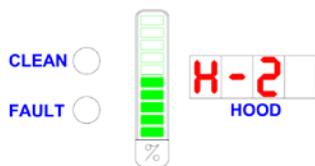




## MELINK INTELLI-HOOD-2 CONTROLS KEYPAD DISPLAYS AND AUDIBLE SOUNDS



### Typical Display

#### Normal Operation

In Normal Operation, the keypad will cycle through 4 hoods (H-1, H-2 ...) displaying a bar graph for each hood channel indicating the fan speed of that channel.

#### Clean Light – Blank or Flashing Red and Green

Clean Light should be blank at all times of Normal Operation. Clean Light will flash red and green if there is an Optics Fault. See Optics Fault in the Troubleshooting list following.

#### Fault Light – Blank or Green

In Normal Operation, fault light will be blank or green. A blank fault light indicates Normal Operation with no faults. A green fault light indicates that the system is receiving a digital input on one of the digital input terminals 25 through 33. A green fault light is a normal occurrence on many systems.

#### Fault Light – Red

Fault light will change to red in the case of any fault. See fault codes in the Troubleshooting list following.

#### Sounds

Keypad is typically silent. In Normal Operation, it will beep only when buttons are pressed such as turning it on/off or turning lights on/off. Keypad will beep if it is commanded by an external input to turn on using Remote on/off function. Keypad may beep indicating other problems. See Troubleshooting list following.



## **MELINK INTELLI-HOOD-2 CONTROLS TROUBLESHOOTING SYMPTOMS AND REPAIR ACTIONS**

1. Keypad appears normal, but fans are not running.
  - a. Check if VFDs are running. Check VFD maximum speed and amp draw.
  - b. Check if fan disconnect switch is on.
  - c. Check if fan belt is adjusted for proper tension.
  
2. When the Fans button is pressed, nothing happens, The keypad does not light up and the fans do not start
  - a. Check programming that Hx-06 is set correctly. If there are no sensors programmed, then the system will not function.
  - b. Check programming that the Fans button is not disabled, parameter SY-25
  - c. Check programming that there are no inputs programmed for "Remote Enable", parameters SY-04, SY-05, Hx-11.
  
3. Keypad displays "-E", such as "H2-E"
  - a. "-E" indicates that system is in "Emergency Bypass Mode". Press 100% Button to take the system out of "Emergency Bypass Mode". Use the Fans Button to turn the system on in Normal Mode.
  
4. Fans shut off every 10 minutes.
  - a. The default timer length of the Emergency Bypass Timer is 10 minutes. Customer is likely using the 100% Button to turn the system on, system runs for 10 minutes, and then shut off. Customer then presses 100% again and repeats the cycle. "-E" indicates that system is in "Emergency Bypass Mode". Press 100% Button to take the system out of "Emergency Bypass Mode". Use the Fans Button to turn the system on in Normal Mode.
  
5. Keypad is blank. Fans are running
  - a. System is likely in fire mode. Check that the main processor has 120VAC power.



6. Keypad is blank. Fans are not running.
  - a. Press the Fans Button to turn on the fans.
  - b. On/Off command may be by another device other than the Fans button. On/Off command may be from a toggle switch, water wash panel, or Building automation system. Refer to system setup drawings and installation documentation for that site.
  - c. System may be disabled by another device. Refer to system setup drawings and installation documentation for that site.
  - d. Check the VFDs for faults.
  
7. Keypad shows a low temperature fault as shown by a lowercase h, **F2-h**
  - a. Processor is reading an extremely low resistance on the temperature sensor circuit.
  - b. Check that the number of temperature probes installed matches the number of temperature probes programmed.
  - c. Check for a damaged component that might be causing a short on the temperature circuit. Sensor cables, Temperature-Y's, APU Header Boards, Optic Cables, and Optic Sensors are all possible causes.
  
8. Keypad shows a high temperature fault as shown by uppercase H, **F2-H**
  - a. Processor is reading an extremely high resistance on the temperature sensor circuit.
  - b. Check to see that temperature sensors are connected.
  - c. Check that the number of temperature probes installed matches the number of temperature probes programmed.
  - d. Check for a damaged component that might be causing an open loop on the temperature circuit. Sensor cables, Temperature-Y's, APU Header Boards, Optic Cables, and Optic Sensors are all possible causes.
  
9. Keypad shows a VFD Fault, such as F3-U **F4-U**
  - a. Check cable connections from VFD to processor
  - b. Check that VFDs are on. All VFDs wired to the system must be on.
  - c. Check VFDs for actual VFD faults, address the VFD faults per VFD documentation
  - d. Check the Simplissimo programming for VFD type and addresses of the VFDs
  - e. Check VFD enable jumper



10. Keypad shows a low optic fault, F1-o, **F3-o**
  - a. Check that optics are connected to the hood channel indicated.
  - b. Clean optic lenses
  - c. Check for obstructions such as fire suppression pipes between the Emitter and Receiver
  - d. Increase the gain switch of the Receiver
  - e. Check for a damaged component that might be causing an open loop on the temperature circuit. Sensor cables, Temperature-Y's, APU Header Boards, Optic Cables, and Optic Sensors are all possible causes.
  
11. Keypad shows a high optic fault, "o" in the upper part of 7-segment display, **F3-o**
  - a. Optic signal is saturated, too strong. Reduce the gain setting on the Receiver board.
  
12. Keypad shows a temperature fault on one of the auxiliary temperature channels, F5-h or F6-h
  - a. Temperature channel 5 is the supply temperature port. Temperature channel 6 is the kitchen space temperature port. Connect a temperature sensor if applicable.
  - b. Check parameter SY-07, economizer mode. Economizer mode will trigger processor to look for both supply and kitchen temperatures
  - c. Check parameter Hx-10, short cycle ratio. Short cycle hoods require a supply temperature sensor.
  
13. Keypad shows a phone fault, F-PH
  - a. Check that the telephone line (analog) is connected and that the line is operational
  - b. Check that modem is installed on autocal board
  - c. Check programming parameter SY-34
  
14. Keypad display "d-on" when the fan button is pressed. **d-on**
  - a. The system is Disables and on or more outputs are programmed for "MUA Damper". In this mode, the output is activated for 2 minutes waiting for something to occur which will Enable and Start the system. If the Enable and Start inputs do not occur in the 2 minute period, the system will shut off.
  - b. Check parameters SY-04, SY-05, and HX-11 for a parameter programmed for Remote Enable. Provide the enable closure or un-program the setting.



15. Vertical Bar graph is flashing and keypad will not shut off the fans
  - a. System is in exhaust temp alarm mode.
  - b. Press the up arrow to check temperatures. Verify temperatures are correct.
  - c. Check Hood Parameter Hx04
  - d. Check the number of temperature probes programmed and check actual number installed.
  
16. Red text display of the keypad scrolls through the hoods “H-1”, “H-2”, etc, but the bar graph is does not light up at all.
  - a. Check that parameters Hx08 is correctly programmed.
  - b. Check that VFD type is correct Hx19 and Sy32
  - c. If there is a situation of primary/secondary VFDs using parameters Hx08 and Hx09, verify that both VFDs are connected and functional.
  
17. VFDs cycle on and off when system is on in normal mode.
  - a. Check VFD for faults.
  - b. If there is a situation of primary/secondary VFDs using parameters Hx08 and Hx09, verify that both VFDs are connected and functional.
  
18. Keypad has a constant tone noise. Fans are at full speed.
  - a. This is the optic block function. Optic Receiver is seeing zero light from the Emitter. If there optic sensors are blocked for 15 minutes, this audible alarm will occur. If the user presses, any button, optic fault will display on the keypad but the fans will not be locked at full speed. The fans will run as temperature-only.
  - b. Remove the solid obstruction.
  
19. Keypad is making a “heartbeat” beeping noise: continuous short beeps occurring about every second
  - a. This beep noise is indicative of a 24V short in the hood sensor circuit. The beep occurs because a current limiting device is cycling processor board power. The processor is rebooting itself.
  - b. Unplug all hood sensor cables.
  - c. Plug cables in one at a time to find the problem hood sensor circuit. Then inspect/replace cables or sensors to fix the problem.



20. Fan increases in speed when the optics are blocked but they never slow down.
  - a. Check the programming of the clock. Press the Enter key to see the system time. If it shows 1200, A, 1 (12 midnight on Sunday), then you know that the processor time was not programmed. Program the clock using SY-12.
  - b. After correcting the programming, make sure that the clock battery backup works correctly. Turn off the main power switch on the power board. Turn it back on. When you turn it back on, check the time again using the keypad. If the system time has reverted back to 12:00 midnight, then troubleshoot the battery of the autocal board.



## VFD TROUBLESHOOTING

### Allen Bradley Powerflex 4 VFDs Used On Melink Intelli-Hood

Refer to the Powerflex 4 Quickstart manual for basic information about the VFD.

Page 8: explains how to navigate the display and programming settings.

Page 9, 10, 11: lists all of the display and programming parameters

Page 11: describes the fault codes.

In addition to the information in the Quickstart Manual, Melink Corporation suggests the following additional troubleshooting steps.

#### Resetting the VFD and Restarting It.

When the VFD is displaying a fault Fxxx, clear the fault by pressing the Red “stop” button on the face of the VFD. To restart the fans, shut them off and restart them. In most cases, use the Melink keypad Fans button to do this. In some other applications, use the water-wash panel or other switch.

#### VFD does not accelerate to full speed

Turn off the IO Processor to put drive in fire more or use programming to put the VFD in Hand Mode, if VFD will not accelerate to the expected full speed (60Hz) check parameters P031 and P032. These parameters should never be changed off of their default values but sometimes they get changed. For example, if the motor is a 460VAC motor and somebody changes the P031 to something less than 460V, then the VFD will not ever output more than P031 and motor will never go full speed.

#### F3: Power Loss

- Allen-Bradley Explanation:
  - Monitor the incoming AC line for low voltage or line power interruption
- Melink Explanation
  - This fault is a problem with low voltage on the input side of the VFD. The most likely time to see this fault is at startup of a new system. Once a system has been started and operating for many weeks, the fault rarely occurs.
    - Check the incoming phases on the VFD to make sure that they are all at even voltage. Check phase-to-phase, as well as each phase to ground.
    - Check that all wire terminals are tight.
    - Check the circuit breaker that supplies power to the drive. Replace the breaker.



#### **F5: Overvoltage**

- Allen-Bradley Explanation:
  - Monitor the AC line for high line voltage or transient conditions. Bus overvoltage can also be caused by motor regeneration. Extend the deceleration time or install dynamic brake option.
- Melink Explanation
  - This is the most difficult fault to troubleshoot. It has many possible causes.
  - In Intelli-hood applications, the most likely cause of this fault is motor failure. Many exhaust fan motors are not inverter-duty. They cannot be operated by a VFD. The insulation of the windings is weak, it breaks down, and the windings short together.
    - Shut off the disconnect switch between the motor and the VFD.
    - Restart the VFD. If the VFD runs, while disconnected from the motor, then the motor needs to be replaced. Make sure that the replacement motor is “Inverter Duty rated” or Class F insulation, but these indicators really don’t tell you that motor will truly work with a VFD.
    - Tell the electrician on site to remove the wiring from the VFD and wire directly to the motor. If the breaker trips or motor fails in this way, then you can tell him that the VFD is fine.
  - If this fault occurs during deceleration of a large inertia fan, extend the deceleration time.
    - Parameter P040 sets the deceleration time. By default, Intelli-hood setting is 60 seconds. Change it to 90 to 120 seconds.
  - Another thing to try is Parameter P037 Stop Mode
    - By default, Intelli-hood uses setting 1, Coast to Stop. Change to setting 0, “ramp to stop, CF”.
  - Set the minimum speed on the VFD P034 to 60 HZ. The drive will stay at full speed at all times. Let the VFD run at full speed in this way. This might tell us that the problem is in the motor. If F5 faults occur when the VFD is not decelerating, then the problem has nothing to do with motor regeneration.
  - High input power can cause this fault. Check voltage at the input terminals. Line reactor may smooth out the variances in input voltage.
  - Output Filter and/or brake resistor will reduce the feedback voltage the drive sees from the motor. These options are possible.
  - Melink has seen cases where a bad disconnect switch caused this fault. It is similar to a short in the motor windings.

#### **F7: Motor Overload**

- Allen-Bradley Explanation:
  - An excessive motor load exists. Reduce load so drive output current does not exceed the current set by P033
- Melink Explanation
  - Melink recommends that the Motor Overload parameter P033 be set to the motor FLA plus 10%. Verify that P033 is correct.



- Set the display to Operating Amps (d003). Restart the fans and watch the amps to see if the amps go above the level set at P033.
- If F7 occurs, the VFD will shut down, restart, and ramp up again. It will try to restart 5 times. If it gets F7 fault 5 times in a row, it will fault to F033 and stop restarting.
- Check the fan rotation direction. A fan spinning backwards will have higher amp draw than forward rotation. Reverse direction by switching any 2 phase on the output of the VFD. You can switch the phase at the VFD output terminals or at the motor.
  - Note that if this is a bypass VFD, check direction both in drive mode and in bypass mode. Check direction in drive mode first. Correct drive mode if necessary. Then check bypass mode. If the direction is wrong in bypass mode, switch any two phase on the input side of the bypass.
- Slow down the fan to get the Operating Amps under the FLA of the motor. Adjust the pulley on the fan or reduce the maximum speed of the VFD. Use parameter P035 to reduce the maximum speed of the VFD.
  - Keep in mind that the minimum operating speed of the VFD should be kept above 18Hz. For example, the minimum speed of Intelli-hood is 40%, then P35 should be kept above 45 Hz.
- Adjust S-Curve parameter A083.
  - Typically Melink sets this to 20%. Change to 30 or 40%. This extends the acceleration time, but makes acceleration smoother and reduces the maximum amp draw.
- Adjust Start Boost Parameter, A084 or S-Curve parameter A083.
  - Typically Melink sets this to 1 "30.0 VT". Change to setting 2 or 3.

#### **F12: Hardware Overcurrent**

- Allen-Bradley Explanation:
  - Check Programming. Check for excess load, improper DC boost setting, DC brake volts set too high or other causes of excess current
- Melink Explanation
  - This is a short on the output side of the VFD.
  - Usually we see this when there is a short on the output side of the VFD. There could be a motor failure. Another common cause is a short in the disconnect switch on the roof. Check the wiring in the disconnect switch. After a heavy rain or after a hood cleaning process, water in the disconnect switch can be the root cause.
  - F12 can also be a short in the motor.
  - Disconnect the output wiring at the VFD. Restart the VFD. If the VFD runs and output voltage on the terminals is verified to be correct, then the problem is on the output side for the VFD.
  - Check that VFD is the correct HP for the motor.
  - Check parameter , A089, current limit. It should be 1.5xDrive rated current. See page of the Quickstart manual for the Drive Rated Current
  - Adjust Start Boost Parameter, A084 or S-Curve parameter A083. See F7 Fault



### **F13: Ground Fault**

- Allen-Bradley Explanation:
  - Check the motor and external wiring to the drive output terminals for a grounded condition.
- Melink Explanation
  - This is a short on the output side of the VFD.
  - Another common cause is a short in the disconnect switch on the roof. Check the wiring in the disconnect switch. After a heavy rain or after a hood cleaning process, water in the disconnect switch can be the root cause.
  - F13 can also be a short in the motor.
  - Disconnect the output wiring at the VFD. Restart the VFD. If the VFD runs and output voltage on the terminals is verified to be correct, then the problem is on the output side for the VFD.
  - Melink suggests contractor to bypass or replace the disconnect switch.
  - Melink suggests replacement of the motor.
  - Melink suggests replacement of the wiring between the VFD and motor. Wiring can be damaged by conduit that is not deburred completely.
  - We have had one case of F13 fault that was drive defect. It is very rare. Jeremy has seen F13 that occurred at a site but did not occur when the VFD was returned to the plant and tested in the RMA test area. The drive was sent back to the site, reinstalled, and then the VFD faulted again on F13. A New VFD on site did not give F13. Our only conclusion is that the fault is related to heat. VFD would warm up and trip on F13 fault.

### **F33: Auto Restart Fault**

- Allen-Bradley Explanation:
  - Correct the cause of the fault and manually clear.
- Melink Explanation
  - Check the fault history parameters.
    - d007 is the previous fault. It will be "33"
    - d008 is the fault that occurred prior to the fault in d007. This is the cause of the fault F033 fault. Check d008 and refer to that fault for tips to repair the problem.
    - d009 is the fault prior to the d008 fault.

### **F100 Fault on Powerflex 400 VFDs**

There is a bug in some PF400 VFDs where if the VFD clock exceeds 10000 hours, the VFD will trip on F100.

1. Check parameters d310, d312, and d316. If any of these are 9999 or more, then the internal timer on the VFD needs to be reset to zero.
2. To reset the VFD timer to zero, go to parameter A195. Change the value to 2, save it. Then cycle power at the breaker. Leave the power off long enough for the VFD to go completely blank. And then turn the power back on.