OMICRON YOUR PARTNER IN QUALITY	**Product Data Sheet** **Ion-Exchange Resin for Demineralizer**	Technical Office

The product contained in Omicron demineralizers and in the related spare parts is a mixed-bed ion-exchange resin, both cationic and anionic, designed to produce pure water for topping up batteries.

When the resin is exhausted, it changes colour from blue to orange

CHARACTERISTICS OF ION-EXCHANGE RESINS

The resin consists of very small blue-green beads.

During the ion-exchange process, water passing through a mixed bed of ion-exchange resin exchanges the ions contained in the water with other ions fixed onto the resins.

Demineralization is the most common ion-exchange method. A mixed-bed cartridge makes it possible to obtain the highest achievable ionic purity, with a conductivity of 0.1 µS/cm.

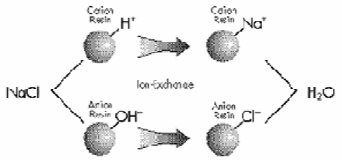
Conductivity	µS/cm 0.1 (µS/cm 1 > 1 < 1)
Hardness	Absent
Foreign minerals	Absent

CYCLIC YIELD OF DEMINERALIZERS BASED ON WATER HARDNESS

Feed pressure		Max 1 bar		
Feed temperature		Min 5°C - Max 60°C		
Approx. litres of demineralized water	Hardness	TRILL/150	TRILL/350	TRILL/650
	10°f	150	350	700
	20°f	100	200	550
	30°f	80	150	400
	40°f	50	100	350

Feed pressure		Max 1 bar		
Feed temperature		Min 5°C - Max 60°C		
Approx. litres of demineralized water	Hardness	MG/1000	MG/2000	MG/3000
	10°f	1200	2100	3000
	20°f	850	1750	2760
	30°f	550	1100	2100
	40°f	300	800	1800

DEMINERALIZATION - CHEMICAL WATER PURIFICATION PROCESS



The technology used in demineralizers, columns filled with ion-exchange resin, is based on the chemical properties of ion-exchange resins, which are synthetic polymer matrices. These resins are provided with active functional groups, anchored to the matrix, capable of exchanging their mobile ions with ions of the same charge contained in the solutions with which they come into contact. In practice, they retain dissolved salts and allow partial or total purification of diluted or concentrated effluents.

The treatment carried out by demineralizers using ion-exchange resins is chemical and enables the production of very low-conductivity water required in several industrial processes, including battery topping up. These resins exchange the cations present in the water with [H+] ions and the anions with [OH-] ions.

Deionization resins exchange both hydrogen ions with cations and hydroxyl ions with anions. Cation-exchange resins, made of styrene and divinylbenzene containing sulfonic groups, exchange one hydrogen ion with any cation with which they come into contact, such as Na+, Ca++, Al+++ and charged soluble organics. Similarly, anion-exchange resins, made of styrene and divinylbenzene containing quaternary amine groups, exchange one hydroxyl ion with any anion, such as Cl-. Hydrogen ions from the cationic resins and hydroxyl ions from the anionic resins combine to form water.

The cationic and anionic resins are mixed together to form an intimate blend arranged in a single column. This produces an in-depth type of demineralization, where each mixed-resin layer, or micro-bed, operates on a lower salinity level than the previous one. The result is an outlet water with high-grade demineralization characteristics: fully neutral pH (7) and conductivity of 0.1 µS/cm2, lower than double-distilled water.

The resin can also treat water with a high salt content. The quantity of water produced will be inversely proportional to the salinity of the raw water: for example, the resin can treat 400 litres of water with a total salinity of 250 ppm as CaCO3, or 200 litres of water with a salinity of 500 ppm as CaCO3.

Generally, at the outlet of a mixed-bed resin there is expected to be some leakage of the components that have lower selectivity, or affinity, with the cationic and anionic resin that make up the mixed bed. Therefore, a few ppb, parts per billion, of sodium may leak from the cationic resin and a few ppb of silica from the anionic resin.

Once the resins have exchanged all their hydrogen ions and/or hydroxyl ions with the ionic contaminants present in the water, they must be replaced.

The resin changes colour to orange and cannot be regenerated.

A mixed-bed cartridge makes it possible to obtain the highest achievable ionic purity, with a conductivity of 0.1 µS/cm2.

PRODUCT CHARACTERISTICS

Product description	■ Cationic resin: styrene/divinylbenzene copolymer, quaternary ammonium. ■ Anionic resin: sulfonated divinylbenzene/styrene copolymer.
Product use description	Ion-exchange and/or absorption process

CHARACTERISTICS OF ION-EXCHANGE RESINS

Requirements and specifications	Notes
Physical state	Beads
New resin colour	From blue to green
Exhausted resin colour	Orange
Minimum operating temperature	5°C
Maximum operating temperature	60°C
Supply water	Water mains
Operating pressure	Max 1 bar
Intended use	Battery topping up
Use warnings	For industrial use only

RESIN DISPOSAL

Exhausted resin is a SPECIAL WASTE, neither toxic nor harmful. It cannot be disposed of as municipal waste.

Correct assignment of both the EWC group and the EWC code for this product depends on how it is used.

In Italy, the EWC code usually used is: 19 09 05 "spent ion-exchange resins".

PERSONAL PROTECTION

When using the resin, observe the following precautions:

gloves

safety goggles

ACCIDENTAL CONTACT WITH THE MATERIAL

- H318 Causes serious eye damage.

Precautionary statements

P280 Protect eyes/face.

Skin contact: Wash with soap and water. If skin irritation persists, call a physician.

Eye contact: Immediately rinse eyes, keeping them open, with plenty of water for at least 15 minutes. Seek medical assistance.

ACCIDENTAL RELEASE OF THE MATERIAL

Sweep up the spilled substance; the floor may become slippery.

TRANSPORT INFORMATION

Classification for transport by ROAD and rail (ADR/RID):
Not regulated (Not dangerous for transport)

Classification for transport by SEA (IMO/IMDG):
Not regulated (Not dangerous for transport)

Classification for transport by AIR (IATA/ICAO):
Not regulated (Not dangerous for transport)

WATER FOR TOPPING UP AND PREPARING ELECTROLYTE

Water must meet the physical requirements shown in Table 1 and the chemical requirements shown in Table 2. Purified water complying with these requirements can be prepared from tap water by ion exchange.

■ Water requirements for battery topping up

The necessary conditions for the water used to fill batteries are:

Appearance	Transparent, colourless, odourless, non-oily
pH value	5 to 7
Electrical conductivity at 20°C newly prepared to be added to the cell	< 10 µS/cm < 50 µS/cm
Table 1	

■ Chemical requirements for purified water

Purified water must not exceed the limit values shown in Table 2.

No.	Impurity	mg/l max.
1	Residue on evaporation	10
2	Oxidizable organic substances calculated as KMnO4	20
3	Hydrogen sulfide group metals (Pb, Sb, As, Sn, Bi, Cu, Cd) each element individually all together	0.1 0.5
4	Ammonium sulfide group metals (Fe, Co, Ni, Cu, Cr) each element individually all together	0.1 0.5
5	Halogens calculated as chloride	0.5
6	Nitrogen as nitrate	2.0
7	Nitrogen, for example as ammonia	40
	Table 2	

■ Storage of purified water

Water must be stored in suitable containers, such as glass, ebonite, polyethylene, polypropylene or other plastic vessels. Flexible hoses must be made of PVC, rubber or polyethylene. Dissolution of metal ions in metal tanks is possible. Therefore, metal containers must not be used.

It is recommended that purified water always be stored in airtight containers because carbon dioxide (CO2), which is absorbed from the air, increases the electrical conductivity of the water.

All mineral salts dissolved in water are present in dissociated form, consisting of 2 parts, or ions: one with a positive electrical charge, the cation, and the other with a negative electrical charge, the anion. The presence of mineral salts in water determines the electrical conductivity of the water itself.

Therefore, the salinity of water, whether high or low, can be measured with a conductivity meter that detects its degree of conductivity, expressed in µS/cm2.

ION-EXCHANGE RESIN FOR DEMINERALIZERS IS CONTAINED IN THE FOLLOWING DEVICES

	WATER DEMINERALIZERS
3000.61	TRILL/150 - 150 litres
3000.63	TRILL/350 - 350 litres
3000.1	TRILL/650 - 650 litres
3000.3	MG/1000 - 1000 litres / wall-mounted support
3000.4	MG/2000 - 2000 litres / wall-mounted support
3000.5	MG/3000 - 3000 litres / wall-mounted support
3000.2	MG/1000C - 1000 litres / wheeled cart
3000.54	MG/2000C - 2000 litres / wheeled cart
3000.35	MG/3000C - 3000 litres / wheeled cart
	RESIN SPARE PARTS
3000.20	Resin refill for Eco/150
3000.21	Resin refill for Eco/400
3000.62	Resin refill for TRILL/150
3000.64	Resin refill for TRILL/350
3000.45	Resin refill for TRILL/650
3000.8	Resin refill for MG/1000
3000.7	Resin refill for MG/2000
3000.34	Resin refill for MG/3000

CE MARKING

The systems comply with the legislative provisions transposing the following directives:

UNI EN 12100- 2010 Safety of machinery - General principles for design - Risk assessment and risk reduction

UNI EN 13857- 2008 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs

DIN 43530-4 (1987-10) Accumulators, electrolytes and water replenishment, water and refilling water in lead-acid batteries and alkaline batteries

EN 60993:2002 Electrolyte for vented nickel-cadmium cells