MSV Fennica

Vessel specification
ARCTIA OFFSHORE – POWER AT SEA

Globally unique multipurpose icebreakers Fennica and Nordica are well-equipped and suited for demanding offshore work that requires a high degree of maneuverability and accuracy. Both are excellent vessels for ice management tasks in polar areas.

Arctia Offshore’s experience is not limited to the North Sea, Arctic Ocean or other polar regions. Vessels sailing under the Arctia’s flag have also worked in the Gulf of Mexico, West Africa and in the Mediterranean Sea.

Our expertise is founded on experienced staff and specialised vessels. These two enable us to offer first class services to our customers.

Arctia Offshore is a part of Arctia Group, a specialised shipping company offering icebreaking, ice management, offshore services and marine construction using multipurpose icebreakers and conventional icebreakers. We also offer oil-spill and harbour icebreaking services.

Arctia fleet consists of
• 2 oil-recovery icebreakers
• 4 conventional icebreakers
• 2 multipurpose icebreakers
MSV FENNICA
SHORT VESSEL DESCRIPTION

Fennica is a multifunctional vessel based on a modified icebreaker design with diesel-electric propulsion. The vessel is specially designed for a wide range of offshore related work.

The vessel is designed to carry out offshore installation tasks and may be equipped for laying pipes, cables and umbilicals. The optional 120T SWL A-Frame is well suited for deploying trenching machines and ploughs. Her great bollard pull strength and strong winches make Fennica ideal for ploughing operations and towing.

ICEBREAKING

Fennica is a part of Arctia Group’s icebreaker fleet, one of the most powerful in the world. Icebreaking services include ice management, assistance, towing, securing vessel traffic safety, and traffic control for vessels proceeding in icy conditions.

Fennica’s icebreaking capability is excellent. The 15 MW diesel generators produce power for two Aquamaster azimuth-thrusters to make the vessel easily manoeuvrable. Fennica is excellent for DP work, all kinds of marine operations and for towing merchant vessels in harsh icy conditions.

VESSEL DETAILS

<table>
<thead>
<tr>
<th>IMO No.</th>
<th>9043615</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call Sign</td>
<td>OJAD</td>
</tr>
<tr>
<td>Type of Vessel</td>
<td>Ice Breaker &amp; Multipurpose Support</td>
</tr>
<tr>
<td>Type of Fuel</td>
<td>HFO / DO / ULSDO option</td>
</tr>
<tr>
<td>Flag State</td>
<td>Finland</td>
</tr>
<tr>
<td>Port of Registry</td>
<td>Helsinki</td>
</tr>
<tr>
<td>Owners</td>
<td>Arctia Offshore</td>
</tr>
<tr>
<td>Built</td>
<td>1993</td>
</tr>
<tr>
<td>Lightweight</td>
<td>7.935 T</td>
</tr>
<tr>
<td>Deadweight (approx.)</td>
<td>4.800 T</td>
</tr>
<tr>
<td>Displacement</td>
<td>12 800 T</td>
</tr>
<tr>
<td>Gross tonnage</td>
<td>9392 T</td>
</tr>
<tr>
<td>LOA</td>
<td>118.0 m</td>
</tr>
<tr>
<td>LWL</td>
<td>96.7 m</td>
</tr>
<tr>
<td>Breadth Moulded</td>
<td>26.0 m</td>
</tr>
<tr>
<td>Depth Moulded</td>
<td>12.5 m</td>
</tr>
<tr>
<td>Draught (Scantling)</td>
<td>8.4 m</td>
</tr>
<tr>
<td>Airdraft</td>
<td>38.0 m</td>
</tr>
</tbody>
</table>

CLASSIFICATION

DNV 1A1 POLAR10 Icebreaker Tug Supply Vessel
SF HELDK EPR EO DYNPOS-AUTR

HELIDECK

Helideck / D’Value 22 m / 12.8 T year 2012
Rated Sikorsky S92
HMS Vaisala HMS
Weather station Vaisala AWS 430

CAPACITIES AND CONSUMABLES

<table>
<thead>
<tr>
<th>Fuel Oil (Dual Fuel)</th>
<th>approx. 1690 m³ HFO/DO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubricating Oil</td>
<td>approx. 817 m³ DO</td>
</tr>
<tr>
<td>Fresh Water</td>
<td>approx. 400 m³</td>
</tr>
<tr>
<td>Water Ballast</td>
<td>approx. 2200 m³</td>
</tr>
<tr>
<td>F.W. Making Capability</td>
<td>approx. 25 T / day</td>
</tr>
</tbody>
</table>

Consumables, 8.4 m Draught:

<table>
<thead>
<tr>
<th>Type of Fuel (Dual Fuel)</th>
<th>HFO / DO / ULSDO option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Consumption, 13 knots</td>
<td>42 T / day</td>
</tr>
<tr>
<td>Fuel Consumption, 11 knots</td>
<td>30 T / day</td>
</tr>
<tr>
<td>Fuel Consumption, DP</td>
<td>15 T / day</td>
</tr>
<tr>
<td>Duration, 13 knots</td>
<td>45 days</td>
</tr>
<tr>
<td>Duration, 11 knots</td>
<td>67 days</td>
</tr>
</tbody>
</table>

ENVIROMENTAL

SCR Catalysators X 4 Mainengine
Urea tank capacity: 100 m³
**PROPULSION**

| Power                  | 16 V 32 / 6000 kW Wärtsilä Vasa x 2  
|                       | 12 V 32 / 4500 kW Wärtsilä Vasa x 2  
| Propeller Type        | Fixed pitch, variable rpm  
| Nozzle Fitted         | 2 pcs (for Aquamasters)  
| El.Prop Motor Type    | 2  
| Type                  | 2 pcs ABB Strömberg Drives  
| Rating                | Both rated at 7500 kW  

**BOW THRUSTERS**

| Number | 3  
| Make   | Brunvoll  
| Type   | FU-80 LTC-2250  
| Power  | 1150 kW  
| Propeller Type | Variable Pitch  

**SWITCHBOARDS**

| Make      | ABB distribution  
| Type      | 6.3 kV prod. 6989C 5001  
| Transformers | 2 x 2000 kva 6300 / 400 V 50 Hz +  
|           | 1250 kva 6300 / 400 V 50 Hz  

**GENERATORS (MAIN)**

| Number | 4  
| Make   | ABB Strömberg Drives  
| Type   | 2 x HSG 1120 MP8  
|        | 2 x HSG 900 LR8  
| Rating | 8.314 kVA / 6.3kV / 750 rpm  
|        | 6.235 kVA / 6.3kV / 750 rpm  

**GENERATORS (HARBOUR SET)**

| Diesel Number | 1  
| Make          | Wartsila  
| Type          | Vasa 4R22/26  
| Rating        | 710 kW / 1000 rpm  
| Generator Type | ALPC 500 AG  
| Rating        | 840 kVA / 400V GENERATORS (EMERGENCY)  

**GENERATORS (EMERGENCY)**

| Number | 1  
| Make   | Caterpillar  
| Type   | 3412  
| Rating | 300 kW / 1500 rpm / 400 v / 50 Hz  

**BOLLARD PULL**

| Bollard pull / Aquamaster | About 230 tonnes  

**ROLL REDUCTION**

| INTERING Upgraded 2016 | Antiheeling / Stabilizer / Ice-Heeling 720 m3  

DYNAMIC POSITIONING

The vessel is equipped with a Kongsberg K-POS DP-22 dynamic positioning system.

The vessel also has an integrated redundant joystick control system. Classification is DNV under the DynPos AUTR class (Dynamic Positioning with Automatic Redundancy). This includes the DP system itself and its power supply plus the vessel’s general switchboard and emergency power supply and the mode operation, both in normal and warning / alarm states.

DP –AND AUTOMATION HARDWARE

<table>
<thead>
<tr>
<th>Type (DP)</th>
<th>Kongsberg K-POS DP-22 (Installed 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator stations (OS)</td>
<td>2 pcs</td>
</tr>
<tr>
<td>Dual redundant controller</td>
<td>1 pc (one cabinet with separated controllers)</td>
</tr>
<tr>
<td>Redundant joystick (cJoy)</td>
<td>1 pc (with own independent cJoy-controller)</td>
</tr>
<tr>
<td>Process/field stations (FS)</td>
<td>8 pcs (for thrusters and power/propulsion plant)</td>
</tr>
<tr>
<td>Network Distribution Units</td>
<td>6 pcs</td>
</tr>
<tr>
<td>Type (Automation)</td>
<td>Kongsberg K-Chief (Installed 2009)</td>
</tr>
<tr>
<td>Operator Stations</td>
<td>5 pcs</td>
</tr>
<tr>
<td>Automation / K-Chief</td>
<td></td>
</tr>
<tr>
<td>DP History station</td>
<td></td>
</tr>
</tbody>
</table>

REFERENCE SYSTEMS / EQUIPMENTS

The DP -system is supported by the following reference systems:

- **Hydro acoustic**: 1 pc Kongsberg HiPaP 500
- **Tautwire**: 1 pc Kongsberg LTW MK15/500
- **Satellite positioning**: 2 pcs Kongsberg DPS -type receivers (IALA, SPOT, Glonass)
- **DPS 232**: High Precision corrections possible upon separate agreement
- **Fanbeam**: 1 pc Fanbeam optional
- **Vertical Reference**: 3 pcs Kongsberg, MRU2 / MRU5 / HMS -types
- **Gyro**: 3 pcs Ixsea Octans (Fiber Optic Gyros)
- **Anemometer**: 2 pcs GILL Ultrasonic wind sensors

MAIN OPERATING MODES

- **Joystick Mode**: Manual Positioning using the three-axis joystick
- **Mixed Joystick / Auto Mode**: Selecting any of the three degrees of vessel movement, as manual and / or auto
- **Auto Position Mode**: Station keeping at selected heading and position
- **Follow Target Mode**: Automatic following of moving target
- **Auto Track (low speed) Mode**: Track keeping in low speed
- **Auto Track (high speed) Mode**: Track keeping in medium or high speed
- **Alongships External Force**: Manual input of force in tonnes by the joystick is used e.g. towing and cable laying
- **Compensation by Joystick**
- **Autopilot-mode**
BRIDGE EQUIPMENT

THE VESSEL’S INTEGRATED NAVIGATION SYSTEM IS EQUIPPED WITH

- Multi-Sensor radar and positioning system
- Type approved Dual ECDIS system

SYSTEM PROVIDES

- Flexible route planning, steering and monitoring
- Continuous calculations of own position and display on ECDIS
- Continuous target tracking by radars and AIS
- Continuous target presentation by ECDIS

EXTERNAL COMMUNICATION SYSTEM

COMPRISING

GMDSS A4 radio station
Marlink VSAT C & KU-band
Fleet broadband Ok
Iridium
Aviation VHF

SEARCHLIGHT

The following Xenon remote controlled search lights are provided:
2 x 1600 W (360 dgr)
2 x 3000 W (360 dgr)
1 x 1000 W

INTERNAL COMMUNICATION SYSTEM

AUTOMATIC TELEPHONE SYSTEM

The telephone system consists of automatic exchange and phone sets. In addition to the land lines there are mobile cellular and ship's satellite communication system connected to the PABX. All cabins fitted with telephones.

4 pcs outside telephone lines available for Project / Client
Radio / TV cable network
Radio / TV cable network receives terrestrial radio / TV broadcasts as well as satellite broadcasts, which are further distributed to the ship’s cable network and TV sets.

DATA NET (CLIENT)

The network is connected to the Norsat KU band communication system onboard.
(May change between projects)

THE NETWORK HAS OUTLETS ON THE FOLLOWING LOCATIONS ONBOARD
Bridge
Operation Center 4th Bridge deck
Conference Room 2nd deck
Owners cabins
Aft Deck
Hospital 2nd Bridge deck

[Image of a ship with searchlights illuminated]
### DECK LAYOUT

- **Shark Jaw**: 2 pcs (adapters 38 mm / 86 mm 95 mm)
- **Karmoy pins**: 2 pcs
- **Air on Deck**: 16 connecting points, 300 m³/h, 7 bar
- **Air Receiver**: 1000 l
- **Sea Water**: 4 connecting points, 40 m³/h, 7 bar
- **Fresh Water**: 1 connecting point, 30 m³/h, 4 bar
- **MS3 Panel Outlets**: 4 pcs 63 A, 8 pcs 125 A, 4 pcs 250 A, 2 pcs 200 A

### ELECTRICITY ON DECK

#### Power Outlets 400 V (± 10%) / 50 Hz
- 1 pc 1600 A Bolt connection
- 2 pcs 630 A Bolt connection
- 1 pc 400 A Bolt connection
- 4 pcs 250 A Plug connection
- 8 pcs 125 A Bolt connection
- 4 pcs 63 A Plug connection

#### Power Outlets 230 V (± 5%) / 50 Hz
- 8 pcs 16 A Plug connection

### External communications system

- **GMDS**: A4 Radio Station
- Telenor SEALINK 2 on Dual Band
- Inmarsat-B
- Iridium
- Aviation VHF 2 fixed 3 portables
## DECK CRANES

### MAIN CRANE

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>HYDRA-LIFT ASA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main hook</td>
<td>30 T Double fall / 11m radius</td>
</tr>
<tr>
<td></td>
<td>15 T Single fall / 20m radius</td>
</tr>
<tr>
<td></td>
<td>5 T / 38m radius</td>
</tr>
<tr>
<td>Wire length</td>
<td>650m</td>
</tr>
<tr>
<td>Working depth</td>
<td>approx. 350m / Single fall</td>
</tr>
<tr>
<td></td>
<td>approx. 180m / Double fall</td>
</tr>
<tr>
<td>Wire size</td>
<td>32mm</td>
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### SECONDARY CRANE (OPTIONAL)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>MELCAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main hook</td>
<td>5 T / 25m at port</td>
</tr>
<tr>
<td></td>
<td>3.5 T / 25m Offshore</td>
</tr>
<tr>
<td></td>
<td>1.5 T / 25m Manriding</td>
</tr>
<tr>
<td>Wire length</td>
<td>65mm</td>
</tr>
<tr>
<td>Wire size</td>
<td>18mm</td>
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</table>

### A-FRAME (optional)

<table>
<thead>
<tr>
<th>Safe Working Load (SWL)</th>
<th>120 T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance between legs</td>
<td>15m</td>
</tr>
<tr>
<td>Vertical clearance</td>
<td>12m</td>
</tr>
</tbody>
</table>
WINCHING CAPACITIES

DECK LOADING
Deck Area  approx. 1100 m²
Capacity  10 T / m² (defined loading area)

ANCHOR
HANDLING DRUM
1084 mm  2030 mm

First Layer  Outmost Layer

Maker  Aquamaster-Rauma
Type  TAW 3000/3000E
Drive  Electric, 2 DC motors each 225 kW
Pay out/in speed  Stepless from 0 to max speed
Cable lifters  2, for 84 mm Ø stud link chain, 1 on each drum

A) At low gear stalling pull 2 min 3750 kN  1765 kN
Nominal load S1  3000 kN  1412 kN
At speed  0-8 m / min  0-16 m / min
Maximum Speed  18 m / min  38 m / min
At load  1325 kN  660 kN
Safety Clutch  66 m / min  140 m / min
Max speed  2.1 knots  4.5 knots

B) At high gear stalling pull 2 min 1656 kN  779 kN
Nominal load S1  1325 kN  623 kN
At speed  0-18 m / min  0-38 m / min
Maximum Speed  40 m / min  85 m / min
At load  585 kN  275 kN
Safety Clutch  148 m / min  314 m / min
Max speed  4.7 knots  10 knots

C) Band Brake static holding load 4500 kN  2118 kN

TOWING

TOWING
In auto-tension mode or with brake engaged
Interfaced to DP

TOWING DRUM

<table>
<thead>
<tr>
<th></th>
<th>First Layer</th>
<th>Outmost Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1283 mm</td>
<td>2577 mm</td>
</tr>
</tbody>
</table>

A) At low gear
At low gear stalling pull 3750 kN  1867 kN
Nominal load S1  3000 kN  1495 kN
At speed  0-8 m / min  0-16 m / min
Maximum Speed  18 m / min  36 m / min
At load  1325 kN  660 kN
Safety Clutch  66 m / min  133 m / min
Max speed  2.1 knots  4.3 knots

B) At high gear stalling pull 2 min 1656 kN  824 kN
Nominal load S1  1325 kN  660 kN
At speed  0-18 m / min  0-36 m / min
Maximum Speed  40 m / min  80 m / min
At load  585 kN  291 kN
Safety Clutch  148 m / min  296 m / min
Max speed  4.7 knots  9.6 knots

C) Band Brake static holding load 4500 kN  2240 kN
ACCOMMODATION

Total Accommodation  77 persons incl. crew (normally 48 client beds)

Day Room / Mess for client:
Day Room  5th Bridge deck
Messroom and cafeteria  Upper deck
Laundry Room  2nd deck
(+ Laundry stations on different decks)
Gym  1st Bridge deck + Fennica Arena
Sauna  2nd deck
Kiosk  Upper deck
Operation Center  4th Bridge deck
Saloon Room  5th Bridge deck
Client Office / Conference Room  1 x 20 m² Office, 2nd deck
Reception (deck office)  Upper deck
Hospital  2nd Bridge deck

SURVEY FACILITIES

The MSV Fennica has no permanent ROV system on board, but it does have the capability for an ROV system should the project require it.

MANNING

Master  1
Chief Officer / DPO  1
First Officer / DPO  1
Second Officer / DPO jr.  2
Chief Engineer  1
1st Engineer  2
Electrical Engineer  1
Electrician  1
Boatswain  1
Deck Repairman  2
Engine Repairman  2
Motorman  1
Cook Steward  1
1st Cook  2
2nd Cook  2
Catering Assistants  2
Crane ops.  2
Total Marine Crew  21-25 persons depending on projects.

LIFE SAVING, FIREALARM AND RESCUE EQUIPMENT

Lifeboats  2 pcs, 82 persons each
Type  Waterman 371
Dimensions  L 9.35 m / B 3.26 m / draught 1.22 m
Weight including Equipment  4730 kg
Engine  Sabb N4.295
Regulation  NMD
Lifeboat Davit  Davit int.type D-NP.120
FRB Boat  1 pc, 6 persons, S-side
Type  Boomeranger FRBD C-600
Dimensions  L 6.05 m / B 2.45 m
Engine  Steyer MO164M40 / 163 hp
Speed  32 knots
Regulation  Solas
FRB Boat Davit  Vest Davit PLR-3600
Liferafts  8 x 25 persons
Type  Viking Life-saving
Life raft Davit  2 pcs Davit D-R8.21
Fire Alarm system  1 pc Autronica BK-30 IB44
The vessel is equipped with an automatic fire detection system.