Our mission is to assure you the perfect climate indoors, regardless of the weather outside.
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"To offer complete operational security to those who ensure ours"
INTRODUCTION

Naval applications are subject to some of the most challenging requirements found at sea as well as on land. As the archetypal mobile but heavy force, the navy is often called upon to channel disaster relief or secure distant areas. This may require it to sail anywhere in the world at short notice, including regions with extreme climates far from supply lines. When this happens, it is important to know that you can rely on your heating, ventilation and air-conditioning units no matter what.

Heinen & Hopman Engineering has long-established and wideranging practical experience in the maritime field. We also provide global coverage and 24-7 service availability thanks to major service points and spare part depots around the world. Our policy of total system responsibility means that we carry out the full cycle of customised design, production, installation and maintenance. In addition, Heinen & Hopman organises procurement, shipping, logistic support, assembly, testing and trials both onshore and off.

All components used in Heinen & Hopman units are subject to shock and vibration criteria and can be mounted on absorbers. All systems and devices mounted onboard are electromagnetically compatible.

Electromagnetic Interference (EMI) is minimised or shielded at the source through the fitting of:
- motors free of radio interference
- earthed foundations and aggregates
- shielded boxes and panels
- EMI-controlled custom-built components such as switches and relays, and shielded cables

After completion and commissioning, installations will be tested both during sea trials and in the harbour.

Specialism

- Heating systems
- Ventilation Systems
- Air Conditioning Systems
- Refrigeration Systems
- Air Conditioning Energy Savings Systems
- Heat Recovery systems
- Explosion proof HVAC+R
- Shock proof HVAC+R
- Non-magnetic HVAC+R
- Air filtering systems
- Proces ventilation systems
- Provision Cooling Plants
- Custom design & production
A cooling plant belongs to the main units of an air conditioning system. Without a cooling plant it will be impossible to meet a comfort inside climate when cooling is needed. A cooling plant consist of four main components "Compressor, condenser, expansion valve and evaporator". The diagram below shows the complete cooling circuit with all the main component as well the phase of the refrigerant in each stage of the circuit.

The selection of a cooling plant depends on several factors like the required cooling capacity, the refrigerant type and cooling medium.

**KEY FEATURES**
- High quality assured;
- Standard Capacity control 25%, 50%, 75% and 100%;
- Refrigerant 134a, [complies with the most ship classifications];
- All common power supplies available on request;
- Paint color standard RAL6011 other colors available on request;
- Easy accessible for maintenance and cleaning;
- Fully ventilated electric switch board;
- Easy cleanable condensers;
- Two fully independent circuit;
- Step less capacity control 25% till 100%;
- All other power supplies available on request;
- Troubleshooting on distance.

<table>
<thead>
<tr>
<th>Model number</th>
<th>( Q_0 ) (kW)</th>
<th>( P_a ) (kW) absorbed</th>
<th>( I_{\text{max}} ) (A)</th>
<th>Volume flow (m(^2)/h) condenser</th>
<th>Volume flow (m(^2)/h) chiller</th>
<th>Dimensions LxWxH (m)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHSCHSC Series 50 Hz</td>
<td>190 - 1100</td>
<td>2x32 - 2x172</td>
<td>2x92 - 2x465</td>
<td>2x16,5 - 2x93,9</td>
<td>27,8 - 161</td>
<td>3.20x1.00x1.66 - 4.50x1.75x2.25</td>
<td>1960 - 7000</td>
</tr>
<tr>
<td>HHSCHFC Series 50 Hz</td>
<td>190 - 1100</td>
<td>2x32 - 2x172</td>
<td>2x92 - 2x465</td>
<td>2x14,5 - 2x82,4</td>
<td>27,8 - 161</td>
<td>3.20x1.00x1.66 - 4.30x1.60x2.25</td>
<td>1960 - 6900</td>
</tr>
<tr>
<td>HHSCHSC Series 60 Hz</td>
<td>200 - 1200</td>
<td>2x38,5 - 2x206,9</td>
<td>2x101 - 2x509</td>
<td>2x17,4 - 2x102,6</td>
<td>29,4 - 176,2</td>
<td>3.20x1.00x1.66 - 4.50x1.75x2.25</td>
<td>1960 - 7000</td>
</tr>
<tr>
<td>HHSCHFC Series 60 Hz</td>
<td>200 - 1200</td>
<td>2x38,5 - 2x206,9</td>
<td>2x101 - 2x509</td>
<td>2x16,3 - 2x90,5</td>
<td>29,4 - 176,2</td>
<td>3.20x1.00x1.66 - 4.30x1.60x2.25</td>
<td>1960 - 6900</td>
</tr>
</tbody>
</table>
PRODUCTS - LOW MAGNETIC SHOCK-PROOF CHILLER

The low-magnetic shock-proof chilled water unit is specially designed for cooling of chilled water on Mine Counter Measure Vessels (MCMV). By using the right materials the magnetic permeability of the complete unit is kept below the maximum allowable value. This way magnetic mines will not be triggered by the ship’s magnetic interference. The specially designed shock proof frame in combination with the selected shock mounts makes the unit suitable to withstand high shock loads.

KEY FEATURES
- Two separate cooling circuits;
- Capacity control 25 / 50 / 75 / 100%;
- Special low magnetic compressors / motors;
- Shock proof tested according MIL-S-901;
- Magnetic silencing characteristics according MIL-STD-2142A;
- Airborne & structure borne noise according MIL-STD-740-1/2;
- Mechanical vibrations according MIL-STD-167;
- Compact design in two modules making the unit suitable to be transported through small openings;
- Build on and fully pre-wired control panel;
- Cables according MIL-C-24640 & 24643;
- Stainless steel SS316Ti frame.

<table>
<thead>
<tr>
<th>Dimensions (LxWxH)</th>
<th>Cooling capacity</th>
<th>Main power supply</th>
<th>Weight</th>
<th>Compressor speed</th>
<th>Evaporating temperature</th>
<th>Condensing temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>3600x1500x1500 mm</td>
<td>2 x 175 kW</td>
<td>3x440V-60Hz</td>
<td>3550 kg</td>
<td>3500 RPM</td>
<td>1°C</td>
<td>45°C</td>
</tr>
</tbody>
</table>
As part of an on-going quest to optimize systems and services, Heinen & Hopman has introduced the Turbocor compressors to the maritime industry. With a focus on the environment and cost savings, this HVAC-R technique makes a world of difference in efficiency, sustainability and applicability. The Turbocor compressors benefit from aerospace and industrially proven technologies such as magnetic bearings, variable-speed centrifugal compression and digital electronic controls. Combined with Heinen & Hopman’ exceptional knowledge of marine HVAC-R technology, this enables the Turbocor range of compressors to achieve the highest overall efficiencies for HVAC-R applications in the maritime sector.

Taking up half the space of conventional compressors and being about one fifth of their weight, Turbocor compressors reduce energy consumption by up to 50% and are around 60% more efficient than comparable compressors. They also have a long service life due to the absence of mechanical wear surfaces offered by frictionless magnetic bearing technology. This further enhances efficiency while adding value in terms of reliability, noise reduction and maintenance.

**KEY FEATURES**
- HFC refrigerant for optimum environmental position;
- Outstanding part load efficiency;
- High full load efficiency;
- Intelligent, self-contained control;
- Light weight;
- Low vibration;
- Oil free operation reduces complexity and cost, improves heat exchange efficiency and eliminates disposal issues;
- Very low sound;
- Soft starting;
- Small footprint;
- Unique technology made ready for the maritime industry.

<table>
<thead>
<tr>
<th>Model number</th>
<th>Dimensions (LxWxH)</th>
<th>Cooling capacity</th>
<th>Main power supply</th>
<th>Weight</th>
<th>Noise level</th>
<th>Starting current</th>
<th>Voltage fluctuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT-300</td>
<td>788x518x487 mm</td>
<td>250 - 320kW each</td>
<td>3x380V-50Hz / 3x440V-60Hz</td>
<td>120 kg</td>
<td>70 db(A) @ 1.5m</td>
<td>&lt; 2A</td>
<td>&lt; 10%</td>
</tr>
</tbody>
</table>
A special Maritime Absorption Chiller has been designed considering and resolving negative aspects such as the refrigerant’s overflow and mixing caused by ship motions, special welding, structure strength and performance de-rating in view of the ship pitching and rolling. After careful design and research the absorption chillers were tested on a moving bed to simulate the marine conditions. Our Maritime Absorption Chillers can be steam or hot water fired and seawater cooled with Cu/Ni or Ti absorber and condenser heat exchangers. It can be used to replace a conventional electric chiller (heat source must be 100% of the time available) or in a hybrid version (Electric chiller as back up).

**KEY FEATURES**

- Customized design for vessel conditions
- Anti-rolling & pitching construction
- Standard designed for hot water (min. 75°C) & steam (1 ÷ 3 bar(g)) as a heat source.
- Other waste heat sources available on request (i.e exhaust gas).
- Seawater absorber & condenser in Cu/Ni or Ti.
- Range from ~150kW to ~5,000kW
- COP up to 0,8

<table>
<thead>
<tr>
<th>Model number</th>
<th>Dimensions in length</th>
<th>Dimensions in width</th>
<th>Dimensions in height</th>
<th>Weight</th>
<th>Cooling capacity</th>
<th>Chilled water Inlet</th>
<th>Chilled water Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWM-60 to SWM-1200</td>
<td>2600 - 6818 mm</td>
<td>1400 - 2829 mm</td>
<td>1877 - 3450 mm</td>
<td>3.9 - 36.4 kg</td>
<td>176 - 3868 kW</td>
<td>12°C</td>
<td>7°C</td>
</tr>
</tbody>
</table>
The propane chiller is our answer to the phase out of greenhouse gases. Refilling existing systems with virgin R22 has been prohibited since 2010 and as of 2015, refilling existing systems with recycled R22 has been prohibited as well. The quest to find an environmentally friendly alternative for R22 led to the conclusion that propane (R290) would be the best substitute. Propane has very similar thermodynamic behavior to R22 and it is a natural refrigerant. By using R290 as a refrigerant, the environmental impact is reduced, because R290 has a zero ODP (Ozone Depletion Potential), a very low GWP (Global Warming Potential) and an assumed equal energy efficiency to R22. Propane is a flammable refrigerant and therefore cautious handling of the refrigerant is required. The most important safety concern is to ensure that in case of a leakage the refrigerant doesn't ignite. By placing the cooling system inside a casing, the possible explosive atmosphere is located inside the casing when a leakage occurs. By using an ATEX fan, the casing can be ventilated so the mixture of gas and air can be discharged outside the casing. We strongly believe it is important to be able to live in a world with optimal environmental conditions. Not just for us, but for the next generations to come as well. With our propane chiller you benefit from the latest, highly efficient, chiller technology while knowing it’s utilizing an environmentally friendly refrigerant.

**KEY FEATURES**

- In accordance with F-gas regulations;
- Environmentally friendly;
- Highly energy efficient.
PRODUCTS - REPLACEMENT CHILLER

An AC-chiller is an essential piece of equipment onboard a ship. So when a unit breaks down, is it better to repair the unit or replace the chiller altogether? One of the greatest challenges with replacement is the difficulty of gaining access. This expensive and time-consuming operation involves cutting into the hull, removing the existing chiller and mounting a new one in its place. Now, with our innovative line of custom Replacement Chillers, Heinen & Hopman offers a new way of overcoming this hurdle. The difference with 'normal' AC-chillers lies in the fact that Heinen & Hopman’s Replacement Chillers are specially designed and manufactured as a building package. While still intended as a permanent solution, they are suitable for transporting through the doors inside a ship and no hole has to be cut in the hull. In addition to the obvious money savings, this also means you don’t have to wait to replace your old AC unit with a state-of-the-art, fully customisable Replacement Chiller. The complete project is handled by our specialists, including:

- Design and engineering;
- Manufacturing and testing;
- Disassembly and shipment;
- Onboard assembly and commissioning.

KEY FEATURES

- High quality assured;
- Fully custom built solutions available on request;
- Refrigerant 407C, (complies with all ship classifications);
- Proven method for more than a decade;
- Fully tested a factory and in the field;
- Power management system;
- Frequency controllers;
- All common power supplies available on request;
- Paint colour fully customable;
- Sea water or fresh water cooled.

<table>
<thead>
<tr>
<th>Model number</th>
<th>Dimensions (LxWxH) in mm</th>
<th>Cooling capacity</th>
<th>Weight</th>
<th>P. absorbed</th>
<th>P. Installed</th>
<th>Chilled water Inlet</th>
<th>Chilled water Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>20TR (2-stage)</td>
<td>1742x950x1789</td>
<td>70 kW</td>
<td>1.100 kg</td>
<td>2 x 11 kW</td>
<td>2 x 16 kW</td>
<td>12°C</td>
<td>6°C</td>
</tr>
<tr>
<td>30TR (2-stage)</td>
<td>1942x1050x1789</td>
<td>106 kW</td>
<td>1.250 kg</td>
<td>2 x 17.7 kW</td>
<td>2 x 25 kW</td>
<td>12°C</td>
<td>6°C</td>
</tr>
<tr>
<td>40TR (2-stage)</td>
<td>1942x1050x1789</td>
<td>141 kW</td>
<td>1.400 kg</td>
<td>2 x 24.5 kW</td>
<td>2 x 36 kW</td>
<td>12°C</td>
<td>6°C</td>
</tr>
<tr>
<td>40TR (3-stage)</td>
<td>1942x1200x2002</td>
<td>141 kW</td>
<td>1.600 kg</td>
<td>3 x 15.8 kW</td>
<td>3 x 23 kW</td>
<td>12°C</td>
<td>6°C</td>
</tr>
<tr>
<td>50TR (3-stage)</td>
<td>1942x1200x2252</td>
<td>176 kW</td>
<td>1.650 kg</td>
<td>3 x 21 kW</td>
<td>3 x 29 kW</td>
<td>12°C</td>
<td>6°C</td>
</tr>
<tr>
<td>60TR (3-stage)</td>
<td>1942x1200x2252</td>
<td>211 kW</td>
<td>1.900 kg</td>
<td>3 x 24.5 kW</td>
<td>3 x 36 kW</td>
<td>12°C</td>
<td>6°C</td>
</tr>
</tbody>
</table>
PRODUCTS - MGO COOLER

The MGO Cooler has been developed in response to the MARPOL sulphur emission regulations. Currently, the most widely used fuel in the shipping industry is Heavy Fuel Oil (HFO). Because of its high content in sulphur and heavy metals, sea going vessels burning HFO emit large amounts of air pollutants and are consequently a major environmental issue worldwide. The MARPOL sulphur emission regulations have been implemented through a series of deadlines that progressively lower the maximum sulphur content of the fuel over years. Ships sailing in ECA waters have already updated their operations to stricter sulphur limitations in 2010, mainly by switching to Low Sulphur Fuel Oil with a maximum sulphur content of 1.0%. In upcoming regulations the allowed maximum sulphur content will be set to 0.1%. Technically, this is impossible to achieve in HFO. Therefore, shipping operators currently face a great challenge on how to implement the technical solutions to adapt existing or future installations to the new MARPOL standards.

Our MGO has been developed based upon decades of experience in successful worldwide sold and operating Heinen & Hopman marine chillers. We have translated our expertise in climate control to fully meet our clients’ needs when adapting their operation to the upcoming emission limitations. Thanks to a precise fuel temperature control, our MGO cooler ensures an optimal protection for any type of engine when fuel is switched from HGO to MGO.

KEY FEATURES

• Customized design for vessel conditions;
• Accurate fuel viscosity and temperature drop control;
• Available with design cooling capacities from 4 to 46 kW suitable for main engine power ranging from 2800 to 3250 kW;
• Sea water or fresh water cooled condenser;
• Designed according to EN 378-2008-Refrigerating Systems and Heat Pumps Safety and Environmental Requirements;
• Delivered for ‘Plug & Play’ which makes it easy to install and minimizes the ship downtime.

<table>
<thead>
<tr>
<th>Range</th>
<th>Model number</th>
<th>Dimensions (LxWxH) in mm</th>
<th>Qo (kW)</th>
<th>Weight (kg)</th>
<th>Pe absorbed (kW)</th>
<th>I Max (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50Hz</td>
<td>HH MGO 4 SW</td>
<td>1100x600x640</td>
<td>4</td>
<td>230</td>
<td>1.5</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>HH MGO 10 SW</td>
<td>1200x650x700</td>
<td>10</td>
<td>260</td>
<td>3.35</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>HH MGO 16 SW</td>
<td>1200x750x700</td>
<td>16</td>
<td>320</td>
<td>4.57</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td>HH MGO 30 SW</td>
<td>1800x900x750</td>
<td>30</td>
<td>550</td>
<td>8.69</td>
<td>20.4</td>
</tr>
<tr>
<td></td>
<td>HH MGO 46 SW</td>
<td>2200x950x800</td>
<td>46</td>
<td>700</td>
<td>13.22</td>
<td>21.5</td>
</tr>
<tr>
<td>60Hz</td>
<td>HH MGO 4 SW</td>
<td>1100x600x640</td>
<td>4</td>
<td>230</td>
<td>1.4</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>HH MGO 10 SW</td>
<td>1200x650x700</td>
<td>10</td>
<td>260</td>
<td>3.35</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>HH MGO 16 SW</td>
<td>1200x750x700</td>
<td>16</td>
<td>320</td>
<td>5</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>HH MGO 30 SW</td>
<td>1800x900x750</td>
<td>30</td>
<td>550</td>
<td>10.5</td>
<td>20.4</td>
</tr>
<tr>
<td></td>
<td>HH MGO 46 SW</td>
<td>2200x950x800</td>
<td>46</td>
<td>700</td>
<td>12.15</td>
<td>23.7</td>
</tr>
</tbody>
</table>
PRODUCTS - CONDENSING UNIT

Cooling is accomplished by the direct expansion of a refrigerant in a cooling coil (DX system). The DX system includes a refrigerant condensing unit that can be either a seawater-cooled type, or an air-cooled type. More than one evaporator cooling coil can be connected to a single condensing unit (co-balanced). DX systems are generally confined to the smaller and intermediate tonnage air conditioning applications (less than 50 tons) and are used for all-air systems / air-water systems.

Heinen & Hopman’s standard water cooled condensing units work in conjunction with one or multiple evaporators to form an air conditioning or high temperature refrigeration system.

**KEY FEATURES**

- Simplified system;
- Localised piping system;
- Lower off-coil temperatures;
- Compact equipment
- Fits through standard doors
- Sea water or Fresh water cooled;
- Low weight.

<table>
<thead>
<tr>
<th>Model number</th>
<th>( Q_0 ) (kW) R407C/R134a</th>
<th>( P_e ) (kW) absorbed</th>
<th>( I_{\text{max}} ) (A)</th>
<th>Volume flow (m³/h)</th>
<th>Dimensions LxWxH (m)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHSCHSC Series 50 Hz</td>
<td>30/20 - 220/145</td>
<td>9/5 - 60/36</td>
<td>20 - 135</td>
<td>6 - 27</td>
<td>1.22x0.52x0.75 - 1.76x0.66x1.27</td>
<td>250 - 870</td>
</tr>
<tr>
<td>HHSCHFC Series 50 Hz</td>
<td>30/20 - 220/140</td>
<td>9/5 - 60/38</td>
<td>20 - 135</td>
<td>10 - 48</td>
<td>1.18x0.52x0.75 - 1.76x0.66x1.27</td>
<td>250 - 870</td>
</tr>
<tr>
<td>HHSCHSC Series 60 Hz</td>
<td>37/25 - 265/178</td>
<td>10/6 - 71/43</td>
<td>20 - 135</td>
<td>10 - 60</td>
<td>1.22x0.52x0.75 - 1.76x0.66x1.27</td>
<td>250 - 870</td>
</tr>
<tr>
<td>HHSCHFC Series 60 Hz</td>
<td>37/24 - 265/170</td>
<td>10/6 - 71/45</td>
<td>20 - 135</td>
<td>10 - 90</td>
<td>1.18x0.52x0.75 - 1.76x0.66x1.27</td>
<td>250 - 870</td>
</tr>
</tbody>
</table>
PRODUCTS - AIR HANDLING UNIT

Air-Handling Units DB are used for the off-shore and marine industry. The air handling units are specially designed to be compact and allow for fitting in the often limited space of ships, yachts and offshore modules. The fans are made of high-quality materials to withstand the extreme sea climate conditions.

The Heinen & Hopman air handling unit is made of the most sturdy materials to withstand extreme cold or hot and humid air conditions, the salt sea air and the extreme environments.

KEY FEATURES
- Aluminium framework - galvanized steel or welded stainless steel are optional;
- Built according to ATEX directives;
- Streamlined manufacturing process accelerates project cycles and increases speed to installation;
- Tested before delivery;
- Reduced sound levels.

PRODUCTS - SELF-CONTAINED UNIT

Heinen & Hopman’s self-contained cooling units are specially designed for marine application and are complete with a compressor, condenser, evaporator and fan built together in a casing. All electrical wiring and refrigeration piping built within.

KEY FEATURES
- Sea water or Fresh water cooled;
- Electro-coated mild-steel casing with powder-coated paint (color on request);
- Removable front and side panels for easy access and maintenance.
PRODUCTS - PACKAGE UNIT

The package unit type HH-PU is a compact unit specially designed for marine installations as air supply for single pipe and or dual pipe systems on board of ships and platforms.

The HH-PU contains an air handling unit and a cooling plant.

KEY FEATURES

- Semi-hermetic compressor;
- Frame of galvanized steel or stainless steel including vibration dampers;
- All necessary control equipment for accurate control of correct working of the package unit;
- Design comply according to EN 1886 and EN 378, other International standards are available on request.

<table>
<thead>
<tr>
<th>Model number</th>
<th>Air quantity range</th>
<th>Cooling capacity range</th>
<th>Compressor power range</th>
<th>Heating capacity range</th>
<th>Fan motor power consumption</th>
<th>Class</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH-PU-1</td>
<td>1500-3500 m³/hr</td>
<td>30-65 kW</td>
<td>9-19 kW</td>
<td>20-50 kW</td>
<td>1.5-3 kW</td>
<td>IP 54 isol. F</td>
<td>2650x1030x1660</td>
</tr>
<tr>
<td>HH-PU-2</td>
<td>3500-7000 m³/hr</td>
<td>65-95 kW</td>
<td>18-26 kW</td>
<td>50-100 kW</td>
<td>3-5.5 kW</td>
<td>IP 54 isol. F</td>
<td>3050x1260x1960</td>
</tr>
<tr>
<td>HH-PU-3</td>
<td>7000-11000 m³/hr</td>
<td>95-135 kW</td>
<td>26-39 kW</td>
<td>70-150 kW</td>
<td>5.5-11 kW</td>
<td>IP 54 isol. F</td>
<td>3150x1530x2080</td>
</tr>
<tr>
<td>HH-PU-4</td>
<td>11000-15000 m³/hr</td>
<td>135-170 kW</td>
<td>39-45 kW</td>
<td>140-220 kW</td>
<td>11-15 kW</td>
<td>IP 54 isol. F</td>
<td>3350x1800x2230</td>
</tr>
</tbody>
</table>
Cabin units supply conditioned air into the accommodation of ships and offshore platforms. There are different types of cabin units:

- **Single-duct cabin units**: single-duct air-handling unit
- **Dual-duct cabin units**: dual-duct air-handling unit
- **Reheat cabin units**: single-duct cabin unit with electric reheater and automatic air temperature control

**KEY FEATURES**

- Plug and play installation and commissioning;
- Excellent noise reducing capacities;
- Air flow: 250 - 450 m³/h;
- Air capacity regulating device;
- Fire protection: B-15 class certified.

<table>
<thead>
<tr>
<th>Model</th>
<th>Casing</th>
<th>Insulation</th>
<th>Diffuser (upper part)</th>
<th>Diffuser (lower part)</th>
<th>Weight aluminium</th>
<th>Weight galvanized</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCM single-duct</td>
<td>Galvanized steel or aluminium</td>
<td>Mineral wool, 160 kg/m³ and thickness of 20 mm</td>
<td>Galvanized steel, aluminium or stainless steel</td>
<td>Galvanized steel, aluminium or stainless steel</td>
<td>2.85 - 4.85 kg</td>
<td>8.3 - 14.5 kg</td>
</tr>
<tr>
<td>HCD dual-duct</td>
<td>Galvanized steel or aluminium</td>
<td>Mineral wool, 160 kg/m³ and thickness of 20 mm</td>
<td>Galvanized steel, aluminium or stainless steel</td>
<td>Galvanized steel, aluminium or stainless steel</td>
<td>5.0 - 8.8 kg</td>
<td>13.8 - 16 kg</td>
</tr>
<tr>
<td>HCM-E single-duct reheat</td>
<td>Galvanized steel or aluminium</td>
<td>Mineral wool, 160 kg/m³ and thickness of 20 mm</td>
<td>Galvanized steel, aluminium or stainless steel</td>
<td>Galvanized steel, aluminium or stainless steel</td>
<td>3.65 - 5.6 kg</td>
<td>10.6 - 16.3 kg</td>
</tr>
</tbody>
</table>
PRODUCTS - CABIN FAN COIL UNIT

The CFU-500 Enigma, is a beautiful state of the art designed fan coil unit. Vertical installation makes it possible to install the unit in narrow service spaces outside cabins or public rooms. Robust lightweight casing executed in reinforced plastics with flame-retardant special designed insulating material. This unique material allows us to create the lightest fancoil unit available in its segment. Easy maintenance through one (1) access panel, the fan coil is able to be connected with the network and have interfacing with balcony doors and hotel management for automatic adjustment to ECO/Ventilation mode on occupancy or presence. In Eco mode, it also controls the fresh air supply and exhaust for correct balancing. Their controller is a newly designed wall mounted unit, 4 inch touchscreen type. It controls the room’s temperature by cooling, variable automatic airflow and stepples reheating. It can even match the room’s color mood by a subtle led lit backlight.

Easily controlled
The cabin climate is controlled by a newly designed 4,3” touchscreen thermostat, which matches the room’s color mood by a subtle backlighting. The clean and intuitive interface allows for easy adaptation of the climate to the user’s desires.

KEY FEATURES
- State-of-the-art design.
- Future-proof design considering increasing sustainability and comfort requirements.
- Energy-efficient due to the integrated intelligence.
- Minimal fluctuations due to continuously measurements.
- Plug and play installation and commissioning.
- Excellent noise reducing capacities.
- Stand-alone or network connection possible.
- Clean and intuitive 4,3” touchscreen thermostat.
- MED B-15 certificated.
PRODUCTS - OVERPRESSURE SYSTEM

An overpressure system creates a safe working climate on board for you, your staff and your equipment. Due to the artificial pressure difference in the cabin, outside air will never enter except through the installed filters. The functioning of an overpressure system depends directly on the seal of your cabin. The more openings are closed off, the less air is required to get the cabin to the desired pressure. The overpressure unit ensures that only the smallest amount of air is let inside. In addition, the incoming, filtered air is immediately heated or cooled via the air conditioning system. Heinen & Hopman offers fully customised overpressure units that meet the current requirements.

KEY FEATURES
• Compact design;
• Proper filtering for a safe living environment;
• Heating;
• Custom production that meet wishes and demands.

PRODUCTS - GALLEY INDUCTION VENTILATION

The induction system helps creating a perfect air envelope around the cooking area. In this way almost all fumes and contamination will be extracted. By feeding air from the central air-handling unit directly to the galley range hood not only helps creating that specific air envelope, it also contributes to lower energy loss because not all the treated air in the kitchen is extracted by the galley range hood. This means in the end the galley is not only free from fumes, smells and contaminants; it is also saving money by saving energy.

KEY FEATURES
• Cost effective and energy saving;
• Air envelope around the cooking area;
• Perfect working conditions for end-users;
• Fully customizable SCADA Control system;
• Fully customizable solutions for galley ventilation.
PRODUCTS - LIQUID TEMPERATURE CONTROL UNIT

The liquid temperature control unit (LTCU) provides a cooling liquid flow which is used to remove the heat produced by equipment and sensors and streamed in from the ambient. A typical principle diagram is shown in figure below. The heat is removed to the ships chilled water by the LTCU (right side in the figure). This is referred to as the primary circuit. The liquid flow to the systems is referred to as the secondary circuit (left side in the figure). When the sensor systems are off, and there is no dissipation, the LTCU’s are used to keep the sensor systems on their operational temperature. The LTCU has a heater for the heating of the secondary cooling liquid. Additional functions of the LTCU are the overpressure protection of the liquid circuit by means of expansion compensation devices and safety overpressure relief valves. For reasons of redundancy and flexibility multiple LTCU’s can be considered. The casing of the LTCU is built out of a carbonsteel, dipcoat-primed power coated frame and panels out of double sheet aluminium with in between a layer Rock-wool 223. The front side of the casing is fitted with a door, which gives access for maintenance. The coating is available in all RAL colors.

KEY FEATURES
- Compact design;
- Electronic magnetic control (EMC);
- Shock qualification MIL-S-901.

<table>
<thead>
<tr>
<th>Dimensions (LxWxH)</th>
<th>Cooling capacity</th>
<th>Heating capacity</th>
<th>Main power supply</th>
<th>Weight</th>
<th>Chilled water Inlet</th>
<th>Chilled water Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>603x603x1800 mm</td>
<td>45 kW</td>
<td>10 kW</td>
<td>3ph / 440V-60Hz</td>
<td>± 325 kg</td>
<td>7°C</td>
<td>13°C</td>
</tr>
</tbody>
</table>
PRODUCTS - BOOSTER COOLER

The Booster Cooler’s function is to keep the internal air of the electrical room at the defined temperature. The Booster Cooler is not designed for cooling of the accommodation but for unmanned spaces. For example, at electrical rooms or other unmanned spaces where the crew occasionally visits for maintenance. To avoid overheating the Booster Cooler extracts air e.g. from the electrical room and cools the air to its set point temperature.

KEY FEATURES

• Compact design;
• Low noise;
• Electronic magnetic control (EMC);
• Shock qualification MIL-S-901.

<table>
<thead>
<tr>
<th>Dimensions (LxWxH)</th>
<th>Cooling capacity</th>
<th>Max air flow</th>
<th>Main power supply</th>
<th>Weight</th>
<th>Chilled water primary circuit temperature</th>
<th>Environment / Storage temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>600x400x1000 mm</td>
<td>2.86 kW</td>
<td>550 m³/h</td>
<td>1ph / 440V-60Hz</td>
<td>± 100 kg</td>
<td>8°C to 13°C</td>
<td>-25°C to +70°C</td>
</tr>
</tbody>
</table>
PRODUCTS - NBC AIR FILTRATION UNIT

Our nuclear, biological and chemical (NBC) filtration system provides clean filtered fresh air, free from NBC contaminates in an over pressure citadel. Three levels of filtration (coalescer, dust, and composite filtration) is applied to incoming air before being supplied to the citadel. The over pressure citadel removes the need for occupants to wear gas masks and protective clothing during NBC attacks. Two modes of operation allows clean fresh air to be supplied during peace time, or conventional combat times, and filtered fresh air during NBC warfare. The control system constantly compares inside and outside pressures, and should the citadel pressurization fail, provide a visual and/or audible warning. The NBC filter unit is designed for external installation to citadels with a supply duct to the citadel interior. The NBC control unit is designed to be installed internally within the citadel covering the air duct to diffuse air entering the citadel. When the NBC filter unit is operational the unit is designed as a fail-safe system, i.e. should the unit sustain damage or an air seal leak, then clean air will leak out of the unit rather than contaminated air being drawn in. With our NBC filter units, provided with STANAG4447 filter elements, in combination with our overpressure controllers, a safe operating environment (citadel) is created, ensuring the optimal performance of the crew and electronic equipment. Our NBC filter units are available in a capacity range of 900 up to 1800m³/h.

KEY FEATURES
- Unique innovative design;
- Smart and powerful NBC / TIM Filter clamping system;
- Easy service and maintenance access;
- Compact and lightweight;
- Completely closed system;
- Doors equipped with end switches;
- Analyzed for gas tightness, shock, vibration and EMC;
- High shock resistance. Up to 60g vertical
- Design according NATO standard;
- Design according STANAG 4447;
- NBC Filter capacity 900, 1200 and 1800m³/h.

<table>
<thead>
<tr>
<th>Model number</th>
<th>Air quantity</th>
<th>Filters</th>
<th>Weight (incl-</th>
<th>Capacity</th>
<th>Rated power</th>
<th>Pst</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFU-500 50/60 Hz</td>
<td>900 m³/h</td>
<td>3 pcs</td>
<td>900 kg</td>
<td>10.5 kW</td>
<td>2.6 kW / 3.12 kW</td>
<td>1.000 Pa</td>
</tr>
<tr>
<td>AFU-1200 50/60 Hz</td>
<td>1.200 m³/h</td>
<td>4 pcs</td>
<td>1.250 kg</td>
<td>10.5 kW</td>
<td>4.0 kW / 4.8 kW</td>
<td>1.000 Pa</td>
</tr>
<tr>
<td>AFU-1800 50/60 Hz</td>
<td>1.800 m³/h</td>
<td>6 pcs</td>
<td>1.400 kg</td>
<td>10 kW</td>
<td>4.0 kW / 4.8 kW</td>
<td>1.000 Pa</td>
</tr>
</tbody>
</table>
PRODUCTS - CARGO VENTILATION

Cargo hold ventilation is very important as it minimizes risk of harm or damage to cargo. A proper ventilation system assures the quality of the transported goods by preventing the formation of condensation in cargo spaces, reducing the harmful heating of the cargo and removing potential hazardous gases from cargo spaces. Dependent on the type of cargo transported by the ship, we can design ventilation systems perfectly suitable for any situation. All of our cargo hold ventilation systems are guaranteed to be strong, functional and easy to maintain. Heinen & Hopman's expertise is to provide our clients with custom-built heating, ventilation, air conditioning and refrigeration systems, offering solutions to their needs.

KEY FEATURES

- Fully customisable cargo hold ventilation;
- Accurately designed, manufactured and commissioned;

PRODUCTS - EXPLOSION PROOF EQUIPMENT

Explosion proof HVAC systems are essential in hazardous areas in petrochemical installations such as offshore platforms for the oil and gas industry. Our explosion proof heating, ventilation and air conditioning systems are designed by our skilled engineers and offer a safe solution of the highest level of quality. These systems are durable and reliable, and they are corrosion protected, designed to withstand the harsh environment in which offshore platforms are located. Some of our commonly supplied ATEX certified HVAC equipment includes:

- Air handling units
- Air cooled condensers
- Axial fans
- Control panel
- (Electric) heating systems
- Exhaust fans
- H2S filtering unit
- Package air conditioning unit
- TR unit

We can guarantee you our heating, ventilation and air conditioning systems are durable and above all safe.
PRODUCTS - CONTROL STARTER PANEL

Combining both control and starting technology, the control starter panel offer a unique total product, at the high levels of quality and reliability that Heinen & Hopman is known for. The starter panel contains the main circuits of the electrical installation. Motor, pumps and heaters are started and stopped from the panel. Usually, these circuits are controlled by the PLC from the starter panel.

KEY FEATURES

• Copper rail system for large power consumers;
• Equipped with frequency controllers;
• Energy management (development);
• PLC/Screen controls + HMI.
Our mission: To ensure you the perfect climate indoors, regardless of the weather outside.

### MAJOR NAVY PROJECTS

#### Activities
- Consultancy
- Design & Engineering
- Project management
- Custom built equipment
- Installation & Implementation
- Supervision
- Commissioning
- Service & Maintenance

#### Equipment
- Air intake systems for HVAC
- Air Handling Units
- Fan coil units
- Refrigeration equipment
- Centrifugal fans
- Axial fans
- Air filters
- Duct heating & cooling Coils
- Dampers
- Sound attenuators
- Supply & extract
- Ornaments
- Heaters
- Sea water coolers
- Self-contained units
- Package units
- HVAC control systems
- HVAC instrumentation
- Piping & Insulation
- Ducting & Insulation

#### Specialism
- Heating systems
- Ventilation Systems
- Air Conditioning Systems
- Refrigeration Systems
- Air Conditioning Energy Savings Systems
- Heat Recovery systems
- Explosion proof HVAC+R
- Shock proof HVAC+R
- Non-magnetic HVAC+R
- Air filtering systems
- Process ventilation systems
- Provision Cooling Plants
- Custom design & production
<table>
<thead>
<tr>
<th>CARRIERS</th>
<th>CORVETTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INS Ambuda</strong></td>
<td><strong>Derzky</strong></td>
</tr>
<tr>
<td>Owner: Indian Navy</td>
<td>Owner: Russian Navy</td>
</tr>
<tr>
<td>Shipyard: Vipul Shipyard</td>
<td>Shipyard: Severnaya Shipyard</td>
</tr>
<tr>
<td>Length: 50 M</td>
<td><strong>Milgem I/II/III/IV</strong></td>
</tr>
<tr>
<td>Delivery year: 2010</td>
<td>Owner: Turkish Navy</td>
</tr>
<tr>
<td></td>
<td>Shipyard: STM Marine</td>
</tr>
<tr>
<td></td>
<td>Length: 99 M</td>
</tr>
<tr>
<td></td>
<td>Delivery year: 2012-2016</td>
</tr>
<tr>
<td><strong>KRI Frans Kaisepo</strong></td>
<td><strong>KRI Sultan Iskander M.</strong></td>
</tr>
<tr>
<td>Owner: Indonesian Navy</td>
<td>Owner: Indonesian Navy</td>
</tr>
<tr>
<td>Shipyard: Damen Schelde Naval Shipbuilding</td>
<td>Shipyard: Damen Schelde Naval Shipbuilding</td>
</tr>
<tr>
<td>Length: 91 M</td>
<td><strong>KRI Diponegoro</strong></td>
</tr>
<tr>
<td>Delivery year: 2007</td>
<td>Owner: Indonesian Navy</td>
</tr>
<tr>
<td></td>
<td>Shipyard: Damen Schelde Naval Shipbuilding</td>
</tr>
<tr>
<td></td>
<td>Length: 91 M</td>
</tr>
<tr>
<td></td>
<td>Delivery year: 2007</td>
</tr>
<tr>
<td><strong>KRI Hasanudin</strong></td>
<td><strong>KRI Hasanudin</strong></td>
</tr>
<tr>
<td>Owner: Indonesian Navy</td>
<td>Owner: Indonesian Navy</td>
</tr>
<tr>
<td>Shipyard: Damen Schelde Naval Shipbuilding</td>
<td>Shipyard: Damen Schelde Naval Shipbuilding</td>
</tr>
<tr>
<td>Length: 91 M</td>
<td><strong>KRI Diponegoro</strong></td>
</tr>
<tr>
<td>Delivery year: 2005</td>
<td>Owner: Indonesian Navy</td>
</tr>
<tr>
<td></td>
<td>Shipyard: Damen Schelde Naval Shipbuilding</td>
</tr>
<tr>
<td></td>
<td>Length: 91 M</td>
</tr>
<tr>
<td></td>
<td>Delivery year: 2005</td>
</tr>
</tbody>
</table>
## FAST ATTACK CRAFTS

<table>
<thead>
<tr>
<th>Shipname</th>
<th>Owner</th>
<th>Shipyard</th>
<th>Length</th>
<th>Delivery year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INS Tihayu</strong></td>
<td>Indian Navy</td>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd</td>
<td>49 M</td>
<td>2016</td>
</tr>
<tr>
<td><strong>INS Tarmugli</strong></td>
<td>Indian Navy</td>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd</td>
<td>49 M</td>
<td>2016</td>
</tr>
<tr>
<td><strong>C-154 (10 vessels)</strong></td>
<td>Indian Coast Guard</td>
<td>Bharati Shipyard</td>
<td>28 M</td>
<td>2014</td>
</tr>
<tr>
<td><strong>INS Koswari</strong></td>
<td>Indian Navy</td>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd</td>
<td>49 M</td>
<td>2013</td>
</tr>
<tr>
<td><strong>INS Karuva</strong></td>
<td>Indian Navy</td>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd</td>
<td>49 M</td>
<td>2013</td>
</tr>
<tr>
<td><strong>INS Kabra</strong></td>
<td>Indian Navy</td>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd</td>
<td>49 M</td>
<td>2012</td>
</tr>
</tbody>
</table>

**C-154 (10 vessels)**

<table>
<thead>
<tr>
<th>Owner</th>
<th>Shipyard</th>
<th>Length</th>
<th>Delivery year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian Coast Guard</td>
<td>Bharati Shipyard</td>
<td>28 M</td>
<td>2014</td>
</tr>
<tr>
<td><strong>FRIGATES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td><strong>KRI Raden Eddy M.</strong></td>
<td><strong>KRI Gusti Ngurah Rai</strong></td>
<td><strong>UMS Mahar Thiha Thura (Refit)</strong></td>
<td></td>
</tr>
<tr>
<td>Owner</td>
<td>Owner</td>
<td>Owner</td>
<td></td>
</tr>
<tr>
<td>Indonesian Navy</td>
<td>Indonesian Navy</td>
<td>Myanmar Navy</td>
<td></td>
</tr>
<tr>
<td><strong>Shipyard</strong></td>
<td><strong>Shipyard</strong></td>
<td><strong>Shipyard</strong></td>
<td></td>
</tr>
<tr>
<td>Damen Schelde Naval Shipbuilding / PT PAL</td>
<td>Damen Schelde Naval Shipbuilding / PT PAL</td>
<td>Hudong-Zhongua Shipyard</td>
<td></td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td><strong>Length</strong></td>
<td><strong>Length</strong></td>
<td></td>
</tr>
<tr>
<td>105 M</td>
<td>105 M</td>
<td>108 M</td>
<td></td>
</tr>
<tr>
<td><strong>Delivery year</strong></td>
<td><strong>Delivery year</strong></td>
<td><strong>Delivery year</strong></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>2017</td>
<td>2012</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>BNS Leopold 1</strong></th>
<th><strong>City Class Frigate</strong></th>
<th><strong>Tarik Ben Ziyad</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Owner</td>
<td>Owner</td>
</tr>
<tr>
<td>Royal Belgian Navy</td>
<td>Canadian and Dutch Navy</td>
<td>Royal Moroccan Navy</td>
</tr>
<tr>
<td><strong>Shipyard</strong></td>
<td><strong>Shipyard</strong></td>
<td><strong>Shipyard</strong></td>
</tr>
<tr>
<td>Damen Schelde Naval Shipbuilding</td>
<td>Damen Schelde Naval Shipbuilding</td>
<td>Damen Schelde Naval Shipbuilding</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td><strong>Length</strong></td>
<td><strong>Length</strong></td>
</tr>
<tr>
<td>122 M</td>
<td>134 M</td>
<td>98 M</td>
</tr>
<tr>
<td><strong>Delivery year</strong></td>
<td><strong>Delivery year</strong></td>
<td><strong>Delivery year</strong></td>
</tr>
<tr>
<td>2010</td>
<td>2009</td>
<td>2008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>BNS Osman 2</strong></th>
<th><strong>Wandelaar</strong></th>
<th><strong>Abu Bakar</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Owner</td>
<td>Owner</td>
</tr>
<tr>
<td>Bangladesh Navy</td>
<td>Royal Belgium Navy</td>
<td>Bangladesh Navy (Refit)</td>
</tr>
<tr>
<td><strong>Shipyard</strong></td>
<td><strong>Shipyard</strong></td>
<td><strong>Shipyard</strong></td>
</tr>
<tr>
<td>Damen Shipyards</td>
<td>SKB</td>
<td>John Brown and Company</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td><strong>Length</strong></td>
<td><strong>Length</strong></td>
</tr>
<tr>
<td>103 M</td>
<td>106 M</td>
<td>101 M</td>
</tr>
<tr>
<td><strong>Delivery year</strong></td>
<td><strong>Delivery year</strong></td>
<td><strong>Delivery year</strong></td>
</tr>
<tr>
<td>2006</td>
<td>2003</td>
<td>2003</td>
</tr>
<tr>
<td>LANDING CRAFTS</td>
<td>MINE COUNTERMEASURE VESSELS</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>L51 - L58 (8 vessels)</strong></td>
<td><strong>1 vessel</strong></td>
<td></td>
</tr>
<tr>
<td>Owner</td>
<td>Owner</td>
<td></td>
</tr>
<tr>
<td>Indian Navy</td>
<td>Undisclosed</td>
<td></td>
</tr>
<tr>
<td>Shipyard</td>
<td>Shipyard</td>
<td></td>
</tr>
<tr>
<td>Garden Reach Shipbuilders &amp; Engineers Ltd</td>
<td>European shipbuilder</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>63 M</td>
<td>52 M</td>
<td></td>
</tr>
<tr>
<td>Delivery year</td>
<td>Delivery year</td>
<td></td>
</tr>
<tr>
<td>2014-2016</td>
<td>Under Construction</td>
<td></td>
</tr>
<tr>
<td><strong>5 vessels</strong></td>
<td><strong>3 vessels</strong></td>
<td></td>
</tr>
<tr>
<td>Owner</td>
<td>Owner</td>
<td></td>
</tr>
<tr>
<td>Undisclosed</td>
<td>Undisclosed</td>
<td></td>
</tr>
<tr>
<td>Shipyard</td>
<td>Shipyard</td>
<td></td>
</tr>
<tr>
<td>European shipbuilder</td>
<td>European shipbuilder</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>52 M</td>
<td>52 M</td>
<td></td>
</tr>
<tr>
<td>Delivery year</td>
<td>Delivery year</td>
<td></td>
</tr>
<tr>
<td>Under Construction</td>
<td>2009 - 2016</td>
<td></td>
</tr>
<tr>
<td><strong>Auerbach (refit)</strong></td>
<td><strong>1 vessel</strong></td>
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<tr>
<td>Owner</td>
<td>Owner</td>
<td></td>
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<tr>
<td>German Navy</td>
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<tr>
<td>Shipyard</td>
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<td></td>
</tr>
<tr>
<td>Kröger Werft</td>
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<tr>
<td>Length</td>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>55 M</td>
<td>52 M</td>
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</tr>
<tr>
<td>Delivery year</td>
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<td></td>
</tr>
<tr>
<td>2012</td>
<td>2016</td>
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### Multi Role Vessels

<table>
<thead>
<tr>
<th>Name</th>
<th>Owner</th>
<th>Shipyard</th>
<th>Length</th>
<th>Delivery year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Purpose Frigate</td>
<td>Foreign Navy</td>
<td>Damen Schelde Naval Shipbuilding</td>
<td>105 M</td>
<td>Under Construction</td>
</tr>
<tr>
<td>TCSg Dost</td>
<td>Turkish Coast Guard</td>
<td>RMK Marine</td>
<td>88 M</td>
<td>2011</td>
</tr>
<tr>
<td>Coronado</td>
<td>US Navy</td>
<td>Austal Shipyard</td>
<td>127 M</td>
<td>2010</td>
</tr>
<tr>
<td>Juan Carlos I</td>
<td>Spanish Navy</td>
<td>Navantia/BAE Systems</td>
<td>231 M</td>
<td>2009</td>
</tr>
<tr>
<td>Independence</td>
<td>US Navy</td>
<td>Austal Shipyard</td>
<td>127 M</td>
<td>2009</td>
</tr>
<tr>
<td>HMNZS Canterbury</td>
<td>Royal New Zealand Navy</td>
<td>Merwede Shipyard</td>
<td>131 M</td>
<td>2005</td>
</tr>
<tr>
<td>Maritime Sustainment Capability Ship</td>
<td>New Zealand Defence Force</td>
<td>Hyundai Heavy Industries</td>
<td>173 M</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Multi-role Patrol Frigates (12x, refit)</td>
<td>PWGS Canada</td>
<td>Halifax Shipyard</td>
<td>134 M</td>
<td>2016-2018</td>
</tr>
<tr>
<td>Maritime Sustainment Capability Ship</td>
<td>Royal New Zealand Navy</td>
<td>Merwede Shipyard</td>
<td>131 M</td>
<td>2005</td>
</tr>
<tr>
<td>Multi-role Patrol Frigates (12x, refit)</td>
<td>PWGS Canada</td>
<td>Halifax Shipyard</td>
<td>134 M</td>
<td>2016-2018</td>
</tr>
<tr>
<td>Multi-role Patrol Frigates (12x, refit)</td>
<td>PWGS Canada</td>
<td>Halifax Shipyard</td>
<td>134 M</td>
<td>2016-2018</td>
</tr>
<tr>
<td>Maritime Sustainment Capability Ship</td>
<td>Royal New Zealand Navy</td>
<td>Merwede Shipyard</td>
<td>131 M</td>
<td>2005</td>
</tr>
<tr>
<td>Multi-role Patrol Frigates (12x, refit)</td>
<td>PWGS Canada</td>
<td>Halifax Shipyard</td>
<td>134 M</td>
<td>2016-2018</td>
</tr>
<tr>
<td>Maritime Sustainment Capability Ship</td>
<td>Royal New Zealand Navy</td>
<td>Merwede Shipyard</td>
<td>131 M</td>
<td>2005</td>
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# PATROL VESSELS

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<thead>
<tr>
<th>Class</th>
<th>Owner</th>
<th>Shipyard</th>
<th>Length</th>
<th>Delivery year</th>
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<tbody>
<tr>
<td>Arctic Offshore patrol Vessels (8 vessels)</td>
<td>Royal Canadian Navy</td>
<td>Halifax Shipyard</td>
<td>104 M</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Samarth-Class OPV (2 vessels)</td>
<td>Sri Lanka Navy</td>
<td>Goa Shipyard</td>
<td>105 M</td>
<td>2014-2016</td>
</tr>
<tr>
<td>501-520 (20 vessels)</td>
<td>Indian Coast Guard</td>
<td>Cochin Shipyard</td>
<td>50 M</td>
<td>2013-2016</td>
</tr>
<tr>
<td>Raptor (5 vessels)</td>
<td>Russian Navy</td>
<td>Pella Shipyards</td>
<td>17 M</td>
<td>2013-2016</td>
</tr>
<tr>
<td>Samarth-Class OPV (6 vessels)</td>
<td>Vietnamese Government</td>
<td>Damen Shipyards</td>
<td>90 M</td>
<td>2015</td>
</tr>
<tr>
<td>BNS Jamuna (refit)</td>
<td>Bangladesh Navy</td>
<td>-</td>
<td>47 M</td>
<td>2016</td>
</tr>
<tr>
<td>SV6503-6504 (2 vessels)</td>
<td>German Water Police</td>
<td>Abeking &amp; Rasmussen</td>
<td>28 M</td>
<td>2017</td>
</tr>
<tr>
<td>Offshore Patrol Vessel</td>
<td>Venezuelan Navy</td>
<td>Damen Shipyards</td>
<td>90 M</td>
<td>2015</td>
</tr>
<tr>
<td>Name</td>
<td>Owner</td>
<td>Shipyard</td>
<td>Length</td>
<td>Delivery year</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------------</td>
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<td>--------</td>
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</tr>
<tr>
<td><strong>CCG</strong> Captain Goddard M.S.M.</td>
<td>Owner Canadian Coast Guard Shipyard</td>
<td>43 M</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td><strong>Arthur Dion Hanna</strong></td>
<td>Owner Royal Bahamas Defence Force Shipyard</td>
<td>42 M</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td><strong>ICG</strong> Samarath</td>
<td>Owner Indian Navy Shipyard</td>
<td>105 M</td>
<td>2014</td>
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</tr>
<tr>
<td><strong>CCG</strong> Corporal Mclaren MMV</td>
<td>Owner Canadian Coast Guard Shipyard</td>
<td>43 M</td>
<td>2013</td>
<td></td>
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<tr>
<td><strong>Uxmal P335</strong></td>
<td>Owner Mexican Navy Shipyard</td>
<td>42 M</td>
<td>2013</td>
<td></td>
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<tr>
<td><strong>TN Fernando Gomez de Saa</strong></td>
<td>Owner Venezuelan Navy Shipyard</td>
<td>42 M</td>
<td>2012</td>
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<tr>
<td><strong>INS</strong> Cankaraso</td>
<td>Owner Indian Navy Shipyard Garden Reach Shipbuilders &amp; Engineers Ltd</td>
<td>49 M</td>
<td>2011</td>
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<tr>
<td><strong>Zr. Ms. Friesland</strong></td>
<td>Owner Royal Dutch Navy Shipyard</td>
<td>108 M</td>
<td>2010</td>
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</tr>
<tr>
<td><strong>ARM</strong> Revolution</td>
<td>Owner Mexican Navy Shipyard Astimar</td>
<td>86 M</td>
<td>2010</td>
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</tr>
</tbody>
</table>

**Notes:**
- **ARC 11 de Noviembre**
  - Owner: Colombian Navy
  - Shipyard: Fassmer
  - Length: 40 M
  - Delivery year: 2011

- **ARC Patrol VESSELS**
  - **Zr. Ms. Friesland**
    - Owner: Royal Dutch Navy
    - Shipyard: Damen Schelde Naval Shipbuilding
    - Length: 108 M
    - Delivery year: 2010

- **MCGS Barracuda**
  - Owner: National Coast Guard Mauritius Shipyard: Garden Reach Ship & Engin.
  - Length: 74 M
  - Delivery year: 2013
# RESEARCH VESSELS

<table>
<thead>
<tr>
<th>Antarctic Supply Research Vessel</th>
<th>Investigator (refit)</th>
<th>RV Sindhu Sadhana</th>
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<tbody>
<tr>
<td><strong>Owner</strong></td>
<td>Australian Antarctic Division</td>
<td><strong>Owner</strong></td>
</tr>
<tr>
<td><strong>Shipyard</strong></td>
<td>Damen Schelde Naval Shipb.</td>
<td><strong>Shipyard</strong></td>
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<td><strong>Length</strong></td>
<td>156 M</td>
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<td><strong>Delivery year</strong></td>
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<table>
<thead>
<tr>
<th>INS Makar</th>
<th>Giao su Vien si Tran Dai Nghia</th>
<th>KBV003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Owner</strong></td>
<td>Indian Navy</td>
<td><strong>Owner</strong></td>
</tr>
<tr>
<td><strong>Shipyard</strong></td>
<td>Alcock Ashdown Gujarat Ltd</td>
<td><strong>Shipyard</strong></td>
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<td><strong>Length</strong></td>
<td>53 M</td>
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<td>2012</td>
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<table>
<thead>
<tr>
<th>HTMS Pharuehatsabodi</th>
<th>Luymes</th>
<th>RV Kilo Moana</th>
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<tbody>
<tr>
<td><strong>Owner</strong></td>
<td>Royal Thai Navy</td>
<td><strong>Owner</strong></td>
</tr>
<tr>
<td><strong>Shipyard</strong></td>
<td>Damen Shipyards</td>
<td><strong>Shipyard</strong></td>
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<td>SUBMARINES</td>
<td>SUPPORT SHIPS</td>
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<tr>
<td><strong>Dreadnought-class (4 vessels)</strong></td>
<td><strong>PNFT</strong></td>
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<tr>
<td><strong>Owner</strong> UK Royal Navy</td>
<td><strong>Owner</strong> Pakistan Navy</td>
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<tr>
<td><strong>Shipyard</strong> BAE Systems Maritime</td>
<td><strong>Shipyard</strong> STM Marine</td>
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<tr>
<td><strong>Length</strong> 153 M</td>
<td><strong>Length</strong> 158 M</td>
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<tr>
<td><strong>Delivery year</strong> Under Construction</td>
<td><strong>Delivery year</strong> 2016</td>
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<tr>
<td><strong>Zr. Ms. Karel Doorman</strong></td>
<td><strong>Zr. Ms. Mercuur</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Owner</strong> Royal Dutch Navy</td>
<td><strong>Owner</strong> Royal Dutch Navy</td>
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<td><strong>Shipyard</strong> Damen Schelde Naval Shipbuilding</td>
<td><strong>Shipyard</strong> Damen Schelde Naval Shipbuilding</td>
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<td><strong>Delivery year</strong> 2012</td>
<td><strong>Delivery year</strong> 2011</td>
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<td><strong>ARM Montes Azules</strong></td>
<td><strong>ARM Libertador</strong></td>
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<tr>
<td><strong>Owner</strong> Mexican Navy</td>
<td><strong>Owner</strong> Mexican Navy</td>
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<td><strong>Shipyard</strong> Astimar</td>
<td><strong>Shipyard</strong> Astimar</td>
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<td><strong>Length</strong> 100 M</td>
<td><strong>Length</strong> 100 M</td>
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<td><strong>Delivery year</strong> 2011</td>
<td><strong>Delivery year</strong> 2013</td>
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<tr>
<td><strong>Weishanhu</strong></td>
<td><strong>Weishanhu</strong></td>
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<tr>
<td><strong>Owner</strong> China Navy</td>
<td><strong>Owner</strong> China Navy</td>
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<td><strong>Shipyard</strong> Hudong-Zhongua Shipyard</td>
<td><strong>Shipyard</strong> Hudong-Zhongua Shipyard</td>
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<tr>
<td><strong>Length</strong> 179 M</td>
<td><strong>Length</strong> 179 M</td>
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<td><strong>Delivery year</strong> 2003</td>
<td><strong>Delivery year</strong> 2003</td>
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<td><strong>Giao su Vien si Tran Dai Nghia</strong></td>
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<tr>
<td><strong>Owner</strong> Vietnam Navy</td>
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<tr>
<td><strong>Shipyard</strong> Damen Shipyards</td>
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<td><strong>Delivery year</strong> 2009</td>
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## TRAINING VESSELS

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<thead>
<tr>
<th>Name</th>
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<th>Length</th>
<th>Delivery year</th>
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</thead>
<tbody>
<tr>
<td><strong>Sycamore</strong></td>
<td>Australian Navy</td>
<td>Damen Shipyards</td>
<td>94 M</td>
<td>2017</td>
</tr>
<tr>
<td><strong>INSV Mhadei</strong></td>
<td>Indian Navy</td>
<td>Aquarius Shipyard Pvt Ltd</td>
<td>17 M</td>
<td>2010</td>
</tr>
<tr>
<td><strong>Van Kinsbergen</strong></td>
<td>Royal Dutch Navy</td>
<td>Damen Shipyards</td>
<td>42 M</td>
<td>1999</td>
</tr>
<tr>
<td><strong>Baltrum (refit)</strong></td>
<td>German Navy</td>
<td>Peene Werft</td>
<td>52 M</td>
<td>2008</td>
</tr>
<tr>
<td><strong>Le Quy Don</strong></td>
<td>Vietnamese Naval Academy</td>
<td>Marine Projects Ltd Sp Zoo</td>
<td>67 M</td>
<td>2015</td>
</tr>
</tbody>
</table>
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