

# 3500/44M Aeroderivative GT Vibration Monitor

## Datasheet

**Cordant™**

143441 Rev. W



## Description

The Bently Nevada™ 3500/44M Aeroderivative GT Vibration Monitor is a four-channel instrument designed for aeroderivative gas turbine applications. It:

- Continuously monitors machinery by comparing monitored parameters against configured alarm setpoints to drive alarms
- Communicates essential machine information for both operations and maintenance personnel

The 3500/44M's Aero GT I/O modules interface to Velomitor sensors and accelerometers through Bently Nevada interface modules. The monitor uses the Prox/Velom I/O to interface to our .

Using the 3500 Rack Configuration Software, you can configure the 3500/44M Aeroderivative GT Vibration Monitor for the following filter options:

- Signal Integration
- 1X vibration tracking
- Band-pass vibration

The 3500/44M Aeroderivative GT Vibration Monitor accepts input from two separate Keyphasor signals, allowing each channel pair to use a different tracking filter.

You can configure multimode channels to have up to eight sets of alarm parameters including alert and danger setpoints and alarm time delays. Each set may be configured for a specific machine mode.

As the machine changes modes, the monitor can switch to a specific set using contacts on multimode I/O modules or software commands through a communications gateway.



**Baker Hughes**

## Specifications

### Inputs

|                   |                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| Signal            | Accepts 1 to 4 signals from interface modules (part numbers 86517 and 86497), velomitors and accelerometers |
| Power consumption | 7.7 Watts, typical                                                                                          |

### Input Impedance

|                                             |                                                                  |
|---------------------------------------------|------------------------------------------------------------------|
| Aero GT I/O                                 | Greater than 95 k $\Omega$ (Proximitors and acceleration inputs) |
| Prox/Velom I/O and Multimode Prox/Velom I/O | 10 k $\Omega$ for Prox/Accel<br>3.5 M $\Omega$ for Velomitor     |

### Sensitivity

|                                              |                                                                                                                                                                                                             |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aeroderivative                               | 3.94 mV/(mm/s) (100mV/(in/s)) or<br>5.71 mV/(mm/s) (145mV/(in/s))                                                                                                                                           |
| Aeroderivative2 and Multimode Aeroderivative | 3.94 mV/(mm/s) (100mV/(in/s)),<br>5.71 mV/(mm/s) (145mV/(in/s)),<br>10.19 mV/(m/s <sup>2</sup> ) (100 mV/g),<br>2.55 mV/(m/s <sup>2</sup> ) (25 mV/g)<br><b>or</b><br>1.02 mV/(m/s <sup>2</sup> ) (10 mV/g) |

## Outputs

### Front Panel LEDs

|                                     |                                                                                                                                                                                             |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OK LED                              | Indicates when the 3500/44M Aeroderivative GT Vibration Monitor is operating properly.                                                                                                      |
| TX/RX LED                           | Indicates when the 3500/44M Aeroderivative GT Vibration Monitor is communicating with other modules in the 3500 Rack.                                                                       |
| Bypass LED                          | Indicates when the 3500/44M Aeroderivative GT Vibration Monitor is in Bypass Mode.                                                                                                          |
| Buffered Transducer Outputs         | The front of each monitor has one coaxial connector for each channel.<br><br>Each connector is short-circuit protected.                                                                     |
| Output Impedance                    | 550 $\Omega$                                                                                                                                                                                |
| Transducer Power Supply             | 23 Vdc nominal at 43 mA max                                                                                                                                                                 |
| Recorder                            | +4 to +20 mA<br>Output is proportional to monitor full-scale.<br><br>One output is provided for each channel.<br><br>Monitor operation is unaffected by short circuits on recorder outputs. |
| Voltage Compliance (current output) | 0 to +12 Vdc range across load<br>Load resistance is 0 to 600 $\Omega$ .                                                                                                                    |
| Resolution                          | 0.3662 $\mu$ A per bit<br>$\pm$ 0.25% error at room temperature<br><br>$\pm$ 0.7% error over temperature range<br><br>Update rate 100 ms or less                                            |

## Signal Conditioning



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

### Aeroderivative

|                                        |                                                                                                                        |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Accuracy                               | Within $\pm 0.33\%$ of full-scale typical<br>$\pm 1\%$ maximum<br>Exclusive of filters                                 |
| <b>Frequency Response</b>              |                                                                                                                        |
| Direct signal                          | 4 Hz to 30 kHz, -3 dB                                                                                                  |
| <b>Direct Signal - Bandpass Filter</b> |                                                                                                                        |
| Low-pass corner                        | 200 Hz (-3 dB)                                                                                                         |
| Low-pass rolloff                       | 10-pole<br>200 dB per decade<br>60 dB per octave                                                                       |
| High-pass corner                       | 25, 75 or 100 Hz (-3 dB)                                                                                               |
| High-pass rolloff                      | 10-pole<br>200 dB per decade<br>60 dB per octave                                                                       |
| <b>Direct Signal - Tracking Filter</b> |                                                                                                                        |
| Tracking filter                        | Valid for machine speeds of 60 to 240,000 cpm                                                                          |
| Constant Q                             | User-configurable by selecting one of 22 normal operating speeds from 2,400 to 18,000 RPM and by bandwidth of 3 or 5Hz |
| Rolloff                                | 6-pole<br>120 dB per decade<br>36 dB per octave                                                                        |

### Aeroderivative 2 and Multimode Aeroderivative

|                                        |                                                                                        |
|----------------------------------------|----------------------------------------------------------------------------------------|
| Accuracy                               | Within $\pm 0.33\%$ of full-scale typical<br>$\pm 1\%$ maximum<br>Exclusive of filters |
| <b>Frequency Response</b>              |                                                                                        |
| <b>Direct Signal - Bandpass Filter</b> |                                                                                        |
| Non-integrated velocity                | 4 Hz to 5500 Hz (-3 dB)                                                                |
| Integrated velocity                    | 18 Hz to 5500 Hz (-3 dB)                                                               |
| Non-integrated acceleration            | 4 Hz to 30,000 Hz (-3 dB)                                                              |
| Integrated acceleration                | 18 Hz to 14,500 Hz (-3 dB)                                                             |
| Bias low-pass filter                   | 0.01 Hz (-3 dB)                                                                        |
| <b>Bandpass Filter</b>                 |                                                                                        |
| Low-pass cutoff frequency              | Configurable between 100 Hz and 5500 Hz (-3 dB)                                        |
| Low-pass rolloff                       | 8-pole<br>160 dB per decade<br>48 dB per octave                                        |
| High-pass cutoff frequency             | Configurable between 10 Hz and 1000 Hz (-3 dB)                                         |
| High-pass rolloff                      | 8-pole<br>160 dB per decade<br>48 dB per octave                                        |

## Tracking Filter

|            |                                                                                                       |
|------------|-------------------------------------------------------------------------------------------------------|
|            | User configurable                                                                                     |
| Constant Q | You can select one of 35 normal operating speeds from 2,400 to 30,000 RPM and bandwidth of 3 or 5 Hz. |
| Rolloff    | 6-pole<br>120 dB per decade<br>36 dB per octave                                                       |

## Alarms

|                          |                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm setpoints          | <p>You can set Alert levels for various values measured by the monitor and Danger setpoints for up to two of the values measured by the monitor using configuration software.</p> <p>Alarms are adjustable from 0 to 100% of full-scale for each measured value except when the full-scale range exceeds the range of the transducer. In this case, the range of the transducer will limit the setpoint.</p> |
| Alarm accuracy           | Within 0.13% of the desired value                                                                                                                                                                                                                                                                                                                                                                            |
| Aeroderivative           | Direct<br>1X Amplitude<br>Bandpass                                                                                                                                                                                                                                                                                                                                                                           |
| Aeroderivative2          | Direct<br>Bandpass<br>1X Amplitude<br>1X Phase Lag                                                                                                                                                                                                                                                                                                                                                           |
| Multimode Aeroderivative | Direct<br>Direct-B<br>Bandpass<br>Bandpass-B<br>1X Ampl<br>1X Ampl-B<br>1X Phase Lag                                                                                                                                                                                                                                                                                                                         |

|                   |                                                                                                                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm Time Delays | <p>For Aeroderivative channels, you can set one alert and one danger delay for each channel.</p> <p>For Aeroderivative2 and Multimode Aeroderivative channels, you can set delays for each measured value having alarm setpoints.</p> |
| Alert             | From 1 to 60 seconds in 1 second intervals                                                                                                                                                                                            |
| Danger            | 0.1 seconds or from 1 to 60 seconds in 1 second intervals                                                                                                                                                                             |

## Measured Values

Measured values are measurements used to monitor the machine. The 3500/44M Aeroderivative GT Vibration Monitor provides the following measured values.

|                          |                                                                                              |
|--------------------------|----------------------------------------------------------------------------------------------|
| Aeroderivative           | Direct<br>1X Amplitude<br>Bandpass                                                           |
| Aeroderivative2          | Direct<br>Bandpass<br>Bias<br>1X Amplitude<br>1X Phase Lag                                   |
| Multimode Aeroderivative | Direct<br>Direct-B<br>Bandpass<br>Bandpass-B<br>1X Ampl<br>1X Ampl-B<br>1X Phase Lag<br>Mode |

Physical

| Monitor Module (Main Board)            |                                                                |
|----------------------------------------|----------------------------------------------------------------|
| Dimensions<br>(Height x Width x Depth) | 241.3 mm x 24.4 mm x 241.8 mm<br>(9.50 in x 0.96 in x 9.52 in) |
| Weight                                 | 0.91 kg (2.0 lb)                                               |
| I/O Modules                            |                                                                |
| Dimensions<br>(Height x Width x Depth) | 241.3 mm x 24.4 mm x 99.1 mm<br>(9.50 in x 0.96 in x 3.90 in)  |
| Weight                                 | 0.45 kg (1.0 lb)                                               |

Rack Space Requirements

|                |                          |
|----------------|--------------------------|
| Monitor Module | 1 full-height front slot |
| I/O Modules    | 1 full-height rear slot  |

## Compliance and Certifications

### FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

### EMC

European Community Directive:

EMC Directive 2014/30/EU

Standards:

EN 61000-6-2; Immunity for  
Industrial Environments  
EN 61000-6-4; Emissions for  
Industrial Environments

### Electrical Safety

European Community Directive:

LV Directive 2014/35/EU

Standards:

EN 61010-1

### RoHS

European Community Directive:

RoHS Directive 2011/65/EU

### China RoHS

Cables associated with the product(s) mentioned in this datasheet have an EFUP designation of 15 years, in accordance with SJ/T 11364-2024.



### Maritime

DNV GL rules for classification – Ships, offshore units, and high speed and light craft

ABS Rules for Condition of Classification, Part 1

- Steel Vessels Rules
- Offshore Units and Structures

## Hazardous Area Approvals



For the detailed listing of country and product-specific approvals, refer to the [Approvals Quick Reference Guide \(108M1756\)](#).

For additional technical documentation, please log in to [bntechsupport.com](http://bntechsupport.com) and access the Bently Nevada Media Library.

When used with I/O module ordering options with internal barriers



II 3(1) G

Ex nA nC ic [ia Ga] IIC T4 Gc;  
Ex ec nC ic [ia Ga] IIC T4 Gc;  
T4 @ Ta= -20°C to +65°C (-4°F to +149°F)  
When installed per drawing 138547.

## cNRTLus

|                                                                      |                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| When used with I/O module ordering options without internal barriers | Class I, Zone 2: AEx/Ex nA nC ic IIC T4 Gc;<br>Class I, Zone 2: AEx/Ex ec nC ic IIC T4 Gc;<br>Class I, Division 2, Groups A, B, C, and D;<br><br>T4 @ Ta= -20°C to +65°C (-4°F to +149°F)<br>When installed per drawing 149243 or 149244.                                    |
| When used with I/O module ordering options with internal barriers    | Class I, Zone 2: AEx/Ex nA nC ic [ia Ga] IIC T4 Gc;<br>Class I, Zone 2: AEx/Ex ec nC ic [ia Ga] IIC T4 Gc;<br>Class I, Division 2, Groups A, B, C, and D (W/ IS Output for Division 1)<br><br>T4 @ Ta= -20°C to +65°C (-4°F to +149°F)<br>When installed per drawing 138547. |

## ATEX/IECEx

|                                                                      |                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| When used with I/O module ordering options without internal barriers | <br><br>II 3 G<br><br>Ex nA nC ic IIC T4 Gc;<br>Ex ec nC ic IIC T4 Gc;<br><br>T4 @ Ta= -20°C to +65°C (-4°F to +149°F)<br>When installed per drawing 149243 or 149244. |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Ordering Information



For the detailed listing of country and product-specific approvals, refer to the [Approvals Quick Reference Guide \(108M1756\)](#).

For additional technical documentation, please log in to [bntechsupport.com](http://bntechsupport.com) and access the Bently Nevada Media Library.

## Aeroderivative Monitor 3500/44 - AA - BB

### A: I/O Module Type

|           |                                                            |
|-----------|------------------------------------------------------------|
| <b>01</b> | Aero GT I/O Module with Internal Terminations              |
| <b>02</b> | Aero GT I/O Module with External Terminations              |
| <b>05</b> | Prox/Velom I/O Module with Internal Terminations           |
| <b>06</b> | Prox/Velom I/O Module with External Terminations           |
| <b>07</b> | Multimode Prox/Velom I/O Module with Internal Terminations |
| <b>08</b> | Multimode Prox/Velom I/O Module with External Terminations |

### B: Hazardous Area Approval Option

|           |                                  |
|-----------|----------------------------------|
| <b>00</b> | None                             |
| <b>01</b> | cNRTLus (Class 1, Division 2)    |
| <b>02</b> | ATEX/IECEX/CSA (Class 1, Zone 2) |

## External Termination Blocks

|           |                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------|
| 125808-03 | Aeroderivative ET Block<br>Euro Style Connectors                                                       |
| 125808-08 | Prox/Velom External<br>Termination Block<br>Euro Style connectors                                      |
| 125808-11 | Multimode Prox/Velom<br>External Termination Block<br>Euro Style connectors                            |
| 125808-13 | Multimode Recorder Output<br>and Mode Input External<br>Termination Block<br>Euro Style connectors     |
| 128702-01 | Recorder External<br>Termination Block<br>Euro Style connectors                                        |
| 128015-03 | Aeroderivative External<br>Termination Block<br>Terminal Strip Connectors                              |
| 128015-08 | Prox/Velom External<br>Termination Block<br>Terminal Strip Connectors                                  |
| 128015-11 | Multimode Prox/Velom<br>External Termination Block<br>Terminal Strip connectors                        |
| 128015-13 | Multimode Recorder Output<br>and Mode Input External<br>Termination Block<br>Terminal Strip connectors |
| 128710-01 | Recorder External ET Block<br>Terminal Strip connectors                                                |

## Cables

### 3500 Transducer (XDCR) to External Termination (ET) Block Cable 129525 - AAAA - BB

#### A: I/O Cable Length

|             |                        |
|-------------|------------------------|
| <b>0005</b> | 5 feet (1.5 metres)    |
| <b>0007</b> | 7 feet (2.1 metres)    |
| <b>0010</b> | 10 feet (3.0 metres)   |
| <b>0025</b> | 25 feet (7.6 metres)   |
| <b>0050</b> | 50 feet (15.2 metres)  |
| <b>0100</b> | 100 feet (30.5 metres) |

#### B: Assembly Instructions

|           |               |
|-----------|---------------|
| <b>01</b> | Not Assembled |
| <b>02</b> | Assembled     |

### 3500 Recorder Output to External Termination (ET) Block Cable 129529 - AAAA - BB

#### A: I/O Cable Length

|             |                        |
|-------------|------------------------|
| <b>0005</b> | 5 feet (1.5 metres)    |
| <b>0007</b> | 7 feet (2.1 metres)    |
| <b>0010</b> | 10 feet (3.0 metres)   |
| <b>0025</b> | 25 feet (7.6 metres)   |
| <b>0050</b> | 50 feet (15.2 metres)  |
| <b>0100</b> | 100 feet (30.5 metres) |

#### B: Assembly Instructions

|           |               |
|-----------|---------------|
| <b>01</b> | Not Assembled |
| <b>02</b> | Assembled     |

## Spares

|           |                                                                                                                  |
|-----------|------------------------------------------------------------------------------------------------------------------|
| 176449-03 | 3500/44M<br>Aeroderivative GT<br>Vibration Monitor                                                               |
| 143490-01 | 3500/44M<br>Aeroderivative GT<br>Vibration Monitor<br>User Guide                                                 |
| 126599-01 | Aero GT I/O Module<br>Internal Terminations                                                                      |
| 140471-01 | Prox/Velom I/O Module<br>with Internal<br>Terminations                                                           |
| 140482-01 | Prox/Velom I/O Module<br>with External<br>Terminations                                                           |
| 169459-01 | Multimode Prox/Velom<br>I/O Module with<br>Internal Terminations                                                 |
| 169459-02 | Multimode Prox/Velom<br>I/O Module with<br>External Terminations                                                 |
| 00580434  | Euro Style connector<br>header<br>8 pin<br>Green<br><br>For use on I/O modules<br>with internal<br>terminations  |
| 00580432  | Euro Style connector<br>header<br>10 pin<br>Green<br><br>For use on I/O modules<br>with internal<br>terminations |
| 00561941  | Prox/Velom and<br>Multimode Prox/Velom<br>I/O Module ten-pin<br>connector shunt                                  |

|          |                                                                             |
|----------|-----------------------------------------------------------------------------|
| 166M2389 | Connector Header<br>Push-in-Spring Type<br>(Alternative for PN<br>00580434) |
| 166M2388 | Connector Header<br>Push-in-Spring Type<br>(Alternative for PN<br>00580432) |