ROTOR POLE TEMPERATURE MEASUREMENTS

WP105

JULY 2024, MK

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Introduction

The Rotor Pole Temperature measurement is made possible using the RTM-200 from MC-Monitoring (MCm). MCm provides the following description of the RTM[1]:

The RTM-200 is a cutting-edge contactless temperature sensor designed specifically for rotor monitoring in generators and motors. Its probe is designed to be inserted into ventilation holes of such machines. This advanced technology sensor employs the latest techniques for remote temperature measurement. The small probe diameter of only 4mm is made possible by these advancements. MC-monitoring's expertise in digital signal processing ensures accurate and linear output by integrating filtering and linearization of the raw signal proportional to the measured temperature.

The benefit of using the instrument is the continuous monitoring of pole temperatures for the detection and evaluation of changes in heat-sources, e.g. caused by short circuits, and heat-transfer mechanisms within the rotor poles.

RTM 200 Details[2]

Measuring range: 0°C to 200°C
Output range: 4-20mA
Output sensitivity: 0.08m A/°C
Measuring accuracy:
+/- 5°C from 30°C to 200°C
Measuring repeatability: +/- 1°C
Frequency bandwidth: 0Hz to 1kHz (-3dB)
Angle of view: ±17°

Contactless temperature monitoring. Magnetic foot attached the exterior of the stator.

- **High speed, allowing rotor instantaneous temperature monitoring during operation**
- **Reduced Ø 4mm probe diameter for insertion in small ventilation holes**
- **Multiple installation depth ranges:**
  - **50mm to 190mm**
  - **190mm to 330mm**
  - **330mm to 470mm**
  - **470mm to 610mm**
- **Integrated Modbus RTU slave for digital interfacing.**

[1] https://mc-monitoring.com/products-service/sensors/rotor-temperature-monitor/
[2] From MC-monitoring SA RTM-200 Datasheet

FDB experience with RTM-200

FDB did a test installation of the RTM-200 at the Øygreyfoss power plant close to Egersund, Norway. The unit runs at 375 rpm, and therefore consists of 16 individual rotor-poles. Figure 1 show the sensor as installed in the stator of the generator-set. The testing allowed both the demonstration of the sensor, but also to collect data to be used for gaining insight in data provided by the sensor and ways to process the same data.

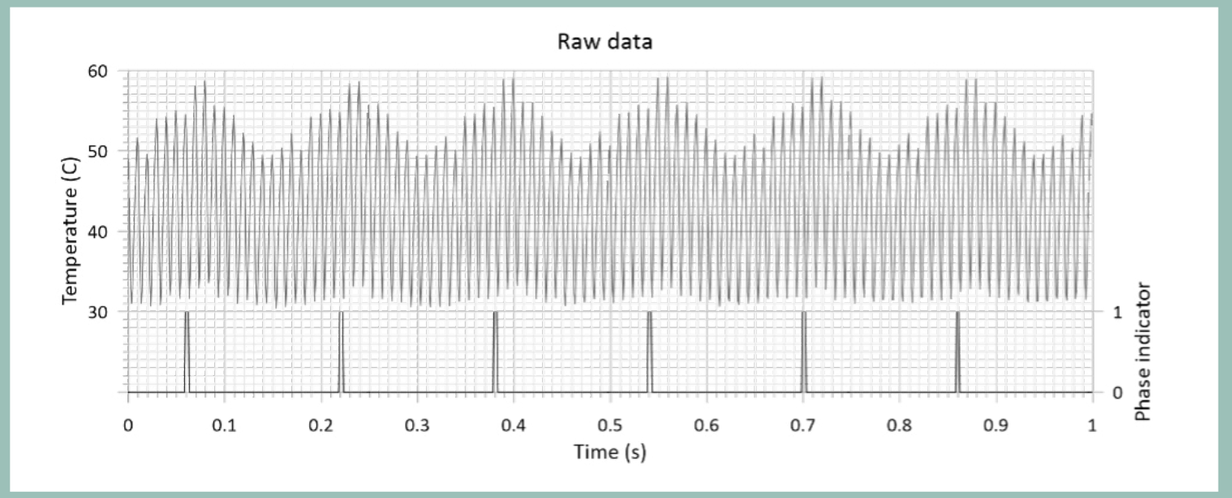
Figure 1

SProbe mounted on the exterior of the stator and a with magnet foot (left) and a visual of the probe tip entering the air gap, see intersection between arrows (right).

Figure 2 shows 1s raw data from the RTM-200 and the phase indicator. The phase indicator allows us to pin-point from which pole the peak temperatures are recorded. The individual pole temperature can therefore be tracked indefinitely allowing trend analysis.

Figure 2

Measurements made at Øygreyfoss. Temperature and phase indicator as a function of time. Individual peaks correspond to maximum temperature on each pole.



HydroCord from FDB uses plug-ins for edge processing and analysis, and one such plug-in is a rotational-phase-dependent solution required for identifying readings from specific poles. Based on 1 second of raw data, corresponding to four full rotations or more if the unit speed is greater than 300 rpm, the average maximum temperature per pole is determined, see Figure 3. HydroCord publishes these results to OPC UA and write results to time series data-bases or files. Current values can be displayed, and historical record can be pulled from the database. The RTM-200 can be used together with both mobile and permanent installations of HydroCord.

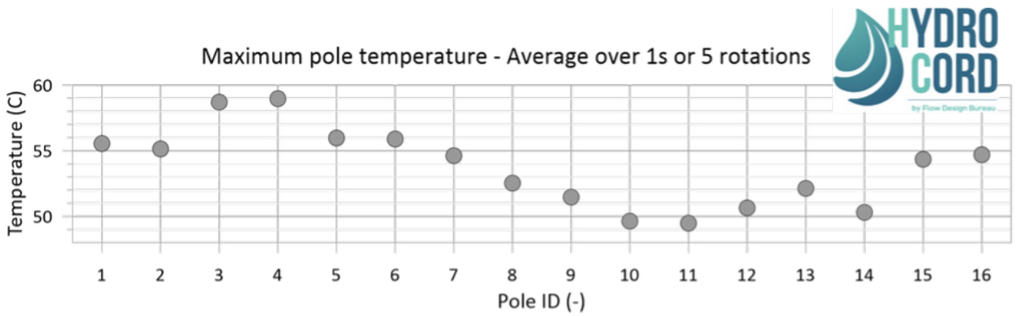


Figure 3

Pole temperatures from Øygreyfoss based on 1s of raw data corresponding to 6.25 rotations. The results are published by HydroCord.

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