



APPLICATION INFO

Continuous UV/Vis/NIR Process Analytics in the Production of Pre-Polymers



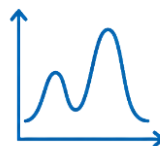
INDUSTRY

Coatings & Resins



APPLICATION

Pre-Polymer
Production



TECHNOLOGY

UV/Vis/NIR
Process Analytics



PRODUCTS

Hellma Falcata XP 12
Knick Ceramat

1 INDUSTRIAL RELEVANCE

Consistent resin quality requires precise control of pre-polymer formation

Polyester resins and alkyd resins are important high-performance binders for coatings and serve as essential raw materials for a wide range of coating and polymer systems. They are typically produced by polycondensation reactions carried out as bulk or melt processes in batch, semi-batch, or continuous reactor systems.



During the synthesis of those resins, pre-polymers are formed through polymerization. They must have a precisely defined and controlled reactivity to enable the targeted processing of paints, coatings, and varnishes. Consequently, end-group chemistry, residual reactivity, moisture sensitivity, and accurate endpoint control become significantly more critical than in many conventional resin or polymerization processes.

2 KEY CONSIDERATIONS

A particular challenge in the batch production of these products is that both the chemical composition and the physical properties of the reaction medium change during a single batch. Reliable monitoring of critical process parameters such as NCO content, temperature, viscosity, residual monomer content and moisture is therefore of great importance.

With conventional PAT probes, however, there is a risk of deposits forming on the probe windows, distorting the optical signal and leading to spurious drifts, particularly when measuring sticky or adhesive media such as viscous polymer materials. This compromises measurement quality and increases maintenance requirements.



CRITICAL FACTORS

- ✓ Accurate reaction endpoint control
- ✓ Regular cleaning of the probe
- ✓ Reliable monitoring of critical process parameters

3 PRODUCT SOLUTION

Easy cleaning during operation thanks to the combination of a process probe and retractable fitting

The **Hellma Falcata XP transflection probe** is specifically designed for measuring transparent or slightly turbid media. The compact and flexible measuring head delivers precise and reliable measurement results in seconds, enabling efficient and safe real-time monitoring of reaction progress, the composition of the reaction mixture, and critical quality parameters.

HELLMA TRANSFLECTION PROBE FALCATA XP 12



SPECIAL FEATURES:

- ✓ Compact & robust design
- ✓ Fast & accurate measurements
- ✓ Interchangeable path length tips

KNICK CERAMAT RETRACTABLE FITTING

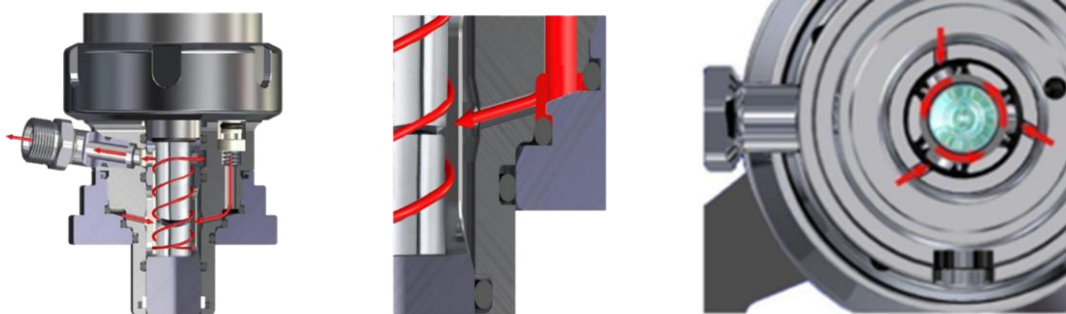


SPECIAL FEATURES:

- ✓ Automated probe cleaning
- ✓ Reference measurements/ calibrations not in running process
- ✓ No process interruption

The probe model is ideally complemented by the Knick Ceramat retractable fitting for this application. Thanks to its special locking mechanism, **the probes can be extended and retracted during operation**. The sealing function is performed by two ceramic discs that separate the calibration chamber from the process chamber through a rotational movement relative to each other. **Cleaning, reference measurements and calibrations are performed outside the process directly in this chamber, without interrupting the production run.**

The probe can be **removed for maintenance and service work without interrupting production**. An automated process allows for cyclic cleaning of the optical probe window when required. For cleaning, the flushing medium is introduced tangentially and directed through nozzles so that it completely flows around the chamber.



Knick patented cyclonic rinsing principle

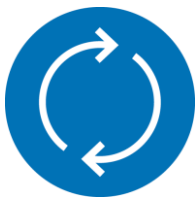
4 BENEFITS



PRECISE PROCESS CONTROL

Reliable UV/Vis/NIR process analytics, even with fouling media and demanding process conditions.

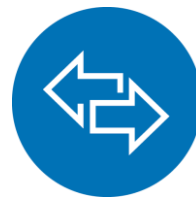
The robust construction of the probe provides outstanding chemical, temperature, and pressure resistance, ensuring **stable and reproducible measurements**.



CONTINUOUS PRODUCTION

No process interruption or reactor draining is required for probe cleaning.

Continuous process monitoring reduces waste and material losses, resulting in **improved cost efficiency**.



HIGH FLEXIBILITY

Variable path lengths enabled by interchangeable path length tips, combined with a broad selection of process connections, allow **adaptation to a wide range of different applications**.



ADDITIONAL INFORMATION

[Retractable Fittings for Probes](#)