PH SENSOR IN FLUE GAS

DESULPHURIZATION PLANTS
For many years, the Pfaudler pH sensor Type 03N has been used successfully in Flue Gas Desulphurization plants of power stations. For this reason, it is also referred to as the FGD sensor.

The FGD sensor serves for the optimum adjustment of the pH in the scrubbing liquid used for wet desulphurization. A fundamental problem associated with pH measurement in an FGD plant is the fact that a tough lime deposit accumulates already after a short period of time. This deposit prevents pH measurement at least in part. For this reason, conventional pH sensors must be removed in short intervals of time and cleaned with acid, a process that causes high operating and maintenance cost.

Pfaudler pH sensors made of glassed steel offer a convincing and technically mature solution for flue gas desulphurization.

Based on its extremely robust design, the FGD sensor can be installed directly and without a protective reinforcement in the pipeline in which the suspension flows at high speed. The particles in this suspension, combined with the high rate of flow, provide for self-cleaning of the FGD sensor and avoid the accumulation of lime deposits. An additional pressurized water flushing cycle ensures a reliable, reproducible pH measurement for a long period of time. Since glass-lined pH sensors are not subject to aging, recalibration of the sensor is not an issue. For this reason, it is not necessary to remove and reinstall the FGD sensor regularly like conventional pH probes. Maintenance of the FGD sensor is carried out in the course of the power plant revision.

In total, the FGD probe offers the following benefits to the operator:

- Considerable operating and maintenance cost savings through a very reliable and maintenance-free operation of the FGD sensor for a long period of time.
- Exact and quick pH measurement for optimum and time-saving metered addition of accessory agents.
- Cost savings through a very long life of the sensor which may be 10 years or more in flue gas desulphurization plants.

In the past few years, it repeatedly happened that the authorities required the power plant operators to monitor the AOX value* in the wastewater and to comply with certain limit values.

AOX compounds are produced in the FGD cycle. The ORP value in the scrubbing suspension is an indicator of these compounds. For this reason, the need to measure not only the pH, but also the ORP value in the scrubbing suspension arises more and more frequently. The FGD sensors from Pfaudler are also available with an integrated oxidation-reduction sensor in order to measure both values with a single sensor.

* AOX value = summation parameter for the quality assessment of wastewater, A = absorbable, O = organic, X = halogen compounds
Construction of the FGD Sensor

For more technical details, please refer to Operating Instructions 307 which are available on request.
In order to ensure the faultless operation of the FGD sensor, please note the following instructions during installation and operation of the sensor:

1. A density sensor is installed in a bypass in most flue gas desulphurization plants for monitoring the suspension. The pH probe should be mounted near this measuring location.

2. If the density is not measured, a bypass with a shut-off mechanism should be provided for pH measurement in a suitable location of the pipeline system. The bypass must have a minimum cross-section of DN 50.

3. In order to ensure the greatest self-cleaning capability possible, a minimum flow rate of 2 m/s should be maintained in the suspension in the area of the FGD sensor.

4. This flow rate is normally achieved without any problems if the FGD sensor is integrated into a specially designed flow fitting made of glass fiber reinforced plastic. This fitting is available from Pfau’dler.

5. A high-pressure water line must be connected to the flushing port of the flow fitting. Depending on your local situation, the system is flushed in intervals of 4 - 12 hours. The maximum flushing time should be 30 seconds. During the flushing process, suspension supply must be shut off and the HOLD function must be activated in the measuring transmitter.

6. The flushing process ensures a reliable function control of the FGD sensor, because the pH of the flushing water is significantly higher than that of the scrubbing suspension. When recording the pH, this pH value change when flushing the system must be clearly detectable. If no pH value change is observed, the FGD sensor must be checked and serviced, if necessary.

7. The FGD sensor and all metal parts inside the pipeline, in the environment of the sensor up to approx. 10 m, must be included in the equipotential bonding system of the plant. Furthermore, we recommend using conductive gaskets when installing the flow fitting.

8. The distance between the FGD sensor and the electrolyte reservoir is limited to 10 m by the maximum length of the electrolyte hose.

9. The distance between the FGD sensor and the pH measuring transducer is limited to 10 m by the maximum length of the pH cable. An isolation amplifier must be used for longer distances.

10. Compressed air is necessary for operating the sensor. The air pressure must be at least 1 bar above the process pressure.

11. When used in the open air or in contaminated environments, the accessories should be installed in a switch cabinet. Completely preassembled switch cabinets are available from Pfau’dler.

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