

# 3500/23E Transient Data Interface

Bently Nevada\* Asset Condition Monitoring

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## Description

The 3500/23E Transient Data Interface (TDI) is the interface between the 3500 ENCORE monitoring system and GE's System 1\* condition monitoring and diagnostic software. The TDI combines the capability of a System Monitor with the data collection capability of a communication processor.

The TDI operates in the System Monitor slot of a 3500 ENCORE rack in conjunction with the vibration monitors (3500/42E) to continuously collect steady state and transient waveform data and pass this data through an Ethernet link to the host software. Static data capture is standard with the TDI, however using an optional Channel Enabling Disk will allow the TDI to capture dynamic or transient data as well. The TDI features improvements in several areas over previous communication processors and incorporates the Communication Processor function within the 3500 ENCORE rack.

The TDI module provides extensive communication capabilities of all rack monitored values and statuses for integration with process control and other automation systems using serial (RS232/RS422/RS485) communications capabilities.

Every 3500 ENCORE rack requires one TDI, which always occupies Slot 1 (next to the power supplies).



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Specifications and Ordering Information  
Part Number 287826-01  
Rev. B (01/14)

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## Specifications

### Inputs

#### Power Consumption

9 Watts

#### Data

##### Front panel:

Ethernet:

2 Ports: 10Base-T or 100Base-TX  
Ethernet, autosensing

##### Using installed 3300 Power Input Module (PIM) I/O:

Serial Communication

115.2 kbaud maximum RS232 or  
RS422 serial communications

1200 baud minimum rate  
supported.

Ethernet

10Base-T Ethernet

##### Using Network I/O:

Serial Communication

115.2 kbaud maximum RS232 or  
RS422 serial communications

1200 baud minimum rate  
supported.

Ethernet

2 Ports: 10Base-T or 100Base-TX  
Ethernet, autosensing.

##### Using Dynamic I/O:

Serial Communication

115.2 kbaud maximum RS232 or  
RS422 serial communications

1200 baud minimum rate  
supported.

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### Outputs

#### Front Panel LEDs

##### Rack OK LED:

Indicates when the 3500 ENCORE  
System is operating properly

##### TDI OK LED:

Indicates when the 3500/23E is  
operating properly

##### TM LED:

Indicates when the 3500 ENCORE  
System is in Trip Multiply mode.

##### CONFIG OK LED:

Indicates that the 3500 ENCORE  
System has a valid configuration.

##### I/O Module OK Relay:

Relay to indicate when the 3500  
ENCORE System is operating  
normally or when a fault has been  
detected within the rack. User  
can select either an "OPEN" or  
"CLOSED" contact to annunciate a  
NOT OK condition. This relay  
always operates as "Normally  
Energized".

##### Using installed 3300 Power Input OK Relay:

Specifications in 3300/12 or  
3300/14 data sheet

##### Using Network or Dynamic I/O OK Relay:

##### Max switched Voltage:

dc: 300V

ac: 250V

##### Max switched current:

dc: 5A

ac: 6A

##### Max switched VA:

dc: 150VA

ac: 1500VA

##### Min switched Current:

dc: 100mA / 12V

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## Controls

### Front Panel

#### **Rack reset button:**

Clears latched alarms and Timed OK Channel Defeat in the rack.

Performs same function as "Rack Reset" contact on I/O module.

#### **Display Control switches:**

Used to control all of the displays of the monitors in the rack.

**Note:** The Display Control switches are provided to support a future enhancement to the 3500/23E.

#### **Home:**

Used to return all of the monitor displays to their primary screen.

#### **Page Up:**

Moves all displays to their next screen.

#### **Page Down:**

Moves all displays to their previous screen.

#### **View Set Points Tag Names:**

Used to change the displays to show the setpoints and tag names for the channels being monitored.

#### **Configuration Keylock:**

Used to place 3500 ENCORE System in either "RUN" mode or "PROGRAM" mode. RUN mode allows for normal operation of the rack and locks out configuration changes. PROGRAM mode allows for normal operation of the rack and also allows for local or remote rack configuration. The key can be removed from the rack in either position, allowing the switch to remain in either the

RUN or PROGRAM position. Locking the switch in the RUN position allows you to restrict unauthorized rack reconfiguration. Locking the switch in PROGRAM position allows remote reconfiguration of a rack at any time.

### I/O Module System Contacts

#### **Trip Multiply:**

*Description:*

Used to place 3500 rack in Trip Multiply.

*Maximum Current:*

<1 mAdc, Dry Contact to Common

#### **Alarm Inhibit:**

*Description:*

Used to inhibit all alarms in the 3500 rack.

*Maximum Current:*

<1 mAdc, Dry Contact to Common

#### **Rack Reset:**

*Description:*

Used to clear latched alarms and Timed OK Channel Defeat.

*Maximum Current:*

<1 mAdc, Dry Contact to Common

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## Data Collection

### Keyphasor\* Inputs:

- Supports the four 3500 system Keyphasor signals.
- Supports multiple events per revolution speed inputs up to 20 kHz.

### Startup / Coastdown Data

- Data collected from speed and time intervals.
- Increasing and decreasing speed interval independently programmable.
- Initiation of transient data collection based on detecting the machine speed within one of two programmable windows.
- The number of transient events that can be collected is only limited by the available memory in the module.

### Alarm Data Collection

- Pre- and post-alarm data.
- 1 second of static values collected for 10 minutes before the event and 1 minute after the event.
- 100 ms static values collected for 20 seconds before the event and 10 seconds after the event.
- 2.5 minutes of waveform data at 10-second intervals before the alarm and 1 minute collected at 10-second intervals after the alarm.

## Static Values Data

- TDI will collect the static values including the values measured by the monitors.
- TDI provides four nX static values for each point. Amplitude and phase are returned for each of the values.

## Waveform Sampling

- Collection of waveforms for 48 channels.
- DC-coupled waveforms.
- Simultaneous Synchronous and Asynchronous data sampled during all operational modes
- User-configurable Synchronous waveform sampling rates:
  - 1024 samples/rev for 2 revolutions,
  - 512 samples/rev for 4 revolutions,
  - 256 samples/rev for 8 revolutions,
  - 128 samples/rev for 16 revolutions,
  - 64 samples/rev for 32 revolutions,
  - 32 samples/rev for 64 revolutions, and
  - 16 samples/rev for 128 revolutions.

- Asynchronous data sampled to support an 800-line spectrum at the following frequency spans:
  - 10 Hz,
  - 20 Hz,
  - 50 Hz,
  - 100 Hz,
  - 200 Hz,
  - 500 Hz,
  - 1000 Hz,
  - 2000 Hz,
  - 5000 Hz,
  - 10 kHz,
  - 20 kHz, and
  - 30 kHz.
- Asynchronous data is anti-alias filtered.
- Channel Pairs for providing Orbit or synchronous full spectrum presentations can be split among multiple monitors. For asynchronous full spectrums the channels must be within a monitor channel pair (30 kHz frequency span data will not be phase correlated between channel pairs).

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## Communications

### Protocols

#### *BN Host Protocol:*

Communication with 3500 Configuration Software

#### *BN TDI Protocol:*

Communication with GE's System 1\* Asset Management and Data Collection Software.

#### *Modbus®:*

Based on AEG Modicon PI-MBUS-300 Reference Manual. Uses Remote Terminal Unit (RTU) transmission mode. Modbus is a registered trademark of Modicon, Inc.

### Front Panel

#### *Communications:*

Ethernet, 10Base-T, and 100Base-TX. Conforms to IEEE802.3.

#### *Protocol Supported:*

BN Host Protocol, BN TDI Protocol, and Modbus® using Ethernet TCP/IP.

#### *Connection:*

2 ports: RJ-45 (telephone jack style) for 10Base-T/100Base-TX Ethernet cabling.

#### *Cable Length:*

100 metres (328 feet) maximum.

### Rear Panel

#### *TDI Host Connector*

#### *Communications:*

Ethernet, 10Base-T

#### *Protocol Supported:*

BN Host Protocol, BN TDI Protocol, and Modbus® using Ethernet TCP/IP.

#### *Connection:*

9 Pin DSub

#### *Cable Length:*

100 metres (328 feet) maximum.

## SDI Host RS-232

95%, non-condensing

### Communications:

RS232

### Protocol Supported:

BN Host Protocol, Modbus®.

### Baud Rate:

115.2 kbaud maximum

### Cable Length:

30 meters (100 feet) maximum

### Connector:

9-pin DSUB

## SDI Host RS-422 & SDI Rack

### Communications:

RS422 & RS485

### Protocol Supported:

Modbus®.

### Baud Rate:

115.2 kbaud maximum

### Cable Length:

1220 meters (4000 feet) maximum

### Connector:

9-pin DSUB

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## Environmental Limits

### Operating Temperature:

-20°C to +65°C (-4°F to +149°F)

For operation above +55°C the unit requires a minimum of 40 linear feet per minute of air moving across the footprint of the system directly below the Power Supply and TDI main card.

### Storage Temperature:

-40 °C to +85 °C (-40 °F to +185 °F)

### Humidity:

### Battery Life

### Powered TDI:

38 years @ 50°C (122 °F)

### Un-powered TDI:

12 years @ 50°C (122 °F)

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## 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](http://www.ge-mcs.com/bently)

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## 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

### TDI Module

#### Dimensions

(Height x Width  
x Depth)

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

#### Weight

1.45kg (3.2 lb)

#### Rack Space

#### Requirements

#### TDI Module

1 full-height front slot.

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## Ordering Information

### Transient Data Interface

#### 3500/23E-AXX-BXX-CXX

##### A: Communications Type

**00** TDI

##### B: I/O Module Type

**00** None (3300 Retrofit)

**01** Network I/O

##### C: 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 C01 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.

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## Spares

### 285690-01

3500/23E TDI

### 287545-01

3500/23E Monitor Manual

### 324146-01

Network I/O module

### 100M2608-01

Dynamic data I/O (provided to support a future enhancement to the 3500/23E).

### 287199

Jumper, 18 Pin, 2 x 9

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## Ethernet Cables

### Standard 10 Base-T/100 Base-TX Shielded Category 5 Cable with RJ-45 connectors (solid conductor)

#### 138131-AXXX

##### A: Cable Length:

<b>006</b>	6 feet (1.8 m)
<b>010</b>	10 feet (3.0 m)
<b>025</b>	25 feet (7.6 m)
<b>040</b>	40 feet (12.2 m)
<b>050</b>	50 feet (15.2 m)
<b>075</b>	75 feet (22.9 m)
<b>085</b>	85 feet (25.9 m)
<b>100</b>	100 feet (30.5 m)
<b>120</b>	120 feet (36.6 m)
<b>150</b>	150 feet (45.7 m)
<b>200</b>	200 feet (61.0 m)
<b>250</b>	250 feet (76.2 m)
<b>320</b>	320 feet (97.5 m)

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## Ethernet 9 Pin Dsub to RJ-45

### 167887-AXXX-BXX

##### A: Cable Length

<b>003</b>	3 feet (1 metres)
<b>010</b>	6 feet (2 metres)
<b>010</b>	10 feet (3 metres)
<b>025</b>	25 feet (7.5 metres)
<b>050</b>	50 feet (15 metres)
<b>100</b>	100 feet (30 metres)
<b>250</b>	250 feet (76 metres)
<b>320</b>	320 feet (100 metres)

##### B: Assembly Option

<b>01</b>	PVC Insulated – Non Plenum
<b>02</b>	PVC Insulated – Plenum

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## Ethernet 9 Pin Dsub to RJ-45 Crossover

### 167974-AXXX-BXX

##### A: Cable Length

<b>003</b>	3 feet (1 metres)
<b>010</b>	6 feet (2 metres)
<b>010</b>	10 feet (3 metres)
<b>025</b>	25 feet (7.5 metres)

Specifications and Ordering Information  
Part Number 287826-01  
Rev. B (01/14)

- 0 5 0 50 feet (15 metres)
- 1 0 0 100 feet (30 metres)
- 2 5 0 250 feet (76 metres)
- 3 2 0 320 feet (100 metres)

**B: Assembly Option**

- 0 1 PVC Insulated - Non Plenum
- 0 2 PVC Insulated - Plenum

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**Serial Data Interface Cables**

**RS232 Cable, Honeywell PLCG to 3500/23E  
89968 - AXXXX-BXX-CXX**

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**Option Descriptions**

**A: Cable Length**

- 0 0 1 0 10 feet (3 meters)
- 0 0 2 5 25 feet (7.5 meters)
- 0 0 5 0 50 feet (15 meters)
- 0 1 0 0 100 feet (30.5 meters)

**B: Assembly Instructions**

- 0 1 Not Assembled
- 0 2 Assembled

**C: Protection Option**

- 0 1 No Surge Protection
- 0 2 Surge Protection Provided

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**RS422 Cable, 3500/23E to 3500/23E  
47125-AXXXX-BXX-CXX-DXX**

**A: Cable Length**

- 0 0 1 0 10 feet (3 meters)
- 0 0 2 5 25 feet (7.5 meters)
- 0 0 5 0 50 feet (15 meters)
- 0 1 0 0 100 feet (30 meters)
- 0 2 0 0 200 feet (61 meters)
- 0 2 5 0 250 feet (75 meters)
- 0 5 0 0 500 feet (150 meters)
- 1 0 0 0 1000 feet (305 meters)
- 2 0 0 0 2000 feet (610 meters)†
- 4 0 0 0 4000 feet (1220 meters)†

† Note: Cannot be ordered assembled.

**B: Assembly Instructions**

- 0 1 Not Assembled
- 0 2 Assembled

**C: Insulation Option**

- 0 1 PVC Insulated
- 0 2 Teflon® Insulated

**D: Protection Option**

- 0 1 No Surge Protection
- 0 2 Surge Protection Provided

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**Surge Protector Kit**

**109959-AXX**

(Note: Each communication cable requires one device at each end of the cable).

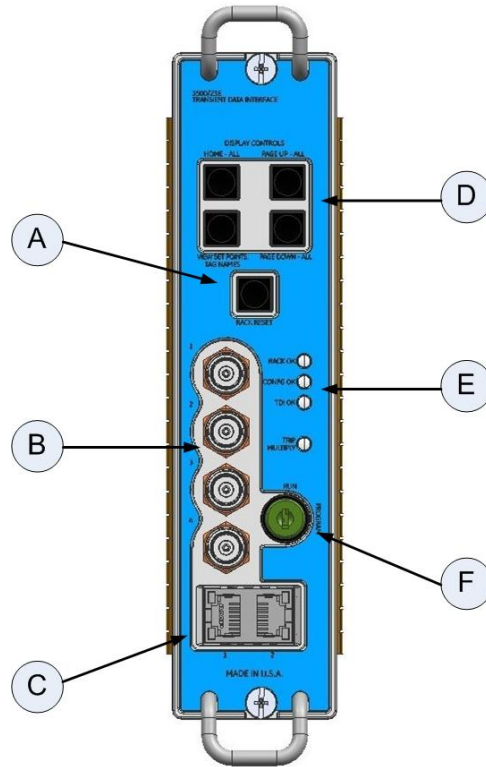
**A: Surge Protector Kit**

- 0 4 For Cable 47125
- 0 9 For Cable 89968



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## Graphs and Figures



- A. Reset Switch
- B. Buffered Transducer Outputs
- C. Ethernet Ports
- D. Display Control Switches
- E. Status LEDs
- F. Keylock (Program / Run)

**Figure 1: Front view of the Proximator\*/Seismic Monitor**

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\* Denotes a trademark of Bently Nevada, Inc., a wholly owned subsidiary of General Electric Company.

Modbus is a registered trademark of Schneider Electric USA, Inc.

Teflon is a registered trademark of Dupont.

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