Purified Water Generation

IPEC

Pure & Simple

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.

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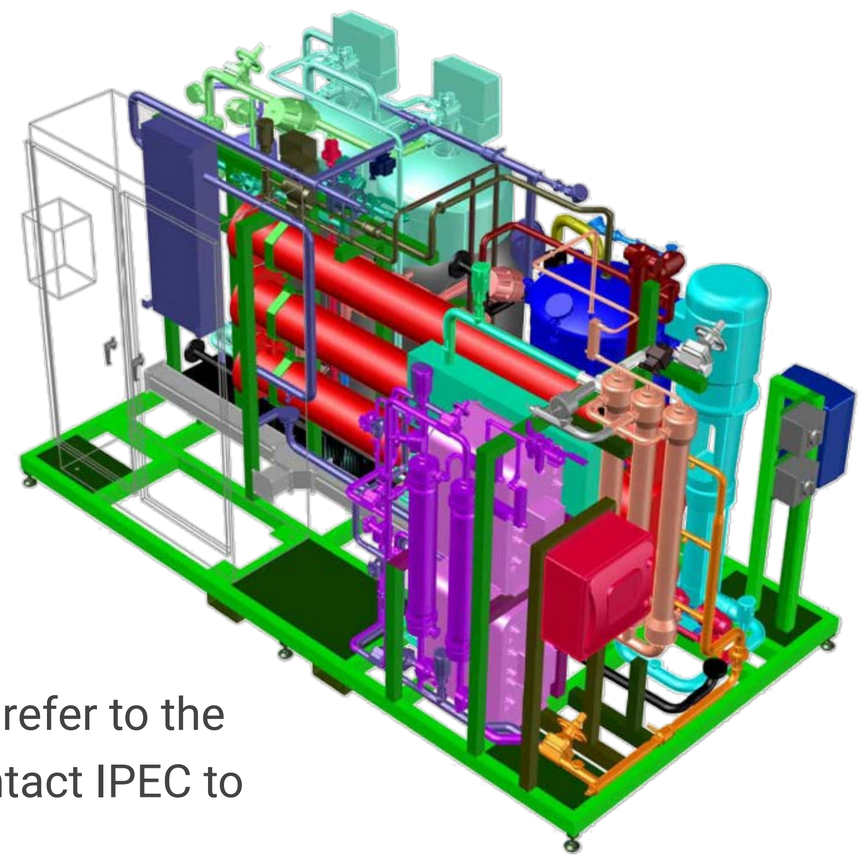
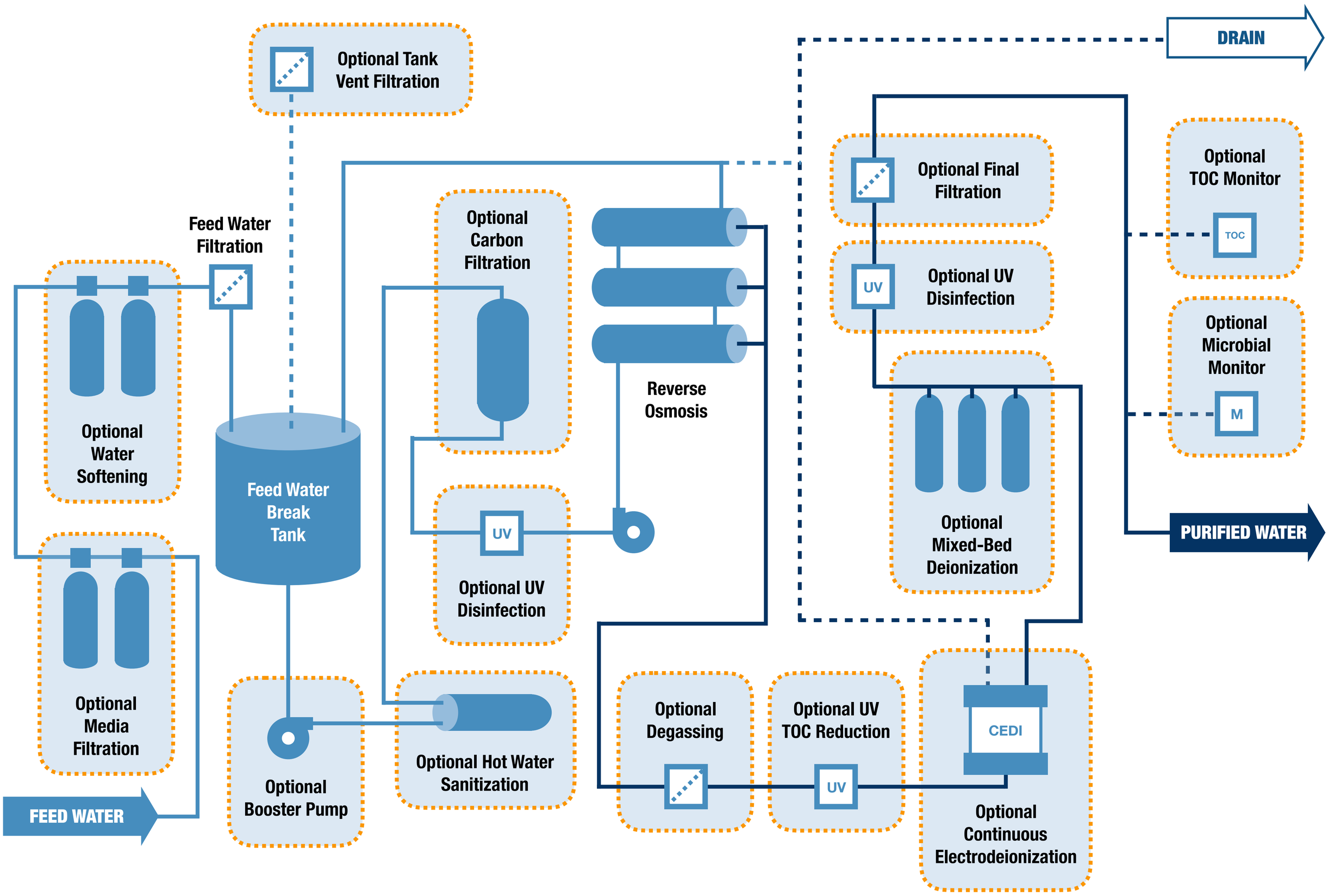
Customize Your Water



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.



Purified Water Generation - Options

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.

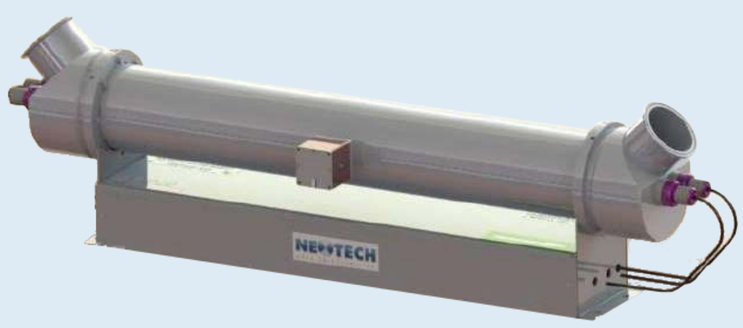
Carbon Filtration

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

Purified Water Generation - Options

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 ore 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.

Purified Water Generation - Options

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

Model	600	1400	2000	3000
Nominal Generation Rate gpm (lpm)	6 (26)	14 (53)	20 (75)	30 (113)
Minimum Feed Water Rate - gpm (lpm)[1]	20 (75)	60 (227)	70 (265)	80 (303)
Minimum Feed Water Pressure - psi (bar)[1]	20 (1.4)			
Electrical Service (3ph 480VAC) A[2]	30	60	100	100

CONTROLS

Electrical Enclosures: NEMA 4X, 304 SS, UL 508A

PLC: Allen Bradley CompactLogix[3]

Touchscreen Interface: Allen Bradley PanelView Plus[3] 15”

Operator Interface: Graphics-Based

Network Communications: Ethernet[3]

Solenoids: Panel-Mount[3]

Instrument Cabling: Multi-Pin Connectors

Pneumatic Tubing: Plastic[3], SS Conduit, Exposed Final Drops

Conduit: PVC-Coated Rigid Galvanized Steel[3]

STRUCTURAL & PIPING

Framing: 304 Stainless Steel Box Tube

Pre-Treat/Pre-RO: 316L SS tubing and Sch. Pipe[3]

Post-RO: 20 Ra[3], 316L SS Tubing, Orbital-Weld, BPE

COMPREHENSIVE DOCUMENTATION PACKAGE

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.

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.

Purified Water Systems

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

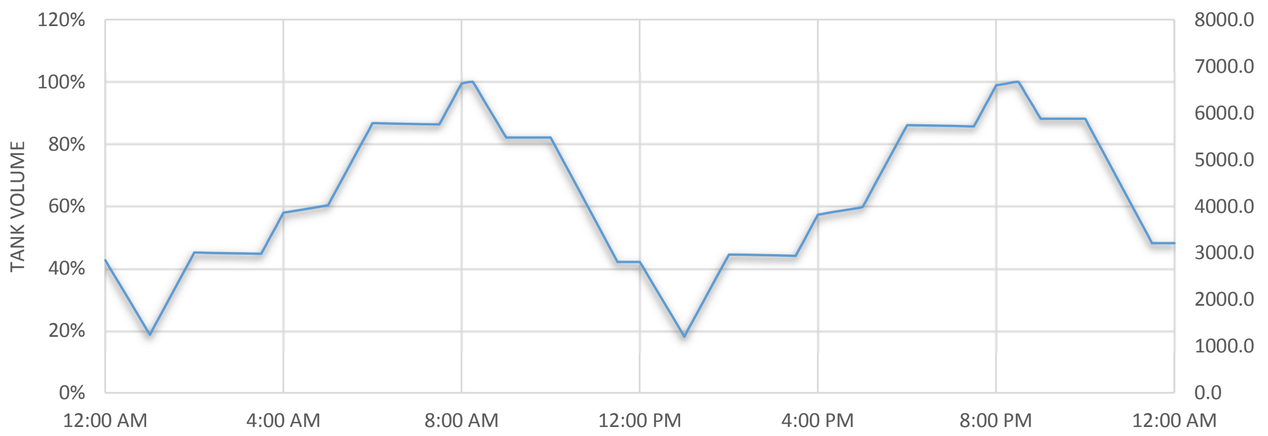
- Duplex Pumps
- Hot Water Sanitization
- Ozone Sanitization
- UV Disinfection
- Loop Filtration
- TOC & Bacterial Monitoring
- Point-Of-Use (POU) Equipment

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.

SYSTEM DESIGN			
PW Generation Rate:	**33.0** (gpm)	Supply Loop Length:	**680** (feet)
Storage Vessel Working Volume:	**7500** (gal)	Loop Tubing Diameter:	**2** (in)
Assumed Daily Starting Volume:	**3200** (gal)	Pump Supply Flow Rate:	**65** (gpm)
Volume to initate Fill Request:	**1500** (gal)	Pump Supply Output Pressure:	**114.0** (psig)

TANK VOLUME (GAL) VS. TIME



LOOP RETURN VELOCITY (FT/SEC) VS. TIME