VFD Alarm Response

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| procedural detail | | |
| Site/Pod: | CM#: | |
| Technician: | Date: | |
| PM Frequency: | <topic breadcrumb> | |
| <DCGS Energized Electrical Work Permit # if required> Reviewers… if not needed I’ll delete row from doc. | | |
| Equipment Information | | |
| Manufacturer: | | Model #: |
| Serial #: | Assed ID: | |

DCEO technicians use this procedure to respond to VFD (variable frequency drive) alarms in IAD data centers.

# References

## Authorization

## Training/Certification

## Equipment/Information

## Policies

## Related Procedures

# Security Considerations

# Background

VFDs control the speed of electrical motors in fans and water pumps. A VFD stops the motor it controls and sends an alarm when any of these conditions occur:

* Motor malfunction
* Tripped safety circuit
* VFD malfunction
* Temporary BMS outage or malfunction
* Temporary power outage

# VFD Alarm Response Procedure

This emergency operating procedure contains these sections:

* Initial Response
  + *Troubleshooting a VFD Failure*
* Mitigation Response
  + *Check the fuse or circuit breaker*
  + *Start a VFD in HAND mode*
  + *Bypass a damaged VFD*
  + *Troubleshoot a damaged motor*
  + *Mitigate a damaged exhaust fan*
  + *Make sure that systems are stable*
* Escalation Response
  + *Escalate the VFD failure*
  + *Monitor temperatures*

# Initial Response

Troubleshoot a VFD failure

1. Look for alarms that show recent power failures or BMS outages.
2. Examine the VFD and the motor it controls.
3. Use this table to find the correct responses to the symptoms you see.

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| --- | --- | --- |
| Symptom(s) | Underlying Problem | Response |
| BMS unreachable or unresponsive | BMS is not correctly controlling VFD in AUTO mode | Skip to *Start a VFD in HAND mode* |
| Recent BMS or power issue at site | VFD was temporarily off during the outage. | If the VFD does not start again automatically after more than five minutes, skip to *Check the fuse or circuit breaker*. |
| No power at VFD. VFD control panel is blank. | Burned fuse or a circuit breaker is not close | Skip to *Check the fuse or circuit breaker*. |
| Power is on, but the VFD control panel is blank, blinks, or does not respond in HAND or AUTO modes. | VFD internal failure (a frequent problem with AC Tech units) | Skip to *Bypass a damaged VFD* |
| VFD red Safety Circuit lamp is on, or the controlled motor smokes, leaks, or shows other signs of damage | Failure of controlled motor | Skip to *Troubleshooting a damaged motor* |

# Mitigation Response

Refer to the table in the *Initial Response* section to find the initial procedure to use.

## Check the fuse or circuit breaker

Do this procedure if the VFD has no power (for example, when the VFD controller is blank):

1. Examine the VFD fuse and replace it if necessary.
2. Make sure that the breaker that supplies power to the VFD is closed.
3. If the VFD starts automatically after you restore power to it, skip to Make sure that systems are stable.

If the VFD does not start, continue to Start a VFD in HAND mode.

## Start a VFD in HAND mode

1. If the controlled motor shows signs of damage, do not use this procedure. Skip to *Troubleshooting a damaged motor*.

**Important:** Operating a damaged motor usually aggravates the problem, and in some cases is dangerous

1. Set the VFD to **HAND** mode.
2. If the control panel operates correctly, set the speed to **60 Hz**, and then skip to *Make sure that systems are stable.*
3. If the control panel does not operate correctly, continue to Step 2 of the next section, *Bypassing a damaged VFD.*

**Note:** Signs of a damaged VFD include a blank or blinking VFD control panel.

## Bypass a damaged VFD

1. If the controlled motor has visible signs of damage, do not bypass the VFD. Skip to Troubleshooting a damaged motor.

**Important:** Operating a damaged motor usually aggravates the problem, and in some cases is dangerous.

1. Set the VFD to BYPASS.
2. If the controlled motor starts, skip to Make sure that systems are stable.

If the controlled motor does not start, skip to Escalation Response.

## Troubleshoot a damaged motor

1. Examine the red Safety Circuit lamp on the VFD.

If the lamp is on, the problem is external to the VFD. This is a strong indicator of a damaged motor.

1. Examine the external surface of the controlled pump or fan. Look for smoke, burn marks, broken belts, signs of shaking, or other signs of damage.

Important: Stay away from moveable parts, especially fan blades.

1. Use the mixing box controls to change the room to 100% recirculation mode.
2. Examine all motors that you started. If a fan or pump shakes violently, set the VFD to OFF, and then skip to Escalation Response.
3. Monitor the temperature of all affected rooms. The BMS should indicate the cold Aisle temp is below 89 Deg F.
4. If the temperature of an affected room is not in the correct limits, skip to Alternative Response
5. When you are sure that the cooling systems are stable, update all related Trouble Tickets.

# Escalation Response

Use the procedures in this section only if you cannot start a VFD again. You must complete the two procedures in the sequence given.

## Escalate the VFD failure

1. Update the applicable Trouble Ticket. Include:
   * Symptoms you see (for example, if the Safety Circuit fault lamp is on or if there is damage to the motor)
   * Steps you did
2. Assign (escalate) the ticket to the DCEO Facility Manager.

## Monitor temperatures

1. Monitor the temperatures of all affected rooms while cooling systems operate with diminished capacity.

The BMS (Pritchett) shows that the subfloor temperature is less than 100°F.

1. If one or more monitored temperatures are above the limit, press the Evac button(s) to put the room into 100% emergency free cooling.

Corrective actions recommended or taken:

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## Document Properties

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| --- | --- |
| **Property** | **Value** |
| Site Code | DCA |
| Filename | dca\_dceo\_eop\_vfd |
| Title | VFD Alarm Response |
| Version number/Date version published | Draft |
| Doc Type | EOP |
| Zone | Region |
| Technical Owner | swilleye@ |
| Technical Writer | beelliot@ |
| Affected Equipment | VFD |
| Sensitivity rating | Amazon Confidential |
| Origin | Commercial version |
| URL | TBD |
| Physical location | TBD |
| Audience | EOT |
| Renewal date | 1/1/15 |
| Special requirements | NA |
| Safety considerations | NA |
| Physical requirements | NA |

## Status

|  |  |  |
| --- | --- | --- |
| **Status** | **Date mm/dd/yy** | **Approver/Reviewer Name** |
| Original filed |  | NA |
| Writer sent to SME for review |  | NA |
| SME sent to Writer |  | NA |
| Writer sent to SME for approval |  | NA |
| SME approved |  |  |
| Writer copy edited |  | NA |
| Site Manager approved |  |  |
| Regional Manager approved |  |  |
| Writer published |  | NA |