

Article | Danfoss SEN — Bearing temperature sensors

Get the highest degree of application performance with bearing temperature measurement

In industries across the world, bearings—in, for example, engine, gearbox, and power transmission applications—are critical to maintaining uptime while offering the highest level of machine performance. That's why temperature measurement is vital—and accuracy is non-negotiable. We're unpacking how the harsh conditions affecting bearings in mobile hydraulic, wind, and marine applications impact temperature measurement—from vibration and humidity to oil and corrosion. And how stable, robust, and purpose-driven temperature sensors enable preventative maintenance to drive long-lasting performance.

Bearing down on temperature measurement in industrial applications

When people think about the food on their table, the goods lining shelves of their stores, or turning a light on in their home, they don't often think about the massive machines making it happen—day in and day out. However, for those working with industrial applications around the world, the performance of machines is rarely taken for granted—making robustness, reliability, and longevity vital to daily operations.

Among the many components in play in these machines, bearings—and more specifically, bearing temperature—are critical to the safe and continuous operation of mobile hydraulic, marine, and wind turbine applications. That's why, when exposed to rough terrains and harsh weather, getting the most accurate bearing temperature measurement can make or break outcomes. Not only can bearing failures be dangerous to both the machine and the operator, but downtime also causes costly, unexpected maintenance and overall financial losses.



Engine bearings:

The heart of industrial applications

Engines are, quite literally, the heart of the merchant fleet. Responsible for propulsion and generating electricity to keep the ships sailing, engines are massive and intense—with a severe potential for overheating bearings in unforgiving circumstances.

In ships, for example, bearing temperature sensors are mounted directly onto the engine—exposing them to shifting environmental temperatures and splashing oil. These two factors alone can greatly affect the bearing temperature—but there are even more considerations.

“In marine engine applications, bearing temperature sensors are also vulnerable to wear and tear—making the sensor itself an integral component in preventing downtime when out at sea,” says Richard Jørgensen, Product Manager at Danfoss Sensing Solutions.

When considering a bearing temperature sensor for marine applications, enclosures, secure contact between the bearing and sensor element, and robust quality—to name a few—are key to ensuring engine bearing temperature is consistently and accurately measured.

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Richard Jørgensen, Product Manager at Danfoss Sensing Solutions



Gearbox bearings: Stabilizing speed in unpredictable environments

Whether on land or out at sea, wind turbines are massive industrial structures that are difficult to access and costly to maintain. Charged with ensuring accurate generator speed relative to wind speed, gearboxes are fundamental to the turbine's daily operation.

As Richard Jørgensen explains, "The combination of powerful vibration and varying ambient temperatures puts intense pressure on gearbox bearings. That's why technical considerations such as robust design and high-quality materials make all the difference in the accuracy of bearing temperature sensors."

The risk factor is simple: should a gearbox bearing overheat, the entire system shuts down. And whether the application is a wind turbine or a ship, the consequences are the same. But the robustness and accuracy of a bearing temperature sensor—an arguably small component in an undoubtedly massive application—has the power to ensure consistent, stable performance from a gearbox.

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Danfoss Sensing Solutions



MBT 3310

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Power transmission bearings: Driving machines across tough terrain

From construction and material handling to agriculture and forestry, mobile hydraulic machines are driven to the limits of performance. Tasked with everything from carrying heavy loads to culling crops, it isn't just the machine itself at stake when it comes to power transmission bearing performance—it's the delicacy of the environments these massive, weighty machines navigate through every day. And in that case, overheating bearings come with added risk of sparking fires.

"Power transmission bearings have to withstand both extreme vibrations and being in the crossfire of natural elements like dirt, mulch, moisture, and rain—to name a few," explains Richard Jørgensen. That's why safeguarding the bearing temperature sensor against the elements with robust, application-specific design is the only way to ensure accurate measurement."

Focusing on bearing temperature measurement in this kind of application isn't just about maximizing uptime—it's about ensuring operator safety, the efficiency of the machine, and protecting both the goods and the environments they work through.

MBT 2310

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Richard Jørgensen, Product Manager
at Danfoss Sensing Solutions

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Accuracy to the highest degree: Danfoss bearing temperature sensors

Industrial machines are at the mercy of nature, exposed to harsh, unpredictable elements, and expected to run at peak performance—all day, every day. Engineered for those environments where reliability, longevity, and accuracy are crucial, Danfoss bearing temperature sensors are purpose-built for accurate temperature measurement in mobile hydraulic, wind turbine, and marine engine room applications. Plus, they help collect data to improve performance while optimizing predictive maintenance.

Our bearing temperature sensors are fitted with an adjustable spring-loaded protection tube that always ensures metallic contact between the bearing and the sensor, making them ideal for monitoring bearing temperatures in applications where there's a risk of overheating, such as engines, gearboxes, and power transmissions.



Features and benefits

- ✓ **Compliance:** Sensors meet enclosure requirements up to IP67 and operate according to TS 16949—ensuring fewer quality issues for lower warranty costs, longer lifetime, and continuous improvement processes
- ✓ **Quality:** All designs are based on Pt 100 / Pt 1000 / NTC technology with sensor tube and pocket material made of AISI 316 Ti.
- ✓ **Reliability:** Spring-loaded, self-adjusting protection tube ensures metallic contact between bearing and sensor at all times. Temperature range is -50 to 200 °C
- ✓ **High performance:** The sensor element is placed at the very tip of the sensor tube meaning it reacts quickly to changes in temperature leading to short response time
- ✓ **Robustness:** The no-welding housing is a single bar stainless steel, ensuring low service costs based on lifetime expectations (fewer maintenance intervals) and longer lifetime (MBT 3310 & 2310 only)
- ✓ **Innovation:** The sensor is small and can be mounted from the top making installation fast and easy (MBT 3310 only)
- ✓ **Marine approvals:** MBT 5310 comes with all relevant marine approvals ensuring less documentation to reduce administration costs and ease the design process
- ✓ **Application expertise and partnership:** We build on decades of experience and deep bearing application insight offering the widest portfolio of dedicated bearing temperature sensors