IPEC Purified Water Generation Systems are designed to produce compendial water for industries where supply dependability and quality are critical. Our standard systems are available with a range of output capacities and can be fabricated quickly with an array of options to meet aggressive project schedules.

The methods used to sequentially purify feed water provide low-maintenance solutions using established technologies. Each system is custom-configured based upon the product water specifications and actual properties of the incoming feed water.

Modular, pre-engineered system designs minimize the package footprint, utility requirements and installation efforts. Pre-validation and Factory Acceptance Testing (FAT) further reduce required time and effort for commissioning on-site.

IPEC’s experience as a global leader in customized, modular process systems also strengthens our ability to support customers with atypical requirements or unique site limitations. We are available to assist with specification, design and fabrication of specialized equipment solutions for challenging situations.

www.ipec-inc.com/water  sales@ipec-inc.com  920.568.0475
In its most basic form, the IPEC Purified Water Generation system provides feed water pre-filtration and reverse osmosis (RO) treatment. The grade of purified water (USP, etc.) and data provided by an on-site feed water analysis will determine which optional equipment will be required to meet specification. Beyond that, there are several instruments or treatment devices, such as UV disinfection lamps or TOC monitors that may be included based on customer preference.

The following pages briefly describe our standard available options. Please refer to the accompanying Budgetary Pricing Summary for additional information or contact IPEC to review which options to include with purchase.
Softening
Twin-alternating or three-tank, progressive flow water softeners for removal of feed water mineral hardness. Required if softened feed water is not available.

Media Filtration
Twin-alternating or three-tank, progressive flow media filters for feed water pre-treatment. May be recommended or required if feed water contains high levels of turbidity, silt, silica, or suspended solids.

Softening
Twin-alternating or three-tank, progressive flow water softeners for removal of feed water mineral hardness. Required if softened feed water is not available.

Sodium Bisulfite Addition
Equipment for injection of sodium bisulfite in the feed water as it fills the break tank. May be required if de-chlorinated feed water is not available.

Booster Pump
Booster pump to charge feed water from the vessel, through additional pre-treatment devices that would otherwise inhibit gravity feed to the RO Feed Pump. Required if any of the following options are included: Hot Water Sanitization, Pre-Treatment UV, Carbon Filtration.

Break Tank Vent Filter
Electric heat-jacketed vent filter (0.2 µm cartridge) on the Feedwater Break Tank and a rupture disc on the tank overflow down-tube. Recommended for systems to be installed in non-cleanroom environments (mechanical space).

Hot Water Sanitization
Capability to hot water sanitize (HWS) the system using a steam or electric heating. Useful to reduce the frequency with which the system must be taken off-line for chemical sanitization.

Carbon Filtration
Granular activated carbon filtration of RO feedwater. May be required if de-chlorinated feed water is not available, which would otherwise prematurely degrade downstream RO membranes.
**ORP Sensor**

ORP sensor & transmitter. Provides confirmation that upstream treatment for chlorine removal is operating properly.

**UV Disinfection/TOC Reduction**

Lamps for dosing water with Ultraviolet (UV) light for disinfection or TOC treatment. May be used to reduce microbial activity at various points within the system.

**Stainless Steel RO Housings**

Replacement of standard fiberglass reinforced plastic RO housings with ASME Code stamped stainless steel units.

**Mixed-Bed Deionization**

System configuration for use with in-line mixed-bed deionization (DI) columns. Assumes the DI columns/bottles will be provided and serviced by others (local). May be required to produce water meeting USP requirements for conductivity.

**Degassing**

Membrane contactor(s) with associated equipment for control. May be recommended or required if feed water contains high levels of dissolved CO2 or other contaminants.

**Continuous Electrodeionization (CEDI)**

System configuration for use with one or more CEDI stacks may be required to produce water meeting USP requirements for conductivity.

**Final Filtration**

Integration of stainless steel filter housing and 0.2 μm filter cartridge(s) for product discharge. Enhances removal of microorganisms.
TOC Monitoring
On-line sensor and analyzer for continuous monitoring and alarming if TOC levels approach or exceed defined set-points. Beneficial to avoid potential errors associated with off-line sampling.

Microbial Monitoring
On-line bioburden monitor for continuous monitoring and alarming if microbial levels approach or exceed defined set-points. Beneficial as standard, off-line sampling requires 24-48 hours for results.

CIP System
Portable CIP System for use with chemically cleaning or sanitizing individual components (RO membranes, CEDI modules, etc.) or system piping. Wide range of functions and options available. Contact IPEC for more information.

Additional Options
Many additional services are available to support equipment design, validation, installation and commissioning:

• Seismic Certification
• System piping pressure testing
• Factory Acceptance Test (FAT) Protocol & execution (pre-validation)
• Vessel spray device coverage (Riboflavin) testing
• System piping passivation
• Freight coordination/shipping
• Installation supervision
• Site Acceptance Test (SAT) Protocol & execution
• Installation Qualification/Operational Qualification (IQ/OQ) documentation
### Purified Water Generation - General Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>600</th>
<th>1400</th>
<th>2000</th>
<th>3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Generation Rate gpm (lpm)</td>
<td>6 (26)</td>
<td>14 (53)</td>
<td>20 (75)</td>
<td>30 (113)</td>
</tr>
<tr>
<td>Minimum Feed Water Rate - gpm (lpm)¹</td>
<td>20 (75)</td>
<td>60 (227)</td>
<td>70 (265)</td>
<td>80 (303)</td>
</tr>
<tr>
<td>Minimum Feed Water Pressure - psi (bar)¹</td>
<td>20 (1.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Service (3ph 480VAC) A²</td>
<td>30</td>
<td>60</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

### CONTROLS

- **Electrical Enclosures**: NEMA 4X, 304 SS, UL 508A
- **PLC**: Allen Bradley CompactLogix³
- **Touchscreen Interface**: Allen Bradley PanelView Plus³ 15”
- **Operator Interface**: Graphics-Based
- **Network Communications**: Ethernet³
- **Solenoids**: Panel-Mount³
- **Instrument Cabling**: Multi-Pin Connectors
- **Pneumatic Tubing**: Plastic³, SS Conduit, Exposed Final Drops
- **Conduit**: PVC-Coated Rigid Galvanized Steel³

### STRUCTURAL & PIPING

- **Framing**: 304 Stainless Steel Box Tube
- **Pre-Treat/Pre-RO**: 316L SS tubing and Sch. Pipe³
- **Post-RO**: 20 Ra³, 316L SS Tubing, Orbital-Weld, BPE

### COMPREHENSIVE DOCUMENTATION PACKAGE

Information and general descriptions included in this brochure may not always apply in actual case of use and are subject to change as a result of further product development. Any obligation to provide the respective characteristics described herein shall only exist if expressly agreed upon in contract terms.

---

¹ Required flow rate and pressure will vary based upon selected or required optional components. To be reviewed and verified at time of order.
² Amperage required for base model. Certain options require additional power.
³ Standard manufacturers, models or system features may be modified upon request.
Storage & Distribution

IPEC also provides Purified Water and WFI Storage and Distribution Systems to complete your plant water utility. These systems are configured with storage volumes and distribution rates designed to match the specific demands of your facility.

You can rely on our industry experience to help guide and assist you with selection of the most appropriate instrumentation, sanitization and automation options.

Optional Items

- Duplex Pumps
- Hot Water Sanitization
- Ozone Sanitization
- UV Disinfection
- Loop Filtration
- TOC & Bacterial Monitoring
- Point-Of-Use (POU) Equipment

Detailed Analysis

IPEC has developed special tools to facilitate customer decision-making for final design of Storage & Distribution Systems. This simple, yet powerful calculator provides quick comparisons of different scenarios (tank volume, loop flow rate, POU consumption) to visualize system performance so you can be confident in your vessel and loop capacity for current and future demand.

<table>
<thead>
<tr>
<th>SYSTEM DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purified Water Generation Rate:</td>
</tr>
<tr>
<td>Storage Vessel Working Volume:</td>
</tr>
<tr>
<td>Assumed Daily Starting Volume:</td>
</tr>
<tr>
<td>Volume to initiate Fill Request:</td>
</tr>
<tr>
<td>Supply Loop Length:</td>
</tr>
<tr>
<td>Loop Tubing Diameter:</td>
</tr>
<tr>
<td>Pump Supply Flow Rate:</td>
</tr>
<tr>
<td>Pump Supply Output Pressure:</td>
</tr>
</tbody>
</table>

TANK VOLUME (GAL) VS. TIME

<table>
<thead>
<tr>
<th>LOOP RETURN VELOCITY (FT/SEC) VS. TIME</th>
</tr>
</thead>
</table>

www.ipec-inc.com/water  sales@ipec-inc.com  920.568.0475