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## Possible Causes

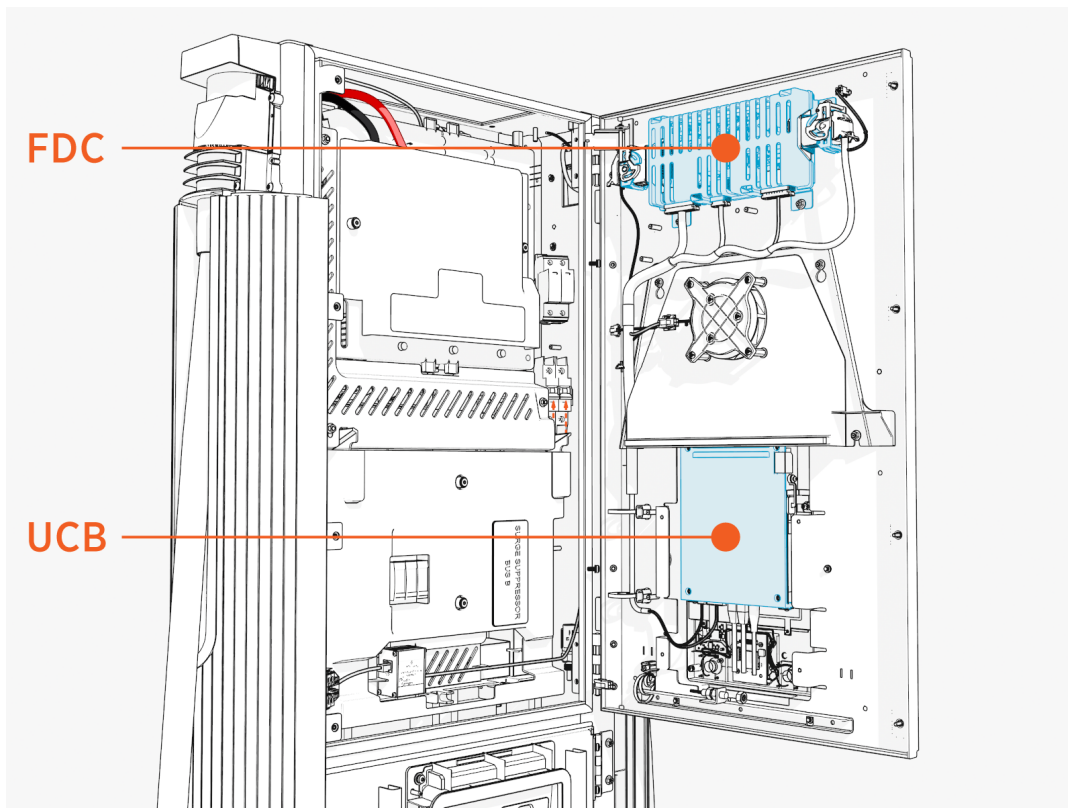
- Actual thermal event
- MDS thermal switch failure

## Troubleshooting

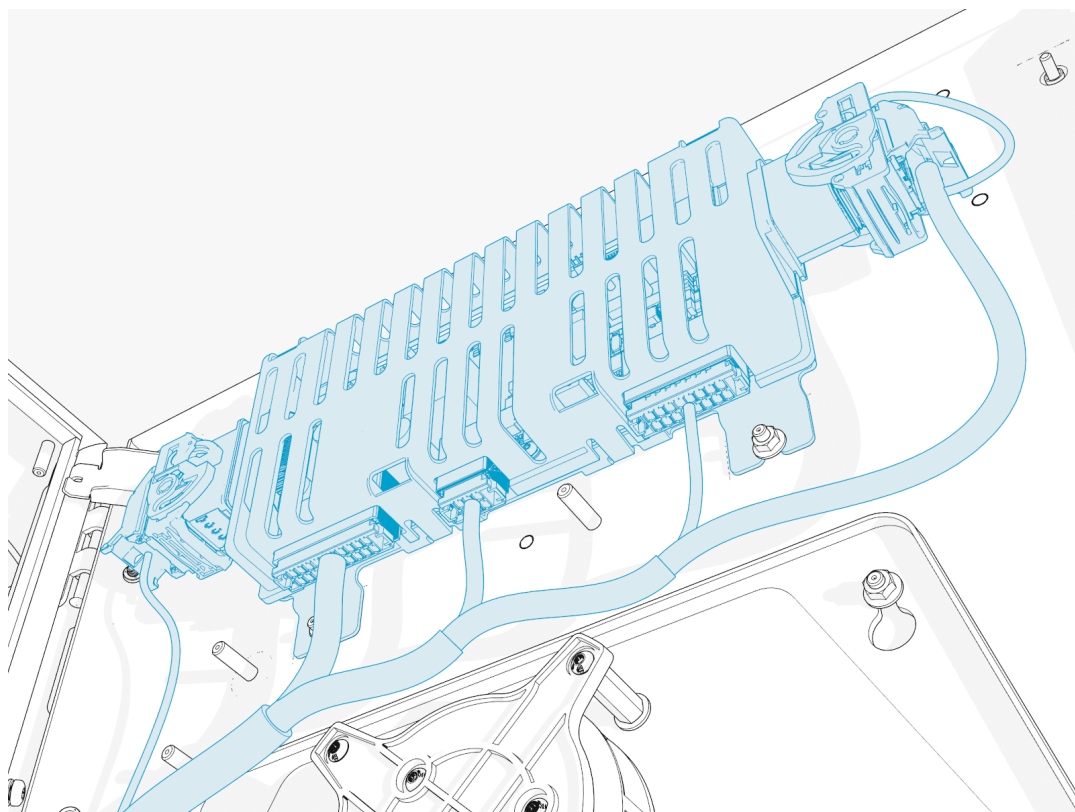
1. Replace MDS to resolve the issue.
2. Contact ChargePoint if the issue persists after MDS replacement.

## FDC Faults Board Location

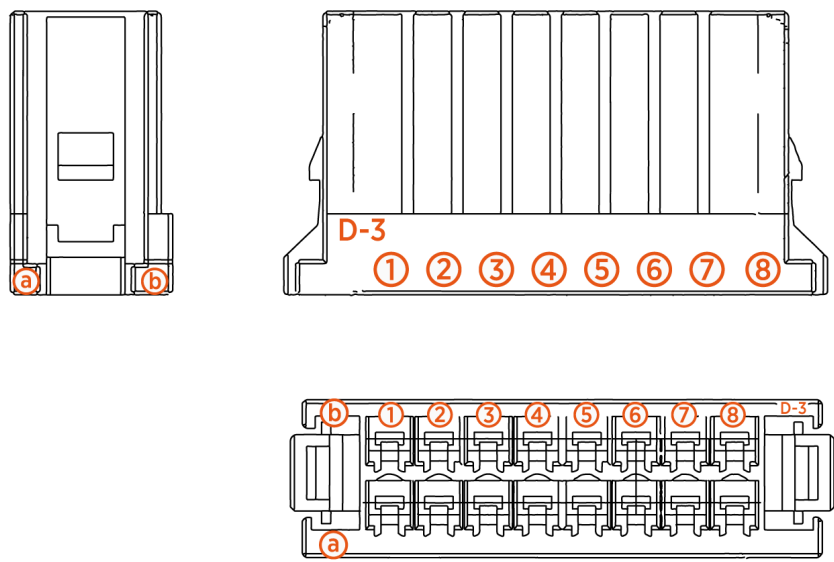
### Front View

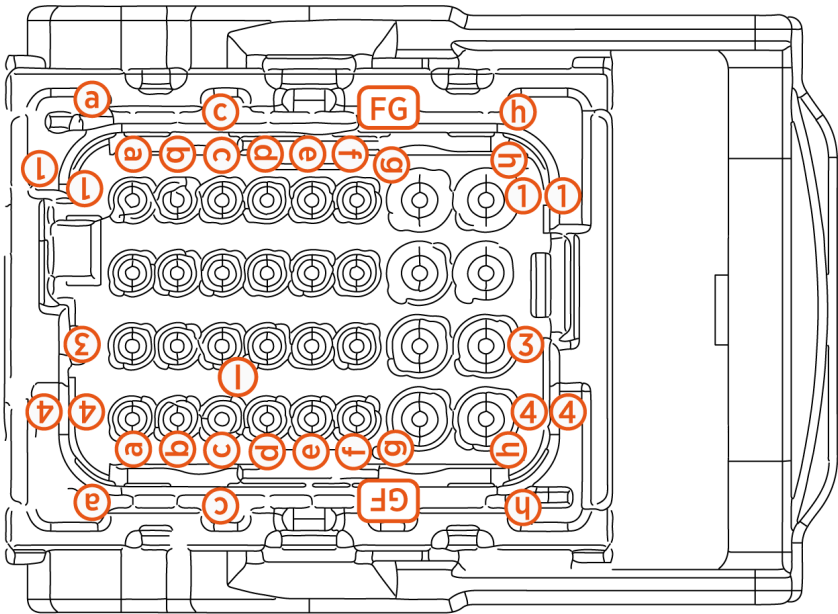


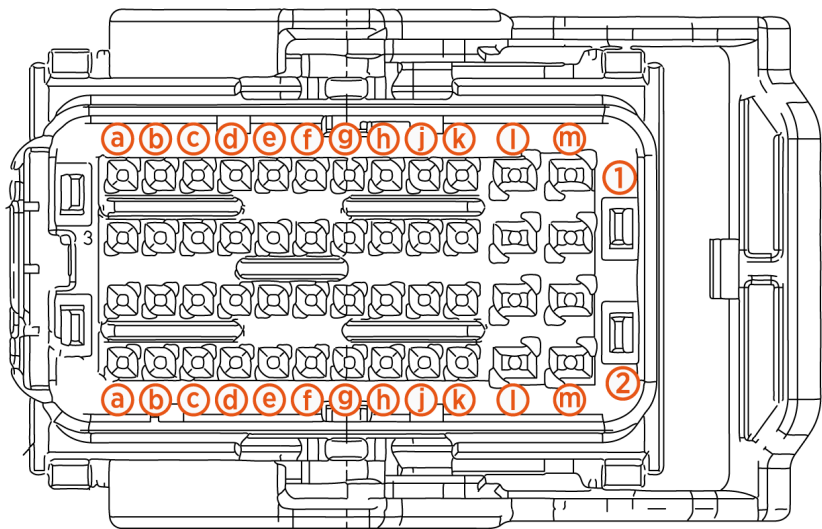
## Close-up View



FDC-P249-05







# FDC Faults

## Loss of Comms with UCB

| Category          | Fault Source | Fault Type        | Criticality |
|-------------------|--------------|-------------------|-------------|
| FDC Communication | FDC          | Hardware/Software | Emergency   |

## Fault Description

If UCB loses communication with FDC for more than 5 seconds, this fault is declared. It does clear if the communication is back and stays up for 60 seconds. FDC will continue to run in the same state that it was at prior to the loss of communication. Any ongoing sessions will be stopped if the communication is not reestablished within 60 seconds and Power Link will be locked out of service. Snapshot of critical parameters from the last 10 seconds prior to failure is captured.

## Possible Causes

If UCB is locked out due to a loss of communications:

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

## Troubleshooting

1. Look for CAN harness going to the FDC for proper seating: P-249-05 is the connector going to FDC which carries CAN signals.
2. If no connector seating issue is found, then measure continuity between CAN\_OUT\_H\_J (Pin B1) and CAN\_OUT\_L\_J (Pin B2). Check if there is a short between CAN H and CAN L lines, if yes then the harness will need to be replaced.
3. Confirm if the CAN termination is good - measure resistance across CAN\_TERM (Pin A4) and CAN\_TERM (Pin B4).
4. If no issues are found with the connector and the harness, then replace the FDC board due to possible board issues.
5. Contact ChargePoint for further debugging steps.

## FDC Checksum Failure

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| FDC FW   | FDC          | Software   | Critical    |

## Fault Description

This fault is declared if FDC firmware version and checksum don't match the expected version after 2 attempts to reflash.

Ideally seen during a new installation or when the software is updated on the system. However, if this is seen during an ongoing session, then the session is immediately terminated and Power Link 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 software update in the field, try to power cycle and see if it recovers.
4. If power cycle does not help, then replace the FDC board.

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## FDC Vicor OverTemperature Warning

| Category  | Fault Source | Fault Type | Criticality |
|-----------|--------------|------------|-------------|
| FDC Board | FDC          | Hardware   | Warning     |

### Fault Description

The warning is declared when one of the module on FDC board reports 90 °C for 10 s.

The fault is cleared if the temperature goes below 100 °C for more than 60 s.

### Possible Causes

- FDC board failure

### Troubleshooting

1. No steps need as the system is allowed to operate normally with this warning.

## FDC Vicor OverTemperature Shutdown

| Category  | Fault Source | Fault Type | Criticality |
|-----------|--------------|------------|-------------|
| FDC Board | FDC          | Hardware   | Critical    |

### Fault Description

The fault is declared when one of the module on the FDC board reports 100 °C for 10 s.

The fault is cleared if the temperature goes below 100 °C for more than 60 s.

Power Link locked out if this fault is seen thrice 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 the unit is locked out.
2. Contact ChargePoint if replacing the FDC board does not resolve the issue.

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## FDC Board OverTemperature Warning

| Category  | Fault Source | Fault Type | Criticality |
|-----------|--------------|------------|-------------|
| FDC Board | FDC          | Hardware   | Warning     |

### Fault Description

The warning is declared when the FDC board temperature exceeds 90 °C for 10 s.

The fault is cleared if the temperature goes below 90 °C for more than 60 s.

### Possible Causes

- FDC board failure

### Troubleshooting

1. No steps needed as the system is allowed to operate normally with this warning.

## FDC Board OverTemperature Shutdown

| Category  | Fault Source | Fault Type | Criticality |
|-----------|--------------|------------|-------------|
| FDC Board | FDC          | Hardware   | Critical    |

### Fault Description

The fault is declared when one of the modules on the FDC board reports 100 °C for 10 s.

The fault is cleared if the temperature goes below 100 °C for more than 60 s.

Power Link is locked out if this fault is seen thrice 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 the unit is locked out.
2. Contact ChargePoint if replacing the FDC board does not resolve the issue.

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## Top RTD OverTemperature Warning

| Category    | Fault Source | Fault Type | Criticality |
|-------------|--------------|------------|-------------|
| Bus Bar RTD | FDC          | Hardware   | Warning     |

### Fault Description

The warning is declared when TOP RTD temperature exceeds 85 °C for 10 s.

The warning is cleared if the temperature goes below 85 °C for more than 60 s.

### Troubleshooting

1. No steps needed as the system is allowed to operate normally with this warning.
2. Replace the FDC board if the unit is locked out.
3. Contact ChargePoint if replacing the FDC board does not resolve the issue.

## Top RTD Overtemperature Shutdown

| Category    | Fault Source | Fault Type | Criticality |
|-------------|--------------|------------|-------------|
| Bus Bar RTD | FDC          | Hardware   | Critical    |

### Fault Description

This overtemperature shutdown is declared when the Top RTD exceeds 95 °C for 10 s. If the session is going on, then it is emergency stopped. The fault is cleared if temperature goes below threshold for 60 s.

Power Link is locked out if this fault is seen thrice within 24 hours. UCB will record critical parameters as part of snapshot feature.

### Possible Causes

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

### Troubleshooting

1. Verify if the wires E1 and F1 on P249-04 are pulled out of connector with basic pull test.
2. Confirm if the harness between RTD and FDC is good by measuring resistance across Pins E1 and F1 on connector P249-04. We should measure 100  $\Omega$  if the switch is good.
3. If the switch reads bad, then replace the RTD to resolve the issue.
4. Once harness is considered good and if it also reads 100  $\Omega$ , then replace FDC to resolve the issue..

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## MDS RTD OverTemperature Warning

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| MDS RTD  | FDC          | Hardware   | Critical    |

### Fault Description

The warning is declared when TOP RTD temperature exceeds 90 °C for 10 s.

The warning is cleared if the temperature goes below 90 °C for more than 60 s.

### Possible Causes

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

### Troubleshooting

1. No steps needed as the system is allowed to operate normally with this warning.

## MDS RTD Overtemperature Shutdown

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| MDS RTD  | FDC          | Hardware   | Critical    |

### Fault Description

This overtemperature shutdown is declared when the MDS RTD exceeds 90 °C for 10 s. If the session is going on, then it is emergency stopped. The fault is cleared if temperature goes below threshold for 60 s.

Power Link is locked out if this fault is seen thrice within 24 hours. UCB will record critical parameters as part of snapshot feature.

### Possible Causes

- Issue with the harness
- Failure of MDS RTD (located behind MDS)
- FDC board

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## Troubleshooting

1. Verify if the wires C1 and D1 on P249-04 are pulled out of connector with basic pull test.
2. Confirm if the harness between RTD and FDC is good by measuring resistance across pins C1 and D1 on connector P249-04. We should measure 100  $\Omega$  if the switch is good.
3. If the switch reads bad, then replace the RTD to resolve the issue.
4. Once harness is considered good and if it also reads 100  $\Omega$ , then replace FDC to resolve the issue.

## Bottom RTD OverTemperature Warning

| Category    | Fault Source | Fault Type | Criticality |
|-------------|--------------|------------|-------------|
| Bus Bar RTD | FDC          | Hardware   | Warning     |

### Fault Description

The warning is declared when Bottom RTD temperature exceeds 80 °C for 10 s.

The warning is cleared if the temperature goes below 80 °C for more than 60 s.

## Troubleshooting

1. No steps need as the system is allowed to operate normally with this warning.

## Bottom RTD OverTemperature Shutdown

| Category    | Fault Source | Fault Type | Criticality |
|-------------|--------------|------------|-------------|
| Bus Bar RTD | FDC          | Hardware   | Critical    |

### Fault Description

This overtemperature shutdown is declared when the Bottom RTD exceeds 90 °C for 10 s. If the session is going on, then it is emergency stopped. The fault is cleared if temperature goes below threshold for 60 s.

Power Link is locked out if this fault is seen thrice within 24 hours. UCB will record critical parameters as part of the snapshot feature.

### Possible Causes

- Issue with the harness
- Failure of Bottom RTD (located on power plate)
- FDC board

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## Troubleshooting

1. Verify if the wires A1 and B1 on P249-04 are pulled out of connector with basic pull test.
2. Confirm if the harness between RTD and FDC is good by measuring resistance across Pins A1 and B1 on connector P249-04. We should measure 100  $\Omega$  if the switch is good.
3. If the switch reads bad, then replace the RTD to resolve the issue.
4. Once harness is considered good and if it also reads 100  $\Omega$ , then replace FDC to resolve the issue.

## Mixing Fan Overcurrent

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| Door Fan | FDC          | Hardware   | Major       |

### Fault Description

If the stirring fan current consumption exceeds 1 A for 100 ms, then we declare this fault. The fault is cleared if the current is <1 A for 1 s. Sampling done at 10 ms.

If this fault is seen thrice in 24 hours, then unit is locked out till service.

### Possible Causes

- Issue with the harness
- Fan rotor stuck (debris stuck?)
- Fan failure
- FDC board

## Troubleshooting

1. Visually confirm if there is anything blocking the fan blades. If yes, clear the debris/block and verify if the fault goes away.
2. Possible short in the harness. Check the continuity between A6 (V48VP0\_Fan\_1\_J) and B6 (V48PO\_Fan\_1\_RTN) on P249-02 connector. If there is a short, then we need to locate the short and replace the harness accordingly.
3. If no short found, then possible issue with fan circuitry internally. Replace the fan to resolve the issue.
4. If the issue persists, then replace the FDC board to resolve any issue with board circuitry that measures this parameter.
5. Contact ChargePoint if the issue persists.

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## MDS Fan Overcurrent

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| Door Fan | FDC          | Hardware   | Critical    |

### Fault Description

If the MDS fan current consumption exceeds 1 A for 4 ms, then we declare this fault. The fault is cleared if the current is <1 A for 1 s. Sampling done at 4 ms.

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

### Possible Causes

- Issue with harness
- Fan rotor stuck (debris stuck?)
- Fan failure
- FDC board

### Troubleshooting

1. Visually confirm if there is anything blocking the fan blades. If yes, clear the debris/block and verify if the fault goes away.
2. Possible short in the harness. Check the continuity between A9 (V48VP0\_Fan\_2\_J) and B9 (V48PO\_Fan\_2\_RTN) on P249-02 connector. If there is a short, then we need to locate the short and replace the harness accordingly.
3. If no short found, then possible issue with fan circuitry internally. Replace the fan to resolve the issue.
4. If the issue persists, then replace the FDC board to resolve any issue with board circuitry that measures this parameter.
5. Contact ChargePoint if the issue persists.

## Mixing Fan Open Circuit

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| Door Fan | FDC          | Hardware   | Critical    |

### Fault Description

If the mixing fan current consumption goes below 0.1 A for 100 ms, then we declare this fault. The fault is cleared if the current is >0.1 A for 1 s. Sampling done at 10 ms.

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

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## Possible Causes

- Issue with harness
- Fan failure
- FDC board

## Troubleshooting

1. Confirm if the connector going to fan is seated correctly. If yes, seat it firmly and verify if the fault goes away.
2. Possible break in the harness. Confirm if the wires carrying 48 V (A6) and 48 V RTN (B6) is continuous from FDC connector to connector at the fan. Measure the continuity from A6 on P249-02 to pin 4 on -Fan1 (-A4); And, measure the continuity from B6 to Pin 3 on -Fan1 (-A4).  
If there is no continuity, then we need to locate the location of the break and replace the harness accordingly.
3. If no harness issue found, then possible issue with fan circuitry internally. Replace the fan to resolve the issue.
4. If the issue persists, then replace the FDC board to resolve the issue.
5. Contact ChargePoint if the issue persists.

## MDS Fan Open Circuit

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| Door Fan | FDC          | Hardware   | Critical    |

## Fault Description

If the MDS fan current consumption goes below 0.1 A for 100 ms, then we declare this fault. The fault is cleared if the current is >0.1 A for 1 s. Sampling done at 10 ms.

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

## Possible Causes

- Issue with harness
- Fan failure
- FDC board

## Troubleshooting

1. Confirm if the connector going to fan is seated correctly. If yes, seat it firmly and verify if the fault goes away.

2. Possible break in the harness. Confirm if the wires carrying 48 V (A9) and 48 V RTN (B9) is continuous from FDC connector to connector at the fan. Measure continuity from A9 on P249-02 to Pin 4 on -Fan2 (-A5); And, continuity from B9 to Pin 3 on -Fan2 (-A5).  
If there is no continuity, then we need to locate the location of the break and replace the harness accordingly.
3. If no harness issue found, then possible issue with fan circuitry internally. Replace the fan to resolve the issue.
4. If the issue persists, then replace the FDC board to resolve the issue
5. Contact ChargePoint if the issue persists.

## Low Mixing Fan Speed

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| Door Fan | FDC          | Hardware   | Major       |

### Fault Description

If the mixing fan RPM goes below 500 for 10 s, then this fault is declared.

The fault clears if the RPM goes above 500 for 60 s.

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

### Possible Causes

- Issue with harness
- Fan failure
- FDC board

### Troubleshooting

1. Confirm if the connector going to fan is seated correctly. If yes, seat it firmly and verify if the fault goes away.
2. Possible break in the harness. Measure continuity from B7 on P249-02 to Pin 1 on -Fan1 (-A4);  
If there is no continuity, then we need to locate the location of the break and replace the harness accordingly.
3. If no harness issue found, then possible issue with fan circuitry internally. Replace the fan to resolve the issue.
4. If the issue persists, then replace the FDC board to resolve the issue
5. Contact ChargePoint if the issue persists.

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## Low MDS Fan Speed

| Category | Fault Source | Fault Type | Criticality |
|----------|--------------|------------|-------------|
| Door Fan | FDC          | Hardware   | Major       |

### Fault Description

If the MDS fan RPM goes below 500 for 10 s, then this fault is declared.

The fault clears if the RPM goes above 500 for 60 s.

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

### Possible Causes

- Issue with harness
- Fan failure
- FDC board

### Troubleshooting

1. Confirm if the connector going to fan is seated correctly. If yes, seat it firmly and verify if the fault goes away.
2. Possible break in the harness. Measure continuity from B10 on P249-02 to Pin 1 on -Fan2 (-A5);  
If there is no continuity, then we need to locate the location of the break and replace the harness accordingly.
3. If no harness issue found, then possible issue with fan circuitry internally. Replace the Fan to resolve the issue.
4. If the issue persists, then replace the FDC board to resolve the issue
5. Contact ChargePoint if the issue persists.

## FDC:Thermal-Switch-Open

| Category       | Fault Source | Fault Type | Criticality |
|----------------|--------------|------------|-------------|
| Thermal Switch | FDC          | Hardware   | Critical    |

### Fault Description

This fault is declared when the thermal switch opens indicating a thermal event. The system is locked out for further inspection.

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## Possible Causes

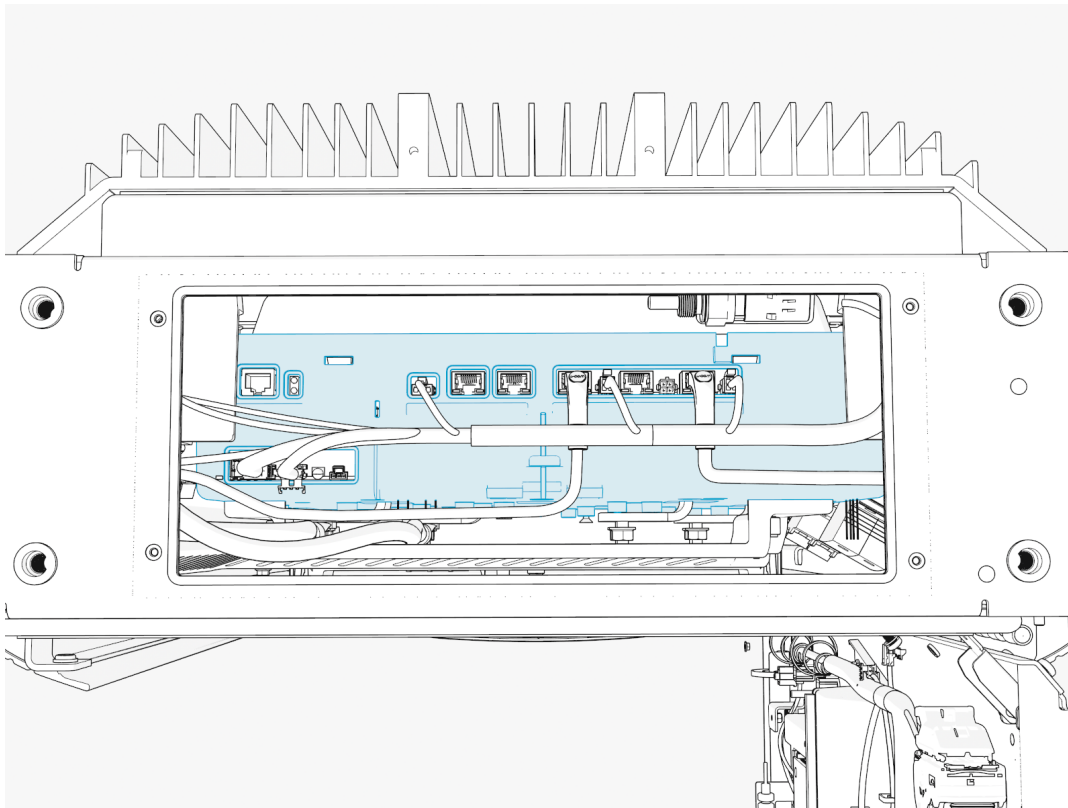
- Issue with harness
- Failed thermal switch
- Actual thermal event

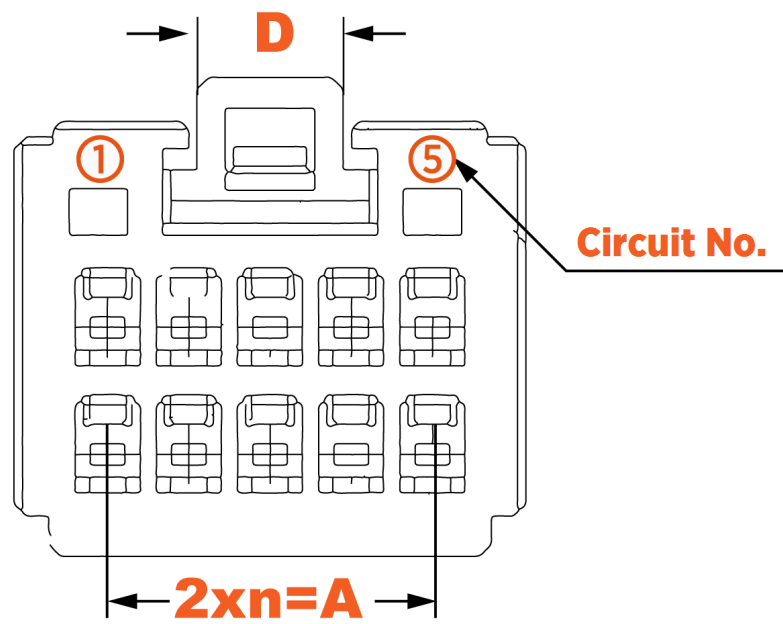
## Troubleshooting

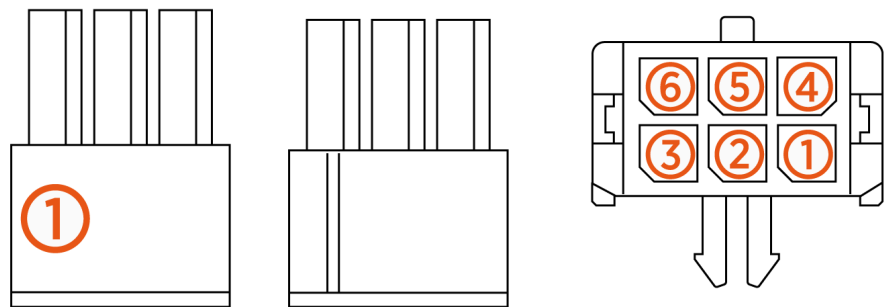
1. Confirm if there are any overtemp faults reported by other FRUs around the time of this failure. If yes, then report to ChargePoint for further log debugging and possible issues internal to the system.
2. If no other thermal faults seen, then confirm continuity across Pins G4 and H4 of the P249-04 connector going to FDC. If there is a short measured, then switch is good. Move to the next step. If the continuity test reads an Open, then the point of failure could be either harness or the switch. Since this switch is not easily accessible - reach out to ChargePoint for further steps.
3. Reach out to ChargePoint after confirming that the harness and switch are good.

## SEVB Faults Board Location

### Top View







# SEVB Faults

## 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.

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## 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.

## 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

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## 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 provisionng 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.

## 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 occuring without changes on our system. If yes, then this could be an interop issue. Reach out to ChargePoint for further debugging.

## 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.

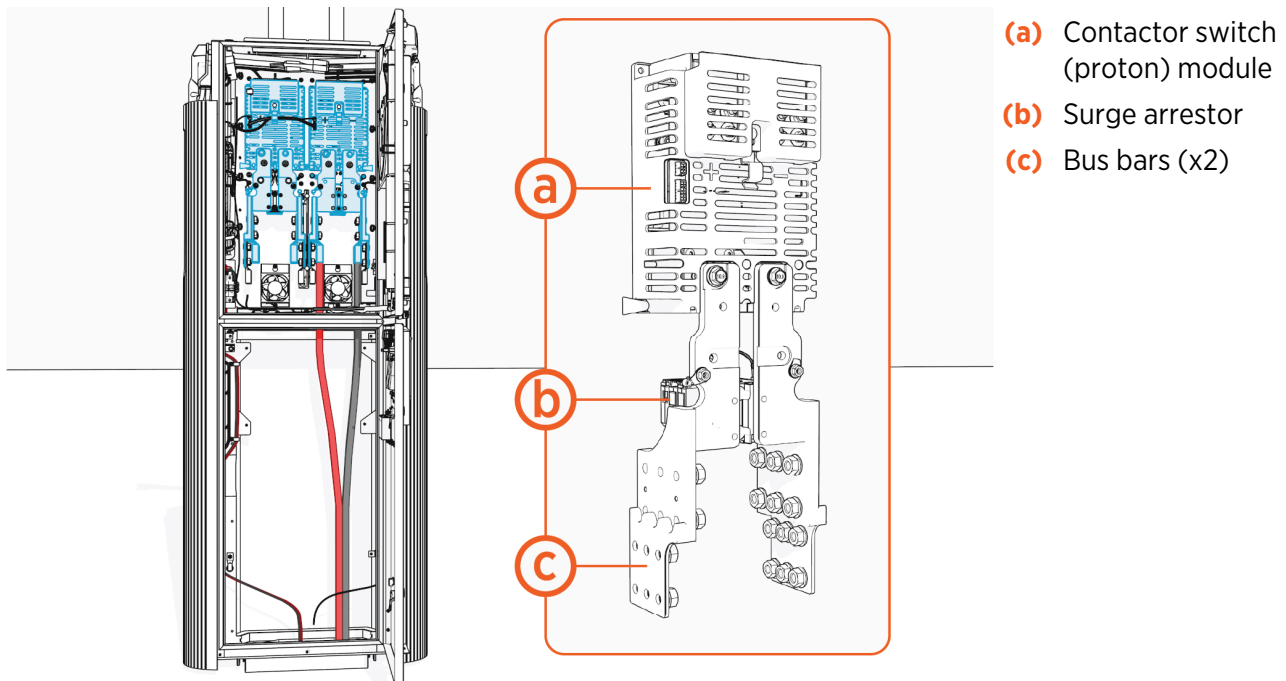
## Possible Causes

- Software or Firware 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 (Power Link 2000)



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# Proton Faults

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

or

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

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

### 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 k $\Omega$  for 8s. Any ongoing session stops. The fault clears if the isolation resistance goes above 100 k $\Omega$  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 clears. 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

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

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

### 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. 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-abnormal-opening

or

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

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

### 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.

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## 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         | Criticality | Fault Source | Fault Type        |
|------------------|-------------|--------------|-------------------|
| Output Contactor | Critical    | Contactor    | Hardware/Software |

## 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.

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

or

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

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

### 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

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

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

### 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                      | Criticality | Fault Source | Fault Type        |
|-------------------------------|-------------|--------------|-------------------|
| Board hardware/firmware issue | Critical    | Proton       | Hardware/Software |

### Fault Description

This fault triggers when the Proton oard 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.

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## 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       | Criticality | Fault Source       | Fault Type |
|----------------|-------------|--------------------|------------|
| Thermal switch | Critical    | Switch or feedback | H          |

## 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, ontact engineering for further troubleshooting.

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

or

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

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

### 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     | Criticality | Fault Source | Fault Type        |
|--------------|-------------|--------------|-------------------|
| Proton board | Critical    | Proton       | Hardware/Software |

### Fault Description

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

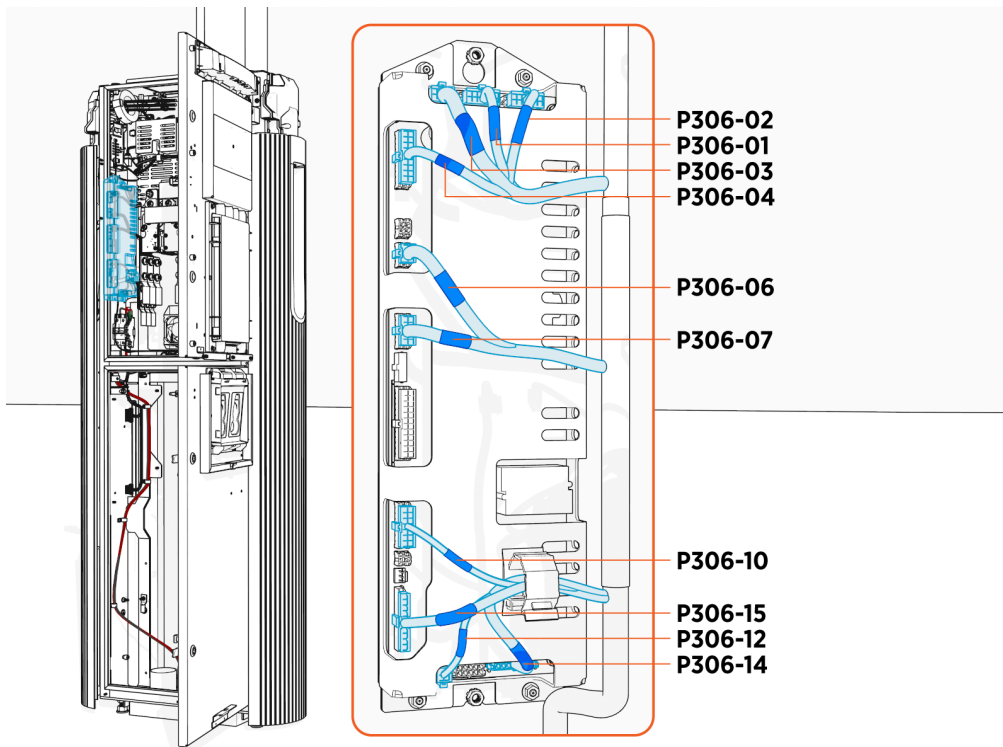
### Possible Causes

- 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.

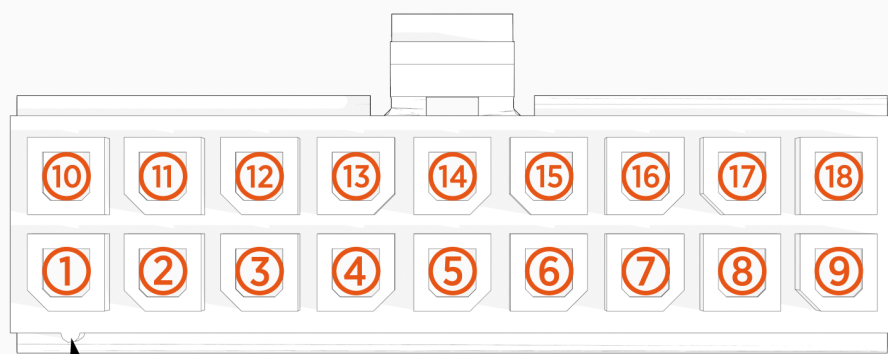
## FDC Location (Power Link 2000)



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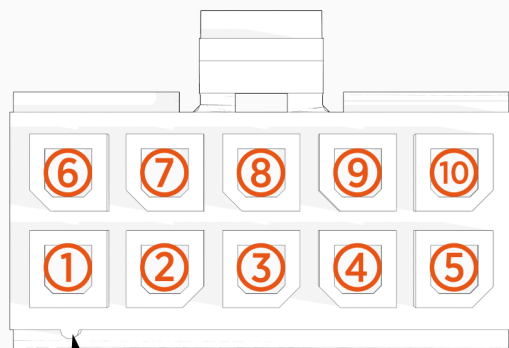
## FDC Connectors' Pin Configuration

### P306-04



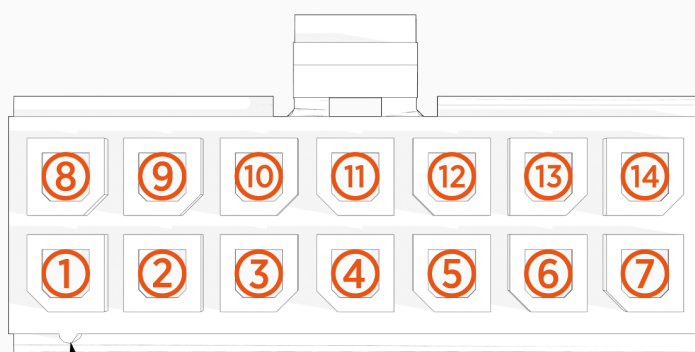
**Rib to identify the first circuit (pin)**

## P306-07



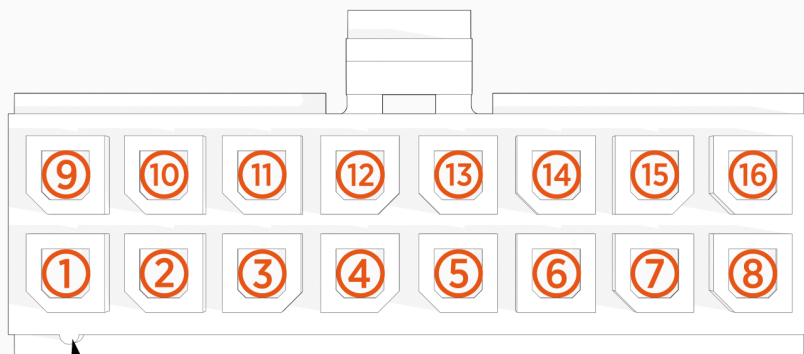
**Rib to identify the first circuit (pin)**

## P306-10



**Rib to identify the first circuit (pin)**

## P306-14



**Rib to identify the first circuit (pin)**

## P306-15



**Rib to identify the first circuit (pin)**

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# FDC Faults

## urn:fault:fdc:Loss-Comms-with-UCB

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

### 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, reseal 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     | Criticality | Fault Source | Fault Type |
|--------------|-------------|--------------|------------|
| FDC Firmware | Critical    | FDC          | Firmware   |

### 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.

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## 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  | Criticality | Fault Source | Fault Type        |
|-----------|-------------|--------------|-------------------|
| FDC Board | Critical    | FDC          | Hardware/Software |

## 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  | Criticality | Fault Source | Fault Type |
|-----------|-------------|--------------|------------|
| FDC Board | Critical    | FDC          | Hardware   |

## 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

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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 | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL RTD   | Critical    | FDC          | Hardware   |

## 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 | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL RTD   | Critical    | FDC          | Hardware   |

### 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  $\Omega$  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  $\Omega$ , replace the FDC to resolve the issue.

## urn:fault:fdc:Top-RTD-Open

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL RTD   | Critical    | FDC          | Hardware   |

### 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  $\Omega$  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  $\Omega$ , replace the FDC to resolve the issue.

## urn:fault:fdc:ExternalHS-Fan-Open

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL Fan   | Critical    | FDC          | -          |

## 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   | Criticality | Fault Source | Fault Type |
|------------|-------------|--------------|------------|
| PROTON Fan | Critical    | FDC          | -          |

### 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 | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL Fan   | Critical    | FDC          | -          |

### Fault Description

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

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## 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 | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL Fan   | Critical    | FDC          | -          |

## 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  | Criticality | Fault Source | Fault Type |
|-----------|-------------|--------------|------------|
| Fan power | Critical    | FDC          | -          |

### 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  | Criticality | Fault Source | Fault Type |
|-----------|-------------|--------------|------------|
| FDC Power | Critical    | FDC          | -          |

### 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  | Criticality | Fault Source | Fault Type |
|-----------|-------------|--------------|------------|
| FDC Power | Critical    | FDC          | -          |

## 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.

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

| Category  | Criticality | Fault Source | Fault Type |
|-----------|-------------|--------------|------------|
| FDC Power | Critical    | FDC          | -          |

### 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 | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL door  | Critical    | FDC          | -          |

### 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.

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## 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 | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL door  | Critical    | FDC          | -          |

## 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.

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## urn:fault:fdc:OPEN-DC-Input-Contactor

| Category     | Criticality | Fault Source | Fault Type |
|--------------|-------------|--------------|------------|
| PL Contactor | Emergency   | FDC          | -          |

### Fault Description

### Possible Causes

### Troubleshooting

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

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

### 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 overtemperature 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.

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

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

### Fault Description

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

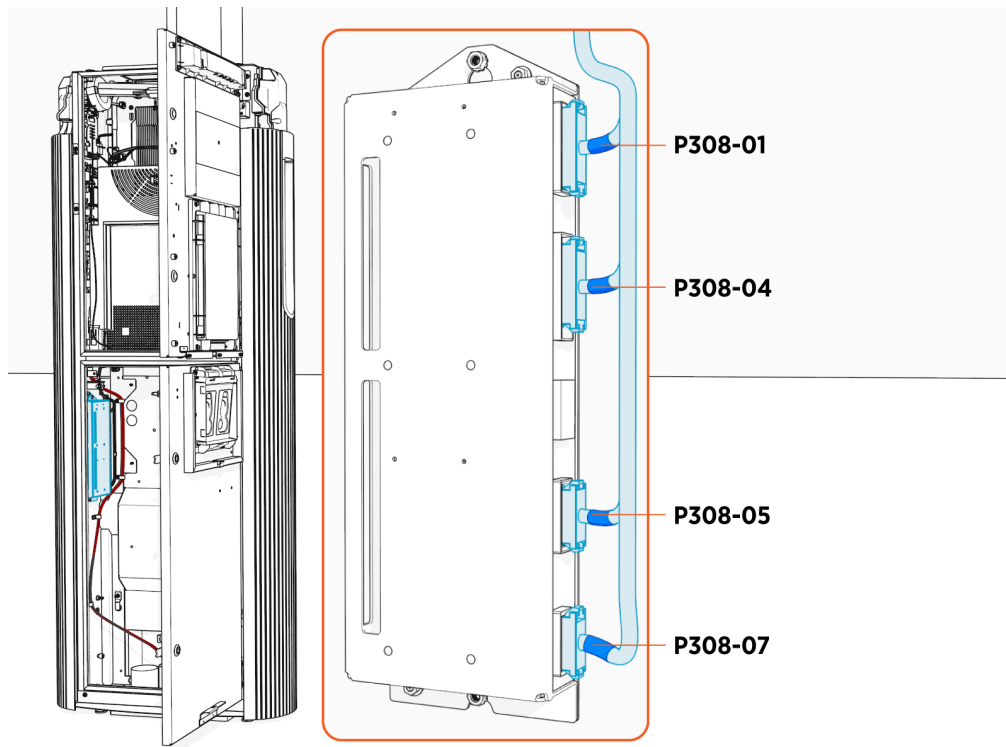
### Possible Causes

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

### Troubleshooting

1. Check if other FRUs reported any overtemperature 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.

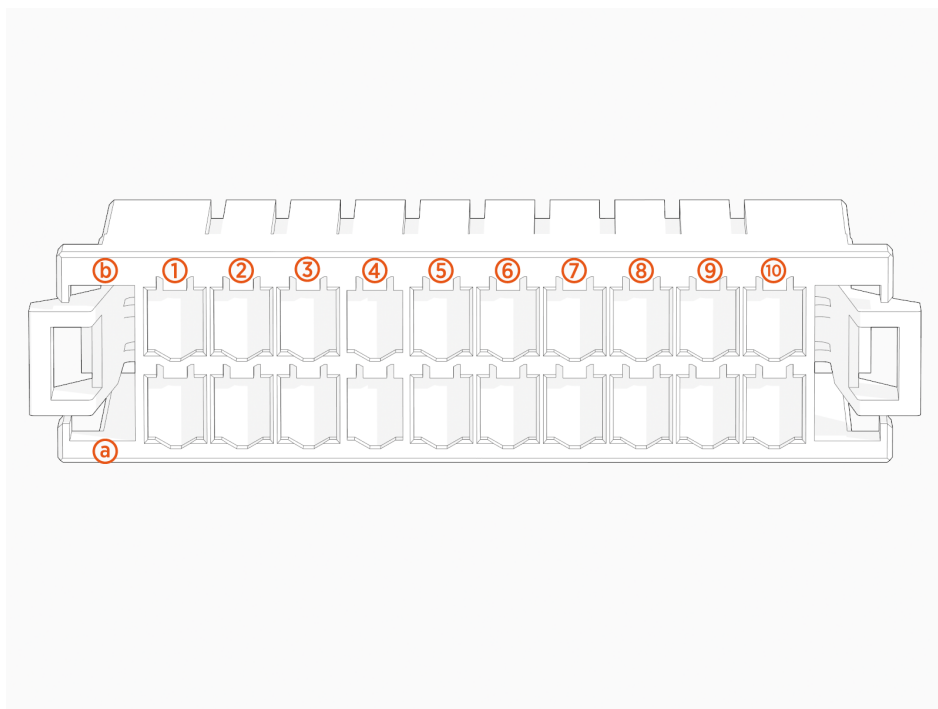
## CCB Location (Power Link 2000)



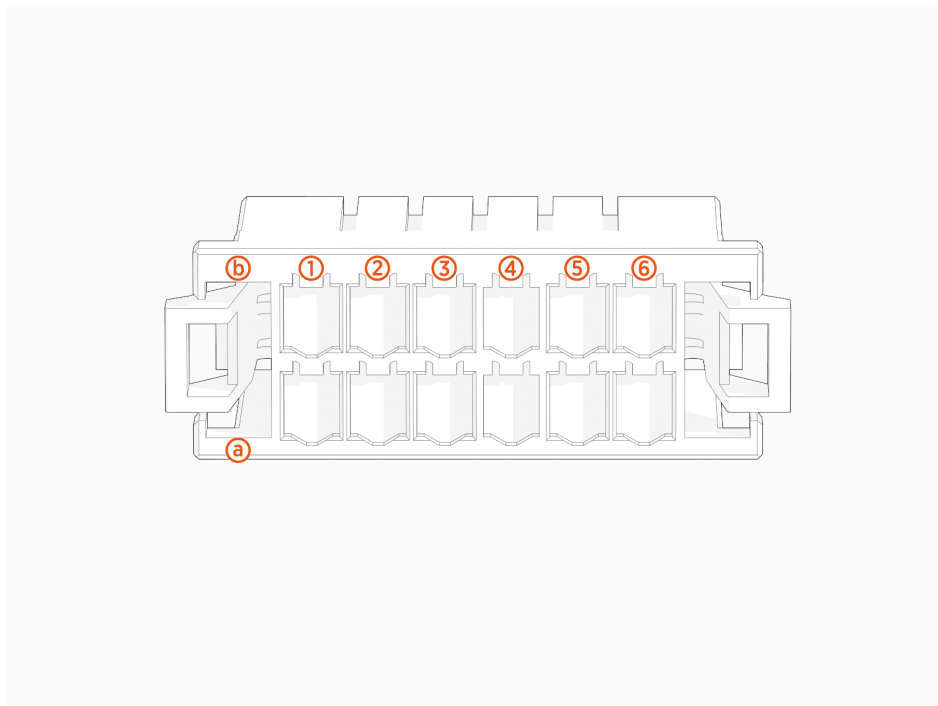
---

## CCB Connectors' Pin Configuration

### P308-04



### P308-05



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# CCB Faults

## urn:fault:coolcntl:fan-tray1-overcurrent

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Fan1      | Hardware   |

### Fault Description

This fault triggers when the fan tray current exceeds 8 A for more than 100 ms.

### Possible Causes

- Break in harness.
- Fan failure.
- CCB failure.

### Troubleshooting

1. Check if there is anything blocking the fan blades from spinning.
2. Check the continuity between B1 and A1 on the P308-04 connector (connecting to the CCB). If there is a short, continue to the next step.
3. If there are no issues in the continuity test, replace the fan tray. Also, re-enable fan tray 1 from EEPROM register.
4. If the issue persists, replace CCB.
5. Contact engineering for further debugging.

## urn:fault:coolcntl:fan-tray2-overcurrent

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Fan2      | Hardware   |

### Fault Description

This fault triggers when the fan tray current exceeds 8 A for more than 100 ms.

---

## Possible Causes

- Break in harness.
- Fan failure.
- CCB failure.

## Troubleshooting

1. Check if there is anything blocking the fan blades from spinning.
2. Check the continuity between B6 and A6 on the P308-04 connector (connecting to the CCB). If there is a short, continue to the next step.
3. If there are no issues in the continuity test, replace the fan tray. Also, re-enable fan tray 2 from EEPROM register.
4. If the issue persists, replace CCB.
5. Contact engineering for further debugging.

## urn:fault:coolctrl:fan-tray1-opencircuit

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Fan1      | Hardware   |

## Fault Description

This fault triggers when the fan is running at >10% speed, but the fan current is <0.3 A for more than 10s. This is a warning, not a fault. The system operates until a self-test failure triggers a service call for the fan tray replacement.

## Possible Causes

- Break in harness.
- Fan failure.
- CCB failure.

## Troubleshooting

1. Check if all connectors are seated correctly on the CCB and the fan tray.
2. Check if there is a break in the wire carrying 48 V to the fans. Check if the fan voltage on the CCB (chassis shell) reads 48 V.

3. Measure continuity from:
  - a. Pin B1 on the P308-04 connector (on the CCB) to red wire 48 V on the fan tray 1 connector.
  - b. Pin A1 on the P4 connector (on CCB) to black wire 48 V RTN on the fan tray 1 connector
4. If there is a break in continuity, then 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 fan tray replacement, then contact engineering for further debugging.

## urn:fault:coolcntl:fan-tray2-opencircuit

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Fan2      | Hardware   |

### Fault Description

This fault triggers when the fan is running at >10% speed, but the fan current is <0.3 A for more than 10s. This is a warning, not a fault. The system operates until a self-test failure triggers a service call for the fan tray replacement.

### Possible Causes

- Break in harness.
- Fan failure.
- CCB failure.

### Troubleshooting

1. Check if all connectors are seated correctly on the CCB and the fan tray.
2. Check if there is a break in the wire carrying 48 V to the fans. Check if the fan voltage on the CCB (chassis shell) reads 48 V.
3. Measure continuity from:
  - a. Pin B1 on the P308-04 connector (on the CCB) to red wire 48 V on the fan tray 2 connector.
  - b. Pin A1 on the P4 connector (on CCB) to black wire 48 V RTN on the fan tray 2 connector
4. If there is a break in continuity, then 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 contact engineering for further debugging.

## urn:fault:coolcntl:fan-tray1-fan1-no-rpm-feedback

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Alarm       | PL_Fan1      | Hardware   |

---

## Fault Description

This fault triggers when the fan is running at >30% speed but the fan RPM feedback is <2000 for more than 10s. This is a warning, not a fault.

## Troubleshooting

No action is required.

## urn:fault:coolcntl:fan-tray2-fan1-no-rpm-feedback

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Alarm       | PL_Fan2      | Hardware   |

## Fault Description

This fault triggers when the fan is running at >30% speed but the fan RPM feedback is <2000 for more than 10s. This is a warning, not a fault.

## Troubleshooting

No action is required.

## urn:fault:coolcntl:pump-overcurrent

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Pump      | Hardware   |

## Fault Description

This fault triggers when the pump current exceeds 8 A for more than 100 ms. The average and maximum current values are noted and saved on the PBC. Relevant derating conditions are applied based on these faults. The pump is disabled in EEPROM and needs intervention from an advanced user to re-enable 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 the CCB node (chassis shell) and confirm if it's reading 48 V. If there is no 48 V, then go to step 2. If 48V is present, then go to step 3.
2. Confirm if there is a short in the CCB harness. Measure continuity across A1 (P\_DC\_PUMP\_RET) and B1 (P\_DC\_PUMP\_POWER) on the P5 connector going to the CCB. If there is a short, then replace the harness.
3. If the continuity test is good, measure continuity between Pin 1 and Pin 4 on the P120 harness. If it shorted there, it is possible that the pump has failed. Replace the pump and confirm if the issue exists.
4. If pump replacement does not fix the issue, then the CCB board might have the fault-shortened pins (that feed connector) or short on the traces carrying this voltage. Replace CCB to resolve the issue.
5. If none of the above steps work, contact engineering.

## urn:fault:coolctrl:pump-opencircuit

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Pump      | Hardware   |

## Fault Description

This fault triggers when the fan is running at >10% speed but the fan current is <0.5 A for more than 5s. The fault clears if the pump runs a self-test and clears it. If the fault repeats three times in 24 hours, then the station is marked offline until the pump is replaced.

## Possible Causes

- Break in harness.
- Pump failure.
- CCB failure.

## Troubleshooting

1. Check if all connectors are seated correctly on the CCB and the pump. Particularly, connectors P308-05 on the CCB and P:CCBTOPUMP on the pump controller.
2. Check if there is a break in the wire carrying 48 V to the fans. Check if the pump voltage on the CCB (chassis shell) reads 48 V.
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 B1 on the P308-05 connector (on the CCB) to Pin 6 on the pump PCBA connector.
  - b. Pin A1 on P308-05 connector (on the CCB) to Pin 5 on the pump PCBA connector.
4. If there is a break in continuity, replace the harness to clear the fault.

- 
5. If the fault exists with no break in continuity, replace the HEX to fix the issue.
  6. If the issue persists after the fan tray replacement, reach out to engineering for further debugging.

## urn:fault:coolcntl:pump-dryrun

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Pump      | Hardware   |

### Fault Description

This fault triggers when the pump is running at >10% speed but the fan RPM feedback is >10000 for more than 5s.

### Possible Causes

- Coolant level low.
- Pump internal failure.

### Troubleshooting

1. Check the coolant level and top it up if it is less than the low level.
2. There may be air bubbles in the reservoir, so try to run the pump priming subroutine to clear them. Check if the fault clears. Also, monitor the pump RPM feedback in the CCB node of the chassis shell.
3. Check if there is a coolant leak in the system.
4. If issue persists, replace the HEX.
5. Contact engineering for further debugging.

## urn:fault:coolcntl:pump-no-rpm-feedback

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Major       | PL_Pump      | Hardware   |

### Fault Description

This fault triggers when the fan is running at >30% speed but the fan RPM feedback is <2000 for more than 10s. This is a warning, not a fault.

### Possible Causes

- Break in harness.
- Pump failure.

---

## Troubleshooting

1. Action required only if it starts failing self-tests and system functionality.
2. Contact engineering for debugging steps.

### urn:fault:coolcntl:pump-internal-dry-run

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Pump      | Hardware   |

## Fault Description

The pump's internal controller triggers this fault. It detects any dry run condition and triggers the faults. Also, this results in pump open circuit as the internal controller opens the 48 V relay.

## Possible Causes

- Coolant level low.
- Pump internal failure.

## Troubleshooting

1. Check the coolant level and top it up if it is less than the low level.
2. There may be air bubbles in the reservoir, so try to run the pump priming subroutine to clear them. Check if the fault clears. Also, monitor the pump RPM feedback in the CCB node of the chassis shell.
3. Check if there is a coolant leak in the system.
4. If issue persists, replace the HEX.
5. Contact engineering for further debugging.

### urn:fault:coolcntl:pump-internal-start-failure

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Pump      | Hardware   |

## Fault Description

The pump's internal controller triggers this fault. Also, this results in pump open circuit as the internal controller opens the 48 V relay.

---

## Possible Causes

- Pump Internal failure.

## Troubleshooting

1. Check if the pump is receiving 48 V power on the CCB node.
2. If yes, then replace HEX to resolve the issue.
3. If the fault persists after HEX replacement, then reach out to engineering for further debugging steps.

## urn:fault:coolcntl:pump-internal-overcurrent

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Pump      | Hardware   |

## Fault Description

The pump's internal controller triggers this fault. Also, this results in pump open circuit as the internal controller opens the 48 V relay.

## Possible Causes

- Pump Internal failure.

## Troubleshooting

1. Check if the pump is receiving 48 V power on the CCB node.
2. If yes, then replace HEX to resolve the issue.
3. If the fault persists after HEX replacement, then reach out to engineering for further debugging steps.

## urn:fault:coolcntl:pump-internal-locked-rotor

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_Pump      | Hardware   |

## Fault Description

The pump's internal controller triggers this fault. Also, this results in pump open circuit as the internal controller opens the 48 V relay.

---

## Possible Causes

- Pump Internal failure.

## Troubleshooting

1. Check if the pump is receiving 48 V power on the CCB node.
2. If yes, then replace HEX to resolve the issue.
3. If the fault persists after HEX replacement, then reach out to engineering for further debugging steps.

## urn:fault:coolcntl:level-sensor-disconnected

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Major       | PL_reservior | Hardware   |

## Fault Description

This fault triggers when the coolant level sensor goes undetected for 10 seconds. The system is derated for the ongoing session but is not allowed to operate until the fault is cleared.

## Possible Causes

- Break in harness.
- Sensor failure.
- CCB failure.

## Troubleshooting

1. Check if the P-308-07 connector is seated correctly on the CCB. Also, the level sensor connected to the reservoir is seated properly. If not, then fix them to resolve the issue.
2. If the issue persists, then there could be a break in harness. Measure continuity between:
  - a. Pin A1 on P-308-07 and Pin 1 on the P:LVSPMT connector on the reservoir side.
  - b. Pin A2 on P-308-07 and Pin 2 on the P:LVSPMT connector on the reservoir side.
  - c. Pin A3 on P-308-07 and Pin 3 on the P:LVSPMT connector on the reservoir side.
3. Replace the harness if any of the continuity checks fail from the above tests.
4. Replace the sensor if the issue persists.
5. If the issue persists, reach out to engineering for further steps.

---

## urn:fault:coolctl:level-low

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Critical    | PL_reservior | Hardware   |

### Fault Description

This fault triggers when the coolant level sensor detects that the coolant level is lower than its low level for 10s. This is a warning and does not affect the system's operation. The service call automatically triggers when it fails during the 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 the system is still showing 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, which is highly unlikely but cannot be ruled out. Contact engineering for further debugging.

## urn:fault:coolctl:level-overfill

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Minor       | PL_reservior | Hardware   |

### Fault Description

This fault triggers when the coolant level is at its max. possible level. No action is required.

## urn:fault:coolctl:fan-tray1-disabled

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Alarm       | PL_Fan1      | Hardware   |

---

## Fault Description

This fault triggers when the fan is disabled in EEPROM due to the fan's overcurrent fault.

## Possible Causes

- Break in harness.
- Fan failure.
- CCB failure.

## Troubleshooting

1. Check if there is anything blocking the fan blades from spinning.
2. Check the continuity between B1 and A1 on the P308-04 connector (connecting to the CCB). If there is a short, continue to the next step.
3. If there are no issues in the continuity test, replace the fan tray. Also, re-enable fan tray 1 from EEPROM register.
4. If the issue persists, replace CCB.
5. Re-enable the fan after each step to let it run. Since it is disabled, it won't run. Reach out to engineering for an EEPROM address to enable.
6. Contact engineering for further debugging.

## urn:fault:coolcntl:fan-tray2-disabled

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_CCB   | Alarm       | PL_Fan2      | Hardware   |

## Fault Description

This fault triggers when the fan is disabled in EEPROM due to the fan's overcurrent fault.

## Possible Causes

- Break in harness.
- Fan failure.
- CCB failure.

---

## Troubleshooting

1. Check if there is anything blocking the fan blades from spinning.
2. Check the continuity between B6 and A6 on the P308-04 connector (connecting to the CCB). If there is a short, continue to the next step.
3. If there are no issues in the continuity test, replace the fan tray. Also, re-enable fan tray 1 from EEPROM register.
4. If the issue persists, replace CCB.
5. Re-enable the fan after each step to let it run. Since it is disabled, it won't run. Reach out to engineering for an EEPROM address to enable.
6. Contact engineering for further debugging.

## Cable Faults (Power Link 2000)

### urn:fault:Cooled-Cable:UL-Stop

| Category | Criticality | Fault Source | Fault Type        |
|----------|-------------|--------------|-------------------|
| PL_LCC   | Critical    | PL_cable     | Hardware/Software |

### Fault Description

This fault triggers when the UL2202 Annex C code decides there is a safety critical fault on one of the LCC cables (UL2202 Annex C does not apply to non-LCC cables). The loop runs continuously. The exact cause of the fault will be sent as a separate fault.

## Troubleshooting

Look for the exact fault sent out and follow troubleshooting steps for that fault code.

### urn:fault:Cooled-Cable:CAN\_COMM\_UNSTABLE

| Category | Criticality | Fault Source     | Fault Type        |
|----------|-------------|------------------|-------------------|
| PL_LCC   | Critical    | PL_Phoenix_cable | Hardware/Software |

### Fault Description

The CAN traffic to the Phoenix cable has dropped three (or perhaps six) consecutive packets.

---

## Possible Causes

- CAN overload.
- SEVB firmware.
- Intermittent connection.

## Troubleshooting

1. Check if the SEVB firmware or any hardware has been changed recently on the Power Link 2000. Reboot SEVB/Power Link 2000 to force a power cycle on SEVB. Check if this clears up the fault.
2. If software was updated, leading to this fault, then re-flash the firmware and check if the issue resolves.
3. If hardware was updated, leading to this fault, then check if all connectors are seated correctly. If any are disconnected, then re-seat them and see if the issue resolves.
4. Contact engineering if the issue persists.

## urn:fault:Cooled-Cable:DATA\_INVALID

| Category | Criticality | Fault Source     | Fault Type |
|----------|-------------|------------------|------------|
| PL_LCC   | Critical    | PL_Phoenix_cable | -          |

## Fault Description

This fault is declared when the CAN traffic from the Phoenix cable has temperature data outside the expected range.

## Possible Causes

- CAN overload.
- SEVB firmware.
- Intermittent connection.

## Troubleshooting

1. Check if the SEVB firmware or any hardware has been changed recently on the Power Link 2000. Reboot SEVB/Power Link 2000 to force a power cycle on SEVB. Check if this clears up the fault.
2. If software was updated, leading to this fault, then re-flash the firmware and check if the issue resolves.
3. If hardware was updated, leading to this fault, then check if all connectors are seated correctly. If any are disconnected, then reseat them and see if the issue resolves.
4. Contact engineering if the issue persists.

---

## urn:fault:Cooled-Cable:POS\_TERMINAL\_TEMP\_FAULT

or

## urn:fault:Cooled-Cable:NEG\_TERMINAL\_TEMP\_FAULT

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_LCC   | Critical    | PL_cable     | Hardware   |

### Fault Description

This fault triggers when the cable's positive terminal temperature exceeds the limit of 89 °C.

### Possible Causes

Cable internal joint failure.

### Troubleshooting

Contact engineering for the debugging steps if this fault triggers three times in 24 hours.

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_LCC   | Critical    | PL_cable     | Hardware   |

## urn:fault:Cooled-Cable:STD\_200A\_TOO\_HOT

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_LCC   | Critical    | PL_Cooling   | Hardware   |

### Fault Description

This fault triggers when terminal temperatures are still above 84 °C and when the current is below the rated 200 A. The fault clears with UL-Stop and when terminal temperatures reach below 80 °C.

### Possible Causes

- Issue with cable cooling.
- Cable internal conductor issue.

---

## Troubleshooting

1. Run Power Link 2000 self-test to confirm if the system is functioning as expected.
2. If this fault triggers on more than three consecutive sessions, replace the cable to resolve the issue (refer to the *Power Link 2000 Service Guide*).
3. Contact engineering if the issue persists.

**urn:fault:cable:RTD0\_SHORTED**

or

**urn:fault:cable:RTD1\_SHORTED**

or

**urn:fault:cable:RTD0\_OPEN**

or

**urn:fault:cable:RTD1\_OPEN**

| Category | Criticality | Fault Source | Fault Type |
|----------|-------------|--------------|------------|
| PL_LCC   | Critical    | PL_SEVB_RTD  | Hardware   |

## Fault Description

This fault triggers when the SEVB RTD temperature is below 70 °C for 10 seconds.

## Possible Causes

Hardware failure.

## Troubleshooting

1. Replace the cable to resolve the issue (refer to the *Power Link 2000 Service Guide*).
2. Contact engineering if the issue persists.

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

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

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