

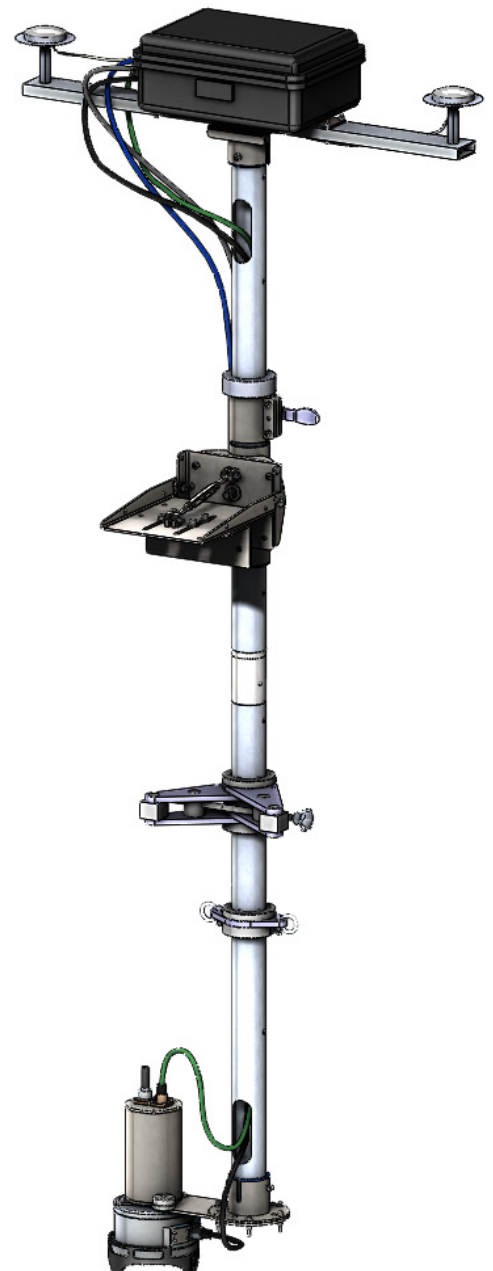
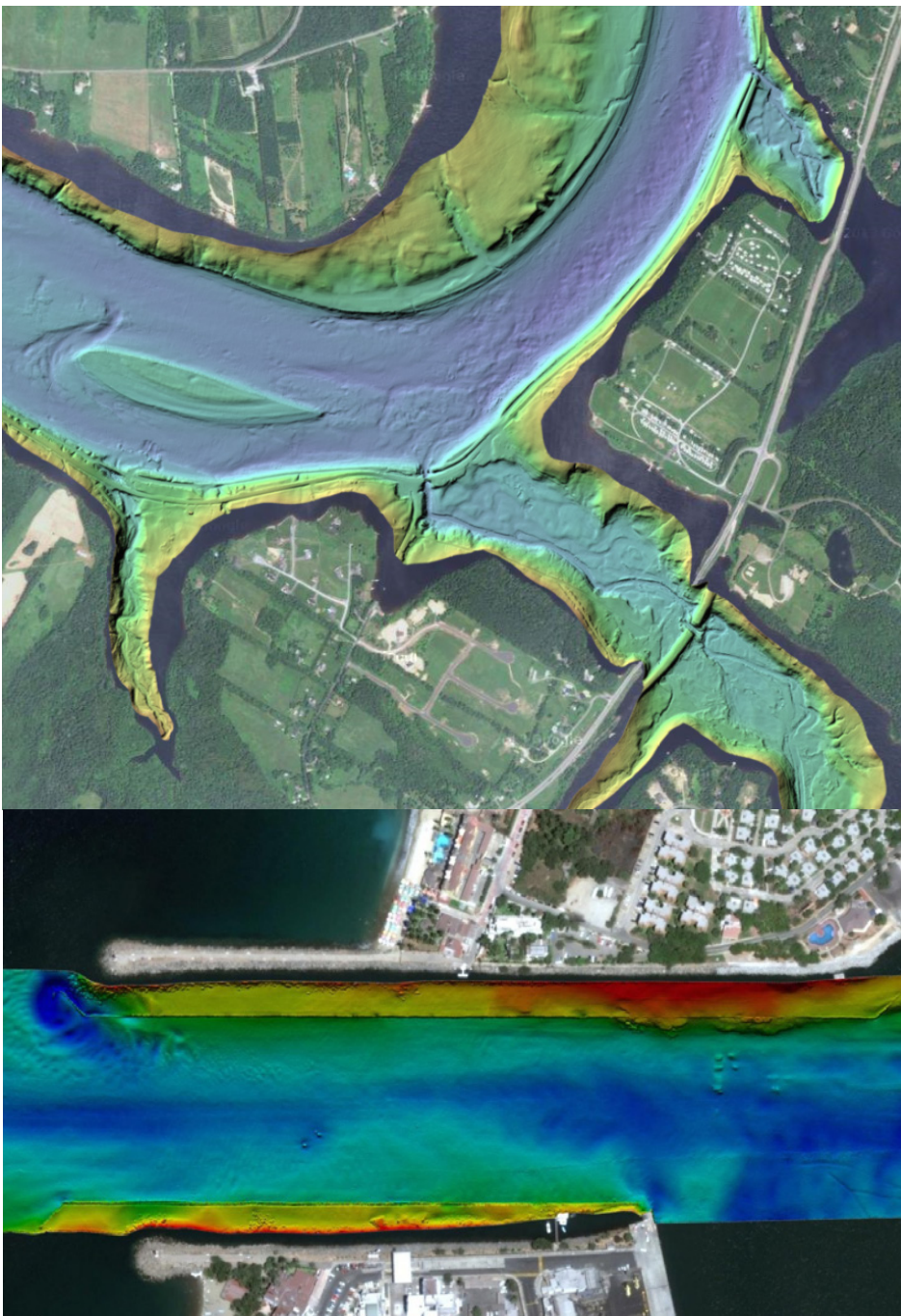
Installation Manual



KONGSBERG

M3 Bathy

Multibeam echo sounder





KONGSBERG

M3 Bathy
Multibeam echo sounder
Installation Manual
Release 1.1

This manual provides you with the basic information required to install the Kongsberg M3 Bathy Multibeam echo sounder. The information is intended for personnel with basic mechanical skills.

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Document information

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- **Document:** Installation Manual
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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. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

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

Disclaimer

Kongsberg Mesotech Limited 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 by phone at +1 604 468 8144, or by email at: km.support.vancouver@km.kongsberg.com. If you need information about our other products, visit <http://www.km.kongsberg.com/mesotech>. On our website you will also find a list of our dealers and distributors.

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About this manual

Observe this general information about the M3 Bathy Installation Manual; its purpose and target audience.

Purpose of manual

The purpose of this manual is to provide the information, procedures and basic drawings required for the physical installation of the M3 Bathy.

Target audience

The manual is intended for technical personnel. You are expected to have basic mechanical skills and familiarity with handling of sensitive electronic equipment. Familiarity with multibeam echo sounder and survey techniques are also recommended.

Licence information

The M3 Software is included with the M3 Bathy system and updates are available free of charge and can be downloaded from: <http://www.kongsberg.com/mesotechsoftware>.

Software version

The M3 Bathy Installation Manual complies to M3 software version 1.62.

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M3 Bathy

Topics

[System description, page 9](#)

[System diagram, page 10](#)

[System units, page 11](#)

[Scope of supply, page 14](#)

[General safety rules, page 17](#)

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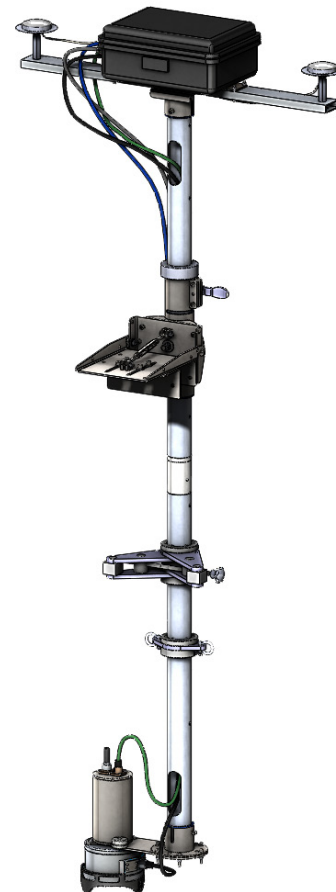
System description

The M3 Bathy is a compact, lightweight multibeam echo sounder system for shallow-water survey.

The standard system configuration includes:

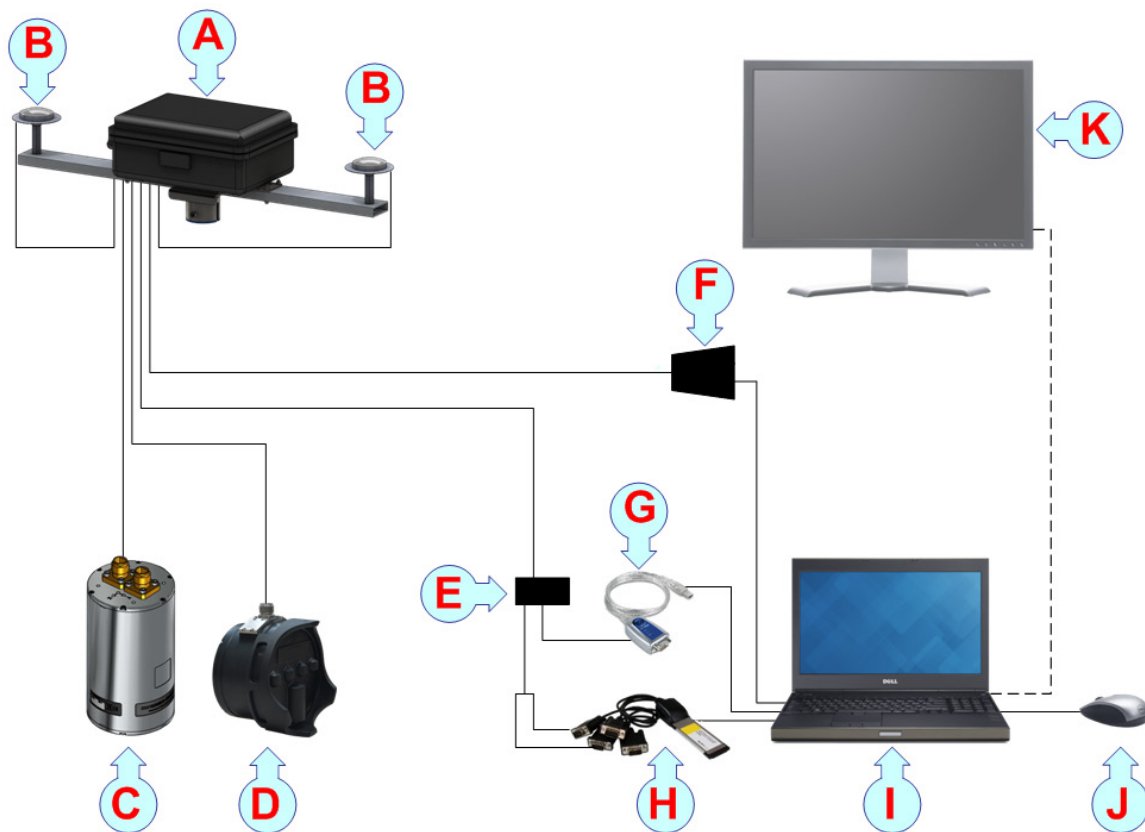
- M3 Sonar Processor laptop
- Surface Interface Unit
- M3 Sonar Head
- Motion Reference Unit (MRU)
- Pole Mount and mounting brackets

The system comes complete with reusable equipment cases for transport and storage of the hardware.



System diagram

The system diagram identifies the main components of the M3 Bathy. Power cables are not shown.



- A Surface Interface Unit
- B GPS Antenna
- C Motion Reference Unit
- D M3 Sonar Head
- E Breakout box for GPS and Motion Reference Unit sensor output
- F Breakout box for Sonar Head and Surface Interface Unit power
- G RS422 to USB Adapter
- H 4-Port RS232 Express Card Adapter
- I M3 Sonar Processor laptop computer
- J Mouse
- K Helmsman display (**not included as part of the standard M3 Bathy system*)

System units

Topics

[Sonar Processor, page 11](#)

[Surface Interface Unit, page 11](#)

[Sonar Head, page 12](#)

[Motion Reference Unit, page 12](#)

[Pole Mount, page 13](#)

Sonar Processor

The Sonar Processor is the computer that controls the M3 Bathy system. It is a vital part of the M3 Bathy Multibeam echo sounder.

In this publication, the computer is referred to as the Sonar Processor.

The Sonar Processor runs the M3 software that manages communication with the Sonar Head, performs all beamforming and image processing and presents the sonar imagery. The computer is connected to the Surface Interface Unit through several cables.



Surface Interface Unit

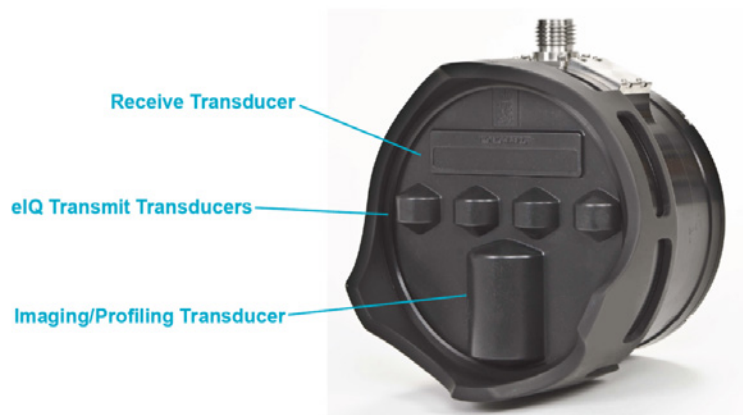
The Surface Interface Unit is a water tight enclosure that houses the GPS Heading Sensor and acts as a junction box for connections to sensors and the Sonar Processor.

The Surface Interface Unit also includes a one meter-long antenna bar. In the M3 Bathy system, the Surface Interface Unit is attached to the top of the Pole Mount.



Sonar Head

The Sonar Head transmits and receives an acoustic pulse when deployed underwater.



The Sonar Head requires DC power via a cable attached to the Surface Interface Unit. In the M3 Bathy system, the Sonar Head is attached to the bottom of the Pole Mount.

Note

The M3 Sonar Head's black polyurethane transducer is delicate. Always keep the Guard Ring and protective cover over the transducer during installation and storage.

Motion Reference Unit

In order to operate correctly, the M3 Bathy requires input from a Motion Reference Unit (MRU).

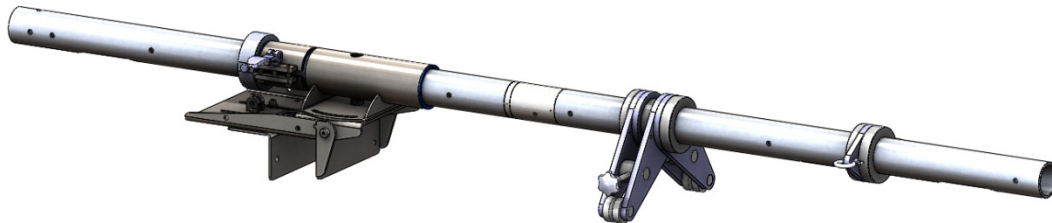
The MRU is used to correct for pitch and roll movement of the Sonar Head resulting from being deployed on a moving vessel.

Instructions are provided for both Seatex and SMC motion reference units. Refer to your M3 Bathy system to confirm which configuration you have.



Pole Mount

The M3 Pole Mount is designed for installation on small vessels of opportunity.



Normally the Pole Mount is installed on the vessel's port side. The top of the Pole Mount is above water and holds the Surface Interface Unit. The bottom of the Pole Mount is below water and holds the Motion Reference Unit and Sonar Head in position during a survey.

Scope of supply

Topics

[Basic items provided with a standard delivery, page 14](#)

[Additional required items, page 16](#)

[Additional optional items, page 16](#)

Basic items provided with a standard delivery

To assemble a complete M3 Bathy 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 Mesotech or obtained locally. Some units are optional.

When you unpack the items provided with the Kongsberg M3 Bathy system, verify that the following items are included.

Product	Order number(s)	In the box(es)
Pole Mount	922-80010000	Pole Mount masts in blue canvas bag Pole Mount parts and tool kit in hard-shell case
Seatex Motion Reference Unit (MRU-H)	803-10570000	Motion Reference Unit Various cables Power cords and supply Dummy plug USB with software and documentation
Seatex Motion Reference Unit (MRU-3)	803-10580000	Motion Reference Unit Various cables Power cords and supply Dummy plug USB with software and documentation
SMC Motion Reference Unit	803-10650000	SMC IMU-108-30 Motion Reference Unit
Sonar Head	922-20010000 922-20050000	M3 Sonar Head Accessory kit Documentation
Surface Interface Unit	922-60020000 922-60030000 922-60060000 922-60070000	Surface Interface Unit and parts in large hard-shell case GPS Antenna and Accessory kit in small hard-shell case Antenna bar in blue canvas bag
Sonar Processor	922-10010000	M3 Sonar Processor laptop Power cords and supply Mouse USB with software and documentation
<i>The M3 Bathy comes with only one Motion Reference Unit.</i>		

Note _____

For the exact contents of your order, refer to the packing lists.

Operational software

Operational software is provided on a suitable media. If the Sonar Processor is purchased from Kongsberg, it is also installed on the computer.

End user documentation

End user documentation is provided on paper and/or digital formats.

Additional required items

The M3 Bathy delivery will contain the mains parts required for basic operation. Some of these can be ordered from Kongsberg, others may be purchased locally.

Sound speed sensor

A sound speed sensor is required to accurately measure in-water speed near the Sonar Head.

Sound velocity profiler

A sound velocity profiler must be used to measure the in-water sound speed profile of the water column to correct for ray bending during data post-processing.

A sound velocity sensor can be connected to the M3 Sonar Processor using one of the spare RS232 ports on the 4-Port RS232 Express Card adapter. This assumes the sound velocity sensor has a cable connected to it, and providing power to it.

Currently the Valeport miniSVS sensor is supported in the M3 Software.

Refer to the *M3 Sonar Operator's Manual* for more information.

Portable power unit

It is important to ensure continuous operation of the M3 Bathy independent of varying quality of the vessel's mains supply. The use of an uninterruptible power supply is therefore required.

Always use either an Uninterruptible Power Supply (UPS) or DC to AC true sine wave inverter (Power Inverter) to power your system. Your power unit must be able to supply up to 280 watts to the M3 Bathy.

Additional optional items

The M3 Bathy delivery will contain the mains parts required for basic operation. Several optional items are also available. Some may be ordered from Kongsberg, others may be purchased locally. These optional items are not required for normal use, but may offer advantages related to installation, maintenance, or operational functionality.

Helmsman Display

The helmsman display is useful for the helmsman to follow preplanned survey lines and show bathymetry coverage.

Any commercial display can be used with the M3 Bathy Multibeam echo sounder, provided that the display meets the minimum requirements. If you intend to use many views simultaneously, we suggest that you purchase a large high-resolution display.

Interfacing to the Helmsman display can be done using a standard VGA cable connected to the M3 Sonar Processor laptop computer.

Optional connector model

The following optional connector is only used if you have purchased an M3 Sonar Head that supports Sync/1PPS.

- Connector Type: SEA CON®
- Connector Model: MIND-4-FCR (Sync & 1PPS)

Sunshade

The Sonar Processor screen can be difficult to see in direct sunlight. A sunshade is recommended for daylight viewing.

General safety rules

The following safety precautions must be followed at all times during installation and maintenance work.

WARNING

The voltages used to power this equipment are potentially lethal. Never work alone on high-voltage equipment!

- You must always switch off all power before installation or maintenance work on the M3 Bathy system.
Use the main circuit breaker, and label the breaker with a warning sign that informs others that maintenance or installation work is in progress on the system.
- For safety reasons, two persons must always be present during troubleshooting with power ON.
- Read and understand the applicable first aid instructions related to electric shock.
- Whenever maintenance is in progress, it is essential that a first aid kit is available, and that all personnel are familiar with the first aid instructions for electrical shock.

Installation requirements

Topics

[Supply power requirements, page 18](#)

[Uninterruptible Power Supply \(UPS\) requirements, page 18](#)

[Electromagnetic compatibility installation guidelines, page 18](#)

Supply power requirements

Observe the general requirements related to the supply power.

The supply voltage to the equipment must be kept within $\pm 10\%$ of the installation's nominal voltage. Maximum transient voltage variations on the main switchboard's bus-bars are not to exceed -15% to $+20\%$ of the nominal voltage (except under fault conditions).

Uninterruptible Power Supply (UPS) requirements

Observe these requirements related to the Uninterruptible Power Supply (UPS).

The Uninterruptible Power Supply (UPS) must have the capacity to independently maintain power to the M3 Bathy for a minimum of 10 minutes.

This ensures that the M3 Bathy can be switched off in a controlled manner in the event of a power failure.

Electromagnetic compatibility installation guidelines

Kongsberg Mesotech Limited equipment and accessories are compliant with applicable electromagnetic compatibility (EMC) regulations. This compliance ensures electromagnetic interference (EMI) between the system components and other on-board equipment is minimized to reduce the risk of performance degradation due to such interference. Correct installation is required to maintain electromagnetic compatibility.

Employ the following recommendations to ensure the best EMC performance:

- Use only Kongsberg-specified cables and check that any ferrite suppression filters fitted on the cables are installed as per the installation drawings. Suppression ferrites are important for minimizing electromagnetic interference. If one has to be removed during the installation, re-install the suppression filter in its original position on the cable before using the system.

- Use a ferrite suppression filter installed on any third-party-supplied cable end attached to M3 Bathy equipment ports.
- Operate using standard length system interconnect cables unless cutting or cable extensions are described in the installation manual.
- Install M3 Bathy equipment and interconnect cables as follows:
 - At least 1 meter (3.3 feet) from any equipment transmitting radio signals, antennas or cables connecting the radio equipment to the antennas.
 - At least 2 meters (6.6 feet) from SSB radios, antennas, and cables.
 - At least 2 meters (6.6 feet) from the path of radar beams. A typical radar beam spreads 20 degrees above and below the plane containing the radiating element.
- Protect the M3 Bathy with a suitably rated fuse or circuit breaker. The power supply should be adequately filtered to minimize equipment exposure to high-voltage transients that may occur during engine start or when other high-power equipment is used on board of the vessel.
- Ground the equipment in accordance to applicable electrical marine/vessel codes.

Note

Where the implementation of these recommendations is not possible, maintain the maximum practical separation between system components and any other electrical/radio equipment operation on the vessel.

Support information

If you need technical support for your M3 Bathy you must contact your local dealer, or our support department.

If you require maintenance or repair, contact your local dealer. You can also contact us by phone at +1 604 468 8144, or by email at: km.support.vancouver@km.kongsberg.com. If you need information about our other products, visit <http://www.km.kongsberg.com/mesotech>. On our website you will also find a list of our dealers and distributors.

Preparations

Topics

[Installation summary, page 21](#)

[Tools and equipment required for M3 Bathy installation, page 22](#)

Installation summary

Installation of the M3 Bathy requires a number of specific procedures and software settings. Two people are required for this installation.

Context

An overall installation procedure is provided below. The procedure does not describe any detailed tasks, but refers to the relevant procedures in this manual.

Note

In order to obtain maximum safety and M3 Bathy performance, it is very important that the installation procedures in this manual are complied to. You must do the tasks in the order they are described.

Procedure

- 1 Unpack and install the Pole Mount on the vessel.
- 2 Unpack and install the Sonar Head, Motion Reference Unit and mounting brackets.
- 3 Unpack and install the Surface Interface Unit.
- 4 Install the Sonar Processor.
- 5 Make all cable connections to the system components.
- 6 Make any connections required to peripheral equipment such as helmsman display or real-time sound velocity sensor.
- 7 Perform initial power on and system check.

Tools and equipment required for M3 Bathy installation

All necessary tools, instruments and consumables must be ready at hand prior to commencing M3 Bathy installation.

You must be equipped with a standard set of tools. This tool set must comprise the normal tools for electronic and electromechanical tasks, such as screwdrivers, pliers, spanners, a cable stripper etc. Each tool must be provided in various sizes. We recommend that all tools are demagnetized to protect your equipment.

Specific tools and consumables you will need for the M3 Bathy installation are included in the supplied accessory kits.

- The Pole Mount tool kit
- The Sonar Head accessory kit
- The Surface Interface Unit accessory kit

The following tools and items are required for the M3 Bathy installation and are not included in the standard delivery. You must purchase these items locally.

- A short length of garden hose to protect the cables from chafing
- A 25-foot length of rope
- An additional tension line may be required (long enough to tie around the hull) if the Pole Mount is unstable when installed.
- Silicone-based o-ring lubricant, such as Dow Corning DC4 (MS4) or equivalent
- Velcro wraps or electrical tape
- A utility knife

If you wish to install the M3 Bathy without drilling holes into your vessel hull, you will need:

- A length of rope or hardware (to affix the board to the vessel)
- A 2x12 board long enough to span the gunwales

Installing the Pole Mount

Topics

[Preparing for Pole Mount installation, page 24](#)

[Installing the Pole Mount, page 27](#)

[Aligning the Pole Mount, page 32](#)

Preparing for Pole Mount installation

The Mast Clamp assembly, which holds the rest of the Pole Mount, attaches to the gunwale of your boat.

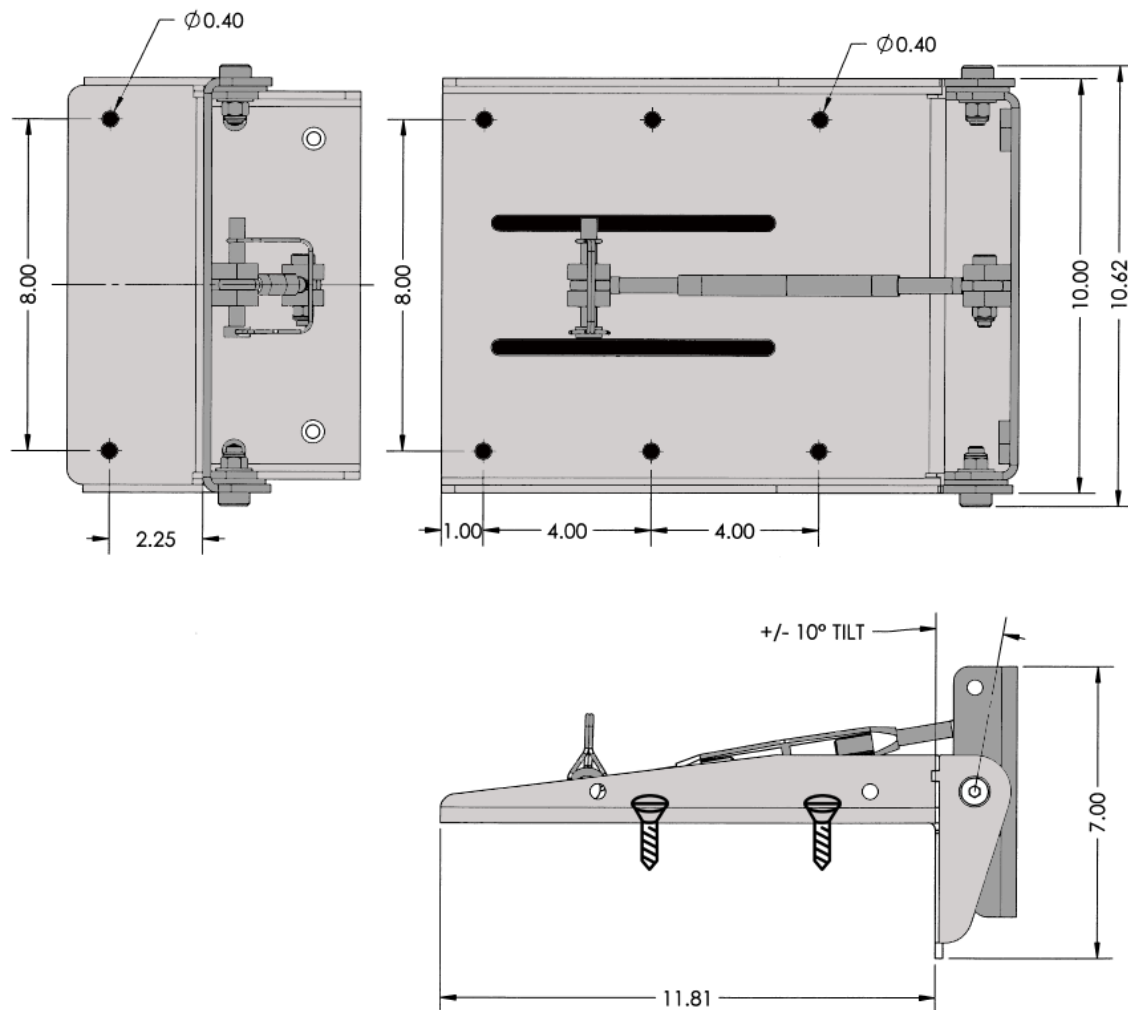
Prerequisites

- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together.
- We assume that you are equipped with a standard set of tools. Your toolset must include tools for hole layout, drilling, and attaching the Mast Clamp assembly to the vessel.
- The Pole Mount tool kit has all the specific tools you need to install the Pole Mount.
- If you wish to install the M3 Bathy without drilling holes into your vessel hull, you will need:
 - A length of rope or hardware (to affix the board to the vessel)
 - A 2x12 board long enough to span the gunwales

Context

The M3 Bathy Pole Mount comes in two cases. One is a large bag containing the three pole sections and the antenna bar. The other is a hard-shell case containing the rest of the Pole Mount hardware and tools.

Normally the Pole Mount is installed on the vessel's port side.



Procedure

- 1 Ensure the vessel is docked on its port side and there is room to work on the dock to set up the Pole Mount.
- 2 Unpack the Pole Mount hardware.
- 3 To determine where to install the Pole Mount, place the Mast Clamp assembly onto the gunwale, as close to amidships as possible.
- 4 Using the Mast Clamp assembly as a guide, mark where to drill the holes on your hull.
- 5 Drill four to eight holes in the gunwale.
- 6 Place the Mast Clamp assembly onto the gunwale.
- 7 Align the Mast Clamp assembly with the holes drilled into the gunwale.

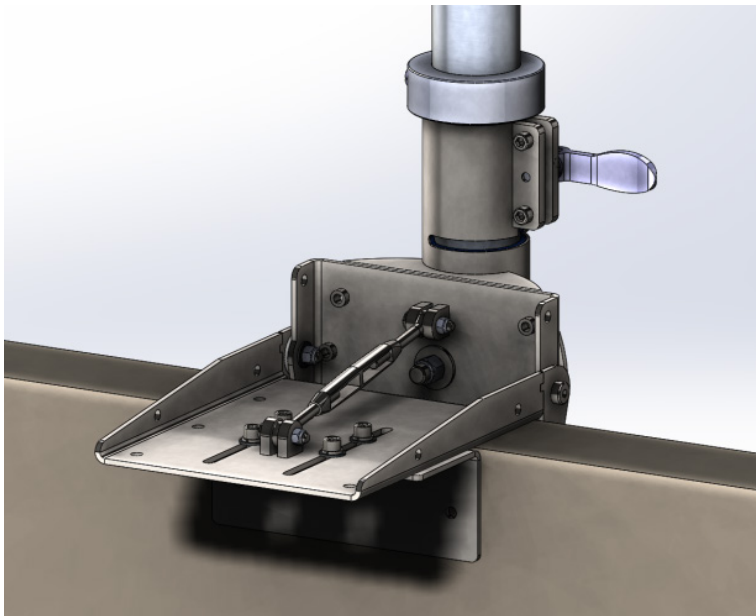
- 8 Bolt the assembly in place.
- 9 If the Mast Clamp assembly still protrudes out from the gunwale, install the right-angle bracket.
 - a Align the right-angle bracket beneath the Mast Clamp assembly and flush against the hull.
 - b Bolt the right-angle bracket to the Mast Clamp assembly through the two cutouts.

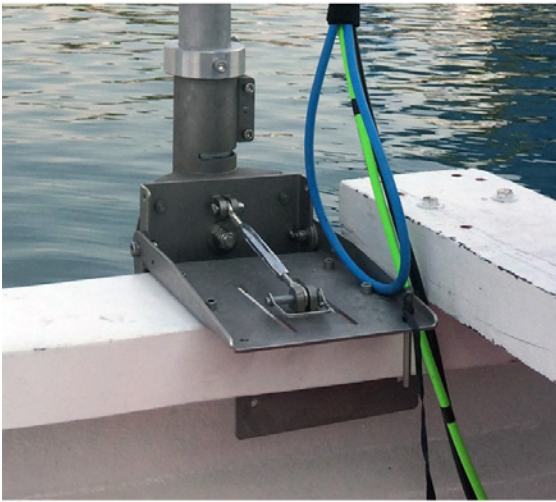
Tip

An alternate method of attaching the Pole Mount to the vessel is to bolt the Mast Clamp assembly to one end of a 2x12 board long enough to span the gunwales. Affix the board to the vessel with rope or hardware and use rope to lower/recover the wet end of the Pole Mount assembly. You do not need the right-angle bracket for this installation option.

Result

The Mast Clamp assembly is attached to the gunwale, as shown in the images.





Further requirements

You are now ready to install the Pole Mount.

Related topics

[Installing the Pole Mount, page 27](#)

Installing the Pole Mount

The Pole Mount masts (either two or three) insert into the Mast Clamp. Adding the Stop Collar, Stabilizer Feet, and Attachment Ring completes the Pole Mount installation.

Prerequisites

- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together.
- You will need the vessel dimensions, including the draft. The vessel draft will be used to determine how deep below the waterline the bottom of the mast will need to go.
- The Pole Mount tool kit has all the specific tools you need to install the Pole Mount.
- You will also need a 25-foot length of rope.

Caution

Marine grade grease or anti-seize compound (included) must be applied to all fasteners during assembly. In particular, apply thoroughly to threads of the Pole Mount mast sections. Failure to do this may result in thread galling of the pole sections or inability to remove screws!

Context

The M3 Bathy Pole Mount comes in two cases. One is a large bag containing the three pole sections and the antenna bar. The other is a hard-shell case containing the rest of the Pole Mount hardware and tools.

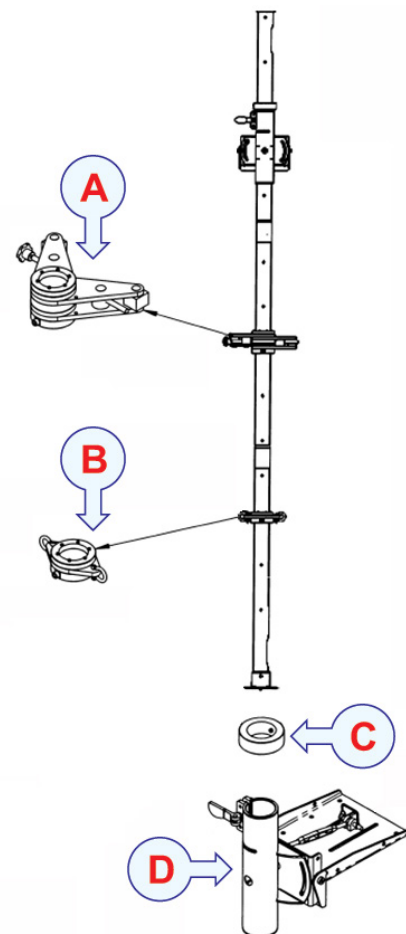
The following parts are required to install the Pole Mount.

- A** Stabilizer Feet
- B** Attachment Ring
- C** Stop Collar
- D** Mast Clamp assembly

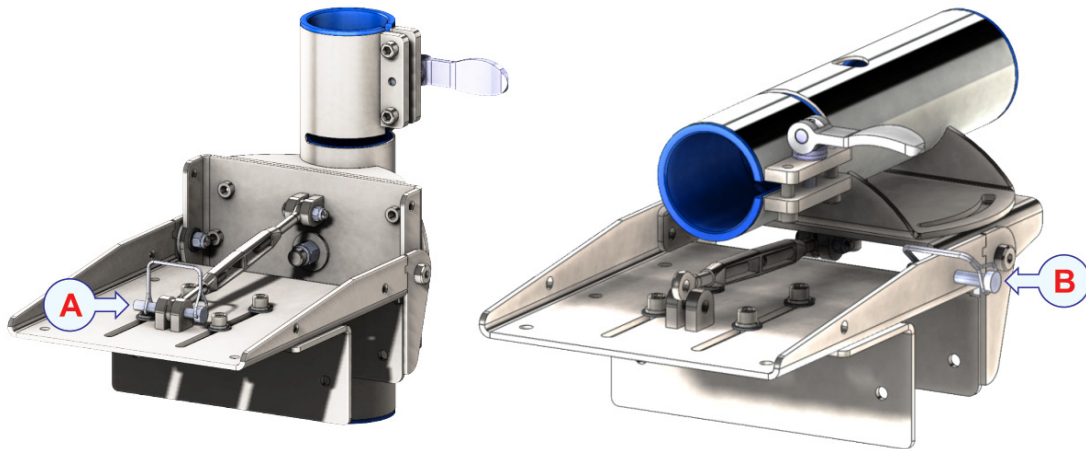
Procedure

- 1 Determine if two or three pole sections are required.

Use the number of pole masts needed to position the M3 Sonar Head below any hull turbulence caused as the vessel moves at survey speed. Air bubbles in front of the transducer can prevent the sonar from effectively detecting the bottom. Generally two poles are adequate if the top of the gunwale is around 1m to 1.5m (3 to 5 feet) above the waterline where the Mast Clamp assembly is located.



- 2 Position the Mast Clamp so it is locked in the horizontal position.
 - a Remove the spring clip (A).
 - b Pivot the Mast Clamp so it is in the horizontal position.
 - c Store the spring clip in the hole (B).

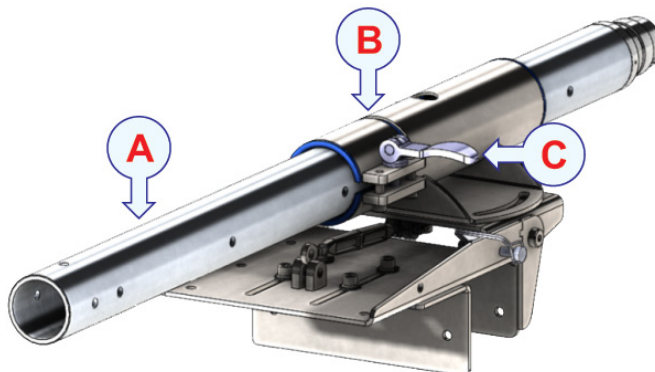


- 3 Insert the Top Mast into the Mast Clamp.
 - a Insert the Top Mast (A) into the Mast Clamp (B) from the dock side of the vessel.

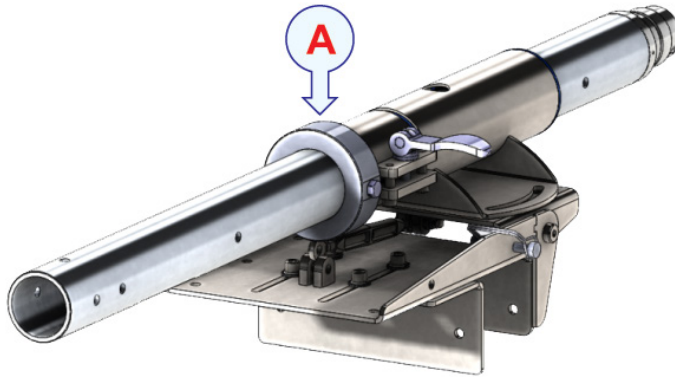
Tip _____

Insert the Top Mast with the pole thread facing away from the gunwale.

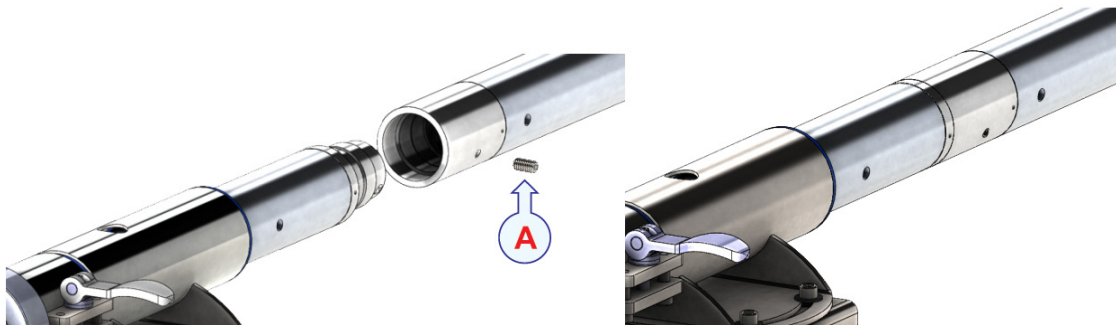
- b Tighten the mast quick release (C) to prevent the mast from rotating or slipping out.



- 4 Attach the Stop Collar to the Mast Clamp.
 - a Slide the Stop Collar (A) onto the Top Mast.
 - b Bolt in place using the 4th hole from the top of the mast.
 - c Ensure the bolt is fully engaged, going all the way into the mast hole.



- 5 Attach the Middle Mast section (if applicable), then the Bottom Mast.
- 6 Install the Set Screw (A) in the lower-pole sections to lock the pole in place.



- 7 Install the Stabilizer Feet on the Bottom Mast.

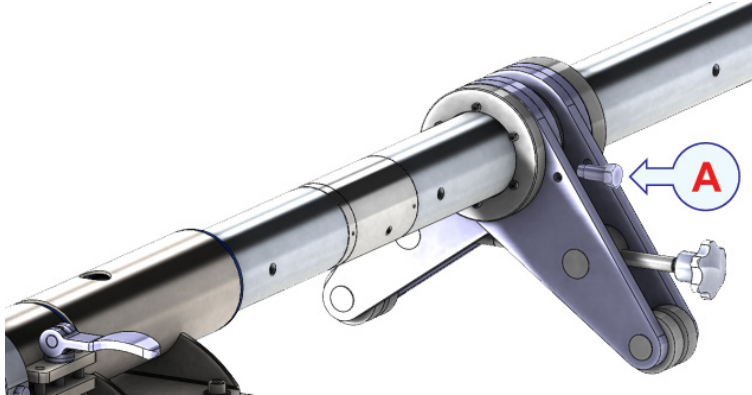
Note

Set the Stabilizer Feet position on the mast based on the depth-maximum draft of the hull. The Stabilizer Feet should be above the waterline.

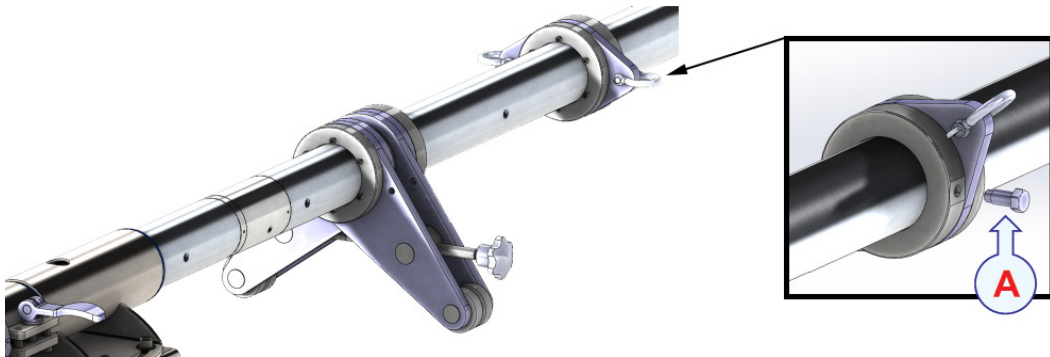
- a Slide the Stabilizer Feet onto the Bottom Mast and slide up.

The six small bolts on the Stabilizer Feet should be oriented up, toward the Mast Clamp assembly.
- b Bolt in place using the 4th hole from the bottom of the mast (or the appropriate hole based on the vessel's draft).

- c Ensure the bolt (A) is fully engaged, going all the way into the mast hole.



- 8 Install the Attachment Ring to the 2nd hole from the bottom of the mast.
 - a Slide the Attachment Ring onto the Bottom Mast.
 - b Bolt in place using the 2nd hole from the bottom of the mast.
 - c Ensure the bolt (A) is fully engaged, going all the way into the mast hole.



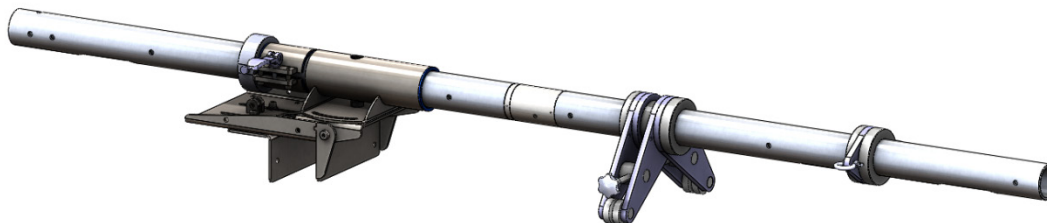
- 9 Attach a rope (to deploy, secure, and recover the Pole Mount) to one of the shackles on the Attachment Ring at the bottom of the pole.

Tip _____

A bowline knot forms a secure loop that will not jam and is easy to tie and untie.

Result

The Pole Mount is installed in a horizontal position.



Further requirements

You are now ready to proceed with Pole Mount alignment.

Related topics

[Aligning the Pole Mount, page 32](#)

Aligning the Pole Mount

The Pole Mount aligns vertically so that it is not leaning at an angle. The Stabilizer Feet adjust so that there is no movement in the Pole Mount when the vessel is underway.

Prerequisites

- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together.
- The Pole Mount tool kit has all the specific tools you need to install the Pole Mount.
- An additional tension line may be required if there is still excessive movement of the Pole Mount after alignment.

Procedure

- 1 Do the following check before alignment.
 - a Confirm the set screws are in place and the lower pole section(s) do not rotate when twisted.
 - b Confirm the Stop Collar is bolted in place and does not move when attempting to slide it up or down the pole.
 - c Confirm the Stop Collar bolt is tightened with an Allen key.

- d Confirm the Stabilizer Feet is bolted in place and does not move when attempting to slide it up or down the pole.
 - e Confirm the Stabilizer Feet bolt is tightened with an Allen key.
 - f Confirm the Attachment Ring is bolted in place and does not move when attempting to slide it up or down the pole.
 - g Confirm the Attachment Ring bolt is tightened with an Allen key.
 - h Confirm the deployment and recovery rope is attached to a shackle on the Attachment Ring.
- 2 Tie off the recovery rope to a strong hardpoint on the vessel and use it as a safety line before test deployment.

Tip

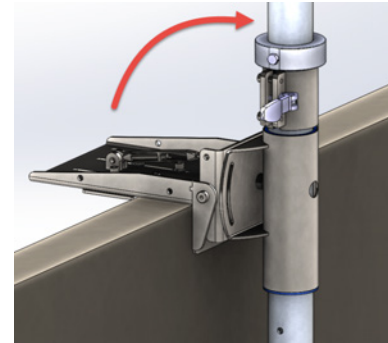
A bowline knot forms a secure loop that will not jam and is easy to tie and untie.

- 3 Rotate the Pole Mount so it is parallel with the side of the vessel.

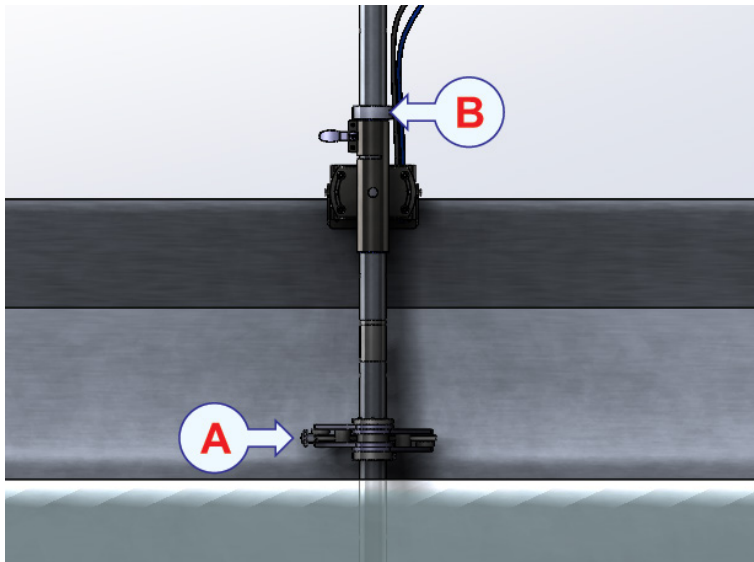


- 4 Tie off any slack in the safety line to secure the Pole Mount in place.
Alternatively, have a second person hold the Pole Mount in place using the safety line.

- 5 Move the Pole Mount into a vertical position.
 - a Allow the Mast Clamp to pivot by confirming the spring clip is released.
 - b Slowly release the second line and/or deployment line allowing the mast to rotate so it rests vertically.



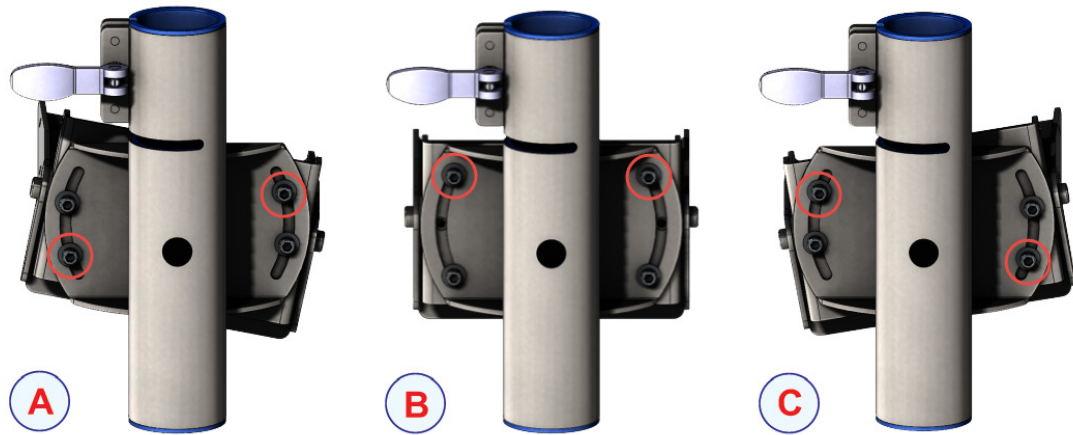
- 6 Check the height of the Stabilizer Feet.
 - a Rotate the Stabilizer Feet so they rest properly on the side of the hull.
 - b Raise the Pole Mount so that the Stabilizer Feet (A) are above the waterline.
 - c Reposition the Stop Collar (B) to the closest hole above the Mast Clamp.



- 7 Check the mast is vertical, then insert two of the bolts into the Mast Clamp plate to restrict mast rotation fore/aft.

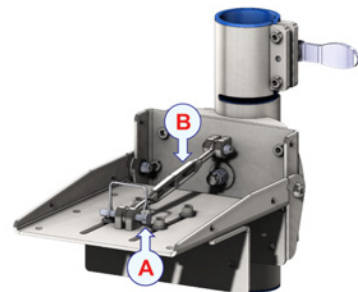
There are three possible bolt configurations to secure the mast, depending on the gunwale configuration.

- A** Gunwale on port side with forward up-slope
- B** Gunwale that is level
- C** Gunwale on starboard side with forward up-slope



- 8 Adjust the alignment of the Pole Mount so that it is not leaning to one side.
 - a Turn the Stabilizer Feet screw knob to eliminate any gap between the feet and the hull.
 - b Check the alignment of the pole to see if there is a roll offset. Re-adjust the Stabilizer Feet if required so the mast remains vertical.

- 9 Secure the Pole Mount in place.
 - a Attach the Spring Clip pin (A) to secure the turnbuckle and Mast Clamp.
 - b With the Spring Clip pin inserted, tighten the turnbuckle (B) with the supplied 9/16" wrench until snug to put pressure on the Stabilizer Feet.
 - c Hold the Top Mast section and pull.
 - d Tighten the turnbuckle until the Stabilizer Feet are not easily pulled from the side of the hull when the Top Mast is wiggled.



Note

If there is still excessive movement at dockside or later when underway, this may require a tension line to pull in and hold the Stabilizer Feet. Attach this line to the Attachment Ring then pass the rope under the vessel and tie off on a cleat on the opposite side of the vessel.

Result

The Pole Mount is installed and aligned in a vertical position.

Further requirements

You are now ready to install the Sonar Head and Motion Reference Unit.

Related topics

[Attaching the Seatex Motion Reference Unit to the Pole Mount's bottom flange, page 38](#)

[Attaching the SMC Motion Reference Unit to the Pole Mount's bottom flange, page 41](#)

Installing the Sonar Head and Motion Reference Unit

Topics

[Attaching the Seatex Motion Reference Unit to the Pole Mount's bottom flange, page 38](#)

[Attaching the SMC Motion Reference Unit to the Pole Mount's bottom flange, page 41](#)

[Installing the Sonar Head onto the bracket assembly, page 44](#)

[Attaching the Sonar Head and Motion Reference Unit to the Pole Mount, page 45](#)

Attaching the Seatex Motion Reference Unit to the Pole Mount's bottom flange

If you have purchased a Seatex Motion Reference Unit (MRU) for your M3 Bathy system, it is installed on the Downlooking bracket, along with the bottom flange of the Pole Mount.

Prerequisites

- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together.
- To install the MRU, you will need tools from the Pole Mount tool kit and the combination wrench from the Surface Interface Unit accessory kit.

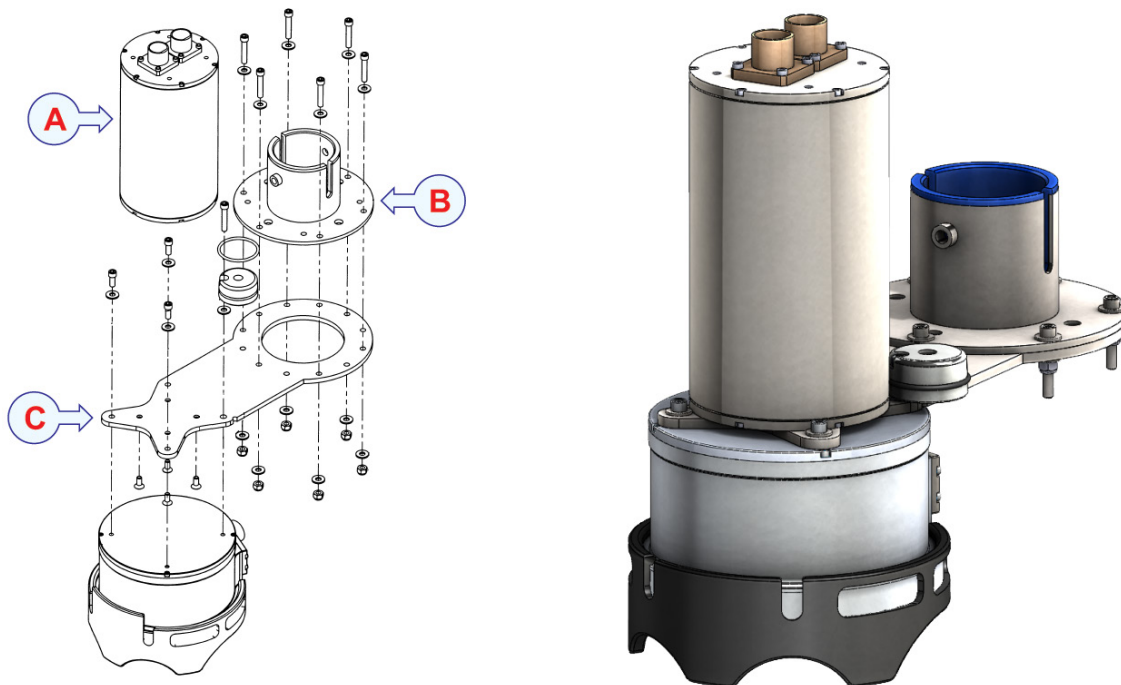
Caution

The Motion Reference Unit is very sensitive to impacts. Be careful not to drop the MRU. The electronics inside will be damaged and need to be returned to the manufacturer for repair.

Context

The following parts are required to install the Motion Reference Unit.

- A** Seatex MRU
- B** Pole Mount's bottom flange
- C** Downlooking bracket



Procedure

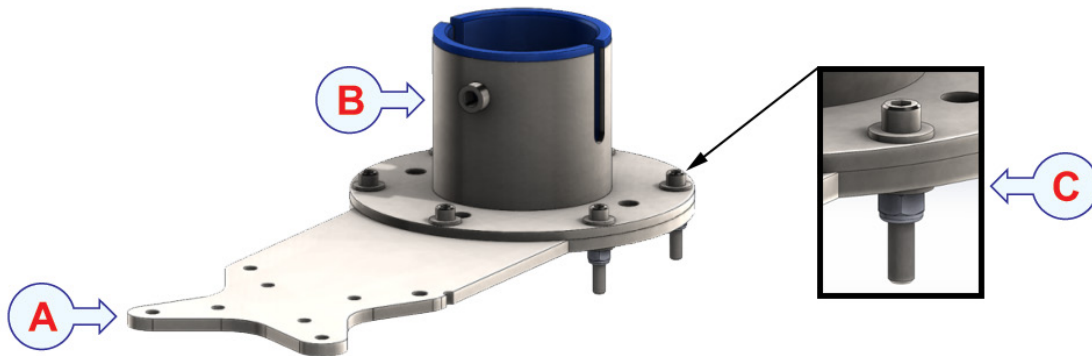
- 1 Identify the Downlooking bracket. One side (facing up) has recessed holes for attaching the MRU.

Tip _____

Orient the Downlooking bracket so that the recessed holes are facing up, and the anode location notch is on the right, as shown in the image.



- 2 Attach the bracket (A) to the Pole Mount's bottom flange (B) using the six nuts and bolts and 12 washers supplied (C).

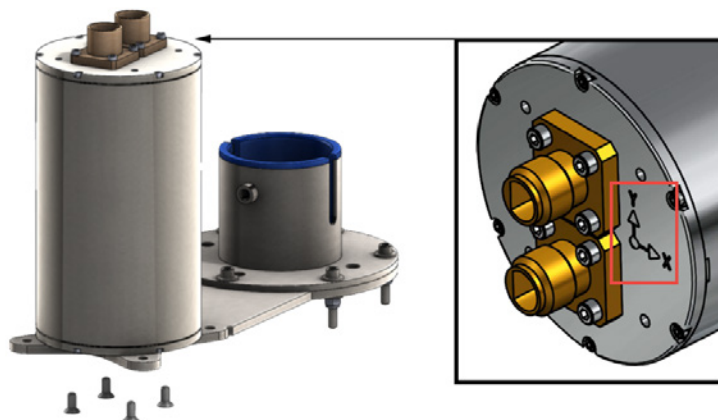


Ensure the bottom flange is oriented with respect to the bracket, as shown in the image.

Caution

Marine grade grease or anti-seize compound (included) must be applied to all fasteners during assembly.

- 3 Attach the MRU to the bracket using the four flathead metric fasteners.
Orient the MRU so that the Y-axis arrow mark points towards the bottom flange.



Result

The Seatex MRU is attached to the Downlooking bracket and Pole Mount's bottom flange to form a bracket assembly.

Further requirements

You are now ready to attach the Sonar Head to the Motion Reference Unit bracket assembly.

Related topics

[Installing the Sonar Head onto the bracket assembly, page 44](#)

Attaching the SMC Motion Reference Unit to the Pole Mount's bottom flange

If you have purchased a Ship Motion Control (SMC) Motion Reference Unit (MRU) for your M3 Bathy system, it is installed on the Downlooking bracket, along with the bottom flange of the Pole Mount.

Prerequisites

- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together.
- To install the MRU, you will need tools from the Pole Mount tool kit and the combination wrench from the Surface Interface Unit accessory kit.

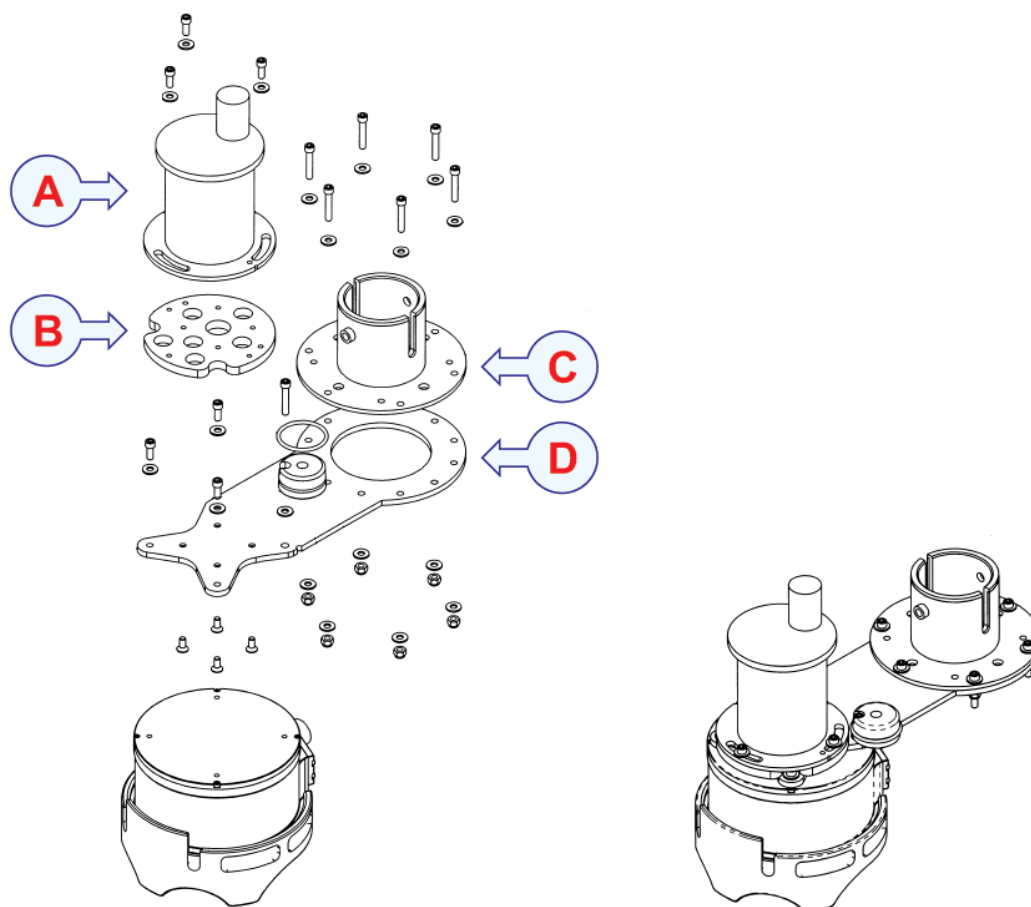
Caution

The Motion Reference Unit is very sensitive to impacts. Be careful not to drop the MRU. The electronics inside will be damaged and need to be returned to the manufacturer for repair.

Context

The following parts are required to install the Motion Reference Unit.

- A** SMC IMU-108-30 MRU
- B** Interface Plate
- C** Pole Mount's bottom flange
- D** Downlooking bracket



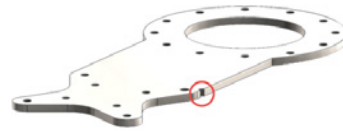
Procedure

- 1 Attach the MRU to one side of the Interface Plate using the included fasteners.

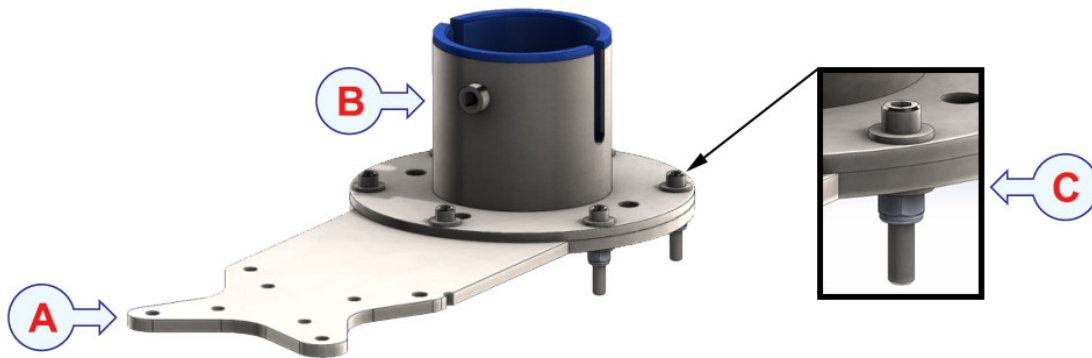
- 2 Attach the other side of the Interface Plate to the Downlooking bracket.

Tip _____

Orient the Downlooking bracket so that the recessed holes are facing up, and the anode location notch is on the right, as shown in the image.



- 3 Attach the bracket (A) to the Pole Mount's bottom flange (B) using the six nuts and bolts and 12 washers supplied (C).



Ensure the bottom flange is oriented with respect to the bracket, as shown in the image.

Caution _____

Marine grade grease or anti-seize compound (included) must be applied to all fasteners during assembly.

- 4 Attach the MRU to the bracket using the four flathead metric fasteners.

Result

The SMC MRU is attached to the Downlooking bracket and Pole Mount's bottom flange to form a bracket assembly.

Further requirements

You are now ready to attach the Sonar Head to the Motion Reference Unit bracket assembly.

Related topics

[Installing the Sonar Head onto the bracket assembly, page 44](#)

Installing the Sonar Head onto the bracket assembly

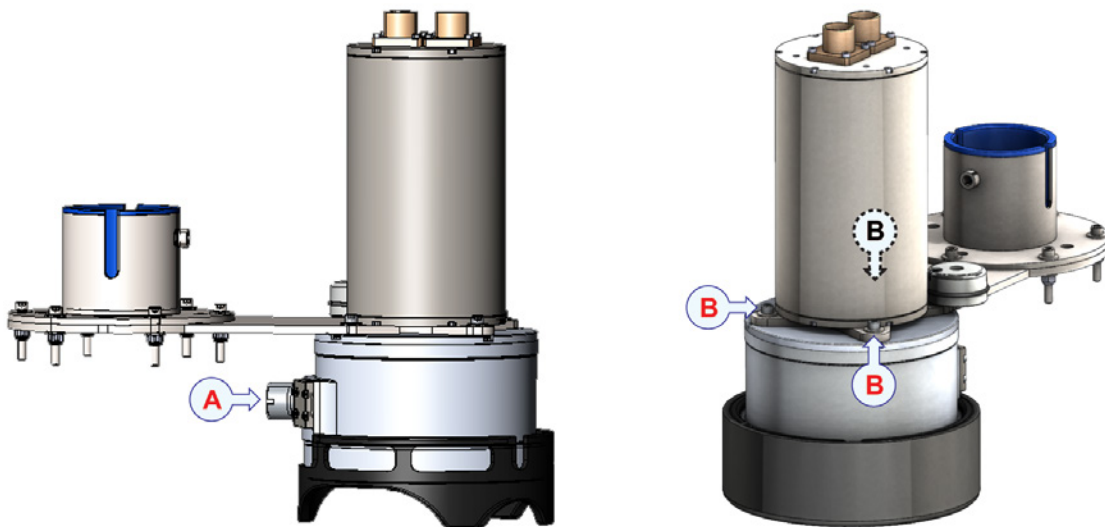
The Sonar Head attaches to the Motion Reference Unit (MRU) bracket assembly.

Prerequisites

- The MRU must be attached to the Downlooking bracket and Pole Mount's bottom flange to form a bracket assembly.
- The Guard Ring and protective cover must be installed on the Sonar Head.
- You will need tools from the Sonar Head accessory kit and the combination wrench from the the Surface Interface Unit accessory kit.

Procedure

- 1 Place the Sonar Head with the transducer face down on a stable flat surface.
- 2 Lay the MRU bracket assembly on top of the Sonar Head with the Sonar Head connectors (A) pointing towards the bottom flange.
- 3 Secure the Sonar Head to the bracket by tightening the three short screws (B) with flat washers to all holes, except the hole with a notch beside it.



Caution

Marine grade grease or anti-seize compound (included) must be applied to all fasteners during assembly.

- 4 Install the anode using the long screw provided (A) in the hole next to the notch. When mounting the zinc anode, install the o-ring bumper (B) to prevent contact with the MRU.

Caution

Ensure the anode is properly installed to prevent the M3 Sonar Head's Aluminum housing from corroding.

Result

The Sonar Head is attached to the Motion Reference Unit bracket assembly to form a bottom flange assembly.

Further requirements

You are now ready to attach the Sonar Head and Motion Reference Unit (bottom flange assembly) to the Pole Mount.

Related topics

[Attaching the Sonar Head and Motion Reference Unit to the Pole Mount, page 45](#)



Attaching the Sonar Head and Motion Reference Unit to the Pole Mount

The Sonar Head and Motion Reference Unit (MRU) attach together to form a bottom flange assembly. This bottom flange assembly attaches to the bottom of the Pole Mount.

Prerequisites

- Pole Mount installation and alignment must be complete.
- You will also need:
 - The Pole Mount tool kit
 - A 25-foot length of rope
- The Sonar Head must be attached to the Motion Reference Unit bracket assembly to form a bottom flange assembly.
- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together. Be careful not to drop the bottom flange assembly when attempting to attach it to the lower mast section.

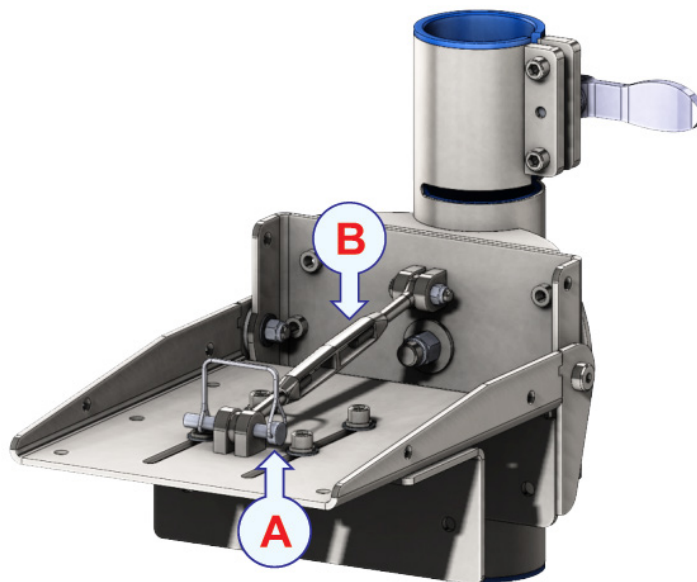
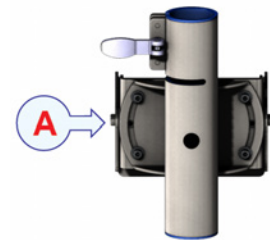
Caution

Be aware the Motion Reference Unit and the M3 Sonar Head are easily damaged through mishandling – in particular the polyurethane face of the Sonar Head transducer.

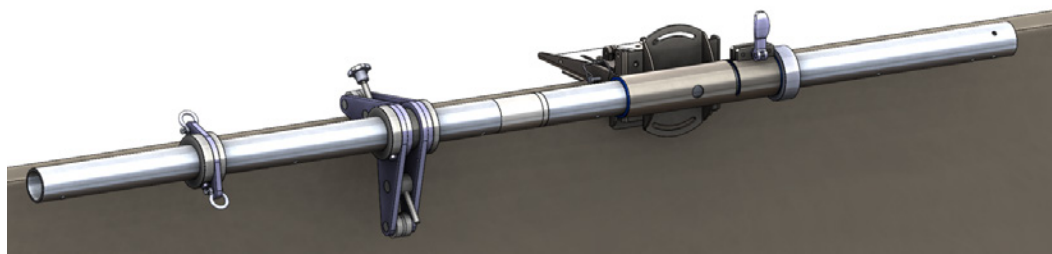
Procedure

1 Recover the Pole Mount.

- a Remove the bolts installed in the Mast Clamp plate (A).
- b Loosen the turnbuckle (B) on the Mast Clamp assembly with the 9/16" wrench and remove the Spring Clip pin (A) securing the turnbuckle.



- c Remove the bottom of the pole from the water by rotating the Pole Mount so it is parallel with the side of the vessel.



- d Rotate the end of the Pole Mount away from the vessel and position the bottom mast on the dock.

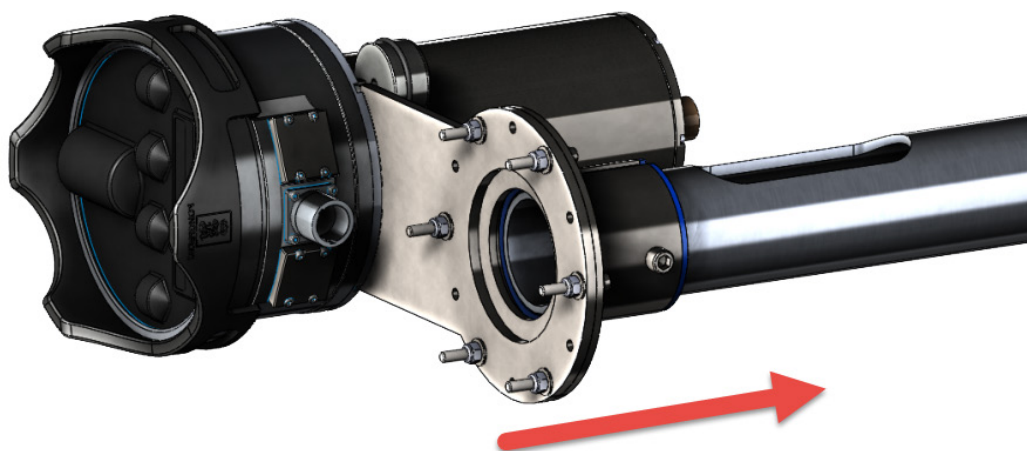
Note

You will need enough space on the dock to attach the bottom flange assembly to the bottom mast.

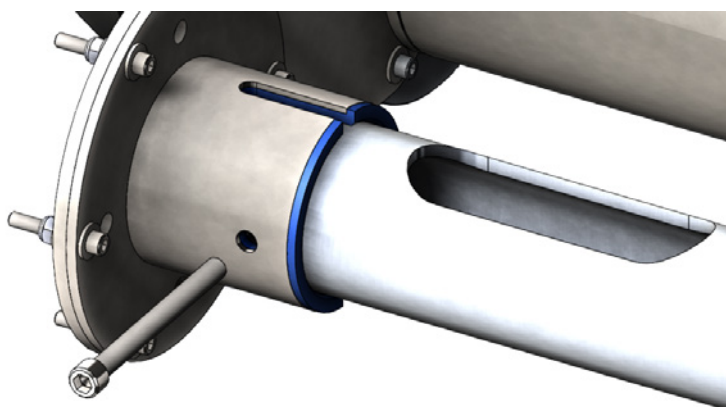
WARNING

To avoid injury, ensure the Pole Mount is locked in place and secure before attaching the bottom flange assembly.

- 2 Slide the bottom flange assembly onto the bottom Pole Mount mast.



- 3 Secure the assembly in place with the single bolt in the bottom flange.



- 4 Tie down the Pole Mount mast with the Sonar Head and MRU securely to prevent them from accidentally falling or bumping into something that could damage the units.

Tip _____

A bowline knot forms a secure loop that will not jam and is easy to tie and untie.

Result

The Sonar Head and Motion Reference Unit are attached to the Pole Mount.

Further requirements

You are now ready to install the Surface Interface Unit.

Related topics

[Assembling the Surface Interface Unit, antenna bar, and antennas, page 50](#)

Installing the Surface Interface Unit

Topics

[Assembling the Surface Interface Unit, antenna bar, and antennas, page 50](#)

[Attaching the Surface Interface Unit to the Pole Mount, page 52](#)

Assembling the Surface Interface Unit, antenna bar, and antennas

The Surface Interface Unit and the antenna bar attach to the top of the Pole Mount.

Prerequisites

- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together.
- The Surface Interface Unit accessory kit has all the specific tools you need to install the Surface Interface Unit.

Caution

Marine grade grease or anti-seize compound (included) must be applied to all fasteners during assembly.

Context

The following parts are required to install the Surface Interface Unit.

- A** GPS antennas
- B** Antenna bar
- C** Surface Interface Unit box



Procedure

- 1 Attach the Surface Interface Unit box to the antenna bar.
 - a Remove the four nuts, bolts, and washers from the antenna bar.
 - b Place the Surface Interface Unit box upside-down on a flat surface.
 - c Place the antenna bar on the Surface Interface Unit box base plate, aligning with the guide pins and holes.
 - d Fasten all four nuts, bolts and washers, securing the Surface Interface Unit box in place.
 - e Turn over the Surface Interface Unit.
- 2 Screw the GPS antennas onto the antenna bar.



Result

The GPS antennas are attached to the antenna bar. The antenna bar is attached to the Surface Interface Unit.

Further requirements

You are now ready to attach the Surface Interface Unit to the Pole Mount.

Related topics

[Attaching the Surface Interface Unit to the Pole Mount, page 52](#)

Attaching the Surface Interface Unit to the Pole Mount

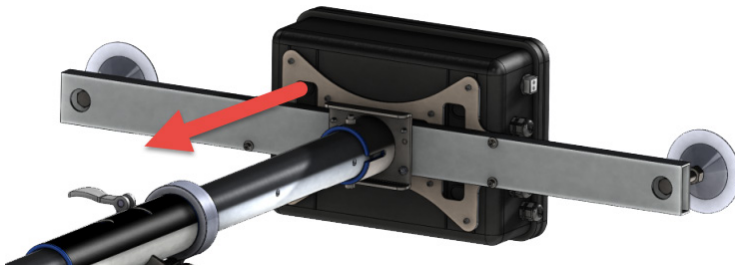
The Surface Interface Unit attaches to the top of the Pole Mount.

Prerequisites

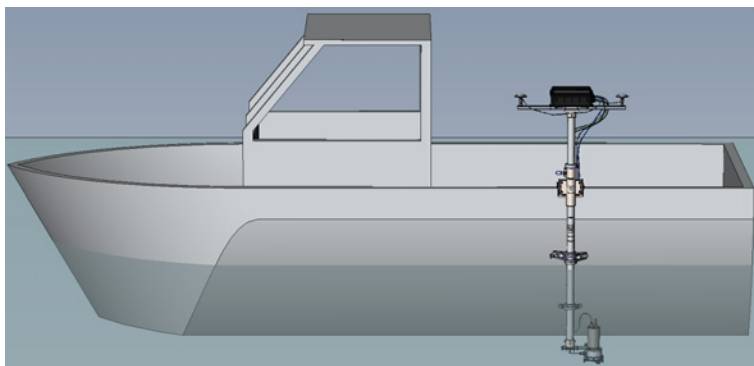
- To install the M3 Bathy, you must have basic mechanical skills. At least two people must do the installation together.
- The Surface Interface Unit accessory kit has all the specific tools you need to install the Surface Interface Unit.
- The Pole Mount with the Sonar Head and Motion Reference Unit attached must be oriented in a horizontal position and tied down to prevent damage to the units.

Procedure

- 1 Attach the Surface Interface Unit onto the Top Mast section of the Pole Mount.



- 2 Align the GPS antenna bar parallel with the vessel's direction of motion. The cables exiting the Surface Interface Unit will be facing vessel aft (back).



- 3 Secure the GPS antenna bar using the single bolt supplied (A).

Result

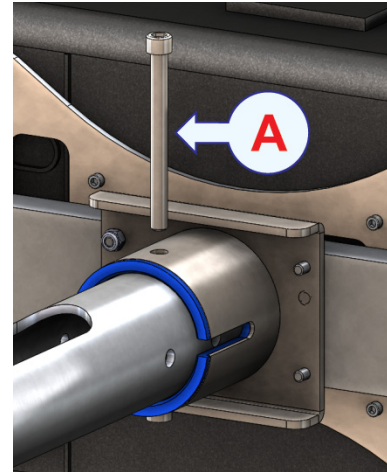
The Surface Interface Unit is attached to the Pole Mount.

Further requirements

You are now ready to install the Sonar Processor.

Related topics

[Setting up the Sonar Processor, page 55](#)



Installing the M3 Sonar Processor

Topics

[Setting up the Sonar Processor, page 55](#)

[Installing the express card and adapter, page 57](#)

Setting up the Sonar Processor

The Sonar Processor is the computer that controls the M3 Bathy system. It is a vital part of the M3 Bathy Multibeam echo sounder.

Prerequisites

Caution

All Sonar Processor parts, along with the laptop, power supply, and Surface Interface Unit power supply are rated for indoor use. You should ensure the components are free from condensation before powering on. Condensation can occur when transitioning from a cool air-conditioned environment to a hot and humid environment – such as outside on an open boat. These parts should also be protected from coming into contact with water, sea-spray, etc. Failure to do so could result in component failure.

Context



The Sonar Processor laptop (D) comes with a power supply (C) and mouse (E). Also included in the equipment case is a printed copy of the M3 Sonar Operators Manual (F), plus software and documentation on a USB drive. Power cords for North America, Europe (A) and UK (B) are included. There are USB ports available on the laptop for removable storage and the USB to serial adapter. An Express Card slot is included in the laptop for installation of the 4-port RS232 Express Card.

Tip

Covering the laptop computer from direct sunlight with a sunshade will make the display easier to see.

Procedure

- 1 Locate a work space to set up the M3 Sonar Processor laptop computer, mouse, and power supply.

Note

The cables provided allow runs up to 50 feet (15 m) between the laptop and the Surface Interface Unit.

- 2 Take the M3 Sonar Processor laptop out of the equipment case and set it up in the location available for the operator workstation.
Ensure there is room around the laptop for air circulation to the cooling vents.
- 3 Select the power cord with the appropriate local plug and connect it to the AC to DC laptop power supply, but do not connect it to the AC mains supply.
- 4 Connect the AC to DC laptop power supply to the laptop.
- 5 Connect the mouse to a USB port on the laptop.

Result

The M3 Sonar Processor is set up in a suitable location with the power supply and mouse connected.

Further requirements

You are now ready to install the express card and adapter.

Installing the express card and adapter

The express card connects the computer to the GPS antennas and sound velocity sensor (if you have one). The adapter connects the computer to the Motion Reference Unit.

Prerequisites

You will need the following components. You can find them in the Surface Interface Unit accessory kit.



A 4-port RS232 Express Card adapter

B Moxa UPort 1150 Serial to USB adapter

Tip

The express card and adapter can disconnect from the laptop if pushed in or pulled on. To prevent the COM ports from being disconnected, tie down and secure the breakout boxes and cables. Doing so will prevent data loss during the survey as a result of the cables being unplugged.

Procedure

- 1 Remove the plastic Express Card plate (A) from the laptop computer.
- 2 Install the 4-Port RS232 Express Card (B) into the card slot in the laptop.



- 3 Attach the Moxa UPort 1150 to a USB port on the laptop computer.



- 4 Store the boxes for the express card and adapter back in the case for the Surface Interface Unit accessory kit.

Result

The express card and adapter are connected to the laptop.

Further requirements

You are now ready to connect all the cables.

Related topics

[Testing the 4-Port RS232 Express Card, page 91](#)

[Testing the Moxa UPort 1150 RS422 to USB adapter, page 93](#)

Cable layout and interconnections

Topics

[Read this first, page 60](#)

[Cable plan, page 61](#)

[List of M3 Bathy cables, page 62](#)

[Cable procedures, page 63](#)

[Cable drawings and specifications, page 76](#)

Read this first

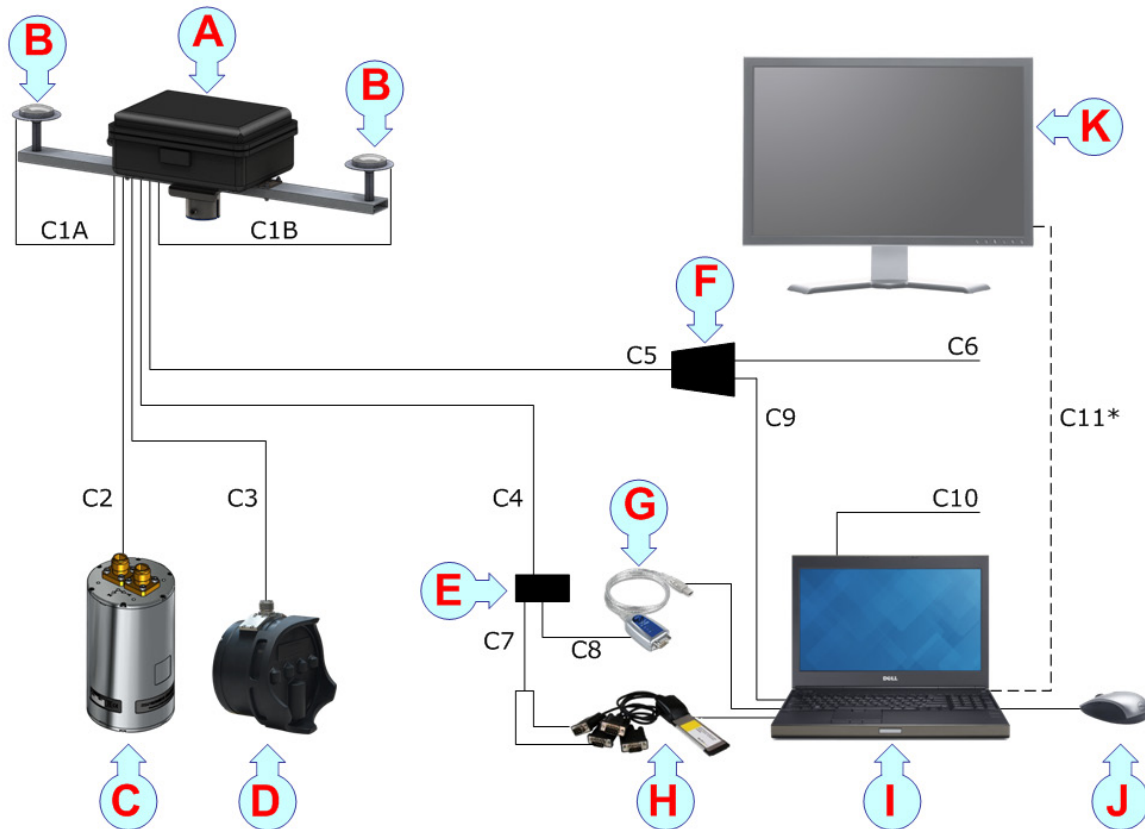
Detailed information about cable specifications, termination and connectors is provided. Unless otherwise specified, all cables are supplied by Kongsberg Mesotech as a part of the M3 Bathy delivery.

Kongsberg Mesotech Limited accepts no responsibility for damage to the system or reduced operational performance caused by improper wiring.

Note

Before you perform the M3 Bathy cabling, ensure that the mains circuit breaker for the system is switched off.

Cable plan



- A Surface Interface Unit
- B GPS Antenna
- C Motion Reference Unit
- D M3 Sonar Head
- E Breakout box for GPS and Motion Reference Unit sensor output
- F Breakout box for Sonar Head and Surface Interface Unit Power
- G RS422 to USB Adapter
- H 4-Port RS232 Express Card Adapter
- I M3 Sonar Processor laptop computer
- J Mouse
- K Helmsman display (**not included as part of the standard M3 Bathyscaphe system*)

Related topics

[List of M3 Bathyscaphe cables, page 62](#)

List of M3 Bathy cables

A set of cables is required to connect the M3 Bathy units to each other, to the relevant power source(s), and to peripheral devices.

Cable	From	To
C1A C1B	GPS Antenna	Surface Interface Unit
C2	Motion Reference Unit (Connector A)	Surface Interface Unit
C3	Sonar Head	Surface Interface Unit
C4	Surface Interface Unit	Breakout box for GPS and Motion Reference Unit sensor output
C5	Surface Interface Unit	Breakout box for Sonar Head and Surface Interface Unit power
C6	Breakout box for Sonar Head and Surface Interface Unit power	AC power supply (UPS / DC to AC Inverter)
C7	Breakout box for GPS and Motion Reference Unit sensor output	P1 and P2 on the 4-Port RS232 Express Card
C8	Breakout box for GPS and Motion Reference Unit sensor output	RS422 to USB adapter
C9	Breakout box for Sonar Head and Surface Interface Unit power	M3 Sonar Processor laptop computer
C10	M3 Sonar Processor laptop computer	AC power supply (UPS / DC to AC Inverter)
C11	M3 Sonar Processor laptop computer	Helmsman display (not included)

Related topics

[Cable plan, page 61](#)

Cable procedures

Topics

[Connecting the GPS antennas to the Surface Interface Unit, page 63](#)

[Connecting the Surface Interface Unit to the Sonar Head and Motion Reference Unit, page 64](#)

[Connecting the Surface Interface Unit to the Sonar Processor, page 73](#)

Connecting the GPS antennas to the Surface Interface Unit

The GPS antenna cables from the Surface Interface Unit are attached to the GPS antennas.

Prerequisites

- The GPS antennas must be attached to the antenna bar, and the antenna bar must be attached to the Surface Interface Unit.
- The Pole Mount with the Sonar Head and Motion Reference Unit attached must be oriented in a horizontal position and tied down to prevent damage to the units.

Caution

The TNC-threaded connectors (A) can easily be cross-threaded. Take care when connecting the GPS antenna cables.



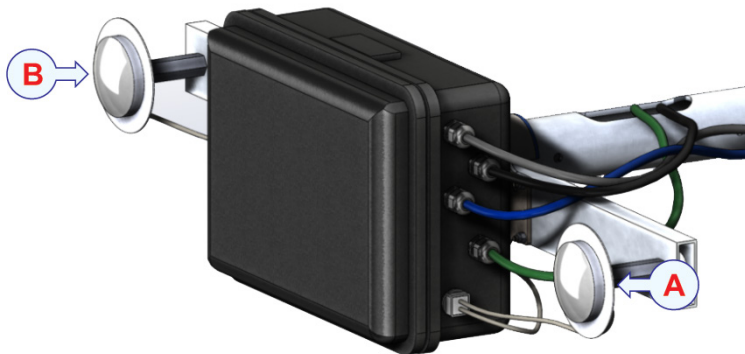
Procedure

- 1 Attach the TNC connector labelled PRI or A to the GPS antenna located aft (back).

Tip

The aft GPS is located on the side of the assembly where the cables exit the Surface Interface Unit.

- 2 Attach the TNC connector labelled SEC or B to the other GPS antenna.



Connecting the Surface Interface Unit to the Sonar Head and Motion Reference Unit

Two long cables leading from the Surface Interface Unit are threaded through the Pole Mount. These cables are connected to the Sonar Head and Motion Reference Unit (MRU) to provide power and convey telemetry data.

Prerequisites

- Silicone-based o-ring lubricant, such as Dow Corning DC4 (MS4) or equivalent
- A utility knife
- Velcro wraps or electrical tape
- A short length of garden hose to protect the cables from chafing
- If you are using a Seatex MRU, you will need the dummy plug from the MRU equipment case.

Caution

With the exception of the Motion Reference Unit cable, all other cable connectors and breakout boxes should be kept dry during assembly and mating.

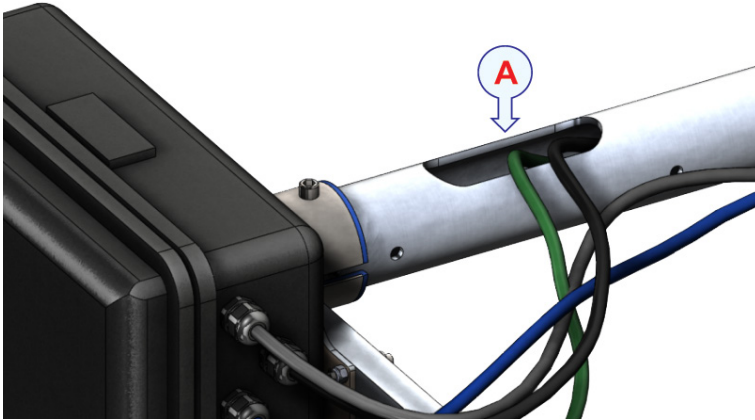
Procedure

- 1 Locate and unroll the two cables connected to the Surface Interface Unit that do not have breakout boxes at the ends.

Tip

The cable for the Sonar Head has a 10-pin connector. The other cable will either have an 8-pin connector (Seatex MRU) or a 12-pin connector (SMC MRU).

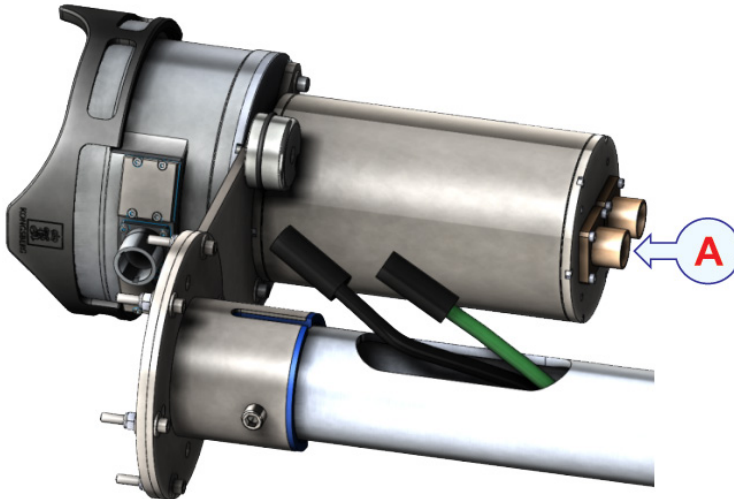
- 2 Feed both cables through the Pole Mount mast sections by making use of the enlarged cut-outs (A) at either end of the Pole Mount.



Caution

Ensure the cables are not damaged during installation and deployment. Bending the cables excessively may weaken or break them.

- 3 For the Seatex Motion Reference Unit, connect the 8-pin cable connector to **Connector A**. For the SMC IMU-108-30, connect the 12-pin cable connector to the single connector on the unit.



Caution

Hold the cable connector while tightening the engaging nut. Over tightening may result in damaging the connector.

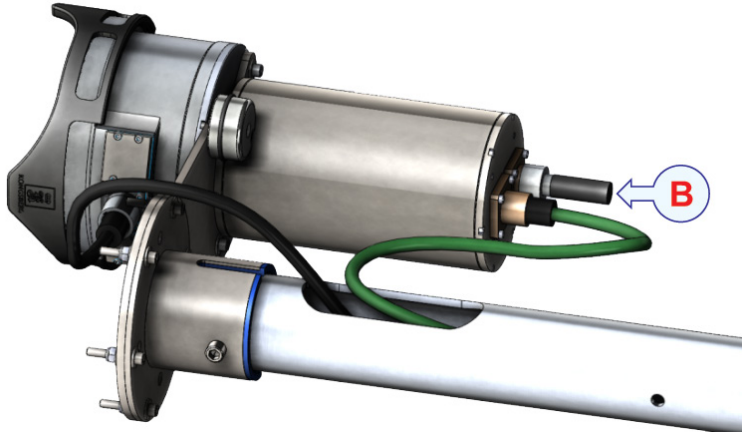
- a Check that the MRU and MRU cable connector are clean. If not, clean off the connector with compressed air, a lint-free cloth, or swab.
- b Apply a small amount of o-ring grease to the rubber on the Motion Reference Unit's cable connector before mating.

Note

To ensure the connectors remain water resistant, it is important to use a silicone-based o-ring grease — do not use a petroleum-based lubricant.

- c Mate and fully secure the locking ring so that it is hand tight.

- 4 For the Seatex MRU, install the dummy plug into **Connector B**.



Caution

The Seatex Motion Reference Unit can be damaged if it is powered on without the dummy plug installed.

- 5 Inspect the 10-pin cable connector and the connector on the Sonar Head.
- a Check the connectors are free of water or other contaminants like dust or hair.
 - b Ensure the pins are not bent, broken, or corroded.
 - c Check the o-ring is installed in the Sonar Head cable connector.

Note

If the o-ring is missing or damaged, it will need to be replaced by qualified personnel. An improperly installed o-ring can result in catastrophic failure and permanently damage the underwater equipment.

- 6 Connect the 10-pin cable connector to the M3 Sonar Head.
- a Rotate the connector to align the key when mating.
 - b Hold the cable connector while tightening the engaging nut.
 - c When the connector is tight, there should be no gap between the engaging nut and the Sonar Head connector.
- 7 Attach anti-chafing protection to the cables to prevent damage during use.
- a Using the utility knife, cut a slit down one side of a short section of garden hose.
 - b Tape the garden hose to the cables near the bottom cutout in the Pole Mount.

Result

The two long cables leading from the Surface Interface Unit are threaded through the Pole Mount and connected to the Sonar Head and MRU.

Related topics

[Replacing the o-ring in the sonar cable connector, page 68](#)

Replacing the o-ring in the sonar cable connector

A cable with a 10-pin cable connector leads out from the Surface Interface Unit and is connected to the Sonar Head. When installing the M3 Bathy, you must check if the o-ring is properly installed. If the o-ring is missing or damaged, it will need to be replaced.

Prerequisites

Caution

Replacing o-rings must only be done by qualified personnel. An improperly installed o-ring can result in catastrophic failure and permanently damage the underwater equipment.

The following included parts are used when replacing the o-ring.

- M3 Sonar Head
- M3 SEACON cable with 10-pin connector
- Replacement o-ring (found in the Surface Interface Unit accessory kit)

The following tools and consumables are not included and must be purchased locally.



- Dove-tail O-ring Installation Tool (DOIT)
- O-ring pick tool
- O-ring grease
- Swabs
- Isopropyl Alcohol

Procedure

- 1 Remove the o-ring from the Cable Connector Plug.

Use the Parker o-ring picks to extract the o-rings from the Cable Connector Plugs and Flanged Connector Receptacle.



- 2 Clean the o-ring surface with Q-Tips and Isopropyl Alcohol.

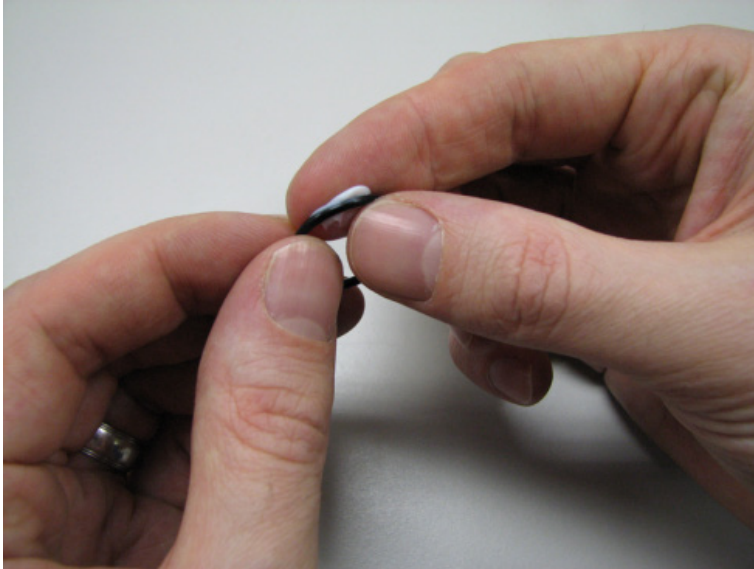
Ensure all dirt, hair, and debris is removed from the o-ring surface.



- 3 Inspect the o-ring for defects.

Be sure to keep the o-ring free of dirt, hairs, or other contaminants.

- 4 Grease the replacement o-ring with a small amount of o-ring grease.



- 5 Fit the o-ring onto the DOIT and slide it to the end.



- 6 Using the DOIT, fit the o-ring back onto the Cable Connector Plug or Flanged Connector Receptacle.

Install the o-ring in the Cable Connector Plug by aligning the key and pressing into the connector.



Tip _____
Rotating the DOIT when pulling it out can help ensure the o-ring stays in place.

Related topics

[Connecting the Surface Interface Unit to the Sonar Head and Motion Reference Unit, page 64](#)

Connecting the Surface Interface Unit to the Sonar Processor

Two long cables with breakout boxes at the end lead from the Surface Interface Unit to the laptop location. The laptop is connected to the breakout boxes through a number of cables. One breakout box communicates with the GPS and Motion Reference Unit (MRU). The other breakout box communicates with the Sonar Head and routes power to the Surface Interface Unit.

Prerequisites

- Velcro wraps or electrical tape
- Ethernet patch cable
- RS232 splitter cable DB9F x 2 to DB9M x1
- Serial extension cable

All the listed cables are found in the Surface Interface Unit accessory kit.

Note

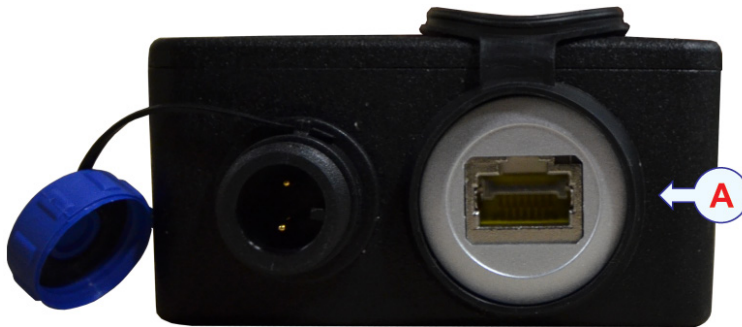
Protective caps are provided for all DB9 serial sensor connectors. Ensure they are stored in a safe place and installed on the breakout box when the system is not being used and during storage and transport.

Procedure

- 1 Locate and unroll the two long cables connected to the Surface Interface Unit with breakout boxes at the ends.
- 2 Run both cables to the M3 Sonar Processor laptop setup location.
 - a Use Velcro wraps or electrical tape to secure the breakout boxes near the laptop.
 - b Ensure the cables with breakout boxes will not move when the cables are pulled.
 - c Ensure the cables are routed out of the way so they do not introduce a tripping hazard. Where possible, tape down or cover the cables.



- 3 Connect the Ethernet patch cable to the breakout box for the Sonar Head and Surface Interface Unit Power (A).



- 4 Connect the other end of the Ethernet patch cable to the RJ45 network socket on the laptop.
- 5 Connect the one GPS sensor cable to the P1 and P2 cables on the 4-port RS232 Express Card (A).



- a Using the RS232 splitter cable, connect the two DB9F connectors to the 4-port RS232 Express Card cables labelled P1 and P2.
- b Connect the other end of the RS232 splitter cable (DB9M) to the breakout box for the GPS and MRU.

- 6 Using the serial extension cable, connect the DB9 connector to the connector labelled “MRU” (A) on the breakout box for the GPS and MRU.



- 7 Connect the other end of the serial extension cable to the Moxa UPort 1150 USB to RS422 adapter (A).



Result

The Sonar Processor is connected to the two breakout boxes leading to the Surface Interface Unit.

Cable drawings and specifications

Relevant cables and connections required for the M3 Bathy are described in detail.

Topics

[Sonar Head - SEACON MINK-10-CCPL: Power and Ethernet, page 76](#)

[Sonar Head - SEACON MIND-4-CCP: Synchronization \(optional\), page 77](#)

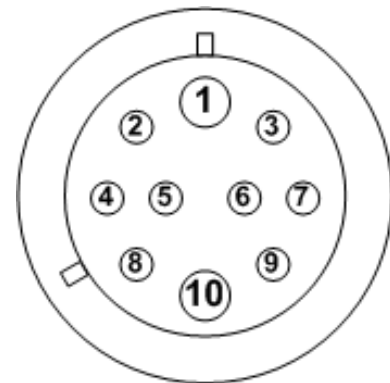
[Motion Reference Unit - Seatex with 50m subsea bottle: Connector A, page 77](#)

[SMC IMU-108-30 - SEACON BH-12-MP, page 78](#)

Sonar Head - SEACON MINK-10-CCPL: Power and Ethernet

Pin Functions

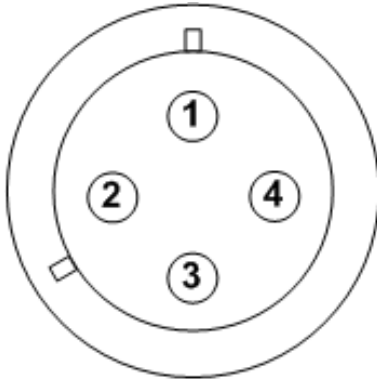
- **Pin 1:** Pri_Power (+12 to +36 VDC)
- **Pin 2:** BI_DA+
- **Pin 3:** BI_DC-
- **Pin 4:** BI_DA-
- **Pin 5:** BI_DB+
- **Pin 6:** BI_DC+
- **Pin 7:** BI_DD+
- **Pin 8:** BI_DB-
- **Pin 9:** BI_DD-
- **Pin 10:** Pri_Power_Return (0 VDC)



CABLE PIN VIEW

Sonar Head - SEACON MIND-4-CCP: Synchronization (optional)

This is an optional cable only used if you have purchased a Sonar Head that supports Sync/1PPS



CABLE PIN VIEW

Pin Functions

- **Pin 1:** DGND
- **Pin 2:** PRI_SYNC
- **Pin 3:** DRAIN
- **Pin 4:** 1PPS_SYNC

Motion Reference Unit - Seatex with 50m subsea bottle: Connector A

Pin Signal (Seapath compatible)

- **Pin 1:** POWER -
- **Pin 2:** POWER +
- **Pin 3:** COM1_IN_A -
- **Pin 4:** COM1_IN_B +
- **Pin 5:** COM1_OUT_B +
- **Pin 6:** COM1_OUT_A -
- **Pin 7:** CGND (ground ref for XIN)
- **Pin 8:** XIN (Seapath 1PPS)

SMC IMU-108-30 - SEACON BH-12-MP

Pin Functions

- **Pin 1:** RS232 – RxD (Serial Output)
- **Pin 2:** RS232 – TxD (Serial Output)
- **Pin 3:** RS422 – TxD+ (Serial Output)
- **Pin 4:** RS422 – TxD- (Serial Output)
- **Pin 5:** RS422 – RxD- (Serial Output)
- **Pin 6:** RS422 – RxD+ (Serial Output)
- **Pin 7:** RS232 – RxD (Serial Input 1)
- **Pin 8:** RS232 – TxD (Serial Input 1)
- **Pin 9:** RS232 – RxD (Serial Input 2)
- **Pin 10:** RS232 – TxD (Serial Input 2)
- **Pin 11:** Supply Voltage (-ive)
- **Pin 12:** Supply Voltage (12 to 30 VDC)

Setting to work

Topics

[Setting to work summary, page 80](#)

[Verifying that the M3 Bathy is ready for operational use, page 81](#)

[Powering up the M3 Bathy for the first time, page 84](#)

[Configuring the M3 Bathy for operational use, page 86](#)

[Testing the M3 Bathy operational functionality, page 91](#)

[Testing the M3 software, page 97](#)

[Creating a backup with the M3 configuration and software installation, page 101](#)

[Powering down the M3 Bathy, page 102](#)

Setting to work summary

Once all the hardware units have been installed, and all the cables have been connected, the M3 Bathy can be powered up for the first time, and set to work.

Prerequisites

- All M3 Bathy hardware units have been installed according to the relevant instructions.
- All system cables have been installed.
- All connections have been made.
- All operating power is available.
- All peripheral devices that shall communicate with the M3 Bathy are available and operational.
- All relevant personnel and tools are available.

Procedure

- 1 Verify that the M3 Bathy is ready for operational use.
 - a Verify that all hardware have been installed correctly.
 - b Verify that all cables have been connected correctly.
- 2 Power up the M3 Bathy for the first time.
- 3 Configure the M3 Bathy for operational use.
 - a If required, configure the network adapter.
 - b Set the mounting offsets according to the number of poles you are using.
 - c Set the sound speed.
- 4 Test the M3 Bathy operational functionality.

To verify that the M3 Bathy fulfills all operational and functional requirements, specific tests are required.
- 5 Create a backup with the M3 Bathy configuration and software installation.

Once all M3 Bathy configuration and testing have been finalized, it is good practice to back up the configuration data and software installation.

Verifying that the M3 Bathy is ready for operational use

Topics

[Verifying that operational power is correct, page 81](#)

[Verifying that all cables and hardware are properly installed, page 82](#)

Verifying that operational power is correct

The M3 Bathy operates on AC power from the vessel's mains supply. Before you can apply AC power up any M3 Bathy unit, you must verify the power is correct.

Prerequisites

- All M3 Bathy hardware units have been installed according to the relevant instructions.
- All system cables have been installed.
- All connections have been made.
- All operating power is available.
- All relevant personnel (ships electrician) and tools (for example a voltmeter) are available.

Procedure

- 1 For each M3 Bathy unit that operates on AC mains:
 - a Verify that the unit is connected to AC mains.
 - b Measure the voltage and the frequency in the power outlet, and make sure that the relevant M3 Bathy unit can operate on this power.
 - c Verify that the circuit breaker on the power circuit can handle the load when the M3 Bathy is powered up.
- 2 Check that the power rating of the UPS or true sine wave inverter is capable of supplying enough power to the M3 Bathy.

Related topics

[Power requirements, page 126](#)

Verifying that all cables and hardware are properly installed

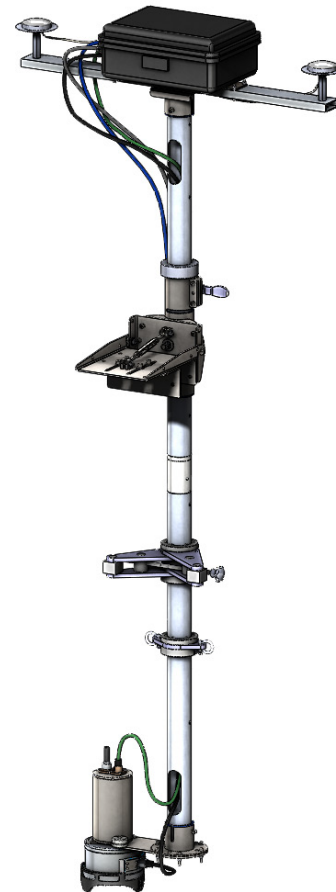
The M3 Bathy relies on communication between each system unit, and between the M3 Bathy and external devices. It is very important that all cables are correctly installed, that the proper cable types have been used, and that all cables are connected correctly. In addition, all hardware must be installed and aligned correctly.

Prerequisites

- All M3 Bathy hardware units have been installed according to the relevant instructions.
- All cables have been installed.
- All connections have been made.
- All operating power is available.
- If the Surface Interface Unit cable glands are loose, you will need an adjustable wrench with a width of at least 1 1/4".

Procedure

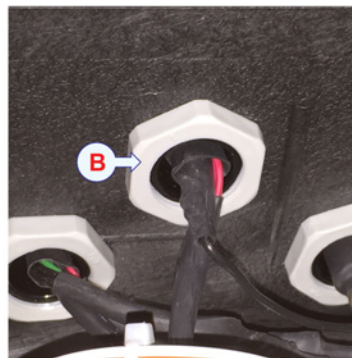
- 1 Check that the Pole Mount is aligned in a vertical position.
- 2 Do the following check before alignment.
 - a Confirm the set screws are in place and the lower pole section(s) do not rotate when twisted.
 - b Confirm the Stop Collar is bolted in place and does not move when attempting to slide it up or down the pole.
 - c Confirm the Stop Collar bolt is tightened with an Allen key.
 - d Confirm the Stabilizer Feet is bolted in place and does not move when attempting to slide it up or down the pole.
 - e Confirm the Stabilizer Feet bolt is tightened with an Allen key.
 - f Confirm the Attachment Ring is bolted in place and does not move when attempting to slide it up or down the pole.
 - g Confirm the Attachment Ring bolt is tightened with an Allen key.
 - h Confirm the deployment and recovery rope is attached to a shackle on the Attachment Ring.



- 3 Verify that the Pole Mount is secure.
 - a Check that the Pole Mount is securely fastened to the vessel and that all screws are tightened.
 - b Check that the Pole Mount does not move when the top of the pole is wiggled.
- 4 For each cable that is in used on the M3 Bathy:
 - a Verify that the cable has been installed.
 - b Verify that the connections made at each end of the cable are correct.
 - c Check that the cables are secured and do not represent a trip hazard.

Tip _____
Clean up any excess cables by coiling and tying them off to the base of the Pole Mount.

- 5 Verify that the cables glands on the Surface Interface Unit are securely tightened.
 - a Open the Surface Interface Unit box.
 - b Use an adjustable wrench to tighten any loose nuts on the outside (A) and corresponding nuts on the inside (B) of the box.



- 6 Check that the Guard Ring on the M3 Sonar Head is oriented correctly so that the Kongsberg logo is in the centre, above the middle connector.



Note

Improper alignment of the guard ring may reduce sonar beam coverage and decrease bottom coverage.

- 7 Remove the protective cover from the Sonar Head before sonar operation.
- 8 Verify that the Sonar Processor has been set up in the correct location.

Further requirements

You are now ready to power up the M3 Bathy for the first time.

Powering up the M3 Bathy for the first time

In order to use the M3 Bathy, you must turn it on. You must power up the Sonar Processor and Surface Interface Unit.

Prerequisites

- The M3 Bathy units have all been installed according to the instructions provided in the M3 Bathy Installation Manual.
- All power and interface cables and connections have been connected and verified.

- All system units have been inspected.

Context

It is impossible to control the weather. However, if the vessel has high dynamics during start-up (for example, as a result of rough seas), the Motion Reference Unit (MRU) may run into problems. High dynamics during start-up means that the MRU has moved up to ± 10 degrees on all the orientation axes. At worst, the alignment must be redone by restarting the MRU.

Procedure

- 1 Turn on the Sonar Processor laptop.
- 2 Log in to Windows.

Tip

Wait for the laptop to power up before turning on the Surface Interface Unit. If the Surface Interface Unit is powered on before the laptop, the Surface Interface Unit will start sending GPS strings to Windows. There is a known issue with Windows where it may detect the GPS string as a serial mouse and the mouse cursor will jump around. To fix this, turn off the Surface Interface Unit or disconnect the GPS, restart Windows, then turn on the Surface Interface Unit or connect the GPS.

- 3 Turn on the Surface Interface Unit.
 - a Plug the AC to DC power brick into the breakout box connected to the Surface Interface Unit.
 - b Confirm the power indicator light on the Surface Interface Unit's power supply is turned on.

Note

It will take up to 15 minutes for the MRU and the GPS to achieve full accuracy.

Further requirements

You are now ready to configure the M3 Bathy for operational use.

Configuring the M3 Bathy for operational use

Topics

[Configuring the network adapter, page 86](#)

[Configuring the M3 software, page 87](#)

[Configuring third-party software, page 90](#)

Configuring the network adapter

The Sonar Head communicates with the Sonar Processor through an Ethernet network. Your laptop must be on the same network as the Sonar Head.

Context

Your M3 Sonar Processor comes with a pre-configured static IP. However, if you connect to another network, your computer will be assigned a different IP address and you will need to re-configure your laptop's IP address. When networking devices at home or in the office, your router usually acts as a DHCP server to dynamically assign IP addresses to all your devices. In the field, use static IP addresses for a one-to-one connection to the Sonar Head. By default, the Sonar Head is set to a fixed IP address of 192.168.1.234.

Procedure

- 1 Open the Windows Network and Sharing Center.
 - a Click the Windows start button in the bottom-left corner of the screen.
 - b In the text box “*Search programs and files*”, type “**network and sharing center**”, then press **Enter**.
- 2 Click **Change adapter settings** on the left-side panel near the top.
- 3 Disconnect the Ethernet cable from the laptop computer.
- 4 Double click the Local Area Connection that changed to Unplugged.
- 5 Change the IP address for your computer.
 - a Click on the **Properties** button.
 - b Double click **Internet Protocol Version 4 (TCP/IPv4)**.
 - c Select **Use the following IP address** and enter **192.168.1.233** in the IP address field.
 - d Click the **Subnet mask** field. The **255.255.255.0** mask is automatically filled in.

- e Click **OK** in the IP Properties dialog box.
- 6 Click **OK** in the Local Area Connection Properties dialog box.
- 7 **Close** the Network Connection window.

Configuring the M3 software

Installing the M3 Bathymetry operational software

If your M3 Bathymetry Multibeam echo sounder is provided with a Sonar Processor, the M3 Bathymetry software has already been installed. If you intend to use your own computer, you must install the software yourself. When a new M3 Bathymetry software version is released, it must be installed on your Sonar Processor.

Prerequisites

You will need the Kongsberg USB drive included with the system or download the latest M3 software release from: <http://www.km.kongsberg.com/mesotechsoftware>.

Procedure

- 1 Launch the installer **M3_Vxxxx Setup.exe**.
- 2 Follow the installation wizard's instructions and select **Standard Installation**.
- 3 Use the default folder location and check **Create a desktop icon**, then click **Next**.
- 4 Click **Yes** to install the **KML USB Converter** when prompted and follow the instructions to finish the installation process.
- 5 Pin the M3 software icon to the Windows Taskbar.
 - a Right click on the M3 software icon.
 - b Click **Pin to Taskbar**.
- 6 Test the M3 software startup.
 - a Click the M3 icon on the desktop to run the software.
 - b Confirm the software finishes launching without any error windows appearing.

Configuring the sonar and sensors

The Sonar Head, Motion Reference Unit, and GPS receivers are all configured to work together using the M3 software. You must configure the mounting offsets for the number of poles you are using. You must also set the sound speed.

Prerequisites

- The M3 software must be running.
- A sound speed sensor is required to accurately measure in-water speed near the Sonar Head.

Procedure

- 1 Set up the correct mounting offset for the number of poles used in the Pole Mount.
 - a Click **Setup**→**System Configuration**.
 - b Select the **Deployment**→**Mounting Offsets** tab.
 - c Enter the correct value for the Z offset [m].
For two poles: -2.64
For three poles: -3.79

Master Reference Mounting Offsets

Serial Number: 1108-001

Name: Sonar

IP Address: 192.168.1.234

Mounting:

Parameter	Value
X Offset [m]	0.000
Y Offset [m]	0.300
Z Offset [m]	-2.640
Orientation	Downward
Pitch Angle [deg]	-90.0
Roll Angle [deg]	0.0
Yaw Angle [deg]	0.0

Tip

If the correct value is already being used, you can safely exit without saving.

2 Save the deployment configuration.

- a Click the **Master Reference** tab.
- b Click **Save As**.
- c Enter a new configuration name and click **OK**.

The configuration file is saved under the M3 software installation folder:
..\KML\M3_Vxxxx\bin\Settings.

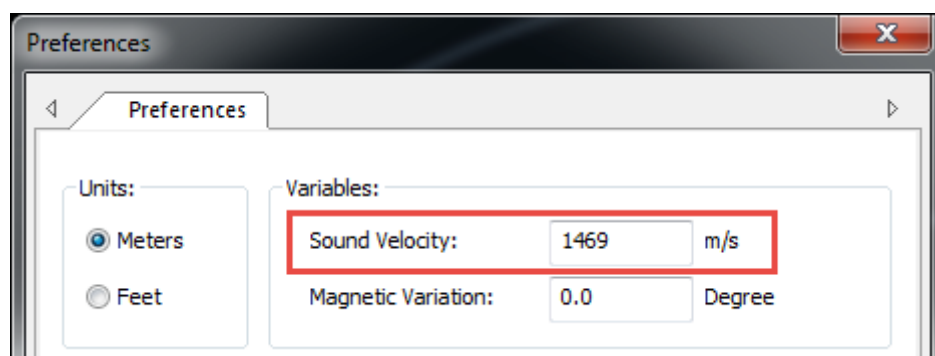
- d Click **Close**.

Tip

*Changing values in the Master Reference or Mounting Offsets tabs changes the values for the current configuration. If you want to create a new configuration, first click **Save As** or **New**, then modify the parameters.*

3 Set the sound speed.

- a Measure the sound velocity at the Sonar Head or calculate the harmonic mean from the sound velocity profile.
- b Click **Setup**→**Preferences**.
- c Enter your measurement result into the **Sound Velocity** field.



- d Click **Close**.

Related topics

[Testing the connection to the sensors, page 97](#)

[Testing the operation of the Sonar Head, page 98](#)

Configuring third-party software

If you ordered third-party software with your M3 Bathy system, it is pre-installed on the Sonar Processor.

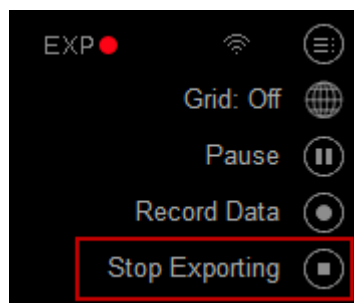
Prerequisites

- Configuration and testing of the M3 software must be complete.
- You will need to insert the third-party software dongle into a USB port on the laptop before running the third-party software. The dongle is packed in the Sonar Processor hard-shell case.

Procedure

- 1 Enable export of the .ALL data over UDP for your third-party software.
 - a Click the M3 icon on the desktop to run the M3 software.
 - b Open the Menu Widget on the top-right corner of the sonar image display window.
 - c Click **Export Data**.

A flashing red dot with “EXP” next to it will appear when exporting profile data.



- 2 Run the third-party software.
- 3 Create a new project and set your geodetic parameters.

Refer to your third-party user documentation for more information.

Testing the M3 Bathy operational functionality

Topics

[Testing the 4-Port RS232 Express Card, page 91](#)

[Testing the Moxa UPort 1150 RS422 to USB adapter, page 93](#)

[Testing the GPS receiver, page 94](#)

[Testing the Motion Reference Unit data output, page 95](#)

Testing the 4-Port RS232 Express Card

An express card with four RS232 ports is supplied with the Surface Interface Unit accessory kit. There is no hardware configuration of the unit required (e.g. jumper or switch settings). The computer serial port settings for the express card are set in software at the factory before shipping.

Prerequisites

You will need an RS232 tester.

Context

The four ports on the express card are assigned to the following COM port numbers.

Connector P1 = COM 11

Connector P2 = COM 12

Connector P3 = COM 13

Connector P4 = COM 14

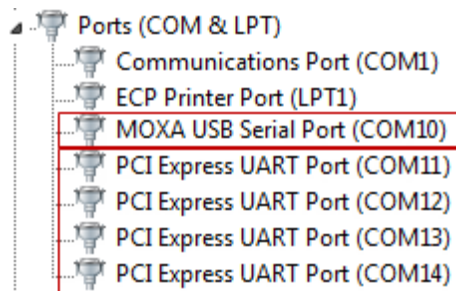
Note

If the express card is detected, but is configured for different COM ports than those shown here, you will need to manually set the COM ports.

Procedure

- 1 Check the devices and COM ports are present.
 - a Click the Windows start button in the bottom-left corner of the screen.

- b In the text box “*Search programs and files*”, type “device manager”, then press **Enter**.
- c In the Device Manager window, click “Ports (COM & LPT)” and check that the four COM ports on the express card are shown.



Note

*If the ports fail to appear, reinsert the express card and scan for hardware changes in the Device Manager. Click **Action**→**Scan for hardware changes**.*

- 2 Connect the RS232 tester to the connector **P1** on the express card.
- 3 Click the M3 icon on the desktop to run the M3 software.
- 4 Click **Setup**→**System Configuration** and select the **Sensors Setup** tab.
- 5 Click **Test Device** and confirm the RTS light changes from green to red.
- 6 Repeat the above steps for the other three ports on the express card.



Note

In some cases the COM port assignment will not be applied in sequence to the port numbers shown on the DB9 connectors. If this happens, plug the RS232 tester into the next DB9 connector to be configured until the RTS light changes to red.

Related topics

[Installing the express card and adapter, page 57](#)

Testing the Moxa UPort 1150 RS422 to USB adapter

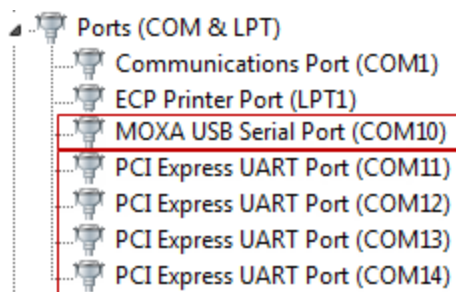
An RS422 to USB adapter is supplied with the Surface Interface Unit accessory kit. There is no hardware configuration of the unit required (e.g. jumper or switch settings). The computer serial port settings for the Moxa UPort 1150 are set in software at the factory before shipping.

Context

The Moxa UPort 1150 is assigned to COM 10.

Procedure

- 1 Click the Windows start button in the bottom-left corner of the screen.
- 2 In the text box “*Search programs and files*”, type “device manager”, then press **Enter**.
- 3 In the Device Manager window, click “Ports (COM & LPT)” and check that the Moxa UPort 1150 is assigned to COM 10.



- 4 If the Moxa UPort 1150 is detected, but is not configured for COM 10, you will need to manually set the COM port.

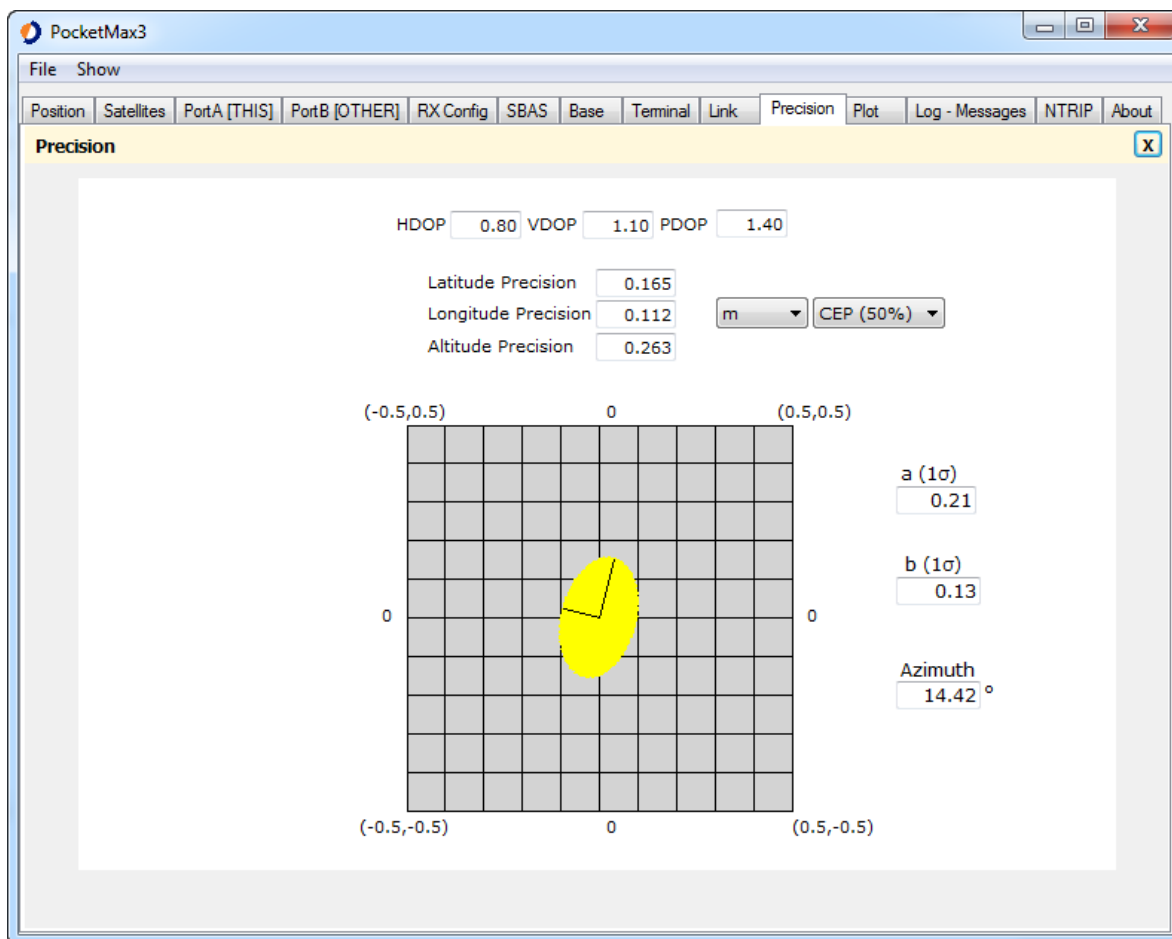
Related topics

[Installing the express card and adapter, page 57](#)

Testing the GPS receiver

The program PocketMax3 is used to configure and test the GPS receivers so that they communicate successfully with the M3 Bathy units.

Context



Tip

If PocketMax3 fails to connect to the GPS, connect the RS232 connector labeled P1 directly to the breakout box for the GPS. Reconnect the serial splitter when the test is complete.

Procedure

- 1 Open PocketMax3 by clicking on the desktop icon.

- 2 Set the **Serial Port Settings** to the following values.

Port:	COM11
Baud Rate:	115200
Mode:	Normal
- 3 Click **Search** to connect to the GPS.
- 4 Click on the **Precision** tab.
- 5 Confirm the plotted position is within the limits required for the survey.
- 6 Close PocketMax3.

Testing the Motion Reference Unit data output

To test the Motion Reference Unit (MRU) data output, you can check the TSS1 data-string output quality flag.

Prerequisites

- You will need serial port-test software, such as HyperTerminal or PuTTY.
- The M3 software must be closed.

Procedure

- 1 Open your serial port-test software.
- 2 Set the serial connection settings to the following values.

Port:	10
Baud Rate:	115,200 bps
Data Bits:	8
Parity:	N
Stop bits:	1
- 3 Connect to the device and inspect the serial data string for the quality flag. The following flags may appear.
 - “U” (unaided mode — settled condition: no data output)
 - “u” (unaided mode — settling: waiting to settle after powering up)
 - “F” (full aided mode — settling: MRU is outputting data, but still settling after powering up)
 - “F” (full aided mode — settled condition: MRU is outputting data)

- 4 Wait for the quality flag to achieve “**F**” (**full aided mode**) status, then close the program.

Example

:020010 -0001F 0023 -0169, where the Quality Flag = F (full aided mode)

Testing the M3 software

Topics

[Testing the connection to the sensors, page 97](#)

[Testing the operation of the Sonar Head, page 98](#)

[Testing the Sonar Head telemetry, page 100](#)

Testing the connection to the sensors

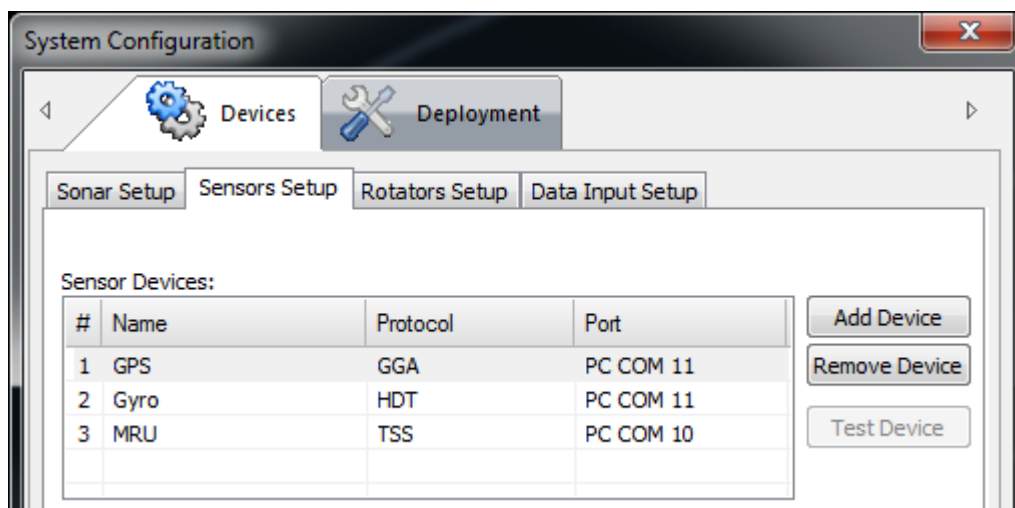
There is a built-in test function in the M3 software that allows you to test the sensors and confirm that the sensor data is being correctly received.

Prerequisites

The M3 software must be running.

Procedure

- 1 Click **Setup**→**System Configuration**.
- 2 Click on the **Devices**→**Sensor Setup** tab.



- 3 Test that the position output from the GPS is being correctly received.
 - a Select Sensor Devices Protocol **GGA PC COM 11** and click **Test Device**.
 - b Confirm the NMEA string for GGA is displayed in the **Port Monitor** box.

- c Click **Stop Test**.
- 4 Test that the heading output from the GPS is being correctly received.
 - a Select Sensor Devices Protocol **HDT PC COM 11** and click **Test Device**.
 - b Confirm the NMEA string for HDT is displayed in the **Port Monitor** box.
 - c Click **Stop Test**.
- 5 Test that the TSS1 output from the Motion Reference Unit is being correctly received.
 - a Select Sensor Devices Protocol **TSS PC COM 10** and click **Test Device**.
 - b Confirm the pitch, roll, and heave from the TSS1 string is displayed in the **Port Monitor** box.
 - c Click **Stop Test**.
- 6 Click **Close**.

Related topics

[Configuring the sonar and sensors, page 88](#)

Testing the operation of the Sonar Head

You can test the operation of the Sonar Head by confirming that sonar data is being correctly displayed in the Information Widget, sonar image display window, and 3D-Point Cloud window. In addition, any errors will be displayed in the Output Messages or Head Status windows.

Prerequisites

The M3 software must be running.

Tip _____

Check there is sufficient disk space available to complete the survey.

Procedure

- 1 Click **Setup**→**Connect** to start the Sonar Head.
Confirm that the sonar image display window is updated.

- 2 Click the “i” icon in the sonar image display window to open the Information Widget.

Confirm the sensor data is updating in the Information Widget.

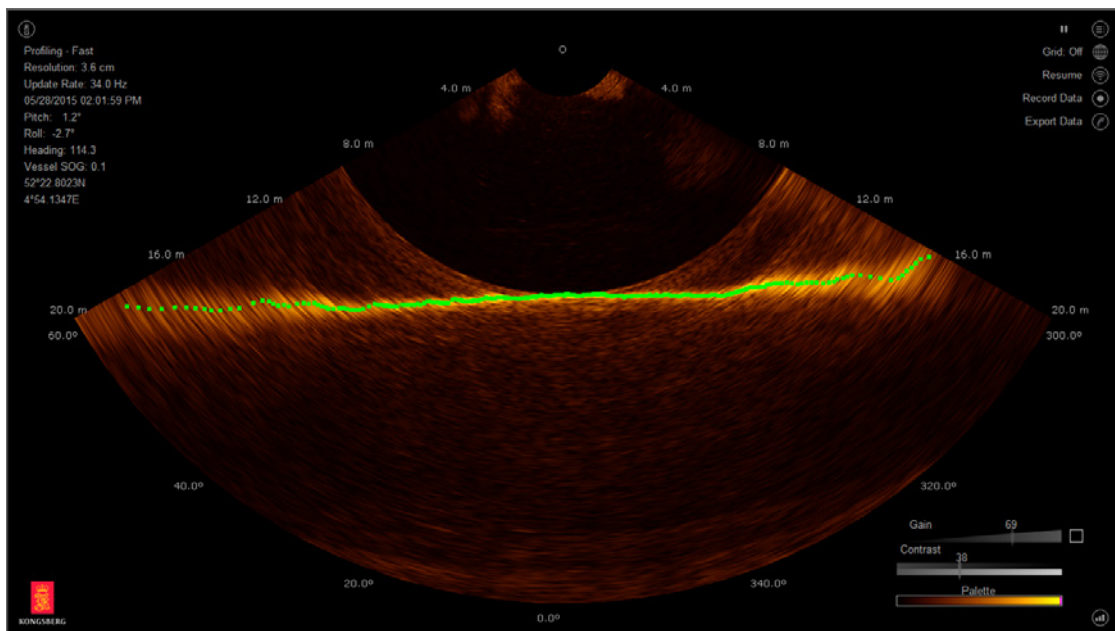
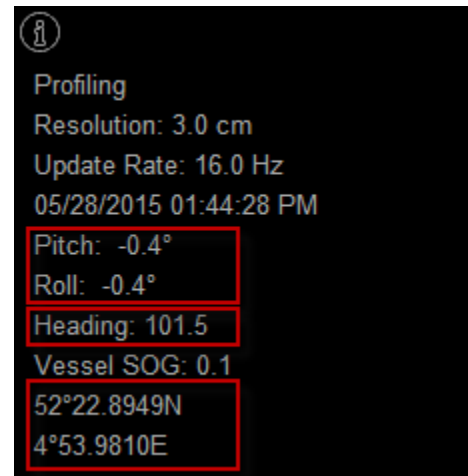
- 3 Click **Sonar Apps**→**Profiling** to set the Sonar App to **Profiling** mode.

- 4 Right click on the sonar image and choose an appropriate range.

Set the range scale to two or more times the bottom depth.

Tip _____

Avoid running the system with a range scale less than two times the water depth. This will provide reduced swath widths and may extract profile points close to the surface for the outer beams.



- 5 Confirm that data is displayed and being updated in the 3D-Point Cloud window.
- 6 Confirm that no errors are displayed in the Output Messages window.
 - a Click **Display**→**Output Messages Window**.
 - b Check for errors shown in the Output Messages window under the **Host Messages** or **Head Messages** tab.

- 7 Check the Head Status.
 - a Click on **Active** located on the Status Bar (lower right).
 - b Confirm that all items listed under the M3 Sonar show green check boxes.

If any items are shown with an X with a red circle, it usually means the device has failed to connect. Disconnect and check the device setup for any sensor that failed.
 - c Click on the top line in the window to open the **Head Status** window.
 - d Confirm all parameters in the list are shown with a check mark inside a green circle.
- 8 Check for acoustic or electrical interference in the sonar image.
 - a Confirm no concentric rings appear. These could be caused by other acoustic devices or power-line noise. Rings with black gaps between them could also be due to excess Ethernet traffic when using a shared network.
 - b Confirm there are no bright radial lines originating from the sonar display. This could be caused by thruster noise. If the radial line appears with the Sonar Head out of water, it could indicate noise in the power line or a fault in the Sonar Head.
 - c Confirm the bottom appears across the entire width of the sonar image. If the edges appear weak, and profile points are not detected at the edges, check for obstructions preventing the Sonar Head's receive. (i.e. improperly installed guard ring or proximity to the vessel hull/keel).

Related topics

[Configuring the sonar and sensors, page 88](#)

Testing the Sonar Head telemetry

You can run a telemetry test to check if the link between the Sonar Head and the M3 software is working correctly.

Prerequisites

- For this test you will need the Sonar Head connected to the Sonar Processor and powered on.
- The M3 software must be running.

Procedure

- 1 Click **Setup**→**Connect**.
- 2 Start an Ethernet test.
 - a Click **Sonar Apps**→**Customize Apps**.

- b Double click on **Ethernet Test – 100Mbps** shown under “Other Apps”.
 - c Click **OK**.
- 3 Check for activity on your local network.
 - a Press <CTRL> + <ALT> +
 - b Click **Start Task Manager**.
 - c Click on the **Networking** tab.
 - d Find the Local Area Connection for the M3 Sonar Head and confirm that the Network Utilization is 95% or higher.

Note

*If the Network Utilization is less than 95%, check that the Override Network Link Speed is set to 1000 Mbps. See **Setup**→**System Configuration**. A link speed of less than 80Mbps may result in a slower than expected ping rate. Also see the Output Message window for any messages.*

Creating a backup with the M3 configuration and software installation

As the M3 software is pre-configured at the factory, you will lose all the M3 Bathy settings if you re-install the software. We recommend creating a backup in case you need to restore your settings at a later time.

Procedure

- 1 Once the system has been configured and tested, copy the folder **C:\KML\M3_Vxxxx** to an external drive as a backup of the configuration.
- 2 To restore the M3 software settings, copy the backup folder into **C:\KML**.

Note

Attempting to restore a backup folder from an older version of the M3 software may not work, as backwards compatibility will vary between software releases.

- 3 As a secondary measure, run windows backup to create a restore point on the M3 Sonar Processor.

Powering down the M3 Bathy

The M3 Bathy is not provided with an on/off switch.

Context

When you do not use the M3 Bathy, switch off the entire system.

Procedure

- 1 Disconnect the power cord leading to the AC to DC power brick.
Alternatively, switch off the breaker supplying power to the M3 Bathy.
- 2 Switch off the Sonar Processor laptop.
 - a Save your settings, then close the M3 software and any third-party software.
 - b Shut down Windows.
- 3 Switch off any additional items, such as a sound velocity profiler or helmsman display
If required, refer to the instructions provided by the product's manufacturer.

Repacking the M3 Bathy

Topics

[Repacking the Sonar Processor, page 104](#)

[Repacking the Surface Interface Unit, page 105](#)

[Repacking the Sonar Head and Motion Reference Unit, page 107](#)

[Repacking the Pole Mount and accessories, page 109](#)

Repacking the Sonar Processor

The Sonar Processor comes in a hard-shell equipment case.

Prerequisites

- All cables must be disconnected and protective dust caps placed on all connectors.
- Ensure the laptop and other items are dry before packing away.

Procedure

- 1 Pack the power supply (A), power cords (B), and mouse (C) in the lower level of the equipment case.



- 2 Disconnect the 4-Port RS232 Express Card.
- 3 Pack the express card in its box, then pack it in the Surface Interface Unit accessory kit.
- 4 Disconnect the Moxa UPort 1150 Serial to USB adapter.
- 5 Pack the adapter in its box, then pack it in the Surface Interface Unit accessory kit.

- 6 Close the laptop (A) and pack it in the top level of the equipment case.
- 7 Pack the USB drive (B) on top of the laptop.
- 8 Pull down the foam lid (C) and pack the M3 Sonar Operator manual in the top of the case.



Repacking the Surface Interface Unit

The Surface Interface Unit and accessories come in two hard-shell equipment cases. The GPS antenna bar comes in the Pole Mount's blue canvas bag.

Prerequisites

- All units and parts must be rinsed with fresh water and dried off before packing away.

- All cables must be disconnected and protective dust caps placed on all connectors.
- The Pole Mount with the Sonar Head and Motion Reference Unit attached must be oriented in a horizontal position and tied down to prevent damage to the units.

Procedure

- 1 Pack all the accessories in the small hard-shell case.
- 2 Remove the GPS antennas and put them in bubble wrap or foam.
- 3 Pack the GPS antennas in the small hard-shell case.
- 4 Separate the GPS antenna bar from the Surface Interface Unit, leaving all the fasteners in the bar.
- 5 Pack the GPS antenna bar in the Pole Mount's blue canvas bag.



- 6 Coil the cables and pack the Surface Interface Unit in the large hard-shell case.



Repacking the Sonar Head and Motion Reference Unit

After installation of the Motion Reference Unit (MRU), please save the transportation container. To maintain warranty validity, the MRU must be shipped in this container for service or repair. The Sonar Head comes in a hard-shell case.

Prerequisites

- All units and parts must be rinsed with fresh water and dried off before packing away.
- All cables must be disconnected and protective dust caps placed on all connectors.
- The Pole Mount with the Sonar Head and Motion Reference Unit attached must be oriented in a horizontal position and tied down to prevent damage to the units.

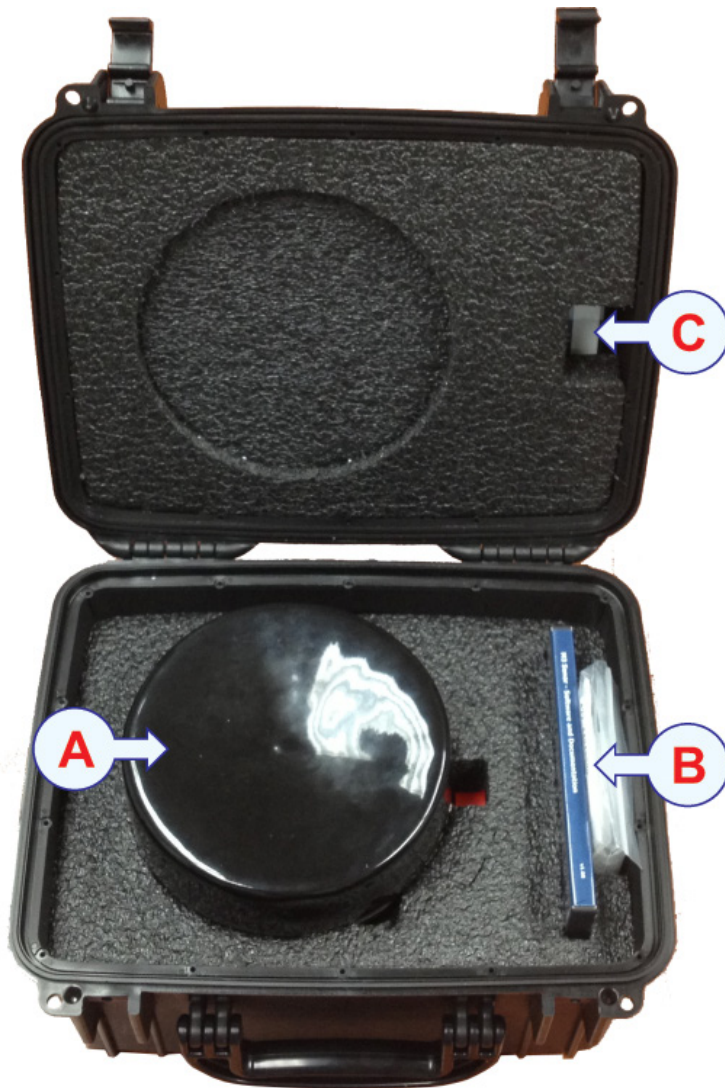
Caution

Be aware the Motion Reference Unit and the M3 Sonar Head are easily damaged through mishandling – in particular the polyurethane face of the Sonar Head transducer.

Procedure

- 1 Place the protective cover over the Sonar Head and Guard Ring and push down until secure.

- 2 Pack the Sonar Head (A) into the circular cutout of the foam insert in the hard-shell case.
- 3 Pack the Sonar Head accessory kit (B) into the side pocket of the foam insert in the hard-shell case.
- 4 Pull down the foam lid (C) and pack the M3 Bathy Installation Manual in the top of the case.



- 5 Pack the Seatex or SMC MRU into its original transportation container.
If you have a Seatex MRU, pack all other MRU accessories and parts into the side pocket of the container.

Repacking the Pole Mount and accessories

The M3 Bathy Pole Mount comes in two cases. One is a large bag containing the three pole sections and the antenna bar. The other is a hard-shell case containing the rest of the Pole Mount hardware and tools.

Prerequisites

- All units and parts must be rinsed with fresh water and dried off before packing away.
- All cables must be disconnected and protective dust caps placed on all connectors.
- The Surface Interface Unit must be repacked.
- The Sonar Head and Motion Reference Unit must be repacked.

Note

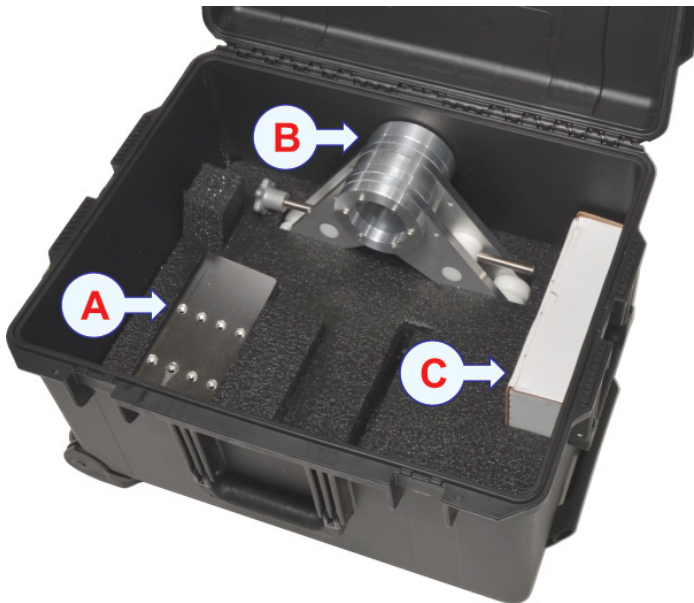
Leave all fasteners attached to the appropriate assemblies.

Context

There are four levels in the hard-shell case. Each level is separated by a foam insert.

Procedure

- 1 Pack the right-angle bracket (A), Stabilizer Feet (B), and Attachment Ring (C) in the first level of the case.



-
- 2 Pack the Mast Clamp assembly (A) into the second level of the case.



-
-
- 3 Pack the Pole Mount's bottom flange (A) into the third level of the case.



- 4 Pack the tool kit case (A), clamps, and wrench (B) in the fourth level of the case.



- 5 Pack the three pole sections (plus the GPS antenna bar from the Surface Interface Unit) in the blue canvas bag.

Drawing file

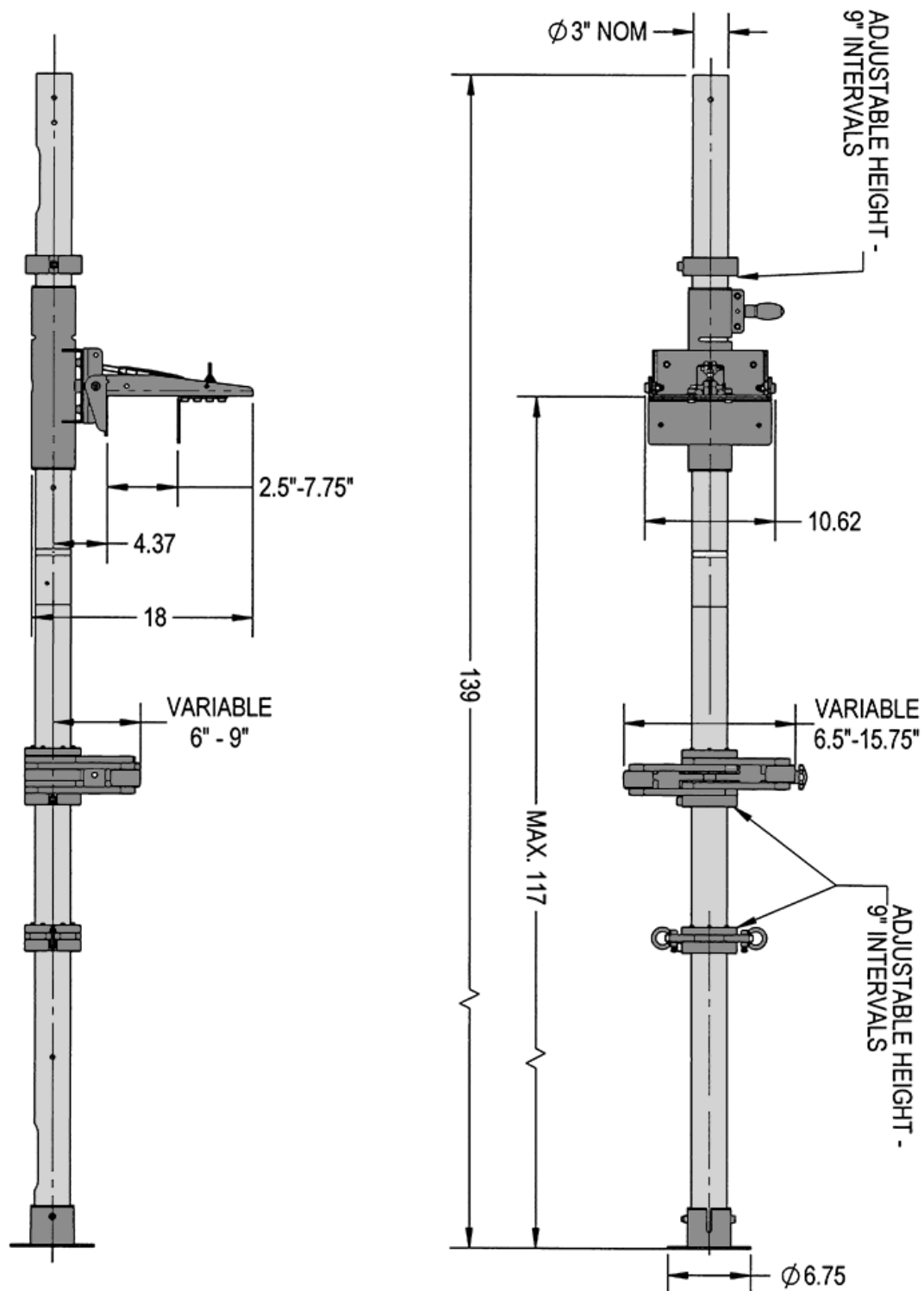
About the drawings in the drawing file

Relevant drawings related to the installation and/or maintenance of the M3 Bathy are provided for information purposes only.

The drawings are not to scale. Unless otherwise specified, all measurements are in inches (in). The original installation drawings are available by request in PDF and/or SolidWorks format.

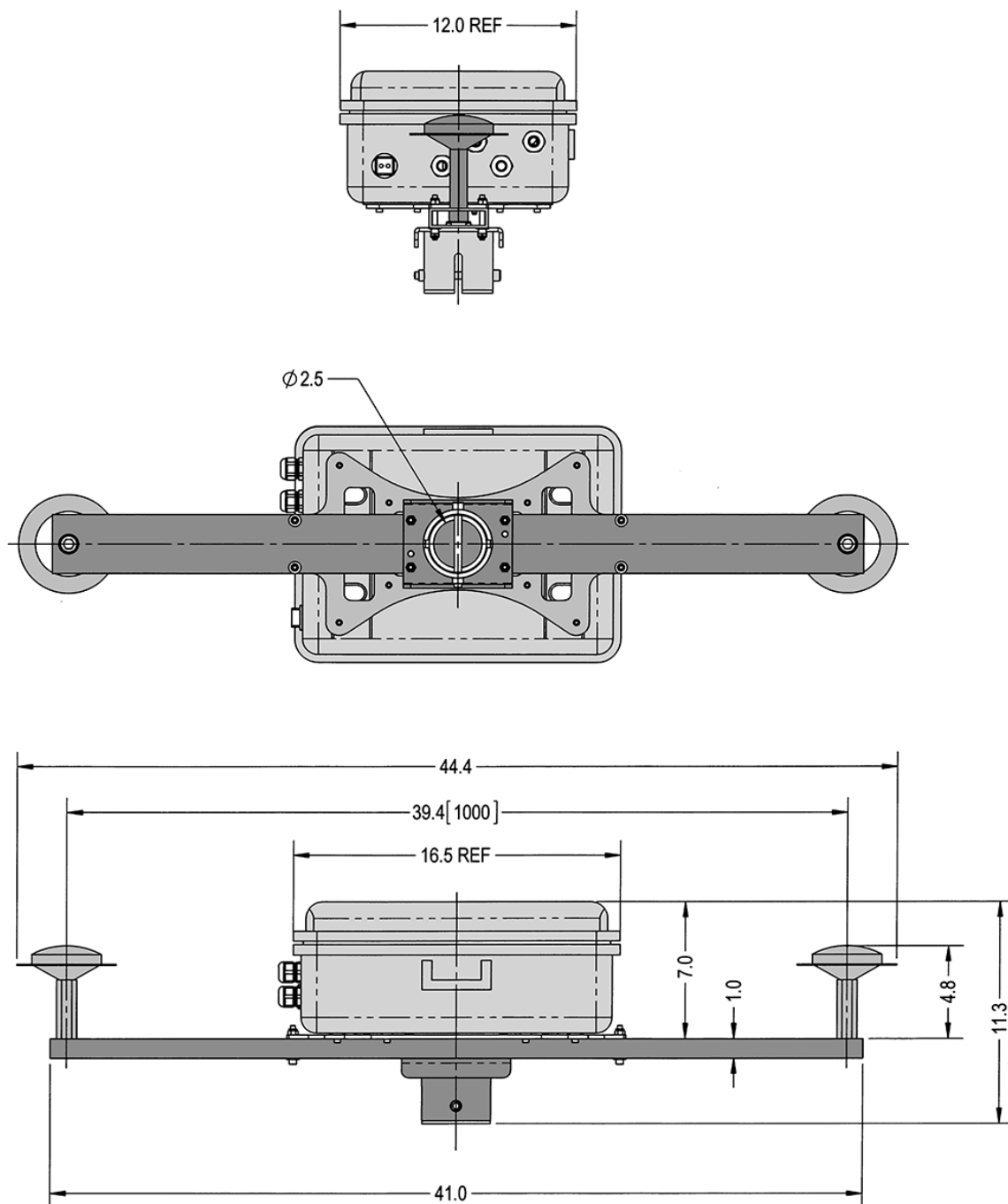
Pole Mount outline dimensions

Document number: 922-80011001



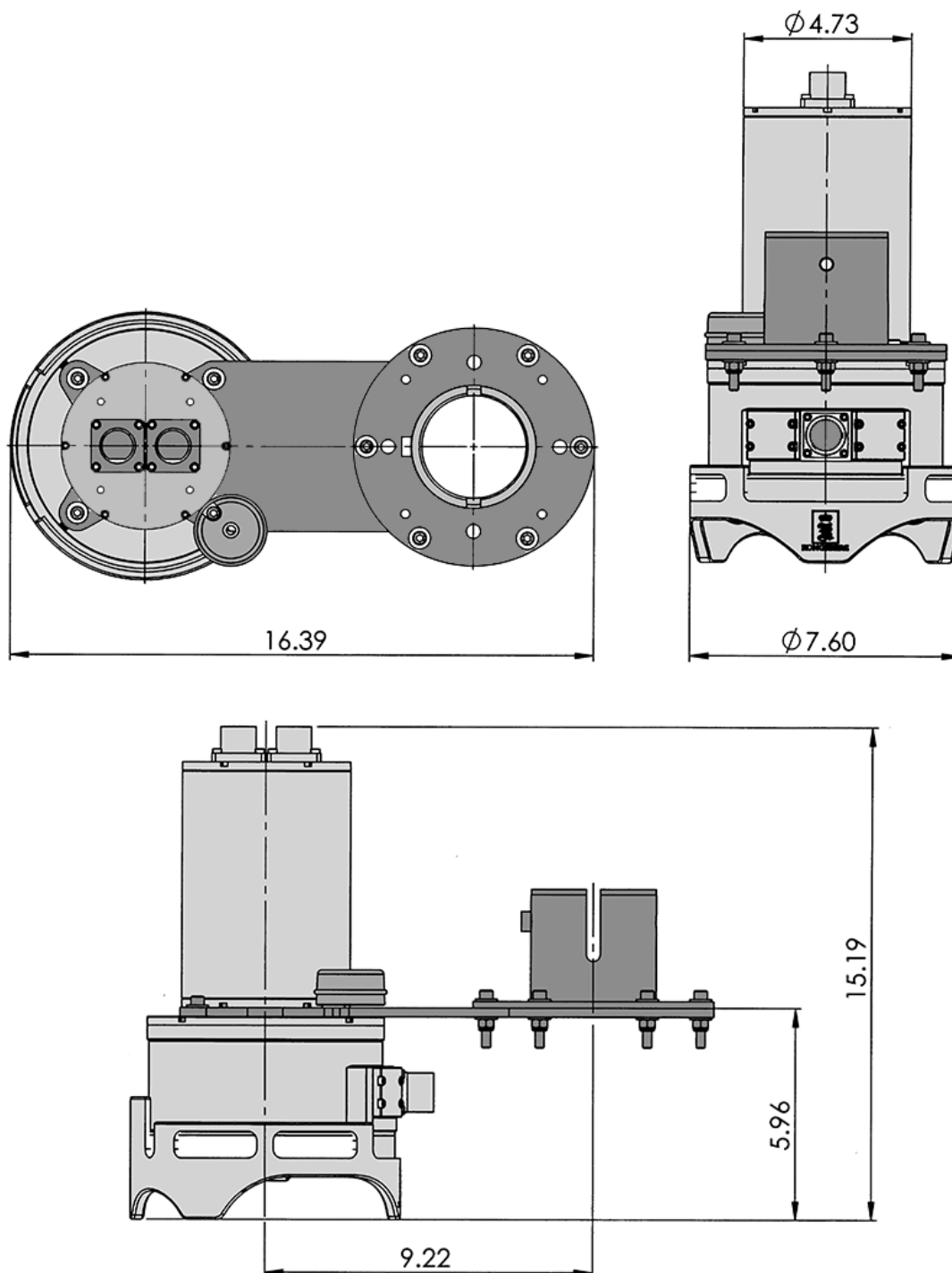
Surface Interface Unit outline dimensions

Document number: 922-60021001



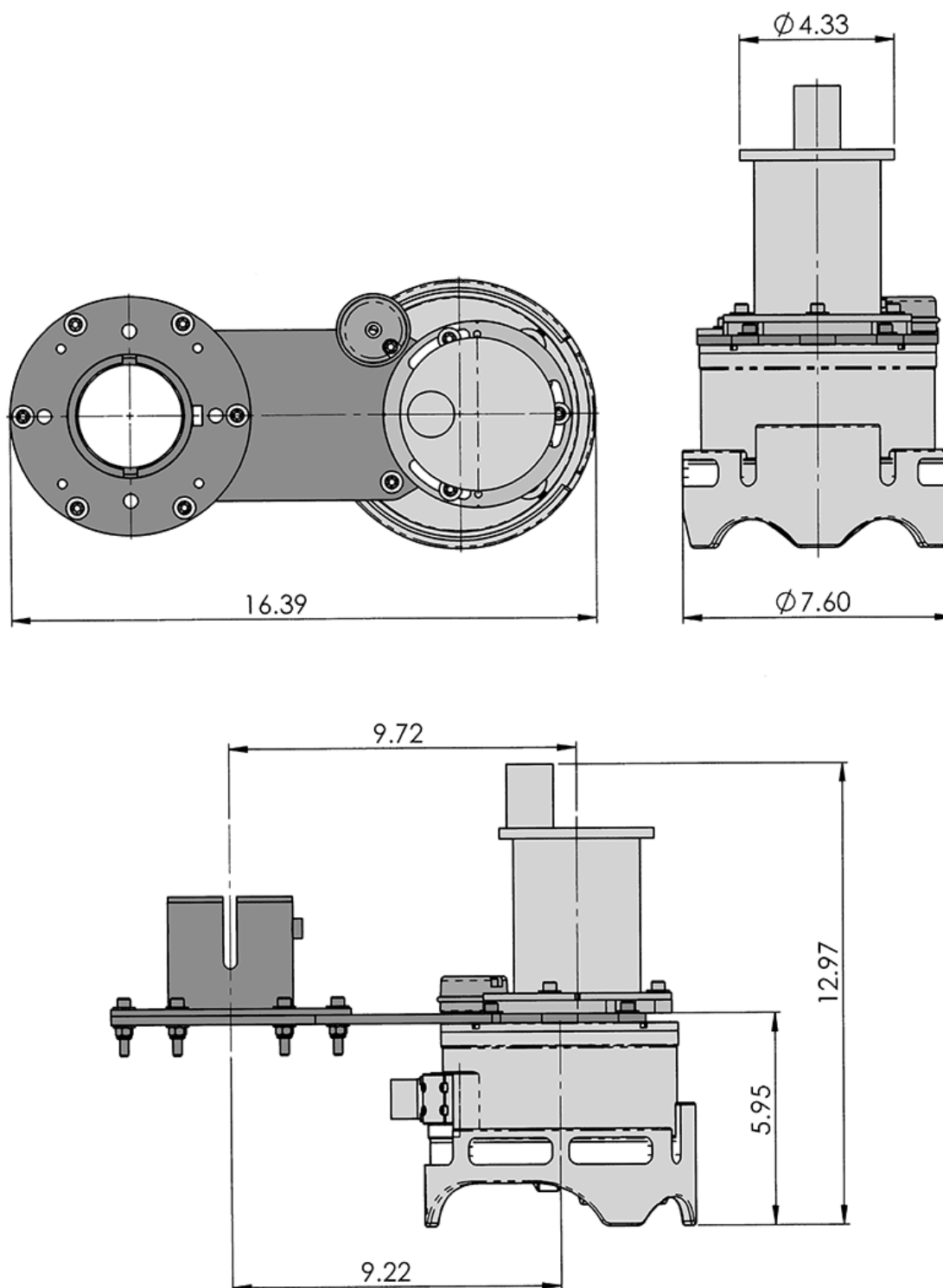
Seatex Motion Reference Unit outline dimensions

Document number: 422-44131001



SMC Motion Reference Unit outline dimensions

Document number: 422-44341001



Technical specifications

Topics

[Introduction to technical specifications, page 119](#)

[Interface specifications, page 120](#)

[Performance specifications, page 122](#)

[Mechanical specifications, page 124](#)

[Power requirements, page 126](#)

[Environmental requirements, page 127](#)

[Minimum computer requirements, page 127](#)

[Minimum technical requirements for helmsman display, page 128](#)

Introduction to technical specifications

These technical specifications summarize the main functional and operational characteristics of the M3 Bathymetric Multibeam echo sounder. It also provides information related to power requirements, physical properties and environmental conditions.

Note

At Kongsberg Mesotech, we are continuously working to improve the quality and performance of our products. The technical specifications may be changed without prior notice.

Interface specifications

The M3 Bathy Multibeam echo sounder will interface with peripheral systems and sensors using standard and/or proprietary datagram formats.

Supported datagram formats for position information

The M3 Bathy supports the following datagram formats for position information.

- **NMEA GGA**

The NMEA GGA datagram transfers the time, position and fix related data from a global positioning system (GPS).

- **NMEA GLL**

The NMEA GLL datagram transfers the latitude and longitude of vessel position, the time of the position fix and the current status from a global positioning system (GPS).

- **GGK**

This third party datagram format contains the vessel's current position with the assigned coordinated universal time (UTC) of position, as well as a selection of position quality factors.

Supported datagram formats for speed information

The M3 Bathy supports the following datagram format for speed information.

- **NMEA VTG**

The NMEA VTG datagram contains the actual course and speed relative to the ground.

Supported datagram formats for heading information

The M3 Bathy supports the following datagram format for vessel heading information.

- **NMEA HDG**

The NMEA HDG datagram provides heading from a magnetic sensor. If this reading is corrected for deviation it produces the magnetic heading. If it is offset by variation, it provides the true heading.

- **NMEA HDM**

The NMEA HDM datagram provides vessel heading in degrees magnetic. The datagram format is no longer recommended for use in new designs. It is often replaced by the NMEA HDG telegram.

- **NMEA HDT**

The NMEA HDT datagram provides the true vessel heading. This is normally information from a course gyro.

- **Kongsberg EM Attitude 3000**

Kongsberg EM Attitude 3000 is a proprietary datagram format created by Kongsberg Mesotech for use with digital motion sensors. It holds roll, pitch heave and heading. The datagram contains a 10-bytes long message.

- **Octans STD1**

This is a third-party proprietary datagram format for heading, speed, and motion. It was created by iXSea (<http://www.ixblue.com>) for use with their Octans gyrocompass.

Supported datagram formats for motion information

The M3 Bathy supports the following datagram formats from a motion sensor.

- **Simrad Sounder/TSS1**

Simrad Sounder/TSS1 is a proprietary datagram format created by Kongsberg Mesotech for heave, roll and pitch compensation. When you select this protocol, the number of sensor variables is fixed, and there is no token associated with it.

- **Kongsberg EM Attitude 3000**

Kongsberg EM Attitude 3000 is a proprietary datagram format created by Kongsberg Mesotech for use with digital motion sensors. It holds roll, pitch heave and heading. The datagram contains a 10-bytes long message.

- **Octans STD1**

This is a third-party proprietary datagram format for heading, speed, and motion. It was created by iXSea (<http://www.ixblue.com>) for use with their Octans gyrocompass.

Supported datagram formats for sound speed sensors

The M3 Bathy supports the following datagram format from a sound speed sensor.

- **Valeport format**

This is a third-party proprietary datagram format. It was created by Valeport Ltd. for use with their sound velocity sensors. The file format is ASCII. There are three formats: standard format (millimetres per second), alternative format #2 (metres per second with two decimal places), and alternative format #3 (metres per second with three decimal places). For more information, see <http://www.valeport.co.uk/>.

Supported datagram formats for depth information

The M3 Bathy supports the following datagram formats for depth output.

- **NMEA DBT**

The NMEA DBT datagram provides the current depth under the transducer. In new designs, this datagram is frequently used to replace the DBK and DBS datagrams.

- **NMEA DPT**

The NMEA DPT datagram provides the water depth relative to the transducer, and the offset of the measuring transducer.

Processed data formats

The following processed data output formats are available.

- **.mmb**

This is raw element data, unbeamformed, in 16-bit fixed-point complex format. This format allows great flexibility in how the data is processed and allows you to do your own beamforming or profile-point extraction. The data body size is determined by the number of elements and the number of samples.

- **.ALL**

This is the proprietary Kongsberg EM series datagram format. M3 software can output this data format to be compatible with third-party post-processing software.

Performance specifications

These performance specifications summarize the main functional and operational characteristics of the M3 Bathy system.

- **Slant range:** 0.2 to 150 m
- **Depth:** 0.2 to 75 m

- **Coverage:** 3.5 x Depth / 120°
- **Range resolution:** 1 cm
- **Frequency:** 500 kHz
- **Pulse types:** CW, LFM

Bathymetry/Profiling mode

- **Across track field of view:** 120°
- **Along track field of view:** 3°
- **Number of beams:** up to 256
- **Update rate:** up to 40 Hz
- **Beam spacing:** Equiangular

Position and Heading Sensor

- **Output format:** RS232
- **Serial output formats:** GGA, HDT, ZDA, VTG
- **Serial port settings:**
 - **Port A to Motion Reference Unit:**
 - * \$GPHDT: 2Hz
 - * \$GPVTG: 2Hz
 - **Port B to Sonar Processor:**
 - * \$GPGGA: 10Hz
 - * \$GPHDT: 10Hz
 - * \$GPVTG: 10Hz
 - * \$GPZDA: 1Hz
- **Antenna spacing:** 1 m

Motion Reference Unit

- **Angle accuracy dynamic at +/- simultaneous roll and pitch:**
 - **Seatex MRU-H:** 0.05° RMS
 - **Seatex MRU-3:** 0.08° RMS
 - **SMC IMU-108-30:** 0.03° RMS
- **Heave accuracy:** 5cm or 5% whichever is highest
- **Output format:** RS422

- **Serial output formats:** TSS1
- **Serial port settings:** 115,200bps 8N1
- **GPS aided:** HDT and VTG at 2 Hz input rate

Mechanical specifications

These mechanical specifications summarize the physical properties of the M3 Bathy system.

Note

For more detailed information about the physical dimensions, see the Drawing file.

Sonar Processor

The Sonar Processor uses a high-quality commercial-off-the-shelf laptop computer workstation. The weight and dimensions of the model may vary. Contact your Kongsberg Mesotech representative for information about the current model that is delivered with your M3 Bathy system.

Sonar Head

- **Depth rating:** 500 m
- **Dimensions**
 - **Diameter:** 185 mm (7.28")
 - **Depth:** 126 mm (4.95")
- **Weight:** 4.4 kg (air), 1.8 kg (water)
- **Materials:** Hard Anodized Aluminum, Stainless Steel 316, Elastomeric Polyurethane
- **Connector type:** SEA CON®
- **Connector model:** MINK-10-FCRL (Ethernet & Power)
- **Optional connector model:** SEA CON, MIND-4-FCR (Sync & 1PPS)

Seatex Motion Reference Unit in 50m subsea bottle

- **Depth rating:** 50 m
- **Dimensions**
 - **Height:** 209 mm, 240.5 mm incl. connectors
 - **Diameter:** 120 mm

- **Depth:** 126 mm (4.95")
- **Weight:** 7.8 kg (air), 5.4 kg (water)
- **Material:** Stainless Steel
- **Connectors:** 2, 8-pin SEA CON®

SMC IMU-108-30 Motion Reference Unit

- **Depth rating:** 30 m
- **Dimensions**
 - **Height:** 123 mm, 169 mm incl. connectors
 - **Diameter:** 134 mm
- **Weight:** 2 kg (air)
- **Material:** Titanium
- **Connector:** SEA CON® BH-12-MP

Surface Interface Unit

- **Dimensions (with antenna bar)**
 - **Height:** 287 mm
 - **Width:** 1138 mm
 - **Depth:** 305 mm
- **Weight (with cables):** 19.6 kg
- **Surface connections:** DC Power, Sonar Processor – serial and Ethernet
- **Subsea connections:** Sonar Head, Motion Reference Unit

Pole Mount (assembled)

- **Dimensions**
 - **Height (two poles):** 2.31 m
 - **Height (three poles):** 2.53 m
- **Weight:** 31 kg

Power requirements

These power characteristics summarize the power specifications for the M3 Bathy system. The total power required for the system is 280 W (max).

Sonar Processor

- **Power adapter input voltage:** 120/240 VAC
- **Laptop input voltage:** 19.5 VDC @ 180W (max)

Surface Interface Unit

- **Power adapter input voltage:** 120/240 VAC
- **DC input voltage:** 24 VDC @ 100W (max)

Sonar Head

- **Input voltage:** 12-36 VDC
- **Input power:** 22W (typical), 60W Peak

Seatex Motion Reference Unit

- **Input voltage:** 10-36 VDC
- **Input power:** 5.5 W (MRU-3) / 12 W (MRU-H)

SMC IMU-108-30 Motion Reference Unit

- **Input voltage:** 12-30 VDC
- **Input power:** 2 W

Position and Heading Sensor

- **GPS receiver input voltage:** 8 – 36 VDC
- **Antenna voltage:** 5VDC max 60mA
- **Input power:** 5.5 W (nominal)

Related topics

[Verifying that operational power is correct, page 81](#)

Environmental requirements

These specifications summarize the temperature requirements and other environmental standards for the M3 Bathy system.

Sonar Processor

The Sonar Processor uses a high-quality commercial-off-the-shelf laptop computer workstation. This computer is intended to be installed inside in an area suitable for extended human habitation. Contact your Kongsberg Mesotech representative for information about the current model that is delivered with your M3 Bathy system.

Surface Interface Unit

- **Enclosure:** IP68
- **Temperature:** -30° to +70 °C (operation), -40° to +85 °C (storage)

Sonar Head

- **Temperature:** -2° to + 38 °C (operation), +40 to +55 °C (storage)
- **Shock qualified:** +/-50gs, 3 Axes, 6 shocks per axis
- **Vibration qualified:** 4g, 30Hz 3 Axes, 2 hours per axis. No resonance below 800Hz

Motion Reference Unit

- **Temperature:**
 - **Seatex MRU-3/MRU-H:** -5° to +55 °C (operation), -25° to +70 °C (storage)
 - **SMC IMU-108-30:** 0° to +55 °C (operation), -40° to +65 °C (storage)
- **Mean time between failures (MTBF):** 50,000 hours
- **Standards:** IEC 60945
- **Max shock non-operational (10ms peak):** 1000 m/s² (Seatex MRU)

Minimum computer requirements

Although a computer can be ordered from Kongsberg Mesotech as a part of the M3 Bathy delivery, it is also possible to purchase one locally.

If you purchase a computer locally, make sure that the chosen model meets the functional and technical requirements.

It is important to make sure that the chosen computer model is relatively new with sufficient processing power, a high performance graphic adapter, and a high speed network adapter.

The computer must be able to facilitate the various interface requirements made by the M3 Bathy, and you may need to add extra Ethernet and serial adapters.

Note

The computer design and construction must allow for maritime use, easy access to connectors, parts and cables, and a safe installation.

The minimum technical requirements are:

- **Processor:** 2.80 Ghz, Intel quad core i7
- **Memory capacity:** Minimum 8 Gb
- **Hard disk capacity:** Minimum 1 TB free space (100-hours recording avg. data rate)
- **Minimum graphics card RAM:** 256 MB
- **Network interface:** 100/1000 Mbps
- **Serial interfaces:** One or more serial line interfaces are also required. The number of serial lines depend on the interface requirements.
- **Operating system:** The M3 Bathy software has been designed for 64-bit Windows® 7. It will also work on 32-bit systems. Older operating systems are not supported.

Tip

If you have connected a USB-to-serial adapter to the Sonar Processor, do not remove it while the M3 Bathy is running. Also, do not move the adapter to a different USB socket on the Sonar Processor.

Minimum technical requirements for helmsman display

Unless specifically ordered, the M3 Bathy is not provided with a display. This item must then be purchased locally.

You can use one or two displays on your M3 Bathy Sonar Processor depending on personal and operational preferences.

Note

It is important that the chosen display meets the technical system requirements. The display design and construction must allow for maritime use, easy access to cables, and a safe installation.

The minimum technical requirements are:

- **Resolution:**
 - **Minimum:** 1280 x 1024 pixels.
 - **Recommended:** 1920 x 1200 pixels or better
- **Video interface:** These must match the video output formats provided by the Sonar Processor.

The Sonar Processor offers video output on several formats. Investigate your options before purchasing a display.
- **Physical size:** This depends on personal and operational preferences.

The M3 Bathy software supports 9:16 displays.

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