
Cathodic Protection System for Large Structures and FPSO s

RETROBUOY



DEEPWATER

www.stoprust.com

RetroBuoy™

At Deepwater, our RetroBuoy remote cathodic protection units have been making quite an impression on the oil and gas industry. Easy to fit, long lasting, consistently powerful and very cost effective to operate, they've made an impression on our growing list of projects too.

This guide shows you some of the specifications and advantages of RetroBuoy, how it can best protect your assets and how it can provide verifiable protection at a lower cost. To find out more, or to talk to one of our engineers, please get in touch with your usual Deepwater contact, or use the addresses and numbers on this guide.



Recent Projects

Recent Cathodic Protection Projects with the RetroBuoy System

A. Fixed Platform, South China Sea

In the Spring of 2010, Deepwater's RetroBuoy system will be used to retrofit the cathodic protection system on the Lufeng (LF) 13-2 WHP fixed production platform, owned and operated by CNOOC. The 4-leg structure is located in approximately 430 ft [132 m] of seawater. Two RetroBuoys will be deployed to supplement with little anode material remains on the structure, extending the life of the CP system by 15 years.

B. 4 Fixed Platforms, North Sea

In 2010, Deepwater will retrofit the cathodic protection system on the Forties platforms (Alpha, Bravo, Charlie & Delta), owned and operated by Apache. These structures are located in approximately 225 ft (70 m) of seawater. An urgent galvanic retrofit was required in 2009 for the risers and flow-lines, using a total of 17 sacrificial anode sleds. The main retrofit, designed for an additional 20 years of CP for the platform structures will employ 5 RetroBuoys.

C. Neptune Spar, Gulf of Mexico

In August / September 2009, Deepwater retrofitted the cathodic protection system on the Neptune Spar. The original cathodic protection system on the hull was approximately 300 sacrificial aluminum anodes. At the request of the operator, DCSI designed, supplied and commissioned a retrofit impressed current CP system (ICCP).

D. Fixed Platform, Gulf of Mexico

In June 2008, Deepwater performed a cathodic protection retrofit of a fixed platform in 720 feet of seawater. This Gulf of Mexico platform is a large 4-leg, 8-skirt pile fixed jacket. Two RetroBuoys were deployed on the seabed 150 to 400 feet outboard of the base of the jacket. Double-armored power cables were used to connect each RetroBuoy to a topside marine transformer-rectifier rated at 450 Amps. The installation took less than 2 days.

About RetroBuoy™

The most efficient and environmentally responsible cathodic protection retrofit system available.

RetroBuoy is a high-capacity impressed current cathodic protection system, designed primarily to be retrofitted to existing structures. It utilizes impressed current titanium anode rods, housed in buoyant floats. This design keeps the anodes in constant contact with the seawater, maximizing the efficiency of the cathodic protection delivered. The sled that anchors the buoys is placed a certain distance from the protected structure, in order to distribute the cathodic protection current more evenly over larger areas. Floating platforms, complex steel structures such as fixed jackets, or structures with many pilings in a tight geometry, such as port facilities or loading jetties benefit immensely from using this type of technology.

Maximum Efficiency

To maintain appropriate levels of protection, individual RetroBuoy anode sleds can be rated anywhere from 150 to 500 Amps. The compact size and remote location of the RetroBuoy directly on the seabed simplifies the installation procedure, keeping the installation portion of the retrofit project cost-effective. As installation costs typically dominate a large offshore cathodic protection upgrade, RetroBuoy thus provides the lowest installed cost per Ampere/Year of any cathodic protection system available.

Transformer Rectifier(s) and Cabling

As with all impressed current CP systems, the RetroBuoy requires a transformer rectifier topside and cabling down to the sea floor. Routing the cable can be done in many different ways, depending on the conditions of each particular project. Several stock scenarios exist, and for situations that require a new solution, our team of N.A.C.E. certified corrosion engineers and CP designers can adapt existing installation procedures. In addition, our partnerships with key transformer / rectifier manufacturers in the US and UK allow us to provide complete systems in compliance with any local electrical requirements and safety codes.

Applications

Large Offshore Platforms

Situated approximately 100 feet (30 m) from the platform jacket, the RetroBuoy can provide up to 400 Amps of cathodic protection, protecting approximately 80,00 sq. ft of underwater steel. Typically, the cable is routed to the surface through an I or J tube, depending on the structure. In some recent installations, a tensioned clamp can be used to thread the cable safely inside the jacket.

FPSO s

For protection of FPSO hulls and mooring, the RetroBuoy has proven to be very efficient and effective. The sleds sit on the seabed and the feed cables are deployed in a "Lazy S" configuration. Spread moored FPSO's are particularly suited to this strategy, as the remote anodes can protect a large area of mooring chain and other hardware.

Key design point

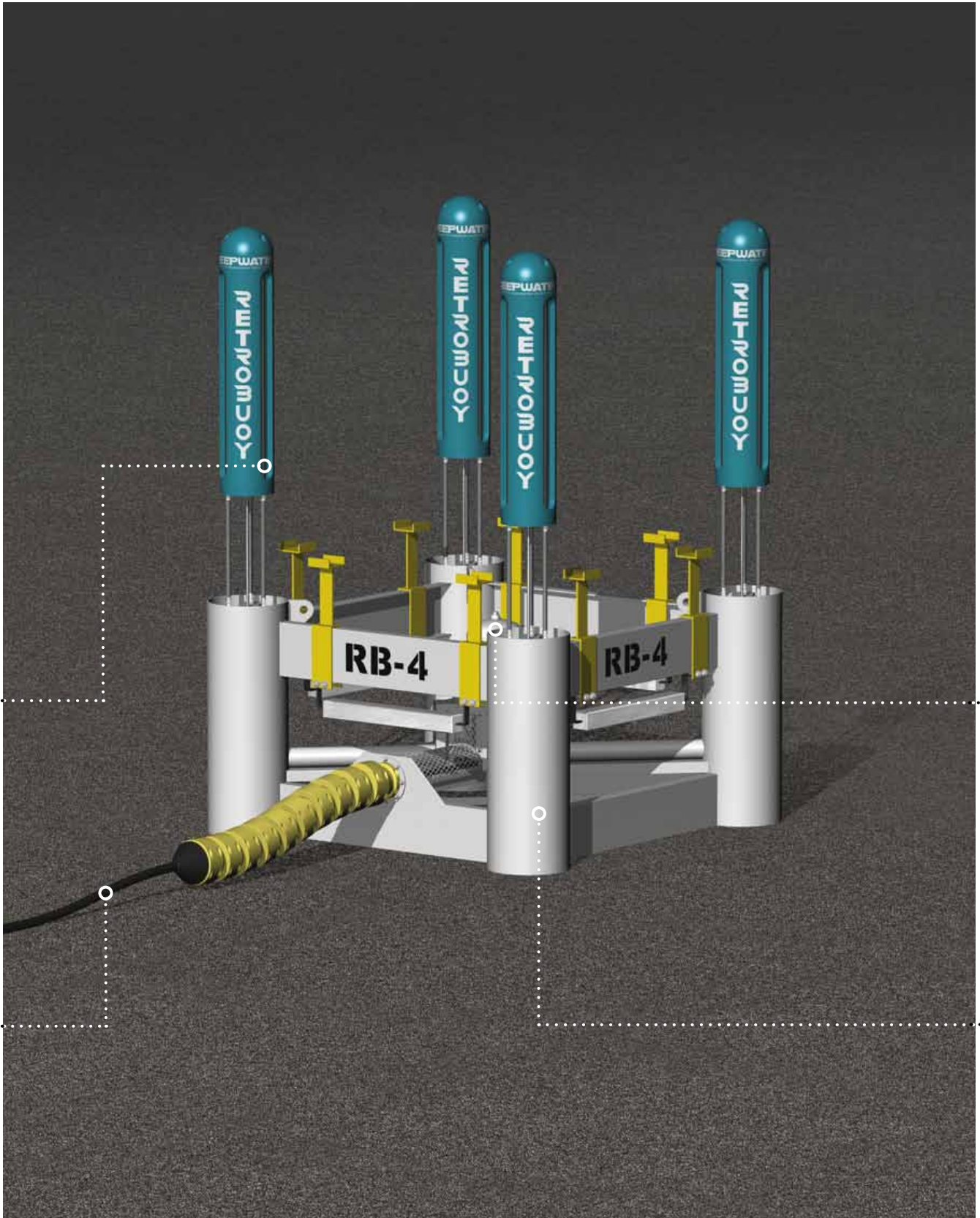
Superior anode efficiency

MMO activated Titanium electrodes allow the anode sled to be operated at very high current output. Installing the electrode elements in buoyant modules ensures that they remain surrounded by clean seawater, optimum conditions for high current output. If the anode were allowed to become silted at all they would have to be significantly de-rated to avoid premature failure.

Key design point

Multiple applications

New innovations in dynamic cable design are allowing more cost effective deployments of these systems on FPSO s or in deep water. Routing the power cable from the seabed to the surface via ROV eliminates a major installation cost for the system.



Cost effective advantages of RetroBuoy™

Remote anode advantage: remote anodes easily and evenly spread corrosion protection around complex structures. The system can also be deployed from almost any vessel, causing the absolute minimum of disruption.

A great deal of power for a great deal of time: the unique design, where the anodes are held buoyant in the seawater, allows RetroBuoy to deliver a high current output for up to 20 years.

Fully compliant to all major standards: we have worked with major UK and US manufactures to make sure our equipment meets complete compliance, and our own Polatrak™ monitoring system can verify performance over the project lifetime.

Any depth: thanks to an oil-filled, pressure-compensated electrical junction box, RetroBuoy is suited to any depth. We have a great deal of experience and a very strong reputation for delivering highly effective, cost efficient and quick to install corrosion protection systems. If you have any further enquiries, please call +1 713 983 7117 or visit www.stoprust.com

Key design point

Designed for harsh environments

The oil-filled, pressure-compensated electrical junction box, which houses the electrode cables, allows the system to operate efficiently at any depth. Anode cables are wire in parallel to the main feed cables, providing a high measure of redundancy in the event of an unforeseen mechanical impact.

Key design point

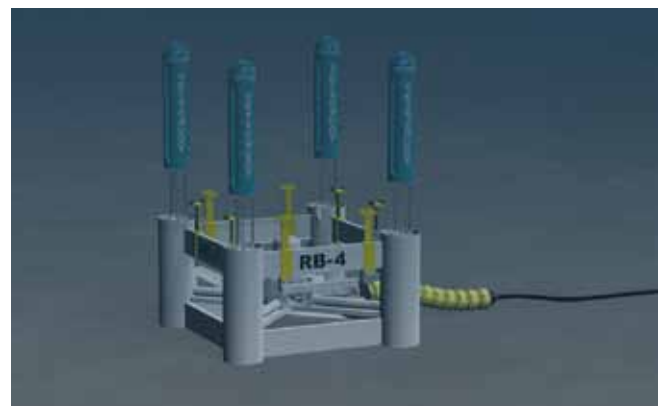
Compact design

The RetroBuoy's sled base is compact and easily handled by most offshore installation vessels.

Why buy RetroBuoy™

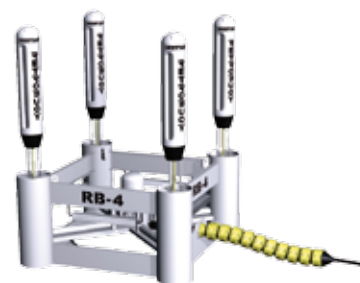
Deepwater now delivers the most cost effective way to retrofit corrosion protection systems for offshore installations. Deepwater's RetroBuoy™ combines the advantages of innovative design and a semi-remote design to offer you a solution that is easy to install, adaptable and capable of delivering a lot of cathodic protection for even the most complex offshore installations. Use RetroBuoy for:

- Major off-shore platforms, both near shore or where conditions are harsh.
- Smaller Offshore Platform – bridge connected complexes.
- Loading Docks – all varieties of dock and jetty structures, where depth and current conditions are right.
- FPSOs (spread moored).



RetroBuoy Specifications

Anode Elements	Mixed metal oxide (MMO) activated titanium tubular 1.25 in x 48 in (31.75 x 1219 mm) center compression connected. Anodes triple coated. Each RetroBuoy MkIV has 4 buoyancy modules each containing 3 MMO tubes (12 Total per RetroBuoy Mk IV).
Buoyancy Modules	PE injection moulded shell / vacuum filled syntactic foam 36 lb./ft.3 (576 kg/m3) – Depth rating 1000 f.s.w. (305 meters). Four buoyancy modules provided per RetroBuoy MkIV. Overall dimensions: 12.75 in Ø x 60 in long (325 x 1524 mm).
Main Feed Cables	<i>NB: may vary.</i> 4/0 AWG (approx. 120 mm ²), HMWPE insulated & bedded, contra-helical double galvanized steel wire armor package, HMWPE overall jacket. Two or three cables will be provided depending on required life and current (Note – Cable specified is for fixed jacket applications only).
Cable Connections	Made inside an oil-filled, pressure compensated junction box. Each anode element is on a separate parallel circuit.
Tethers	1 Plasma 12 strand synthetic rope
Frame	Welded steel construction (Grade ASTM A36 or A53), coated and provided with sacrificial anode cathodic protection for required life.



Contact Details

Deepwater Corrosion Services Inc.
 10851 Train Court, Houston, TX 77041
Telephone +1 713 983 7117
Fax +1 713 983 8858
Email sales@stoprust.com
www.stoprust.com

Local Exclusive Distributor

