

## Hydrogen and oxygen measurement in nuclear power plants

Customer: Konrad Mess- & Regeltechnik - Switzerland

### Background information

Hydrogen (H<sub>2</sub>) is generated in the primary circuit of a nuclear power plant. With hydrogen gas there is always the risk of an explosion which can trigger an incident in a nuclear power plant. Therefore, the generated hydrogen (H<sub>2</sub>) is converted into water via a recombiner (catalyst) and the systematic dosage of oxygen (O<sub>2</sub>). Both reactants, i.e. oxygen and hydrogen, must be precisely monitored to generate a stoichiometric ratio to ensure a complete conversion into water at the recombiner. Both gases are measured with the I-GRAPHXPR. With this changeover to gas chromatographic monitoring via the I-GRAPHXPR, the construction-inherent technology of the nuclear power plant from the 1970s has been replaced by cutting-edge micro technology. The I-GRAPHXPR is thus the most important link in the safety chain of our nuclear power plants.

### Tasks

The I-GRAPHXPR continuously measures hydrogen (H<sub>2</sub>) and oxygen (O<sub>2</sub>) and outputs the measured values via a 4-20 mA interface to the process control system..

Gases to be measured		Concentration
H <sub>2</sub>	Hydrogen	0,1% - 5%
O <sub>2</sub>	Oxygen	0,1% - 5%

Parameters	
Column	ShinCarbon
Detector	TCD (Thermal Conductivity Detector)
Carrier gas	Nitrogen (N <sub>2</sub> )
Sample gas pressure	0,5 - 1,5 bar
Sample gas treatment	Cooler, filter

### Our solution

I-GRAPHXPR process chromatograph with 4-20 mA interface  
 Certified for application in nuclear power plants  
 Integration in the existing control cabinet

### Note

A special model of the I-GRAPHXPR is initially used to ensure 'operational reliability' in Switzerland. This instrument includes two Standard modules which can be switched individually or together for test purposes ('operational reliability').

The peak in the chromatogram is negative due to the thermal conductivity. However, this does not influence the evaluation.

### Chromatogram:

