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UP-FLOW®

Counter-Current Deionization System

GOSHU KOHSAN CO., LTD.

UP-FLOW®

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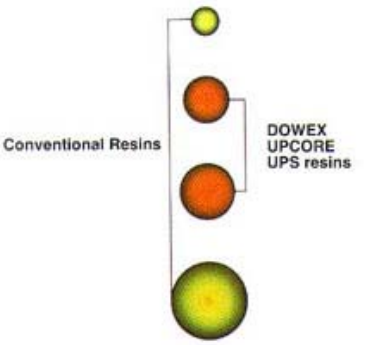
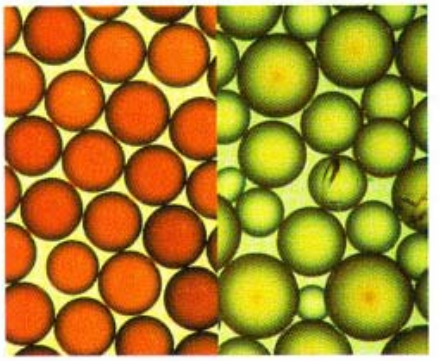
The UPCORE System
(Up-flow Counter-Current Deionization System)



Introduction

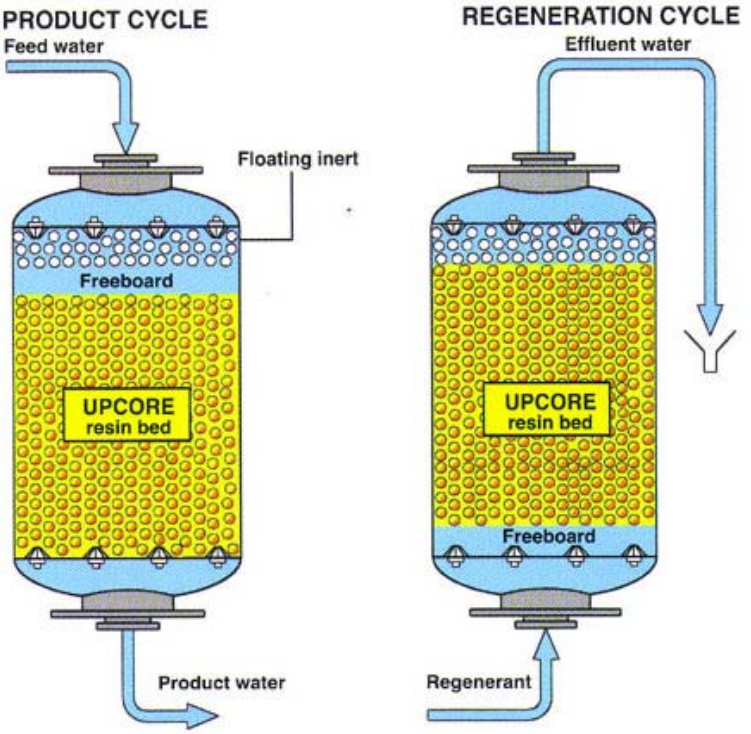
Now it is the time for a new deionization technology, which uses regenerant chemicals more efficiently, diminishes wastewater volumes significantly, and reduces the effluent post-processing.

The UPCORE system uses DOWEX* UPCORE resins in packed-bed ion exchange demineralizers. This advanced technology provides the significant productivity and economic advantages of counter-current deionization without the drawbacks of earlier-generation processes. These counter-current deionization systems typically generate 50% less effluent while consuming about half the amount of regenerant chemicals and service water of co-current systems. Also, the regeneration in counter-current system is approximately twice as fast as in co-current systems, thus achieving higher water quality.

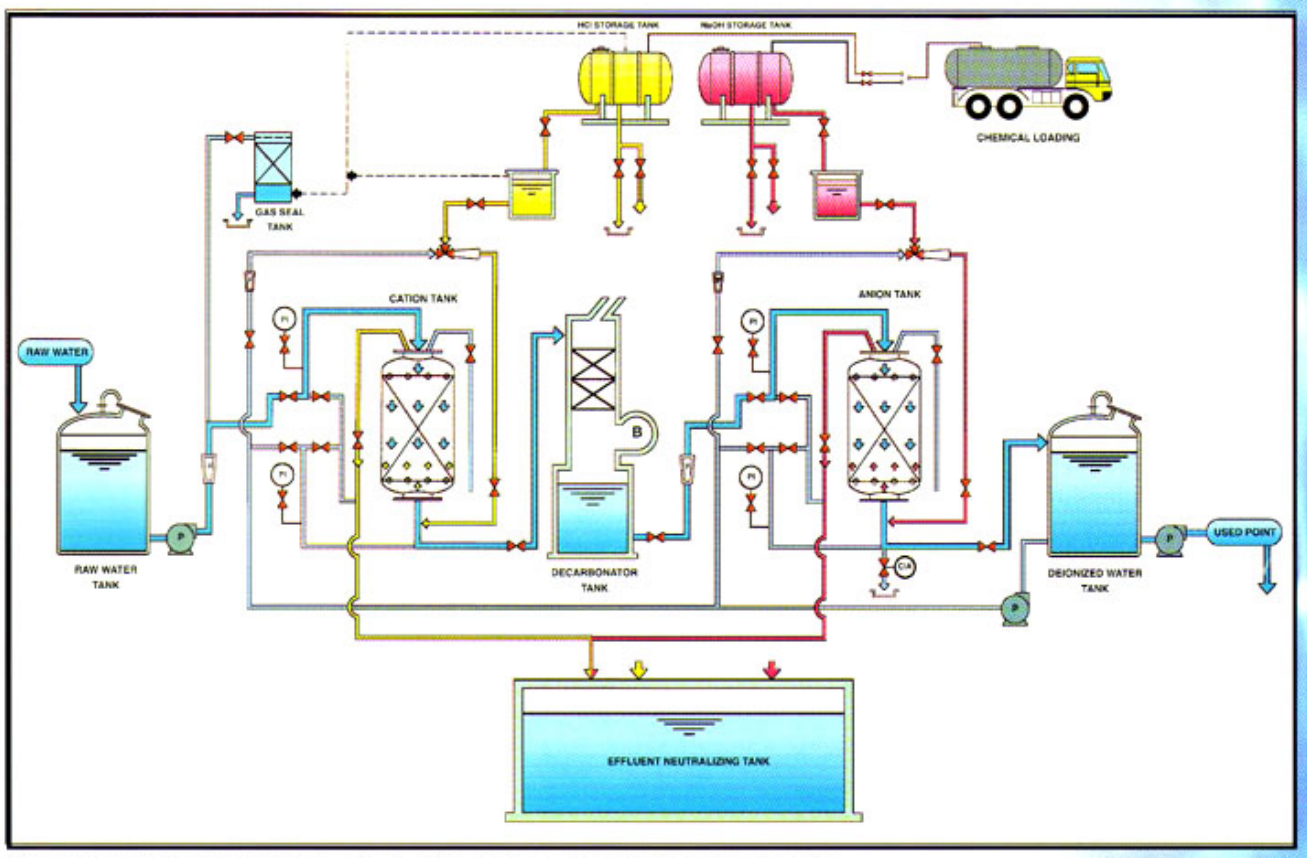


Key advantages of the UPCORE system :

- Simple design
- Easy to control and automate
- Inexpensive
- Ideal for upgrades
- Easy configurability of layered beds
- Optimized vessel volume utilization
- Insensitive to flow rate variations
- Self-cleaning, no separate backwash step needed



** The UPCORE system, an modern down-flow service and up-flow regeneration technology pioneered by The Dow Chemical Company.*



** A system design bases on water quality and your application requirement.*

** All designs and specifications will be subject to change with or without notice.*

Examples of Practical Use of Counter-Current Deionization

Item		Unit		Case 1 SAC[1]-SBA[2]		Case 2 SAC-Deg[3]-SBA		Case 3 SAC-Deg[3]-SBA	
				Co-flow	Counter-flow	Co-flow	Counter-flow	Co-flow	Counter-flow
Raw Water Quality	Total Cation	ppm as $CaCO_3$		62		245		507	
	Total Anion	ppm as $CaCO_3$		64		62.5		178	
	$\%SiO_2$			15.7		52		20	
Treated Water Quality	Conductivity	μs/cm	• Average	10	1	10	1	10	1
			• End-point	15	4	15	4	20	4
	SiO_2	ppm as $CaCO_3$	• Average	0.2	0.05	0.2	0.05	0.2	0.05
			• End-point	0.3	0.1	0.3	0.1	0.3	0.1
Regeneration Level		g(100%HCl)/l-R		80	57	80	57	112.5	65
		g(100%NaOH)/l-R		87.5	58	105	71	95	60

Remarks *: The data was calculated by computer design program*

1) Strong Acid Cation Resin 2) Strong Base Anion Resin 3) Degasifier

Applications

1. Rinsing water in semiconductor-electronics industries to control the product quality
2. Feed water for boiler to reduce the potential of scale occurrence
3. Processing water in pharmaceutical field
4. Processing and rinsing water in plating and coating field
5. Others

UPCORE System Comparison to Co-Current System

Attributes	UPCORE	Co-Current flow	Benefit over Co-Current flow
● Simple Construction	+	+	-
● Water Quality	+	-	● Conductivity < 2 μs/cm
● Water Productivity	+	-	● 130-200% higher
● Chemical Efficiency			● Lower chemical
- Single bed	+	-	consumption ~ 50-70 %
- Layered bed	++	+	reduction
● Regeneration Time	+	-	● Almost 50% less time
● Waste Stream	++	-	● Reduction up to 50%
● Resin Cleaning	+	+	-
● Vessel Utilization	+	-	● Lower free board requirement

UPCORE System Comparison to Up-flow Service System

Attributes	UPCORE	Up-flow Service Counter-Current	Benefit over Up-flow Service
● Simple Construction	+	-	● External backwash tank for cleaning is not required
● Water Quality	+	+	-
● Chemical Efficiency	+	+	-
● Vessel Utilization	+	+	-
● Regeneration Time	+	+	-
● Rebuild Suitability	+	-	● More economically suitable for co-current retrofits
● Layered Beds without Middle Plate	+	-	-
● Control / Automation	+	-	● Insensitive to change in flow rate and/or no interruptions during production cycle
● Fines Removal	+	-	● Resin trap to avoid carry-over of fines is not required ● No suspended solids accumulated in resin bed

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