

Speed Measurement

Controlling, Monitoring and Diagnosis of Safety-related Rotating Machines Operating in Harsh Conditions

Enhance plant safety with Framatome's proven speed measurement sensors enabling a reliable controlling, monitoring and diagnosis of rotating machines

Challenge

The optimum operation of rotating machines like reactor coolant pumps in nuclear power plants has a significant value to secure the plant's safe operation and reliability.

Sensors designed and qualified to operate under normal or degraded conditions, such as those encountered in nuclear power plants, are necessary to achieve the uppermost reliability in both nuclear and non-nuclear applications.

Robust and qualified speed measurement sensors are key for reliable controlling, monitoring and diagnosis of rotating machines.

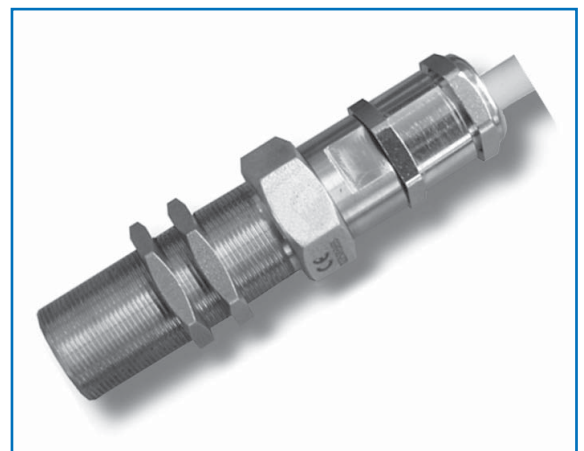
Solution

Framatome offers the full range of nuclear instrumentation solutions critical to the safe operation of the plant throughout its entire lifecycle.

We have selected, adapted and qualified an industry-proven rotational speed measurement sensor for class 1E applications to withstand the most challenging of environmental conditions. The sensor is qualified to operate even in harsh nuclear conditions and is compliant with international standards.

Framatome can also provide the suitable TELEPERM XS signal conditioning module which is qualified according to KTA, IEC and IEEE. Thus we are supplying the complete measurement chain up to the evaluation electronic – all from one trusted source.

When it comes to speed measurement, Framatome offers the full range of solutions and related services from system design to installation and commissioning including reporting, training, consulting and maintenance. We draw on over 60 years of expertise to support our customer's needs, offering quality you can count on.



Framatome speed measurement sensor

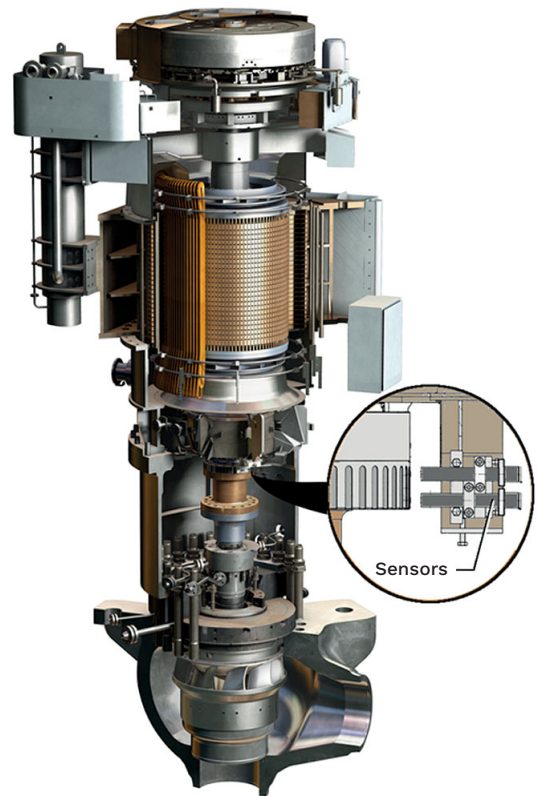
Customer benefits

- Improved safety and operations thanks to reliable and accurate speed measurement
- Proven and qualified speed measurement sensors for safety-related machines
- Designed and manufactured for use under harsh conditions
- No power supply required (passive sensor)
- Qualified according to international nuclear standards

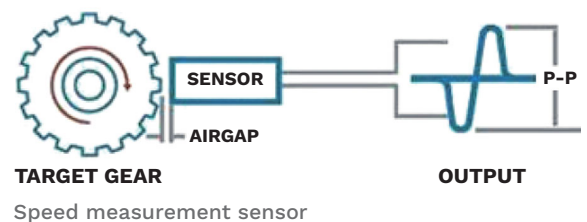
Your performance
is **our** everyday **commitment**

Technical information

- Variable reluctance sensor consisting of an iron core, an inductive coil and a permanent magnet
- Target can be a rotating shaft with integrated permanent magnet or a ferrous pole wheel
- Induction of an AC-voltage each time the target passes the sensor
- No power supply required (passive sensor)
- The generated output signal is proportional to the shaft speed and also affected by air gap and target geometry
- Output signal, measuring range and response time depend on the signal conditioning module
- Typical output signal of $5 V_{PEAK}$ for a nominal speed of 1500 rpm with a maximal response time of 200 ms when used in conjunction with TELEPERM XS signal conditioning module
- The sensor is approximately 10 cm long and can be easily mounted on a support plate with a M16 or M22 borehole
- Suitable for use in harsh environments (e.g. high temperature, pressure, radiation, humidity, electromagnetic disturbances, vibration)
- Qualified according to KTA-3505 and compliant to RCC-E K1* and IEC/IEEE 60780-323



Exemplary sensor installation on a pump



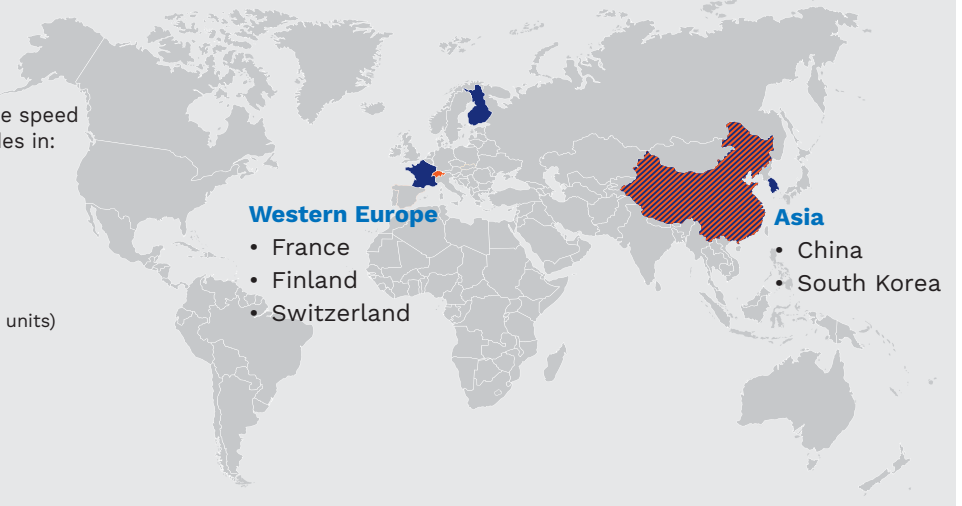
References

Framatome has been deploying complete speed measurement systems for several decades in:

- France EDF 900 MWe fleet (34 units)
- China CPR 1000 MWe type (16 units), CPN 600 MWe type (2 units), Hualong type (4 units)
- South Korea 900 MWe type (2 units)
- the EPR fleet (4 units)
France (1 unit), Finland (1 unit), China (2 units)

More recently, the Framatome sensor has been deployed in:

- China ACPR-1000 (2 units)
- Swiss BWR-6 type (1 unit)



Western Europe

- France
- Finland
- Switzerland

Asia

- China
- South Korea

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