

STANDARD FEATURES:

- Completely Modular Design To Meet Virtually Any Requirement
- Recirculation Loop Flows up to 50 gpm
- Resistivities up to 18+MΩ
- Makeup Flows to 12,000 GPD

ADVANTAGES:

- Materials Selected to Maintain Water Quality
- Components Selected For Long Term Service
- Standard Designs Reduce Cost, Installation and Delivery Time
- Simple Operation Reduces Operator Training Requirements

MODULE OPTIONS INCLUDE:

- Polypropylene or PVC Piping
- Cartridge Filtration
- Carbon Pretreatment
- Dual and Single Water Softeners
- Reverse Osmosis Units
- Post-RO Demineralization
- RO Storage Tanks
- Recirculation Loop Pumps and Controls
- Distribution Pump and Controls
- Polishing Demineralization
- UV Sterilization
- Post RO Cartridge Filtration
- Polishing Loop Resistivity Monitors
- Automatically Controlled Make Up Water Supply
- Recirculation Loop Back-Pressure Regulation

**For Options Not Listed Here
Please Contact Nalco Res-Kem**

Nalco Res-Kem pre-designed modular ultrapure water systems to match your water requirements to available water treatment technologies. Using a simple water treatment design and only the equipment you need, a series of modules can be joined together to achieve the required water quality for your process or industry. Nalco Res-Kem took this path because every water source is different and the required water quality depends upon the product being manufactured and the industry being served.

Variety of Standard Sizes

Used in conjunction with portable exchange DI systems, the standard recirculation loop flows of up to 50 gpm and resistivity of 18+ Meg-ohm can be achieved. With a custom design, higher flow systems are available. Nalco Res-Kem Zeo-Tech Modular Ultrapure Water Systems are ideal for laboratory, electronic, pharmaceutical, and many other commercial applications. Regeneration of the exchange tanks is available through our sister company, General Water Services.

Economical and efficient, Nalco Res-Kem Zeo-Tech Modular UPW Systems can be equipped for semi-automatic or full-automatic operation. Regardless of the configuration, only limited technical expertise is required for operation. Nalco Res-Kem Zeo-Tech Modular UPW Systems will integrate into a complete water treatment system without expensive custom field engineering and programming.



Recirculation Loop Repressurization and Treatment Module

Why use an Ultra Pure Water System?

Ultra pure water treatment is required in many industries, applications, and processes. Nalco Res-Kem offers a series of pre-assembled, modular systems for the production of a continuous supply of high purity deionized water. These pre-packaged ultra high purity water systems combine the operation of several water purification processes within each skid mounted assembly. Among the many applications for ultra pure water are:

- Nanotechnology products
- Laboratories
- Semiconductor Fabrication
- Medical Device Production
- Pharmaceutical Plants
- Electronic Products
- Alloy metal fabrication
- Aerospace

Prefiltration Module

All systems require a filter to treat all of the water entering the water treatment system. Nalco Res-Kem selected two options for prefiltration, cartridge filtration and multi-media filtration. A prefilter will remove any large suspended particles and solids that can damage downstream equipment. A cartridge prefilter is generally the lowest installed capital cost, but the operating cost can be very high if there is poor quality inlet water. A multi-media filter has a slightly higher capital cost, but virtually no operating costs. The system simply backwashes on an as-needed basis.

Water Softener Module

A water softener should be installed when the inlet water hardness is greater than 50 ppm or 3 grains/gallon. The industrial water softener is particularly important in systems with a Reverse Osmosis, RO, system. Calcium, Magnesium, Manganese, and Iron can precipitate within the flow passages of the RO membrane. A water softener will reduce downtime required for membrane cleaning, increase membrane life, and virtually eliminate unplanned system shutdowns.



Two configurations are used. When continuous flow is required, a dual tank softener will be required. If your plant operates 1-2 shifts per day, a properly sized, single tank softener is fine.

Activated Carbon Filtration Module

If your system has an RO and is on city water, an activated carbon filter is required to remove the chlorine or chloramine used to protect the population from harmful bacteria. If you do not remove the chlorine or chloramine, the life of your RO will be severely shortened. Depending upon the level of either oxidant, a noticeable degradation in RO membrane rejection will happen in as soon as a few months. Even if your water does not have chlorine or chloramine, carbon filtration is still highly recommended to remove organics in the feed water which can foul the membranes.



Two carbon filtration modules are offered by Nalco Res-Kem. The simplest option is to use a carbon exchange service like our sister company [General Water Services](#) provides in the mid-Atlantic region. The other choice is to install a simple backwashable activated carbon filter. The backwashing step will increase the life of the carbon by removing suspended material from the top of the bed where it may accumulate. The tradeoff between the two options is the exchange carbon involves a smaller capital investment, but a higher operating expense. The backwashable activated carbon system has a nominally higher capital cost requires a drain line connection, and carbon replacement every 2-4 years.

Reverse Osmosis System Module

The heart of a Nalco Res-Kem modular water treatment system is the RO system. The RO system removes 95 - 98% of the feedwater ions. Since an RO membrane acts as a barrier, particles and bacteria will be removed. While an RO is a great tool to produce consistently high quality water, it is particularly susceptible to foulants and oxidants. To reduce the potential for the damage, Nalco Res-Kem has the pretreatment modules of filtration, softener, and/or carbon filtration described above.



An RO system performs best and most efficiently when it operates nearly continuously.

Also, after an RO system, a storage tank is highly recommended. The level in this tank will turn on and off the RO system.

The standard RO systems have between 1 and 6 RO membranes. These systems operate at a recovery of 95% and higher depending upon the inlet water quality. To keep the RO system at or near continuous operation, the number of elements should be tailored to the typical water demand downstream of the RO system.

Post RO Demineralization Module

As the water quality requirements increase, a deionization process should be added to the RO permeate line before the water enters the RO/Recirculation loop storage tank. Doing this will increase the "makeup" water resistivity and quality. The deionization process used is called exchange deionization. A service DI tank provider, like [General Water](#), will deliver regenerated mixed bed resin in pressure vessels or tanks, connect the tanks into the water treatment system, and remove the used or exhausted tanks of resin. After the tanks are brought back to the service company, the resins are recycled by regenerating it in a regeneration facility.

RO/Recirculation Loop Storage Tank Module

Almost without exception, a properly designed recirculation loop and storage tank will substantially improve the operation and reduce the capital cost of the entire treatment system. A storage tank and recirculation loop pump will easily handle rapid and large surges in water demand. As stated above, an RO is designed for relatively constant flow rate. **Without a tank, the only option is to size the RO, and all equipment ahead of it, for the instantaneous demand.**



For example, if the instantaneous flow rate of your process is five times greater than the average flow rate, your prefiltration, softener, carbon filter, and RO will all have to be about four times larger than equipment sized for the lower, average flow rate. Nalco Res-Kem finds the capital expenditure will be dramatically higher when you have to upsize the equipment versus adding the cost of a tank.

Distribution Loop Module

The final module of the of the water treatment system is the repressurization and final treatment before the water enters the recirculation loop. This module includes the recirculation loop pump, two service DI mixed beds tanks in series, an ultraviolet unit, and a final filter. A resistivity monitor and sample ports insure the correct water quality is going to your manufacturing process.

Using all of the treatment modules will achieve the highest water quality. For less critical water quality requirements, fewer modules will be necessary to achieve the water quality for your process.

