CORROSION & WATER-CONTROL bv

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Don't worry about
fouling and corrosion

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Brief Introduction

CORROSION & WATER-CONTROL bv

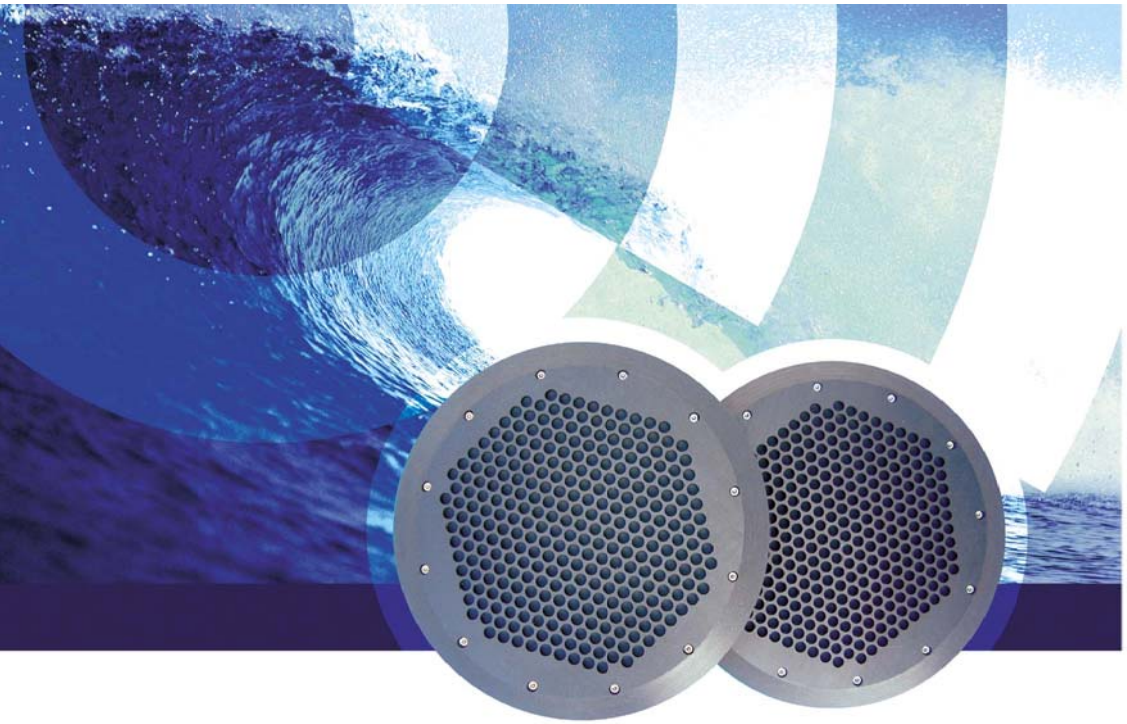
With decades of experience in cathodic (corrosion) protection of steel structures and marine growth prevention (for boxcoolers and sea water intakes), we have been enjoying high reputations around the world for our expertise and know-how. Supplemented by worldwide services and marketing distribution networks, we are a leading international supplier in this field. For our core technological products (ICCP and ICAF/MGPS), they are the ultimate and most economical solutions against corrosion and fouling.

The headquarters of our company is located in The Netherlands. With the state-of-the-art technology of our products and dedicated services to the customers, our company has earned the recognition and top positions in the marine protection market around Europe. We have also brought our technical resources and expertise to Asia, to support the customers by solving the problems of corrosion and fouling once and for all. In order to let the customers in Asia enjoy the best services and technical support, Corrosion & Water-Control Ltd. was set up in China to achieve this goal.

Until now our systems have been installed on hundreds of vessels. The satisfying feedbacks from these customers are the most convincing proof of the quality of our systems. We supply systems to customers from navy, coast guards, yachts, supply vessels, tugs, cruise vessels, dredgers, container liners, trawlers, FPSOs, VLCCs, ferries and product carriers. Some of our international customers include: US Coast Guard (US), Indian Coast Guard (India), Royal Dutch Navy (The Netherlands), Irish Marine Department (Ireland), Simatech Dubai (United Arab Emirates), China Offshore (China), Schöller (Germany), Jan de Nul NV (Belgium), AP Möller (Denmark) and Wagenborg Shipping (The Netherlands).

To let our customers get easy access to the technical support and services, our servicing engineers are located in the following countries and regions: China (North, South and Middle), Cyprus, Denmark, Finland, Greece, India, Italy, Iran, Korea, Norway, Singapore, Spain, Taiwan, UK, the Netherlands, Turkey, United Arab Emirates, Ukraine, USA and Vietnam.

ICAF/MGPS ICCP On-/Offshore Sacrificial Ano des



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Impressed Current Cathodic Protection (ICCP)

Impressed Current Cathodic Protection (ICCP) system from Corrosion & Water-Control (CWC), which utilizes the principle of shifting the natural potential of metals, protects your ship durably and effectively against corrosion. This ICCP system provides the ships with all-round protection, including the protection for the propulsion and rudder systems.

All the submerged metal parts of the vessel with the damage or ageing of coatings are effectively protected by our ICCP system. A clear indication of your coating's condition will be shown on our Touch Screen Display. All data can be downloaded to an external computer and transferred by Internet for checking. System adjustments can also be made via the same procedure by uploading.

Our ICCP system offers many additional benefits compared with sacrificial anodes, such as far cheaper to operate in the long-term, almost maintenance free and long lifetime (25 years). We deliver and design not only complete ICCP systems, but also sacrificial anodes and all spare parts according to your specifications.

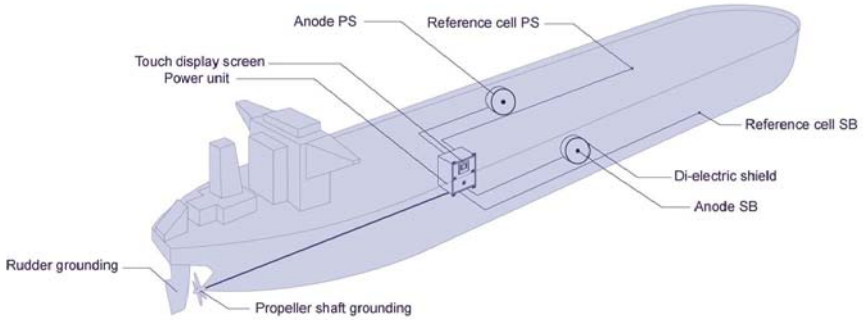
Our system is uniquely characterized by the extensive control and steering options, and can be connected to the vessel management system. The special designed controlling program constantly processes the flows of data received from the sensors that are installed on the vessels. Together with the high-grade keramox® coated titanium anodes and the reference electrodes, the Power Unit ensures the correct degree of protection in any situation. Even if the electrolytic effects of water vary considerably, this system quickly adapts and continues to offer correct and optimum protections. This performance can never be achievec by the sacrificial anodes or simple paint systems.

Advantages of ICCP Power unit

- Touch display operation in all main languages
- "Off potential" controlled
- Coating condition indicator
- Propeller shaft monitoring (+ alarm function)
- Automatic system scan
- Down-/uploading via Windows hyper-terminal (Internet)
- Automatic / Manual mode
- History of all data in years
- 3 points temperature check of the cabinet (+ alarm function)
- Connectable to Ship Management System via RS485 and RS232 (optional)

Extra advantages of *High Frequency Power unit* (new)

The advanced *High Frequency Power Unit* is based on modular units. The most obvious advantage is when one of the modular units fails due to the maintenance or failure, the other ones are still in operation. Furthermore, the weight and size of this *new Power Unit* are reduced tremendously.

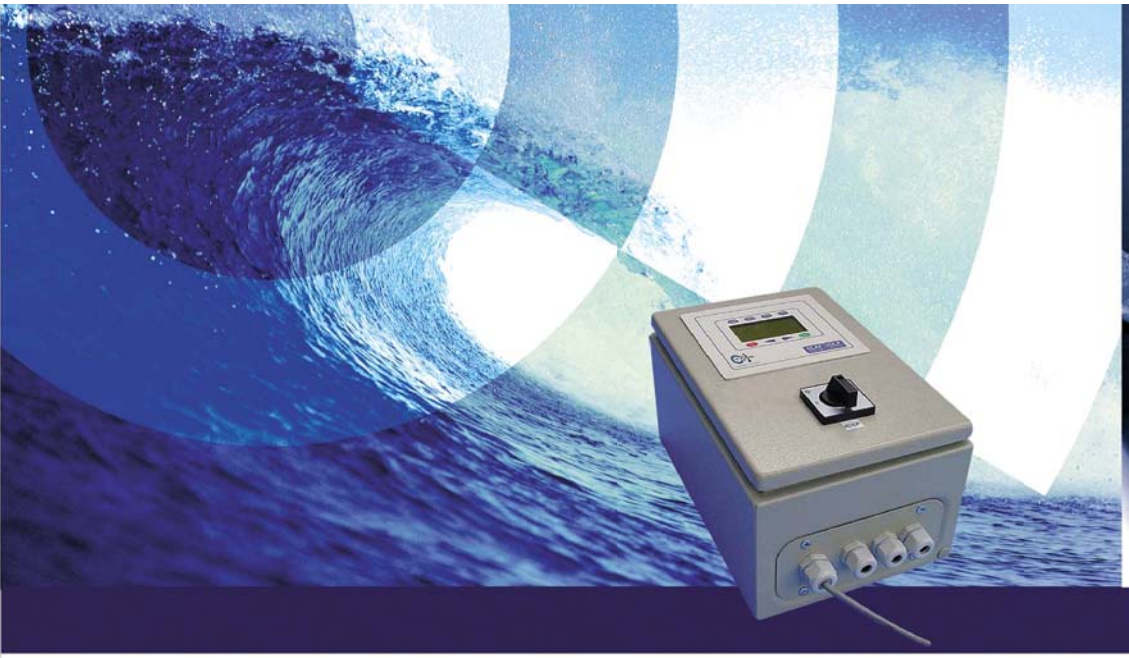


Seagoing Vessels

The corrosion of steel-hulled seagoing vessels in sea water is electrochemical in nature. Our ICCP system can prevent this corrosion on the exterior underwater areas of vessels. This system is a sophisticated method of corrosion control that supplements the coating, which guarantees the perfect protection of the hull. Our automatically-controlled system is virtually maintenance free. The ICCP Ti-MMO anodes last for 25 years, as opposed to sacrificial anodes which must be replaced at each dry-docking. Any of the crucial data can be read just by a simple click on our Touch Display Screen.

Inland-going Vessels

Due to the higher resistance of fresh water, ICCP system for seagoing vessels is not applicable to the inland-going vessels. As a result, we have developed a special model of ICCP for the inland navigation. The system consistently monitors electrical potential around the hull and automatically adjusts the anode output, to cope with the external factors (e.g. condition of the paintwork, changes in salinity of seawater and temperature, ship's velocity, etc.). Even if the electrolytic effects of the water vary considerably, this system quickly adapts and continues to offer correct and optimum protection.



Impressed Current Anti-Fouling (ICAF)
Marine Growth Prevention System (MGPS)

ICAF/MGPS for Boxcoolers

Boxcoolers are always potential fouling victims. Barnacles, mussels, algae and other types of shellfish grow on the boxcooler and thus affect its heat transfer function. Ships operating in the coastal water run the greatest risk. Our Impressed Current Anti-Fouling (ICAF) system / Marine Growth Protection System (MGPS) is a guarantee to effectively prevent this kind of fouling.

The functioning principle is based on an artificially triggered voltage difference between the copper anodes and integrated steel plate cathodes. As the copper dissolves into the seawater, an ambient environment is created precluding fouling and protecting the boxcoolers. The Power Unit of the system ensures that the copper anodes add the exact required amount of copper particles to the seawater. Perfect protection is guaranteed under all conditions and the amount of dissolved copper is minimized to prolong the lifetime of anodes.

ICAF/MGPS for Seawater Intakes

Seawater intake pipe-work systems always suffer the problems of fouling. Removing this kind of bio-fouling in the pipe-work systems invariably increases the maintenance costs considerably. Ships sailing in coastal water are at the greatest danger. Our Impressed Current Anti-Fouling (ICAF) system or Marine Growth Protection System (MGPS) is the best option to prevent this kind of fouling.

The copper anodes of our ICAF/MGPS system mounted in the sea chest or strainer are connected to the Power Unit; this Power Unit has a complete set of controlling functions and guarantees the amount of dissolved copper as required into the seawater is minimum. The lifetime of anodes is prolonged to the maximum and the perfect protection is assured under all conditions. In most of the cases, along with the copper anodes, aluminum or soft iron anodes must be installed to protect the pipe-work against corrosion.

As an expert in the protection of boxcoolers and seawater intake cooling systems for decades, we can assure you of the long term perfect functioning of the system. All data can be downloaded to an external computer and transferred by Internet for checking. System adjustments can also be easily made via the same procedure by uploading.

Advantages of ICAF/MGPS Power Unit

- Touch display operation in all main languages
- Automatic correct installation check (+ alarm function)
- Remaining lifetime of the anodes (+ alarm function)
- Interactive with seawater pumps via several digital inputs to save anode material
- Down-/uploading via Windows hyper-terminal (Internet)
- History of all data in years
- Low voltage/short circuit (+ alarm function)
- Polarity check for anode identification (+ alarm function)
- Connectable to Ship Management System via RS485 and RS232 (optional)

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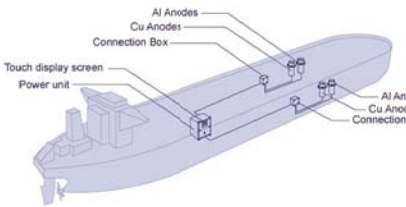

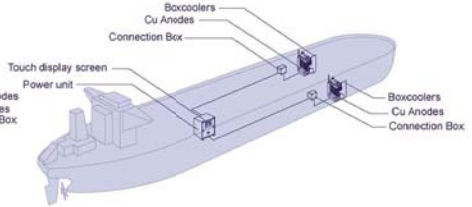

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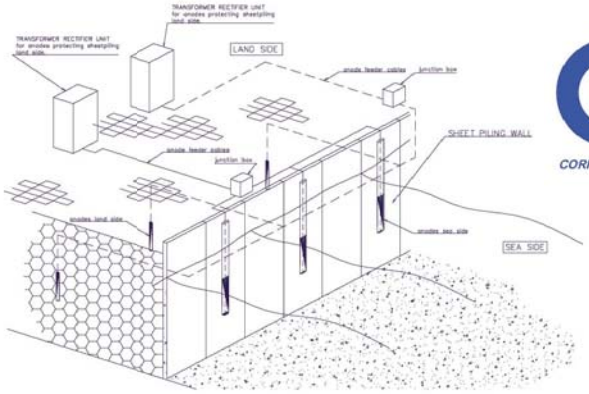
On-/Offshore

On-/Offshore and Harbor Structures Protection

Seawater/water is a natural electrolyte of high corroding rate. On-/offshore and harbor structures submerged in seawater/water or buried in the ground are at the serious threat of corrosion, which challenges the safe operation. These structures frequently have an expected service life of decades. To survive, the structures must be protected from corrosion with our Impressed Current Cathodic Protection (ICCP) system or sacrificial anodes.

We developed an ICCP system, in which the size and shape of the Ti-MMO anodes are tailor-made in a unique way due to the different structures to be protected. As a result, these tailor made anodes are easy to install and meet the design of different structures.



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Anode Materials of ICCP System

Besides the lifetime, the most important characteristic of an anode material is the relationship between the rate of consumption and the current output. The consumption rate of galvanic anodes, for example, is very high in comparison with our special ICCP anodes, such as Metal Mixed Oxide (MMO) keramox®, or Platinized Titanium anodes. Our ICCP anodes last for 25 years.

Consumption rates of different anode materials:

Anode Type	Anode Current Density (Amp/M^2)	Consumption Rate (Gram/Amp/Year)
Graphite	50-150	30-450
Ferrosilicon (FeSi)	300	90-250
Lead/Silver (PbAg)	300-500	30-90
Magnetite	100	3-5
Platinized Titanium (PtTi)	500-750	0.01
Keramox®, (MMO)	100-750	0.005
Zinc (Zn)		11,200
Aluminum (Al)		3,400
Magnesium (Mg)		7,750

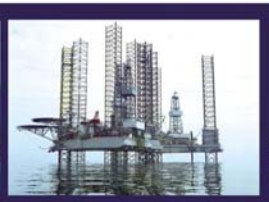
Transformer Rectifier Units

Transformer Rectifier Units are tailor-made to meet all the system requirements and/or customers' specifications. They are air or oil cooler, manually or automatically potential controlled and suitable for placing in most common environments. Special units are available for use in hazardous environments. The cabinets are suitable for pole, wall or floor mounting and for in/outdoor installation. These units are provided with a lockable front opening door for easy access. Analogue or digital voltage/current and potential readout meters are installed either on the enclosure door or inside the cabinet.

Reference Electrodes

The high purity zinc reference electrode (Zn=99.995%) is utilized in our ICCP systems. The zinc reference cells continuously monitor the potential of the hull and feed measurements back to the Power Unit. Then the Power Unit automatically calculates the accurate current output activated by the Ti-MMO anodes.

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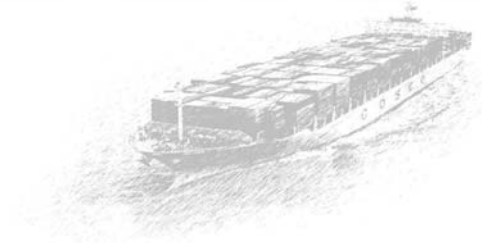

Sacrificial Anodes

Cathodic protection can also be achieved by a more traditional way, namely sacrificial anodes. This method is to connect the protected metal structures with a more active metal or alloy. When two metals are electrically connected to each other in an electrolyte (e.g. seawater), the more active metal (anode) supplies current and dissolves (sacrifices) to effectively protect the other metal (structures).

Sacrificial anodes are cast with high efficiency alloys and featured by light weight and high amperage output. They can function economically and efficiently without any maintenance during the operating period to control the corrosion. Furthermore, after installation there are no labor costs involved and no electrical supply is required.

Application:
- Ships
- Harbor installations
- Offshore engineering
- Underground structures
- Tanks
- Power plants, refinery and chemical plants
- Reinforced concrete structures and buildings' piling foundation