Ultrapure & Industrial Services, LLC
Total Service and Support For Water Treatment Systems
ISO 9001: 2008 Certified

The following information pertains to a high purity water system and a basic breakdown of each piece of equipment and a synopsis of its function.

1. **City Water Supply Brass Double Check: This equipment acts as a control and barrier of your city water supply. It allows city water into your system and will not allow for a backwards flow so that anything from the check on will not penetrate through a reverse flow back into the city water supply.**

2. **Carbon Filter: This is an FRP (Fiberglass) tank which is filled with granular activated carbon (AGC40-MG – Resintech Carbon / Medical Grade). The carbon media removes color, odor, taste, and chlorine in ppm levels from the city water supply. The basic method of removal is adsorption. Chlorine is removed because it is an oxidizer and can damage other resins and or membranes up-stream.**

3. **Softener System: This is also and FRP tank and resin media system. The tank is 60% filled with Cation Ion exchange resin beads in the sodium form. This resin is specific to the removal of hardness ions such as calcium, magnesium and potassium. These ions can cause scale to form on the interior of piping or on the RO membrane surface and causes them to fail prematurely. The beads are loaded with salt ions and exchange those salt ions for hardness ions until they are "exhausted" or unable to continue to exchange and then the softener goes into "regen mode" where-by salt which is in the brine tank is saturated with surface water and is forced to flow through the resin tank and regenerate the resin bead so that they are once again loaded with salt ions and the process begins again.**

4. **Reverse Osmosis System: There is a pre-filter (1 or 5 micron) followed by a reverse osmosis membrane which under pressure from a pump forces water through the membrane surface so that what remains is sent to drain as "concentrate" and what makes it through the membrane surface goes to the storage tank as product or "permeate." RO membranes are expected to reject between 90% – 98% of the contaminants and salts in the feed water. When they can no longer do this because they are impregnated with contaminants they must be either replaced or cleaned.**

5. **Storage Tank: You may have a cone bottom storage tank which holds the RO permeate as well as the return loop water. The RO permeate is held in storage and is circulated through the "polish loop" and returned to the tank through the PRV (pressure regulating valve) until such time as it is required at the POU or "Point of Use."**

6. **Distribution Pump: This pump pulls water from the bottom of the storage tank, and forces it through the remaining polish loop and subsequent equipment used to "polish" the water to a attain certain quality specification. This pump generally runs between 35 – 60 psi and at a flow rate that is regulated to meet the end user requirement.**

7. **Deionizers: This is a two-bed system in a lead / lag configuration. Each tank is FRP and is filled with "mix bed ion exchange resin." The two components being cation resin in the hydrogen form and anion resin in the hydroxyl form. These beads exchange hydrogen ions and hydroxyl ions for other contaminants and clean up or "polish" the water for use as required by the end user. DI water is aggressive and is used to remove contaminants from many other surfaces because it pulls those unwanted ions into the flow path by ion exchange as it "wants to get dirty." The general water quality specification for RO followed by DI is measured in resistivity and should be in a range from 10 meg-ohm to 18.2 meg-ohms resistance. DI water quality is measured by its resistance to conduct electricity.**

8. **Ultraviolet Sterilizer: Ultraviolet light which is NOT visible is used to sterilize bacteria and virus by use of the 254nm wave length of light. This wave length causes bacteria and virus to become sterile and unable to reproduce. Based on the various bacteria and virus and the flow rate of the water path the size of the UV unit can be deduced so that no "viable" bacteria can come through the effluent side of the UV sterilizer.**

9. **Final Filtration: This filtration method is used to remove the remaining particles as well as any remaining bacteria and / or virus in the flow path. The filter is sized in a "sub-micron" measurement. The size of this filter should be either 0.2 or 0.1 micron to properly remove the final contaminants.**

10. **Distribution Loop: The loop is defined as a system of piping coming from storage, through additional purification / water treatment equipment and returning to the storage tank such that it is in constant flow and is in fact a "loop." Loop size is determined by end user requirements for flow and water usage. Optimum flow rates for DI water are based on pipe / loop length and pipe diameter and are ultimately based on what the final end user application and volume needs are.**