CATHODIC MARINE ENGINEERING PTE LTD

About Us

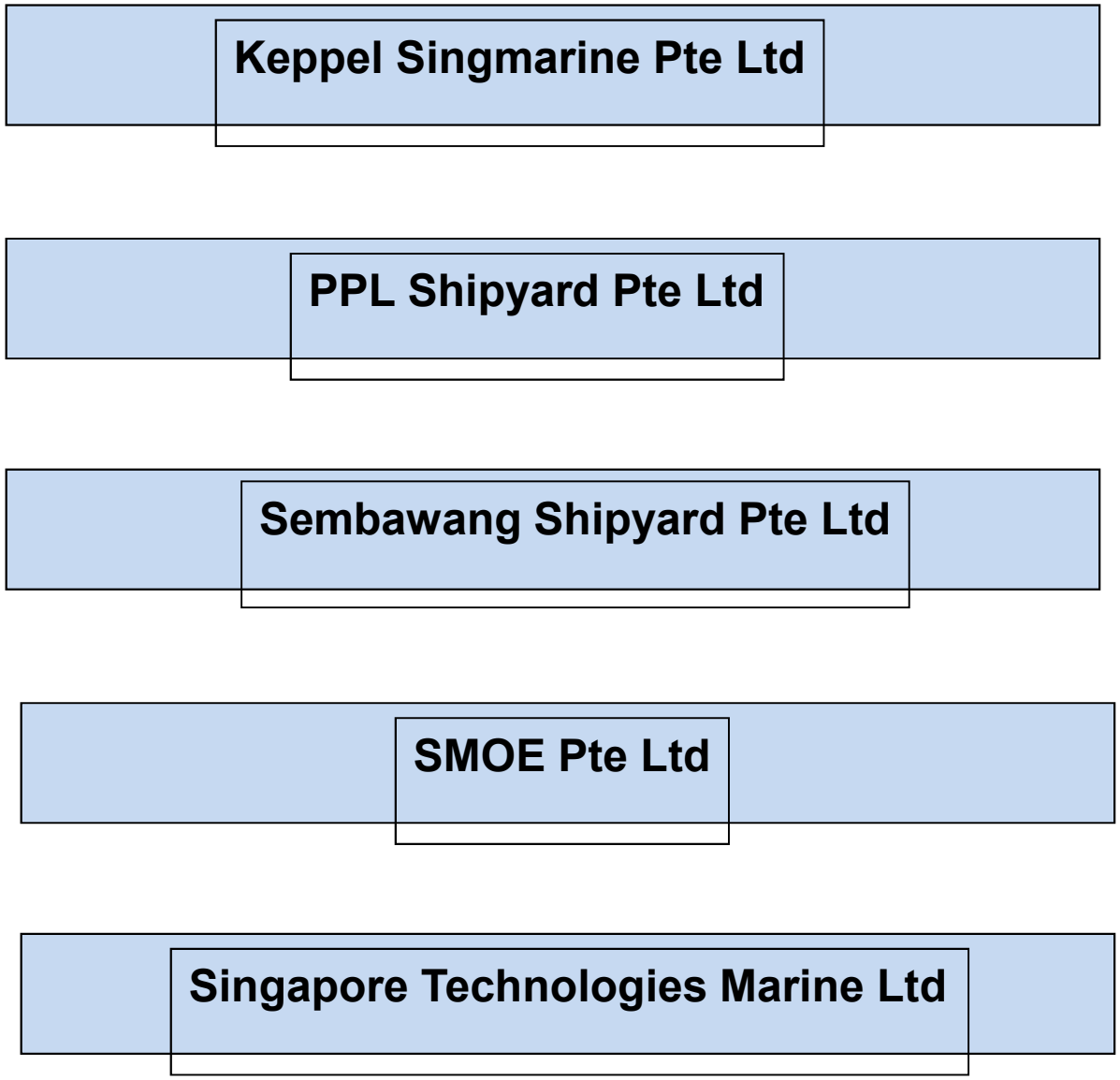
Cathodic Marine Engineering Pte Ltd, established in 2001, is a marine company which caters to the the Marine, Naval and Offshore industries.

Cathodic Marine Engineering Pte Ltd provides sales and technical services with competent Manpower for various Shipbuilding and Ship Reparing yards in Singapore , Asia & Middle East.

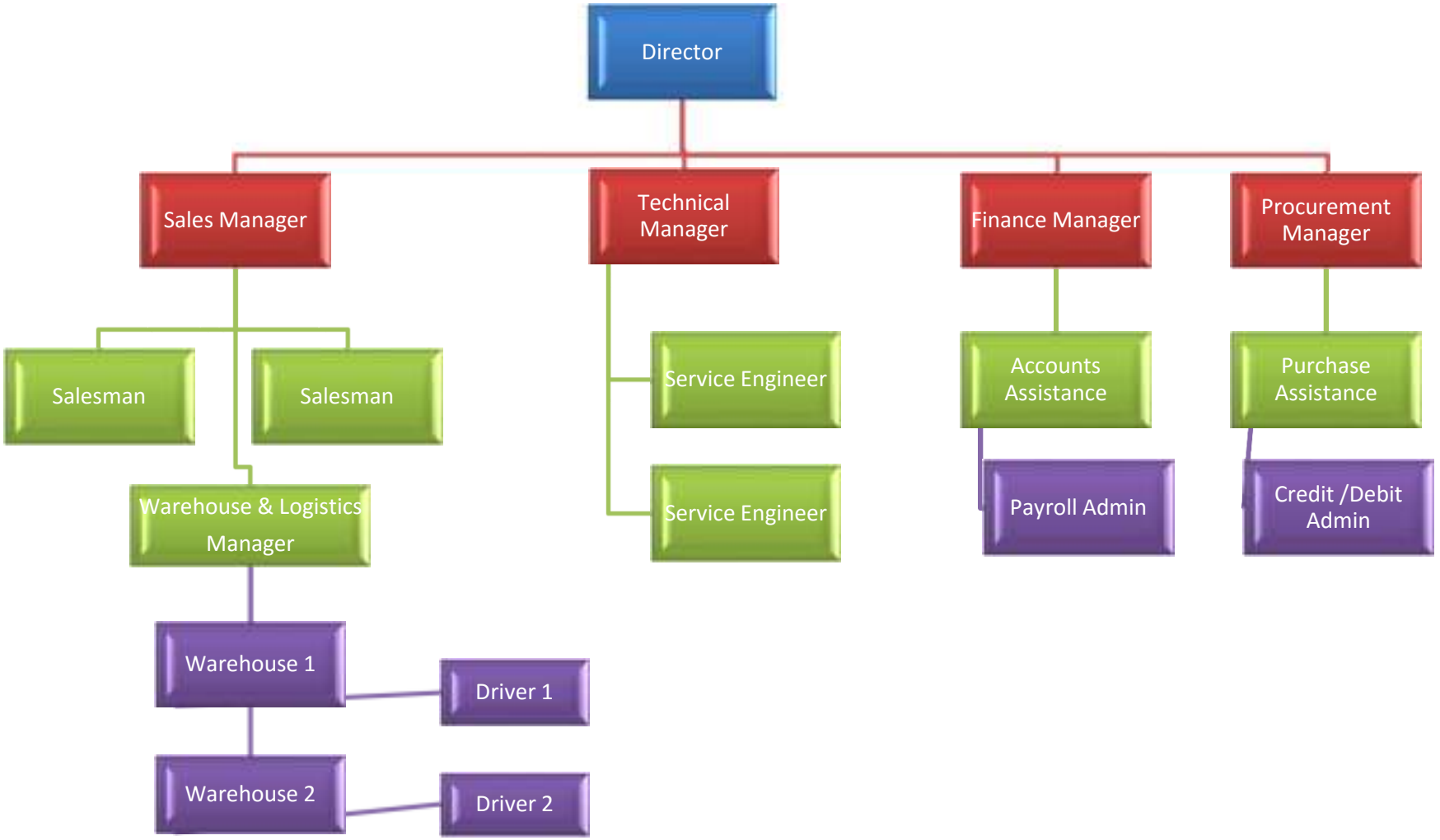
Geared with a team of experienced, well-trained personnel possessing the required skills and an extensive knowledge of the local market ,allows it to secure various projects with valuable and profile centric project management to cater to the Marine & Offshore Sectors.

Major Clients

- Drydocks World - Singapore Pte Ltd
- Jaya Shipbuilding & Engineering Pte Ltd
- Jurong Shipyard Pte Ltd
- Keppel FELS Ltd
- Keppel Shipyard Ltd


Keppel Singmarine Pte Ltd
PPL Shipyard Pte Ltd
Sembawang Shipyard Pte Ltd
SMOE Pte Ltd
Singapore Technologies Marine Ltd

Organization Chart



CATHODIC MARINE ENGINEERING PTE LTD

Sacrificial Anodes (Zinc & Aluminium) (Hull & Tanks)

Impressed Current Cathodic Protection(I.C.C.P.) System

Anti-fouling System(M.G.P.S.)

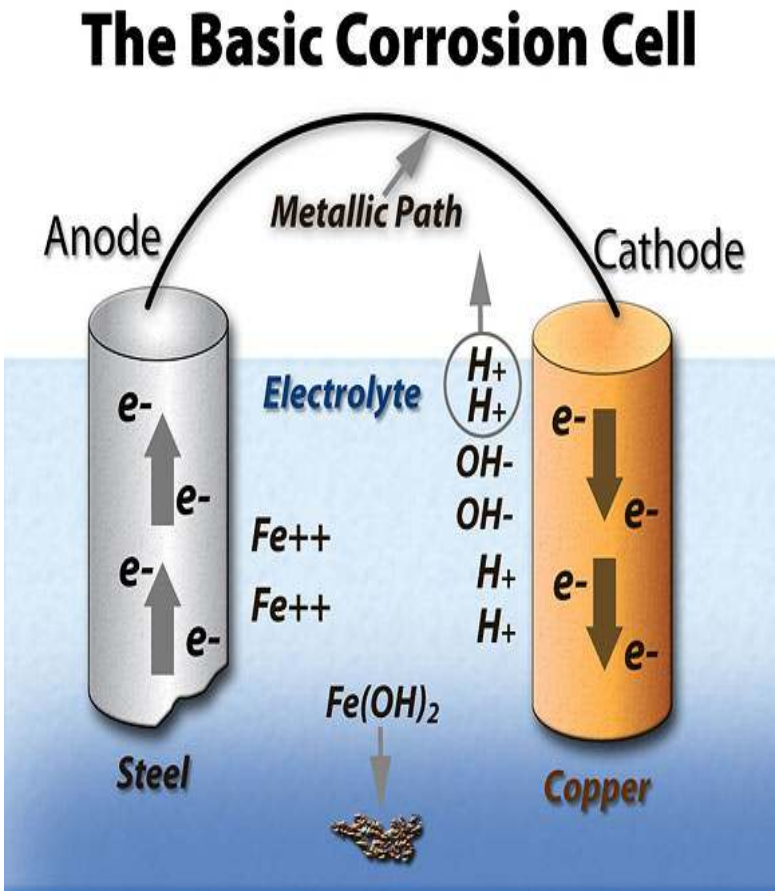
Shaft Earthing Device

What is cathodic protection ?

- Cathodic protection (CP) is a method for reducing the corrosion rate of a metal.
- The principle is based on “Supplying electrons to the base material”.
- This is done by either:
  - Connecting the structure to a more electro- negative material (Sacrificial anode) or
  - Connecting the structure to an external electron source (Impressed current)

The principle of cathodic protection

- In a corrosion cell steel will corrode when coupled to a more noble material
- The noble material is replaced with a material being less noble than steel: A sacrificial anode
- The direction of the current will change
- The steel will be protected while the anode corrodes



Sacrificial Hull Anodes

- Many different sizes and shapes are available
- Anodes can be welded or clamped on to the structure.

Anodes in a water ballast tank

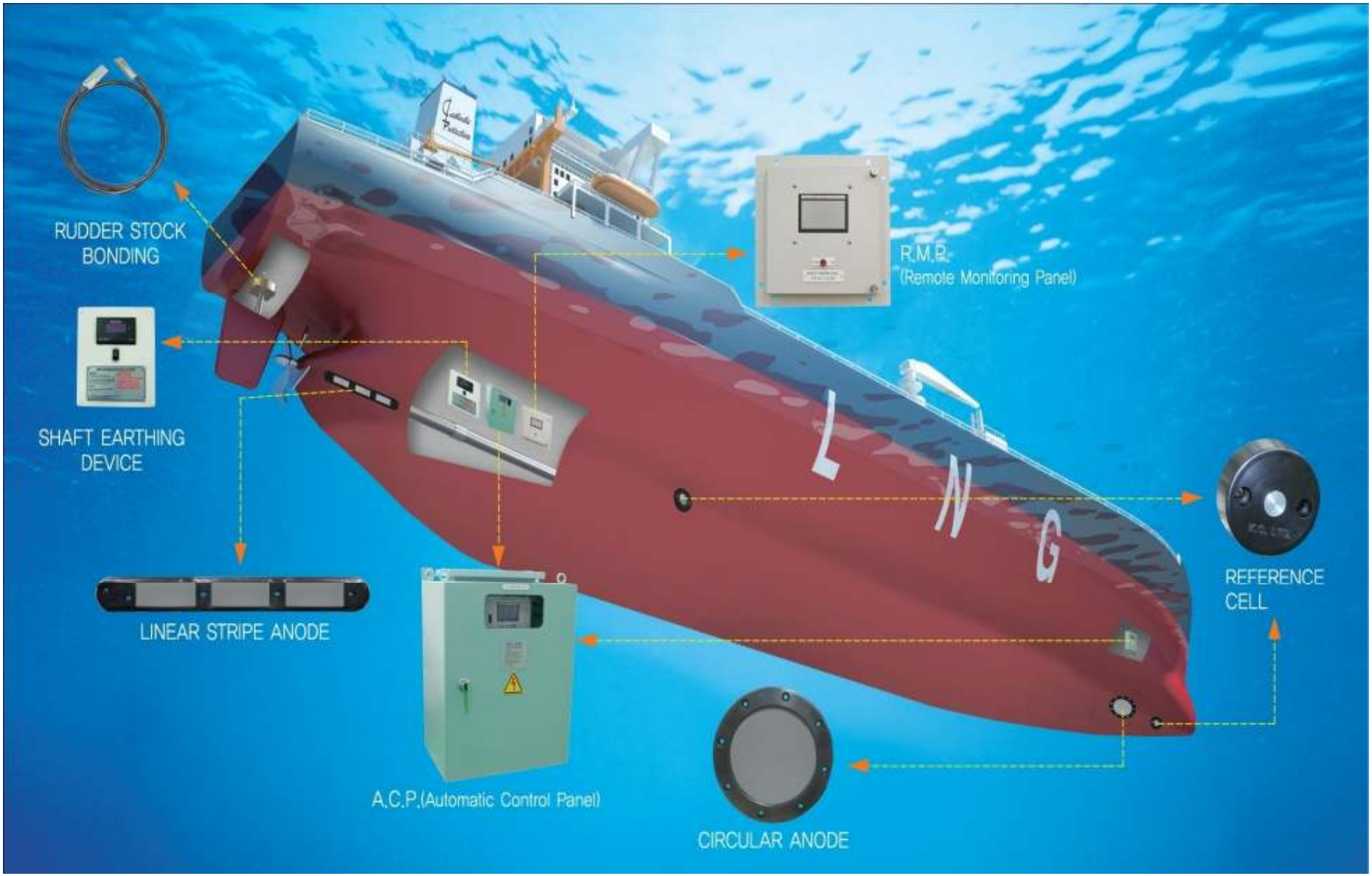
Why choose a SACP system on hull?

- Simple installation
- Maintenance free between dry dockings
- Low cost for short term operation
- World-wide availability

Sacrificial anode system
Disadvantages

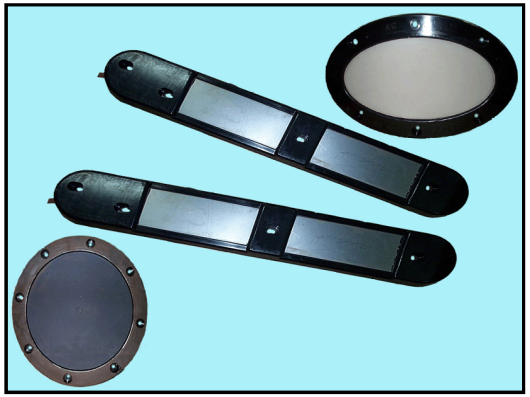
- Increases the frictional resistance
- Adds weight to the vessel
- Must be renewed at dry-dockings

I.C.C.P System


RUDDER STOCK
BONDING
SHAFT EARTHING
DEVICE
R.M.P.
(Remote Monitoring Panel)
L N G
REFERENCE
CELL
LINEAR STRIPE ANODE
A.C.P.(Automatic Control Panel)
CIRCULAR ANODE

PRODUCT (I.C.C.P System)

<Fig. 1 Control panel>



<Fig . 2 Anodes>

<Fig. 3 Reference cell>

Although modern hull coatings can provide some protection against corrosion they seldom offer a complete solution. For this reason, most operators choose to protect their vessels with a purpose designed in impressed current cathodic protection system.

Using an arrangement of hull mounted anodes <Fig.2> and reference cells<Fig. 3> connected to automatic control panels<Fig. 1>, the system produces a more powerful external current to suppress the natural electro-chemical activity on the wetted surface of the hull. This eliminates the formation of aggressive corrosion cells on the surface of plates and avoids the problem which can exit where dissimilar metals are introduced through welding or brought into proximity by other components such as propellers.

An essential feature of ICCP system is that it constantly monitors the electrical potential of the seawater / hull interface and efficiently control the protective current to the anodes in relation to this.

Therefore, the system is much more effective and reliable.

Why choose an ICCP system on hull

- Smooth hull, no drag
- Flexible dry-docking intervals
- Low cost for long term operation
- Long lifetime, minimum of maintenance
- No welding required at dry docking
- No risk of damaging internal Paint systems
- Fully automatic corrosion protection
- Useful information on Hull paint condition

I.C.C.P SYSTEM -REFERENCE LIST FOR NAVY

As of Jul. 29, 2016

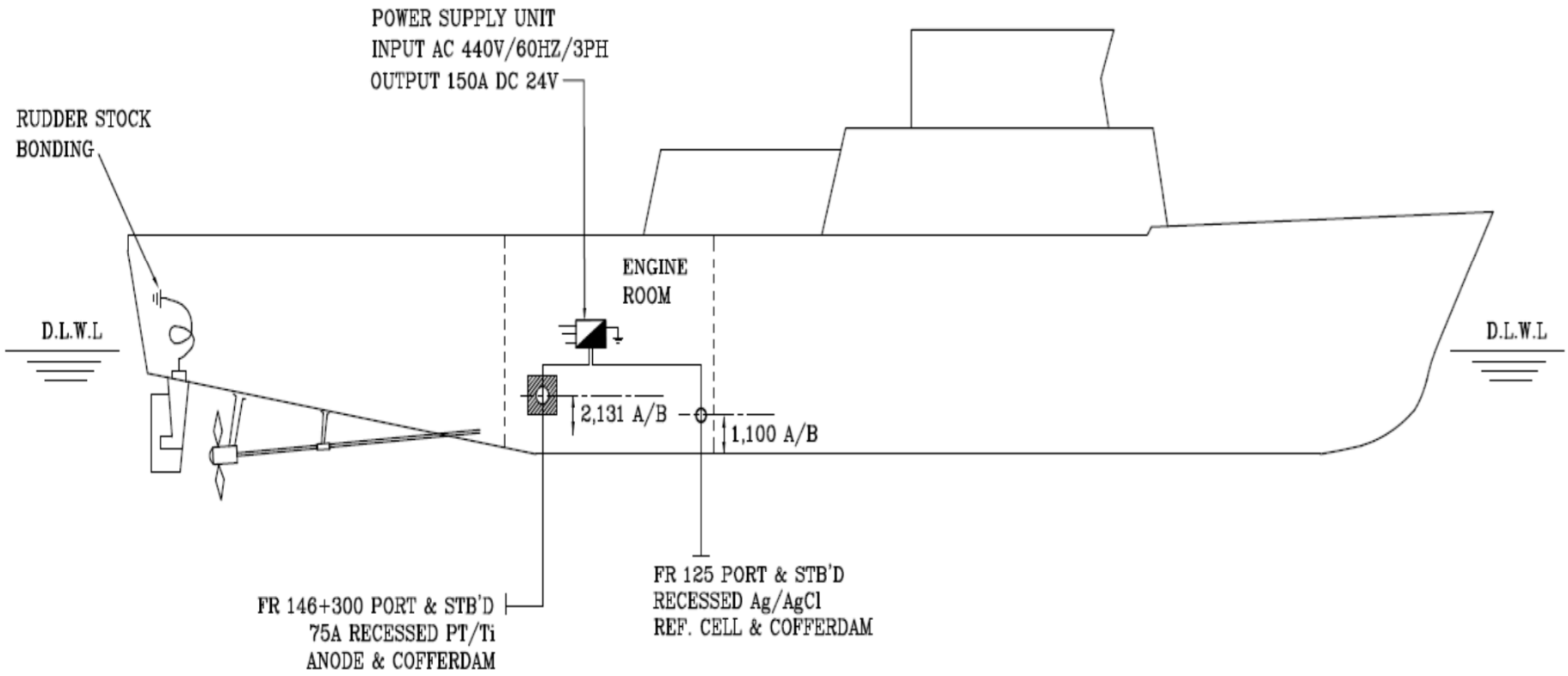
SHIPYARD	PROJECT NO.	SHIPOWNER	VSL TYPE	ITEM DELIVERY
CSBC	1025	TAIWAN NAVY	NAVY OIL SUPPLY SHIP	5-Aug-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7038	KOREA NAVY	차기수상함 구조함(ATS-II)	15-Feb-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7039	MALAYSIAN NAVY	ROYAL MALAYSIAN NAVY TRAINING VESSEL	2-May-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7040	MALAYSIAN NAVY	ROYAL MALAYSIAN NAVY TRAINING VESSEL	17-Jul-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7048	NDLO(NORWAY NAVY)	LOGISTICS SUPPORT VESSEL	9-Dec-15
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7049	THAI NAVY	THAI NAVY FRIGATE	5-Dec-16
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7050	KOREA NAVY	FFX-II	31-Jul-15
HAI LONG COMPANY	HIGH SPEED VESSEL	VIETNAM NAVY	HIGH SPEED VESSEL	5-Dec-05
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S117	KOREA NAVY	LST-II	14-Jun-13
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S132	KOREA NAVY	ATS-II 2번함	28-Apr-15
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P123	KOREA NAVY	차기호위함(FFX-I 1번함)	23-Apr-10
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P133	KOREA NAVY	차기호위함(FFX-I 2번함)	30-May-13
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P134	KOREA NAVY	차기호위함(FFX-I 3번함)	30-May-13
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P147	KOREA NAVY	MLS-II	9-Apr-14
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P153	KOREA NAVY	LST-II 2번함	18-Jun-15
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P154	KOREA NAVY	AOE-II	30-Jul-15
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P155	KOREA NAVY	LST-II 3번함	2-Nov-15
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P156	KOREA NAVY	LST-II 4번함	30-May-17
STX SHIPBUILDING CO., LTD.	N1016	KOREA NAVY	FFX-I 4번함	20-Mar-14
STX SHIPBUILDING CO., LTD.	N1017	KOREA NAVY	FFX-I 5번함	20-Jun-14
STX SHIPBUILDING CO., LTD.	N1019	KOREA NAVY	PKX-A 17번함	30-Apr-16
STX SHIPBUILDING CO., LTD.	N1024	KOREA NAVY	FFX-I 6번함	30-Jan-15
STX SHIPBUILDING CO., LTD.	N1029	PERU NAVY	PATROL VESSEL	26-Jan-15
STX SHIPBUILDING CO., LTD.	N1030	PERU NAVY	PATROL VESSEL	26-Jan-15
STX SHIPBUILDING CO., LTD.	N1031	PERU NAVY	PATROL VESSEL	20-Jan-16
STX SHIPBUILDING CO., LTD.	N1032	PERU NAVY	PATROL VESSEL	20-Jan-16
XINGANG SHIPYARD	SBM02-3	PAKISTAN NAVY	FAST ATTACK CRAFT	20-Dec-16

DRAWING TITLE	**APPROVAL DRAWING**
ITEM	**IMPRESSED CURRENT CATHODIC PROTECTION (I.C.C.P) SYSTEM**
SHIPYARD	**DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.**
HULL No.	**H7049**
VESSEL TYPE	**FRIGATE FOR ROYAL THAI NAVY**
K.C. LTD. MODEL	**CATHSYS**
K.C. LTD. Ref. No.	**KI60609**

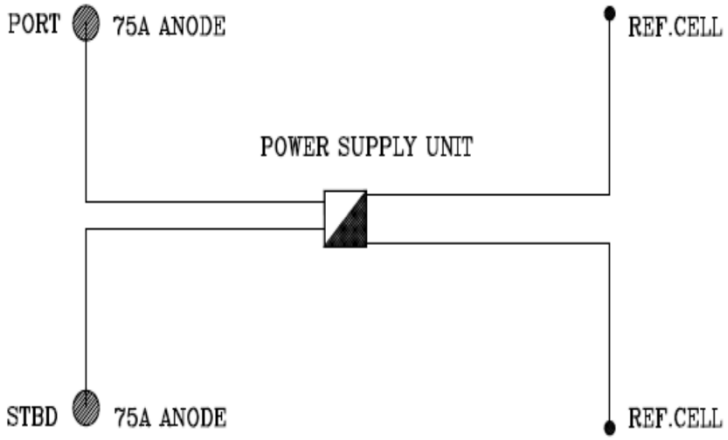
SPECIFICATION & SCOPE OF SUPPLY

CLIENT	DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.
PROJECT NO	H7049 FRIGATE FOR ROYAL THAI NAVY

QUANTITY	DESCRIPTION FOR THE SYSTEM :
ONE (1)	MODEL : CATHSYS TYPE : KC3T715A POWER SUPPLY UNIT : INPUT : AC 440V/3PH/60HZ OUTPUT : MAX. 150AMPERE/24V DC PAINTED : MUNSELL 7.5 BG 7/2 ENCLOSURE : IP 44 Supplied complete with Earthing cables and all necessary terminals for connections. The sophisticated and intelligent power supply unit consists of; - 4.3" TFT LCD Touch screen display for easy operation of the system. - Full Automatic operation on AUTO mode and MANUAL mode. - Display all the readings (Ref.cell potentials, Output current/voltage) and alarm status. - Common alarm (over/under protection, anode fault, PCB fault, power fail) contacts. - Interface with Ship's AMS via RS485 Modbus RTU. Logging & history of all data and readings through recording of IPMS.
TWO (2)	75 AMPERE RECESSED PT/Ti CIRCULAR ANODE ASSEMBLY EACH COMPLETE WITH : EPOXY PUTTY FOR DI-ELECTRIC SHIELD CIRCULAR DOUBLER PLATE COFFERDAM WITH CABLE GLANDS The anode is made of electrochemically resistant and mechanically robust MMO/Ti(Mixed Metal Oxide). Resin moulded around anode is sufficiently tested.
TWO (2)	PURITY Ag/AgCl REFERENCE CELL ASSEMBLY EACH COMPLETE WITH : COFFERDAM WITH CABLE GLANDS The zinc ref.cells measures and transfers hull potential ceaselessly to power supply unit for the generation of optimum protective current.

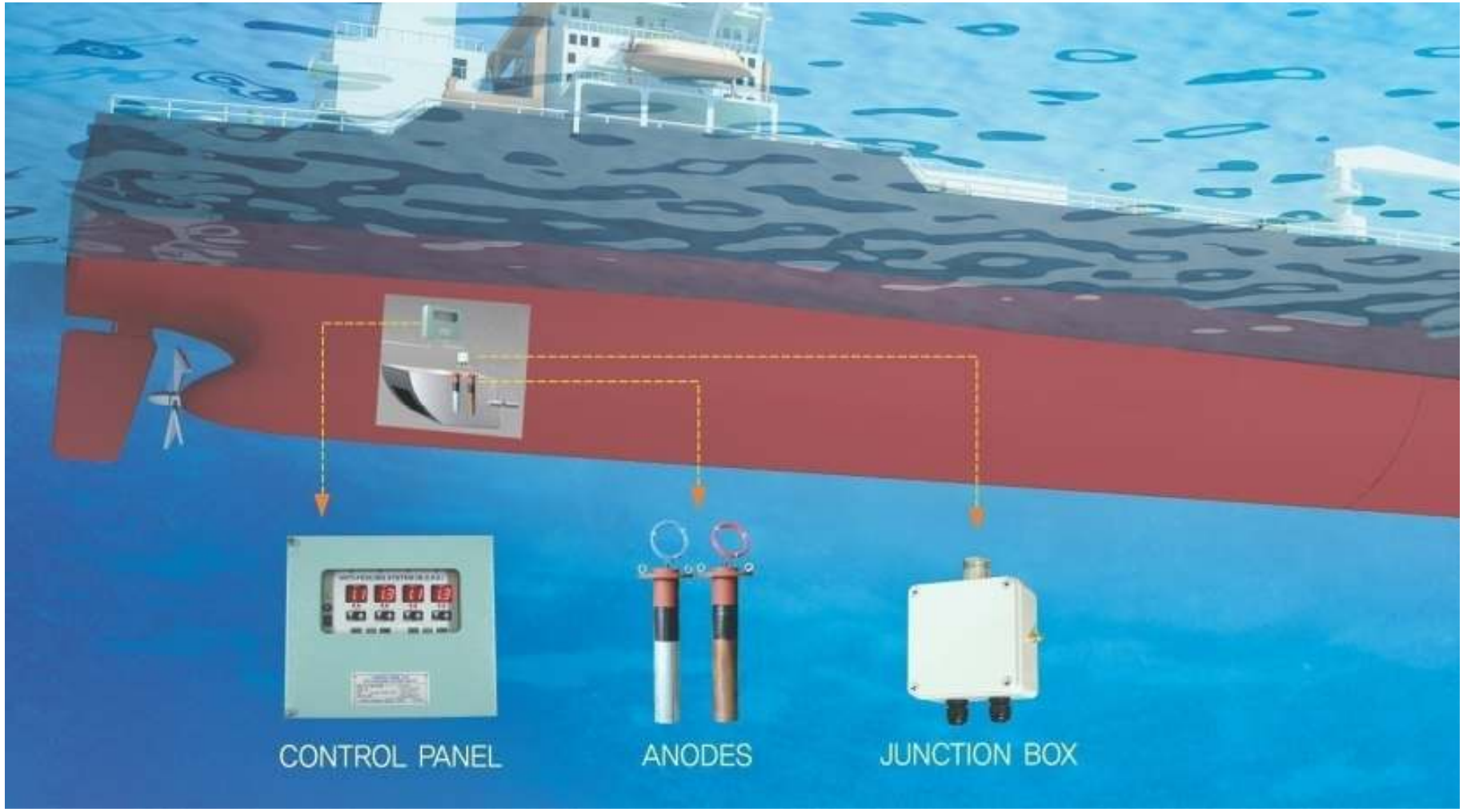


SYSTEM SCHEMATIC WIRING



* NOTE

Anti-fouling System(M.G.P.S.)



Typical System components

PRODUCT (Anti-fouling System (M.G.P.S.)

The fouling problem arises when barnacles, mussels and other lower forms of marine life as larvae enter pipework systems and settle on the internal surface of pipes where they rapidly grow and multiply.
In the most extreme cases, complete seawater lines can become blocked, affecting the safety and operational capability of the ship. In other instances, the gradual restriction in the flow of seawater through cooling systems can impair engine efficiency, leading to increased fuel usage.

The anti-fouling system is based on the electrolytic principle and consists of copper, aluminium and ferrous anodes which are fed with an impressed electrical current from a control panel.

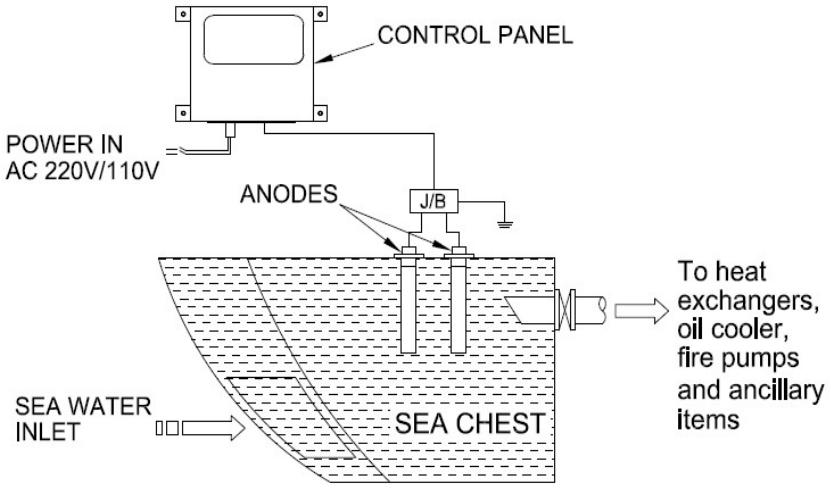
The anode are usually mounted in pairs in the ship's seachest or strainer where they are in direct contact with the flow of water entering the seawater lines.

In operation, the copper anode produces ions which are transported by the seawater and carried into the pipework system and equipment beyond.

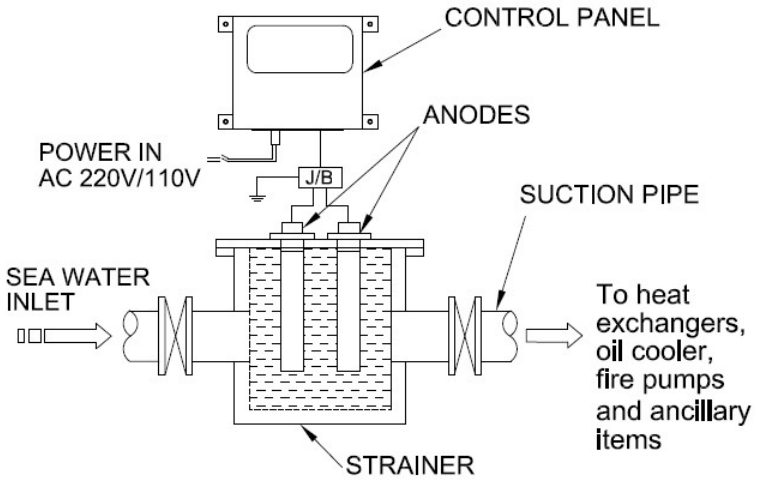
Although the concentrations of copper in solution are extremely small i.e. less than 2 parts per billion they are sufficient to prevent marine life from setting and multiplying.

At the same time, the slow dissolution of the aluminium / ferrous anode produces ions which spread throughout the system and produce an anti-corrosive layer on the internal surface of pipes.
In this way, the anti-fouling system gives complete and continuous protection to pipework, valves and condensers as well as vital firefighting equipment, refrigeration and air conditioning unit.

PRODUCT (Anti-fouling System (M.G.P.S.))



1. Typical Arrangement for Sea chest Mount

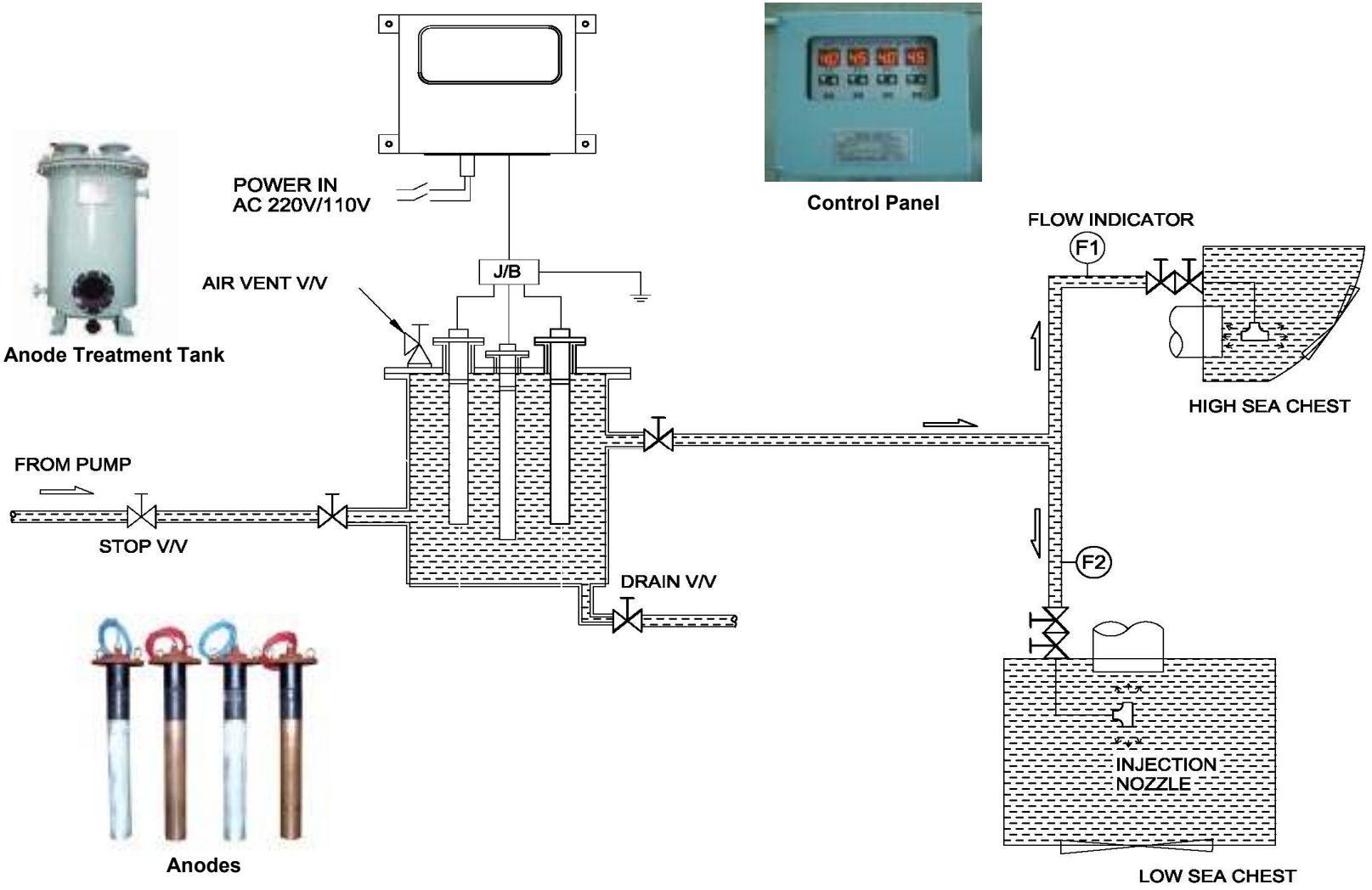


2. Typical Arrangement for Strainer Mount

Anodes

Control Panel

PRODUCT (Anti-fouling System (M.G.P.S.))



3. Typical Arrangement for Treatment Tank Mount

PRODUCT (Anti-fouling System (M.G.P.S.))

Dual purpose combined anodes

Combination anodes are used in areas of reduced confined spaces.

Anti-fouling system (M.G.P.S.) -REFERENCE LIST FOR NAVY

As of Jul. 29, 2016

SHIPYARD	PROJECT NO.	SHIPOWNER	VSL TYPE	ITEM DELIVERY
CSBC	1025	TAIWAN NAVY	NAVY OIL SUPPLY SHIP	30-Sep-12
DAESUN SHIPBUILDING & ENGINEERING CO., LTD.	ED-0501	INDONESIAN NAVY	MULTI-PURPOSE HOSPITAL SHIP	1-Mar-07
DAESUN SHIPBUILDING & ENGINEERING CO., LTD.	ED-0502	INDONESIAN NAVY	MULTI-PURPOSE HOSPITAL SHIP	1-Jul-07
DAESUN SHIPBUILDING & ENGINEERING CO., LTD.	SB441	INDONESIAN NAVY	MULTI-PURPOSE HOSPITAL SHIP	3-Mar-03
DAESUN SHIPBUILDING & ENGINEERING CO., LTD.	SB458	INDONESIAN NAVY	MULTI-PURPOSE HOSPITAL SHIP	20-Sep-06
DAESUN SHIPBUILDING & ENGINEERING CO., LTD.	SB459	INDONESIAN NAVY	MULTI-PURPOSE HOSPITAL SHIP	20-Dec-06
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7024	KOREA NAVY	FRIGATE	30-Oct-01
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7024	KOREA NAVY	FRIGATE	30-Oct-01
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7026	KOREA NAVY	FRIGATE	18-Jul-02
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7026	KOREA NAVY	FRIGATE	18-Jul-02
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7028	KOREA NAVY	FRIGATE	30-Jan-05
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7028	KOREA NAVY	FRIGATE	30-Jan-05
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7029	KOREA NAVY	FRIGATE (이지스함)	30-Jan-08
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7029	KOREA NAVY	FRIGATE (이지스함)	30-Jan-08
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7038	KOREA NAVY	차기수상함 구조함(ATS-II)	16-Feb-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7039	MALAYSIAN NAVY	ROYAL MALAYSIAN NAVY TRAINING VESSEL	23-May-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7039	MALAYSIAN NAVY	ROYAL MALAYSIAN NAVY TRAINING VESSEL	23-May-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7040	MALAYSIAN NAVY	ROYAL MALAYSIAN NAVY TRAINING VESSEL	17-Jul-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7040	MALAYSIAN NAVY	ROYAL MALAYSIAN NAVY TRAINING VESSEL	17-Jul-12
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7044	UK NAVY	Military Afloat Reach and Sustainability (MARS)	20-May-15
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7045	UK NAVY	Military Afloat Reach and Sustainability (MARS)	25-Nov-15
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7046	UK NAVY	Military Afloat Reach and Sustainability (MARS)	31-Dec-15
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7047	UK NAVY	Military Afloat Reach and Sustainability (MARS)	31-Dec-15
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7048	NDLO (NORWAY NAVY)	LSV	16-Dec-15

SHIPYARD	PROJECT NO.	SHIPOWNER	VSL TYPE	ITEM DELIVERY
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7049	THAILAND NAVY	FRIGATE	5-Dec-16
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7050	KOREA NAVY	차기호위함(FFX-II)	18-May-15
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7712	INDONEISIA NAVY	SUBMARINE	26-Feb-16
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7713	INDONEISIA NAVY	SUBMARINE	15-Jun-15
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7714	INDONEISIA NAVY	SUBMARINE	15-Jan-16
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7716	KOREA NAVY	SUBMARINE	1-Apr-16
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD.	H7717	KOREA NAVY	SUBMARINE	2-Apr-18
HAI LONG COMPANY	HIGH SPEED VESSEL	VIETNAM NAVY	HIGH SPEED VESSEL	1-Dec-05
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S042	KOREA NAVY	대형수송함 (LPH-Landing Platform Helicopter)	30-Apr-05
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S139	KOREA NAVY	대형수송함 (LPH-Landing Platform Helicopter)	19-Dec-16
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S051	KOREA NAVY	고속함-검독수리-A 1 번함 (PKX-A)	23-Aug-06
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S080	KOREA NAVY	YWS(청수정)	10-Sep-09
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S081	KOREA NAVY	YWS(청수정)	30-Jan-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S092	KOREA NAVY	고속함-검독수리-A 6 번함 (PKX-A)	26-Feb-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S093	KOREA NAVY	고속함-검독수리-A 7 번함 (PKX-A)	31-Mar-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S094	KOREA NAVY	고속함-검독수리-A 8 번함 (PKX-A)	30-Apr-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S095	KOREA NAVY	고속함-검독수리-A 9 번함 (PKX-A)	28-May-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S102	KOREA NAVY	YWS(청수정)	18-Jun-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S103	KOREA NAVY	YWS(청수정)	6-Aug-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S104	KOREA NAVY	LCU-235 TON (군수지원정)	30-Apr-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S105	KOREA NAVY	LCU-235 TON (군수지원정)	30-Apr-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S106	KOREA NAVY	LCU-235 TON (군수지원정)	5-Jun-10
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S111	KOREA NAVY	LCU-500 TON (군수지원정)	2-Aug-11
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S112	KOREA NAVY	LCU-500 TON (군수지원정)	21-Dec-11
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S113	KOREA NAVY	LCU-500 TON (군수지원정)	21-Dec-11
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S117	KOREA NAVY	차기상륙함(LST-II)	30-Jan-13

SHIPYARD	PROJECT NO.	SHIPOWNER	VSL TYPE	ITEM DELIVERY
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S118	KOREA NAVY	고속함-검독수리-A 13 번함 (PKX-A)	4-Sep-12
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S119	KOREA NAVY	고속함-검독수리-A 14 번함 (PKX-A)	4-Sep-12
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S120	KOREA NAVY	고속함-검독수리-A 15 번함 (PKX-A)	4-Sep-12
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S121	KOREA NAVY	YWS(청수정)	20-Jul-12
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S125	KOREA NAVY	LCU-235 TON (군수지원정)	20-Mar-13
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S132	KOREA NAVY	차기수상함 구조함(ATS-II 2번함)	15-Jan-15
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S138	KOREA NAVY	차기고속정-검독수리-B 1 번함 (PKX-B)	8-Apr-16
HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.	S143	KOREA NAVY	다목적 훈련 지원정 (MTB)	5-Aug-16
HINDUSTAN SHIPYARD	11173	INDIAN NAVY	50T BOLLARD PULL TUGS	17-Sep-15
HINDUSTAN SHIPYARD	11174	INDIAN NAVY	50T BOLLARD PULL TUGS	17-Sep-15
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P110	KOREA NAVY	FRIGATE (이지스함)	28-Apr-06
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P122	KOREA NAVY	FRIGATE (이지스함)	29-Oct-09
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P123	KOREA NAVY	차기호위함(FFX-I 1번함)	9-Sep-10
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P133	KOREA NAVY	차기호위함(FFX-I 2번함)	7-Sep-12
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P134	KOREA NAVY	차기호위함(FFX-I 3번함)	28-Sep-12
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P135	KOREA NAVY	PATROL & SALVAGE	29-Mar-12
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P147	KOREA NAVY	차기기뢰부설함(MLS-II)	25-Sep-14
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P153	KOREA NAVY	차기상륙함(LST-II 2번함)	7-May-15
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P154	KOREA NAVY	차기군수지원함(AOE-II)	29-Mar-16
HYUNDAI HEAVY INDUSTRIES CO., LTD.	P155	KOREA NAVY	차기상륙함(LST-II 3번함)	7-Apr-16
STX SHIPBUILDING CO., LTD.	N1002	KOREA NAVY	고속함-검독수리-A 2 번함 (PKX-A)	20-Jun-08
STX SHIPBUILDING CO., LTD.	N1003	KOREA NAVY	고속함-검독수리-A 3 번함 (PKX-A)	20-Jun-08
STX SHIPBUILDING CO., LTD.	N1004	KOREA NAVY	고속함-검독수리-A 4 번함 (PKX-A)	20-Jul-08
STX SHIPBUILDING CO., LTD.	N1005	KOREA NAVY	고속함-검독수리-A 5 번함 (PKX-A)	20-Jul-08
STX SHIPBUILDING CO., LTD.	N1009	KOREA NAVY	고속함-검독수리-A 10 번함 (PKX-A)	28-Feb-12
STX SHIPBUILDING CO., LTD.	N1010	KOREA NAVY	고속함-검독수리-A 11 번함 (PKX-A)	28-Mar-12
STX SHIPBUILDING CO., LTD.	N1011	KOREA NAVY	고속함-검독수리-A 12 번함 (PKX-A)	28-Apr-12

SHIPYARD	PROJECT NO.	SHIPOWNER	VSL TYPE	ITEM DELIVERY
STX SHIPBUILDING CO., LTD.	N1016	KOREA NAVY	차기호위함(FFX-I 4번함)	20-Mar-14
STX SHIPBUILDING CO., LTD.	N1017	KOREA NAVY	차기호위함(FFX-I 5번함)	20-Jun-14
STX SHIPBUILDING CO., LTD.	N1018	KOREA NAVY	고속함-검독수리-A 15 번함 (PKX-A)	10-Sep-13
STX SHIPBUILDING CO., LTD.	N1019	KOREA NAVY	고속함-검독수리-A 16 번함 (PKX-A)	17-Oct-13
STX SHIPBUILDING CO., LTD.	N1020	KOREA NAVY	고속함-검독수리-A 17 번함 (PKX-A)	8-Nov-13
STX SHIPBUILDING CO., LTD.	N1024	KOREA NAVY	차기호위함(FFX-I 6번함)	25-Jan-15
STX SHIPBUILDING CO., LTD.	N1026	COLOMBIA NAVY	46M COASTAL PATROL VESSEL	5-Dec-13
STX SHIPBUILDING CO., LTD.	N1027	COLOMBIA NAVY	46M COASTAL PATROL VESSEL	5-Dec-13
STX SHIPBUILDING CO., LTD.	N1029	PERU NAVY	PATROL VESSEL	26-Jan-15
STX SHIPBUILDING CO., LTD.	N1030	PERU NAVY	PATROL VESSEL	30-Apr-16
STX SHIPBUILDING CO., LTD.	N1031	PERU NAVY	PATROL VESSEL	20-Jan-16
STX SHIPBUILDING CO., LTD.	N1032	PERU NAVY	PATROL VESSEL	20-Jan-16

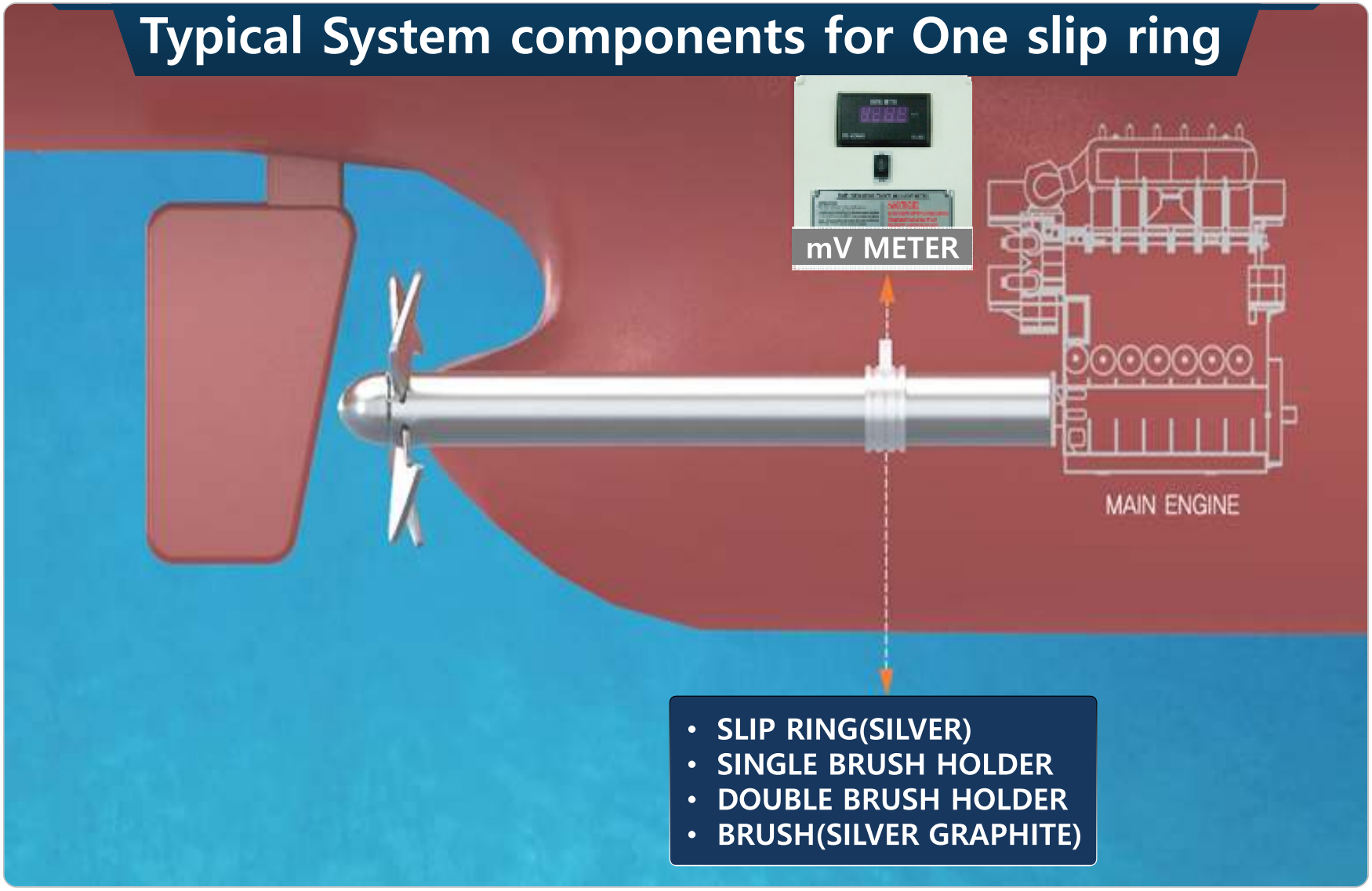
DRAWING TITLE	**APPROVAL DRAWING**
ITEM	**ANTI-FOULING SYSTEM (M.G.P.S)**
SHIPYARD	**DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.**
PROJECT No.	**H7049**
PROJECT NAME	**FRIGATE FOR ROYAL THAI NAVY**
K.C. LTD. REF. No.	**KM60614**

SPECIFICATION & SCOPE OF SUPPLY FOR M.G.P.S

Client Project No	DSME H7049

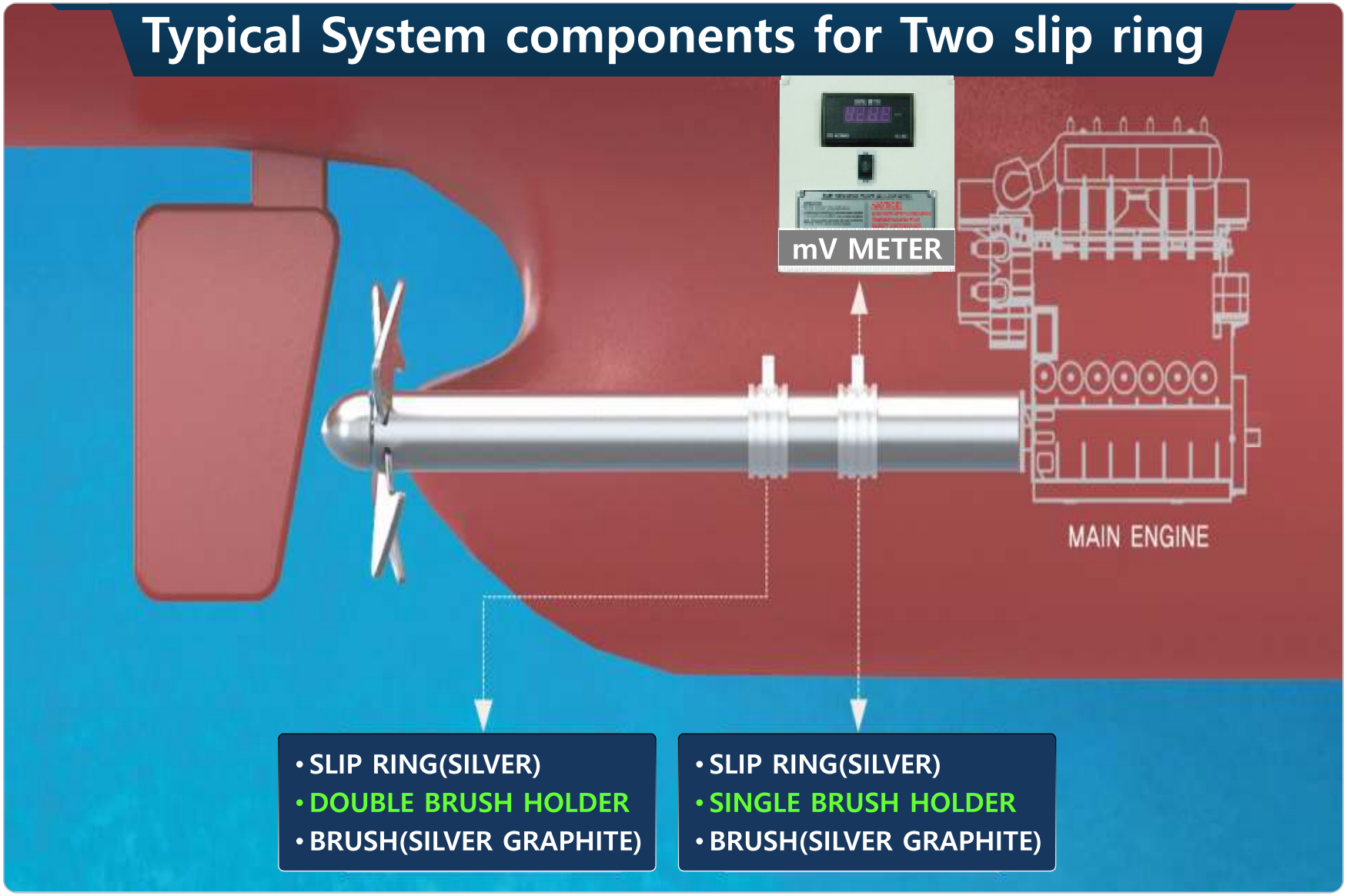
Anode location Anode mounting type	1 Cu in each of 1 sea chests JIS 10K-100A flange mounting sleeve for No.1/2/3/4/5/6/9/10/11 sea chests JIS 10K-150A flange mounting sleeve for No.7/8sea chests
Scope of supply	**FOR No.1 Sea Chest** 1 × KACU300 anode assembly for 3 years of ship construction ② 1 × KACU300 anode assembly for 3 years after ship delivery ① **FOR No.2 Sea Chest** 1 × KACU 320 anodes assembly for 3 years of ship construction ② 1 × KACU 320 anodes assembly for 3 years after ship delivery ① **FOR No.3/4 Sea Chest** 2 × KACU520 anodes assembly for 3 years of ship construction ② 2 × KACU520 anodes assembly for 3 years after ship delivery ① **FORNo.5/6 Sea Chest** 2 × KACU 390 anodes assembly for 3 years of ship construction ② 2 × KACU 390 anodes assembly for 3 years after ship delivery ① **FOR No.7/8 Sea Chest** 2 × KBCU 560 anodes assembly for 3 years of ship construction ② 2 × KBCU 560 anodes assembly for 3 years after ship delivery ① **FOR No.9/10 Sea Chest** 2 × KACU 440 anodes assembly for 3 years of ship construction ② 2 × KACU 440 anodes assembly for 3 years after ship delivery ① **FOR No.11 Sea Chest** 1 × KACU 300 anodes assembly for 3 years of ship construction ② 1 × KACU 300 anodes assembly for 3 years after ship delivery ① 1 × KCAF 2110MC control panel with cable glands 11 × Junction boxes 11 × Cable connector 1 × Set standard spares
Painting color Electric source Electric power consumption	Control panel to Munsell 7.5 BG 7/2 AC 220V, 60Hz, 1PH Max 330 Watt
Life time of anodes	Total 6 years (3 year for ship construction + 3 year ship delivery)

Shaft Earthing Device - One Slip Ring



Typical System components

Shaft Earthing Device - Two Slip Rings



Typical System components for Two(2) slip ring

PRODUCT (Shaft Earthing Device)

A turning propeller shaft on a ship becomes electrically insulated from the hull. When the shaft is insulated in this way an electrical potential can be measured between the shaft and the hull and this can accelerate corrosion in the ship.

If the ship has a system of cathodic protection, whether it is sacrificial anode or an impressed current system, the shaft insulation will prevent the propeller and the boss from receiving protection.
The electrical potential between the shaft and the hull can also cause a heavy current to flow in bearings. This current can cause deep pitting of the bearing surface

Now in addition it's necessary to reduce the spark erosion causing the excessive wear on main engine metal bearings and this shaft earthing is the most appropriate method.

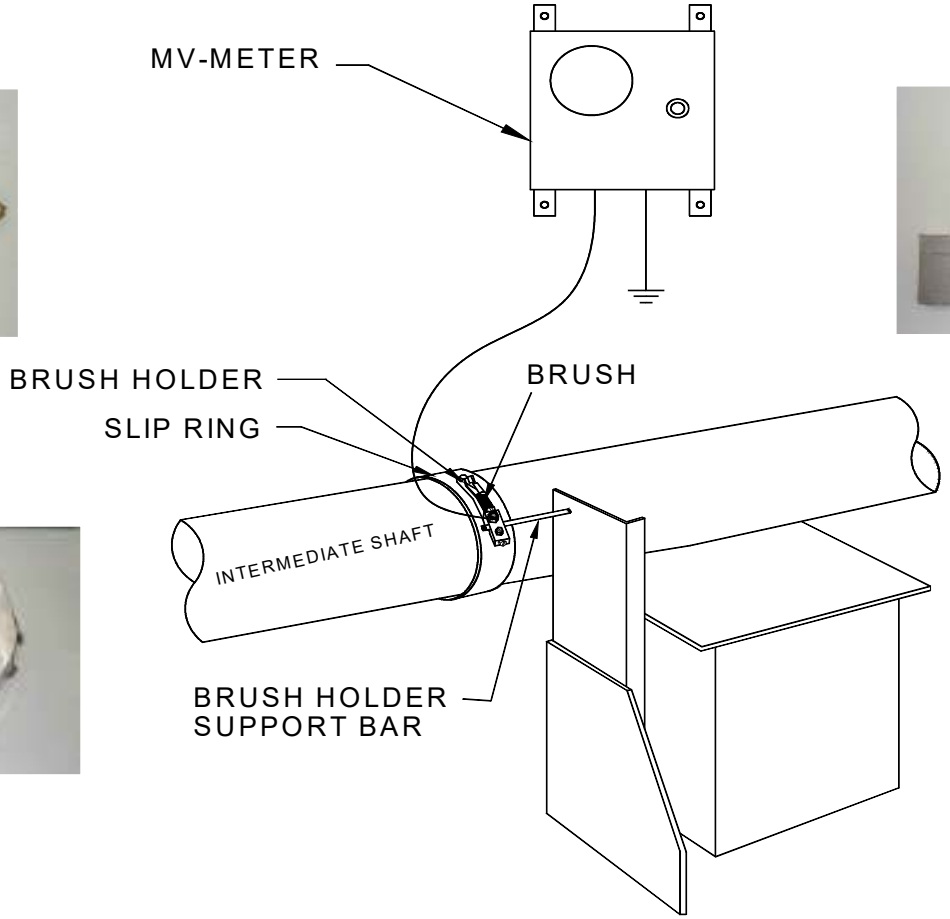
All the troubles can be avoided and cathodic protection can be extended to the propeller if the shaft is properly earthed with a propeller shaft slip ring.

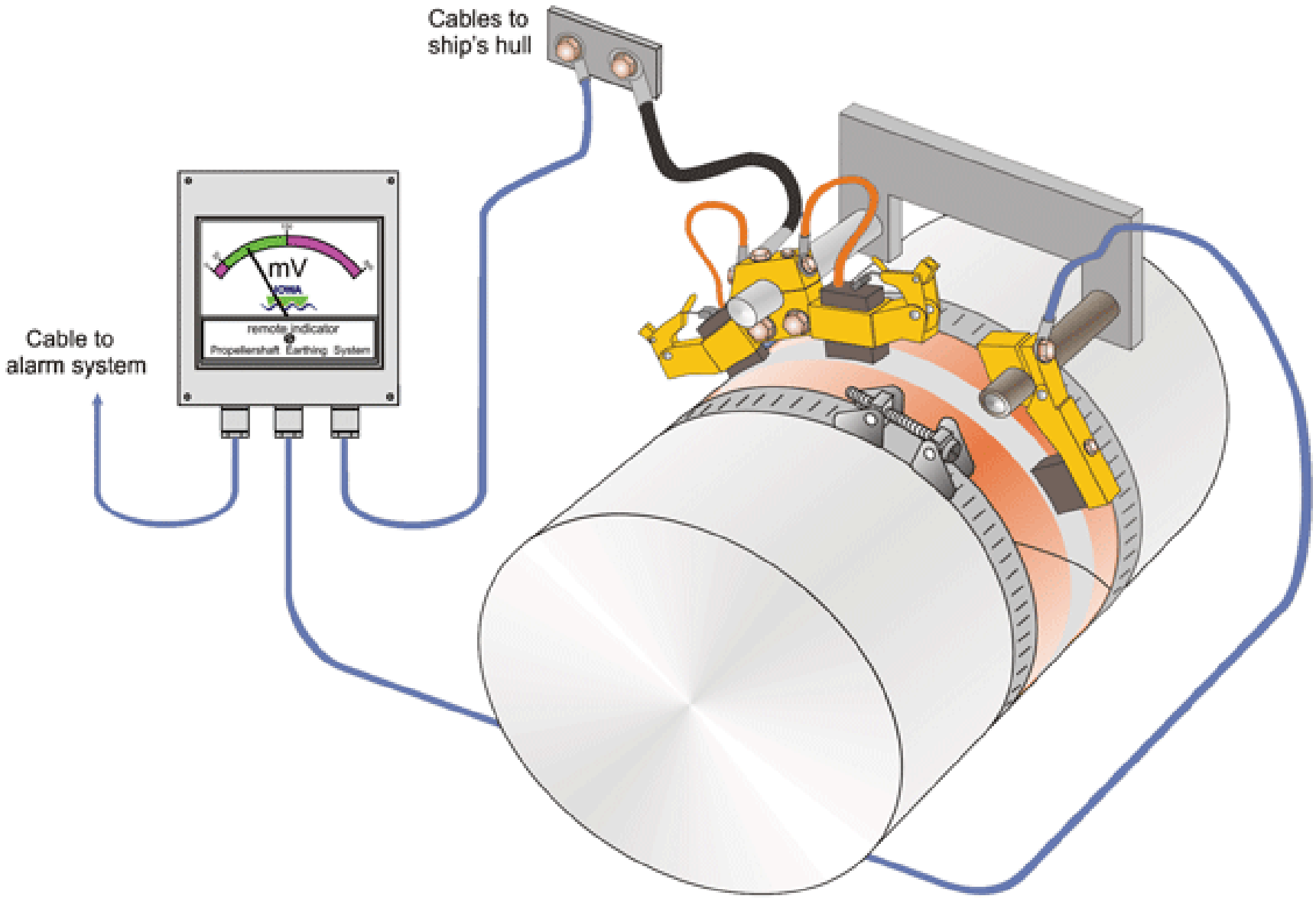
The shaft earthing assembly comprises a pair of high silver content / graphite compound brushes mounted in balanced brush holder, running on a copper slip ring with solid silver inlay track.
Each brush holder has a adjustable spring tensioner which is supplied preset to the minimum, and results in a pressure of 225g/cm^2. At this pressure the expected life of the brush is in excess of one year.

PRODUCT (Shaft Earthing Device)

ANALOG MV METER

DIGITAL MV METER




Cables to
ship's hull
Cable to
alarm system
mV
remote indicator
Propellershaft Earthing System

Contact Us

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