

# 3500/25 Enhanced Keyphasor Module

## Datasheet

**Cordant™**

141532 Rev. Y



## Description

The Bently Nevada™ 3500/25 Enhanced Keyphasor Module is a half-height, two-channel module used to provide Keyphasor signals to the monitor modules in a 3500 rack. The module receives input signals from proximity probes or magnetic pickups and converts the signals to digital Keyphasor signals that indicate when the Keyphasor mark on the shaft coincides with the Keyphasor transducer. The 3500 Machinery Protection System can accept up to four Keyphasor signals for normal configuration and up to eight Keyphasor signals in a paired configuration.



Keyphasor signal is a once-per-turn or multiple-event-per-turn pulse from a rotating shaft or gear used to provide a precise timing measurement. This allows 3500 monitor modules and external diagnostic equipment to measure shaft rotative speed and vector parameters such as 1X vibration amplitude and phase.

The Enhanced Keyphasor Module is an improved 3500 system module. It offers expanded Keyphasor signal processing capabilities over the previous design while maintaining complete downward-compatibility in terms of form, fit and function with existing Keyphasor modules for use in legacy systems. The Keyphasor module, PWA 125792-01, is completely replaced by the updated 149369-01 module.

When a system Keyphasor input is required for Triple Modular Redundant (TMR) applications, the 3500 system should employ two Keyphasor modules. In this configuration, the modules work in parallel to provide both a primary and secondary Keyphasor signal to the other modules in the rack.



**Baker Hughes** 

A system with more than four Keyphasor inputs may use a paired configuration provided there are no more than four primary Keyphasor input signals. A paired configuration requires two consecutive monitoring positions in either the upper/lower or both half-slot positions. Four Keyphasor modules will accept four primary and four backup input channels and provide four output channels (one per module). A configuration of two paired and one non-paired (three Keyphasor modules total) is also possible. In such a configuration, the user may configure the one non-paired Keyphasor (order either two 2-channel or one 1-channel and one 2-channel option)

The Isolated Keyphasor I/O module is designed for applications where the Keyphasor signals are tied in parallel to multiple devices and require isolation from other systems, such as a control system. The Isolated I/O module was created specifically for Magnetic Pickup applications but is compatible with and will provide isolation for Proximity\* applications as long as an external power supply is provided.

The intent of this I/O module was primarily to measure shaft speed and not phase. The module can provide phase measurements, but this I/O introduces a slightly higher phase shift than the Non-Isolated I/O version. Figure 1 shows the amount of phase shift that the Isolated I/O modules will add at different machine speeds.

Enhanced product features include generation of once-per-turn event signals from multi-event-per-turn inputs, field-upgradeable firmware, and asset management data reporting.

## Specifications

### Inputs

|                   |                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Consumption | 3.2 Watts typical                                                                                                                                                                                                                                                                                                                                                                       |
| Signal            | Each Keyphasor Module accepts up to two transducer signals from proximity probe transducers or magnetic pickups. The input signal range is +0.8 V to -21.0 V (Nonisolated I/O modules) or +5V to -11V (Isolated I/O modules). Signals exceeding this range are limited internally by the module. Passive magnetic pickups require a shaft rotative speed greater than 200 rpm (3.3 Hz). |
| Input Impedance   | 21.8 k $\Omega$ minimum                                                                                                                                                                                                                                                                                                                                                                 |

### Signal Conditioning

|                                           |                                                                                                                                                                                |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Speed/<br>Frequency<br>Signal<br>Ranges   | Input range of 1 to 1,200,000 cpm (0.017 to 20 kHz). Supports multiple events per revolution to a maximum of 20 kHz.<br><br>Output range of 1 to 99,999 cpm (0.017 to 1667 Hz) |
| Speed/<br>Frequency<br>Signal<br>Accuracy | Specified at +25°C (+77°F).                                                                                                                                                    |
| Non-processed<br>Signals                  | 0.017 to 100 Hz ... $\pm 1$ cpm<br>101 to 500 Hz ... $\pm 8$ cpm<br>501 to 20 kHz ... $\pm 1\%$ of cpm                                                                         |
| Processed<br>Signals                      | 0.017 to 60 Hz ... $\pm 1$ cpm<br>61 to 150 Hz ... $\pm 8$ cpm<br>151 to 20 kHz ... $\pm 1\%$ of cpm                                                                           |

### Transducer Conditioning

|                  |                                                                                                                                                                                      |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Auto Threshold   | Minimum signal amplitude for triggering is 2 volts peak to peak and minimum frequency is 120 rpm (2 Hz).                                                                             |
| Manual Threshold | Use for any input above 0.017 Hz (1 rpm for 1 event per revolution). User-selectable from 0 to -20 volts dc. Minimum signal amplitude for triggering is 500 millivolts peak to peak. |
| Hysteresis       | User-selectable from 0.2 to 2.5 Volts.                                                                                                                                               |

### Outputs

|                                   |                                                                                                                                                                                                    |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Buffered Keyphasor Signals        | Two buffered Keyphasor outputs are available at the front of the rack via coaxial connectors. Two buffered Keyphasor outputs are also available at the back of the rack via Euro Style connectors. |
| Output Impedance                  | 504 $\Omega$ maximum buffered output impedance.                                                                                                                                                    |
| Keyphasor Transducer Power Supply | -24 Vdc, 40 mA maximum per channel.                                                                                                                                                                |

#### Front Panel LEDs

|           |                                                                                            |
|-----------|--------------------------------------------------------------------------------------------|
| OK LED    | Indicates when a fault has been detected in the Keyphasor Module.                          |
| TX/RX LED | Indicates when the Keyphasor Module is communicating with the Rack Interface Module (RIM). |

## Environmental Limits

|                       |                                                                                                                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature | <p>-30°C to +65°C (-22°F to +150°F) when used with Keyphasor I/O Module other than the Internal Barrier version.</p> <p>0°C to +65°C (32°F to +150°F) when used with Keyphasor Internal Barrier I/O Module (Internal Termination).</p> |
| Storage Temperature   | -40°C to +85°C (-40°F to +185°F)                                                                                                                                                                                                       |
| Humidity              | 95%, non-condensing                                                                                                                                                                                                                    |

## Physical

| Main Module                         |                                                                  |
|-------------------------------------|------------------------------------------------------------------|
| Dimensions (Height x Width x Depth) | 119.9 mm x 24.4 mm x 256.5 mm<br>(4.72 in x 0.96 in x 10.10 in). |
| Weight                              | 0.34 kg (0.76 lbs.)                                              |
| I/O Module                          |                                                                  |
| Dimensions (Height x Width x Depth) | 241.3 mm x 24.4 mm x 103.1 mm<br>(9.50 in x 0.96 in x 4.06 in)   |
| Weight                              | 0.46 kg (1.01 lbs.)                                              |

## Rack Space Requirement

|             |                                                                                                                                                                                                                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main Module | <p>1 half-height front slot</p> <p>The half-height main modules require a special mounting adapter for mounting in the full-height slots. The user can place the main modules in any one of the 14 available slots. Each rack may have no more than two main modules, one in a top half-slot and one in a bottom half-slot.</p> |
| I/O Modules | 1 full-height rear slot                                                                                                                                                                                                                                                                                                         |

## External Termination Blocks

|           |                                                                  |
|-----------|------------------------------------------------------------------|
| 128718-01 | Keyphasor External Termination Block (Euro Style Connectors)     |
| 128726-01 | Keyphasor External Termination Block (Terminal Strip Connectors) |

## Cables

### 3500 Keyphasor (KPH) Signal to External Termination (ET) Block Cable

#### 129530-AAAA-BB

| A:Cable Length           |                        |
|--------------------------|------------------------|
| 0005                     | 5 feet (1.5 metres)    |
| 0007                     | 7 feet (2.1 metres)    |
| 0010                     | 10 feet (3 metres)     |
| 0025                     | 25 feet (7.5 metres)   |
| 0050                     | 50 feet (15 metres)    |
| 0100                     | 100 feet (30.5 metres) |
| B: Assembly Instructions |                        |
| 01                       | Not assembled          |
| 02                       | Assembled              |

## Spares

|           |                           |
|-----------|---------------------------|
| 149369-01 | Enhanced Keyphasor Module |
|-----------|---------------------------|



This module may be ordered as a direct plug-in replacement for Keyphasor Module 125792-01.

|           |                                              |
|-----------|----------------------------------------------|
| 125800-01 | Keyphasor I/O Module (Internal Terminations) |
| 126648-01 | Keyphasor I/O Module (External Terminations) |

|                                            |                                                                                                |
|--------------------------------------------|------------------------------------------------------------------------------------------------|
| 125800-02                                  | Isolated Keyphasor I/O Module (Internal Terminations) (Designed for use with Magnetic Pickups) |
| 126648-02                                  | Isolated Keyphasor I/O Module (External Terminations) (Designed for use with Magnetic Pickups) |
| 135473-01                                  | Keyphasor I/O Module (Internal Barriers and Internal Terminations.                             |
| 04425545                                   | Grounding Wrist Strap (single use)                                                             |
| 00580438                                   | Connector Header, Internal Termination, 4-Position, Green                                      |
| 166M2391                                   | Connector Header, Push-in-Spring Type (alternative for PN 00580438)                            |
| 00502133                                   | Connector Header, Internal Termination, 12-Position, Blue                                      |
| 129770                                     | Keyphasor Module User Guide                                                                    |
| <b>Half-height Blank Monitor Cover Kit</b> |                                                                                                |
| 131151-01                                  | Half-height Blank Front Panel Cover (qty 1, includes screws)                                   |

## Half-height Card Adapter

|           |                                |
|-----------|--------------------------------|
| 125388-01 | Half-height Chassis            |
| 125565-01 | Card Guide                     |
| 04300111  | Assembly Screws (Order Qty. 3) |