFET PBC_Warning

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This fault indicates 48 V PBC load switch MOSFET failed due to short circuit. This is reported if the fault exist for 10 s (1 s sampling time). Snapshot of the failure along with operating conditions are stored on PBC and reported to NOS.

The self test to determine if the fault is real is performed and if TRUE, the system is disabled till serviced.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

Shorted MOSFET EXT_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This fault indicates 48 V PBC load switch MOSFET failed due to short circuit. This is reported if the fault exists for 10 s (1 s sampling time). Snapshot of the failure along with operating conditions are stored on PBC and reported to NOS.

The ongoing session will continue as long as 48V_EXT current draw is <15 A. If it is >15 A, then the session is stopped and the system is disabled.

The self test to determine if the fault is real is performed and if TRUE, the system is disabled till serviced.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

48V_EXT_HW_Overcurrent_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This fault is triggered when current consumption on EXT channel exceeds 28 A. This also changes the EXT_PG signal to LOW.

Any ongoing session will be stopped and Power Link 1000 will be disabled (as 48 V is not present anymore). PBC stores the fault snapshot. PBC tried to enable 48V_EXT_OUT after 30 s of session stop. If the issue is noted 3 times in 24 hours, then system is disbaled till service.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS.

48V_PBC_HW_Overcurrent_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This fault is triggered when the current consumption on the PBC channel exceeds 2 A. This also changes the PBC_PG signal to LOW.

Any ongoing session will be stopped (as 48 V is not present anymore). AUX PS stores the fault snapshot. AUX PS tries to re-enable 48V_PBC power after 10 s (3 attempts made - 60 s interval). System locked out if unable to reenable.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

48V_CC_HW_Overcurrent_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

This fault is triggered when current consumption on CC channel exceeds 28 A. This also changes the CC_PG signal to LOW.

Any ongoing session will be stopped (as 48 V is not present anymore). AUX PS stores the fault snapshot. AUX PS tries to re-enable 48V_CC power after 10 s (3 attempts made - 60 s interval). System locked out if unable to reenable.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

Aux_PS_Overtemp_Warning

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Major

Fault Description

Fault declared when TEMP0 or TEMP1 from AUX PS is above 80° C for 10 s. The fault is cleared if this value is <80° C for 3 s. PBC tracks and reports both these temps.

PBC confirms if this fault is true and then derates the PB output to 50%. PBC stores the fault and snapshot - reports to NOS.

PB is disabled if the error is seen 3 times within 24 hours.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

Aux_PS_Overtemp_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

Fault declared when TEMP0 or TEMP1 from AUX PS is above 90° C for 10 s. The fault is cleared if this value is <90° C for 3 s. PBC tracks and reports both these temps.

After 30 s, the load switch to 48 V CC and EXT is disabled.

PBC stores the fault and snapshot - reports to NOS.

PB is disabled if the error is seen 3 times within 24 hours.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

LLC_Current_Imbalance_Warning

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Major

Fault Description

Monitor the current being supplied by each of the three LLC outputs, if there is a discrepancy exceeding

Fault set threshold of 2 A for 10 s. Fault clears if the difference is less than 1.5 A for 3 s.

Fault is reported to PBC every 1 s and also stores the snapshot from failure. Allow the Power Block operation if the sum of PBC_I_OUT, CC_I_OUT and EXT_I_OUT is less than 40 A.

Derate the Power Block to 50% if the sum PBC_I_OUT, CC_I_OUT and EXT_I_OUT is greater than 40 A.

PBC shall communicate to NOS and update the error messages and error cycle count.

Disable the Power Block if error persists for more than 48 hours, requiring maintenance of Aux PS.

Possible Causes

- Imbalance in input 3 phase voltage
- Internal AUX PS circuitry

Troubleshooting

1. Inspect 3-phase voltage for any imbalance.
2. Replace AUX PS.

Aux_PS_Fan_Failed_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

Fault is declared if the AUX PS FAN speed RPM is 20% away from expected range for more than 10 s. It is cleared if the FAN speed RPM is in the expected range for 3 s. Fault is reported to PBC every 1 s and also stores the snapshot from failure. Power Block is disabled if this error is seen 3 times in 24 hours.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

Fan_Overcurrent_Shutdown

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Critical

Fault Description

Fan load switch overcurrent fault. nFLT signal from Fan load switch is monitored and trigger a fault when nFLT signal goes “LOW”.

Disable the Aux PS Fan nEN_FAN after detecting fan overcurrent fault. Fault is reported to PBC every 1 s and also stores the snapshot from failure. Power Block is disabled if this error is seen 3 times in 24 hours.

Possible Causes

- Internal AUX PS circuitry

Troubleshooting

1. Replace AUX PS

Relative_Humidity_Warning

Category	Fault Source	Fault Type	Criticality
48 V signal	AUX Power Supply	Hardware	Major

Fault Description

Fault is reported if relative humidity exceeds 80% for more than 10 s. It will clear if it is less than 80% for 3 s. Fault is reported to PBC every 1 s and also stores the snapshot from failure.

Possible Causes

- Internal AUX PS circuitry
- Actual high humidity event

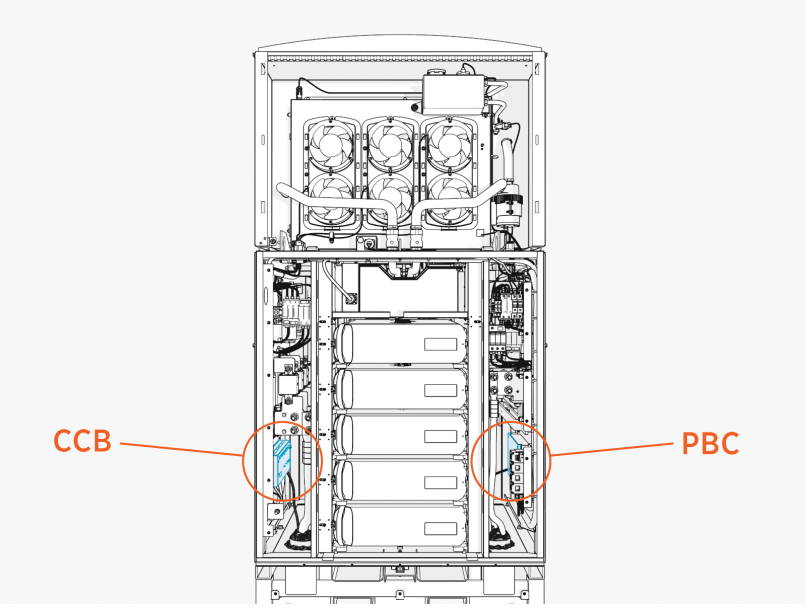
Troubleshooting

1. Replace AUX PS

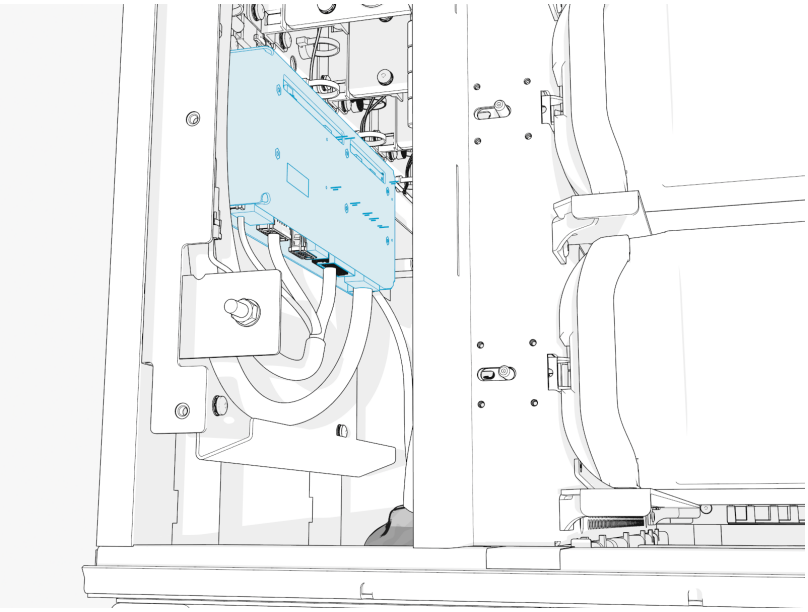
CCB Faults Board Location

The following illustrations provide CCB faults board location:

Front View for Locating the Boards for the CCB Faults



CCB Faults Board Location



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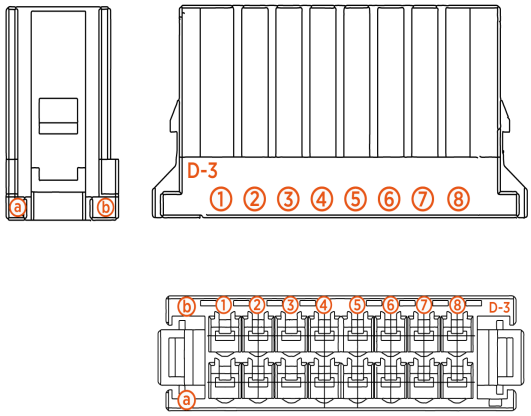


NOTE: The rest of the connectors have the same connector type, but with less inputs. So, use the same logic to identify rows and columns for measurements.

CCB Faults

PUMP_OVERCURRENT

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

If the pump current exceeds 8 A for more than 100 ms, the fault is declared. The average and maximum current values are noted and saved on PBC. The pump is disabled in EEPROM and needs intervention from advanced users to reenable the pump after inspection or replacement.

Possible Causes

- Shorting in the pump harness
- Shorting in the motor winding, or locked rotor
- Issue with CCB

Troubleshooting

1. Check the voltage on the pump through CCB node (chassis-shell) and confirm if it is reading 48 V. If it is not reading 48 V, then go to the step 2. If 48 V is present, then go to step 3.
2. Confirm if there is short in the CCB harness. Measure continuity across A1 (P_DC_PUMP_RET) and B1 (P_DC_PUMP_POWER) on the connector going to CCB. If there is a short, then the CCB harness needs to be replaced.
3. If the continuity test is good, measure continuity between Pin 1 and Pin 4 on P120 harness. If it shorted, it is possible that the pump has failed. Replace the pump and confirm if the issue goes away.
4. If pump replacement does not fix the issue, then the CCB board might have the fault, like shorted pins (feeding the connector), or a short on the traces carrying this voltage. Replace CCB to resolve the issue.
5. If none of the above steps work, please contact ChargePoint.

PUMP_DRYRUN_DETECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

If pump RPM is > 20 RPM and < 100 RPM for 5 s on commanding speed > 10, then this fault is declared. The fault is cleared and counter is reset. The pump will go back to operation.

NOTE: Pumps (GRI) have dry run detection and protection. They auto-protect by not spinning for 30 s.

PUMP_DRYRUN_EXCEEDED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

If the pump dry run fault is detected 3 times in 24 hours, then this fault is declared.

Possible Causes

- Low coolant level in the reservoir
- Presence of air bubble in the coolant loop
- Pump failure
- Coolant leak

Troubleshooting

1. Check the coolant level to confirm if it is indeed low. Top up if it is less than LOW.
2. Possibility of air bubbles, so try to run the pump priming sub routine to clear them. See if the fault goes away. Also monitor the Pump RPM feedback in the CCB node of chassis-shell.
3. Verify if there is a coolant leak in the system.
4. If the issue persists, then replace the pump.
5. Contact ChargePoint for further debugging steps.

PUMP_OPENCIRCUIT_DETECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

Fault is declared when pump runs at speed >10% for 10 s, but reports pump current <0.5 A.

Troubleshooting

1. Check the RPM value reported on the pump at the time of failure (logs or chassis-shell). Each RPM number is associated with certain fault type. Reach out to ChargePoint with RPM number for further debugging steps.

PUMP_OPENCIRCUIT_EXCEEDED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

The pump is disabled and the system is locked out when PUMP_OPENCIRCUIT_DETECTED fault repeats 3 times in 24 hours.

Possible Causes

- Issue with pump harness
- Pump failure
- CCB failure

Troubleshooting

1. Check the pump voltage in the CCB node - if it reads 48 V then, there is a break in the harness.
2. Check the continuity in the pump harness. Measure between A1 on P5 connector and B1 on P5 connector and see if it reads open.

FAN_TRAY1_OVERCURRENT

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

This fault is declared if fan current consumption exceeds 8 A for 100 ms. The Fan Tray is disabled in EEPROM and can only be cleared by a self-test or by an advanced user. Capture the fault in PBC and store the average Fan Tray current value along with maximum current.

Possible Causes

- Short in fan harness
- Shorting of fan winding
- Locked rotor on fan
- CCB failure

Troubleshooting

1. Confirm if there is anything blocking the fan blades from spinning.
2. Check the continuity between Pin 1 (FAN_RET_0) and 2 (FAN_PWR_0) on P109 connector (going to fans). Also, between Pins 5 (FAN_PWR_1) and 6 (FAN_RET_1). If there is a short in either of these measurements, then we have a short in the harness - go to step 3. If no issue, go to step 4.
3. Check if the short is from connector going from CCB or the junction in between. Measure continuity between Pins A1 (FAN_RET_0) and B1 (FAN_PWR_0) & Pins A3 (FAN_RET_1) and B3 (FAN_PWR_1). If issue found, you need to replace that harness.
4. If no issues were found in continuity test, replace the fan tray. Also re-enable the Fan 1 from EEPROM register.
5. If the issue persists, replace CCB.
6. Contact ChargePoint for further debugging.

FAN_TRAY2_OVERCURRENT

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

This fault is declared if fan current consumption exceeds 8 A for 100 ms. The Fan Tray is disabled in EEPROM and can only be cleared by a self-test or by an advanced user. Capture the fault in PBC and store the average Fan Tray current value along with maximum current.

Possible Causes

- Short in fan harness
- Shorting of fan winding
- Locked rotor on fan
- CCB failure

Troubleshooting

1. Confirm if there is anything blocking the fan blades from spinning.
2. Check the continuity between Pin 1 (FAN_RET_2) and 2 (FAN_PWR_2) on P110 connector (going to the fans). Also, between Pins 5 (FAN_RET_3) and 6 (FAN_PWR_3). If there is a short in either of these measurements, then we have a short in the harness - go to step 3. If no issue, go to step 4.
3. Check if the short is from P4 connector going from CCB. Measure continuity between Pins A6 (FAN_RET_2) and B6 (FAN_PWR_2) and Pins A8 (FAN_RET_3) and B8 (FAN_PWR_3). If an issue is found, then you need to replace that harness.
4. If no issues were found in continuity test, replace the fan tray. Also re-enable the fan 2 from EEPROM register.
5. If the issue persists, replace CCB.
6. Contact ChargePoint for further debugging.

FAN_TRAY3_OVERCURRENT

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

This fault is declared if fan current consumption exceeds 8 A for 100 ms. The Fan Tray is disabled in EEPROM and can only be cleared by a self-test or by an advanced user. Capture the fault in PBC and store the average Fan Tray current value along with the maximum current.

Possible Causes

- Short in fan harness
- Shorting of fan winding
- Locked rotor on fan
- CCB failure

Troubleshooting

1. Confirm if there is anything blocking the fan blades from spinning.
2. Check the continuity between Pin 1 (FAN_RET_4) and 2 (FAN_PWR_4) on P111 connector (going to fans). Also, between Pins 5 (FAN_RET_5) and 6 (FAN_PWR_5). If there is a short in either of these measurements, then we have a short in the harness - go to step 3. If no issue, go to step 4.
3. Check if the short is from connector going from CCB or the junction in between. Measure continuity between Pins A1 (FAN_RET_4) and B1 (FAN_PWR_4) and Pins A3 (FAN_RET_5) and B3 (FAN_PWR_5). If an issue is found, then that harness need to be replaced.
4. If no issues were found in continuity test, replace the fan tray. Also re-enable the Fan 3 from EEPROM register.
5. If the issue persists, replace CCB.
6. Contact ChargePoint for further debugging.

FAN_TRAY1_OPENCIRCUIT_DETECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

The fault is declared if fan is run at >30% speed but, that fan current is <0.3 A for more than 10 s. This is a warning and not a fault. The system is operated as such until the self-test failure triggers a Service Call for fan tray replacement.

Possible Causes

- Break in harness
- Fan failure
- CCB failure

Troubleshooting

1. Confirm if all the connectors are seated correctly on CCB and at the Wet Zone section.
2. Confirm if there is a break in wire carrying 48 V to fans. Check if the fan voltage on CCB (chassis-shell) reads 48 V. Also confirm by measuring it across Pins 1 and 2 on P109 connector and Pins 5 and 6.
3. If 48 V is not present, it is possible that there is a break in the wire carrying 48 V. Measure continuity from:
    a. Pin A1 on P4 connector (on CCB) to Pin 1 on P109 connector.
    b. Pin B1 on P4 connector (on CCB) to Pin 2 on P109 connector.
    c. Pin A3 on P4 connector (on CCB) to Pin 5 on P109 connector.
    d. Pin B3 on P4 connector (on CCB) to Pin 6 on P109 connector.
4. If there is a break in continuity, then we need to replace the harness to clear the fault.
5. If the fault exists with no failure in continuity, then replace the Fan Tray 1 to fix the issue.
6. If the issue persists after the fan tray replacement, then reach out to ChargePoint for further debugging steps.

FAN1_TRAY1_NO_FEEDBACK

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Minor

Fault Description

The fault is declared if fan is run at >30% speed but, the fan RPM feedback is <2000 for more than 10 s. This is a warning and not a fault.

FAN2_TRAY1_NO_FEEDBACK

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Minor

Fault Description

The fault is declared if fan is run at >30% speed but, the fan RPM feedback is <2000 for more than 10 s. This is a warning and not a Fault.

FAN_TRAY2_OPENCIRCUIT_DETECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

The fault is declared if fan is run at >30% speed but, the fan current is <0.3 A for more than 10 s. This is a warning and not a fault. The system is operated asis until the self-test failure triggers a Service Call for the replacement of the fan tray.

Possible Causes

- Break in harness
- Fan failure
- CCB failure

Troubleshooting

1. Confirm if all the connectors are seated correctly on CCB and at the Wet Zone section.
2. Confirm if there is a break in wire carrying 48 V to the fans. Check if fan voltage on CCB (chassis-shell) reads 48 V. Also confirm by measuring it across Pins 1 and 2 on P110 connector and Pins 5 and 6.
3. If 48 V is not present, it is possible that there is a break in wire carrying 48 V. Measure continuity from:
    a. Pin A6 on P4 connector (on CCB) to Pin 1 on P110 connector..
    b. Pin B6 on P4 connector (on CCB) to Pin 2 on P110 connector.
    c. Pin A8 on P4 connector (on CCB) to Pin 5 on P110 connector.
    d. Pin B8 on P4 connector (on CCB) to Pin 6 on P110 connector.
4. If there is a break in continuity, then we need to replace the harness to clear the fault.
5. If the fault exists with no failure in continuity, then replace the Fan Tray 2 to fix the issue.
6. If the issue persists after fan tray replacement, then reach out to ChargePoint for further debugging steps.

FAN1_TRAY2_NO_FEEDBACK

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Minor

Fault Description

The fault is declared if the fan is run at >30% speed but, the fan RPM feedback is <2000 for more than 10 s. This is a warning and not a fault.

FAN2_TRAY2_NO_FEEDBACK

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Minor

Fault Description

The fault is declared if the fan is run at >30% speed but, the fan RPM feedback is <2000 for more than 10 s. This is a warning and not a fault.

FAN_TRAY3_OPENCIRCUIT_DETECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

The fault is declared if the fan is run at >30% speed but, the fan current is <0.3 A for more than 10 s. This is a warning and not a fault. The system is operated as is until the self-test failure triggers a Service Call for the fan tray's replacement.

Possible Causes

- Break in harness
- Fan failure
- CCB failure

Troubleshooting

1. Confirm if all the connectors are seated correctly on CCB and at the Wet Zone section.
2. Confirm if there is a break in wire carrying 48 V to fans. Check if the fan voltage on CCB (chassis-shell) is read 48 V. Also confirm by measuring it across Pins 1 and 2 on P111 connector and Pins 5 and 6.
3. If 48 V is not present, it is possible that there is a break in wire carrying 48 V. Measure continuity from:
    a. Pin A1 on P4 connector (on CCB) to Pin 1 on P111 connector.
    b. Pin B1 on P4 connector (on CCB) to Pin 2 on P111 connector.
    c. Pin A3 on P4 connector (on CCB) to Pin 5 on P111 connector.
    d. Pin B3 on P4 connector (on CCB) to Pin 6 on P111 connector.
4. If there is a break in continuity, then we need to replace the harness to clear the fault.
5. If the fault exists with no failure in continuity, then replace the Fan Tray 3 to fix the issue.

COOLANT_LEVEL_SENSOR_DISCONNECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

This fault is declared when coolant sensor goes undetected for 120 s. This is a warning and does not stop system operation.

Possible Causes

- Break in harness
- Sensor failure

- CCB failure

COOLANT_LEVEL_LOW

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

This fault is declared when coolant sensor detects coolant level is below its LOW threshold for 120 s. This is a warning and does not affect system operation.

A Service call is automatically created when it fails during self-test.

Possible Causes

- Coolant level is low
- Coolant sensor failure.
- CCB failure

Troubleshooting

1. Check the coolant level in the reservoir and make sure it is topped up (if low).
2. If the coolant level is high and system still shows the fault, then make sure the sensor is still in its place and aligned the right way. Instances where the actual level sensing plate is wrongly fitted resulting in this error have been seen in the past.
3. Harness breaking and CCB failure should not result in this failure - highly unlikely but, cannot be ruled out. Contact ChargePoint for further debugging steps.

RTD_HX_INLET_DISCONNECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

This fault is declared when temperature sensor at the HEX inlet reports >100 °C for 10 s. This is a warning and does not affect the system operation.

Service call is automatically created when it fails during self-test.

Possible Causes

- Harness failure.
- Sensor failure.
- CCB failure.

Troubleshooting

1. Measure the continuity between Pins A4 and B4 on P5 connector going to CCB. If it measures an open, then issue is with the harness and needs replacement.
2. Inspect the connector on the Inlet RTD for any obvious disconnect or damage. If no issues, then the sensor might have failed. Contact ChargePoint for further steps.

RTD_HX_INLET_SHORTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

This fault is declared when temperature sensor at the HEX inlet reports -40 °C for 10 s. This is a warning and does not affect the system operation.

Service call is automatically created when it fails during self-test.

Possible Causes

- Harness failure
- Sensor failure
- CCB failure

Troubleshooting

1. Measure the continuity between Pins A4 and B4 on P5 connector going to CCB. If it measures a short, then the issue is with the harness and needs replacement.
2. Inspect the connector on the Inlet RTD for any obvious disconnect or damage. If there are no issues, then the sensor might have failed. Contact ChargePoint for further steps.

RTD_HX_OUTLET_DISCONNECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

This fault is declared when temperature sensor at the HEX outlet reports >100 °C for 10 s. This is a warning and does not affect the system operation.

Service call is automatically created when it fails during self-test.

Possible Causes

- Harness failure
- Sensor failure
- CCB failure

Troubleshooting

1. Measure the continuity between Pins A5 and B5 on P5 connector going to CCB. If it measures an open, then issue is with the harness and needs replacement.
2. Inspect the connector on the HEX Outlet RTD for any obvious disconnect or damage. If no issues, then sensor might have failed. Contact ChargePoint for further steps.

RTD_HX_OUTLET_SHORTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

This fault is declared when temperature sensor at the HEX outlet reports -40 °C for 10 s. This is a warning and does not affect the system operation.

Service call is automatically created when it fails during self-test.

Possible Causes

- Harness failure
- Sensor failure
- CCB failure

Troubleshooting

1. Measure the continuity between Pins A5 and B5 on P5 connector going to CCB. If it measures a short, then the issue is with the harness and needs replacement.
2. Inspect the connector on the HEX Outlet RTD for any obvious disconnect or damage. If no issues, then the sensor might have failed. Contact ChargePoint for further steps.

RTD_WETZONE_AMB_DISCONNECTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

This fault is declared when wetzone ambient RTD reports >100 °C for 10 s. This is a warning and does not affect the system operation.

Service call is automatically created when it fails during self-test.

Possible Causes

- Harness failure
- Sensor failure
- CCB failure

Troubleshooting

1. Measure the continuity between Pins A6 and B6 on P5 connector going to CCB. If it measures an open, then the issue is with the harness and needs replacement.
2. Inspect the connector on the Ambient Wetzone RTD for any obvious disconnect or damage. If no issues, then the sensor might have failed. Contact ChargePoint for further steps.

RTD_WETZONE_AMB_SHORTED

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Major

Fault Description

This fault is declared when temperature sensor at the HEX inlet reports -40 °C for 10 s. This is a warning and does not affect the system operation.

Service call automatically created when it fails during self-test.

Possible Causes

- Harness failure
- Sensor failure
- CCB failure

Troubleshooting

1. Measure the continuity between Pins A6 and B6 on P5 connector going to CCB. If it measures an short, then the issue is with the harness and needs replacement.
2. Inspect the connector on the Ambient Wetzone RTD for any obvious disconnect or damage. If no issues, then the sensor might have failed. Contact ChargePoint for further steps.

CCB_BOARD_TEMP

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

The temperature sensing chip on CCB board reports board temperature as >80 °C. This is a warning and the system operates normally.

Service call is created automatically.

Possible Causes

- Temp sensor is stuck in a bad state
- I2C chip measuring this temp has failed on CCB

Troubleshooting

1. I2C chip measures this board temperature, so it is possible that it is stuck at a certain value. Reboot the CCB to see if the issue goes away (recommend Hard Power Cycle).
2. If the issue persists over power cycle, then replace the CCB board to fix the issue.

   Contact ChargePoint if the issue persists.

CCB_12V_SUPPLY

Category	Fault Source	Fault Type	Criticality
Cooling	CCB	Hardware	Critical

Fault Description

12 V supply on CCB is used to control MOSFETs that turn ON/OFF the pump and fans. If this 12 V goes out of spec, DSP_12V_PGOOD signal goes low and then this fault is declared..

Possible Causes

- DSP stuck at some point
- Failure on CCB board

Troubleshooting

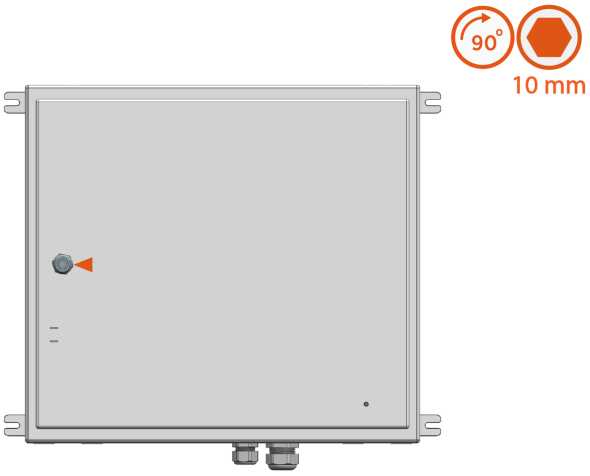
1. Power cycle to confirm if DSP is just stuck at some point bringing this 12 V down. If the issue persists after the power cycle then, see the following steps.
2. Replace CCB to fix the issue.
3. Contact ChargePoint if the issue persists.

PD Controller Troubleshooting 6

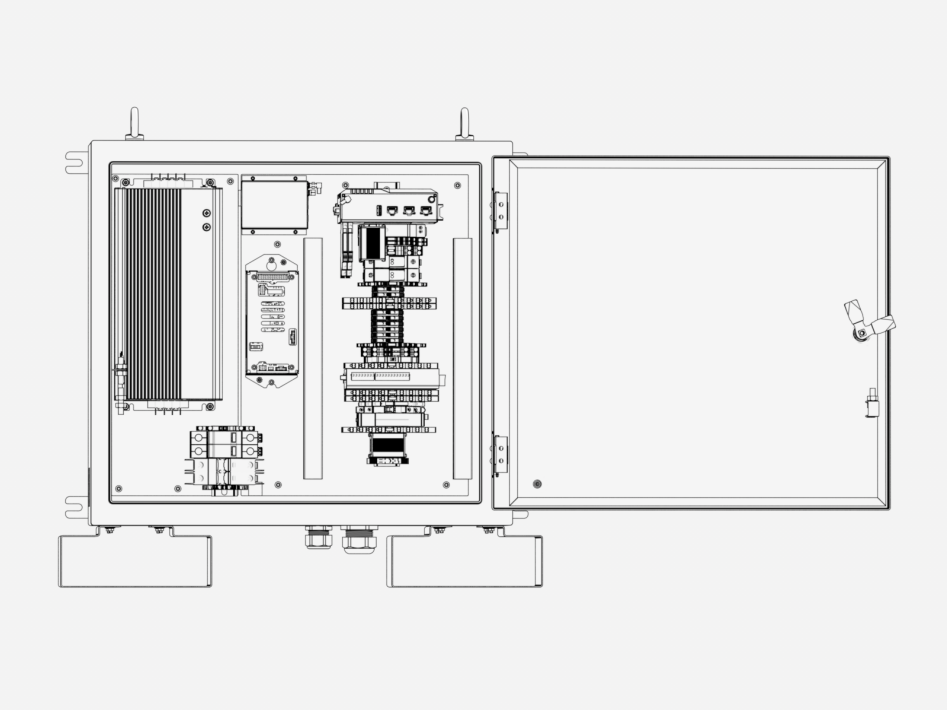
This section is aimed to help Industrial Support Engineers, field technicians, and the Commissioning team in identifying problems and performing initial debug of problems related to the PD Controller.

Open PD Controller

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

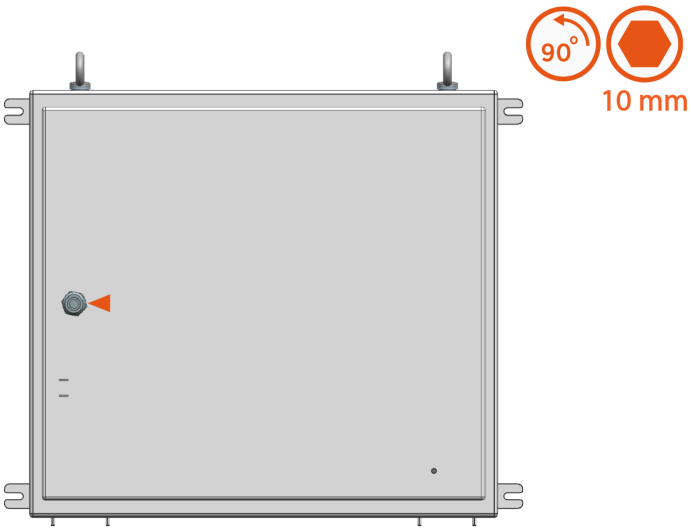


2. Open the door.



Close PD Controller

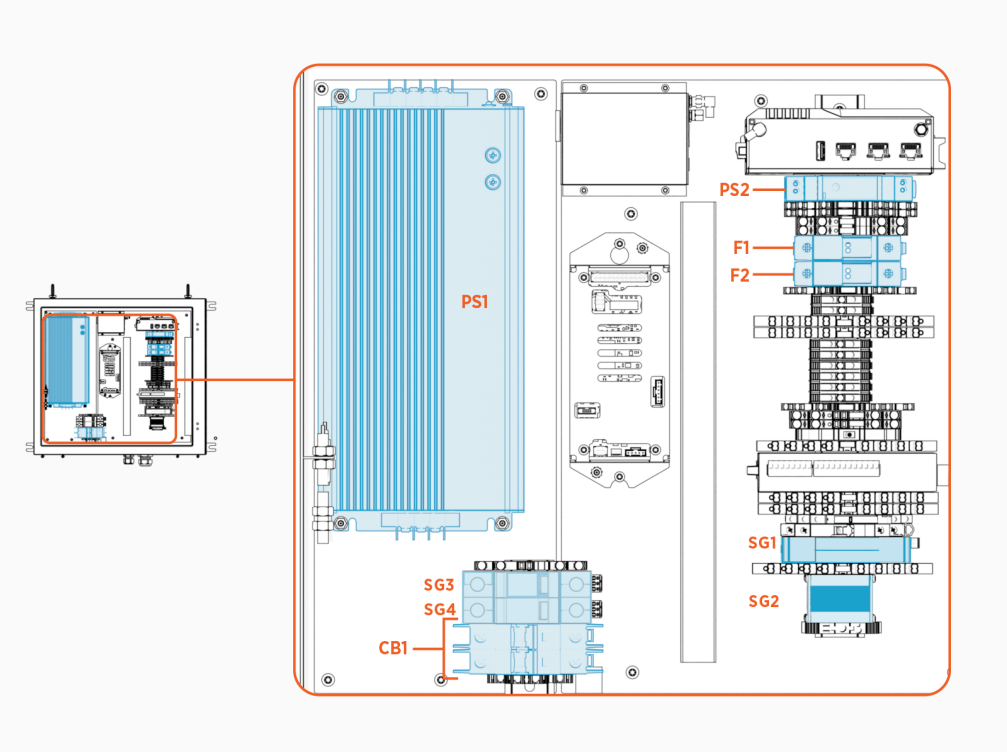
Close the PD Controller and quarter turn the door latch.



PD Controller Components

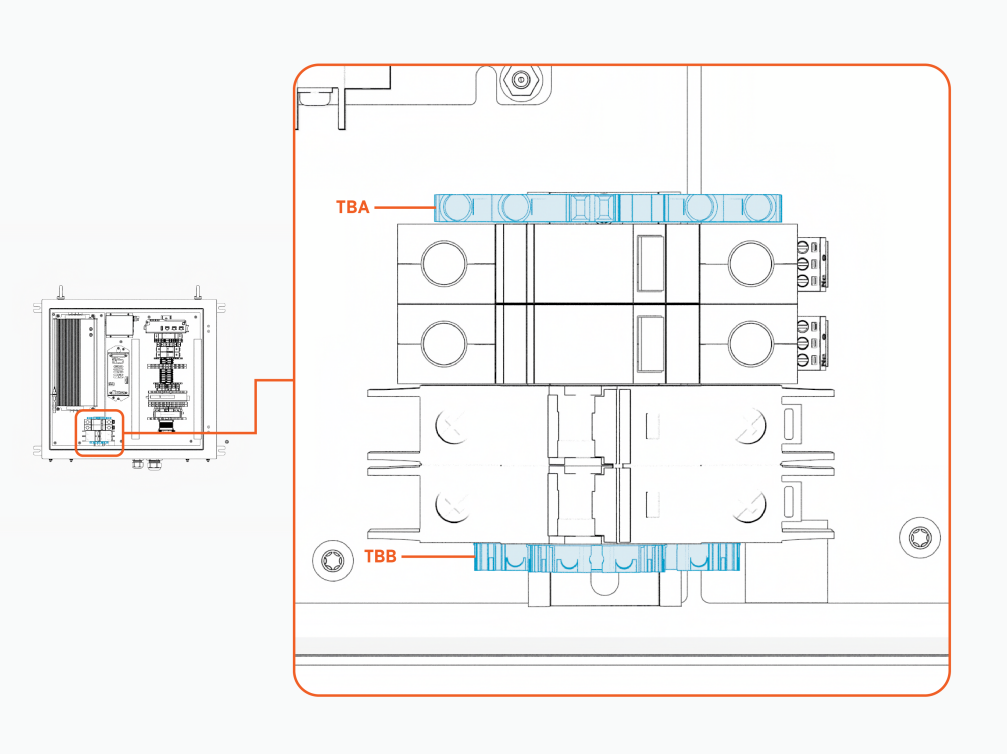
This section covers the PD Controller components.

Power and Protection Components

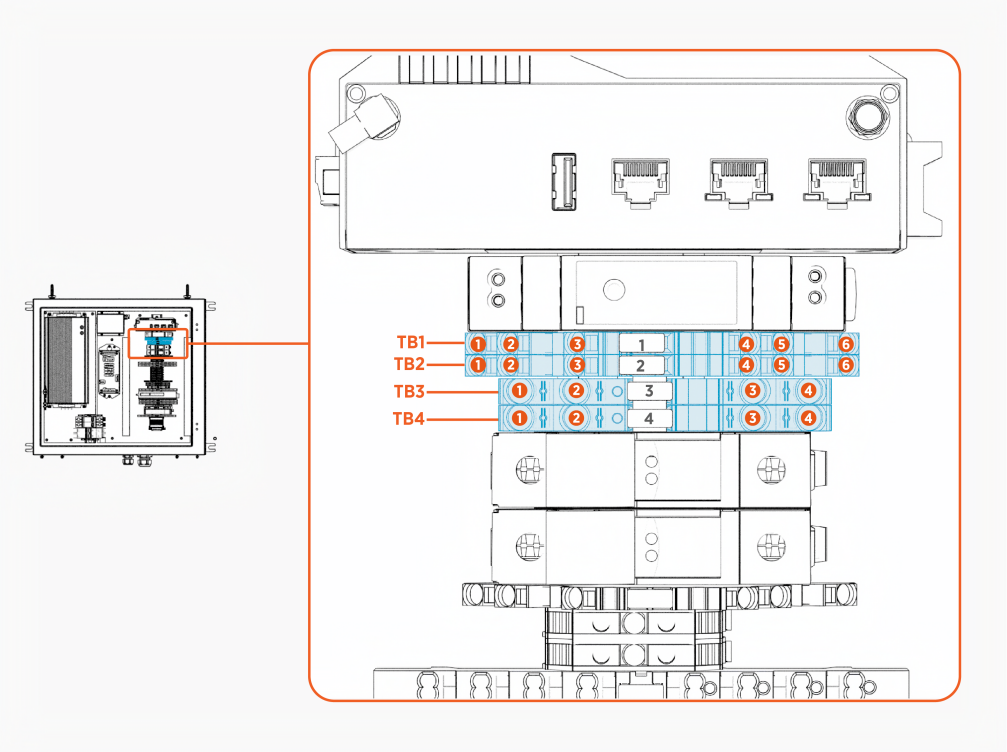


Symbol	Component Type	Color	Description
CB1	Circuit Breaker	WHITE	Circuit breaker and field landing for AC power (L/N)
PS1	Power Supply	SILVER	24 V system power supply
PS2	Power Supply	DARK GRAY	24 V-to-5 V RFID reader power supply
F1	Fuse	WHITE	Low current 24 V fuse; protection for pantograph
F2	Fuse	WHITE	High current 24 V fuse; protection for pantograph
SG1	Surge Protection	GRAY	Surge protection for 48 V from Power Link
SG2	Surge Protection	BLUE	Field landing and surge protection for Ethernet from Power Link
SG3	Surge Protection	GRAY	Surge protection for AC power (L)
SG4	Surge Protection	GRAY	Surge protection for AC power (N)

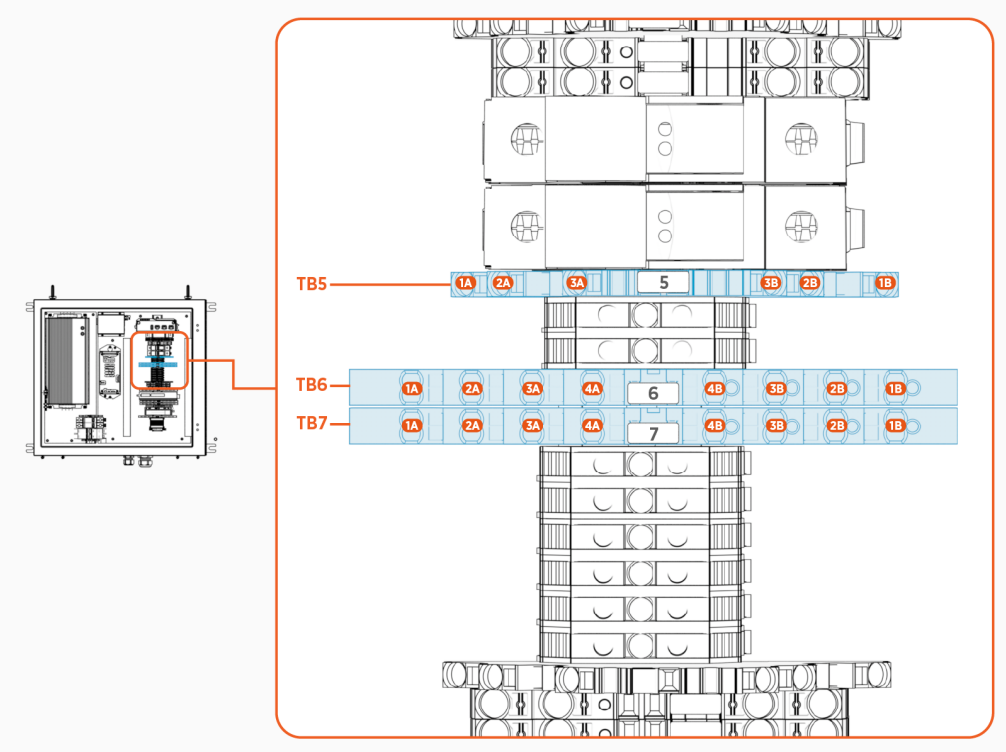
Terminal Block Components



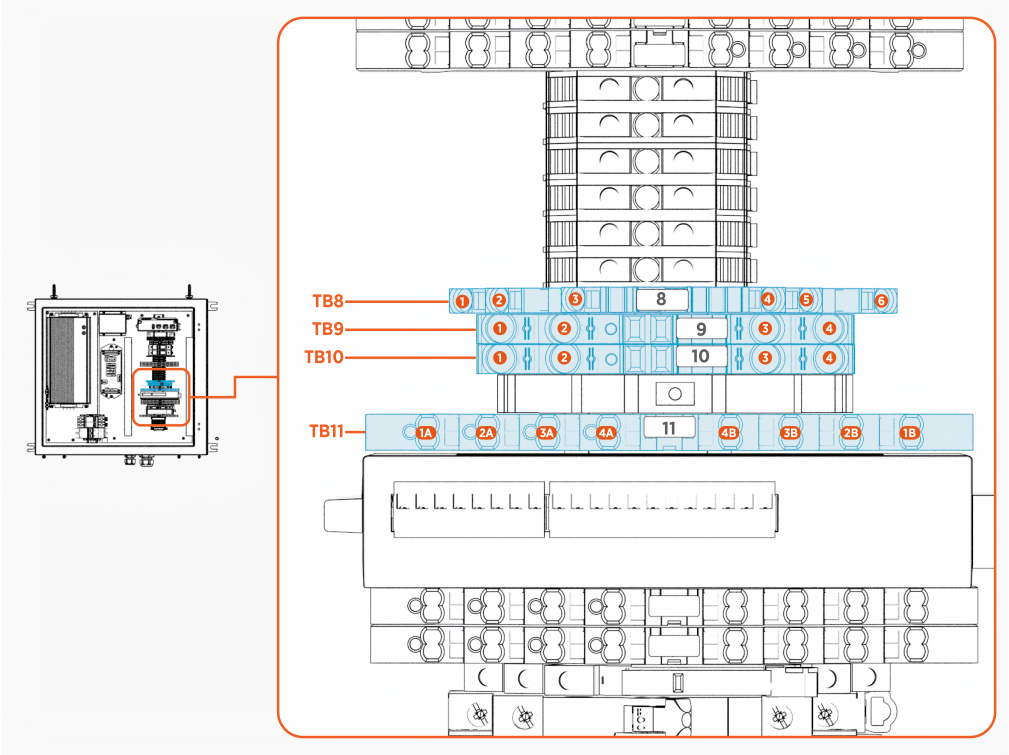
Symbol	Component Type	Color	Description
TBA	Terminal Block	GREEN/YELLOW	AC power Protective Earth (PE) distribution
TBB	Terminal Block	GREEN/YELLOW	Field landing for AC power Protective Earth (PE)



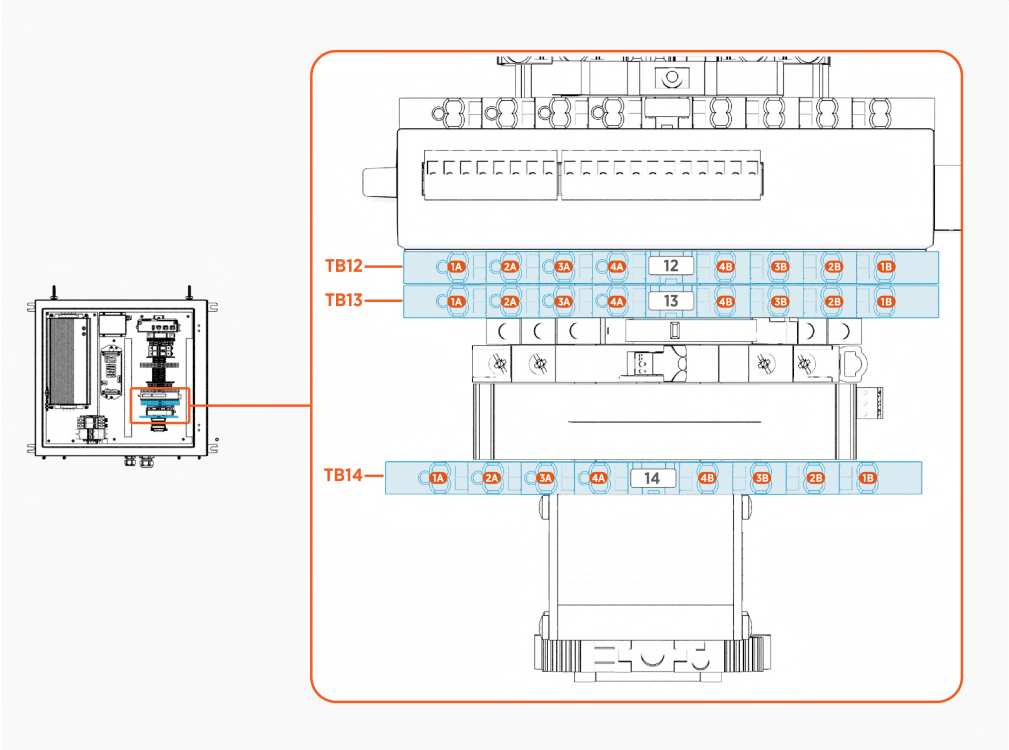
Symbol	Component Type	Color	Description
TB1	Terminal Block	GREEN/YELLOW	System ground distribution
TB2	Terminal Block	GREEN/YELLOW	System ground distribution and field landing from Power Link
TB3	Terminal Block	GRAY	24 V power distribution
TB4	Terminal Block	GRAY	24 V power distribution



Symbol	Component Type	Color	Description
TB5	Terminal Block	BLUE	Field landing for Control Pilot (CP)
TB6	Terminal Block	BLUE	Field landing for status LED
TB7	Terminal Block	BLUE	Field landing for status LED

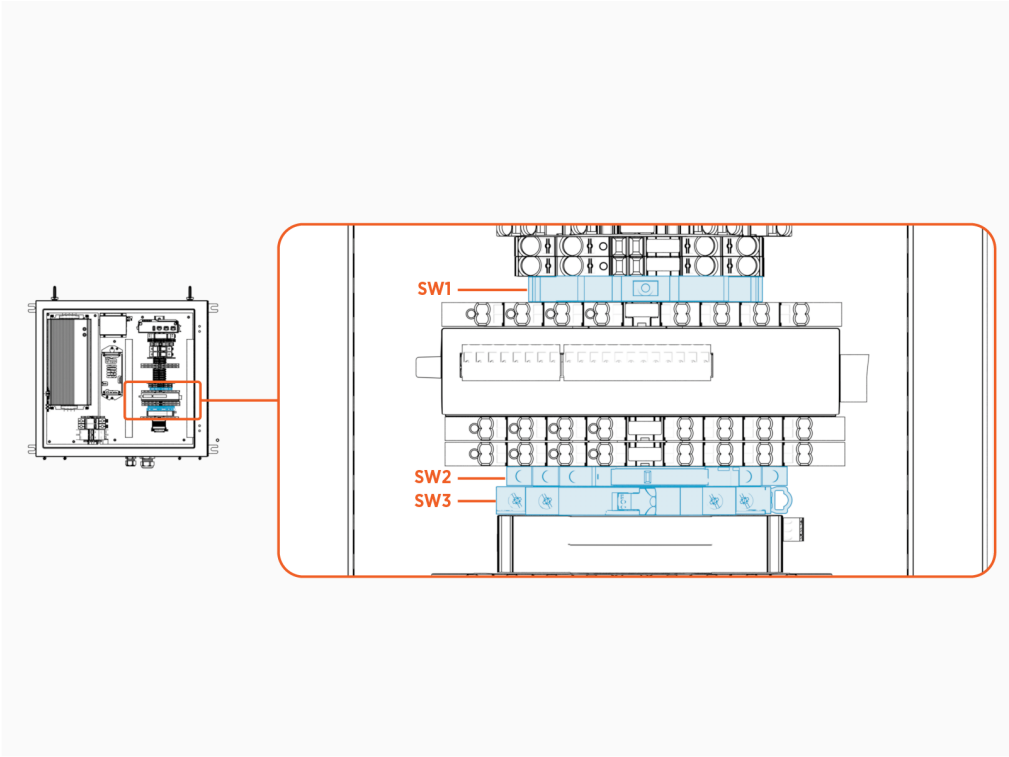


Symbol	Component Type	Color	Description
TB8	Terminal Block	GREEN/YELLOW	Field landing for system ground to pantograph
TB9	Terminal Block	BLUE	Field landing for low current 24V to pantograph
TB10	Terminal Block	RED	Field landing for high current 24V to pantograph
TB11	Terminal Block	WHITE	Field landing for pantograph status signals



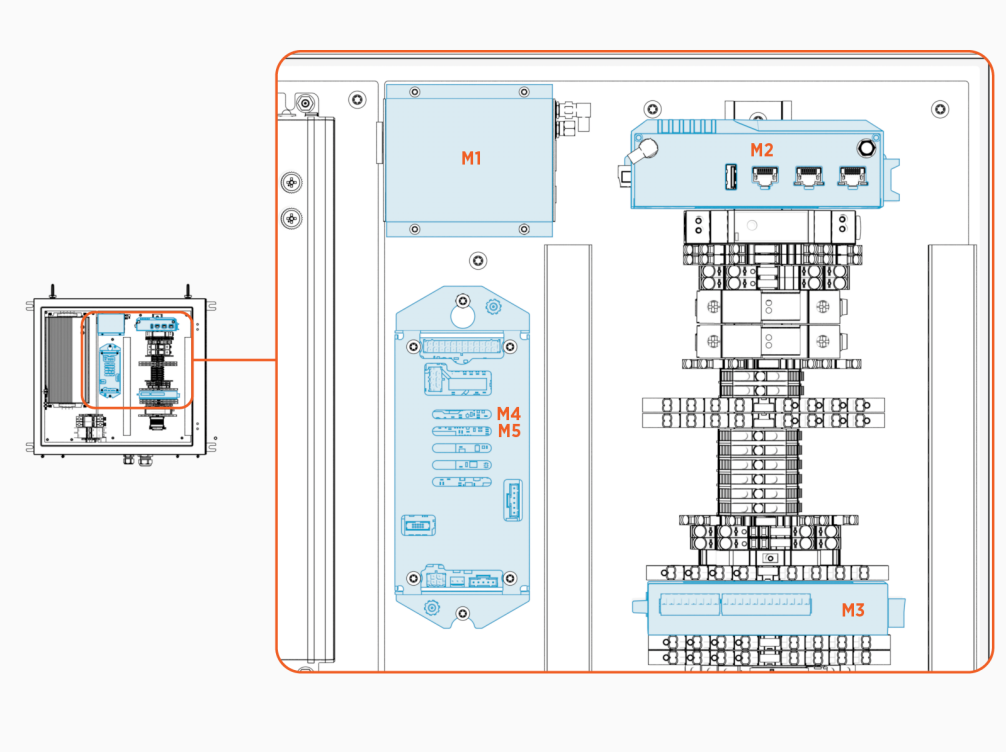
Symbol	Component Type	Color	Description
TB12	Terminal Block	GRAY	Field landing for pantograph control signals
TB13	Terminal Block	GRAY	Field landing for pantograph control signals
TB14	Terminal Block	WHITE	Field landing for 48 V from Power Link

Control Switch Components



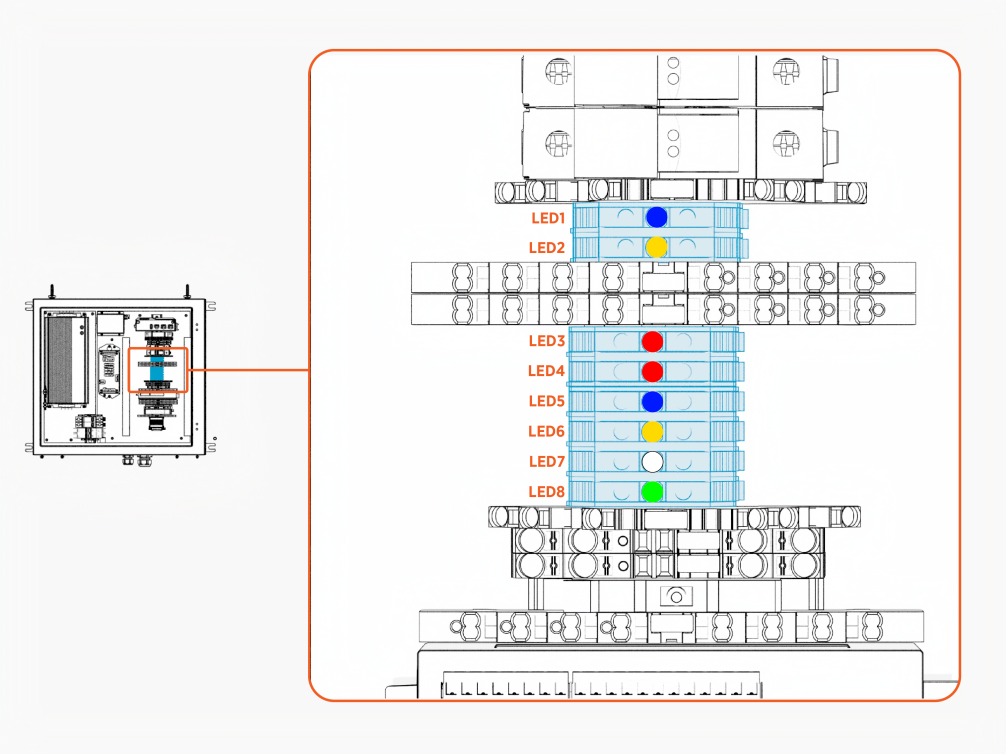
Symbol	Component Type	Color	Description
SW1	Switch	GRAY	Pantograph manual operation switch
SW2	Switch	BLACK	24 V power supply enable relay
SW3	Switch	GRAY	24 V power supply enable manual override

Critical Modules



Symbol	Component Type	Color	Description
M1	Module	GRAY	EV RFID tag reader
M2	Module	BLACK	Wi-Fi Access Point for EV-to-EVSE charging communication
M3	Module	GRAY	24 V digital signal interface from SEVB to pantograph
M4	Module	SILVER	SEVB-USC; controller board for the system
M5	Module	SILVER	External status LED driver board

Signal LEDs



Symbol	Component Type	Color	Description
LED1	LED	BLUE	Request Raise/Retract status light
LED2	LED	YELLOW	Request Lower/Extend status light
LED3	LED	RED	High current 24 V status light
LED4	LED	RED	Low current 24 V status light
LED5	LED	BLUE	Raised/Retracted status light
LED6	LED	YELLOW	Lowered/Extended status light
LED7	LED	WHITE	Reserved for future use
LED8	LED	GREEN	Rest position sensor status light

PD Controller Faults

This section lists the PD Controller faults.

The PD Controller is also referred to as Universal Smart Charging Interface (USCI) for the Pantograph Down 2000 system.

urn:fault:usci:ac-surge-replacement-needed

Fault Description

AC surge protector is damaged and needs to be replaced.

Category	Fault Source	Fault Type	Criticality
USCI Surge Protection	USCI	Hardware	Minor

Possible Causes

- Electrical surge
- Terminal plug is not fully seated
- Poor/missing wiring

Troubleshooting

1. Check status window on AC surge suppressors (SG3, SG4). Replace the surge cartridge if the status window is RED.
2. Check that the GREEN, three screw-terminal plugs are fully seated in the AC surge suppressor assemblies (SG3, SG4). Push so that it sits flush with the module.
3. Push-pull check that two wires are clamped in the outside terminals marked **Nc** and **C** on both AC surge suppressors (SG3, SG4).
4. If fault still exists, re-seat the surge cartridges, ensuring cartridges are fully inserted with no gap or misalignment.

urn:fault:usci:door-open

Fault Description

USCI door is open.

Category	Fault Source	Fault Type	Criticality
USCI Door	USCI	Hardware	Critical

Possible Causes

- USCI door open
- Magnet and sensor misaligned
- Door sensor defective/damaged

Troubleshooting

1. Confirm USCI door is closed and locked.
2. Confirm that when door closes, the magnet on the door is close in height (but not overlapping) to the corresponding sensor on the enclosure.
3. Check that the magnet has the potted end facing downwards.
4. Check for wiring continuity from the door sensor to SEVB (M4) J5 (24-pin connector).

urn:fault:usci:48v-surge-replacement-needed

Fault Description

48V surge protector in the USCI is damaged and needs to be replaced.

Category	Fault Source	Fault Type	Criticality
USCI Surge Protection	USCI	Hardware	Minor

Possible Causes

- Electrical surge
- Terminal plug is not fully seated
- Poor/missing wiring

Troubleshooting

1. Check that the GREEN, three screw-terminal plug is fully seated in the 48 V surge suppressor assembly (SG1). Push so that it sits flush with the module.
2. Push-pull check that two wires are clamped in the bottom two screw terminals on the 48 V surge suppressor.
3. Check resistance between bottom two screw terminals with it firmly inserted into the surge suppressor assembly. If high resistance, replace the 48 V surge cartridge.

urn:fault:usci:io-module-unreachable

Fault Description

IO module cannot be reached via the SEVB interface.

Category	Fault Source	Fault Type	Criticality
USCI Pantograph Interface	USCI	Hardware/Software	Critical

Possible Causes

- IO module (M3) defective/damaged
- Ethernet cable defective/damaged
- Access Point (M2) defective/damaged
- Software issue
- Poor/missing electrical connection

Troubleshooting

1. If urn:fault:usci:wireless-ap-unreachable is present, resolve that fault first and check if io-module-unreachable fault is still present.
2. If fault occurred after SW update, revert SW.
3. Check that the Ethernet cable is securely connected from wireless AP (M2) LAN2 to IO module (M3) port 2.
4. If none of the status lights on the IO module (M3) are on when the USCI is powered, check that there is 24 V across V+ to V- and V+ to PE on M3. Wires may have gotten disconnected and need to be reterminated.
5. Replace the IO module (M3).

6. Replace the wireless AP (M2).
7. Replace the Ethernet cable between wireless AP (M2) and IO module (M3)

urn:fault:usci:wireless-ap-unreachable

Fault Description

AP cannot be reached via the SEVB interface.

Category	Fault Source	Fault Type	Criticality
USCI Wi-Fi Interface	USCI	Hardware/Software	Critical

Possible Causes

- Ethernet cable defective/damaged
- Access Point (M2) defective/damaged
- Software issue
- Poor/missing electrical connection

Troubleshooting

1. If fault occurred after SW update, revert SW.
2. If none of the status lights on the AP module (M2) are on when the USCI is powered, check that there is 24 V across PWR1+ to PWR1-. Wires may have gotten disconnected and need to be reterminated.
3. Check the Ethernet cable is securely connected from SEVB J9 (6-pin connector on M4) to LAN1 on the AP (M2).
4. Replace the Ethernet cable from SEVB J9 (6-pin connector on M4) to LAN1 on the AP (M2).
5. Replace the AP module (M2).

urn:fault:usci:rfid-reader-unreachable

Fault Description

RFID reader cannot be reached via the SEVB interface.

Category	Fault Source	Fault Type	Criticality
USCI RFID Interface	USCI	Hardware/Software	Major

Possible Causes

- RFID module (M1) defective/damaged
- IO module (M3) defective/damaged
- Ethernet cable defective/damaged
- Access Point (M2) defective/damaged
- 5 V Power Supply PS2 defective/damaged

- Software issue
- Poor/missing electrical connection

Troubleshooting

1. If wireless-ap-unreachable fault is present, resolve that fault first.
2. If io-module-unreachable fault is present, resolve that fault first.
3. If there are no visible lights on the RFID module (M1) -- LEDs are located near the power connector -- check for 5V across +Vo and -Vo on PS2 and check that the barrel plug is fully seated in the +5 VDC port of the RFID module. If 5 V is not present across +Vo and -Vo on PS2, check that the wires are terminated securely on both the input and output side of the power supply. If measuring 24V across +VIn and -VIn on PS2 and not measuring 5 V across +Vo and -Vo, disconnect the power plug from the RFID module M1. If +Vo to -Vo is still not measuring 5 V, replace PS2.
4. Check for secure Ethernet connection from RFID module (M1) LAN to IO module (M3) Port 1.
5. Replace the RFID module (M1).
6. Replace the IO module (M3).
7. Replace the Ethernet cable from RFID module (M1) LAN to IO module (M3) Port 1.

urn:fault:usci:pantograph-retract-timeout

Fault Description

Retracted signal not observed within 19 seconds of commanding the panto to retract.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Minor

Possible Causes

- Pantograph defective/damaged
- IO module (M3) defective/damaged
- Poor electrical connection - pantograph supply voltage may be too low

Troubleshooting

1. If pantograph-retract-timeout-critical is present, resolve that fault first.
2. Visually inspect pantograph for anything impeding retraction. Remove any impediments.
3. Service pantograph to ensure it is performing nominally.
4. Check the quality of the connections at TB10 and at all of the TB8 connections. Check connection quality at both ends of fuse holder F2. Check connection quality at the primary power supply (PS1) +V and -V.

urn:fault:usci:pantograph-extend-timeout

Fault Description

Extended signal not observed within 19 seconds of commanding the panto to extend.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Minor

Possible Causes

- Pantograph defective/damaged
- IO module (M3) defective/damaged
- Poor electrical connection - pantograph supply voltage may be too low

Troubleshooting

1. If pantograph-extend-timeout-critical is present, resolve that fault first.
2. Visually inspect pantograph for anything impeding extension. Remove any impediments.
3. Service pantograph to ensure it is performing nominally.
4. Check the quality of the connections at TB10 and at all of the TB8 connections. Check connection quality at both ends of fuse holder F2. Check connection quality at the primary power supply (PS1) +V and -V.

urn:fault:usci:pantograph-retract-timeout-critical

Fault Description

Retracted signal not observed within 20 seconds of commanding the panto to retract. (20 seconds required by V2G_SECC_ACD_Disconnection_Timeout in V2G2-OC-724 of SAE J3105:2023).

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Critical

Possible Causes

- Pantograph defective/damaged - pantograph may not be receiving request retract signal or signaling retracted correctly.
- IO module (M3) defective/damaged - request retract signal may not be driven correctly or the retracted signal may not be detected correctly.
- Poor/missing electrical connection - connection path from pantograph to the IO module (M3) can be broken on request retract signal or retracted signal.

Troubleshooting

1. If Pantograph isn't retracting/raising at all and is stuck in the extended position, reboot the Power Link to disable power on the USCI, which removes power to the Pantograph. If the Pantograph does not retract at this time, the Pantograph must be serviced. When the Pantograph loses power, it will retract without any signaling from the USCI.

2. If the Pantograph isn't retracting/raising as expected but then retracts when the PL is rebooted in step 1, then the "request retract" signal may not be properly received by the Pantograph. Check that BLUE LED1 is lit when trying to retract the Pantograph (i.e. via manual operation). If it isn't, check the voltage across LED1. If 24V, replace the LED. If less than 5V, check that the BLUE/WHITE striped wire from the interface cable is terminated securely at TB13 4B and that TB13 4A is securely connected to IO module (M3) DO 0. If TB13 4B is ~0 ohms to IO module (M3) DO 0 and the voltage is less than 5V across LED1, replace the IO module (M3). If the voltage is instead 24V, then the interface cable needs to be checked for continuity from the striped BLUE/WHITE bare wire to pin 8 on the Harting connector at the Schunk pantograph. If full connection path looks good, then service the Pantograph electrical system.
3. If this fault is raised and the Pantograph appears to be retracting normally, check that the BLUE LED5 is lit when the Pantograph is fully raised. If it isn't, check the voltage across LED5. If 24V, replace the LED. If 24V is measred at M3 DI 2 and panto operation is as expected, replace the IO module (M3). If less than 5V, check that the solid BLUE wire from the interface cable is terminated securely at TB11 4B and that TB11 4A is securely connected to IO module (M3) DI 2. If TB11 4B is ~0 ohms to IO module (M3) DI 2, then the interface cable needs to be checked for continuity from the solid BLUE bare wire to pin 6 on the Harting connector at the Schunk pantograph. Otherwise, if seeing less than 5V at M3 and full connection path looks good, then service the Pantograph.

urn:fault:usci:pantograph-extend-timeout-critical

Fault Description

Extended signal not observed within 20 seconds of commanding the panto to extend and retract the Pantograph. (20 seconds required by V2G_SECC_ACD_Connection_Timeout in V2G2-OC-704 of SAE J3105:2023)

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Critical

Possible Causes

- Pantograph defective/damaged - Pantograph may not be receiving request extend signal or signaling extended correctly.
- IO module (M3) defective/damaged - request extend signal may not be driven correctly or the extended signal may not be detected correctly.
- Poor/missing electrical connection - connection path from Pantograph to the IO module (M3) can be broken on request extend signal or extended signal.

Troubleshooting

1. If the Pantograph isn't extending/lowering as expected then the request extend signal may not be properly received by the Pantograph. Check that YELLOW/amber LED2 is lit when trying to extend the Pantograph (i.e. via manual operation). If it isn't, check the voltage across LED2. If 24 V, replace the LED. If less than 5 V, check that the YELLOW/WHITE striped wire from the interface cable is terminated securely at TB13 3B and that TB13 3A is securely connected to IO module (M3) DO 1. If TB13 3B is ~0 ohms to IO module (M3) DO 1 and the voltage is less than 5V across LED2, replace the IO module (M3). If the voltage is instead 24 V, then the interface cable needs to be checked for continuity from the striped YELLOW/WHITE bare wire to pin 9 on the Harting connector at the Schunk pantograph. If full connection path looks good, then service the Pantograph electrical system.

2. If this fault is raised and the Pantograph appears to be extending normally, check that the YELLOW LED6 is lit when the Pantograph is fully lowered. If it isn't, check the voltage across LED6. If 24 V, replace the LED. If 24 V is measured at M3 DI 3 and panto operation is as expected, replace the IO module (M3). If less than 5 V, check that the solid YELLOW wire from the interface cable is terminated securely at TB11 3B and that TB11 3A is securely connected to IO module (M3) DI 3. If TB11 3B is ~0 ohms to IO module (M3) DI 3, then the interface cable needs to be checked for continuity from the solid YELLOW bare wire to pin 7 on the Harting connector at the Schunk pantograph. Otherwise, if seeing less than 5 V at M3 and full connection path looks good, then service the Pantograph.

urn:fault:usci:pantograph-rest-sensor-error

Fault Description

Rest sensor not active when Pantograph is signaling retracted.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Critical

Possible Causes

- Pantograph retraction physically impeded
- IO module (M3) defective/damaged - rest sensor signal may not be detected correctly
- Missing/broken electrical connection from Pantograph rest sensor to IO module (M3)
- Rest sensor on pantograph defective/damaged

Troubleshooting

1. If Pantograph is not fully retracting to the home/rest position, remove any obstacle or impediment.
2. If Pantograph is not fully retracting to the home/rest position and there are no restrictions, service the pantograph.
3. If this fault is raised and the Pantograph appears to be fully retracted to the home/rest position, check that the GREEN LED8 is lit when the pantograph is fully raised. If it isn't, check the voltage across LED8. If 24 V, replace the LED. If 24 V is measured at M3 DI 5, replace the IO module (M3). If less than 5 V, check that the GREEN/BLUE striped wire from the interface cable is terminated securely at TB11 1B and that TB11 1A is securely connected to IO module (M3) DI 5. If TB11 1 is ~0 ohms to IO module (M3) DI 5, then the interface cable needs to be checked for continuity from the GREEN/BLUE striped bare wire to pin 4 on the 4-pin M12 connector at the Schunk pantograph. Next, check that 24 V is present on TB9 3. If not, check the fuse at F1 and the connection from TB9 to F1. If yes, check that 24 V is present along the interface cable to the rest sensor relative to the ground fed to the rest sensor. If seeing less than 5 V at M3 and full connection path for 24 V, ground, and signal to the sensor looks good, then service the Pantograph.

urn:fault:usci:pantograph-extended-lost

Fault Description

Pantograph was extended and then lost the extended signal without any retraction command.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Critical

Possible Causes

- Pantograph defective/damaged - Extended signal not driven correctly
- Missing/broken electrical connection from Pantograph to IO module (M3) - Extended signal
- IO module (M3) defective/damaged - Extended signal not read correctly

Troubleshooting

Manually extend the Pantograph; at full extension, check that the YELLOW/amber LED6 is on. If it isn't, check the voltage across LED6. If 24V, replace the LED. If 24V is measured at M3 DI 3 and an extension fault is present, replace the IO module (M3). If less than 5V is measured at M3 DI 3, check continuity from M3 DI 3 to TB11 3B, tracing the solid YELLOW wires. If continuity looks good, then check resistance from the field-landed solid YELLOW bare wire to pin 7 on the Harting connector at the pantograph. If that looks good, then service the Pantograph.

urn:fault:usci:pantograph-retracted-lost

Fault Description

Pantograph was retracted and then lost the retracted signal without any extension command.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Major

Possible Causes

- Pantograph defective/damaged - Retracted signal not driven correctly
- Missing/broken electrical connection from pantograph to IO module (M3) - Retracted signal
- IO module (M3) defective/damaged - Retracted signal not read correctly

Troubleshooting

Manually retract the Pantograph; at full retraction, check that the BLUE LED5 is on. If it isn't, check the voltage across LED5. If 24V, replace the LED. If 24V is measured at M3 DI 2 and a retraction fault is present, replace the IO module (M3). If less than 5V is measured at M3 DI 2, check continuity from M3 DI 2 to TB11 4B, tracing the solid BLUE wires. If continuity looks good, then check resistance from the field-landed solid BLUE bare wire to pin 6 on the Harting connector at the pantograph. If that looks good, then service the Pantograph.

urn:fault:usci:pantograph-unknown-position

Fault Description

No active Extended signal and no rest sensor signal a significant amount of time after commanding in a certain direction. Pantograph shall always be either in the home/rest position or the fully extended position in steady state. If pantograph is not in either of these states 30 seconds after the last pantograph movement command is sent and the pantograph position is unknown.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Critical

Possible Causes

- Fuse(s) blown
- Other Pantograph fault present

Troubleshooting

1. Address any other faults first.
2. Check fuses F1 and F2 and replace as necessary.
3. Check for 24 V from TB9 4 and TB9 3 to TB8 4. Check for 24 V from TB10 4 to TB8 5. If 24 V not present, check wiring.
4. Check for 24 V at the Pantograph Harting connector from Pin 1 to Pin 2 and from Pin 3 to Pin 4. If not present but present at the USCI, replace the interface cable or resolve connection issues. If both 24 V are validated at the connector and this fault is still present, service the Pantograph.

urn:fault:usci:pantograph-stuck-at-rest-position

Fault Description

Rest position active but Retracted signal is not present.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Critical

Possible Causes

- Pantograph extension is physically impeded
- Pantograph signalling defective/damaged - Retracted signal not driven correctly
- IO module (M3) defective/damaged - Retracted signal not read correctly
- Missing/broken electrical connection from pantograph to IO module (M3) - Retracted signal

Troubleshooting

1. Remove any objects that impede the pantograph's ability to lower.
2. If fault is present when pantograph is not in the fully raised position, check if GREEN LED8 is brightly lit with the pantograph lowered. If yes, the voltage across it will measure 24V. Disconnect the striped GREEN/BLUE wire from TB11 1B. If the LED turns off/dim, the pantograph rest sensor needs to be serviced. If LED8 remains brightly lit with the GREEN/BLUE striped wire on TB11 1B disconnected, validate the voltage is 24V, check for any miswiring that would short the signal to 24V. Then, replace the IO module (M3).
3. If LED8 is dim/off with the pantograph lowered and the fault present, measure the voltage across LED8. If 24V, replace the LED and check step 2. If less than 5V, replace the IO module (M3).
4. If fault is raised with pantograph in the fully raised position, check if BLUE LED5 is brightly lit. If yes, the voltage across it will measure 24V. Validate that this 24V is seen at IO module (M3) DI 2. If yes, replace the IO module (M3).

5. If fault is raised with pantograph in the fully raised position and BLUE LED5 is not brightly lit, then check the voltage across LED5. If 24V, replace the LED and go to previous step. If less than 5V, check continuity from IO module (M3) DI 2 to TB11 4B (solid BLUE wire). If that looks good, then check continuity from the field-landed solid BLUE wire to pin 6 on the Harting connector at the pantograph. If that looks good, then service the pantograph.

urn:fault:usci:pantograph-position-signal-error

Fault Description

Both extended and retracted signals are active at the same time.

Category	Fault Source	Fault Type	Criticality
Pantograph	Pantograph or USCI	Hardware	Major

Possible Causes

- Pantograph signalling defective/damaged - Retracted signal and/or Extended signal stuck at 24 V.
- IO module (M3) defective/damaged - Retracted signal and/or Extended signal being falsely read as logic high
- Miswiring - Retracted signal and/or Extended signal is shorted to 24 V

Troubleshooting

1. If fault is present and IO module (M3) DI 2 or DI 3 are not at 24 V, replace M3.
2. If fault is present and IO module (M3) DI 2 and DI 3 are at 24 V, disconnect the solid BLUE wire at TB11 4B and the solid YELLOW wire at TB11 3B. Check DI 2 and DI 3 again, if either are still at 24 V, check for any miswiring along the path that may short to 24 V. Otherwise, replace M3.
3. With the solid BLUE and solid YELLOW wires coming from the pantograph disconnected from TB11, measure the voltage on both. If both of them are 24 V, service the pantograph.

urn:fault:usci:ev-abnormal-closed-comms

Fault Description

TCP session closed by the EV outside of a normal shutdown sequence (i.e. CP still state C).

Category	Fault Source	Fault Type	Criticality
Charging Communications	EV/EVSE Interface	Software/Hardware	Critical

Possible Causes

- EV communications closed without a normal shutdown sequence as per SAE J3105
- Other communication fault present

Troubleshooting

1. Resolve other faults.
2. Contact EV OEM and ChargePoint for support.

urn:fault:usci:wireless-ev-communication-lost

Fault Description

Message sequence timeout reached in charging communication.

Category	Fault Source	Fault Type	Criticality
Charging Communications	EV/EVSE Interface	Software/Hardware	Critical

Possible Causes

- Wi-Fi communications between EV and EVSE have been lost/interrupted
- EV hasn't sent a message within the SAE J3105 timeout

Troubleshooting

1. Attempt another charge session; if charging does not start, check for the station Wi-Fi networks underneath the station with any Wi-Fi device (phone/laptop). If the Wi-Fi networks containing the station name are not present with good signal strength, check and replace the AP (M2) or the Wi-Fi antenna assembly (including surge suppressor). If the Wi-Fi networks are present with good signal strength and charging is not starting, try with another EV and contact EV OEM and ChargePoint for support.
2. If issue is intermittent, check if the issue follows a specific EV and service that EV.
3. If issue is intermittent and the issue follows a specific station, check that all coaxial connections from M2 to the Wi-Fi antenna are properly secured and torqued. If no bad connections, then look at replacing M2 and/or the Wi-Fi antenna assembly. Lastly, replace the Ethernet cable from M2 LAN1 to the SEVB (M4) J9 (6-pin connector).

urn:fault:usci:pantograph-ev-alignment-error

Fault Description

Pantograph fully extended but CP still in state A, indicating the pantograph has not successfully made contact with the EV.

Category	Fault Source	Fault Type	Criticality
EV Positioning	EV/EVSE Interface	Hardware	Critical

Possible Causes

- EV misalignment; pantograph rails not making contact with bus rails or EV is not in the correct orientation
- Missing/broken electrical connection from pantograph to PL (PE) or USCI (Control Pilot)
- Defective/damaged SEVB
- EV CP/PE circuit issue

Troubleshooting

1. Resolve any other pantograph faults first if present.
2. Visually verify bus alignment and that the 4 pantograph rails are making contact with the 4 bus rails.
3. Verify the bus driving direction matches the pantograph orientation.
4. With no EV present, measure the voltage from the pantograph CP rail to the PE rail. If not ~12 V, check signal continuity back to the SEVB (M4 J5 pins 2 and 24). If continuity looks good and ~12 V not present when SEVB is powered, replace the SEVB assembly (M4+M5).
5. If issue only occurs with one EV or EV model and does not occur on others, contact the vehicle OEM for support.

urn:fault:usci:pantograph-ev-state-c-timeout

Fault Description

EV fails to transition from State B to State C within the timeout defined by OppCharge/SAE J3105.

Category	Fault Source	Fault Type	Criticality
EV Charging Issue	EV/EVSE Interface	Hardware	Critical

Possible Causes

EV hasn't signalled charge readiness according to SAE J3105.

Troubleshooting

Contact EV OEM to service the EV.

urn:fault:usci:pantograph-isolation-monitoring-timeout

Fault Description

Isolation monitoring check exceeds timeout.

Category	Fault Source	Fault Type	Criticality
Isolation Monitoring	USCI	Hardware/Software	Critical

Possible Causes

- DC+ to DC- voltage not stable
- IMD not operating as expected

Troubleshooting

1. Check and resolve Power Module faults on the Power Block
2. If issues still present after eliminating PM faults, replace the Proton

urn:fault:usci:comms-performance-time-violation

Fault Description

Warning is triggered when a V2G response message is not sent within the required performance time after receiving the corresponding request.

Category	Fault Source	Fault Type	Criticality
Charging Communications	USCI	Software	Minor

Possible Causes

Software/firmware timing performance.

Troubleshooting

Contact ChargePoint for support.

urn:fault:usci:rfid-ppd-tag-not-found

Fault Description

Occurs when the EV RFID tag is not read, despite V2G communication indicating that an RFID is present.

Category	Fault Source	Fault Type	Criticality
RFID Validation	EV/EVSE Interface	Hardware	Critical

Possible Causes

- EV RFID tag not present
- EV RFID tag is shielded by physical obstruction
- EV RFID tag is not type specified in SAE J3105-1:2023
- EV RFID tag not placed in the location specified by SAE J3105-1:2023
- EV RFID tag not sensitive enough to be read at the application range
- RFID antenna damaged/defective
- RFID coaxial connection damaged/defective
- RFID module (M1) damaged/defective
- RFID module is connected to an incorrect RFID antenna

Troubleshooting

1. Check if the EV is able to charge on a different station. If able to charge on a different station, check that all coaxial connection are properly secured and torqued from the RFID module (M1) to the correct RFID antenna. If all connections are secure and fault still occurs, replace the RFID module (M1) and/or the RFID antenna assembly.

2. If the EV is not able to charge on a different station, use a test RFID tag under the pantograph to validate that the system is able to read the tag successfully. If no, check that all coaxial connection are properly secured and torqued from the RFID module (M1) to the RFID antenna. If all connections are secure and test RFID is still not read, replace the RFID module (M1) and/or the RFID antenna assembly.
3. If the EV is not able to charge and the test RFID tag is read successfully, ensure there is nothing obstructing the EV RFID tag and then service the EV to ensure the tag is programmed, placed, and designed correctly as per SAE J3105.

urn:fault:usci:rfid-ppd-incorrect-tag-found

Fault Description

When EV RFID tag is read but RFID tag doesn't match the communicated EVCCID.

Category	Fault Source	Fault Type	Criticality
RFID Validation	EV/EVSE Interface	Hardware	Critical

Possible Causes

- EV RFID tag not programmed to match communicated EVCC ID
- EV RFID tag not present
- EV RFID tag is shielded by physical obstruction
- EV RFID tag is not the type specified in SAE J3105-1:2023
- EV RFID tag not placed in the location specified by SAE J3105-1:2023
- EV RFID tag not sensitive enough to be read at the application range
- RFID antenna damaged/defective
- RFID module is connected to an incorrect RFID antenna

Troubleshooting

1. Check if the EV is able to charge on a different station. If able to charge on a different station, check that all coaxial connection are properly secured and torqued from the RFID module (M1) to the correct RFID antenna. If all connections are secure and fault still occurs, replace the RFID module (M1) and/or the RFID antenna assembly.
2. If the EV is not able to charge on a different station, use a test RFID tag under the pantograph to validate that the system is able to read the tag successfully. If no, check that all coaxial connection are properly secured and torqued from the RFID module (M1) to the RFID antenna. If all connections are secure and test RFID is still not read, replace the RFID module (M1) and/or the RFID antenna assembly.
3. If the EV is not able to charge and the test RFID tag is read successfully, ensure there is nothing obstructing the EV RFID tag and then service the EV to ensure the tag is programmed, placed, and designed correctly as per SAE J3105.

urn:fault:usci:sevb-usc-unreachable

Fault Description

SEVB-USC within the USCI is unreachable.

Category	Fault Source	Fault Type	Criticality
SEVB Communication	USCI SEVB	Hardware	Critical

Possible Causes

- 24V Power Supply not receiving AC power
- Enable signal not present at the Power Supply
- Ethernet surge suppressor damaged
- Wiring installation issue or disconnected

Troubleshooting

1. Check that single-phase AC power (120-277 VAC) is energized to the USCI.
2. Is the USCI visibly powered? (lights on?) If yes, skip to step 5. If no, continue with the following.
3. Check that the breaker CB1 is in the ON position. If AC power is reaching the power supply input, the status LED at the top of PS1 will be RED or GREEN. If not on, check connections and validate AC voltage. If correct AC voltage is validated at the power supply (PS1) input and the status LED on PS1 is not lit, replace PS1.
4. If status light is RED and Power Link is powered on, measure the voltage across TB14 1A and TB14 2A. If this is not 48 V, check the terminal block connections in the Power Link to ensure the wires are landed securely. If 48 V, check that 48 V is present across A1+ and A2- on relay SW2. If no, fix wiring. If yes, check resistance from 11 to 14 on SW2. If resistance is ~0 ohms, check the gray wiring from SW2 to SW3 to PS1 CN71. If high resistance across 11 and 14 and 48 V is present across A1+ and A2-, replace the SW2 relay.
5. If the USCI is visibly powered, check for blinking GREEN LEDs on the SEVB (M4). If none, check wiring from M4 J6 (4-pin connector) back to TB1 2 and TB4 2 to ensure there is 24V present. If connector looks good and 24 V is confirmed present, replace the SEVB module (M4+M5).
6. Otherwise, if SEVB appears powered, check the Ethernet connection path from SEVB to SSLAN. Check that the top-most SSLAN Ethernet ports are used. There is one blank port on the SSLAN towards the bottom that cannot be used. Once all connections are verified from SSLAN to Ethernet surge suppressor in the PL, to Ethernet surge suppressor in the USCI (SG2), to SEVB (M4), test the field landed Ethernet cable and reterminate/replace as needed. Otherwise, replace the cable from USCI surge suppressor (SG2) to SEVB (M4) first. Then, try bypassing or using new Ethernet surge suppressors to check if either needs to be replaced. Then, check the remaining cable and replace as needed. If issues persist and no other faults present, replace the SSLAN.

urn:fault:fdc:acd-thermal-switch-open

Fault Description

The side DC landing on the Power Link 2000 has reached abnormally high temperature.

Category	Fault Source	Fault Type	Criticality
Thermal Switch	Thermal Switch	Hardware	Critical

Possible Causes

- Sensor connection issue
- Over-temperature issue

Troubleshooting

*For bottom-exit PLs.

1. If fault is present when no current is being delivered in an active charge session, check if the thermal switch is high impedance at the connector 24-003291. If high impedance across the two pins, replace the Bottom-Exit FRU. If low impedance across the two pins, check for continuity from this connector to FDC J13 (pins 6/7 or 8/9). If continuity fails, the wiring harness needs to be fixed/replaced. Otherwise, if the thermal switch is measured as low impedance across 6/7 and 8/9 at the FDC J13 connector and the connector looks good, replace the FDC.
2. If fault is only present when delivering current in an active charge session, validate correct torque values of the conductors landing onto the lug landing. Visually inspect for any abnormalities. Validate that correct lug and conductor materials and sizes are used. If all of this is validated and the fault is still occurring, replace the Bottom-Exit FRU.

*For top-exit PLs.

1. If fault is present when no current is being delivered in an active charge session, check if the thermal switch is high impedance at the connector closest to the field-landed assembly. If either switch is high impedance at idle, replace the thermal switch/assembly. If both are measuring low impedance, check for continuity from the thermal switches to the FDC J13 pins 6/7. If continuity fails, fix/replace the harness. Otherwise, if the thermal switch is measured as low impedance across 6/7 at the FDC J13 connector and the connector looks good, replace the FDC.
2. If fault is only present when delivering current in an active charge session, validate correct torque values of the conductors landing onto the lug landing. Visually inspect for any abnormalities. Validate that correct lug and conductor materials and sizes are used. If all of this is validated and the fault is still occuring, replace the Top-Exit Landing assembly.

urn:fault:usci:manual-power-override

Fault Description

The power enable override switch is flipped ON. Detected by SEVB being connected before SSLAN enables power.

Category	Fault Source	Fault Type	Criticality
Manual Interface	Operator Switch	Hardware	Critical

Possible Causes

- The manual power enable override switch has been left ON
- Relay SW2 has welded closed

Troubleshooting

1. Move SW3 to the OFF position. Then, reboot the PL.
2. If fault is still present with SW3 OFF throughout reboot, check impedance from SW2 pin 11 to pin 14. If resistance is <5 ohms, replace relay SW2.

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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.

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