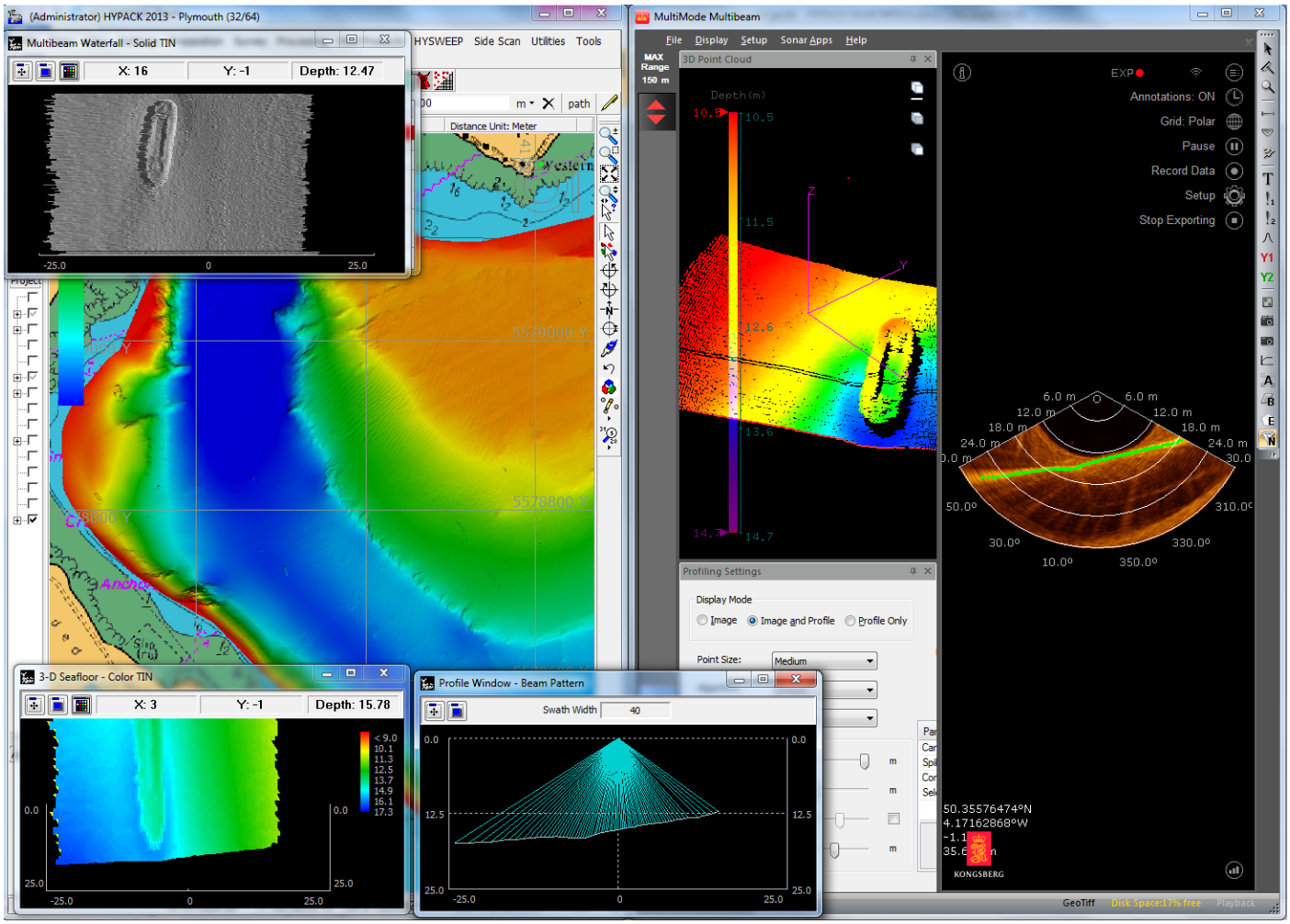
Quick start guide

KONGSBERG

M3 BATHY
Multibeam Echo Sounder: Using Hypack



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M3 BATHY
Quick start guide:
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Revision status

Document no: Document Number / Revision		
1.3	28.OCT.2015	Updated the offset description in M3 and Hypack software. Updated the procedures through out the document.
1.4P	11.NOV.2015	Updated the procedure to use “Raw” data in Hypack
1.4P	25.NOV.2015	Fixed issue in ticket DTW-8. Also reviewed all changes from version 1.3 to 1.4.
1.4	17 FEB.2016	Added extra step to *Starting up the Hypack Software*.
1.5	10 JUNE.2016	Corrected some Hypack parameters in *Configuring Hypack Hardware settings*.

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Disclaimer

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

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**

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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 Hypack 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 using Hypack 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 Hypack® license is supplied as part of the standard M3 BATHY system. Updates can be obtained directly from Hypack®. Annual software maintenance fees apply to the software package for updates and support.

Software version

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

- M3 Software v1.62
- Hypack® 2016

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- M3 Sonar®
- Hypack®

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 Hypack software. Refer to the M3 user manual and Hypack user manual for detailed information.

Topics

- *System description* on page 5
- *System diagram* on page 5
- *Support information* on page 6

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 Hypack software.

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

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

System diagram

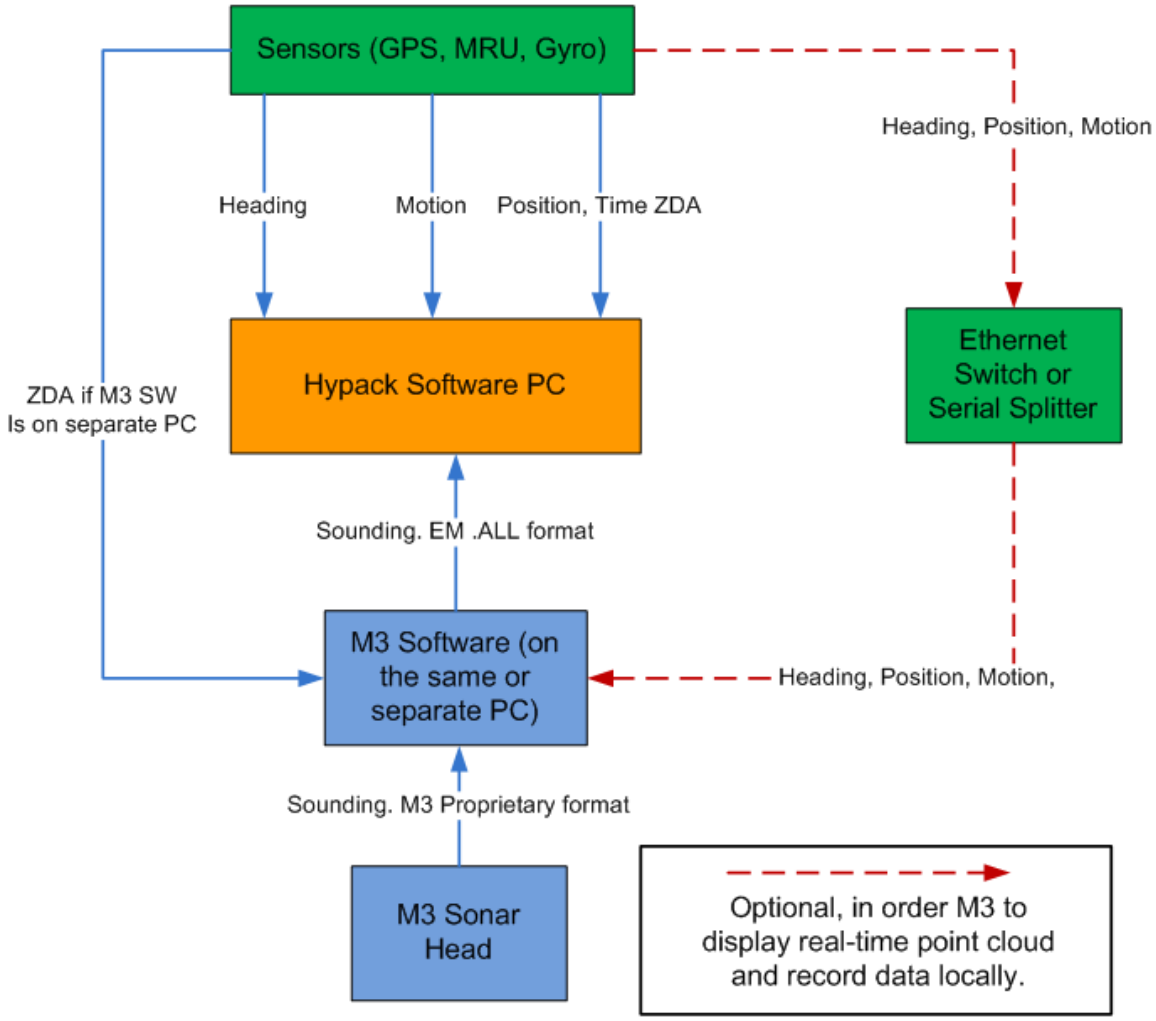

Figure 1. System Diagram

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

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Getting started

Topics

- *Powering on the system* on page 7
- *Powering off the system* on page 8
- *Starting up the M3 software* on page 8
- *Starting up the Hypack software* on page 10

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.*

---

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

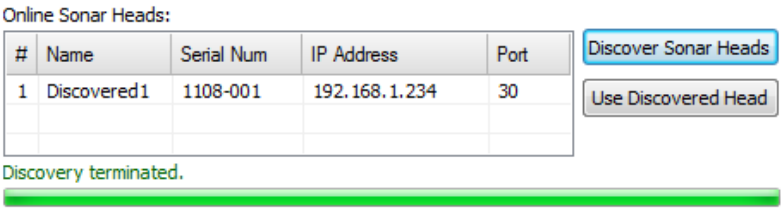
Note! *If the Surface Interface Unit (SIU) is powered on before the processor laptop, the SIU will start sending GPS strings to Windows. There is a known issue with Windows where it may detect the GPS string as a serial mouse and the mouse cursor will jump around. To fix this, turn off the SIU or disconnect 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, then close the Hypack and M3 Software.
   b. Shut down Windows.

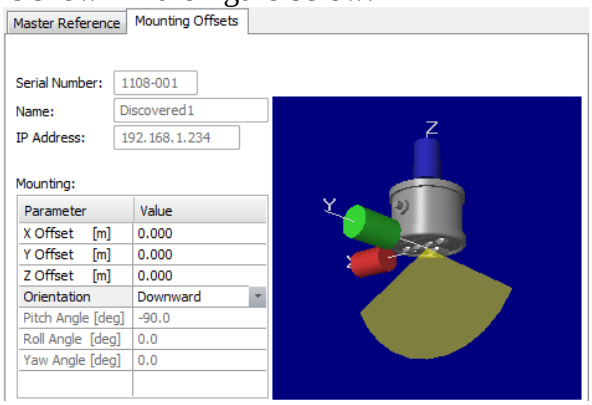
Starting up the M3 software

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 13. Default configuration for M3 BATHY – Downlooking is shown in the figure below.

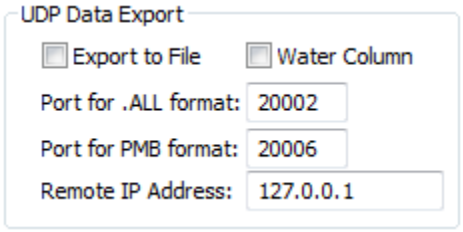


c. Close the **System Configuration** window.

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 16. 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:

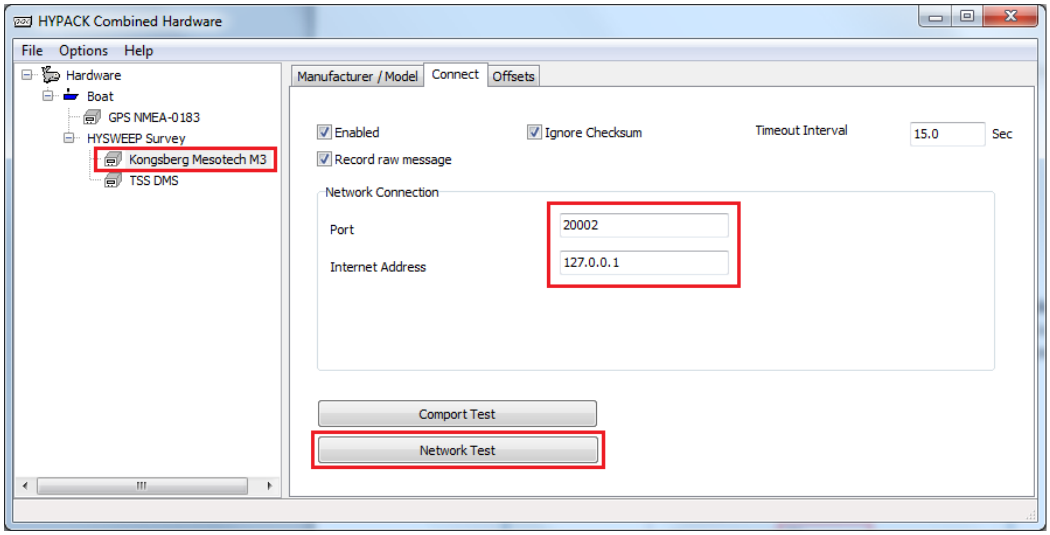
a. Select **Setup** menu > **Connect** to activate the M3 Sonar Head.

b. Confirm that the sonar image updates.

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

Starting up the Hypack software

1. Insert the Hypack dongle into a computer USB port.
2. Start the Hypack software:
   a. Double click the Hypack 2016 icon on the Windows desktop.
3. Confirm that data is being received from the Hypack software:
   a. Select **Preparation** menu **> Hardware Setup**, then click on the **Kongsberg Mesotech M3** driver entry under **HYSWEEP Survey**. If the hardware is not configured, see the section *Configuring Hypack Hardware settings* on page 19 to configure the HYSWEEP Hardware.
   b. Select the **Connect** tab and click the **Network Test** button.

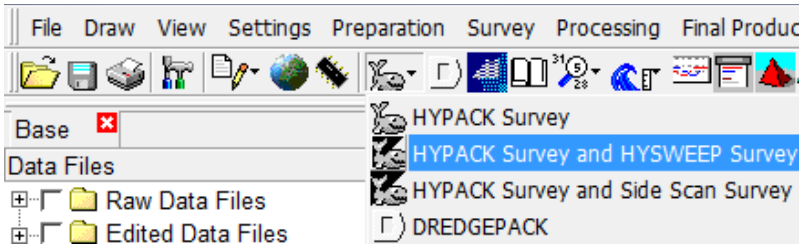


   c. Click the **UDP Connect** button on the **Network Connection** window to confirm the received UDP data from the M3 software.
   d. Close the **Network Connection** window.
4. Confirm that data is being received from the GPS:
   a. Click on the **GPS NMEA-0183** entry under **Boat** (on the left side of the **HYPACK Combined Hardware** window). If the hardware is not configured, see the section *Configuring Hypack Hardware settings* on page 19.
   b. Select the **Survey Connect** tab, then click the **Test Device** button.
   c. Confirm that GPS data is being received in the test window.
5. Check that the following survey requirements have been met (for more details, refer to the Appendix):
   a. Geodesy parameters have been entered.
   b. A background chart has been added.

c. Survey lines and a matrix have been plotted.

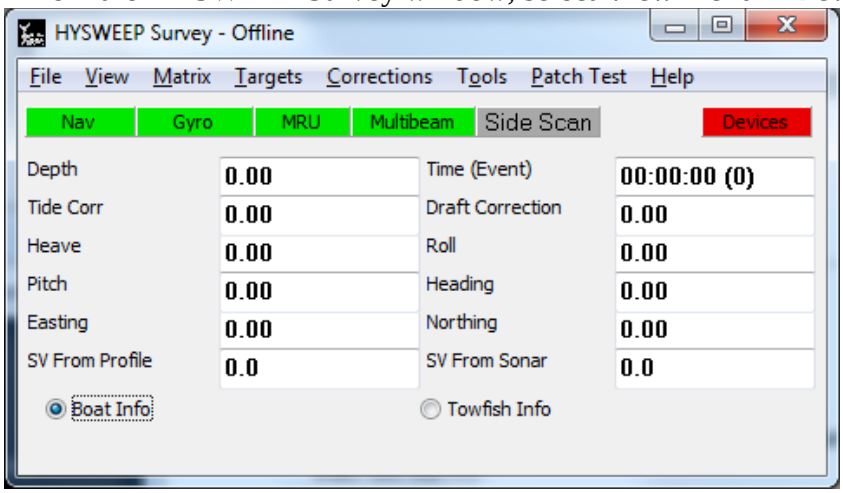
6. Collect Bathymetry data using Hypack:

a. Click the whale icon, then click **HYPACK Survey and HYSWEEP Survey** to start the survey.

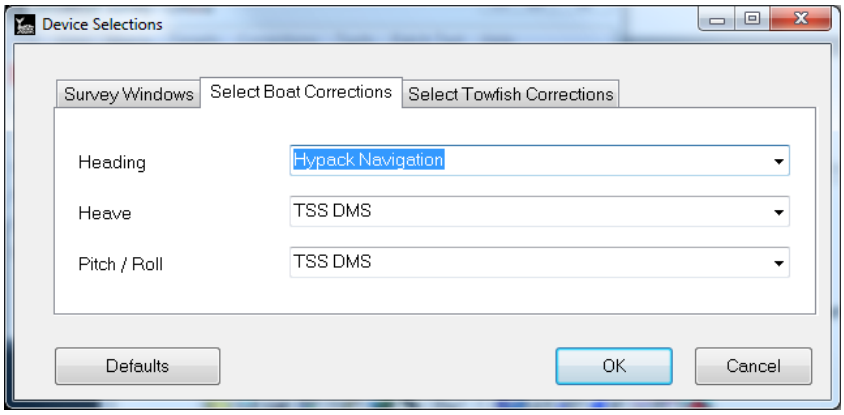


b. If this is your first time starting a survey, set the source for Heave and Pitch/Roll data to the Motion Reference Unit. You only need to do this procedure once:

- From the HYSWEEP Survey window, select **View menu > Device Selection.**

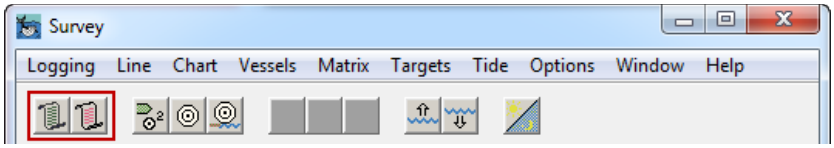


- From the **Device Selections** page, click the **Select Boat Corrections** tab.
- Select **Hypack Navigation** for the Heading, select **TSS DMS** for Heave, and select **TSS DMS** for Pitch/Roll
- Click **OK**.



c. Survey line recordings are displayed in the Data Display window. The file names should be written in a notebook during the survey for later reference.

d. Start and end logging using the buttons in the Hypack Survey control window shown below:



Note! *You can also use <CTRL + S> to start logging and <CTRL + E> to end logging.*

Note! *See Hypack user documentation and training material for how to perform a patch test and how to collect survey data.*

Appendix A: Supplemental Procedures

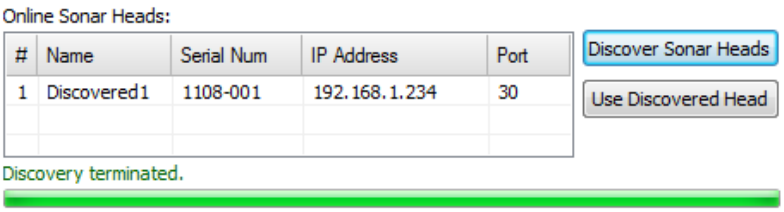
Topics

- M3 software setup procedures on page 13
- Hypack software setup procedures on page 17

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**.

Device Properties:

Head Name	Discovered1
Serial Number	1108-001
IP Address	192.168.1.234
IP Port	30
IP Subnet Mask	255.255.255.0
IP Default Gateway	0.0.0.0
Trigger Mode	Master - Immediate Start
Time Sync Mode	Master - Immediate Start
	Slave - External Pulse Triggered

Get Default

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.

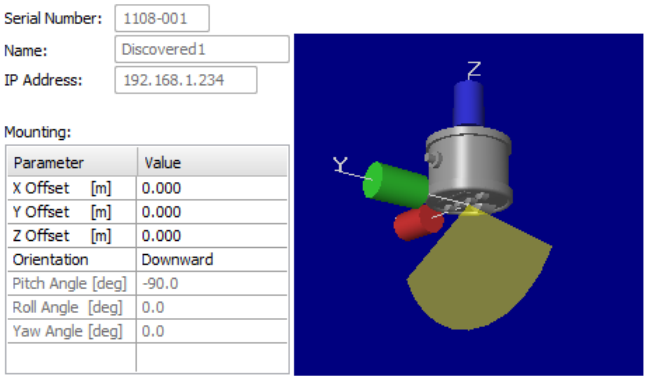


Figure 2. ***Downward*** *Mounting*

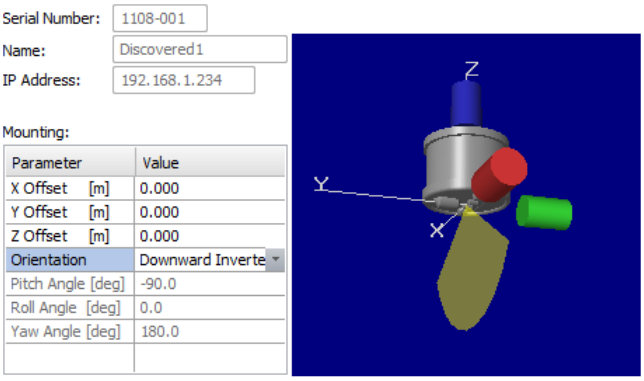


Figure 3. ***Downward-Inverted*** *Mounting*

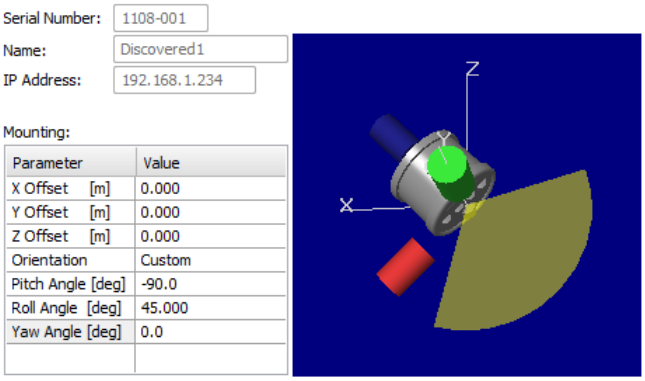


Figure 4. ***Downward*** *Mounting with 45-degree roll and two poles*

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.

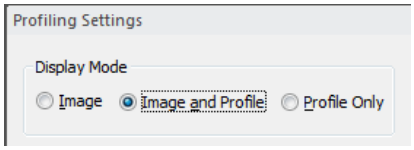
Note! *Changing values in the Master Reference or Mounting Offsets tabs changes the values for the current configuration. If you want to create a new configuration, first click* ***Save As*** *or* ***New****, then modify the parameters.*

Setting the sound speed

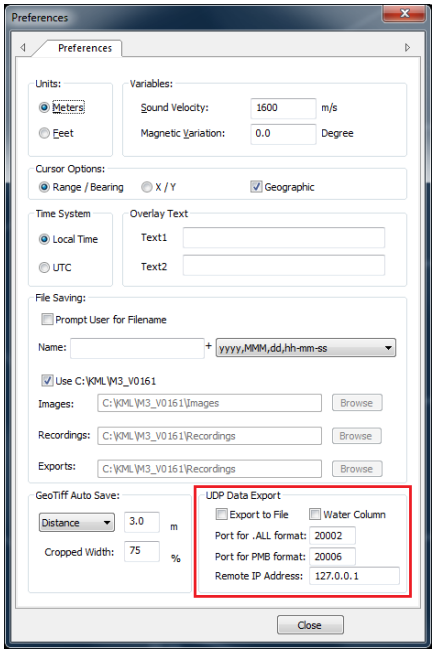
1. Measure the sound velocity at the Sonar Head or calculate the harmonic mean from the sound velocity profile.
2. Run the M3 Software.
3. Click **Setup** menu > **Preferences**.
4. Enter the Variable: **Sound Velocity**.
5. Click **Close**.

M3 Sonar data recording and exporting

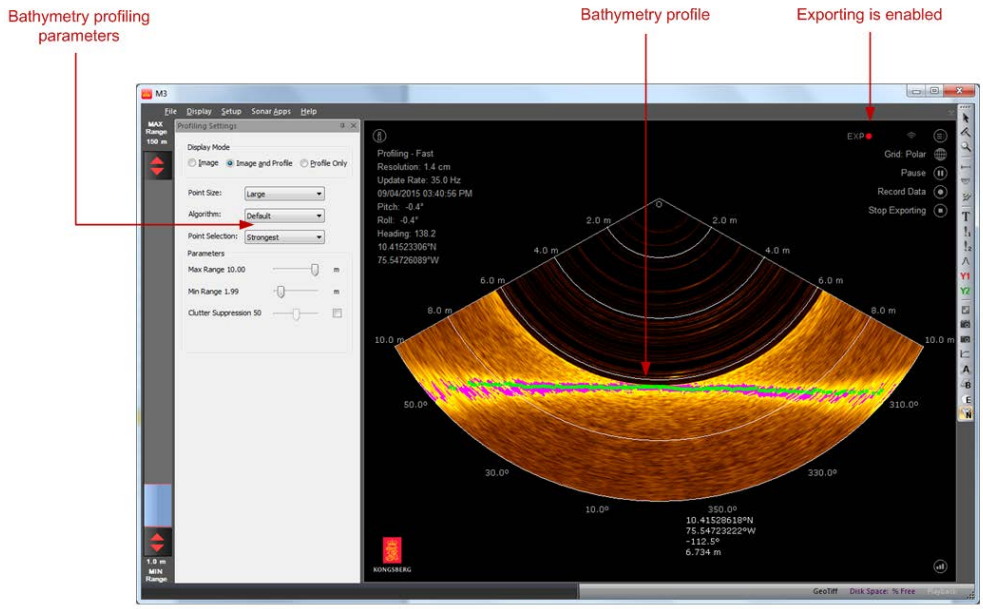
1. Display **Profiling Settings** by selecting **Profiling Settings** from the **Display** menu.
2. Select **Profiling** or **Profiling – Fast** application mode from the **Sonar Apps** menu. **Profiling – Fast** mode provides a much higher ping rate but is not recommend to be used for a short range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



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



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:

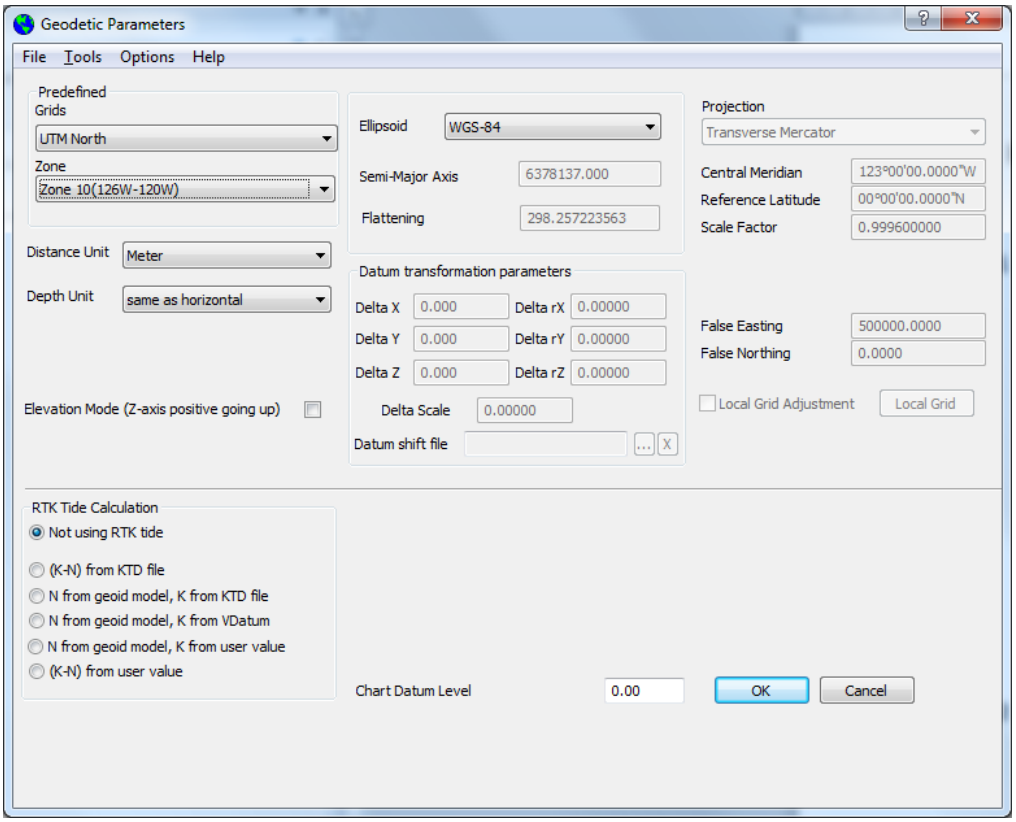


Hypack software setup procedures

The following configuration steps are required to interface Hypack for data acquisition. This document uses Hypack software version Hypack 2016.

Creating a Hypack project

1. Run Hypack 2016, then click on the **File** menu **> New Project** to create a new project (for example, M3 BATHY Harbor Acceptance Test).
2. Set the Geodesy by selecting **Preparation** menu **> Geodetic Parameters**.
   a. Set the **Grids** and **Zone** for the project location.

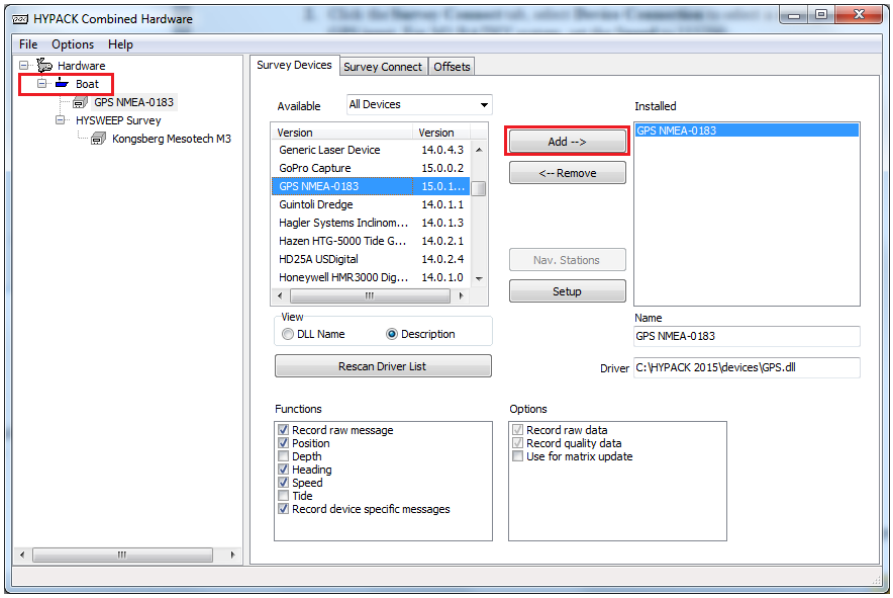


b. Click **OK** when done.

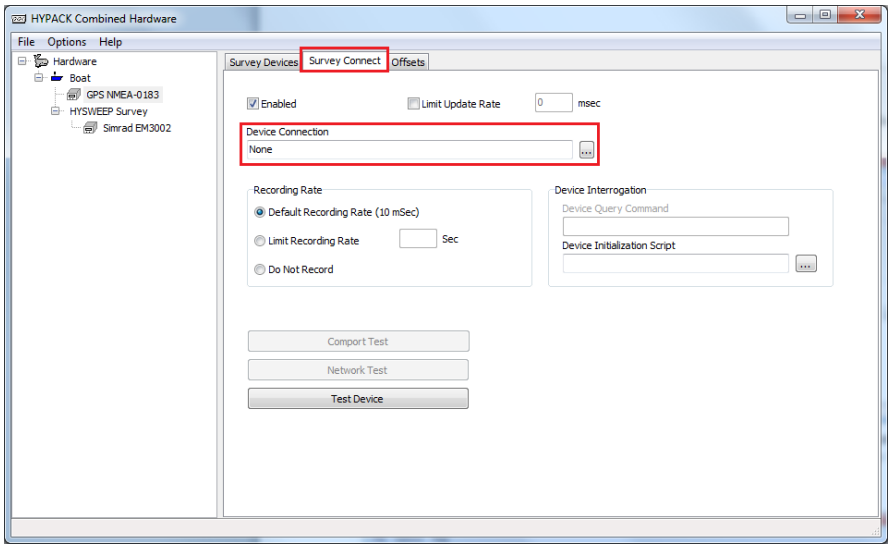
c. Save the project by selecting the **File** menu > **Save Project**.

Configuring Hypack Hardware settings

1. Configure Hypack for a GPS input:
   a. Select **Preparation** menu > **Hardware Setup**.
   b. Click on **Boat**, select the **GPS NMEA-0183** driver, then click the **Add** button. Remove other devices in the list, such as the default **HYPACK File Simulation**.



   c. Click on **GPS NMEA-0183** in the Hardware list on the left.
   d. Click the **Survey Connect** tab, then click the "…" button next to **Device Connection**.

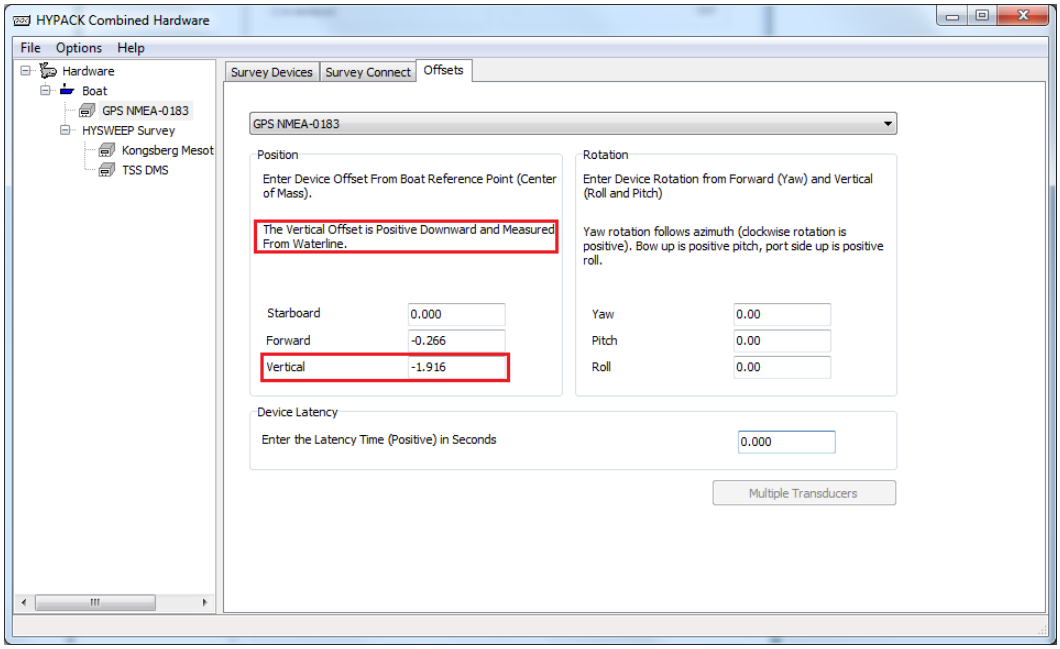


   e. Select **Serial** for the connection type.
   f. For the M3 BATHY system, set the S**peed** to 115200, and **Port** to COM12.

g. Click **OK**.

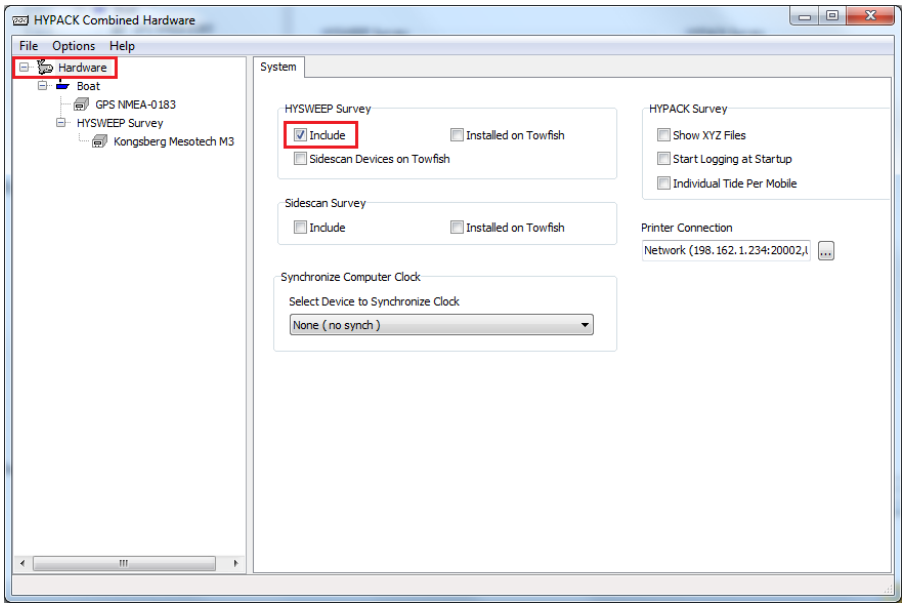
h. Click the **Offsets** tab, then enter the offsets from the M3 receive array to the GPS primary antenna. For the M3 BATHY system, set **Starboard** (X) = 0 and **Forward** (Y) = -0.266 m.

i. Measure the distance from the waterline to the GPS primary antenna, positive downward. Then, enter this distance as a negative number for the **Vertical** (Z) value.

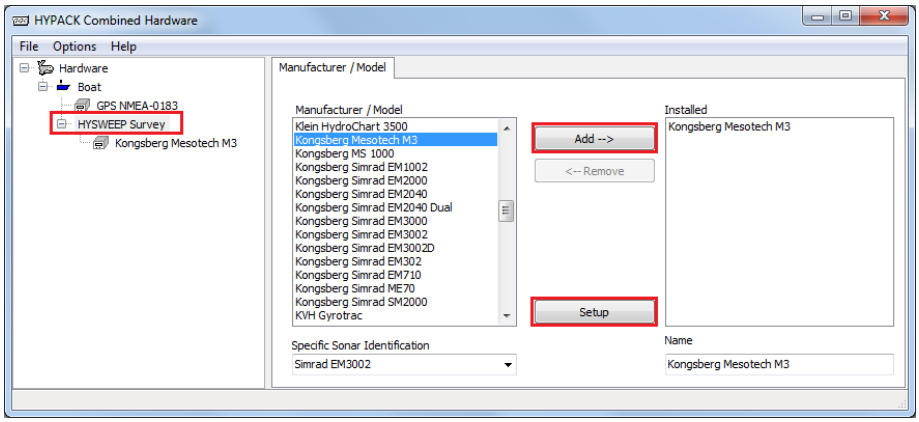


2. Configure HYSWEEP Hardware:

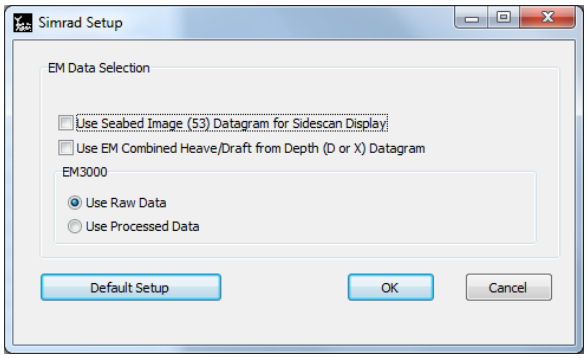
a. Click on **Hardware** (on the left). Under **HYSWEEP Survey**, check **Include** to include Hysweep hardware setup.



b. Click on **HYSWEEP Survey** (on the left), then select **Kongsberg Mesotech M3**. Click the **Add** button to add the device, then click the **Setup** button.

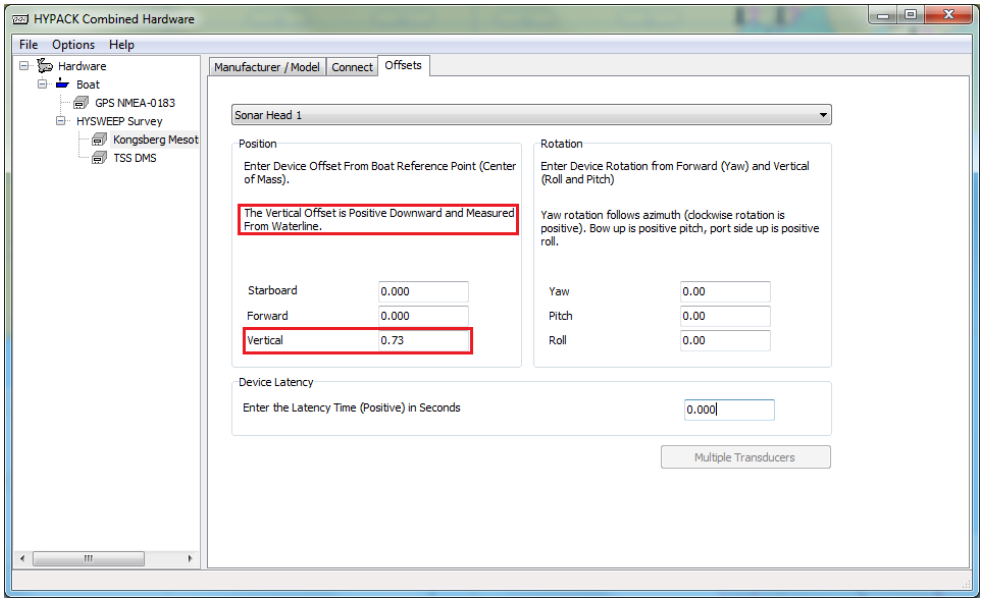


c. Select **Use Raw Data** in the setup window, then click **OK**.

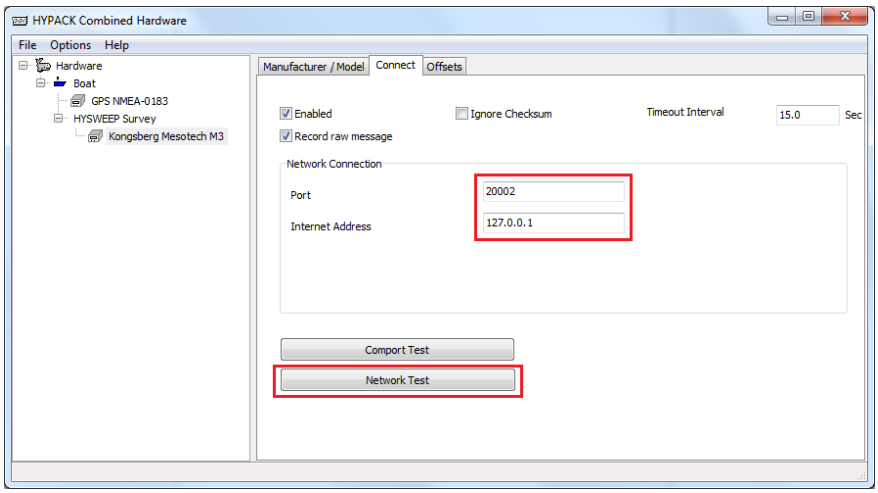


d. Select the **Offsets** tab to configure the transducer **Position** offsets. Leave the **Rotation** offsets all at zero. For the M3 BATHY system, set **Starboard** (X) = 0 and **Forward** (Y) = 0.

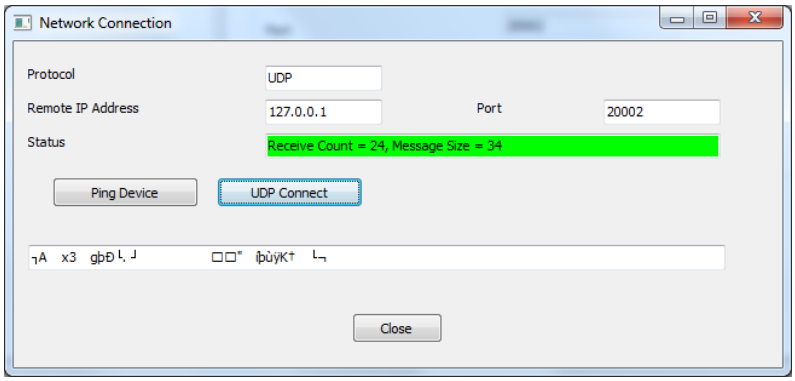
e. Measure the distance from the waterline to the receive array, positive downward. Then, enter this distance as a positive number for the **Vertical** (Z) value.



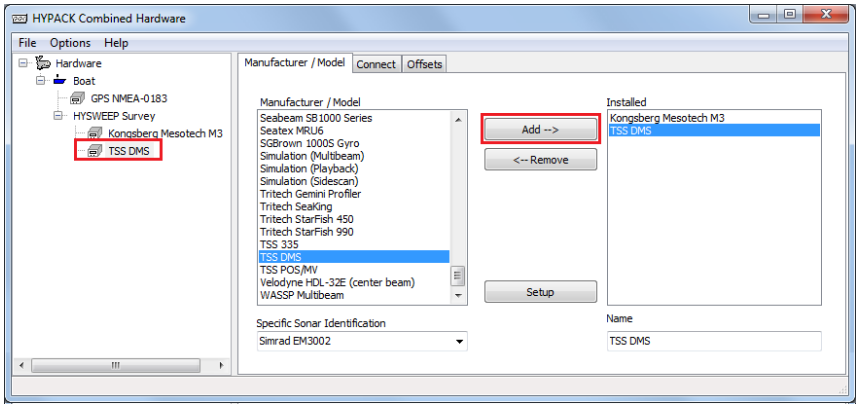
f. Select the **Connect** tab to configure the port and IP Address to match the M3 computer IP address and the M3 .ALL UDP exporting port. (The default local-host configuration is: Internet Address **127.0.0.1**, Port **20002**). Click the **Network Test** button to open the **Network Connection** page.



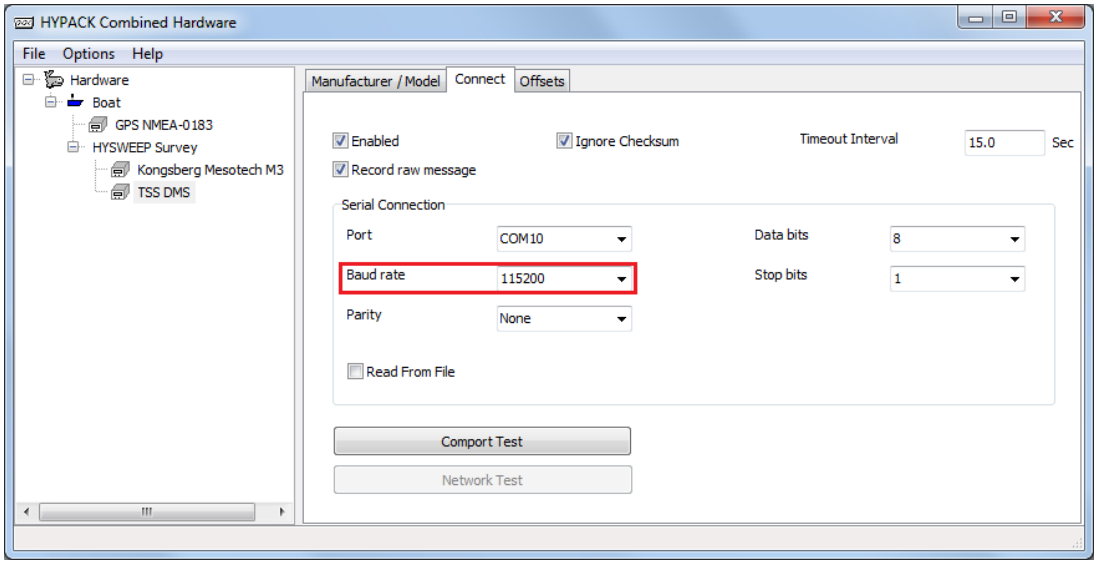
g. Click the **UDP Connect** button to confirm the received UDP data from the M3 software.



h. Click on **HYSWEEP Survey** (on the left), then select **TSS DMS**. Click the **Add** button to add the device.

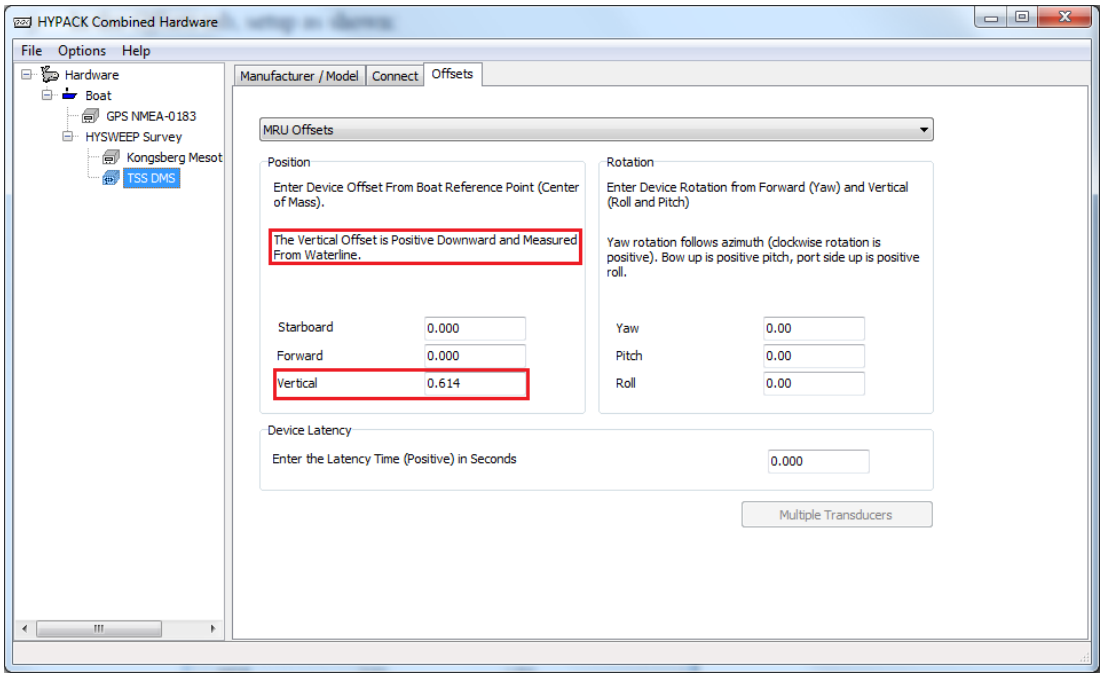


i. Select the **Connect** tab to configure the serial port and settings. For the M3 BATHY system, set the **Baud rate** to 115200, and the **Port** to COM10.



j. Select the **Offsets** tab to configure the **MRU** offsets. For the M3 BATHY system, set **Starboard** (X) = 0 and **Forward** (Y) = 0.

k. Measure the distance from the waterline to the MRU reference point, positive downward. Then, enter this distance as the **Vertical** (Z) value.



l. Click **File** menu > **Save** to save the configuration.

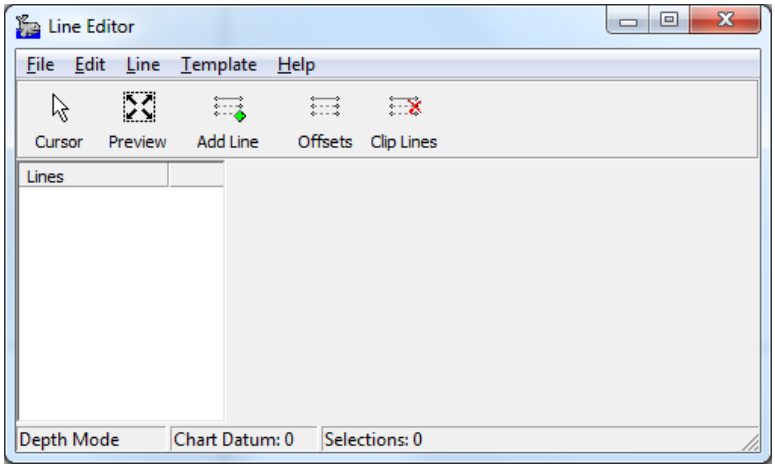
Creating a matrix and survey lines in Hypack

The Hypack **Line Editor** is used to layout lines that will be used to cover a survey area. Recording in Hypack can be configured to automatically begin recording when the vessel reaches the start of the line. Recording can also be stopped automatically when the vessel reaches the end of the line.

The **Matrix Editor** is used to layout the region where the bathymetry data will be displayed in the map view during the survey and in the Hypack window. The cell height and width are defined in the matrix.

1. Layout the survey lines in Hypack:

a. Select **Preparation** menu > **Editors** > **Line Editor**.



b. 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.

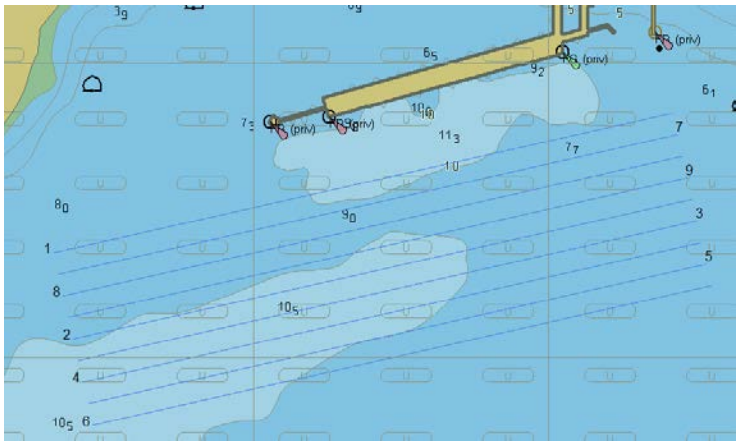


Figure 5. Survey lines displayed in the Hypack main window

c. In the Line Editor window, click **File** menu > Save when done. Enter a file name for your survey lines, then click **Save**.

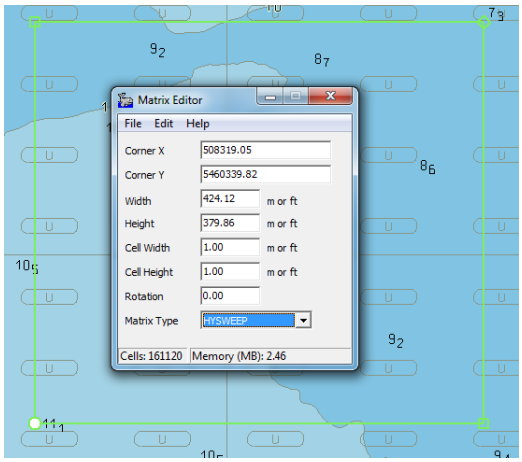
2. Layout a matrix area around the survey lines:

a. Open the Matrix editor by selecting **Preparation** menu > **Editors > Matrix Editor**.

b. Set the Matrix Type to HYSWEEP.

c. Set the cell width and height to 1.0 m.

d. You can adjust the matrix dimensions by rotating and positiong the green rectangle around the survey lines.

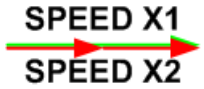


e. When you are done, click **File** menu > Save in the Matrix Editor window. Enter a file name for your matrix, then click **Save**.

Performing a 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.

Note! *When making the planned lines in Hypack, they should be 100m (300ft) long. See Hypack user documentation for more information about patch tests.*



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.
   - **c.** Record a second set of lines.

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

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.
   - **c.** Record a second set of lines.

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