

Membrane filtration system in pharmaceutical industry

**Membrane filtration systems are essential in the pharmaceutical industry for purifying water, separating, Concentrating & Purification of drug compounds, and ensuring product quality reducing cost and time.**

Here's a detailed look at how these systems are used and why they matter:

### ❑ What Is Membrane Filtration?

Membrane filtration is a separation process that uses semi-permeable membranes to remove particles, microorganisms, and dissolved substances from liquids. In pharma, it's primarily used to:

- **Purify water** for drug formulation and equipment cleaning
- **Separate and concentrate active pharmaceutical ingredients (APIs)**
- **Ensure sterility** in injectable and ophthalmic products

### ❑ Types of Membrane Filtration in Pharma

Each type targets different particle sizes and applications:

Filtration Type	Pore Size Range	Common Uses in Pharma
<b>Microfiltration</b>	0.1–10 µm	Removal of bacteria, suspended solids
<b>Ultrafiltration</b>	1kda – 100kda	Protein separation, virus removal, molecule separation, Monomer removal.
<b>Nanofiltration</b>	100da – 1000da	Removal of small organic molecules, divalent salts
<b>Reverse Osmosis</b>		Production of ultrapure water

### ◆ Applications in Pharmaceutical Manufacturing

- **Water purification:** Critical for producing Water for Injection (WFI) and Purified Water (PW)
- **Sterile filtration:** Ensures injectable drugs are free from microbial contamination
- **API & Mother Liquor recovery and concentration:** Enhances yield and purity
- **Wastewater treatment:** Supports sustainability and regulatory compliance

### ✓ Regulatory and Operational Benefits

- **Meets GMP and FDA standards** for water and product purity
- **Scalable and cost-effective** for large production volumes
- **Reduces chemical usage** compared to traditional filtration
- **Improves product consistency and safety**