3500/42M Proximitor Seismic Monitor

Datasheet

Cordant™

143694 Rev. AE

Description

The Bently Nevada™ 3500/42M Proximitor Seismic Monitor:

- Protects machinery by continuously comparing monitored parameters against configured alarm setpoints to drive alarms.
- Communicates essential machine information to both operations and maintenance personnel.

The 3500/42M Proximitor Seismic Monitor is a four-channel monitor that accepts input from proximity and seismic transducers. It conditions the signal to provide vibration and position measurements and compares the conditioned signals with user-programmable alarms.

You can program each channel using the 3500 Rack Configuration Software to monitor and report:

- Radial vibration	- REBAM	- Thrust position
- Acceleration	- Differential expansion	- Shaft absolute
- Eccentricity	- Circular acceptance region	- Velocity

The monitor channels are programmed in pairs and can perform up to two of the listed functions at a time. For example, Channels 1 and 2 can perform one function while channels 3 and 4 perform another or the same function.

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.

Baker Hughes

Specifications

Inputs

Signal	Accepts from 1 to 4 proximity, velocity or acceleration 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)
Acceleration & Acceleration2	10 mV/ (m/s^2) (100 mV/g)
Velocity & Velocity2	20 mV/ (mm/s) pk (500 mV/ (in/s) pk) or 5.8 mV/ (mm/s) pk (145 mV/ (in/s) pk) or 4 mV/ (mm/s) pk (100 mV/ (in/s) pk)
Shaft Absolute, Radial Vibration	3.94 mV/µm (100 mV/mil) or 7.87 mV/µm (200 mV/mil)
Shaft absolute, Direct	3.94 mV/µm (100 mV/mil) or 7.87 mV/µm (200 mV/mil)
Shaft absolute, Velocity	20 mV/ (mm/s) pk (500 mV/ (in/s) pk) or 5.8 mV/ (mm/s) pk (145 mV/ (in/s) pk) or 4 mV/ (mm/s) pk (100 mV/ (in/s) pk)
Circular Acceptance Region	See Radial Vibration on page 4.

Outputs

Front Panel LEDs	
OK LED	Indicates when the 3500/42M Proximitor Seismic Monitor is operating properly.
TX/RX LED	Indicates when the 3500/42M Proximitor Seismic Monitor is communicating with other modules in the 3500 rack.
Bypass LED	Indicates when the 3500/42M Proximitor Seismic Monitor is in Bypass Mode.
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
Recorder	+4 to +20 mA Values are proportional to monitor full-scale. The monitor provides individual recorder values for each channel. Monitor operation is unaffected by short circuits on recorder outputs.
Voltage Compliance (current output)	0 to +12 Vdc range across load Load resistance is 0 to 600 Ω.

Front Panel LEDs	
Resolution	0.3662 µA per bit ±0.25% error at room temperature ±0.7% error over temperature range Update rate approximately 100 ms or less
Shaft Absolute Buffered Outputs	The Shaft Absolute I/O modules have one output for each channel group. Each output is short-circuit protected.
Shaft Absolute Output Impedance	300 Ω
Output supply parameters	See Output Supply Parameters on page 14..

Signal Conditioning

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

Radial Vibration

Frequency Response	
Direct filter	User-programmable Single-pole -3db at 4 Hz to 4000 Hz or 1 Hz to 600 Hz ± 1% accuracy
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

Acceleration

Accuracy	Within ±0.33% of full-scale typical ±1% maximum Exclusive of filters
Filter Quality	
High-pass	4-pole (80 dB per decade, 24 dB per octave)
Low-pass	4-pole (80 dB per decade, 24 dB per octave)

Table 1: Frequency Ranges if Both Channels of a Channel Pair are Enabled

Dual Channel Frequency Response			
Output Type	**Without Filter**	**Low or High Pass Filter**	**With Integration**
RMS	10 to 30,000 Hz	10 to 9,155 Hz	10 to 9,155 Hz
Peak	3 to 30,000 Hz	3 to 9,155 Hz	10 to 9,155 Hz

Table 2: Frequency Ranges if a Single Channel of a Channel Pair is Enabled

Single Channel Frequency Response		
Output Type	**Without Filter Low or High Pass Filter**	**With Integration**
RMS	10 to 30,000 Hz	10 to 14,500 Hz
Peak	3 to 30,000 Hz	10 to 14,500 Hz

Acceleration II

Accuracy	Within ± 0.33% of full scale typical ± 1% maximum Exclusive of filters
Filter Quality	
High-pass	4-pole (80 dB per decade, 24 dB per octave)
Low-pass	4-pole (80 dB per decade, 24 dB per octave)
Frequency Response	
Bias filter	-3 dB at 0.01 Hz
Not OK filter	-3 dB at 2400 Hz
1X and 2X vector filter	Valid for machine speeds of 60 cpm to 100,000 cpm

Table 3: Frequency Ranges for the 3500/42M Proximitor Seismic Monitor under Different Options using the Acceleration II Channel Type

Frequency Ranges		
Output Type	**Without Filter Low or High Pass Filter**	**With Integration**
RMS	10 to 30,000 Hz	10 to 20,000 Hz
Peak	3 to 30,000 Hz	10 to 20,000 Hz

Velocity and Velocity II

Accuracy	Within ±0.33% of full-scale typical ±1% maximum +1% -3% with MTL 764(-) Zener External Barrier Exclusive of filters
Velomitor sensor accuracy	Full Scale 0-0.5: ±3% typical Full Scale 0-1.0: ±2% typical Full Scale 0-2.0: ±1% typical
Velomitor sensor accuracy with barriers	Under radiated immunity conditions, add ± 11% for all full scale ranges. The total Velomitor sensor accuracy will be ± 15%.
Frequency Response	
Bias	-3dB at 0.01 Hz Velocity II only
Not OK filter	-3 dB at 40 Hz Velocity II only
RMS	10 to 5,500 Hz, -3 dB
Peak or peak-to-peak	3 to 5,500 Hz, -3 dB
1X and 2X vector filter	Valid for machine speeds of 60 to 100,000 cpm Velocity II only
Filter Quality	
High-pass	4-pole (80 dB per decade, 24 dB per octave)
Low-pass	2-pole (40 dB per decade, 12 dB per octave)

Output Supply Parameters

The following values are accurate regardless of external barrier connections.

I/O Part and Order Options	Description	Configuration	Supply Parameters		
			U (V)	I (mA)	P (W)
128229-01 A 01	Prox/Seismic I/O Module with Internal Terminations	Prox/Accel	23.9	45.5	1.09
		Velomitor	23.9	45.5	1.09
		Seismoprobe	6.82	2.75	0.02
128240-01 A 02	Prox/Seismic I/O Module with External Terminations	Prox/Accel	23.9	45.5	1.09
		Velomitor	23.9	45.5	1.09
		Seismoprobe	6.82	2.75	0.02
138708-01 A 07	Shaft Absolute I/O Module with Internal Terminations	Prox & Velomitor	23.9	45.5	1.09
		Prox & Seismoprobe	6.82	45.5	0.31
138700-01 A 08	Shaft Absolute I/O Modules with External Terminations	Prox & Velomitor	23.9	45.5	1.09
		Prox & Seismoprobe	6.82	45.5	0.31
140471-01 A 09	Prox/Velom I/O Module with Internal Terminations	Prox/Accel	23.9	45.5	1.09
		Velomitor	23.9	45.5	1.09
140482-01 A 10	Prox/Velom I/O Module with External Terminations	Prox/Accel	23.9	45.5	1.09
		Velomitor	23.9	45.5	1.09

B: Assembly Instructions	
01	Not Assembled
02	Assembled

Spares

176449-02	3500/42M Proximitor Seismic Monitor
128229-01	Prox/Seismic I/O Module with internal terminations
128240-01	Prox/Seismic I/O Module with external terminations
00530843	3500/42M Prox/Seismic I/O Module four-pin connector shunt
143489	3500/42M Monitor User Guide
135489-01	I/O Module with Internal Barriers (internal terminations, 4 x Prox/Accel)
135489-02	I/O Module with Internal Barriers (internal terminations, 2 x Prox/Accel and 2 x Velomitor)
135489-03	I/O Module with Internal Barriers (internal terminations, 4 x Velomitor)
138708-01	Shaft Absolute I/O Module with internal terminations
138700-01	Shaft Absolute I/O Modules with external terminations
00517018	3500/42M Shaft Absolute I/O Module 8-pin connector shunt
140471-01	Prox/Velom I/O Module with internal terminations
140482-01	Prox/Velom I/O Module with External Terminations
00561941	3500/42M Prox/Velom I/O Module 10-pin connector shunt
00580434	Internal I/O Module connector header, Euro style, 8-pin Used on I/O modules 128229-01 and 138708-01
00580432	Internal I/O Module connector header, Euro style, 10-pin Used on I/O modules 128229-01 and 138708-01
00502133	Internal I/O Module connector header, Euro style, 12-pin
166M2389	Connector header Push-in-Spring Type (Allternative for PN 00580434)
166M2388	Connector header Push-in-Spring Type (Allternative for PN 00580432)

For spare front and rear cover plates, please see 3500/05 System Rack datasheet (document 141525)

I/O Module Types

AA Ordering Option	I/O Part Number	I/O Description	Transducer Type
01	128229-01	Prox/Seismic I/O Module with internal terminations	Seismoprobe Prox/Accel and Velomitor are supported but are not recommended.
02	128240-01	Prox/Seismic I/O Module with external terminations	Seismoprobe Prox/Accel and Velomitor are supported but are not recommended.
04	135489-01	I/O Module with internal Barriers, internal terminations, 4 x Prox/Accel	Prox/Accel on channels 1 through 4
05	135489-02	I/O Module with internal barriers, internal terminations, 2 x Prox/Accel and 2 x Velomitor	Prox/Accel on channels 1 and 2 Velomitor on channels 3 and 4
06	135489-03	I/O Module with internal barriers, internal terminations, 4 x Velomitor	Velomitor on channels 1 through 4
07	138708-01	Shaft Absolute I/O Module with internal terminations	Prox/Accel or Velomitor or Seismorprobe
08	138700-01	Shaft Absolute I/O Modules with external terminations	Prox/Accel or Velomitor or Seismorprobe
09	140471-01	Prox/Velom I/O Module with internal terminations	Prox/Accel, Velomitor or HTVS
10	140482-01	Prox/Velom I/O Module with external terminations	Prox/Accel, Velomitor or HTVS

External termination blocks cannot be used with Internal Termination I/O Modules. When ordering I/O modules with external terminations, order the external termination blocks and cable separately for each I/O module.