Bently Nevada 3500 Series Service Manual

3500/70-01-00

1. Description

3500/70-01-00

3. Product Information

3500/70-01-00 | Bently Nevada | Recip Impulse/Velocity Monitor

The Bently Nevada™ 3500/70M Recip Impulse Velocity Monitor is a 4-channel device used as part of the reciprocating compressor solutions package to monitor compressor crankcase and crosshead vibration. The monitor accepts input from seismic transducers, conditions the signal to derive vibration measurements, and compares the conditioned signals with user-programmable alarms.

You can program each channel using the 3500 Rack Configuration Software to perform the following functions:

l Impulse Acceleration

l Acceleration 2

l Recip Velocity

l Low Frequency Recip Velocity

The primary purpose of the 3500/70M Recip Impulse Velocity Monitor is to provide the following:

l Machinery protection for reciprocating compressors by continuously comparing monitored parameters against configured alarm setpoints to drive alarms

l Essential reciprocating compressor 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.

Manufacturer : Bently Nevada

Part Number : 3500/70-01-00

Recip Impulse/Velocity Monitor

3500/70-AXX-BXX

A: I/O Option : 01 = Prox/Velom I/O Module with Internal Terminations

B: Agency Approval Option : 00 = None

Weight : 0.91 kg (2.0 lb.)

Inputs

Signal Accepts from 1 to 4 proximity probe signals.

Input impedance

10 kΩ acceleration input

>1 MΩ velocity input

Special inhibit Contact closure

5 Vdc @ 390µA typical

Power consumption 7.7 watts, nominal

Sensitivity

Impulse acceleration

0.51 – 11.72 mV/(m/s2)

5 – 115 mV/g

Acceleration 2

0.51 – 11.72 mV/(m/s2)

5 – 115 mV/g

Recip velocity 3.54 – 22.64 mV/(mm/s)

90 – 575 mV/(in/s)

Low Frequency Recip velocity

3.54 – 22.64 mV/(mm/s)

90 – 575 mV/(in/s)

Front Panel LEDs

OK LED

Indicates when the
3500/70M Recip Impulse
Velocity Monitor is operating
properly.

TX/RX LED

Indicates when the
3500/70M Recip Impulse
Velocity Monitor is
communicating with other
modules in the 3500 rack.

Bypass LED

Indicates when the
3500/70M Recip Impulse
Velocity Monitor is in Bypass
Mode.

Voltage -22 Vdc minimum

Current

40 mA maximum

15 mA maximum on startup
to guarantee no fold back

Output
impedance

20 Ω typical operating

1000 Ω typical under fold
back conditions

Protection Foldback current

15.4 to 24.9 mA

Front Panel Buffered Outputs

Buffered
Transducer
Outputs

The front of each monitor
has one coaxial connector
for each channel.

Output
Impedance 550 Ω typical

Protection Each connector is shortcircuit protected.

Recorder Outputs

Recorder

+4 to +20 mA proportional to
monitor full-scale.

Selects one static data value
from each channel to be
used for that channel’s
recorder value.

Voltage
compliance +12 Vdc maximum

Load
resistance 600 Ω maximum

Resolution 0.3662 µA maximum

Update rate <100 millisecond

Accuracy

Within ±0.05 mA.

±0.14 mA over temperature
range.

Impulse Acceleration
Accuracy

Within ± 0.33% of full-scale

typical,

± 1% maximum

Exclusive of filters

Band start 0 to 359°

1° resolution

Band duration 1 to 360°

1° resolution

Frequency Response

Bias filter

-3 dB at 0.01 Hz

1-pole

Low-Pass

Not OK filter

-3 dB at 2400 Hz

1-pole

Low-Pass

Static values Smoothing filter

8-revolution average value

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

Acceleration 2

Accuracy

Within ± 0.33% of full-scale

typical

± 1% maximum

Exclusive of filters

Frequency Response

Bias filter

-3 dB at 0.01 Hz

1-pole

Low-Pass

Not OK filter

-3 dB at 2400 Hz

1-pole

Low-Pass

Peak static

values

-3 dB at 0.3 Hz

1-pole

Low-Pass

RMS static

values

-3 dB at 0.1 Hz

1-pole

Low-Pass

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

Recip Velocity

Accuracy

Within ± 0.33% of full-scale

typical

± 1% maximum

Exclusive of filters

Velomitor

Additional accuracy

degradation occurs when

full scale signal levels are

low:

Full Scale 0-0.5: ±3% typical

Full Scale 0-1.0: ±2% typical

Full Scale 0-2.0: ±1% typical

Frequency Response

Bias filter

-3 dB at 0.01 Hz

1-pole

Low-Pass

Not OK filter

-3 dB at 2400 Hz

1-pole

Low-Pass

Integration

filter

-3 db at 0.34 Hz

1-pole

Low-Pass

RMS static

values

-3 dB at 0.1 Hz

1-pole

Low-Pass

Peak static

values

-3 dB at 0.3 Hz

1-pole

Low-Pass

1X & 2X Vector

Filter

Constant Q filter with

bandwidth = ±3% running

speed

Q = 16.7

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

Low Frequency Recip Velocity

Accuracy

Within ± 0.33% of full-scale

typical

± 1% maximum

Exclusive of filters

Velomitor

Additional accuracy

degradation occurs when

full scale signal levels are

low:

Full Scale 0-0.5: ±3% typical

Full Scale 0-1.0: ±2% typical

Full Scale 0-2.0: ±1% typical

Frequency Response

Bias filter

-3 dB at 0.01 Hz

1-pole

Low-Pass

Not OK filter

-3 dB at 2400 Hz

1-pole

Low-Pass

Integration

filter

-3 db at 0.34 Hz

1-pole

Low-Pass

RMS static

values

-3 dB at 0.1 Hz

1-pole

Low-Pass

Peak static

values

-3 dB at 0.3 Hz

1-pole

Low-Pass

1X & 2X Vector

Filter

Constant Q filter with

bandwidth = ±3% running

speed

Q = 16.7

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

Rack Space Requirements

Monitor 1 full-height front slot

I/O Modules 1 full-height rear slot

Physical

Monitor Module (Main Board)

Dimensions

(Height x Width x

Depth)

241.3 mm x 24.4 mm x

241.8 mm

(9.50 in x 0.96 in x 9.52 in)

Weight 0.91 kg (2.0 lb)

I/O Modules (non-barrier)

Dimensions

(Height x Width x

Depth)

241.3 mm x 24.4 mm x 99.1

mm

(9.50 in x 0.96 in x 3.90 in)

Weight 0.20 kg (0.44 lb)

I/O Modules (barrier)

Dimensions

(Height x Width x

Depth)

241.3 mm x 24.4 mm x

163.1 mm

(9.50 in x 0.96 in x 6.42 in)

Weight 0.46 kg (1.01 lb)

Barrier Parameters

The following parameters apply to CSA-NRTL/C

and CENELEC approvals.

Proximitor Barrier

Circuit

Parameters

Vmax (PWR) = 26.80

V (SIG) = 14.05 V

Imax (PWR) = 112.8 mA

(SIG) = 2.82 mA

Rmin (PWR) = 237.6 Ω

(SIG) = 4985 Ω

Channel

Parameters

(Entity)

Vmax = 28.0 V

Imax = 115.62 mA

Rmin (PWR) = 237.6 Ω

(SIG) = 4985 Ω

Seismic Barrier

Circuit

Parameters

Vmax (PWR) = 27.25 V

Imax (PWR) = 91.8 mA

Rmin (PWR) = 297 Ω

Channel

Parameters

(Entity)

Vmax = 27.25 V

Imax = 91.8 mA

Rmin (PWR) = 297 Ω

Environmental Limits

Operating

Temperature

When used with Internal /

External Termination

Proximitor / Seismic I/O

Module:

-30°C to +65°C

(-22°F to +149°F)

When used with Proximitor /
Seismic Internal Barrier I/O
Module (Internal
Termination)
0°C to +65°C
(32°F to +149°F)
Storage
Temperature
-40°C to +85°C
(-40°F to +185°F)
Humidity 95%
Non-condensing