KNOWLEDGE BASE

Article Type: **Instructions**

VFD Trouble-shooting Tips for Control Technique "SP" Drives

Description:

Instructions on "How to" trouble-shoot variable Frequency Drive "VFD", For Control Techniques "SP" Drives.

WARNING

Never work on, clean or service this unit, control panel or any machine or open or remove any protective cover, guard, grate, door, or maintenance panel until the power or energy sources has been turned off, locked out / tagged out, and all moving parts have come to a complete stop and or blocked to prevent movement. Machinery is dangerous – avoid personal injury and or death by following manufacture, Local, and OHSA safety procedures. Contact Columbia Machine for safety decals, guards, horns and beacons.

VFD TROUBLE SHOOTING TIPS
for the Control Techniques SP Drives

When diagnosing a VFD problem one of the first things I try to find out is, is the incoming voltage correct. The second, what is the amp output to the vibrator motor under load (during compression). This is to try and determine if the problem is really with the VFD or is it the motor or vibrator shaft.

A. If the vibrator fails to achieve the desired RPM and the amp output is above motor nameplate Full Load Amps the VFD is OK and the problem is the motor or vibrator shaft. If the vibrator belt is disconnected and the amps remain high the motor is the problem, if not it's the vibrator shaft.
B. If the vibrator fails to achieve the desired RPM and the amp output is below motor nameplate Full Load Amps the VFD is the problem. At this point verify the VFD is getting the speed reference for compression speed. This done by observing the VFD LED display. It should display the compression speed called for. If not check the potentiometer (or analog signal with CPM). If the correct speed is being displayed but not achieved reset the VFD parameters back to factory presets (load 1244 into address 0.00 then press reset button) and reprogram the VFD as shown on parameter sheet of machine wiring schematics.

Listed below are most of the VFD problems I have encountered:

1. Slow acceleration at beginning of shift	Typically this happens in cold weather. To solve the problem reduce vibrator speed to roughly 1,000 RPM and run for a minute or 2 minutes to warm up the vibrator shaft grease or oil at the beginning of the shift
2. Deceleration time to short	Sometimes customer wants to extend Deceleration time to help strip product. Add more time to parameter 0.04 as required. Also the strip delay time in the PLC can be increased to give the vibrator more time to come to a stop if necessary
3. Slow acceleration at install	This has happened at two M21 installs due to a combination of factors, lower than expected plant voltage (if present check isolation transformer taps settings), undersized VFD, and less than ideal sheave sizes. Since the easiest change to make in the field is changing sheave size that was the solution at both plants. With a 1 to 1 sheave ratio Motor torque falls off above 1800 RPM making it difficult to achieve 3,000 RPM if the plant voltage is lower than expected. The 1 to 1.6 ratio we used on older machines works better at high RPM than the 1 to 1 ratio but has reduced pull up torque. At a China M21 plant I think we found a 1 to 1.3 sheave ratio worked best. Typically we now oversize the VFD enough so any ratio works. As time allows I think we will re-evaluate sheave ratios The other solution is to provide a 380V to 460V isolation transformer. A higher voltage into the VFD gives a higher VFD voltage output to the motor increasing the vibrator motors ability to develop the power needed at RPM 's above 1,800 RPM

4. OI.AC fault code (over current fault)	Can be caused by: Bad vibrator shaft bearings. The way to verify its the vibrator bearings causing the problem is to get the motor nameplate FLA, then use an amp probe to see what vibrator motor running amps are, then compare. If the running amps are more than nameplate FLA something is putting an excessive load on the motor and in most cases its bad bearings. Once the problem was improper grease and another time it was excessive pallet table air pressure settings causing the fault If the O1.AC fault code is displayed with the load disconnected and cannot be reset - the VFD is defective A short circuit in the motor windings or the wiring between the VFD and the motor. Especially if the O1.AC fault code is displayed on VFD during power up and the signal to run has not been given. This has happened on a CPM's because of j-box mounting bolt falling into the windings. With a CPM you can temporarily run the with either the left or right vibrator motor only to determine which motor has the short.
5. OV fault code (DC bus over voltage)	This can be caused by: Overheated braking resistor. This could be caused by the braking resistor having an accumulation of cement dust. Undersize braking resistor will cause the same fault. A short term solution is to lengthen the deceleration time (parameter 0.04) to keep the customer running. Open circuit in the braking resistor or the wiring to the braking resistor.
6. Oht2 or Oh2 fault code (Heat sink temp)	Typically caused by a build up of cement dust in the VFD heat sink or a failed heat sink fan.
7. Vibrator cog belt breaks	Lengthen S ramp time (parameter 0.19) to .2 seconds, replace cog belt with Kraft belt
8. The VFD goes dead but comes back to life if you cycle power	This has happened at two locations. If you encounter this problem and you have verified it's not a problem with the 3 phase contactor supplying power to the VFD, get a new VFD in the mail because the one you have isn't long for this world. Be sure and include the serial # of the bad drive on the CSA
9. On a CPM VFD panel the Manual Motor Protector for one of the motors trips	A motor coupler has failed so the vibrator motor with the good coupling is doing all the work

10. Vibrator motor runs at a much lower RPM than called for, two of the motor leads show very high amp draw and one lead shows no amp draw	Bad vibrator motor
11. VFD supply fuses blow with no load on VFD	Defective VFD
12. Occasionally we get a call from a customer reporting the VFD suddenly operates differently	If a parameter change is made and the EPROM doesn't get burned, the VFD will store the change as long as power is on but the change is lost when power is cycled off
13. The VFD fails to operate and displays "inh"	This indicates a problem with the wiring to the VFD enable input. This circuit typically contains motor starter overload and auxiliary contacts and may also include a lube pump interlock. These items may be bypassed temporarily in order to isolate a field wiring problem. Also sometimes that control wire terminal strip on the VFD comes loose and needs to be reseated
14. Cement dust or parameter error	With VFD problems that don't fit the above examples, often times the problem is either cement dust build up in the VFD or someone has accidentally made an unwanted parameter change. If cement dust build up is noted blow off the VFD inside and out. Typically the cement enters the panel through conduit entries in the top of the panel. If a parameter error is suspected clear the VFD parameters and reprogram as shown on the parameter sheet provided with the block equipment.

(continued on next page)

NOTES:

After a VFD failure, it's a good idea to have the motor insulation tested with a Megger Meter to make sure the VFD failure wasn't caused by the motor, if there is any doubt as to the cause of the VFD failure.

For additional trouble shooting info see the trip codes listed on the parameter sheet included with the wiring schematics or the VFD manual included with the VFD panel.

If it is determined the VFD is defective and is still under warranty get the model # and serial # off the defective VFD. Include this information for use on the warranty request form.

On installations with motor leads longer than 100' Baldor recommends a load reactor to protect the motor.

The Block Machine 3 phase system must have a good earth ground so line disturbances can't follow the ground conductor to the VFD.