COMPANY PROFILE

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Design Smart Energy

KTE

for DEFENSE

KTE, a manufacturer specializing in integration of marine electrical and control system since 1979, has been supplying naval electrical equipment such as main switchboard, PLC(Programmable Logic Control), side thruster, etc. to Republic of Korea Navy for several decades.

In recent years, KTE has been contributing to the defense industry by developing and supplying power converters for naval and integrated platform management systems for submarines.

PRODUCTS

- Main switchboard and PLC for naval ship
- Power converter for naval ship
- Side thruster for surface ship
- ACB(Air circuit breaker) for surface ship
- Integrated platform management system for submarine
- FWD & AFT Aux Switchboard for submarine
- Main Switchboard for submarine
- Fuel cell control board for submarine
- Integrated mast control unit for submarine
- Fault Current Limiter for submarine

NAVAL EQUIPMENT

Electrical Equipment

Electrical Equipment for Navy

KTE's naval equipment is specially designed and manufactured to meet US-MIL-STD, and it supplies power to on ship.
KTE has been continuously supplying naval equipment such as main switchboard, power load center, IC switchboard and distribution board, etc.

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, national & 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., in compliance with US-MIL-STD requirements.

Main Switchboard for LPH

Main Switchboard for ASR-II

Main Switchboard for UK MARS

NAVAL EQUIPMENT

Electrical Equipment

Electrical Equipment for Navy

KTE's electrical equipment is suitable for Naval vessels overseas as well as Korea's. Naval equipment overseas requires US-MIL-STD or NATO STANAG, and our equipment is specifically designed and built according to the required regulations. KTE has supplied various equipment that meets regulation set by Navy of Thailand, the Philippines, the United Kingdom, Norway, New Zealand.

LPH(Landing Platform Helicopter, ROKS Marado, 2021)

- Owner : Republic of Korea Navy
- Shipyard : HJ Shipbuilding & Construction Co., Ltd
- Supply : Main Switchboard, IC SWBD

ASR-II(Auxiliary Submarine Rescue Ship, ROKS Ganghwado, 2023)

- Owner : Republic of Korea Navy
- Shipyard : Daewoo Shipbuilding and Marine Engineering Co., Ltd. (DSME)
- Supply : Main Switchboard, IC SWBD

FFX-III(Frigate, ROKS Chungnam, 2024)

- Owner : Republic of Korea Navy
- Shipyard : SK Oceanplant Co., Ltd.
- Supply : Main Switchboard, IC SWBD, IC Distribution Panel

NDLO LSV(Logistics & Support Vessel, 2016)

- Owner : Norwegian Defense Logistics Organization (NDLO)
- Shipyard : Daewoo Shipbuilding and Marine Engineering Co., Ltd. (DSME)
- Supply : AC440V/220V Power Plants, Medical Electric System, Motor Control Center, Distribution Board, Individual Starter, Shore Connection Box, Electric Test Panel

UK MARS Tanker(2017)

- Owner : The Ministry of Defense (MoD), United Kingdom
- Shipyard : Daewoo Shipbuilding and Marine Engineering Co., Ltd. (DSME)
- Supply : AC440V/220V Power Plants, Motor Control Center, Distribution Board, ABT & MBT, Individual Stater, Shore Connection Box, AC690V Load Bank Connection Panel

Thai Frigate(2018)

- Owner : Royal Thai Navy (RTN)
- Shipyard : Daewoo Shipbuilding and Marine Engineering Co., Ltd. (DSME)
- Supply : AC440V Main Switchboard, IC Switchboard, Power Load Center, Distribution Board, ABT & MBT, Individual Starter, Shore Connection Box

New Zealand MSC(Maritime Sustainment Capability, 2020)

- Owner : Royal New Zealand Navy (RNZN)
- Shipyard : HD Heavy Industries
- Supply : AC690V/440V/220V Power Plants, Motor Control Center, Distribution Board, Individual Starter, Shore Connection Box, Medical Distribution Board

NAVAL EQUIPMENT

Power Conversion Equipment

Power Conversion Equipment(PCE)

PCE converts high voltage DC to low voltage DC or AC in order to supply electrical power to the necessary devices.
Design is optimized for the environment of a naval ship

AC 115V 60Hz Inverter

- Owner : Republic of Korea Navy
- Supply : KSS-III Batch-I & II
- Supplies power to AC115V 60Hz circuit upon input of ship's network power

AC 115V 400Hz Inverter

- Owner : Republic of Korea Navy
- Supply : KSS-III Batch-I & II
- Supplies power to AC115V 400Hz circuit upon input of ship's network power

NAVAL EQUIPMENT

Power Conversion Equipment

DC 220V Converter

- Owner : Republic of Korea Navy
- Supply : KSS-III Batch-I & II
- Supplies power to AC115V 60Hz circuit upon input of ship's network power

Power Converter

- Owner : Republic of Korea Navy
- Supply : KSS-I
- Supplies power to 3PH AC115V 60Hz circuit upon input of ship's network power

NAVAL EQUIPMENT

For Submarine

Integrated Platform Management System(IPMS)

- Integrated Platform Management System(IPMS) is the core of ship operation as integrated automation system
- Enables a single crew to monitoring & control various system and equipment in the ship
- Displays the status information in relation to ship operation.
- Lamp & Switch panel for Emergency & Dedicate operations.
- The IPMS individual equipment is located in different areas of the submarine respectively
- Main network consists of duplexing industrial Ethernet(optical communication)
- Integrated Control & Monitoring for all system in the submarine
- External components are connected with various interface(Ethernet, RS422/485, I/O Hardwire)
- Application of touch screen HMI optimized for submarines
- Access protection divided into 5 level according to Operating authority
- Alarm, Event, Trend are displayed and archived in real time
- Automation and Sequential control based function
- Supply : KSS-III Batch-I & II

No. 1 Console

No. 2 Console

No. 1, 2 ,3 Control Panel

NAVAL EQUIPMENT

For Submarine

FWD & AFT Aux. Switchboards+Propulsion System Controller

- The FWD & AFT Aux. Switchboards distribute electrical energy to all consumers on board and contain all necessary electrical devices for a safe and reliable power supply.
- The Propulsion System Controller(PSC) contains all electrical equipment and functional groups, necessary to activate, control and monitor the Propulsion Motor and its auxiliary systems.
- The PSC is divided into 2 partial systems. They can operate independently from each other.
- The PSC consists of Automatic Propulsion System Controller(APSC) and Manual Propulsion System Controller(MPSC).
- Optimized for diesel submarines and reliable power distribution.
- Apply main processor redundancy.
- Supply : KSS-III Batch-I & II

FWD Aux. Switchboards

AFT Aux. Switchboards

NAVAL EQUIPMENT

For Submarine

Switchboards

- The switchboards distribute electrical power to main consumers on board and protection of consequent fault propagation to other system.
- The switchboards have selectivity for protection of short circuit.
- The switchboard provides proper protection coordination to minimize the effect of a propulsion system fault.
- The electrical power distribution system consists of four individual switchboards: Main Switchboard, Power Conversion Equipment Switchboard, AFT AUX Machinery Power Distribution Switchboard, and AFT Battery Switching Equipment Switchboard.
- Supply : KSS-III Batch-II

Main Switchboard

Power Conversion Equipment Switchboard

AFT AUX Machinery Power Distribution Switchboard

AFT Battery Switching Equipment Switchboard.

NAVAL EQUIPMENT

For Submarine

Fuel Cell Control Board(FCCB)

- FCCB(Fuel Cell Control Board) is a main device that controls and monitors Fuel Cell System, one of the representative AIP System.
- FCCB checks the status of FC System in real time by linking with Fuel Cell Modules, Fuel Cell DC/DC Converter, valves, pumps and Sensors and operates sequence control of FC System as well as remote control of each interlocking devices.
- Application of touch screen HMI optimized for submarines
- Alarm, Event, Trend are displayed and archived in real time
- Two independent Touch Screen monitors & PCs for HMI
- Automation and Sequential control based function
- Main Processor redundancy and application of dedicated safety system
- Supply : KSS-III Batch-I & II

Fuel cell control Board

NAVAL EQUIPMENT

For Submarine

Integrated Mast Control Unit(IMCU)

- IMCU controls various types of mast for submarines and performs inter working with the ship's main equipment.
- Control the Solenoid Valve of the Hydraulic Control Unit(HCU), increases and reduces hydraulic pressure to the mast according to the condition of the valve, raising and lowering the mast.
- Application of touch screen HMI optimized for submarines
- Application of Safety Logic for Mast Safety according to Conditions of submarine
- Apply main processor and power redundancy design
- Control stage junction box and hydraulic control block remote input/out put module box for control of each mast
- Supply : KSS-III Batch-II

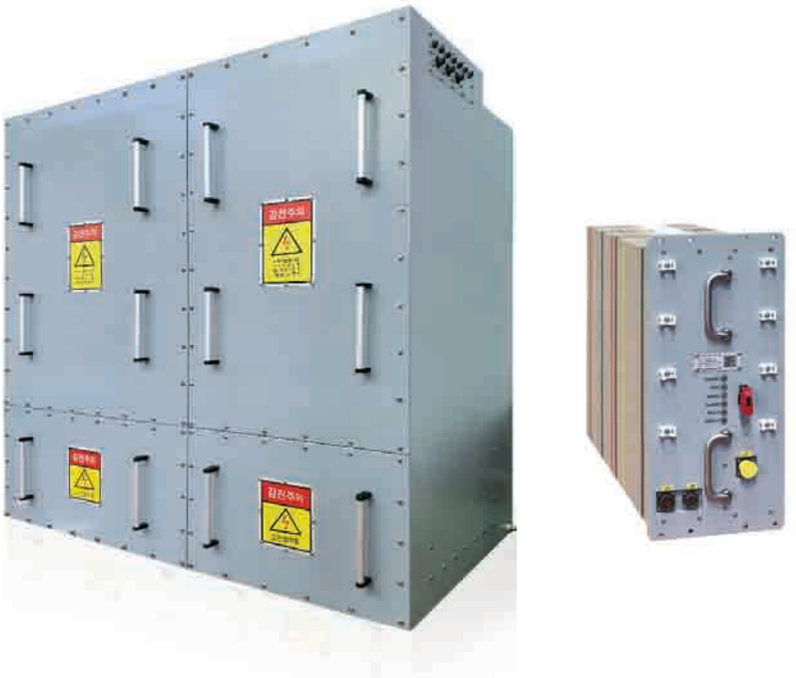
Integrated Mast Control Unit

NAVAL EQUIPMENT

For Submarine

Fault Current Limiter(FCL)

- The Fault Current Limiter is composed of drawer assemblies for maintenance convenience and a lithium battery string is connected to each drawer assembly.
- The lithium battery and propulsion network are connected/disconnected through the Fault Current Limiter device and it is configured in both directions to supply power through the lithium battery and charge the lithium battery and performs protection against bidirectional short-circuit accidents.
- The Fault Current Limiter monitors the voltage, current, temperature and operation status of each part and performs protection against abnormal operation and situations.
- Software can be updated through CAN communication.
- Supply : KSS-III Batch-II



Fault Current Limiter and drawer assembly

SIDE THRUSTER

Model TCT

Greater thrust while being more compact in size
Our model is newly designed thruster based on our vast experience and achievements.



Greater Thrust

As a result of tank tests, and improvements in both design and strength of the blades, we have created a thruster with much greater thrust than conventional ones of the past.
Motor output range is from 115kW to 3,650kW.

Minimum vibration, Low noise

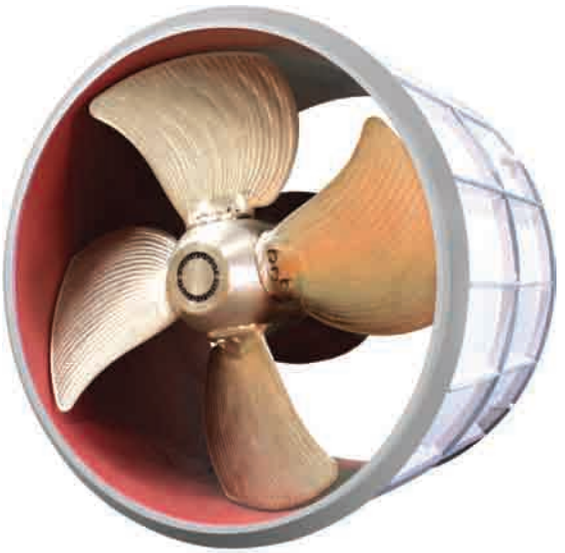
Utilizing our unique forward-skew design for the thruster's blades and the results of many tank tests enabled outstanding progress in low noise and reduction in vibration.

Easy installation

Reduction in the thruster length has made it possible for the thruster to be installed to the forward part of the bow section of the ship compared to conventional ones. This gives the ship agreat turning moment.

Easy maintenance and Inspection

Replacement of propeller blade can be conducted in the duct easily by removing the blade bolts. The thruster body can be dismounted in the duct, shifted outside and inspected on shore.
Adoption of the same oil for lubrication and pitch control brings easy maintenance for the thruster.



SIDE THRUSTER

Model TFT

Our model is newly designed thruster based on our vast experience and achievements.



Prime mover is available by means of reversible hydraulic motor.
Reversible electric motor or diesel engine.
Direction of thrust can be obtained by controlling direction of revolution and any thrust in the range by controlling prime mover speed

Simple structure and easy maintenance

Lubrication at turning and rubbing positions inside thruster unit is of oil soaking system thus oil supply inspection is not necessary. Header tank is arranged in piping connection with thruster unit and keeps a little higher lubrication oil pressure inside thruster than sea water pressure, thereby an ingress of seawater is prevented.

The thruster unit is fabricated inside the duct and both ends of the duct are welded to the hull.

THRUSTER CONTROL SYSTEM

This product is an exclusive controller to control a thruster when a ship is coming or going alongside the pier. The main function of this product is to control blade angle of thruster to control signal which is detected control command and feedback value. Besides, it can provide an automatic control of a thruster, optimized using a follow-up control algorithm.

Operation Unit KTE-TOU

Display Unit KTE-MDU

Wing Unit Unit KTE-TWU

Main Control Unit KTE-TMU

Auto Blade Angle Control

Main function of this system is to control blade angle with command value. That is to say, this system controls blade angle automatically with command, when follow up control algorithm is used. If feedback value becomes close to command value, this system doesn't transmit S/V control signal constantly but pulse signal with constant time interval and feedback value can reach the objective value quickly without overflowing command value. Users have to set parameters with parameter setting equipment in advance and it is possible to set parameters properly in accordance with characteristics of every ship.

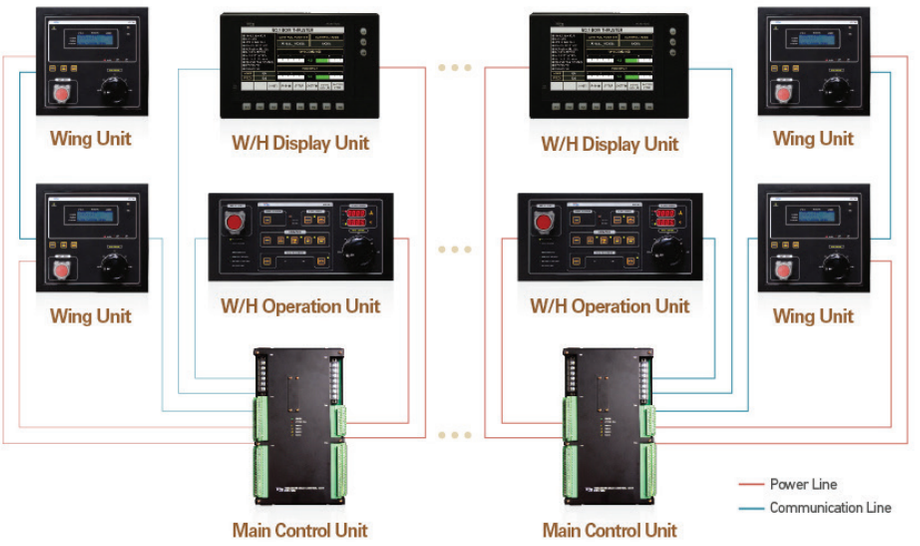
Auto Load Control

This is for protecting overload in follow up operation and controlled automatically by PI control depending on set points.
If main motor actual load is more than present load in follow up condition, the blade angle automatically changes to the angle of preset load.

Zero Pitch System

During voyage of the vessel, sometimes the propeller is rotated by the tide(the seawater coming into the thruster tunnel) and the pitch is moved out of the zero position. In this situation, hydraulic pump automatically operates to keep the pitch at zero. When blade angle returns to zero position, hydraulic pump and solenoid valve will be stopped after preset time.

THRUSTER CONTROL SYSTEM



Features of controller

- Simple design and compact size.
- Easy system expansion and maintenance.
- Easy interface to DPS(1, 2), AMS, VDR etc.
- Flexible addition or modification of function.
- Combination control.

Standard Specification

- Supply voltage : DC 24V
- Temperature : 0~70℃
- Controller : 16 bit Micro-controller
- Communication method : 2 CAN Channel

ATS-II(Auxiliary Towing Salvage, ROKS Tongyeong, 2014)

- Owner : Republic of Korea Navy
- Shipyard : Daewoo Shipbuilding and Marine Engineering Co., Ltd. (DSME)
- Supply : Three bow & Two stern Thruster

ASR-II(Auxiliary Submarine Rescue Ship, ROKS Ganghwado, 2023)

- Owner : Republic of Korea Navy
- Shipyard : Daewoo Shipbuilding and Marine Engineering Co., Ltd. (DSME)
- Supply : Three bow & Two stern Thruster

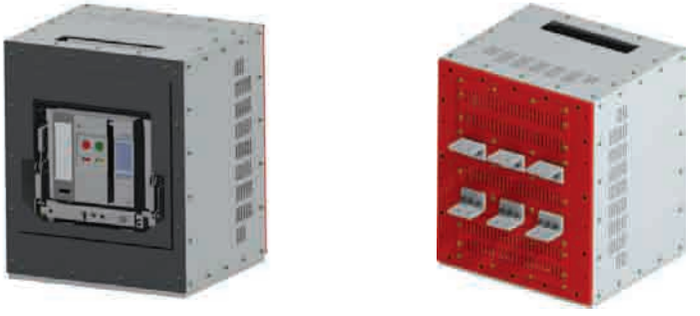
NAVAL EQUIPMENT

ACB

KTE-ACB-1600HR

KTE has successfully developed KTE-ACB-1600HR, a MIL-Type naval air circuit breaker that can replace a discontinued product ACB-1600HR.
KTE-ACB-1600HR utilizes Commercial Off-The-Shelf air circuit breaker which has been approved for its structural integrity through MIL-type shock and vibration test. It has an additional advantage of being completely compatible with ACB-1600HR, can be replaced without any electrical or structural modification.

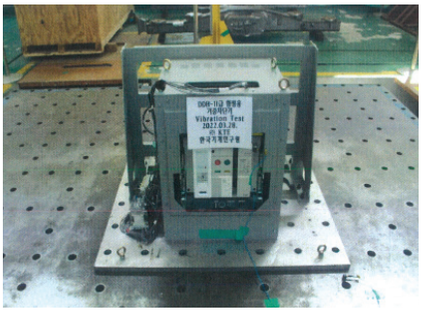
Model	ACB-1600HR (Discontinued)	KTE-ACB-1600HR (Replacement)
Rated Voltage	AC 450V	AC 450V
Rated Frequency	60Hz	60Hz
Rated current	1600A	1600A
Rated Breaking Capacity	85kA	85kA
Control Voltage	AC 115V	AC 115V
Shock	MIL-STD-901	MIL-STD-901D
Vibration	MIL-STD-167-1	MIL-STD-167-1A
Dimension (W x H x D, mm)	610 x 739 x 532	610 x 739 x 532
Weight	225 kg	225 kg



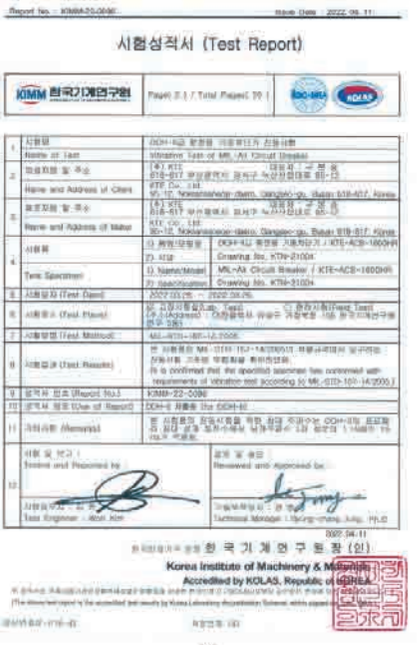
[KTE-ACB-1600HR]

NAVAL EQUIPMENT

ACB



시험성적서 (Test Report)



시험성적서 (Test Report)

Application Standard

IEC 60947-1 : Low-voltage switchgear and controlgear Part 1 : General rules

IEC 60947-2 : Low-voltage switchgear and controlgear Part 2 : Circuit breakers

MIL-S-901D : Shock tests, H.I. (HIGH-IMPACT) shipboard machinery, equipment and systems

MIL-STD-167-1A : Mechanical vibrations of shipboard equipment

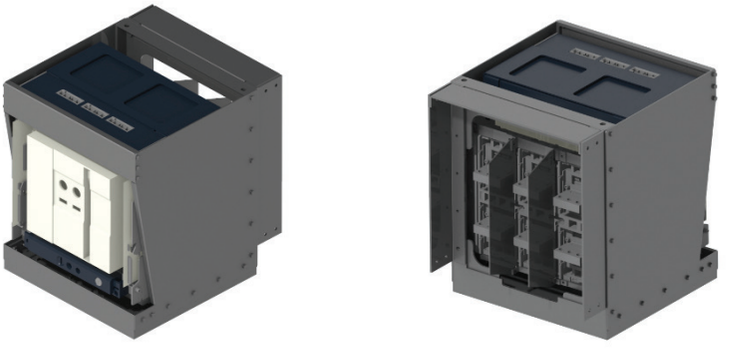
NAVAL EQUIPMENT

ACB

KTE-ACB-2012

KTE has successfully developed KTE-ACB-2012, a MIL-Type naval air circuit breaker that can replace a discontinued product ACB-2012.
KTE-ACB-2012 utilizes Commercial Off-The-Shelf air circuit breaker which has been approved for its structural integrity through MIL-type shock and vibration test. It has an additional advantage of being completely compatible with ACB-2012, can be replaced without any electrical or structural modification.

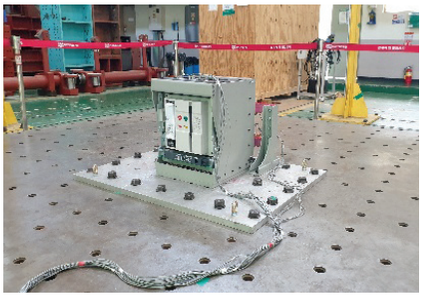
Model	ACB-2012 (Discontinued)	KTE-ACB-2012 (Replacement)
Rated Voltage	AC 450V	AC 450V
Rated Frequency	60Hz	60Hz
Rated current	2000A	2000A
Rated Breaking Capacity	85kA	85kA
Control Voltage	AC 115V	AC 115V
Shock	MIL-STD-901	MIL-STD-901D
Vibration	MIL-STD-167-1	MIL-STD-167-1A
Dimension (W x H x D, mm)	449 x 530 x 414	449 x 530 x 414
Weight	146 kg	146 kg

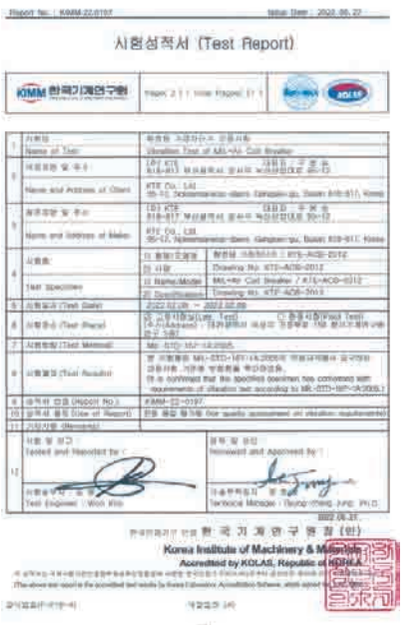


[KTE-ACB-2012]

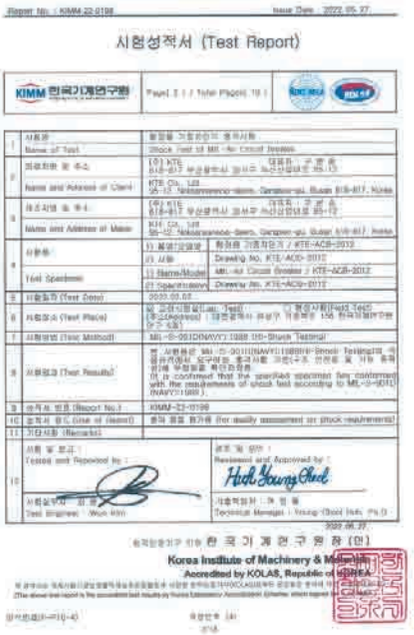
NAVAL EQUIPMENT

ACB





시험성적서 (Test Report)



시험성적서 (Test Report)

Application Standard

IEC 60947-1 : Low-voltage switchgear and controlgear Part 1 : General rules

IEC 60947-2 : Low-voltage switchgear and controlgear Part 2 : Circuit breakers

MIL-S-901D : Shock tests, H.I. (HIGH-IMPACT) shipboard machinery, equipment and systems

MIL-STD-167-1A : Mechanical vibrations of shipboard equipment

NAVAL EQUIPMENT

ACB

KA5000M-100

KTE has successfully developed KA5000M-100, a MIL-Type naval air circuit breaker that can replace a discontinued product ACB-4000HR.
KA5000M-100 utilizes Commercial Off-The-Shelf air circuit breaker which has been approved for its structural integrity through MIL-type shock and vibration test. It has an additional advantage of being completely compatible with ACB-4000HR and thus, can be replaced without any electrical or structural modification.

Model	ACB-4000HR (Discontinued)	KA5000M-100 (Replacement)
Rated Voltage	AC 450V	AC 450V
Rated Frequency	60Hz	60Hz
Rated current	4000A	5000A
Rated Breaking Capacity	85kA	100kA
Control Voltage	AC 115V	AC 115V
Shock	MIL-STD-901	MIL-STD-901D
Vibration	MIL-STD-167-1A	MIL-STD-167-1A
Dimension (W x H x D, mm)	740 x 775 x 686	740 x 775 x 686
Weight	524 kg	452 kg

[KA5000M-100]

NAVAL EQUIPMENT

ACB

시험성적서 (Test Report)

KIMM 한국기계연구원

Korea Institute of Machinery & Materials
Accredited by KOLAS, Republic of KOREA

시험성적서 (Test Report)

KIMM 한국기계연구원

Korea Institute of Machinery & Materials
Accredited by KOLAS, Republic of KOREA

Features

- Generator under voltage protection
- Generator overcurrent protection
- Short circuit protection
- Manual / Remote controllable
- Draw-out function

Benefits

- Electrical, Structural compatible
- Reasonable price
- Short lead time
- Domestic Engineering Service (Korea)

User Convenience

- Functionality test with ACB installed
- Easy maintenance with draw-out function