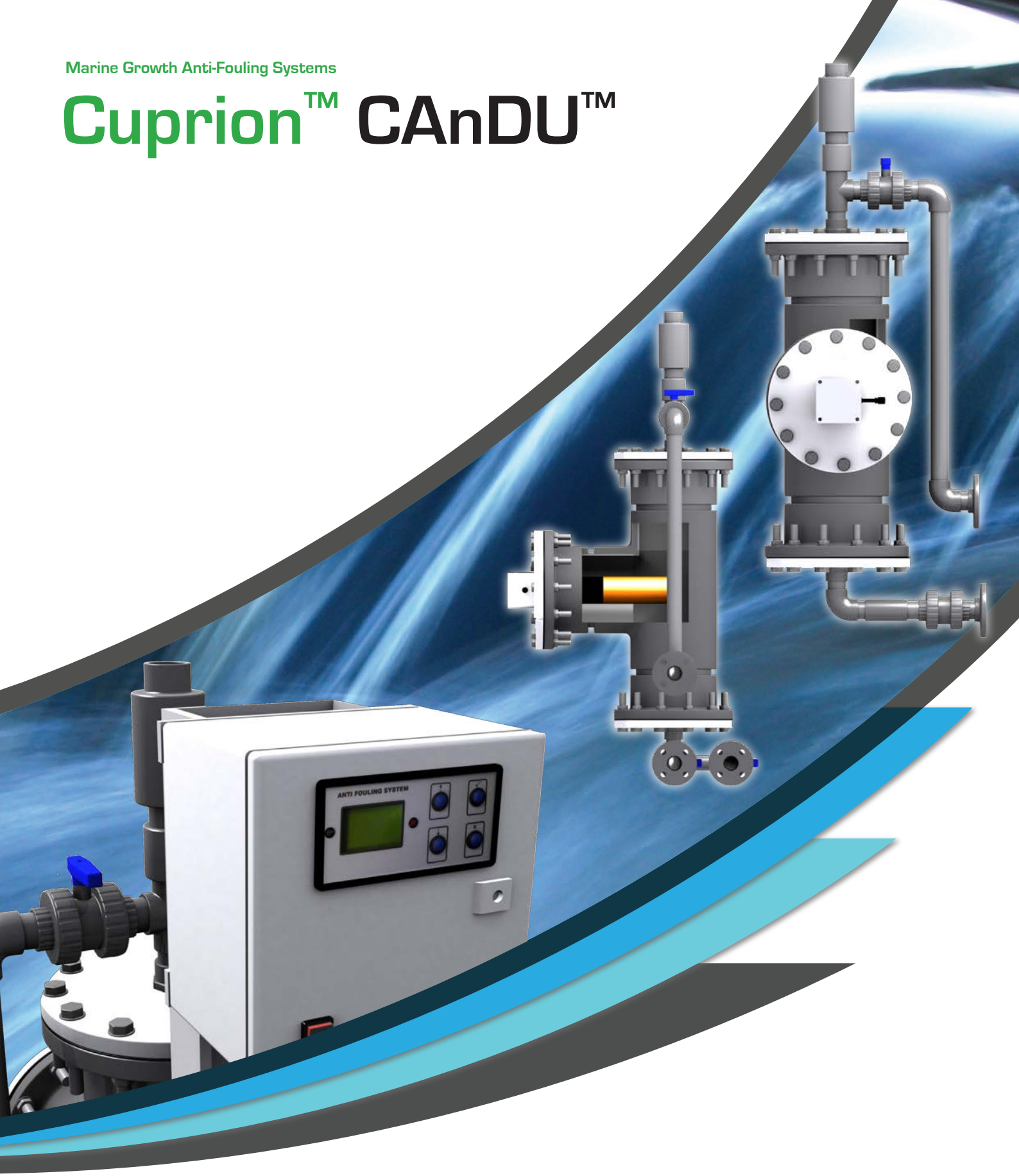
Marine Growth Anti-Fouling Systems

Cuprion™ CAnDU™



SEAWATER PUMP FOULING PREVENTION

CATHODIC PROTECTION CO LIMITED

CUPRION™ ANTI FOULING OVERVIEW

Cathodic Protection Co. Limited have manufactured and supplied the electrolytic 'Cuprion'™ anti-fouling system since the early 1970's to protect pumped sea water systems against marine growth. Today, the system is used by many of the major oil and gas offshore operators to protect vertical sea water and fire water pumps on platforms. Other applications include jetty fire pumps and sea water intake systems.

BENEFITS OF THE 'CUPRION'™ ANTI FOULING SYSTEMS:-

- Reduction in power requirements over alternative methods for fouling control.
- Low maintenance system
- Low power requirement
- No handling or storage of chemicals required
- Environmentally acceptable
- 35 years of proven experience

CUPRION™ SYSTEM DESCRIPTION

The method is based upon the application of an impressed current through copper and aluminium electrodes which allows a controlled dosing process of both elements in solution. The copper acts as a natural biocide preventing hard bio-fouling such as Barnacles, Limpets, Mussels and Tubeworms. The Aluminium allows the copper to stay in solution for longer and provides a corrosion control benefit.

CAnDU™ SYSTEM OVERVIEW

Bio-Fouling of water intake pumps and pipework can be a major problem, causing expensive equipment damage and pipework blockages, leading to shut down of vital seawater supplies.

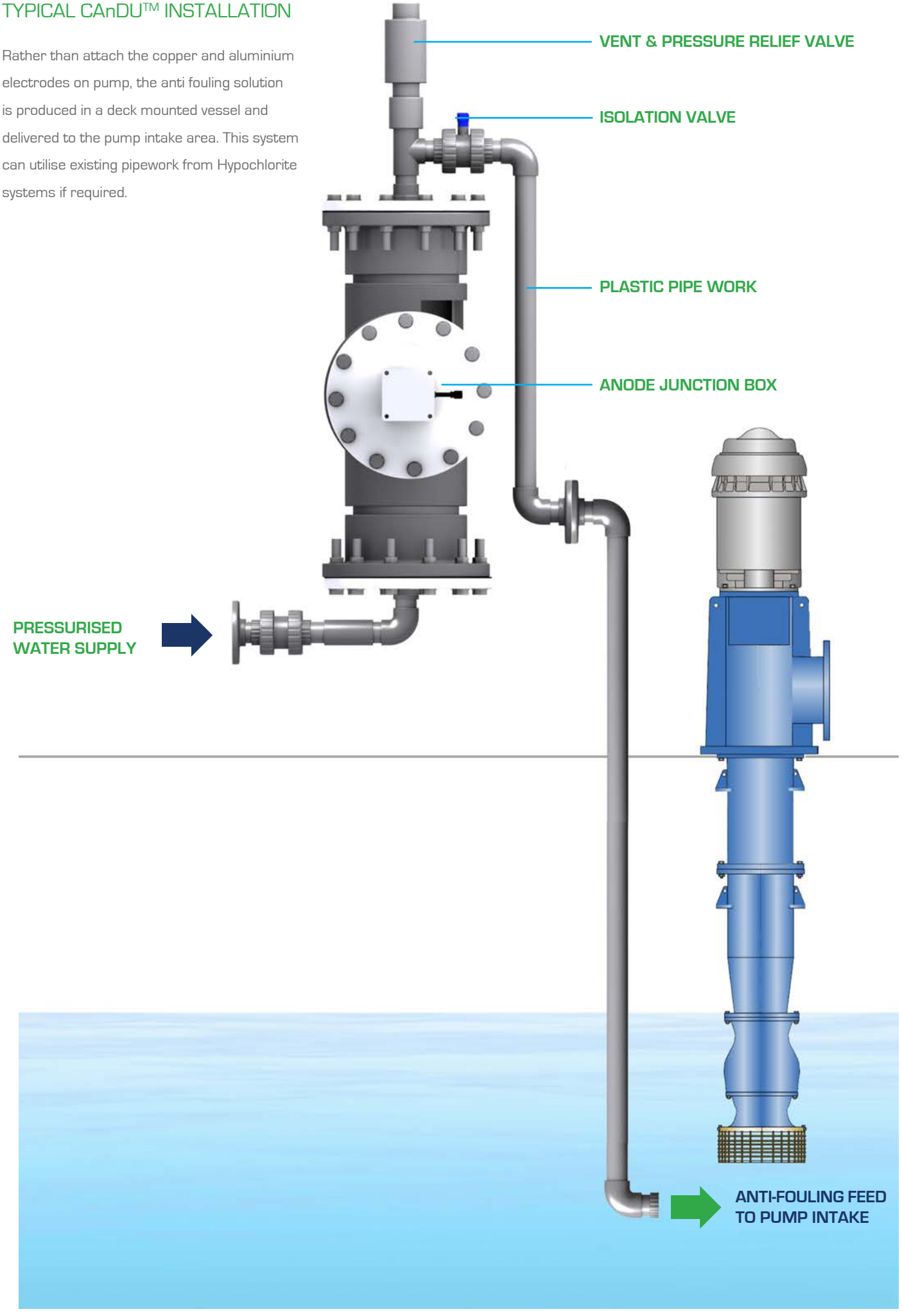
To address these issues Cathodic Protection Co. Limited has developed a deck mounted anti-fouling system, which can use the existing delivery pipe work from a chlorine anti-fouling system. This latest version from Cathodic is known as the CAnDU™ system. It features a modular design which can be expanded to suit different pump capacities, allowing manufacturing costs to be minimised. The result is an affordable system which will provide complete anti fouling protection to the pump and significant savings to the operator.

FEATURES, BENEFITS AND ADVANTAGES OF THE CAnDU™ SYSTEM

- Quicker anode replacement
- Anodes changed without lifting pump
- Multiple pumps can be serviced from one location
- Direct replacement for Hypochlorite / Chemical dosing system using same dosing pipework
- No hazardous chemicals to handle
- Non-corrosive media, copper & aluminium ion solution
- Lower power consumption than Hypochlorite
- Minimal maintenance requirement
- Safe for use with Reverse Osmosis equipment

TYPICAL CAnDU™ INSTALLATION

Rather than attach the copper and aluminium electrodes on pump, the anti fouling solution is produced in a deck mounted vessel and delivered to the pump intake area. This system can utilise existing pipework from Hypochlorite systems if required.



TYPICAL CAnDU™ UNIT

Each CAnDU™ unit is designed according to the specific requirements of the project, however the fundamentals of the design are outlined in the diagram below. The vessel body is available in heavy duty uPVC material or steel for greater impact resistance if this is a site consideration.

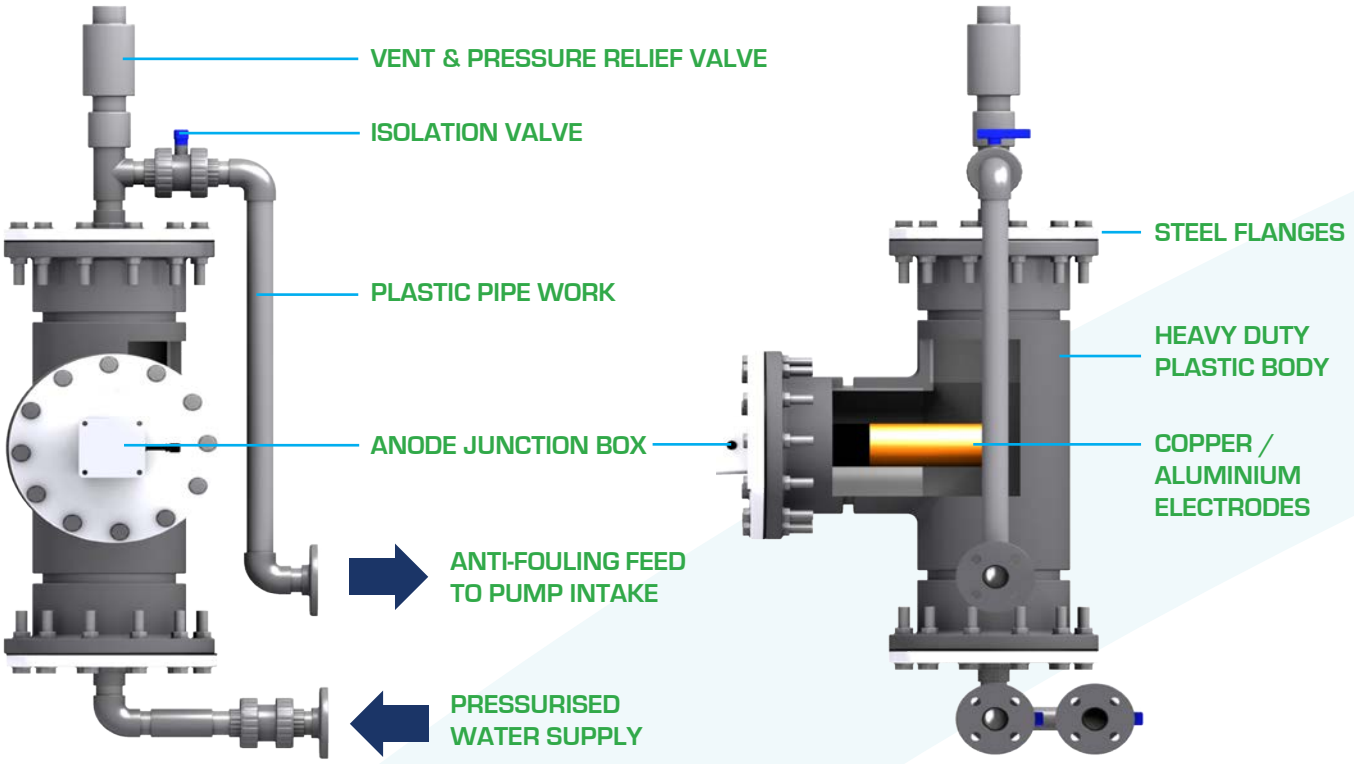
The Copper and Aluminium electrodes are located inside the vessel and are easily replaced at the end of their service life. The complete assembly is mounted along with the power control unit on a self contained skid unit as shown overleaf.

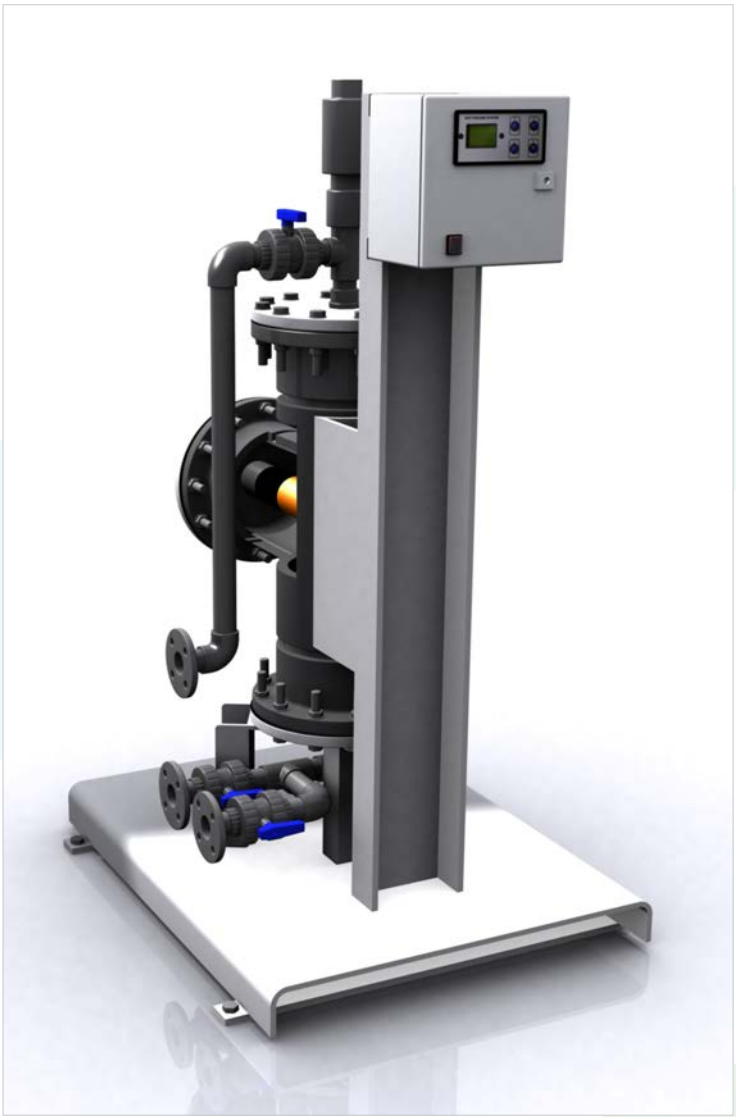
If required the CAnDU™ unit can be used to dose multiple pumps from one vessel making it even more cost effective and efficient to run.

In general electrode life is designed for 1 – 2 years in service. Replacement electrodes can be made in under one hour and spare /replacement electrodes can be sent quickly and efficiently via our network or distributors worldwide.

The CAnDU™ system is environmentally friendly, cost efficient and removes the need to handle and store hazardous chemicals associated with alternative Anti Fouling solutions.

VISUAL DESIGN GUIDE - ANTI FOULING SYSTEM





CAnDU™ DECK MOUNTED ANTI FOULING

The CAnDU™ unit is locally controlled with a simple to use switch mode power supply / output control unit.

This allows the client to set and monitor dosing levels and systems performance levels.

Once set up the unit requires practically zero user interface / maintenance.

The units construction is designed for harsh marine environment operating conditions.

The Control Unit automatically adjusts the dosing level when pumps are in standby mode and at most risk of marine growth. This feature maintains pump protection whilst at the same time increasing electrode life and minimising operating costs.

The CAnDU™ system comes as a complete skid mounted assemble ready for fast and easy installation at site.

Vessel can be constructed in uPVC or Steel (including Stainless options) according to the requirements and location of the site.

Cuprion™ units are in service across the world and spare parts and replacement electrodes are available quickly and economically through our range of distributors or direct from CPCL.

Corrosion problems and poor reliability are issues which are often reported by operators of chlorine based anti fouling systems. The Cuprion™ system in contrast is non-corrosive and requires no routine maintenance.

CUPRION™ ANTI FOULING OVERVIEW

In order to help you specify and request a quotation for a CAnDU™ system we have provided a checklist / questionnaire below requesting the outline information we need to provide you with a detailed offer.

Location of pumps (i.e. North Sea, Gulf of Mexico) _____

Number of pumps: _____

Normal pump running capacity: _____ m^3/hr Distance between pump intake and deck level: ____ m

Pump run time: _____ hr/yr Caisson I.D _____ mm

Time between pump overhauls/removal from caisson: _____ Years

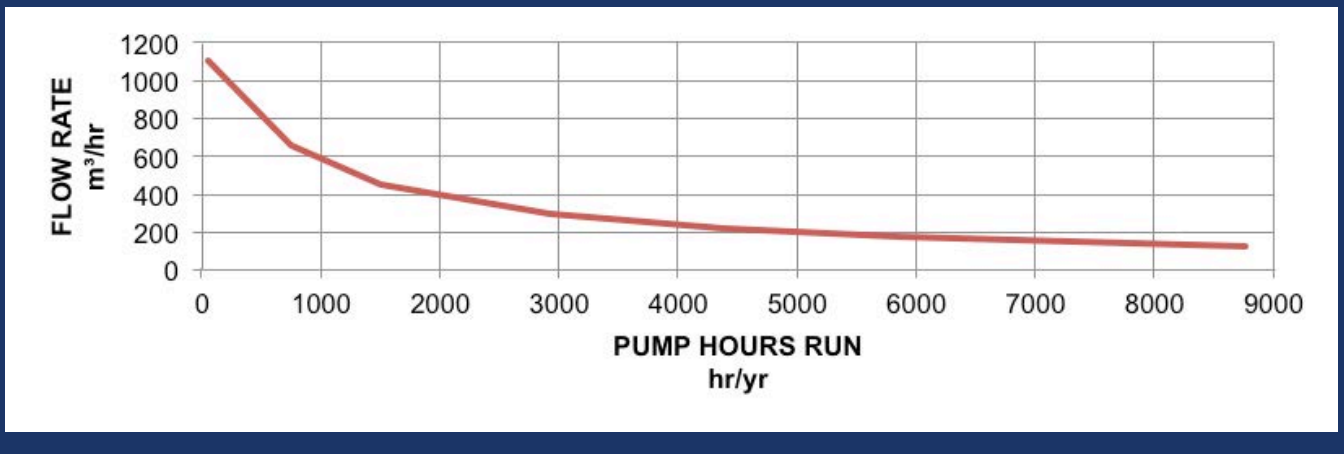
Location and IP Rating of Control Panel: _____

Other relevant information: _____

_____

The standard design consists of 1 copper and 1 aluminium anode. The following chart gives an estimation of the flow rate that can be protected by this standard design, against pump hours run per year.

This chart is just one example, we can provide design and data to suit many different applications. Submission of the data requested above will enable us to tailor a solution specific to your requirements.



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References include