

Understanding AMS Machinery Manager Statistical Alarms

There are two basic statistical warning alarms in the AMS Machinery Manager software. The alarms are called the Baseline Ratio (Br) and the Baseline Statistical (Bs) Alarms, respectively. Depending upon the timeframe of the data collection event, either the Br value or the Bs value is used to generate the Warning Alarm in the software.

The Baseline Ratio (Br) alarm provides a Warning Alarm that is sensitive to the actual collected data level, which should always be lower in amplitude than the static Alert and Fault Alarms most commonly used and generally based on a vibration alarm guideline from some company, group or association. Here is how the Br statistic works: the first time that data is collected on a machine, the Alarm Limit set calculates a Br alarm that is based on the user-defined bands from the measurement point's Analysis Parameter Set. The Warning (Br) alarm is just a multiple of the existing collected energy in each band, which can be changed by the user, but rarely is moved from the default value of two. In a given Analysis Parameter Set band, the energy recorded in the band must increase by a factor of two, or a 100% increase in vibration from the current level in each band, for a Warning Alarm to be generated under the Br statistic. From the first data collection event, the software provides basic protection of the user's equipment as the first data collection is considered, by default, the baseline data from which statistics will be calculated. No matter what the machine's condition at the first data acquisition event (good or bad), a change from the first reading of 100% is a significant change. The Br statistic catches such a large change in vibration energy and displays the warning level for the user on the first, second and third data collection event on the machine. Subsequent data trend values that appear above the Br-generated warning level indicate that a large change in vibration energy has occurred, and the equipment should be further analyzed.

The Statistical Warning Alarm is also used to generate a warning alarm once the third vibration reading is taken. The Baseline Statistical (Bs) alarm calculates a mean (average value) and Standard Deviation (SD) value for each band and updates the mean and SD values with each subsequent data acquisition up until the 12th set of data is acquired (Note: the user sets the total number of SD's to use in each band; typically set at one to three standard deviations). Twelve is the default value for collected data events and twelve is considered for most statistical work a minimum value of events to generate proper statistics, but some users report good alarms for as low as six data sets. After the 12th reading the mean and SD are no longer updated with new data, but the values for the mean and SD are used for generating statistical alarms for all subsequent data collection until the statistics are reset by the user (usually after a machinery repair or replacement event). The Bs Warning Alarm is for early warning protection of critical assets, and the mean or average value of the energy in a specific band has a default of one SD added to the mean as a potential initial alarm level candidate. The mean plus one SD formula works to help establish alarm warnings, based on the historical vibration energy from the last 12 data collection events, which is the default event number value. The user can change the default of one to two or three SD's if the Baseline Statistical Bs statistic is too narrow and generates alarms too early. The only controls the user has for the Bs statistic are to set the number of events that are used to calculate the Bs statistic and the number of standard deviations to apply.

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Statistical alarms (Br and Bs) are powerful because both are based on the collected data and not just set to a user-defined static alarm or fault value like the Alert and Fault alarms. Users can elect not to use Alert and Fault alarms and can even set the Baseline Ratio to zero to effectively disable the Br alarm (not recommended), but the Baseline Statistical (Bs) value is calculated from the original twelve data sets or the twelve data sets following a user-reset baseline event. The Warning Alarm using the Br value or Bs value is always calculated to help the user determine if the vibration energy has materially changed from previous data collection events.

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