Schneider Electric Merchant Marine Activity

Global specialist in energy management
With over 90 years experience in Marine applications Schneider Electric optimize your Capex and Opex all along the lifecycle of your installations.

**Schneider Electric, a long-lasting partnership**

Schneider Electric is a key-player in merchant marine. Its knowledge is fundamental, whenever safety and economical performance depend on the reliability of automation and electrical distribution systems. Present in 190 countries, Schneider Electric always remains very close to your needs and guarantees the high quality level of services it provides.

**World-wide presence, local service**

With Schneider Electric, you can rely on a world-wide presence, close to the main ports in Europe, North America, Southern Africa, Middle East and Asia. The expertise of our technical engineers relies on a continuous training. It ensures them thorough knowledge of every type of on-board system. In addition to their comprehensive experience of specific merchant marine constraints, our experts can be immediately operational and solve any kind of challenge, everywhere in the world.

**Innovative solutions and services, a unique set of competencies**

Schneider Electric proposes comprehensive and consistent solutions for automation, control and electrical distribution to ensure the availability of safe energy on board. Thanks to available resources in the field of R&D and engineering, Schneider Electric proposes all the competencies to design and implement relevant solutions to satisfy your specific requirements:

- consulting
- engineering and installation
- maintenance
- on-site operation
- retrofit
- spare parts
- training.

From the early design stage, and throughout ship life, you are ensured of expert assistance to adapt our solutions to your specific needs: economical, logistical, implementation, maintenance and refurbishing.
Energy management
Focus on Medium Voltage

Thanks to the Schneider Electric offer, find consistent and efficient solutions for your shipboard electrical distribution needs. You can easily design, operate and maintain your electrical installation with complete peace of mind. Our entire product offer has been designed to be fully compatible in terms of electrical, mechanical and communication coherence. Our solutions (including tools such as software, training...) guarantees you optimized, reliable, evolving and compliant installations.

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>7.2 to 17.5 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current of main busbar</td>
<td>3150 A</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>up to 40 kA per 3 sec or 50 kA per 3 sec (12kV)</td>
</tr>
<tr>
<td>Access</td>
<td>rear</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP4X</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 62271-200</td>
</tr>
<tr>
<td>Regulations</td>
<td>GL,Bv,DNV</td>
</tr>
</tbody>
</table>

Example of MCset, PIX and Motorpact Marine switchboards

Main advantages
Breaking techniques/technologies
> SF6 contactors and circuit breakers: MCset
> vacuum contactors and circuit breakers: PIX and Motorpact

Staff’s safety
> complete metallic insulation of the functional units
> availability of an internal arc proof version according to IEC 62271 - 200.

Ring Main Unit

The RM6 is a compact unit combining all MV functional units to enable connection, supply and protection of one or two transformers on an open ring network.

Main advantages

The MV loop configuration offers significant advantages
> smaller main MV switchboard: only two cells to feed a MV loop
> reduced length of LV cables: shortening average ratio 10 times for the configuration
> reduced copper losses by 50%
> improved maintainability and availability of the network.

<table>
<thead>
<tr>
<th>Rated voltage (IEC) kV rms</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
<td>630</td>
</tr>
<tr>
<td>Rated short-time current</td>
<td>25kA, 1sec</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>enclosure IP67</td>
</tr>
<tr>
<td>Regulations</td>
<td>DACS compliant, DNV type-approved</td>
</tr>
</tbody>
</table>
Transformers and reactors

This equipment provides reduced temperature rise and suitable cooling systems:

Applications
- General distribution
- Freeze container
- VSD
- Propulsion (max 5MW)
- MV converters

Main advantages
- Choice between two technologies:
  - impregnated technology
  - cast resin technology
- High quality magnetic core (grain oriented with step lap cut)
- Design adapted to particular specification
- Specially dimensioned for Marine application.
Energy management
Focus on Low Voltage

Main and emergency switchboards

Okken, MB301M and MB401M switchboards enable optimum and rational use of all Schneider Electric’s low voltage products. The complete range satisfies all electrical distribution requirements, from generation to motor control and final distribution. Moreover, several versions are available (front and rear access, fixed or withdrawable drawers, degree of protection up to IP44) to satisfy all the requirements and limitations as far as space and location are concerned, due to marine use. They have been used, with full satisfaction of the shipowner, in all types of applications, from oil-tankers to cruise ships.

Main characteristics

<table>
<thead>
<tr>
<th>Okken</th>
<th>MB301M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage</td>
<td>1000 V</td>
</tr>
<tr>
<td>Rated current of main busbar</td>
<td>up to 6300 A</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>up to 150 kA per 1 sec</td>
</tr>
<tr>
<td>Access</td>
<td>Front / Rear / Double Front</td>
</tr>
<tr>
<td>Cable inlets and outlets</td>
<td>top and bottom</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP31/42 up to IP54</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 61641 v2 / IEC 61439-1 &amp; 2</td>
</tr>
<tr>
<td>Regulations</td>
<td>IACS compliant, DNV and RINA type approved</td>
</tr>
<tr>
<td>Rated insulation voltage</td>
<td>1000 Vac</td>
</tr>
<tr>
<td>Rated current of main busbar</td>
<td>up to 7300 A</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>up to 120 kA per 1 sec</td>
</tr>
<tr>
<td>Access</td>
<td>front or rear</td>
</tr>
<tr>
<td>Cable inlets and outlets</td>
<td>top and bottom</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP22-32</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC61439-1,2</td>
</tr>
<tr>
<td>Regulations</td>
<td>IACS compliant, DNV type-approved</td>
</tr>
</tbody>
</table>
Motor control centers

Main characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage</td>
<td>750 Vac</td>
</tr>
<tr>
<td>Rated current of main busbar</td>
<td>up to 2000 A</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>up to 70 kA per 1 sec</td>
</tr>
<tr>
<td>Access</td>
<td>front</td>
</tr>
<tr>
<td>Cable inlets and outlets</td>
<td>top and bottom</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>from IP21 to IP44</td>
</tr>
<tr>
<td>Nb of modules for section</td>
<td>12</td>
</tr>
<tr>
<td>Dimensions of available drawer</td>
<td>1/2.1.2.3.4 (in modules)</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 92, 439</td>
</tr>
<tr>
<td>Regulations</td>
<td>IACS compliant</td>
</tr>
</tbody>
</table>

Power and lighting panels

Main characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage</td>
<td>up to 750 Vac</td>
</tr>
<tr>
<td>Rated current of main busbar</td>
<td>up to 600 A</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>up to 50 kA per 1 sec</td>
</tr>
<tr>
<td>Access</td>
<td>front</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP44</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 92, 439</td>
</tr>
<tr>
<td>Regulations</td>
<td>IACS compliant</td>
</tr>
</tbody>
</table>

Busbar trunking

“Canalis”, busways from 20A to 5000A, on low voltage have been type-approved by major classification societies: ABS, BV, DNV, GL...
Ship automation

Thanks to the Schneider Electric offer, find efficient solutions for your shipboard automation and electrical needs. Simple to use, our products and software make it easy for you to develop and maintain your applications with complete peace of mind. Our high performance offer guarantees optimum ship installation availability and efficiency. The return on your investment is maximized over the long term.

Main engines and diesel generators monitoring and control
To check the required starting conditions, to guarantee the process carrying out and to monitor the main parameters related to engine safety.

Power management
To optimize the number of working generator sets, to distribute active power, to control the frequency set point, to perform load sharing and to adapt system configuration to the different navigation phases.
Handling of coupled alternators.

Fluids management
To carry out ballast operations, fuel transfer (fuel-oil and diesel-oil), automatic fuel management (FO-DO and DO-FO transfers), filling and draining operations.

Load operation
Heel control enables the ship to be held stable, automatically or manually, during the loading and unloading phases:
> liquid with density adjustment
> fuel oil, diesel oil, water
> freight.

Real-time management
> based on an Ethernet TCP/IP architecture
> distributed architecture (several servers and users)
> real-time database.

Auxiliaries management
For automation and handling of operational pumps and compressors sequences, of cooling and aeration systems, particularly in the equipment preparation stage before setting sail.
Wheelhouse
For monitoring, the whole system is reachable from the wheelhouse. Some sub-systems are set for viewing.
Using some restricted areas, access to the specific ship information screens and the set screens.

Alarm and measurement system
To display, record (log) and process all the analog (with threshold management) and digital alarms.
Event current printing.

Curves and ship's performance
Displays the real and historical time values curves.

Engine control room
Engine starting in accordance with the start-up conditions starting:
➢ security mechanisms on
➢ correct fuel supplying
➢ low-speed turning sequence performed correctly
Engine stopping:
➢ normal stop
➢ stop due to fault or security stop.
The system allows access to the following features:
➢ two types of fuel management
➢ monitoring and processing of exhaust temperatures
➢ display on engine parameters.

Measurement processing
Speed, draft, power, fuel consumption, etc.
Enables comparison between the ship's real and theoretical performances.
Schneider Electric as the Global Specialist in Energy Management enables you with its complete solution in Building Management System to:

- Optimize your Business Performance applying Energy Efficiency to your ships
- Secure the operation of the vessels with Access Control and Security features.

This solution guarantees that you can supply Energy saving, Green, Safe, Comfortable ships for your cutting edge strategy.

Building Management System

A single interface dedicated to all our systems
- Installation cost reduction
- Lighting cost saves
- Video monitoring
- Multi zone regulation
Your partner in Electrical distribution and Automation Solutions

Pumping, waste and water treatment systems
> full solutions offer
> dedicated soft starters and drives
> partnering with key Players.

Winches, thrusters, Electrical propulsion
> new solutions development capabilities
> complete package offer in partnership with OEM’S
> service support or global ship processes and functions.

Handling systems, Deck cranes
> 50 years long Schneider Electric Expertise
> high power drives range
> strong service support.
Ship automation and energy management

All Schneider Electric standard products are developed in compliance with European and international standards, and regulations of the main worldwide classification companies such as ABS, BV, CCS, DNV, GL, KRS, LRS, NKK, RINA, and RS.

**Programmable logic controllers**
- A wide range of specialized platforms, ideal for ship automation applications.

**Speed drives**
- Soft starters and variable speed driver for synchronous or asynchronous motors.

**Moulded case circuit breakers**
- Compact NS and NSX series from 11 to 1250 A, four dimensions for 23 types of equipment, auxiliaries common to the whole range, high degree of discrimination and limitation.

**Vigilohm**
- Isolation devices and overall insulation monitoring for detection and indication of insulation faults.

**Human Machine Interface**
- Graphic terminals with high visibility screen.

**Intelligent remote terminal blocks**
- The perfect digital and analog I/O integration solution.

**Open-type circuit breakers**
- Masterpact NT from 800 to 1600 A, the smallest open-type circuit breaker in the world.
- Masterpact NW from 800 to 6300 A, same dimensions up to 4000 A, auxiliaries common to the whole range, simplified maintenance.

**High performance Modular circuit**
- Breakers up to 125A.

**Altivar 71**
- Altivar 38

**Ultra Rapid CB**
- 5 000 and 6 000 A for high installed power on board and busbar coupling.

**LV Uninterruptible Power Supply**
- MGE Galaxy G5500 from 20 to 120 kVA.

**Modicon M340**

**Magelis XBT 6T**

**Intensys STB distributed I/O**

**Compact NS and NSX series**
- From 11 to 1250 A, four dimensions for 23 types of equipment, auxiliaries common to the whole range, high degree of discrimination and limitation.

**Contactors**
- Thermal and electronic protection relay
- Circuit breaker for motor protection
- Automatic contactor circuit breakers.

**Tetys**

**LV Uninterruptible Power Supply**
- MGE Galaxy G5500 marine
Marine applications
A complete range of solutions for the marine environment

1. Transitional sources and emergency lighting
   > Passenger ships
   > UPS in dedicated room, or in the emergency genset room
   > Three-phase 80-400 kVA UPS, 30 min

2. Propulsion systems and automation
   > All types of merchant and cruise ships
   > UPS located in the control room/engine room/main switchboard room
   > Single-phase 5-40 kVA UPS

3. “Shore connection”
   > Frequency converter for berthed ships and harbor
   > Three-phase frequency converter, 400 kVA - 6 MVA

Single-Phase UPS
1–10 kVA Smart-UPS RT
> High-density and performance suitable for any on-board application
> Rack/tower convertible and optimized form factor for easy integration

Three-phase UPS
10-120 kVA, MGE Galaxy 5500 Marine
> High power quality to ensure optimum operation of applications
> Reduced footprint for easy installation in reduced space
4 SOLAS applications (emergency transitional lighting, public address, VDR, watertight bulkhead, fire doors...)
   > All types of merchant and cruise ships
   > UPS units spread out in small technical rooms within the ship
   > Single and three-phase UPSs from 1 to 400 kVA
   > Single-phase 800-2000 VA type approved UPS for VDR

6 Navigation and transmission systems
   > All types of merchant and cruise ships
   > UPS located in the wheelhouse
   > Single and three-phase 5-60 kVA UPS

5 Low-voltage active filter against harmonic pollution
   > Harmonic conditioner range: 20-120 A

7 Sound and light systems - management computing
   > Passengers ships
   > UPS located near the theater or broadcast room or casino
   > Single and three-phase 10-80 kVA UPS

MGE Galaxy 7000 GFC
500 kVA
   > Parallel capability until 12
   > Frequency conversion 50 to 60 Hz
   > High efficiency

AccuSine active harmonic conditioning
20-120 A capacity
   > Mitigation of harmonics for more reliable operation of applications
   > Small design for easy integration into new or existing installations
   > Power factor correction for energy savings
World Wide Marine Services performed by passionate people

Promoted by an international sales organization & operated by Schneider Electric Service Centres, able to provide 24/7 emergency line and on board support at major Sea Ports, for the satisfaction of our customers.

European and Asian competency Centers to provide:
> consulting for customer system performance optimization
> expertise in energy management
> new solution development
> project quotation and execution
> commissioning
> training.
Schneider Electric global marine service support program:

> provides a 24/7 on line support
> offers to dedicated customers on board capabilities and spares at key Sea Ports
> improves fleets operation efficiency on all shipping routes
> reduces drastically Customer’s number of services providers.

Operation

> capabilities adapted to your needs
> "on line" or “on site” support
> extended warranty, maintenance contracts
> all necessary spare parts to fit your equipment.

Retrofit

> adaptation and upgrading solution.
More than “90 years” at the service of the merchant marine industry
Schneider Electric offers more than 2,700 references in the field of automation and control, electrical distribution in the merchant marine sector.

Some references from the shipping companies we service
To learn more
Visit www.schneider-electric.com/marine