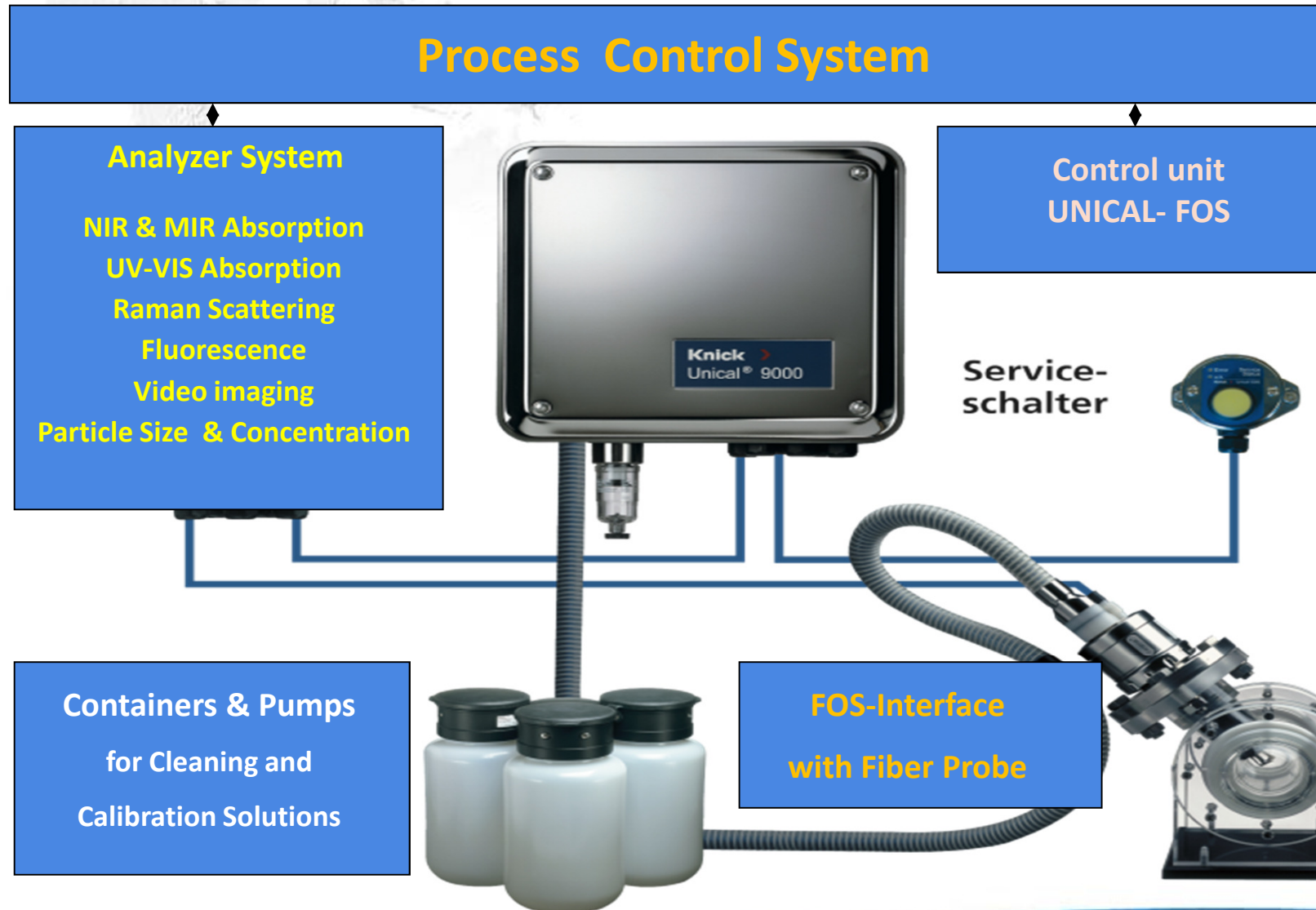


# Full Automated Process-Interface



# Full automated Process-Interface



Complete analyzer system with automated process interface, controller, vessels with pumps for cleaning and calibration solutions i-PC for spectrometer and controller interface. Direct connection via OPC to PCS

# Full automated Process-Interface



Biogas plant LEPPE, complete analyzer system with probe and Ceramat (A), MIR-spectrometer (B) and controller unit (C). Cleaning in this case was supported through a direct water line, connected to the local water supply.

# Optimized Sensor port

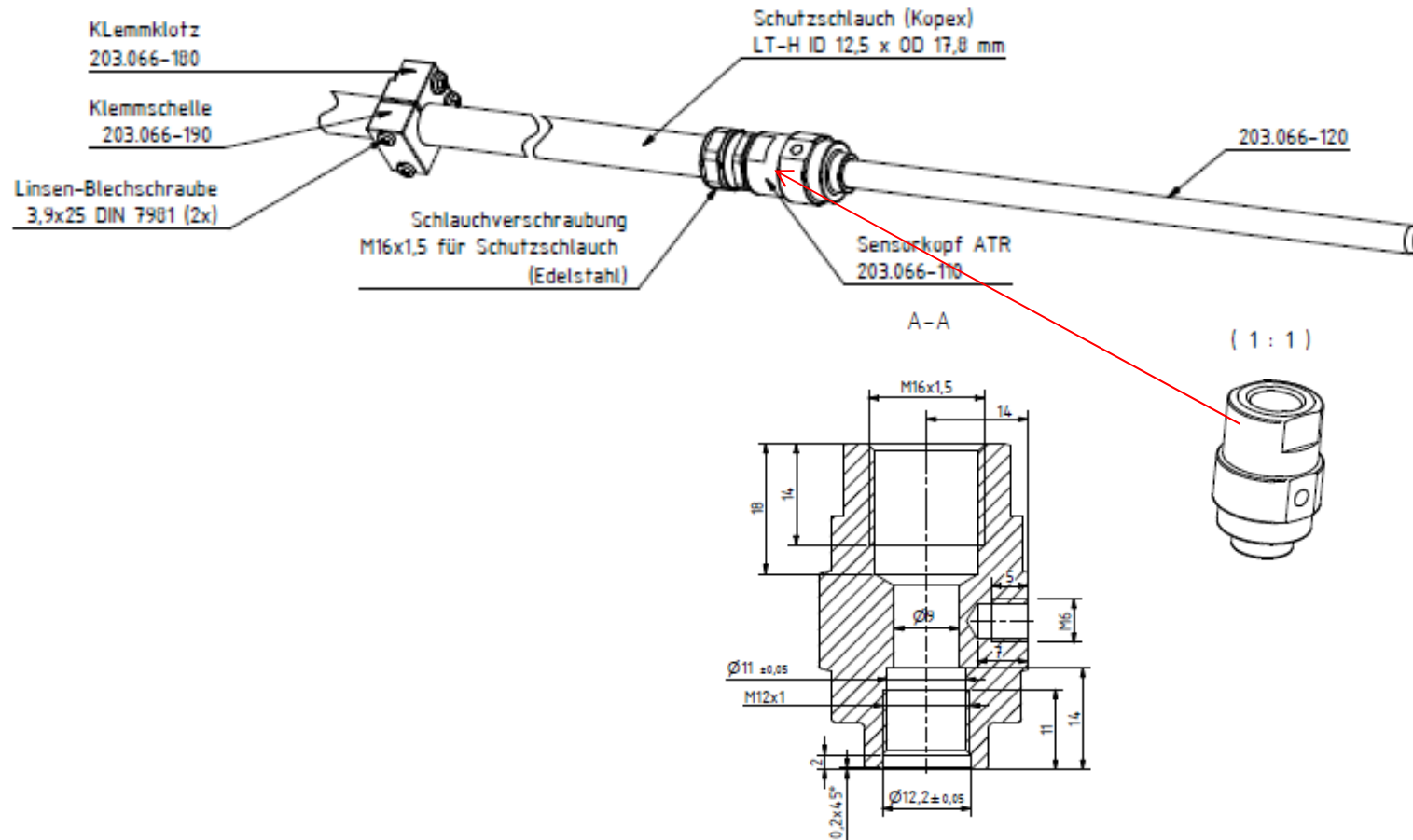


## Ceramat-FOS

Sensor port optimized for fiber optical probes. Modification of a standard retractable port to avoid tension and stress for the optical fiber between reference/cleaning position and sample measurement position. The turn of the ceramic valve does not impact the probe itself because of an anti-twist device. In addition is the bend radius fixed and the linear motion of approx. 15 mm does not impact the spectrum taken in measurement position against the reference taken in the service position during calibration

# Optimized Sensor with PG 13,5

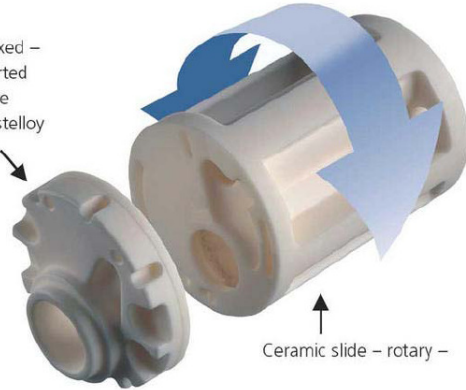
Example: ATR-Probe



# Ceramat-FOS & SensoGate-FOS from KNICK



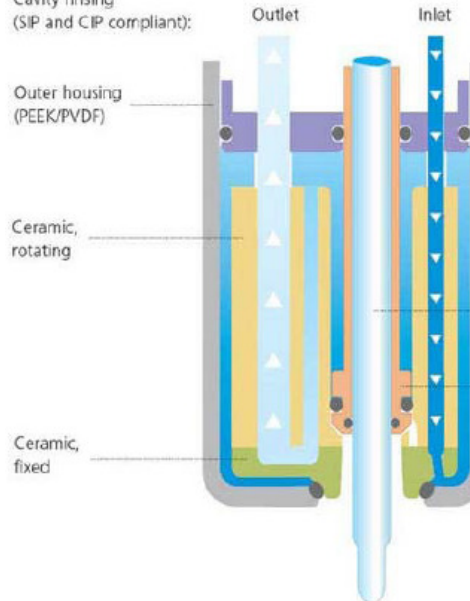
Ceramic slide – fixed –  
 – Movably supported  
 – Contact pressure  
 provided by Hastelloy  
 springs



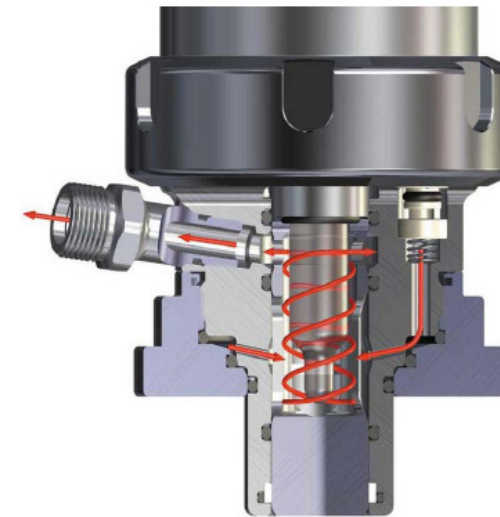
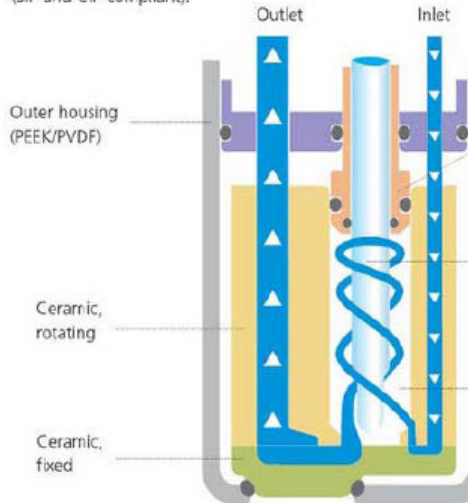
Ceramic slide – rotary –



**Process position:**  
 Cavity rinsing  
 (SIP and CIP compliant):



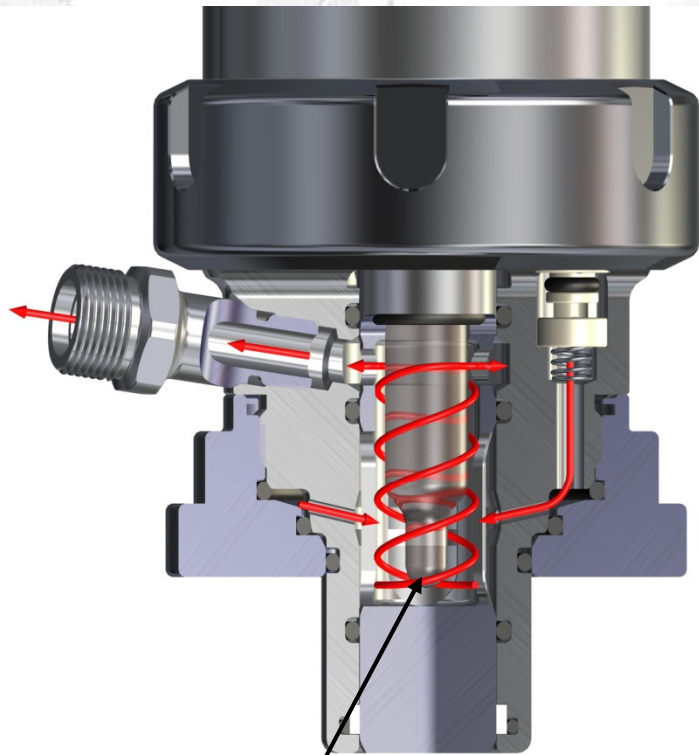
**Service Position:**  
 For rinsing or filling of the calibration/cleaning chamber or fo  
 (SIP and CIP compliant):



# Washing of Fiber Probes in Process Interface



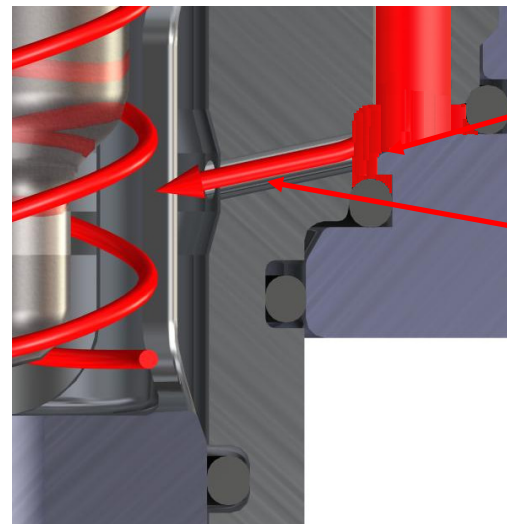
**Fiber optical probe can be retracted pneumatically into washing and calibration chamber**



Probe head with observation window or ATR-Crystal

## Effective cleaning of sensor

- Turbulular and nozzle effect in central configuration of the cleaning tubes
- tangential incident flow of cleaning medium
- high flow velocity



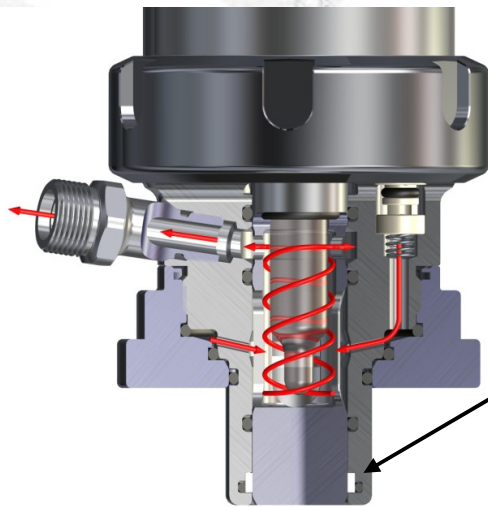
Circular slit

Cyclone-nozzle tangential

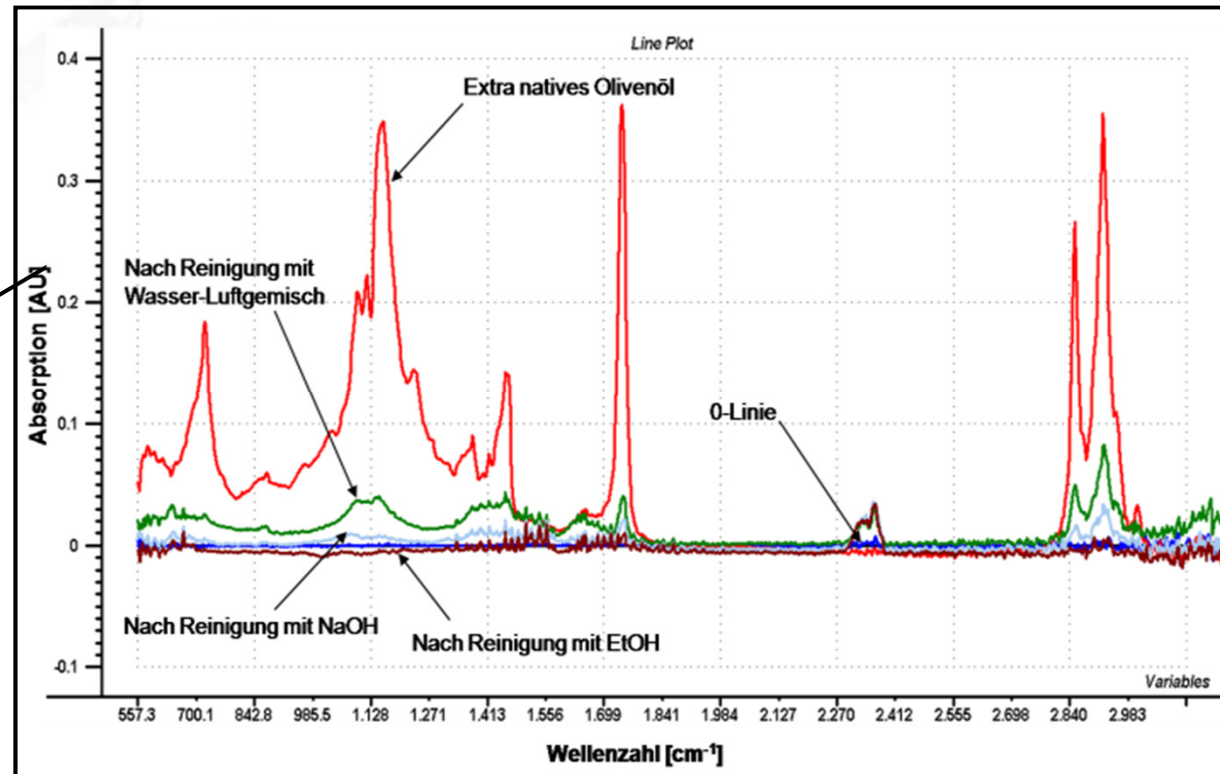
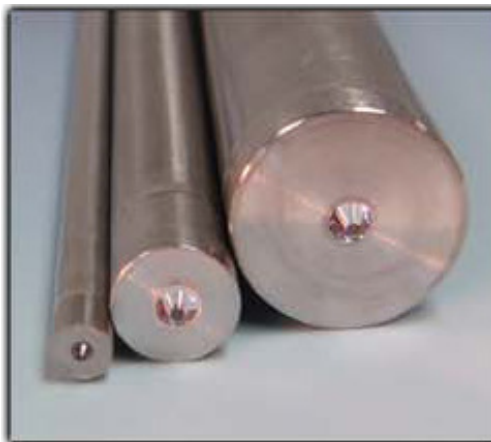
# Example: Cleaning of ATR-probe from Olive Oil



Fiber ATR-probe was retracted into the wash chamber to clean it in multi-functional, programmable washing cycles



Sensing Probe Heads with Diamond ATR-Crystal

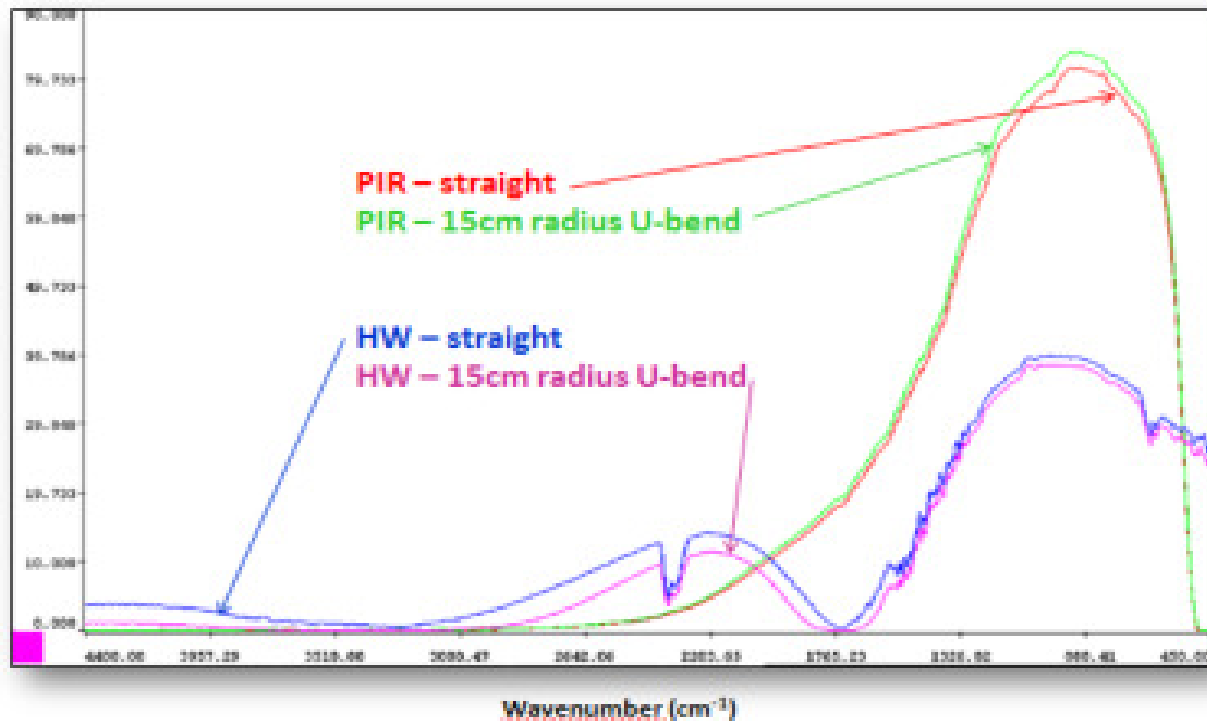


Washing of Diamond ATR PIR-fiber probe contaminated with olive oil. Base line was reached again in result of 3 CIP cycles under real time monitoring by DiATR-probe connected with FTIR spectrometer



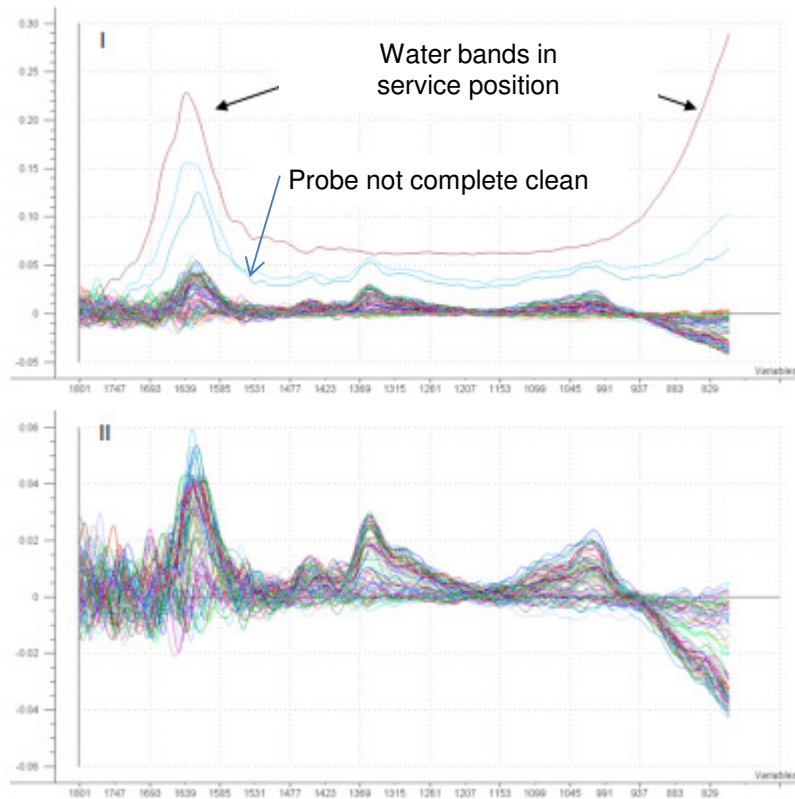
# Test of impacts

PIR fiber and hollow wave with bend radius of 150 mm



**RESULT:** Even if the changes are small, the design of a sensor port should foresee a fixed bend radius!

# Test of impacts

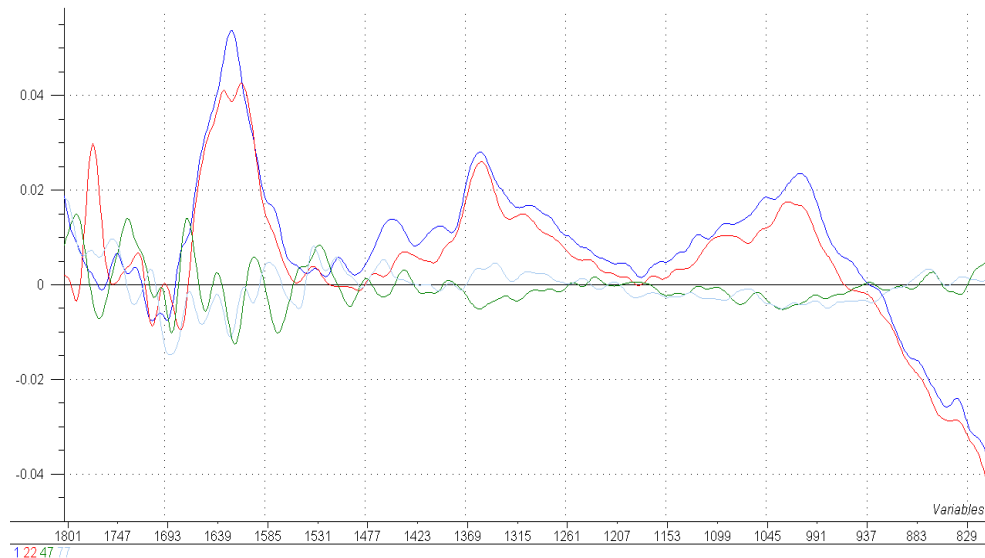


I) Probe under real conditions in biogas plant. The probe was moved into service position and cleaned (water bands) and moved back to measurement position. The movement has no significant impact to the zero baseline.

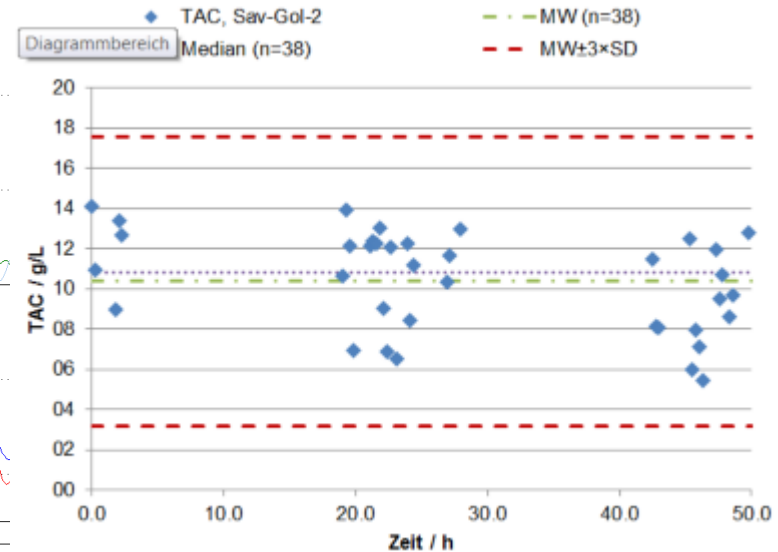
II) Spectra with water bands are removed. Signal changes are caused by the process itself.

**RESULT:** Fixed bend radius and the anti-twist device of the CERAMAT-FOS avoids impacts of the linear moved probe.

# Results achieved in Biogas plant



Red, Blue: sample measurement at different times  
 Green, Grey: service measurement zero base-line  
 at different times



Time plot of 3 measurement periods.  
 Between the sample measurements  
 a service cycle was performed.  
 The measurements have been taken  
 under control of an operator from one shift

# Confidentiality

**Please respect:**

**Confidential marked slides are  
not for public use !**