Agenda

• Drive will not start
• Drive will not get to speed
• 10 Common Fault codes
  1. Overcurrent
  2. Current limit controller
  3. Ground fault
  4. Output phase fault
  5. Overvoltage Fault
  6. Overvoltage controller
  7. Undervoltage fault
  8. Unit over temperature
  9. Motor over temperature
  10. Input phase fault
## Drive does not start

### Causes
- Drive not ready
- Drive not receiving a Run Signal

#### Not Ready Causes
- Active fault
- DC bus too high or low
- Run enable input not present

#### Run Signal not present
- Control place not correct
  - Example trying to start from I/O when active control place is keypad.

[Flowchart of Drive does not start causes and solutions]

- **No Start**
  - **Drive Ready?**
    - **Yes**
      - Check Start source settings
      - **Yes**
      - Check Control Place
      - **Yes**
      - Check Start Signal
      - **Yes**
      - Correct Settings
      - **Yes**
      - Ensure start command is active, check wiring
      - **Yes**
      - Restart Drive
    - **No**
      - Active Fault?
      - **Yes**
      - DC Bus OK?
      - **Yes**
      - Run Enable?
      - **Yes**
      - Restart Drive
    - **No**
      - Drive Ready?
Drive does not get to speed

Not getting to speed

Current or DC bus Limit

Yes

Check Motor Current OK?

No

Analog Input reading?

Yes

Check wiring

No

Check Reference source settings

Yes

Correct Settings

No

Preset speed active?

Yes

Remove fixed speed command

No

Check Speed

Causes

- Missing reference
- Preset speed or jog speed active

Missing Reference

- Check analog input monitor
- Check that the drive is programmed to follow the correct input
- Ensure the drive is not hitting any other limits
- Check frequency reference compared to output frequency
10 Common Fault Codes - Overcurrent

**Causes**
- Incorrect motor parameters
- Mechanical fault
- Electrical fault
- Current measurement error

- Check wiring and motor for insulation failures and proper connections
- Check for mechanical overload, Locked rotor
- Check for proper drive size
10 Common Fault Codes – Current Limit

**Causes**
- Incorrect motor parameters
- Mechanical fault
- Electrical fault
- Current measurement error

- Not all models have an indication when the current limit is reached
- Current limit will reduce output frequency to reduce output current to at or below the current limit setting
10 Common Fault Codes – Ground Fault

**Causes**
- Faulty motor
- Electrical fault
- Current measurement error

- Check for loose or high resistance connections to the motor
- Test motor for electrical failure
- Disconnect motor leads or apply known good motor to verify current measurements

**Flowchart:**
1. **Ground Fault**
   - Check Motor leads
     - Yes → Disconnect Motor Leads, Restart drive
     - No → Correct cabling
2. **Ground Fault**
   - Yes → Current measurement fault in Drive
   - No → Check Motor, and test drive with known good motor
3. **Restart Drive**
10 Common Fault Codes – Output Phase

**Causes**
- Loose Motor Connections
- Faulty Motor
- Current measurement error

- Caused by current imbalance on the output of the VFD
- Look for loose connections or fault in motor windings

- Disconnect Motor Leads
- Check Motor and connections
- Output Phase Fault
  - Yes: Faulty Current Measurement
  - No: Output Phase
- Restart Drive
10 Common Fault Codes - Overvoltage

Causes
- High Line Voltage
- Regenerated voltage from load
- Excessive line side harmonics

- If Fault occurs during deceleration or stop command then increase deceleration time or brake chopper may be needed.
- Cyclic loads may need regen unit or brake chopper.
- Excess harmonics may be overcharging DC link capacitors.

Diagram:
- Over Voltage
  - Line Voltage OK?
    - Yes
      - Correct input voltage
    - No
      - Fault occurs during deceleration or when motor is overrun
        - Monitor = Measured value
          - Yes
            - Increase deceleration time or add brake chopper
          - No
            - measurement fault in drive
              - Yes
                - Check line side Harmonics
              - No
                - Restart Drive

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10 Common Fault Codes – Overvoltage Controller

**Causes**
- High Line Voltage
- Regenerated voltage from load
- Excessive line side harmonics

- Trouble shooting is the same as for the overvoltage fault, the overvoltage controller will increase the reference in an attempt to bleed off excess voltage
- Not all series of VFD’s have an indication of when this controller is active.
10 Common Fault Codes – Undervoltage

**Causes**
- Low Line Voltage
- Improperly sized drive

- Check for low line voltage or drops in line voltage under load.
- Check for damaged input rectifiers with static checks
- Check for even current draw on input when drive is running

**Flowchart**

- **Under Voltage**
  - **Line Voltage OK?**
    - Yes: **Correct input voltage**
    - No: **Static Checks OK?**
      - Yes: **Monitor = Measured value**
        - Yes: **Check power quality and proper drive sizing**
        - No: **measurement fault in drive**
      - No: **Replace faulty components**
  - **Wrong input voltage**

**Actions**
- Restart Drive
10 Common Fault Codes – Unit Over temp

### Causes
- High Ambient temperature
- Insufficient airflow
  - Plugged heat sink
  - Failed cooling fan
- Check Main cooling fan for rotation
- Ensure unobstructed heat sink and airflow
- Check ambient temperature is below the drives ratings
10 Common Fault Codes – Motor Over temp

Causes
- Overloaded Motor
- Operating Motor at high load at low speeds
- Undersized Motor
- Incorrect Motor Parameters

- Check Motor Parameters
- Observe current and speed
- Current should be nearly proportional to speed, if running half speed at FLA drive will protect motor from increased thermal stress from reduced cooling

Motor Over Temperature

Motor Parameters OK?

Yes

Correct Parameters

No

Motor Overload

Yes

Reduce Motor Load

No

Check Motor thermal overload parameters after ensuring no overload condition exists

Restart Drive
10 Common Fault Codes – Input Phase

**Input phase fault**

- Line Voltage OK? (Yes/No)
  - Yes: Correct input voltage
  - No: Static Checks OK? (Yes/No)
    - Yes: Replace faulty components
    - No: Input phase fault (Yes/No)
      - Yes: measurement fault in drive
      - No: Restart Drive

**Causes**

- Missing Input phase
- Damaged Drive

- Check for Line Voltage imbalance
- Check for loose connections or blown fuses
- Check for damaged input rectifiers with static checks
- Single phase input drives need to have this protection disabled
- Check for even current draw on input when drive is running