



## Pre-Charge Fuse Failure

### Affected Units

- Nabors PACE-X: Rigs X-01 to X-50
- Nabors 1200 Rigs
- Nabors Rig 1100
- Cyclone AC Rigs
- Big Dog 31
- Felderhoff 35

### Issue

Negative side pre-charge fuses in the VFD frequently blow when starting the equipment. It has been determined that the pre-charge contact remains closed until after the disconnect switch closes.

The pre-charge complete setpoint is below normal bus voltage, therefore there is a small inrush when the disconnect switch closes. Depending on rig operations and conditions there may be a smaller or larger inrush. There is very little impedance in the negative leg of the pre-charge circuit and a larger inrush will blow the fuse.

### Recommendation

Canrig recommends modifying the relay logic for the pre-charge circuit to open the pre-charge contactor before closing the disconnect switch.

The pre-charge circuit modification kit (Canrig P/N: AY22722 for Standard and AY22732 for Nabors) contains the relays, ferrules, wire, and blank wire labels to modify one VFD cabinet. Contact RIGLINE 24/7™ Support to order these kits, or to arrange for a Canrig technician to perform this job.



**Note:** Kit contains parts for six VFDs.

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## Procedure



**Warning!**

Only qualified personnel should perform work on VFD lineup. Proper precautions and following lockout/tagout procedures are required!

## Standard Rigs

For third party rigs, in the steps below replace 'x' in wire labels with the number associated with that VFD cabinet, for example, replace x with 5 for MP3 VFD.

1. Remove the PCH relay contact from the PCC circuit as indicated below.

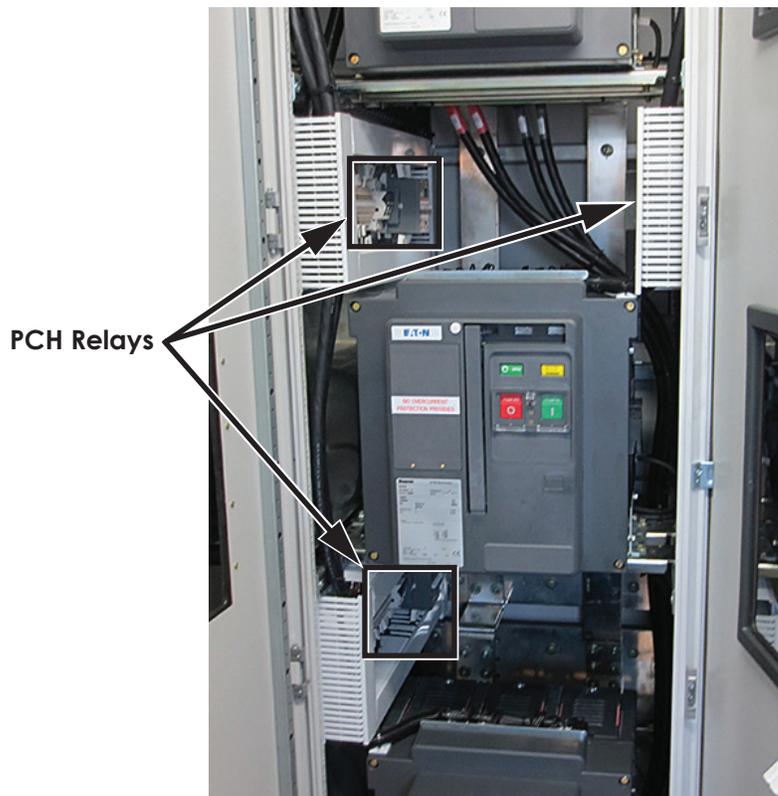


Figure 1: PCH Relays

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- a. Remove wire 1x063 between 1xTB02-05 and PCH-13. See Figure 2.
- b. Remove wire 1x013 between PCH-14 and 1xTB08-24.

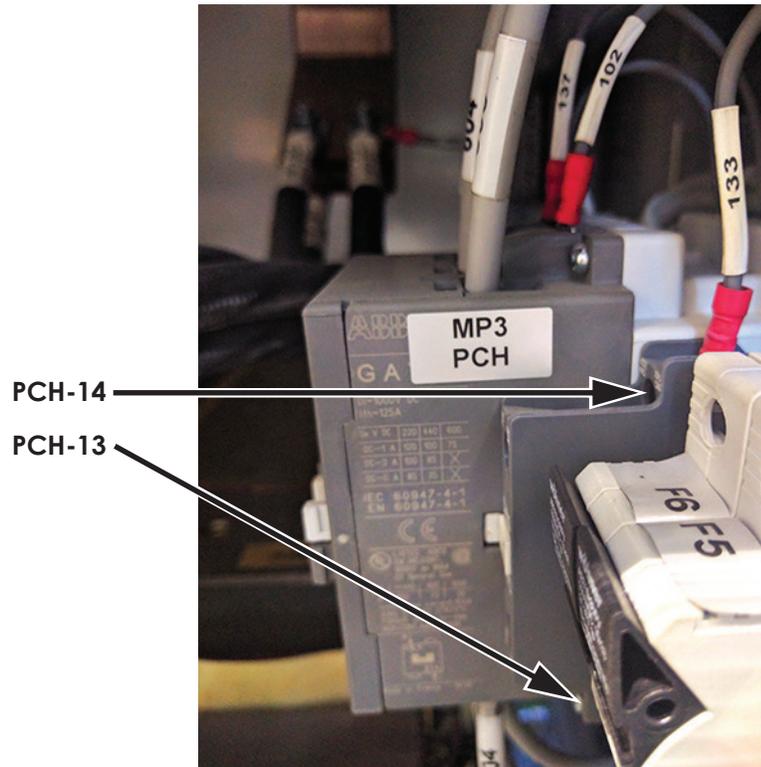


Figure 2: PCH 13 and PCH 14

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c. Add wire labeled 1x063 between 1xTB02-05 and 1xTB08-24.

d. Replace labels on wire 1x013 with 1x063, between 1xTB08-24 and the VFD-DO3.

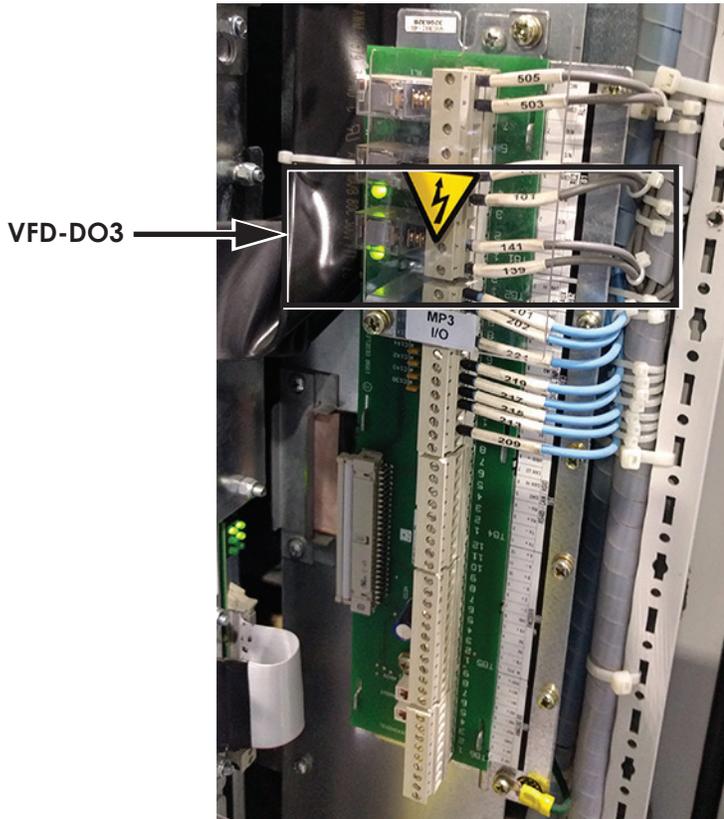


Figure 3: VFD-DO3

2. Remove wire 1x047 between PCC-5 and 1xTB08-13.
3. Remove wire 1x063 between 1xTB02-04 and 1xTB08-09.
4. Replace the PCC relay with a time delay relay Eaton TRL27 (Canrig P/N: E15361), see Figure 4 on page 5.

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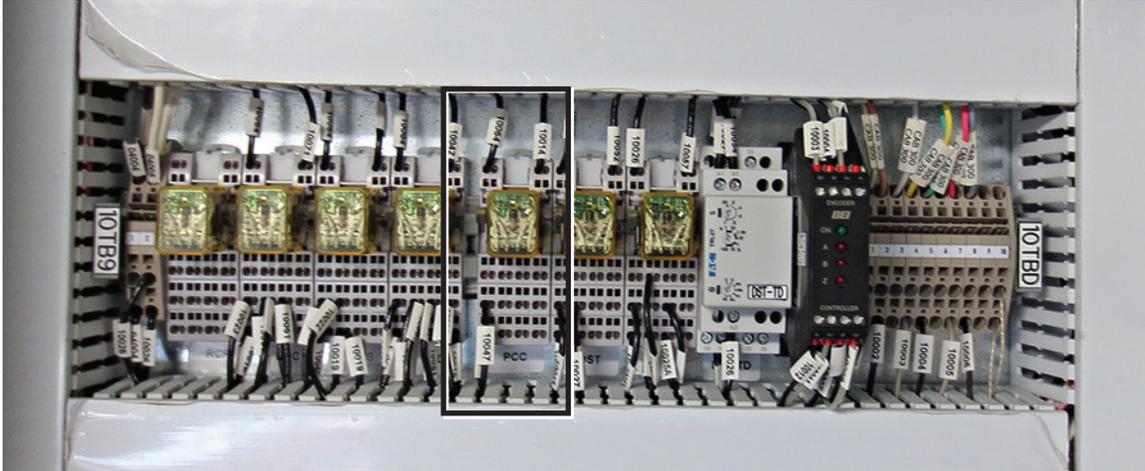


Figure 4: Replacing PCC Relay with Time Delay Relay

- Terminate wire 1x014 on PCC-A1 (Reroute/replace wire as necessary).
- Terminate wire 1x064 on PCC-A2 (Reroute/replace wire as necessary).
- Terminate wire 1x063 on PCC-15 (Reroute/replace wire as necessary).
- Set function dial to 'E' (On Delay). See Figure 5.
- Set time delay to 3 seconds.

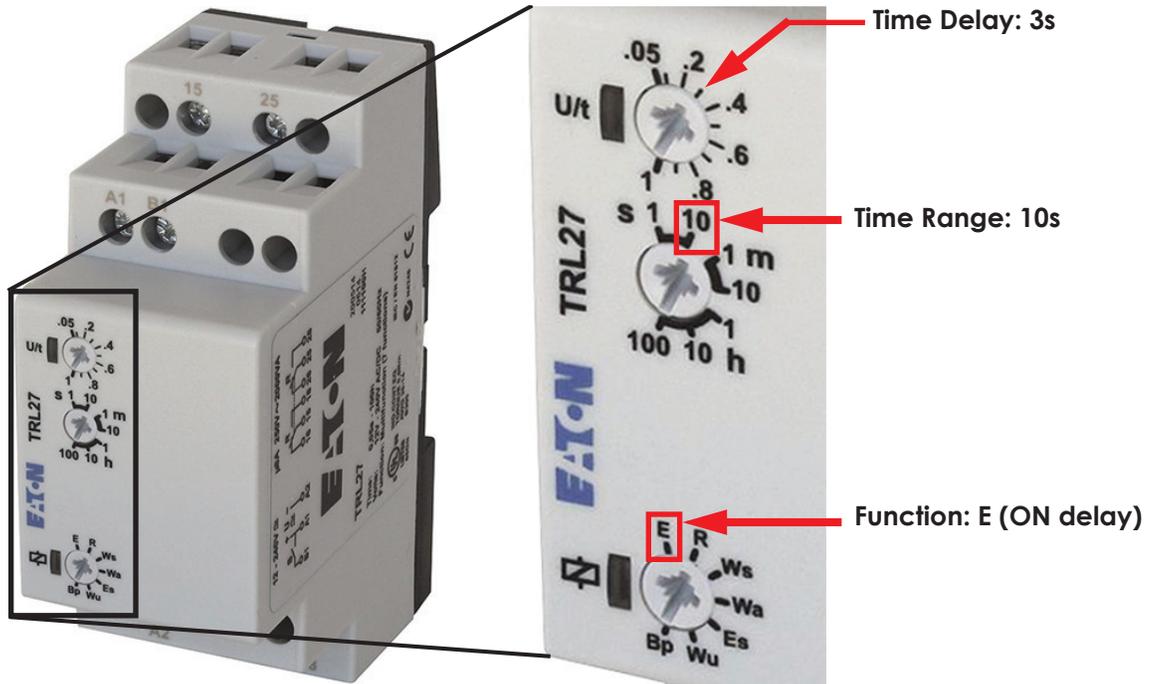
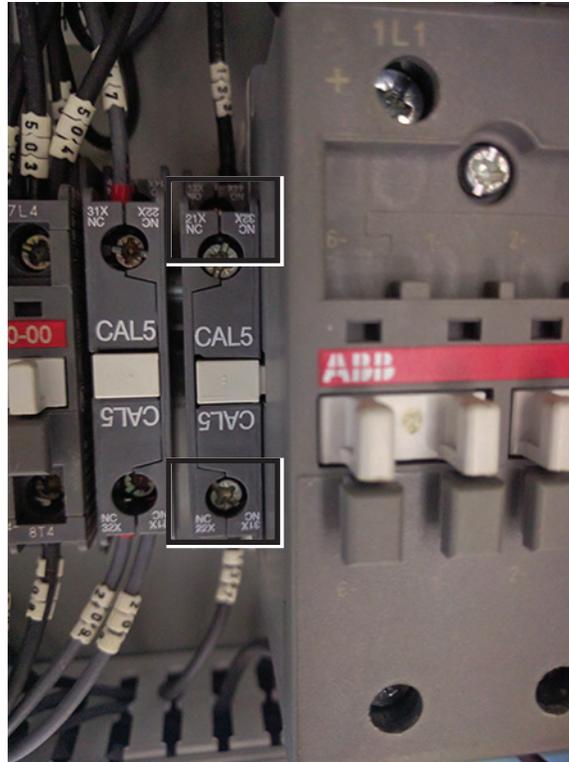


Figure 5: TRL27 Settings

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5. Add wire labeled 1x047 between PCC-18 and PCH-21.
6. Add wire labeled 1x053 between PCC-16 and 1xTB08-09.
7. Add wire labeled 1x054 between PCH-22 and 1xTB08-13.



**PCH Relay**

Figure 6: PCH Relay

# Third Party Rigs Pre-Charge Circuit Wiring Diagram

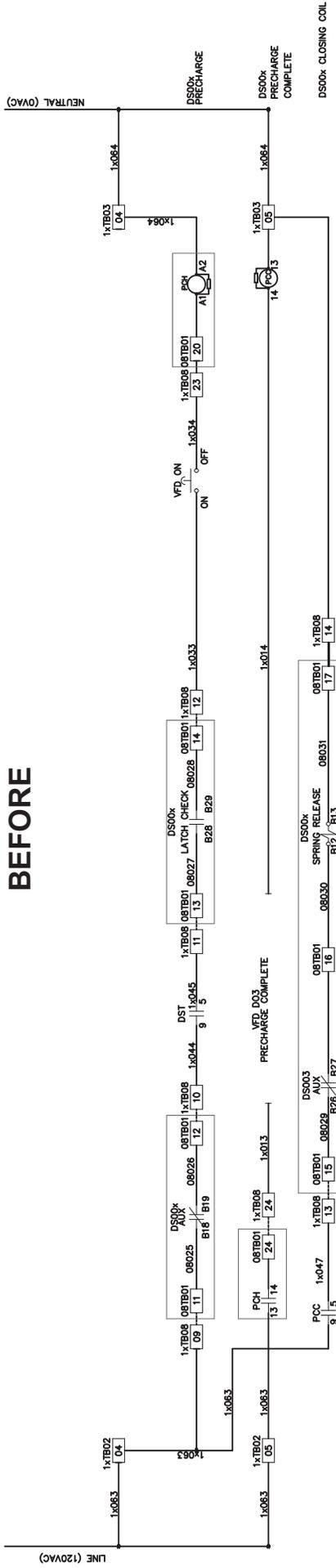


Figure 7: Third Party Rigs Wiring Diagram (before)

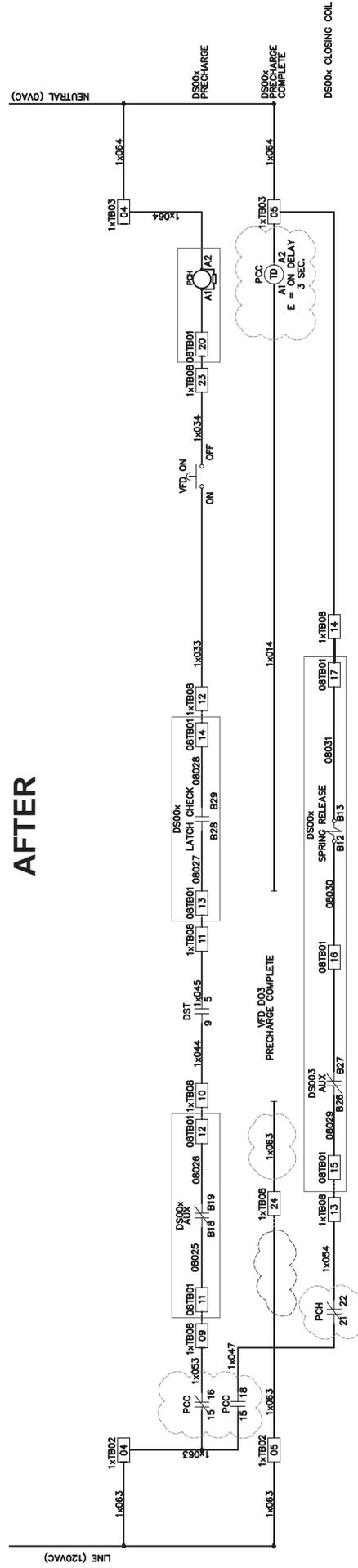


Figure 8: Third Party Rigs Wiring Diagram (after)

Model: See Affected Units List	Dec. 20, 2016
Serial #: See Affect Units List	
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## For Nabors Rigs

For steps below refer to Figure 9 and Figure 10 on page 9.

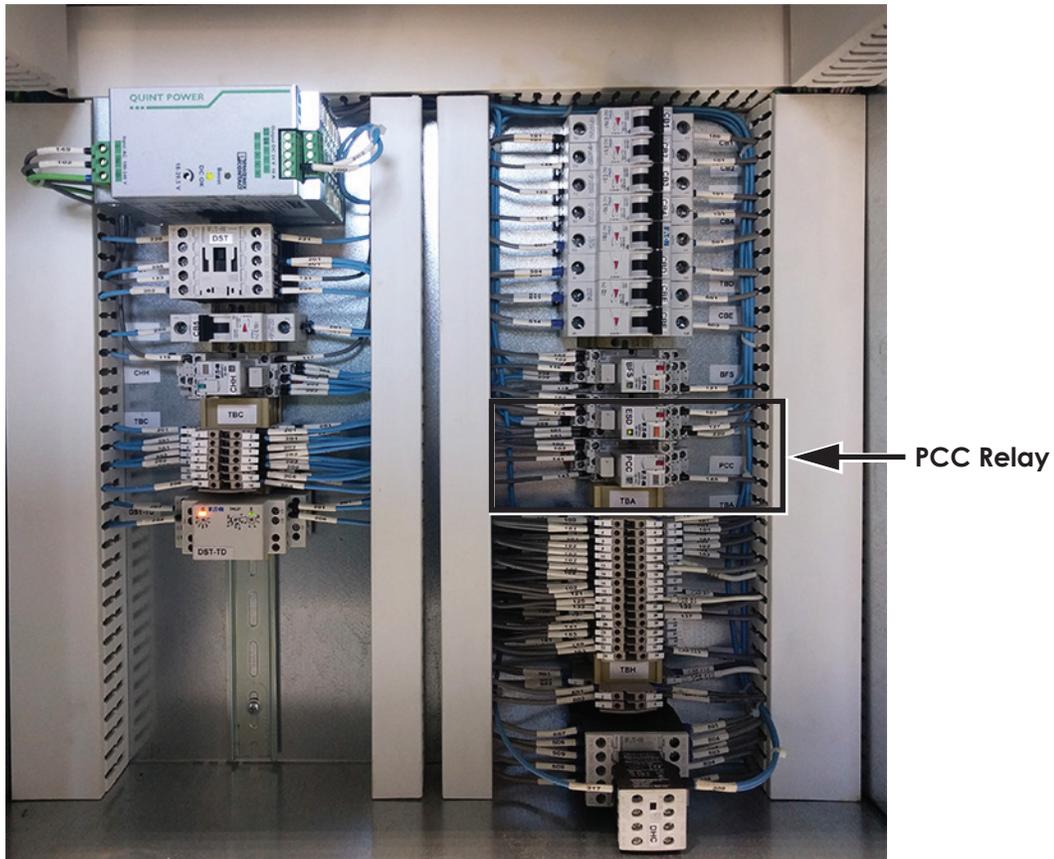
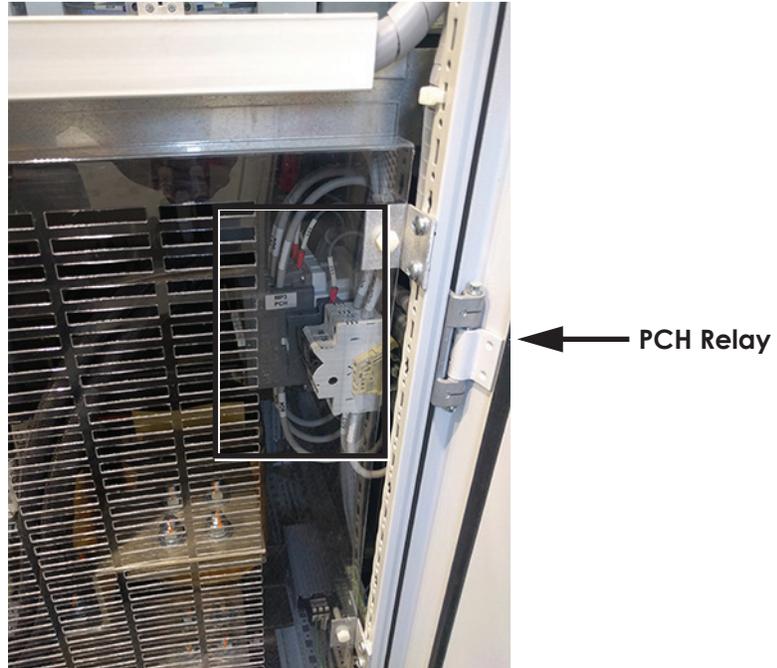


Figure 9: PCC Relay Location on Nabors Rigs

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PCH Relay

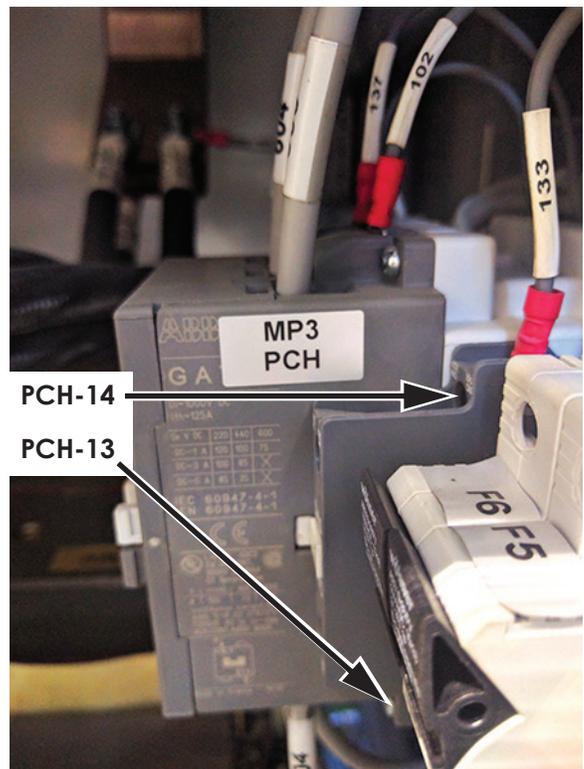
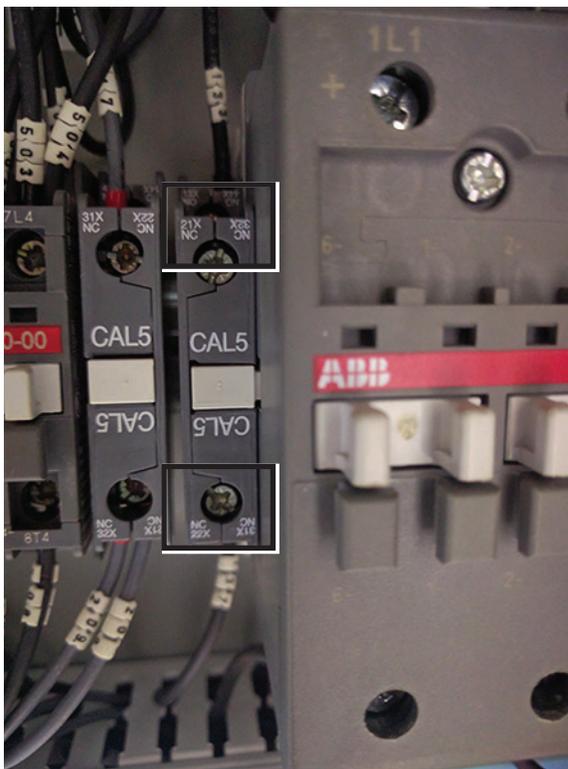
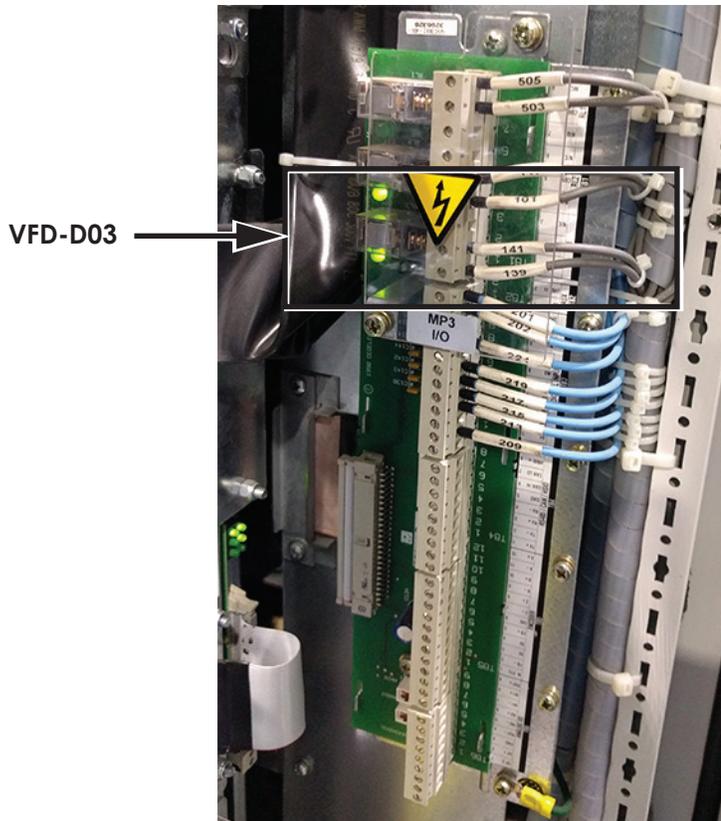


Figure 10: PCH Relay Location on Nabors Rigs

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1. In the Power House, make the following wiring changes:
  - a. Remove wire 139 between PCH-14 and connection point TBA-27.
  - b. Remove wire 101 from PCH-13.
  - c. Add wire 101 between 120VAC supply terminals and TBA-27.
2. In the Driller's Cabin, make the following wiring changes:
  - a. Remove wire 139 between PCH-44 and VFD D03 connection point TB1-1.
  - b. Remove wire 101 from PCH-43.
  - c. Add wire 101 between 120VAC supply terminals and VFD D03 connection point TB1-1.
3. In both the Power House and Driller's Cabin, replace labels on wire 139 with 101, between TBA-27 and the VFD-D03.



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4. In both the Power House and Driller's Cabin, remove wire 101 between 120VAC supply terminal and the disconnect switch terminal X5-7. See Figure 11.



Figure 11: Disconnect Switch Terminals X5

5. In both the Power House and Driller's Cabin, remove wire 131 between the disconnect switch terminal X5-8 and DST-43.
6. In the Power House, remove wire 145 between PCC-5 and TBA-29.
7. In the Driller's Cabin, remove wire 145 between PCC-5 and DS5 X6-7.
8. In both the Power House and Driller's Cabin, replace the PCC relay with a time delay relay Eaton TRL27 (Canrig P/N: E15361) as follows:
  - a. Terminate wire 141 on PCC-A1 (Reroute/replace wire as necessary).
  - b. Terminate wire 102 on PCC-A2 (Reroute/replace wire as necessary).
  - c. Terminate wire 143 on PCC-15 (Reroute/replace wire as necessary).
  - d. Add wire labeled 131 between PCC-16 and DST-43.
  - e. Add wire labeled 145 between PCC-18 and PCH-21
  - f. Set function dial to 'E' (On Delay). See Figure 12 on page 12.
  - g. Set time delay to 3 seconds.

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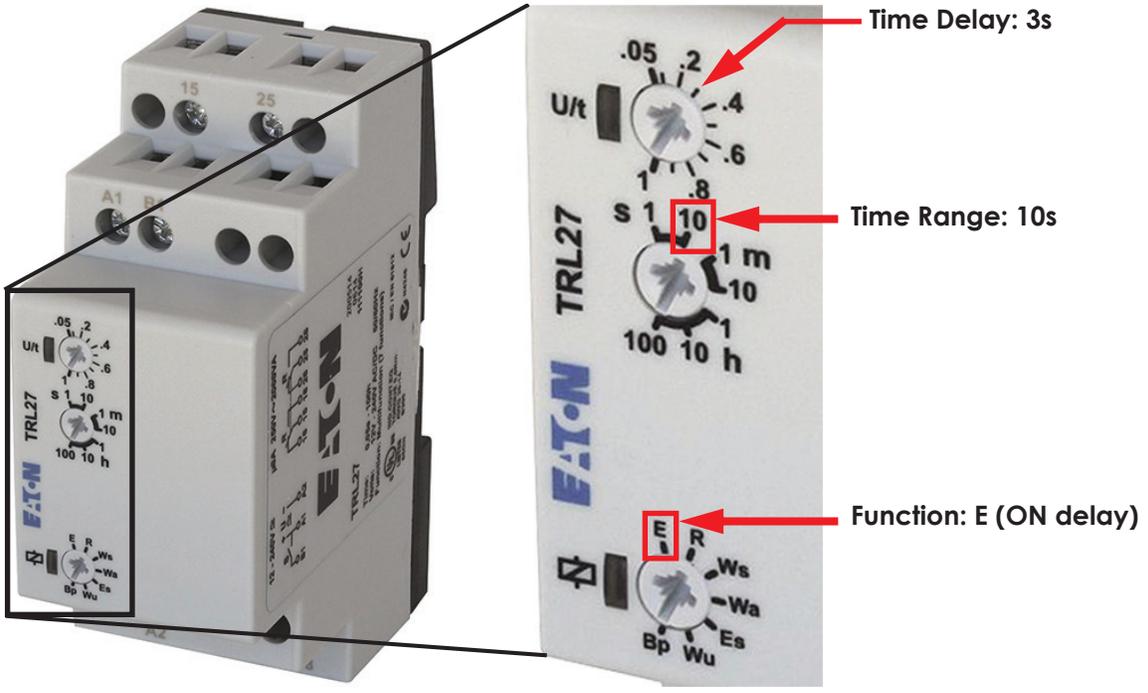


Figure 12: TRL27 Settings

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**Nabors Rigs Pre-Charge Circuit Wiring Diagram**

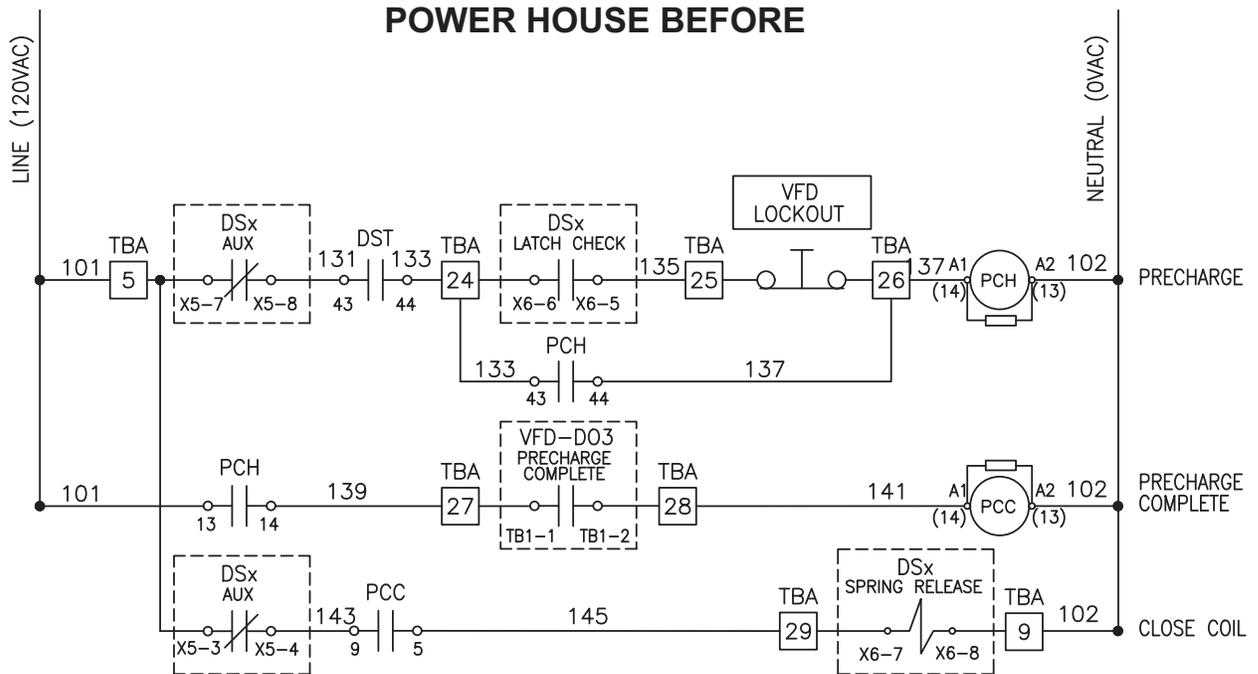


Figure 13: Nabors Rigs Power House Wiring Diagram (before)

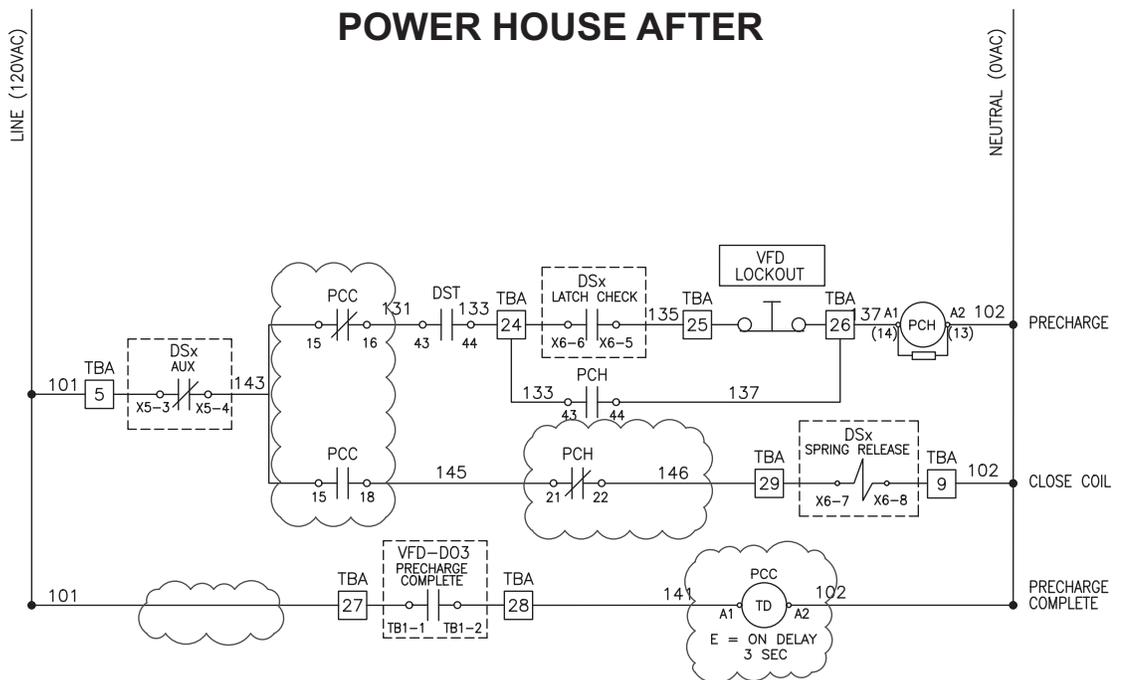


Figure 14: Nabors Rigs Power House Wiring Diagram (after)

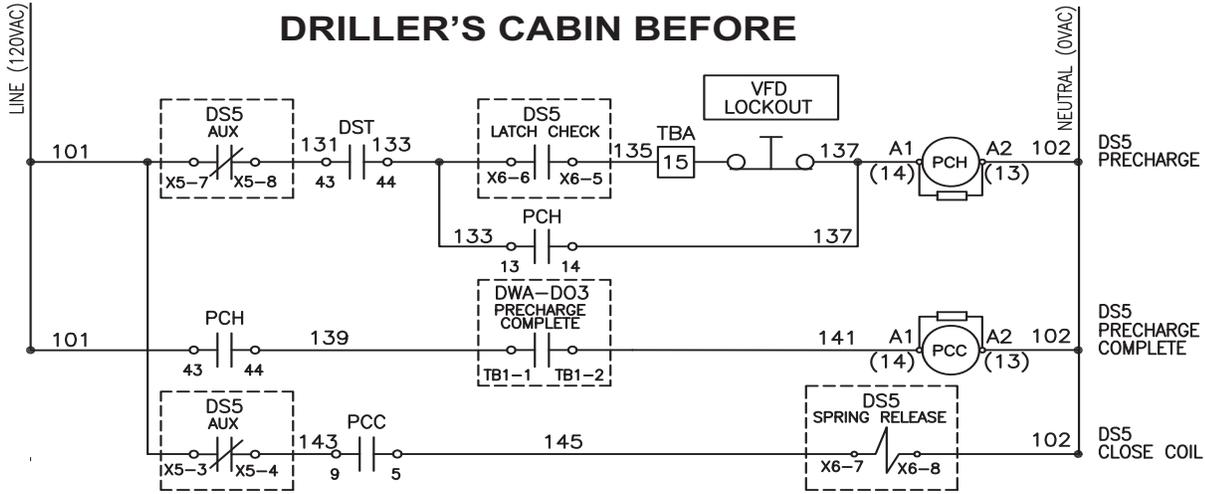


Figure 15: Nabors Rigs Driller's Cabin Wiring Diagram (before)

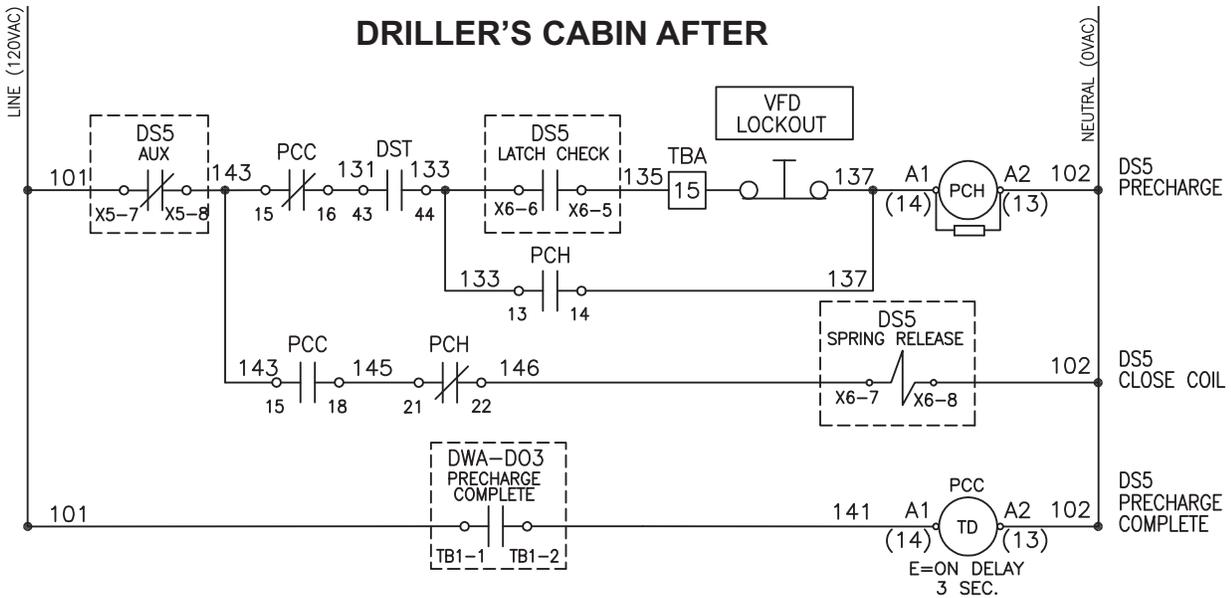


Figure 16: Nabors Rigs Driller's Cabin Wiring Diagram (after)