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Selling dependable EDI systems

This article will discuss the features, benefits and opportunities for electrodeionization.

▶ Electrodeionization (EDI) is a technology which reliably produces ultrapure water. EDI continuously operates, so it can also be referred to as continuous electrodeionization (CEDI). CEDI is synonymous with EDI. EDI replaces chemically regenerated polishing mixed beds. Like mixed beds, EDI treats reverse osmosis permeate and produces high purity water, but with no chemicals and with continuous regeneration using electrical current. EDI is used by large water treatment companies with full engineering staffs, yet despite the significant installed base and numerous applications and markets, many commercial and industrial water treatment dealers are still unfamiliar with EDI and hesitant to use the technology.

This article will discuss the features, benefits and opportunities for electrodeionization. For a technical explanation of how EDI operates, refer to the "Electrodeionization basics" article in the June 2010 issue of *Water Technology*, which is also available online at www.watertechnology.com.

Opportunity to sell

A large and lucrative opportunity exists for dealers to sell RO-EDI systems. Some system manufacturers offer packaged systems as an alternate to service DI for small systems, as well as custom engineered larger systems. Figure 1 shows a packaged pretreatment, RO and EDI skid mounted system for laboratory grade water generation rated for continuous production of 2 gpm. The packaged systems typically include multimedia filtration, softener, activated carbon filter, reverse osmosis and electrodeionization with integrated controls installed on a common skid.

The system is simple and easy to install and operate. While some types of EDI systems may be somewhat complicated to operate, a system with no concentrate recirculation is as easy to operate as an RO system. It is recommended that dealers work with a manufacturer who has experience with all styles of EDI to determine the best design and features, and to ensure the system will operate as desired.

Any customer with mixed beds is an opportunity to sell EDI. EDI has been installed in numerous manufacturing plants, including research laboratories, pharmaceutical, biotech, boiler feed water, power, semiconductor, automotive, electronics, semiconductor, chemical processing, bottled water and many other industries.

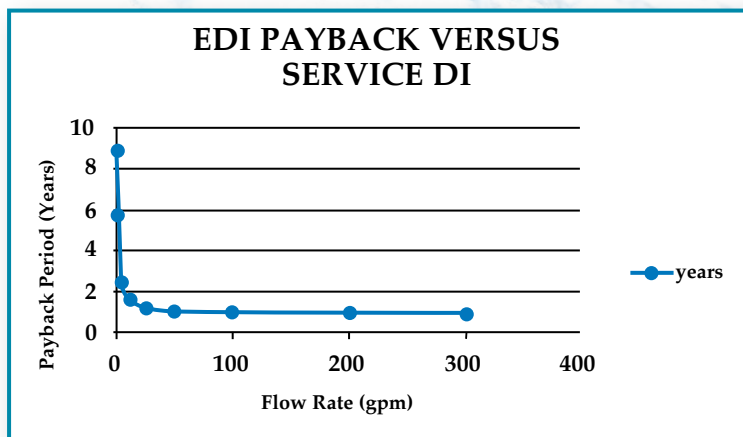
EDI can produce as high as 18 megohm ($M\Omega\text{cm}$) or better quality water depending on the module and pretreatment, but the typical requirements are between 1 to 18 $M\Omega\text{cm}$. The pharmaceutical industry uses EDI to produce USP grade water ($<1.3 \mu\text{S}/\text{cm}$). Power plants typically require better than 10 $M\Omega\text{cm}$ and less than 5, 10 or 20 ppb of silica.

Semiconductor applications may require better than 18 $M\Omega\text{cm}$. And many other industrial applications can be tailored to meet the performance guarantees required by the customer.

Method for finding applications

One method of finding applications is to approach end users who typically use service exchange deionization (SDI). There is a capital investment in electrodeionization or onsite regenerated mixed bed ion exchange, while offsite regeneration has little initial outlay. The operating cost of EDI is usually less than mixed bed regeneration and significantly less than service DI. Figure 2 shows a cost comparison between the Service Deionization and electrodeionation, assuming a functional conductivity equivalent of 15 microsiemens/cm including CO_2 , 24 hour per day operation and national average in market costs. Since dealers normally do not provide onsite regeneration ion exchange equipment, it has been omitted from the comparisons. The payback period is typically one to two years depending on flow rate, RO permeate quality, local utility costs as well as geographic cost differences of service DI.

There are several manufacturers of



electrodeionization modules available. When selecting the right EDI module for the application, among the information the dealer should be comfortable with are the performance guarantees that are included. Comparisons of various commercially available EDI are listed in the table below. FCE stands for functional conductivity

equivalent and is a measure of the EDI feed water quality, including a conversion factor for CO₂ and silica. In lieu of FCE, some manufacturers publish TEA, which stands for total exchangeable anions.

The FEC in those cases are converted assuming the anionic load is entirely CO₂ by using a conversion factor of TEA load

equal to ppm CO₂ x 2. In the case of multiple product offerings of the same manufacturer, they are tabulated separately for equal comparison.

History and experience show that EDI can be a reliable technology if applied properly. The EDI market is growing, and the data above shows manufacturers

Manufacturer	Maximum FCE as µS/cm	Typical product quality (MΩcm)	Guaranteed product silica	Maximum Feed Hardness (as CaCO ₃)	Maximum Feed Silica	Warranty	Inlet Pressure Continuous (psi)
A: Standard	40	>16	<5	1.0	1.0	3 years	30-100
A: High Hardness CDIT	100	>17	<5	4.0	1.0	3 years	30-100
A: Ultrapure	10	>18	>99+% rejection	N/A	N/A	3 years	40-100
B	34.9	>16	<5	1.0	1.0	3 years	60-100
C: Standard	34.9	>5	<5	0.5	0.5	3 years	32-80
C: Ultrapure	11.1	>15	<5	0.5	0.5	3 years	32-80
D: Optimal	9	10-17.5	< 5	1.0	0.5	3 years	30-100
D: Maximum	43	<10	80% rejection	2.0	0.5	3 years	30-100

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Jeff Tate is president of Agape Water Solutions Inc. Agape is a manufacturer and designer of industrial water treatment systems and stresses quality, customer service, environmental friendliness and cost effectiveness in its products and services. It is the North American Master Service Provider for Ionpure, a manufacturer of electrodeionization modules. Aside from its work on electrodeionization modules, Agape Water Solutions designs and manufactures other quality products equipped to perform water filtration, dechlorination and reverse osmosis. To learn more about the services provided by Agape Water Solutions, please visit the company's website at www.agapewater.com.



History and experience show that EDI can be a reliable technology.

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