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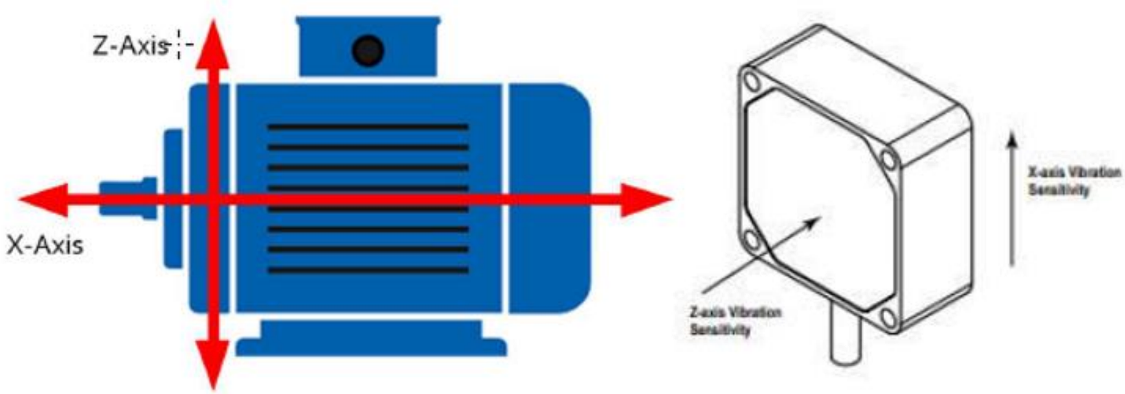
Introduction

Welcome to the Machine Monitoring and Vibration Analysis Dictionary, a comprehensive resource that empowers our team with valuable insights into machinery performance and health. This report covers critical parameters measured along both the horizontal (X) and vertical (Z) axes, offering a detailed analysis of dynamic behavior. Key terms include frequency, amplitude, velocity, acceleration, and displacement, providing a holistic view of vibrations. The horizontal axis detects imbalances and misalignments, while the vertical axis reveals issues like bearing faults and structural problems. Understanding resonance and harmonics is crucial for preventing excessive wear. With these insights, we can make informed decisions for proactive maintenance and optimization, ensuring the reliability and efficiency of our machinery. The document supports a data-driven approach, facilitating early detection of potential issues and minimizing downtime.



Definitions

1. **Machine Status -** Tells us if the machine is running right now or not.
2. **X Axis Velocity** - Measures how fast something (our motor) is moving from left to right or from right to left along the X - axis. Provides information about the speed of the motion in the horizontal direction.
3. **Z Axis Velocity -** Measures how fast something (our motor) is moving up and down along the Z – axis. Provides information about the speed of the motion in the vertical direction.
4. **X Axis Hi Frequency Acceleration –** measurement of how quickly the motor is moving from left to right (in the X direction) and paying special attention to fast changes in that movement.
5. **Z Axis Hi Frequency Acceleration -** measurement of how quickly the motor is moving up and down (in the Z direction) and paying special attention to fast changes in that movement.
6. **Temperature -** This is the temperature of the motor at the sensor placement.
7. **X Axis Crest Factor** - is a measurement used in vibration analysis to describe the shape of a waveform. It is the ratio of the peak value of a waveform to its RMS (Root Mean Square) value. In the context of the X Axis Crest Factor for sensors measuring vibration along the X-axis, it would be the ratio of the peak acceleration in the horizontal direction to the RMS acceleration. In simpler terms, the Crest Factor provides information about the shape of the vibration waveform. A high Crest Factor indicates that the waveform has sharp peaks, suggesting potentially abrupt changes in acceleration. It's often used to assess the severity of vibrations and identify any irregularities or unexpected behavior in the system being monitored. In summary, the X Axis Crest Factor helps in understanding the nature of vibrations along the horizontal (X) direction, specifically by analyzing the ratio of peak to RMS acceleration values. Optimal values for good bearings usually range from 3 to 4.
8. **Z Axis Crest Factor -** is a measurement used in vibration analysis to describe the shape of a waveform. It is the ratio of the peak value of a waveform to its RMS (Root Mean Square) value. In the context of the Z Axis Crest Factor for sensors measuring vibration along the Z-axis, it would be the ratio of the peak acceleration in the vertical direction to the RMS acceleration. In simpler terms, the Crest Factor provides information about the shape of the vibration waveform. A high Crest Factor indicates that the waveform has sharp peaks, suggesting potentially abrupt changes in acceleration. It's often used to assess the severity of vibrations and identify any irregularities or unexpected behavior in the system being monitored. In summary, the Z Axis Crest Factor helps in understanding the nature of vibrations along the vertical (Z) direction, specifically by analyzing the ratio of peak to RMS acceleration values. Optimal values for good bearings usually range from 3 to 4.
9. **X Axis Peak Acceleration -** refers to the highest value of acceleration along the horizontal (X) direction. In simpler terms, it represents the maximum intensity or strength of the acceleration experienced by a sensor measuring vibrations in the left-to-right direction.
10. **Z Axis Peak Acceleration -** refers to the highest value of acceleration along the vertical (Z) direction. In simpler terms, it represents the maximum intensity or strength of the acceleration experienced by a sensor measuring vibrations in the up and down direction.

11. **X Axis RMS (Root Mean Square) Low Acceleration -** represents the average magnitude of low-frequency vibrations or accelerations in the left-to-right direction. This measurement can be useful for assessing the baseline or average level of low-frequency vibrations in the horizontal axis.
12. **Z Axis RMS (Root Mean Square) Low Acceleration -** represents the average magnitude of low-frequency vibrations or accelerations in the up and down direction. This measurement can be useful for assessing the baseline or average level of low-frequency vibrations in the vertical axis.
13. **X Axis Peak Velocity Frequency Component -** the highest peak velocity and identifying the specific frequency range or component of vibrations associated with that peak velocity in the left-to-right direction. This measurement can be valuable for understanding not only how fast the system is moving horizontally but also at which frequency or range of frequencies this high-velocity movement occurs. It provides insights into the dynamic behavior of the system in terms of both speed and frequency along the X axis.
14. **Z Axis Peak Velocity Frequency Component -** the highest peak velocity and identifying the specific frequency range or component of vibrations associated with that peak velocity in the up-to-down direction. This measurement can be valuable for understanding not only how fast the system is moving vertically but also at which frequency or range of frequencies this high-velocity movement occurs. It provides insights into the dynamic behavior of the system in terms of both speed and frequency along the Z axis.
15. **X Axis Kurtosis** - refers to a statistical measurement that describes the shape, or "tailedness," of the distribution of acceleration values along the horizontal (X) axis. Kurtosis provides information about the heaviness of the tails of a distribution compared to a normal distribution. High kurtosis indicates a more peaked and heavy-tailed distribution, suggesting that there are extreme values (outliers) in the dataset. Low kurtosis indicates a flatter distribution with fewer extreme values. So, "X Axis Kurtosis" helps you understand the shape of the distribution of acceleration values along the X-axis. It is often used in vibration analysis to identify unusual patterns or extreme values in the acceleration data, which can be indicative of certain conditions or issues in the system being monitored.
16. **Z Axis Kurtosis** - refers to a statistical measurement that describes the shape, or "tailedness," of the distribution of acceleration values along the vertical (Z) axis. Kurtosis provides information about the heaviness of the tails of a distribution compared to a normal distribution. High kurtosis indicates a more peaked and heavy-tailed distribution, suggesting that there are extreme values (outliers) in the dataset. Low kurtosis indicates a flatter distribution with fewer extreme values. So, "Z Axis Kurtosis" helps you understand the shape of the distribution of acceleration values along the Z-axis. It is often used in vibration analysis to identify unusual patterns or extreme values in the acceleration data, which can be indicative of certain conditions or issues in the system being monitored.

Document History

Version Number	Purpose/Change	Author	Date
0.1	Initial draft	AD&R	05/01/2023
1.0	Final Version	AD&R	05/18/2023
1.1	Intro added and definitions updated	Pavlo Yeriemieiev	01/22/2024