



**Industry: Chemical Industry**  
**Driving with alcohol: only purified bioethanol is sufficient for the tank**

**Waldkirch/Zeitz, Tour Stop No 24 - Water has to be extracted from the ethanol: measure H<sub>2</sub>O online instead of in a laborious manual way. The laboratory quality still has to be achieved. SICK has the solution.**

**Challenge: Quality Control**

Otto motors have it, flexible fuel motors have it: the fuel addition with bioethanol respectively E85, a fuel mixture with the highest ethanol concentration. The ethanol has to reach a purity of over 99 % to qualify as an alternative to fossil fuels. The biggest bioethanol plant in Europe is operated by CropEnergies in Zeitz, amidst one of the largest wheat producing areas of Germany with a direct sugar sirup pipeline from the adjacent company Südzucker AG. Bioethanol is produced by alcoholic fermentation, distillation and dehydration which extracts water from the alcohol. For the production, molecular filters are used which are regenerated after saturation. To avoid a break through of water, the filters are regenerated long before saturation. It was SICK's task to measure the water content online with comparable accuracy to the laboratory method previously used, in order to noticeably prolong the service life of the filters between two regenerations.

**Solution: Laboratory-like H<sub>2</sub>O measuring accuracy**

To solve this task, SICK uses the IR photometer MCS100 HW with heated process gas cuvette – installed in an explosion-proof polyester cabinet with reduced surface resistance. As the process measurement takes place in an explosion hazardous area, the analysis cabinet is pressurized and of course certified according to ATEX. The sample gas is extracted from the process with an explosion-proof heated extraction tube (protection class II 2G Ex e T3-



T6). The gas entry is equipped with a detonation protection to prevent re-ignition from the analysis system into the process tube.

The concentrations of ethanol and water are continuously measured in the gas mixture. The measuring ranges are 90 ... 100 Vol.% C<sub>2</sub>H<sub>5</sub>OH and 1 ... 10 Vol.% H<sub>2</sub>O, the specific accuracy is +/- 0.1 Vol.%. Should the H<sub>2</sub>O value exceed the customer's specification, the approaching saturation of the molecular filter is signalled and therefore requires drying for the regeneration of the filters. Reference samples are tested by Karl Fischer titration.

### **Everything's supposed to run smoothly**

Cost cutting by optimizing down time of the molecular filters, lower costs for regeneration, elimination of manual laboratory measurements, maintenance of the product quality by continuous monitoring of the water content in the ethanol – all success factors for the analysis system by SICK.