
ABB MEASUREMENT & ANALYTICS | DATA SHEET

9380/100

Ultrafilter



Measurement made easy

Powerful filtration technology –
simple solutions

Ensures maximum availability of associated analyzer measurement

- produces filtrate free of all suspended solids down to 0.02 µm
- tubular filter design with close-fitting membrane

Reduced maintenance

- specialized cross-flow design

Optimum self-cleaning action

- filter membrane only 1 µm thick

Rapid response to sample changes

- high sample flow rate, low volume retention

Easy access for cleaning

- quick-fit coupling fittings

Description

The 9380 Ultrafilter is a tubular filter that produces filtrate free of all suspended material down to 0.02 µm, including bacteria, algal spores and colloidal material. The filter is recommended for use with ABB ion-selective and colorimetric analyzers in dirty-water applications such as sewage, wastewater, industrial effluent and river water monitoring.

The cross-flow design of the filter gives it self-cleaning properties that considerably reduces off-line maintenance and enables samples with high solids content to be handled.

Previously, such samples could not be analyzed successfully without frequent analyzer cleaning.

Ultrafiltration

In general, ultrafiltration is the removal from solution of all suspended material down to ultrafine particle sizes. In practice, this includes the removal of microbiological material such as bacteria, algae and sewage final effluent particles, together with colloidal material, down to at least 0.02 µm.

By removing biological material, ammonia stripping in the line after filtration is avoided. However, build-up of filtered material on a membrane-surface / matrix can still result in stripping at the filtration point unless kept to an absolute minimum.

The cross-flow design of the ABB Ultrafilter gives high linear sample flow rates across the membrane surface providing a self-cleaning action.

Cleaning with water is a very efficient method of removing deposits on the surface of filter membranes and enables samples with high solids content to be handled. Since the filter membrane is only 1 µm thick, filtration takes place on the surface not within the membrane, maximizing the effectiveness of the self-cleaning action.

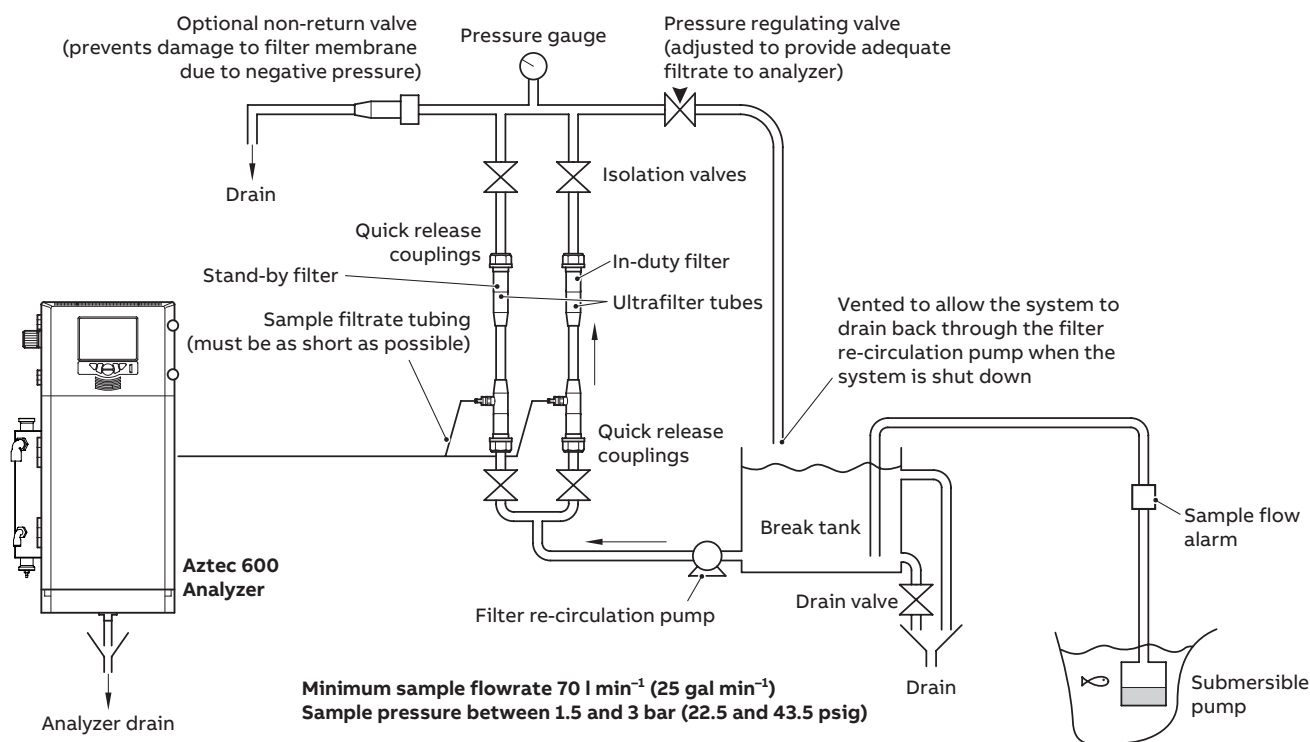
Satisfactory operation relies very significantly on adherence to minimum sample velocities and pressures. The more contaminated the sample (for example, raw sewage or activated sludge), the more critical pump performance and attention to regular maintenance becomes.

Installation

The Ultrafilter installation must be designed carefully to suit the specific circumstances existing on site and to minimize routine maintenance.

A typical installation is shown below. This includes an optional dual filter arrangement (for example, one in service and one on standby) and a two-stage pumping system that is required when the sample must be pumped over large distances or where the sample must be lifted a long way up to the analyzer.

The final installation is dependent on the specification of the pump(s) used. If the sample lift and pumping distances are within the specification of the filter re-circulation pump, the break tank and associated pump are not required.



Typical Ultrafilter installation

Ultrafilter construction

The Ultrafilter comprises a tubular shell enclosing a second tube joined at each end such that a sealed annular space is formed. The inner tube consists of a filter element with a close-fitting, semi-permeable membrane applied to the surface of a flexible porous polyester support material. The sample water flows through the inner tube longitudinally to the membrane at high pressure and velocity.

The membrane excludes all suspended solids with particle size greater than approximately $0.02\ \mu\text{m}$. It can tolerate a pH range of 2 to 10 but can be damaged by some organic solvents. Membrane life depends on the nature of the sample and varies for each application but can be up to 2 years under favourable conditions.

Maintaining and cleaning ultrafilters

A common problem in measuring water samples from rivers or treatment works is the presence of bacteriological growth in the sample. In the form of algae it creates a problem by growing inside the filter and, if severe, this growth can hinder the efficiency of the system.

Algae may also affect the concentrations of the measured parameter in the sample. This is particularly severe when monitoring ammonia. Single microbiological growth in supply lines may cause ammonia stripping and, consequently, a reduction in the measured concentration. Other parameters may also be affected.

It is therefore essential to maintain sterile conditions. This requires periodic cleaning and it is recommended that a regular maintenance programme is introduced rather than wait for visual signs of the presence of microbiological growth. Once growth is visible the problem is already serious.

To ensure reliability of supply and maximum life clean the ultrafilter weekly, especially if it is being used on biologically-active samples. If it is found that fouling is minimal the period of cleaning may be extended.

The recommended cleaning agent for ultrafiltration tubes is sodium hypochlorite solution containing about 0.05 % ($500\ \text{mg l}^{-1}$) available chlorine.

Specification

Housing body

PVC

Membrane

PVDF and epoxy-impregnated polyester and fiberglass

Operating pressure

1.5 to 3.0 bar at 38 °C (22.5 to 43.5 psig at 100.4 °F)

Maximum operating pressure

5.8 bar (85 psig)

Maximum operating temperature

49 °C (131.8 °F)

pH range at 49 °C (131.8 °F)

- Continuous 2.0 to 10.0
- Short term 1.5 to 10.5

Minimum flowrate

70 lmin⁻¹ (25 galmin⁻¹)

End connections

1¼ in. union bush fitting

Filtrate outlet connections

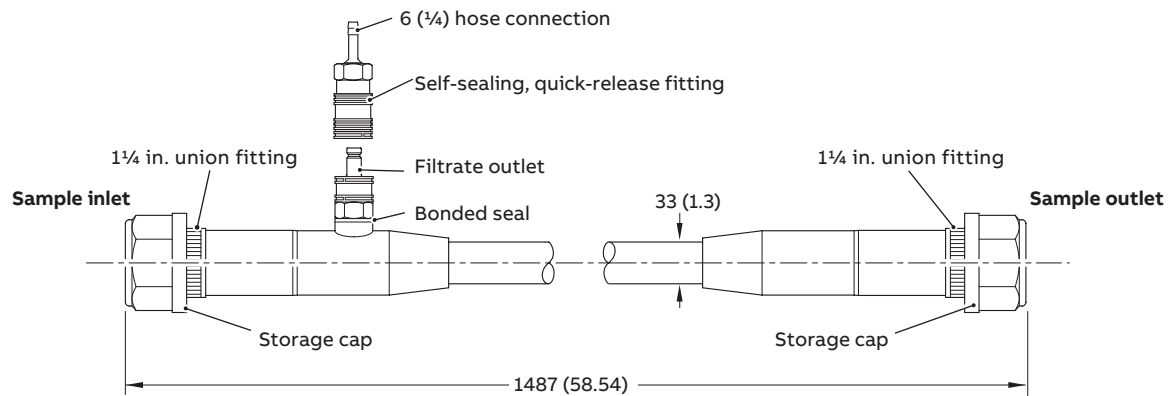
6mm (¼ in.) OD hose connection, quick-release fitting

Filter tube dimensions

1.487 m (58.54 in.) long

Overall dimensions

Dimensions in mm (in.)



Service



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