How to Answer the Setup Questions for a Vibration Test with the Fluke 810 Vibration Tester

The Fluke 810 Vibration Tester can accurately diagnose a wide range of machine conditions, but to do so it must have a complete and accurate description of the components being tested and how they are configured.

To gather the required information quickly and conveniently, the Tester asks a series of questions about the following when you set up a new test:

• The motor that drives the system
• The couplings and transmission
• The driven component

As you answer these questions, the Fluke 810 Vibration Tester displays an image of the system that you have described so you can be sure that it has an accurate representation.

Entering Motor Information

Entering an accurate running speed (RPM) is critical to receiving a proper diagnosis. The Fluke 810 Vibration Tester uses the running speed that you enter to analyze vibration information and to give you an accurate diagnosis. Entering an incorrect running speed significantly reduces the accuracy of the tester. Use the keypad of the Fluke 810 Vibration Tester to enter the running speed. (Figure 1)

Getting the speed information for constant-speed motors

You can get the speed of a constant-speed motor from the motor nameplate or the motor manual. You can also measure RPM with tachometer supplied with the Fluke 810.

Getting the speed information for variable-speed motors

You can get the speed of a variable-speed motor from:

• The tachometer supplied with the Fluke 810 Vibration Tester
• A separate strobe or contact tachometer
• The information listed on the variable frequency drive

To get consistent diagnoses on motors controlled by variable speed drives (VFDs), it may be necessary to reduce or increase the load on the motor to get the motor speed to match the speed at which previous measurements were made. If you can manually adjust the VFD, set the VFD to its maximum output speed (50Hz or 60Hz).

To calculate motor speed from the VFD output setting, use the following formula:

\[
\text{VFD output frequency / motor nameplate frequency} \times \text{motor nameplate speed} = \text{motor speed}
\]

For example, if the motor nameplate tells you that that motor speed at 60 Hz is 1,775 RPM and you set the VFD to 60 Hz, the motor runs at its nameplate speed:

\[
\frac{60 \text{ Hz}}{60 \text{ Hz}} \times 1,775 \text{ RPM} = 1,775 \text{ RPM}
\]

If you reduce the VFD to half the previous output frequency, the motor runs half as fast:

\[
\frac{30 \text{ Hz}}{60 \text{ Hz}} \times 1,775 \text{ RPM} = 887 \text{ RPM}
\]

Using the Machine Setup Wizard

When you set up a machine for measurement and diagnosis using the Machine Setup Wizard, answer each question carefully and correctly, based on your knowledge of the machine to be tested. If you are unsure about how to interpret the questions asked by the Machine Setup Wizard, refer to the Fluke 810 User’s Manual or this guide.

• Use the Dial on the Fluke 810 to highlight your choice. (Figure 2)
• Use the softkeys to select the component, and then press Enter (Figure 3)
Setup Questions and Results

Create A New Machine Setup

1. Push "New Machine" on the startup screen. (or press SETUP)

2. Enter a machine name:

   Use the Dial to select and enter characters.

   A maximum of 15 characters is allowed.

3. Motor Close Coupled?

   Answer "NO" unless:

   • The motor shaft is driving the driven component directly.
   • The only bearings are on the motor shaft (for example, when the motor is bolted directly to a fan, a pump, or a compressor).

   Then, answer "YES".

4. If in doubt, select "Flexible Coupling".

5. Coupling between motor and next component?

   Flexible Coupling

   • If there is material between the Select the coupling, answer "Flexible".
   • There are bearings on both the motor and the driven shaft, or a driven component directly supported or overhung.

   Rigid Coupling

   Otherwise, if the nomenclature and the bearings are bolted together with no flexible material, or no coupling, answer "Rigid".

   Select component: Press Enter on the center of the Drive, rotate the Dial, select the driven unit, then select the driven unit.

   What is known: Shaft speeds/ Gear ratios/Gear Teeth Count Make selection and enter either shaft speeds, gear ratios, or gear teeth count. Flexible coupling between gearbox and next component? Yes/No Select whether there is or isn’t a coupling between the gearbox and the coupling.

   Next component: Gear driven machine

   Bearings on motor, gearbox and driven shaft

   Motor shaft, gear shafts – driven shaft – different speeds

   Answer "Yes" if the driven unit shaft speed changes. 1.25:1 (increaser) or 1:4.25 (reducer). Flexibly driven motors will always use number one in ratio – 6.25/1 (reducer) or 1.25/4 (increased). Overhung Fan

   Driven Unit (Fan) is supported by:

   • Supported or Overhung
   • Two Bearings/Overhung
   • Two Bearings/Overhung

   If in doubt, select Flexible Coupling.

   If doubt, enter input and output shaft speeds to calculate ratio.

6. Motor Close Coupled?

   Answer "NO" unless:

   • The motor shaft is driving the driven component directly.
   • The only bearings are on the motor shaft (example, when the motor is bolted directly to a fan, a pump, or a compressor).

   Then, answer "YES".

7. Motor driven by belt or gear drive?

   Belt driven machine

   • Shafts on motor and driven shafts
   • Two shafts with different speeds

   Gear driven machine

   Bearings on motor, gearbox and driven shaft

   Motor shaft, gear shafts – driven shaft – different speeds

   Answer "Yes" if the driven unit shaft speed changes. 1.25:1 (increaser) or 1:4.25 (reducer). Flexibly driven motors will always use number one in ratio – 6.25/1 (reducer) or 1.25/4 (increased). Overhung Fan

   Driven Unit (Fan) is supported by:

   • Supported or Overhung
   • Two Bearings/Overhung
   • Two Bearings/Overhung

   If in doubt, select Flexible Coupling.

8. Motor Close Coupled?

   Answer "NO" unless:

   • The motor shaft is driving the driven component directly.
   • The only bearings are on the motor shaft (for example, when the motor is bolted directly to a fan, a pump, or a compressor).

   Then, answer "YES".

9. Coupling between motor and next component?

   Flexible Coupling

   • If there is material between the Select the coupling, answer "Flexible".
   • There are bearings on both the motor and the driven shaft, or a driven component directly supported or overhung.

   Rigid Coupling

   Otherwise, if the nomenclature and the bearings are bolted together with no flexible material, or no coupling, answer "Rigid".

   Select component: Press Enter on the center of the Drive, rotate the Dial, select the driven unit, then select the driven unit.

   What is known: Shaft speeds/ Gear ratios/Gear Teeth Count Make selection and enter either shaft speeds, gear ratios, or gear teeth count. Flexible coupling between gearbox and next component? Yes/No Select whether there is or isn’t a coupling between the gearbox and the coupling.

   Next component: Gear driven machine

   Bearings on motor, gearbox and driven shaft

   Motor shaft, gear shafts – driven shaft – different speeds

   Answer "Yes" if the driven unit shaft speed changes. 1.25:1 (increaser) or 1:4.25 (reducer). Flexibly driven motors will always use number one in ratio – 6.25/1 (reducer) or 1.25/4 (increased). Overhung Fan

   Driven Unit (Fan) is supported by:

   • Supported or Overhung
   • Two Bearings/Overhung
   • Two Bearings/Overhung

   If in doubt, select Flexible Coupling.

10. Coupling between motor and next component?

    Flexible Coupling

    • If there is material between the Select the coupling, answer "Flexible".
    • There are bearings on both the motor and the driven shaft, or a driven component directly supported or overhung.

    Rigid Coupling

    Otherwise, if the nomenclature and the bearings are bolted together with no flexible material, or no coupling, answer "Rigid".

    Select component: Press Enter on the center of the Drive, rotate the Dial, select the driven unit, then select the driven unit.

    What is known: Shaft speeds/ Gear ratios/Gear Teeth Count Make selection and enter either shaft speeds, gear ratios, or gear teeth count. Flexible coupling between gearbox and next component? Yes/No Select whether there is or isn’t a coupling between the gearbox and the coupling.

    Next component: Gear driven machine

    Bearings on motor, gearbox and driven shaft

    Motor shaft, gear shafts – driven shaft – different speeds

    Answer "Yes" if the driven unit shaft speed changes. 1.25:1 (increaser) or 1:4.25 (reducer). Flexibly driven motors will always use number one in ratio – 6.25/1 (reducer) or 1.25/4 (increased). Overhung Fan

    Driven Unit (Fan) is supported by:

    • Supported or Overhung
    • Two Bearings/Overhung
    • Two Bearings/Overhung

    If in doubt, select Flexible Coupling.

11. Answering the Setup Questions

    1. Select motor type:

        AC DC

    2. AC motor with VFD? Yes No Select a variable frequency drive ("VFD") or a constant speed motor ("CFD").

    3. Enter speed in RPM:

    4. Enter nominal hp (kw):

    5. Motor mounted: Horiz/Vert

        • Horizontally mounted
        • Vertically mounted

        Select roller or journal bearings.


        Choose roller or journal bearings.

    7. Motor detached from drive train?

        Answer NO unless: No Select component: Belt Drive

        Press Enter on the center of the Drive, rotate the Dial, then select Belt Drive. Input shaft speed:

        Enter the motor speed. Output shaft speed:

        Enter the driven unit shaft speed. Rotation speed (optional):

        Use a stroke or contact tachometer to measure the speed of the belt.

    8. Motor Close Coupled?

        Answer "NO" unless:

        • The motor shaft is driving the driven component directly.
        • The only bearings are on the motor shaft (for example, when the motor is bolted directly to a fan, a pump, or a compressor).

        Then, answer "YES".

12. After completing the steps in #9:

    Belt component: Gear driven machine

    Bearings on motor, gearbox and driven shaft

    Motor shaft, gear shafts – driven shaft – different speeds

    Answer "Yes" if the driven unit shaft speed changes. 1.25:1 (increaser) or 1:4.25 (reducer). Flexibly driven motors will always use number one in ratio – 6.25/1 (reducer) or 1.25/4 (increased)

13. After completing the steps in #10:

    Belt component: Belt drive

    Press Enter on the center of the Drive, rotate the Dial, then select Belt Drive. Input shaft speed:

    Enter the motor speed. Output shaft speed:

    Enter the driven unit shaft speed. Rotation speed (optional):

    Use a stroke or contact tachometer to measure the speed of the belt.

    Next component: Belt Drive

    14. After completing the steps in #11:

    Supported or Overhung Component

    15. After completing the steps in #12:

    Supported Fan

    If in doubt, select spindle for all driven units that are not a pump, compressor, or blower.

    Blower refers to a driven with multi-stage centrifugal wheels or lobes, not a fan with blades (should be set as a fan if a pump).

    If there are bearings on both sides (see diagram) the "Overhung" the fan is mounted at the end of the shaft unsupported on one side.

    No. of fan blades (optional):

    If you are certain you know the number of blades, enter the number. If not, leave blank.

    Allures when you are select Belt Drive. Then select Datas.

16. After completing the steps in #13:

   一直都是输入和输出轴速度来计算比例。