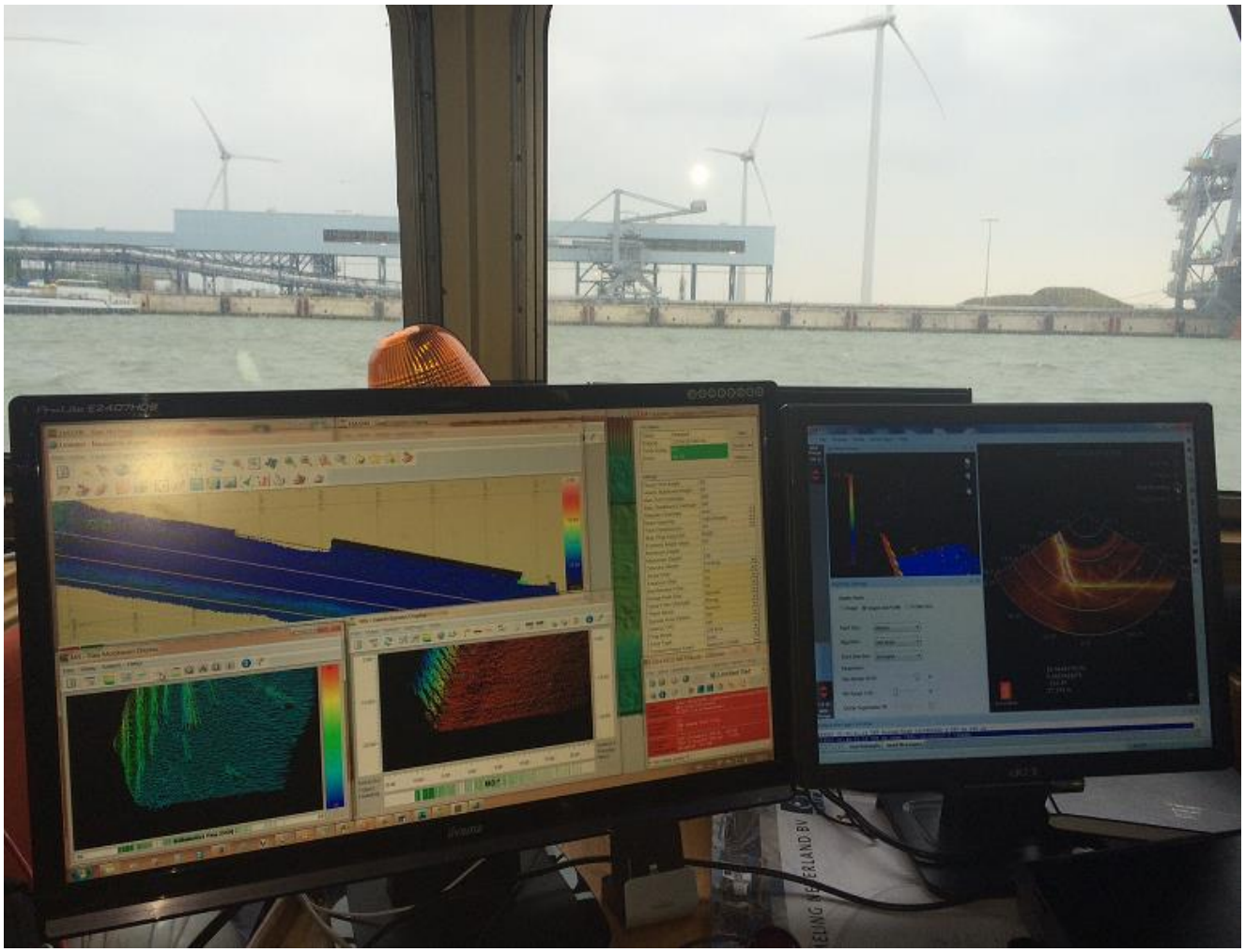
Quick start guide

KONGSBERG

M3 BATHY
Multibeam Echo Sounder: Using QINSy - Lite



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Document no: Document Number / Revision		
1.0	04.JUN.2015	First release
1.1	10 JUNE 2016	Updated the format and offsets parameters

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

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 our web site. On the web site you will also find a list of our dealers and distributors.

Feedback

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism. Please send all such – in writing by Email to: **alan.zhao@km.kongsberg.com**

Table of contents

About this manual

Purpose

The purpose of this document is to provide the necessary instructions and reference diagrams required to properly configure the M3 and QINSy software. Installation of all M3 hardware should be complete before reading this guide.

Target audience

The reader is expected to have a background in multibeam echo-sounder bathymetry survey techniques and experience of using QINSy software.

Licence information

The M3 Software is included with the M3 BATHY system. Updates are available free of charge and can be downloaded from: http://www.km.kongsberg.com/mesotechsoftware.

A QINSy ® Lite license is supplied as part of the standard M3 BATHY system. Updates can be obtained directly from QPS.

Software version

The software references and associated figures in this manual are using:

- M3 Software v1.62
- QINSy® Lite 8.10 (Build 2015.06.14.1)

Registered trademarks

- M3 Sonar®
- QINSy®

M3 BATHY

This is the quick start guide for the software configurations of the M3 BATHY shallow water bathymetric survey system.

This manual does not give a detailed description of every function in the M3 and QINSy software. Refer to the M3 user manual and QINSy user manual for detailed information.

Topics

System description

The M3 BATHY is a compact, lightweight multibeam echo-sounder system for shallow water survey. The M3 BATHY system software package includes the M3 software and the QINSy software.

The M3 software controls the M3 multibeam echo-sounder, acquires sounding data and exports the sounding data to the QINSy software.

The QINSy software receives the sounding from the M3 software through UDP with the **Kongsberg Mesotech M3** driver.

System diagram

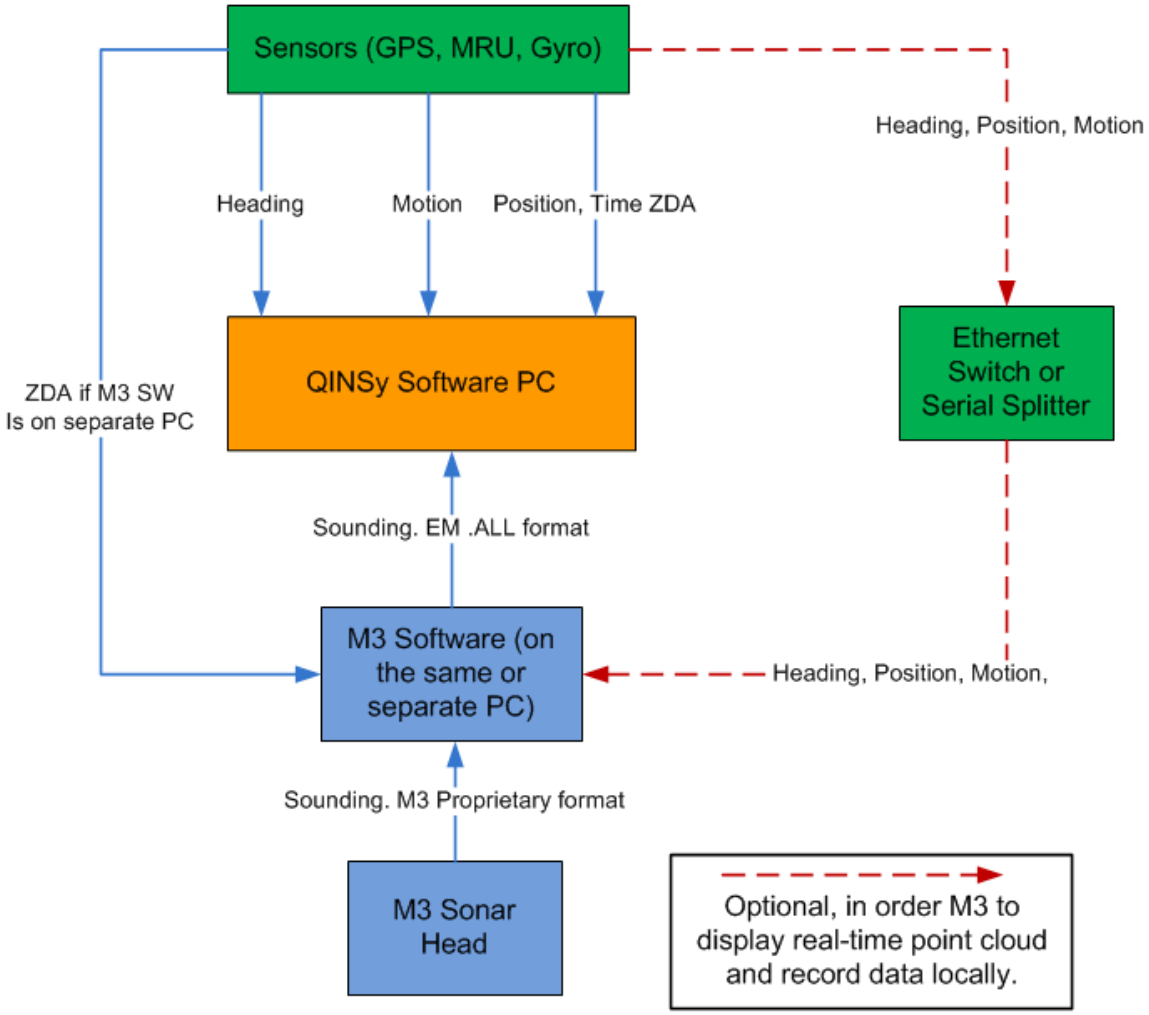

Figure 1. System Diagram

- All sensors — including GPS, Gyro, Motion Reference Unit (MRU), and ZDA — need to be connected to the QINSy software. It's optional to split the sensor data to the M3 software for M3 local recording.
- The M3 software sends sounding through EM .ALL format over UDP.
- If the QINSy software and M3 software are running on separate computers, split the ZDA string to the QINSy software and M3 software so that both computers' time can be synchronized with ZDA time.
- If the QINSy software and M3 software are running on the same computer, configure the ZDA string only to the QINSy software.

Support information

If you require assistance with your M3 BATHY system, please contact:

Kongsberg Mesotech Ltd. Phone: +1 604 464 8144

Email: km.support.vancouver@km.kongsberg.com

If you require assistance with QINSy software, please visit QPS support website, https://confluence.qps.nl/display/support/QPS+Support+Portal

The Netherlands: +31 (0)30 6941 220

United Kingdom: +44 (0)1295 817742

Canada: +1 506 454 4487

United States: +1 603 431 1773

Getting started

Topics

Powering on the system

1. Starting up the Sonar Processor laptop:
   a. Power on the laptop**.**
   b. Log in to Windows.
2. Powering 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.
   c. It will take the Motion Reference Unit (MRU) up to 15 minutes before full accuracy is achieved.

Note! *If the vessel has high dynamics during start-up, the MRU may run into problems. At worst, the alignment must be redone by restarting the MRU. High dynamics during start-up means that the MRU has moved up to ±10 degrees on all the orientation axes.*

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   d. The GPS will also need up to 15 minutes to acquire all satellites and achieve full accuracy.

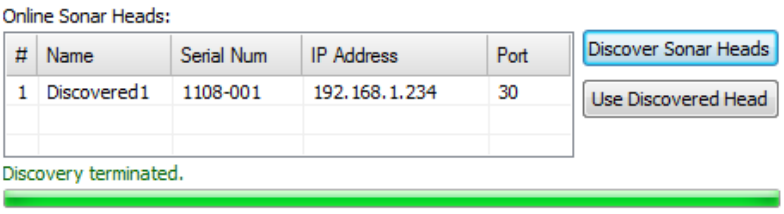
Note! *If the Surface Interface Unit (SIU) is powered on before the processor laptop, the SIU will start sending GPS strings to Windows. There is a known issue with Windows where it may detect the GPS string as a serial mouse and the mouse cursor will jump around. To fix this, turn off the SIU or disconnect the GPS, restart Windows, then turn on the SIU or connect the GPS.*

Powering off the system

1. Powering off the Surface Interface Unit simply requires unplugging the power cord or switching off the breaker to the Surface Interface Unit's AC to DC power-supply brick.
2. Powering off the Sonar Processor Laptop:
   a. Save your settings, and then close the QINsy and M3 Software.
   b. Shut down Windows.

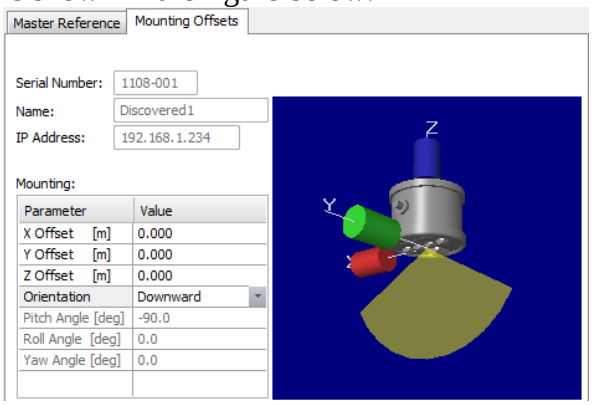
Starting up the M3 software

1. Start the M3 software:
   a. Double click the M3 software icon on the Windows desktop.
2. Confirm that the M3 Sonar is connected to the system:
   a. Select **Setup** menu > **System Configuration** > **Devices** > **Sonar Setup**.
   b. Click the **Discover Sonar Heads** button.
   c. Confirm that the Sonar Head appears in the **Online Sonar Heads** list. If not, check the Ethernet connection between the laptop and the M3 Sonar Head.



   d. Select the Sonar Head listed under Online Sonar Heads and click on the button **Use Discovered Head**.
3. Confirm that the mounting offsets have been entered correctly:
   a. Click on the **Deployment** tab > **Mounting Offsets** in the System Configuration window.

b. Confirm that the offsets are entered according to the *Configuring the sonar and sensors* section on page 16. Default configuration for M3 BATHY – Downlooking is shown in the figure below.

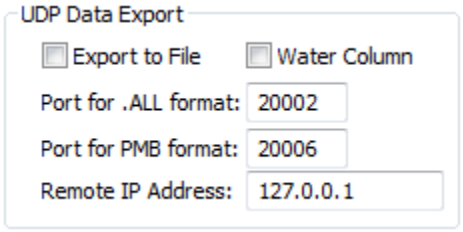


c. Close the **System Configuration** window.

4. Confirm that the M3 Software data export and profiling settings are correct:

a. Select **Setup** menu > **Preferences**.

b. In the **Preferences** window, confirm the IP address and port settings are configured according to the *M3 Sonar data recording and exporting* section on page 19. The default values are shown in the figure below.



c. Close the **Preferences** window.

d. Select **File** menu > **Exporting Format**, then confirm the format is set to "Profile Point (.all)".

e. From the **Profile Settings** window (if not open, select **Display** menu > **Profiling Settings**), confirm either "Image and Profile" or "Profile Only" is selected**.**

f. From the **Sonar Apps** menu, confirm that either "Profiling" or "Profiling - Fast" is selected.

5. Connect the M3 Sonar and start exporting:

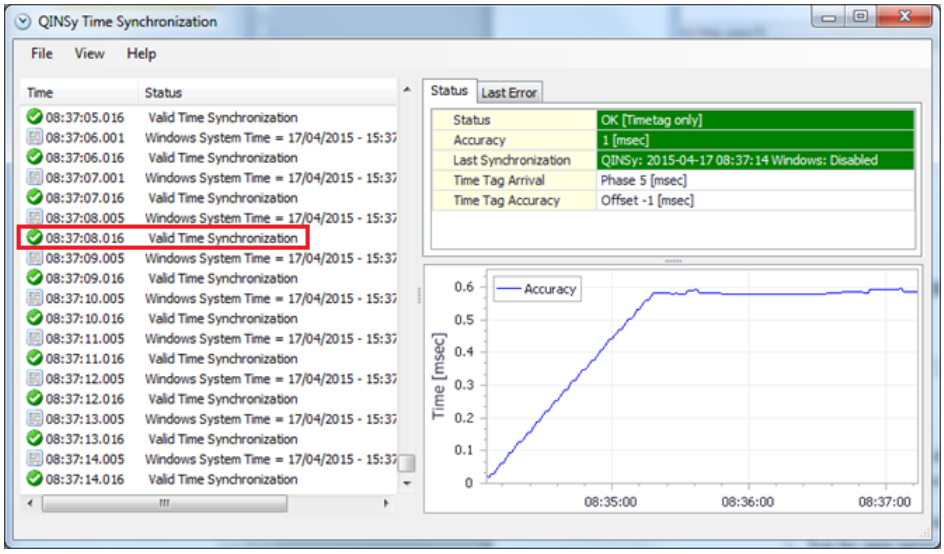
a. Select **Setup** menu > **Connect** to activate the M3 Sonar Head.

b. Confirm that the sonar image updates.

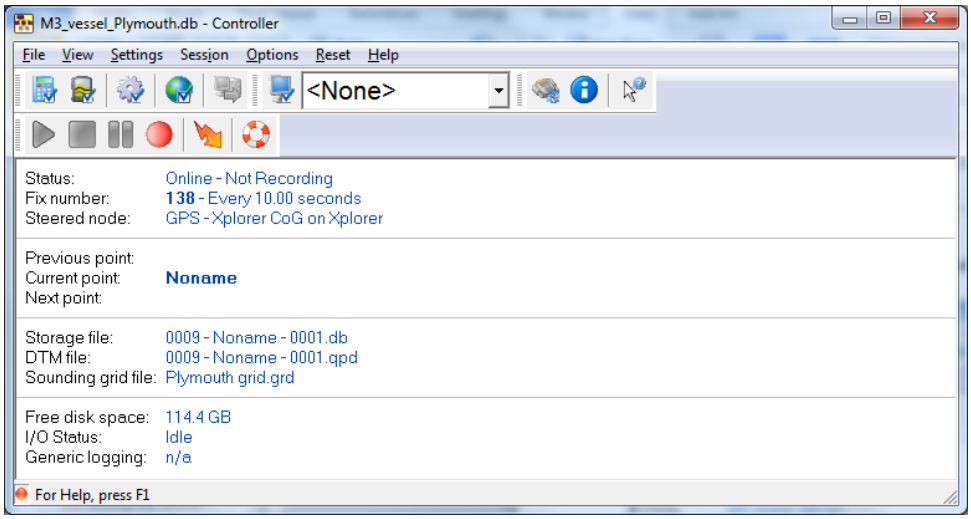
c. Click on the **Export Data** button located in the top-right menu of the sonar screen.

Starting up the QINSy software

1. Insert the QINSy dongle into a computer USB port.
2. Start the QINSy software:
   a. Double click the QINSy icon on the Windows desktop.
3. Confirm that the correct database file is used:
   a. Select **Setup** button from the QINSy Console, select the correct database file in the **Active Template**, then close the **Template Manager**.
4. Bring QINSy online for data acquisition:
   a. Click the **Online** button from the QINSy console to bring QINSy online for data acquisition.
   b. Check the **QINSy Time Synchronization** window to have **Valid Time Synchronization**.

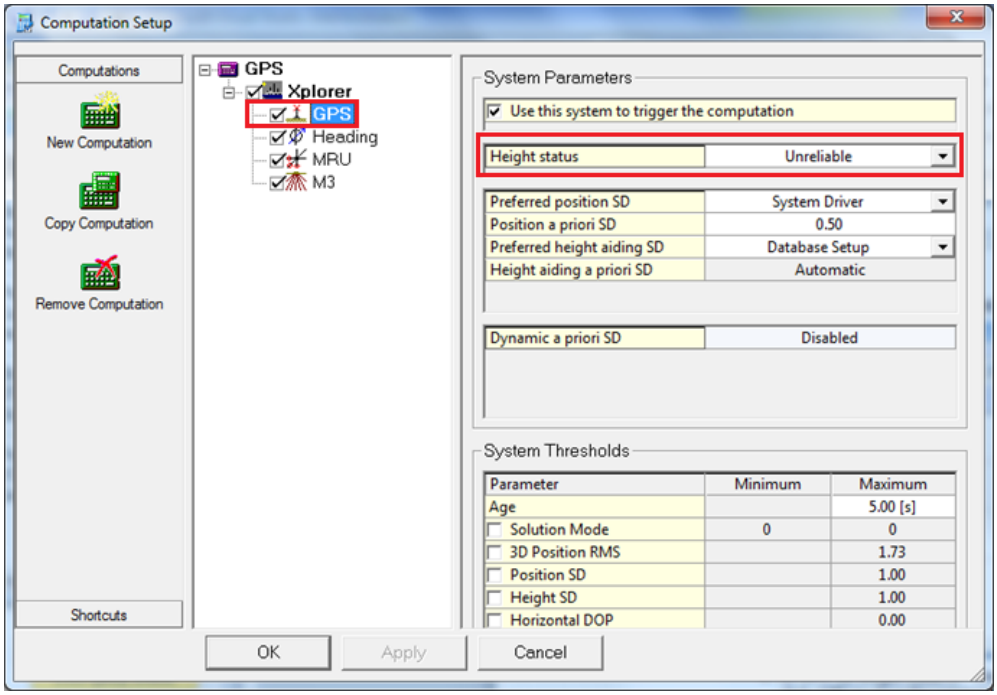


   c. Select **Online** button to start the QINSy controller.



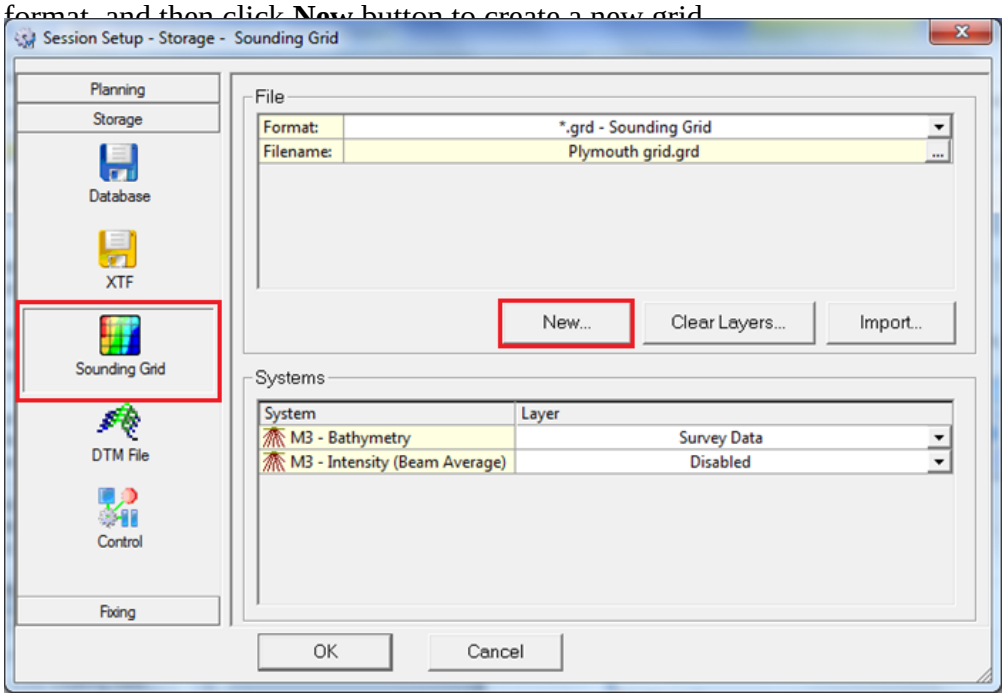
d. From the Controller window, select **Settings->Computation Setup**.

e. Click on **GPS** under the boat name, set **Height status** to **Unreliable** if not using RTK, then click **OK** to close the computation setup window

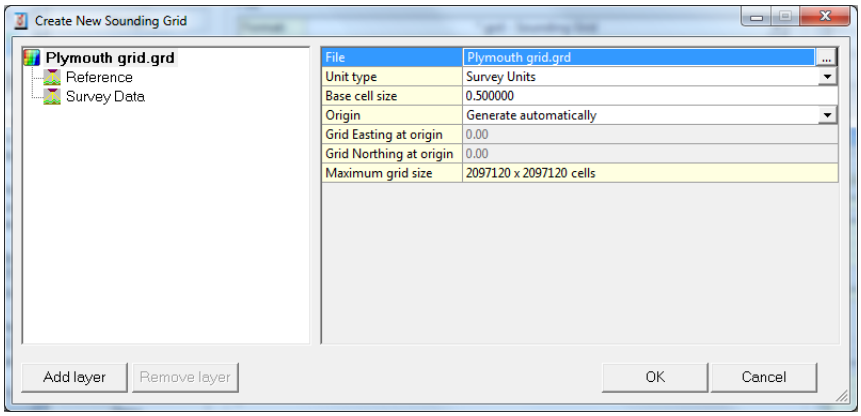


f. From the Controller window, select **Settings -> Session Setup**.

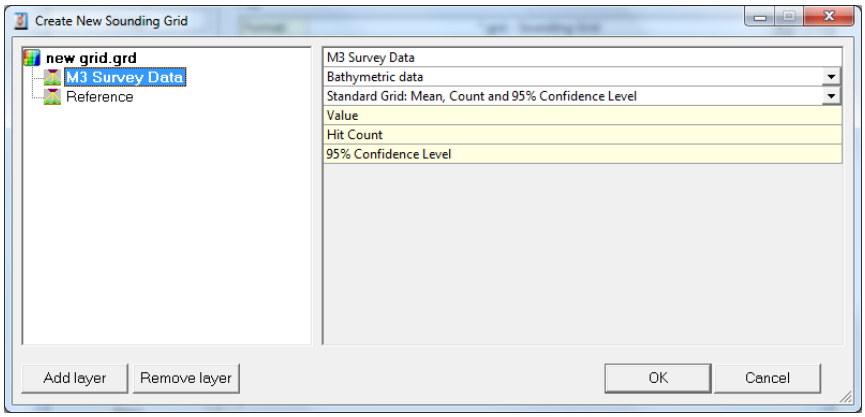
Select **Sounding Grid** from the left panel under **Storage**, select ***.grd-Sounding** format, and then click **New** button to create a new grid.



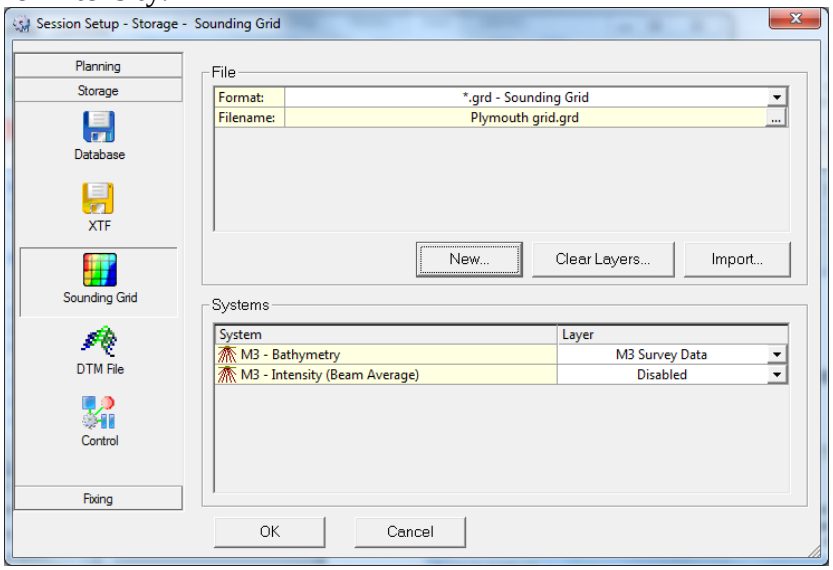
g. Create a new **.grd** file name.



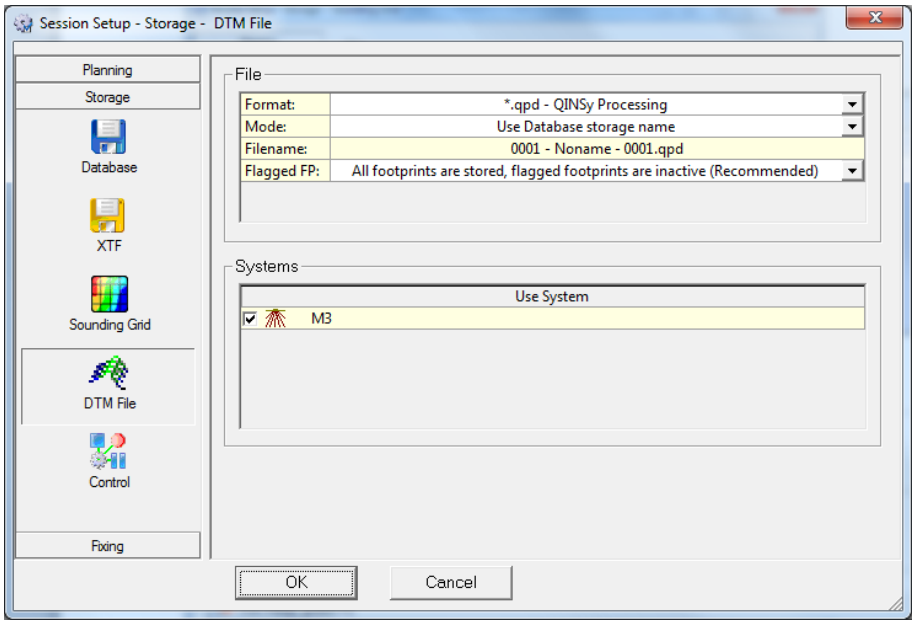
h. Name the **Survey Data** layer to an easy remembered name, such as **M3 Survey Data**. Select **Bathymetric data**, **Standard Grid: Mean, Count and 95% Confidence Level**, then click **OK**.



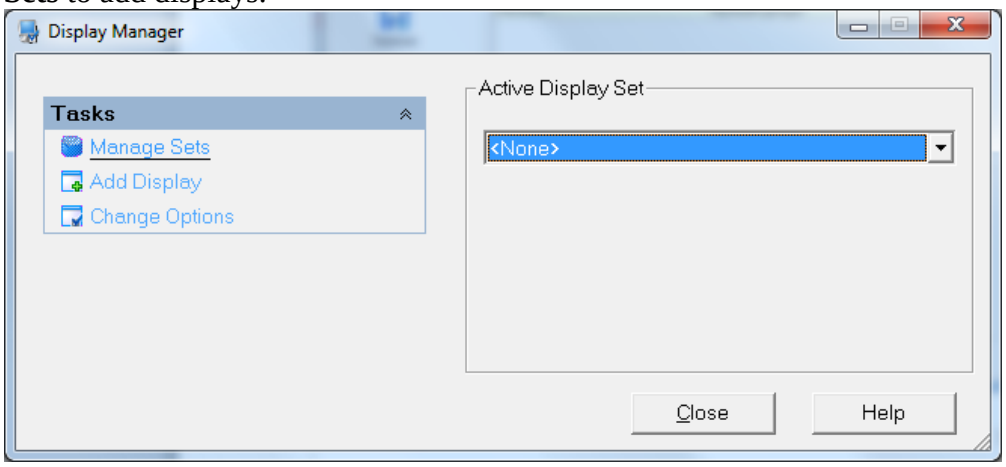
i. Select named layer such as **M3 Survey Data** for Bathymetry, and select **Disabled** for Intensity.



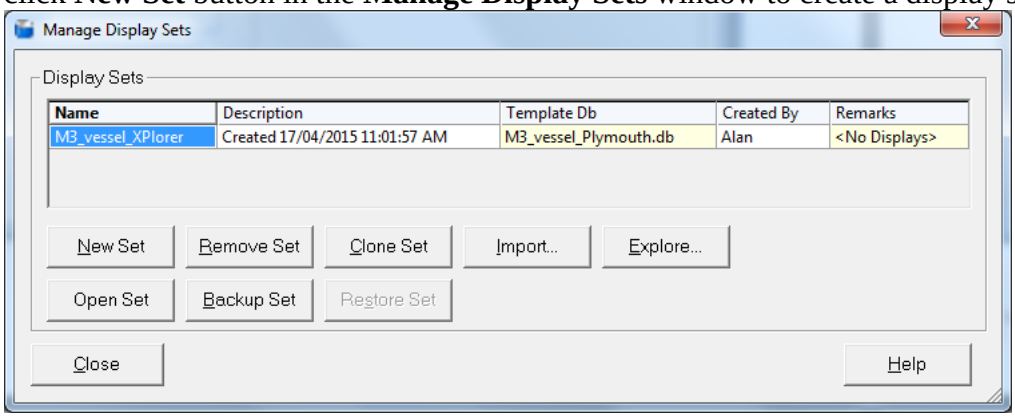
j. Select **DTM File** from the left panel. Configure DTM storage file as **Format: *.qpd – QINSy Processing**.



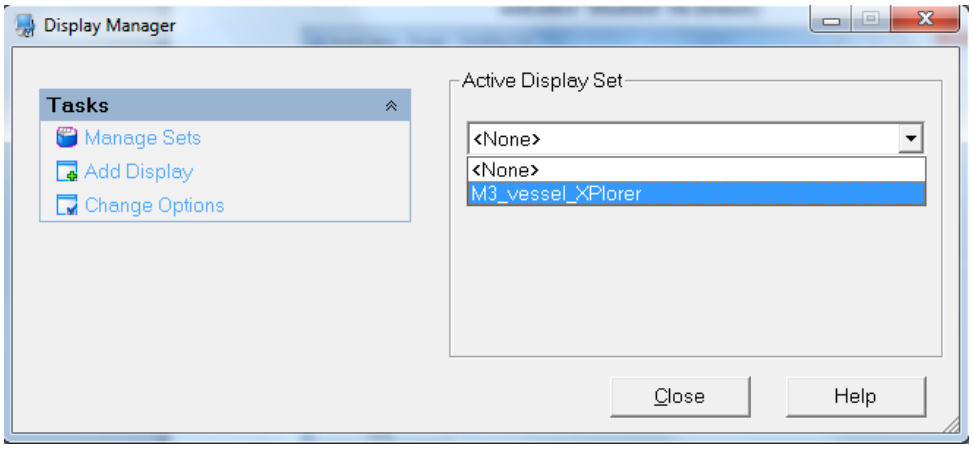
k. From the Controller window, select menu **Options -> Displays** and click **Manage Sets** to add displays.



l. click **New Set** button in the **Manage Display Sets** window to create a display set



m. From the **Active Display Set**, select just created display set, and then click **Add Display.**



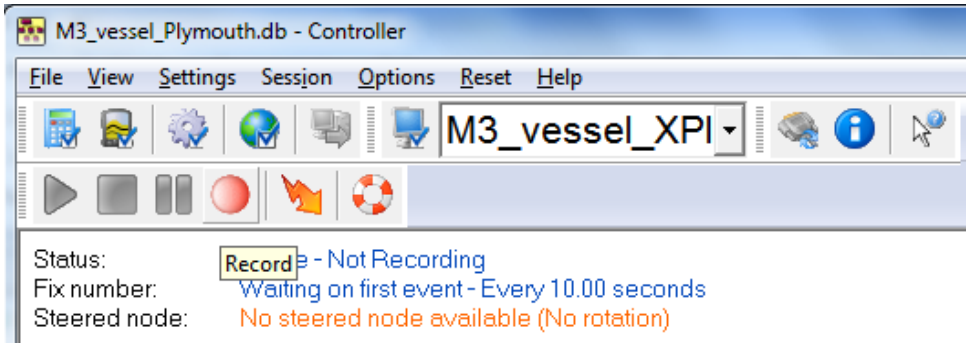
- **Observation Physics Display** is recommended to add to monitor all the sensor input. Any RED entry in the **Observation** display means the data is not receiving properly.

- **Raw Multibeam Display** is recommended to add to monitor the multibeam data.

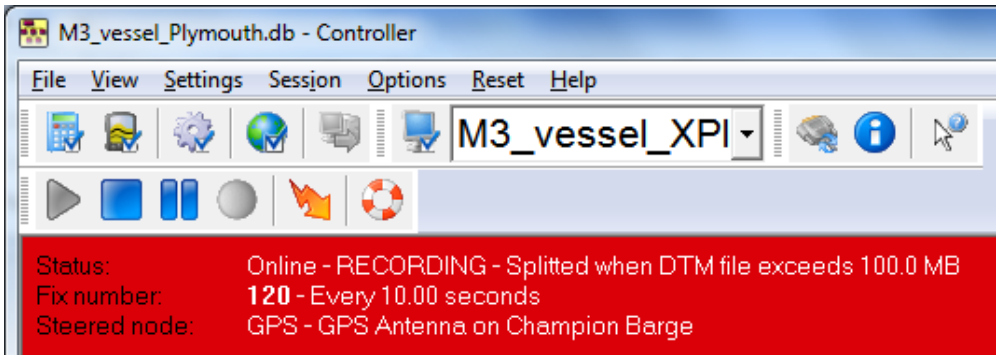
- **Navigation Display** is used to show vessel position and multibeam coverage on the navigation chart.

5. Collect Bathymetry data using QINSy:

   a. From the **Controller** console, click the **Record** button to start the recording.



   b. Click the **Stop** button to stop the recording.

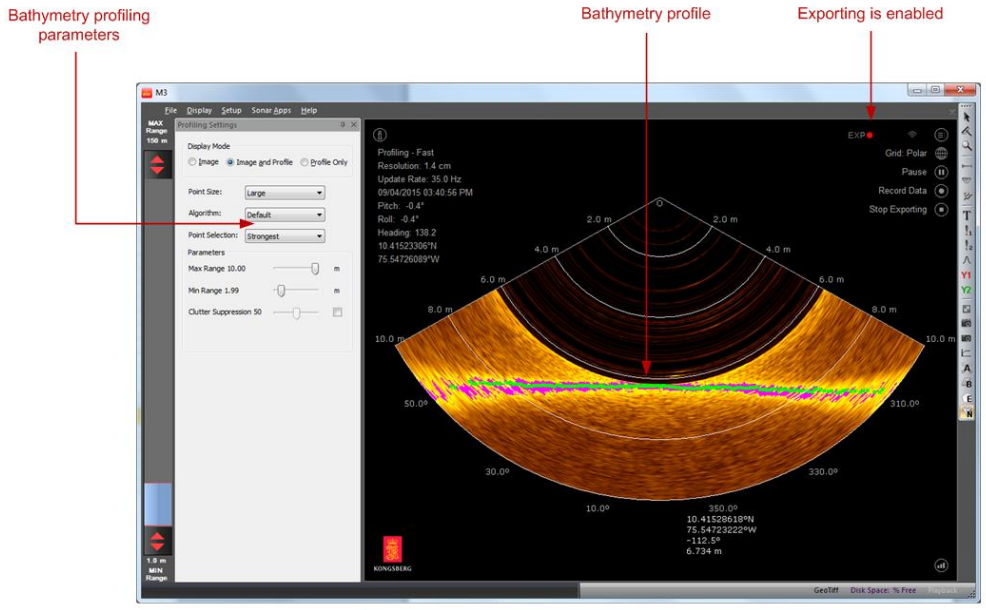


Appendix A: Supplemental Procedures

Topics

- M3 software setup procedures on page 16

6. Enter the UDP port in **Port for .ALL format.** This is the UDP port set in the third-party software to receive the .ALL data from the M3. Set the **Remote IP Address**; this is the IP address of the computer running the third-party software. If the third-party software is running on the same computer as the M3, enter **127.0.0.1**.
7. Close the **Preferences** window.
8. Click the **Export Data** button in the top-right menu to enable UDP .ALL data export.
9. Select **Setup** menu > **Connect** to activate the M3 Sonar Head.
10. The M3 data-acquisition screen should be similar to the screen below:

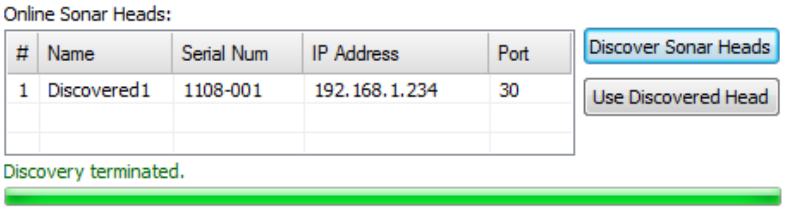


- QINSy software setup procedures on page 20

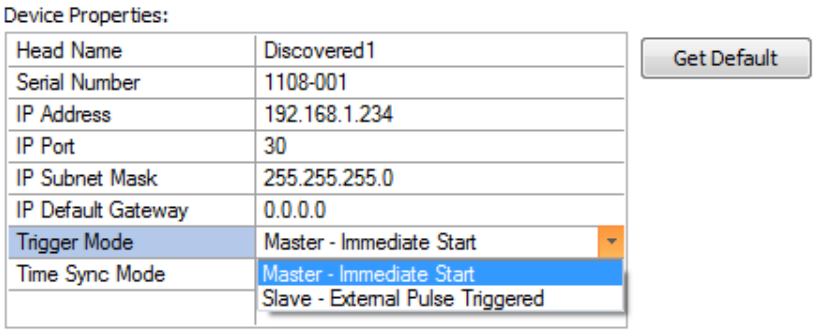
M3 software setup procedures

Configuring the sonar and sensors

1. Run the M3 software.
2. Set up the sonar:
   a. Click **Setup** menu > **System Configuration.**
   b. Select the **Devices** > **Sonar Setup** tab.
   c. Click **Discover Sonar Heads.**
   d. Click **Use Discovered Head** to accept.



   e. Set the Trigger mode to synchronize the M3 with another acoustic device. Set the trigger mode to **Master** to send out a sync pulse so that the other acoustic device can be triggered by the M3 sync pulse. Set the Trigger mode to **Slave** to be triggered by the sync pulse from the other device. For M3 BATHY system, the default is set to **Master**.



3. Set up the mounting offset:
   a. Click **Setup** menu > **System Configuration.**

b. Select the **Deployment** > **Mounting Offsets** tab.

c. If the M3 is installed as connector towards bow, select **Downward** from the **Orientation**. If the M3 is installed as connector towards stern, select **Downward Inverted** from the **Orientation**. If the M3 is installed as sideways looking to scan vertical structures, enter the **Roll** angle.

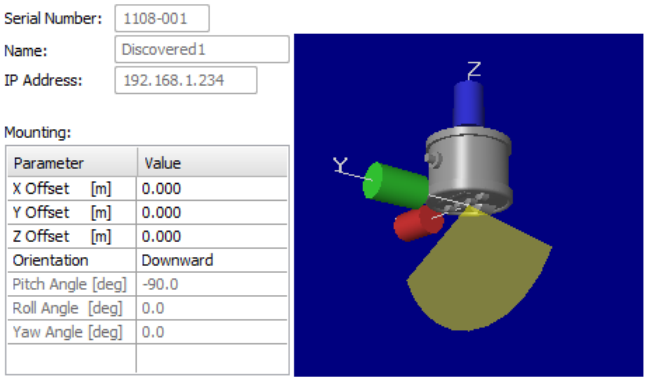


Figure 2. ***Downward*** *Mounting*

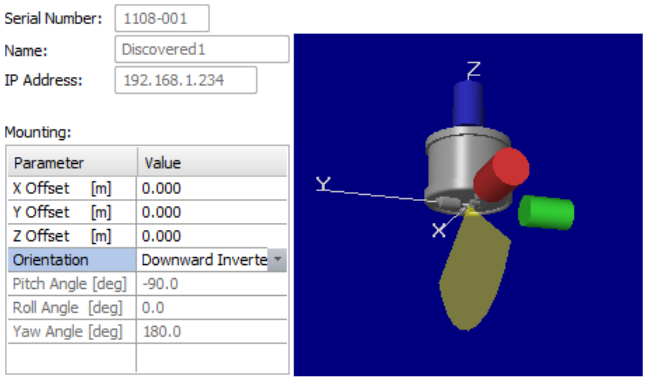


Figure 3. ***Downward-Inverted*** *Mounting*

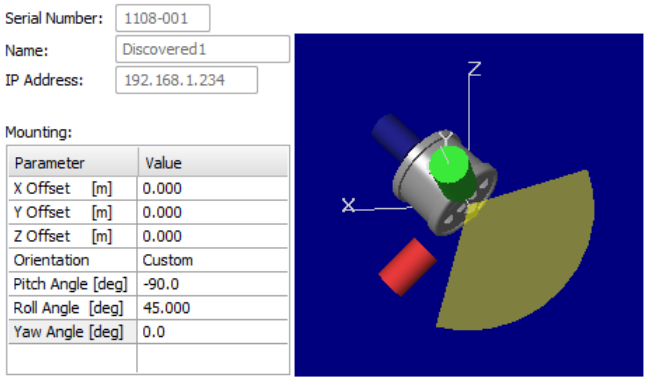


Figure 4. ***Downward*** *Mounting with 45-degree roll and two poles*

Note! *The M3 BATHY default mounting configuration is **Downward**.*

4. Save the deployment configuration:
   a. Click the **Master Reference** tab.
   b. Click the **Save As** button.
   c. Enter a new configuration name and click **OK**. (e.g. Downlooking Mode)
   d. The configuration file is saved under the M3 software installation folder: ..\KML\M3_Vxxxx\bin\Settings.

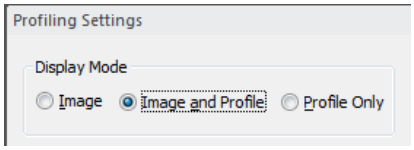
Note! *Changing values in the Master Reference or Mounting Offsets tabs changes the values for the current configuration. If you want to create a new configuration, first click **Save As** or **New**, then modify the parameters.*

Setting the sound speed

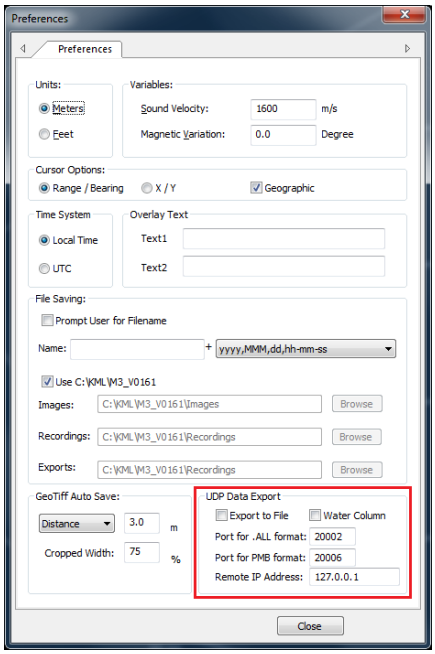
5. Measure the sound velocity at the Sonar Head or calculate the harmonic mean from the sound velocity profile.
6. Run the M3 Software.
7. Click **Setup** menu > **Preferences**.
8. Enter the Variable: **Sound Velocity**.
9. Click **Close**.

M3 Sonar data recording and exporting

10. Display **Profiling Settings** by selecting **Profiling Settings** from the **Display** menu.
11. Select **Profiling** or **Profiling – Fast** application mode from the **Sonar Apps** menu. **Profiling – Fast** mode provides a much higher ping rate but is not recommend to be used for a short range of less than 5 meters.
12. Choose **Image and Profile** or **Profile Only** to enable profile points on the sonar image window.



13. Select **File** menu > **Exporting Format** > **Profile Point (.all)**.
14. Select **Setup** menu > **Preferences** to configure the UDP port and IP address.



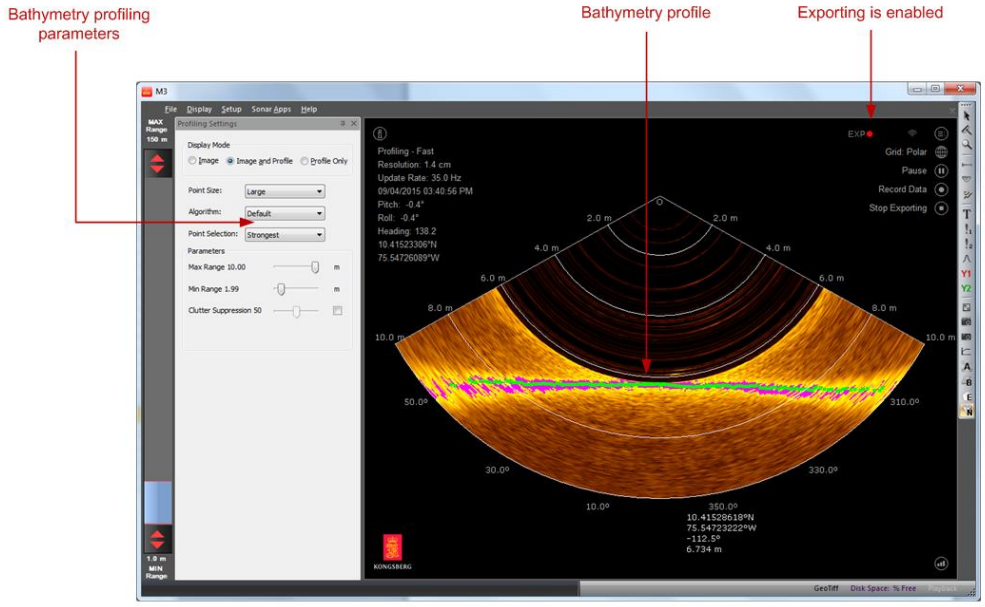
15. Enter the UDP port in **Port for .ALL format.** This is the UDP port set in the third-party software to receive the .ALL data from the M3. Set the **Remote IP Address**; this is the IP address of the computer running the third-party software. If the third-party software is running on the same computer as the M3, enter **127.0.0.1**.

16. Close the **Preferences** window.

17. Click the **Export Data** button in the top-right menu to enable UDP .ALL data export.

18. Select **Setup** menu > **Connect** to activate the M3 Sonar Head.

19. The M3 data-acquisition screen should be similar to the screen below:

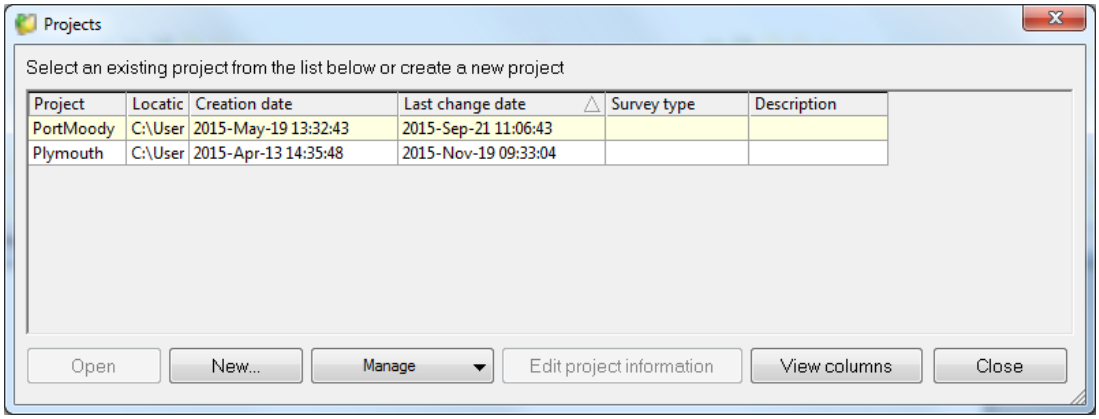


QINSy software setup procedures

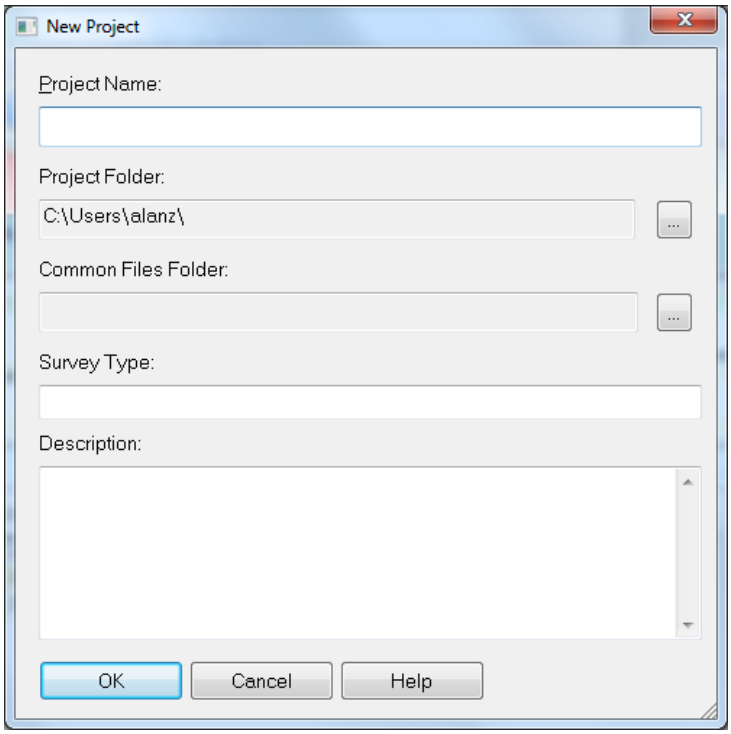
The following configuration steps are required to interface QINSy for data acquisition. This document uses QINSy software version 8.10 (Build 2015.06.14.1).

Creating a project

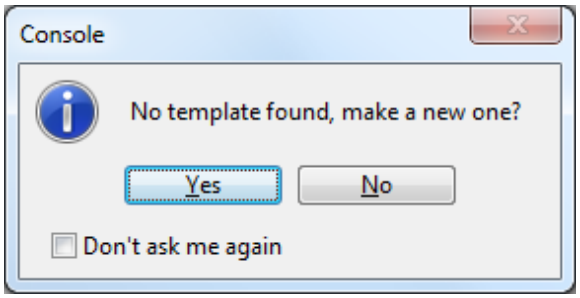
1. Run QINSy software, select menu **File -> Manage Projects** to create a new project.
   a. Click **New** button to create a new project.



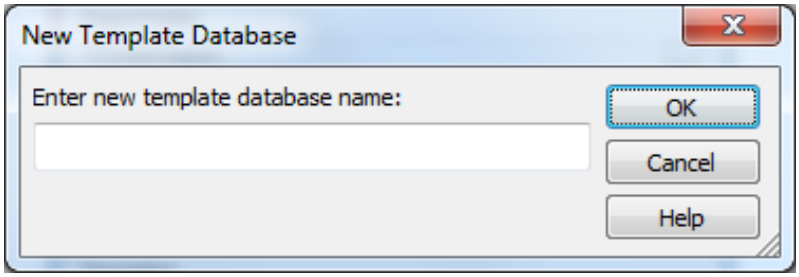
   b. Provide a project name, select the file folder, add description, and click **OK** to create the project.



c. If prompt **No template found, make a new one?**, click **Yes**.

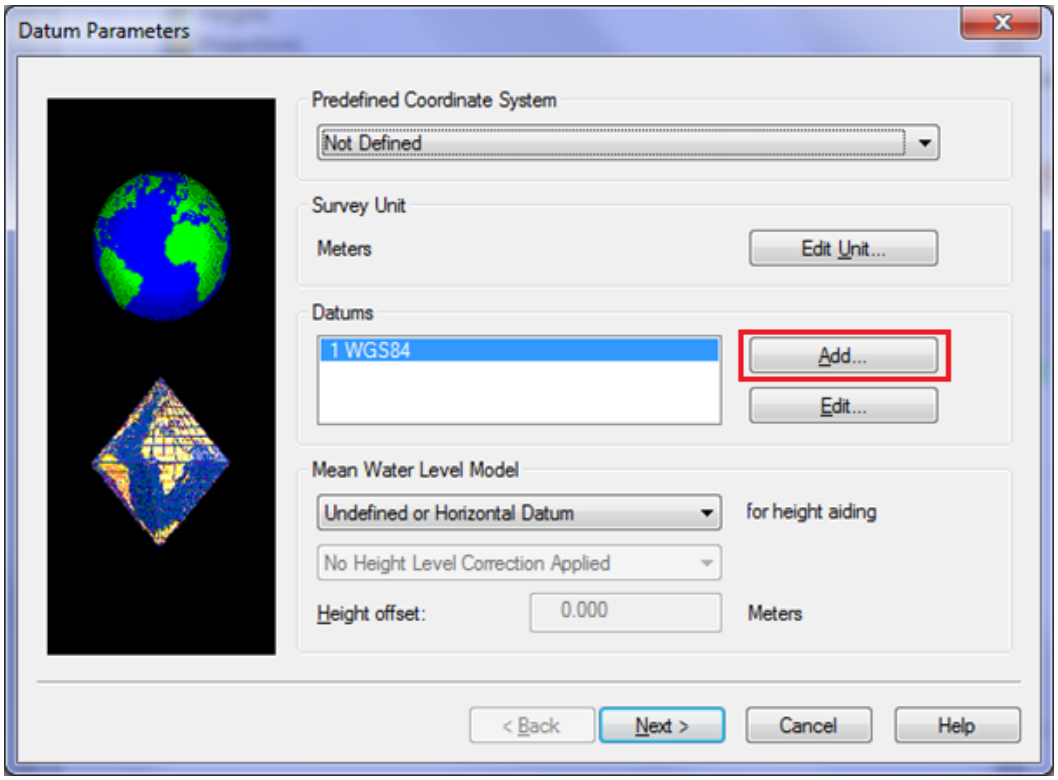


d. Provide a new template database name and click **OK**.

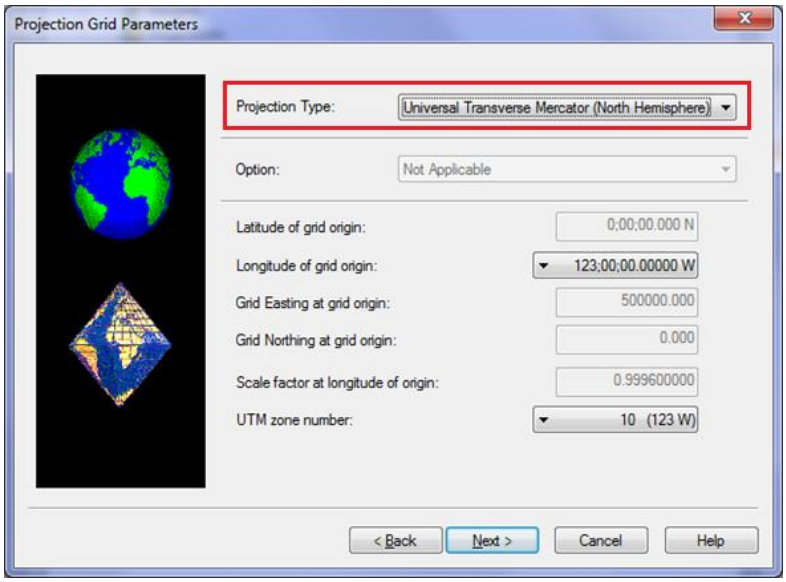


2. Configure Geodetic parameters.

a. From the **Datum Parameters** page, click **Add** button to add a datum, such as **WGS84**, and then click **Next**.



b. Select a **Project Type** based on the survey requirement, such as UTM and zones.

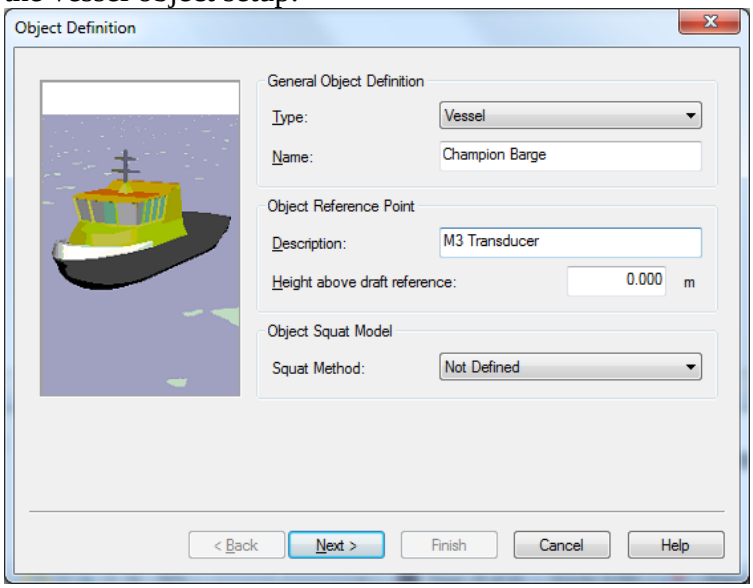


c. Click **Finish** to complete the Geodetic setup.

3. Setup vessel object.

a. Enter a vessel name, give a description to the **Object Reference Point**, such as **M3 Transducer**, and then click **Next.**

b. Leave the rest of the pages as default, and click **Finish** at the last page to complete the vessel object setup.



4. Add Position Navigation System

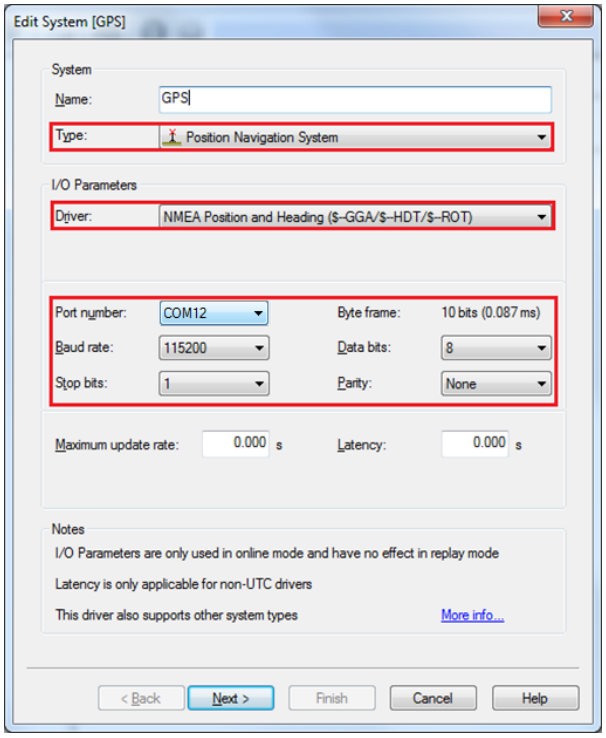
a. From the **New System** window, give a name such as **GPS**.

b. Select type **Position Navigation System**.

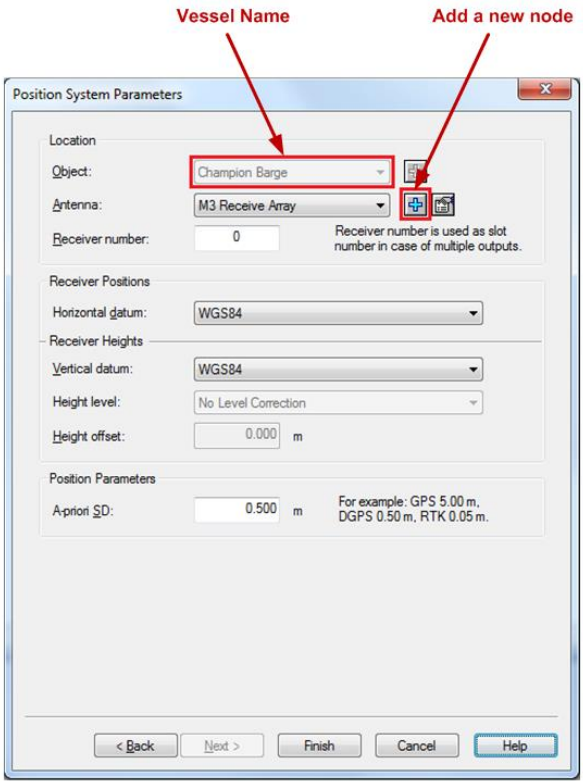
c. Select driver **NMEA Position and Heading (GGA/HDT)**

d. For M3 BATHY system, set the S**peed** to 115200, and **Port** to COM12.

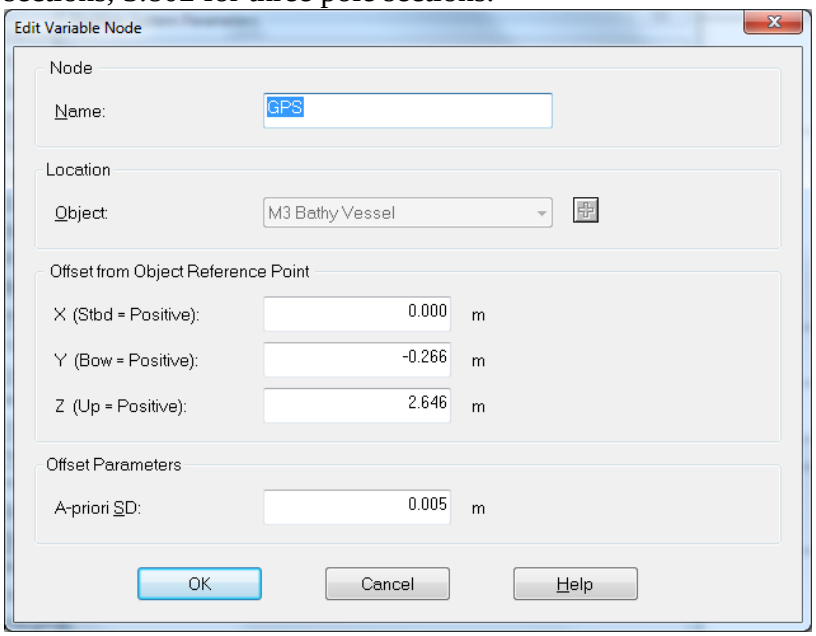
e. Click **Next**.



f. In **Position System Parameters** page, select previously defined vessel as **Object** and click the  button to add a new node.



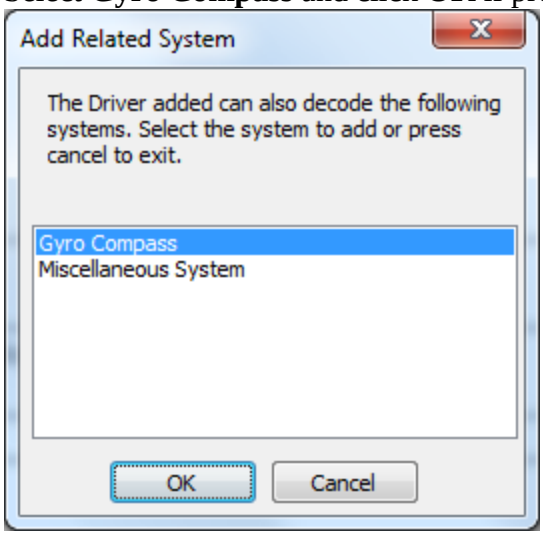
g. Enter the offset from the M3 BATHY GPS primary antenna to the reference point and then click **OK**. For M3 BATHY system, if using M3 transducer as the reference point, the offsets for the GPS is X = 0, Y = -0.266m, the Z = 2.646 for two pole sections, 3.802 for three pole sections.



h. Click **Finish** to complete the **Position Navigation System** setup.

5. Add **Gyro Compass**

a. Select **Gyro Compass** and click **OK** if prompt to **Add Related System**

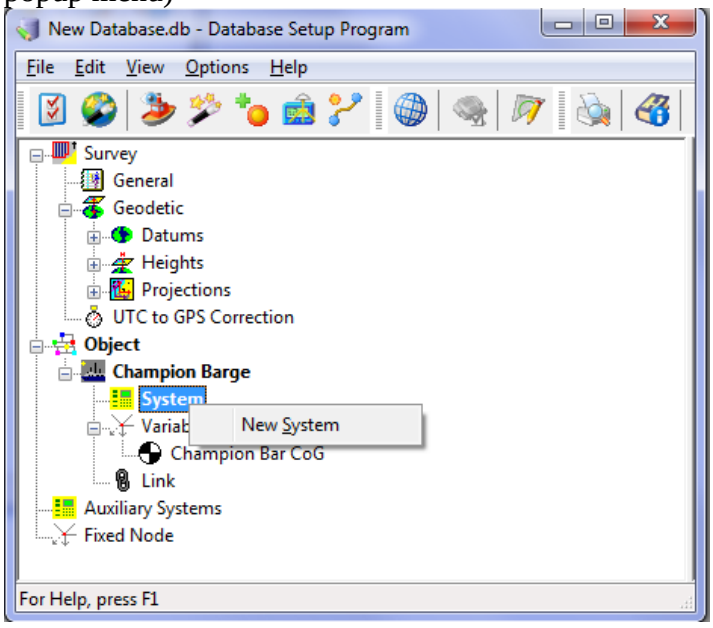


b. For M3 BATHY system, the heading and position are both coming from the same source. Use the same driver and port settings as GPS for Gyro Compass and then click **Next**.

c. Select the vessel name as **Location** and click **Finish** to complete the **Gyro Compass** setup.

6. Add M3 Multibeam sonar

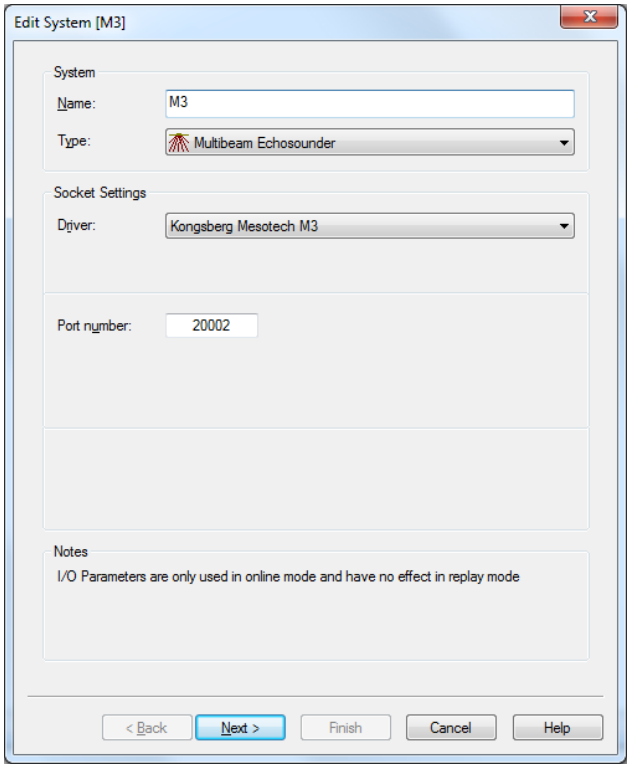
a. Right-click on **System**, select **New System**. (can also add other sensors through this popup menu)



b. Select type **Multibeam Echosounder.**

c. Select driver **Kongsberg Mesotech M3**.

d. Set the **Port Number** to match the M3 software .ALL UDP exporting port number, such as 20002. Click **Next**.



e. Enter Roll, Pitch, and Heading offsets according to the M3 mounting.

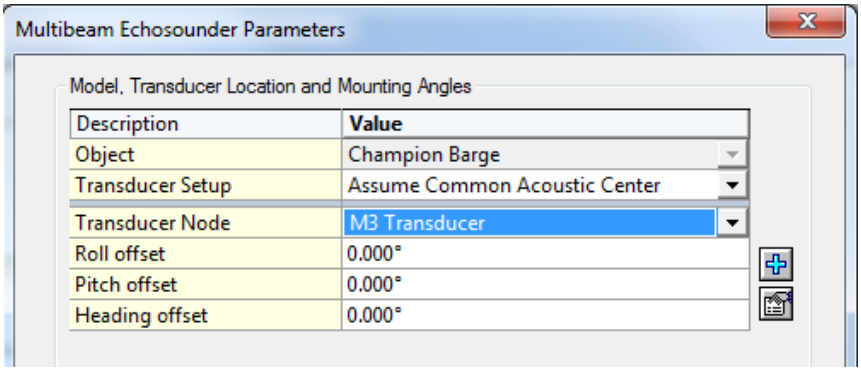


Figure 5. ***Downward*** *Mounting*

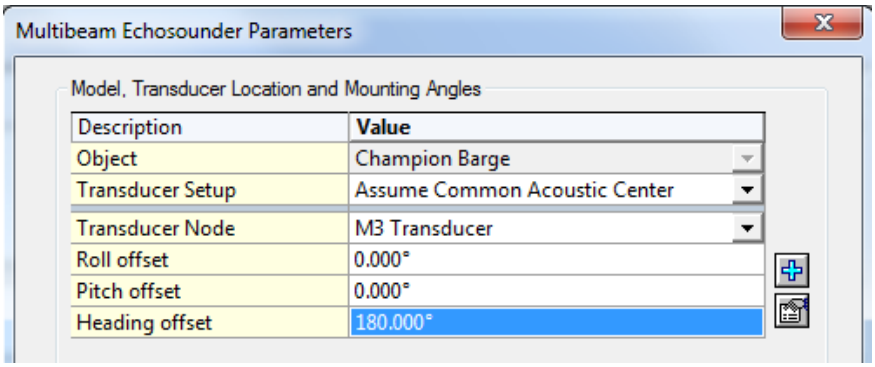


Figure 6. ***Downward-Inverted*** *Mounting*

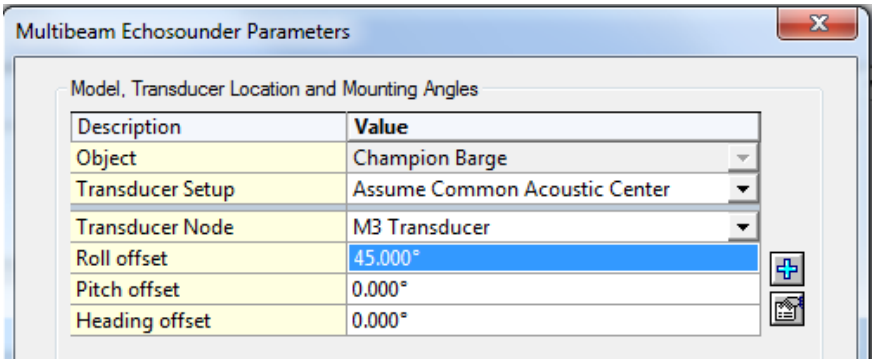


Figure 7. ***Downward*** *Mounting with 45 degree roll*

f. Leave the rest pages as default, and click **Finish** in the last page.

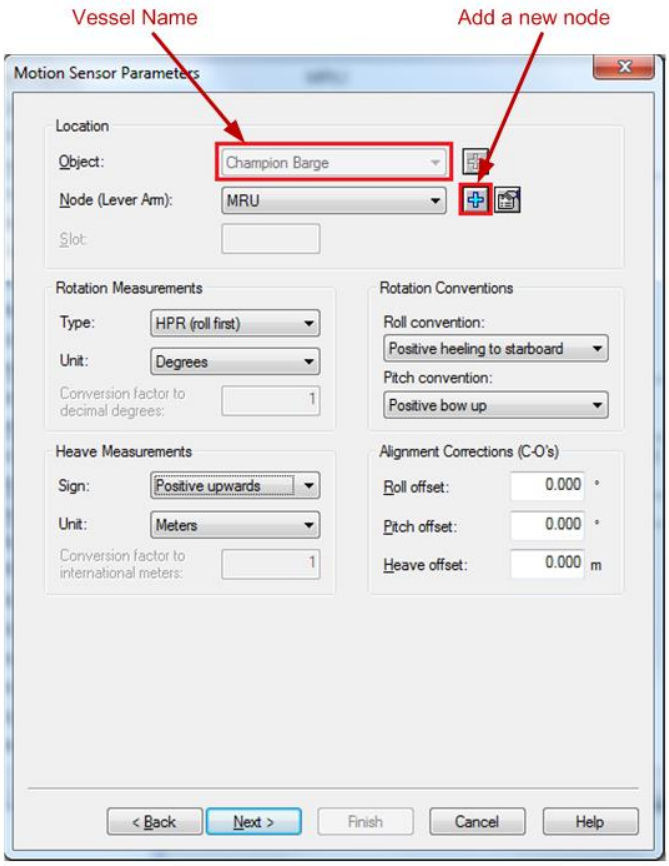
7. Add **Pitch Roll Heave Sensor**

a. Right-click on **System**, select **New System**. (can also add other sensors through this popup menu)

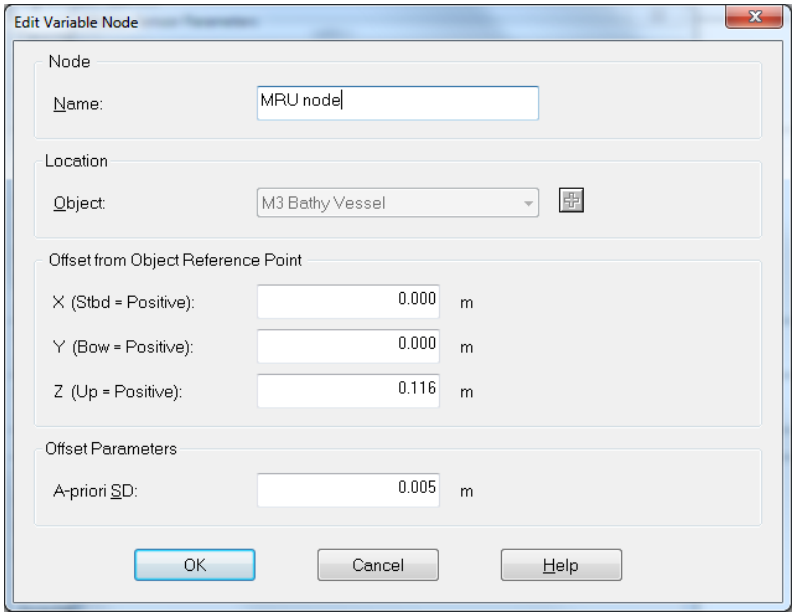
b. Select driver **TSS DMS R-P-H**

c. Select port settings, choose **Port** COM10 and 115200 baud rate and then click **Next**.

d. Click the  button to add a new node.



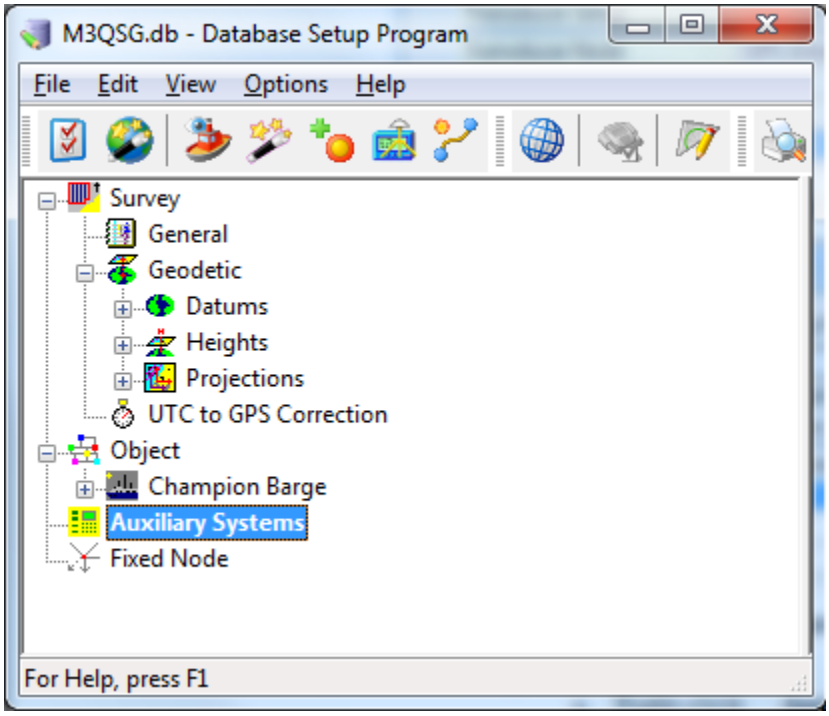
e. For M3 BATHY system, if using M3 transducer as reference point, the X offset is 0, the Y offset is 0, the Z offset for the Kongsberg Seatex MRU is +0.116m.



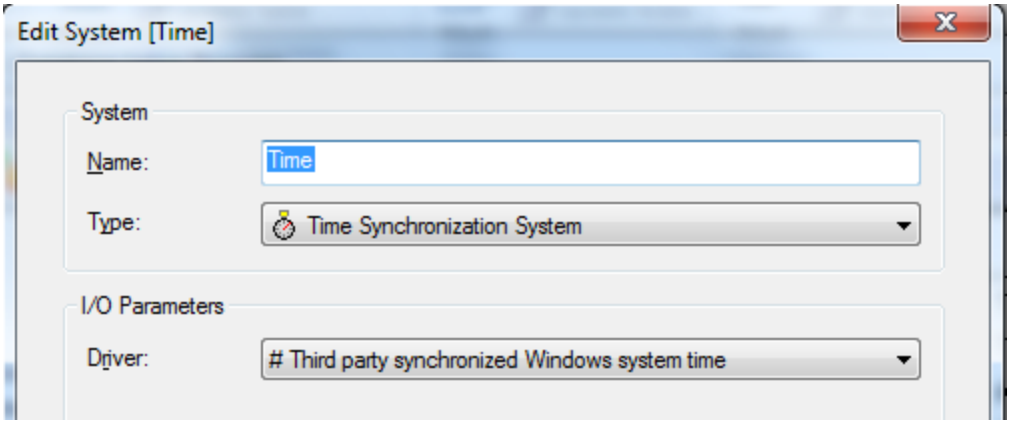
f. Leave the rest pages as default, and click **Finish** in the last page.

8. Add **Time Synchronization System**:

   a. Right-click **Auxiliary Systems** to add **Time Synchronization System**.

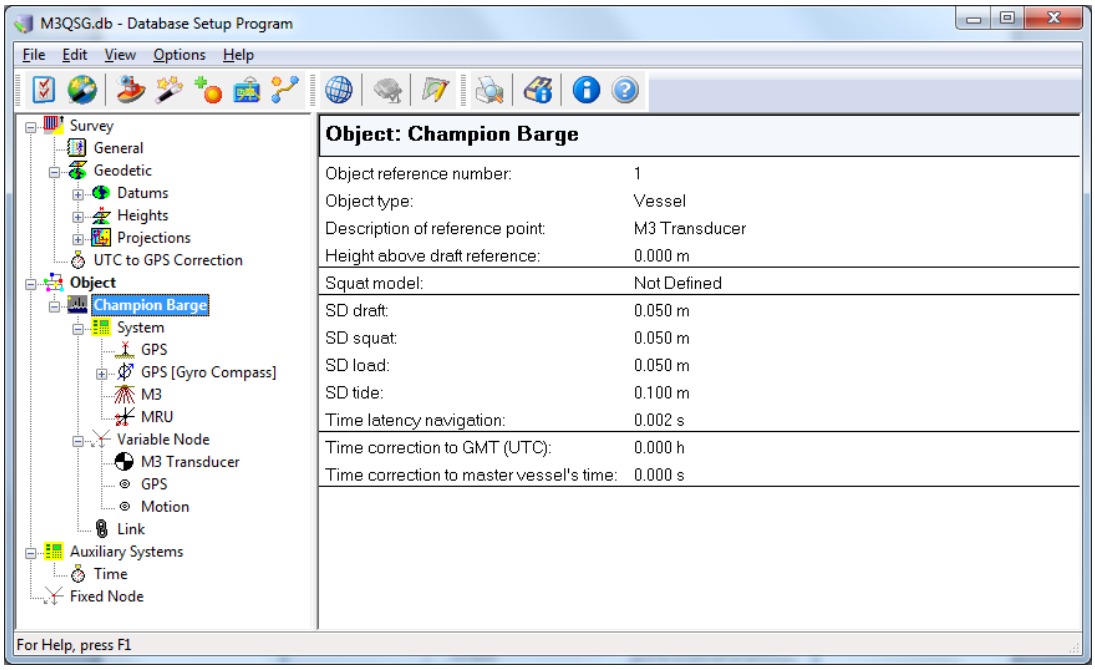


   b. Select a time source, if not sure what time source to use, select **Third party synchronized Windows system time**.



   c. Leave the rest pages as default, and click **Finish** in the last page.

   d. The finished Database Setup should be similar to screenshot below.



Importing ENC chart to QINSy

1. Click ENC Administra... button in **QINSy Console** to open **ENC Administrator** to import ENC chart to the system for navigation.
   a. Choose one of the chart types to import, such as S57, and then click **Next**.
   b. Browse to the folder contains the chart files, then click **Next**
   c. Click **Start Import process** to import chart, then click **Next** to see the importing result.
   d. Click **Finish** to complete importing chart.

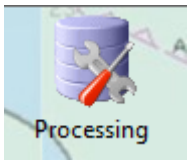
   e. From the **Line Editor**, click **Add Line** to define survey lines:

   - Click **Add Point**, **Insert Point**, and **Offset** to add lines by entering coordinates.

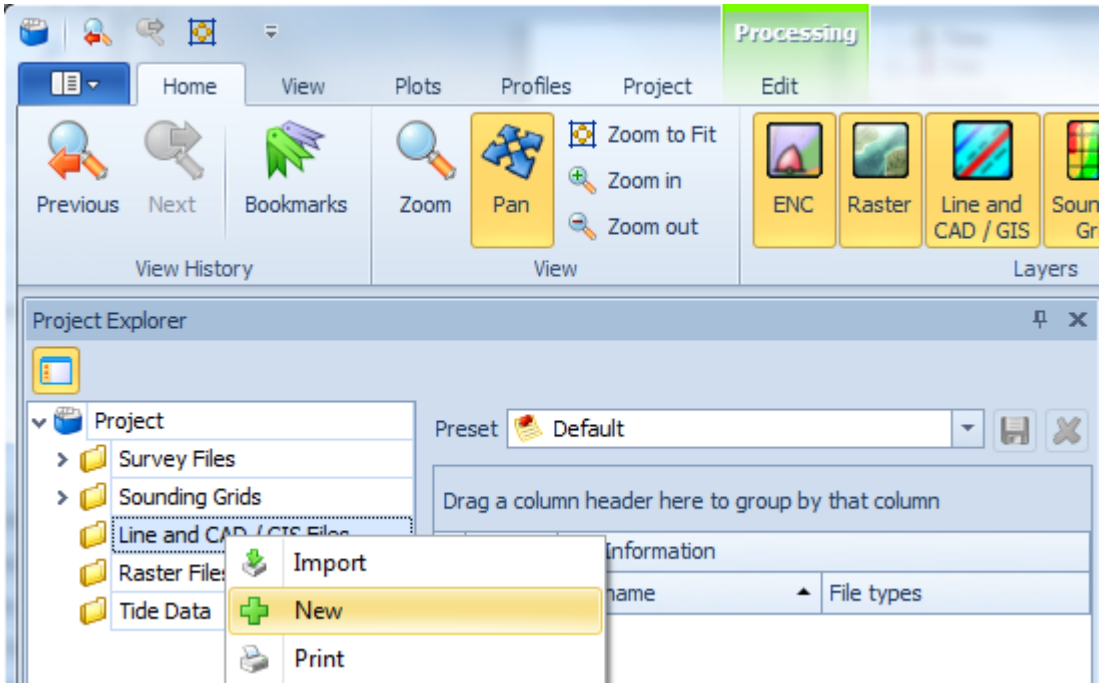
   - Click **Cursor** to draw survey lines.

   - Click **Offsets** to add parallel lines.

Planning survey lines

1. Click 

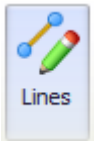
button in **QINSy Console** to open **Processing Manager** to plan survey lines.
2. Right-click **Line and CAD/GIS Files**, select **New** to create a new survey line file.



3. Click the 

button to create a new survey line. Click on the chart to start the line, click again to finish the line.
4. Click the 

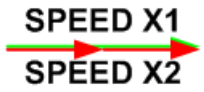
button to add parallel lines and click the 

button to add cross lines.
5. Click 

button to edit or remove survey lines.

Performing patch-test

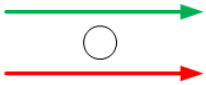
Once the hardware tests are complete, perform a calibration test to measure the Latency, Pitch, Roll and Yaw. Set up the patch-test survey lines before leaving the dock to save time by using the nautical chart to choose appropriate areas for each test.



1. Record Latency calibration data:
   - **a.** Select one survey line with a feature like a wreck, rock outcrop, or slope.
   - **b.** Run the survey line in the same direction at one speed.
   - **c.** Run the same survey line in the same direction at twice the speed of the first run.

2. Record Roll calibration data:
   - **a.** Select one survey line on a flat sea floor with a depth of 30m or deepest available area.
   - **b.** Run the survey line at the same speed in opposite directions.

3. Record Pitch calibration data:
   - **a.** Select one line on sloped seafloor.
   - **b.** Run the line at the same speed in the opposite direction.



4. Record Yaw calibration data:
   - **a.** Select two lines offset by half the swath width. The overlap of the two runs should cover an object such as a wreck, rock; outcrop, pipeline, or trench line.
   - **b.** Run both lines in same directions and at the same survey speed.

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