

3500/50E Tachometer Module

Bently Nevada* Asset Condition Monitoring



Description

The 3500/50E Tachometer Module is a 2-channel module that accepts input from proximity probes or magnetic pickups (except as noted) to determine shaft rotative speed, rotor acceleration, or rotor direction, compares these measurements against user-programmable alarm setpoints, and generates alarms when these setpoints are violated. The 3500/50E Tachometer Module is programmed using the 3500 Rack Configuration Software and can be configured with four different options:

1. Speed Monitoring, Setpoint Alarming, and Speed Band Alarming.
2. Speed Monitoring, Setpoint Alarming, and Zero Speed Notification.
3. Speed Monitoring, Setpoint Alarming, and Rotor Acceleration Alarming.
4. Speed Monitoring, Setpoint Alarming, and Reverse Rotation Notification.

The 3500/50E also has a peak hold feature that stores the highest speed, highest reverse speed, or number of reverse rotations (depending on channel type selected) that the machine has reached. These peak values can be reset by the user.

The 3500 ENCORE series is available in two configurations:

3500 ENCORE Rack Upgrade: In this configuration the 3500/50E is installed as part of a 3500 ENCORE upgrade of a 3300 Monitor System where the 3300 chassis and IO remain in place. When used in a rack upgrade the tachometer monitors use the pre-existing 3300 series IO Module and the relays located on the 3300 series IO.

3500 ENCORE System: In this configuration there will be a 3500 ENCORE System Rack with 3500 ENCORE tachometer IO modules. Monitors in 3500 ENCORE Systems use a logic programmable Relay Module to drive alarm relays.

Application Note

Bently Nevada* Tachometer Modules are not designed for use independently as, or as a component of, a speed control or overspeed protection system.

Bently Nevada Tachometer Modules do not provide protective redundancy nor the response speed needed for reliable operation as a speed control or overspeed protection system.

Where provided, the analog proportional output is suitable for data logging, chart recording, or display purposes only. Also, where provided, speed alert setpoints are suitable for annunciation purposes only.

Magnetic pickups may not be used for the reverse rotation option because these transducers do not provide a clean edge for the detection circuit during low speeds. This could lead to false indications of rotation direction.

Magnetic pickups are not recommended for the zero speed option because these transducers do not provide a clean edge for the detection circuit during low speeds.

Failure to take the above items into account constitutes a misuse of the product and may result in property damage and/or bodily injury.

Note: The Bently Nevada product line does supply an Overspeed Protection System for the 3500 System. Consult Specification and Ordering Information part number 141539-01.



Specifications and Ordering Information
Part Number 287824-01
Rev. A (08/13)



Specifications

Inputs

Signal:

Each Tachometer Module accepts up to 2 transducer signals from proximity probe transducers or magnetic pickups. The input signal range is +10.0 V to -24.0 V. Signals exceeding this range are limited internally by the module.

Input

Impedance:

20 k Ω (standard);

Power

Consumption:

4.75 watts, typical.

Transducers:

Accepts 1-2 proximity transducer signals.

Note: Restrictions may apply to magnetic pickups. Refer to the Application Note (page 1).

Outputs

Front Panel

LEDs

OK LED

Indicates when the 3500/50E is operating properly.

DANGER LED

Indicates the 3500/50E has detected a danger condition and is driving the danger relay.

ALERT LED

Indicates the 3500/50E has detected an Alert condition and is driving the alert relay.

Bypass LED

Indicates when the 3500/50E is in Bypass Mode.

Buffered

Transducer

Outputs:

The front of each module has one coaxial connector for each channel. Each connector is short circuit and ESD protected. Buffered outputs are available at the I/O module.

Output

Impedance:

500 Ω .

Relay Contacts

The 3500/50E will drive the relays for the various 3300 SIRM options.

Transducer

Power Supply:

24 Vdc, 40 mA maximum per channel.

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 .

Resolution

0.3662 μ A per bit

\pm 0.25% error at room temperature

\pm 0.7% error over temperature range.

Update rate 100 ms or less.

Signal Conditioning

Specified at +25 $^{\circ}$ C (+77 $^{\circ}$ F).

Speed Input:

The 3500E Tachometer will support 0.0039 - 255 events per revolution with a maximum full scale range of 99,999 rpm and a maximum input frequency of 20 kHz. Minimum input frequency for proximity transducers is 0.0167 Hz (1 rpm for

1 event/revolution) and for passive magnetic pickups is 3.3 Hz.

RPM Accuracy:

Less than 100 rpm = ± 0.1 rpm,
100 to 10,000 rpm = ± 1 rpm,
10,000 to 99,999 rpm = $\pm 0.01\%$ of true shaft speed.

RPM/Min Accuracy:

± 20 rpm/min.

Transducer Conditioning

Auto Threshold:

Use for any input above 0.0167 Hz (1 rpm for 1 event/revolution). Minimum signal amplitude for triggering is 1 volt peak-to-peak.

Manual Threshold:

User selectable from +9.5 Vdc to -23.5 Vdc. Minimum signal amplitude for triggering is 500 millivolts peak-to-peak.

Hysteresis:

User selectable from 0.2 to 2.5 volts.

Alarms

Alarm Setpoints:

Alarm 1 levels (setpoints) can be set for each value measured by the Tachometer. In addition, Alarm 2 setpoints can be set for any two of the values measured by the Tachometer. All alarm setpoints are set using software configuration. Alarms are adjustable and can normally be set from 0 to 100% of full scale for each measured value.

Alarm Time

Delays:

Alarm delays can be programmed using software, and can be set as follows:

Alarm 1:

From 1 to 60 seconds in 1 second intervals.

Alarm 2:

From 1 to 60 seconds in 0.1 second intervals.

Static Values

Static values are speed measurements used to monitor a machine. The Tachometer Module returns the following static values:

Rotor Speed

Speed¹,
Speed Band,
GAP², and
Peak Speed²

Rotor Acceleration:

Rotor Acceleration¹,
Speed,
GAP², and
Peak Speed²

Zero Speed:

Zero Speed¹,
Speed,
GAP², and
Peak Speed²

Reverse Rotation:

Reverse Speed¹,
Reverse Peak Speed,
Speed (forward),
GAP², and
Num Reverse Rotations

¹ The primary value for the channel. This value can be included in contiguous registers in the Communications Gateway Module.

² This static value is for display and setup purposes only. No alarming is provided.

Environmental Limits

Operating Temperature:

When used with Internal/External Termination I/O Module:

-20 °C to +65 °C (-4 °F to +150 °F)

Storage

Temperature:

-30 °C to +85 °C (-22 °F to +185 °F).

Humidity:

95%, non-condensing.

Compliance and Certifications

EMC

European Community Directives:
EMC Directive 2004/108/EC

Standards:

EN 61326-1:2006
Emissions and Immunity
EN 61000-6-2 (2005) +C1
EN 61000-3-2 (2006) +A1, +A2
EN 61000-3-3 (2008)
EN 61000-6-4 (2007) +A1

Electrical Safety

Standards:

EN 61010-1: 2010

European Community Directive:
2006/95/EC Low Voltage

For further certification and approvals information please visit the following website:

www.ge-mcs.com/bently

Hazardous Area Approvals

North American:

Class I, Div 2.

Groups A, B, C, D.

T4 @ Ta = -20 °C to +65 °C.

(-4 °F to +150 °F).

Note: When installed as a retrofit monitor for a 3300 System, hazardous area approval is valid only if the existing 3300 System has the same type of approval.

For further certification and approvals information please visit the following website:

<http://www.ge-mcs.com/en/bently-nevada.html>

Physical

Monitor Module (Main Board)

Dimensions (Height x Width x Depth)

228 mm (8.97 in) x 50 mm (1.98 in) x
289mm (11.39 in)

Weight

1.25 kg (2.75 lb)

Rack Space Requirements

Monitor Module

1 full-height front slot.

Ordering Information

General

The 3500/42E Module requires the following (or later) firmware, and software revisions:

3500/01 Software – Version 4.0

Use of the 3500/50E in an ENCORE system rack requires the following (or later) firmware , and software revisions:

3500/01 Software - Version 4.6

Ordering Options

Tachometer

3500/50E-AXX-BXX

A: I/O Module Type

00 none, uses currently installed
3300 SIM or SIRM

01 Tachometer I/O Module

B: Agency Approval Option

00 None

01 CSA/NRTL/C (Class 1, Div 2)

Note: For installation as a retrofit monitor for a 3300 System, Agency Approval Option B01 should be ordered only if the existing 3300 System has the same type of approvals. Installation of a retrofit monitor in a system without approvals will invalidate the approvals of the monitor.

Specifications and Ordering Information
Part Number 287824-01
Rev. A (08/13)

Spares**287199****285693-01**

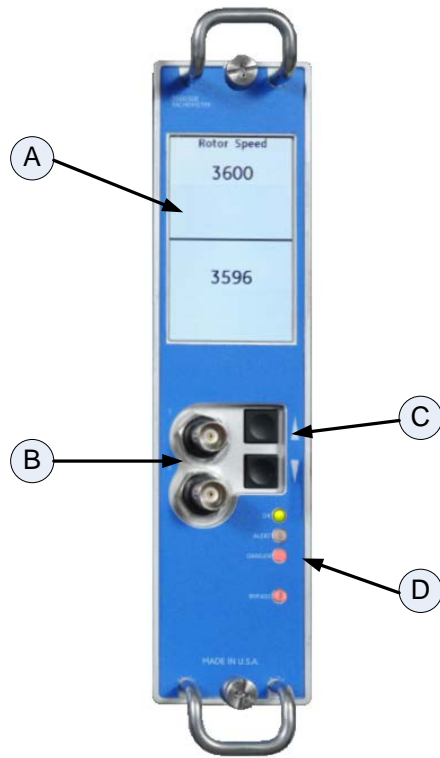
Jumper, 18 Pin, 2 x 9

3500/50E Tachometer

100M2930-01

3500/50E Tachometer I/O

287548-013500/50E Monitor Manual



- A. Color LCD Display
- B. Buffered Transducer Outputs
- C. Display Control Switches
- D. Status LEDs

Figure 1: Front view of the Tachometer



Figure 2: Front view of the Tachometer I/O module

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1631 Bently Parkway South, Minden, Nevada USA 89423

Phone: 775.782.3611 Fax: 775.215.2873

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