### Specifications of VSAT

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antenna Unit</strong> KU-100AT</td>
<td></td>
</tr>
<tr>
<td>Antenna Diameter</td>
<td>1.0 m</td>
</tr>
<tr>
<td>Antenna Gain</td>
<td>41.8 dB at 14.25 GHz</td>
</tr>
<tr>
<td>Reception</td>
<td>39.5 dB at 12.65 GHz</td>
</tr>
<tr>
<td>Polarization</td>
<td>L-POL</td>
</tr>
<tr>
<td>Transmitting Frequency</td>
<td>14.0-14.5 GHz (STD)</td>
</tr>
<tr>
<td>Receiving Frequency</td>
<td>10.75-11.75 GHz (STD)</td>
</tr>
<tr>
<td>RF Package TX</td>
<td>8 W BUC (Standard BUC)</td>
</tr>
<tr>
<td>RX</td>
<td>8 W Extended BUC (option)</td>
</tr>
<tr>
<td>GPS Receiver</td>
<td></td>
</tr>
<tr>
<td>Ship's Motion</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>BUC</td>
</tr>
<tr>
<td>Pitch</td>
<td>±10°/5 sec</td>
</tr>
<tr>
<td>Time</td>
<td>±120 sec</td>
</tr>
<tr>
<td>Rate of Turn</td>
<td>±6°/1 sec, ±1°/sec²</td>
</tr>
<tr>
<td><strong>Satellite Router iDirect 5100</strong></td>
<td></td>
</tr>
<tr>
<td>Data Interface UART</td>
<td>16.1&quot;86</td>
</tr>
<tr>
<td>Power Supply</td>
<td>408 V 16.1&quot;</td>
</tr>
<tr>
<td>Temperature Operational RX</td>
<td>±25° to ±55°, RX 0° ± 15°</td>
</tr>
<tr>
<td>Humidity</td>
<td>±85% at 40°C</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>80 min Max.</td>
</tr>
<tr>
<td><strong>Uninterruptible Power Supply</strong></td>
<td></td>
</tr>
<tr>
<td>E11A102A002USJ</td>
<td></td>
</tr>
<tr>
<td>E11A102A001</td>
<td></td>
</tr>
<tr>
<td><strong>Satellite Router iDirect 5000</strong></td>
<td></td>
</tr>
<tr>
<td>Power Supply</td>
<td>300 W</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
</tr>
<tr>
<td><strong>below Deck Unit</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Antenna Control Unit KU-100AC</strong></td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td></td>
</tr>
<tr>
<td><strong>VoIP Switch AFG200</strong></td>
<td></td>
</tr>
<tr>
<td>FXO Ports</td>
<td>2</td>
</tr>
<tr>
<td>FXO Ports</td>
<td>0</td>
</tr>
<tr>
<td>VoIP Ports</td>
<td>0</td>
</tr>
<tr>
<td>Voice Alarm</td>
<td>6</td>
</tr>
<tr>
<td>FAX Support</td>
<td>1.38 (T.30) and G3 at 2.4, 4.8, 7.2, 14.4 kbps, 14.4 kbps</td>
</tr>
<tr>
<td>Echo Canceller</td>
<td>ITU T.37, ITU T.38, up to 128 ms</td>
</tr>
<tr>
<td>IP Options</td>
<td>IP-Link</td>
</tr>
<tr>
<td>Interface</td>
<td>RJ-11 for analog telephones, 10/100 Base T-F, RJ-45 (LMS Interface)</td>
</tr>
<tr>
<td>Power Supply</td>
<td>10-240 VAC, 50/60 Hz 22 W</td>
</tr>
<tr>
<td><strong>Satellite Router iDirect 5100</strong></td>
<td></td>
</tr>
<tr>
<td>Power Supply</td>
<td>26.9 kg 59.2 lb</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
</tr>
</tbody>
</table>

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Furuno Hellas S.A.
Piraeus, Greece
www.furuno.gr

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**Uninterruptible Power Supply**
E11A102A002USJ
175 kg 385.88 lb

**Satellite Router iDirect 5100**
Weight 8 kg 17.64 lb

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**VoIP Switch**
AFG200 400/800
VoIP Ports
2 4 8
FXO Ports
0 0 0
VoIP Ports
0 0 0
Voice Alarm
6 6 6
FAX Support
1.38 (T.30) and G3 at 2.4, 4.8, 7.2, 14.4 kbps, 14.4 kbps
Echo Canceller
ITU T.37, ITU T.38, up to 128 ms
IP Options
IP-Link
Interface
RJ-11 for analog telephones, 10/100 Base T-F, RJ-45 (LMS Interface)
Power Supply
10-240 VAC, 50/60 Hz 22 W

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**UPS**
E11A102A002USJ, E11A102A001
System Topology
Hybrid
Output Power
700 W 1000 VA
Frequency
50/60Hz
Voltage
230 VAC 100 VAC
Battery Type
Maintenance free sealed lead-acid battery
Battery Backup Time
5 mins
Environment
Operating Temperature
0 to 40 °C
Humidity
20 to 90 %

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**Battery**
Maintenance free sealed lead-acid battery
Weight
8 kg 17.64 lb

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**Environment**
- Maximum operating temperature: 0 to 40 °C
- Minimum operating temperature: -25 to +55°C
- ADE: -25 to +55°C, BDE: 0 to +55°C
- Humidity: up to 93 % at 40 °C
- Wind Speed: 60 m/sec Max.
- Electric: IEC 60945 Ed. 4 2002-08
- EMC: IEC 60068-2-27
- Vibration: Integrated: ±6°/1 sec, ±1°/sec²
- Shock: ±4°/20 sec
- Temperature: 0 to 40 °C
- Humidity: up to 93 % at 40 °C
- 100-240 VAC (50, 60 Hz)

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**Antenna Control Unit**
Weight 175 kg 385.88 lb
Bring cost-effective and high-speed broadband communications to your vessel with FURUNO’s VSAT

FURUNO brings a Ku-band VSAT communications solution to the maritime industry to meet the growing demand for more bandwidth at sea. VSAT provides broadband communications at sea that are comparable to the communication speeds we are accustomed to using while on shore. On top of fast communication speed for data and voice applications of up to 1 Mbps, VSAT delivers the cost-effective means to maritime broadband communications through its monthly flat communication rate, allowing ship owners to budget air-time rate without any unanticipated fare to be charged. The ERP (Enterprise Resource Planning) system at the head office can be extended to the vessels via VPN (Virtual Private Networks). This means that the officers and crewmembers are now able to make use of more bandwidth-hungry applications such as videoconferencing and downloading, streaming video on demand and others without worrying about the communication bill thanks to the flat communication rate.

This will totally transform maritime communication, with increasing levels of both operational and social communications conducted all at the same time through this new service. Navigators can obtain weather and chart updates* online in order to optimize their route planning and monitoring tasks, while all onboard can still enjoy the benefit of the Internet, e-mailing and making voice calls to the head offices or their friends and families back home all via a single terminal. It would greatly increase information efficiency onboard. It will change the way mariners and vessels communicate, just as on-shore broadband data communications paved the way for the broadband IP era.

* available in the future

Features of VSAT

► Brings land-based broadband communications environment onboard vessels

Selectable communication rates meeting with requirements onboard:
- Service providing best effort delivery of up to 1 Mbps down-link
- Fixed flat rate charge according to the selected bandwidth

► Provides broadband communication that can be utilized for a wide variety of applications including both operational and social purposes

VPN networking, Internet (web browsing, e-mailing), VoIP, Video Store and Forward, high quality live video transmission, two-way videoconferencing, onboard monitoring, chart updates, remote ship management system, etc.*

* Please note that some of these applications listed will be available in the future. Also, certain network devices must be arranged locally, in order for you to make use of some of the applications.

► Allows for unlimited connection at a fixed monthly fee, depending solely on the bandwidth you require

You will no longer need to worry about the communication bill, for independently of how extensive your broadband connection is utilized, the communication costs remain the same, depending on the service plan you select.

Ku-band GEO Satellite system

Hundreds of Ku-band GEO (Geostationary Earth orbit) Satellites are located 2-3 degrees apart at altitude of 35,880 km. Although each VSAT transponder has a limited coverage delivered by its regional footprint, SafeComNet facilitates switch-over from the footprint of one satellite to another in order to deliver a seamless Ku-band service that embraces the major shipping lanes around the world.
**System Overview of VSAT**

- **VSAT Satellites**
- **HUB Station** (Master Earth Station)
- **Antenna Control Unit**
- **VoIP Switch**
- **Satellite Router**
- **Analog Telephone**
- **Antenna Unit**
- **UPS**
- **Onboard LAN Network**
- **Voice over IP**, **Internet**, **e-mailing**, and **office applications**, **Store and forward Video**, etc.
- **VoIP Switch**, **Onboard VSAT Station**, **Below Deck Unit**, **Option**, **VoIP Switch**
- **Photo credit**: Courtesy of Eutelsat

**Comparison between VSAT and FleetBroadband**

<table>
<thead>
<tr>
<th></th>
<th>VSAT</th>
<th>FleetBroadband</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Communication Speed</td>
<td>Up to 1 Mbps*</td>
<td>432 kbps (FELCOM 500, best effort delivery)</td>
</tr>
<tr>
<td>Billing</td>
<td>Fixed flat rate according to the selected bandwidth</td>
<td>Pay-as-you-go</td>
</tr>
<tr>
<td>Service Coverage</td>
<td>Regional coverage provided by multiple service providers (seamless roaming possible without any roaming surcharge)</td>
<td>Global coverage (with exception of extreme polar regions)</td>
</tr>
<tr>
<td>Voice calls</td>
<td>VoIP</td>
<td>Inmarsat rates</td>
</tr>
</tbody>
</table>

* For service faster than 1 Mbps, please consult with your nearest distributor.

FURUNO brings broadband L-band and Ku-band communications solutions "SafeComNet" to the maritime industry to meet the growing demands for more bandwidth at sea. FURUNO’s FleetBroadband and VSAT systems provide broadband communication speed that we are accustomed to using while onshore.

FURUNO’s new satellite communication solution "SafeComNet" delivers all-in-one, truly seamless broadband communication to the maritime industry.

www.safecomnet.com

FURUNO Mobile Satellite Services

Ku-band Satellites

Inmarsat Satellites

Internet

Voice communication

Emailing

Video-streaming
User applications of VSAT*

VSAT supports an extensive range of user applications, which can be conducted all at the same time through a single terminal.

*Certain network devices must be arranged locally, in order for you to make use of some of the applications.

Social communication and increased welfare for crewmembers
Crewmembers are now able to make private phone calls or send SMS using their SIM card to their friends and families back home. They can also browse through the Internet to read news from home, football results or any other news of their interests.

Real-time chart and weather information update for route optimization*
Navigators can now update chart as well as weather information in real-time by which the optimal, fuel-efficient routes can be plotted from port to port based upon the up-to-the-minute chart and weather information.

* available in the future

Educational opportunities for crewmembers using distance learning
Using their off-duty time in a more productive manner has become very popular amongst navigators. VSAT allows crewmembers to attend off-campus distance learning courses through the Internet, using video-streaming or IP-TV to further enhance their skills and academic levels while off-duty.

Briefing with the head office, port authorities and others
Chief officers can conduct briefing with the head offices, port authorities and ship chandlers by using VoIP (Voice over Internet Protocol) and web mail for various occasions. Alternatively, they can make use of two-way live video streaming to facilitate videoconferencing if needed.

Trouble-shooting in case of equipment failure
In case of failure of engine or other onboard equipment, chief engineers onboard can set up live, on-the-spot remote condition-review and trouble-shooting sessions with service engineers from various manufacturers onshore by using two-way live video-streaming. A reliable high bandwidth connection is essential for enabling these functions, and VSAT provides a perfect solution.

“Always on” connectivity to the internet and the head office’s network through secure VPN connection
Crewmembers can access the company’s intranet through a secure VPN channel.

*Briefing with the head office, port authorities and others
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