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Instruction Manual

M3 Sonar® API

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M3 Sonar API

Instruction Manual

Release 1.4

This manual provides the basic information required to get started with the M3 Sonar API.

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Warning

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

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

Disclaimer

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Support information

If you require maintenance or repair, contact your local dealer. You can contact us by phone at +1 604 464 8144, or by email at: support.vancouver@kd.kongsberg.com. If you need information about our other products, visit https://www.kongsberg.com/discovery/. On our website you will also find a list of our dealers and distributors.

Table of contents

About this manual

This manual provides the information and procedures required to use the M3 Sonar API.

Target audience

This publication is intended for all users of the M3 Sonar system.

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

We assume that you are familiar with the basic setup and operation of the M3 Sonar. 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.

Software version

This M3 Sonar Instruction Manual complies with M3 software version 2.5.4.

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

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We always want to improve our products. We also want our end-user documentation to be comprehensive and relevant. You can help. Please provide comments, suggestions or constructive criticism to our support office. You can contact us by phone at +1 604 464 8144, or by email at: support.vancouver@kd.kongsberg.com.

M3 Sonar

Topics

System description

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

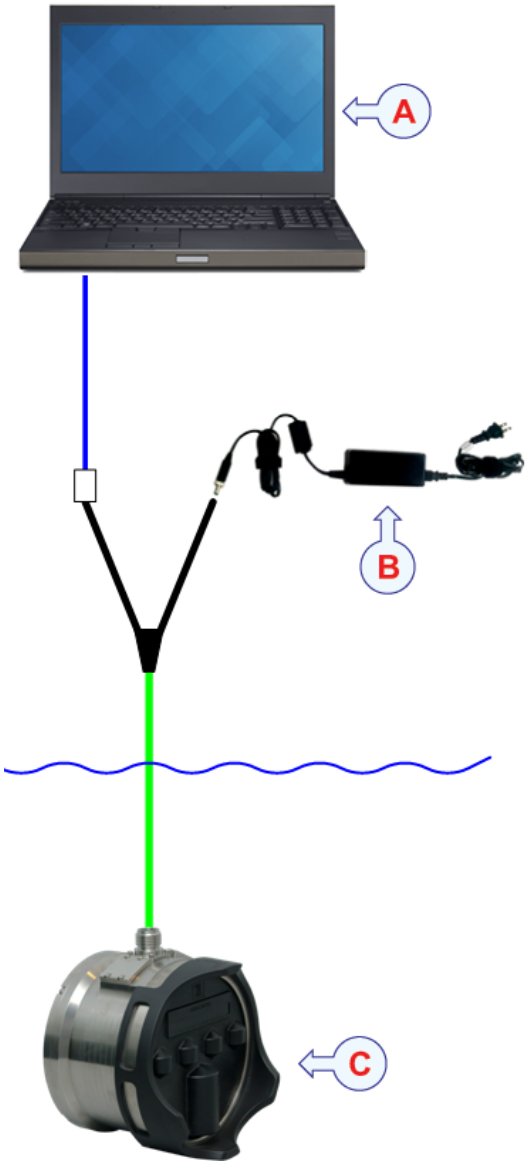
Multibeam sonars have an array of transducers that simultaneously transmits pings (sound pulses) at a specified frequency to cover a large area in less time than a single-beam transducer. To generate data, computer software assigns a colour range corresponding to the amount of sound reflected off a target. 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.



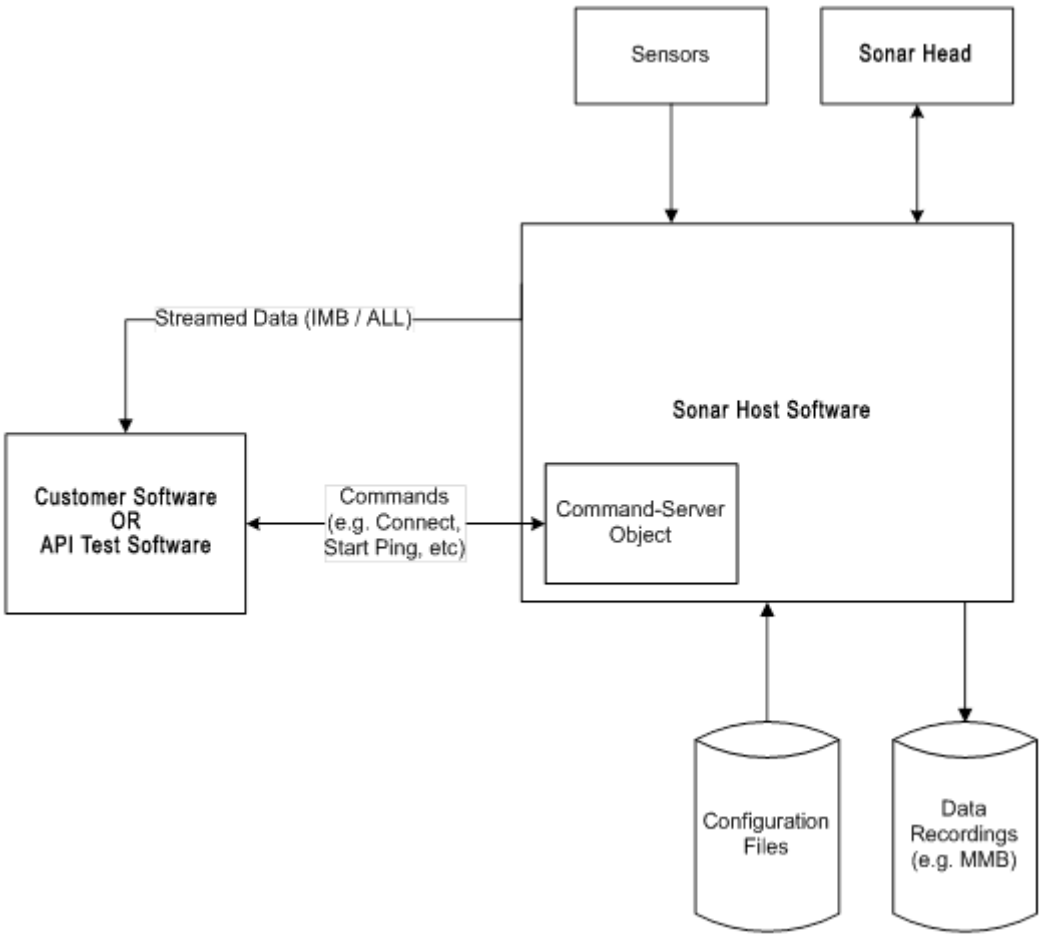
A *Sonar Processor*

B *Power supply*

C *M3 Sonar Head*

M3 Sonar API overview

The M3 Sonar API allows you to control the M3 Sonar via remote TCP/IP commands and without the graphical user interface.



When the API is enabled, you can use your custom application (TCP client) to issue commands to the sonar. You can write API commands in XML format.

The Command-Server Object listens on a port for TCP/IP commands issued by your application. When the Command-Server Object receives commands, it will send the commands to a Command-Processor Object, which process the commands and makes the appropriate function calls. The Command-Server Object replies with a response string that is received by your TCP client. You can read these responses to understand the result of the last API command sent to the server.

You can use the API Testing software to test the M3 Sonar API functionality. You can also use the Database Editor software to view or edit all the sonar applications (operational modes) available for the sonar.

The M3 Sonar API is enabled through the Windows command prompt. For imaging applications where low CPU usage is required, you can disable the Display Manager with a command-prompt switch.

To start the API automatically when your computer boots up, you can create a batch file containing the command-prompt text suitable for your application. If you have more than one Sonar Head, it is possible to run multiple instances of the API.

IMB data is streamed automatically every time your TCP client connects to the IMB port of the M3 Sonar API. You can also stream ALL data by issuing API commands to start and stop the data export. ALL data can be exported to third-party software, such as Hypack.

System units

Topics

Sonar Processor

In this publication, the computer can also be referred to as the *Processor Unit*, and vice versa. The Sonar Processor contains the operational software, and offers the user interface that allows you to control the M3 Sonar. It is a vital part of the M3 Sonar system.

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.

If you purchase a computer locally, make sure that the chosen model meets the functional and technical requirements. The computer must be designed for rugged use. The construction must be able to withstand the vibrations and movements of a vessel.

Power supply

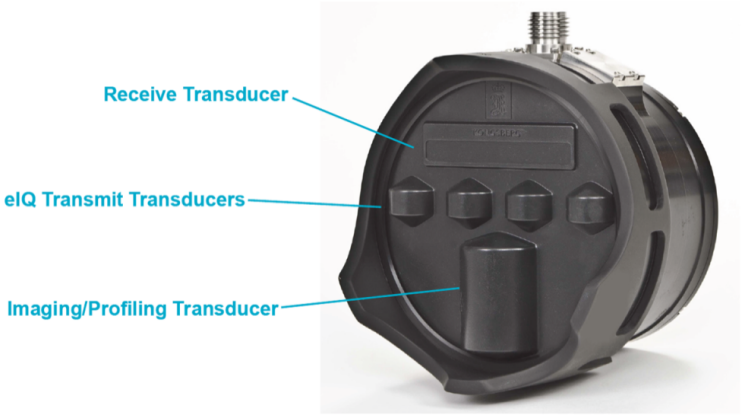
The Sonar Head requires a DC power supply to run.

Normally, the DC voltage is supplied in the location where the Sonar Head is mounted, such as on a remotely operated vehicle (ROV). A small DC switching supply can be used when running the system on a surface vessel.

A test cable and power supply is available for order as an accessory. The test power supply uses a 24 VDC switching power supply.

Sonar Head

When deployed underwater, the Sonar Head transmits and receives acoustic pulses.



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 Sonar Processor using a standard Ethernet link.

Note

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

Several different M3 Sonar models are available – your model may differ from the one shown here. For example, there are models with different depth ratings and materials, as well as models that include an integrated sound velocity sensor or high-frequency transducer.

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 +1 604 464 8144, or by email at: support.vancouver@kd.kongsberg.com. If you need information about our other products, visit https://www.kongsberg.com/discovery/. On our website you will also find a list of our dealers and distributors.

Getting started

Topics

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, select the Windows® **Start** button.

2 On the menu, select **Settings**.
Observe that the **Settings** window opens.

3 Select **System**.

4 In the menu on the left, select **Power & sleep**.

5 Make sure that the Sonar Processor will never go to sleep when plugged in.

   a Click the **Additional power settings** link on the right side of the window.
   Observe that the **Power Options** dialog box opens.

   b In the menu on the left, select **Create a power plan**.

   c Select the **High performance** radio button.

   d Give your new custom plan a name, then click **Next**.

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

   f Click **Create**.

Tip

Once you have created a custom plan, you can adjust some more advanced settings. You may, for example, wish to keep any secondary displays on when the laptop lid is closed. Click **Change plan settings** *next to your custom plan. Click the* **Change advanced power settings** *link. Observe that the* **Power Options** *dialog box opens. Click the "+" to expand the submenus, then select the desired options from the drop-down lists. At the bottom of the dialog box, select* **Apply** *to save your settings.*

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 can find the software on the Kongsberg USB drive included with the system, or you can contact your local dealer or distributor to have the latest software version installed.
- 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_V0254 Setup.exe**.

2 Follow the installation wizard's instructions and select *Standard Installation*.

Note

Use the Dual-M3 on Same PC option only if you are using two M3 Sonars. Selecting this option will install two separate copies of the software, with each copy having its own settings. You can identify which copy you are using by observing the top header of the software presentation. The header will read either "M3 - Master Head" or "M3 - Slave Head".

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 computer's 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 serial adapter in your Sonar Processor, you will only need to do this once.

Procedure

1 On the computer, close the M3 software.

2 Open the **Network Connections** dialog box.

   a In the bottom-left corner of your desktop, select the Windows® search function.

   b In the search box, type "Network Connections", and open the **Network Connections** dialog box.

   c Right-click the network adapter you are going to use and select **Properties** on the shortcut 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 Select **OK** to save the settings, then close all the dialog boxes.

Changing the Windows regional format to English

If your local Windows settings uses commas for decimal points, the Database Editor will not function properly. To handle the database values properly, you will need to change the Windows regional format to English.

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.

Procedure

1 In the bottom-left corner of your desktop, select the Windows® **Start** button.

2 On the menu, select **Settings**.

Observe that the **Windows Settings** dialog box opens.

3 Select **Time & Language**.

4 Select **Region**.

5 Select *English (United States)* from the **Regional format** drop-down list.

6 Close the dialog box by selecting [**X**] in the upper-right corner.

Starting operation of the Sonar Head

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

Prerequisites

- The M3 software must be running.
- The sound speed has been configured 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.

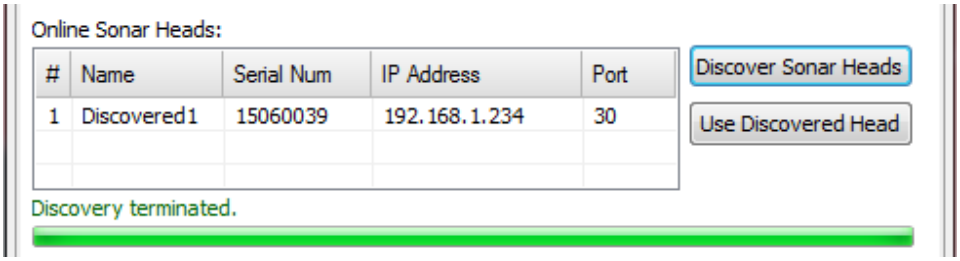
Tip

*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, make sure 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 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**.

Enabling the M3 Sonar API

You can use the Windows command prompt to enable the M3 Sonar API.

Prerequisites

- Your computer must be on the same network as the Sonar Head.
- You must have discovered your Sonar Head using the M3 software.
- The M3 software should not be running.

Caution

Do not run the M3 software and the M3 Sonar API at the same time. Running both may cause a conflict with unpredictable results.

Context

The following command-prompt switches can be used when enabling the M3 Sonar API.

- **/api**

  This switch runs the M3 Sonar API in the background. When enabled, the graphical user interface for the M3 software will not be visible.

- **/no_dm**

  This switch disables the internal Display Manager for cases where low CPU usage is needed. Use this switch if you don't need Display Manager functions.

  Note

  *Use the **/no_dm** switch for imaging applications only. Do not use the **/no_dm** switch for profiling applications.*

Procedure

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

  Observe that the **Command Prompt** window opens.

2 For imaging applications, type the following into the command prompt, then press **Enter**.

  start c:\kml\m3_v0254\bin\m3.exe /api /no_dm

  Alternatively, for profiling applications, type the following into the command prompt, then press **Enter**.

start c:\kml\m3_v0254\bin\m3.exe /api

If you don't see any error messages, the M3 Sonar API should be enabled.

Tip

You can test the M3 Sonar API functionality in the M3 Sonar API Testing software.

3 Close the **Command Prompt** window.

Related topics

Automatically enabling the M3 Sonar API at bootup, page 32

Disabling the M3 Sonar API

You can use the Windows command prompt to disable the M3 Sonar API.

Prerequisites

The M3 Sonar API must be enabled.

Procedure

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

Observe that the **Command Prompt** window opens.

2 Type the following into the command prompt, then press **Enter**.

taskkill /im m3.exe /f

Observe that a success message appears in the **Command Prompt** window.

3 Close the **Command Prompt** window.

Tip

If you need to disable the M3 Sonar API often, create a batch file (such as "M3Stop.bat") with the line "taskkill /im m3.exe /f".

Operating procedures

Topics

Testing the M3 Sonar API

You can use the API Testing software to test the M3 Sonar API functionality.

Prerequisites

- Your Sonar Head must be powered on.
- Your computer must be on the same network as the Sonar Head.
- You must have discovered your Sonar Head using the M3 software.
- The M3 Sonar API must be enabled through the command prompt.

Caution

Do not run the M3 software and the M3 Sonar API at the same time. Running both may cause a conflict with unpredictable results.

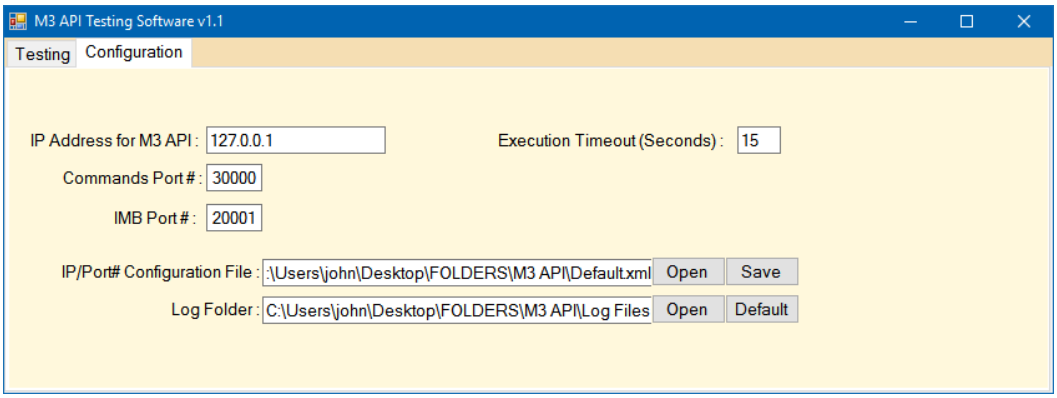
Procedure

1 Navigate to C:\KML\M3_V0254\API_Tester

2 Open the API Testing software by double-clicking the “M3_API_Tester.exe” file.

3 Make sure that the IP Address is correct.

a Click the **Configuration** tab.



b If the M3 Sonar API is running on the same computer as the API Testing software, leave the IP Address as 127.0.0.1.

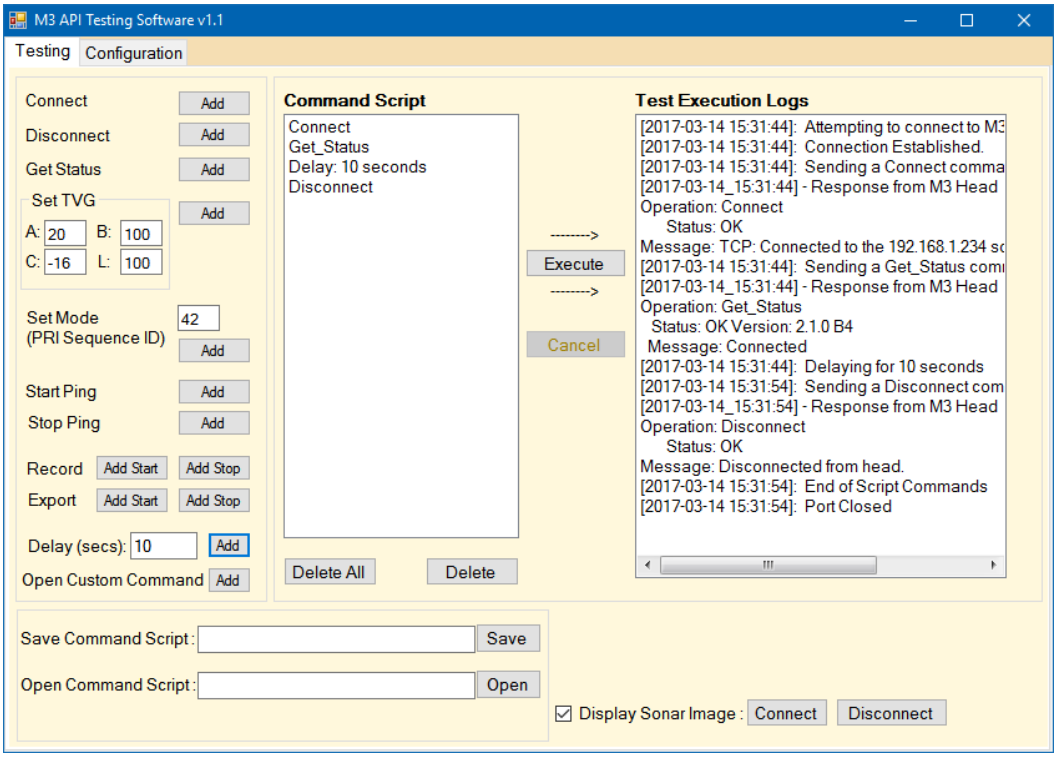
Note

127.0.0.1 is a loopback address (localhost). This address establishes an IP connection to the same computer that you are using. Do not enter the Sonar Head’s IP Address.

If the M3 Sonar API is running on a different computer, enter that computer's IP Address.

4 Prepare the software for an API test.

a Click the **Testing** tab.



b Make sure that the **Display Sonar Image** box is checked.

c Click the **Connect** button beside the **Display Sonar Image** checkbox.

Observe that the **Sonar Image** window opens. The window will be blank when the sonar is not running.

5 Create and execute a Command Script.

a Click the **Add** button beside **Connect**.

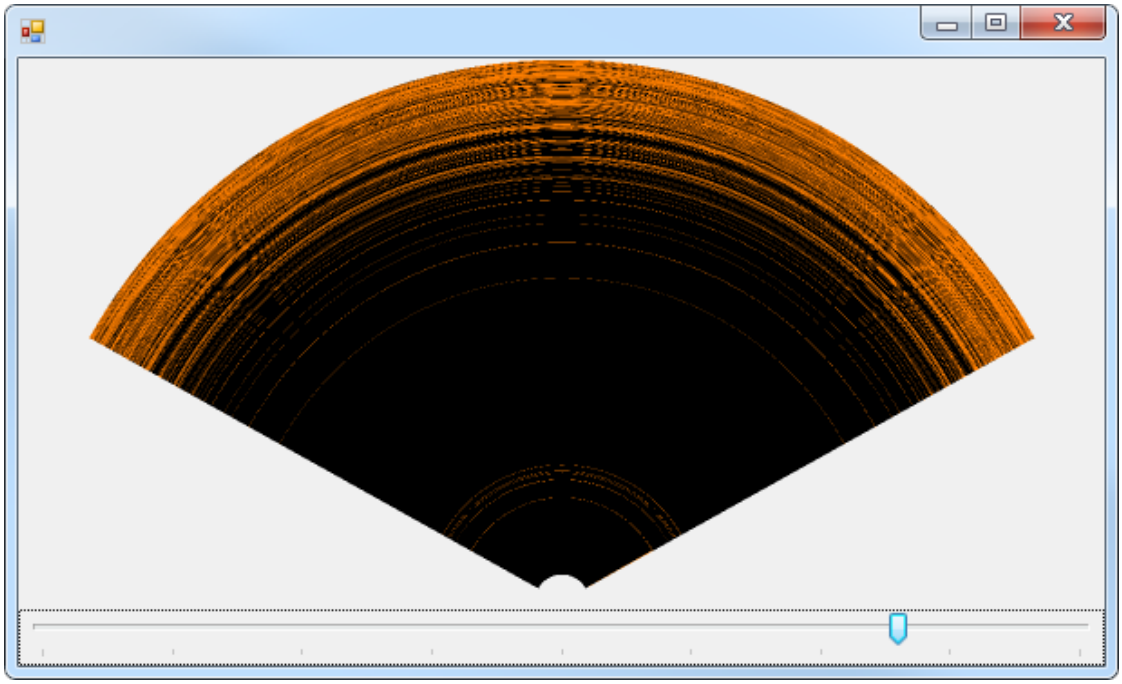
b Click the **Add** button beside **Get Status**.

c Click the **Add** button beside **Delay (secs)**.

d Click the **Add** button beside **Disconnect**.

e Click the **Execute** button.

6 Make sure that the sonar view updates in the **Sonar Image** window.



Tip

You can make the image look brighter by dragging the gain slider located under the image.

7 Observe the **Test Execution Logs** pane.

Make sure that the script executes as expected.

Make sure that you do not see any error messages, such as **FAIL**, **BAD_CMD**, or **UNKNOWN**.

8 Close the API Testing software.

Related topics

API Testing software dialog box - Testing page, page 50

Finding a mode number

You can use the Database Editor software to find a mode number for use in the **Set Mode** API command.

Prerequisites

- The Database Editor software is not part of the M3 software application package. You can obtain the Database Editor software from Kongsberg Discovery.
- Make sure that the M3 software is closed or that the M3 Sonar API is disabled.

Tip

*If you wish to disable the M3 Sonar API without rebooting your PC, type **taskkill /im m3.exe /f** at the command prompt.*

Procedure

1 Open the Database Editor software by double-clicking the “M3_DB_Editor.exe” file.

2 Open the database.

a Click **File⟶Import DB**.

Observe that a **Browse For Folder** dialog box opens.

b Navigate to C:\KML\M3_V0254\DB

c Click **OK**.

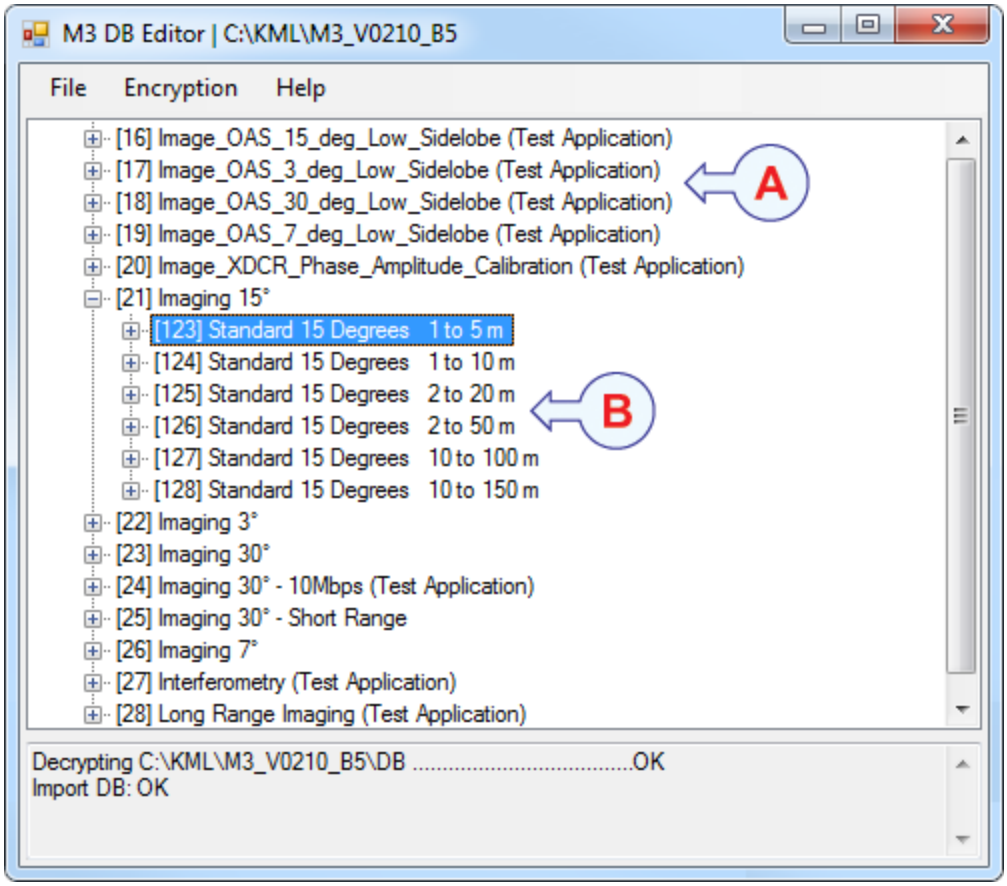
Observe that a numbered list of modes appears.

3 Click the "+" button to the left of a mode to expand a sub-list (B) showing the mode numbers (PRI Sequence IDs).

Note

The only valid mode numbers are contained in the expanded sub-list (B) of standard applications. The numbers in the main "root" list (A) are not mode numbers and will not work.

Also, any mode numbers listed under test applications will not work. Do not expand any modes in the main list with "(Test Application)" at the end of the name.



4 Take note of the desired mode number so that you can use it in the **Set Mode** API command.

5 Close the Database Editor software.

Related topics

Set Mode, page 38

Changing the IMB port number

The default port for 32-bit IMB streaming is 20001, and the default port for 8-bit streaming is 21001. You can change the default 32-bit IMB port of the M3 Sonar API by editing the "UsersInfo.xml" file and finding the <DataExport_IMB_Port> XML tag.

Prerequisites

Download and install a free XML file editor, such as Notepad++.

Note

Avoid using the default Notepad editor in Windows, as it may insert hidden characters into XML files that will cause the M3 Sonar API to crash.

Context

The M3 software automatically creates a port for 8-bit IMB streaming based on the current <DataExport_IMB_Port> value. The port for 8-bit IMB streaming is always the <DataExport_IMB_Port> value plus 1000. For example, if you set the <DataExport_IMB_Port> value to 30001, then the 8-bit IMB port will be 31001.

You can stream IMB data from the M3 Sonar API once it is connected to the Sonar Head, and the head is running. As soon as your TCP/IP client connects to one of the IMB ports of the API (either the <DataExport_IMB_Port> value or <DataExport_IMB_Port> + 1000), the IMB data will start streaming back to the client.

Procedure

1 Navigate to C:\KML\M3_V0254\BIN\SETTINGS

2 Right-click on the file "UsersInfo.xml".

Observe that a context menu opens.

3 Select **Edit with Notepad++** to open the file.

Alternatively, open the file in your preferred XML file editor.

4 Find the XML tag <DataExport_IMB_Port>

5 Change the value between the tags to your desired port number.

6 Click **File⟶Save**, then close your XML file editor.

Related topics

IMB streaming, page 47

Streaming ALL data for profiling applications

You can configure the external server that will receive an ALL stream by editing a text file. To start streaming ALL data, you must use the **Start Export** API command.

Prerequisites

Download and install a free XML file editor, such as Notepad++.

Note

Avoid using the default Notepad editor in Windows, as it may insert hidden characters into XML files that will cause the M3 Sonar API to crash.

Context

Data is exported through the UDP port to an external server. You must enter the IP address of this external server into the <DataExport_Dest_IPAddr> XML tag found in the "UsersInfo.xml" file. To start streaming ALL data, you must use the **Start Export** API command.

Procedure

1 Configure the IP address of the external server that will receive the ALL stream.

Alternatively, if you prefer using a graphical user interface, you can open the M3 software, click **Setup⟶Preferences**, then enter the IP address into the **Remote IP Address** field. Make sure that the **Display Mode** in the **Profiling Settings** dialog box is set to *Image and Profile* or *Profile Only*. Also, click **File⟶Exporting Format** and make sure that *Profile Point (.all)* is selected.

a Navigate to C:\KML\M3_V0254\BIN\SETTINGS

b Right-click on the file "UsersInfo.xml".

Observe that a context menu opens.

c Select **Edit with Notepad++** to open the file.

Alternatively, open the file in your preferred XML file editor.

d Find the XML tag <DataExport_Dest_IPAddr>

e Enter the IP address of the external server that will receive the ALL stream.

f Make sure to leave these parameters at the following default values.

<ProfileMode>1</ProfileMode>
<ExportingFormat>19</ExportingFormat>

g Click **File⟶Save**, then close your XML file editor.

2 Enable the API.

a In the bottom-left corner of your desktop, type “cmd” into the Windows search box, then press **Enter**.

Observe that the **Command Prompt** window opens.

b Type the following into the command prompt, then press **Enter**.

start c:\kml\m3_v0254\bin\m3.exe /api

Note

*Do not use the **/no_dm** switch for profiling applications.*

3 Send the **Start Export** API command to start exporting.

```
<Command>
<Operation>Start_Export</Operation>
</Command>
```

4 When you are done, send the **Stop Export** API command to stop exporting.

```
<Command>
<Operation>Stop_Export</Operation>
</Command>
```

Related topics

Start Export, page 42
ALL streaming, page 48

Running more than one Sonar Head

In order to run more than one Sonar Head, you must configure and enable multiple instances of the M3 Sonar API.

Prerequisites

- You must have installed the M3 software.
- Your computer must be on the same network as the Sonar Heads.
- Download and install a free XML file editor, such as Notepad++.

Note

Avoid using the default Notepad editor in Windows, as it may insert hidden characters into XML files that will cause the M3 Sonar API to crash.

Procedure

1 Navigate to C:\KML

2 Make multiple copies of the “M3_V0254” folder and rename each folder accordingly.

Make one copy for each Sonar Head that you have. For example, “M3_V0254_1”, “M3_V0254_2”, “M3_V0254_3”, etc. Each “M3_V0254” folder represents one instance of the M3 Sonar API.

3 For each instance of the M3 Sonar API, configure each Sonar Head’s IP address and assign unique port numbers.

a Navigate to C:\KML\M3_V0254_1\BIN\SETTINGS (Replace “M3_V0254_1” with the name you have used for this instance).

b Right-click on the file “UsersInfo.xml”.

Observe that a context menu opens.

c Select **Edit with Notepad++** to open the file.

Alternatively, open the file in your preferred XML file editor.

d Find the XML tag <IPAddress>

e Enter the IP address of the Sonar Head you wish to use with this M3 Sonar API instance.

Make sure that you don’t use the same IP address used in another instance.

Tip

*By entering the IP address into the “UsersInfo.xml” file, you will not have to discover and connect to the Sonar Head by running the M3 software. However, if you do not know each Sonar Head’s IP address, you may run the M3 software, then click **Setup⟶System Configuration⟶Devices⟶Sonar Setup⟶Discover Sonar Heads** to view the IP addresses.*

f Enter unique port numbers into the following three XML tags.

<API_Commands_Port> (send API commands from your client to this port)

<DataExport_IMB_Port>

<DataExport_DotALL_Port>

Note

Use any free numbers not used in other instances. For example, if M3_V0254_1’s range of ports is 20000, 20001, and 20002, then use 20010, 20011, and 20012 for M3_V0254_2 (and so on). Using the same port numbers for all instances of the M3 Sonar API will cause a conflict.

g Click **File⟶Save**, then close your XML file editor.

h Repeat this procedure for each instance of the M3 Sonar API.

4 Run each instance of the M3 Sonar API.

a In the bottom-left corner of your desktop, type “cmd” into the Windows search box, then press **Enter**.

Observe that the **Command Prompt** window opens.

b Run the “m3.exe” file for each instance in the command line.

For example, for three instances, you will run the three different “m3.exe” files found in each folder you created:

start c:\kml\m3_v0254_1\bin\m3.exe /api /no_dm
start c:\kml\m3_v0254_2\bin\m3.exe /api /no_dm
start c:\kml\m3_v0254_3\bin\m3.exe /api /no_dm

5 Send your API commands from your client to the API Commands Port you specified for each instance.

Tip

You can use the API Testing software to send commands to different ports. Click the ***Configuration*** *tab, then enter the port into the* **Commands Port #** *field.*

Automatically enabling the M3 Sonar API at bootup

If you want the M3 Sonar API to start automatically when your computer boots up, you can create a simple batch file.

Prerequisites

- Your Sonar Head must be powered on.
- Your computer must be on the same network as the Sonar Head.
- You must have discovered your Sonar Head using the M3 software.

Procedure

1 Create a batch file.

a In the bottom-left corner of your desktop, type “notepad” into the Windows search box, then press **Enter**.

Observe that a new text document opens.

b Enter the following line into the text document.

start c:\kml\m3_v0254\bin\m3.exe /api /no_dm

Note

*Use the **/no_dm** switch for imaging applications only. Do not use the **/no_dm** switch for profiling applications.*

c Select **File→Save**.

d Type “M3Start.bat” into the **File name** field.

e Select *All Files* from the **Save as type** drop-down list.

Note

Leave the **Encoding** *setting as ANSI.*

f Click **Save**.

g Close the text document.

2 Create a shortcut to the batch file.

a Right click the *M3Start.bat* file on your desktop.

b Select **Create shortcut**.

3 Add the shortcut to your *Startup* folder.

a In the bottom-left corner of your desktop, type “run” into the Windows search box, then press **Enter**.

Observe that the **Run** dialog box opens.

b Type the following into the **Open** field.

shell:startup

c Click **OK**.

Observe that the *Startup* folder opens.

d Drag the *M3Start.bat* file into your *Startup* folder.

4 Reboot your computer.

The batch file should run at bootup.

Tip

You can test the M3 Sonar API functionality in the M3 Sonar API Testing software.

Related topics

Enabling the M3 Sonar API, page 20

Functions and dialog boxes

Topics

API functions

Topics

M3 Sonar API overview

You can write API commands in XML format.

Description

You can write any API command in either a string or byte array in ASCII through your TCP client. The commands require a newline character after each node.

If you are using the API Testing software, then you can write an XML test script file with a list of commands that are executed sequentially.

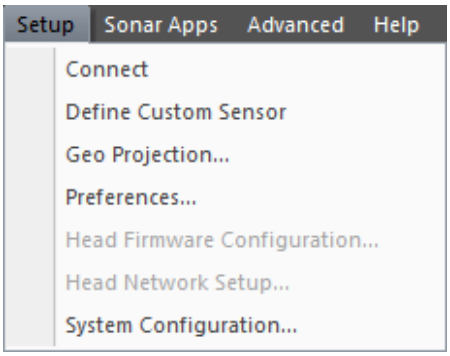
For every XML string successfully sent to the server, the host TCP server will issue a response string to be received by the TCP client. You can read these responses to understand the result of the last API command sent to the server.

Connect

The **Connect** function establishes communication between the M3 software and Sonar Head, then starts "pinging".

Description

In the M3 software, clicking **Setup⟶Connect** enables the **Connect** function.



Details

Connect API

```
<Command>
<Operation>Connect</Operation>
</Command>
```

Disconnect

The **Disconnect** function stops operation of the Sonar Head.

Description

In the M3 software, clicking **Setup⟶Disconnect** performs this function.

This function only works if the Sonar Head is running. Attempting to execute this command when the Sonar Head is not running will elicit a **FAIL** response.

Details

Disconnect API

```
<Command>
<Operation>Disconnect</Operation>
</Command>
```

Get Status

The **Get Status** function displays information about the Sonar Head and M3 software in the API response text.

Description

There is no equivalent to this function in the M3 software.

This command will return the Sonar Head status (Pinging, Connected, or Not Connected) as well as the M3 software version number.

Note

The <Status> tag shown in API responses is not related to the **Get Status** *function.*

Details

Get Status API

```
<Command>
<Operation>Get_Status</Operation>
</Command>
```

Get Status API response

```
<Response>
<Operation>Get_Status</Operation>
<Status>OK</Status>
<Message>Pinging</Message>
<Version>2.1.0</Version>
<Time>2016-09-13 15:22:21</Time>
</Response>
```

Set Mode

The **Set Mode** function allows you to set the optimal operating mode for your application. Each mode has its own pre-defined characteristics, such as differing ranges, angular resolutions, and pulse types.

Description

In the M3 software, the operating mode is set using the **Sonar Apps** menu (found at the top of the presentation).

This API command requires a mode number (PRI Sequence ID). You can find a list of mode numbers in the Database Editor software.

Details

Set Mode API

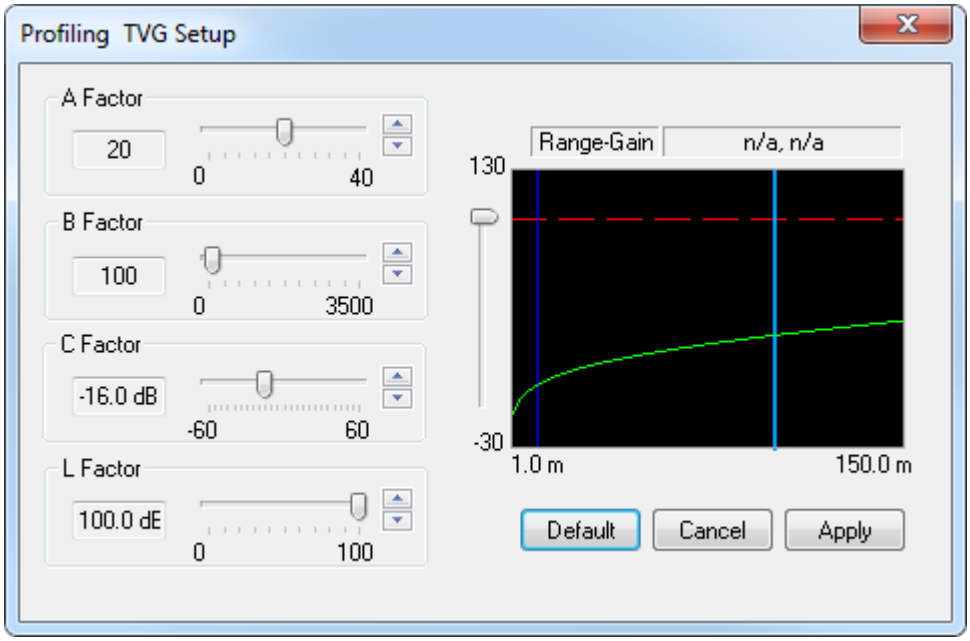
```
<Command>
<Operation>Set_Mode</Operation>
<Mode>123</Mode>
</Command>
```

Related topics

Finding a mode number, page 26

Set TVG

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the transducer and the target(s), the greater the loss of energy. **TVG** (Time Variable Gain) compensates for the loss of acoustic energy due to geometric spreading and absorption.



Description

In the M3 software, the TVG parameters are set using the **TVG** button located on the tool bar.

Each sonar application has its own TVG profile. If you wish to change the TVG profile for a specific application, issue the **Set Mode** API command before the **Set TVG** command. Otherwise, the **Set TVG** command will configure the default sonar application.

Details

The TVG compensation is expressed as a logarithmic curve. You can choose from a selection of curves. Each curve has a different slope creating a different gain compensation. Four adjustable factors are used to set the gain curve.

Set TVG API

```
<Command>
<Operation>Set_TVG</Operation>
<TVG_A>20</TVG_A>
<TVG_B>100</TVG_B>
<TVG_C>-16</TVG_C>
<TVG_L>100</TVG_L>

</Command>
```

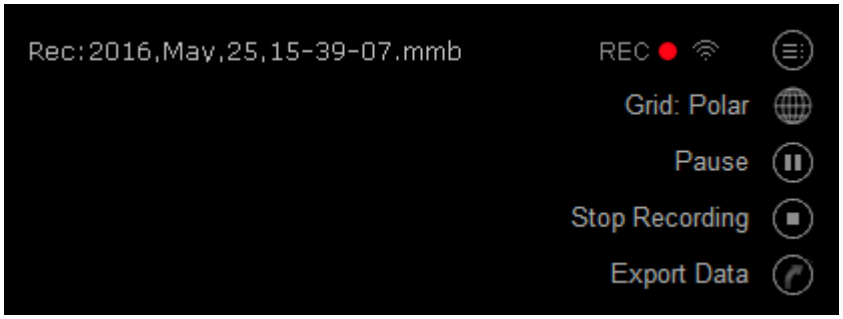
Stop Ping

If the Sonar Head is running, the **Stop Ping** function pauses operation of the head.

Description

When you want to stop operation of the Sonar Head, use the **Disconnect** API command. The **Disconnect** function stops communication with the Sonar Head. The **Stop Ping** command, however, pauses operation of the Sonar Head without disconnecting from it. When you issue this command to pause the Sonar Head, you can use the **Start Ping** command to resume pinging.

In the M3 software, the **Pause** function is the equivalent of the **Stop Ping** command. Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**. Then, click **Pause**.



Details

Stop Ping API

<Command>
<Operation>Stop_Ping</Operation>
</Command>

Start Ping

If the Sonar Head is paused, the **Start Ping** function resumes operation and starts "pinging".

Description

When you want to start operation of the Sonar Head, use the **Connect** API command. The **Connect** function establishes communication between the M3 software and Sonar Head, then starts "pinging". Issuing an additional **Start Ping** command is therefore not necessary. However, if you pause the Sonar Head, then use **Start Ping** to resume pinging.

Note

*Attempting to execute this command when the Sonar Head is not connected will elicit a **FAIL** response.*

In the M3 software, the **Resume** function is the equivalent of the **Start Ping** command. Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**. Then, click **Resume**.

Details

Note

You can include the operating mode in this API command, but this is optional. The **Set Mode** *command can be used instead.*

Start Ping API

<Command>
<Operation>Start_Ping</Operation>
<Mode>123</Mode> **(Optional)**
</Command>

Start Record

Record allows you to record echo data.

Description

This function records a sonar data sequence and saves it in a time-stamped digital format. Your recording will be saved under the folder "C:\KML\M3_V0254\Recordings" by default.

In the M3 software, the **Record** function can be found in the **Menu Widget**. Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**.

Details

Start Record API

```
<Command>
<Operation>Start_Record</Operation>
</Command>
```

Stop Record

If you are recording, the **Stop Record** API command will stop the recording activity.

Description

In the M3 software, the **Stop Recording** function can be found in the **Menu Widget**. Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**.

Details

Stop Record API

```
<Command>
<Operation>Stop_Record</Operation>
</Command>
```

Start Export

The **Export** function allows you to send echo data to third-party software through the UDP port.

Description

Sonar data is exported using the ".ALL" format, which is a proprietary Kongsberg EM-series datagram format.

In the M3 software, the **Export** function can be found in the **Menu Widget**. Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**. A flashing red dot with "EXP" next to it will appear when exporting profile data.

Note

You can only export data in a profiling mode (using one of the **Profiling** *sonar applications). You can use the* **Set Mode** *API command to enable a profiling mode.*

You will still get a ***FAIL*** *response if you have not set the* **Remote IP Address***, if the* **Display Mode** *is not set to "Image and Profile" or "Profile Only", or if the* **Exporting Format** *is not set to "Profile Point (.all)".*

Details

Start Export API

```
<Command>
<Operation>Start_Export</Operation>
</Command>
```

Related topics

Streaming ALL data for profiling applications, page 29
ALL streaming, page 48

Stop Export

If you are exporting data, the **Stop Export** API command will stop the export.

Description

In the M3 software, the **Stop Exporting** function can be found in the **Menu Widget**. Click the circular icon in the top-right corner of the sonar view to open the **Menu Widget**.

Details

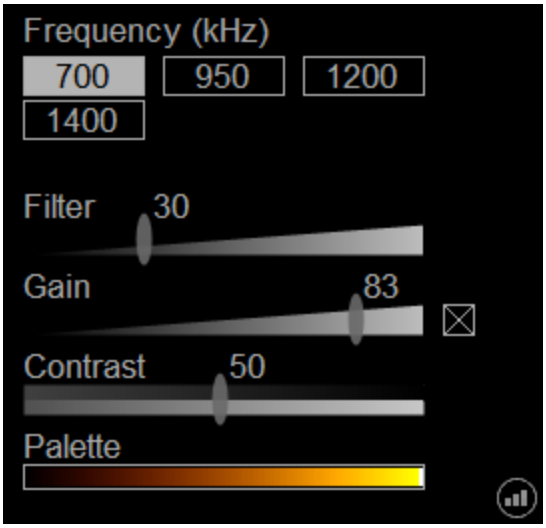
Stop Export API

```
<Command>
<Operation>Stop_Export</Operation>
</Command>
```

Frequency

There are transducers with varying frequencies available for the M3 Sonar.

If you have a high-frequency M3 Sonar transducer, the **Frequency** function allows you to change the frequency. The **Frequency** function will not work if you are using a 500 kHz transducer.



Each frequency has a different mode number (PRI Sequence ID). When creating a command script, we recommend setting the frequency before setting the mode.

Description

In the M3 software, you can change the frequency using the **Display Widget**. Click the **Display Widget** icon. This icon is located in the lower-right corner of the sonar view.

Details

Frequency API

```
<Command>
<Operation>Set_Frequency</Operation>
<Frequency>1200</Frequency>
</Command>
```

Tip

You can test the **Frequency** *function by creating a command script, then using the* **Open Custom Command** *feature in the M3 Sonar API Testing software.*

API responses

For every XML string successfully sent to the server, the host TCP server will issue a response string to be received by the TCP client. You can read these responses to understand the result of the last API command sent to the server.

Description

All API commands received will be acknowledged with a response indicating whether or not the command was successful. The server will reply with a status of **OK**, **FAIL**, or **BAD_CMD**. If a command is a valid command, but it is not possible to get a completion status for that command, then **UNKNOWN** will be returned. If you are using the API Testing software, then all responses will be saved to a log file.

Tip

The <Message> tag gives you further information about the status.

Details

OK

This response indicates that the command request was successfully completed.

```
<Response>
<Operation>Connect</Operation>
<Status>OK</Status>
<Message>Connected to 11120091</Message>
<Time>2016-09-13 15:22:21</Time>
</Response>
```

FAIL

This response indicates that the command was valid, but could not be completed.

```
<Response>
<Operation>Connect</Operation>
<Status>FAIL</Status>
<Message>Timed out attempting to connect to 11120091</Message>
<Time>2016-09-13 15:22:21</Time>
</Response>
```

BAD_CMD

This response indicates that the command itself was not valid.

<Response>
<Operation>Unknown</Operation>
<Status>BAD_CMD</Status>
<Message>Invalid Command</Message>
<Time>2016-09-13 15:22:21</Time>
</Response>

UNKNOWN

This response indicates that the command was valid, but it is not possible to determine completion status.

<Response>
<Operation>Start_Export</Operation>
<Status>UNKNOWN</Status>
<Message>Cannot determine status</Message>
<Time>2016-09-13 15:22:21</Time>
</Response>

Data streaming

Topics

IMB streaming

You can stream IMB data from the M3 Sonar API once it is connected to the Sonar Head, and the head is running.

Description

IMB streaming differs from ALL streaming in the following way.

- **ALL streaming**: The M3 Sonar API acts as the client and sends data to an external server.
- **IMB streaming**: The M3 Sonar API acts as the server which sends data to an external client. This external client must connect to the IMB port of the API.

The default port for 32-bit IMB streaming is 20001, and the default port for 8-bit streaming is 21001. You can change the default 32-bit IMB port of the M3 Sonar API by editing the "UsersInfo.xml" file and finding the <DataExport_IMB_Port> XML tag.

The M3 software automatically creates a port for 8-bit IMB streaming based on the current <DataExport_IMB_Port> value. The port for 8-bit IMB streaming is always the <DataExport_IMB_Port> value plus 1000. For example, if you set the <DataExport_IMB_Port> value to 30001, then the 8-bit IMB port will be 31001.

No API commands are needed for the IMB data to start streaming. As soon as your TCP/IP client connects to one of the IMB ports of the API (either the <DataExport_IMB_Port> value or <DataExport_IMB_Port> + 1000), the IMB data will start streaming back to the client.

Note

The IMB data format is quite large and the data rate could be hundreds of megabits per second, depending on the sonar application (mode) and range selected.

Details

.imb

This format consists of beamformed data.

You can choose between a 32-bit floating point complex or 8-bit integer magnitude format. Select the 8-bit format only if you are interested in imaging pixel data and want a reduced data file size. The 8-bit format takes up a quarter of the 32-bit format's size.

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.

Tip

For technical details on this format, refer to the document "IMB Beamformed Data Format" (Document number 922-20007002).

Related topics

Changing the IMB port number, page 28

ALL streaming

ALL streaming is for profiling applications. To start streaming ALL data, you must use the **Start Export** API command.

Description

ALL streaming differs from IMB streaming in the following way.

- **IMB streaming**: The M3 Sonar API acts as the server which sends data to an external client.
- **ALL streaming**: The M3 Sonar API acts as the client and sends data to an external server. You must enter the IP address of this external server into the <DataExport_Dest_IPAddr> XML tag found in the "UsersInfo.xml" file.

Details

.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.

Related topics

Streaming ALL data for profiling applications, page 29
Start Export, page 42

API Testing software

Note

You may use the source code of the API Testing software as an example to help you create your own custom application. You can view the source code by navigating to C:\KML\M3_V0254\API_Tester.

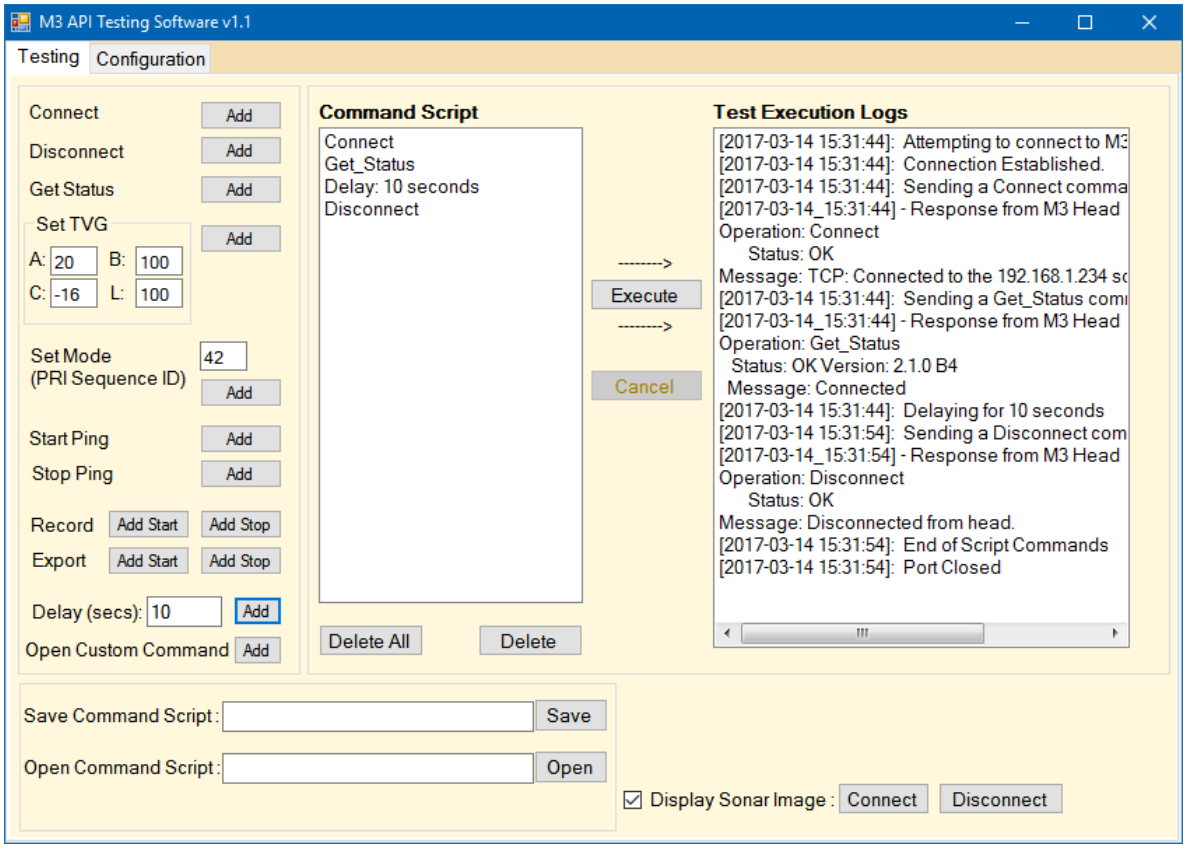
Topics

API Testing software dialog box - Testing page

Use the **Testing** page to write and execute a Command Script, then view the results in the Test Execution Log.

How to open

Click the **Testing** tab in the API Testing software.



Description

The **Testing** page allows you to make sure the M3 Sonar API is working as expected. You can also save any script you create so that you can run the same test at a later date.

To delete a command, select the command in the *Command Script* pane, then click **Delete**. Clicking **Delete All** will remove all commands from the *Command Script* pane.

After creating your script, click the **Execute** button to send the API commands to the Commands Port. You can abort script execution by clicking **Cancel**.

This page also allows you to display a sonar image so that you can verify operation of the Sonar Head and verify that the M3 Sonar API is streaming IMB data.

Details

Connect

The **Connect** function establishes communication between the M3 software and Sonar Head, then starts "pinging". Click the **Add** button to add this command to your script.

Disconnect

The **Disconnect** function stops operation of the Sonar Head. Click the **Add** button to add this command to your script.

Get Status

The **Get Status** function displays information about the Sonar Head and M3 software in the API response text. Click the **Add** button to add this command to your script.

Set TVG

TVG (Time Variable Gain) compensates for the loss of acoustic energy due to geometric spreading and absorption. Click the **Add** button to add this command to your script. Four adjustable factors are used to set the gain curve. You can edit these values in the text boxes.

Set Mode

The **Set Mode** function allows you to set the optimal operating mode for your application. Each mode has its own pre-defined characteristics, such as differing ranges, angular resolutions, and pulse types. This API command requires a mode number (PRI Sequence ID). You can find a list of mode numbers in the Database Editor software. Enter a value into the text box.

Start Ping

If the Sonar Head is paused, the **Start Ping** function resumes operation and starts "pinging". Click the **Add** button to add this command to your script.

Stop Ping

If the Sonar Head is running, the **Stop Ping** function pauses operation of the head. Click the **Add** button to add this command to your script.

Record

Record allows you to record echo data. Click the **Add Start** button to add this command to your script. If you are recording, the **Stop Record** API command will stop the recording activity. Click the **Add Stop** button to add this command to your script.

Export

Exporting ".ALL" data is not supported in the M3 Sonar.

Delay

The **Delay** function is a "control" statement simply used to add a delay between API commands. The **Delay** function is only used in the API Testing software. However, you can code a delay between API commands into your custom application. Click the **Add** button to add this command to your script.

Open Custom Command

This feature is useful in the event that new API commands are supported in the M3 Sonar API, but you are still running an old version of the API Testing software. Adding the new command to an XML file will allow you to test it. The "Commands" folder contains XML files of all supported API commands — this folder is a good place to add your custom command. Click the **Add** button to browse for an XML file that you can add to the *Command Script* pane.

Save Command Script

Click the **Save** button to create an XML commands file that you can run later.

Open Command Script

Click the **Open** button to open an XML commands file. Opening a file will add the commands to the *Command Script* pane, but will not remove commands already listed in the pane.

Display Sonar Image

Check the **Display Sonar Image** box, then click the **Connect** button to open the **Sonar Image** window.

Related topics

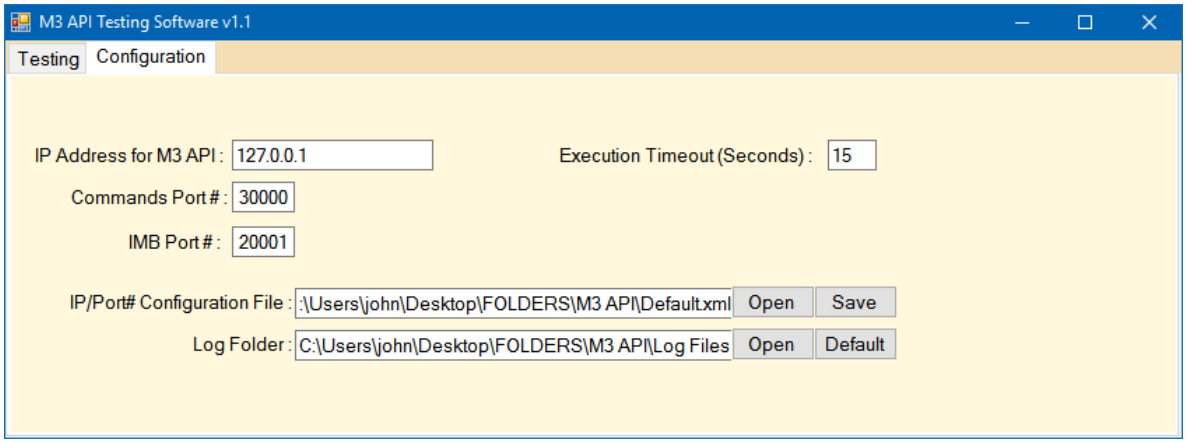
Testing the M3 Sonar API, page 23

API Testing software dialog box - Configuration page

Use the **Configuration** page to set the IP address of the computer running the M3 Sonar API and to configure which ports the API Testing software uses to communicate with the API.

How to open

Click the **Configuration** tab in the API Testing software.



Description

The **Configuration** page allows you to change the parameters you need to connect to the M3 Sonar API.

These parameters match the default values defined in the "UsersInfo.xml" file of the M3 Sonar API. If you change the default values in the "UsersInfo.xml" file, then you must change the values here too.

Altered parameters on this page will only be saved if you overwrite the "Default.xml" file or create your own configuration file.

You can also change the location of your log files.

Details

IP Address for M3 Sonar API

If the M3 Sonar API is running on the same computer as the API Testing software, leave the IP Address as 127.0.0.1. 127.0.0.1 is a loopback address (localhost). This address establishes an IP connection to the same computer that you are using. If the M3 Sonar API is running on a different computer, enter that computer's IP Address.

Note

Do not enter the Sonar Head's IP Address.

Execution Timeout

During script execution, if the M3 Sonar API doesn't respond within the timeout defined here, then script execution will end and an error message will appear. Enter the number of seconds before the timeout occurs.

Commands Port #

The Commands Port receives API commands from the API Testing software. Make sure this value matches the port defined in the <API_Commands_Port> XML tag in the "UsersInfo.xml" file of the M3 Sonar API.

IMB Port #

The IMB Port sends data to the API Testing software.

IP/Port# Configuration File

Click the **Open** button to choose a Configuration File to load. Click the **Save** button to save the IP Address and Commands Port parameters into a new or existing Configuration File.

Log Folder

Click the **Open** button to choose a folder for your log files. Click the **Default** button to reset the log file location to the default folder.

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