

E ION EXCHANGE Refreshing the Planet

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SPOTLIGHT

Complete Cure for the Pharma Industry's Need

The pharmaceutical industry is critical to the healthcare sector. The Indian pharmaceutical industry has contributed immensely to the Indian and global healthcare outcomes. With an aim to boost growth and make India a global leader in end-to-end drug manufacturing, the Government of India has unveiled 'Pharma Vision 2020'. This will enable 100% FDI under automatic route and will ensure reduced approval time for new facilities.

Ion Exchange, with over five decades of expertise in water and environment management, is closely working with the pharmaceutical industry in order to facilitate its growth. Our technological expertise and R&D capabilities have enabled us to understand the pharma industry's need and develop customised solutions and speciality products to meet the industry's requirements for compendial high purity water treatment & distribution and bulk drug purification. We also offer ion exchange excipient resins for a variety of applications in pharmaceutical formulations and state-of-the-art effluent treatment, recycle and zero liquid discharge solutions to meet the stringent effluent discharge norms. Thus, we are a one-stop solution provider for the pharma industry.

Our solutions for the pharmaceutical industry include:

- Raw water treatment
- Process water treatment
- High purity water systems
- Purification, separation and concentration of bulk drugs, APIs, etc.
- Speciality excipient resins for pharmaceutical formulations

- Cooling tower and boiler water management
- > Effluent treatment & recycle
- Zero liquid discharge
- Waste to energy
- > 24/7 service

Complete Integrated Solution for High Purity Water Generation, Storage & Distribution

INDION° 5W IFT

The INDION Swift range comprises a family of automatic twin-bed deionisers - Swift 5Gx, Swift Plus & Swift. These incorporate state-of-the-art counter-flow ion exchange technology previously available only in large, custom designed plants.

INDION Swift series of products are exceptionally compact and are skid-mounted on a corrosion-resistant frame. The regeneration time required for the INDION Swift is only 35 minutes – after a minimum service cycle of four hours – minimising the need for both, a standby plant and the storage of large volumes of water. Regeneration of the cation and anion beds is simultaneous, reducing waste disposal costs and environmental impact.

Our latest introduction to the range is INDION Swift 5Gx which produces mixed bed quality water that meets stringent international standards. (Please refer 'Product Launch' section)



INDION Swift is available in a wide range, from 2.25 m³/h to 50 m³/h with the below mentioned features:

- Treated water conductivity is < 1 μS/cm; resistivity is 1 - 10 mg.ohm/cm
- Short cycle (4 hours), rapid regeneration (35 mins)
- Enhanced bacterial control
- Reduced treated water storage cost
- Near neutral effluent, reduces disposal cost
- Low operating cost
- Quick start-up time
- Low footprint

INDION® RO-EDI Systems

- Hot water sanitisable
- Fully pre-validated to FAT
- Compliance with USP & Ph. Eur. specifications
- Compliance with cGMP/cGAMP & ISPE design standards
- Fully automated with SCADA



INDION® High Purity **Distribution System**

- Hot water sanitisation at > 80°C
- SS 316L tubes
- Orbitally welded with printout facility
- Built around ISPE and cGMP guidelines
- Fully automatic with SCADA 21 CFR Part 11 compliant



INDION® Resins - Drug Actives & Excipients for Formulations

Ion Exchange is India's first company to have an ISO 9001 & 14001 certified state-of-the-art ion exchange resin manufacturing facility in Ankleshwar, Gujarat. Integrated into this manufacturing facility is an independent INDION drug actives & excipients manufacturing unit which is US FDA compliant, WHO-GMP certified and has Drug Master Files from US Food & Drug Administration for this range of products. The facility is accredited with cGMP certificate by the Food & Drugs Control Administration (FDA), Gujarat for manufacturing bulk drugs.



INDION Speciality Excipient Resins

- Taste masking
- Sustained & controlled release
- Vitamin B12 stabilisation
- Rapid tablet disintegration
- Cholesterol reduction
- Treatment of hyperkalemia

Ion Exchange Resins & Polymeric Adsorbents

These are widely used for isolation, concentration and purification of fermented products, bulk drug intermediates and APIs manufactured by the pharma industry. Typical applications include:

- Isolation and concentration of antibiotics and APIs
- Decolourisation of antibiotics and bulk drug intermediates
- Deashing of antibiotics and APIs

Our customised biotech applications for separation and purification are:

- Aloe vera juice purification
- Fenugreek/Methi seed extract purification

Ion Exchange Membranes for Purification, Concentration and Separation

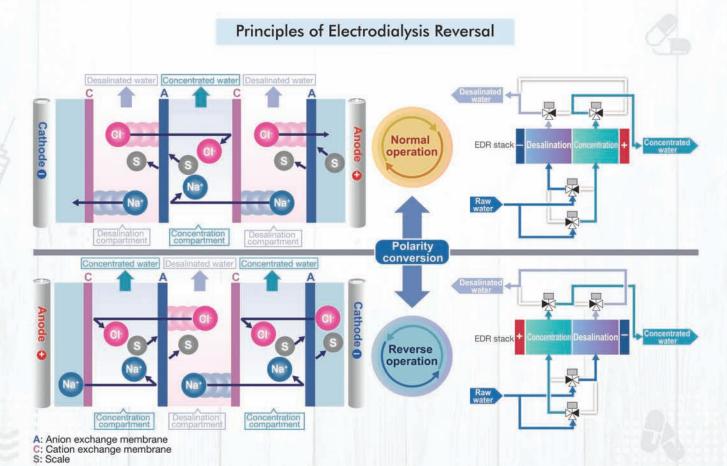
In association with ASTOM, Japan, we offer worldclass validated ion exchange membrane and electrodialyzer technologies. Like ion exchange resins, ion exchange membranes are selectively permeable to ions. Available in a wide range of cation and anion exchange membranes, they are used for various concentrations, desalination, demineralisation and speciality applications requiring selective permeability of monovalent ions, chemical stability, etc. Unlike ion exchange resins which are loaded in pressure vessels, ion exchange membranes are incorporated into electrodialyzers made up of cathode and anode for various separation and purification applications. However, unlike ion exchange resin process that requires periodic regeneration after exhausting its capacity, ion exchange membranes in an electrodialysis process do



not require regeneration and thereby allow continuous service for an extended period of time. Thus, ionic separation in aqueous solution is enhanced through a combination of ion exchange membranes and the power of electricity.

Electrodialyzer - ACILYZER ED can desalt, concentrate, refine and recover ionic substances in aqueous solution with the ion exchange membrane and power of electricity.

Electrodialysis Reversal - ACILYZER EDR system allows changing of cell polarity thereby improving the performance, both with respect to cost and maintenance for applications like zero liquid discharge.



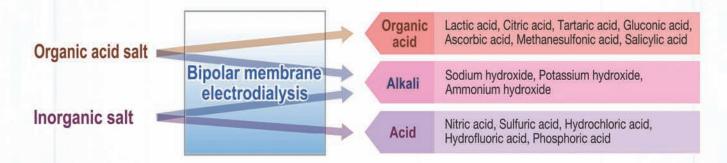
Bipolar Membrane Electrodialyzer – ACILYZER BPED uses ion exchange membrane in its cell design which on the application of DC current produces acid and a base from corresponding organic or inorganic acid salt in combination with conventional monopolar ion exchange membrane.

Anion exchange layer Bipolar membrane H₂OH → H⁺ + OH

Specification of Bipolar I	Membrane
Water splitting voltage*1	1.2V*²
Water splitting efficiency*1	≧0.98
Burst strength	≥0.40MPa
Thickness	0.22mm

^{*1 1}N NaOH · 1N HCL 10A/dm2 30° C

Example of Production with Bipolar Membrane Electrodialyzers



Diffusion Dialyzer - ACILYZER DD recovers acid using a concentration difference of solution on both sides of the ion exchange membrane.

Applications:

- Electrodialysis Desalination of APIs, bulk drug intermediates, amino acids, organic acids and carbohydrate solution (oligo saccharide).
- Bipolar Membrane Electrodialyzer Production of organic acid from organic acid salt and acid/alkali from the inorganic salt.
- Electrodialysis Reversal
 - Desalination
 - Zero liquid discharge

^{*2} Potential difference measured between silver-silver chloride electrodes

Complete Effluent Treatment & Zero Liquid Discharge Solutions

Pollution and increased demand have made good quality water scarce and expensive, both in terms of direct cost and effect of unsuitable water on plant economics and product quality. At the same time, disposal norms are getting tighter and their enforcement stricter. Ion Exchange offers effluent treatment, recycle, zero liquid discharge solutions and a wide range of multi-effect evaporator systems with choice of metallurgy [SS 316L & SS 316 (TI)] to address these problems and simultaneously generate substantial savings.

Our effluent treatment solutions are based on biological and advanced membrane treatment processes. To treat complex pharmaceutical effluents, we offer INDION Disc Tube Reverse Osmosis (DTRO) and INDION Multieffect Evaporator (MEE) Systems.

We have more than ten working references for MEE system.



Biological System



Disc Tube Reverse Osmosis (DTRO) System



Multi-effect Evaporator

HYDRAMEM Membranes

Ion Exchange's HYDRAMEM - High Performance Membranes are manufactured in India's first integrated reverse osmosis membrane manufacturing facility in Goa. HYDRAMEM RO membranes are broadly offered in the below categories.

Water Treatment

- Low Pressure RO Membranes
- **Brackish Water RO Membranes**
- **Fouling Resistant Membranes**
- Sea Water RO Membranes

Speciality Membranes

- **Enzyme** concentration
- API/enzyme purification
- API concentration



- Fermentation broth clarification
- Whey concentration
- Dextrose clarification

ONWARD MARCH

Committed to Nature

Patanjali Ayurved Ltd. is one of India's largest FMCG companies. Ion Exchange has been entrusted with a project to supply a 62.5 m³/h effluent treatment plant (ETP) for their FMCG manufacturing unit in Guwahati, Assam. This plant will consist of primary, secondary & tertiary treatment and will ensure water recovery for reusing in the process. Premium quality is what matters and that is what we, at Ion Exchange, deliver.

Good Chemistry

Deepak Fertilisers and Petrochemicals Corporation Ltd. is one of India's leading producers of industrial chemicals and fertilisers. We, at Ion Exchange, will be installing a plant comprising 650 m³/day ETP, 20 m³/day sewage treatment plant (STP), primary & secondary treatment, recycle and 68 m³/day zero liquid discharge (ZLD) plant. This plant will recover >95% water for reusing in their manufacturing process. Together, we believe in creating value and delivering it to the world.

Driven To Perform

Hyundai Motor India Ltd. is one of the most revered names in the automotive industry. We have bagged an order for installing a 13 KLD ZLD plant for their manufacturing facility in Chennai, Tamil Nadu. We will supply an agitated thin film dryer for the same. The recovered water from the plant will be reused in the process. Hyundai Motor India Ltd. endeavours to be a centre of excellence in automobile engineering, and we wish to stand by it with our expert offerings.

Weaving Timeless Bonds

Mecords India Ltd. is one of the largest Indian manufacturer of woven tyre-reinforcing technical textiles, industrial and speciality fabric. Ion Exchange will be installing a 600 l/day or 25 kg/h ZLD plant at their facility in Tarapur, Maharashtra. Our trusted quality and technical support is the reason why Mecords and many other industry players choose us.

Gearing up to Thrive

These are truly exciting times for Kia Motors, as they eagerly await their very first interaction with Indian customers in 2019 when their manufacturing facility in Andhra Pradesh will begin mass production. They will be manufacturing 2.5 lakh vehicles per year and Ion Exchange will be with them as they celebrate their inception. Ion Exchange will provide total water management solutions, which include process water, drinking water, sewage & waste water treatment plants including zero liquid discharge system for their factory and the integrated township. By doing so, they will reduce their fresh water intake. A new chapter for the Kia brand in India unfolds and we will be standing tall with them on their road to success.

Patenting Performance

Hindalco is the world's largest aluminium rolling company and one of Asia's biggest producers of primary aluminium. A 200 m³/h effluent treatment plant will be supplied to Hindalco Industries Ltd., Renukoot, Uttar Pradesh for treatment of fluoride. The manufacturing unit requires water containing <1 ppm fluoride for their process from feed water containing 35 ppm fluoride. Ion Exchange has developed an indigenous system containing its patented resin column system. Compared to conventional systems, this scheme will reduce their operational costs and will provide quality water for their process. Integrity, commitment and passion are some of the values Hindalco lives by, just like us at Ion Exchange.

COMMISSIONED

Serving The Technological Powerhouse

Bosch Ltd. is one of the largest manufacturers of automotive products and services. We have installed a 20 m³/day zero liquid discharge (ZLD) plant at their manufacturing facility in Jaipur, Rajasthan. This facility is successfully treating the effluent and recovering >95% water for process reuse. Bosch Ltd. designs products and services that improve quality of life, so do we.



Precise Needs Call For Specialised Expertise

Munters India (formerly known as Kevin Enterprises) is a subsidiary of Munters, Sweden. The company is engaged in the design, manufacture, supply and installation of mass transfer equipment. We installed a 10 m³/week ZLD plant for them at their manufacturing unit in Ambernath, Maharashtra. The plant treats effluent generated from their process and recovers it for reuse. Standing shoulder to shoulder with our clients on their journey towards excellence is not just our duty; it has become a habit that we are proud of!

Treading Ahead. Creating Pathways

From humble beginnings to a multi-billion legacy that produces quality tyres used all around India & internationally, MRF's legacy has truly been an inspiring one. MRF India is the largest manufacturer of tyres in India and the 14th largest manufacturer in the world. They recently started operating their manufacturing facility in the Medak district, Telangana. We, at Ion Exchange, executed a project to treat effluent generated from the plant. It contains primary & secondary treatment, recycle and ZLD. By treating the effluent, they are recovering >95% of water for reuse in their process thus, setting an example for the tyre industry.



GLOBAL ORDERS

Headquartered in Mumbai, Ion Exchange has seven manufacturing & assembly facilities across India, and one each in Bahrain and UAE. It also has a presence across other key geographies. Ion Exchange has supplied products and services in the international market owing to its strong global reach. The company exports to Africa, Japan, Middle East, Russia, South East Asia, Europe, UK, USA, Canada and neighbouring countries. As the global sales continue to burgeon, it is clear that the demand and trust for our products will soon reach stellar heights.

Below are some of Ion Exchange's orders worth a mention:

- Design, supply & installation of 2 x 60 m³/h sand filter package with auto operation for Phoenix Pulp & Paper Public Co. Ltd., Khon Kaen, Thailand.
- 100 m³/day membrane bio-reactor based waste water treatment plant and 9 m³/h softener from Albwardy Engineering, Dubai, UAE.
- 200 m³/day membrane bio-reactor from Green Water Solutions, UAE.
- 120 m³/day membrane bio-reactor from Albwardy Engineering Enterprises Est., Tanzania.
- 2 x 200 m³/day containerised brackish water reverse osmosis plant from Ministry of Defence Pension Fund, Al Jabal Akhdar, Oman.
- 400 m³/day fluidised media reactor from Ministry of Defence, Kuwait through Arabi Company, Kuwait.
- 150 m³/day fluidised media reactor from L&T Hydrocarbon Engineering Ltd., UAE.
- 3 x 50 m³/day containerised effluent treatment and recycling plant from National Ready Mix Concrete, Dubai, UAE through Nutec Overseas, Dubai, UAE.
- 350 m³/day effluent treatment plant from a textile industry in Iran.
- 135 m³/h water treatment plant from Shah Cement Industries Ltd., Bangladesh.
- 288 m³/day effluent treatment plant and 10 m³/h reverse osmosis plant from Glencarol (Pty) Ltd., South Africa.
- 158.6 m³/day, 105.4 m³/day & 78 m³/day reverse osmosis plants from Angelique International Ltd., Maldives.
- 650 m³/h reverse osmosis plant with demineralisation plant from S Alam Refined Sugar Industries Ltd.,
 Chittagong, Bangladesh.
- 300 m³/day effluent treatment plant from Arabi Company Qatar W.L.L., UAE.
- Two 32 m³/h demineraliser plants, 5 m³/day sewage treatment plant, 2 x 230 m³/h pretreatment and 35 m³/h filtration from Global Infra Corporation, UAE.

RURAL REACH

Access to safe drinking water has been a grave problem for India, especially in rural areas where lack of usable water has resulted in decades-old sanitation and health problems. The dual problems of not having access to water or having access to unsafe water have resulted in safe and hygienic water, a basic amenity, becoming a luxury.

Rural population faces severe water scarcity as well as problems due to ground water contamination. Providing innovative solutions to overcome these problems has always been at the forefront for lon Exchange.

Ground Water Contamination

More than three-quarters of India's rural population depends on groundwater for drinking, but the country's aquifers are not only under tremendous stress, the quality of water they provide is also deteriorating. Ion Exchange has helped the water and sanitation departments in various rural areas in tackling this crucial issue by providing:

- 29 units of fluoride removal hand pump attachment (FRHPA) to PHED, Maharashtra.
- 30 units of FRHPA to Rural Water Supply & Sanitation Department, Bhubaneswar, Odisha.



Surface Water Contamination

The total utilisable water resources of the country are the average annual surface run-off generated by rainfall and snowmelt. However, it is estimated that only 37 per cent of the surface water resources can actually be mobilised.

To provide the population with safe drinking water, Ion Exchange offers path-breaking water treatment solutions to governments and authorities.

Ion Exchange has supplied the following to treat surface water:

 A 7.8 MLD Lamella Clarifier for Rural Drinking Water Supply and Sanitation Department, Gadag, Karnataka was inaugurated by the then honourable Chief Minister of Karnataka, Mr. Siddaramaiah.



- 50 m³/h CSF and 30 m³/h activated carbon filter (ACF) for Madhya Pradesh PHED.
- 100 m³/h demineralisation (DM) plant comprising Lamella, multigrade filter (MGF), dosing systems, etc. for PHED, Chhattisgarh.

Sewage Treatment Solutions

Billions of litres of sewage is generated every day, of which only a part is collected. Even lesser percentage of this sewage is treated because of limited treatment capacity available. The rest is just emptied into rivers, lakes, sea and ponds. Ion Exchange is a frontrunner in solving this problem with its wide-ranging, functional solutions.



The following orders bear testimony to this fact:

- 400 m³/day fluidised media reactor (FMR) for PHED, Odisha.
- 200 m³/day FMR from Utkal Institute of Medical Sciences, Bhubaneswar, Odisha.

PRODUCT LAUNCH

INDION® Disc Tube Membrane (DTRO) System

Ion Exchange, in association with world leaders in DTRO technology, Rochem Group SA, introduced the specially designed INDION DTRO system that treats water from complex alternate water sources and makes it suitable for drinking and industrial purposes. With its flat-sheet membrane technology, it treats complex water with minimal pretreatment and footprint. It produces water which has very low dissolved solids and is free from particulates, colloids and organic matter.

The system has provision for inline dosing. It is equipped with an in-built clean-inplace (CIP) for periodic membrane cleaning and safety features such as dry run protection, overload protection, etc. to prevent high-pressure pump and membrane system from damage. Complete operation and fault indication is simulated onscreen. INDION DTRO removes more than 95% of total dissolved



solids (TDS) and efficiently handles TDS fluctuation. It reduces the replacement cost of the membrane.

INDION DTRO treats complex wastewater generated from industries like distillery, pharmaceutical, chemical, textile, tannery and many more.

INDION° SWIFT 5Gx

Another invention from the house of Ion Exchange is the INDION Swift 5Gx.

INDION Swift 5Gx is exceptionally compact and is skid-mounted on a corrosion-resistant frame which also accommodates a stainless steel multipurpose pump. In addition to optimising the performance of the plant during service and regeneration, the pump provides a number of recirculation options to maintain the high quality of water in the treated water tank. INDION Swift 5Gx integrates a cation polishing unit (catpol) in order to produce mixed bed water quality meeting stringent international standards.

With its short cycle ion exchange process and fully automatic features, INDION Swift 5Gx is all set to redefine the limits of engineering excellence.



ZERO B AutoSand Filter

Ion Exchange is at the forefront of the water management industry, because of its sustained focus on technological advancement through R&D. Innovation is our hallmark as our numerous patents testify. ZeroB AutoSand Filter is one such product worth a mention.



ZeroB offers AutoSand Filter, an automatic particle filtration system that delivers highly clarified water from the unpleasant particulate water.

This product reduces turbidity and improves suspended solid removal unlike conventional sand filter media. Automatic backwashing is a key feature which ensures consistent water quality and prolongs the life of the filtration

media. It also enhances performance of softeners and larger reverse osmosis systems.

An AutoSand Filter is programmed in a way that it does not require manual interface for backwashing. Truly, an international quality product.



ON DISPLAY

Exhibitions

When it comes to innovations, Ion Exchange is second to none. Year after year, we exhibit our path-breaking innovations to various organisations.

Ion Exchange successfully showcases total water and environment management solutions and innovations by participating in numerous domestic & global exhibitions on water and environment solutions that bring together thought leaders, decision makers, leading researchers and business representatives from within and outside the water sector.

We have made it a habit to 'wow' our discerning clients at every exhibition we attend with our newest additions of innovative systems. That's precisely what we did at ET Acetech.

Our innovative total water and environment management solutions model was displayed at ET Acetech in Bengaluru, Mumbai & Delhi, where Zero B bagged an award in Design Wall Contest 2017 for Innovative Product - Icy Hot.

With our innovative outlook, we shall continue to win many more awards and clients' hearts as well.



3D model of 'Total Water Management Solutions' for residential & commercial complexes and actual swimming pool at ET Acetech (Bengaluru, Mumbai & Delhi)



Chemtech Hyderabad



Aquatech Amsterdam, a pivotal platform for us to accentuate our product presence.

At Envirotech Asia, we impressed our clients and left a mark on many more.



Events / Launch

Launch of INDION° SWIFT 5Gx

At the pharma meet organised in Hyderabad, we launched our high purity water generation product – INDION Swift 5Gx for the pharmaceutical industry. And needless to say, it was a stellar success.





Inauguration of ANDICOS™ Waste to Energy Plant

We launched India's first ANDICOS Waste to Energy plant at Akshaya Patra in Hyderabad to treat waste water and organic waste from its new and fully automated kitchen. The ANDICOS Waste to Energy plant has a capacity to treat approximately 1000 kgs of organic kitchen waste and 2 - 6 m³ of sewage sludge on a daily basis and will generate approximately 20 KW/H of electrical power along with 1.35 tonnes of rich organic fertiliser per day.







CSR INITIATIVES



In sync with Swachh Bharat Abhiyan, we constructed toilets at Mucharla Primary School, Telengana. Not only were the students provided with a good facility, but were also educated about the importance of cleanliness.

The Tree Plantation Initiative at New Gurukul Girls High School, Telengana was a truly inspiring endeavour to highlight the importance of plants for a greener, cleaner future.



INDION Arsenic Removal Tubewell Attachment at Kuralita Village, Punjab for providing safe drinking water to the villagers. This endeavour ensured that the population will have a continuous supply of safe drinking water and complete protection from waterborne diseases.









Whether it's about making our clients happy or putting a smile across the face of children, Ion Exchange will do it without a second thought. And that's exactly what we did.

Ion Foundation, with a team of Ion Exchange Mumbai employees, supported Smile Foundation by participating in TATA Mumbai Marathon 2018. A total of 35 employees participated in the Marathon, out of which seven employees participated in Half Marathon (21 Km)

Ion Foundation continues its enterprising journey and vows never to shy away from any opportunity to make lives better.

AWARDS

It always feels special to be recognised for your efforts and hard work. Winning industry accolades and awards is simply the best way to feel so.

We, at Ion Exchange, have made winning a habit. A habit we shall strive to perfect with time.



ET Acetech Design Wall 2017 - Zero B Icy Hot



Exemplary Work in Industrial Waste Management in India at the Eighth Regional 3R Forum in Asia and the Pacific





y & Innovation in

ASSOCHAM'S Water Management Excellence Awards 2018 - Significant Contribution In Water Industry

Water Digest Awards 2018:

- Best Water Conserver 'Waste Water Management'
- · Made in India Best Water Company
- Best Complete Domestic Water Management Solutions Provider Domestic & Institutions 2018

EMPLOYEE ENGAGEMENT

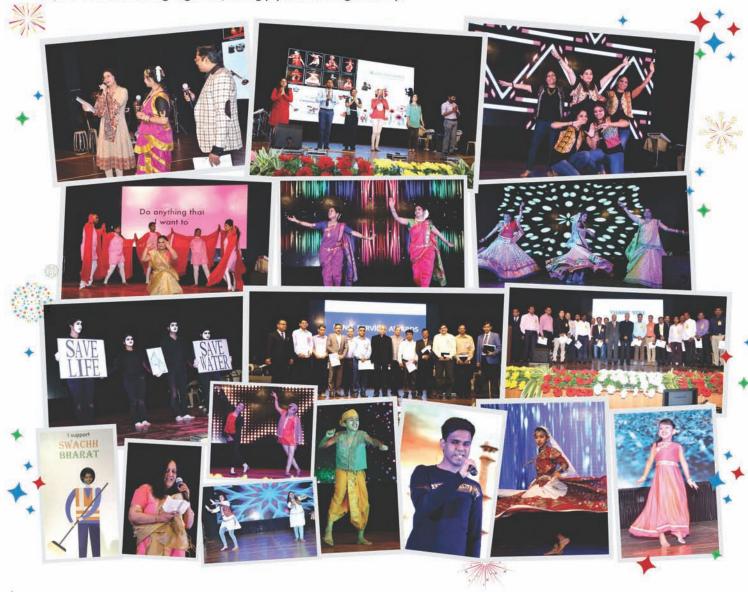
Jal Tarang – A Joy of Togetherness

Coming together, giving the employees and their family members a platform to showcase their hidden talents and spread joy is what Jal Tarang is all about.

Jal Tarang is an annual get together for Ion Exchange Head Office, Vashi & Rabale employees. It showcases the employees & their family members' talents and strengthens the bond between the employees, their families and the organisation. This year, Jal Tarang was made memorable by impeccable performances through multiple dance forms, songs, a skit by the multi-talented & enthusiastic employees & their family members.

As per the tradition, Ion Exchange employees were felicitated for their dedicated long service. This was followed by a sumptuous dinner. This year, we also had a selfie booth based on the Swacch Bharat theme where the employees took selfies & posted pictures on social media platforms which further helped spread the message. It was the first time that Jal Tarang had gone online with live posts. Efforts put in by each and everyone made Jal Tarang a truly memorable evening.

lon Exchange is one big family and events like Jal Tarang help us strengthen bonds and sprout newer ones. After all, it's all about being together, being joyous...being a family!



Cricket League

Off the field or on it, Ion Exchange gives all it has to make a winning statement. The Ion Exchange Cricket Premier League (IECPL) was one such event where our employees went all out to showcase their talent and fighting spirit.

IECPL was held at Western Railway Cricket Ground, Mumbai. Matches were played between multiple teams. The final match of women's team was played between Head Office & Rabale, and the men's final match was played between Aquanomics & Rabale 2. Rabale women's team and Aquanomics men's team were declared as winners of IECPL 2018.

The competition was entertaining. The atmosphere was electrifying. All the teams gave their best performances...and in the end the best teams won!







INDION ZERO B SWIFT and WYDRAMEM are registered trademarks of Ion Exchange (India) Ltd.