



## Electrical Solutions Corporation

2368 Eastman Ave, Suite 13, Ventura, CA 93003  
Phone (805) 658-0848 ~ Fax (805) 658-0868

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### HS2 Setup with AB PowerFlex 70 Drive

Drive Cat#: 20A-D-022-A-O-AYNANCO, Serial#: 1JBB5GUO  
Display Cat#: 20-HIM-A3, Series A

#### Problem

Using the standard default drive parameters, the drive would not turn the motor.

#### Observations

- When the drive was started, the drive frequency and the output amps would ramp up at the specified rate until the drive output was 33A.
- The output would then pause at that amperage for a few seconds, then drop back down to 22A.
- The amber light would come on and the drive display would show “current limit.”
- These symptoms are consistent with a locked-rotor condition during startup.

#### Actions

1. Meggered field wiring and motor. >500 MΩ to ground.
2. Checked voltage at drive output. 480 VAC on all three legs, phase-to-phase (roughly) and 277 VAC phase-to-ground (roughly).
3. Removed belts. Drive turns motor at rated speed with 4.2 A of current draw.
4. Reconnected belts and had rig crew pull up on pump so it is no longer seated. Drive turns motor at rated speed with 9.0A of current draw.
5. Had rig crew set motor back into seat and rotate with the drilling tongs to see if they could loosen up the pump/seat interface. Drive still would not start motor.
6. Measured current on all three phases to see if there was a single phase condition. Phase difference was less than 1%.
7. Downloaded motor torque data from Marathon Electric. Motor is capable of putting out 44.7 ft-lb of torque at rated load. 6” motor pulley diameter, 9” rod pulley diameter means that 55.8 ft-lbs of torque are delivered to the pump shaft. According to the pump manufacturer, this should be sufficient.
8. Disconnected drive and hooked the motor directly to the breaker to try to measure the inrush current and break the motor loose. Inrush current peaked at 59.6 A (motor full load current = 13.0 FLA) then quickly settled to 9.2 A while the motor was spinning freely. Continued to run motor for 5 minutes.



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9. According to the drive manufacturer (Allen Bradley), this drive limits the current output to 1.5 x rated drive output (in this case, 1.5 x 22A = 33A). This is non-adjustable.
10. Reconnected the drive to the motor. This time the drive was able to start the motor. Drive turned motor at 60hz with 9.4A. As the drive frequency was reduced, the motor load increased until the load was 16.5A at 35hz, At this point the motor stalled and the drive went down on “current limit.”
11. Restarted the drive several times to try to find the lowest frequency the motor would run at which would not stall the motor. The last time the motor was started, something “broke free.” The motor started running at rated speed with 8.0-8.5A. Lowering the frequency to 5hz did not significantly affect the motor load.
12. Placed drive/motor in service with the output set to 20hz. Motor load 8.0-8.5A.

### Drive Setup

All drive parameters were set to the factory default, except for the following:

| <u>Parameter</u> | <u>Value</u>                           |
|------------------|--|
| 41               | Motor NP Volts = 460                   |
| 42               | Motor NP FLA = 13.0                    |
| 43               | Motor NP Hertz = 60                    |
| 44               | Motor NP RPM = 1175                    |
| 45               | Motor NP Power = 10.0hp                |
| 46               | Motor NP Power Units = 0 (horsepower)  |
| 47               | Motor OL Hertz = 0                     |
| 48               | Motor OL Factor = 1.25                 |
| 49               | Motor Poles = 6                        |
| 53               | Motor Control Select = 2 (Custom V/Hz) |
| 54               | Maximum Voltage = 460                  |
| 69               | StAcc Boost = 20                       |
| 90               | Speed Ref A Sel = 18 (DPI Port 1)      |
| 93               | Speed Ref B Sel = 18 (DPI Port 1)      |
| 192              | AutoMan Cnfg = xxxx xxxx xxxx 0111     |
| 213              | Speed Ref Source = 18 (DPI Port 1)     |
| 361              | Digital In1 Sel = 0                    |
| 362              | Digital In2 Sel = 0                    |
| 363              | Digital In3 Sel = 0                    |
| 364              | Digital In4 Sel = 0                    |
| 365              | Digital In5 Sel = 0                    |
| 366              | Digital In6 Sel = 0                    |