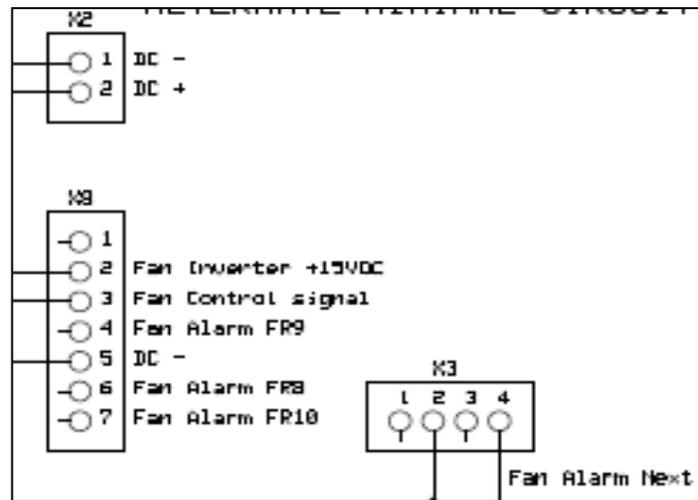


## Troubleshooting SVX/SPX AC Fan Failures

AC driven fans are on the FR8 chassis and higher drives. These all have fan inverters that run the fan. These drives are also the only ones that will come up with a F32 fan fault. This fault comes from the fan inverter. Below is the pin outs for the controls of the fan driver board.



- X2 pins 1 & 2 are DC bus. This comes from the DC bus of the drive through a pair of fast acting 6A fuses.
- X3 pins 2 & 4 are for the alarm coming from the next board in the series. The last board in the series will have a jumper between these two pins. Most FR8 & 9 drives have a board that does not have this connector.
- X8 pin 2 is +15VDC control voltage. The VB00299 board creates its own 15V, all others are fed from the power board. Pin 3 is the control signal, this will be -DC bus. When there is a 15VDC potential between pins 2 & 3 the fan driver turns on. Pins 4, 6 & 7 are the different alarm signal. 15VDC referenced to -DC bus is OK, 0V is alarmed.

There are really 2 types of failures that you get with this type of system. The first is that the fan is not spinning but the drive is able to run. This will normally end with the drive tripping in a F14 drive over temp trip. The second fault is a F32 fan fault. The difference between them is that in the first case the fan driver board thinks everything is OK, in the second case the fan driver board is faulted out. Below are the steps to follow when troubleshooting this.

### Fan control and LED status:

The first thing to do when troubleshooting a fan problem is to turn the fan control to continuous. To do this, go into programming mode and then go to the system menu. In the system menu go to hardware



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and then fan control. Turn the fan control to continuous. If the fan still is not spinning look at the LEDs on the fan driver board. There are 2 LEDs on this board, a green one and a red one. One of these LEDs should always be on, if neither is on you should get a F32 fault and probably the fuses for this would be blown. If the board thinks it is running, you should get just a flashing green LED. If there is no control signal applied to the board you should get a solid on green and red LED. If the board is faulted you should see something other than the above statuses.

### Checking the fuses (this step is skipped if there are LEDs lit on the fan driver):

If when the drive is powered up there are no LEDs lit on the fan driver board the most likely cause is that the fuses are blown. The fuses for this are 6A fast acting fuse and like fuses should be used when replacing these. Remove power from the drive and locate the fuses. If you follow the wires back from X2 on the fan driver this should lead you to the fuses. Remove fuses and ohm check. If you have a blown fuse before you replace it do a diode check on the X2 connector. Forward bias you should get .8-1.6V depending on the board and reverse bias you should get an overload. If you see a short on this the fan driver will have to be replaced, this is likely as something took out the fuse and it is likely to be the fan driver.

### Checking the output of the fan driver board:

Insure that power is removed from the drive and then disconnect the blue and black wires going out of the fan driver board. These are the only 2 spade connections made to this board. Connect a DMM to the spade connections on the board, you will be reading 230VAC at 50 Hz when the board is running. Power up drive and insure that the green LED is flashing, you should have roughly 230VAC on the DMM. If you don't have 230VAC here replace the board. If you have 230VAC here power down and reconnect the wires that were originally connected to these terminals.

### Checking the output of the fan isolation transformer:

The easiest place to check the fan isolation transformer is at the fan plug. On FR9 and above units this is at the bottom of the drive where the fans are and is a 4 pin quick disconnect. On FR8 drives this is located where the output leads enter the drive at the bottom of the unit, these are spade connectors. Disconnect the fan. Power up the drive and insure there is a flashing green LED on the fan driver board. With a DMM between the blue and black connection you should read 230VAC and between the blue and brown connection you should read the same. If you do not read this replace the isolation transformer.

### Checking the fan and starting capacitor:

Remove power from the drive and check the fan windings and starting capacitance per the table below. Normally if you are going to see something wrong with the windings they will be open. If the capacitor is less than 50% of its value it probably is not going to get the fan spinning at full speed. The fan may run with the cap at a low value but it will probably not get up to speed as it depends on this cap to give the motor a rotating magnetic field.

| Fan part number        | PP01123 (FR8)      | PP01080 (FR9 and above) |
|------------------------|--------------------|-------------------------|
| Fan Wires              | Resistance in ohms | Resistance in ohms      |
| Black – Brown          | 110                | 60                      |
| Brown – Blue           | 50                 | 35                      |
| Blue - Black           | 60                 | 25                      |
| Fan Starting Capacitor | 5uF                | 7uF                     |

Try to spin the fan by hand to see if there is something mechanical stopping it from working. On the PP01080 fan we have never seen a failure of the actual fan itself but on the PP01023 it is not unknown to have bearings go bad. If the fan does not spin freely remove whatever is obstructing movement or replace the fan. If the fan spins freely hook the fan back up and power up the drive. The fan should start as soon as the green LED starts flashing on the driver board. If the fan doesn't start replace the fan.

By following the above steps this should lead you to successfully troubleshooting the problem but there are a few problems these will not find but all of the basic signals are explained. There can still be problems in the ASICs and control board for FR10 and above and problems in the power board and control board for the FR8 & 9. You should be able to tell this by the signals into and out of the fan driver board.

|                     | FR8/230V | FR8/480V | FR8/690V | FR9/230V | FR9/480V | FR9/690V |
|---------------------|----------|----------|----------|----------|----------|----------|
| <b>Fan Driver</b>   | VB00599  | VB00799  | VB00699  | VB00899  | VB00399  | VB00299  |
| <b>Iso Xmfr</b>     | PP08026  | PP08026  | PP08026  | PP09056  | PP09055  | PP09055  |
| <b>Fan</b>          | PP01123  | PP01123  | PP01123  | PP01080  | PP01080  | PP01080  |
| <b>Starting Cap</b> | S00734   | S00734   | S00734   | S00465   | S00465   | S00465   |
| <b>Fan fuses</b>    | PP20202  | PP20202  | PP20202  | PP20202  | PP20202  | PP20202  |

|  | FR10/12                          | FR11    | FR13/14 |
|--|----------------------------------|---------|---------|
| <b>Fan Driver</b>                                    | VB00299                          | VB00299 | VB00299 |
| <b>Iso Xmfr</b>                                      | FR10844 (Left)<br>FR10845(Right) | FR10845 |         |
| <b>Fan Driver Assembly Includes Both Parts Above</b> | FR10846 (Left)<br>FR10847(Right) | FR10847 | FI13301 |
| <b>Fan</b>   | PP01080                          | PP01080 | PP01080 |
| <b>Starting Cap</b>                                  | S00528                           | S00530  | S00528  |
| <b>Fan Fuses</b>                                     | PP20202                          | PP20202 | PP20202 |

## Additional Help

In the US or Canada: please contact the Technical Resource Center at 1-877-ETN-CARE or 1-877-326-2273 option 2, option 6.

All other supporting documentation is located on the Eaton web site at [www.eaton.com/Drives](http://www.eaton.com/Drives)

