Reference Manual

M3 Sonar®

Multibeam Sonar

KONGSBERG

M3 Sonar

Multibeam sonar

Reference Manual

Release 1.2

This manual provides you with reference information required to operate and fully understand the commands, menus, modes and options provided by the Kongsberg M3 Sonar Multibeam sonar.

Document information

- **Product**: Kongsberg M3 Sonar

- **Document**: Reference Manual

- **Document number**: 922-10017001

- **Revision**: 1.2

- **Date of issue**: 18 August 2017

Copyright

Warning

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

Kongsberg 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 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.

Kongsberg Mesotech Limited
www.kongsberg.com

Table of contents

About this manual

The purpose of this manual is to provide the descriptions, procedures and detailed parameter explanations required to allow for safe and efficient use of the M3 Sonar. The manual also provides you with a thorough understanding of the M3 Sonar parameters and adjustments.

Target audience

This manual is intended for all users of the M3 Sonar. Due to the nature of the descriptions and the level of detail provided by this manual, it is well suited for those who are - or wish to be - expert users.

A good understanding of system functions and controls is essential to fully take advantage of the functionality provided. Careful study of the information in this manual is highly recommended, preferably while exploring the M3 Sonar functionality.

We assume that you are familiar with the basic acoustic principles of sound in water. We also expect that you have some experience with sonar operation.

License information

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

Software version

This M3 Sonar Reference Manual complies to M3 software version 2.1.

Registered trademarks

Observe the registered trademarks that apply.

Windows® is a registered trademark of Microsoft Corporation in the United States and other countries.

M3 Sonar® is a registered trademark of Kongsberg Mesotech Limited in the United States and other countries.

We want your feedback

We want to make the M3 Sonar as good as possible. We also want our end user documentation to be comprehensive and appropriate. You can help. Please provide comments, suggestions or constructive criticism to our support office. You can contact us by phone at +1 604 468 8144, or by email at: km.support.vancouver@km.kongsberg.com.

M3 Sonar

Topics

System description

The Kongsberg Mesotech M3 Sonar is a compact, versatile multibeam sonar.

Multibeam sonars have an array of transducers that simultaneously transmits pings (sound pulses) at a specified frequency to cover a large area in less time than a single-beam transducer. To generate data, computer software assigns a colour range corresponding to the amount of sound reflected off a target. The distance to the target is determined by the length of time it took to receive the transmitted acoustic pulse.

By combining the high refresh rate of a conventional multibeam sonar with an image quality comparable to a single-beam sonar, the M3 Sonar provides high-resolution images that are easy to interpret. The M3 Sonar detects objects out to 150 metres and has a 120° to 140° field of view, allowing you to see the full underwater picture in real-time.

The M3 Sonar provides wide-angle full-range situational awareness and concurrent ultra-short range imaging with dynamic focusing. For optimized obstacle avoidance, the M3 Sonar uses variable vertical beamwidth.

System diagram

The system diagram identifies the main components of a basic M3 Sonar system. Only the main connections between the units are shown. Detailed interface capabilities and power cables are not shown.

A   *Sonar Processor*

B   *Power Supply*

C   *M3 Sonar Head*

System units

Topics

Sonar Processor

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

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 Sonar Processor communicates with the sonar through a standard Ethernet cable.

Related topics
Minimum computer requirements, page 168

Power supply

The Sonar Head requires a DC power supply to run.

Normally, the DC voltage is supplied in the location where the Sonar Head is mounted, such as on a remotely operated vehicle (ROV). A test cable and power supply is available for order as an accessory. The test power supply uses a 24 VDC switching power supply.

Related topics
Power requirements, page 166

Sonar Head

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

The Sonar Head includes transmit and receive transducers and the electronics to generate the transmit pulse and digitize the received signal. The sonar data is sent to the M3 Sonar Processor using a standard Ethernet link.

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.

Related topics

Support information

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

If you require maintenance or repair, contact your local dealer. You can 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.

Getting started

Topics

Powering the M3 Sonar on and off

Topics

Powering up the M3 Sonar

In order to use the M3 Sonar, you must first power it up. You must first power up the display and the Sonar Processor. After this you can start the M3 software.

Prerequisites

- The M3 Sonar units have all been installed.
- All power and interface cables and connections have been connected and verified.
- All system units have been inspected.

Context

The M3 software is <u>not</u> automatically started when the Sonar Processor is powered up. Double-click the M3 icon on the Sonar Processor desktop to start the software.

Note

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

Procedure

1   Power up the Sonar Head using the power supply.

Note

It may take up to 20 seconds for the M3 software to connect to the Sonar Head once the power is applied.

2   Power up the Sonar Processor.

Wait for the operating system to start up.

3   Log in to Windows.

4   Double-click the M3 icon on the Sonar Processor desktop to start the software.

5   Once the M3 software has started, observe that the presentation fills the entire screen.

The software starts up using the same settings as the last time you used it. If these settings are acceptable, continue operation. If you wish to alter any of the settings, see the relevant procedures.

6   Click **Setup→Connect**.

The sonar will start pinging automatically once the connection is complete.

Powering down the M3 Sonar

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

Context

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

Procedure

1   If you are running the sonar, click **Setup→Disconnect** in the M3 software.

2   Switch off the Sonar Processor.

    a   Save your settings, then close the M3 software and any third-party software.

    b   Shut down Windows.

3   Disconnect the power cord leading to the power supply.

Alternatively, switch off the breaker supplying power to the M3 Sonar.

4   Switch off any additional items, such as a sound velocity profiler or display.

If required, refer to the instructions provided by the product's manufacturer.

Starting normal operation

Topics

Introduction to the basic procedures

Once you have powered up the complete M3 Sonar system, and started the M3 Sonar program, you are ready to start the actual operation.

Observe these brief procedures to familiarize yourself with the basic operation.

When starting up, the M3 Sonar will automatically apply its previous settings. The procedures are partly provided to get you acquainted with the basic functionality offered by the M3 Sonar, and partly to set up the M3 Sonar for normal use. If you already know the current operational settings are acceptable, you may not need to do any of these procedures.

Setting the Sonar Processor to High Performance

To avoid slowdowns or disruptions while running the sonar, ensure your Sonar Processor is using all of its processing power and does not go to sleep.

Prerequisites

This procedure is made for the Microsoft® 64-bit Windows 10 operating system.

Procedure

1   In the bottom-left corner of your desktop, type "power options" into the Cortana search box, then press **Enter**.

Observe that the Control Panel opens.

2   Select **High performance**.

3   Verify that the Sonar Processor will never go to sleep when plugged in.

a   Click **Change plan settings** (the hyperlink beside **High performance**).

b   Select *Never* for both **Turn off the display** and **Put the computer to sleep** when plugged in.

c   Click **Change advanced power settings**.

Observe that the **Power Options** dialog box opens.

d   Click "+" to expand the **Sleep** option.

e   Click "+" to expand the **Hibernate after** option.

f   Select *Never* for **Plugged in**.

g   If applicable, click "+" to expand all the **Graphic Power Settings** options for your graphics card.

h   Verify that the settings for **Plugged in** are set to *Maximize Performance*.

i   At the bottom of the dialog box, select **Apply** to save your settings.

j   Click **Save changes** in the **Edit Plan Settings** window.

4   Close the Control Panel.

Installing the M3 software

If your system is provided with a Sonar Processor, the M3 software has already been installed. If you intend to use your own computer, you must install the software yourself. We recommended installing the latest M3 software 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.

- If you are installing a new software version, uninstall the previous version of the M3 software before proceeding.

Note ──────────────────────────────────────

When running the M3 software for the first time, a Windows Firewall dialog box may appear. Allow access for all networks.

───

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 Double click the M3 icon on the desktop to run the M3 software.

   b Confirm the software finishes launching without any error windows appearing.

Defining the IP address on the Sonar Processor network adapter

The communication between the Sonar Processor and the Sonar Head is made using a high-speed Ethernet cable. If a Sonar Processor is not configured to connect to the sonar, you must define which IP Address and Subnet mask the Ethernet adapter in the Sonar Processor shall use for this communication.

Prerequisites

This procedure is made for the Microsoft® 64-bit Windows 10 operating system. It is assumed that you are familiar with the Windows® operating systems, computer technology, and interface principles.

Context

As long as you do not change the Sonar Processor to another computer, or replace the network adapter in your Sonar Processor, you will only need to do this once.

Procedure

1   On the Sonar Processor, close the M3 software.

2   Open the **Network and Sharing Center** dialog box.

    a   In the bottom-left corner of your desktop, type "network and sharing center" into the Cortana search box, then press **Enter**.

       Observe that the Control Panel opens.

    b   On the left-hand menu, select **Change adapter settings**.

    c   Click once on your network adapter to select it, then right-click and select **Properties** on the short-cut menu.

    d   On the list of connections, select **Internet Protocol 4 (TCP/IPv4)**, and then **Properties**.

3   Select **Use the following IP address**, and type the IP address and network mask.

    IP Address: **192.168.1.N** (*"N" can be any number from 1 to 254, except 234, which is the Sonar Head default.*)

    Subnet mask: **255.255.255.0**

    You can leave **Default Gateway** blank.

4   Click **OK** to save the settings, then close all the dialog boxes.

Testing 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 view, and **3D Point Cloud** window. In addition, any errors will be displayed in the **Output Messages** or **Head Status** windows.

Prerequisites

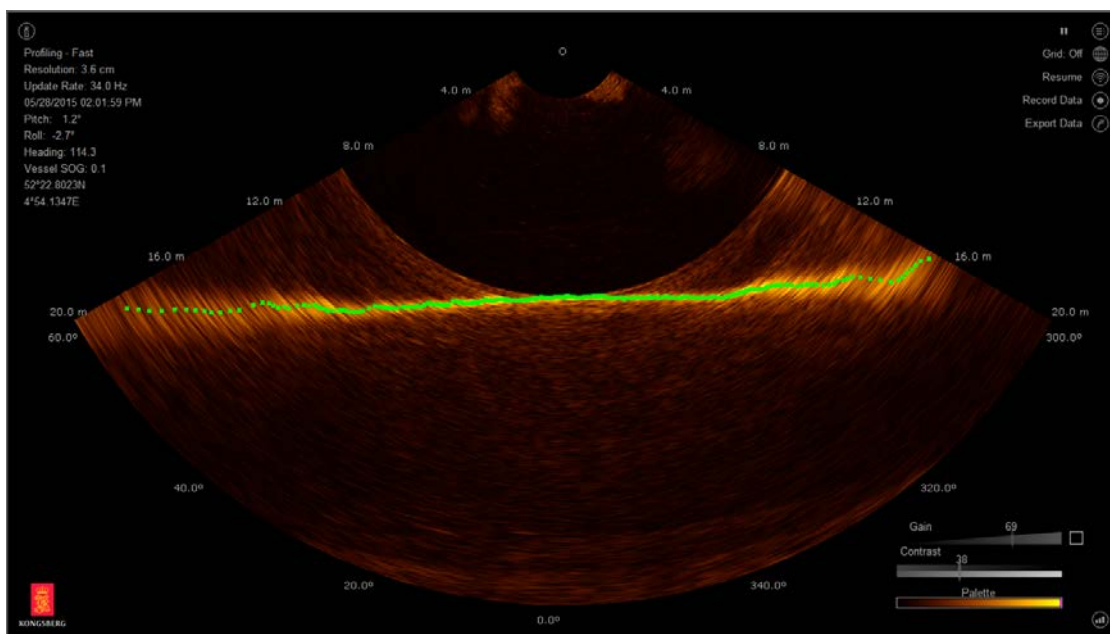The M3 software must be running.

Tip

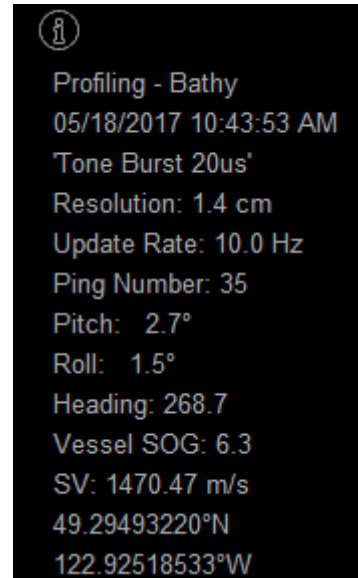*Check there is sufficient disk space available to complete the survey.*

Procedure

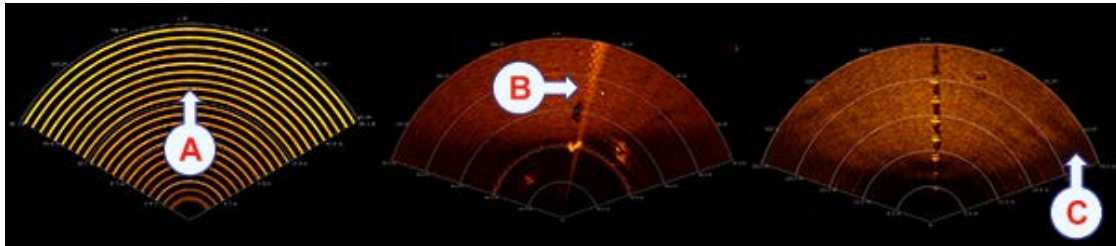1   Click **Setup**→**Connect** to start the Sonar Head.

     Verify that a sonar image appears in the sonar view window.

2   Click the "i" icon in the top-left corner of the sonar view to open the **Information Widget**.

Verify that the sensor data is updating in the **Information Widget**.

3   Click **Sonar Apps**→**Profiling - Bathy**.

4   If the profiling settings are not visible, click **Display**→**Profiling Settings** to open the **Profiling Settings** dialog box.

5   Check the **Depth Tracking** box to automatically adjust the range according to the current depth.

6   Verify that data is displayed and being updated in the **3D Point Cloud** window.

7   Verify 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.

8   Check for errors in the **Connection Status** and **Head Status** windows.

　　a   Click on the text "Active" located in the lower-right corner of the status bar.

　　　　Observe that the **Connection Status** window opens.

　　b   Verify 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 **Connection Status** window.

　　　　Observe that the **Head Status** window opens.

　　d   Verify that all parameters in the list are shown with a check mark inside a green circle.

Profiling - Bathy
05/18/2017 10:43:53 AM
'Tone Burst 20us'
Resolution: 1.4 cm
Update Rate: 10.0 Hz
Ping Number: 35
Pitch: 2.7°
Roll: 1.5°
Heading: 268.7
Vessel SOG: 6.3
SV: 1470.47 m/s
49.29493220°N
122.92518533°W

9   Check for acoustic or electrical interference in the sonar view.

A   Verify that no concentric rings appear. These rings 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   Verify that there isn't a bright radial line originating from the Sonar Head. This line 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   Verify that the bottom appears across the entire width of the sonar view. 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

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.

• This procedure is made for the Microsoft® 64-bit Windows 10 operating system. It is assumed that you are familiar with the Windows® operating systems, computer technology, and interface principles.

Context

This procedure explains how to measure the available bandwidth on a 100Base-TX (100 Mbps) Ethernet link. The same procedure can be used for 10BaseT and 1000BaseT links

by selecting the appropriate sonar application and adjusting the Ethernet adapter settings to the corresponding link speed.

Note _____

There are no standard sonar applications with a telemetry-link speed requirement higher than 100 Mbps.

_____

When the **Override Network Link Speed** box on the **Sonar Setup** page is unchecked, then the M3 software attempts to estimate the available telemetry bandwidth.

The update rate is normally taken from the sonar application or range setting. If the estimated available bandwidth is less than the bandwidth required by the sonar application/range, the M3 software reduces the ping rate to compensate.

Note _____

The update rate is the actual ping rate when running the M3 Sonar system. The displayed **Ping Rate** *may be different from the* **Update Rate** *because the system might be delayed by other processes.*

_____

When the **Override Network Link Speed** box on the **Sonar Setup** page is checked, then the telemetry bandwidth value entered into the **Mbps** field is used (minus a 20 percent safety margin). If the applied override telemetry bandwidth is less than the telemetry bandwidth required by the sonar application/range, the ping rate is reduced.

Procedure

1   Limit the Ethernet adapter link speed to 100 Mbps.

   a   In the bottom-left corner of your desktop, type "view network connections" into the Cortana search box, then press **Enter**.

          Observe that the Control Panel opens.

   b   Right click on the **Local Area Connection** connected to the M3 Sonar Head, then select **Properties**.

   c   Click the **Configure** button.

   d   Click the **Advanced** tab (this tab may also be called **Link speed**).

   e   Select *Speed & Duplex* in the **Property** list.

          Note _____

          The options available in this dialog box will vary depending on the Network Driver you have installed. The Property may also be called Link Speed, or Link Speed & Duplex.

          _____

f   Select *100 Mbps Full Duplex* from the **Value** drop-down list.

g   Click **OK** to apply the changes and close the dialog box.

> **Note** ───────────────────────────────────────
>
> *When you change the speed, the Sonar Head may temporarily disconnect from the network. Wait for it to reconnect. If the Sonar Head fails to reconnect, power cycle it.*

2   Click **Setup**→**Connect** to start the Sonar Head.

3   Add the Ethernet Test application to your list of favourite applications.

    a   Open the **Sonar Apps** menu on the top bar, then select **Customize Apps**.

    b   Double click on *Ethernet Test - 100Mbps* shown under **Other Apps**.

    c   Click **OK**.

4   Open the **Sonar Apps** menu on the top bar, then select **Ethernet Test - 100Mbps**.

5   Open the **Task Manager** and find your Local Area Connection.

    a   Press the **<CTRL> + <ALT> + <DEL>** keys.

    b   Click **Task Manager**.

    c   Click on the **Performance** tab.

    d   Click on the Ethernet connection for the M3 Sonar Head.

6   Check the activity on your local network.

    a   Allow the system to run for a few minutes to plot the *Throughput* graph.

    b   Observe the graph to determine the average network link speed.

        An average link speed of at least 80 Mbps is required by most sonar applications (some applications and range scales will use less). A link speed of less than 80 Mbps may result in a slower than expected ping rate.

    c   Right-click in the *Throughput* graph and select **View network details**.

        Observe that the **Network Details** window opens.

    d   Confirm that the *Network utilization* is at least 80%.

> **Note** ───────────────────────────────────────
>
> *If the Network utilization is less than 80%, click **Setup**→**System Configuration** in the M3 software and uncheck the **Override Network Link Speed** box.*

    e   Check the **Output Messages** window in the M3 software for any messages.

        Verify that there are no lost packets.

Tip ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

The contents of the **Output Messages** *window are also saved to a file in the folder C:\KML\M3_Vxxxx\LOGS.*

⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

f   If you see missing pings, try reduce the override value (in the **Mbps** field) to improve the performance.

Operational procedures

Topics

Setting up and running the sonar

Topics

Starting operation of the Sonar Head

To start operation of the M3 Sonar sonar, you may need to verify that the Sonar Head has been discovered.

Prerequisites

- The M3 software must be running.
- The sound speed has been entered in
  Setup→System Configuration→Deployment→Master Reference.
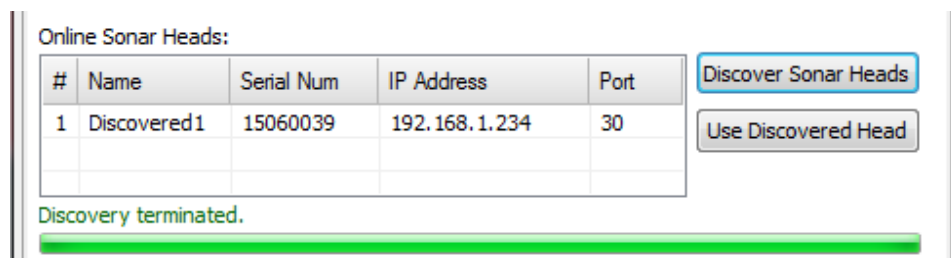
Procedure

1   Click **Setup→Connect** to start the Sonar Head.

Wait for "Sync OK" to appear on the status bar before collecting data. It takes two minutes to synchronize the Sonar Head clock.

Tip ────────────────────────────────────

*By default, the M3 software uses the computer's time to set the Sonar Head clock (Host mode). You can change the time synchronization settings by clicking **Setup→System Configuration→Sonar Setup→Time Sync Mode**.*

──

2   If you see an error in the **Output Messages** window, verify that the Sonar Head has been discovered.

a   Click **Setup→System Configuration→Devices→Sonar Setup**.

b   Click **Discover Sonar Heads** to search for the sonar on the network.

c   If the M3 Sonar Head is found, select it, then click **Use Discovered Head**.

A discovered Sonar Head appears in the **Online Sonar Heads** list. If the Sonar Head does not appear, the Ethernet connection between the Sonar Processor and Sonar Head has not been established.

d   Click **Close**.

Related topics

Configuring your preferences

You may wish to set up the system preferences to use measurement units appropriate to your location, or to choose a preferred save location for your recorded sonar data.

Context

The **Preferences** dialog box is used to set up system preferences such as units of measure, time format, etc. This dialog box also allows you to select the save location for screenshot images and recorded sonar data files.

Procedure

1   Click **Setup→Preferences**.

2   Choose the unit of measurement for all the readouts related to range and distances in the M3 Sonar user interface.

3   Choose whether you would like to display the range and bearing or X and Y coordinates of your mouse cursor position.

4   Fill out the **Overlay Text** boxes if you wish to display information on your screenshots and data recordings.

5   Choose your desired **File Saving** settings.

6   Select **Close** to save the chosen settings and close the dialog box.

Related topics

Choosing the sonar range

The **Range** function allows you to specify the maximum theoretical vertical depth and horizontal distance covered by the M3 Sonar.

Context

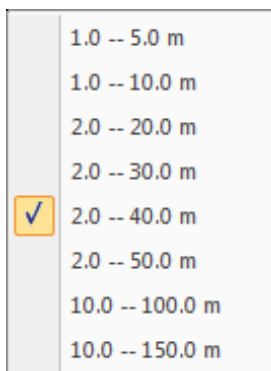The M3 Sonar Sonar Head can operate at different predefined near and far ranges.

The range value is defined from the Sonar Head.

Note ────────────────────────────────────

Even though you can choose a large range value, that does not mean that you can detect your targets on the same range. The range value only defines the range that is shown in the views. Actual target detection will always depend on the operational environment, such as water temperature, salinity, interference and layers in the water column.

────────────────────────────────────

Procedure

1   Right click inside the sonar view to display the range menu.

    1.0 -- 5.0 m
    1.0 -- 10.0 m
    2.0 -- 20.0 m
    2.0 -- 30.0 m
    ✓ 2.0 -- 40.0 m
    2.0 -- 50.0 m
    10.0 -- 100.0 m
    10.0 -- 150.0 m

2   Select the desired near and far range from the menu.

    Note ────────────────────────────────

    You can change the units of measurement in the **Preferences** *dialog box.*

    ────────────────────────────────

3   You can increase or decrease the range using the range slider bar to the left of the sonar view.

    a   Click the top arrows to increase or decrease the far range.

    b   Click the bottom arrows to increase or decrease the near range.

MAX Range 150 m

1.0 m MIN Range

Note ──

To change the depth range settings in the **3D Point Cloud** *window, click* **Depth***, uncheck the* **Adaptive Palette** *box, enter the top and bottom depth, then click* **Apply***.*
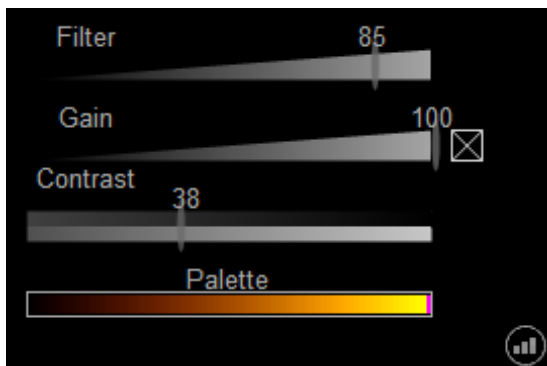
──

Result

The range is displayed with measured intervals in the sonar view. The current range will be updated when the Sonar Head is running.

Tip ──

Enabling Depth Tracking will automatically adjust the range according to the current depth when the head is running. To enable this feature, select the **Depth Tracking** *checkbox in the* **Profiling Settings** *dialog box.*

──

Adjusting the sonar view

All echo information offered by the M3 Sonar is shown in the sonar view. The **Display Widget** allows you to adjust the filter strength, change the display gain, and choose your echo colours.

Context

Tip ──

You can change the physical size of the sonar view by clicking on the left view border, then dragging it to create a smaller or larger window. You can also make the sonar view full screen by clicking **Display**→**Full Screen** *or by clicking the* **Show Full Screen** *button in the tool bar.*

──

You can drag sliders with the mouse to increase or decrease parameter values. For fine adjustments, use the mouse scroll wheel to move the slider by one increment.

Procedure

1   Click the **Display Widget** icon.

     This icon is located in the lower-right corner of the sonar view.

2   To adjust the strength of an enabled filter in the sonar view (such as Average Filter or
     Edge Enhancement), drag the **Filter** slider to increase or decrease the filter effect.

     Note ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

     The **Filter** *slider will not appear if no filters are enabled. Note that filter settings will
     not be saved when the software is closed.*

3   To adjust the display gain manually, check the box and drag the **Gain** slider to increase
     or decrease the gain.

     Uncheck the box if you want the software to adjust the gain automatically.

     Note ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

     The **Display Gain** *controls the "visual amount" of echo that are displayed, in other
     words the strength of the echo presentation.*

4   Drag the **Contrast** slider to increase or decrease the sonar view display contrast.

5   To choose your echo colours, right-click on the **Palette** bar to cycle through the colour
     scale options.

     Which colour scale to use is mainly a personal preference based on ambient light
     conditions, the nature of the echoes and your own experience.

6   Click the **Display Widget** icon to hide the widget.

     Tip ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

     To change the colour scale of the 3D Point Cloud, click **Depth***, check the* **Adaptive
     Palette** *box, then click* **Apply***.*

Applying filters

You can apply an averaging, background removal, or an edge enhancement filter to the sonar view.

Context

These buttons are located on the tool bar.

Procedure

1   Click one of the filter buttons.

Observe the changes in the sonar view.

2   Increase or decrease the filter effect.

a   Click the **Display Widget** icon.

This icon is located in the lower-right corner of the sonar view.

b   Drag the **Filter** slider to adjust the strength of the filter.

3   Click the **No Filter** button to turn off all filters.

Related topics

Adjusting the TVG (Time Variable Gain) setting

You can adjust the Time Variable Gain for each sonar application in the **TVG Setup** dialog box.

Context

The **TVG** (Time Variable Gain) function is used to compensate the received echo data for the loss of acoustic energy due to geometric spread and absorption.

Procedure

1   Select the sonar application you wish to configure from the **Sonar applications list** on the top bar.

Note

Each sonar application has its own TVG profile.

2   Click the **TVG** button.

This button is located on the tool bar.

3   Drag the sliders to adjust the A, B, C, and L Factors.

Click the arrow buttons to make small adjustments.

4   Click **Apply** to save the settings.

Related topics

Controlling the rotator

You can control your rotator(s) with the **Rotator Control** dialog box.

Prerequisites

• You must set up your rotator(s) by clicking **Setup**→**System Configura-tion**→**Devices**→**Rotators Setup**.

• If you have a single-axis rotator, choose the type of control you would like in the **Rotator Test** dialog box. On the **Rotators Setup** page, select your single-axis rotator in the **Rotators** table, click the **Test Device** button, then select either *3D Scan* or *Pan/Tilt Control* from the **Rotator Control Dialog Type** drop-down list.

• If necessary, configure your rotator axis offsets relative to the sonar by clicking **Setup**→**System Configuration**→**Deployment**→**Mounting Offsets**.

• This dialog box will only appear if the sonar is running.

Context

If you have more than one rotator installed, then one dialog box for each rotator will appear.

The controls you see will depend on the type of rotator you have and which control type you have selected.

Single-axis rotator with Pan/Tilt controls:

Single-axis rotator with 3D Scan controls:

Dual-axes rotator:

Procedure

1   Click **Setup→Connect** to start the Sonar Head.

Observe that the **Rotator Control** dialog box opens.

2   Click **Connect** to enable the rotator controls or **Disconnect** to disable the rotator controls.

3   If you have a Kongsberg 806-00360000 rotator, click the **Calibrate** button.

4   If you are using Pan and Tilt controls, click the arrow buttons to move the Sonar Head.

If you have a single-axis rotator, the arrow buttons will either pan or tilt, depending on the orientation of the rotator installation.

Tip _____

Drag the slider to control the rotator speed.

_____

5   If you are performing a 3D scan, then set up the scan sector before starting the scan.

Note _____

The green wedge in the dialog box graphic represents the sector to be scanned.

_____

a   Drag the **Width** slider to define the scan coverage.

b   Drag the **Center** slider to define the centre of the scan coverage.

c   Drag the **Speed** slider to set the rotator speed. Slower speeds will result in higher angular resolutions.

d   Check the **Record** box to record data during the scan.

e   Click **Start Scan**.

The rotator will move to one side of the sector, start the scan, then stop the scan at the other side of the sector.

Tip ——————————————————————————————

To export the 3D scan into third-party software, ensure either **Image and Profile** *or* **Profile Only** *is selected in the* **Profiling Settings** *dialog box. Click the circular icon in the top-right corner of the sonar view to open the* **Menu Widget**. *Click* **Export Data**.

Related topics

Saving and recalling screen captures

Topics

Saving and retrieving images

With one click, you can capture an image of the sonar view — either with overlays or without overlays.

Prerequisites

Open the **Preferences** dialog box to change the default save location, choose your own filename, and add overlay text.

Procedure

1   Click the **Save image with overlay** button.

If you want to save the sonar view without overlays, click the **Save image without overlay** button instead.

These buttons are located on the tool bar.

Note

A "Save As" dialog box will appear if you have checked the **Prompt User for Filename** *box in the* **Preferences** *dialog box.*

2   Retrieve your images and view them.

a   In the bottom-left corner, click the Windows® **Start** button.

b   On the left side of the menu, click **File Explorer**.

c   Click **This PC**.

d   Navigate to C:\KML\M3_Vxxx\Images.

Alternatively, navigate to where you saved your images earlier.

e   Open the images with your preferred image viewer..

Recording sonar data

You can record a sonar data sequence and save it in a time-stamped digital format. You can also re-record data during playback to capture a smaller clip of the data set.

Prerequisites

- Open the **Preferences** dialog box to change the default save location, choose your own filename, and add overlay text.

- Click **File**→**Recording Format** to choose between recording raw sonar data (to a ".mmb" file) or recording beamformed sonar data (to a ".imb" file).

Procedure

1   Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**.

2   Click **Record Data** or press **F4** to start recording.

When recording is in progress, a flashing recording icon will appear in the top-right corner of the sonar view. The recording filename will also appear here. Observe the percentage of disk space free for recording on the far right of status bar.

Note ───

A "Save As" dialog box will appear if you have checked the **Prompt User for Filename** *box in the* **Preferences** *dialog box.*

──

3   Click **Stop Recording** or press **F4** when you are done.

Your recording will be saved under the folder "C:\KML\M3_Vxxxx\Recordings" by default. You can change this save location in the **Preferences** dialog box.

Related topics

Playing back a recording

You can play back a previously recorded data file to view the sonar image sequence captured during operation of the Sonar Head.

Prerequisites

Open the **Preferences** dialog box to change the default save location, choose your own filename, and add overlay text.

Tip ──

When the M3 software isn't running, double-click on a recording file to open the software and begin playback automatically.

──

Procedure

1   Click **File**→**Playback**.

     A file browser dialog box opens to let you choose which file to play back.

2   Select the file you want to play back and click **Open**.

     Playback will begin. The **Playback Console** will automatically open to offer you
     additional functionality.

3   Control playback using the **Playback Console**.

     You can stop, pause, fast forward, or advance through the recording one ping at a time.
     You can also repeat playback of the file on a never-ending loop.

     Tip

     *You can also apply filters to the playback, such as the Average or Edge Enhancement
     filters.*

4   When you are done, click the **Stop** button on the Playback Console, then close the
     console.

     Alternatively, click **File**→**Stop Playback**.

Related topics
Convert to Video Format dialog box, page 85
Playback Console, page 92

Converting your recordings

If you want to keep your recordings in .mmb format but process your data in .imb format,
you can convert .mmb files to .imb files using a batch conversion utility.

Context

The M3 software records sonar data in two formats — raw element data (.mmb) or
beamformed data (.imb).

If you wish to convert a selected clip of data, you can play back an .mmb file and record
the clip as an .imb file. However, if you wish to batch convert many files, a conversion
utility is provided with the M3 software.

Note

If files are recorded in .imb format, they cannot be converted to .mmb.

You can find the conversion utility in the folder C:\KML\M3_Vxxxx\bin\M3Converter.exe.

Procedure

1   Select *Recording File* to convert a single .mmb recording.

Alternatively, select *Recording Folder* and *Include Subdirectories* to convert all your .mmb files.

2   Click the **Browse** button beside **Source** to select your .mmb file or folder.

3   Click the **Browse** button beside **Destination** to select where you want to save the converted files.

If you are saving a single recording, then you must give the file a name.

Tip ——————————————————————————————————————

When converting the contents of a folder, the files will automatically be renamed. However, we recommend selecting different source and destination folders to avoid filename duplications.

——

4   Click **Convert**.

A dialog box will notify you when the file conversion is complete. Click **OK** to dismiss it.

Related topics
Recording Format, page 84

Saving GeoTiff files

GeoTiff files are TIFF files which have geographic data embedded within them. The geographic data can then be used to position the image in the correct location and geometry on the screen.

Prerequisites

- You must have a position and heading sensor connected to your system and sending data to the M3 software. To add sensors, click **Setup**→**System Configuration**→**Devices**→**Sensors Setup**.

- Your Master Reference must be set up to use the sensor inputs or to use a fixed location by entering Latitude, Longitude, and Heading. To set up the Master Reference, click **Setup**→**System Configuration**→**Deployment**→**Master Reference**.

- Your mounting offsets must be configured correctly. To configure your mounting offsets, click **Setup**→**System Configuration**→**Deployment**→**Mounting Offsets**.

- You must be using the appropriate coordinate system for your current location. To choose your coordinate system, click **Setup**→**Geo Projection**.

Context

GeoTiff files contain georeferencing information and can be opened in third-party software, such as Google Earth Pro.

Procedure

1   Click **Setup→Preferences**.

2   Fill out the fields in the **GeoTiff Auto Save** section.

    a   To automatically save a GeoTiff file every set number of meters, select Distance and enter a value. To automatically save a GeoTiff file every set number of seconds, select Time and enter a value.

    b   To save a cropped GeoTiff image for mosaicking purposes, enter the percentage to crop.

3   Press F11 to enable or disable GeoTiff auto save. The status bar will display "GeoTiff" in green when auto save is enabled.

When GeoTiff autosave is enabled, GeoTiff files will be saved automatically and continuously based on travel distance or time.

Alternatively, press **F10** to save a single GeoTiff file to your images folder. Your images will be saved under the folder "C:\KML\M3_Vxxxx\Images" by default. You can change this save location through the **Preferences** dialog box.

Related topics

Using sonar view overlays

Topics

Measuring distances

You can use the tape measure tool to draw a line in the sonar view and measure the distance between two points.

Context

Measures distances on the sonar view. Also allows you to place a measurement overlay on the sonar view.

Procedure

1   Click the **Tape Measure** button.

    This button is located on the tool bar.

2   Click and hold the left mouse button on your first target, then drag the mouse to your second target.

    The length and bearing between the targets is displayed dynamically.

    Note _____

    The measurement line will not remain on the display when you release the mouse button.

    _____

3   To keep the measurement line on the display, place a measurement overlay.

    a   Click and hold the right mouse button on your first target.

    b   Drag the mouse to your second target and release the mouse button.

    c   Move the mouse to a place on the screen where you would like to place the overlay length and bearing label.

        Note _____

        Once the measurement overlay is placed, you can use the default arrow cursor to drag the length and bearing label to a position on the screen where it is more legible.

        _____

    d   Click the left mouse button to place the overlay.

        Tip _____

        *To remove this overlay, click the **Wiper** button, then click the overlay.*

        _____

Related topics

Measuring angles

You can use the protractor to measure the angle between two lines, then place the resulting overlay in the sonar view.

Context

The protractor tool measures the angle between a baseline and a second line that intersects the baseline.

Procedure

1   Click the **Protractor** button.

    This button is located on the tool bar.

2   In the sonar view, click the point where you want to start the baseline.

3   Click the point where you want to end the baseline.

    The second line will appear.

4   Lock one end of the second line to the baseline.

    a   Choose where you want the second line to intersect the baseline by moving the mouse along the length of the baseline.

    b   When ready, click the left mouse button.

5   Choose where you want the second line to end.

    a   Move the mouse to any point on either side of the baseline to adjust both the length and angle of the second line.

    b   Click the left mouse button to place the overlay.

        Tip —————————————————————

        To remove this overlay, click the **Wiper** *button, then click the overlay.*

Related topics

Defining an area

You can use the string measure tool to define an area. The size and perimeter of the area will be calculated for you.

Context

Defines and measures perimeters and areas. Allows you to place an area overlay on the sonar view.

Procedure

1   Click the **String Measure** button.

    This button is located on the tool bar.

2   Click anywhere in the sonar view to start a point.

3   Move to the second point, then click again.

4   Click as many times as necessary to create the required area.

5   Double-click on the last point to finish.

    The area will automatically be closed, and a rectangular label will appear providing information about the area and perimeter.

6   Move the label to a position on the screen where it is most legible, then click the left mouse button to place it.

    Tip

    To remove this overlay, click the **Wiper** *button, then click the overlay.*

Related topics
String Measure, page 152

Placing text labels

The text label tool allows you to place comments on the screen.

Prerequisites

Text labels will not appear on sonar data recordings. To place a text overlay on a recording, click **Setup→Preferences** and fill out the **Overlay Text** boxes.

Procedure

1   Click the **Text Label** button.

This button is located on the tool bar.

2   In the sonar view, click the area of interest that you want to label.

3   Click and hold the left mouse button on the label overlay and drag it to a place on the screen where the text is legible.

4   Label the area of interest.

    a   Double-click on the label overlay to open an **Edit Text Box** dialog box.

    b   Enter the desired text into the dialog box.

    c   Click **OK** when done.

5   If the text you entered does not fit within the text label overlay, you can resize the label by clicking on the label border, then dragging it to create a larger label.

Tip

To remove this overlay, click the **Wiper** *button, then click the overlay.*

Related topics

Placing reference cursors

You can place one or two reference cursors as overlays on the sonar view. When you place two cursors, an additional overlay will appear with information about the cursors.

Context

The Reference Cursor buttons are used to mark points of interest and to determine the range and bearing of these points (relative to the Sonar Head).

These buttons are located on the tool bar.

Procedure

1   Click the **Reference Cursor 1** button.

2   Move the mouse to where you want to place the cursor.

Tip

To make fine adjustments to the cursor position, drop a reference cursor into a Zoom window.

3   Click the left mouse button to place the cursor as an overlay in the sonar view.

The range and bearing of the cursor's position — relative to the Sonar Head — is shown in the bottom-left corner of the view.

4   Click the **Reference Cursor 2** button.

5   Move the mouse to where you want to place the cursor.

6   Click the left mouse button to place the cursor as an overlay in the sonar view.

The range and bearing of the cursor's position — relative to the Sonar Head — is shown in the bottom-left corner of the view. "Delta" shows the range and bearing from cursor 1 to cursor 2.

Tip ──

To remove this overlay, click the **Wiper** *button, then click the overlay.*

───

Related topics

Placing target markers

The Target Marker function is primarily used for remotely operated vehicle (ROV) navigation. Third-party ROV software can use the time and location information to steer the ROV toward the target.

Context

You can press 0–9 to place a marker in the sonar view that is stamped with time and location information. In addition, you can export this information to a serial or UDP port.

Procedure

1   To start using target markers, click **Display**→**Enable Target Marker**.

Observe that the **Target Marker Export** dialog box opens.

2   Choose a serial port from the drop-down list.

Note ───

The default serial settings cannot be altered.

───

3   Click **OK** to enable serial port export.

Alternatively, click **Cancel** to use the Target Marker function without exporting to a serial port.

UDP export is always available, whether you enable serial port export or not.

4   Move the mouse cursor to the location in the sonar view where you wish to place a marker.

5   Press any number key from 0 to 9 on your keyboard to place a marker.

Note ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Target markers cannot be moved once they are placed.

⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

6   To remove all target markers from the sonar view, click **Display**→**Delete All Markers**.

Alternatively, use the wiper located on the tool bar to remove individual markers.

Related topics

Programming the Sonar Head

Topics

Upgrading the Sonar Head

The Sonar Head has both software and firmware. You can upgrade these with the latest versions obtained from Kongsberg Mesotech. You can also use this same procedure to downgrade software and firmware versions.

Prerequisites

If you are performing a full upgrade, you will need to write three files to the Sonar Head before power cycling the unit:

- The Sonar Head software file (.ASW)
- The Sonar Head transmit firmware file (.TXF)
- The Sonar Head receive firmware file (.RXF)

You can obtain these files from customer support. You can contact us by phone at +1 604 468 8144, or by email at: km.support.vancouver@km.kongsberg.com.

Context

The **Head Firmware Configuration** dialog box allows you to upgrade the Sonar Head firmware. This dialog box is only available when the Sonar Head is connected and paused.

Procedure

1   Click **Setup→Connect** to start the Sonar Head.

2   Open the **Head Firmware Configuration** dialog box.

    a   Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**.

    b   Click **Pause**.

    c   Click **Setup→Head Firmware Configuration**.

       Observe that the **Head Firmware Configuration** dialog box opens.

3   Take note of the current versions of software and firmware (Rx HW, Rx SW, Tx HW, and Tx SW).

    The version numbers are listed in the **Head Firmware Configuration** dialog box.

4   Write the latest firmware and software to the Sonar Head.

    a   Select *Head Application Software* under **Configuration type**.

    b   Click the file folder icon under **Configuration file** to browse and select the .ASW file on your local drive.

Use the .ASW file with the same version as the .RXF file.

_____

c   Click **Write**.

Observe that a confirmation dialog box opens.

d   Click **Yes** to start the upgrade.

Tip _____

*If you click **Cancel** or **Stop**, the upgrade process will be aborted. The Sonar Head software and firmware will not be changed.*

_____

e   Select *RX FPGA Configuration* (receive firmware) under **Configuration type**.

f   Click the file folder icon under **Configuration file** to browse and select the .RXF file on your local drive.

g   Click **Write**, then click **Yes** to start the upgrade.

Note _____

This file may take a few minutes to program.

_____

h   Select *TX FPGA Configuration* (transmit firmware) under **Configuration type**.

i   Click the file folder icon under **Configuration file** to browse and select the .TXF file on your local drive.

j   Click **Write**, then click **Yes** to start the upgrade.

Note _____

This file may take a few minutes to program.

_____

k   Close the **Head Firmware Configuration** dialog box.

5   Confirm the upgrade was successful.

a   Click **Setup**→**Disconnect**.

b   Disconnect the power to the Sonar Head, then power it up again.

c   Wait ten seconds for the software to discover the Sonar Head.

d   Click **Setup**→**Connect** to start the Sonar Head.

e   Click **Setup**→**Head Firmware Configuration**.

Observe that the **Head Firmware Configuration** dialog box opens.

f   Confirm that the software and firmware has been upgraded from the versions you took note of earlier.

Note ───

The receive hardware (RX HW) and software (RX SW) must both be on the same version. In other words, the application software (.ASW) and FPGA RX Firmware (.RXF) files being upgraded must have the same version numbers. The Sonar Head will check if the versions are the same. If not, the version numbers shown in the **Head Firmware Configuration** *dialog box will not be updated.*

───

Related topics

Changing the Sonar Head IP Address

If you have a unique network environment (such as an IP Address conflict between two devices on your network), or you are installing a second Sonar Head, then you will need to change the IP Address.

Context

The **Head Network Setup** dialog box allows you to change the Sonar Head network parameters, such as the IP address. This dialog box is only available when the Sonar Head is connected and paused.

You can program the IP address and the IP port of the M3 Sonar Head for various network environments. The factory default IP address is 192.168.1.234, and the default port number is 30.

Procedure

1   Set up the Sonar Head and M3 software.

a   Connect the Sonar Head directly to the computer network card. Do not connect through an intermediary device, such as a network switch or router.

b   Power up the Sonar Head.

c   Double click the M3 icon on the desktop to run the M3 software.

d   Click **Setup**→**Connect** to start the Sonar Head.

e   Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**.

f   Click **Pause**.

2 Write the new IP Address to the Sonar Head.

    a Click **Setup**→**Head Network Setup**.

       Observe that the **Head Network Setup** dialog box opens.

    b Click **Read from Head** to refresh the fields in the **Head Network Setup** table.

    c Enter the new IP Address in the table.

    d Click **Write to Head**.

       Observe that a confirmation dialog box opens.

    e Click **Yes** to confirm.

       Wait for the write operation to complete.

    f Close the **Head Network Setup** dialog box.

3 Click **Setup**→**Disconnect**.

4 Apply the new IP Address to the Sonar Head.

    a Power off the Sonar Head for three seconds, then power it back up.

    b If necessary, change the computer's network adapter address to place it on the same network as the Sonar Head.

    c Click **Setup**→**System Configuration**→**Devices**→**Sonar Setup**.

    d Click the **Discover Sonar Heads** button.

       The Sonar Head with its updated IP Address should appear in the **Online Sonar Heads** table.

    e Select the Sonar Head in the **Online Sonar Heads** table, then click the **Use Discovered Head** button.

    f Close the **System Configuration** dialog box.

5 Click **Setup**→**Connect** to start the Sonar Head.

Related topics
Defining the IP address on the Sonar Processor network adapter, page 21
Head Network Setup dialog box, page 103

User interface

Topics

M3 Sonar presentation overview

By default, the M3 Sonar presentation covers the entire screen.

This M3 Sonar screen capture shows you a typical data replay situation.

The presentation provides you with a lot of information. The sonar view presents sonar echo data. The 3D Point Cloud presents profile point data that can be rotated in three dimensions. The menu system on the top gives you easy access to all the functionality offered by the M3 software. The tool bar provides buttons for functions, filters, and sonar view overlays. The bottom **Output Messages** window and bottom status bar provide diagnostic messages.

You can resize a window by clicking on the window border, then dragging it to create a smaller or larger window. Click the pin icon on the window title bar to auto hide the window. To show the window, hover your mouse over the labelled tab that appears on the side of the presentation.

A   **Menu system**

The menu system is located on the top of the presentation. To open any of the menus, click the menu title.

B   **3D Point Cloud**

Profiling mode allows you to view a real-time 3D point cloud of the sea bottom or structures under the water. You can zoom into or rotate the real-time 3D point cloud data, as well as switch to a project, top, or side view.

C   Range slider bar

You can increase or decrease the range using the range slider bar to the left of the sonar view. Click the top arrows to increase or decrease the far range. Click the bottom arrows to increase or decrease the near range.

D   Profiling Settings

In the **Profiling Settings** dialog box, you can choose to display only the sonar view, only the 3D Point Cloud, or both. The profile point data can be exported to a file so that third-party software can extract depth, distance, and volume measurements.

E   Output Messages

The **Output Messages** window displays information, diagnostic, and error messages. There are two tabs in this window: one for host messages and one for head messages.

F   Sonar view

All echo information offered by the M3 Sonar is shown in the sonar view.

G   Tool bar

The tool bar provides access to useful functions, such as the ability to take a screenshot or change your TVG settings. In addition, several measuring tools are available.

H   Information Widget

The **Information Widget** displays sonar pulse details as well as vessel speed, sound speed, heading, and latitude/longitude coordinates from external sensors.

I   Menu Widget

The **Menu Widget** provides controls to record and export data, play or pause playback, and configure the grid.

J   Display Widget

The **Display Widget** allows you to adjust the filter strength, change the display gain, and choose your echo colours.

K   Playback Console

Control playback using the **Playback Console**. You can stop, pause, fast forward, or advance through the recording one ping at a time. You can also repeat playback of the file on a never-ending loop.

L   Status bar

The status bar is located at the bottom of the M3 Sonar presentation. It allows you to view the system status and disk space. You can also access detailed telemetry info.

The M3 menu system

The menu system is located on the top of the presentation. To open any of the menus, click the menu title.

To select operational parameters on the M3 Sonar, use the menu system. The menus are organized in a tree structure. Some of the menu items open dialog boxes to offer additional choices.

A   The **File** menu allows you to open a recorded file, as well as choose the recording and exporting formats of your data files. You can also convert your data to a video file (AVI or MP4 format) or load your user settings from a previous software version.

B   Use the **Display** menu to control the visual aspects of the system, and to show or hide various elements in the presentation.

C   You can connect to the Sonar Head using the **Setup** menu. You can also configure the system, choose your preferences, set up the coordinate system, or program the Sonar Head.

D   The **Sonar Applications** menu lists various operating modes used for different applications. Each mode has its own pre-defined characteristics, such as differing ranges, angular resolutions, and pulse types. You can configure which applications will appear by opening the **Customize Apps** dialog box, which is the last item in this list.

E   The **Advanced** menu is intended for experienced users or for testing purposes and is not required for normal operation of the M3 Sonar. This menu requires a software license key, and will not appear if you do not have one.

F   The **About M3** dialog box in the **Help** menu displays hardware and software information and provides a link to the software Reference Manual.

Sonar view

All echo information offered by the M3 Sonar is shown in the sonar view.

Description

The range and bearing or X/Y coordinates of the current mouse cursor position is shown at the bottom of the sonar view.

Click the icon in the top-left corner of the sonar view to open the **Information Widget**. The **Information Widget** displays sonar pulse details as well as vessel speed, sound speed, heading, and latitude/longitude coordinates from external sensors.

Click the icon in the bottom-right corner of the sonar view to open the **Display Widget**. The **Display Widget** allows you to adjust the filter strength, change the display gain, and choose your echo colours.

Right click inside the sonar view to display the range menu. You can increase or decrease the range using the range slider bar to the left of the sonar view. Enabling Depth Tracking will automatically adjust the range according to the current depth when the head is running. To enable this feature, select the **Depth Tracking** checkbox in the **Profiling Settings** dialog box.

Tip

You can change the shape of the grid (range rings), or turn it off. Click the icon in the top-right corner of the sonar view to open the **Menu Widget***, then click* **Grid** *to cycle through the options.*

You can change the physical size of the sonar view by clicking on the left view border, then dragging it to create a smaller or larger window. You can also make the sonar view full screen by clicking **Display**→**Full Screen** or by clicking the **Show Full Screen** button in the tool bar.

Interpreting the sonar view

The sonar view is a map of the echo returns over the scanned area.

A sequence of colours is used to show the relative strengths of the echo returns. Several colour scale options are available. Most of them use darker colours to indicate weak returns, and brighter colours to indicate stronger returns.

Bright spots in the image indicate strong sonar targets. Generally, bright spots indicate a hard, highly reflective surface. Dark spots in the image indicate either areas of low reflectivity (soft areas), or possibly an acoustic shadow zone behind a target.

Most targets will block the transmission of sound — either by reflecting it, or absorbing it. This will leave a shadowed area behind the target that is not ensonified and therefore will not generate any echoes. This is very similar to the shadow formed when an object is illuminated with a single light source. The shadow behind a target can often yield more information about the target than the reflections from the target itself. The shadow will often reveal the shape of the target, but you must remember that the shape will usually be distorted according to the position of the Sonar Head relative to the target and the bottom, and according to the slope of the bottom. It is often possible to estimate the height of a bottom target based on the length of the shadow and the known height of the Sonar Head.

Noise and interference

Acoustic noise and bubble interference can affect the quality of the sonar view image.

It is usually easy to recognize interference from other acoustic sources such as echo sounders, pingers, and other sonars. These sources all produce pulses at regularly timed intervals and will therefore tend to create a regular or symmetrical pattern of blips on the screen. Mechanical noise sources such as propellers, hydraulic pumps, and thrusters, are usually more directional and tend to show up only when the sonar is pointed directly at them.

In addition, sonar signals are easily blocked by air or gas bubbles in the water or on the transducer face. As an example, the aeration present in the wake of a vessel will often last for ten to twenty minutes and effectively mask out most sonar returns on the far side.

The aeration partially blocks the outgoing pulses as well as any returns. Another source of gas bubbles can be found when a sea bottom containing decomposing organic matter is disturbed by dredging or ploughing.

3D Point Cloud

The 3D Point Cloud presents profile point data that can be rotated in three dimensions.

Description

Profiling mode allows you to view a real-time 3D point cloud of the sea bottom or structures under the water. The profile point data can be exported to a file so that third-party software can extract depth, distance, and volume measurements.

Tip

In the **Profiling Settings** *dialog box, you can choose to display only the sonar view, only the 3D Point Cloud, or both. If you can't see the 3D Point Cloud, ensure that either Image and Profile or Profile Only are selected. You can also change the point cloud display parameters in this dialog box.*

To change the depth range settings in the **3D Point Cloud** window, click **Depth**, uncheck the **Adaptive Palette** box, enter the top and bottom depth, then click **Apply**. To change the colour scale of the 3D Point Cloud, click **Depth**, check the **Adaptive Palette** box, then click **Apply**.

The following controls can be used in the **3D Point Cloud** window.

• Use the mouse scroll wheel to zoom in or out.

• To rotate the point cloud, press and hold the left mouse button, then move the mouse.

• To clear the point cloud, double click the right mouse button.

The following buttons, found in the top-right corner of the **3D Point Cloud** window, offer different views and measurements. The currently selected view or tool will be underlined.

A **Project view**: An isometric view where you can rotate the point cloud in three dimensions.

B **Top view**: A top-down view where you can measure distances or place target markers.

C **Side view**: You can see the elevation of the points in the side view.

D **Marker**: Click to select this tool in the Top view, then click anywhere in the **3D Point Cloud** window to place a target marker overlay. You can place as many markers as you need.

Note

Georeference information on each marker will be added to a ".kml" file in the folder "C:\KML\M3_Vxxxx\Recordings".

E **Tape Measure**: Click to select this tool in the Top view, then click and hold the left mouse button and drag the mouse to measure distances.

Related topics

Tool bar description

The tool bar provides buttons for functions, filters, and sonar view overlays.

The tool bar provides access to useful functions, such as the ability to take a screenshot or change your TVG settings. In addition, several measuring tools are available.

A   **Arrow**

Click to use the default arrow cursor. With the default cursor you can select and manipulate objects on the screen.

B   **Wiper**

Removes items from the sonar view. When selected, click on each overlay you wish to delete.

C   **Zoom windows**

You can open up to four true zoom windows when running a Sonar Head.

D   **Tape Measure**

Measures distances on the sonar view. Also allows you to place a measurement overlay on the sonar view.

E   **Protractor**

You can use the protractor to measure the angle between two lines, then place the resulting overlay in the sonar view.

F   **String Measure**

You can use the string measure tool to define an area. The size and perimeter of the area will be calculated for you.

G   **Text Label**

The text label tool allows you to place comments on the screen.

H   **Reference Cursor 1**

I   **Reference Cursor 2**

You can place one or two reference cursors as overlays on the sonar view. When you place two cursors, an additional overlay will appear with information about the cursors.

J   Image Quality Analysis System

The Image Quality Analysis System (IQAS) analyzes the image quality of a point target, or can be used to measure a known point target against a specification.

K   Y1

Horizontal line overlay that can be used to mark the depth of the natural seabed (for use when excavating).

L   Y2

Horizontal line overlay that can be used to mark the depth of a trenching target (for use when excavating).

M   Show Full Screen

Click to make the sonar view full screen. Press the **Esc** key to exit full screen mode.

N   Save image with overlays

Click this button to save sonar view images, including any overlays you've placed in the sonar views.

O   Save image without overlays

Click this button to save sonar view images, excluding any overlays you've placed in the sonar views.

P   TVG Setup dialog box

The **TVG** (Time Variable Gain) function is used to compensate the received echo data for the loss of acoustic energy due to geometric spread and absorption.

Q   Average Filter

Clicking the "A" button will enable the Average Filter. This filter reduces noise. Slow-moving features persist on-screen.

R   Background Removal

Clicking the "B" button will enable the Background Removal filter. This filter removes stationary parts of the background to enhance moving objects (such as fish, for example).

S   Edge Enhancement

Clicking the "E" button will enable Edge Enhancement. This filter enhances the edge of moving features.

T   No Filter

Disables any filters. The sonar view will display an unfiltered sonar image.

Status bar

The status bar is located at the bottom of the M3 Sonar presentation. It allows you to view the system status and disk space. If network logging is enabled, you can view the sonar connection performance. You can also access detailed telemetry info.

A   **Recording information**

Displays the filename when you are recording data.

B   **Depth Tracking**

If Depth Tracking is enabled, then this text will appear when the head is running.

C   **Time synchronization status**

Displays the status of the time synchronization process if *Host* Time Sync Mode is enabled. "Syncing" displays during time synchronization (which takes approximately two minutes). "Sync OK" displays when time synchronization is complete. "Sync Error" displays if the computer clock is irregular (for example, due to interference from the time source). In this case, restart the synchronization process by disconnecting, then reconnecting, the Sonar Head.

D   **Sound Speed**

The sound speed is displayed in green (after filtering and thresholding). This text will display in blue during playback if **Override Sound Speed** is enabled.

E   **GeoTiff**

If GeoTiffs are automatically being created, then this text will display in green.

F   **Disk space monitor**

Displays the percentage of hard drive space you have available for data recordings.

G   System status

Shows the system status, such as "Active" when the system is connected to a Sonar Head, "Inactive" when not connected, or "Playback" when replaying a recorded file. Clicking the system status text will open a **Connection Status** window. You can click on **M3 Sonar** in the **Connection Status** window to open a **Head Status** window showing telemetry information.

H   Sonar connection performance

If network logging is enabled in the **System Configuration** dialog box, then the ping loss, packet loss, and the last ping data rate will be displayed.

I   Offsets

If Mounting Offsets Override is enabled then this text will appear during playback.

Tip

Right-click on the status bar to configure it. You can show or hide any of the information displayed here.

Related topics

Recording sonar data, page 41
System Configuration dialog box - Master Reference page, page 120
System Configuration dialog box - Mounting Offsets page, page 123
Saving GeoTiff files, page 45
System Configuration dialog box - Sonar Setup page, page 107
Starting operation of the Sonar Head, page 30

Menu system

Topics

File menu

The **File** menu allows you to open a recorded file, as well as choose the recording and exporting formats of your data files. You can also convert your data to a video file (AVI or MP4 format) or load your user settings from a previous software version.

How to open

To open this menu, click the menu title.

Description

- **Playback**

  The *Playback* mode allows you to choose the echo data file(s) you wish to play back.

- **Stop Playback**

  Clicking *Stop Playback* will stop the playback of a recording. You can also use the **Playback Console** to control playback.

- **Recording Format**

  Click *Recording Format* to choose between recording raw sonar data (to a ".mmb" file) or recording beamformed sonar data (to a ".imb" file).

- **Exporting Format**

  You can choose the exporting format for sonar data. The default ".all" format is the Kongsberg EM datagram standard and can be processed by third-party software.

- **Convert to Video**

  The **Convert to Video Format** dialog box allows you to convert an MMB or IMB file to a video file (AVI or MP4 format).

- **Load User Settings**

  Click to browse for a "UsersInfo.xml" file (in the folder **C:\KML\M3_Vxxxx\bin\Settings**) from a previous software version. You can import your previous settings to a new version of the M3 software.
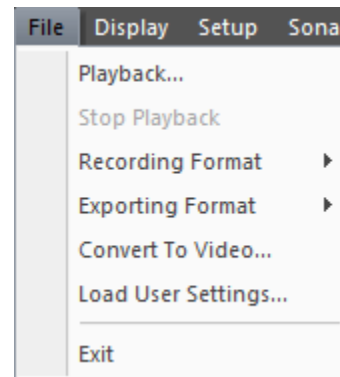
- **Exit**

  Click to close the M3 software.

Display menu

Use the **Display** menu to control the visual aspects of the system, and to show or hide various elements in the presentation.

How to open

To open this menu, click the menu title.

Description

- **Enable Target Marker**

  Click to enable the Target Marker function. You can press 0–9 to place a marker in the sonar view that is stamped with time and location information. In addition, you can export this information to a serial or UDP port.

- **Delete All Markers**

  Click to remove all target markers from the sonar view.

- **Full Screen**

  Click to make the sonar view full screen. Press the **Esc** key to exit full screen mode.

- **Output Messages Window**

  Click to show or hide the **Output Messages** window. The **Output Messages** window displays information, diagnostic, and error messages.

- **Playback Console**

  Click to show or hide the **Playback Console**. Control playback using the **Playback Console**. You can stop, pause, fast forward, or advance through the recording one ping at a time. You can also repeat playback of the file on a never-ending loop.

- **3D Point Cloud**

  Click to show or hide the **3D Point Cloud** window. The 3D Point Cloud presents profile point data that can be rotated in three dimensions.

- **Profiling Settings**

  Click to show or hide the **Profiling Settings** dialog box. Profiling mode allows you to view a real-time 3D point cloud of the sea bottom or structures under the water.

- **Rotator Control**

  Click to show or hide the **Rotator Control** dialog box for each rotator you have installed.

- **Tool bar**

  Click to show or hide the tool bar. The tool bar provides buttons for functions, filters, and sonar view overlays.

- **Annotations**

  Click to enable or disable the bearing and range annotations in the sonar view.

- **Font Size**

  You can choose between using a normal or a large font size throughout the M3 software.

- **Palette**

  Click *Palette* to choose your preferred echo colours. Which colour scale to use is mainly a personal preference based on ambient light conditions, the nature of the echoes and your own experience.

- **Sector Orientation**

  You can rotate the sonar view so that it is facing left, right, up, or down.

- **Heading Overlay**

  If your Sonar Head is forward looking, click to enable or disable the heading overlay. When this feature is enabled, the degree annotations in the sonar view will change to reflect the current sonar heading.

- **Speckle Filter**

  Click to enable or disable the Speckle Filter. This filter reduces noise (the grainy "salt-and-pepper" pattern) in uniform areas of the sonar view. Distinguishable details in features and targets will be retained.

- **Reset to Default Layout**

  Click to reset the presentation layout. All windows and dialog boxes will be docked in their default location. In addition, some display elements are hidden by default.

Setup menu

You can connect to the Sonar Head using the **Setup** menu. You can also configure the system, choose your preferences, set up the coordinate system, or program the Sonar Head.

How to open

To open this menu, click the menu title.

Description

- **Connect**

  Click *Connect* to connect to the Sonar Head and start "pinging".

  ### Note

  When the Sonar Head is running, this menu command will change to Disconnect.

- **Geo Projection**

  Click to open the **Geo Projection** dialog box. You can configure the coordinate system using the **Geo Projection** dialog box.

- **Preferences**

  Click to open the **Preferences** dialog box. The **Preferences** dialog box is used to set up system preferences such as units of measure, time format, etc.

- **Head Network Setup**

  Click to open the **Head Network Setup** dialog box. The **Head Network Setup** dialog box allows you to change the Sonar Head network parameters, such as the IP address. This dialog box is only available when the Sonar Head is connected and paused.

- **Head Firmware Configuration**

  Click to open the **Head Firmware Configuration** dialog box. The **Head Firmware Configuration** dialog box allows you to upgrade the Sonar Head firmware. This dialog box is only available when the Sonar Head is connected and paused.

- **System Configuration**

  Click to open the **System Configuration** dialog box. This dialog box allows you to set up the Sonar Head, external sensors (such as a GPS or Motion Reference Unit), and rotators. In addition, you can configure the deployment of the M3 Sonar and enter mounting offsets.

Sonar Applications menu

The **Sonar Applications** menu lists various operating modes used for different applications. Each mode has its own pre-defined characteristics, such as differing ranges, angular resolutions, and pulse types.

How to open

To open this menu, click the menu title.

Description

*   **EIQ**

    This sonar application captures high-quality images. At short ranges the images are relatively insensitive to the motion of the sonar. At longer ranges the sonar should be relatively motionless.

    Note ———————————————

    This application is less sensitive to motion than EIQ - Fine.

*   **EIQ - Fine**

    This sonar application captures very high-quality images. At short ranges the images are relatively insensitive to the motion of the sonar. At longer ranges the sonar should be relatively motionless.

*   **EIQ - Ultra Fine**

    This sonar application captures the highest quality images possible. At short ranges the images are relatively insensitive to the motion of the sonar. At longer ranges the sonar should be relatively motionless.

*   **Ethernet Test - 1000Mbps**

    You can test your 1000Mbps link to verify that the link throughput is available. The test uses 80 percent utilization and uses *EIQ - Ultra Fine*.

*   **Ethernet Test - 100Mbps**

    You can test your 100Mbps link to verify that the link throughput is available. The test uses 80 percent utilization and uses *EIQ*.

- **Ethernet Test - 10Mbps**

  You can test your 10Mbps link to verify that the link throughput is available. The test uses 80 percent utilization and uses *Imaging 30°*.

- **Imaging 15°**

  You can use this sonar application for navigation and obstacle avoidance. This application uses a 15-degree Tx vertical beamwidth.

- **Imaging 3°**

  Use this sonar application primarily for profiling using a 3-degree Tx vertical beamwidth. You may also use this application for shallow-water obstacle avoidance.

- **Imaging 30°**

  You can use this sonar application for navigation and obstacle avoidance. This application uses a 30-degree Tx vertical beamwidth.

- **Imaging 30° - Short Range**

  You can use this sonar application for the support of manipulator operations, with the highest-speed short-range imaging. Speed and detail are more important than overall image quality.

- **Imaging 7°**

  You can use this sonar application to provide long-range obstacle avoidance and navigation into the work site. This application uses the highest pulse power. Pulse durations are used to get a reliable long-range detection. The trade-off is a reduction in the ping rate.

- **Profiling**

  Use this sonar application for the automated point extraction of the sea bottom or structures to create a real-time 3D Point Cloud. The *Profiling* application has a slow ping repetition rate and is best suited for slow-moving ROVs, trenchers, and ploughs.

- **Profiling - Bathy**

  This sonar application is ideal for Bathymetry Surveys.

- **Profiling - Fast**

  This sonar application performs using much higher ping rates than the normal *Profiling* application. This application is ideal for surface-vessel surveys.

- **ROV Navigation**

  This sonar application automatically switches between *EIQ - Fine*, *EIQ*, and *Imaging 30°* applications. *EIQ - Fine* is used to provide the highest-resolution images with a good image update rate at short ranges. *EIQ* is used for medium ranges. *Imaging 30°* is used for long ranges.

- **Rub Test**

  Use this sonar application as part of a system check to verify that the transducer is receiving a signal. Rub the transducer and verify that bright streaks or rings appear in the sonar view.

- **Customize Apps**

  Click to open the **Customize Apps** dialog box. You can select which sonar applications will appear in the **Sonar Apps** menu.

Advanced menu

The **Advanced** menu is intended for experienced users or for testing purposes and is not required for normal operation of the M3 Sonar. This menu requires a software license key, and will not appear if you do not have one.

How to open

To open this menu, click the menu title.

Description

- **Power User Settings**

  Click to open the **Power User Settings** dialog box. The **Power User Settings** dialog box allows you to configure advanced controls. You can also override the beamlist or processing type during playback. The Ping Rate, Update Rate, and Mode ID are displayed for your information.

- **Program Head**

  Click to open the **Program Head** dialog box. You can perform advanced tasks in the **Program Head** dialog box, such as configuring production settings, making head corrections, or changing transmit pulse definitions. This dialog box is only available when the Sonar Head is connected and paused.

- **Convert to Profile**

  Click to open the **Profile Batch Conversion** dialog box. The **Profile Batch Conversion** dialog box allows you to convert many data files at once into another format. You can convert ".mmb", ".imb", and ".pmb" files.

- **Raw Data Frequency Spectrum**

  Click to open the **Raw Data Spectrum** window. The **Raw Data Spectrum** window allows you to check the data for noise in real-time.

- **Enable Network Sniffer**

  Click to open the **Network Sniffer** window. The **Network Sniffer** window allows you to monitor network traffic in real-time. When this feature is enabled, the menu option will change to **Disable Network Sniffer**.

  Note _____

  To use this feature, you must run the M3 software as an administrator (right-click on the icon and select **Run as administrator***).*

Help menu

The **About M3** dialog box in the **Help** menu displays hardware and software information and provides a link to the software Reference Manual.

How to open

To open this menu, click the menu title.

Description

About M3

The **About M3** dialog box displays the software version of the M3 software. The version described in this Reference Manual is 2.1.

Functions and dialog boxes

Topics

File menu

The **File** menu allows you to open a recorded file, as well as choose the recording and exporting formats of your data files. You can also convert your data to a video file (AVI or MP4 format) or load your user settings from a previous software version.

How to open

To open this menu, click the menu title.

Description

- **Playback**

  The *Playback* mode allows you to choose the echo data file(s) you wish to play back.

- **Stop Playback**

  Clicking *Stop Playback* will stop the playback of a recording. You can also use the **Playback Console** to control playback.

- **Recording Format**

  Click *Recording Format* to choose between recording raw sonar data (to a ".mmb" file) or recording beamformed sonar data (to a ".imb" file).

- **Exporting Format**

  You can choose the exporting format for sonar data. The default ".all" format is the Kongsberg EM datagram standard and can be processed by third-party software.

- **Convert to Video**

  The **Convert to Video Format** dialog box allows you to convert an MMB or IMB file to a video file (AVI or MP4 format).

- **Load User Settings**

  Click to browse for a "UsersInfo.xml" file (in the folder **C:\KML\M3_Vxxxx\bin\Settings**) from a previous software version. You can import your previous settings to a new version of the M3 software.

- **Exit**

  Click to close the M3 software.

Topics

Recording Format

Click *Recording Format* to choose between recording raw sonar data (to a ".mmb" file) or recording beamformed sonar data (to a ".imb" file).

.mmb

.mmb is the default recommended recording format.

This is raw element data, not beamformed, in a 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.

If you want to keep your recordings in .mmb format but process your data in .imb format, you can convert .mmb files to .imb files using a batch conversion utility.

.imb

This format consists of beamformed data in a 32-bit floating point complex format. Data body size is determined by the number of beams and samples. Different modes may form a different number of beams. Therefore, data body size may change depending upon the mode.

.imb files are easier to work with when using the M3 MATLAB toolbox and can be used with third-party software, such as Echoview.

Note _____

If files are recorded in .imb format, they cannot be converted to .mmb.

_____

Related topics

Exporting Format

You can choose the exporting format for sonar data. The default ".all" format is the Kongsberg EM datagram standard and can be processed by third-party software.

.xyz

This is an ASCII point cloud format for M3 rotator 3D profiling data on a tripod only.

.all (recommended default)

This M3 profiling data format uses the Kongsberg EM datagram standard. The ".all" file can be processed by third-party software such as Hypack, QINSy, Caris, and EIVA.

Convert to Video Format dialog box

The **Convert to Video Format** dialog box allows you to convert an MMB or IMB file to a video file (AVI or MP4 format).

How to open

This dialog box is opened from the **File** menu.

Description

Use this dialog box if you want to export a recording to a format that is playable by any media player. This function is useful if you wish to share recordings with others who do not have the M3 software installed on their computers, or if you wish to upload your recording to an online service.

Details

Frame Rate

- **Match Ping Rate**

  Select if you want the converted video frame time to match the ping time.

- **One Frame per Ping**

  Select if you want each video frame to be converted from each sonar ping.

Gain Control

- **Auto**

  Select to automatically adjust the gain during the video conversion.

- **Manual**

  Select to apply a fixed gain setting to the entire video. Use this setting when auto gain produces a video that is either too dark or too bright for a particular data set. Click and drag the slider to choose the gain setting.

Resolution

  You can select the desired resolution for the converted video. Note that higher resolutions require longer conversion times and result in larger file sizes.

Palette

  Select your preferred echo colours for the converted video file. Which colour scale to use is mainly a personal preference based on ambient light conditions, the nature of the echoes and your own experience.

Display Mirror

  Check to mirror the sonar image in the converted video file (port to starboard, starboard to port).

Source File

  Click this button to select a recording for conversion (only .mmb or .imb files are supported).

Target file naming convention

  Select a name for the converted file. Selecting *Auto name* will preserve the original filename and save the converted file in the same location as the original. Selecting *User defined* will allow you to enter your own filename into the **Target File** box. There are also some predefined filenames available.

Target File

  Click this button to select a filename and location for the converted video file. This button is only available if you select *User defined* for the **Target file naming convention**.

Convert

    Click this button to start the conversion.

Note ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

The range annotations (metres or feet) displayed in the converted video file will be the same as currently configured in the M3 software. You can change the units of measurement in the **Preferences** *dialog box.*

Related topics

Display menu

Use the **Display** menu to control the visual aspects of the system, and to show or hide various elements in the presentation.

How to open

To open this menu, click the menu title.

Description

- **Enable Target Marker**

  Click to enable the Target Marker function. You can press 0–9 to place a marker in the sonar view that is stamped with time and location information. In addition, you can export this information to a serial or UDP port.

- **Delete All Markers**

  Click to remove all target markers from the sonar view.

- **Full Screen**

  Click to make the sonar view full screen. Press the **Esc** key to exit full screen mode.

- **Output Messages Window**

  Click to show or hide the **Output Messages** window. The **Output Messages** window displays information, diagnostic, and error messages.

- **Playback Console**

  Click to show or hide the **Playback Console**. Control playback using the **Playback Console**. You can stop, pause, fast forward, or advance through the recording one ping at a time. You can also repeat playback of the file on a never-ending loop.

- **3D Point Cloud**

  Click to show or hide the **3D Point Cloud** window. The 3D Point Cloud presents profile point data that can be rotated in three dimensions.

- **Profiling Settings**

  Click to show or hide the **Profiling Settings** dialog box. Profiling mode allows you to view a real-time 3D point cloud of the sea bottom or structures under the water.

- **Rotator Control**

  Click to show or hide the **Rotator Control** dialog box for each rotator you have installed.

- **Tool bar**

  Click to show or hide the tool bar. The tool bar provides buttons for functions, filters, and sonar view overlays.

- **Annotations**

  Click to enable or disable the bearing and range annotations in the sonar view.

- **Font Size**

  You can choose between using a normal or a large font size throughout the M3 software.

- **Palette**

  Click *Palette* to choose your preferred echo colours. Which colour scale to use is mainly a personal preference based on ambient light conditions, the nature of the echoes and your own experience.

- **Sector Orientation**

  You can rotate the sonar view so that it is facing left, right, up, or down.

- **Heading Overlay**

  If your Sonar Head is forward looking, click to enable or disable the heading overlay. When this feature is enabled, the degree annotations in the sonar view will change to reflect the current sonar heading.

- **Speckle Filter**

  Click to enable or disable the Speckle Filter. This filter reduces noise (the grainy "salt-and-pepper" pattern) in uniform areas of the sonar view. Distinguishable details in features and targets will be retained.

- **Reset to Default Layout**

  Click to reset the presentation layout. All windows and dialog boxes will be docked in their default location. In addition, some display elements are hidden by default.

Topics

Target Marker Export dialog box

The Target Marker function is primarily used for remotely operated vehicle (ROV) navigation. Third-party ROV software can use the time and location information to steer the ROV toward the target.

How to open

This dialog box is opened from the **Display** menu.

Description

You can place a marker on a target of interest in the sonar view. This marker is stamped with both time and location details. You can export this time and location information to a serial port (or UDP port 20004).

To start using target markers, click **Display**→**Enable Target Marker**.

The **Target Marker Export** dialog box opens when you enable the Target Marker function.

Choose a serial port in the **Target Marker Export** dialog box, then click **OK** to enable serial port export. Click **Cancel** to use the Target Marker function without exporting to a serial port. UDP export is available in both cases.

Once the Target Marker function is enabled, pressing number keys 0 to 9 will place a marker at the location of the arrow cursor in the sonar view.

Details

Port

Select which serial port you want to export the time and location information to.

Serial port parameters

The serial port parameters are fixed and cannot be changed. Ensure that your third-party software is set to receive the data using these values.

- **Baud Rate**

  9600

  The speed of the serial communication.

- **Data Bits**

  8

  The number of data bits in each character.

- **Parity**

  N

  If required, a parity bit is used in a simple error detection algorithm for a serial port.

- **Stop Bits**

  1

  This parameter is used to indicate the end of the transmission. It is usually set to *1*.

Target Marker format

$MSTRK,xx,hhmmss.ss,nnnnnnnn.nn,c,eeeeeeee.ee,c,U<CR><LF>

$MSTRK	Start character and prefix.
xx	Target number, ranging from 00 to 99.
hhmmss.ss	UTC time in hours, minutes, and seconds.
nnnnnnnn.nn	Northing or Latitude depends on the "U" definition.
c	N: North; S: South
eeeeeeee.ee	Easting or Longitude depends on the "U" definition.
c	E: East; W: West
U	'f': Northing/Easting in feet. Variable number of digits for Northing/Easting and variable number of digits for decimal-fraction of Northing/Easting.
	'm': Northing/Easting in metres. Variable number of digits for Northing/Easting and variable number of digits for decimal-fraction of Northing/Easting.
	'l': Lat/Lon in degrees. For Latitude: two fixed digits of Latitude degrees, two fixed digits of minutes, and a variable number of digits for decimal-fraction of minutes. For Longitude: three fixed digits of Longitude degrees, two fixed digits of minutes, and a variable number of digits for decimal-fraction of minutes.
CRLF	Termination

Related topics

Playback Console

You can play back a previously recorded data file to view the sonar image sequence captured during operation of the Sonar Head. Control playback using the **Playback Console**.

How to open

The **Playback Console** is opened from the **Display** menu. The **Playback Console** is also opened automatically when you choose a file for playback.

Description

A   The name of the playback file in use and the time and date of the recording.

B   The playback progress bar. Click and hold, then drag your mouse along the bar to search through the recording. Click anywhere in the bar to jump to a specific point.

C   Click to stop the recording.

D   Click to pause the recording.

E   Click to fast forward through the recording.

F   Click to advance through the recording one ping at a time.

G   Click to repeat playback of the file on a never-ending loop.

H   Click to close the **Playback Console**. Closing the Console will not stop playback.

Related topics

Profiling Settings dialog box

Profiling mode allows you to view a real-time 3D point cloud of the sea bottom or structures under the water.

How to open

This dialog box is opened from the **Display** menu.

Description

In the **Profiling Settings** dialog box, you can choose to display only the sonar view, only the 3D Point Cloud, or both. The profile point data can be exported to a file so that third-party software can extract depth, distance, and volume measurements.

Details

Display Mode

- **Image**

  Select if you want to update the sonar view only.

- **Image and Profile**

  Select if you want to update both the sonar view and the 3D Point Cloud.

- **Profile Only**

  Select if you want to display only the profile points in the sonar view and 3D
  Point Cloud.

Point Size

Select the size of the displayed profile points.

Algorithm

Select the profiling algorithm. The default setting is optimal for most conditions. The
split beam algorithm will improve point detection with sub-degree accuracy at a low
grazing angle (but with the compromise of a lower ping rate).

Point Selection

Select which profile points to display. You can choose to display only the points closest
to the sonar transducer origin, or only the points with the strongest signal returns.

Parameters

- **Max Range**

  Select the upper range limit of the profile points. No profile points will be detected
  above this range.

  Note _____

  *The maximum range slider limit is set by the current range selected. Right-click in
  the sonar view to set the range.*

  _____

- **Min Range**

  Select the lower range limit of the profile points. No profile points will be detected
  below this range.

- **Clutter Suppression**

  This feature removes the number of detected noise profile points. If the box is
  unchecked, the system will automatically adjust the clutter suppression. You can
  choose your own clutter suppression percentage by checking the box and dragging
  the slider. Setting the suppression to zero will disable this feature. Setting the
  suppression to 100 will suppress all noise detections.

Depth Tracking

Check this box to automatically adjust the range according to the current depth when the head is running. This feature is only available if *Image and Profile* or *Profile Only* is selected for the **Display Mode**.

Note ──

When the head is running, the estimated depth below the Sonar Head is shown in real time. During playback, the recorded depth is shown.

───

Related topics
3D Point Cloud, page 67

Setup menu

You can connect to the Sonar Head using the **Setup** menu. You can also configure the system, choose your preferences, set up the coordinate system, or program the Sonar Head.

How to open

To open this menu, click the menu title.

Description

- **Connect**

  Click *Connect* to connect to the Sonar Head and start "pinging".

  Note ─────────────

  When the Sonar Head is running, this menu command will change to Disconnect.

- **Geo Projection**

  Click to open the **Geo Projection** dialog box. You can configure the coordinate system using the **Geo Projection** dialog box.

- **Preferences**

  Click to open the **Preferences** dialog box. The **Preferences** dialog box is used to set up system preferences such as units of measure, time format, etc.

- **Head Network Setup**

  Click to open the **Head Network Setup** dialog box. The **Head Network Setup** dialog box allows you to change the Sonar Head network parameters, such as the IP address. This dialog box is only available when the Sonar Head is connected and paused.

- **Head Firmware Configuration**

  Click to open the **Head Firmware Configuration** dialog box. The **Head Firmware Configuration** dialog box allows you to upgrade the Sonar Head firmware. This dialog box is only available when the Sonar Head is connected and paused.

- **System Configuration**

  Click to open the **System Configuration** dialog box. This dialog box allows you to set up the Sonar Head, external sensors (such as a GPS or Motion Reference Unit), and rotators. In addition, you can configure the deployment of the M3 Sonar and enter mounting offsets.

Topics

Geo Projection dialog box

You can configure the coordinate system using the **Geo Projection** dialog box.

How to open

This dialog box is opened from the **Setup** menu.

Description

This dialog box allows you to convert the latitude and longitude data from your GPS into a coordinate system of your choice. For example, you may wish to match the coordinate system used in your survey maps. You can display location data as Easting and Northing coordinates measured from a horizontal datum. You can also set the zone so that accurate location data is embedded in any GeoTiff files that you create.

Details

Datum

- **Latitude / Longitude**

  Select a datum for latitude and longitude coordinates.

- **Northing / Easting**

  Select a datum for a Northing/Easting projection.

- **Zone**

  Select a zone for a Northing/Easting projection.

- **Display Coords In**

  Choose which coordinate format you want to use in the sonar view when displaying location information.

- **Latitude / Longitude Format**

  Choose whether to display the latitude/longitude format in degrees, degrees and minutes, or degrees, minutes, and seconds.

- **Datum Parameters**

  The **Datum Parameters** button will become available when selecting the *BEIJING_1954* datum. Clicking the **Datum Parameters** button will open a dialog box with a number of fields specific to this datum.

Calculator

  You can use the calculator as a tool to convert your location from one coordinate system to another.

Preferences dialog box

The **Preferences** dialog box is used to set up system preferences such as units of measure, time format, etc. This dialog box also allows you to select the save location for screenshot images and recorded sonar data files.

How to open

This dialog box is opened from the **Setup** menu.

Description

The **Preferences** dialog box allows you to customize the software. In addition, you can configure features such as GeoTiff Auto Save and UDP Data Export. You can also configure unique filenames and save locations.

Details

Units

- **Meters**

  Select to display all units of measurement in meters.

- **Feet**

  Select to display all units of measurement in feet.

Cursor Options

- **Range / Bearing**

  Select to show the range and bearing of the current mouse position at the bottom of the sonar view.

- **X / Y**

  Select to show the X and Y coordinates of the current mouse position at the bottom of the sonar view.

- **Geographic**

  Check this box if you want to display the coordinates of the mouse position at the bottom of the sonar view.

  Tip ———————————————————————————————

  You can configure the coordinate system using the **Geo Projection** *dialog box.*

  ———————————————————————————————

Time System

- **Local Time**

  Select to use the current time at your location.

- **UTC Time**

  Select to use Coordinated Universal Time (UTC) time.

  Note ———————————————————————————————

  During the winter, Local Time equals standard time. During the summer, Local Time equals Daylight Saving Time (DST). Note that the offset between Local Time and UTC Time is not constant, but varies in locations where DST is used.

  ———————————————————————————————

Overlay Text

  Fill out the **Overlay Text** boxes if you wish to display information on your screenshots and data recordings.

File Saving

- **Prompt User for Filename**

    Check this box to open a "Save As" dialog box when you record data or save an image.

- **Name**

    Type any name into the text box. The chosen name will be used as prefix in all the data file names. The time/date stamp will be used as the filename if the name field is left blank.

- **Use C:\KML\M3...**

    Check this box to use the default location when saving files. Disable this setting if you want to choose alternative save locations. The **Browse** buttons will become available.

GeoTiff Auto Save

- **Distance / Time**

    To automatically save a GeoTiff file every set number of meters, select Distance and enter a value. To automatically save a GeoTiff file every set number of seconds, select Time and enter a value.

    Tip ─────────────────────────────

    Press F11 to enable or disable GeoTiff auto save. The status bar will display "GeoTiff" in green when auto save is enabled.

    ─────────────────────────────────

- **Cropped Width**

    To save a cropped GeoTiff image for mosaicking purposes, enter the percentage to crop.

UDP Data Export

- **Export to File**

    Check this box to save export data to a file on the local hard drive.

- **Port for .ALL format**

    Enter the UDP port for exporting .ALL data. You need to configure this port if you are interfacing with third-party software.

- **Remote IP Address**

  Enter the IP Address of the computer you wish to export the profile data to.

  – To disable data export, enter *0.0.0.0*.

  – To broadcast, enter *255.255.255.255*.

  – To use the local computer, enter *127.0.0.1* (for example, if your third-party software is installed on the same computer as the M3 software.

Related topics
Configuring your preferences, page 31

Head Network Setup dialog box

The **Head Network Setup** dialog box allows you to change the Sonar Head network parameters, such as the IP address.

How to open

This dialog box is opened from the **Setup** menu.

Note ──

*This dialog box is only available when the Sonar Head is connected and paused. To pause the Sonar Head, click **Setup→Connect**, then open the Menu Widget in the top-right corner of the sonar view. Click **Pause**.*

──

Description

You can program the IP address and the IP port of the M3 Sonar Head for various network environments. The factory default IP address is 192.168.1.234, and the default port number is 30.

To change the Sonar Head IP address, click **Read from Head** to get the information from the Sonar Head. Edit the fields, then click **Write to Head**.

Details

Head Name

> The name assigned to the Sonar Head. You cannot change this parameter — it is read only.

Serial Number

> The unique serial number of the Sonar Head. You cannot change this parameter — it is read only.

Automatic IP address allocation

> Determines whether the Sonar Head can be assigned an IP address from a DHCP Server. By default, the Sonar Head uses a static IP address. You cannot change this parameter — it is read only.

IP Address, Port, Subnet Mask, and Default Gateway

> These network parameters are used to identify and locate the Sonar Head on the local network. If you need to set up a unique network environment, you can change the IP Address, Port, Subnet Mask, and Default Gateway of the Sonar Head using the **Head Network Setup** dialog box.

> Note _____

> *Your Sonar Processor must be on the same network as the Sonar Head.*

_____

Get Default

> Click this button to populate the fields with the default network settings for the Sonar Head.

Write to Head

> Click this button to re-program the Sonar Head with the parameters that you have entered.

Read from Head

> Click this button to populate the fields with the current parameter values.

Related topics

Head Firmware Configuration dialog box

The **Head Firmware Configuration** dialog box allows you to upgrade the Sonar Head firmware.

How to open

This dialog box is opened from the **Setup** menu.

Note _____

*This dialog box is only available when the Sonar Head is connected and paused. To pause the Sonar Head, click **Setup→Connect**, then open the Menu Widget in the top-right corner of the sonar view. Click **Pause**.*

_____

Description

In addition to head application software, the M3 Sonar Head has receive firmware (RX FPGA) and transmit firmware (TX FPGA). You can upgrade these by selecting the configuration type, browsing for the file, then clicking the **Write** button.

Note _____

The receive hardware (RX HW) and software (RX SW) must both be on the same version. You can view the current version numbers in this dialog box.

Details

Head

      The **Head** table shows you the serial number and IP Address of the Sonar Head.

Configuration type

      Select the type of software or firmware that you are upgrading.

Configuration file

> Click the folder icon to browse for the latest software or firmware file on your local drive.

Read

> Enter a filename in the **Configuration file** box, then click **Read** to save the firmware or software to a file. You can create a backup of your current software or firmware with this feature.

Write

> Click this button to start the upgrade process. You will be prompted to confirm the upgrade.

Related topics

System Configuration dialog box - Sonar Setup page

You can discover and connect to the Sonar Head on the **Sonar Setup** page. You can also view the Sonar Head network properties and adjust the network link speed.

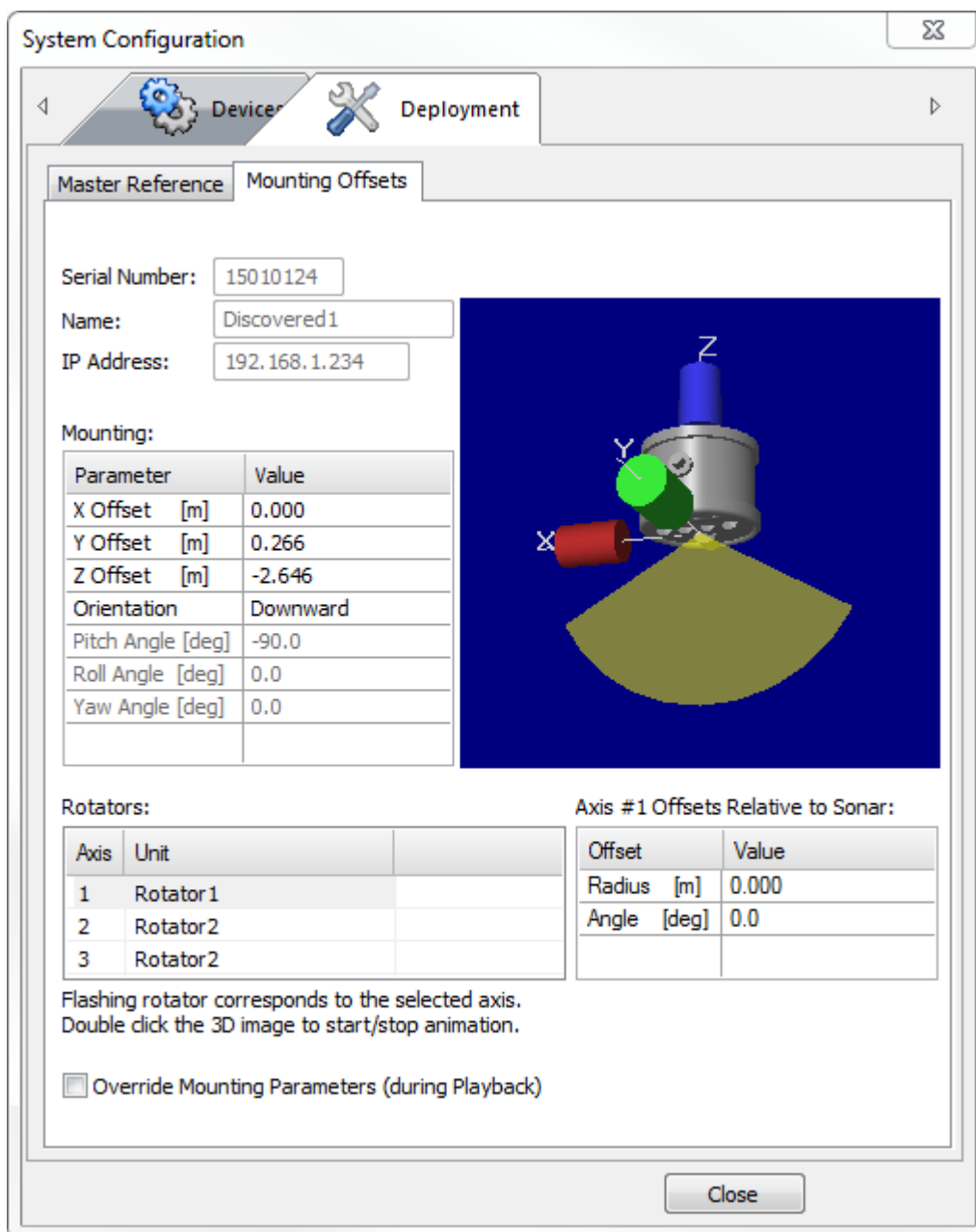**How to open**

This dialog box is opened from the **Setup** menu.

Select the **Devices**→**Sonar Setup** tab.

Note

This page is not available while the Sonar Head is running.

Description

This dialog box allows you to connect to the Sonar Head. You can connect manually or automatically each time you start the software. This dialog box also provides diagnostic network tools.

Details

Device Properties

> Tip ———————————————————————————————————————
>
> *You do not have to enter in the Device Properties manually. Clicking* **Discover Sonar Heads***, then* **Use Discovered Head** *will automatically populate the Device Properties fields.*

- **Head Name**

  You can enter any name to identify the Sonar Head.

- **Serial Number**

  The unique serial number of the Sonar Head.

- **IP Address, Port, Subnet Mask, and Default Gateway**

  These network parameters are used to identify and locate the Sonar Head on the local network. Your Sonar Processor must be on the same network as the Sonar Head.

  > Tip ———————————————————————————————————————
  >
  > *If you need to set up a unique network environment, you can change the IP Address, Port, Subnet Mask, and Default Gateway of the Sonar Head using the* **Head Network Setup** *dialog box.*

- **Trigger Mode**

  If applicable, set the **Trigger mode** to synchronize the Sonar Head with another acoustic device (such as a second M3 Sonar Head or a sub-bottom profiler). Set the trigger mode to *Master* to send out a sync pulse so that the other acoustic device can be triggered. Set the trigger mode to *Slave* to be triggered by the sync pulse from the other device. For the M3 Sonar, the default is set to *Master*.

- **Time Sync Mode**

  Time synchronization is critical for Bathymetry applications. By default, the M3 software uses the computer's time to set the Sonar Head clock (*Host* mode). Your computer can keep accurate time by using a GPS or network time server as the master time source. When connecting to the Sonar Head, it takes two minutes to synchronize the time to within five milliseconds. The M3 software will then continuously keep the Sonar Head clock in sync for the duration of the session. The status bar shows the time synchronization status.

Get Default

> Click this button to use the default network settings to connect to a Sonar Head.

Autoconnect at program start

> Check this box to connect to the Sonar Head automatically the next time the software starts.

Override Network Link Speed

> If telemetry quality is poor, check this box to limit the network link speed.

> Note ──
>
> *Overriding the network link speed will provide a more stable link connection, but a slower ping rate.*
>
> ──

Network log level

> This setting outputs network-related diagnostic messages to the **Output Messages** window and a *UDP.log file (found in the LOG directory) for troubleshooting purposes. You can select the amount of detail provided, ranging from none (No logging) to high (Detailed info). When logging is enabled, ping loss, packet loss and the last ping data rate will be displayed on the status bar.

Discover Sonar Heads

> Click **Discover Sonar Heads** to search for the sonar on the network.

Use Discovered Head

> Click **Use Discovered Head** to connect to the discovered head.

Related topics

System Configuration dialog box - Sensors Setup page

The **Sensors Setup** page allows you to configure external sensors (such as a GPS to provide navigation information).

How to open

This dialog box is opened from the **Setup** menu.

Select the **Devices**→**Sensors Setup** tab.

Note

This page is not available while the Sonar Head is running.

Description

If you have external sensors that provide speed, heading, or latitude/longitude coordinates, then this dialog box allows you to set them up. Readings from these sensors will appear in the **Information Widget** located in the sonar view.

Details

Add Device

Click this button to add a sensor for data import.

Remove Device

Click this button to remove the selected sensor from the **Sensor Devices** list.

Test Device

Click this button to start a sensor test. The sensor data will be displayed in the **Port Monitor** box.

Device Properties

- **Name**

  Enter any name into this field to label the device.

- **Protocol**

  This drop-down lists all supported datagram formats.

- **Port Location**

  The location of the port receiving external sensor data – can be either a COM port or UDP Ethernet port.

- **Port#**

  This drop-down lists the available port numbers. Select the port where the device is connected.

- **Baud Rate**

  Specify the baud rate ("speed") for the serial communication. The standard baud rate defined for NMEA communication is *4800*.

- **Data Bits**

  Select the number of data bits for the serial communication.

  Note ──────────────────────────────────

  The standard number of data bits defined for NMEA serial line communication is 8 (eight).

- **Parity**

  Specify the parity for the serial communication.

  Note ⸻

  If required, a parity bit is used in a simple error detection algorithm for a serial port. Standard parity defined for NMEA serial line communication is "None".

- **Stop Bits**

  This parameter is used to indicate the end of the transmission. It is usually set to *1*.

- **Interface**

  This drop-down lists possible serial communication methods.

Related topics

System Configuration dialog box - Rotators Setup page

Rotators are required if you wish to pan or tilt the M3 Sonar during operation. Use the **Rotators Setup** page to set up and test your rotators.

How to open

This dialog box is opened from the **Setup** menu.

Select the **Devices**→**Rotators Setup** tab.

Note ⸻

This page is not available while the Sonar Head is running.

Description

The M3 software supports the following rotators.

- Kongsberg OE 10-102: Dual-Axes Pan and Tilt unit
- Kongsberg OE10-103: Single-Axis Pan unit
- Kongsberg Mesotech 806-00360000 (SS350): Single-Axis high-precision Pan unit

You must connect your rotator to a PC COM port.

Details

Add Device

Click this button to add a rotator.

Remove Device

Click this button to remove the selected rotator from the **Rotators** list.

Test Device

Click this button to open the **Rotator Test** dialog box.

Device Properties

- **Name**

  Enter any name into this field to label the device.

- **Unit**

  Select the rotator model you have from the list.

- **Device Axis**

  Select one sonar axis if you are using a single-axis unit, or select two sonar axes for a dual-axes unit.

  There are three possible sonar axes. To view the orientation of each axis, click **System Configuration**→**Deployment**→**Mounting Offsets** and select each axis in the **Rotators** section. Observe the animation to see the rotation of each axis.

- **Port Location**

  Select which port the rotator is connected to — can either be a COM port or a Sonar port.

- **Port#**

  This drop-down lists the available port numbers. Select the port where the device is connected.

- **Baud Rate**

  Specify the baud rate ("speed") for the serial communication.

- **Data Bits**

  Select the number of data bits for the serial communication.

- **Parity**

  Specify the parity for the serial communication.

  Note ───────────────────────────────────

  If required, a parity bit is used in a simple error detection algorithm for a serial port.

  ───

- **Stop Bits**

  This parameter is used to indicate the end of the transmission. It is usually set to *1*.

- **Interface**

  This drop-down lists possible serial communication methods.

Related topics

Rotator Test dialog box

Test your rotators in this dialog box by verifying you can connect to the rotator and send commands to it.

How to open

This dialog box is opened from the **Rotators Setup** page in the **System Configuration** dialog box.

Click the **Test Device** button to open this dialog box.

Description

Use this dialog box to test the rotator rotation speed, rotator movement, and pan and tilt operation (for dual-axes rotators). If you are using a single-axis rotator, you can choose the type of rotator control dialog box you will see when running the sonar (*3D Scan* or *Pan/Tilt Control*).

If you have selected a single-axis rotator, then the following dialog box is used.

Note

*This dialog box shows the options for the Kongsberg OE10-103. The Kongsberg Mesotech 806-00360000 (SS350) is similar, except a **Calibrate** button appears. You must click this button to correctly align the rotator after powering down and powering up (this rotator does not keep absolute zero indexing). In addition, there is no option to set up soft stops (this rotator has fixed hard and soft stops).*

If you have selected a dual-axes rotator, then the following dialog box is used.

Details

Connect

Click this button to connect to the rotator.

Disconnect

Click this button to disconnect from the rotator.

Current Position

Shows the current rotator position in degrees.

A **Calibrate** button will appear here is you are using the Kongsberg Mesotech 806-00360000 (SS350) rotator. Click this button to reset the zero index after powering down then powering up.

Directional Move

For single-axis rotators, use the **Speed** control to set the rotator rotation speed. Click and hold the **Go Up** button to move the rotator up. Click and hold the **Go Down** button to move the rotator down. Check the **Reverse Rotator Direction** box if your rotator has been installed in a reversed position.

If you have a dual-axes rotator, you will be presented with arrow icons. Click the up and down arrow icons to tilt up or down. Click the left and right arrows to pan left or right. Check the **Switch Axes** box to invert the controls so that the up/down arrows are used to pan and the left/right arrows are used to tilt. You can adjust the tilt and pan speeds by dragging the sliders. Check the **Reversed Tilt Rotator Direction** box if your rotator is installed with the tilt axis reversed. Check the **Reversed Pan Rotator Direction** box if your rotator is installed with the pan axis reversed.

Soft Stops

Check the **Use Soft Stops** box to use a software function to set the rotator stops, so that the rotator will not rotate beyond the stops during operation. To avoid hitting objects or twisting cables when rotating, hard stops (pins) are usually bolted onto the rotator mount to stop rotation at predefined positions. However, soft stops allow you to program the rotator stops in the M3 software to mitigate mechanical wear and avoid shearing the hard stops.

To set the soft stops, uncheck the **Use Soft Stops** box. Set up the soft stops by moving the rotator until it reaches the limit where the attached devices or cables still have clearance.

- Click the **Go Up** button/up arrow to move the rotator up to the desired position, then click the **Set Up Stop** button.

- Click the **Go Down** button/down arrow to move the rotator down to the desired position, then click the **Set Down Stop** button.

- Click the right arrow (dual-axes only) to move the rotator right to the desired position, then click the **Set Right Stop** button.

- Click the left arrow (dual-axes only) to move the rotator left to the desired position, then click the **Set Left Stop** button.

Re-check the **Use Soft Stops** box when you are done.

Positioning

You can use the positioning function to move the rotator to a specific position (in degrees). Use this function for precise and quick positioning instead of clicking the **Go Up** or **Go Down** buttons. Enter a degree in the **To position** field, then click **Goto** (single-axis only). You can also rotate in degree increments by entering a degree into the **Step by size** field, then clicking **Step Up** or **Step Down** to rotate to the next/previous increment.

If you have a dual-axes rotator, you can enter a degree into the **Tilt to position** or **Pan to position** fields, then click the associated button to move the Sonar Head to that position on the tilt or pan axis.

Click the **Stop Move** button to cancel the rotation.

Rotator Control Dialog Type

Set the **Rotator Control Dialog Type** before you start operation of the sonar.

Select *3D Scan* if you have installed the Sonar Head to automatically scan a sector during operation, with the rotator sweeping the Sonar Head from one side of the sector to the other. Select *Pan/Tilt Control* if you wish to manually move the Sonar Head up, down, or sideways during operation.

System Configuration dialog box - Master Reference page

On the **Master Reference** page, you can assign any external sensors you have set up as the primary source for various types of navigational data.

How to open

This dialog box is opened from the **Setup** menu.

Select the **Deployment→Master Reference** tab.

Description

When using the M3 Sonar for imaging, set up sensors for **Position** and **Heading** if you want to create GeoTiff files or create a real-time mosaic.

When using the M3 Sonar for Bathymetry or Profiling, set up sensors for **Position**, **Heading**, **Pitch/Roll**, and **Heave** as a minimum.

If no sensor input is required for a particular reference, you may leave the value set to *Fixed*. For example, if the Sonar Head is mounted on a tripod with a known position, heading, and pitch/roll, these references will have fixed values. Also, sensor input may not be required for the M3 software if the sensors have been set up in third-party software.

Details

Configuration

> Select the desired configuration from the drop-down list. Click **New** to create a new configuration based on the default settings. Click **Save As** to save the current configuration or **Delete** to delete the current configuration.

Master Reference

- **Position**

   A location derived from measuring external reference points.

- **Depth**

   The vertical distance downwards from the water surface.

- **Heading**

   The direction in which a vessel is pointing, as opposed to the course made good.

- **Magnetic Variation**

   If you are using a magnetic heading sensor, enter the local magnetic variation into the **Magnetic Variation** box to get true heading. This parameter can be changed while the Sonar Head is running.

- **Pitch/Roll**

   Pitch is the up/down rotation of a vessel about its lateral axis. Roll is the tilting rotation of a vessel about its longitudinal axis.

- **Heave**

   Heave is the linear vertical (up/down) motion of the vessel.

- **Sound Speed**

   This shows the current sound speed value, whether it is provided by a sensor, calculated or entered manually. A sound speed sensor is required to accurately measure in-water speed near the Sonar Head. This parameter can be changed while the Sonar Head is running.

   Check the **Override Sound Speed** box if you want to replace the sound speed value in your recording with a fixed value during playback. This may be necessary, for example, if your recorded sound speed is not accurate.

   Note _____

   You can override the sound speed in .mmb files only.

Related topics

System Configuration dialog box - Mounting Offsets page

The mounting offsets are required to calibrate the position of the Sonar Head relative to the GPS antenna. If you have a rotator, you must calibrate the position of the rotator relative to the Sonar Head.

How to open

This dialog box is opened from the **Setup** menu.

Select the **Deployment**→**Mounting Offsets** tab.

Note ────────────────────────────────

This page is not available while the Sonar Head is running.

Description

If you are mounting your M3 Sonar (on a Pole Mount for example), you will need to specify where the Sonar Head is positioned in three-dimensional space relative to the GPS antenna.

Inaccurate mounting offsets will display your sonar data incorrectly in the 3D Point Cloud and sonar view.

If you have recorded your sonar data using the wrong offsets, you can still fix the offsets using this dialog box. Check the **Override Mounting Parameters** *box to apply the correct mounting offsets to your recording.*

Details

Mounting

- **X Offset**

  X is defined as the Sonar Head relative to the GPS antenna across track. Port is negative and Starboard is positive.

- **Y Offset**

  Y is defined as the Sonar Head relative to the GPS antenna along track. Aft is negative and Fore is positive.

- **Z Offset**

  Z is defined as the Sonar Head relative to the GPS antenna's vertical distance. Down is negative and Up is positive.

- **Orientation**

  This drop-down list allows you to select a number of pre-configured Sonar Head orientations. Observe the animation to verify which direction the Sonar Head should be facing for each orientation. The orientation depends on how you are using the M3 Sonar. For example, a forward-facing orientation can be used for obstacle avoidance on a remotely operated vehicle (ROV). A downward-facing orientation can be used for bathymetric surveying. An orientation that rolls sideways can be used to scan vertical structures. An upward-facing orientation can be used for scientific research, such as gas-seep monitoring. If you wish to create your own orientation, select *Custom*, then enter in the precise pitch, roll, and yaw angles of the Sonar Head position.

  Tip _____

  If images appear on the wrong side of the sonar view (for example, objects on the right appear on the left), then select one of the "Inverted" orientations.

Rotators

Select the rotator you wish to configure from the Rotators list. You can see which axis has been assigned to each rotator.

- **Radius**

  The radius offset is necessary if your Sonar Head is attached to the rotator with an arm. The length of the arm can be entered as the radius.

- **Angle**

  Entering an angle is not necessary if the transducer face of the Sonar Head is aligned with the rotator. However, if the Sonar Head is installed at an angle to the rotator, then enter that value here.

Override Mounting Parameters

Enabling this option will apply the current offsets on this page during playback instead of the offsets recorded in your data file. The offset override affects what you see during playback in the 3D Point Cloud, not the sonar view.

Related topics

Sonar Applications menu

The **Sonar Applications** menu lists various operating modes used for different applications. Each mode has its own pre-defined characteristics, such as differing ranges, angular resolutions, and pulse types.

How to open

To open this menu, click the menu title.

Description

*   **EIQ**

    This sonar application captures high-quality images. At short ranges the images are relatively insensitive to the motion of the sonar. At longer ranges the sonar should be relatively motionless.

    Note

    This application is less sensitive to motion than EIQ - Fine.

*   **EIQ - Fine**

    This sonar application captures very high-quality images. At short ranges the images are relatively insensitive to the motion of the sonar. At longer ranges the sonar should be relatively motionless.

*   **EIQ - Ultra Fine**

    This sonar application captures the highest quality images possible. At short ranges the images are relatively insensitive to the motion of the sonar. At longer ranges the sonar should be relatively motionless.

*   **Ethernet Test - 1000Mbps**

    You can test your 1000Mbps link to verify that the link throughput is available. The test uses 80 percent utilization and uses *EIQ - Ultra Fine*.

*   **Ethernet Test - 100Mbps**

    You can test your 100Mbps link to verify that the link throughput is available. The test uses 80 percent utilization and uses *EIQ*.

- **Ethernet Test - 10Mbps**

  You can test your 10Mbps link to verify that the link throughput is available. The test uses 80 percent utilization and uses *Imaging 30°*.

- **Imaging 15°**

  You can use this sonar application for navigation and obstacle avoidance. This application uses a 15-degree Tx vertical beamwidth.

- **Imaging 3°**

  Use this sonar application primarily for profiling using a 3-degree Tx vertical beamwidth. You may also use this application for shallow-water obstacle avoidance.

- **Imaging 30°**

  You can use this sonar application for navigation and obstacle avoidance. This application uses a 30-degree Tx vertical beamwidth.

- **Imaging 30° - Short Range**

  You can use this sonar application for the support of manipulator operations, with the highest-speed short-range imaging. Speed and detail are more important than overall image quality.

- **Imaging 7°**

  You can use this sonar application to provide long-range obstacle avoidance and navigation into the work site. This application uses the highest pulse power. Pulse durations are used to get a reliable long-range detection. The trade-off is a reduction in the ping rate.

- **Profiling**

  Use this sonar application for the automated point extraction of the sea bottom or structures to create a real-time 3D Point Cloud. The *Profiling* application has a slow ping repetition rate and is best suited for slow-moving ROVs, trenchers, and ploughs.

- **Profiling - Bathy**

  This sonar application is ideal for Bathymetry Surveys.

- **Profiling - Fast**

  This sonar application performs using much higher ping rates than the normal *Profiling* application. This application is ideal for surface-vessel surveys.

- **ROV Navigation**

  This sonar application automatically switches between *EIQ - Fine*, *EIQ*, and *Imaging 30°* applications. *EIQ - Fine* is used to provide the highest-resolution images with a good image update rate at short ranges. *EIQ* is used for medium ranges. *Imaging 30°* is used for long ranges.

- **Rub Test**

  Use this sonar application as part of a system check to verify that the transducer is receiving a signal. Rub the transducer and verify that bright streaks or rings appear in the sonar view.

- **Customize Apps**

  Click to open the **Customize Apps** dialog box. You can select which sonar applications will appear in the **Sonar Apps** menu.

Topics

Enhanced Image Quality (EIQ)

Enhanced Image Quality (EIQ) applications are intended for slower moving operations where the vehicle or vessel is moving slowly, or is stationary for at least a few seconds.

Description

The Fine EIQ applications overlap beams to improve image quality. *EIQ* uses four pings, *EIQ - Fine* uses eight pings, and *EIQ - Ultra Fine* uses 12 pings. Note that the Fine EIQ applications have a slower sonar view refresh rate.

Details

Sonar Application Names:	EIQ
	EIQ - Fine
	EIQ - Ultra Fine
Range:	0.4 m to 150 m
Angular Resolution:	0.95° x 30°
Pulse Type:	Continuous Wave and Linear FM (Chirp)

Imaging

Imaging applications provide long-range detection for monitoring and navigation.

Description

Imaging applications use the highest pulse power. They use pulse durations to get reliable long-range detection. The trade-off is a reduction in the ping rate, partially due to the long range, and partially to maintain power consumption within reasonable limits.

Details

Sonar Application Names:	Imaging 30°
	Imaging 15°
	Imaging 7°
	Imaging 3°
	Imaging 30° - Short Range
Range:	0.2 m to 150 m
Angular Resolution:	1.6° x 30°
	1.6° x 15°
	1.6° x 7°
	1.6° x 3°
Pulse Type:	Continuous Wave and Linear FM (Chirp)

Profiling

Use this sonar application for the automated point extraction of the sea bottom or structures to create a real-time 3D Point Cloud.

Description

The *Profiling* application has a slow ping repetition rate and is best suited for slow-moving ROVs, trenchers, and ploughs. When recording data, the file size will be small. Use the *Profiling* application for very shallow depths. The *Profiling - Bathy* application is more versatile. This sonar application is ideal for Bathymetry Surveys. The *Profiling - Fast* application performs best at longer ranges (i.e. depths greater than 5 m). This sonar application performs using much higher ping rates than the normal *Profiling* application. This application is ideal for surface-vessel surveys.

Details

Sonar Application Names:	Profiling
	Profiling - Bathy
	Profiling - Fast
Range:	1 m to 150 m
Angular Resolution:	1.6° x 3°
Pulse Type:	Continuous Wave and Linear FM (Chirp)

ROV Navigation

This sonar application automatically switches between *EIQ - Fine*, *EIQ*, and *Imaging 30°* applications.

Description

EIQ - Fine is used to provide the highest-resolution images with a good image update rate at short ranges. *EIQ* is used for medium ranges. *Imaging 30°* is used for long ranges.

Details

Sonar Application Name:	ROV Navigation
Range:	0.4 m to 150 m
Angular Resolution:	1.6° x 30°
Pulse Type:	Continuous Wave and Linear FM (Chirp)

Advanced menu

The **Advanced** menu is intended for experienced users or for testing purposes and is not required for normal operation of the M3 Sonar. This menu requires a software license key, and will not appear if you do not have one.

How to open

To open this menu, click the menu title.

Description

- **Power User Settings**

  Click to open the **Power User Settings** dialog box. The **Power User Settings** dialog box allows you to configure advanced controls. You can also override the beamlist or processing type during playback. The Ping Rate, Update Rate, and Mode ID are displayed for your information.

- **Program Head**

  Click to open the **Program Head** dialog box. You can perform advanced tasks in the **Program Head** dialog box, such as configuring production settings, making head corrections, or changing transmit pulse definitions. This dialog box is only available when the Sonar Head is connected and paused.

- **Convert to Profile**

  Click to open the **Profile Batch Conversion** dialog box. The **Profile Batch Conversion** dialog box allows you to convert many data files at once into another format. You can convert ".mmb", ".imb", and ".pmb" files.

- **Raw Data Frequency Spectrum**

  Click to open the **Raw Data Spectrum** window. The **Raw Data Spectrum** window allows you to check the data for noise in real-time.

- **Enable Network Sniffer**

  Click to open the **Network Sniffer** window. The **Network Sniffer** window allows you to monitor network traffic in real-time. When this feature is enabled, the menu option will change to **Disable Network Sniffer**.

  Note

  To use this feature, you must run the M3 software as an administrator (right-click on the icon and select **Run as administrator***).*

Topics

Power User Settings dialog box

The **Power User Settings** dialog box allows you to configure advanced controls. You can also override the beamlist or processing type during playback. The Ping Rate, Update Rate, and Mode ID are displayed for your information.

How to open

This dialog box is opened from the **Advanced** menu.

Description

Use the Advanced Controls to configure special processes used during beamforming. Use the Playback Controls to override the fields of recorded ".mmb" data during playback. You can also view detailed system information for the current sonar application.

Details

Advanced Controls

- **RX Amplitude and Phase Correction**

  This feature allows you to verify if the RX Amplitude and Phase Correction has been successfully written to the Sonar Head during production configuration. Unchecking this box will not apply the correction stored in the Sonar Head to the raw data before beamforming.

- **Azimuth Processing**

  This feature allows you to verify if the raw data is received properly and if there are any elements in the transducer that are faulty. Unchecking this box will display the range-compressed raw data in the sonar view with a range vs. element number instead of a range vs. beam angle. The beamforming processing (either the time-domain beamformer or the FFT beamformer) will not be applied.

- **Range Processing**

  This feature, when used together with Azimuth Processing, allows you to see the unprocessed raw data received directly from the transducer. If the transmit pulse is an LFM pulse, unchecking this box will not apply range compression to the raw data before the beamforming processing.

- **Sidelobe Reduction**

  This feature allows you to reduce the sidelobe for very bright targets in imaging applications (this feature is not recommended for profiling applications). Drag the slider to the right to increase sidelobe reduction — on the highest settings you may notice a black line appearing around the same range of the bright target.

Playback Controls

Note

*You can also edit the **Playback Controls** settings in the "PowerUsersInfo.xml" file.*

- **Override Beamlist**

  This feature allows you to replace the beamlist of a recorded ".mmb" file with a new beamlist XML file. The recorded raw data will be beamformed based on the new beamlist. Checking the **Override Beamlist** box will enable the **Beamlist File** field. You can type in the beamlist file's address or click the folder icon to browse for it.

- **Override Processing Type**

  This feature allows you to switch between the time-domain beamformer and the FFT beamformer for profiling applications. Select the *Profiling* option when playing back an ".mmb" file (recorded using the *Profiling - Fast* or *Profiling - Bathy* sonar applications) to use the time-domain beamformer. Leave this setting as *No* to use the original processing type for beamforming in post processing.

System Information

- **Ping Rate**

  The ping rate is determined either by the database or calculated based on the network link speed.

- **Update Rate**

  The update rate is the actual ping rate when running the M3 Sonar system. The displayed **Ping Rate** may be different from the **Update Rate** because the system might be delayed by other processes.

- **Mode ID**

  All sonar applications have their own unique mode number. The mode number displayed here corresponds to a PRI Sequence ID found in the M3 software database.

Related topics
Power User Settings XML file, page 144

Program Head dialog box - Production Config page

You can perform advanced tasks in the **Program Head** dialog box, such as configuring production settings, making head corrections, or changing transmit pulse definitions.

How to open

This dialog box is opened from the **Advanced** menu.

Note

*This dialog box is only available when the Sonar Head is connected and paused. To pause the Sonar Head, click **Setup→Connect**, then open the Menu Widget in the top-right corner of the sonar view. Click **Pause**.*

Select the **Production Config** tab.

Description

Use the **Production Config** page to view or change advanced Sonar Head parameters, such as the Serial Number or MAC Address. This page is primarily intended for use by production test engineers.

Details

Head

The **Head** table shows you the serial number and IP Address of the Sonar Head.

Configuration file

Click the folder icon to browse for the latest configuration file on your local drive. Click the **Load from file** button to populate the **Production Configuration** fields with values from your configuration file.

To save the current parameters, locate the field at the bottom of the dialog box and choose a filename or browse to replace an existing file. Click the **Save to file** button beside this field.

Production Configuration

This table lists all the advanced parameters and their values for the Sonar Head.

Write Config

Click this button to re-program the Sonar Head with the parameters displayed in the **Production Configuration** table.

Read Config

Click this button to populate the **Production Configuration** fields with the current parameter values (values are read from the Sonar Head).

Program Head dialog box - Head Corrections page

You can perform advanced tasks in the **Program Head** dialog box, such as configuring production settings, making head corrections, or changing transmit pulse definitions.

How to open

This dialog box is opened from the **Advanced** menu.

Note _____

*This dialog box is only available when the Sonar Head is connected and paused. To pause the Sonar Head, click Setup→Connect, then open the Menu Widget in the top-right corner of the sonar view. Click **Pause**.*

_____

Select the **Head Corrections** tab.

Description

Use the **Head Corrections** page to write Phase/Amplitude Corrections or Range Reference Coefficients to the Sonar Head. This page is primarily intended for use by production test engineers.

Details

Head

The **Head** table shows you the serial number and IP Address of the Sonar Head.

Configuration type

Select the type of configuration you wish to apply.

Configuration file

Click the folder icon to browse for the latest configuration file on your local drive.

Click the **Write** button to apply the configuration parameters in your file to the Sonar Head. Click the **Read** button to save the current Sonar Head configuration to your configuration file.

Program Head dialog box - TX Pulse page

You can perform advanced tasks in the **Program Head** dialog box, such as configuring production settings, making head corrections, or changing transmit pulse definitions.

How to open

This dialog box is opened from the **Advanced** menu.

Note _____

*This dialog box is only available when the Sonar Head is connected and paused. To pause the Sonar Head, click **Setup→Connect**, then open the Menu Widget in the top-right corner of the sonar view. Click **Pause**.*

_____

Select the **TX Pulse** tab.

Description

Use the **TX Pulse** page to apply a new TX pulse definition to the Sonar Head if a new TX pulse is designed for the M3 software database.

Details

Configuration file

Click the folder icon to browse for the latest configuration file on your local drive.

Click the **Write** button to apply the configuration parameters in your file to the Sonar Head. Select the box if you wish to load the transmit pulse definitions when connecting to the Sonar Head.

Profile Batch Conversion dialog box

The **Profile Batch Conversion** dialog box allows you to convert many data files at once into another format.

How to open

This dialog box is opened from the **Advanced** menu.

Description

You can convert ".mmb", ".imb", and ".pmb" files. The current profiling settings in the M3 software are used when converting to ".all" files. The source and destination folders

are saved in the "PowerUsersInfo.xml" file after the **Profile Batch Conversion** dialog box is closed.

After setting up the batch conversion, click the **Convert** button to start the conversion process. You can view the progress of both the current file and of all files in the batch.

Details

Input type

Select the type of source file that you wish to convert. Click the **Browse Source** button to select a valid source file or folder.

Export type

Select the file type for your destination file. Click the **Browse Destination** button to select a destination folder or enter a filename.

If your selected export type is ".pmb", then you can check the *Water Column* box to export the ".pmb" file with water column data. When saving water column data, profile range and bearing data will also be saved. Split-beam profiling will include amplitude and phase in the water column data, but the default profiling mode will include amplitude only.

Convert Mode

Select *Folder* for batch conversion. If you check the *Sub Folder* box, then all files in all sub folders will be included in the batch conversion. To convert a single file, select *File*.

Related topics

Raw Data Spectrum window

The **Raw Data Spectrum** window allows you to check the data for noise in real-time.

How to open

This window is opened from the **Advanced** menu.

Description

This window displays the normalized, real-time raw data spectrum. The frequency range of the received signal is shown on the x-axis, and the normalized spectrum amplitude is shown on the y-axis (in dB).

Power User Settings XML file

The Power User Settings XML file allows you to change advanced M3 software parameters by editing the file with any text editor.

How to open

Note ──────────────────────────────────────

Close the M3 software before editing the Power User Settings XML file.

──

Download and install a free XML file editor, such as Notepad++ Navigate to C:\KML\M3_V0210\BIN\SETTINGS. Open the "PowerUsersInfo.xml" file with your XML file editor.

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<!--Remove blank lines!!-->
<dataroot Software="M3" Version="0002">
    <User>
        <ID>0</ID>
        <Name>none</Name>
        <Password>none</Password>
        <Level>P</Level>
        <DeploymentFile></DeploymentFile>
        <Settings>
            <PlaybackOverrideBeamlists>No</PlaybackOverrideBeamlists>
            <OverrideBeamlistFile></OverrideBeamlistFile>
            <ProcessingTypeOverride>No</ProcessingTypeOverride>
            <BatchProfilingSrcFolder></BatchProfilingSrcFolder>
            <BatchProfilingDesFolder></BatchProfilingDesFolder>
            <Profile3DCloudPingToKeep>2000</Profile3DCloudPingToKeep>
            <ProfileSpikeFilter>0</ProfileSpikeFilter>
            <ProfileContinuousContour>0</ProfileContinuousContour>
            <ProfileSelectionFilterCoef>1.00</ProfileSelectionFilterCoef>
        </Settings>
    </User>
</dataroot>
```

Description

You need a software license key to apply the values in the "PowerUsersInfo.xml" XML file to the M3 software. If you do not have a software license, then the default values will be used. The new values will be applied after restarting a licensed copy of the M3 software.

Details

<PlaybackOverrideBeamlists>

This feature allows you to replace the beamlist of a recorded ".mmb" file with a new beamlist XML file. The recorded raw data will be beamformed based on the new beamlist. Enter a value of "Yes" or "No" in the XML tag.

<OverrideBeamlistFile>

Enter the beamlist file's address into the XML tag.

<ProcessingTypeOverride>

Enter a value of "Yes" or "No" in the XML tag. This feature allows you to switch between the time-domain beamformer and the FFT beamformer for profiling applications. Select the *Profiling* option when playing back an ".mmb" file (recorded using the *Profiling - Fast* or *Profiling - Bathy* sonar applications) to use the time-domain beamformer. Leave this setting as *No* to use the original processing type for beamforming in post processing.

<BatchProfilingSrcFolder>

In the XML tag, enter the address of the folder for the files you wish to convert.

<BatchProfilingDesFolder>

In the XML tag, enter the address of the destination folder where your converted files will be saved.

<Profile3DCloudPingToKeep>

This parameter controls how many pings to keep in the memory when displaying a 3D point cloud. The maximum value depends on the amount of memory allocated to the point cloud. If the value you enter exceeds the maximum, then it will be reset to the default value of 2000.

<ProfileSpikeFilter>

This parameter removes noisy profiling points due to midwater objects, such as fish, and is useful when a clean bottom profile is needed. Enter a value between zero and 51 into the XML tag (zero disables the filter). The spike filter applies to profiling applications.

<ProfileContinuousContour>

This parameter interpolates the profiling result before it is displayed. Sometimes the bottom profile has missing points due to noise or midwater objects. Enabling this filter can replace these points. For example, this filter will fill out a hole in the middle of a bottom profile, but may produce artificial points at both edges.

<ProfileSelectionFilterCoef>

This parameter adjusts the smoothing filter before selecting the profiling algorithm. Enter a value between one and ten in the XML tag.

Related topics

Help menu

The **About M3** dialog box in the **Help** menu displays hardware and software information and provides a link to the software Reference Manual.

How to open

To open this menu, click the menu title.

Description

About M3

The **About M3** dialog box displays the software version of the M3 software. The version described in this Reference Manual is 2.1.

Tool bar description

The tool bar provides buttons for functions, filters, and sonar view overlays.

The tool bar provides access to useful functions, such as the ability to take a screenshot or change your TVG settings. In addition, several measuring tools are available.

A   **Arrow**

Click to use the default arrow cursor. With the default cursor you can select and manipulate objects on the screen.

B   **Wiper**

Removes items from the sonar view. When selected, click on each overlay you wish to delete.

C   **Zoom windows**

You can open up to four true zoom windows when running a Sonar Head.

D   **Tape Measure**

Measures distances on the sonar view. Also allows you to place a measurement overlay on the sonar view.

E   **Protractor**

You can use the protractor to measure the angle between two lines, then place the resulting overlay in the sonar view.

F   **String Measure**

You can use the string measure tool to define an area. The size and perimeter of the area will be calculated for you.

G   **Text Label**

The text label tool allows you to place comments on the screen.

H   **Reference Cursor 1**

I   **Reference Cursor 2**

You can place one or two reference cursors as overlays on the sonar view. When you place two cursors, an additional overlay will appear with information about the cursors.

J   Image Quality Analysis System

The Image Quality Analysis System (IQAS) analyzes the image quality of a point target, or can be used to measure a known point target against a specification.

K   Y1

Horizontal line overlay that can be used to mark the depth of the natural seabed (for use when excavating).

L   Y2

Horizontal line overlay that can be used to mark the depth of a trenching target (for use when excavating).

M   Show Full Screen

Click to make the sonar view full screen. Press the **Esc** key to exit full screen mode.

N   Save image with overlays

Click this button to save sonar view images, including any overlays you've placed in the sonar views.

O   Save image without overlays

Click this button to save sonar view images, excluding any overlays you've placed in the sonar views.

P   TVG Setup dialog box

The **TVG** (Time Variable Gain) function is used to compensate the received echo data for the loss of acoustic energy due to geometric spread and absorption.

Q   Average Filter

Clicking the "A" button will enable the Average Filter. This filter reduces noise. Slow-moving features persist on-screen.

R   Background Removal

Clicking the "B" button will enable the Background Removal filter. This filter removes stationary parts of the background to enhance moving objects (such as fish, for example).

S   Edge Enhancement

Clicking the "E" button will enable Edge Enhancement. This filter enhances the edge of moving features.

T   No Filter

Disables any filters. The sonar view will display an unfiltered sonar image.

Topics

Arrow

Click to use the default arrow cursor. With the default cursor you can select and manipulate objects on the screen.

If you are currently using one of the tools, such as the **Tape Measure** for example, clicking the **Arrow** button will cancel the current tool.

To move overlays around in the sonar view, click the **Arrow** button, then click and hold the left mouse button on an overlay. Drag it to where you want it then release the mouse button.

Wiper

Removes items from the sonar view. When selected, click on each overlay you wish to delete.

If your sonar view becomes too cluttered with overlays, you may wish to remove some of them.

Click the **Wiper** button, then left-click on any overlay that has been placed in the sonar view (such as a **Reference Cursor**, for example) to remove it. Note that you cannot undo this action.

Zoom windows

You can open up to four true zoom windows when running a Sonar Head.

To open a zoom window, click the **Zoom windows** button in the tool bar, then click a target of interest in the sonar view.

The zoom area (A) in the sonar view is a fixed size and cannot be adjusted. However, you can move the zoom area to another location with the cursor. The images in the true zoom windows (B) are acquired separately using high-resolution sampling parameters and adequate transmit pulses.

If you record sonar data while the zoom windows are open, the zoom window data will also be recorded for replay. During playback, the zoom windows will open automatically.

Tip

Reference cursors can be used with a Zoom window. To make fine adjustments to the cursor position, drop a reference cursor into a Zoom window.

Tape Measure

Measures distances on the sonar view. Also allows you to place a measurement overlay on the sonar view.

To measure the distance between two targets, click the **Tape Measure** button. Click and hold the left mouse button on your first target, then drag the mouse to your second target. The length and bearing between the targets is displayed dynamically. The measurement line will not remain on the display when you release the mouse button.

To place a persistent measurement overlay, click and hold the right mouse button on your first target, then drag the mouse to your second target and release the mouse button. Click the left mouse button to place the overlay.

Related topics

Protractor

You can use the protractor to measure the angle between two lines, then place the resulting overlay in the sonar view.

The protractor tool measures the angle between a baseline and a second line that intersects the baseline.

In the sonar view, click the point where you want to start the baseline. Click the point where you want to end the baseline. Lock one end of the second line to the baseline. Choose where you want the second line to end.

Related topics

String Measure

Defines and measures perimeters and areas. Allows you to place an area overlay on the sonar view.

To define an area, click the **String Measure** button. Click anywhere in the sonar view to start a point. Move to the second point, then click again. Click as many times as necessary to create the required area. Double-click on the last point to finish. The area will automatically be closed, and a rectangular label will appear providing information about the area and perimeter. Move the label to a position on the screen where it is most legible, then click the left mouse button to place it.

Related topics

Text Label

The text label tool allows you to place comments on the screen.

Click the **Text Label** button. In the sonar view, click the area of interest that you want to label. Click and hold the left mouse button on the label overlay and drag it to a place on the screen where the text is legible. Double-click on the label overlay to open an **Edit Text Box** dialog box.

Tip ———————————————————————————————————

If the text you entered does not fit within the text label overlay, you can resize the label by clicking on the label border, then dragging it to create a larger label.

——

Related topics
Placing text labels, page 51

Reference cursors

You can place one or two reference cursors as overlays on the sonar view. When you place two cursors, an additional overlay will appear with information about the cursors.

To mark a point of interest, you can place a cross-hair type marker on the sonar view. Click one of the **Reference Cursor** buttons. Choose where you want to place the cursor, then click the left mouse button to place it. The range and bearing of the cursor's position — relative to the Sonar Head — is shown in the bottom-left corner of the view.

When you place both cursor 1 and cursor 2 on the sonar display, the cursor range and bearing — relative to the Sonar Head— will be displayed. "Delta" shows the range and bearing from cursor 1 to cursor 2.

Cursor:1	Cursor:2	Delta:
154.5°	14.3°	357.9°
45.425 m	63.702 m	102.794 m

Related topics
Placing reference cursors, page 52

Image Quality Analysis System

The Image Quality Analysis System (IQAS) analyzes the image quality of a point target, or can be used to measure a known point target against a specification.

IQAS measures a known point target against a specification, such as resolution, Peak Side Lobe Ratio (PSLR), or Integrated Side Lobe Ratio (ISLR).

To enable IQAS, click the **IQAS** button on the tool bar.

Two IQAS dialog boxes will open. One dialog box shows the range (in metres), and the other shows the azimuth angle (in degrees).

Move the IQAS cursor to a target of interest in the sonar view, then click the left mouse button to place the cursor.

The following information will be displayed in the two IQAS dialog boxes.

Resolution, Impulse Response Width (IRW)

The IRW is measured 3 dB down from the top of the Main Lobe of the impulse response. In the range dialog box, the IRW is displayed in pixels and metres. In the azimuth angle dialog box, the IRW is displayed in pixels and degrees.

Peak Side Lobe Ratio (PSLR)

The PSLR is the Peak Side Lobe level in the Near Region relative to the level of the Main Lobe. The unit of measurement is dB.

Integrated Side Lobe Ratio (ISLR)

The ISLR is the ratio of the energy in the Near Region to the energy within the Main Lobe Region. The unit of measurement is dB.

Save image with or without overlays

With one click, you can capture an image of the sonar view — either with overlays or without overlays.Click this button to save sonar view images, including any overlays you've placed in the sonar views.

Click the **Save image with overlay** button to save the sonar view image, including any overlays (such as the Tape Measure or Text Labels for example) you've placed in the sonar view. If you want to save the sonar view without overlays, click the **Save image without overlay** button instead.

Your images will be saved under the folder "C:\KML\M3_Vxxxx\Images" by default. You can change this save location through the **Preferences** dialog box.

A text file with information on the image capture sonar settings will also be created.

Tip ─────────────────────────────────

Open the **Preferences** *dialog box to change the default save location, choose your own filename, and add overlay text.*

TVG Setup dialog box

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the Sonar Head and the target(s), the greater the loss of energy. The **TVG** (Time Variable Gain) function is used to compensate the received echo data for the loss of acoustic energy due to geometric spread and absorption.

How to open

Note ───

Each sonar application has its own TVG profile. Before changing the TVG settings, select the sonar application you want to configure from the **Sonar applications list**.

───

Click the **TVG** button. This button is located on the tool bar.

Description

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the Sonar Head and the target(s), the greater the loss of energy.

- **Geometric spread**

  Once transmitted, the acoustic energy will spread out to form a circular beam. The width of this beam increases with the physical distance to the target(s).

- **Absorption loss**

  Depending on the salinity and temperature, the water will absorb some of the energy from the transmission. The absorption loss increases as the range increases.

Both the geometric spread and the absorption will also have an effect on the returned echo signal. That is why we normally refer to these factors as the *two-way transmission loss*.

The TVG compensation is designed to counteract the natural phenomena of geometric spread and absorption loss. This is done in the M3 Sonar using digital signal processing. The TVG equalizes the echo presentation as a function of range to make the targets with the same strength appear with the same intensity independent of their physical distance from the Sonar Head.

Details

The TVG compensation is expressed as a logarithmic curve. The TVG curve can be selected with several different slopes, each having different gain regulations. Four adjustable factors are used to set the gain curve.

A Factor

> Represents spreading loss.

B Factor

> Represents one-way absorption loss.

C Factor

> Represents a base or starting gain level.

L Factor

> Limits the maximum gain to reasonable levels.

To the left of the TVG curve display is a slider with a range from -30 to 130. This represents the system gain. Moving this slider down until the line intersects the green TVG curve will cause a Range-Gain pair of values to be displayed in the "Range-Gain" box. Adjust this slider to determine the gain at a particular range.

If you have a software license for advanced features, then an additional pane and slider bar will become available. When the Sonar Head is running, a graphic representation of the receive signal will appear at the bottom of the dialog box so that you can ensure that the signal is not being clipped. A slider is provided so that you can exclude the low end percent of the gain.

Related topics
Adjusting the TVG (Time Variable Gain) setting, page 35

Filters

You can apply an averaging, background removal, or an edge enhancement filter to the sonar view.

Note

You can adjust the strength of these filters in the **Display Widget**.

Average Filter

Clicking the "A" button will enable the Average Filter. This filter reduces noise. Slow-moving features persist on-screen.

This filter averages the image from ping to ping so that slow-moving features will persist, while reducing noise in the image. The Average Filter is especially useful when the image is constructed from multiple pings.

Background Removal

Clicking the "B" button will enable the Background Removal filter. This filter removes stationary parts of the background to enhance moving objects (such as fish, for example).

Edge Enhancement

Clicking the "E" button will enable Edge Enhancement. This filter enhances the edge of moving features.

This filter provides some persistence for the image. Edge Enhancement is especially useful when you wish to view a school of fish clearly, for example.

No Filter

Disables any filters. The sonar view will display an unfiltered sonar image.

No filtering is preferable if instantaneous readings are required, since this shortens the delay between updating the changes in sonar data, and the corresponding displayed information.

Related topics

Technical specifications

Topics

Introduction to technical specifications

These technical specifications summarize the main functional and operational characteristics of the M3 Sonar Multibeam sonar. 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 Sonar Multibeam sonar will interface with peripheral systems and sensors using standard and/or proprietary datagram formats.

Supported datagram formats for position information

The M3 Sonar 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 Sonar 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 Sonar supports the following datagram formats for vessel heading and/or gyro 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. The information is normally provided by a course gyro.

- **Kongsberg EM Attitude 3000**

    The 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 information. 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 Sonar supports the following datagram formats from a motion sensor.

- **Simrad 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**

    The 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 information. 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 Sonar supports the following datagram format from a sound speed sensor.

- **Valeport**

    This is a third-party proprietary datagram format 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 Sonar 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, not beamformed, in a 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.

- **.imb**

This format consists of beamformed data in a 32-bit floating point complex format. Data body size is determined by the number of beams and samples. Different modes may form a different number of beams. Therefore, data body size may change depending upon the mode.

- **.ALL**

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

Synchronization

- **PRI Sync**

PRI Sync (set with *Trigger Mode* on the **Sonar Setup** page of the **System Configuration** dialog box) provides ping synchronization with another M3 Sonar Head or other acoustic source that supports synchronization (for example, EK60, Sidescan, DVL, etc.). PRI Sync is a level-sensitive method of synchronization. When the sync is held high, the sonar will not transmit. The PRI Sync INPUT must be held low for 25μs in order to trigger the M3 Sonar Head. The Sonar Head will transmit a 100μs sync OUTPUT pulse when configured as **Master** on the **Sonar Setup** page. The sync OUTPUT is generated each time the Sonar Head transmits.

- **Host Time Sync Mode**

Host mode synchronizes the Sonar Head time with the computer time. This mode is critical for Bathymetry applications. *Host* mode only works if the computer is connected to an accurate time source, such as a GPS or network time server. When connecting to the Sonar Head, it takes two minutes to synchronize the time to within five milliseconds.

- **Computer Time Sync**

  If ZDA is configured, the M3 software will use the time in the ZDA message to synchronize the computer clock automatically in the background. However, you may need to run the M3 software as an administrator (right-click on the icon and select **Run as administrator**) or Windows may not allow the software to change the system clock. Computer time sync can be useful when data is being logged on more than one computer and synchronized timing is required. This method is not recommended for Bathymetry applications as it is not accurate enough.

  Note

  Computer time sync requires both GGA and ZDA input.

Performance specifications

These performance specifications summarize the main functional and operational characteristics of the M3 Sonar 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
- **Modes**: Variable Vertical Beamwidth, EIQ
- **Communication**: Ethernet
- **Data Rates**: 10/100/1000 Mbps

PRI Synchronization (master / slave operation)
- **Sync Input**: 0 to 5 VDC, hold-off when high
- **Sync Output**: 0 to 5VDC active low pulse 100μs

Variable Vertical Beamwidth (Imaging) mode
- **Horizontal Field of View**: 120°
- **Vertical Field of View**: 3°, 7°, 15°, 30°
- **Angular Resolution**: 1.6°

- **Update rate**: up to 40 Hz

EIQ mode

- **Horizontal Field of View**: 140°

- **Vertical Field of View**: 30°

- **Angular Resolution**: 0.95°

- **Update rate**: up to 10 Hz

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

Mechanical specifications

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

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 Sonar system.

500 m 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 Aluminium, Stainless Steel 316, Elastomeric Polyurethane

- **Connector type**: SEA CON®

- **Connector model**: MINK-10-FCRL (Telemetry & Power)

4000 m Sonar Head

- **Depth rating**: 4000m

- **Dimensions**

    – **Diameter**: 185 mm (7.28")

    – **Depth**: 140 mm (5.50")

- **Weight**: 8.2 kg (air), 5.1 kg (water)

- **Materials**: Titanium, Stainless Steel 316, Elastomeric Polyurethane

- **Connector type**: SEA CON®

- **Connector model**: MINK-10-FCRL (Telemetry & Power)

Optional connector models

- **Synchronization**: SEA CON®, MIND-4-FCR

- **100BaseTX Ethernet and Power**: Alstom Seanet (4000 m M3 Sonar only)

VDSL

Cable requirements: 1 twisted pair (100-ohm impedance)

Note _____

VDSL will work over two wires. Actual data rate will vary with the cable quality.

_____

- **3 m (10 foot) cable**: Up to 100Mbps

- **152 m (500 foot) cable**: Up to 100Mbps

- **1000 m (3300 foot) cable**: 27 Mbps (measured on Belkin 1353A)

Power requirements

These power characteristics summarize the supply power requirements for the M3 Sonar system.

Sonar Processor

- **Power adapter input voltage**: 120/240 VAC

- **Laptop input voltage**: 19.5 VDC @ 180W (max)

Sonar Head

- **Input voltage**: 12 to 36 VDC

- **Input power**: 22W (avg.), peak power < 60W, mode dependant
- **Maximum cable loop resistance for Sonar Head power**:
  - 0.1 Ω @ 12VDC
  - 2 Ω @ 24VDC
  - 6 Ω @ 36VDC

Note

These values were measured at +23°C.

Environmental requirements

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

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

Note

The stated operation temperature range is for the Sonar Head in water. The sonar can be powered on and started at temperatures between -20° to +45° C. There is a built-in temperature monitor that will display a software warning message and automatically power down the sonar before it overheats.

Minimum computer requirements

Although a computer can be ordered from Kongsberg Mesotech as a part of the M3 Sonar 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 Sonar, 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**: minimum 8 GB

- **Hard disk**: minimum 500 GB

- **Graphics card RAM**: 256 MB

- **Network interface**: 100/1000 Mbps

- **Serial interfaces**: One or more serial line interfaces are required. The number of serial lines depends on the interface requirements.

- **Operating system**: The M3 software has been designed for the Microsoft® 64-bit Windows 10 operating system. Windows 7 is supported for imaging applications only. Profiling applications will not work properly in Windows 7. Operating systems older than Windows 7 are not supported.

Index

E

F