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# SWITCHBOARD AND CONTROL CONSOLE



Take the sea with **KTE**

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## **We help your safe journey and convenient operation saving your precious time.**

KTE, as a company specializing in manufacturing and developing high quality marine, offshore and plant electrical equipments since 1979, has contributed to providing our valuable customers with world-class electrical equipments.

Using the highest standards for our design, manufacture and our inspection, while employing a state-of-the-art technology and know-how, we could not just to meet customer's expectation but to exceed them as well.

Now, we are utilizing all our competencies to develop ourselves as a globally competitive company through new-value creation and innovation.

We are making incessant effort to improve the quality of our product and to create customer-oriented future.



# KHMS-25A

for High Voltage Switchboard



KTE Technology

## Features

- Metal-clad construction
- Horizontal isolation, horizontal draw-out
- Mechanical interlock
- Removable(drawout) circuit breaker
- Fully compartmented construction





## High Voltage Metal-clad Switchboard with Withdrawable Circuit Breaker

The KHMS-25A is a high voltage metal-clad switchboard commonly used for protection and switching of transformers, motors, generators, capacitors, buses, distribution feeder line and, in general, for protection of any high-voltage power circuit.

KHMS-25A's high quality and compact design with easy installation at low cost, for new buildings, are important factors for ensuring complete customer satisfaction. We are dedicated to designing, manufacturing and marketing KHMS-25A for the safe and securing customer requirements.

### User Convenience

- Adaptable solutions tailored to your specific requirements
- Enhanced safety for your personnel and operations
- Effective space utilization
- Significantly reduced maintenance
- Easy installation

### Easy of use

- Development of dedicated internal arc handle mounted
- Do not use a screw bolt
- Convenient handle operation type

### Benefits for you

- Low installation cost
- Type approved
- Compact design
- Technical support
- Easy installation
- Fastest engineering service worldwide



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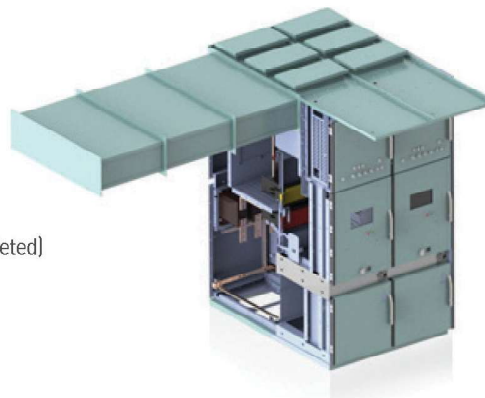
### KHMS-25A : Main characteristics

|  |  |                                 |              |
|--|--|---------------------------------|--------------|
| Rated voltage (kV)                                       |  | 7.2                             |              |
| Rated insulation level                                   | Power frequency withstand voltage 60 Hz-1 min (rms kV) | 20                              |              |
|  | Lightning impulse withstand voltage 1.2/50µs (kV peak) | 60                              |              |
| Nominal current and maximum short time withstand current | Functional unit with circuit breaker                   |                                 |              |
|  | Short time withstand current                           | I <sub>th</sub> max. (kA/3s)    | 25           |
|  |  | I <sub>th</sub> max. busbar (A) | 7000         |
|  |  |                                 | 630          |
|  | Rated current  | I <sub>n</sub> CB (A)           | 1250<br>2000 |
| Internal arc withstand                                   | (kA/1s)  | 25                              |              |

### Tunnel closed architecture of the two ended

1 Tunnel closed at the two ends

- Be equipped with auto transformer (IEC62271-200 Test Completed)
- Direct molded Switchboard and possible individual starter
- Draw-out metal-enclosed switchgear functional units
- Air insulated cubicle(AIS)



### Internal Arcing Protection (Cubicles subjected to internal arcing tests)



In conformity with IEC 62271-200  
3 compartments tested (cables, CB, busbar)

### Certifications (Certificate of Type tests with IEC 62271-200 standards)

1250A Incoming Panel

1250A Bus-Tie and Bus-Riser Panel

2000A Bus-Tie and Bus-Riser Panel

1250A Internal Arc

2000A Internal Arc

1250A Incoming Panel

1250A Bus-Tie and Bus-Riser Panel

2000A Bus-Tie and Bus-Riser Panel

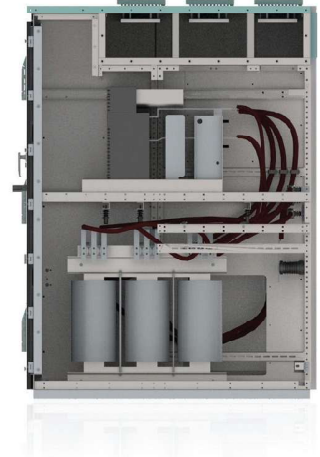
1250A Internal Arc

2000A Internal Arc

## High voltage Starter (Auto Transformer)

### General Solutions

- Line current lower than motor current
- Provides high torque per Ampere of line current
- Medium or heavy duty
- 50/60 Hz
- 3 Contactors Main, Run, Start
- Includes surge protection
  - switching transient protection for autotransformer
- Taps 50, 65, and 80 % or as required
- Internal arc classified (IEC62271-200)



### System Specification

| Item                               | Content             |
|------------------------------------|---------------------|
| Applied standard                   | IEC62271-200        |
| Rated voltage                      | 7.2kV               |
| Service voltage                    | 6.6kV               |
| Rating (kw)                        | 3000KW              |
| Rated current                      | 400A                |
| Rated frequency                    | 50/60Hz             |
| Internal Arc                       | 25kA/1sec           |
| Rated short-time withstand voltage | 75kA/3sec           |
| Rated peak withstand current       | 65kA/3sec           |
| Degree of protection               | IP4X                |
| Control voltage                    | DC 110V             |
| Maintenance access                 | Front and Rear type |

## Authorized Certificate

### Complies with the following IEC standards

- IEC 60694 : Common clauses for HV switchgear
- IEC 62271-200 (60298) : AC metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52kV
- IEC 62271-100 (60056) : HV AC circuit-breakers
- IEC 60470 : HV AC contactors
- IEC 60265-1 : HV switches
- IEC 60282-2 : HV fuses
- IEC 62271-102 (60129) : AC disconnect and earthing switch
- IEC 60255 : Measurement relay and protection device
- IEC 60044-1 : Current transformers
- IEC 60044-2 : Voltage transformers
- IEC 60044-8 : Electronic current transformers





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# MCset

for High Voltage Switchboard



KTE Technology

## Overview

MCset series for marine and off-shore applications is a complete range of High Voltage standardized units, insulated air metal-clad type ones, for the performing of the following functions.

- 115 columns up to 4000A,
- 230 columns above 4000A.
- Connection from the top, the bottom or the rear
- Short-circuit current up to 150kA/1s
- Highly compact configurations
- Incomers changeover in 1 column
- Incomers+Coupling in 2 columns

In choosing MCset, you have the key advantage of :

- the extensive experience of the world leader in high voltage
- the host of solutions derived from the most modern concepts





## Features

Marine MCset is a range of modular functional units, each one dedicated to a specific application

### Each unit includes

- A metalclad cubicle, composed of several metallic compartments
- A withdrawable breaking device (circuit-breaker, contactor-fuses)
- A dedicated protection and control unit

### Easy installation

Several assembling solutions meet all Marine requirements and lay out or location constraints.

- Ground surface savings : reduced width of cubicles without rear access
- Easy front access to busbars and cables connections
- Easy on site extension
- Standardized ground bolting

## MCset has taken account of three key user requirements

### Reliability

- Type testing was carried out for each performance level
- Three-dimensional computer modeling techniques were used to study the electrical field

### Simplicity

- A user interface which is easily understood by everybody
- Interlocks and padlocks preventing operator errors
- Sepam-type protection units enabling on-site information retrieval without any additional devices
- Easy installation due to identical civil engineering dimensions for all cubicles and installation being possible against a wall

### Safety

- Operations are all performed from the front, including access to connections and bus bars
- The earthing switch has making capacity
- Internal arc withstand developed for all functional units



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# LOW VOLTAGE SWITCHBOARD



KTE Technology

## Specification

- Type : Total-enclosed, dead-front
- Rated insulation : Voltage AC1000V
- Rated voltage : Up to AC690V
- Rated current : Up to 9300A
- Rated frequency : 50/60 Hz
- Maintenance : Front and rear
- Protection degree : IP 22
- Short circuit strength (I<sub>cw</sub> / I<sub>pk</sub>) :  
Up to 130 KA / 330 KA





Allseas Pipe - lay Platform Installation/Removal Vessel

Low voltage switchboards are not only recognized as useful means of power source protection but also highlighted as central means for controlling power.

Specializing in the manufacture of both commercial and industrial applications, KTE has so far developed various products adapted for the users' needs on the basis of our long year expertise and the latest technology.

We would like to introduce our trusted LV switchboards, which meet the rules and regulations of the classification societies of various countries such as ABS, BV, CCS, DNVGL, LR, NK and KR.



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Front Maintenance Type



Emergency Switchboard

## Features

### Long life span and reliability

KTE Low Voltage switchboards are adaptable to all possible ship conditions as the most reliable components have been chosen on the basis of over 36 year accumulated experiences.

Excellent anti-corrosive coating, baked melamine finish and orderly device arrangement make the switchboards more reliable.

### Best suited arrangement

Almost all type of Low Voltage switchboards have already been delivered in large quantities. Which means that system satisfies various user requirements and are ready for immediate applications, and the results of many tank tests enabled outstanding progress in low noise and reduction in vibration.

### Rigid construction and safety

The switchboards are sufficiently drip-proof and durable against vibration, moisture, heat and shock.

From design stage of the products, KTE thoroughly reflects all the safety rules and regulations of international standards and classification societies to the switchboards.

### Rules and regulations

KTE has acquired Type Approval Certificate for Low Voltage Switchgear system from Germanischer Lloyd.

KTE maritime switchboards also meet the rules and regulations of the classification societies of various countries and industrial standards.





## Power Management System

- **Input specification**  
Digital input : 3 Channel
- **Output specification**  
Digital output : 5 Channel
- **Screen control switch** : F1-F8 Switch
- **Indication screen** : LED Status indicator & 7" color LCD Display
- Full protection functions for generators, large consumers and tie-breakers
- Easy installation and maintenance
- Flexible addition or modification of function
- Flexible replacement of I/O or CPU
- Easy confirmation and control by using TFT touch operation panel
- Flexible communication connection with external system (IAS, INS, AMS, VDR, etc.)
- Class approved components (ABS, BV, DNVGL, LR, etc.)



## Motor Controller (SMC-400 series)

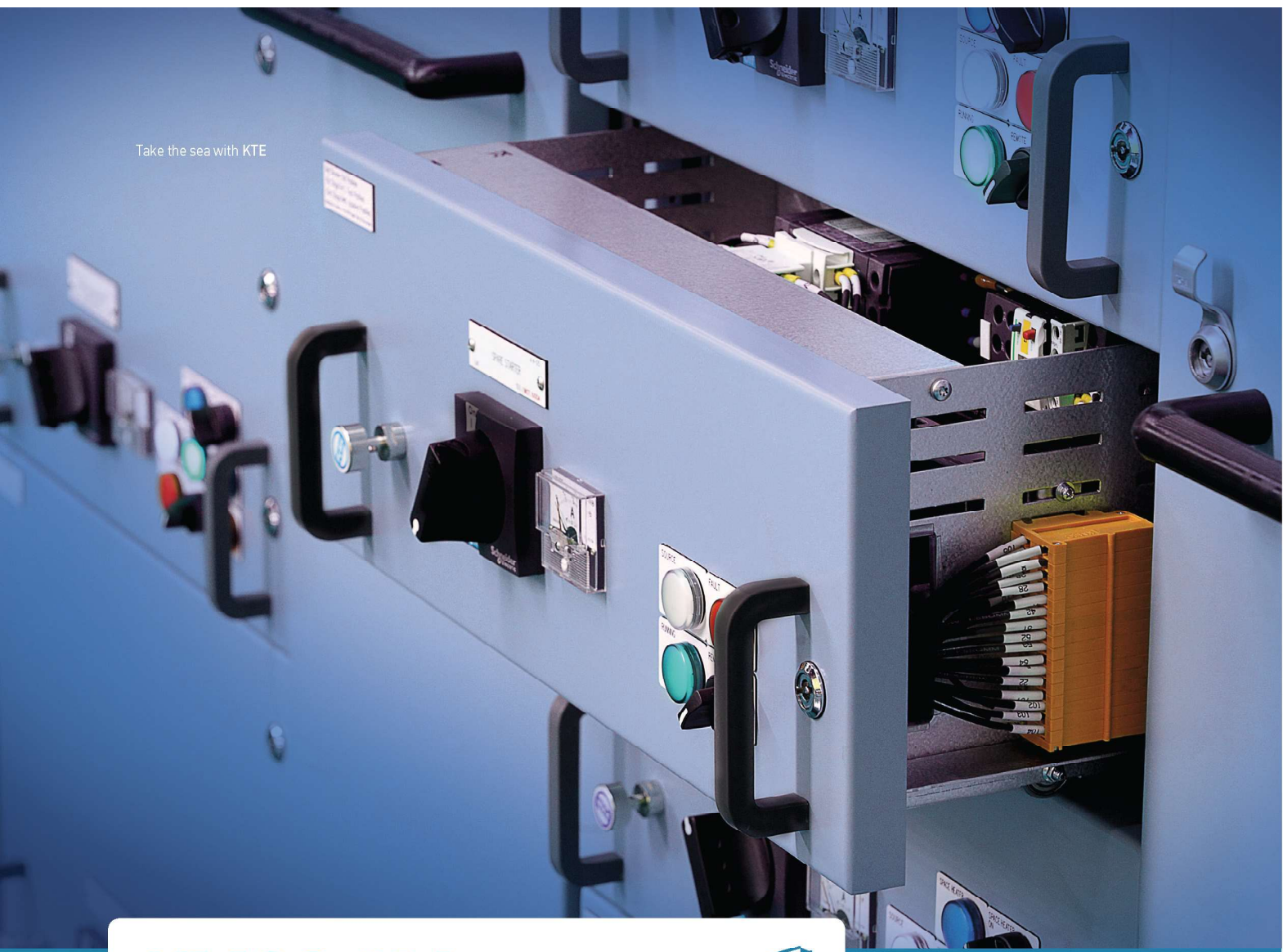
- **Material** : PC (Flame retardant) UL 94V-0 / TRIREX3025G10 G/F (Reinforced)
- **Ambient temperature** : .5 -20°C ~ +55°C
- **Humidity** : 45% ~ 95% R.H
- **IP Grade Selector switch** : IP 65/Mounting bracket: IP 65 with packing
- **Vibration Test (LR rule)** : 30 Hz, acceleration ; 0.7 G (7m/s)
- **Shock Resistance** : 10G

## Programmable Starter Unit (KT-PSTAR)

- **Input Specification**  
AC Signal Input : 1 Channel (Max 250Va.c, 10A)  
DC Signal Input : 13 Channel (CN 1)
- **Output Specification**  
Magnet Contactor : 4 Channels (Max 250Va.c, 10A)  
DC Contactor : 9 Channels (Max 30Vd.c., 2A)  
Alarm Contact Output :  
- System Failure Contactor (CN 2)  
- Power Failure Contactor (CN 2)  
- ST-BY Alarm Contactor (CN 2)



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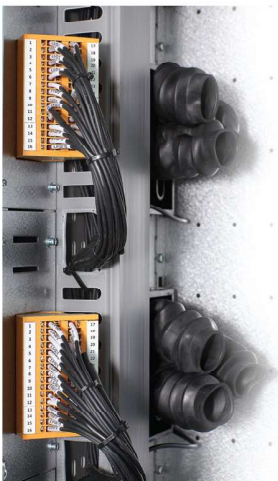


# KMCC-80A



KTE Technology

for Offshore & Plant Low Voltage Switchboard and Motor Control Center



## KMCC-80A Switchboard & MCC Overview

KMCC-80A is a withdrawable low voltage switchboard up to 5000A in accordance with IEC 61439-1 standards.

The system provides motor control and power distribution functionality. KMCC-80A is a compact, flexible and reliable Low Voltage solution for applications where the supply of energy is vital for your business process. In line with form 3b and 4b, the withdrawable units can be exchanged without having to disconnect power and/or control cabling.





### Front Maintenance Type

|                                    |   |
|------------------------------------|---|
| Apparatus                          | Low voltage switchgear and control gear |
| Applicable standard                | IEC 61439-1:2011                        |
| Type                               | KMCC-80A                                |
| Number of poles                    | 3                                       |
| Rated frequency                    | 60Hz                                    |
| Rated voltage                      | Up to 690V                              |
| Rated insulation voltage           | AC1000V                                 |
| Rated normal current               | 3000A                                   |
| Rated short-time withstand current | 80kA- 1s                                |

### Front & Rear Maintenance Type

|                                    |   |
|------------------------------------|---|
| Apparatus                          | Low voltage switchgear and control gear |
| Applicable standard                | IEC 61439-1 & 2:2011                    |
| Type                               | KMCC-80A                                |
| Number of poles                    | 3                                       |
| Rated frequency                    | 50/60Hz                                 |
| Rated voltage                      | Up to 690V                              |
| Rated insulation voltage           | AC1000V                                 |
| Rated normal current               | 2000A                                   |
| Rated short-time withstand current | 80kA - 1s                               |
| Rated impulse withstand voltage    | 8kV                                     |
| Degree of protection               | IP44, Form 2a + 4b                      |
| Pollution degree                   | 3                                       |



## Safety

- Reliable interlocking mechanisms to ensure operational safety / disconnection / test positions.
- Withdrawable in operation to ensure the safety of your operating personnel : safe modification under energized conditions.
- Separated and isolated bus bar compartment to increase operation safety
- Separated and isolated cable compartment
- Upgrade / exchange of functional units without service interruption

## User Convenience

- Slide and guide design for optimal compartment guidance
- Applicable to the Intelligent MCC
- High stacking density of motor control and /or power distribution units (Max. 13 units in 1 vertical column)
- Intuitive withdrawal mechanics of the compartments
- Modular and flexible design





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# Okken



KTE Technology

for Offshore & Plant Low Voltage Switchboard and Motor Control Center

## High Dependability and Low Voltage Switchboard

Okken is a low voltage switchboard designed for use in critical largesite applications : off-shore platforms, large industrial plants. Okken's safety and high operational dependability are essential for your applications in critical processes, in power distribution as well as for motor control.

Okken is a totally type-tested switchboard, in accordance with IEC 61439-1, and certified by independent labs : LOVAG, ASEFA, CESI and VIRLAB.





### A wide range of solutions

Withdrawable device for high power incomers or feeders up to 6300 A

Fixed for economical low-power feeder applications. Disconnectable up to 630 for a high upgradability

Plug-in up to 630 for fast interchangeability without handling the power cables

Drawers for highest availability and safety of electrical distribution and motor control



### Okken High Safety and Availability Switchboard up to 6300 A

Okken's modular design makes it easier to use for main switchboard power distribution up to 6300 A, as well as for the control and monitoring of motors up to 250 KW. It allows a combination of different types of feeders in the same column.

High dependability and low voltage switchboard

Okken is a low voltage switchboard designed for use in critical large-site applications :

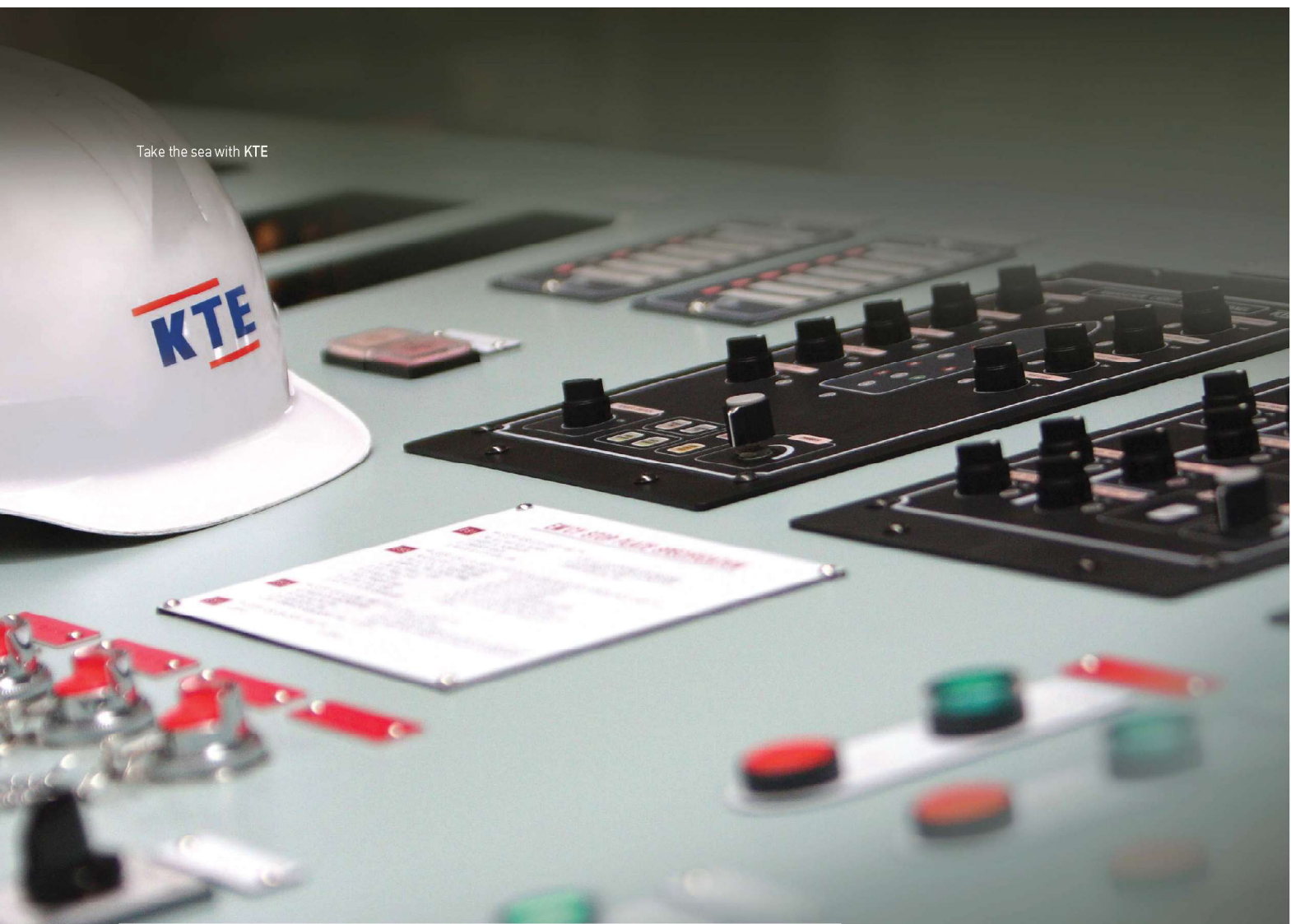
- Off-shore platforms
- Large industrial plants

Okken offers different protection levels:

IP31 / IP41 / IP54, appropriate to the environmental characteristics of your installation.



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# CONTROL CONSOLES



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## Features

### Long-life span and high performance

KTE marine control consoles are adaptable to all possible ship conditions. They are highly resistant to vibration, moisture and temperature, employing parts chosen on the basis of our high technology and accumulated experience. Thus, long-life span and high performance are ensured.

### Optimum arrangement

For easy monitoring and operation, the layout of the panel surface is sectioned for separate group apparatuses, such as the main engine, the boiler and the auxiliary machinery. This arrangement can fully meet user's requirements.



### Rigid construction and good appearance

Designed for marine applications, the consoles are sufficiently drip-proof and durable against vibration and shock and are constructed for easy installation. Excellent anti-corrosive coating, baked melamine finish and orderly device arrangement produce a superb appearance.

### Easy inspection and maintenance

The arrangement of the parts in the console and the wiring facilitates inspection and maintenance.



### From Design Features to Operational Efficiency

KTE, a highly-specialized manufacturer of marine equipment, produces control consoles which assure safe ship navigation along with switchboards and starters.

With splendid appearance and simplified arrangement several hundreds of Control Consoles have been delivered to vessels sailing all over the world.



To work closely together with our precious customers, people in KTE will devote themselves. KTE is well aware of the fact that a company's future is under customers' thumbs. Therefore, CUSTOMER SATISFACTION should be taken into account FIRST in all matters.

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# NAVAL EQUIPMENT



KTE Technology

## Electrical Equipment for the Navy

KTE marine electrical equipment has already been recognized not only by major classification societies but also by leading ship authority around the world. As a specialized manufacturer with many years of marine and shipbuilding experience,



Military Afloat Reach and Sustainability Tankers



Main Switchboard for LPX  
(Landing Platform Experimental)

KTE's technology is also utilized in naval vessels such as LPX, submarines, minesweepers and kinds of overseas defense project.

KTE has continuously provided naval equipment like main switchboard, IC switchboard, training simulator, power converter, control system, etc. for the Republic of Korea Navy for decades.

## IPMS (Integrated Platform Management System)



IPMs-1

IPMc-1

IPMs-2

IPMc-2

IPMs-3

## FWD and AFT Auxiliary Switchboard



## Power Conversion System



### DC 220V Converter

- Input Voltage  
DC 450 ~ 830(900V)
- Output Voltage  
DC 230V  $\pm$ 10V



### AC 115V 60Hz and 400Hz Inverter

- Input Voltage  
DC 450 ~ 830(900V)
- Output Voltage(60Hz)  
AC 120V 3Ph 60Hz,  $\pm$ 5V
- Output Voltage(400Hz)  
AC 120V 3Ph 400Hz,  $\pm$ 5V

## Fuel Cell Control Board



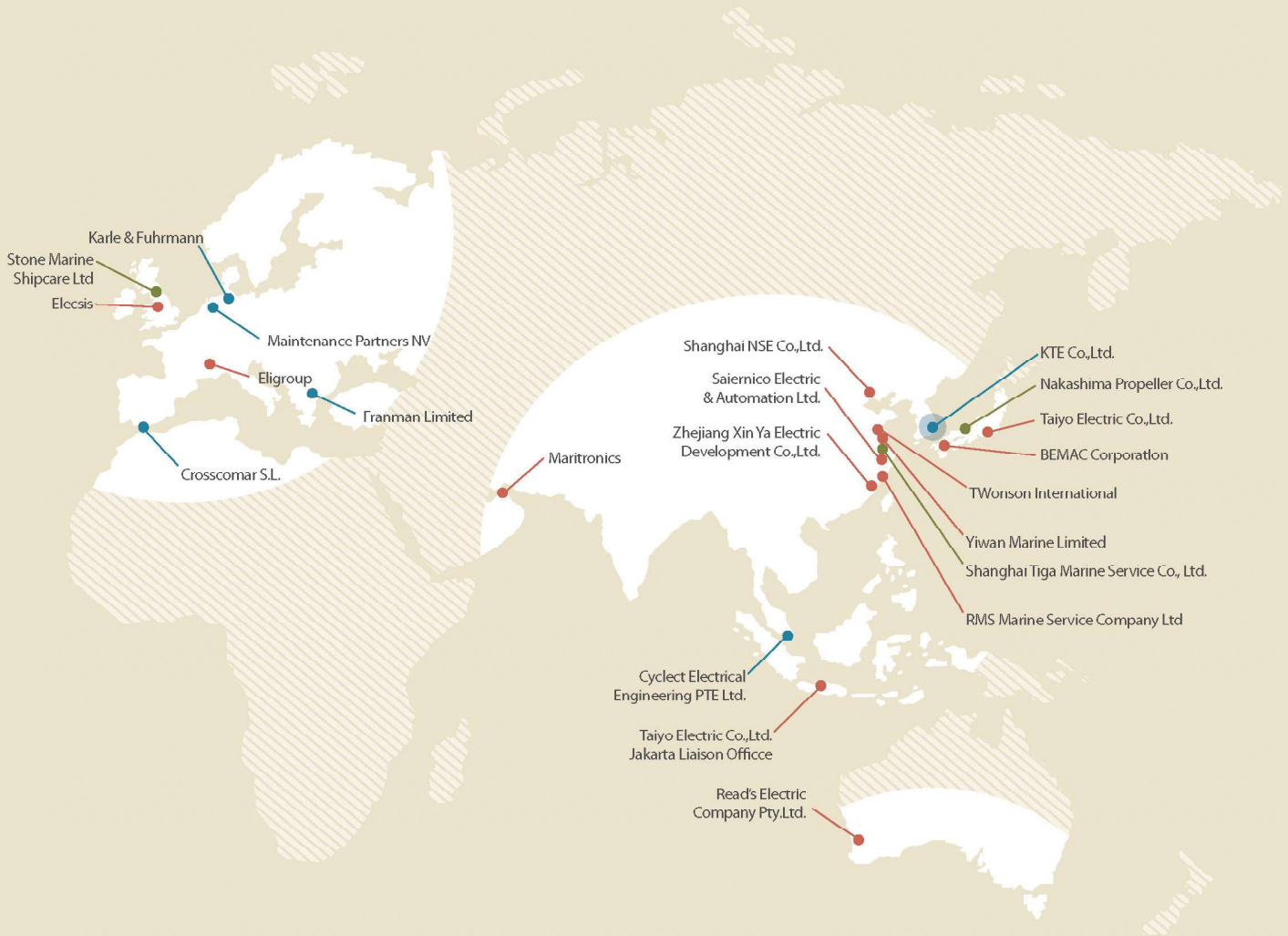
## Safety & Reliability

KTE's rigid and sturdy switchboard ensures the safe and reliable distribution of electricity on board naval vessels. All products are specially designed in accordance with the requirements of military standards, nation & international standards and tested by means of trials and qualification tests.

Also, it is made to handle harsh environments such as vibration, mechanical shocks, cold, heat, humidity, corrosion, etc.

# Service Network

Customers are recommended to contact KTE first.



- Greece** ● **Franman Limited**  
TEL : +30-210-9532-350  
www.franman.gr
- Australia** ● **Read's Electric Company Pty. Ltd.**  
TEL : +61-8-9335-9344  
www.readselectric.com
- Belgium** ● **Maintenance Partners NV**  
TFI : +32-3-544-3235 (24/7)  
www.maintenancepartners.com
- Brazil UK** ● **Metalock Brasil**  
TEL : +55-13-3226-4686  
www.matalock.com.br
- **Elecsis**  
Tel : +44-1278-427374  
www.elecsis.com
- **Stone Marine Shipcare Ltd**  
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www.stonemarineshipcare.com.

- China** ● **Saiernico Electric & Automation Ltd.**  
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 \* Schneider's CIS(Customer International Support) network also available everywhere in the world for HV Switchboard, Okken & all the Schneider's products.

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