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How to Deal with a Nonstandard Fault Diagnosis from the Fluke 810 Vibration Tester

Application Note

Is it really a nonstandard fault, or is it just the setup? Find out how to tell the difference and how to fix common setup issues.

The onboard diagnostic engine of the Fluke 810 Vibration Tester relies on correct setup and data collection to deliver an accurate diagnosis.

What is a nonstandard fault?

With proper setup and data collection, the Fluke 810 Vibration Tester can detect, locate, and assess the severity of four standard mechanical conditions, or faults: bearing condition, misalignment, imbalance, and looseness. These standard faults cause most of the mechanical problems in equipment with rotating parts at a typical manufacturing or commercial facility. Under certain conditions, however, the Fluke 810 may identify a nonstandard fault.

A nonstandard fault diagnosis is usually caused by one of three conditions:

1. **Incorrect or incomplete machine setup.** Information about drivetrain components was not completely or accurately entered during setup of the Fluke 810.
2. **Incorrect or insufficient data collection.** The running speed of the machine under test was not accurately entered and/or the minimum data collection requirements were not met.
3. **Vibration condition other than one of the four standard faults.** One or more other faults (mechanical and/or electrical) are affecting the equipment's vibration signature. The Fluke 810 recognizes these readings and diagnoses them as nonstandard faults. (See the sidebar Nonstandard Faults for the Fluke 810 Vibration Tester for a list of possible nonstandard fault conditions.)

What should you do if you get a nonstandard fault diagnosis?

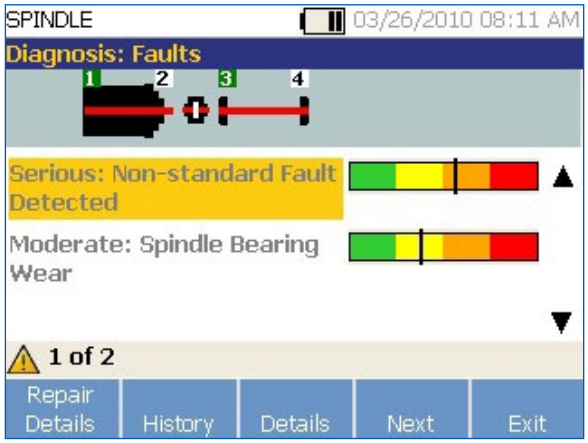
If confronted with a nonstandard fault diagnosis during a normal testing procedure, take the measurements again and see if you get a second nonstandard fault diagnosis. If you don't, the diagnosis was probably caused by an isolated vibration event or a data collection error. If you do get another nonstandard fault diagnosis, take the following steps to eliminate the most probable causes:

1. **Double-check the machine setup in the Fluke 810.**
   - Has all of the required information about the driver, transmission, and driven component been entered?
   - Are the component types correctly described in the setup? For example, was an ac motor improperly described as dc? Was a screw compressor entered as a piston compressor?

2. **Ensure that the data quality and quantity are sufficient for accurate diagnosis.**
   - Are measurements being taken from all of the identified components (driver, transmission, driven component) in the machine's setup? For example, if a drivetrain is set up to include a motor, gearbox, and pump, and only data from the motor and pump is collected, the Fluke 810's diagnostic engine may misdiagnose the problem because it does not have all of the required information. A good rule of thumb is never to set up or test partial drivetrains.
   - If only a motor is being tested, was this indicated in the setup? If so, ensure that the motor is uncoupled from the rest of the drivetrain prior to testing to minimize or eliminate transient vibrations.
   - Was vibration data collected with the sensor from a minimum of one location for each identified component? Did the sensor's location and orientation on the components match those in the setup diagram in the Fluke 810?
   - Were the best test locations used for the data collection? The training DVD and quick reference guide provided with the Fluke 810 provide guidance in identifying these test points.

In summary, the onboard diagnostic engine of the Fluke 810 relies on accurate setup and data collection to deliver an accurate diagnosis. We recommend reviewing the setup data to ensure that all of the information provided during the machine setup was correct. Guesses or estimates about the setup can give misleading or incorrect diagnoses. Next, make sure that a sufficient number of measurements were taken from the recommended test points. If possible, repeat the measurements.

If, after ensuring that setup and measurement steps have been completed as suggested, a nonstandard fault is still diagnosed, other electrical and mechanical problems outside of the basic four standard faults may be occurring. If this is the case, you may want to consult the machinery's documentation, the manufacturer, or a vibration specialist. See the sidebar "Nonstandard Faults for the Fluke 810 Vibration Tester" for a list of possible nonstandard fault conditions.



Under certain conditions, the Fluke 810 Vibration Tester may identify a "nonstandard fault."

Nonstandard Faults for the Fluke 810 Vibration Tester

Four standard faults—bearing condition, misalignment, imbalance, and looseness—cause most of the mechanical problems in equipment with rotating parts. If the Fluke 810 Vibration Tester gives a nonstandard fault diagnosis after you have verified correct setup, consider these other fault conditions.

Electrical
- Electrical switching fault in a variable frequency drive
- Motor component (stator, winding, commutator, brush) problems
- Motor lamination looseness
- Motor air gap problem
- Line phase voltage imbalance

Non-bearing mechanical element wear or defect
- Pump component (vane, timing gear, impeller, piston, idler shaft, rotor) wear or clearance problems
- Motor cooling fan blade damage
- Gearbox input shaft pinion problem
- First gear mesh problem or wear
- Fan wheel wobble
- Fan dirt buildup or blade clearance problem
- Sheave problems
- Drive belt irregularity
- Coupling wear
- Compressor component (rotor thread , piston/valve, impeller, lobe) wear

Flow related
- Pump cavitation or air ingestion
- Fan air flow disturbance
- Compressor gas pulsation

Structural
- Structural vibration or resonance
- Motor or pump mounting flexibility
- Motor foundation flexibility or resonance
- Foundation weakness or resonance
- Foundation vibration
- Fan mounting transverse flexibility

Other
- Overloaded accelerometer
- Oil whirl
- Oil whip

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