

# 3300/02 Transient Data embedded (TDe) System Monitor

Bently Nevada™ Asset Condition Monitoring

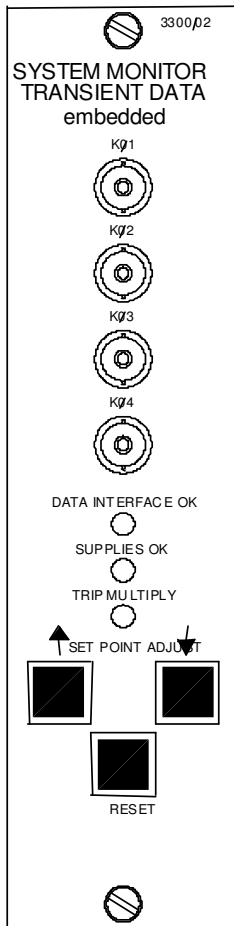
## Description

The 3300/02 TDe System Monitor includes an embedded communications processor for direct interface between 3300 series machinery protection systems and System 1® online condition monitoring software. With no intermediary hardware required, the 3300/02 provides a convenient and lower installed cost solution for online condition monitoring of critical rotating machinery. The 3300/02 TDe includes data acquisition options for transient (machine startup & shut down) and/or steady-state machine operating modes, with data collected simultaneously across all channels in the rack.

The 3300/02 is compatible with later version 3300 systems, which supported Dynamic Data Interface (DDI) systems. No rack hardware or firmware changes are required.

### Warning

A transducer field wiring failure, monitor failure, or loss of primary power can cause loss of machinery protection. This could result in property damage and/or bodily injury. Therefore, we strongly recommend connection of an external (operator control panel mounted) annunciator to the OK Relay terminals.



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## Specifications

### Inputs

#### Power

##### Consumption:

9 watts

#### Keyphasor® Signal:

Accepts up to four proximity probe Keyphasor® signals.

#### Input impedance:

10 k  $\Omega$ .

#### Frequency Range:

60 to 60,000 cpm (rpm).

#### Duty Cycle:

Greater of 1% or 50  $\mu$ s.

#### Amplitude:

0.5 V peak-to-peak minimum.

#### dc Signal Range:

0 to -24 V (VT = -24 Vdc);

0 to -18 V (VT = -18 Vdc).

### Ethernet Communications

#### Baud Rate:

10 MBPS

#### Protocol:

TCP/IP with Bently Nevada proprietary message content.

#### Interface

Interface conforms to ISO/IEC 8802-3 1996 (IEEE 802.3)

#### Cable Length:

100m (328 feet) maximum

#### Connection:

9-pin D style connector

### RS422 Communications

#### Impedance:

4 k  $\Omega$ .

#### Input Threshold:

0.2 V.

#### Baud Rate:

19.2 k baud maximum

#### Output Levels:

High 2.5 V, minimum;

Low 0.5 V, maximum.

#### Distance:

1200 meters (4000 feet) maximum.

### RS232 Communications

#### Impedance:

3 k  $\Omega$  to 7 k  $\Omega$ .

#### Input Levels:

High +3 to +25 V;

Low -3 to -25V.

#### Baud Rate:

19.2 k baud maximum

#### Output Levels:

High +5 V, minimum;

Low -5 V, maximum.

#### Distance:

30 meters (100 feet) maximum.

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### Signal Conditioning – Specified at +25°C (+77°F)

#### 1X, 2X

#### Amplitude:

#### Accuracy:

$\pm$ 1% of Full Scale Maximum

#### Filter Response:

Constant Q filter, Q=9. Stopband begins at  $\pm$ 0.15 times the center frequency. Minimum rejection in stopband is -50db. Filter settles in 19 shaft revolutions (100% settled)

#### 1X, 2X Phase:

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Specifications and Ordering Information  
Part Number 167386-01  
Rev. C (08/07)

**Accuracy:**

±1 degree (100mV minimum amplitude at 60,000 cpm)

**Filter Response:**

Constant Q filter, Q=9. Stopband begins at ±0.15 times the center frequency. Minimum rejection in stopband is -50db. Filter settles in 19 shaft revolutions (100% settled)

**Not 1X:****1X Rejection:**

Constant Q notch filter. Q=3. Stopband begins at 0.97 and 1.03 times the center frequency (1X). Minimum rejection in stopband is 35 db.

**Accuracy:**

± 3% of Full Scale Maximum

**Frequency Range:**

7.2 Hz to 15.8 times speed

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**Keyphasor Signal Conditioning****Speed Accuracy:**

±0.1% of Full Scale (7 Vpp square wave input)

**Minimum Amplitude:**

0.5 V pp (square wave)

**Error Detection:**

Data invalid for changes greater than 12.5% between shaft revolutions.

**Phase Reference:**

Selectable for leading edge of notch or projection.

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**Outputs****Buffered Keyphasor® Outputs:**

Four coaxial connectors on front panel.

**Output Impedance:**

100 Ω.

**Keyphasor® Transducer Power Supply:**

User-programmable for -24 Vdc or -18 Vdc. Voltages are short-circuit protected.

**Indicators:**

Three LEDs on front panel

**Supplies OK:**

ON when all system supply voltages are within tolerance. LEDs behind the slide-away front panel indicate the condition of the various monitored supply voltages. The appropriate Supply voltage LED and the SUPPLIES OK LED on the front panel turn OFF if a voltage is out of tolerance.

**Trip Multiply:**

ON when Trip Multiply function is active.

**Data Interface OK:**

OFF when the TDe hardware is not functioning properly. LEDs behind the slide away front panel indicate the status of the CPU and Sampler modules.

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**System Ok Relay**

One hermetically sealed, normally energized, single-pole double-throw relay is used for annunciation of a NOT OK condition in the monitoring rack and/or a problem with the primary (mains) power to the rack.


**Contact Ratings - Standard:**

5A at 28 Vdc  
5A at 120 Vac, 50/60 Hz  
3A at 220 Vac, 50/60 Hz

## CSA Approval:

5A at 28 Vdc

5A at 120 Vac, 50/60 Hz

 II 3 G

EEx nC[L] IIC

T4 @ Ta = -20°C to +60°C

When installed per document number 132577-01.

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## Controls

### Front Panel:

Two switches control the Up and Down adjustment of monitor alarm setpoints. A third switch controls the alarm RESET function.

### Rear Panel:

Terminals provide connections for Rack Inhibit, Trip Multiply, and Alarm Reset contact closures.

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## Environmental Limits

### Operating Temperature:

0°C to +65°C (+32°F to +150°F).

### Storage Temperature:

-40°C to +85°C (-40°F to +185°F).

### Relative Humidity:

To 95%, noncondensing.

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## CE Mark Directives

### EMC Directive

Certificate of Conformity: 158710

### Low Voltage Directive

Certificate of Conformity: 135300

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## Hazardous Area Approvals

### CSA/NRTL/C

Class I, Div 2

Groups A, B, C, D

T4 @ Ta = +65 °C

*Certification Number*

150368 – 1002151 (LR 26744)

*Certification Number*

BN26744C-55A

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## Physical

### Rack Space Requirements:

One rack position, installs only in position two (next to the Power Supply).

### Weight:

0.9 kg (2.2 lbs.).

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## Data Collection

### Synchronous Waveforms:

#### Sample Rate:

Software selectable

128 samples per revolution (60 to 15,000 cpm)

64 samples per revolution (60 to 30,000 cpm)

32 samples per revolution (60 to 60,000 cpm)

#### Length:

1024 samples.

#### Filter Response:

No anti-alias filters on synchronous path

### Asynchronous Waveforms:

#### Frequency Spans:

Software Selectable – 20, 50, 100, 200, 500, 1000, 2000, 5000, 10k, and 25k Hz

#### Length:

1024 samples

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## ATEX

Specifications and Ordering Information  
Part Number 167386-01  
Rev. C (08/07)

**Filter Response:**

Frequencies outside of the configured frequency span are attenuated by -80 dB minimum.

**Update Rate:**

Static records every 4 seconds. Waveforms every 40 seconds (10:1 ratio). A waveform is taken at the time of the alarm buffer trigger.

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**Data Buffers****Delta Time Buffer:****Capacity:**

320 static records and 32 waveform records.

**Capture Interval:**

Static records every 4 seconds. Waveforms every 40 seconds (10:1 ratio).

**Transient (RPM based) Buffer:****Quantity:**

2 independent buffers

**Capacity:**

320 static records and 32 waveform records. (40 static and 4 waveform time based collect records just prior to buffer trigger, 280 static and 28 waveform records are post-trigger rpm based.)

**RPM capture interval:**

1 to 60,000 rpm.

**Trigger Modes:**

Startup captures data in increasing rpm direction only; Coast-down captures data in both increasing and decreasing directions.

**Alarm Buffer:****Capacity:**

40 static records and 4 waveform records.

**Trigger Modes:**

Alert or danger alarm event in monitor.

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**SDI Data****Protocols:**

Configurable for Allen-Bradley or Modbus® protocols.

**Connection:**

RS422 or RS232 communication link.

**Data:**

Data returned are monitor values plus 1X, 2X, gap and Not 1X static data.

Speed values and status for the four 3300 Keyphasor® Inputs.

**Registers:**

Registers organized both by channel and proportional value type configurations.

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**System Requirements****Software**

Compatible with System 1® version 5.0 with Service Pack 1 or later.

**Rack**

Requires a 3300 rack that is compatible with the 3300/03. Consult the "3300 System Compatibility Guide" BN doc # 104003-01.

**Power Supply**

Requires either the 3300/12 or 3300/14 power supply. Consult the "3300 System Compatibility Guide" BN doc # 104003-01.

## Monitors

Requires 3300 monitors that are compatible with the 3300/03. Consult the "3300 System Compatibility Guide" BN doc # 104003-01.

## Communications

TDe uses 10 Base T Ethernet to communicate between the System 1® DAQ computer and the TDe module. Accessory Media Converter modules are available to extend Ethernet across RS-422 cabling.

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## Ordering Information

### TDe

3300/02 - AXX-BXX-CXX-DXX- EXX-FXX-GXX-HXX-IXX-JXX-  
KXX-LXX-MXX-NXX

#### A: Data Collection Slot 3

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### B: Data Collection Slot 4

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### C: Data Collection Slot 5

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### D: Data Collection Slot 6

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### E: Data Collection Slot 7

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### F: Data Collection Slot 8

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### G: Data Collection Slot 9

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### H: Data Collection Slot 10

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data  
**10** 1 Channel of Transient  
Waveform Data  
**20** 2 Channels of Transient  
Waveform Data

#### I: Data Collection Slot 11

**00** Static Data Only  
**01** 1 Channel of Steady-State  
Waveform Data  
**02** 2 Channels of Steady-State  
Waveform Data

- 1 0 1 Channel of Transient Waveform Data
- 2 0 2 Channels of Transient Waveform Data

**J:** Data Collection Slot 12

- 0 0 Static Data Only
- 0 1 1 Channel of Steady-State Waveform Data
- 0 2 2 Channels of Steady-State Waveform Data
- 1 0 1 Channel of Transient Waveform Data
- 2 0 2 Channels of Transient Waveform Data

**K:** Data Collection Slot 13

- 0 0 Static Data Only
- 0 1 1 Channel of Steady-State Waveform Data
- 0 2 2 Channels of Steady-State Waveform Data
- 1 0 1 Channel of Transient Waveform Data
- 2 0 2 Channels of Transient Waveform Data

**L:** Data Collection Slot 14

- 0 0 Static Data Only
- 0 1 1 Channel of Steady-State Waveform Data
- 0 2 2 Channels of Steady-State Waveform Data
- 1 0 1 Channel of Transient Waveform Data
- 2 0 2 Channels of Transient Waveform Data

**M:** System Extended Warranty

- 0 0 None
- 0 1 Extended Warranty

**N:** Approvals Option

- 0 0 None
- 0 1 CSA/NRTL/C
- 0 2 ATEX self certification

**Note:** ATEX approval requires the monitor rack to be installed in a weatherproof housing.

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## Accessories

### Media Converters

These devices can be used to connect the TDe to an Ethernet network by using existing RS-422 cables. A Host and Remote Media Converter are required each cable run. CSA and ATEX approvals **pending**.

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### Media Converter

**Host**  
167919

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### Media Converter

**Remote**  
167920

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**+24V Power Supply**  
02200794

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### Ethernet Cables

**9 Pin Dsub to RJ-45**  
167887-AXXX-BXX

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**9 Pin Dsub to RJ-45 Crossover**  
167974-AXXX-BXX

**A:** Cable Length

|       |                       |
|-------|-----------------------|
| 0 0 3 | 3 feet (1 metres)     |
| 0 1 0 | 6 feet (2 metres)     |
| 0 1 0 | 10 feet (3 metres)    |
| 0 2 5 | 25 feet (7.5 metres)  |
| 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 3300/02 to Allen-Bradley 1770-KF2 Communication Module or Honeywell PLC® Gateway or Data Highway**  
89968 - AXXXX-BXX-CXX

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**RS232 3300/02 to Allen-Bradley 1771-KE or 1785-KE Communications Module**  
89969 - AXXXX-BXX-CXX

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**RS422 3300/02 to Allen-Bradley 1770 KF2 Communications Module**  
89970 - AXXXX-BXX-CXX

**A:** Cable Length

|         |                      |
|---------|----------------------|
| 0 0 1 0 | 10 feet (3 metres)   |
| 0 0 2 5 | 25 feet (7.5 metres) |
| 0 0 5 0 | 50 feet (15 metres)  |

- B:** Assembly Option
- 0 1 0 0** 100 feet (30 metres)
  - 0 1** Not Assembled
  - 0 2** Assembled
- C:** Protection Option
- 0 0** No Surge Protection
  - 0 1** Surge Protection provided

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**RS422 3300/02 to 3300/02 or 3300/03**

**47125 - AXXXX-BXX-CXX-DXX**

- A:** Cable Length
- 0 0 1 0** 10 feet (3 metres)
  - 0 0 2 5** 25 feet (7.5 metres)
  - 0 0 5 0** 50 feet (15 metres)
  - 0 1 0 0** 100 feet (30 metres)
  - 0 2 0 0** 200 feet (61 metres)
  - 0 2 5 0** 250 feet (76 metres)
  - 0 5 0 0** 500 feet (152 metres)
  - 1 0 0 0** 1000 feet (305 metres)
  - 2 0 0 0** 2000 feet (610 metres)\*
  - 4 0 0 0** 4000 feet (1220 metres)\*
- \*Note: Can not be ordered assembled.
- B:** Assembly Option
- 0 1** Not Assembled
  - 0 2** Assembled
- C:** Insulation Option
- 0 1** PVC Insulated
  - 0 2** Teflon® Insulated
- D:** Protection Option
- 0 0** No Surge Protection
  - 0 1** Surge Protection provided

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**RS422 3300/02 to 3300/01**

**(3300/01 electrically closest to host computer)**

**89966 - AXXXX-BXX-CXX**

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**RS422 3300/01 to 3300/02**

**(3300/02 electrically closest to host computer)**

**89967 - AXXXX-BXX-CXX**

- A:** Cable Length
- 0 0 1 0** 10 feet (3 metres)
  - 0 0 2 5** 25 feet (7.5 metres)
  - 0 0 5 0** 50 feet (15 metres)
  - 0 1 0 0** 100 feet (30 metres)
  - 0 2 5 0** 250 feet (76 metres)
  - 0 5 0 0** 500 feet (152 metres)
- B:** Assembly Option
- 0 1** Not Assembled

- C:** Surge Protection
- 0 2** Assembled
  - 0 0** No Surge Protection
  - 0 1** Surge Protection Provided

**Surge Protector Kit**

(for existing installations, not required when surge protection option is specified with new cables).

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**109959-AXX**

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

- A:** Surge Protector Kit
- 0 1** TDM Comm Processor end of cables 81650 and 78205
  - 0 2** Host Computer end of TDM cable 78205; both Host and Comm Processor end of DDI cable 89950; Comm Processor end of DDI cable 89949.
  - 0 3** Host Computer end of TDM cable 81650 and DDI cable 89949.
  - 0 4** Comm Processor end of cable 78206 (TDM Host to First Comm Processor), 103629 (TDM2 Host to first Comm Processor) and 132632 or 132633 (DM2000 Host to First Comm Processor); both ends of cable 47125 (DDM/PDM/ TDM Comm Processor to Comm Processor); 3300/02 rack end of cables 89966, 89967, and 89970.
  - 0 5** Host Computer end of cable 78206 (TDM Host to First Comm Processor).
  - 0 6** Host Computer end of cable 103629 (TDM2 Host to first Comm Processor).
  - 0 7** Host Computer end of cables 132632 and 132633 (DM2000 Host to First Comm Processor)
  - 0 8** Allen-Bradley Communications Module end of cable 89969 (3300/02 to Allen-Bradley 1771-KE).
  - 0 9** 3300/02 rack end of cables 89968 (3300/02 to Allen-Bradley 1770-KF2) and 89969



(3300/03 to Allen-Bradley  
1771-KE).

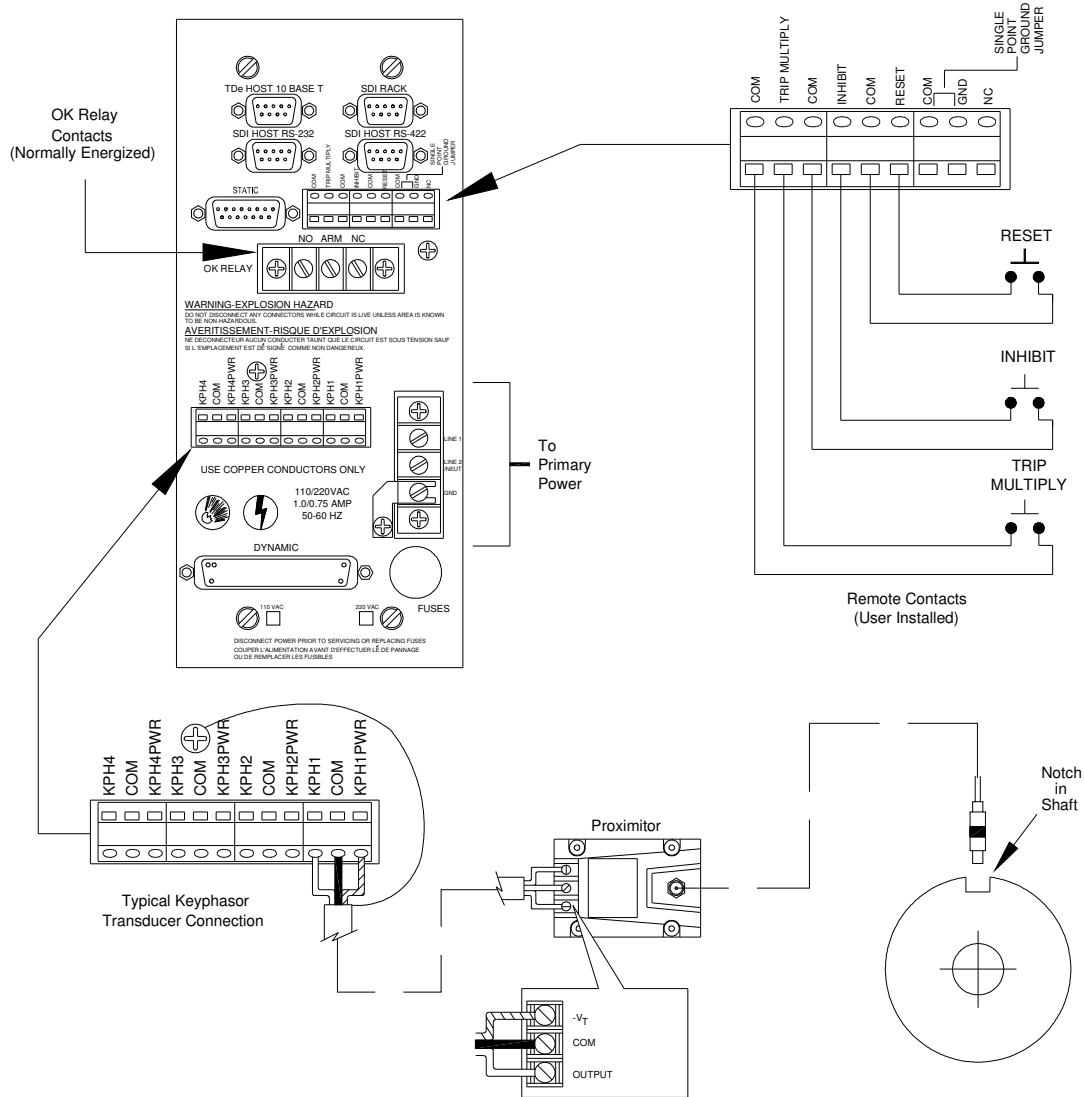
**10** 3300/01 rack end of cables  
89966 (3300/02 to 3300/01)  
and, 89967 (3300/02 to

3300/01) and on AB Comm  
Module end of cable 89970  
(3300/02 to Allen-Bradley  
Comm Module).

**11** Allen-Bradley Communication  
Module end of cable 89968  
(3300/02 to Allen-Bradley  
1770-KF2).

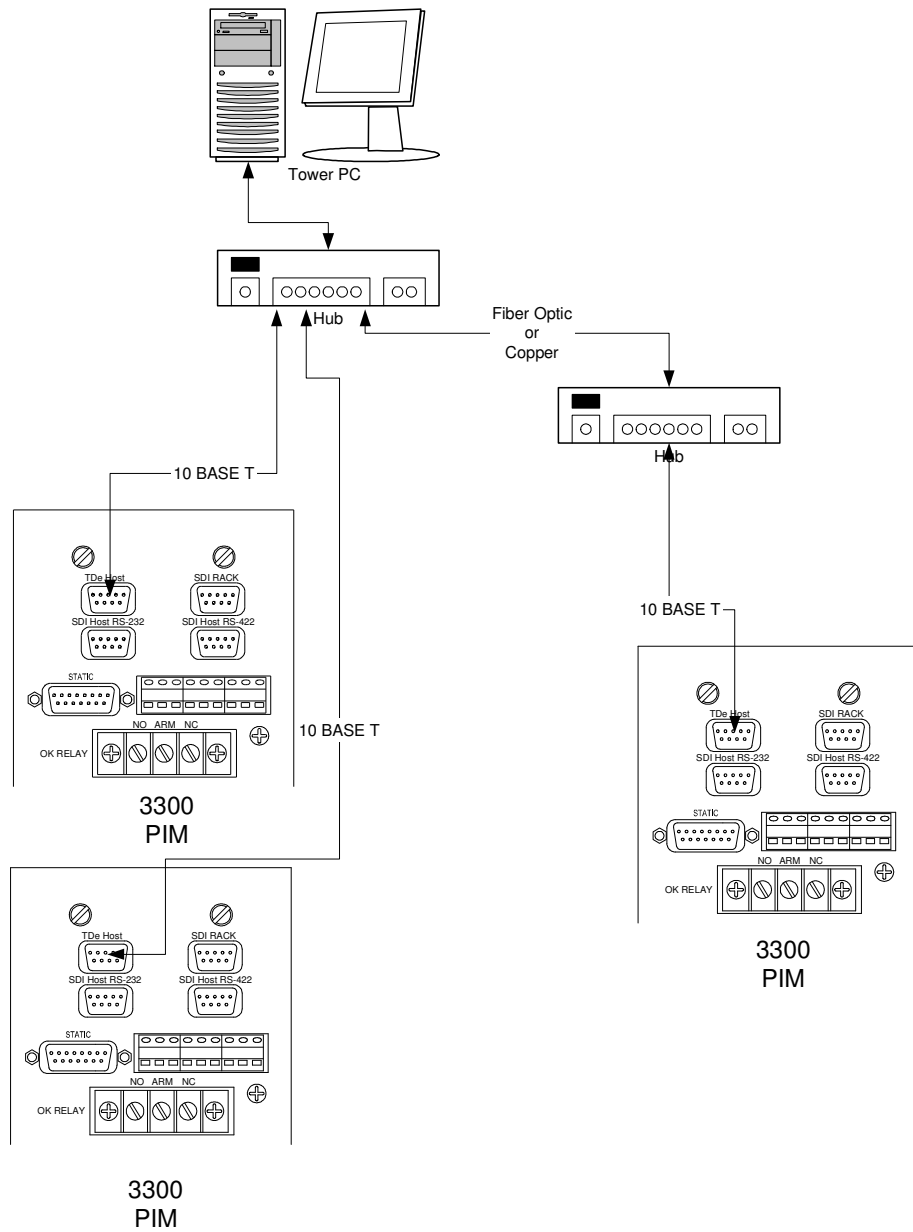
# Field Wiring Diagrams

3300/02 System Monitor

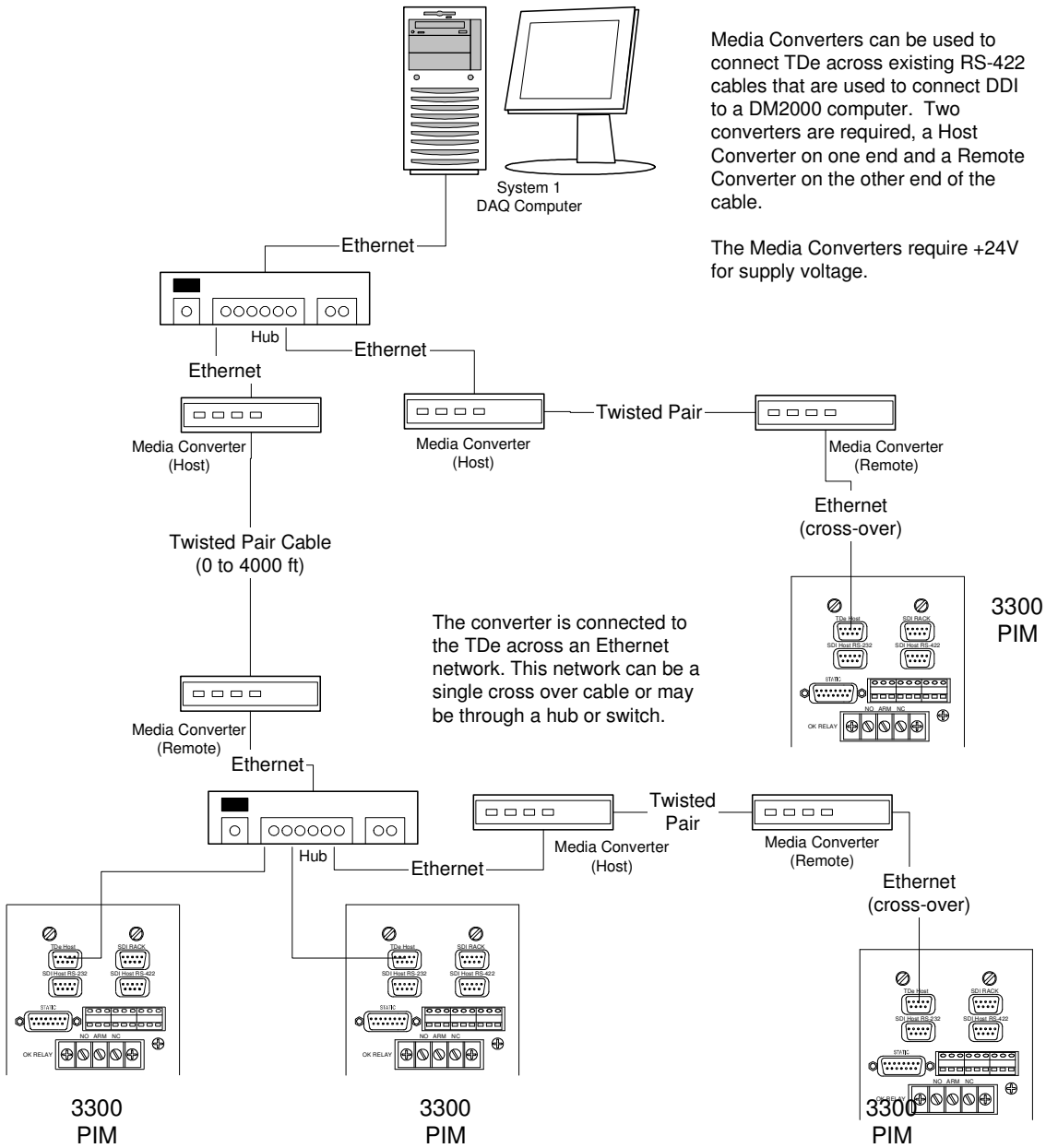


Field wiring diagram for 3300/02 System Monitor  
(ac Power Supply without internal barriers)

# Network Wiring Examples



## Connecting TDe Across RS-422 Cabling



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