

Sensor Technology For Wind Turbine Applications







WIND

Operating In Extreme Conditions

WIND installations often operate in extreme conditions. The WIND turbine industry needs business partners who understand the need for high efficiency and minimum downtime in their installations.

Today, Senmatic works with leading players in the WIND turbine industry, designing and manufacturing temperature and humidity sensors for demanding WIND applications.

Our temperature and humidity sensors are designed to work under extreme operating conditions in offshore WIND turbines as well as turbines installed in remote sites.

The sensors may be small, but they play a vital role in the operation of WIND farms. They detect, monitor, and communicate information about parameters such as temperature and humidity in each WIND turbine, non-stop. This data is collected and processed in a command center, where overall operations as well as the health of each turbine in a WIND farm is monitored and optimized in order to ensure reliability and optimal performance.

If errors or issues arise at a WIND farm, they can be extremely costly to investigate and repair as WIND farms are typically located offshore or in other areas with limited accessibility. Therefore, even the smallest of irregularities or errors can be critical and lead to significant losses. For a setup to be profitable and safe, error rates need to be minimized. Reliable sensors play an essential role in creating high efficiency, maximum reliability, and minimum downtime.

With integrated industrial sensor solutions for a broad range of industry segments, we draw on a wide range of in-house technologies for the efficient and agile development of customized sensor solutions. The technology areas where we excel include mechanical, electronic and software engineering for low and high-temperature sensors, humidity sensors and gas sensors.

At Senmatic, we work using quality management systems and processes that live up to the requirements of global industry leaders and certification for compliance to standards in, for example WIND, marine, oil & gas and other industries. A Danish company founded in 1975, Senmatic supports our customers worldwide from sales and production facilities in Denmark and China.

**Nacelle:**

- Sensors for ambient temperature
- Sensors for humidity

Blades:

- Sensors for pitch cylinder

Controls:

- Sensors for temperature inside cabinet
- Sensors for humidity inside cabinet

Hydraulic:

- Sensors for oil lubrication system
- Sensors for cooling system

Senmatic sensors in WIND turbines

Senmatic offers a comprehensive range of temperature & humidity sensors ensuring high operational reliability and rentability of WIND power.



Brakes:

- Sensors for temperature on brakes
- Sensors for hydraulic brake system

Generator:

- Sensors for cooling system
- Sensors for lubrications
- Sensors for bearing

Gears:

- Sensors for cooling, filtering and lubrication system
- Sensors for bearings.

Air condition / Climate:

- Sensors for relative humidity tower
- Sensors for relative humidity Control cabinets

Product examples: Customized sensors are our strength, just ask !

Products (The figures in brackets indicate where in the application the product can be utilized)

Type B - Threaded immersion thermometer with exchangeable insert (3, 6, 7)



- Process connection 1/2" BSP
- Protection tube $\varnothing 9 \times 1$ with $\varnothing 12$ extension length AISI316
- Exchangeable insert type MI60 $\varnothing 6$ mm AISI316
- Pt100 element according to EN60751
- Connection head aluminium alloy
- Connection head IP65
- M20 cable gland

Type PTR -Resistance thermometer (3, 6, 7)



- Process connection 1/2" BSP
- Protection tube $\varnothing 8 \times 1$ mm AISI316
- Pt100 element according to EN60751
- 4 wire connection
- Pt100 element according to EN60751
- Connection head aluminium alloy
- Connection head IP65
- M20 cable gland

Type S-Threaded immersion thermometer with exchangeable insert (3, 4, 6, 7)



- Process connection 1/4" BSP, 1/2" BSP or 1/2" NPT
- Protection tube $\varnothing 8 \times 1$ with $\varnothing 12$ extension length AISI316
- Platinum RTD element according to EN60751
- Connection 4 pole connector
- 3 poles connected to element
- Temperature range: -50 °C to $+150$ °C

Type MHT - Relative humidity sensor (10, 11)



- Process connection 2pcs. M5 screws distance 35mm
- Voltage supply 24 V DC
- Measuring range 0-100 % RH
- Output 4-20mA or 0-10V via PUR cable
- Absolute accuracy for temperatures 10 °C to 35 °C:
 $10-90$ % RH: ± 4 % RH
 $90-100$ % RH: ± 6 % RH
 Additional outside 10 °C to 35 °C: $\pm 1-2$ % RH
- Long-term stability: < 1 % RH per year
- PTFE membrane everything potted with macro melt
- CE
- EN 61000-4-2
- EN 61000-4-4
- EN 61000-4-6

Type BJ - Cable sensor with spring loaded bayonet connection (4, 5, 12)



- Process connection 1/4" BSP or 1/8" BSP
- Protection tube $\varnothing 6 \times 0.5$ mm AISI316
- PT100 element according to EN60751

Type PTE - Cable sensor (1, 2, 3, 6, 7, 8, 9, 10, 11, 12)



- Process connection compression fitting
- MgO filled protection sheath AISI304
- Cable 2, 3 & 4 wire PUR, silicone and PTFE
- Pt100 element according to EN60751
- Temperature range: -170 °C to $+250$ °C

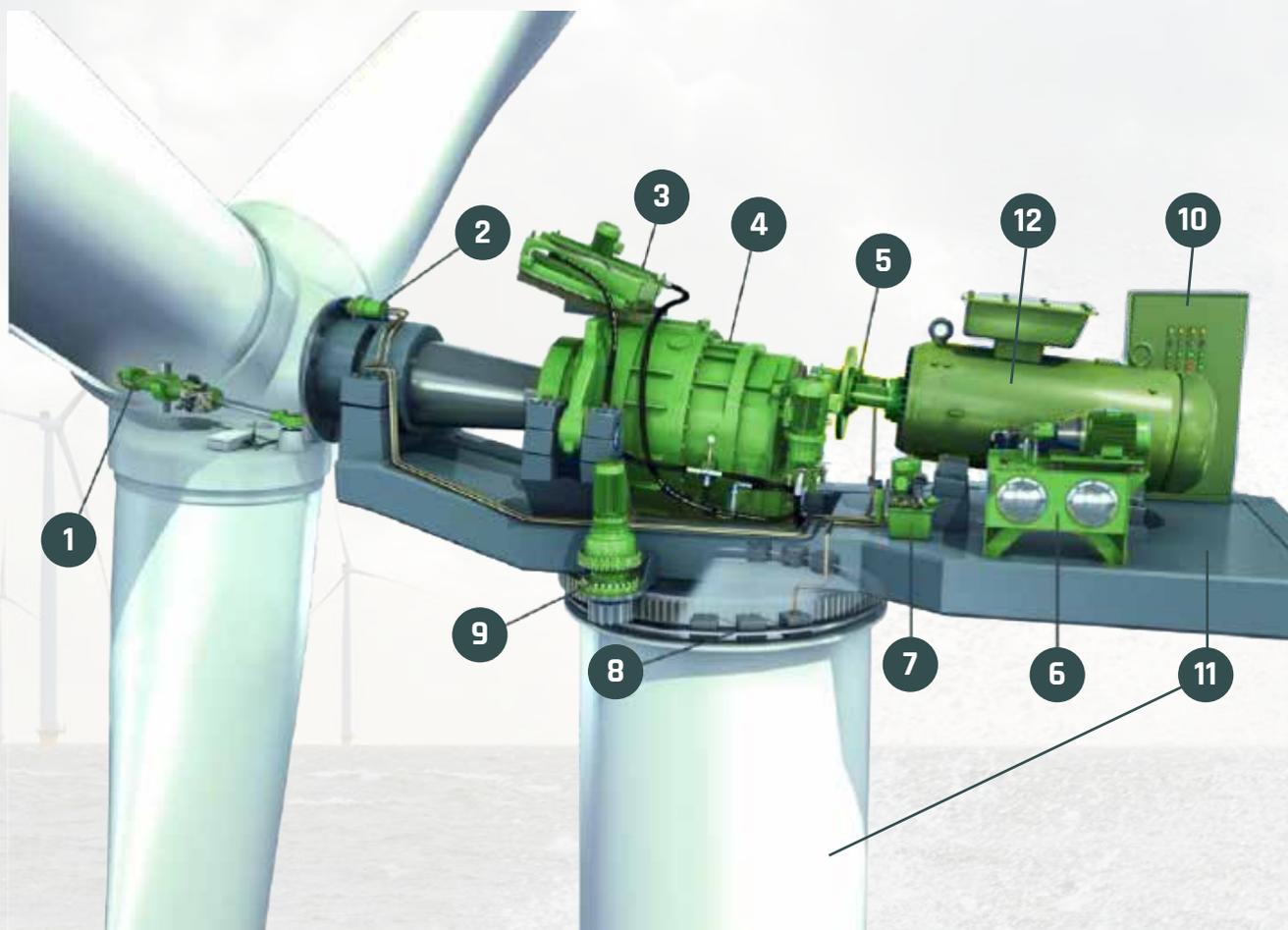
Type LOF - Thermowell with fixed thread (6, 7)



- Material for thermowell is stainless steel AISI 316Ti.
- Available with pressure certificate up to 75 bars.
- Immersion sheath $\varnothing 12/\varnothing 11/\varnothing 9$ with wall thickness of 1 mm.
- Rated torque: 50 Nm.



WIND



Applications:

- | | |
|---------------------|-----------------------------|
| 1) Pitch cylinder | 7) Hydraulic system |
| 2) Rotor lock | 8) Brakes |
| 3) Cooling system | 9) Engine (Yaw) |
| 4) Gearbox | 10) Control cabinet |
| 5) Bearing/coupling | 11) Climate nacelle & tower |
| 6) Cooling system | 12) Generator |



ABOUT SENMATIC

Senmatic is a Danish manufacturer specializing in quality integrated industrial sensor solutions, supplying low and high-temperature sensors, humidity sensors and gas sensors for a broad range of industry segments, as well as LED and controller technology for horticulture. We are technology pioneers within mechanical, electronic and software engineering, and we constantly strive to set new standards. With great accuracy, we develop state-of-the-art products and turnkey solutions with superior quality.

Since 1975 we have worked with global industry leaders, delivering sensor solutions tested, certified and compliant to the highest standards. Senmatic employs more than 90 dedicated people and is headquartered in Sønderø on the island of Funen. Senmatic A/S is a company in the Indutrade Group.

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