EB150E 600/480 Volts

"Field Assist Troubleshooting Guide"

Welcome to the Campo **"Field Assist Troubleshooting Guides".**

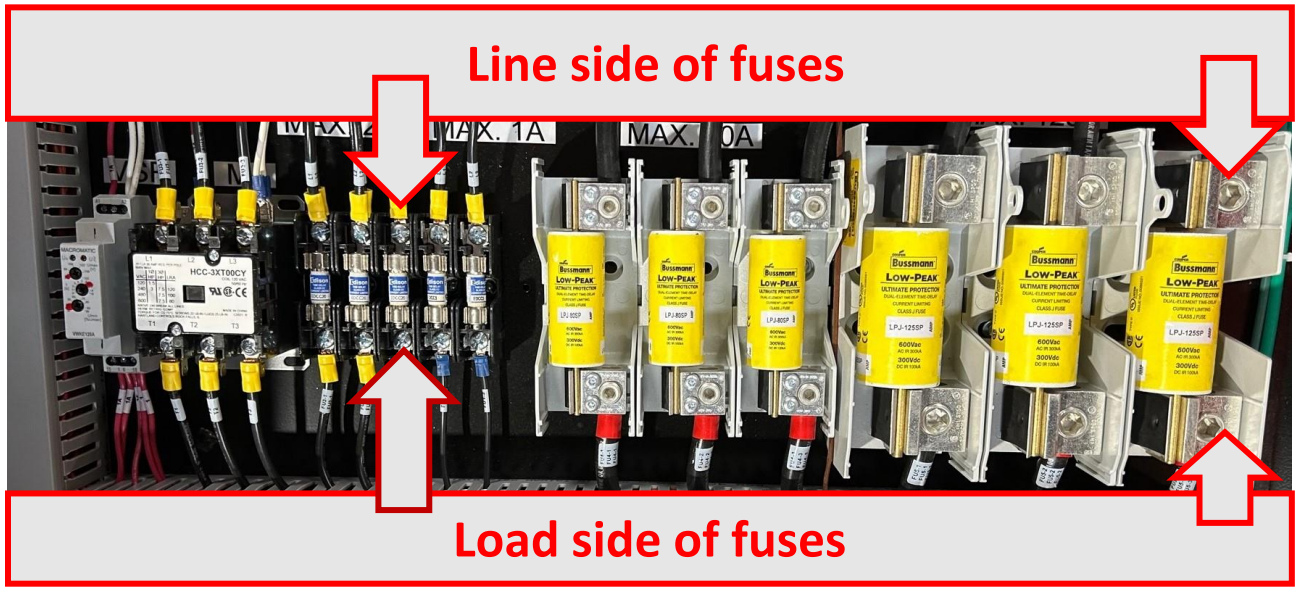
These guides were developed to assist the working technicians in the field. We've supplied issues and solutions to the most common problems encountered in the field. If you need assistance while troubleshooting on the job, they are easy to store in your smart phone, tablet or computer.

Getting Started is easy Just click on Page # for information or issue you are encountering

- **Note:** The EB150E is dual voltage, 600 volts or 480 volts and is divided into 3 banks of elements, 60 KW, 90 KW, and 150 KW.

Getting started…

"Field Assist Troubleshooting Guide"



You may have breakers

Note: It is important to check all fuses or breakers before starting troubleshooting procedures.

- ➢ Check voltage between all phases and "NOT to ground."
- • Check for 480 volts or 600 volts if selected between L1 and L2, L2 to L3, L1 to L3.
- ✓ If selected voltage is not present on one of the line side of the fuses, Issue with power from land line or generator.
- • Check for selected voltage on the load side of the fuses,
- ✓ If selected voltage is not present, burnt fuse or loose connection.
- • If selected voltage is present on load side of all the fuses continue…Page 3

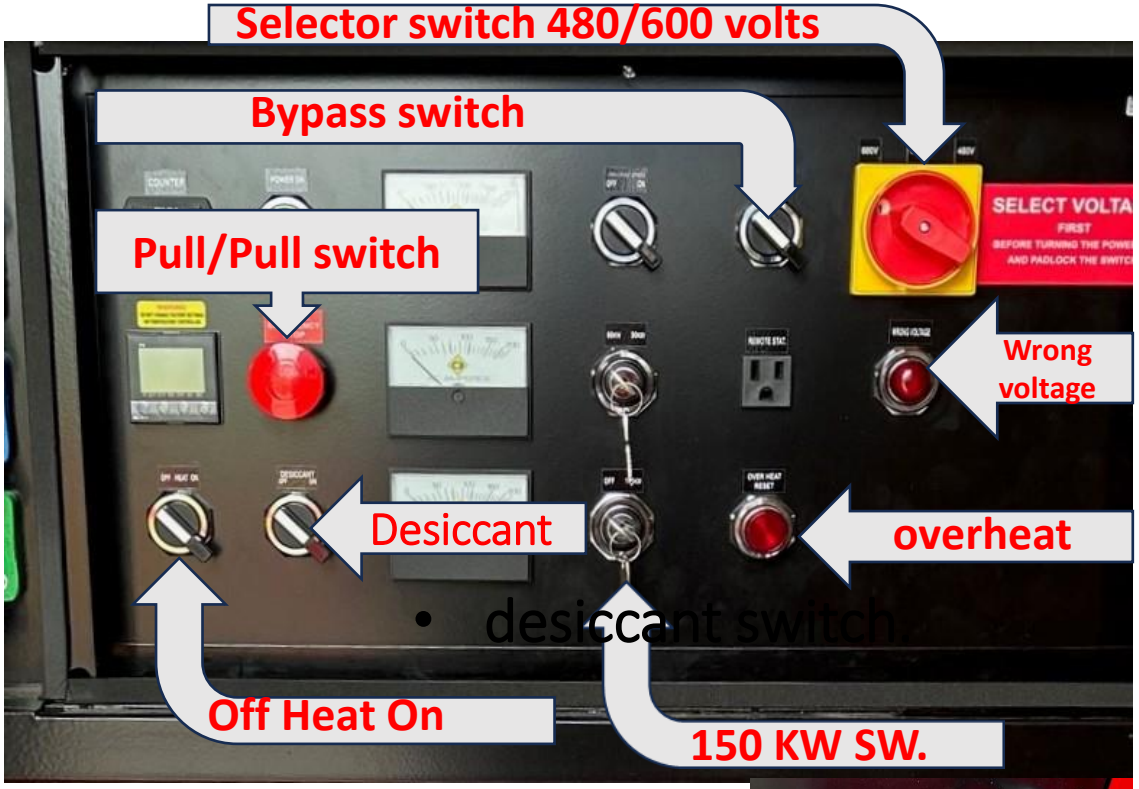
Choose the Voltage the heater is connected to and click on the Page

- Note: Once the proper voltage is selected the selector switch should be padlocked with Tie raps to protect against accidental switching during operation.
  - ✓ If You are connected to 480 volts…Page 4
  - ✓ If You are connected to 600 volts…Page 23

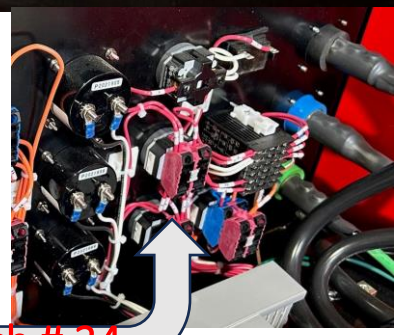
Getting Started...

"Field Assist Troubleshooting Guide"

Choose the issue you are encountering and click on the page



- desiccant switch

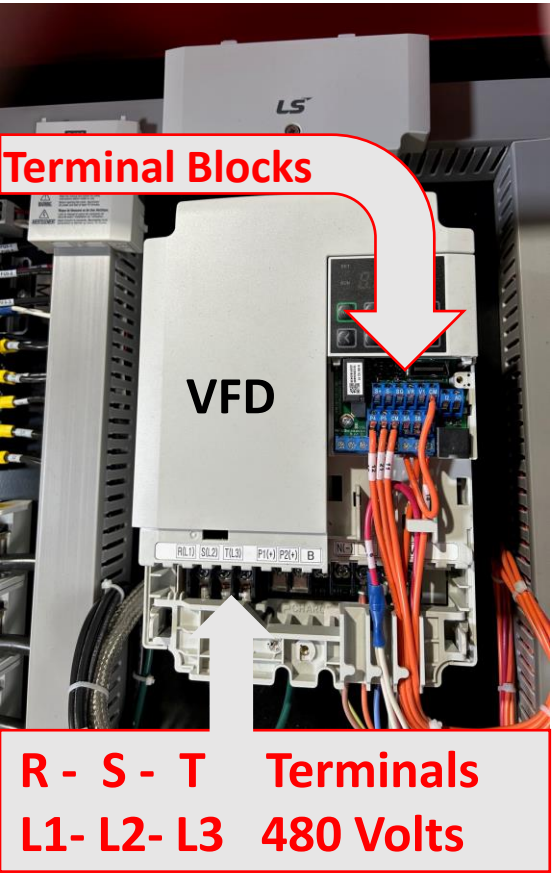


desiccant switch # 34

- ➢ Ensure the selector switch is set to 480 volts.
- ✓ Ensure the Pull/Push switch is out.
- Turn the Off Heat On switch to "Heat on"
- Turn the Bypass Stat switch on.
- Turn the 150 KW key switch to 150 KW on.
- Turn the Desiccant switch to off.
- Check for 120 volts on wire #34 on desiccant switch.
- ✓ If 120 volts is not present, defective desiccant switch.
- If 120 volts is present, Continue...Page 6

No heat and fan doesn't start...

"Field Assist Troubleshooting Guide"



Note: The circulating Fan must start first before any of the elements are energized. The VFD controls the fan and fan speeds. All the wiring for switches and contacts are orange. The contacts and control circuit are very low voltage, and the use of a jumper wire is best.

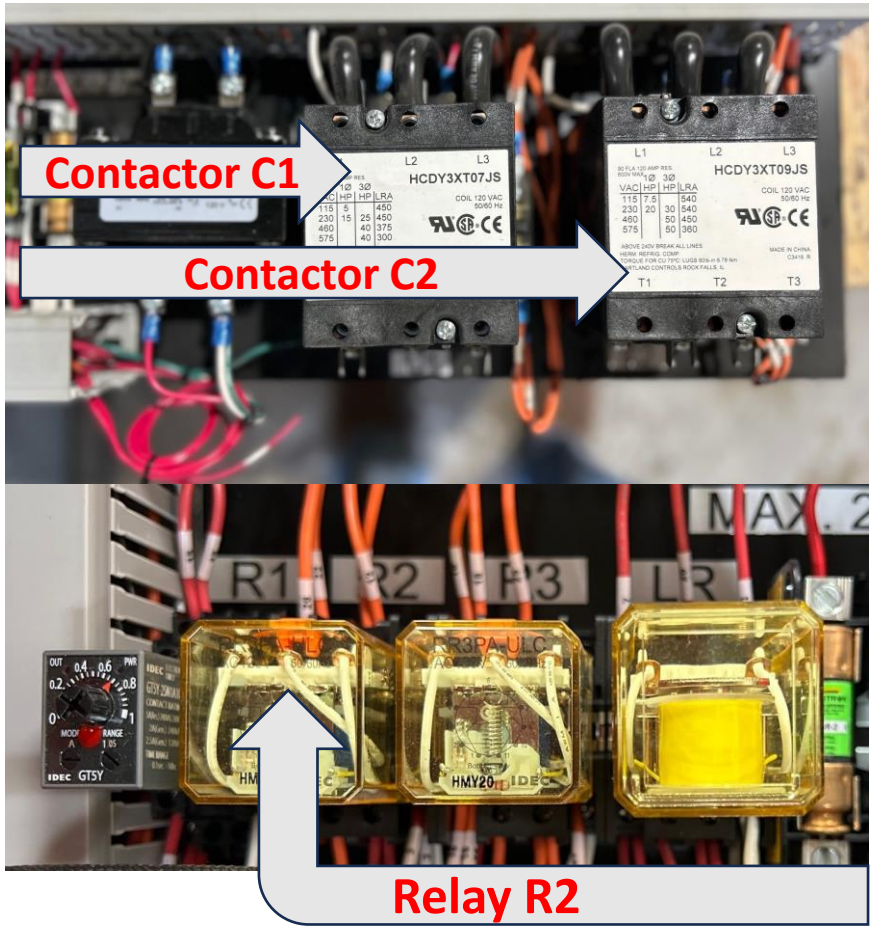
- If the fan does not start with the Off Heat On switch to "Heat on"
- Place a jumper wire between wire # 11 on the heat switch and wire # 12 on R2 relay.
- If the fan starts...Page 7
- If the fan does not start, check for 480 volts to the VFD.

✓ If you have 480 volts present, the VFD is defective.

- Note: The VFD can work on single phase or 3 phases.
- Before replacing the VFD make sure all the terminal blocks inside the VFD are in place and orange wires are properly connected.

Problem solved

HOME



- Place a jumper wire between wire # 21 on contactor C2 and wire # 29 on C2 contactor.

✓ If the fan starts, defective C2 aux contact.

- If the fan doesn't start, place a jumper wire between wire # 29 on contactor C1 and wire # 28 on C1 .

✓ If the fan starts, defective C1 aux contact.

- If the fan doesn't start, place a jumper wire between wire # 28 on contactor C1 and wire #26 on relay R2.
- If the fan starts, defective R2 relay.
- If the fan doesn't start, place a jumper wire between wire # 26 on relay R2 and wire # 11 on Off Heat On switch.
- If the fan starts, defective on Off Heat On switch.

Problem solved

There is “No Heat” fan starts.

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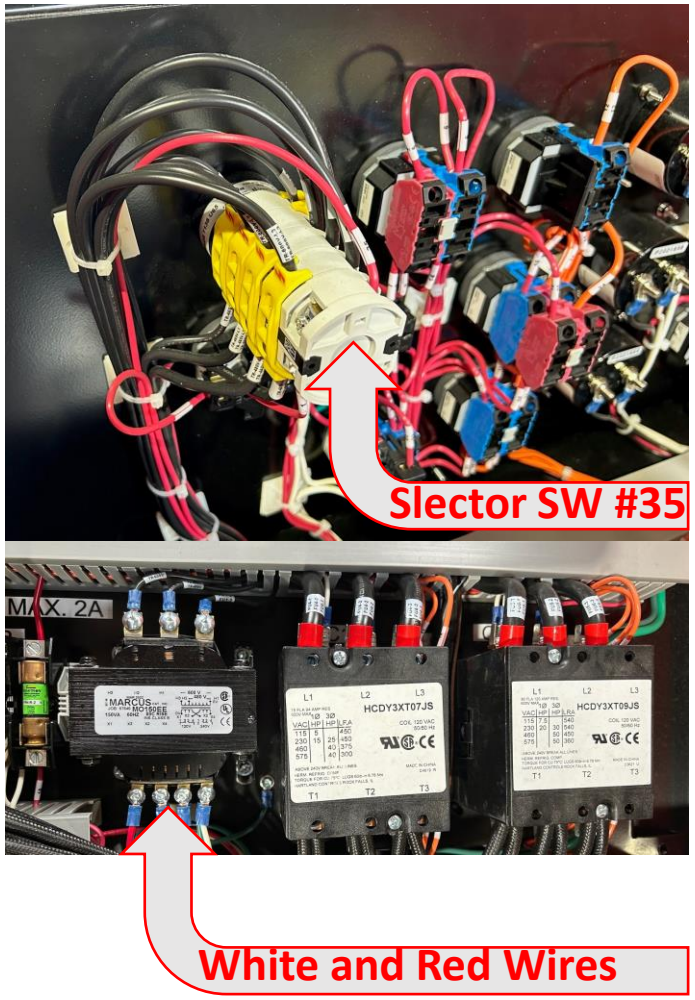


- Note: when checking for 120 volts on controls always use the neutral white wire on transformer and not to ground. The control wires are all red, and number labeled.

- Check for 120 volts on transformer between white and red wires.

✓ If 120 volts is not present, defective transformer.

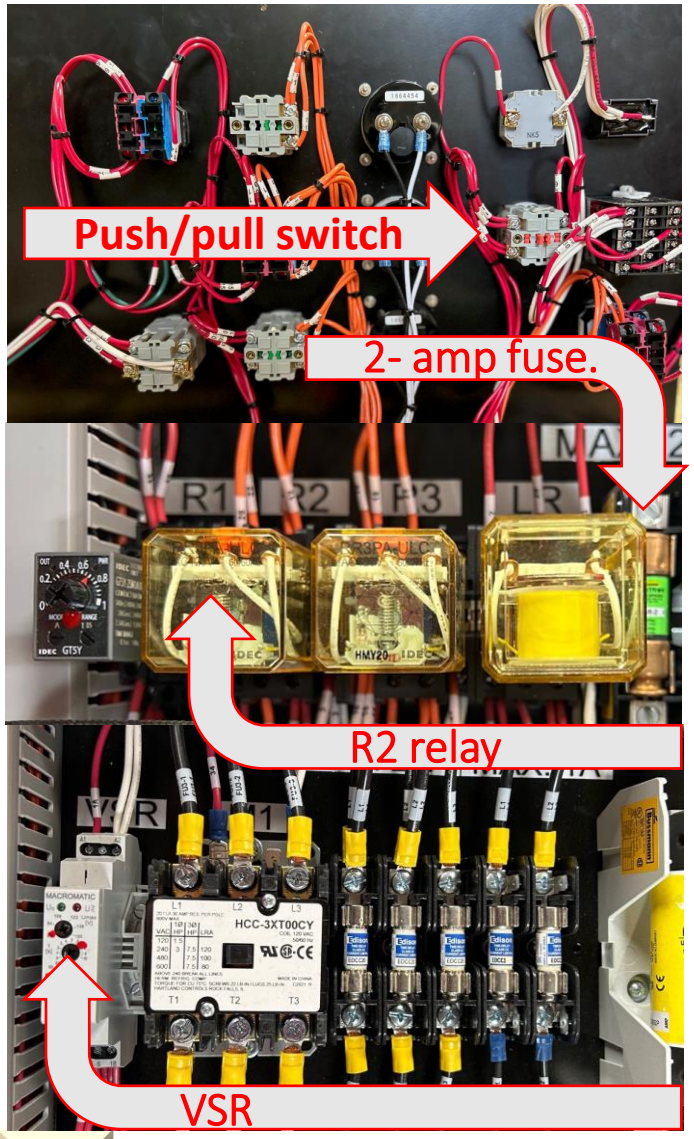
- If 120 volts is present, check for 120 volts on selector switch wire #35.

✓ If 120 volts is not present, defective selector switch.

✓ If 120 volts is present…Page 9

HOME

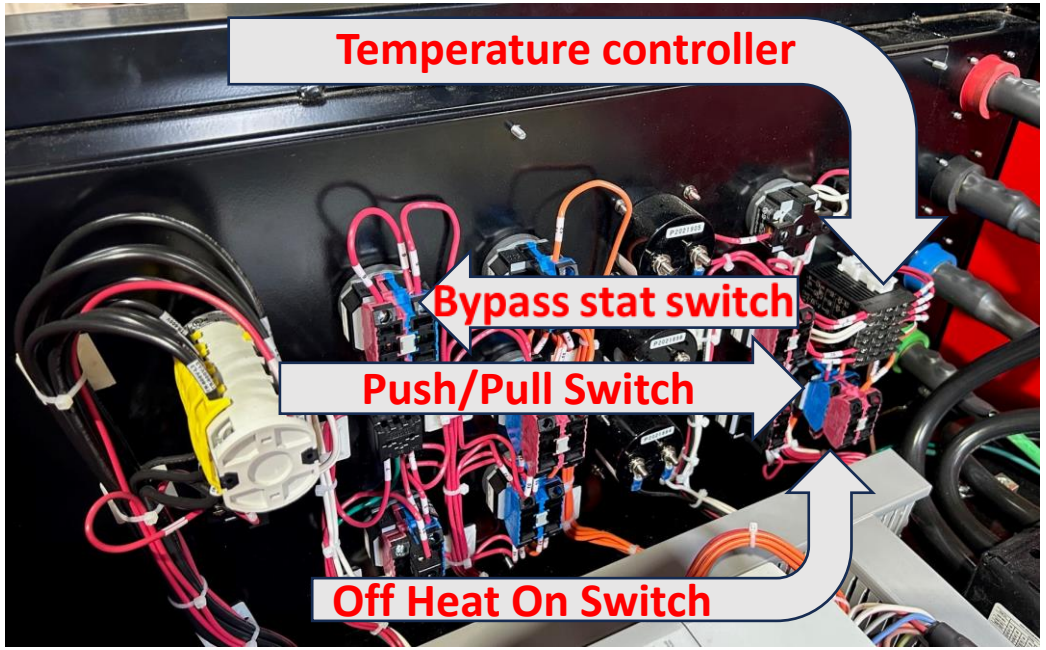
There is “No Heat” fan starts.



- If 120 volts is present, check for 120 volts on wire # 1A on 2- amp fuse.
- If 120 volts is not present, burnt fuse.
- If 120 volts is present, check for 120 volts on wire # 1 on VSR.
- If 120 volts is not present, defective VSR.
- If 120 volts is present, check for 120 volts on wire # 3 on R2 relay.
- If 120 volts is not present, defective push pull switch.
- If 120 volts is present, continue…Page 10

➢ Note: Do not attempt to change settings on VSR this may cause damage and will void all warranty.

There is No Heat.



- If 120 volts is present, check for 120 volts on wire # 4 on temperature controller.

✓ If 120 volts is not present, defective Off Heat On switch.

- If 120 volts is present, check for 120 volts on wire # 30 on temperature controller.

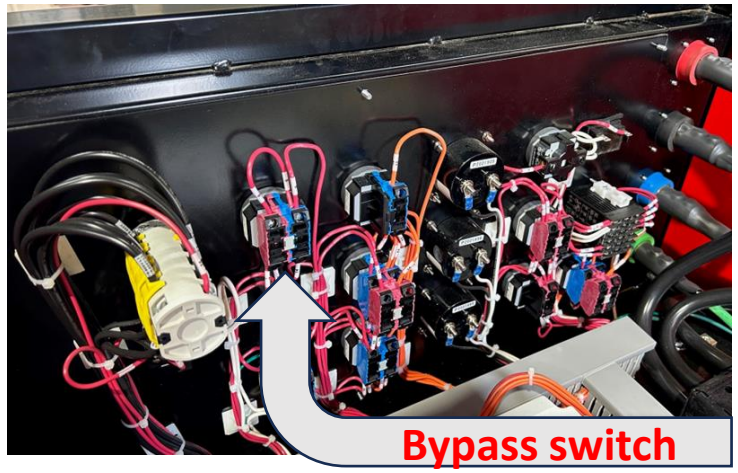
✓ If 120 volts is not present, defective temperature controller or thermocouple.

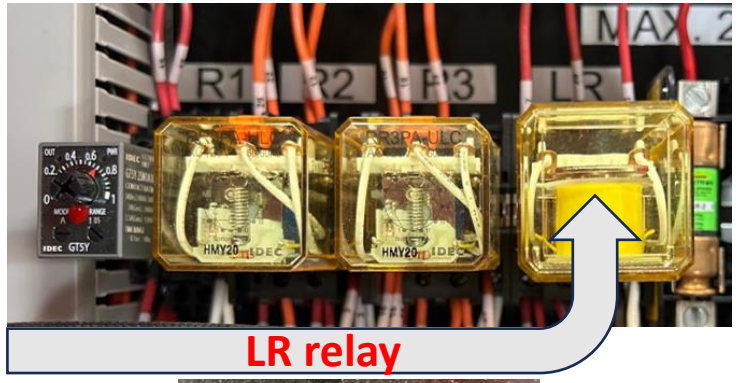
- If 120 volts is present, check for 120 volts on wire # 6 on Bypass stat switch.

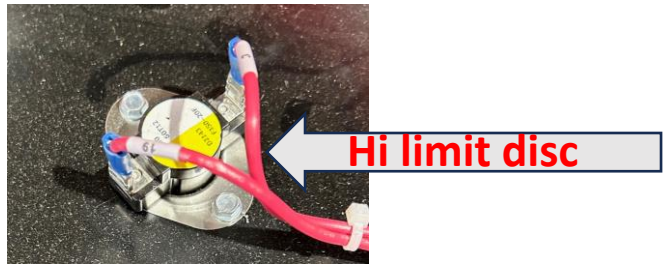
✓ If 120 volts is not present, defective Push/Pull switch.

- If 120 volts is present, continue…Page 11

There is No Heat.







- If 120 volts is present, check for 120 volts on wire # 7 on Bypass switch.

✓ If 120 volts is not present, defective Bypass switch.

- If 120 volts is present, check for 120 volts on wire # 8 on LR relay.
- If 120 volts is present continue…Page 12
- If 120 volts is not present, check for 120 volts on wire # 19 on LR.
- If 120 volts is present on wire #19, remove the wire #19 from the Hi Limit disc.

✓ If the heater starts, defective Hi Limit disc.

✓ If the heater doesn't start, defective temperature controller or thermocouple.

Problem solved

There is No Heat.

Air switch

Fan motor

- If 120 volts is present, check for 120 volts on wire # 9 on air proving switch.
- If 120 volts is not present, defective fan motor thermostat.

➢ Note: the fan motor thermostat is located inside the fan motor and is not field serviceable.

If 120 volts is present, check for 120 volts on wire # 10 on air proving switch.

- If 120 volts is present, you should have heat on 1 or more banks of elements.
- If there is no elements coming on continue…

Checking contactors and elements…Page 13

There is No Heat on 60 KW.

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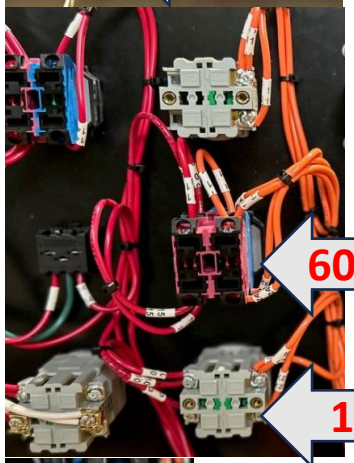

- With the 60 KW switch set to 60 KW, check for 120 volts on wire #15 of the selector switch.
- ✓ If 120 volts is not present, defective 60 KW switch.
- If 120 volts is present, check for 480 volts between T1 - T2 and T1 – T3 and T2 – T3 on C1.
- ✓ If 480 volts is present on all phases, defective bank of elements.
- ✓ If 480 volts is not present on one of the phases, defective C1 contactor.
- If the 90 KW switch is set to 90 KW…Page 14

There is No Heat on 90 KW.

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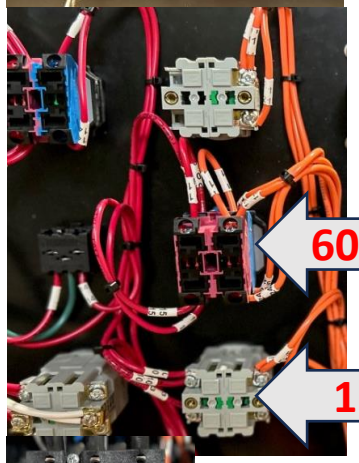

- Note: when checking for 120 volts on controls always use the neutral white wire on transformer and not to ground. The control wires are all red, and number labeled.

- With the 90 KW switch set to 90 KW, check for 120 volts on wire #17 of the selector switch.
  - ✓ If 120 volts is not present, defective 90 KW switch.
  - If 120 volts is present, check for 480 volts between T1 - T2 and T1 – T3 and T2 – T3 on C2
    - ✓ If 480 volts is present on all phases, defective bank of elements.
    - ✓ If 480 volts is not present on one of the phases, defective C2 contactor.

- If the 150 KW switch is set to 150 KW…Page 15

HOME

There is No Heat on 150 KW or only partial heat.

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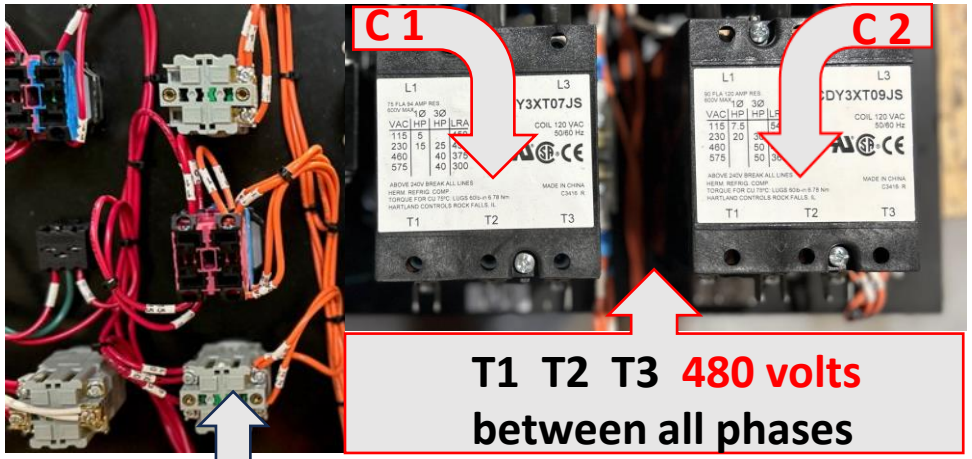
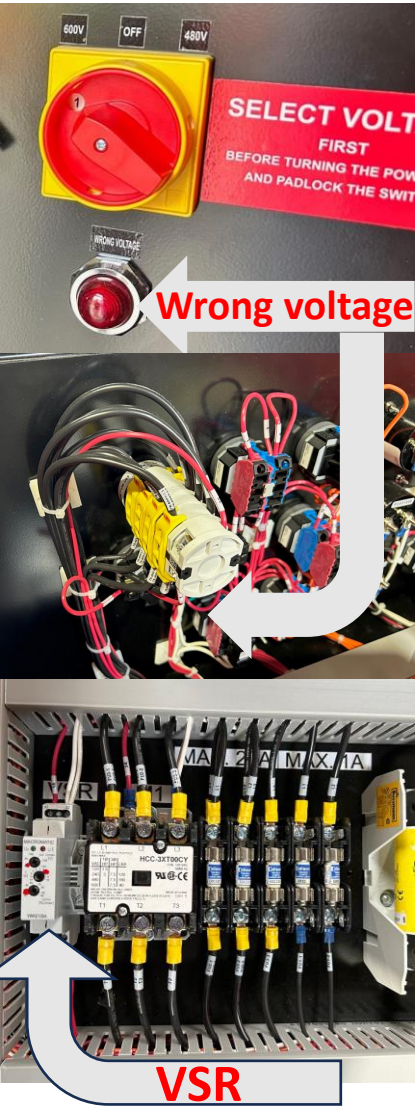


- **Note**: Both Contactors C1 and C2 should be closed with 150 Kw switch in the on position. Newer models have a timer relay instead of a regular R1 relay.
- With the 150 KW switch set to 150 KW, check for 120 volts on wire #13 of the R1 relay or timer relay.
  - ✓ If 120 volts is not present, defective 150 KW switch.
  - ✓ If 120 volts is present, Defective R1 relay
- If there is only partial heat, check which contactor is not working by checking for 480 volts between all phases T1 - T2 and T1 – T3 and T2 – T3 of contactors C1 and C2.
  - ✓ If 480 volts is present on all phases, defective bank of elements.
  - ✓ If 480 volts is not present on one of the phases, defective C1 or C2 contactor.

Problem solved

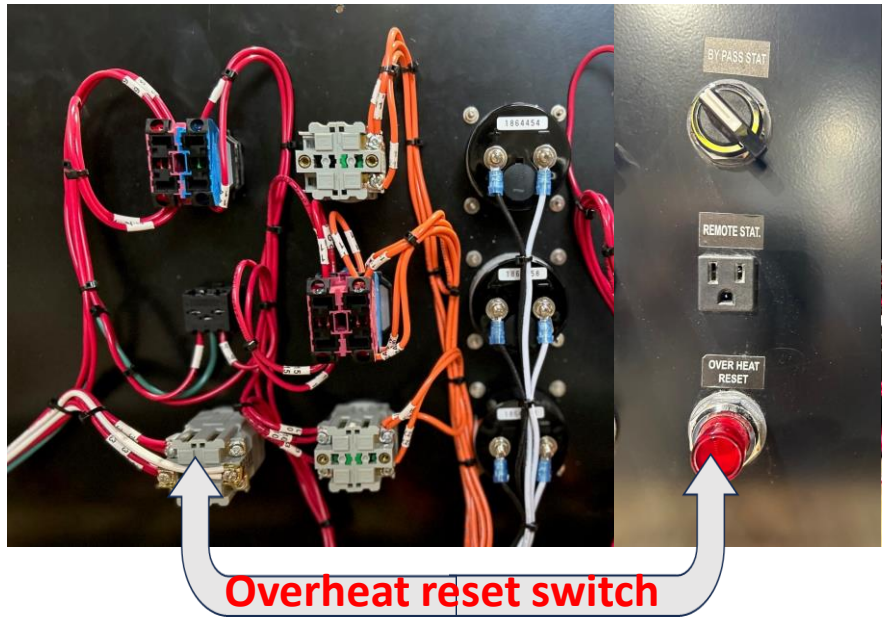


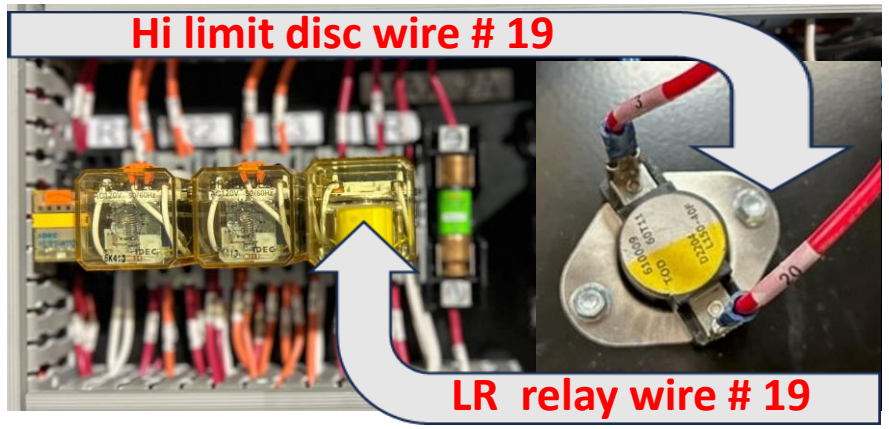
Note: the EB150E 600/480 is equipped with a VSR to help protect against low or to high of voltage.

If the wrong voltage indicator is illuminated, check 120 volts to wire # 1A on the VSR.
If voltage is between 100 volts and 135 volts, defective VSR.
If voltage is not, wrong voltage is being supplied to the heater.

Problem solved

There is No Heat, overheat light is on…





- Check for 120 volts on wire # 19 on LR relay.
- If 120 volts is present on wire #19, remove the wire #19 from the Hi Limit disc.

✓ If the heater starts, defective Hi Limit disc.

- If the heater doesn't start, with the wire still off the disc, check for 120 volts on relay wire # 19,

✓ If 120 volts is present, defective temperature controller or thermocouple.

✓ If 120 volts is not present, press the reset and hold in, check for 120 volts on wire # 20 on LR relay.

✓ If 120 volts is not present, defective overheat reset.

Problem solved

HOME

The fan doesn’t start with the Fan max speed switch On.

Fan max speed switch

Off Heat On switch

- If the fan starts with the Off Heat On switch but does not start with the Fan max speed switch On.

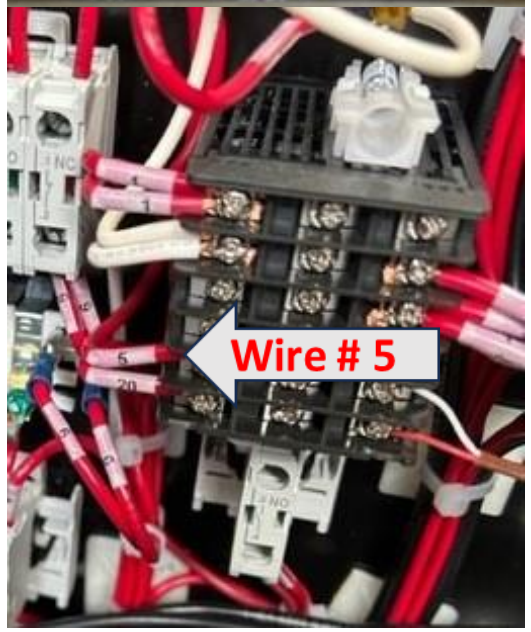
✓ Defective Fan max speed switch.

Problem solved

HOME

The fan shuts off before cooling down "Field Assist Troubleshooting Guide"

Temperature control



➢ Note: the temperature controller shuts down the fan after the call for heat has ended at 80° F.

✓ If the display reads odd numbers, defective thermocouple.

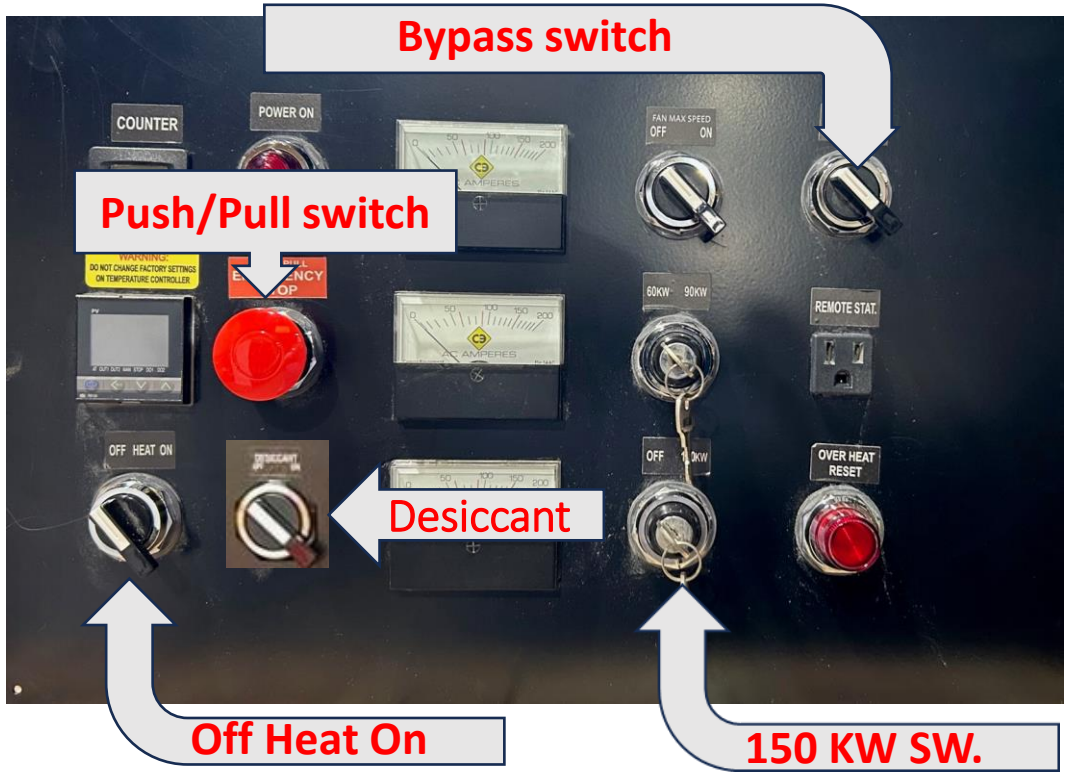
- With the Bypass switch on off and with the display temperature under 80° F.

- Check for 120 volts on wire # 5 on the temperature controller.

✓ If 120 volts is present, the temperature controller is defective.

Problem solved

The fan won't shut off.



- Ensure the Pull/Push switch is in.
- Turn the Off Heat On switch to "Heat off"
- Turn the Bypass Stat switch off.
- Turn the 150 KW key switch to 150 KW on.
- Turn the Desiccant switch to off.
- Ensure the temperature control is under 80° F.

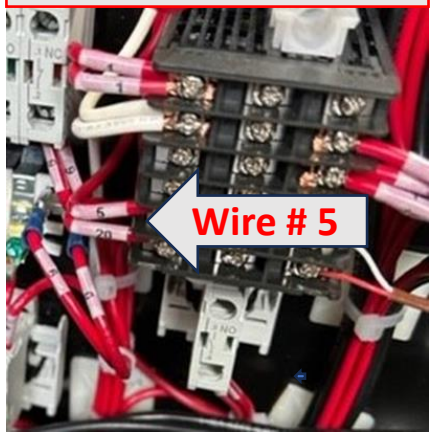
➢ If the blower fan doesn't shut off continue…Page 21

HOME

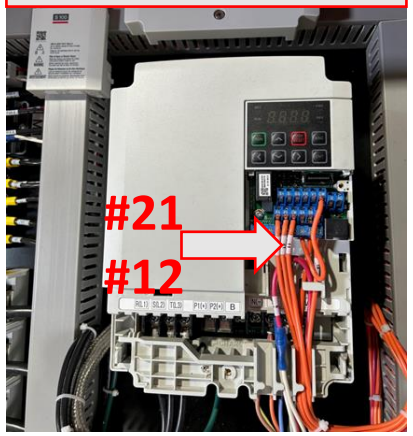
The fan won't shut off.

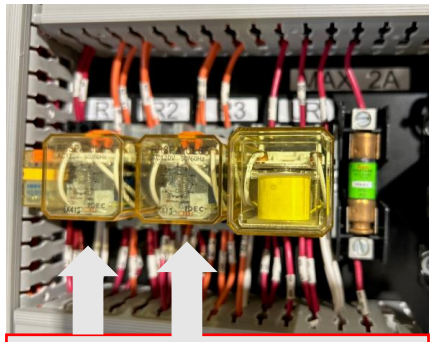
"Field Assist Troubleshooting Guide"

Temp. Control

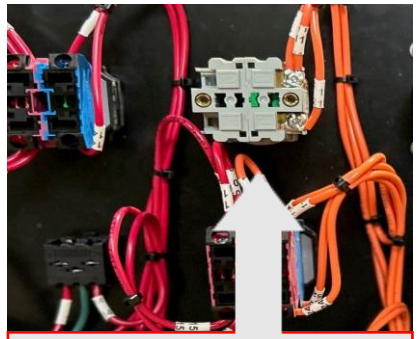


VFD





R2 R3 relays

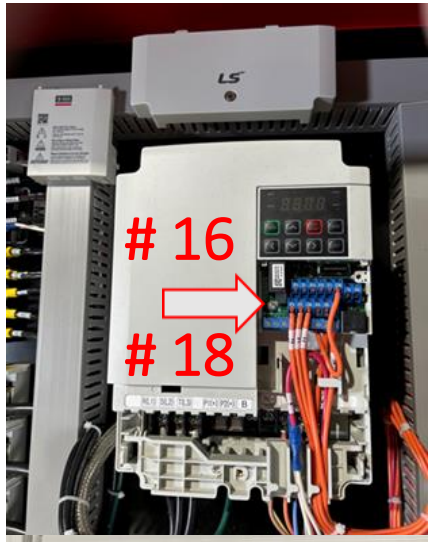


Fan max speed switch

- Check for 120 volts on #5 wire of temperature control.
- ✓ If 120 volts is present, defective temperature control.
- If 120 volts is not present, remove cover from VFD and then remove wire # 21.
- ✓ If fan stops, defective Off Heat On switch.
- If fan continues to run, remove wire # 12 on Fan max speed switch.
- ✓ If fan stops, defective fan switch.
- If fan continues to run, remove wire # 12 on VFD.
- ✓ If fan stops, defective R2 relay.
- ✓ If fan continues to run…Page 22

HOME

The fan won't shut off.



R2 R3 relays

Note: wire # 16 and # 18 on VFD are lower fan speeds.

- Remove wire #16 or # 18 from VFD.

✓ If fan continues to run, defective VFD.

✓ If fan stops running, defective R3 relay.

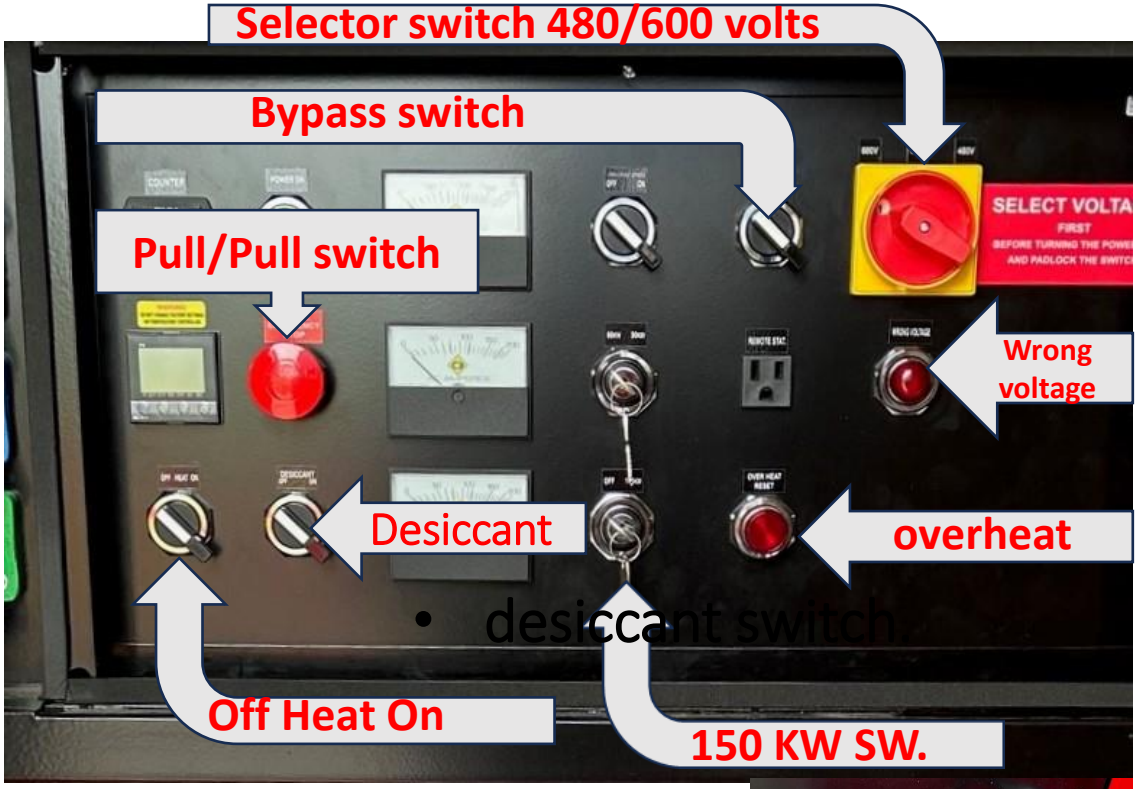
Problem solved

HOME

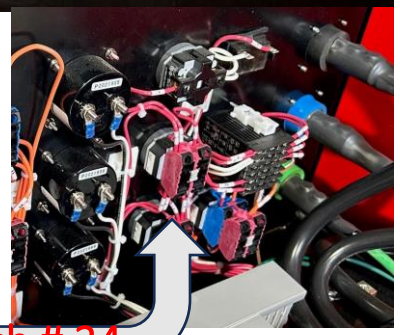
Getting Started...

"Field Assist Troubleshooting Guide"

Choose the issue you are encountering and click on the page



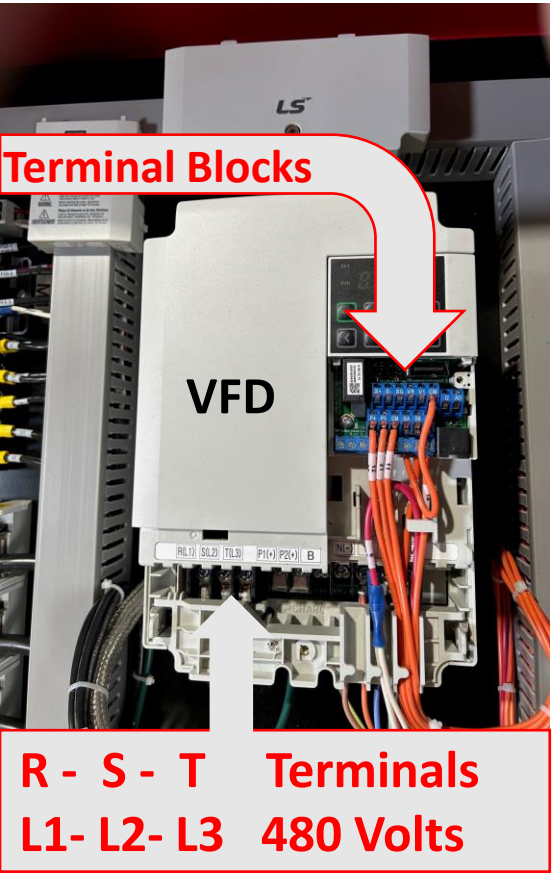
- desiccant switch



desiccant switch # 34

- ➢ Ensure the selector switch is set to 600 volts.
- ✓ Ensure the Pull/Push switch is out.
- Turn the Off Heat On switch to "Heat on"
- Turn the Bypass Stat switch on.
- Turn the 150 KW key switch to 150 KW on.
- Turn the Desiccant switch to off.
- Check for 120 volts on wire #34 on desiccant switch.
- ✓ If 120 volts is not present, defective desiccant switch.
- If 120 volts is present, Continue…Page 25

No heat and fan doesn't start... "Field Assist Troubleshooting Guide"



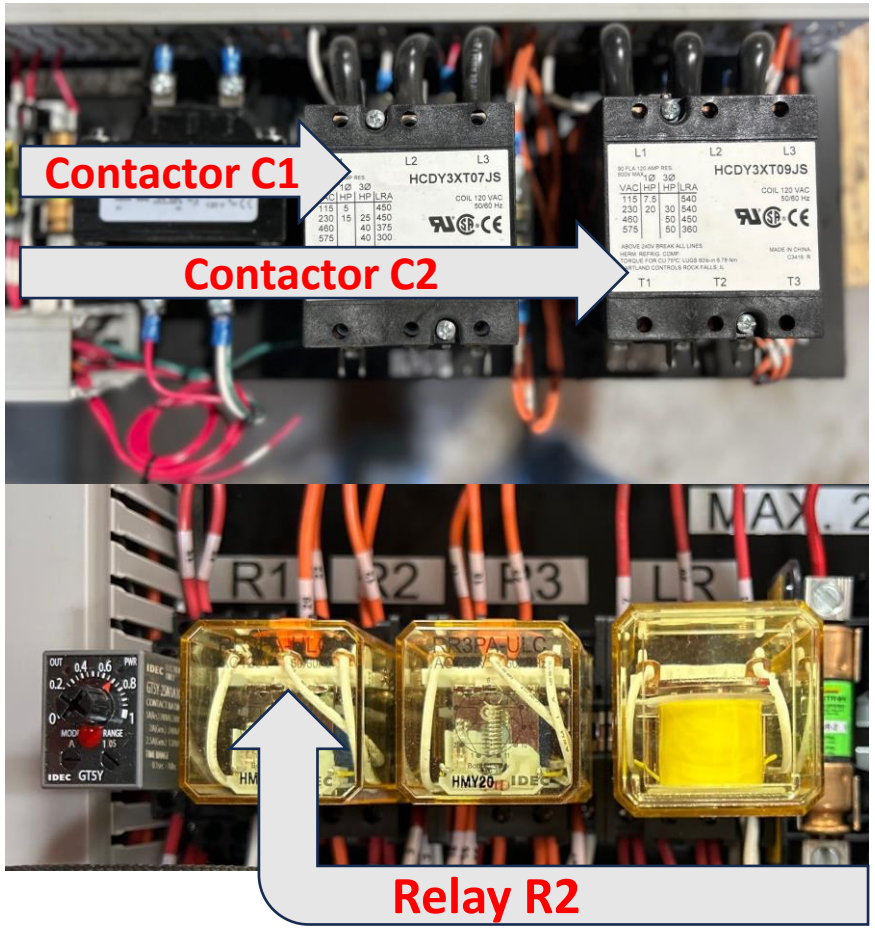
Note: The circulating Fan must start first before any of the elements are energized. The VFD controls the fan and fan speeds. All the wiring for switches and contacts are orange. The contacts and control circuit are very low voltage, and the use of a jumper wire is best.

- If the fan does not start with the Off Heat On switch to "Heat on"
- Place a jumper wire between wire # 11 on the heat switch and wire # 12 on R2 relay.
- If the fan starts...Page 26
- If the fan does not start, check for 480 volts to the VFD.

✓ If you have 480 volts present, the VFD is defective.

- Note: The VFD can work on single phase or 3 phases.
- Before replacing the VFD make sure all the terminal blocks inside the VFD are in place and orange wires are properly connected.

Problem solved



- Place a jumper wire between wire # 21 on contactor C2 and wire # 29 on C2 contactor.

✓ If the fan starts, defective C2 aux contact.

- If the fan doesn't start, place a jumper wire between wire # 29 on contactor C1 and wire # 28 on C1 .

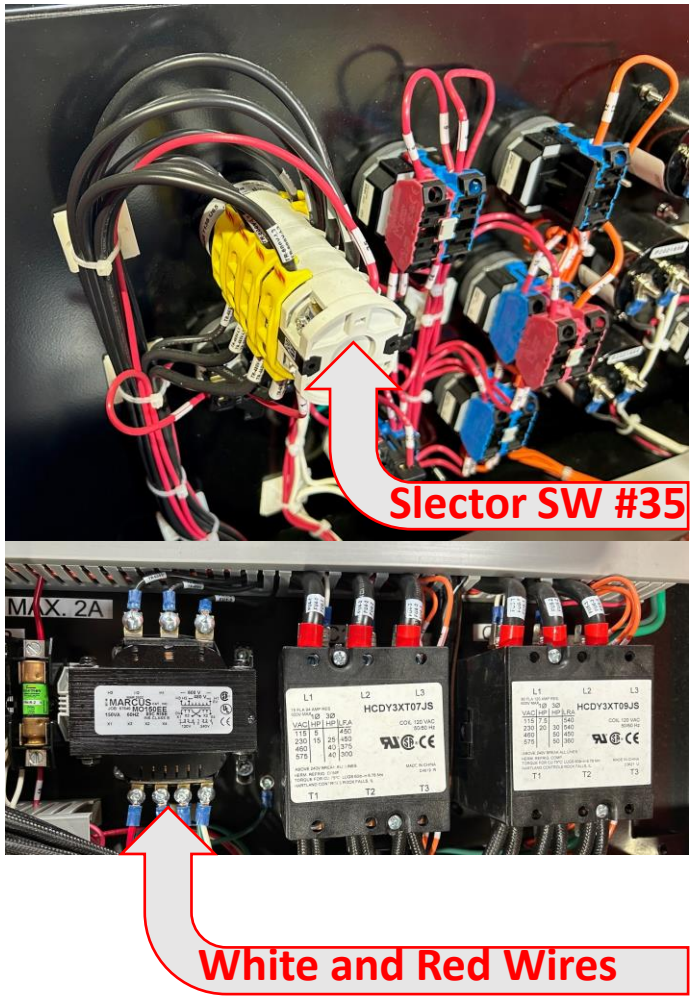
✓ If the fan starts, defective C1 aux contact.

- If the fan doesn't start, place a jumper wire between wire # 28 on contactor C1 and wire #26 on relay R2.
- If the fan starts, defective R2 relay.
- If the fan doesn't start, place a jumper wire between wire # 26 on contactor R2 and wire # 11 on Off Heat On switch.
- If the fan starts, defective on Off Heat On switch.

Problem solved

There is “No Heat” fan starts.

“Field Assist Troubleshooting Guide”



➢ Note: when checking for 120 volts on controls always use the neutral white wire on transformer and not to ground. The control wires are all red, and number labeled.

- Check for 120 volts on transformer between white and red wires.

✓ If 120 volts is not present, defective transformer.

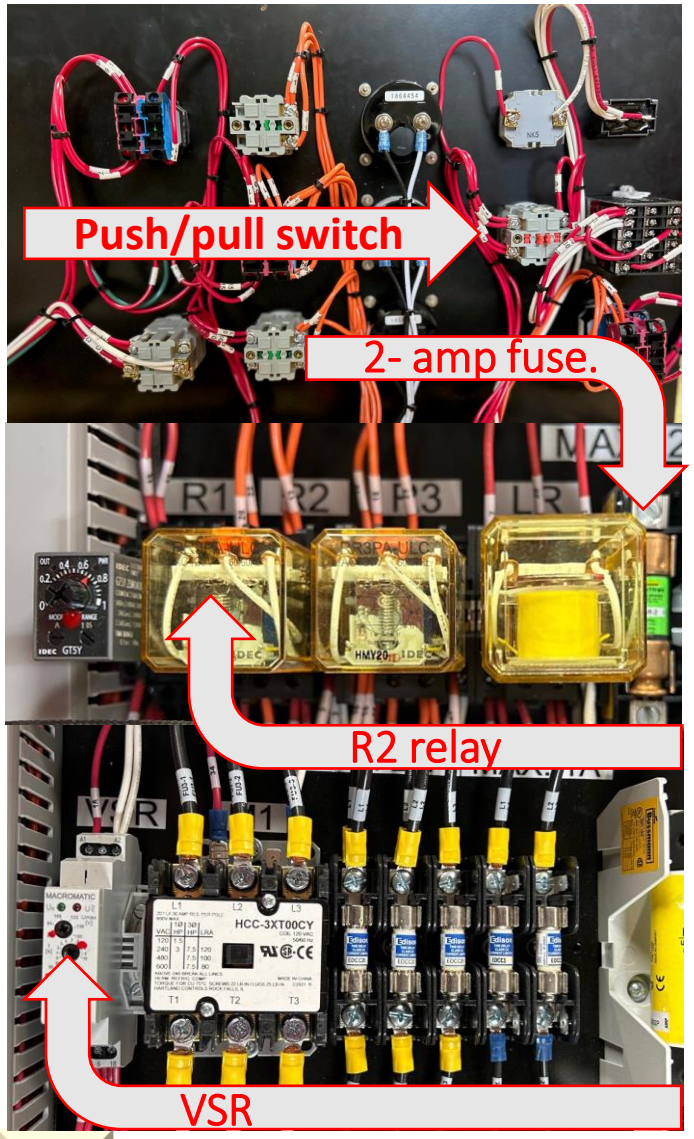
- If 120 volts is present, check for 120 volts on selector switch wire #35.

✓ If 120 volts is not present, defective selector switch.

✓ If 120 volts is present…Page 28

HOME

There is “No Heat” fan starts.

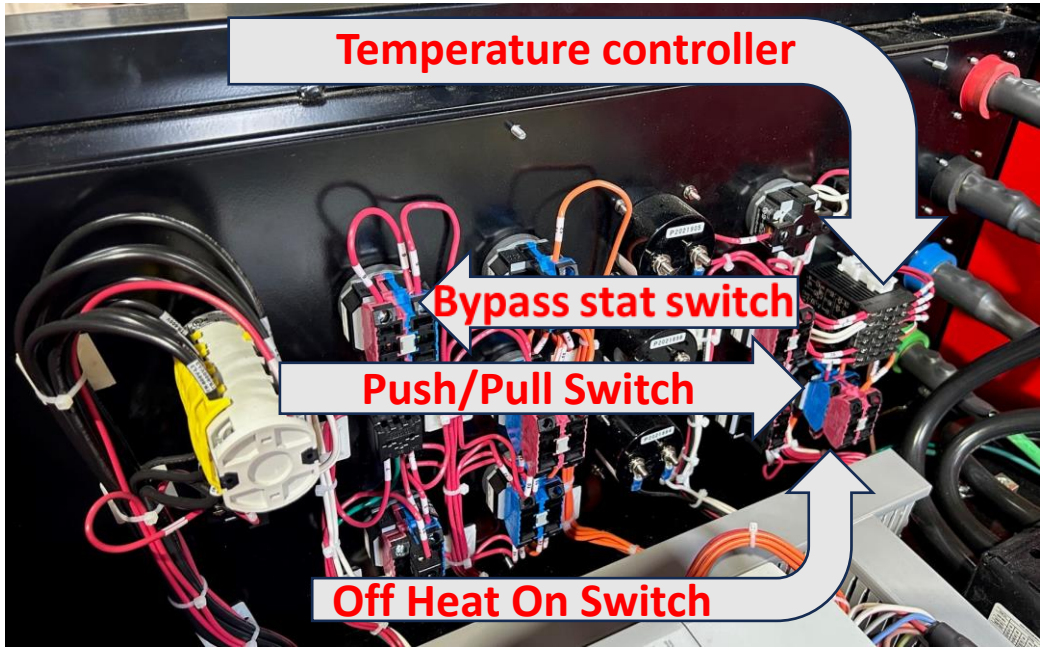


- If 120 volts is present, check for 120 volts on wire # 1A on 2- amp fuse.
- If 120 volts is not present, burnt fuse.
- If 120 volts is present, check for 120 volts on wire # 1 on VSR.
- If 120 volts is not present, defective VSR.
- If 120 volts is present, check for 120 volts on wire # 3 on R2 relay.
- If 120 volts is not present, defective push pull switch.
- If 120 volts is present, continue…Page 29

➢ Note: Do not attempt to change settings on VSR this may cause damage and will void all warranty.

HOME

There is No Heat.



- If 120 volts is present, check for 120 volts on wire # 4 on temperature controller.

✓ If 120 volts is not present, defective Off Heat On switch.

- If 120 volts is present, check for 120 volts on wire # 30 on temperature controller.

✓ If 120 volts is not present, defective temperature controller or thermocouple.

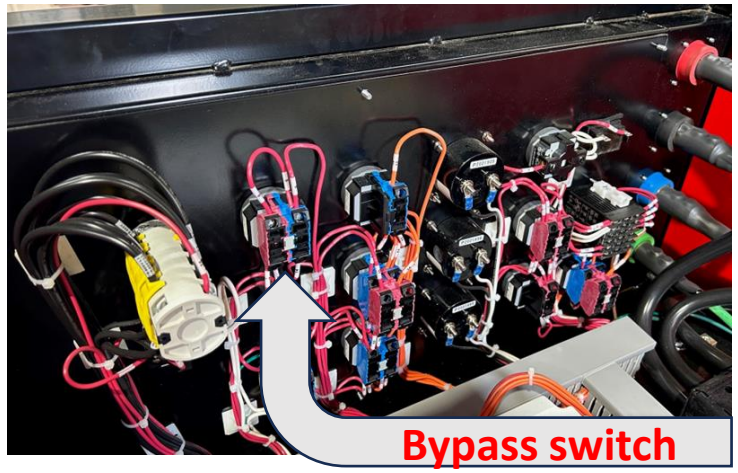
- If 120 volts is present, check for 120 volts on wire # 6 on Bypass stat switch.

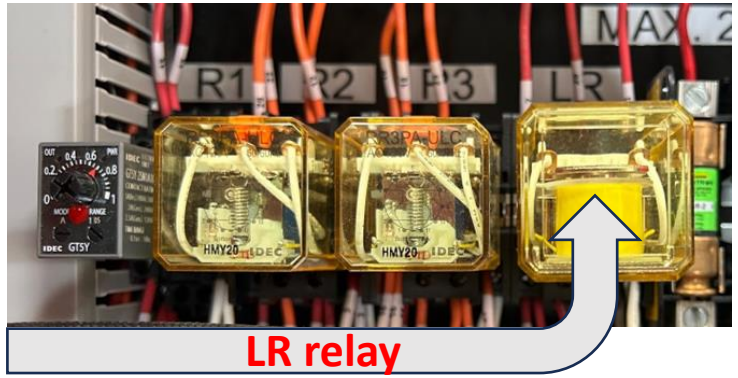
✓ If 120 volts is not present, defective Push/Pull switch.

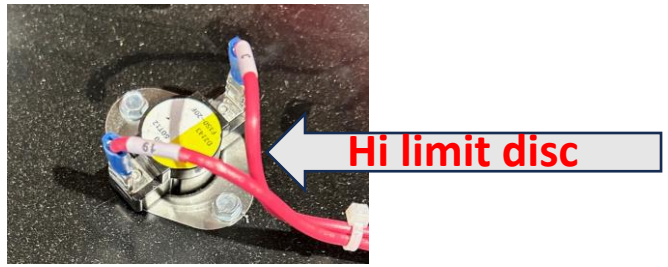
- If 120 volts is present, continue…Page 30

HOME

There is No Heat.







- If 120 volts is present, check for 120 volts on wire # 7 on Bypass switch.

✓ If 120 volts is not present, defective Bypass switch.

- If 120 volts is present, check for 120 volts on wire # 8 on LR relay.
- If 120 volts is present continue…Page 31
- If 120 volts is not present, check for 120 volts on wire # 19 on LR.
- If 120 volts is present on wire #19, remove the wire #19 from the Hi Limit disc.

✓ If the heater starts, defective Hi Limit disc.

✓ If the heater doesn't start, defective temperature controller or thermocouple.

Problem solved

Air switch

Fan motor

- If 120 volts is present, check for 120 volts on wire # 9 on air proving switch.
- If 120 volts is not present, defective fan motor thermostat.

➢ Note: the fan motor thermostat is located inside the fan motor and is not field serviceable.

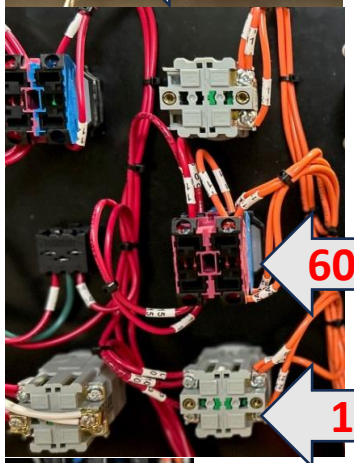
If 120 volts is present, check for 120 volts on wire # 10 on air proving switch.

- If 120 volts is present, you should have heat on 1 or more banks of elements.
- If there is no elements coming on continue…

Checking contactors and elements…Page 32

There is No Heat on 60 KW.

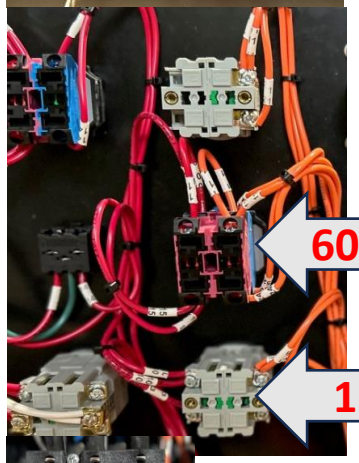
"Field Assist Troubleshooting Guide"



- With the 60 KW switch set to 60 KW, check for 120 volts on wire #15 of the selector switch.
- ✓ If 120 volts is not present, defective 60 KW switch.
- If 120 volts is present, check for 600 volts between T1 - T2 and T1 – T3 and T2 – T3
- ✓ If 600 volts is present on all phases, defective bank of elements.
- ✓ If 600 volts is not present on one of the phases, defective C1 contactor.
- If the 90 KW switch is set to 90 KW…Page 33

There is No Heat on 90 KW.

"Field Assist Troubleshooting Guide"

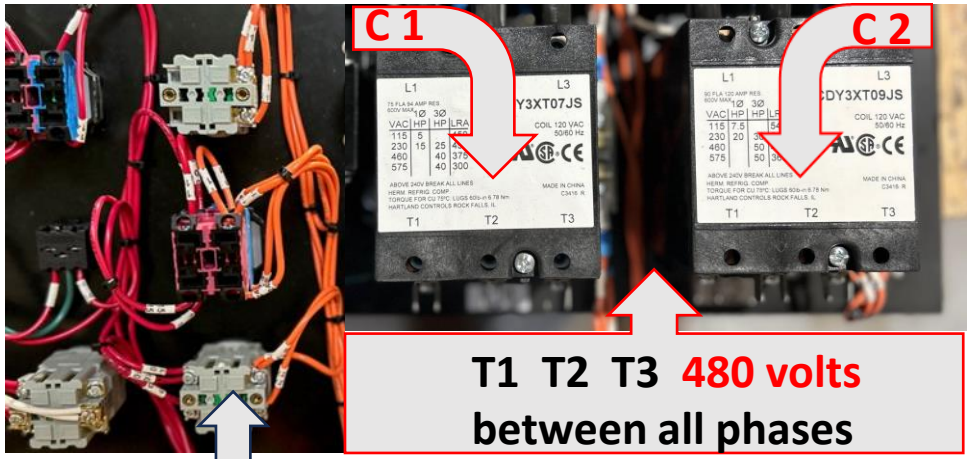


- Note: when checking for 120 volts on controls always use the neutral white wire on transformer and not to ground. The control wires are all red, and number labeled.

- With the 90 KW switch set to 90 KW, check for 120 volts on wire #17 of the selector switch.
  - ✓ If 120 volts is not present, defective 90 KW switch.
  - If 120 volts is present, check for 600 volts between T1 - T2 and T1 – T3 and T2 – T3
  - ✓ If 600 volts is present on all phases, defective bank of elements.
  - ✓ If 600 volts is not present on one of the phases, defective C2 contactor.
- If the 150 KW switch is set to 150 KW…Page 34

HOME

There is No Heat on 150 KW or only partial heat.



Problem solved

➢ **Note**: Both Contactors C1 and C2 should be closed with 150 Kw switch in the on position. Newer models have a timer relay instead of a regular R1 relay.

- With the 150 KW switch set to 150 KW, check for 120 volts on wire #13 of the R1 relay or timer relay.

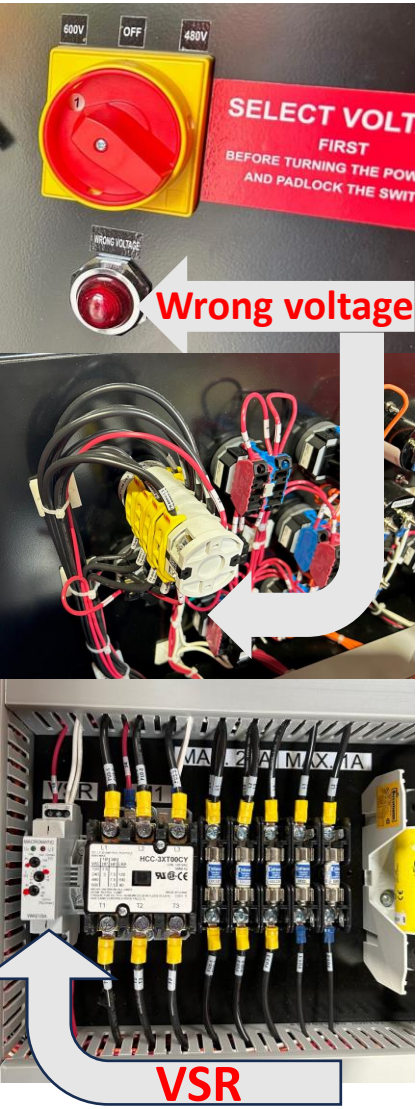
✓ If 120 volts is not present, defective 150 KW switch.

✓ If 120 volts is present, Defective R1 relay

- If there is only partial heat, check which contactor is not working by checking for 600 volts between all phases T1 - T2 and T1 – T3 and T2 – T3 of contactors C1 and C2.

✓ If 600 volts is present on all phases, defective bank of elements.

✓ If 600 volts is not present on one of the phases, defective C1 or C2 contactor.

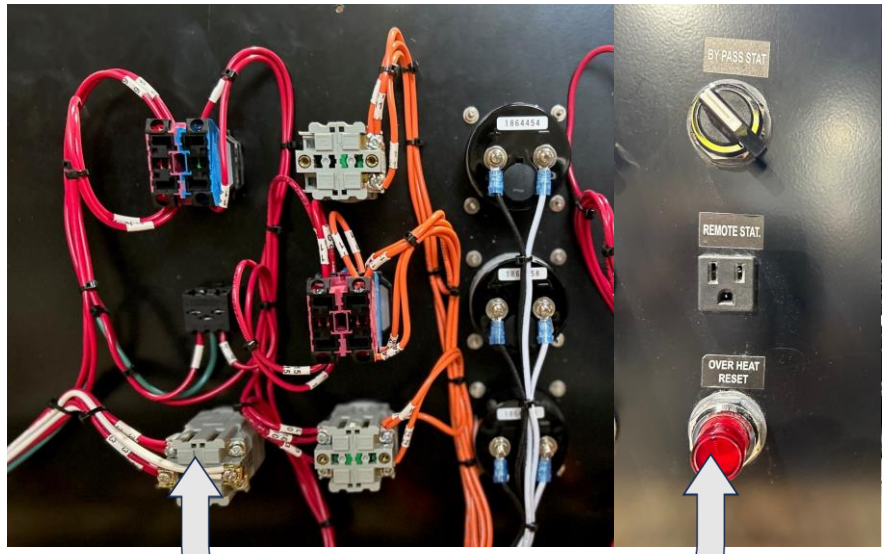


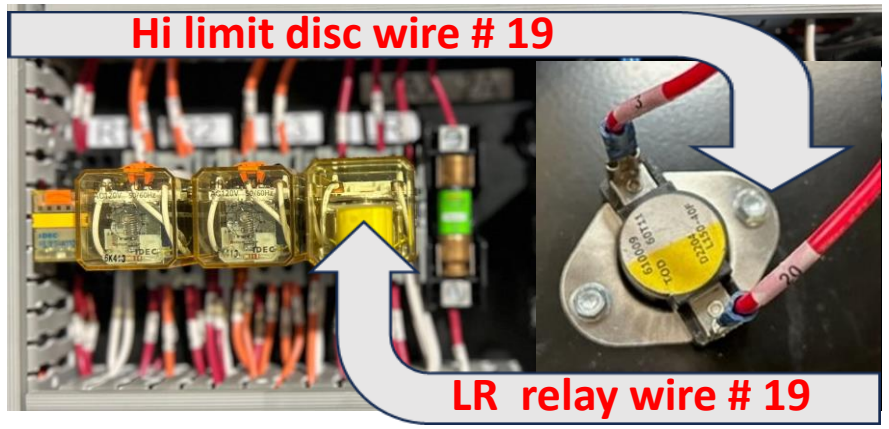
Note: the EB150E 600/480 is equipped with a VSR to help protect against low or to high of voltage.

If the wrong voltage indicator is illuminated, check 120 volts to wire # 1A on the VSR.
If voltage is between 100 volts and 135 volts, defective VSR.
If voltage is not, wrong voltage is being supplied to the heater.

Problem solved

There is No Heat, overheat light is on…





- Check for 120 volts on wire # 19 on LR relay.
- ✓ If 120 volts is not present, defective LR relay.
- If 120 volts is present on wire #19, remove the wire #19 from the Hi Limit disc.
- ✓ If the heater starts, defective Hi Limit disc.
- If the heater doesn't start, with the wire still off the disc, check for 120 volts on relay wire # 19,
- ✓ If 120 volts is present, defective temperature controller.
- ✓ If 120 volts is not present, press the reset and hold in, check for 120 volts on wire # 20 on LR relay.
- ✓ If 120 volts is not present, defective overheat reset.

Problem solved

HOME

Fan max speed switch

Off Heat On switch

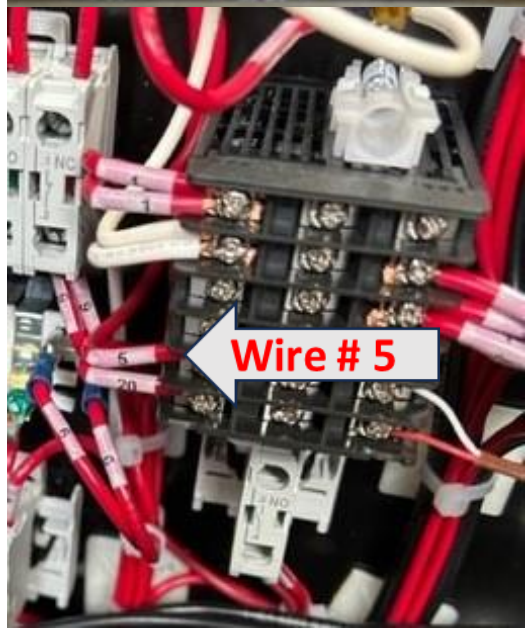
- If the fan starts with the Off Heat On switch but does not start with the Fan max speed switch On.

✓ Defective Fan max speed switch.

Problem solved

The fan shuts off before cooling down "Field Assist Troubleshooting Guide"

Temperature control



➢ Note: the temperature controller shuts down the fan after the call for heat has ended at 80° F.

✓ If the display reads odd numbers, defective thermocouple.

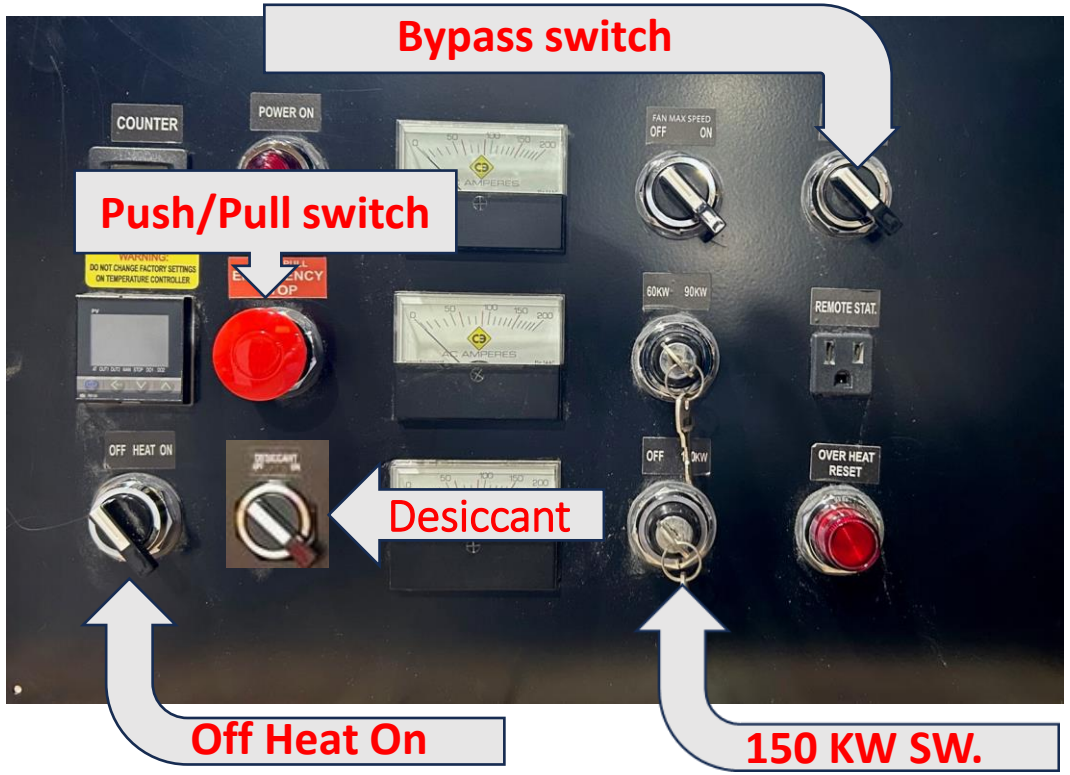
- With the Bypass switch on off and with the display temperature under 80° F.

- Check for 120 volts on wire # 5 on the temperature controller.

✓ If 120 volts is present, the temperature controller is defective.

Problem solved

The fan won't shut off.



- Ensure the Pull/Push switch is in.
- Turn the Off Heat On switch to "Heat off"
- Turn the Bypass Stat switch off.
- Turn the 150 KW key switch to 150 KW on.
- Turn the Desiccant switch to off.
- Ensure the temperature control is under 80° F.

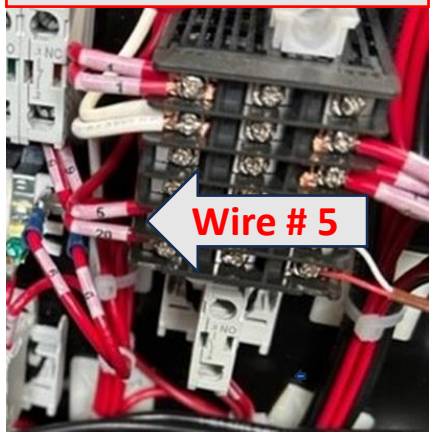
➢ If the blower fan doesn't shut off continue…Page 40

HOME

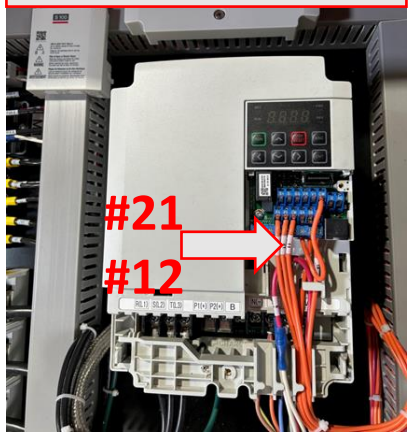
The fan won't shut off.

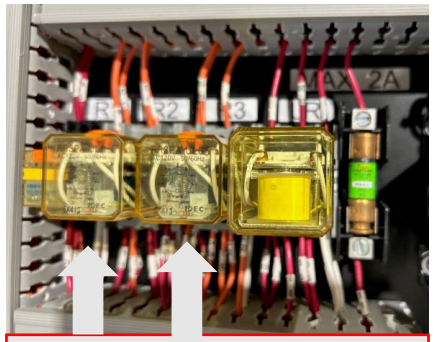
"Field Assist Troubleshooting Guide"

Temp. Control

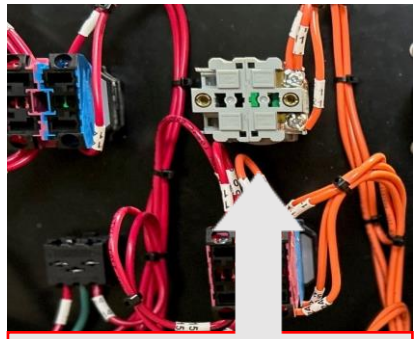


VFD





R2 R3 relays

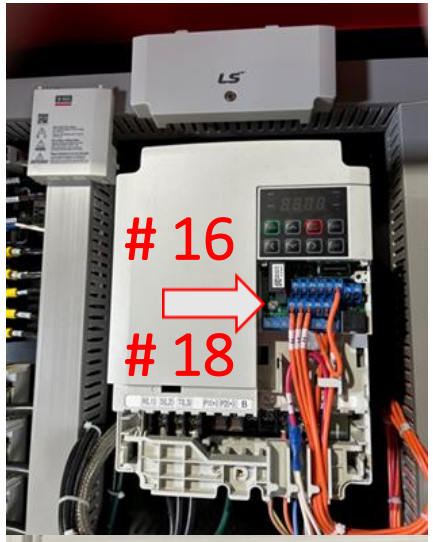


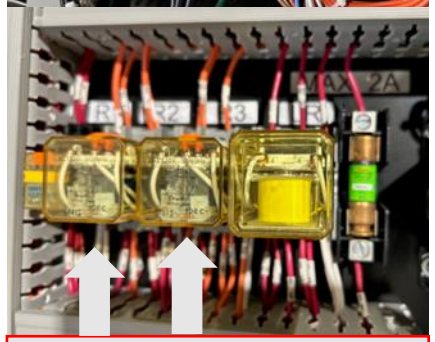
Fan max speed switch

- Check for 120 volts on #5 wire of temperature control.
- ✓ If 120 volts is present, defective temperature control.
- If 120 volts is not present, remove cover from VFD and then remove wire # 21.
- ✓ If fan stops, defective Off Heat On switch.
- If fan continues to run, remove wire # 12 on Fan max speed switch.
- ✓ If fan stops, defective fan switch.
- If fan continues to run, remove wire # 12 on VFD.
- ✓ If fan stops, defective R2 relay.
- ✓ If fan continues to run…Page 41

HOME

The fan won't shut off.





R2 R3 relays

Note: wire # 16 and # 18 on VFD are lower fan speeds.

- Remove wire #16 or # 18 from VFD.

✓ If fan continues to run, defective VFD.

✓ If fan stops running, defective R3 relay.

Problem solved

Start-up procedure for electric heaters "Field Assist Troubleshooting Guide"

1

Ensure the selector switch is set to proper voltage being supplied to the heater 600 or 480 volts.

2

Determine power wiring size to feed power to the heater.

Refer to… Page 46

3

Ensure all wires are properly protected from water, traffic, and other obstructions.

4

Ensure all connections are tight and properly connected.

5

Ensure proper duct sizing is installed.

Page 47

6

"Before starting the heater", with the Off Heat turned off, turn the OFF Fan to On.

7

With the Fan running, check to ensure the voltage remains stable at selected voltage

600 or 480 volts

Continue…Page 43

HOME

Start-up procedure for electric heaters "Field Assist Troubleshooting Guide"

8	9	10	11	12	Done
If the voltage is stable, set the 60 KW-90 KW selector switch to 60 KW.	Turn the Off Fan On switch to off. Turn the Off Heat On .	Turn the Bypass switch to on. Check the voltage.	Turn the selector 60-90 selector to 90 KW and check the voltage.	Turn the 150 KW selector switch to 150 KW and check the voltage.	If all the voltage checks are correct, the heater is set to go.

- **Note**: If the heater is going to be connected to a generator, always have the heater shut off until the generator is operating steady and voltage is correct. Ensure the generator is properly sized to accommodate the heater voltage and amperage draw.

Start-up set up procedure is complete.

HOME

Annual Maintenance Check List.

- ✓ Inspect all wiring for broken wires or loose connections.
- ✓ Tighten all high voltage connections and replace if necessary.
- ✓ Using compressed air blow off all dust from auxiliary contacts.
- ✓ Ensure all auxiliary contacts are secured properly in place.
- ✓ Using compressed air blow off all dust from electrical components.
- ✓ Using compressed air blow off all dust from elements.
- ✓ Check all fuses.
- ✓ Inspect heater casing for dents or damage, repair or replace if necessary.
- ✓ Store in clean dry environment.
- ✓ Tag ready to rent after maintenance.

➢ Note: large dents in heater casing changes the air flow and can cause issues with elements and could cause damage to wires and controls.

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- All wiring and connections to the heater should be calculated by a qualified electrician and approved by the local authorities having jurisdiction.

Note: The proper voltage and amperage draw is specified on the rating plate of the heater, failure to comply with electrical standards for wiring and amperage draw of the heater may cause damage to the heater. Consult a qualified electrician for assistance in wire sizing.

Back to previous menu…Page 42

Duct sizing.

The EB150E 600/480 volt can be used in most applications with ductwork.
The maximum outlet (supply air) is 200 feet. The maximum inlet (return air) is 25 feet.
Total ducting, Outlet plus Inlet not to exceed 200 feet.

- Best practices…
- ✓ Never exceed the 200 feet of outlet ducting and 25 feet of air inlet ducting.
- ✓ If flexible ducting is used, there should be no kinks in ductwork.
- ✓ Weather flexible or solid ducting is used, try to avoid sharp 90^{θ} turns.
- ✓ If ducting is split into 2 locations, use a TY not a T. and a maximum of 200 feet total ducting.
- ✓ If ducting is split into 2 locations, ensure the volume of air passing through is equal to or greater than the single outlet of the heater.
- ✓ Ensure all ducting is properly protected from water, traffic, and other obstructions.
- Note: Improper ducting will cause overheating and short cycling which will damage the heater and void all warranty.

Back to previous menu…Page 42