

*VIBRATION MONITORING  
FOR THE  
**PAPER**  
INDUSTRY*



**WHEN RELIABILITY MATTERS  
CONNECT TO CONFIDENCE**

Predictive maintenance is essential to the paper and pulp manufacturing process to ensure product efficacy, operational uptime, and prevent catastrophic failure. Due to the intense heat and caustic processes involved in paper manufacturing, machine fires are a common occurrence in the absence of predictive maintenance.

Condition monitoring programs can be used to monitor the vibration of the bearings throughout the plant and improve reliability of the overall process.

### Commonly monitored machines

within a paper mill include:

- ▶ Calendars
- ▶ Chippers
- ▶ Dryers
- ▶ Drying Cylinders
- ▶ Fans
- ▶ Gearboxes
- ▶ Motors
- ▶ Compressors
- ▶ Paper Machine Rolls
- ▶ Couch Rolls
- ▶ Pumps
- ▶ Winders

**Common faults** like misguided felts, breaks, and fires can be caused by defects in rolling element bearings resulting from:

- ▶ Improper Lubrication
- ▶ Misalignment
- ▶ Uneven Wear
- ▶ Overloading



Due to the often hot, wet, and chemically challenging environment present in paper and pulp processing, CTC recommends **permanent mounting of vibration sensors** to the machine. CTC offers a variety of robust and reliable hardware tailored to meet the needs and environments of each industrial process within the paper industry.

## FORMING / PRESSING AND CALENDAR SECTIONS

Environmental Challenges:



high  
moisture



caustic  
chemicals

### Recommended Products

**Standard Accelerometer Offerings** for environments up to 250 °F (121 °C):

#### AC102 & AC104



Multipurpose  
Accelerometer,  
2 Pin Connector,  
100 mV/g,  
±10%  
±80 g, Dynamic Range

#### AC292 & AC294



Premium Compact  
Accelerometer,  
2 Pin Connector,  
100 mV/g,  
±5%  
±80 g, Dynamic Range

#### UEB332 & UEA332



Dynamic Vibration IEPE  
Ultrasound Sensor,  
1/4-28 Mounting,  
2 Pin Mini-MIL Connector,  
100 mV/g,  
±10%  
±80 g, Peak

#### TREA330



Miniature Industrial Triaxial  
Accelerometer,  
4 Pin Mini-MIL Connector,  
100 mV/g,  
±5%  
±80 g, Peak

**500 mV/g Accelerometer Offerings** for slow, low frequency applications:

#### AC133



Low Frequency  
Accelerometer,  
Top Exit, 2 Pin Connector,  
500 mV/g,  
±10%

#### AC134



Low Frequency  
Accelerometer,  
Side Exit, 2 Pin Connector,  
500 mV/g,  
±10%

#### TXFA331



Low Frequency  
Triaxial Accelerometer,  
Side Exit, 4 Pin Mini-MIL  
Connector,  
500 mV/g,  
±5%

CTC's **Dual Output Sensors** are also very popular choices for paper mill predictive maintenance programs. Dual Output Sensors allow the user to measure both temperature and vibration in one sensor.

**Dual Output Vibration & Temperature Offerings:**

**TA200 SERIES**



Dual Output Sensors,  
Temperature & Acceleration

Options:  
25 mV/g and 10 mV/°C  
100 mV/g and 10 mV/°C  
500 mV/g and 10 mV/°C

**TR100 SERIES**



RTD Sensors,  
Temperature & Acceleration

Options:  
100 mV/g and 10 mV/°C  
500 mV/g and 10 mV/°C

**VT200 SERIES**



Dual Output Piezo Velocity  
Sensors,  
Velocity & Temperature

Options:  
100 mV/in/sec and 10 mV/°C

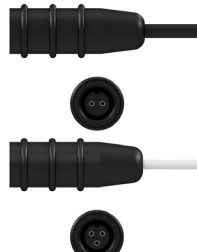
CTC's **Nylon Connectors** are the ideal choice for use with multi-purpose accelerometers and Dual Output Sensors in paper processing. Our nylon connectors have strong chemical resistance for the caustic environments to protect the efficacy of your data. For high moisture concerns, select **V Series Viton™ Seal-Tight Boots** for an IP69-rated seal:

**A2N & A3N**



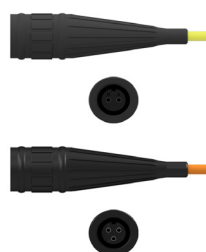
Nylon Molded Connector,  
250 °F (121°C)

**B2N & B3N**



Seal-Tight Silicone Boot  
Connector with Nylon Insert,  
250 °F (121°C)

**V2N & V3N**



Seal-Tight Viton™ Boot  
Connector with Nylon Insert,  
250 °F (121°C)

**J4N**



Nylon Molded Connector for  
4 Pin Triaxial Accelerometers,  
250 °F (121°C)

CTC recommends **FEP Jacketed Cabling** for the chemical concerns present in paper processing:

**CB111**



Twisted, Shielded Pair Cable  
for Single Axis Sensors,  
392 °F (200 °C)

**CB112**



3 Conductor, Shielded Cable  
for Dual Output Sensors,  
392 °F (200 °C)

**CB119**



4 Conductor, Shielded Cable  
for Triaxial Sensors,  
392 °F (200 °C)

## DRYER SECTION & HIGH TEMPERATURE APPLICATIONS

Environmental Challenges:



high & varying  
temperatures



high  
moisture

### Recommended Products

For high temperature environments, CTC offers a variety of **IEPE Sensors** with high temperature resistance up to 325 °F (162 °C).

**High Temperature IEPE Offerings** for environments up to 325 °F (162 °C):

#### AC207 & AC208



High Temperature IEPE  
Accelerometer,  
2 Pin Connector,  
100 mV/g,  
±10%

#### TXEA331-HT



High Temperature Triaxial  
Accelerometer,  
Side Exit 4 Pin Mini-MIL  
Connector,  
100 mV/g,  
±5%



Pair CTC's high temperature resistance sensors with our high temperature resistance connectors. CTC offers a variety of **PPS Connectors** rated for temperatures up to 325 °F (162 °C). CTC's V2R (for single axis sensors) and JV4R (for triaxial sensors) are **Viton™ Seal-Tight Boot Connectors with PPS Inserts**. These connectors are great in caustic environments and have an IP69-rated seal to protect against hot and wet environments:

**A2R**



2 Socket MIL-Style PPS Molded Connector, 392 °F (200 °C)

**A2S**



2 Socket MIL-Style PPS Molded Connector and Locking Ring, 392 °F (200 °C)

**V2R**



2 Socket MIL-Style Seal-Tight Viton™ Boot with PPS Insert, for Single Axis Sensors, 350 °F (177 °C)

**JV4R**



4 Socket Mini-MIL Seal-Tight Viton™ Boot Connector with PPS Insert, for Triaxial Accelerometers, 350 °F (177 °C)

**CB111**



Twisted, Shielded Pair Cable for Single Axis Sensors, 392 °F (200 °C)

**CB119**







4 Conductor, Shielded Cable for Triaxial Sensors, 392 °F (200 °C)

When permanently mounting sensors, it is important to run cables back to a safe data collection point to limit analyst exposure to the high temperatures found in the dryer section. CTC **Junction Boxes** provide a common cable termination point for bringing compatible cables for sensors back to one location for routine data collection with portable data collectors.

CTC offers a wide variety of Junction Boxes ranging from 1 channel up to 48 channels. Multiple channel count configurations means that you only pay for the numbers of channels that you require. Due to moisture ingress concerns in paper processing, CTC recommends only selecting enclosures with latching doors for a NEMA 4X (equivalent to IP66) rating.

**Junction Box Features Compared:**

	<b>MINI-MAXX BOXES</b> <i>Mini enclosed BNC connection boxes</i>	<b>MAXX BOXES</b> <i>Enclosed BNC connection boxes</i>	<b>SB BOXES</b> <i>Legacy switch box series</i>	<b>JB BOXES</b> <i>Premium switch box series</i>
				
<b>Provides connection for remotely installed sensors to portable data collectors</b>	✓	✓	✓	✓
<b>Optional cord grip or conduit inputs provide quick &amp; secure cable entry to closure</b>	✓	✓	✓	✓
<b>Withstands harsh factory &amp; outdoor environments</b>	✓ NEMA 4X / IP66 rated	✓ NEMA 4X / IP66 rated	✓ NEMA 4X / IP66 rated	✓ NEMA 4X / IP66 rated
<b>Covered BNCs</b>	✓	✓	✓	✓
<b>Quick release terminal blocks</b>		✓	✓	✓
<b>Fiberglass &amp; stainless steel options available</b>		✓	✓	✓
<b>Sloped top &amp; modular box options available</b>		✓	✓	✓
<b>Optional continuous outputs</b>			✓	✓
<b>Minimum channel count</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>4</b>
<b>Max channel count</b>	<b>4</b>	<b>12</b>	<b>48</b>	<b>48</b>
<b>Fold-forward panel for easy wiring</b>				✓
<b>IEPE bias indicator light</b>				✓
<b>Cost rating (1-4)</b>	<b>1</b> lowest cost option for harsh factory environments	<b>2</b> low cost option for higher channel counts in harsh environments	<b>3</b> high-end offering for ease of data collection & ability for online expansion	<b>4</b> premium offering with the most benefits & features in one NEMA 4X enclosure