

Measurement of Sizing Agents

Controlling of the Concentration of Starch, Carboxymethyl Cellulose and Polyvinyl Alcohol

In textile manufacturing, sizing agents play a critical role during the weaving process. Substances such as starch, carboxymethyl cellulose (CMC), and polyvinyl alcohol (PVA) are applied to yarns to improve strength, reduce friction, and minimize thread breakage during high-speed weaving operations. After weaving, these sizing agents are removed from the fabric during washing and desizing processes, generating large volumes of wastewater containing dissolved sizing materials. Traditionally, contaminated wash water has been discharged or treated as waste. However, increasing environmental regulations, rising water costs, and the high price of sizing chemicals have significantly increased interest in recovery and recycling solutions within the textile industry. Recovering sizing agents not only reduces wastewater pollution but also lowers operating costs by enabling repeated reuse of valuable materials. One of the most efficient methods for recovering sizing agents is ultrafiltration (UF). This membrane-based separation process concentrates dissolved polymers and starches while simultaneously producing reusable permeate water. Continuous monitoring of the concentration throughout the ultrafiltration process is essential to ensure stable product quality, efficient membrane operation, and optimal recovery performance.

Ultrafiltration in Textile Processing

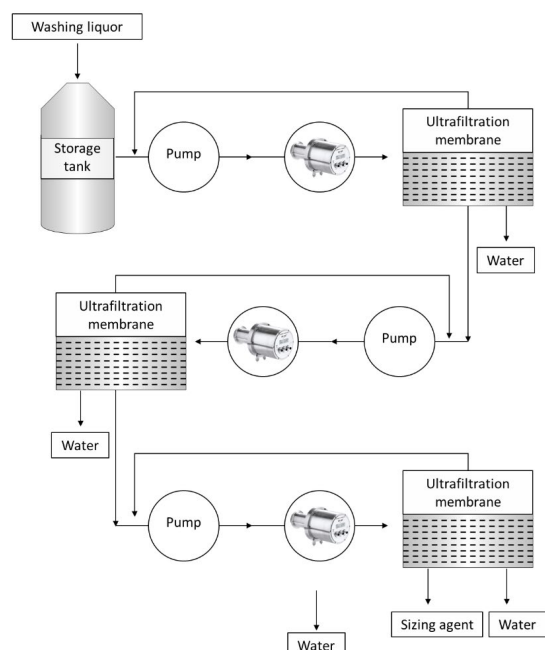
During the process, wash liquor containing diluted sizing agents passes through UF membranes under pressure. Water and smaller dissolved components permeate through the membrane, while larger polymer molecules and starch particles are retained and concentrated. Typically, the concentration of sizing agents in the washing liquor ranges from approximately 20–30 g/L. Inside the ultrafiltration system, these solutions are concentrated to levels between 150–350 g/L, allowing the recovered concentrate to be reused directly in the sizing process. At the same time, the permeate water can be recycled back into the washing process, significantly reducing fresh water consumption.

Refractive Index as Process Analytical Tool (PAT)

The refractive index is a highly reliable parameter for determining the concentration of dissolved sizing agents. Since the refractive index changes proportionally with concentration, inline refractometers provide precise real-time monitoring throughout the ultrafiltration process. Compared to conventional laboratory sampling methods, inline measurement offers major advantages:

- Continuous real-time concentration monitoring
- Immediate detection of concentration deviations
- Reduced laboratory workload and sampling errors
- Optimized membrane utilization
- Improved recovery efficiency
- Lower water and chemical consumption

Because refractive index measurement is independent of color and largely unaffected by suspended particles or process fluctuations, it is particularly suitable for demanding textile wastewater applications.



Solution from SCHMIDT + HAENSCH

Using the SCHMIDT + HAENSCH Full-Range Inline Process Refractometer iPR FR² provides a reliable method for monitoring the concentration of sizing agents during textile ultrafiltration and recovery processes. Installed directly in the ultrafiltration circulation loop or process piping, the refractometer delivers continuous real-time concentration measurements throughout the entire recovery process. This enables immediate detection of concentration changes and ensures optimal recovery efficiency as well as consistent sizing agent quality for reuse. The iPR FR² can be installed on the pressure side of the circulation pump, directly in the UF system, or alternatively in a bypass line for flexible process integration without interrupting production operations.



iPR FR²
Full-range Inline
Process Refractometer

Product type	Product	ID-N°
Process Refractometer	iPR FR ² Full-Range Inline Process Refractometer	10970
Accessories	VARINLINE® housings (severals ends and diameters)	
Accessories	VariVent Tank weld-in flange	07516

Advantages

- Accurate, reliable, and fast inline concentration measurement
- Continuous real-time monitoring during ultrafiltration and recovery processes
- Optimized recovery efficiency of sizing agents such as starch, CMC, and PVA
- Reduced water consumption and wastewater discharge
- Lower operating and chemical costs through reuse of sizing materials
- Reduced risk of production interruptions and process deviations
- Consistent sizing agent quality for textile production reuse
- Enhanced sustainability and resource efficiency in textile processing

Typical industries

- Textile manufacturing
- Textile wet processing
- Fabric weaving operations
- Industrial laundry and washing systems
- Membrane filtration and recovery systems
- Technical textile production