



# World-Class Equipment & Process Expertise

## CIX Ion Exchange Systems

### CIX25S WATER RECYCLING

#### TANKS

<b>System Feed</b>		<b>DI Supply Pump</b>	
Volume	Minimum 2,000 Gallons	Horsepower	3 HP
		Motor Control (Optional)	Variable Freq Drive

<b>DI Water</b>		UV Sterilization	
Volume	Minimum 2,000 Gallons	Tank-size dependent	

#### OPERATING SPECIFICATIONS

#### SKID MOUNTED COMPONENTS

<b>System Skids</b>		<b>Feed Water Quality</b>	
		Temperature	55°F-105°F

Primary	One (1)	pH	3SU-10 SU
Secondary	One (1)	TSS	<5 mg/L

<b>Feed Pumps</b>		TDS	
Number	Two (2)	Chlorine	<2 mg/L

Horsepower	3 HP	<b>Product Water Quality</b>	
Motor Control (Optional)	Variable Frequency Drive	TDS	<3 mg/L

<b>Standard Pre-Treatment</b>		Conductivity	
Number	Four (4)	Silica	<20 µg/L

Vessel Construction	PE Lined Fiberglass	System Flow	20 gpm
Media	Granular Activated Carbon	<b>REGENERATION SPECIFICATIONS</b>	

Volume per Vessel	2.0 ft <sup>3</sup>	Flow Configuration	Alternating Duplex
<b>Bag Filters</b>		Regeneration	Countercurrent

Number	Four (4)	Waste Flow Cycle Time	1-10 gpm
Filter Rating	5-micron	Cycle Time	93 minutes

#### Cation & Anion Exchangers

<b>Cation Exchangers</b>		<b>Anion Exchangers</b>	
Number of Cation	Four (4)	HCl per Cycle	4.2 gallons

Number of Anion	Four (4)	Waste per cycle	110 gallons
Vessel Size	13" x 54"	Grains Capacity	60,000

Construction	PE Lined Fiberglass	<b>Anion Exchangers</b>	
Cation Resin	Strong Acid	NaOH per cycle	2.1 gallons

Anion Resin	Strong Base	Waste per Cycle	125 gallons
Volume per Vessel	3.0 ft <sup>3</sup>	Grains Capacity	54,000

#### Controls

<b>UTILITIES</b>		<b>PHYSICAL DATA</b>	
Inlet Conductivity	Signet 2850 1 per Skid	Electrical Voltage	208-230/460

Outlet Conductivity	Signet 2850 1 per Skid	Full Load Amps	30/15
Outlet Flow	Signet 2537 1 per Skid	Make-up Water	3.5 gpm

Outlet pH	Signet 2750 1 per Skid	<b>PHYSICAL DATA</b>	
Controller	CompactLogix	Footprint (LxWxH)	111" x 117" x 91"

Touchscreen	5.7" PanelView 7+	Shipping/Operating Wgt	1,750/2,000 lbs
Drum Low Level Sensors	One (1) of Each	Frame/Coating	304SS/Polyurethane

		Piping	Schedule 80 PVC
--	--	--------	-----------------

**Operating Profile** - Removes dissolved solids from compatible feed water with TDS <450-mg/l using pre-treatment by back-washable carbon & replaceable bag filtration followed by two-stage, separate-bed cation & anion exchange. Produces a near-continuous supply of deionized water with duplex components with 50% of the resin in reserve or in regeneration. Water quality of less than 5 µS is produced when operated within design parameters

**System Feed Tank** - Constructed of HDLPE and sized based on system operating capacity. Analog level control provides for automatic water make-up supply, system operation, high level alarm, and to prevent the feed pump from running dry. PVC tank fittings for inlets & outlets pipes including tank isolation valve are included. As applicable, includes required seismic anchoring with PE certification

**System Feed Pump** - Sized to provide full rated-service flow even during periodic resin regeneration. Constructed of 316 SS, Viton® & ceramic wetted-parts. Centrifugal-drive 230/460VAC TEFC motor with optional variable Hz drives for soft-start to optimize operating efficiency. Includes pump inlet isolation & outlet check valves for service

**Carbon Filters** - Includes duplex parallel vessels sized for minimum service flow of 8-gpm per ft<sup>2</sup> of bed surface area. Utilizes flow control valves for manual up-flow backwash to remove accumulated particles of one vessel during service without need to take system off-line. Backwash is required based upon pressure differential across vessels as measured by in-line gauges.

**Bag Filters** - There are two (2) bag filter housings each rated for 15-gpm flow piped in parallel with isolation valves allowing filter change-out during ongoing service. The housings are constructed of reinforced polypropylene with polypropylene filter bags with a nominal rating of 5 microns

**Cation & Anion Exchanger** – Both are two-vessel units alternating between service & regeneration controlled by Kinetico's proprietary patented regeneration control valve. Service flow as pressurized by the feed pump is down-flow with internal upper slotted and bottom diffuser. The in-service vessel produces the pressurized DI water required by the regenerating vessel for its chemical draw.

**Regenerations** –Initiated in Feed-forward mode based on resin loading as calculated separately for the Cation and Anion in-service vessel by measuring the feed water quality and flow. Feed-back regenerations are triggered based on the outlet water quality and with cation or alternatively anion regeneration triggered based on outlet water pH as an indicator of relative exhaustion.



**Deionization Media** - Each cation vessel shall utilize high-capacity, strong acid, macroporous cation resin, with an exchange capacity of >20,000 grains per cubic foot when regenerated with 4 pounds of hydrochloric acid per cubic foot of resin. The cation resin will have a minimum of 10% cross-linking. Each Anion vessel shall include high-capacity, weak and strong base anion resins, with an exchange capacity of >18,000 grains per cubic foot when regenerated with 6 pounds of sodium hydroxide per cubic foot of resin. The weak and strong base resin bead sizes are designed to keep the two layers separate. Inert plastic beads shall be used to pack both the Cation and Anion resin vessels while still allowing the resin minimum space for expansion and contraction.

**Chemical Draw** - The regenerating vessel will draw regeneration chemicals from a customer provided 55-gallon drum or bulk tank. The feed is educted by the Kinetico valve with internally pressurized water feed with concentration verified with a hydrometer and adjusted with proportional valving to control the flow of chemical regulated from 0-10 lbs/ft<sup>3</sup>.

**DI Water Storage Tank** - Constructed of HDLPE and sized based on system operating capacity and production demand. Analog level control provides for automatic system operation, high level alarm, and to prevent the feed pump from running dry. PVC tank fittings for inlets & outlets pipes including tank isolation valve are included. As applicable, includes required seismic anchoring with PE certification. DI water is continuously recirculated through an UV Sterilizer at 3-4 tank turn-overs per hour to retard biological growth.

**DI Water Supply Pump** - Constructed of 316 SS, Viton® & ceramic wetted-parts. Centrifugal-drive 230/460VAC TEFC motor with optional variable Hz drives for soft-start to optimize operating efficiency. Skid outlets to service with a diaphragm valve for flow control. The DI water supply loop recirculates to the tank with a pressure-retaining valve to ensure adequate supply pressure

**System Skids** - Components other than tanks are skid-mounted, pre-piped, & pre-wired limiting installation to interconnect piping & electrical connections. Construction is of 304- SS with sandblasting prior to a polyurethane coating. Skids include feet for securing skids to the floor and lugs for electrical grounding of electrical components.

**Piping** - Piping is Schedule 80 PVC with both solvent welded and threaded connections.

**System Controls** – Operation, monitoring, and control of the integrated system utilizes an Allen-Bradley CompactLogix programmable automation controller (PAC) with Human-machine interface (HMI) through a Panelview Plus color touch screen. System operation while highly automated also employs manual control with an intuitive operator-friendly interface. Product water to process is assured with recirculation of “off-spec” water to the feed tank if above an operator-adjustable set point. System operating set points and alarms are set at the touch screen which is password protected to limit access to the operator, supervisor, maintenance, or engineer based on necessity and relative expertise.

