Tunnel thrusters

Users can select from eleven diameters and four different models, in each size designed to suit a specific application.

- **AUX**: Standard type for auxiliary use only
- **ICE**: High ice-class with stainless steel propeller blades
- **DPN**: Continuous DP service - shallower draught vessels
- **DPD**: Continuous DP service - deeper draught vessels

Units comprise standard tunnel, propeller unit, hydraulic system and remote control

**Technical data**

<table>
<thead>
<tr>
<th>D (Dia)</th>
<th>A (Length)</th>
<th>B (Shaft length)</th>
<th>Weight (kg)*</th>
<th>Main dimensions (mm)</th>
<th>Motor input (rpm)</th>
<th>Propeller (rpm)</th>
<th>Tip speed (m/s)</th>
<th>Maximum Power (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D</strong></td>
<td><strong>AUX</strong></td>
<td><strong>ICE/DPN/DPD</strong></td>
<td></td>
<td><strong>Motor input (rpm)</strong></td>
<td><strong>Propeller (rpm)</strong></td>
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<td>24 - 36</td>
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<td>149 - 212</td>
<td>27 - 37</td>
<td>3100 - 3700</td>
<td>2790 - 3300</td>
</tr>
</tbody>
</table>

* Fixed pitch propeller
** includes std tunnel, propeller unit, hydraulic system and remote control

**Key features:**
- Available with FP or CP propellers
- Skewed blades for efficiency/low noise
- Heavy duty propeller for DP units
- Shaft seal pressure control with drain connection in DP thrusters
- Mechanical locked bearings in DP thrusters
Super Silent type

The Super Silent (SS) tunnel thruster has a modified hydraulic power pack for low noise. It has double walls through the full tunnel length and a flexibly mounted inner tunnel.

**Key features:**
- Reduced tip speed
- Noise reduction of up to 10 dB compared to standard design
- Reduction of up to 25 dB can be reached in combination with floating floors and other measures by shipbuilder

![Super Silent type](image)

**Technical data**

<table>
<thead>
<tr>
<th>Thruster type</th>
<th>Dia. (mm)</th>
<th>Motor (rpm)</th>
<th>Propeller output (rpm)</th>
<th>Max power (kW)</th>
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</thead>
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<tr>
<td>TT1850 SS</td>
<td>1850</td>
<td>1180</td>
<td>290</td>
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<td>228</td>
<td>1350</td>
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</tbody>
</table>

All data subject to change without prior notice

Permanent magnet

The Permanent magnet tunnel thruster (TT-PM) is the latest tunnel thruster design from Rolls-Royce and has been engineered with reliability and through life costs as the focus. Using permanent magnet motor technology increases efficiency and makes the installation more compact, only the variable frequency drive unit is housed in the thruster room, freeing up space on board. It also simplifies maintenance as the patented mount means units can be removed and replaced without drydocking. PM thrusters are currently available in two sizes with powers of 1,000 and 1,600 kW. These thrusters have been developed for the most demanding applications such as DP.

**Key features:**
- Efficient and space saving PM technology
- Fast response times to full power
- Rugged design with high reliability
- Equal thrust in both directions
- Patented resilient mounting system reduces noise and vibration, simplifies tunnel fabrication and removal/installation
- Oil filled stator for superior cooling and protection
- Robust centre shaft carries all propeller loads

![Permanent magnet](image)

**Technical data**

<table>
<thead>
<tr>
<th>Thruster type</th>
<th>Dimensions (mm)</th>
<th>Weight (kg)</th>
<th>Performance</th>
<th>Hull mount</th>
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<tbody>
<tr>
<td></td>
<td>Prop. Dia.</td>
<td>Tunnel Dia</td>
<td>Thruster Dia</td>
<td>Connection &amp; mounts</td>
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<tr>
<td>TT PM 1600</td>
<td>1600</td>
<td>2180</td>
<td>7250</td>
<td>1957</td>
</tr>
<tr>
<td>TT PM 2000</td>
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<td>2600</td>
<td>12217</td>
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All data subject to change without prior notice
Promas offers increased propulsive efficiency and improved manoeuvrability by adapting the propeller and rudder into one propulsive unit. It is suitable for conventional single and twin screw ships.

Each installation comprises a twisted full spade rudder with a Costa bulb that is smoothly connected to the propeller by a hubcap, and a propeller design adapted to the rudder.

A well designed twist adapts the rudder to the rotation of the propeller slipstream and reduces the angle of attack on the rudder’s leading edge. This gives a more efficient rudder profile with lower drag and better recovery of rotational energy from the propeller slipstream.
Promas integrates the propeller, a hubcap, rudder bulb and the rudder itself into a single hydrodynamic efficient unit.

A tapered hubcap fitted to the propeller hub leads the waterflow onto a bulb which forms part of the spade rudder. The rudder has a twisted leading edge, optimized for the flow from the propeller, which converts into additional forward thrust some of the swirl energy in the slipstreams that is normally lost.

The result is an increase in propulsive efficiency of up to 8 per cent depending on the application, leading to reduced fuel consumption and emissions. Large steering forces can also be developed.

Promas has been developed using the latest CFD technologies. As the risk of hub vortex cavitation is removed, the radial distribution of hydrodynamic loads on the propeller blades can be modified, reducing tip loading and helping to limit the intensity of blade pressure pulses (up to 25 per cent) and associated noise and vibration.

Promas + nozzle
Developed specifically for offshore vessels. A new nozzle, propeller, hubcap, bulb and rudder profile combine to maximise free-running efficiency and improve bollard pull, typically by 5 – 8 per cent. Water flow leaving the nozzle passes over the special profile rudder to provide high steering forces yet minimum drag.

Key features:
• Propeller and rudder designed as a single system for optimum efficiency
• Propulsive efficiency increased by 3 – 8 per cent
• Improved low speed manoeuvrability
• Improved possibility for low pressure pulse/low noise propeller design
• Almost as easy to install as a conventional propeller-rudder system
• Nozzle option can reduce fuel consumption in transit by 15 – 20 per cent
• Simple and robust with short payback time

Propulsive efficiency improved
In general, the Promas efficiency gain is in the region of 3 – 8 per cent for single screw, and 2 – 6 per cent for twin screw vessels. A good rudder design with optimised profile shape, positioning of the rudder in the slipstream and skeg design can increase the propulsive efficiency by an additional 2 per cent. Comparison tests between a conventional propeller-rudder system and Promas are shown in the graphs below.

Relative power delivered vs. Ship speed - Single screw vessel
The rudder area, profile shape and position are identical for the conventional and Promas cases in the graphs below. So the increase in efficiency shown is the pure effect of the bulb, hubcap, rudder twist and adapted propeller design.

Relative power delivered vs. Ship speed - Twin screw vessel
Improved manoeuvring at low speed
At low speed manoeuvring, i.e., harbour manoeuvring, a maximum side force and a maximum rudder drag is important. The graph below shows the non-dimensional lift against rudder angle for a single screw vessel.

![Rudder lift vs. Rudder angle - bollard pull (equivalent to low speed manoeuvring)](image.png)

Promas Lite
Promas Lite is a version of the successful Promas system that can be easily fitted to vessels already in service. The installation is simple with only three areas of modification:

- Welding a prefabricated bulb in position on the existing rudder
- Bolting the hubcap to the propeller hub
- Fitting of a new propeller or reblading the original one

Improving propulsive efficiency is key to reducing fuel burn and emissions. Promas Lite installations on vessels operating significantly off their original design speed should provide an efficiency improvement in the region of 5 – 15 per cent. Recent installations on twin screw cruise vessels have demonstrated efficiency improvements within these guidelines giving a payback period of well under two years. The improvement it delivers in propulsive efficiency means that engine loads are reduced, which also helps to lower wear and tear on the engine.

**Key features:**

- Reduced fuel consumption of between 5 – 15 per cent
- Lower exhaust emissions
- Short payback time
- Simple and quick installation (7 – 10 days)
Podded propulsors

Mermaid™ pods have steadily evolved over the last decade. The range offers five fame sizes from 1,850mm to 2,770mm motor stator diameter, with five powers from 5 to 27MW. Advances in design have increased the power density, which means for a given power the pod diameter can be reduced allowing a more streamlined form for the underwater unit for improved efficiency. Both induction and synchronous motors are offered. For ice-going vessels induction motors are normally specified due to their good torque characteristics at low speed. Rolls-Royce and GE Energy Conversion combine their resources and expertise on the electrical, mechanical and hydrodynamic elements of the design. The application of Mermaid pods is not restricted to passenger vessels or ice going ships. Underwater mountable units are available for rigs, and Mermaid pods are also powering naval vessels.
Podded propulsors

Mermaid™ pods offer flexibility in vessel design and machinery layout. They combine the functions of a propulsion motor, main propeller, rudder and stern thruster in a single unit. The integrated electric motor drives the shaft, saving space on board and eliminates the need for a gearbox.

The propeller is a fixed pitch high skew design for low noise and vibration. It can be supplied as a monobloc or with separately bolted blades, that can be simply changed in the event of damage. All seals are environmentally friendly, with no oil release in the event of a failure.

**Key features:**
- Powers from 5 to 27MW
- Synchronous motor with brushless excitation, or induction motor
- Excellent manoeuvring capability
- Flexible machinery arrangement with simpler machinery installation
- High efficiency with low noise and vibration
- Environmentally friendly sealing arrangement
- Remote controlled brake and locking unit
- Pulling azimuth unit for maximum propulsive efficiency.

**Technical data**

<table>
<thead>
<tr>
<th>Standard Mermaid sizes</th>
<th>Power Synchronous motor (MW)</th>
<th>Power Induction motor (MW)</th>
<th>Shaft speed (rpm)</th>
<th>Weight (t)</th>
<th>Prop. dia. (m)</th>
<th>Speed (knots)</th>
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</thead>
<tbody>
<tr>
<td>185</td>
<td>6 - 11</td>
<td>6 - 10.5</td>
<td>110 - 210</td>
<td>70 - 115</td>
<td>3.6 - 5.4</td>
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<tr>
<td>210</td>
<td>8 - 16</td>
<td>8 - 13.5</td>
<td>105 - 195</td>
<td>110 - 155</td>
<td>4.1 - 5.9</td>
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<tr>
<td>232</td>
<td>11 - 20</td>
<td>9 - 17</td>
<td>100 - 180</td>
<td>145 - 190</td>
<td>4.5 - 6.4</td>
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<td>95 - 170</td>
<td>185 - 220</td>
<td>4.9 - 6.9</td>
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<td>277</td>
<td>15 - 27</td>
<td>13.5 - 23.5</td>
<td>90 - 160</td>
<td>230 - 270</td>
<td>5.4 - 8.0</td>
<td></td>
</tr>
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</table>

All data subject to change without prior notice

**Main components**

1. *Cooling cubicle:* Mounted on the steering unit and contains the fans, coolers and air drying equipment.
2. *Steering unit:* The steering machinery is mounted in the pod seat and contains the slewing bearing, steering gear wheel and steering motors. These can be either electric or hydraulic.
3. *Pod seating:* Custom built for each hull. Is delivered fairly early to the yard and becomes an integral part of the hull.
4. *Pod unit:* Rotates 360°, +/- 35° in transit. Equipped with slip rings and fluid distribution swivel inside steering unit.
**Mermaid™ ICE and HICE**

Mermaid ice-strengthened pods are specifically designed for all vessels that operate in the toughest arctic conditions. Mermaid ICE units are designed to IACS PC4 and provide excellent hydrodynamic performance for open sea voyages for fuel savings in a mixed operating profile. HICE pods (illustrated below) for heavy duty ice applications are designed for ice classes to IACS PC1. Both types are equipped with robust heavy duty induction PWM motors with high torque at low rpm suitable for tough ice milling conditions.

**Key features:**
- Power range 5 to 18MW
- Induction PWM motor
- High torque at low shaft speed for good ice milling capability
- Stator shrink fitted to pod housing for efficient cooling
- Stainless steel fixed pitch propeller with bolted blades for simple change out

**Technical data**

<table>
<thead>
<tr>
<th>Pod size</th>
<th>Bollard pull (MW)</th>
<th>Shaft speed (rpm)</th>
<th>Weight (t)</th>
<th>Prop. dia (m)</th>
<th>Bollard pull thrust (kN)</th>
<th>Open water speed (knots)</th>
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<td>70 - 115</td>
<td>3.7 - 5.0</td>
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<td>110 - 155</td>
<td>4.5 - 5.65</td>
<td>1000 - 1500</td>
<td>14 - 19</td>
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<tr>
<td>250</td>
<td>10 - 15</td>
<td>95 - 140</td>
<td>145 - 190</td>
<td>4.9 - 6.0</td>
<td>1200 - 1650</td>
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<td>250 - 325</td>
<td>5.4 - 6.5</td>
<td>1300 - 2000</td>
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</table>

All data subject to change without prior notice.
Mermaid™ PUSH

The Mermaid pushing pods are designed for low speed, high load and high bollard pull applications. Fitted with a hydrodynamically optimised nozzle for maximum efficiency, they enable offshore operators to utilise the full benefits of space saving electrical pod propulsion.

**Key features:**
- Power range 4 to 11MW
- Induction or Synchronous motor
- Excellent performance for applications requiring high thrust and reliability
- Underwater mountable option for most hull designs
- Choice of fixed pitch monobloc or bolted propeller

**Technical data**

<table>
<thead>
<tr>
<th>Pod size</th>
<th>Bollard pull (MW)</th>
<th>Shaft speed (rpm)</th>
<th>Weight (t)</th>
<th>Prop. dia (m)</th>
<th>Bollard pull thrust (kN)</th>
<th>Speed (knots)</th>
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<tr>
<td>185</td>
<td>4 - 8</td>
<td>110 - 180</td>
<td>70 - 125</td>
<td>2.7 - 4.1</td>
<td>750 - 1150</td>
<td>Up to 16</td>
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<td>210</td>
<td>7 - 11</td>
<td>105 - 150</td>
<td>110 - 170</td>
<td>3.6 - 4.8</td>
<td>1200 - 1550</td>
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</table>

All data subject to change without prior notice
Bearings and thrust blocks

Part of the Rolls-Royce Group, Michell Bearings are the premier designer and manufacturer of whitemetal (or babbitt) and PTFE-faced hydrodynamic bearings for a wide variety of marine and industrial applications. They are installed on vessels covering more than 35 navies worldwide.

Key features:
• Bespoke designs to suit all applications – aircraft carriers to submarines
• Compact and highly reliable
• Shock resistant
• Self-contained water cooled or forced/flooded oil lubricated options available

Thrust blocks
• Freestanding main propeller shaft thrust bearings, flange mounted motor bearing assemblies and gearbox mounted internal assemblies available
• Typical thrust pressures of 400 – 550 psi
• Self-contained water cooled designs and forced oil/circulating oil cooling using an external lubrication system available
• Integral whitemetal (babbitt) lined journal bush or tilting pad journal bearing can be accommodated
• Thrust blocks can be supplied complete with shafting

Plummer bearings
• Standard or bespoke designs of propeller shaft ‘plummer’ bearings available
• Radial loads can be supported on whitemetal (babbitt) lined journal bushes or tilting journal pads for cases with high dynamic misalignment
• Self-contained natural air/water cooled designs and circulating oil cooling using an external lubrication system available

Thrust metering and resonance changing equipment
• Hydraulic thrust metering equipment can be fitted to thrust bearing to provide instantaneous reading of propeller thrust
• Can be used continuously to ensure operation at extremes of dynamic misalignment
• Vessels already in service can be retrofitted
• Resonant frequency of vibration eliminated from operating speed range using hydraulic resonance changing – a development incorporating oil accumulators and motorised pumps that permits the reduction of axial stiffness

Bearings for naval motor and generator applications
• Generally application-specific designs for electric propulsion motors, generators and auxiliary machines (pumps, fans etc.)
• Self-contained natural air/water cooled and circulating oil cooled options
• Exotic requirements can be met – angled operation without leakage, special materials, space constraints, starting under load, low noise/vibrations etc.

<table>
<thead>
<tr>
<th>Products</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cruise &amp; Merchant</strong></td>
<td></td>
</tr>
<tr>
<td>Thrust blocks</td>
<td>Cruise, ferries, mega yachts, oceanographic research vessels, VLCC, tankers and bulk carriers.</td>
</tr>
<tr>
<td>Plummer bearings</td>
<td></td>
</tr>
<tr>
<td>Propulsion motor bearings</td>
<td></td>
</tr>
<tr>
<td>Generator bearings</td>
<td></td>
</tr>
<tr>
<td><strong>Naval</strong></td>
<td></td>
</tr>
<tr>
<td>Thrust blocks</td>
<td>Submarines and Naval surface ships ranging from patrol craft to aircraft carriers.</td>
</tr>
<tr>
<td>Plummer bearings</td>
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<tr>
<td>Bulkhead sealing glands</td>
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<td>Propulsion motor bearings</td>
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<td>Generator bearings</td>
<td></td>
</tr>
<tr>
<td>Thrust metering and resonance changing equipment</td>
<td></td>
</tr>
</tbody>
</table>
Reduction gears

The Rolls-Royce reduction gear range is of the proven single-input single-output design with built-in clutch and thrust block. They have a variety of power take-offs that enable large shaft generators to be driven, and electric motors to feed in power for get-you-home propulsion or as part of a hybrid system. Power, torque and shaft offsets correspond to current and anticipated market demands in terms of engine power/speed and propeller revolutions for a wide range of vessels. Large reduction ratios allow for all popular medium speed engines and give slow and efficient propeller speeds. They can be specified with one-step reduction up to 6.25:1 and two-step reduction with max. ratio up to 12:1.

**AGHC type: max. torque output - 90 to 950 kNm**
- Available with a range of both vertical and horizontal shaft offsets
- Four configurations can be specified:
  - Standard AGHC
  - P – with primary PTI/PTO
  - S – with secondary PTO
  - SC – with secondary PTO & clutch

**Technical data**

<table>
<thead>
<tr>
<th>Technical data</th>
<th>AGHC/AGSC</th>
<th>AGSC-P</th>
<th>AGSC-S/SC</th>
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</thead>
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<td>23000 - 235000</td>
<td>23000 - 235000</td>
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<tr>
<td>Reduction ratio, min. one step</td>
<td>1.8:1</td>
<td>1.8:1</td>
<td>1.8:1</td>
</tr>
<tr>
<td>Reduction ratio, max. two step</td>
<td>12:1</td>
<td>12:1</td>
<td>12:1</td>
</tr>
<tr>
<td>Weight (dry), kg</td>
<td>3000 - 27800</td>
<td>3300 - 28800</td>
<td>3300 - 28800</td>
</tr>
<tr>
<td>Gearbox PTO transmitted power, kW</td>
<td>-</td>
<td>800 - 4000</td>
<td>800 - 2400</td>
</tr>
<tr>
<td>PTO/PTI speed, rpm</td>
<td>-</td>
<td>1200 - 1800</td>
<td>1200 - 1800</td>
</tr>
<tr>
<td>Max. step up ratio</td>
<td>-</td>
<td>1:3</td>
<td>1:3</td>
</tr>
<tr>
<td>Min. step up ratio</td>
<td>-</td>
<td>1:1</td>
<td>1:1.33</td>
</tr>
</tbody>
</table>

All data subject to change without prior notice
Various types of Rolls-Royce stabiliser technology can be selected to match the vessel and its operating requirements. Fin stabilisers are popular and suitable for a broad range of vessels and reduce roll when underway. Tank stabilisation and anti-heeling systems are effective at low speeds or when stationary. The Neptune range uses a retractable fin that folds into slots in the hull, flush with the vessel’s side, and is ideal for cruise ships and larger ferries. The smaller and lightweight Aquarius range is suitable for large yachts and smaller cruise vessels. Fin designs have been modified and control systems developed to provide stabilisation at rest capability for large yachts using both Aquarius and Neptune range. Where it is not necessary or required for the fin to retract, both the Modular and Gemini range cater for a variety of applications including military vessels.
Fin stabilisers

Rolls-Royce manufactures the broadest range of stabilisers in the market, suitable for commercial or naval vessels of all sizes. The most recent addition is ‘stabilisation at rest’ (SAR) specifically developed for large yachts using retractable fins – a world first.

Non-retractable stabilisers

Modular
The Modular range uses a simplified design configuration that offers reduced maintenance costs. In operation, the superior hydrodynamic profile of the fin blade remains unbroken, reducing the potential for cavitation. The range fully satisfies military standards for noise, shock and vibration levels where required to meet specifications.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Fin Area (m²)</th>
<th>Maximum dimensions (m)</th>
<th>Weight* (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>NR22</td>
<td>1.9 - 4.8</td>
<td>1.30</td>
<td>1.35</td>
</tr>
<tr>
<td>NR26</td>
<td>5.0 - 6.5</td>
<td>1.30</td>
<td>1.70</td>
</tr>
<tr>
<td>NR30</td>
<td>7.0 - 9.0</td>
<td>1.50</td>
<td>1.88</td>
</tr>
<tr>
<td>NR35</td>
<td>9.5 - 12.0</td>
<td>1.75</td>
<td>1.95</td>
</tr>
<tr>
<td>NR41</td>
<td>13.0 - 16.5</td>
<td>2.00</td>
<td>2.20</td>
</tr>
</tbody>
</table>

*Weights shown include the hull plates
All data subject to change without prior notice

Gemini
The compact and ruggedly designed Gemini range is supplied with a plain high performance fabricated fin and is suitable for commercial vessels and government/military applications where Milspec requirements are not required. It can be supplied with or without hull plate to allow a balance of cost against ease of installation.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Fin Area (m²)</th>
<th>Maximum dimensions (m)</th>
<th>Weight* (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>10</td>
<td>1.4</td>
<td>1.20</td>
<td>1.17</td>
</tr>
<tr>
<td>20</td>
<td>2.0</td>
<td>1.55</td>
<td>1.29</td>
</tr>
<tr>
<td>30</td>
<td>3.2</td>
<td>1.86</td>
<td>1.72</td>
</tr>
</tbody>
</table>

*Weights shown include the hull plates
All data subject to change without prior notice
Retractable stabilisers

The Neptune and Aquarius retractable-fin stabilisers both incorporate a one-piece fin construction, with a ‘fishtail’ high-lift profile. When not in use, the fins are folded into recesses in the hull, flush with the vessel’s side.

Aquarius

The Aquarius folding-fin stabiliser range gives high performance roll damping, with a compact, lightweight design and state-of-the-art controls. The fin operating mechanism is specially configured for smaller vessels.

Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Fin Area (m²)</th>
<th>Maximum dimensions (m)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>A25</td>
<td>1.06 - 2.05</td>
<td>2.44</td>
<td>3.77</td>
</tr>
<tr>
<td>A50</td>
<td>1.82 - 3.51</td>
<td>3.19</td>
<td>4.94</td>
</tr>
<tr>
<td>A100</td>
<td>4.21 - 5.78</td>
<td>3.99</td>
<td>6.18</td>
</tr>
</tbody>
</table>

All data subject to change without prior notice

Neptune

The Neptune one-piece fin is built of fabricated materials, with a modified NACA section to maximise lift properties and minimise drag.

Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Fin Area (m²)</th>
<th>Maximum dimensions (m)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>N200</td>
<td>5.45 - 7.48</td>
<td>4.54</td>
<td>6.68</td>
</tr>
<tr>
<td>N300</td>
<td>7.00 - 9.62</td>
<td>5.14</td>
<td>7.54</td>
</tr>
<tr>
<td>N400</td>
<td>9.42 - 12.95</td>
<td>5.97</td>
<td>8.71</td>
</tr>
<tr>
<td>N500</td>
<td>12.5 - 17.19</td>
<td>6.88</td>
<td>9.96</td>
</tr>
<tr>
<td>N600</td>
<td>16.24 - 22.33</td>
<td>7.84</td>
<td>11.35</td>
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</table>

All data subject to change without prior notice
Stabilisation at rest

The stabilisation at rest system – has been developed through modifications to the existing Aquarius and Neptune stabilisers. It represents the latest product design – to deliver the best in performance, underway and at rest particularly for large luxury yachts.

“Active” fin control and the advanced hydrodynamic design means outstanding roll reduction at anchor and the usual excellent performance of the Aquarius and Neptune range whilst under way.

Key features:
- Fins can be folded for safety reasons. When fully retracted the hull retains its sleek form
- Compared to industry standards, Rolls-Royce fin design gives less drag in the working position
- Rolls-Royce retractable stabilisers will deliver the required roll reduction with only a single pair of fins
- Fewer components and sub-systems for reliability and availability with less maintenance
- Electro-hydraulic actuation for low noise

Stabiliser fins have a larger surface area for optimum performance at rest.

Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Fin Area (m²)</th>
<th>Maximum dimensions (m)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Aquarius</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>A50</td>
<td>4.79 - 6.1</td>
<td>3.19</td>
<td>4.94</td>
</tr>
<tr>
<td>A100</td>
<td>8.0 - 9.0</td>
<td>3.99</td>
<td>6.18</td>
</tr>
<tr>
<td>Neptune</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>N200</td>
<td>9.0 - 12.0</td>
<td>4.54</td>
<td>6.60</td>
</tr>
<tr>
<td>N300</td>
<td>15.0</td>
<td>5.14</td>
<td>7.5</td>
</tr>
</tbody>
</table>

All data subject to change without prior notice
Steering gear

Rolls-Royce supplies a complete range of steering gear – suitable for all ship sizes and types, including VLCCs, large container vessels, offshore and naval applications and built on a 60 year pedigree during which time more than 30,000 units have been delivered. All steering gears are delivered as a complete system, including hydraulic power units, control and alarm systems. We also see more navies and coastguards selecting our ‘COTS’ steering gear.

Rotary vane steering gears are very compact – they include integrated rudder carrier bearings (lubricated by the hydraulic system oil) and are typically 50 – 60 per cent the weight of some competing designs, with low noise and vibration. Operationally, rotary vane is widely selected as it ensures full torque is available at all rudder angles. It gives more flexibility in the design of the steering system as the steering gear is optimised for the type of rudder it will be used with. Units come in 2, 3 and 4 vane variants with 70, 45 and 35° rudder angles respectively.
### SR/SV series

The compact and powerful SR/SV series is suitable for small to medium sized ships and is designed with integrated frequency controlled reversible pumps. This ensures smooth starting and stopping and enables a precise control system. Pump motors are mounted directly on the unit, reducing the need for pipework onboard. They are supplied with steering control and rudder angle indicators as a complete system.

### SR series: 16 412kNm

<table>
<thead>
<tr>
<th>Type</th>
<th>Std. Rudder Stock Diameter (mm)</th>
<th>Max Working Pressure (bar)</th>
<th>Max Working Torque (kNm)</th>
<th>Max Mechanical Rudder Angle (deg)</th>
<th>FCP</th>
<th>Conventional</th>
<th>Dimension AxBxC (mm x mm x mm)</th>
<th>Weight Approx. (kg)</th>
<th>Max Radial Load (kN)</th>
<th>Max Axial Load (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR562L</td>
<td>120</td>
<td>54</td>
<td>16</td>
<td>2 x 61</td>
<td>YES</td>
<td>YES</td>
<td>1230 x 390 x 900</td>
<td>400</td>
<td>175</td>
<td>104</td>
</tr>
<tr>
<td>SR562</td>
<td>160</td>
<td>133</td>
<td>40</td>
<td>2 x 61</td>
<td>YES</td>
<td>YES</td>
<td>1230 x 390 x 1150</td>
<td>400</td>
<td>175</td>
<td>104</td>
</tr>
<tr>
<td>SR622</td>
<td>200</td>
<td>125</td>
<td>70</td>
<td>2 x 71.5</td>
<td>YES</td>
<td>YES</td>
<td>1210 x 675 x 980</td>
<td>620</td>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>SR642</td>
<td>240</td>
<td>125</td>
<td>110</td>
<td>2 x 72</td>
<td>YES</td>
<td>YES</td>
<td>1330 x 765 x 1090</td>
<td>920</td>
<td>600</td>
<td>250</td>
</tr>
<tr>
<td>SR662</td>
<td>280</td>
<td>125</td>
<td>170</td>
<td>2 x 72</td>
<td>YES</td>
<td>YES</td>
<td>1430 x 810 x 1180</td>
<td>1800</td>
<td>700</td>
<td>354</td>
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<tr>
<td>SR722</td>
<td>300</td>
<td>125</td>
<td>275</td>
<td>2 x 72</td>
<td>YES</td>
<td>YES</td>
<td>1610 x 875 x 1470</td>
<td>2750</td>
<td>855</td>
<td>370</td>
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<tr>
<td>SR723</td>
<td>320</td>
<td>125</td>
<td>412</td>
<td>2 x 44</td>
<td>YES</td>
<td>YES</td>
<td>1610 x 875 x 1470</td>
<td>2800</td>
<td>855</td>
<td>370</td>
</tr>
<tr>
<td>SV430-2</td>
<td>340</td>
<td>160</td>
<td>430</td>
<td>2 x 72</td>
<td>YES</td>
<td>YES</td>
<td>1665 x 1050 x 1550</td>
<td>3430</td>
<td>1400</td>
<td>500</td>
</tr>
<tr>
<td>SV570-2</td>
<td>360</td>
<td>160</td>
<td>570</td>
<td>2 x 72</td>
<td>YES</td>
<td>YES</td>
<td>1800 x 1155 x 1790</td>
<td>4300</td>
<td>1800</td>
<td>700</td>
</tr>
<tr>
<td>SV650-3</td>
<td>360</td>
<td>160</td>
<td>650</td>
<td>2 x 46</td>
<td>YES</td>
<td>YES</td>
<td>1665 x 1050 x 1550</td>
<td>3430</td>
<td>1400</td>
<td>500</td>
</tr>
<tr>
<td>SV850-3</td>
<td>400</td>
<td>160</td>
<td>850</td>
<td>2 x 46</td>
<td>YES</td>
<td>YES</td>
<td>1800 x 1155 x 1790</td>
<td>4300</td>
<td>1800</td>
<td>700</td>
</tr>
</tbody>
</table>

All data subject to change without prior notice

### SV Series: 412 – 850 kNm

**Key features**
- Compact and lightweight
- Simple installation and maintenance
- High positioning precision
- No external moving parts
- Rudder angles up to 70°
- FC pumps for low power consumption

Pump motors are mounted on the unit to minimise pipework.

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**Technical data**

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RV/IRV Series

The RV series of steering gear is suitable for large and medium sized vessels and is available with 2, 3 and 4 vane options. A dual, submerged pump powerpack simplifies installation as no expansion tank is needed. Modulated flow control gives a soft start and precise control for small rudder movements. The IRV series incorporates a double sealing system, completely separating the actuator into two individual pressure systems. Automatic isolation of the actuator’s dual hydraulic system is a feature to meet IMO single failure criteria for large tankers over 100,000dwt. They can be supplied with steering controls, CANBUS alarm system and rudder angle indicators.

RV/IRV 2 & 3 vane: 430 – 3916kNm

Key features:
- Rudder angles 35 - 70°
- Complies with IMO regulations
- Compact and lightweight
- Installation with reamer bolts or stoppers
- Modulated flow for precise rudder movements

RV/IRV 4 vane: 845 – 6550kNm

Key features:
- Compact size
- Excellent power-to-weight ratio
- Simplified maintenance: 4-piece split bearings and seals on base and cover
- Integrated storage tank and rudder carrier
- Full overhaul possible without removing the rudder stock connection for steering gear sizes of RV2600-4 and over

An integrated lifting device enables access to all bearings and seals without loosening the rudderstock connection.
### Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>Max Rudderstock Diameter (mm)</th>
<th>Max Working Pressure (bar)</th>
<th>Max Working Torque (kNm)</th>
<th>Friction loss in Rudder Carrier (kNm)</th>
<th>Max Mechanical Rudder Angle (deg)</th>
<th>Dimension A x B x C (mm x mm x mm)</th>
<th>Weight Approx. (kg)</th>
<th>Max Radial Load (kN)</th>
<th>Max Axial Load (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV450-2</td>
<td>360</td>
<td>80</td>
<td>430</td>
<td>49</td>
<td>2 x 71.5</td>
<td>1450 x 890 x 115</td>
<td>3200</td>
<td>1400</td>
<td>500</td>
</tr>
<tr>
<td>RV550-2</td>
<td>390</td>
<td>80</td>
<td>568</td>
<td>53</td>
<td>2 x 71.5</td>
<td>1450 x 1025 x 115</td>
<td>3500</td>
<td>1400</td>
<td>500</td>
</tr>
<tr>
<td>RV650-3</td>
<td>390</td>
<td>80</td>
<td>644</td>
<td>56</td>
<td>2 x 46.5</td>
<td>1450 x 890 x 115</td>
<td>3200</td>
<td>1400</td>
<td>500</td>
</tr>
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<td>RV700-2</td>
<td>410</td>
<td>80</td>
<td>677</td>
<td>71</td>
<td>2 x 71.5</td>
<td>1600 x 1055 x 140</td>
<td>5000</td>
<td>1800</td>
<td>700</td>
</tr>
<tr>
<td>RV850-3</td>
<td>450</td>
<td>80</td>
<td>853</td>
<td>61</td>
<td>2 x 46.5</td>
<td>1450 x 1025 x 115</td>
<td>3700</td>
<td>1400</td>
<td>500</td>
</tr>
<tr>
<td>RV850-4</td>
<td>390</td>
<td>170</td>
<td>845</td>
<td>70</td>
<td>2 x 36.5</td>
<td>1380 x 1115 x 450</td>
<td>3650</td>
<td>500</td>
<td>450</td>
</tr>
<tr>
<td>RV900-2</td>
<td>450</td>
<td>80</td>
<td>874</td>
<td>75</td>
<td>2 x 71.5</td>
<td>1600 x 1200 x 140</td>
<td>6000</td>
<td>1800</td>
<td>700</td>
</tr>
<tr>
<td>RV1050-3</td>
<td>495</td>
<td>80</td>
<td>1015</td>
<td>80</td>
<td>2 x 46.5</td>
<td>1600 x 1055 x 140</td>
<td>5000</td>
<td>1800</td>
<td>700</td>
</tr>
<tr>
<td>RV1050-4</td>
<td>420</td>
<td>170</td>
<td>1065</td>
<td>87</td>
<td>2 x 36.5</td>
<td>1550 x 1144 x 467.5</td>
<td>4410</td>
<td>600</td>
<td>650</td>
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<td>RV1100-2</td>
<td>510</td>
<td>80</td>
<td>1094</td>
<td>137</td>
<td>2 x 71.5</td>
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<td>8000</td>
<td>3000</td>
<td>1250</td>
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<tr>
<td>RV1350-3</td>
<td>495</td>
<td>80</td>
<td>1312</td>
<td>87</td>
<td>2 x 46.5</td>
<td>1600 x 1200 x 140</td>
<td>6000</td>
<td>1800</td>
<td>700</td>
</tr>
<tr>
<td>RV1400-2</td>
<td>500</td>
<td>80</td>
<td>1412</td>
<td>88</td>
<td>2 x 71.5</td>
<td>1600 x 1612 x 140</td>
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<tr>
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<td>470</td>
<td>170</td>
<td>1440</td>
<td>108</td>
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<td>8000</td>
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<td>1250</td>
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<tr>
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<td>560</td>
<td>80</td>
<td>1709</td>
<td>150</td>
<td>2 x 71.5</td>
<td>1900 x 1596 x 195</td>
<td>11000</td>
<td>3000</td>
<td>1250</td>
</tr>
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<td>RV1850-4</td>
<td>510</td>
<td>170</td>
<td>1860</td>
<td>132</td>
<td>2 x 36.5</td>
<td>1800 x 1350 x 550</td>
<td>7480</td>
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<td>900</td>
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<tr>
<td>RV2050-2*</td>
<td>580</td>
<td>80</td>
<td>2029</td>
<td>157</td>
<td>2 x 71.5</td>
<td>2110 x 1659 x 334</td>
<td>12000</td>
<td>3000</td>
<td>1250</td>
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<td>620</td>
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<td>2563</td>
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<td>3000</td>
<td>1250</td>
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<tr>
<td>RV2600-4*</td>
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<td>170</td>
<td>2586</td>
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<td>1050</td>
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<td>2666</td>
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<td>3000</td>
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<td>RV3050-2*</td>
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<td>80</td>
<td>3043</td>
<td>236</td>
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<td>RV3050-3</td>
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<td>3043</td>
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<td>2 x 46.5</td>
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<td>3000</td>
<td>1250</td>
</tr>
<tr>
<td>RV3900-4*</td>
<td>670</td>
<td>170</td>
<td>3882</td>
<td>314</td>
<td>2 x 36.5</td>
<td>2200 x 1803 x 743</td>
<td>14000</td>
<td>900</td>
<td>1200</td>
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<tr>
<td>RV4000-3</td>
<td>700</td>
<td>80</td>
<td>4000</td>
<td>201</td>
<td>2 x 46.5</td>
<td>2110 x 1964 x 334</td>
<td>15000</td>
<td>3000</td>
<td>1250</td>
</tr>
<tr>
<td>RV4200-2*</td>
<td>730</td>
<td>80</td>
<td>4200</td>
<td>273</td>
<td>2 x 71.5</td>
<td>2400 x 2046 x 339</td>
<td>24000</td>
<td>3000</td>
<td>1800</td>
</tr>
<tr>
<td>RV5500-4*</td>
<td>750</td>
<td>170</td>
<td>5498</td>
<td>498</td>
<td>2 x 36.5</td>
<td>2560 x 1886 x 771</td>
<td>20000</td>
<td>1250</td>
<td>1750</td>
</tr>
<tr>
<td>RV6550-4*</td>
<td>800</td>
<td>170</td>
<td>6565</td>
<td>609</td>
<td>2 x 36.5</td>
<td>2700 x 1974 x 810</td>
<td>23000</td>
<td>1250</td>
<td>2000</td>
</tr>
</tbody>
</table>

* Available in IMO execution (tankers over 100,000 DWT)
All data subject to change without prior notice
Rotary vane steering gear - for naval applications

The Rolls-Royce compact naval rotary vane steering gear range has been designed to meet the highest military standards for noise, shock, vibration and EMI/EMC.

A 17 model range delivers steering torques from 19 – 2,512kNm and has been developed to suit a wide range of naval vessels. The standard working rudder angle is 37° to one side, although gears can be supplied to give maximum working angles of 70° and 90° to one side.

They have been selected by a large number of the world’s navies, including those of the USA, Canada, Malaysia, India, Australia and the UK Royal Navy. This range seamlessly integrates the wide array of applications deployed in naval fleets.

Key features:
- Meets military standards for noise, shock and vibration
- Select from a 17 model range to match the application
- Torques from 19 – 2,512kNm
- Compact size suitable for installation on single or multiple-rudder installations
- Maximum working angles of 70° and 90° to one side can be specified

Actuator steering gear

Actuator type steering gear is popular with a number of navies. Its simple and robust design provides the reliability and redundancy required, as two actuator systems provide single rudder operation. Even with one actuator bypassed, 50 per cent of the torque is still available. Rudders can also be operated independently if necessary.

Systems are normally of bespoke design for a specific vessel type. Layout means fewer interface surfaces on board as the actuator anchor brackets can be welded directly onto the hull cartridge. Therefore installation of actuator steering gear is less tolerance-critical for the yard.

Routine maintenance is also minimal and replacing an individual actuator is a simple operation.

Key features:
- Specifically designed for corvettes, frigates and destroyers
- Select from a 7 model range
- Torques from 36 to 448kNm
- Cost-effective and simple installation
- Minimal maintenance

Actuator steering gear is fitted to the UK Royal Navy Type 45 destroyers.
Rudders

Rolls-Royce has over 20 years experience in rudder design and cavitation prediction. With experience drawn from the Rolls-Royce Hydrodynamic Research Centre and in-house Hydrodynamics specialists, advanced computer programmes have been developed to simulate manoeuvres to evaluate different rudder sizes and types to optimise the rudder design for each vessel.
Conventional spade rudders

**TYPE: CB / CM / CS**

This range of rudders is built as full spade rudders, with three different standard profiles and no rudder angle limitation, to ensure optimal manoeuvrability for passenger, cargo vessels and high-speed craft. The medium and slim profiles can be combined with a twisted leading-edge for improved efficiency and reduced cavitation risk.

**Type CB:**
- **for lower speeds**
  - A bulbous profile and large vane end plates improve low speed manoeuvrability. It shares the same profile as the FB flap rudder and is typically used for offshore supply, cargo, fishing and seismic vessels.
  - **Options:**
    - Heel connection module
    - Wire Guard

**Type CM:**
- **for medium speeds**
  - The profile is optimised to provide good manoeuvrability with propulsive efficiency, with a tapered or rectangular blade, meeting the rudder needs of passenger and cargo vessels.
  - **Options:**
    - Twisted leading edge
    - Wire Guard

**Type CS:**
- **for higher speeds**
  - The slim profile increases overall propulsive efficiency and reduces cavitation risk. The blade is tapered with rounded corners. It has the same profile as the FS flap rudder.
  - **Options:**
    - Twisted leading edge
    - Wire Guard

**Trunk Type:**
- Extended, with steering gear foundation or Standard
- **Options:**
  - Designed for minimum installation time and cost
  - Tailor-made for each vessel
  - The extended trunk is available with or without fairwater/shell plating
Flap rudders

**TYPE: FB / FM / FS**

Rolls-Royce has developed and built flap rudders since the 1980s. The performance of a flap rudder is determined both by the flap, the link mechanism and the profile, as well as the hull and the propeller. Rolls-Royce has therefore designed a range of flap rudders suitable for different types of vessels and functions, to ensure customers receive a rudder best suited to their vessel’s operating requirements.

**Type FB:**
- **for low to medium speeds**
- This rudder has a bulbous profile for maximum manoeuvring performance. The design also has large upper and lower vane plates. It is ideal for use on workboats, fishing vessels, offshore vessels, small tankers, cargo vessels, ferries and other coastal vessels.

**Options:**
- Heel connection module
- Wire Guard

**Type FM:**
- **for medium speeds**
- Designed with a moderate profile for enhanced manoeuvrability and propulsive efficiency.

**Options:**
- Twisted leading edge
- Wire Guard

**Type FS:**
- **for medium to high speeds**
- A slim profile that is purpose-designed to suit the vessel. The rudder is built around a cast cone module and has a robust link mechanism and hinge system to withstand the high forces. It is also an ideal all-round flap rudder suitable for a wide range of vessel types.

**Options:**
- Twisted leading edge
- Wire Guard

**Trunk Type:**
- Extended, with steering gear foundation or Standard
- Designed for minimum installation time and cost
- Tailor-made for each vessel
- The extended trunk is available with or without fairwater/shell plating
Rolls-Royce provides the widest range of deck machinery in the industry - we manufactured our first hydraulic winch back in 1941. Today, our capability in designing complete systems is helping us set the standard in many sectors. Our winch range is ideal for merchant vessels, offshore vessels, tugs, fishing vessels and naval applications, where we also supply replenishment-at-sea systems.
Modular anchor and mooring winches

The Rolls-Royce concept for anchor and mooring winches delivers tailor-made winch solutions for most vessel types from a range of standard modules that are light, compact and easy to install. The modular design allows us to accommodate a wide range of customer requirements while maintaining short lead times and consistent quality.

Drive options
Select from four drive options to suit the application. Low-pressure hydraulic (64 bar), high-pressure hydraulic (250 bar), electrical-frequency controlled or electrical pole change drive.

Flexible build options
The winch system is adapted in order to reflect vessel and operational characteristics. Popular options include:

**Mooring Winches with:**
- Automatic tension control
- Remote control for speed, direction of rotation, brakes and clutches
- Stainless steel brake drum surfaces

**Windlasses with:**
- Automatic speed control for the anchor lowering operation
- Cable length indicator
- Chain Stopper
- Stainless steel brake surface

**Typical tailored solutions**

**5 - 8000 bhp**
- Chain size: Up to 137mm
- Pull capacity: 20 tonnes
- Wire capacity: 1200 meter of 56 mm

**8 - 12000 bhp**
- Pull capacity: 30 tonnes
- Wire capacity: 1500 meter of 56 mm
- Synthetic rope: 800 meter of 208 mm

**12 - 18000 bhp**
- Pull capacity: 30 tonnes
- Wire capacity: 12000 meter of 76 mm
- Synthetic rope: 2 x 1600 meter of 208 mm

**18 - 20000 bhp**
- Pull capacity: 15 tonnes
- Wire capacity: 5000 meter of 76 mm
- Synthetic rope: 800 meter of 208 mm

**> 20000 bhp**
- Pull capacity: 16 tonnes
- Wire capacity: 12000 meter of 76 mm
- Synthetic rope: 2 x 1600 meter of 208 mm
Towing winch systems for tugs

Rolls-Royce is one of the leading suppliers of heavy-duty winches for escort, harbour and coastal tugs, thanks to customers demanding the best solutions possible. Our towing winch systems are the preferred choice among the major tug operators around the world. They appreciate the tremendous pulling force, compact design, easy operation and high reliability. We provide high-pressure hydraulic-driven, electric, frequency converter-driven and low pressure-driven winches for tugs.

Rope reels
Pull capacity: 1 - 150 tonnes

Waterfall towing winches
Pull capacity: 1 - 300 tonnes

Escort winches
Pull capacity: 1 - 150 tonnes
Rendering capacity: 1 - 200 tonnes

Rope reels

Towing winches
Pull capacity: 1 - 150 tonnes

Systems for supply and service vessels

Rolls-Royce continues to innovate in offshore vessel design and the systems that are making them more productive, fuel efficient and safer places to work. Safer deck operations using rail-mounted cranes are now used to move cargos quickly and efficiently. Tailor-made dry bulk handling systems with remote controls, tanks and valves, air dryers and compressors are designed to suit customer requirements. Automated cargo fastening systems use moving pillars mounted in tracks flush with the deck to move and secure pipes and equipment on deck, speeding up loading and maximising use of deck space.

Bulk hose operations can be risky when receiving and securing the bulk hose onboard a vessel. The newly developed Safer Hose Operation System (SHOS) has been developed in cooperation with experienced offshore crane operators for this purpose. Previously the bulk hose had to be manually roped to the rails while the vessel was moving. The new SHOS securing arm holds the bulk hose for safer operation and minimises risks when the crane hook on the platform releases the bulk hose. It is able to serve all types of hoses regardless of hose coupling type and is easy to install.

Product key

1. Cargo rail cranes
2. Dry bulk tanks/air dryers/compressors
3. Capstan winches
4. Tugger winches
5. Automated sea fastening arrangement
6. Anchor and mooring winches

Automated sea fastening arrangement
Safer hose operation system
Systems for anchor handling and supply vessels

The world’s most powerful anchor handling and towing winches are designed and developed by Rolls-Royce and have capacities of more than 600 tonnes pull. Winch dimensions and layout are normally tailored to the specific vessel and its operation. They come complete with the Towcon RT control and monitoring system for complete control. A range of innovative safer deck equipment has been progressively introduced to enhance crew safety.

**Selection of anchor handling winches**

<table>
<thead>
<tr>
<th>Pull capacity:</th>
<th>5 - 8000 bhp</th>
<th>8 - 12000 bhp</th>
<th>12 - 18000 bhp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire capacity:</td>
<td>&lt;150 tonnes</td>
<td>150 - 300 tonnes</td>
<td>300 - 400 tonnes</td>
</tr>
<tr>
<td>Synthetic rope:</td>
<td>Wire capacity: 1200m/56mm</td>
<td>Wire capacity: 1500m/56mm</td>
<td>Wire capacity: 5000m/76mm</td>
</tr>
<tr>
<td>18 - 20000 bhp</td>
<td>Pull capacity: 350 - 500 tonnes</td>
<td>Pull capacity: 400 - 600 tonnes</td>
<td>Pull capacity: 12000m/76mm</td>
</tr>
<tr>
<td>&gt; 20000 bhp</td>
<td>Wire capacity: 5000m/76mm</td>
<td>Synthetic rope: 800m/208mm</td>
<td>Synthetic rope: 2 x 1600m/208 mm</td>
</tr>
</tbody>
</table>

**Product key**

1. Stern rollers - single, twin or triple
2. Tugger winches
3. ARF/ALARS for assisting launch and recovery of anchors up to 130 tonnes
4. Storage winches – capacities 5 - 65 tonnes
5. Spooling devices
6. Stop pins and centring devices
7. Cargo rail crane with tool
8. Secondary winches: 65 - 210 tonnes
9. Cable lifter changer
10. LARS (Launch and recovery system) for ROVs
11. Pennant winder
12. Rope tensioner

Automated handling systems for subsea vessels

As the need to work in deeper waters grows, our equipment has evolved to meet the requirements. Our multi-purpose aft deck systems can be integrated into unified solutions to meet specific operating requirements and maximise operating efficiency and productivity. Fibre rope deployment systems are now working effectively at depths of 4,000m and beyond and active heave compensation enables vessels to operate safely as weather conditions worsen, extending the time they can remain on station.

**Product key**

1. Installation and work over control system (IWOC)
2. Skid and hatch systems with skidding capacity up to 70 tonnes
3. Active heave compensated fibre rope crane
4. Module handling towers with capacity up to 125 tonnes
5. Fibre rope deployment systems: 20 - 150 tonnes
6. LARS for WROV - through moon pool
7. LARS for WROV - over side
8. Module handling towers - covers everything from IMR to construction work in ultra deep waters
9. Fully integrated guiding solutions
10. Field proven fibre rope winch (CTCU) or wire winch configuration
11. Adaptive layouts to meet customer requirements
12. Capacity: up to 125 tonnes

**Launch and recovery systems for ROVs**

- Accurate active heave compensation
- Side launch and moon pool launch
- Gentle handling of third party equipment
- Automatic launch and recovery to a given target depth at a given target speed
- Hydraulic or AC-driven
Automated handling for seismic vessels

Our automated handling systems are among the most reliable on the market, have many advanced features and have become the industry standard. To effectively integrate these compact systems we work closely with customers to design the entire aft deck. Control systems allow the operators to direct and synchronise all winches, streamers and auxiliary equipment remotely. User-friendly controls which feature automated spooling, reduces the need for manual handling on the aft deck for enhanced crew safety.

Product key

1. Moving vessel profilers
2. Wide tow system
3. Auxiliary system
4. Streamers system
5. Source handling systems

Positioning mooring systems for barges, rigs, drillships and FPSOs

Mooring systems are designed to operate safely in the harshest climatic zones. Bespoke packages of equipment are normally developed closely with customers for specific projects or applications. The product range comprises of chain jacks, windlasses, anchor mooring drums, combination winches (wire/chain) and traction winches. In addition, Rolls-Royce supplies fairleads, fairlead stoppers and chain stoppers.

Most products are delivered with control and monitoring systems for precise handling and control. Winches can be supplied with low-pressure hydraulic, high-pressure hydraulic or electric drive.

Product key

1. Chain or wire fairleads
2. Drum or traction winches
3. Control Cabins

Fairleads
- Unique and field-proven technology
- Space-saving and easy rotation of belt
- Gentle handling increases lifespan of cables
- Optional tension measuring
- Tufline and tufnose fairing

Deflector handling systems
- Gentle and safe handling and storage of deflectors
- Easy and safe access for maintenance in storage position
- Adapts to all sizes of diverters
- Integrated wide tow system

Streamer lines
- Hydraulic or AC-driven
- Gentle, safe and efficient deployment and recovery
- Streamer manufacturer proven

Source handling systems
- Space-efficient
- Safe storage
- Weight-optimised
- For rigid and flexible arrays

Chain stoppers
Vertial shaft windlass
Chain jacks
Moveable windlasses
Automated systems for well intervention on vessels and fixed platforms

Improving oil recovery from existing wells is a key operating requirement and the reason for our continued development in advanced systems. With a focus on safe and cost effective rigging the product range has been extended to include modular workover units. We also have experience as a sub-contractor for well service equipment that includes coiled tubing reels, tower structure, advanced coiled tubing tension frames and jacking frames for platforms and vessels.

Product key

1. Pipe handling system
2. LER container
3. Main & auxiliary HPU
4. Derrick
5. Drive units and top drive
6. Cherry pickers in BOP deck and drill floor
7. Circulation skid

Automated handling for oceanographic vessels

Using fibre rope handling technology has eliminated water depth restrictions for taking seabed samples. We provide tailor-made solutions using our patented cable traction control technology to deploy and recover samples at great depths. A Moving Vessel Profiler with a ‘free fall fish’ equipped with sensors is towed behind the vessel and moves from the surface to the bottom and back every few miles collecting data as the ship travels.

Control systems, winches and overboard systems are designed for the specific needs of vessels used in oceanography and deep-sea operations.

Product key

1. CTD system
2. A-frames
3. Deep tow and deep water coring systems
4. Overboard system
5. Piston corer handling system

Deep tow and deep water coring system with CTCU
CTD winch systems with active heave compensation. Max line speed 2m/sec
Fishing solutions

Complete deck machinery solutions comprising up to 20 individual winches are supplied for all kinds of fishing vessels. Drive options are low and high pressure hydraulic and electric. Frequency controlled spooling reduces wear on the wire and provides optimum spooling regardless of the wire size, and can be fitted on existing winches. The latest trawl winches are direct drive with fewer moving parts and more power. As the motors turn slowly responsiveness is more accurate providing the operator greater sensitivity, favourable for trawling. The Synchro RTX Autotrawl system is available to maximise catching capability.

Product key

1. Net sounder winches
2. Net drum winches
3. Trawl winches
4. Auxiliary winches
5. Purse seiner winches
6. Anchor and mooring winches

Subsea cranes

With more offshore oil and gas activity in very deep water, cranes with a large lifting capability to handle heavy deck cargo at sea are needed, and Rolls-Royce supplies units up to 700 tonne metre capacity. The key feature is the very effective active heave compensation system, which prevents the wave induced motion of the vessel influencing the precision of the load handling and extends the operating window to much tougher sea conditions.

The range of subsea cranes have been developed to significantly increase the max SWL work area. The cranes have accurate active heave compensation with steel rope configuration and Integrated machinery with compact design. The dual draglink crane has increased cover area at full load and outstanding max load lifting height which enables long and wide lifting arrangements.
Multifunctional cargo rail cranes

Cargo rail cranes have been developed to improve safety on deck, where the crew have to handle heavy moorings and deck cargo at sea. Rail cranes equipped with various manipulators are an integral part of this, enabling the crew to conduct operations on any part of the working deck by remote control from a safe location.

Working on the deck of an anchor-handler poses a risk to life and limb. To reduce this risk, the cargo rail cranes are equipped with comprehensive systems for handling ropes, wires, chains and shackles, which may be under great tension, with the minimum of manual work on deck.

Safer deck systems

Making decks safer offshore

The safety of crew and vessel is a top priority for vessel operators working in harsh environments. Therefore Rolls-Royce has focused on developing the systems that help reduce the risks for crew members who undertake dangerous tasks on board anchor-handlers. Remotely controlled cranes traverse the length of the vessel’s cargo rails. Each crane has two arms equipped with specially designed manipulators that work in conjunction with the winches and other systems installed into the deck, like centering quadrants, towing pins, spooling sheaves and shark jaws. Many operations can be carried out including:

- Shackling wires or chains together
- Handling chains
- Capturing a wire
- Lassoing a buoy
- Pennant wire coiling
- Heavy anchor shifting
- Cable tensioning

Manipulators can perform a variety of tasks, without the need for human intervention on deck.
Replenishment/fuelling-at-sea (RAS) systems

The Rolls-Royce standard RAS systems is designed to transfer 2 tonnes at ship distances from 24 to 55m, (max. 61m) and at ship speeds between 10 and 16 knots. A new heavy replenishment-at-sea system (HRAS) has been developed that will permit loads of up to 5 tonnes to be safely transferred between ships. This contrasts with the light jackstay rig which is a simple manual system for the transfer of loads up to 250kg.

At the heart of each system is the AC powered jackstay winch, that automatically responds to extremes of vessel movement once the tension is set. Where liquids and solids are required to be transferred at the same time the dual capacity high performance rig is the ideal solution. A single control console controls fuelling and/or transfer operations.

Other systems:
• Astern refuelling rigs
• Large derrick rigs
• Dual purpose rigs
• Light jackstay rigs
• Moveable highpoints

A typical RAS arrangement.
Naval handling systems

Shipbourne winch and sensor handling systems
Natives around the world use our systems for their demanding undersea sensor towing applications. The portfolio ranges from systems design and production of the Multi-Functional Towed Array (MFTA) for the US Navy’s DDG1000 destroyer, to automated electro-hydraulic winches and sonar tow body handling systems for the Singapore Navy’s Formidable class. Our design team listen to your requirements and develops a solution to match your expectations.

Other systems
- Active/passive towed sonar handling
- Multi-function towed array winch and handling
- Torpedo defence winches
- Sidescan sonar winch and handling
- Containerised sonar towing/handling

Helicopter sensor handling systems
Our lightweight composite equipment for helicopter undersea sensor deployment comes in a variety of configurations. Typical are the winch and fairlead tow cable systems for the US Navy’s Organic Airborne Mine Countermeasures program and the HELRAS dipping sonar reeling machines for Canada’s new maritime helicopters.

Other systems:
- Organic Reeling Cable Assembly (ORCA)
- Helicopter Long Range Active Sonar (HELRAS)
- Carriage, Stream, Tow Recovery System (CSTRS)

Unmanned vehicle launch and recovery systems
We have developed a portfolio of innovative systems to handle virtually any unmanned vehicle requirement. Some can be automated or semi-automated, removing some of the potential risks inherent in manual on-deck operations. Examples include launch and recovery systems (LARS) for the US Naval Oceanographic’s ORCA USV.

Other systems:
- Semi-submersible USV LARS
- AUV LARS for smaller vessels
- Davit type LARS for manned and unmanned craft
- Towed sonar LARS for UAVs
Automation and control

Ergonomically designed systems with an intuitive operator interface are essential in environments where operators demand maximum reliability, efficiency and safety.

Our systems are developed from an in-depth experience of over 30 years. We pay great attention to the human machine interface (HMI) to reduce operator fatigue, important when controlling complex vessels for prolonged periods. Maximum use is made of configurable controls and touch screens.

Our common system architecture and design philosophy provides proven standard modules as building blocks for fully customised systems, so that the specific operating requirements of each vessel can be met. The Rolls-Royce family of dynamic positioning systems uses the latest technology and our integrated bridge concept provides multiple workstations with the flexibility to switch between functions in a comfortable ergonomic environment, enhanced by the integrated operator’s chair.
Integrated bridge systems

Rolls-Royce systems include work-stations for navigation, manoeuvring, dynamic positioning, anchor-handling and deck operations, and machinery controls. They are built up from modules and standardised components using the Rolls-Royce common controls platform (all systems work together via the Rolls-Royce integrated network where information and control signals are exchanged safely, and the integrity of each system is secured.), and are tailored to the ship giving the user access to the underlying ship systems. The intuitive design combined with common look and feel menus increase both operator performance and overall operational safety.

Key features:
- Multifunctional displays allow the operator to choose which information is to be collected and presented together
- Important and critical information displayed at all times for simple and safe operation
- Control levers ergonomically placed to allow operator to work sitting or standing, with all information clearly displayed on touch screens
- The Operator’s Chair incorporates the best in ergonomic design – controls and interactive screens may be located in chair armrests, chairs can be supplied as part of a bridge system or as an individual product.

Dynamic positioning systems

Icon DP is a range of dynamic positioning (DP) systems from Rolls-Royce. The systems comply with the IMO requirements to DP Class 1, 2 and 3. All positioning systems use the Rolls-Royce common control platform architecture and are of modular design. Icon DP systems comprise one or several operator stations, control cabinet, network and power supplies. The cabinet contains computers and input/output (I/O) modules for interfacing to sensors, position reference systems, thrusters, rudders, power system and other DP related equipment.

Simplicity and proximity are unique design principles incorporated in the Icon system design. The goal is to simplify DP operations and to bring the system physically closer to the operator, thus increasing both operator performance and overall operational safety.

Triple redundant solutions are standard for Icon DP2 and DP3 systems. The two-out-of-three voting principle ensures enhanced safety and reliability compared to basic Class rules.

Turnkey retrofit solutions
Complete DP solutions are supplied, and this can include the upgrading of the propulsion system and thruster package of existing vessels to provide the necessary additional thrust.

Joystick system
Poscon is an independent joystick control system for manual vessel positioning and low speed manoeuvring. A Poscon operator station consists of a joystick control device and a touch screen. The Poscon controller calculates the required thrust to be set out by the propellers, rudders and thrusters to move the vessel according to the command given from the joystick system.
**Automation systems**

**Acon**
The Rolls-Royce ship automation system (Acon) is designed to control and monitor ship operational systems and equipment, and comprises a wide range of control, monitoring and alarm products. Acon is integration/interface-ready for any vessel type and ship system or equipment via standard data communication protocols. Multifunctional displays allow the operator to choose between system to be controlled and the information to be presented.

All products are based on the Rolls-Royce common control platform and communicate via the Rolls-Royce ship integration network. Acon can be delivered as standalone products or as an integrated solution (IAS).

**Integrated automation**
Acon products are normally delivered as integrated automation systems with multifunctional operator stations - Acon IAS. Third party equipment or systems like HVAC, fire and gas etc. are easily interfaced to Acon IAS for control and monitoring. The Acon IAS user interface is tailored to the ship with access to the underlying ship systems through an ergonomic standardised interface specially designed for easy and safe operation.

**Built in functions**
- Alarm and monitoring
- Machinery control
- Cargo control
- Tank sounding
- Power management
- LNG control and monitoring
- Ship operational mode control

**Naval automation**
This intelligent system monitors, controls and regulates routine processes automatically, leaving operators free to concentrate on important tasks. It incorporates propulsion control levers and keypads and monitors the whole propulsion plant, the on-board power supply and the entire ship.

It is a key contributor to efficient operation and safety of the vessel. The measured data acquired from the various ship areas can be retrieved at the control console and viewed on screens to provide a fast and current overview of ship operation.

Modularity and versatility allow the system to be adapted to meet many varied requirements and tailored to meet specific naval applications. Capability can be expanded with additional system modules.

Suitable for FP or CP propeller installations and waterjet systems.

It can be also used for combined propulsion plants:

**Machinery control**
Monitoring & control of:
- Propulsion plant
- Electrical power generation and distribution
- Auxiliary systems (bilge, tanks, ventilation)
- Ship area extension with:
  - Fire detection
  - Duty alarm
  - Machinery telegraph
  - CCTV

**Damage control**
- Incident management (flooding, fire)
- CCTV
- Interactive state boards, Kill cards, crew location etc.

**Maintenance package**
- Online documentation
- Trending
- 3D instructional videos
- Maintenance check lists

**Training system**
- Onboard training
- Land based training
- Simulation

![Integrated Automation Systems](image-url)
Propulsion control

Control solutions are supplied for the wide range of Rolls-Royce propulsion equipment – diesel and gas engines, controllable pitch propellers, waterjets, rudders, tunnel and azimuth thrusters of various types, as well as multi-product systems. Complex machinery installations like diesel-electric, gas-electric and hybrid propulsion are catered for.

Where possible, system components are installed on equipment and calibrated at the factory to simplify shipyard installation. Maximum use is made of touch screens and joy sticks to enhance the human machine interface and improve operator performance.

Helicon X3

Helicon X3 is the latest model in the long and successful series of Helicon propeller and thruster (P&T) control systems and delivers automated and seamless switching between normal and back-up control. The control lever units have a compact ergonomic design with integrated pushbuttons for all key functions including command transfer, alarms acknowledge and back-up control on/off. Control lever units require very little space making control station integration both easy and flexible. One Helicon-X3 display located at each operator station is a touch screen operator panel common for all propulsion units. Helicon X3 uses the same range of components for all propeller and thruster types resulting in a unified control desk design and cable installation is reduced through use of serial line communications.

CanMan touch

CanMan touch is the latest of the proven CanMan series of propulsion control systems. It is suitable for a wide range of vessels to control and monitor engines, FP and CP propellers and systems with multiple bow and stern tunnel thrusters. Users have access to all system functions via the configurable touch screens. Information is presented in digital, graphic and mimic formats to provide an intuitive operator interface which is easy to use with operation based on the Rolls-Royce common controls platform.

Designed for high reliability, CanMan touch uses two parallel CAN buses to transmit data and provide a high level of redundancy. This reduces the amount of wiring required and simplifies installation as well as troubleshooting. Gateways and fire walls are an integral part of the system and prevent the failure of an individual CAN bus.

System modularity means it can be installed in stages – individual controllers (ie. propeller) can be installed and tested before the bridge electronics are operational. It also simplifies upgrading.

The control leavers for thrust control are supplied as separate units for each control station.

Features:
• Intuitive graphical user interface
• Single control point for multiple propulsors
• Built in redundancy – dual CAN bus architecture with twin screens
• Modular for ease of installation and testing

Typical main bridge control station
Aquapilot control system for azimuth thrusters
The Aquapilot ND control system is an independent follow-up control system with non-follow-up back-up control system for a single azimuth thruster - each thruster has an independent control system. The system provides an accurate, smooth and reliable thrust direction and can be interfaced with the ship’s automation system, DP, Voyager, prime mover, autopilot and joysticks.

Well known for it ergonomic and user-friendly features, Aquapilot ND has been designed for the operator and the lever can be customised to meet individual preferences. The operator can select from different operational modes suitable for various operations and the panels have LED indication on symbols.

Compact control system for smaller waterjets
Designed for the FF-series, A3-series and smaller S3-series waterjets, the system is suitable for single through twin, twin plus boost to quad waterjet installations. Control devices are calibrated and key hydraulic components installed on the jets at the factory to simplify yard installation. The system interfaces with engines, gears, autopilot, voyage data recorder and DP, with an option for a bow thruster. Another option is automatic interceptor control that links interceptor movements to steering commands.

Users can select from a joystick, twin levers or steerable lever control devices mounted in the console or on the arms of the chair. A colour touch screen presents system status and performance data. As each propulsion line is independent, there is ample redundancy and a number of interlocks for enhanced safety.

Systems for steering, alarm and rudder angle indication
The systems are designed to meet the latest SOLAS and IMO requirements and are type approved by DNV, BV, GL, LRS, RINA and ABS. They are supplied for both solenoid operated valves and frequency controlled pumps/motors with the use of a frequency converter.

The system consists of a main control panel with pump start/stop, emergency steering, NFU/FU-steering mode selections, and low/high rudder angle selections. It is designed to interface with the autopilot, dynamic positioning system, joysticks and voyage data recorder (VDR).

Non-follow-up (NFU) steering and follow-up steering (FU) are available, as are systems for single or twin rudder vessels.
The Rolls-Royce electrical capability incorporates a wide portfolio of skills, products and competencies that range from electric propulsion systems design and supply to turnkey contracts for the supply of onboard electrical power distribution and control packages. Systems development activities are supported by state-of-the-art simulation and modelling capabilities. As system integrators we manage the complete process from concept design to through life support ensuring the delivery of flexible and efficient solutions that meet all major classification society requirements.

We act as a prime contractor for the onboard power generation, electric-propulsion, LV electrical power distribution and automation/control packages. As we integrate the system with the power and propulsion products, they are designed to work together as an efficient system providing the best in performance.
Electrical power systems

Rolls-Royce provides a range of services spanning the full life-cycle of marine systems and equipment, from concept to disposal. Electrical power systems and electrical/mechanical hybrid propulsion concepts have been developed and installed on a wide range of vessels.

Rolls-Royce has a pedigree in the design and supply of electrical systems and is capable of taking the lead in the design and supply of vessel power systems in excess of 100MVA, tailored to specific requirements and supported by a range of high and low voltage products. Electrical networks are designed and supplied through the use of industry standard simulation tools and hardware. An integrated analysis environment has been developed that allows power system analysis on a range of equipment including the mix of mechanical and electrical systems, hybrid configurations and their controls.

Power management systems (PMS)

A full power management capability is tailored for individual vessel power systems. The intuitive PMS will handle the control of the entire electrical power system, the main generators, harbour generator, all thrusters and the shore connector.

Key features:
- Automatic load dependent start/stop
- Automatic stand-by start after black-out
- Sequential starting selection
- Automatic synchronisation/load sharing
- Load shedding
- Load and frequency control
- Propulsion mode control

Power distribution and conversion

A comprehensive range of medium and low voltage marine switchboards, distribution and motor starter boards are designed and supplied to meet both naval and commercial standards.

Rugged modular units have shock ratings from 15-22g, and bespoke naval designs up to 70g.
- Main/auxiliary switchboards
- Distribution/ emergency switchboards
- Intelligent switchboards
- Motor control centres (MCC)
- LV Drives

Electric/hybrid propulsion

A comprehensive propulsion system design and integration service is provided where Rolls-Royce takes responsibility for the performance of the overall propulsion system and each of its sub-systems, typically gensets, switchboards, drives and motors. (See page 52 for the main system options)

AFE Frequency drives

Rolls-Royce water cooled frequency convertors or drives are specially designed for marine installations, where there are special demands on ambient conditions and high power density. active front end (AFE) technology is used to avoid harmonic distortion and to transfer power in both directions. Modular construction maximises availability and minimises maintenance times, while ensuring a common spares holding. Drives can be used for induction synchronous and permanent magnet AC motors.

Power range:
- 380 - 500V AC 400 - 2500kW
- 525 - 690V AC 700 - 5700kW

Other advanced control and safety systems can be integrated into the propulsion system and comprise:

- Black-out prevention
  - Ensures necessary power is always available
  - Constantly monitors all key components which can cause an electrical blackout
- Low current starter
  - Reduces generator capacity required for motor starting
  - Performance exceeds that of Star-Delta and Auto-transformer starters
- Digital Excitation
  - Automatic voltage regulation for synchronous electrical machines
  - Direct voltage sensing with dedicated protection, bus-communication monitoring and over-boost device
  - Ensures stable network voltage in all load conditions

- Capacitor Monitoring
  - Capacitor bank with integrated monitoring for AFE drives
  - Gives a continuous capacitance status, can detect a single capacitor failure
  - Designed for LCL (low pass filter) and LC (sine filter) in AFE drives, and can be used on past and present systems

- Voltage Quality Monitoring
  - Monitors grid quality in electrical power plants with AFE drives
  - Analyses several specific harmonic ranges affected if a failure in LCL filter occurs, total harmonic distortion and live ground to earth voltage
  - Can be delivered as a stand-alone unit or integrated with black-out prevention systems
Syncrolift® shiplifts are designed to increase shipyard efficiency by reducing drydocking times by up to 50 per cent. Today, Syncrolifts have been installed in over 70 countries - more than 240 installations worldwide - used in over two million drydockings for vessels large and small. The modern synchronized AC drive systems and PLC controls have been refined and updated to ensure today’s systems are the most advanced, providing a fast, safe, profitable and versatile method of drydocking for ships up to 100,000dwt.
Syncrolift® a versatile solution

A Syncrolift® is simply an elevator for lifting ships of up to 100,000dwt from the water to a level where they can be quickly and safely transferred onshore for maintenance. They are also used to launch large concrete caissons weighing up to 25,000t and 52m wide. Each installation is a bespoke design to independent standards set by regulating authorities such as Lloyds Register.

Key features:
Articulated platform – mechanically supports the ship in a similar way to buoyancy when afloat. Minimises peak loads on the hull structure. The modular design simplifies future expansion to obtain increased lifting capacity and/or increased docking length.

Synchronised hoists – driven by AC synchronous motors. Every hoist in a system operates at the specified speed regardless of the individual loads on each hoist. They behave as if they are mechanically coupled.

Specialised wire ropes – designed for high strength and long life in a marine environment.

ATLAS Dockmaster® control system – a user-friendly system that assists the dockmaster with intuitive, fail-safe operation. Automatically calculates and displays the ship’s longitudinal centre of gravity and transverse centre of gravity, plus any fault indication.

Transfer systems - unlock the benefits of increased multi-berth capacity. Additional berths can be added at a fraction of the capital cost, compared to graving or floating docks. Various types of transfer system can be used depending on individual requirements, as illustrated.
Rolls-Royce is committed to supporting our customers to ensure vessels operate safely at design efficiency and unscheduled downtime is minimised. Our commitment to ensuring vessels continually operate at their peak has led to the steady evolution of Rolls-Royce support options. Conventional services range from the provision of spare parts, equipment repair, and exchange programmes, to upgrades improving vessel performance and efficiency while reducing emissions. Innovative new services, such as underwater intervention and condition monitoring have also been introduced. At the centre of our support philosophy is recognition that all customers have different and often unique requirements based on their fleet operations. Whatever the mix of requirements, Rolls-Royce is committed to meeting them.

24/7 support
Our marine technical support is only one call away.
Rotterdam : +31 20 700 6474
Houston : +1 312 725 5727
Singapore : +65 6818 5665
Contacting any of these numbers will put you through to our global support team or email: marine247support@rolls-royce.com
Global footprint
Wherever your vessel is located, Rolls-Royce is not far away.

Service Workshops

North & South America
1. Vancouver
2. Seattle, WA
3. Galveston, TX
4. St. Rose, LA
5. Pascagoula, MS
6. Fort Lauderdale, FL
7. Walpole, MA (Naval)
8. St John's
9. Rio de Janeiro

Europe
10. Dunfermline
11. Portsmouth
12. Brattvaag
13. Bergen
14. Ulsteinvik
15. Aalborg
16. Kristinehamn
17. Tarragona
18. Rotterdam
19. Genoa
20. Hamburg
21. Gdynia

Middle East, Africa, Asia
22. Walvis Bay
23. Dubai
24. Mumbai
25. Singapore
26. Guangzhou
27. Hong Kong
28. Shanghai
29. Busan
30. Perth
31. Melbourne

Other Services Facilities

A. Dutch Harbor, AK**
B. Cleveland, OH**
C. Houston, TX
D. Veracruz & Cuidad Del Carmen
E. Santiago
F. Bilbao
G. Paris
H. Helsinki
I. St. Petersburg
J. Piraeus
K. Istanbul
L. Dalian
M. Vladivostok
N. Kobe
O. Christchurch

Product Centres*

Austevoll - (Power electric systems)
Bergen - (Engines)
Bergen - (Power electric systems)
Brattvaag - (Deck machinery)
Dunfermline - (Stabilisers)

Stavanger - (Subsea)
Hjørringvåg - (Seismic & Subsea)
Kokkola - (Waterjets)
Kristinehamn - (Propellers)
Longva - (Automation & control)

Molde - (Seismic)
Rauma - (Azimuth thrusters)
Hagavik - (Steering gear)

Regional parts & Services personnel locations

Training Centres

Álesund
Singapore
Indianapolis, IN (open in 2013)

* Product centres are not shown on map. Refer to in directory.
** Seasonal containerised workshops
Focused on training
Experienced and informed people are a key asset

Regular training ensures you get the most out of a vessel’s equipment and systems, and that they are operated and maintained efficiently and safely. The latest simulators and products are available at our training centres in Norway and Singapore, for crew training prior to any new vessel deployment. A new training centre in the US will be operational in 2013.

We offer courses that are:
• Classroom-based
• Onboard your vessel
• On-line

Simulator training
Extensive use is made of simulators to ensure crews operate safely and efficiently. The centre at Ålesund, Norway, has a full-scale 360° bridge simulator.
• Dynamic Positioning simulator – practise manoeuvring around an oil platform in all types of sea states. Replicated realistic situations using a complete operator station arranged as an aft bridge
• Simulator domes – allows users to train on a number of operations as they can be configured for systems or stand-alone operations like subsea, bridge, crane or winch operations
• Winch simulator – enhanced with the latest winch remote control and monitoring system to help crews learn how to handle complex winch operations.
With 24/7 technical support, you no longer have to search for the right point of contact. The team has direct access to our product centres should additional support be required. Our 24/7 technical support team handles your call from the time it is received to the time the issue is resolved. For the more complex issues, a product specialist will be assigned. Our priority is to get the right expertise quickly matched to the issue to provide the answers you need.

Contacting any of these numbers will put you through to our global support team

**Rotterdam:**  
+31 20 700 6474

**Houston:**  
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**Singapore:**  
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**Email:** marine247support@rolls-royce.com
## Contact Information

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Norway, Brattvaag - Deck Machinery

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<thead>
<tr>
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<tr>
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<td><strong>Address</strong></td>
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<tr>
<td><strong>Vladivostok 690065, Russia</strong></td>
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<tr>
<td><strong>Office 41H, 32, Nevsky pr., 191011</strong></td>
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<th><strong>Singapore</strong></th>
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<td><strong>Email</strong></td>
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<td><strong>Address</strong></td>
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<td><strong>Estartexe, 8 oficina E, 48940</strong></td>
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<tr>
<td><strong>Leioa - Vizcaya, Spain</strong></td>
</tr>
</tbody>
</table>
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Email service.tarragona@rolls-royce.com
Address C/Dinamarca s/n (Pol. Ind. Constanti), 43120 Constanti, Tarragona Spain
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Sweden, Kristinehamn - Propellers

Telephone + 46 550 840 00
Email techsup.sweden@rolls-royce.com
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Turkey, Istanbul

Telephone + 90 216 446 9999
Email service.turkey@rolls-royce.com
Address Nazan Sok. No:2 Lagoon Plaza D:3, 34940 Tuzla, Istanbul, Turkey
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U.A.E, Dubai

Telephone + 971 4 883 3881
Email service.dubai@rolls-royce.com
Address P.O. Box no - 261103, Oil Field Supply Centre, Shed no - 47 Jebel Ali free Zone. Dubai, U.A.E.
24-Hr Emergency No. + 971 5 0645 9170

UK, Dunfermline - Stabilisers

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Email aftermarket.dunfermline@rolls-royce.com
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Telephone + 44 2392 310 000
Email marineinfo@rolls-royce.com
Address North harbour Road, Cosham, Portsmouth, PO6 3TL, UK

USA, Cleveland, OH

Containerised workshops are open during the operating period. Please contact Fort Lauderdale office. Tel. + 1 954 436 7100

USA, Dutch Harbor, AK

Containerised workshops are open during the fishing months. Please contact Seattle office. Tel. + 1 206 782 9190

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<tr>
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<td><a href="mailto:service.seattle@rolls-royce.com">service.seattle@rolls-royce.com</a></td>
<td>1731 13th Ave. SW, Seattle, WA 98134, USA</td>
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Marine products and systems

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