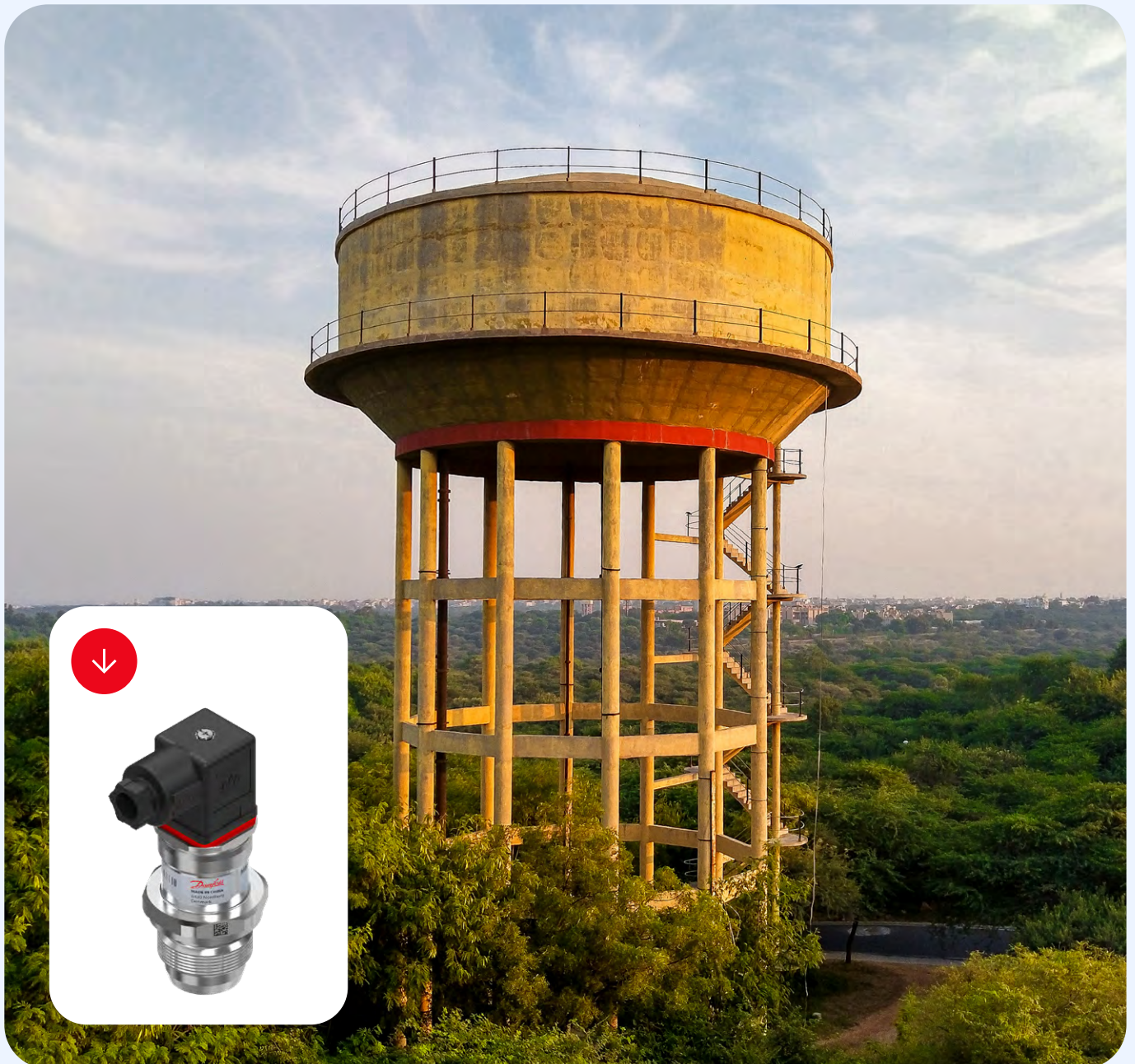


Why hydrostatic pressure sensing is the most effective method for monitoring water levels in overhead tanks



Water level monitoring is an essential element of effective water management. In addition to being of a national focus in India, it also plays an important role in addressing water scarcity and distributing water more efficiently. With the wide range of water level monitoring approaches and solutions on the market, the question arises: Which is the most effective for remote water level monitoring in overhead tanks?

In this white paper, we explore hydrostatic pressure sensing and highlight why we believe it is the most accurate and effective method for measuring water levels in overhead tanks.

One of the most common methods for measuring water levels in overhead tanks (OHTs) is using an ultrasonic sensor. These sensors are an attractive choice, as they don't touch the water surface and are easy to install. However, they can be unreliable in real-world conditions, such as when they are exposed to foam, condensation, dust or temperature changes. They are also prone to misalignment over time, which can impact measurement accuracy. Given the fact that accurate water level measurements impact

everything from demand forecasting to pump scheduling and overflow prevention, getting the right reading is paramount. Thus, the question arises, is there a monitoring solution that can overcome these challenges?

The Danfoss Sensing Solutions team has explored applying pressure sensing technology to this issue, to determine if pressure could be an accurate method for monitoring and measuring OHT water levels. The results – which we will share in this white paper – indicate that **hydrostatic pressure sensing** enables accurate, reliable water level measuring in OHTs.

How a hydrostatic pressure sensor works

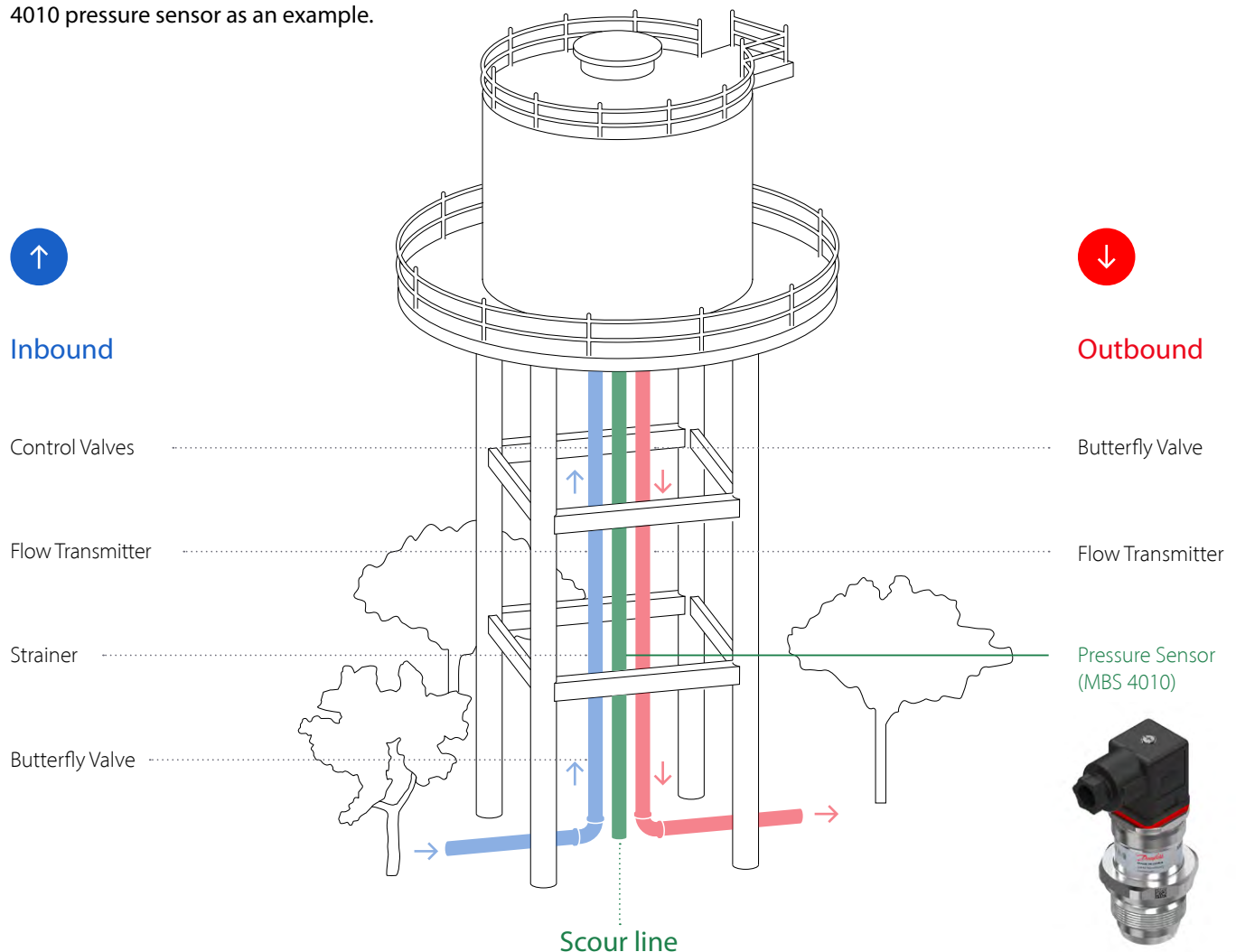
Hydrostatic pressure is a property that describes the force exerted by a liquid due to its weight. A hydrostatic pressure sensor uses this pressure as a tool to determine the liquid's presence and height. Since water's hydrostatic pressure is directly proportional to the height of the water column above the sensor, the pressure will increase as the water level increases.

Using the pressure of the water at the bottom of the tank as the reference, the sensor detects changes in water level. By converting the measured pressure into an electrical signal (such as 4–20 mA), the sensor can accurately measure the current water level.



How a pressure sensor works in an OHT

The following diagram illustrates how a hydrostatic pressure sensor can work in an OHT setting using the Danfoss MBS 4010 pressure sensor as an example.



01 Mounting the sensor.

The sensor is threaded into the scour pipeline so it can sense the fully hydrostatic head.

02 Daily performance / Protection against the elements.

The MBS 4010 pressure sensor contains a flush diaphragm which resists clogging from suspended solids, sediments and viscous fluids.

03 Sensing the water level.

The sensor's software converts $\text{mA} \rightarrow \text{pressure} \rightarrow \text{water level}$ ($h = P / (\rho \cdot g)$) and applies temperature or density compensation, if necessary.

04 Maintaining & calibrating the sensor.

Periodic verification is simple, and the flush diaphragm design means physical cleaning is rarely needed.

The benefits of measuring pressure

Using a pressure sensor to measure OHT water levels offers six concrete advantages as opposed to ultrasonic sensors.



01 [Hydrostatic pressure sensors are more robust in real-world conditions.](#)

Pressure sensors are largely unaffected by surface foam, floating debris, vapors, wind or acoustic noise, which commonly degrade ultrasonic sensor performance.



02 [They are easy to install and align.](#)

Ultrasonic sensors require careful aiming and a clear “cone of sound”. Pressure sensors can simply be mounted at a known depth and have no beam alignment issues. This reduces commissioning time and the likelihood of human error.



03 [They require less maintenance and are more reliable.](#)

While exposed ultrasonic transducers are vulnerable to condensation, dust or insect ingress, pressure sensors have no moving parts and a rugged industrial construction that reduces the need for routine cleaning and recalibration. For example, the MBS 4010 pressure sensor offers IP-rated protection and materials suitable for water applications.



04 [They are directly compatible with industrial telemetry.](#)

One of the most important features when selecting an OHT water level monitoring solution is its ability to be monitored remotely. The MBS 4010 pressure sensor has a 4-20 mA analog output that maps directly to PLC/RTU inputs. It can easily be aggregating into existing SCADA and telemetry networks as a part of a remote monitoring solution.



05 [They offer accuracy and range flexibility.](#)

Pressure sensors are available in very low ranges suitable for tall OHTs, or very shallow sensors for small OHTs. For example, Danfoss' pressure sensor covers a range from 0–0.25 bar up to 0–60 bar.



06 [They offer a lower cost of ownership.](#)

Installing pressure sensors can reduce the total lifecycle cost by up to **60%**. These savings come from lower product and installation costs; fewer field visits; reduced maintenance and servicing; simpler electrical integration; and an extended lifetime in harsh outdoor environments.

Conclusion

When looking for a reliable, cost-effective method for measuring water levels in OHTs, hydrostatic water pressure sensing offers several advantages to traditional ultrasonic sensors. Pressure sensors such as the MBS 4010 from Danfoss Sensing Solutions are impervious to external elements such as dust, foam, condensation and temperature changes. They are easier to install, require less maintenance and can easily be integrated into remote monitoring solutions. These advantages can generate up to 60% saving over the sensor's lifetime.

As smart water management expands, Danfoss Sensing Solutions will be there, bringing innovative design and decades of sensing technology experience to develop reliable water level sensors that support utilities and industrial applications. [Get in touch with your local Danfoss representative to learn more about our sensing technology.](#)



Fact box:

The MBS 4010 pressure sensor – a reliable water level monitoring technology

With the increasing focus on smarter water management, our multidisciplinary team of experts at Danfoss Sensing Solutions has worked together with our customers to explore and test various water level measurement technologies.

We wanted to combine our decades of experience in developing sensing solutions with the latest research in this area, so we could base our solution on the technology and product design that would deliver the best results for our customers' water distribution systems. The **MBS 4010** pressure sensor is the result of this collaboration, marking a major step forward in accurate and reliable OHT level measurement.

The MBS 4010 is equipped with high-precision measurement and robust design features that ensure reliable, consistent water level monitoring. Its unique flush diaphragm and durable construction ensure a long product lifetime, even under harsh conditions, such as in outdoor tanks, sediment exposure or turbulent waters.

The next step in this journey is expanding our local support and deployment capabilities in India, placing us closer to our customers. This will make it easier to partner with utilities and integrators to develop new water sensing solutions; improve speed-to-market and lead times; and reduce operational inefficiencies. By doing so, we can effectively meet the growing demand for reliable OHT level monitoring and support our customers' smart water management initiatives.

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