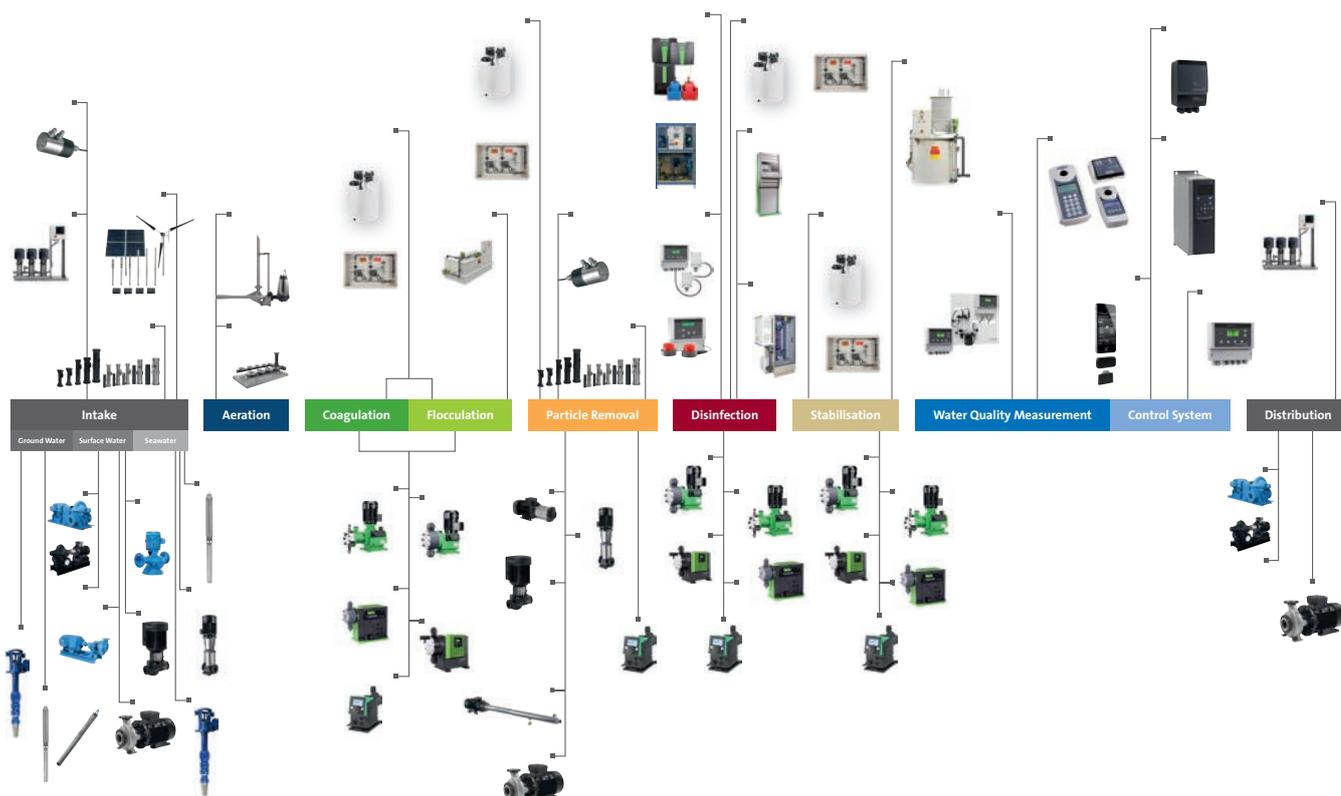


Reliable and efficient ultrafiltration applications



By Marco Witte, Application Manager Water Treatment, Grundfos Germany

Email: mwitte@grundfos.com

In many water treatment applications, the removal of particles is the center part in order to provide clean water to the afterwards usage. An ultrafiltration plant removes effective particles down to a size of $0,01 \mu\text{m}$, such as bacteria, suspended solids, etc. The pressure range in which an ultrafiltration is running lasts from 1 - 10 bar. The size of ultrafiltration plants can vary from small-scaled systems, e.g. water supply in remote areas with only a few consumers, up to big industrial parks with the use as process water and water supply for thousands of people.

Major challenges in the ultrafiltration applications can be:

- Changing raw water conditions (e.g. turbidity increase, etc.)
- Changing demand on the clean water side

These challenges must be handled and solved by a modern set-up, in a reliable and smooth way.

With a complete water treatment solution from Grundfos you obtain multiple advantages:

- All pump components are “speaking” the same language
- Changes in flux rates are easily adapted by the pump systems
- Easier engineering
- Intelligent and reliable dosing in pre-treatment and chemical backwash/cleaning
- Energy saving
- Chemical saving

Let’s have a look at the advantages in more detail:

Intelligent Booster*:

1. Flow variability, pressure stability:

An intelligent booster can account for variability in water supply requirements for an UF system. A good deal of variability could take place despite these being ‘fixed-flow units’. Seasonality, process fluctuations or even water supply restrictions can cause variability. The right drive on a pump can help to control flow without wasting energy, e.g. with a throttling valve. Additionally, a drive can allow for simple constant-pressure control for your membrane system regardless of changes in supply or discharge pressure (variability).

2. Save energy:

End-users often use a throttling valve to decrease flow on a fixed speed pump. This wastes large amounts of energy and money, a problem exaggerated when pumps are over-sized when engineered. Furthermore, throttling will move a pump down the efficiency curve, so not only is the power draw higher, it is less efficient. A drive can allow you to dial in the exact flow and pressure requirement, and save large amounts of energy at better efficiencies.

3. Membrane wear:

Moreover, an efficient booster pump softens the start-up and shut-down of flow. This eliminates powerful water forces that can, under some circumstances, increase wear of membranes in a system.

4. Membrane degradation:

All membranes will foul eventually and require cleaning – and as membranes clog, the pressure requirements to treat water at the same flow rate increases. Without a drive, a system with a fixed-speed pump will begin to deliver less than the rated permeate flow. A drive and pump can account for pressure changes easily, allowing end-users to go longer between cleanings without a loss in production flow; all provided that you don’t surpass water quality requirements.

5. Plan for the future:

The right drive and pump selection can help you plan for future system enhancements. This could be changes to the trains, newer, lower pressure membranes or process flow changes. This flexibility will make retrofits cheaper in the future, so you can take advantage of new green and performance solutions.

6. Think integrated:

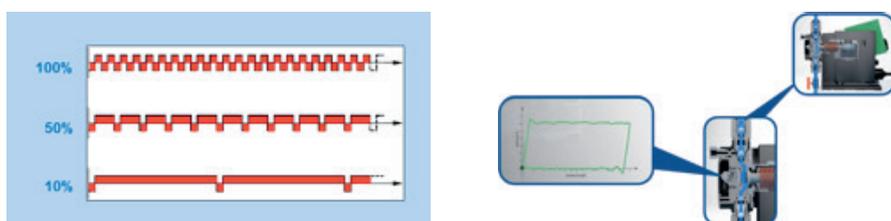
Newer pumps include integrated drives, where a drive is optimised for, mounted on, and works together with the pump motor. This can help reduce motor sizes, optimise performance and ensure the pump is protected. Also, look for a pump-designed drive. Many drives on the market are generic to a variety of motor needs. A drive designed for pumps can make installation and set-up easier, and increase efficiency.

Grundfos' CR/CRE pump range will accommodate all the above. The basic CR multi-stage centrifugal in-line pump range can be customised for and applied in almost any industrial water treatment solution thanks to its modular design.

Chemical Dosing in pre-treatment and backwashing:

1. Precise Dosing:

Grundfos' Digital Dosing pumps can deliver the required amount of chemicals very accurately. When we look at the diagram below one can see the nearly continuous dosing flow, which is provided by the motor technology of the stepper motor, even with small volumes. The flow is controlled by an integrated flow monitor, which is able to give feedback about the actual flow in comparison to the set point.



Picture 1: Flow monitor principle and dosing flow diagram

2. Simple Dosing:

On top of that the SMART Digital range will provide modular pumps for easy system integration. The clear menu structure and the plain text menu provide the needed information about the status of the pump and eases the live of the system operators in the daily work. Communication with this pump is no longer a challenge in the system integration. By connecting via the e-box it is possible to communicate in many different ways with the overall PLC.



The example illustrates the range of intelligent pump solutions to supply for an efficient and reliable filtration process.

Sources:

*Harland Pond: Using Pump Variable Speed Drive Solutions in Membrane Filtration