MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

3300 SYSTEM

3300/15 02-02-00-00-00-00

MACHINERY MONITORING MODULE

Used with the applicable 3300 System configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Bently Nevada 3300/15 02-02-00-00-00-00 manufacturer documentation

Dual Vibration Monitor
3300/15

Reliable vibration monitoring for rotating machinery

The 3300/15 Dual Vibration Monitor provides sophisticated on-line vibration monitoring and is suitable for virtually all types of rotating and reciprocating machinery. It can continuously measure and monitor two independent channels of radial vibration, accepting inputs from two proximity probe transducer systems. The monitor is used in conjunction with the 3300 System Rack, Power Supply and System Monitor, each of which is ordered separately.

The 3300/15 Dual Vibration Monitor is designed to meet the requirements of American Petroleum Institute Standard 670, Second Edition, June 1986.

Applications

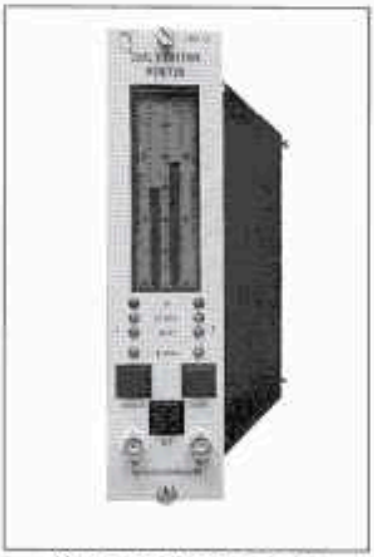
Complete on-line machinery protection to fit a wide variety of applications

Shaft radial vibration amplitude is a primary indicator of the overall mechanical condition of rotating machinery. Many machine malfunctions, including rotor imbalance, misalignment, bearing wear, shaft cracks, and rubs can be detected with vibration measurements.

The Dual Vibration Monitor measures and monitors the inputs from two proximity probe transducers. Amplitude values for both channels are continuously displayed on the LCD bargraph.

For complete vibration protection at one bearing location, two probes should be installed 90° apart (XY) at the same longitudinal location along the shaft near the journal bearing. The actual orientation, however, does not have to be true vertical and horizontal.

Since the two monitor channels operate independently, including alarm setpoint values, the two transducers do not even have to be mounted at the same bearing location. For example, one probe could be mounted at each end of the shaft or one on each of two machines. However, for shaft radial measurements, single-plane monitoring (one probe per bearing) is not satisfactory. For complete protection against excessive shaft radial vibration, XY transducers are recommended at each radial bearing location.



3300/15 Dual Vibration Monitor

Functions

The Dual Vibration Monitor is a microprocessor-based monitor which provides digitally adjustable Alert and Danger setpoints. Each channel has individual Alert and Danger alarm setpoints for radial vibration amplitude. It provides status indications (monitor and transducer OK, Alert, Danger and Bypass) and independent per channel peak to peak amplitude detection of vibration signals for continuous display and for driving recorder outputs. It provides short circuit protected power to the two transducer systems via the rear terminal strip. The OK circuit continuously monitors the operation of each transducer and associated field wiring. Both channels are ***continuously*** displayed independently on the monitor's LCD readout.

The monitor is ***ready for computer interfacing.*** No additional hardware is required to enhance the system for computerized data access, using Bently Nevada standard on-line computerized monitoring hardware and software.

Indication on the monitor display of alarm setpoint levels and gap voltages is obtained by pressing the Alert, Danger, and Gap switches. System self-test functions are standard, and any associated error codes can be read from the monitor display.

Both transducer input signals are buffered and sent to separate terminals at the Signal Input/Relay Module (which is at the rear of the monitor) and to the monitor front panel coaxial connectors. Instruments such as the Bently Nevada Digital Vector Filter 3, 108 Data Acquisition Instrument (ADRE®3), Snapshot® System, TK83 Balance Master®2 and TK81 can be connected ***directly*** to these terminals for machinery diagnostics and predictive maintenance programs, without the need for special cables or interface cards.

Features/Benefits

3300 Monitors have quality, reliability and flexibility built-in

Each monitor operates independently within the system without the requirement of a separate control panel, keyboard or programming module. The Dual Vibration Monitor incorporates features which maximize long-term, reliable and highly accurate system operation. These features are extremely important, especially for installations where the monitoring system is used as an input to an automatic machine shutdown system.

It is not always possible, when placing your order, to determine the exact monitor options you will need for a particular application. The Dual Vibration Monitor provides a wide range of plug-in (user-programmable) jumpers so that the appropriate monitor options can be easily set when you receive the system. If necessary in the future, these options can be changed in the field. Programming of jumpers does not require tools or extra parts. These are plug-in jumpers that can be set by hand. The on-board microprocessor reads the jumper positions and dictates monitor operation accordingly.

Dual Vibration Monitor
3300/15

Programmable options

Following are brief descriptions of the programmable options. Refer to the 3300 System Overview for benefits and more details.

Recorder Outputs — 0 to –10 Vdc, +1 to +5 Vdc, or +4 to +20 mA.

Monitor Full-Scale Ranges — various full-scale ranges can be jumper programmed (monitor requires recalibration after changing full-scale ranges).

Meter Scales — various high quality, laser printed cut-outs are provided in the manual.

Alarm Time Delays — 0.1, 1, 3 and 6 seconds. Alarm time delay is the time interval between the point when the input signal amplitude exceeds the alarm setpoint level and when the alarm circuit causes the relay to actuate. Our research and field experience have shown that a 3 second delay is generally sufficient to minimize false alarms from either "normal" transient vibration or electrical noise sources. Therefore, the monitor is shipped from the factory with jumpers positioned for 3 second alarm delays. However, for machines which are subject to rapid failures (less than 3 seconds), shorter delays may be necessary. The original machinery manufacturer should be consulted in these cases.

Danger Relay Voting Logic — OR or AND in accordance with API 670. For dual channel monitors, AND Danger voting logic allows either channel to independently generate an Alert Alarm, but requires ***both*** channels to measure a Danger alarm condition before the Danger relay will activate. AND logic is "two out of two" voting logic. OR voting logic is "one out of two," which allows ***either*** channel to independently generate a monitor alarm (Alert or Danger).

In general, AND voting is appropriate when the two channels represent exactly the same measurement variable (transducer redundancy) and when it is likely that a transducer fault will produce a false monitor alarm. OR voting logic is appropriate when the two channels do not represent exactly the same measurement variable (transducer redundancy) and when it is likely that a transducer failure will produce a false monitor alarm.

The most common types of transducer and field wiring faults (short and open circuits) generate signals which are ***not*** likely to produce false alarms in a vibration monitor. Thus, it is generally ***not*** necessary to use AND voting logic for the purpose of transducer redundancy.

For XY applications (two probes per bearing), the radial transducers cannot actually be considered as redundant anyway. That is, they do not measure exactly the same variable. Shaft radial vibration is almost never the same in both measurement directions. In fact, our research and field experience have shown that machine damage can occur due to excessive vibration in one plane while the vibration in the orthogonal plane remains below the alarm setpoint levels. Therefore, AND voting logic for XY vibration monitors is not only unnecessary from the electrical viewpoint, it is technically inappropriate from the mechanical viewpoint.

*Note: A transducer field wiring fault which is transient and rapidly varying **may** generate a signal which will produce a false alarm in a vibration monitor. The solution to this problem is our proprietary Timed OK/ Channel Defeat circuit. This circuit, incorporated in all Bently Nevada vibration monitors, can differentiate between a transient transducer fault (which is **not** allowed to produce a monitor alarm) and high vibration amplitude (which is allowed to produce an alarm). Refer to the "Timed OK/ Channel Defeat" paragraph below for a more detailed description of this circuit's operation.*

For the above reason, the 3300/15 Dual Vibration Monitor is shipped from the factory with jumpers positioned for OR voting logic. Note that Quad relays ***cannot*** be selected for voting. For more information, refer to Bently Nevada Applications Note AN032, "Voting Logic - Radial Vibration and Thrust Position Monitoring."

Timed OK/Channel Defeat — This special proprietary circuit minimizes the possibility of false alarms caused by a defective transducer, its associated interconnect wiring, or transducer power supply. When the OK limit is exceeded, the channel is defeated and the OK LED is turned OFF. The microprocessor then checks for proper transducer operation to be (re)established. When the fault clears, the channel is put back into normal operation (typically after 30 seconds delay) and the green OK LED on the monitor front panel flashes until a user-initiated reset. If the transducer problem persists, the offending monitor channel can be defeated via the internal Channel Bypass switch. A red LED on the monitor front panel will indicate the Bypass condition.

Alarm Reset Mode — latching or nonlatching, independent for Alert and Danger.

Alarm Relay Mode — Alert and Danger relay mode, normally energized or normally de-energized, is jumper-programmable (per relay) on the Signal Input/Relay Module.

First Out — indicated the first alarm to occur in the rack since the last power-up or Reset.

Frequency Response — 4 to 4,000 Hz (240 to 240,000 cpm) or 1 to 600 Hz (60 to 36,000 cpm).

*Note: The 1 to 600 Hz (60 to 36,000 cpm) option is **not** recommended for machine applications with rapid startup and coastdown rates where acceleration/deceleration exceeds 1,000 rpm per second. Because of the extended low frequency range to 60 cpm, the monitor circuitry will retain vibration transients normally experienced during fast start-ups (such as with motor driven equipment). This can hold vibration levels above alarm setpoints beyond alarm time delays. This may result in Danger relay actuation after the internal time delay has lapsed, even if the actual vibration has decreased below the Danger alarm setpoint level. If, based on this explanation, the 240 cpm low frequency limit is not satisfactory for your application, contact your local Bently Nevada sales representative. The low frequency option is recommended for applications where shaft rotative speed is less than 1000 rpm.*

The following outstanding features also are standard:

Danger Bypass — The Danger relay may be bypassed in accordance with API 670. The red bypass LED on the front panel will be ON whenever the monitor is in this condition. A jumper on the monitor circuit board can be programmed to prevent unauthorized