One-stop Solution

Marine Switchboards and Control Systems
THE LEADER IN SWITCHGEAR & SYSTEM SOLUTIONS

L&T is India’s largest switchgear manufacturer, offering wide product ranges for virtually every application. Leveraging its technological resources, L&T is committed to offer indigenously engineered system solutions to customers.

Typically, L&T engineers conduct a detailed study of the customer’s system, and provide a professional analysis of the application along with recommended cost-benefit solutions. The spectrum:
- Innovative and Totally Re-engineered solutions
- Retrofit solutions
- System up-gradation

L&T’s switchgear spectrum stretches from Push Buttons to Air Circuit Breakers. L&T’s leadership goes far beyond the range to include a number of factors like:
- Volume – L&T manufactures over 36,000 ACBs and 32,000 switchboard panels every year.
- Sophistication of indigenous manufacturing facilities.
- Investment in R&D – facilities include 85kA test station that is NABL accredited and certified by KEMA. A camera taking 33,000 frames per second to study dynamic behavior.
- Concurrent engineering with a sophisticated set-up uses Pro/E Inventor to convert design conceptualization to manufacturing drawings. Every design is vetted using ANSYS software for its shock and vibration withstand capability.
- Quality assurance – Facilities have secured ISO 9001-2008 certification and are NABL accredited.

L&T had entered into a long term partnership with M/s Servowatch, UK for execution of IPMS projects. M/s Servowatch has a rich experience of over 35 years in IPMS and equivalent projects. They have proven track records in many navies including U.K., Australia, New Zealand, Thailand, U.S.A., Portugal etc. Together, L&T and Servowatch have ushered in cutting-edge technology in the Indian Navy with Servowatch providing the state-of-the-art technology and L&T spearheading Indigenisation and Life Cycle Support in line with the country’s drive in attaining Self Reliance in Critical Defense Projects. Subsequently, L&T has acquired Servowatch & is a subsidiary company of L&T.

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PRODUCT RANGE

Air Circuit Breakers (ACB)
A product list indicative of L&T’s comprehensive range of products and systems certified for naval application (JSS55555).
- 630-9000A range
- Three & four pole version
- Fixed and draw-out version
- Manual or electrically operated version
- Breaking capacity up to 100kA
- Supported with range of protection releases
- Replaceable arcing contacts, safety shutters for extended life & safety
- Complying with IEC 60947-2, EN 60947 -2
- AC & DC application

Protection Relays
- Generator protection
- Auto-synchronization
- Load sharing / shedding
- Motor protection Relays (IPMS Compatible)

Changeover Systems
- Manual
- Automatic with fast changeover switches (<15 msec Changeover time)

L&T Switchgear is Certified by:
- Director General of Quality Assurance (DGQA)
- Indian Navy
- American Bureau of Shipping (ABS)
- Indian Register of Shipping (IRS)
- Det Norske Veritas (DNV)
- Lloyd’s Register of Shipping (LRS)
- Bureau Veritas (BV)

Moulded Case Circuit Breakers (MCCB)
- Germanischer Lloyds (GL)
- RINA
- Nippon Kaiji Kyokai (NK)

Machinery Control Systems (Motors & Starters)
- Composite offering of Starters along with Naval Duty Motors
- Direct-On-Line Starter
- Star-Delta Starter
- Soft Starter (AC & DC application)
- Designed as per EED-Q-071 & IEC 60947
- Microprocessor based Motor Protection Unit
- IPMS-compliant
- Relay based/PLC based controls available

Custom-built Switchboards
Switchboards are designed and manufactured up to 690V, 6000A, 100kA
- Rated up to 6000A
- 690V / 440V / 380V / 230V Voltage Levels
- Fault withstand capacity up to 100kA
- Compatible with intelligent systems
- Designed to offer highest operational safety and reliability
- Customized dimensions and arrangement to suit customers requirements
- Integrated with APMS
- Ready for IPMS integration
- Available in Aluminum, Stainless steel, & Mild steel enclosures

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Energy Distribution Center

Type approved Marinised Switchgear
MV Switchboards
- Type approved MV Panel up to 36 kV system voltage
- Complete range from 630A to 4000A
- Short time rating up to 40 kA for 3 sec
- Metal clad, fully compartmentalized panel
- Internal arc compliant as per IEC 62271-200
- In-built comprehensive safety interlocks
- Integrated with hybrid as well as electric propulsion system

Automated Power Management System (APMS)
- Automatic Generator synchronizing & load sharing
- Load Shedding
- Islanding
- Generator Protection
- Event Logging
- Fault/Alarm History
- Trending
- Blackout Recovery

Integrated Bridge System (IBS)
- Centralized Control of Navigation Equipment: Radar, ECDIS
- Integrated GMDSS and Communication Equipment
- Redundancy of workstation
- Expandability

Int egrated Platform Machinery Control System (IPMCS)
Control and Monitoring of:
- Main Propulsion Machinery and associated systems
- Auxiliary Propulsion Machinery and associated systems
- Auxiliary machinery and systems
- Power Management System
- Battle Damage Control System
- Bilge & tank levels
- Fire Alarm and Flood Level Indications
- Vibration Monitoring

Features
- Integrated Onboard Training Simulator
- Online Health Monitoring
- Performance Prediction
- Dynamic Analysis & Engine Performance
- Mimics providing sensor information and control function for machinery and other equipment.
- Common Dual Redundant Gigabit Network for all functions viz. IPMS, IBS and APMS.
- Standard RTU configuration for all function viz. IPMS, IBS and APMS

Alarm Monitoring System (AMS)
The Alarm system provides the following facilities:
- User Configurable Alarm Parameters
- Alarm Status (Active / Reset, Acknowledged)
- Alarm Message (Text description, time & date)
- Online alarm printing
- Database for Alarm list & Event List
- Engineers Call system
- Alarm Acknowledgment by individual alarm or alarm page
- Online event printing
- Comprehensive Alarm
- Event browsing facilities
- Alarm Blocking
- Tagging for selected signals

The status of following parameters will be monitored by alarm & monitoring system:
- Temperature sensors (PT 100, thermocouple)
- Pressure transmitters (4 – 20 mA)
- Pressure switches
- Speed sensors
- Temperature switches
- Level switches (float type)
- Level transmitters

The Alarm Monitoring System architecture is laid out in 3 levels of architecture:
- Data acquisition level
- Network level
- HMI
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Integrated Platform Machinery Control System (IPMCS)
- Dual Redundant Network
- Navigation and communication equipment for centralized monitoring and control
- Interface with IPMS, Machinery Data

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Vessel Management System (VMS)

The Vessel Management System (VMS) has a provision for continuous monitoring and time-based records of various parameters like Temperature, Pressure, etc. for ship systems like Main Engine and Diesel Generators, Bilge System, Advanced Fire Detection Systems (AFDS), Power Amplifier, Thruster System, and so on. The System has DACU (Data Acquisition Control Unit), rugged PC workstation (for monitoring and controlling), and communication network. The system monitors various parameters like Temperature, Pressure, Speed, etc. and generates Audio Visual alarms in case of their abnormality. It also helps to take appropriate action for safe navigation of the ship. VMS also controls various motors and pumps.

Key Advantages:
- Modular System Approach
- Fully Type Approved Equipment
- Tested, Certified System dispatch
- Redundant Array of Independent Disk (RAID) in the Machinery Control Room offering comprehensive monitoring and control of the ships services.
- Expansion flexibility, allowing continual network upgrade and development.
- Life Cycle Support.

Alarm annunciation and displays will be in the following formats:
- LED Annunciator display at each DACU
- 2 line LCD Operator Interface Unit at each DACU
- Tracker ball controlled PC monitors
- Engineers Alarm System
- Dead Man Alarm System

Degaussing

The magnetic signature control system

Sea mines and torpedoes detect a vessel’s magnetic signature and attack the particular type of vessel based on its specific magnetic signature. To save a vessel from these attacks, a counter-magnetic field has to be generated onboard vessel. This system generates required counter-magnetic field in three axes to suit the vessel’s magnetic signature.

L&T has successfully indigenized the degaussing system to suit naval vessels operating at various locations throughout the globe. The indigenized solution reduces the cost of the system substantially and also reduces MTTR for such an important system. Our Degaussing system can be custom built for:
- Frigates
- Air Defence Ships
- Corvette

Key Advantages:
- Dual Redundancy For Key Functions
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Our offerings:
- Degaussing coil design and layout
- Completely indigenized, fully tested and certified
- Command and Control Unit
- Power amplifier
- Degaussing Coils
- Degaussing software - custom built as per the specific magnetic signature of the vessel

Salient features:
- A promised Degaussing ON/OFF Ratio 1:10 for all the solutions over time
- Completely distributed architecture resulting in easy configuration of the system
- Low cost effective
- High reliability
- Geo Mag maps based control
- Provision of Magnetometer Sensing Modes
- Communication through Ethernet or RS 485
- Configurable regarding expected Degaussing Ratio
- Warnings and alarms management

LAND DEPERMING RANGE

A Land Magnetic Deperming Range is a facility for magnetic treatment of machine parts to minimize their magnetic signature caused by magnetic stray fields. This requires both, generating high magnetic fields and precise measurement of small fields in arbitrary magnetic environments.

The objectives of the land range are:
- Reduction of the magnetic signature of components
- Measurement and analysis of magnetic stray fields of military covering the range from DC to over 3 kHz
- Formulation and analysis of new magnetic treatment and compensation methods
- Analysis of magnetic stability
- Fundamental research for generating small magnetic signatures

A complete Deperming Range comprises:
- Magnetic Multi Channel Measurement System
- Master Control Unit
- Software
- Magnetic Field Simulator
- Nonmagnetic Building
- Nonmagnetic Trolley System
- Nonmagnetic Rail Guiding System
- Crane System

DEPERMING RANGE

A Deperming Facility removes the permanent signatures or generation of well defined permanent signatures of naval vessels after ascertaining the magnetic signature levels. The facility can also be used to calibrate onboard Degaussing systems to ensure minimal signatures.

- Minerships
- Destroyers
- Offshore Patrol Vessels
- Submarines
- Retrofitment projects

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Turnkey solutions

- Finalization of DG set capacity and load distribution after approval of load analysis and single line drawing by classification society / owners
- Design & Supply of Class / Navy approved Main Switchboards, Group Starter Panels, Distribution boards, Transformers, TRUs, DCDBs, NLCP etc.
- Design of shipboard electrical
  - Short Circuit Calculation
  - Protection Co-ordination
  - ANSYS Analysis
  - Cable tray layouts and cable schedules
  - Equipment Location layouts, Lighting calculations and lighting layouts
- Compartment layouts for Galley, Chart Room, Bridge, MCR, Gyro cum ECP room, WT Office, Antennae Layout as per IMO guidelines
- Finalization of navigation & communication equipment in accordance with SOLAS requirements
- COLREG-compliant LSS plan
- FMELA analysis for switchboards / control system

- Wiring drawings for the Integrated Platform Management System / Alarm Monitoring System
- As fitted drawings for all electrical sub-systems
- Design of wiring drawings for yard-supplied equipment
- Main Engines, Main DG sets, Emergency DG Set, STP, AC Plant, Pumps & other machineries
- External Communication Equipment – VHF/UHF sets, VLF sets, HF sets, etc.
- Manufacturing, Installation and Trials of Electrical & Automation Systems
- Design, Supply & Installation of Integrated Propulsion and Machinery Control System (IPMCS) and Auto Power Management System (APMS) / Alarm Monitoring System
- Remote Terminal Units (RTUs) with VME / PLC technology
- Drop-in plate for engine control with VME / PLC based control
- MCR Console, Bridge Console and APMS standalone consoles

- Engine Order Telegraphs, UPS, Flood Alarm System, Fire Detection System, Tank Gauging System, Soft control for Main Engines and other auxiliary machineries i.e. bilge pumps, ventilation fans, salvage pumps, RM 200
- Equipment Health Monitoring System & Dynamic Analysis
- Naval Ships - Battle Damage Control System, Degaussing System
- Design, Supply & Installation of Integrated Bridge System
- Bridge Management System including RADAR, Conning and ECDIS operation
- Communication and Navigation Equipment i.e. RADAR, Gyro Compass, Magnetic Compass, AIS, Navtex, Weather Chart Facsimile, INMARSAT C, INMARSAT M, etc.
- Intercom System, Auto Telephone System, Talk Back System
- Supply & Installation of electrical equipment including COTS items

- Galley & Laundry Equipment
- Office & SRE Equipment
- WT & Decorative Light fittings, switch-sockets.
- Supply & Installation of Electrical Equipment including hot-work
- Cable Trays, Cable Hangers, Multi Cable Transits (MCTs)
- Equipment Foundation for Switchboards, Electrical equipment, Antennae, Lighting fixtures, IPMS equipment, etc.
- External Communication Equipment
- Hydrographic Equipment
- Additional Services
  - Installation of Hydrographic / External Communication Equipment
  - Completion of Alignment Survey for installation of Hydrographic equipment
  - Setting of voltage and frequency droops for DG sets & Manual Paralleling of DG sets
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- Preparation and Submission of Load Analysis
- Antennae and Mast Layouts
- 3D Modelling of Console
- Onboard Installation of electrical components including cabling and lighting

- 3D Layout for Cable Tray Arrangement
- Compartment Layouts
- 3D Modelling of Switchboard
- 3D Modelling of Console

- ANSYS (Shock & Vibration) Analysis
- 3D Modelling of Console
- Preparatory and Submission of Load Analysis
- Antennae and Mast Layouts
- 3D Modelling of Switchboard
## Major Orders
**Naval Switchboards & Control Systems**

<table>
<thead>
<tr>
<th>Customer</th>
<th>Type of Vessel/Owner</th>
<th>Scope of supply in brief</th>
<th>Yard/ Hull No.</th>
<th>No. of Vessels</th>
<th>Year of Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goa Shipyard Ltd.</td>
<td>Naval Offshore Patrol Vessel for Indian Navy</td>
<td>o Main switchboards with Automated Power Management System o Emergency Switchboard o Energy Distribution Centers o 440V Power Panels o Integrated Platform Management System</td>
<td>1194 1195 1196 1211</td>
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<td>2008 - 2010</td>
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<tr>
<td></td>
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<td>o Emergency Switchboard</td>
<td>1203 1204 1205</td>
<td>3</td>
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<td>Garden Reach Shipbuilders &amp; Engineers Ltd.</td>
<td>ASW Corvettes for Indian Navy</td>
<td>o Degaussing System o Converted Supply Switchboard</td>
<td>3017 3020</td>
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<tr>
<td></td>
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<td>o Main Switchboard</td>
<td>2057 2066</td>
<td>10</td>
<td>2008</td>
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<td>o Main Switchboard</td>
<td>2072 2079</td>
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<td>2010</td>
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<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>3021</td>
<td>1</td>
<td>2012 &amp; 2013</td>
</tr>
<tr>
<td>Alcock Ashdown (Gujarat) Limited</td>
<td>Naval Survey Vessel for Indian Navy</td>
<td>Complete Electrification including supply of all electricals like : o Main Switchboard o Emergency Switchboard o Group Starter Panels o Galley &amp; pantry Equipment o Cables &amp; accessories o Integrated Platform Management System o Auto Power Management System o Integrated Bridge System</td>
<td>257-262</td>
<td>6</td>
<td>Delivered for first two ships in 2009</td>
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<tr>
<td>Mazagon Dock Limited</td>
<td>Destroyers for Indian Navy</td>
<td>o Main Switchboards with Automated Power Management System o Feeder Sections o Energy Distribution Centers o Local Control Panel o Shore connection box o Converted Supply Switchboard o Helo-Starting rectifier o Bridge Console o Power panels o Starter &amp; Control panels</td>
<td>12701 12702 12703</td>
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<tr>
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<td>o Main Switchboards with Automated Power Management System</td>
<td>-</td>
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<td></td>
<td>o Local Control Panel</td>
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<td>o Main Switchboards</td>
<td>766 767</td>
<td>2</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>3020-3024</td>
<td>4</td>
<td>2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>2011-2013</td>
<td>6</td>
<td>2011 to 2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>35001 to 350036</td>
<td>54</td>
<td>Delivered for first twenty six ships since 2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>36001 to 36018</td>
<td>54</td>
<td>Delivered for first twenty six ships since 2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>145 to 150</td>
<td>6</td>
<td>2011 to 2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>11184</td>
<td>1</td>
<td>Supply still to commence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Main Switchboard</td>
<td>-</td>
<td>4</td>
<td>2014</td>
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## Major Orders
### Naval Switchboards & Control Systems

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Offshore Patrol Vessel for Indian Coast Guard</td>
<td>o Emergency Switchboard</td>
<td>1203, 1204, 1205</td>
<td>3</td>
<td>2009</td>
</tr>
<tr>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd.</td>
<td>ASW Corvettes for Indian Navy</td>
<td>o Degaussing System, o Converted Supply Switchboard</td>
<td>3017, 3020</td>
<td>4</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Water Jet fast Attack Craft</td>
<td>o Main Switchboard</td>
<td>2057, 2066</td>
<td>10</td>
<td>2008</td>
</tr>
<tr>
<td>Indian Coast Guard Inshore Patrol Vessel</td>
<td>o Main Switchboard</td>
<td></td>
<td>2072, 2079</td>
<td>8</td>
<td>2010</td>
</tr>
<tr>
<td>Mauritius</td>
<td>Offshore Patrol Vessel</td>
<td>o Main Switchboard, o Emergency Switchboard, o Addressable Fire Detection System</td>
<td>3021</td>
<td>1</td>
<td>2012 &amp; 2013</td>
</tr>
<tr>
<td>Alcock Ashdown (Gujarat) Limited</td>
<td>Naval Survey Vessel for Indian Navy</td>
<td>Complete Electrification including supply of all electricals like : o Main switchboard, o Emergency Switchboard, o Group Starter Panels, o Galley &amp; pantry Equipment, o Cables &amp; accessories, o Integrated Platform Management System, o Auto Power Management System, o Integrated Bridge System</td>
<td>257-262</td>
<td>6</td>
<td>Delivered for first two ships in 2009</td>
</tr>
<tr>
<td>Mazagon Dock Limited</td>
<td>Destroyers for Indian Navy</td>
<td>o Main Switchboards with Automated Power Management System, o Feeder Sections, o Energy Distribution Centers, o Local Control Panel, o Shore connection box, o Converted Supply Switchboard, o Helo-Starting rectifier, o Bridge Console, o Power panels, o Starter &amp; Control panels</td>
<td>12701, 12702, 12703</td>
<td>3</td>
<td>2006 - 2008</td>
</tr>
<tr>
<td>Indian Navy</td>
<td>Underwater Platforms</td>
<td>o Switchboards, o Power Equipment</td>
<td></td>
<td>-</td>
<td>2011 - 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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## Major orders
### Naval Switchboards & Control Systems

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<th>Year of Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian Navy</td>
<td>RE Class of ship of Indian Navy</td>
<td>o Main Switchboards, o Local Control Panel</td>
<td></td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Indian Navy</td>
<td>Minesweepers of Indian Navy</td>
<td>o Main Switchboards</td>
<td></td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Shalimar Works</td>
<td>500T Fuel Barge for Indian Navy</td>
<td>o Main Switchboard</td>
<td>766, 767</td>
<td>2</td>
<td>2009</td>
</tr>
<tr>
<td>Cochin Shipyard Limited</td>
<td>Indian Air Craft Carrier (P71) for Indian Navy</td>
<td>o Main Switchboard, o Feeder section, o Energy Distribution Centers, o Power Distribution Boards</td>
<td></td>
<td>S-071</td>
<td>1</td>
</tr>
<tr>
<td>Hindustan Shipyard Limited</td>
<td>50T Ballard Pull Tug for Indian Coast Guard</td>
<td>o Alarm Monitoring System</td>
<td>11160 to 11164</td>
<td>5</td>
<td>2011 to 2013</td>
</tr>
<tr>
<td>Bharti Shipyard</td>
<td>200T Water Barge for Indian Navy</td>
<td>o Main Switchboard, o Distribution Boards, o Group Starter panels, o Battery chargers, o Starters</td>
<td>431 to 433</td>
<td>3</td>
<td>2013</td>
</tr>
<tr>
<td>L&amp;T Shipbuilding</td>
<td>Interceptor Boats for Indian Coast Guard</td>
<td>o Main Switchboard, o Distribution Boards, o Group Starter panels, o Battery chargers, o Addressable Fire Detection System, o Flood detection system, o Consoles, o General Alarm System, o Tank Gauging system</td>
<td>35001 to 350036 &amp; 36001 to 36018</td>
<td>54</td>
<td>Delivered for first twenty six ships since 2011 to 2014</td>
</tr>
<tr>
<td>Temba</td>
<td>10T Tug for Indian Navy</td>
<td>o Main Switchboard, o Distribution Boards, o Group Starter panels, o Battery chargers, o Galley equipments, o Consoles, o Communication equipment</td>
<td>145 to 150</td>
<td>6</td>
<td>2011 to 2013</td>
</tr>
<tr>
<td>Hindustan Shipyard Limited</td>
<td>Fleet Support Vessel</td>
<td>o Main Switchboard, o Distribution Boards, o Group Starter panels, o Battery chargers, o Integrated Platform Management System</td>
<td>11184</td>
<td>1</td>
<td>Supply still to commence</td>
</tr>
<tr>
<td>Indian Navy</td>
<td>SNF Class</td>
<td>o Addressable Fire Detection System, o Helo Starting Rectifier</td>
<td></td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>
### Major Orders
#### Naval Switchboards & Control Systems

<table>
<thead>
<tr>
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<th>Year of Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temba</td>
<td>25T Tug for Indian Navy</td>
<td>o Main Switchboard o Distribution Boards o Group Starter panels o Battery chargers o Consoles o Galley equipment o Communication equipment</td>
<td>151 to 154</td>
<td>4</td>
<td>2012 to 2013</td>
</tr>
<tr>
<td>Modest Infrastructure for Indian Navy</td>
<td>500T Fuel Barge</td>
<td>o Main Switchboard o Group Starter Panels o Distribution Boards &amp; Starters o Cables &amp; accessories o SRE system, Engineers call system, AFDS o Luminaries o Alarm monitoring system</td>
<td>316 to 322</td>
<td>7</td>
<td>2011 - 2013</td>
</tr>
<tr>
<td>Indian Navy</td>
<td>P25</td>
<td>o Main Switchboard o Power Management System o Distribution Boards o Changeover Switches o Transformers</td>
<td>-</td>
<td>4</td>
<td>2013</td>
</tr>
<tr>
<td>Mazgaon Dock Limited for Indian Navy</td>
<td>Destroyers (P15B)</td>
<td>o Degaussing System o Main Switchboard o Energy Distribution Centers o DA Local Control Panel o Automated Power Management System o Integrated Platform Management System</td>
<td>12704 to 12707</td>
<td>4</td>
<td>Supply still to commence</td>
</tr>
<tr>
<td>ABG Shipyard</td>
<td>Cadet Training Ship for Indian Navy</td>
<td>Turnkey Electrical Package including: o Main &amp; Emergency Switchboard o Group Starter Panels o Distribution Boards o Holo Starting rectifiers o Integrated Platform Management System o Integrated Bridge System</td>
<td>397, 398 &amp; 423</td>
<td>3</td>
<td>Supply still to commence</td>
</tr>
<tr>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd.</td>
<td>Landing Craft Utility for Indian Navy</td>
<td>o Integrated Platform Management System o Integrated Bridge System</td>
<td>2092 to 2099</td>
<td>8</td>
<td>First shipment delivered in Aug 2014</td>
</tr>
</tbody>
</table>

#### Major Orders
#### Commercial Switchboards & Control Systems

<table>
<thead>
<tr>
<th>Customer</th>
<th>Type of Vessel/Owner</th>
<th>Scope of supply in brief</th>
<th>Yard/ Hull No.</th>
<th>No. of Vessels</th>
<th>Year of Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Converteam UK Ltd./ZERA Marine, Singapore</td>
<td>Flexible Pipelay Vessel Levak Crusader (134m)</td>
<td>o 690V Main Switchboard o 440V Main Switchboards o 220V Main Switchboards o 440V &amp; 220CV Emergency Switchboards o 440V, 220V AC &amp; 24V DC DBs o Distribution Transformers o Starters (DOL &amp; Soft)</td>
<td>602</td>
<td>1</td>
<td>2009</td>
</tr>
<tr>
<td>ABG Shipyard/Tanker Pacific, Singapore</td>
<td>80T Anchor Handling Tug</td>
<td>o Main Switchboard o Emergency Switchboard o Group Starter Panels o Distribution Boards (AC &amp; DC) o Navigation Lighting Panel o Distribution Transformers o Alarm Monitoring System o Main Switchboard o Emergency Switchboard o Group Starter Panels o Distribution Boards (AC &amp; DC) o Navigation Lighting Panel o Shore Supply Box</td>
<td>327 - 328</td>
<td>2</td>
<td>2009</td>
</tr>
<tr>
<td>L&amp;T Shipyard/Rolldock, Netherlands</td>
<td>RoRo LoLo Ships</td>
<td>Multimode &amp; ROV Support Vessel</td>
<td>81001</td>
<td>3</td>
<td>2009</td>
</tr>
<tr>
<td>Greatship Global Offshore Services Pte Ltd., Singapore</td>
<td>Multi-Purpose Survey Vessels</td>
<td>o 690V Main Switchboard o 1050kW Soft starters</td>
<td>314 - 344</td>
<td>4</td>
<td>2009</td>
</tr>
<tr>
<td>L&amp;T Shipyard/ Big Lift, Netherlands</td>
<td>Big Lift Cargo Vessel</td>
<td>o Main Switchboard o Emergency Switchboard o Group Starter Panels o Distribution Boards (AC &amp; DC) o Navigation Lighting Panel o Distribution Transformers o TRUs o Alarm Monitoring System</td>
<td>81007</td>
<td>1</td>
<td>2011</td>
</tr>
<tr>
<td>ABG Shipyard/ Vardha Marine, Norway</td>
<td>130T BP Anchor Handling Tug</td>
<td>o 1050kW Soft starters</td>
<td>343, 344 &amp; 354</td>
<td>4</td>
<td>Delivered for two ships in 2011</td>
</tr>
<tr>
<td>ABG Shipyard/ Marsani, Italy</td>
<td>130T BP Anchor Handling Tug</td>
<td>o Main Switchboard o Distribution Boards o Starters o Electricals</td>
<td>355</td>
<td>1</td>
<td>2012</td>
</tr>
<tr>
<td>Purus Lloyd</td>
<td>Mahesh 1 Barge</td>
<td>o Main Switchboard o Main Switchboard o Distribution Boards o Starters</td>
<td>-</td>
<td>1</td>
<td>2012</td>
</tr>
<tr>
<td>Hindustan Shipyard Limited / Kandla Port Trust</td>
<td>50T BP Tug</td>
<td>o Supply still to commence</td>
<td>11173 &amp; 11174</td>
<td>2</td>
<td>2012</td>
</tr>
</tbody>
</table>
### Major Orders
**Naval Switchboards & Control Systems**

<table>
<thead>
<tr>
<th>Customer</th>
<th>Type of Vessel/Owner</th>
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<th>Yard/ Hull No.</th>
<th>No. of Vessels</th>
<th>Year of Supply</th>
</tr>
</thead>
</table>
| Temba    | 25T Tug for Indian Navy | o Main Switchboard  
o Distribution Boards  
o Group Starter Panels  
o Battery chargers  
o Consolas  
o Galley equipment  
o Communication equipment | 151 to 154 | 4 | 2012 to 2013 |
| Modest Infrastructure for Indian Navy | S007T Fuel Barge | o Main Switchboard  
o Group Starter Panels  
o Distribution Boards & Starters  
o Cables & accessories  
o SRE system, Engineers call system, AFDS  
o Luminaries  
o Alarm monitoring system | 316 to 322 | 7 | 2011 - 2013 |
| Indian Navy | P25 | o Main Switchboard  
o Power Management System  
o Distribution Boards  
o Changeover Switches  
o Transformers | - | 4 | 2013 |
| Mazgaon Dock Limited for Indian Navy | Destroyers (P158) | o Degaussing System  
o Main Switchboard  
o Energy Distribution Centers  
o DA Local Control Panel  
o Automated Power Management System  
o Integrated Platform Management System  | 12704 to 12707 | 4 | Supply still to commence |
| ABG Shipyard | Cadet Training Ship for Indian Navy | Turnkey Electrical Package including:  
o Main & Emergency Switchboard  
o Group Starter Panels  
o Distribution Boards  
o Holo Starting rectifiers  
o Integrated Platform Management System  
o Integrated Bridge System | 397, 398 & 423 | 3 | Supply still to commence |
| Garden Reach Shipbuilders & Engineers Ltd. for Indian Navy | Landing Craft Utility | o Integrated Platform Management System  
o Integrated Bridge System | 2092 to 2099 | 8 | First shipped delivered in Aug 2014 |
| Pipavai Defence Offshore and Engineering Co. Ltd. for Indian Navy | Naval Offshore Patrol Vessels | o Main & Emergency Switchboard  
o Energy Distribution Centers  
o Navigation Light Control Panel  
o Starters | 001 to 005 | 5 | Supply still to commence |

### Major Orders
**Commercial Switchboards & Control Systems**

<table>
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<tr>
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<th>Scope of supply in brief</th>
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<th>No. of Vessels</th>
<th>Year of Supply</th>
</tr>
</thead>
</table>
| Converteam UK Ltd./E4RA Marine, Singapore | Flexible Pipelay Vessel Levak Crusader (134m) | o 690V Main Switchboard  
o 440V Main Switchboard  
o 220V Main Switchboards  
o 440V & 220CV Emergency Switchboards  
o 440V, 220V AC & 24V DC DBs  
o Distribution Transformers  
o Starters (DOL & Soft) | 602 | 1 | 2009 |
| ABB Shipyard/Tanker Pacific, Singapore | 80T Anchor Handling Tug | o Main Switchboard  
o Emergency Switchboard  
o Group Starter Panels  
o Distribution Boards (AC & DC)  
o Navigation Lighting Panel  
o Distribution Transformers  
o Alarm Monitoring System  
o Main Switchboard  
o Emergency Switchboard  
o Group Starter Panels  
o Distribution Boards (AC & DC)  
o Navigation Lighting Panel  | 327 | 2 | 2009 |
| L&T Shipyard/RollDock, Netherlands | RoRo LoLo Ships | o Main Switchboard  
o Emergency Switchboard  
o Power Management System  
o Integrated Platform Management System  
o Integrated Bridge System | 81001 | 3 | 2009 |
| Greatship Global Offshore Services Pte Ltd., Singapore | Multirole & ROV Support Vessel | o 690V Main Switchboard  
o 1050kW Soft starters | 314 - 344 | 4 | 2009 |
| L&T Shipyard/ Big Lift, Netherlands | Big Lift Cargo Vessel | o Main Switchboard  
o Emergency Switchboard  
o Group Starter Panels  
o Distribution Boards (AC & DC)  
o Navigation Lighting Panel  
o Distribution Transformers  
o TRUs  
o Alarm Monitoring System  | 81007 | 1 | 2011 |
| ABG Shipyard/ Vardha Marine, Norway | 130T BP Anchor Handling Tug | o Alarm Monitoring System | 343, 344 & 354, 355 | 4 | Delivered for two ships in 2011 |
| ABG Shipyard/ Marnavi, Italy | 130T BP Anchor Handling Tug | o Switchboards/Electricals | 355 | 1 | 2012 |
| Punj Lloyd | Mahesh 1 Barge | o Main Switchboard  
o Distribution Boards  
o Starters | - | 1 | 2012 |
| Hindustan Shipyard Limited / Kandla Port Trust | 50T BP Tug | o Main Switchboard  
o Distribution Boards  
o Starters | 11173 & 11174 | 2 | Supply still to commence |
One-stop Solution

Marine Switchboards and Control Systems