3500/40M Proximitor Monitor

Datasheet

Cordant™

141535 Rev. R

Description

The Bently Nevada™ 3500/40M Proximitor Monitor is a four-channel monitor that accepts input from Bently Nevada proximity transducers, conditions the signal to provide various vibration and position measurements, and compares the conditioned signals with user-programmable alarms. The user can program each channel of the 3500/40M with the 3500 Rack Configuration Software to perform any of the following functions:

- Radial vibration
- Eccentricity
- REBAM
- Thrust position
- Differential expansion

The primary purpose of the 3500/40MProximitor Monitor is to provide the following:

- Machinery protection by continuously comparing monitored parameters against configured alarm setpoints to drive alarms
- Essential machine information for both operations and maintenance personnel

Each channel, depending on configuration, typically conditions its input signal to generate various parameters called **static values**. You can configure **alert setpoints** for each active static value and **danger setpoints** for any two of the active static values.

You program the monitor channels in pairs. The monitor channels can perform up to 2 of these functions at a time. Channels 1 and 2 can perform one function, while channels 3 and 4 perform another (or the same) function.

Baker Hughes

Specifications

Inputs

Signal	Accepts from 1 to 4 proximity transducer signals
Power consumption	7.7 Watts, typical
Input Impedance	
Standard I/O	10 kΩ (Proximitor and acceleration inputs

Sensitivity

Radial Vibration	3.94 mV/µm (100 mV/mil) or 7.87 mV/µm (200 mV/mil)
Thrust	3.94 mV/µm (100 mV/mil) or 7.87 mV/µm (200 mV/mil)
Eccentricity	3.94 mV/µm (100 mV/mil) or 7.87 mV/µm (200 mV/mil)
Differential Expansion	0.394 mV/µm (10 mV/mil) or 0.787 mV/µm (20 mV/mil)
REBAM	40 mV/µm (1000 mV/mil) or 80 mV/µm (2000 mV/mil)

Outputs

Front Panel LEDs	
OK LED	Indicates when the 3500/40M SIL Proximitor is operating properly.
TX/RX LED	Indicates when the 3500/40M SIL Proximitor is communicating with other modules in the 3500 rack.
Bypass LED	Indicates when the 3500/40M SIL Proximitor is in Bypass Mode.

Front Panel LEDs	
Buffered Transducer Outputs	The front of each monitor has one coaxial connector for each channel. Each connector is short-circuit protected.
Output Impedance	550 Ω
Transducer Power Supply	-24 Vdc

Signal Conditioning

Specified at +25°C (+77°F) unless otherwise noted.

Radial Vibration

Frequency Response	
Direct filter	User-programmable Single-pole 4 Hz to 4000 Hz or 1 Hz to 600 Hz
Gap filter	-3 dB at 0.09 Hz
Not 1X filter	60 cpm to 15.8 times running speed Constant Q notch filter Minimum rejection in stopband of -34.9 dB
Smax	0.125 to 15.8 times running speed
1X and 2X vector filter	Constant Q Filter Minimum rejection in stopband of -57.7 dB

1X and 2X Vector, Not 1X, and Smax parameters are valid for machine speeds of 60 cpm to 60,000 cpm.

Accuracy

Direct and Gap	Exclusive of filtering Within ±0.33% of full-scale typical ±1% maximum
1X and 2X	Within ±0.33% of full-scale typical ±1% maximum
Smax	Within ±5% maximum
Not 1X	±3% for machine speeds less than 30,000 cpm ±8.5% for machine speeds greater than 30,000 cpm

Thrust and Differential Expansion

Accuracy	Within ±0.33% of full-scale typical ±1% maximum
Frequency Response	
Direct filter	-3 dB at 1.2 Hz
Gap filter	-3 dB at 0.41 Hz

Eccentricity

Accuracy	Within ±0.33% of full-scale typical ±1% maximum
Frequency Response	
Direct filter	-3 dB at 15.6 Hz
Gap filter	-3 dB at 0.41 Hz

REBAM

Frequency Response	
Spike	User-programmable from 0.152 to 8678 Hz
Element	User-programmable for BPFO ranging from 0.139 to 3836 Hz High-pass corner is 0.8x BPFO. Low-pass corner is 2.2x BPFO.
Rotor	User programmable from 0.108 to 2221 Hz
Direct	Programmable from 3.906 to 14.2 Hz Selection is determined by Spike and Rotor filters.
Gap	Programmable from 0.002 to 1.0 Hz Selection is determined by the Rotor filter.
1X vector filter	The range of shaft speeds for which the value is valid depends on the nominal shaft speed for which the channel is configured.

Table 1: Relationship Between Nominal Shaft Speed and the Valid Speed Range

Nominal Shaft Speed (Hz)	Valid Speed Range (Hz)
10 to <126	0.071 to 160
126 to <252	0.133 to 330
252 to <504	0.25 to 660
504 to 584	0.50 to 750

If a multi-event gear or speed wheel generates the speed input, the upper limitation of the resultant input signal is approximately 20 KHz.

Filter Quality	
Spike high-pass	6-pole Elliptic (155 dB per decade, minimum) Corner frequency is -0.1 dB.
Element bandpass	8-pole Butterworth (155 dB per decade minimum) Corner frequency is -3 dB.
Rotor low-pass	6-pole Elliptic (155 dB per decade, minimum) Corner frequency is -0.1 dB.
Rotor, direct high-pass	1-pole Butterworth (18 dB per decade, minimum) Corner frequency is -3 dB.
Spike, direct low-pass	Corner is -0.3 dB maximum.
Gap low-pass	1-pole Butterworth (18 dB per decade, minimum) Corner frequency is -3 dB.
1X amplitude	Constant Q of 16.67 Stopband frequencies are 0.91 and 1.09 times the running speed. Stopband attenuation is -51 dB minimum.

Accuracy	
Amplitude	Within ±0.33% of full scale typical ±1% maximum when input signal is at the center frequency of the measured value's passband

Accuracy	
Phase	3 degrees error, maximum
Channels enabled	Certain configurations allow the user to enable only one channel of a channel pair.

Filter Tracking / Stepping (Requires a valid speed signal)	
Initial condition	Nominal filter set used
Switch from nominal to lower filter set	Current shaft speed ≤ 0.9 x (nominal shaft speed)
Switch from lower to nominal filter set	Current shaft speed ≥ 0.95 x (nominal shaft speed)
Switch from nominal to higher filter set	Current shaft speed ≥ 1.1 x (nominal shaft speed)
Switch from higher to nominal filter set	Current shaft speed ≤ 1.05 x (Nominal Shaft Speed)
Shaft speed error condition	Nominal filter set used

0007	7 feet (2.1 meters)
0010	10 feet(3.0 meters)
0025	25 feet (7.6 meters)
0050	50 feet (15.2 meters)
0100	100 feet (30.5 meters)
B: Assembly Instructions	
01	Not assembled
02	Assembled

Spares

176449-01	3500/40M Proximitor Monitor
125680-01	Proximitor I/O Module with Internal Terminations
126615-01	Proximitor I/O Module with External Terminations
135489-04	Proximitor I/O Module with Internal Barriers and Internal Terminations
143488	3500/40M Monitor User Guide
00580434	Internal I/O Module connector header, Euro style, 8-pin
00502133	Internal I/O Module connector header, Euro style, 12-pin
166M4363	Connector header, push-in-spring type (alternative for PN 00580441)
166M2389	Connector header, push-in-spring type (alternative for PN 00580434)