HiPAP

502/452/352/102 System

Instruction Manual
Document information

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Warning

*The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. You must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.*

*Kongsberg Maritime disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.*

Disclaimer

*Kongsberg Maritime AS endeavours to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omissions.*

Support information

If you require maintenance or repair, contact your local dealer. You can also contact us using the following address: km.support.hpr@kongsberg.com. If you need information about our other products, visit [http://www.kongsberg.com](http://www.kongsberg.com). On this website you will also find a list of our dealers and distributors.
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About this manual

The purpose of this manual is to provide the descriptions, procedures and detailed parameter explanations required to allow for safe and efficient use of the HiPAP.

Target audience
This manual is intended for all users of the HiPAP.

Online information
All end-user manuals provided for operation and installation of your HiPAP can be downloaded from our website.

- https://www.km.kongsberg.com

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HiPAP Instruction Manual

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General supply conditions, page 10
Support information, page 12
System description

The HiPAP system is designed for optimal positioning of subsea objects in both shallow and deep water.

The HiPAP systems provides accurate positions of subsea objects such as Remotely operated vehicles (ROVs), Autonomous underwater vehicles (AUV’s), towed bodies or fixed seabed transponders.

The system is offering the user a wide range of transponder channels and cNODE transponder models for depths rating down to 11000 metres.

The HiPAP systems use a signal processing technique which enables narrow transmitter and receiver beams to be generated in all directions within the lower half of the transducer, using electronic beam control to achieve accuracy.
System diagram

The system diagram identifies the main components of a basic HiPAP system. Only the main connections between the units are shown. Detailed interface capabilities and power cables are not shown.

A  Computer
B  Transceiver
C  Hull unit
D  Transducer
E  Hoist control unit
F  Gate valve control unit (optional)
G  Responder Driver Unit (optional)

System units
Transceiver

The transceiver is provided to transmit acoustic energy through water. This transmission and reception are commonly referred to as a ping. After each transmission, the transceiver receives the echoes from the targets in the water and/or the seabed. These echoes are filtered and amplified, and then converted to digital format.

The transceiver is a stainless steel cabinet that contains racks holding the system electronic modules. It contains a number of circuit boards and modules. The transceiver is designed to be installed on a suitable bulkhead and are fitted with vibration/shock absorbers to reduce the effects of vessel vibrations.

1PPS Converter (Optional)

The 1PPS Converter is a special made module designed for interfacing GPS signals to the High Precision Acoustic Positioning Operator station and to the 502/452/352/102 System.

The GPS signal consists of RS-232 serial NMEA data, and a 1PPS TTL pulse to synchronise the internal timing clock on High Precision Acoustic Positioning operator station and 502/452/352/102 System Control processor to the GPS clock.

The RS-232 serial NMEA data is transferred straight through the module, while the 1PPS TTL pulse is shaped to a fixed pulse length.

Responder Driver Unit (optional)

The Responder Driver Unit provides responder trigger signals to responders.

The Responder Driver Unit is a stand-alone unit. The Responder Driver Unit is connected to the interface unit and the switch. APOS controls which drive is being active while the sync/timing is received from the transceiver.
APOS - the HiPAP operator system

The HiPAP system is operated from an acoustic positioning operator station (APOS). The operator station is a Windows based computer running dedicated acoustic positioning software.

The system can be operated from one single APOS station or from a wide number of APOS operator stations connected on a network.

Scope of supply

To assemble a complete HiPAP system, you will need a set of system units. The main units required are provided with the standard delivery. Other required units may be purchased from Kongsberg Maritime or obtained locally. Some units are optional.

When you unpack the parts provided with the HiPAP delivery, make sure that the following items are included.

• Computer
• Transceiver
• Cables

Optional items

• Responder Driver Unit
• 1PPS Converter

General supply conditions

General supply conditions apply to this HiPAP delivery.

Related topics

Inspection of units and transportation boxes after arrival, page 58
Unpacking standard parts and units, page 58
Specifications for storage after unpacking, page 60
Transporting Kongsberg Maritime equipment, page 61
Receipt, unpacking and storage

Upon accepting shipment of the equipment, the shipyard and/or the dealer must ensure that the delivery is complete and inspect each shipping container for evidence of physical damage.

If the inspection reveals any indication of crushing, dropping, immersion in water or any other form of damage, the recipient should request that a representative from the company used to transport the equipment be present during unpacking.

All equipment must be inspected for physical damage, i.e. broken controls and indicators, dents, scratches etc. during unpacking. If any damage to the equipment is discovered, the recipient must notify both the transportation company and Kongsberg Maritime so that Kongsberg Maritime can arrange for replacement or repair of the damaged equipment.

Once unpacked, the equipment must be stored in a controlled environment with an atmosphere free of corrosive agents, excessive humidity or temperature extremes.

The equipment must be covered to protect it from dust and other forms of contamination when stored.

Equipment responsibility

Unless otherwise stated in the contract, the shipyard doing the installation and/or equipment dealer becomes fully responsible for the equipment upon receipt.

The duration of responsibility cover:

- The period of time the equipment is stored locally before installation
- The entire installation process
- Commissioning
- The period of time between commissioning and the final acceptance of the equipment by the end user or owner

Unless other arrangements have been made in the contract, the Kongsberg HiPAP warranty period (as specified in the contract) begins when the acceptance documents have been signed.
Support information

Should you need technical support for your HiPAP you must contact a Kongsberg Maritime office. A list of all our offices is provided on our website. You can also contact our main support office in Norway.

• Company name: Kongsberg Maritime AS
• Address: Strandpromenaden 50, 3190 Horten, Norway
• Telephone: +47 33 03 41 00
• Telephone 24h support: +47 33 03 24 07
• Telefax: +47 33 04 76 19
• Website: http://www.km.kongsberg.com
• Support website: http://www.km.kongsberg.com/support_hpr
• E-mail address: km.support.hpr@kongsberg.com
Installing the HiPAP hardware units

Topics
Installing the computer with a KM1000 kit, page 14
Installing the computer in a 19" rack, page 15
Installing the transceiver, page 15
Installing the 1PPS Converter, page 16
Installing the Responder Driver Unit, page 16
Installing the computer with a KM1000 kit

The computer can be installed inside a console, inside a suitable cabinet, in a 19" rack or on a desk. This procedure describes how to install the computer using KM1000 kit (331385).

Prerequisites
Install the computer horizontal or vertical with the KM1000 kit.

Procedure
1. Prepare four holes, each for M6, following the illustration.
2. Mount the bottom plate using countersunk screws or bolts.
3. Place the computer on the bottom plate.
4. Mount the two brackets to the bottom plate using M5 locking nuts and washers.

Further requirements
Connect the cables.
After electrical installation, secure all cables to cable fingers and holes.
Installing the computer in a 19" rack

The computer can be installed inside a console, inside a suitable cabinet, in a 19" rack or on a desk. This procedure describes how to install the computer using rack kit 371931.

**Context**

**Procedure**

1. Remove the lid from the rack shelf.
2. Place the computer on the shelf with the front to the front of the shelf.
3. Mount the lid, and secure properly with the lock nuts and washers.
4. Mount the shelf to the rack with the cage nuts, washers and screws provided.

**Further requirements**

Connect the cables.

After electrical installation, secure all cables to cable fingers and holes.

Installing the transceiver

The physical length of the cables limit the distance between the transducer and the transceiver.

**Prerequisites**

There must be a clear space of at least 500 mm in front of the unit for maintenance and 200 mm under the unit for the cables.

The transceiver unit must be mounted on a bulkhead. You do not need to remove the circuit boards or modules from the transceiver unit during the installation process. Keep the transceiver unit door on during the installation. Make sure that the unit is not exposed to dust, moisture, vibration or physical damage during the installation process.

The brackets for hanging up the transceiver is delivered with the unit.

**Caution**

*Do not weld in the vicinity of the transceiver unit. First weld the brackets, then bring in the transceiver unit.*

**Procedure**

1. Measure and mark the locations where to mount the brackets.
Make sure the transceiver is at a suitable height for easy access.

2  Weld the brackets to the bulkhead.

3  Clean the welds and brackets, and paint them with an appropriate preservation medium.

4  Once the paint is dry, lift the unit into position and align the unit onto the brackets.

5  Start with the upper bracket, and bolt the shock absorbers to the brackets.

Further requirements
Connect the cables.

Related topics
About Electrostatic Discharge (ESD), page 33

Installing the 1PPS Converter

The 1PPS converter is mounted on the cable between the GPS receiver and the COM port used on the computer.

Prerequisites
The 1PPS converter requires a power of 9-15 VDC and 100 mA.
We advice you to mount the 1PPS converter closer than 10 m to the GPS receiver.

Procedure
1  Mount the box wherever suitable.
2  Fasten the 4 screws on either side of the 1PPS converter.

Installing the Responder Driver Unit

The Responder Driver Unit provides responder trigger signals to responders. The RDU is a stand-alone unit and can be mounted horizontally or vertically.

Prerequisites
The unit should be located where it is most suitable for connecting the cables to the responders. This can be close to Remote Operating Vehicle (ROV) operation room. The unit must be installed so it is easy accessible for operators to check the working condition of the responder trigger status diodes.

Procedure
1  Open the unit by removing the four screws that secures the lid.
2 Lift off the lid and see the four mounting holes, one in each corner.
3 Mount the responder driver unit where suitable.
   The mounting screws with nuts and washers are delivered with the unit.
4 Close the unit.

Installing the HiPAP hardware units
Cable layout and interconnections

Topics

Topside cable plan, page 19
Sonar room cable plan (transceiver), page 20
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Installing the HiPAP cables, page 23
Topside cable plan

The topside/bridge cables include those used to connect the HiPAP computer and the display to each other, to AC mains power, and to external devices.

A Display
B Computer
C Ethernet switch
D Power supply, Ethernet switch
E Patch panel
F Fibre optic cables to the transceiver
G 1PPS Converter
H Power supply, 1PPS Converter
Sonar room cable plan (transceiver)

The sonar room cables include those used to connect the HiPAP units to AC mains power, as well as the control cables between the units.

A  Transceiver
B  Hoist control unit
C  Fibre optic cables to the computer
D  Responder Driver Unit
E  Responder
F  Gate valve control unit
List of cables

A set of cables is required to connect the HiPAP units to each other, and to the relevant power source(s). Additional cables are required to connect the HiPAP to peripheral devices.

**Topside cables**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Type</th>
<th>From/To</th>
<th>Minimum requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Video cable</td>
<td>From computer to display</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>Computer cable</td>
<td>From computer to keyboard</td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>Computer cable</td>
<td>From computer to mouse (or another similar device)</td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C5 (a)</td>
<td>AC power cable</td>
<td>From display to AC power outlet</td>
<td></td>
</tr>
<tr>
<td>C5 (b)</td>
<td>AC power cable</td>
<td>From computer to AC power outlet</td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>Ground cable</td>
<td>From computer to vessel ground</td>
<td></td>
</tr>
<tr>
<td>C7 (a)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C7 (b)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C7 (c)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C7 (d)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C7 (e)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C7 (f)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C7 (g)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C7 (h)</td>
<td>Serial cable</td>
<td>From computer to external device(s)</td>
<td></td>
</tr>
<tr>
<td>C8 (a)</td>
<td>Ethernet cable</td>
<td>From computer to local area network (LAN) A</td>
<td>Cat 7</td>
</tr>
<tr>
<td>C8 (b)</td>
<td>Ethernet cable</td>
<td>From computer to local area network (LAN) B</td>
<td>Cat 7</td>
</tr>
<tr>
<td>C8 (c)</td>
<td>Ethernet cable</td>
<td>From computer to local area network (LAN) C</td>
<td>Cat 7</td>
</tr>
<tr>
<td>C9</td>
<td>Ethernet cable</td>
<td>From computer to Ethernet switch</td>
<td>Cat 7</td>
</tr>
<tr>
<td>Cable</td>
<td>Type</td>
<td>From/To</td>
<td>Minimum requirements</td>
</tr>
<tr>
<td>--------</td>
<td>------------------</td>
<td>-----------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>C10</td>
<td>DC power cable</td>
<td>From Ethernet switch to switch power</td>
<td></td>
</tr>
<tr>
<td>C11</td>
<td>AC power cable</td>
<td>From switch power to AC power outlet</td>
<td></td>
</tr>
<tr>
<td>C12</td>
<td>Fibre optic cable</td>
<td>From Ethernet switch to fibre optic patch panel</td>
<td></td>
</tr>
<tr>
<td>C13</td>
<td>Fibre optic cable</td>
<td>From transceiver to fibre optic patch panel</td>
<td></td>
</tr>
<tr>
<td>C14</td>
<td>DC power cable</td>
<td>From 1PPS converter to 1PPS power, Optional</td>
<td></td>
</tr>
<tr>
<td>C15</td>
<td>Serial cable</td>
<td>From 1PPS converter to GPS, Optional</td>
<td></td>
</tr>
<tr>
<td>C16</td>
<td>AC power cable</td>
<td>From 1PPS power to AC power outlet, Optional</td>
<td></td>
</tr>
</tbody>
</table>

**Sonar room cables (transceiver)**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Type</th>
<th>From/To</th>
<th>Minimum requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>C13</td>
<td>Fibre optic cable</td>
<td>From transceiver to fibre optic patch panel</td>
<td></td>
</tr>
<tr>
<td>C17</td>
<td>AC power cable</td>
<td>From transceiver to AC power outlet</td>
<td>3 x 1.5 mm²</td>
</tr>
<tr>
<td>C18</td>
<td>AC power cable</td>
<td>From transceiver to AC power outlet</td>
<td>3 x 1.5 mm²</td>
</tr>
<tr>
<td>C19</td>
<td>Ground cable</td>
<td>From transceiver to vessel ground</td>
<td></td>
</tr>
<tr>
<td>C20</td>
<td>Serial cable</td>
<td>From transceiver to transceiver, Optional</td>
<td>2 x 2 x 0.75 mm²</td>
</tr>
<tr>
<td>C21</td>
<td>Transducer cable</td>
<td>From transceiver to hull unit junction box</td>
<td></td>
</tr>
<tr>
<td>C22</td>
<td>Ethernet cable</td>
<td>From hoist control unit to transceiver</td>
<td>Cat 7</td>
</tr>
<tr>
<td>C23</td>
<td>Ethernet cable</td>
<td>From transceiver to gate valve control unit, Optional</td>
<td>Cat 7</td>
</tr>
<tr>
<td>C24</td>
<td>Ethernet cable</td>
<td>From transceiver to Responder Driver Unit, Optional</td>
<td>Cat 7</td>
</tr>
<tr>
<td>C25</td>
<td>Serial cable</td>
<td>From transceiver to Responder Driver Unit, Optional</td>
<td></td>
</tr>
<tr>
<td>C26</td>
<td>Serial cable</td>
<td>From responder driver unit to responder, Optional</td>
<td></td>
</tr>
<tr>
<td>C27</td>
<td>AC power cable</td>
<td>From Responder Driver Unit to AC power outlet, Optional</td>
<td></td>
</tr>
</tbody>
</table>
Installing the HiPAP cables

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Connecting the transducer to the transceiver, page 27
Connecting the Responder Driver Unit to the transceiver, page 28
Connecting the transceivers, page 30

Installing the HiPAP topside cables
The topside/bridge cables include those used to connect the HiPAP computer and the display to each other, to AC mains power, and to external devices.

Procedure
1. Connect the power cable from the display to the AC power outlet. (C5b)
2. Connect the power cable from the computer to the AC power outlet. (C5a)
3. Connect the video cable from the computer to the display. (C1)
4. Connect the cable from the computer to the keyboard. (C2)
5. Connect the cable from the computer to the mouse (or another similar device). (C3)
6. Connect the serial cable from the computer to the external device. (C4)
7. Connect the ground cable from the computer to vessel ground. (C6)
The cable must be provided by the installation shipyard.
8. Connect the Ethernet cable from the computer to the local area network (LAN). (C8a, C8b, C8c)
9. Connect the serial cables from the computer to the relevant external devices. (C7)
10. Connect the serial cable from the computer to the 1PPS. (C7a) (Optional)
11. Connect the power cable from the 1PPS converter to the 1PPS power. (C14) (Optional)
12. Connect the cable from the 1PPS converter to the GPS. (C15) (Optional)
13. Connect the power cable from the 1PPS power to the AC power outlet. (C16) (Optional)
14. Connect the Ethernet cable from the computer to the Ethernet switch. (C9)
15. Connect the power cable from the Ethernet switch to the switch power. (C10)
16 Connect the power cable from the switch power to the AC power outlet. (C11)
17 Connect the fibre optic cable from the Ethernet switch to the fibre optic patch panel. (C12)

**Installing the HiPAP sonar room cables**

The sonar room cables include those used to connect the HiPAP units to AC mains power, as well as the control cables between the units. One high capacity Ethernet cable connects the transceiver to the topside computer.

**Procedure**

1 Connect the power cable from the transceiver to the AC power outlet. (C17, C18)
   
   **Connecting power and ground to the transceiver, page 24**

2 Connect the ground cable from the transceiver to vessel ground. (C19)
   
   **Connecting power and ground to the transceiver, page 24**

3 Connect the cable from the transceiver to the fibre optic patch panel. (C13)
4 Connect the Ethernet cable from the hoist control unit to the transceiver. (C22)
5 Connect the Ethernet cable from the transceiver to the gate valve control unit. (C23)
6 Connect the cable from the transceiver to the Responder Driver Unit. (C24)
7 Connect the cable from the transceiver to the Responder Driver Unit. (C25)
   
   **Connecting the Responder Driver Unit to the transceiver, page 28**

8 Connect the power cable from the RDU to the AC power outlet. (C27)
9 Connect the cable from the responder driver unit to the responder. (C26)
10 Connect the synchronization cable from the transceiver to the transceiver. (C20)
   
   **Connecting the transceivers, page 30**

11 Connect the transducer cable from the transceiver to the hull unit junction box.
   
   (C21)
   
   **Connecting the transducer to the transceiver, page 27**

**Connecting power and ground to the transceiver**

The transceiver must be connected to AC mains and it must be properly grounded.

**Prerequisites**

The transceiver is delivered with a power cable for test use only. The power cable must be provided by the yard.
**Procedure**

1. Produce the cable according to the specification.
2. Connect the cable between the power source and the transceiver.
3. Loosen the cable gland on the cable to the filter. The top part needs to be loosened, not the nut.

The cable gland is located near the bottom of the cabinet.
4 Remove the 16 screws on the power box underneath the transceiver cabinet.

5 Take care not to lose the gasket around the box.

6 Remove the test cable.

7 Enter the cable through the gland, connecting it as shown in the wiring diagram and the cable description.

There are room for two individual power cables, for redundancy.

8 Block the cable gland not in use, if there is no redundancy in the power supply. Use a F/M20 cable gland blind plug.

9 Screw the power box back on with the gasket fitted.

10 Fasten the cable glands, both the one loosened and the one/s for the power cable/s.
11 Connect the grounding cable to ships ground.

Connecting the transducer to the transceiver
The transducer cable is part of the hull unit delivery.

Prerequisites
The transducer patch cable is connected from the junction box that moves up and down with the transducer. Make sure this cable moves as smooth as possible without any unnecessary wear.

Procedure
1 Fasten the cable between the HiPAP junction box and the transceiver. Make sure the cable can move freely when the transducer goes up and down.
2 Remove the blind cover from underneath the transceiver on the right side, keeping the screws for the cover and EMC gasket.
3 Insert the cable and connectors.
4 Fasten the cover.
5 Connect the individual cables to the correct circuit board.
The connectors are numbered. Circuit board 1 is to the left following in sequence to board number 8 to the far right.

6 Bundle the cables to the bracket inside the transceiver unit.

7 Insert the cable ends of the other end of the cable into the junction box and fasten the cover.

8 Open the side door to get access to the cables inside the junction box.

9 Connect the cables according to the markings.

10 Close the door.

Connecting the Responder Driver Unit to the transceiver
The synchronization cable for the Responder Driver Unit is provided by the yard.

Prerequisites
The 9-pin D-sub plug is delivered with the Responder Driver Unit.
A Responder Driver Unit, **Input Responder Sync**

B Transceiver Unit, X2

**Procedure**

1. Select the cable according to the specification and cut it to the needed length.
2. Install the 9-pin D-sub plug to the cable.
3. Support the cable between the transceiver and the Responder Driver Unit, making sure the D-sub connector ends at the Responder Driver Unit.
4. Remove one of the blind plugs in the bottom of the cabinet.
5. Insert the cable through one of the cable glands delivered with the transceiver cabinet.
6. Connect the wires to terminal block X2 according to the cable drawing or the wiring diagram.

7. Provide a service loop on the cable and fasten the cable gland.
8. Connect the 9-pin D-sub plug to the **Input Responder Sync** connector on the Responder Driver Unit.
Connecting the transceivers

The synchronization cable for the transceiver is provided by the installation shipyard.

Prerequisites

A  Transceiver
B  Transceiver

Procedure

1  Select the cable according to the specification and cut it to the needed length.
2  Support the cable between the transceivers.
3  Remove one of the blind plugs in the bottom of the cabinet.
4  Insert the cable through one of the cable glands delivered with the transceiver cabinet.
5  Connect the wires to termination block X2 according to the cable drawing or the wiring diagram.
6  Fasten the cable gland.
7  Repeat step 3 to 6 for the other transceiver cabinet.
Operating procedures

See APOS online help.
Maintenance

Topics
About Electrostatic Discharge (ESD), page 33
Maintenance philosophy, page 34
Preventive maintenance schedule, page 35
Creating a backup, page 35
Transceiver unit, page 36
About Electrostatic Discharge (ESD)

Electrostatic discharge (ESD) is the sudden flow of electricity between two electrically charged objects. Such flow can be caused by contact, an electrical short, or dielectric breakdown. Electrostatic discharge (ESD) can cause serious damage to printed circuit boards and electronic modules.

**Beware of Electrostatic Discharge (ESD)!**

*Note*

> When you handle electronic circuit boards and modules, you must beware of the dangers of electrostatic discharge (ESD), both to yourself and to the equipment. In order to ensure safe transport and storage, circuit boards and other electronic units will always be wrapped in a clear plastic protective bag, and the bag will be sealed.

For correct and safe handling of printed circuit boards and electronic modules, you need a suitable working area. The working area must be covered by an approved conductive service mat that has a resistance of between 50 kΩ and 2 MΩ, and is connected directly to a reliable earth point via its earthing cord. You - and all other service personnel involved - must wear a wristband in direct contact with the skin. The wristband must be electrically connected to the service mat.

**What is Electrostatic Discharge (ESD)?**

Electrostatic Discharge (ESD) is the transfer of an electrostatic charge between two bodies at different electrostatic levels, caused either by direct contact or induction by an electrostatic field. The passing of a charge through an electronic device can cause local overheating, and it can also "puncture" insulating layers within the structure of the device. This may deposit a conductive residue of the vaporized metal on the device, and thus create a short circuit. Electrostatic Discharge (ESD) may result in a failures or degraded performance of the device.

ESD can create spectacular electric sparks (thunder and lightning is a large-scale ESD event), but also less dramatic forms which may be neither seen nor heard, yet still be large enough to cause damage to sensitive electronic devices. Electric sparks require a field strength above approximately 4 kV/cm in air, as notably occurs in lightning strikes. Other forms of ESD include corona discharge from sharp electrodes and brush discharge from blunt electrodes.

ESD can cause a range of harmful effects of importance in industry, including gas, fuel vapour and coal dust explosions, as well as failure of solid state electronics components such as integrated circuits. These can suffer permanent damage when subjected to high voltages. Electronics manufacturers therefore establish electrostatic protective areas free of static, using measures to prevent charging, such as avoiding highly charging materials and measures to remove static such as grounding human workers, providing antistatic devices, and controlling humidity.

Precautions to prevent Electrostatic Discharge (ESD)

Sensitive printed circuit boards and electronic modules must always be transported and stored in protective antistatic packing bags. It is as also important that they are not transported or stored close to strong electrostatic, electromagnetic or radioactive fields. If it is necessary to open and touch the printed circuit board or module inside the protective bag, the following precautions must be taken.

1. For correct and safe handling of printed circuit boards and electronic modules, you need a suitable working area. The working area must be covered by an approved conductive service mat that has a resistance of between 50 kΩ and 2 MΩ, and is connected directly to a reliable earth point via its earthing cord.

2. You - and all other service personnel involved - must wear a wristband in direct contact with the skin. The wristband must be electrically connected to the service mat.

3. Printed circuit boards and electronic modules must be placed on the conductive service mat during installation and maintenance operations.

4. If, for any reason, it is necessary to move the circuit board from the conductive service mat, it must be placed in an approved antistatic transportation container (for example a static shielding bag) before transportation.

5. During installation and servicing, all electrical equipment (for example soldering irons and test equipment) must be earthed.

Maintenance philosophy

All maintenance on the HiPAP must be carried out according to the maintenance philosophy defined by Kongsberg Maritime.

Organisational level

You will only perform limited preventive and corrective maintenance on the HiPAP. There is no need for technical education or training, and no need for any instruments. Typical tasks are exterior cleaning with fresh water and checking and replacing o-rings and sacrificial anodes.
Preventive maintenance schedule

In order to secure long and trouble-free operation of the HiPAP, certain specific preventive maintenance tasks must be done. The tasks are organized in a preventive maintenance schedule.

- **After use**
  - Clean the transducer
  - Clean the repeater unit
  - Lubricate the connectors
  - Check that all fasteners are tightened
  - Check that there are no physical damage to the unit

- **Every month**
  - Dust the units
  - APOS backup

- **Every sixth month**
  - Check all cable connections
  - Check all units for damage

Creating a backup

For backup procedures, refer to the backup files document, doc. no. 859-216300. This is a separate manual supplied with the system delivery.

Take a backup of all operator stations at regular intervals (1-3 months), and every time major changes have been performed in the configuration and/or user settings.

**Important**

A backup must be performed when the software has been upgraded.
Transceiver unit

Replacing the Ethernet switch
The Ethernet switch is replaced if malfunctioning.

Procedure
1 Turn off the transceiver.
2 Remove the cables connected to the Ethernet switch.
3 Loosen the mounting screws and remove the unit.
4 Remove the unit and unplug the power cable.
5 Replace the unit.
6 Reconnect all cables.
7 Switch on the transceiver unit using the Main switch.

Further requirements
The new Ethernet switch/Converter must be configured. You will find the configuration information on the Operator Station.
Ref: C:\Install\moxa\moxaconfig.rtf

Removing the LPT32 Transceiver board
The boards are located inside the unit.

Context
Caution

Be careful not to touch the sides of the circuit boards and filter boards as the capacitors might still be charged.
**Procedure**

1. Turn off the transceiver.
2. Make sure the light on the power unit inside goes from **blue to red/off** before touching any of the boards.
3. Locate the faulty board.
4. Remove the cable connected to the front of the board.
5. Loosen the screws. (A)
6. Loosen the circuit board by pushing the two red locking devices on the handles. (B)
7. To loosen the board, push the top ejector up, and the bottom ejector down. (C)
8. Grab the handles and pull the circuit board straight out.
9. Place the circuit board inside an anti-static plastic bag. Place it on a clean and stable workbench.

**Further requirements**

To return the circuit board for repair or replacement, observe the relevant handling instructions.

Follow the procedure in reverse to install the new board.

**Related topics**

About Electrostatic Discharge (ESD), page 33

**Removing a filter board**

The boards are located inside the unit.

**Context**

*Caution*

Be careful not to touch the sides of the circuit boards and filter boards as the capacitors might still be charged.

**Procedure**

1. Turn off the transceiver.
2. Make sure the light on the power unit inside goes from **blue to red/off** before touching any of the boards.
3. Locate the faulty board.
4. Remove the cable connected to the front of the board.
5 Loosen the screws.
6 Loosen the circuit board by pushing the two red locking devices on the handles.
7 To loosen the board, push the top ejector up, and the bottom ejector down.
8 Grab the handles and pull the circuit board straight out.
9 Place the circuit board inside an anti-static plastic bag. Place it on a clean and stable workbench.

Further requirements
To return the circuit board for repair or replacement, observe the relevant handling instructions.
Follow the procedure in reverse to install the new board.

Related topics
About Electrostatic Discharge (ESD), page 33

Removing the power module from the transceiver unit
The power module is located in back of the transceiver unit.

Prerequisites
Removing the Moxa switch makes the job of replacing the power unit easier.

Procedure
1 Switch off the transceiver unit using the Main switch.
2 Disconnect all the cables in the grey area marked in the illustration.
3 Disconnect the Ethernet cable from the power unit.
4 Remove the screw on the front of the power unit and remove the cover.
5 Disconnect all the cables that are connected to the power unit.
6 Open the lock on the right hand side of the power unit and turn it 180° counter-clockwise.
7 Slide the power unit to the left and pull out the power unit very carefully out of the Transceiver unit.

Pull the top of the power unit out towards you before sliding it sideways through the gap in the transceiver unit.
8 Make sure all cables are detached before removing the power unit.

Related topics
About Electrostatic Discharge (ESD), page 33
Replacing the power module in the transceiver unit
The power module is located in back of the transceiver unit.

Prerequisites
Removing the Moxa switch makes the job of replacing the power unit easier.

Procedure
1. Insert the new power unit through the same gap in the Transceiver unit.
2. Place the power unit on the six nuts on the back wall of the Transceiver unit.
3. Slide the power unit to the right and secure the power unit by turning the flap on the right side 180° and close the flap.
4. Reconnect all cable to the power unit.
5. Reattach the cover and secure with the screw.

Replacing the fan unit in the transceiver unit
The fan unit is located below the circuit boards inside the transceiver unit.

Prerequisites
Removing some of the circuit boards at the left side makes the job of replacing the fan unit easier.

Procedure
1. Switch off the transceiver unit using the Main switch.
2. Remove the four screws in the front.
3. Unplug the power cable by pressing the IEC lock on the connector at the back of the fan unit.
4. Remove the fan unit.
5. Replace the old fan unit with the new one.
6. Plug the power cable back in at the back of the fan unit.
7. Screw in the four screws in the front.
8. Switch on the transceiver unit using the Main switch.

Replacing the terminal block in the transceiver unit
The Ethernet switch/Converter is located below the PCB rack in the transceiver unit.

Procedure
1. Switch off the transceiver unit using the Main switch.
2 Remove the power cables in to the cabinet.
3 Disconnect the terminal block module.
4 The module is snapped on. To remove it, pull down the lock-tab in the lower end, and pull it directly out from the support rail.
5 Align the new module on the support rail.
6 Press the module and pull down the lock-tab until it snaps into place.

**Replacing a fuse in the transceiver unit**

The transceiver unit is powered via a Main switch mounted on the support rail at the bottom of the transceiver unit.

**Context**

The fuse is a circuit breaker, and it trips at 25 A.

**Note**

*Always use the correct size and type of fuse. Irreparable damage may be caused to the transceiver unit if the wrong fuse (or anything else) is used.*

**Procedure**

1 Switch off all external units and systems connected to the HiPAP system.
2 Remove the transceiver unit front door.
3 Switch off power to the unit using the Main switch.
4 Replace the blown fuse(s) with a fuse with correct size and type.
5 If the Main switch has tripped, reset the switch.

**Note**

*Release the switch immediately. It is made so it can trip again if necessary.*

6 Turn on the power to the HiPAP system and then to the other external units.

**Note**

*If, when a fuse is replaced, it blows or trips again when power is switched on to the system, a more serious fault exists. Do not replace the fuse(s) a second time until the fault has been found and corrected.*

7 Close the transceiver unit front door.
The following table lists the Kongsberg Maritime drawings that must be referred to when installing the HiPAP.

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Technical Data:
- Power Supply: 100-240 VAC 50-60 Hz
- Power Consumption, Max: 240Watt
- Weight: 7 kg
- Computer Part No. 406280 for K-Chief 600
- Computer Part No. 406301 for K-Chief 500
- Air Filter Part No. 406317

Alt. 1: Fixing Instructions:
Fit velcro band with adhesive on computer, 2 pcs. Fit 2 pcs. of velcro band on fixing surface in the same position as on the computer, and connect. Can also be used for keyboard.


Alt. 2: Use Clamps as shown.

Kongsberg Maritime AS
Merchant Marine Division
Horten

Computer MP 5810
Desk mounting without mariner kit

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Kongsberg Maritime

Document ID: 413568
Revision/Version: B
Technical specifications

Topics

- Interface specifications, page 53
- Weights and outline dimensions, page 53
- Power requirements, page 54
- Environmental requirements, page 55
Interface specifications

The HiPAP system will interface with peripheral systems and sensors using standard and/or proprietary datagram formats.

Supported datagram formats for motion information

- NMEA $**HDT
- NMEA $**VHW
- Yokogawa $**HRC
- SKR
- STL
- EM 3000
- $SPSXN,10
- $SPSXN,23
- IxSea Octans TAH ($PHOCT) R-P-H (UTC)
- IxSea Octans $PHTRO
- Ixsea Octans $PHLIN

The data rate should be at least 25 Hz, 100 Hz is recommended for attitude data.

Data input can be either serial line RS-232,RS-422 or Ethernet UDP.

Serial line speeds can be from 1200 baud up to 115200 baud, 1 or 2 stop bits, 7/8 bit data and parity none, even or odd.

Weights and outline dimensions

These weights and outline dimension characteristics summarize the physical properties of the HiPAP 502/452/352/102 System.

Computer weight and outline dimensions

- **Make and model:** Hewlett Packard MP5810
- **Outline dimensions:**
  - **Depth:** 379 mm
  - **Width:** 338 mm
  - **Height:** 100 mm
- **Weight:** 7 kg
Transceiver weight and outline dimensions

- **Make and model:** HiPAP Transceiver x82
- **Outline dimensions:**
  - **Depth:** 548 mm
  - **Width:** 525 mm
  - **Height:** 909 mm
- **Weight:** 72 kg

Responder Driver Unit weight and outline dimensions

- **Make and model:** HiPAP Responder Driver Unit
- **Outline dimensions:**
  - **Depth:** 200 mm
  - **Width:** 280 mm
  - **Height:** 73 mm
- **Weight:** 2.8 kg

Power requirements

These power characteristics summarize the supply power requirements for the HiPAP 502/452/352/102 System.

Computer power requirements

The standard commercial computer has been configured to fit the operational requirements of the HiPAP.

- **Make and model:** Hewlett Packard MP5810
- **Voltage requirement:** 100/240 VAC, 50 to 60 Hz, autosensing
- **Maximum power consumption:** 240 W (Approximately)
Transceiver power specifications

- **Make and model**: HiPAP Transceiver x82
- **Voltage requirement**: 115/230 VAC, 50/60 Hz
- **Maximum voltage deviation**: 15 %
- **Maximum current draw**: 40 A
- **Normal current draw**: 0.8 A

Responder Driver Unit power specifications

- **Make and model**: HiPAP Responder Driver Unit
- **Voltage requirement**: 88–264 VAC, 47–63 Hz
- **Maximum current draw**: 0.4 A
- **Normal current draw**: 0.06 A
- **Nominal power consumption**: 15 W

Environmental requirements

These environmental specifications summarize the temperature and humidity requirements for the HiPAP 502/452/352/102 System.

Computer environmental requirements

- **Make and model**: Hewlett Packard MP5810
- **Operational temperature**: 0 to +55 °C
- **Storage temperature**: -20 to 70 °C
- **Relative humidity**: 5 to 95% relative, non-condensing
**Transceiver environmental requirements**

- **Make and model:** HiPAP Transceiver x82
- **Operational temperature:** 0 to +55 °C
- **Storage temperature:** -20 to 65 °C
- **Degree of protection:** IP44
- **Vibration range:** 5–100 Hz
- **Excitation level:** 5–13.2 Hz ± 1.5 mm, 13.2–100 Hz 1 g
- **Relative humidity:** 15 to 95% relative non-condensing

**Responder Driver Unit environmental requirements**

- **Make and model:** HiPAP Responder Driver Unit
- **Operational temperature:** 0 to +55 °C
- **Storage temperature:** -40 to 75 °C
- **Degree of protection:** IP44
- **Vibration range:** 5–100 Hz
- **Excitation level:** 5–13.2 Hz ± 1.5 mm, 13.2–100 Hz 1 g
- **Relative humidity:** 15 to 95% relative non-condensing
Equipment handling

Topics
- Inspection of units and transportation boxes after arrival, page 58
- Unpacking standard parts and units, page 58
- Specifications for storage after unpacking, page 60
- Transporting Kongsberg Maritime equipment, page 61
Inspection of units and transportation boxes after arrival

A visual inspection must be done immediately after the box(es) have arrived at their destination.

Prerequisites

If you suspect that the equipment has been damaged during the transport, request that a representative of the carrier is present during the inspection.

Procedure

1. Check all boxes (wooden or cardboard boxes, plastic bags and/or pallets) for physical damage.
   Look for signs of dropping, immersion in water or other mishandling.

2. If external damage is detected, open the box to check its contents.
   Request that a representative of the carrier to be present while the box is opened, so any transportation damage can be identified and documented.

3. If a unit has been damaged, prepare an inspection report stating the condition of the unit and actions taken.
   Describe the damage, and collect photographic evidence if possible. Return the inspection report to Kongsberg Maritime as soon as possible.

4. If units are not damaged, check the humidity absorbing material.
   If required, dry or replace the bags, then re-pack the unit(s) according to the packing instructions.

Unpacking standard parts and units

Prior to installation or use, parts and units must be inspected, and then unpacked from their transport boxes. It is important that this unpacking is done without inflicting damage to the equipment.

Context

This procedure provides the basic tasks of unpacking units (main unit, spare parts etc) from boxes shipped from Kongsberg Maritime.
Note

If the unit in question is not unpacked for immediate use, you may consider storing it unopened in its original box. However, it may be useful to open the box to check its contents for damage and retrieve any accompanying documentation.

Do not use a knife to open cardboard boxes - the contents may be located close to the surface, and can then be damaged by the blade.

Procedure

1 Check the carton before opening it to ensure it shows no signs of dropping, immersion in water or other mishandling.
   1 If external damage is detected, open the box to check its contents.
   2 Request that a representative of the carrier to be present while the box is opened, so any transportation damage can be identified and documented.
   3 If a unit has been damaged, prepare an inspection report stating the condition of the unit and actions taken.
      Describe the damage, and collect photographic evidence if possible. Return the inspection report to Kongsberg Maritime as soon as possible.

2 Place the box on a stable work bench or on the floor with the top of the box facing upwards.

3 In the absence of other instructions, always open the top of the carton first.
   The contents of the box will normally have been lowered into the carton from above, so this will usually be the easiest route to follow. Be careful when you open the box, and make sure that the contents are not damaged. Do not use a knife to open cardboard boxes.

4 If the box has been closed using staples, remove the staples from the carton as you open it.
   This will reduce the possibilities of scratch injury to yourself and damage to the contents.

5 If a wooden box has been closed using screws, always remove them using a screwdriver.
   Do not attempt to force the lid open with a crowbar or similar tool.

6 Once the carton is open, carefully remove all loose packing and insulation material.

7 Check for user manuals and other documents that may have been added to the carton during packing.

8 Check also for special tools, door keys etc.
Specifications for storage after unpacking

The unit must whenever possible be stored in its original transportation crate until ready for installation.

**General specifications**

During storage, each box must not be used for any purpose for which it was not intended (work platform, table, steps etc.).

Once unpacked, all equipment must be kept in a dry, non condensing atmosphere, free from corrosive agents and isolated from sources of vibration.

*Note*  
Do not break the seal to open a circuit board package before the board is to be used.  
If the board package is returned to Kongsberg Maritime with the seal broken, we will assumed that the unit has been used, and then you will be billed accordingly.

Each unit must be installed in its intended operating position as soon as possible after unpacking. If the unit contains normal batteries, these may have been disconnected/isolated before the unit was packed. These must then be reconnected during the installation procedure. Units containing batteries are marked.

*Caution*  
Units containing lithium or alkaline batteries must be handled separately and with care.  
Such units are marked accordingly. Do not attempt to recharge such batteries, open them, or dispose of them by incineration.

Refer to the applicable product data sheets or battery handling procedures for further details.

**Temperature protection**

Any units that requires protection against extreme temperatures are identified as such in the applicable documentation. The box used to transport and store such units are clearly marked, for example:

Must not be transported or stored in temperatures below -5 °C.

Other temperature limits may be used if applicable.

If a unit needs temperature protection, the box to be used for storage and transportation must be lined on all walls, base and lid, using minimum 5 cm thick polyurethane or polystyrene foam.

Most system units can normally be stored in temperatures between -30° C and +70° C. Refer to the relevant technical specifications for details.
Note

Unless otherwise specified, transducers and hydrophones must not be stored in temperatures below −10°C and above +50°C.

Transporting Kongsberg Maritime equipment

Unless otherwise stated in the accompanying documentation, electronic, electromechanical and mechanical units supplied by Kongsberg Maritime can be only transported using methods approved for delicate and fragile equipment.

Prerequisites
Transportation methods approved for delicate equipment includes transportation by road, rail, air or sea.

Context
The units are to be transported in accordance with general or specific instructions for the appropriate unit(s), using pallets, transport cases, wooden boxes, or carton boxes as appropriate.

Observe the packing instructions.

Note

Special local restrictions concerning air transportation may be applied to units containing certain types of batteries. These units must be checked properly, and the regulations must be investigated by the packer/shipper before the unit is dispatched.

Procedure
1. Ensure that all local transportation is done according to the same specifications as for the initial delivery.

2. Make sure that the box containing the unit is kept dry at all times, and sheltered from the weather.

   It must not be subjected to shocks, excessive vibration or other rough handling. The box will normally be marked with text or symbols indicating which way it is to be placed. Follow the instructions provided, and make sure that the box is always placed with its “top” facing upwards.

3. Make sure that the box is not used for any purpose for which it was not intended (step, table, etc.).

   In the absence of other information, no other boxes must be stacked on top of it.

4. Handle all boxes and units with care.
Note

Due to the nature of Kongsberg Maritime’s products, and the extensive use of delicate electronic parts, all units and boxes must be regarded and handled as fragile equipment.
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