

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/Velosity 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:

I Impulse Acceleration

I Acceleration 2

I Recip Velocity

I Low Frequency Recip Velocity

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

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

I 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/Velosity 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 μ A maximum

Update rate <100 millisecond

Accuracy

Within ± 0.05 mA.

± 0.14 mA over temperature

range.

Impulse Acceleration

Accuracy

Within $\pm 0.33\%$ of full-scale
typical,
 $\pm 1\%$ 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 $\pm 0.33\%$ of full-scale
typical
 $\pm 1\%$ 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 $\pm 0.33\%$ of full-scale
typical
 $\pm 1\%$ maximum
Exclusive of filters
Velomitor
Additional accuracy
degradation occurs when
full scale signal levels are
low:
Full Scale 0-0.5: $\pm 3\%$ typical
Full Scale 0-1.0: $\pm 2\%$ typical
Full Scale 0-2.0: $\pm 1\%$ 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 = $\pm 3\%$ 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 $\pm 0.33\%$ 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

$V_{max} (PWR) = 26.80$

$V (SIG) = 14.05 V$

$I_{max} (PWR) = 112.8 mA$

$(SIG) = 2.82 mA$

$R_{min} (PWR) = 237.6 \Omega$

$(SIG) = 4985 \Omega$

Channel

Parameters

(Entity)

$V_{max} = 28.0 V$

$I_{max} = 115.62 mA$

$R_{min} (PWR) = 237.6 \Omega$

$(SIG) = 4985 \Omega$

Seismic Barrier

Circuit

Parameters

$V_{max} (PWR) = 27.25 V$

$I_{max} (PWR) = 91.8 mA$

$R_{min} (PWR) = 297 \Omega$

Channel

Parameters

(Entity)

$V_{max} = 27.25 V$

$I_{max} = 91.8 mA$

$R_{min} (PWR) = 297 \Omega$

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 Proximito /
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

