

### RetroBuoy Mk IV

#### General

RetroBuoy Mk IV is a modular impressed-current anode array rated at 500 Amperes for 20 years in its standard configuration. Anodes (12) are held within four (4) buoyant modules providing a current rating on each module of up to 150 Amperes (20% redundancy).

#### Buoyancy module (Item 2)

Material	PE injection-moulded shell/vacuum filled syntactic foam
Buoyancy	36 lb/ft <sup>3</sup> [576 kg/m <sup>3</sup> ]
Depth rating	1000 ft [304 m]
Dimensions	Ø 12.75" x 60" long [Ø 324 x 1525 mm long]
Net buoyancy	110 lb [50 kg] per buoyancy module

#### Tether system (Item 4)

Primary tether	1" Plasma 12 strand synthetic rope
Tensile strength	110,000 lb [500 kN]
Water absorption	0% Hygroscopic
Anchors	Top and bottom (Resin-filled spelter)
Quantity	1 per buoyancy module
Upper tether plate	Anchors hose fittings; attaches to inside recess in base of buoyancy module

#### MMO anode / cable connection

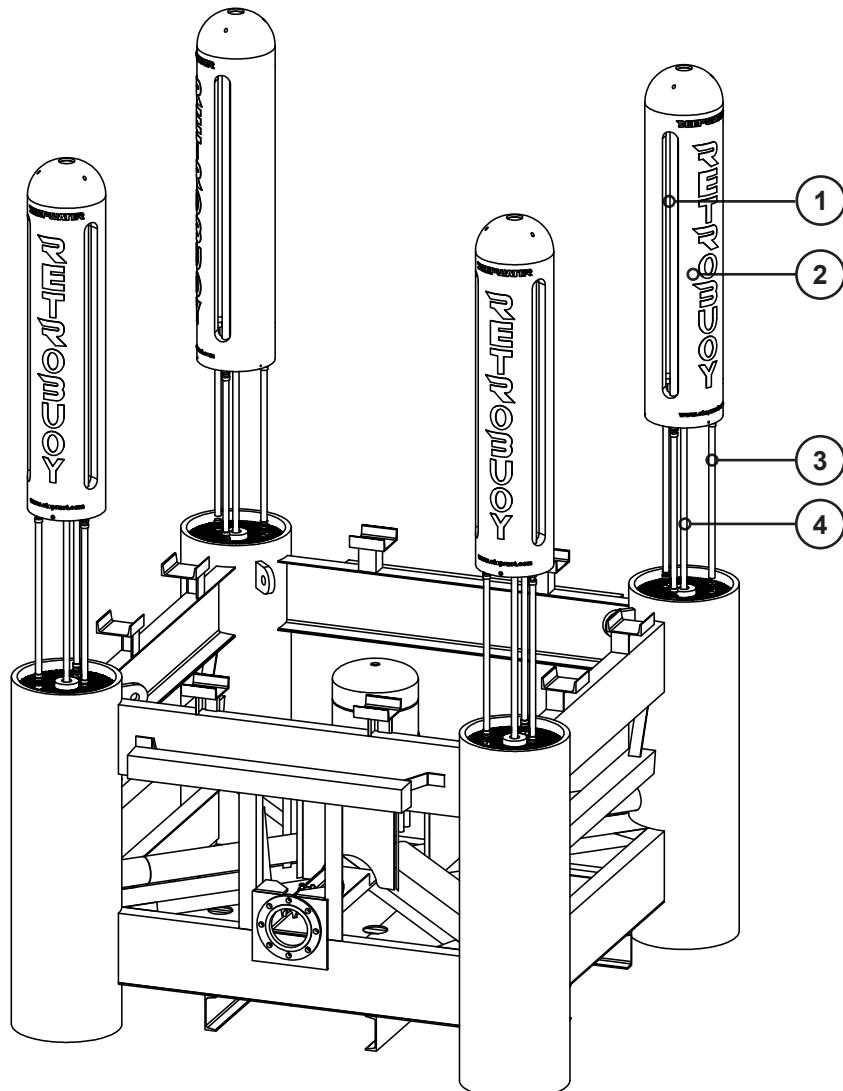
Method	Tin alloy expanding compression fitting (internal)
Sealing	Flexible resins (2 stage)
Testing	Helium leak test at 20 PSI [138 kPa]
Cable OD	0.423" [10.7 mm]
Weight (air)	0.23 lb/ft [0.34 kg/m]
Cable length / Anode	16' [5 m]

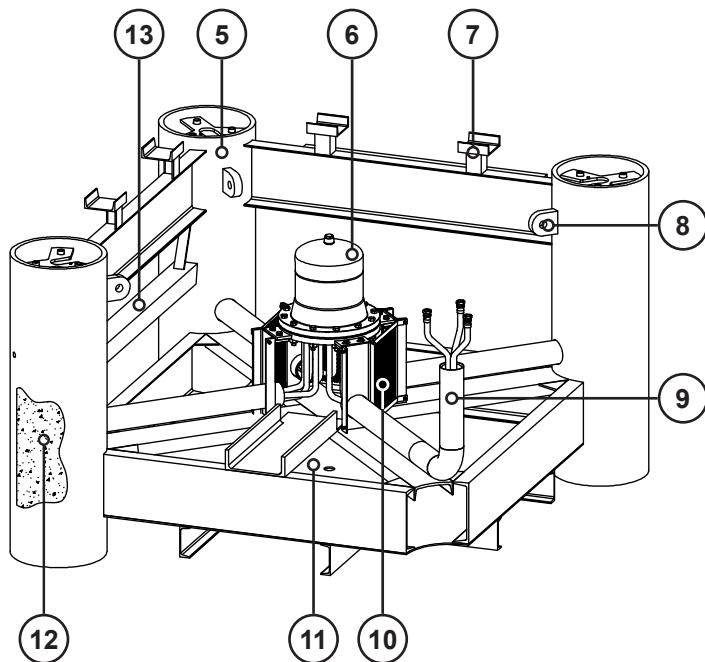
#### MMO anode elements (Item 1)

Base material	Titanium tube – Grade ASTM B338 grade 1 or 2
Outside diameter	1.25" [31.75 mm]
Wall thickness	0.035" [0.9 mm]
Length	48" [1220 mm]
Coating	Mixed metal oxide activation coating comprising of iridium dioxide / tantalum pentoxide, proprietary application method.
Current density	265 mA/in <sup>2</sup> [40 mA/cm <sup>2</sup> ] – deepwater derating

#### Anode cable (Item 3)

Type	2 AWG flexible cable [35 mm <sup>2</sup> ] 600/1000 V grade marine power cable
Conductor	Soft annealed stranded tinned copper conductor to ASTM B33
Insulation	Type P XLPO
Ampacity	162 A @ 95°C





#### Support frame / Gravity base (Item 5)

Steel grade	Piping - ASTM A53 [ ASTM A106 ] Frame sections - ASTM A36 [ EN 10025 S355 ]
Welding	All welding conducted in accordance with Steel Structural Welding Code – AWS D1./D1.1M:2006 [ EEMUA 158 ]
Coating	Shot blast SA2.5 (white metal) 2 part epoxy paint system DFT 10 mils [ 250 microns ] Applied in accordance to NORSO M-501 system no. 7 Colour white – ID characters black
Features	Buoyancy module supports for deployment (Item 7) Lifting Padeyes (Item 8) Conduit for anode cable routing (Item 9) Cable routing screen/grating (Item 10) Mud mat (Item 11) Warning label (provided if requested) - Typically black letters on yellow background, 4" [ 100 mm ] high text, wording as required.
Column ballast (Item 12)	Dependant on location. Ballast weights given are based on a typical concrete density of 160 lb/ft <sup>3</sup> [ 2560 kg/m <sup>3</sup> ]. Actual weight could be as much as 2.5 times the values shown below. Weight (air) 2080 lb [ 950 kg ] Weight (water) 1235 lb [ 560 kg ]

#### Junction box (Item 6)

Dimensions	Ø 14" Sch 40 x 19" [ 480 mm ]
Steel grade	Body - ASTM A53 [ ASTM A106 ] Cap - ASTM A234 [ EN 10025 S355 ] Flange - ASTM A105 [ ASTM A106 ]
Base plate	14" 150# RF CS blind flange ASTM A105 with gasket Entries 12 @ 1/2" NPT (anodes) 1 @ 1/2" NPT (drain plug) 3 @ 3/4" NPT (feed cable)* 1 @ 1" NPT (PC system)
Cable entry	Brass glands
Fill vent	1/2" NPT Plug / Thread-o-Let
Pressure comp.	Black delrin machined piston assembly, Nitrile O-rings
Bus bar	Electrolytic copper Brass connection fasteners with double nuts
Water block	Inline solder butt encapsulated in oil
Lug type	Copper solder
Isolator	CPVC pipe cap

#### Main feed cable entry

Entry size	The ICCP anode array can be connected to a wide range of feed cables depending on method of deployment and cable routing.
Bend limiter	Cable will enter through a segmented articulated polyurethane bend limiter suited to the cable. This is attached to the frame via an adapter flange welded to the side of the frame.
Termination flange	Behind the bend limiter is a customised steel armour termination assembly that is anchored to the main frame. Provides entry of the main feed cable with armour removed.
Junction box entry	Provides entry of the inner conductor(s) and primary insulation only.

#### Standard feeder cable

Dual 4/0 AWG [ ~120 mm<sup>2</sup> ], HMWPE insulated & bedded, Contra-helical double galvanised steel wire armour package, HMWPE overall jacket. Cable size and quantity is confirmed during detailed design phase.  
*Note – Cable specified is for fixed-jacket applications only. Other cables may be utilised depending on design requirements and client specifications*

#### Overall weights & dimensions\*\*

Dimensions (W x D x H)	96" x 96" x 148" [ 2440 x 2440 x 3760 mm ]
Weight (air)	7950 lb [ 3600 kg ] Fully ballasted
Weight (water)	5350 lb [ 2430 kg ] Fully ballasted