
User Manual for
Starmon mini
Temperature Recorder
and

SeaStar 
Graphic Supporting Software

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1. Introduction

SeaStar is supporting software for the **Starmon mini** temperature recorder. **SeaStar** can run under versions newer than Win 2000. This manual takes you step-by-step through the hardware connections and use of the **SeaStar** Program.

Free upgrades of **SeaStar** are available at:

<http://www.star-oddi.com/Online-Support/Software-updates/>.

Please note that the downloaded file has to be installed into the existing **SeaStar** folder. The update alone is not a complete program and therefore will not work like that. Follow the instructions on the update website for correct installation.

This manual guides the users of **Starmon mini** through the operation of the recorder. Setting the operating parameters as well as data retrieval requires access to a PC computer with a standard RS-232C serial interface or USB.

Starmon mini is a compact microprocessor-controlled temperature recorder with electronics and probe housed in a strong waterproof cylinder made of either plastic or titanium. The plastic housing allows for an external pressure of 40 bars, which equals a depth of approximately 400m. The titanium housing has a pressure tolerance of 1100 bar (11000m).

The serial name of the recorder is T-*nnnn*. *nnnn* is a four-digit number.

The recorder is powered by a small 3.6V lithium battery. The battery can be replaced with the use of a soldering iron. The recorder can be sent to Star-Oddi for battery replacement and recalibration.

Starmon mini is calibrated at Star-Oddi, and each recorder has its calibration constants stored in its internal memory. It is recommended that the recorder be recalibrated every 1-2 years.

The installation program is on the **SeaStar** CD. Insert the CD into your compact disc drive. To install the program, follow the automatic InstallShield Wizard. Follow the instructions on the screen. You will be prompted for a directory name for your **SeaStar** program.

To uninstall the program, do the following:

1. Click on the Start button in Windows.
2. Go to Settings and Control Panel.
3. Choose Add/Remove Programs.
4. Choose **SeaStar** and click on Change/Remove, and 'Yes to all'.

2. Preparation

This chapter describes preparations that should be carried out before connecting to the recorder.

Start SeaStar and the following window will appear.

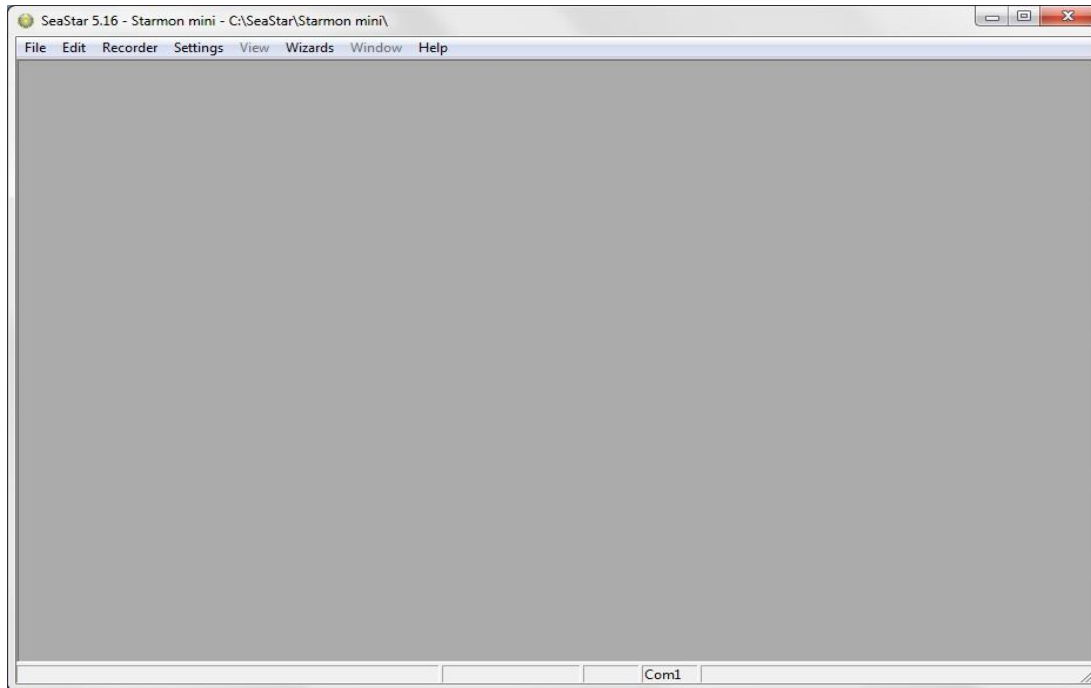


Figure 2.1 SeaStar main Window

Before connecting to the recorder, it is important that the clock on the PC computer is correct. This is important since the recorder automatically downloads the PC clock settings.

2.1 Select Recorder Type

SeaStar is compatible with other Star-Oddi instruments. A recorder type must be selected before connecting to the recorder. The default setting in the software is set to Starmon mini as a recorder type. Change the recorder type to Starmon mini by doing the following:

1. Choose the File menu and the New Recorder Type command.
2. Select **Starmon mini** as a recorder type.

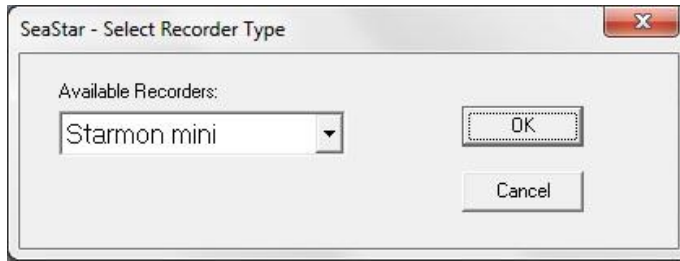


Figure 2.2 Select Starmon as Recorder Type

2.2 Configuration of the Communication Port

It is necessary to define which serial port on your PC computer you will use for the communication cable. This is done the following way:

1. Choose the Communication command in the Settings menu. The Communication definition dialog box appears.
2. Select a serial port for communications.
3. Choose the OK button.

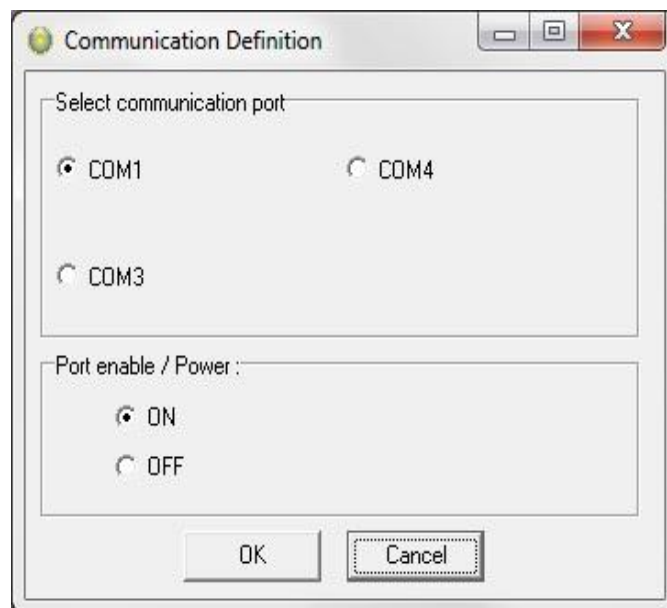


Figure 2.3 Communication Port Configuration

Before connecting to the recorder, it is important that the clock on the PC computer is correct. This is important since the recorder automatically downloads the PC clock settings.

The user is also advised to view the Settings menu, to insure that the data directory **and data format are according user's requirements**. The Settings menu is described in detail in chapter 7.

To check which communication ports are available on your computer, open your Device Manager. On Windows XP you can do it following way: Control panel > system > hardware > device manager.

Under Ports you can view all available ports. Make sure that the port you are intending to use is enabled: right-click on the appropriate port and select properties. Under 'Device usage' it should state 'use this device (enable)'.

2.3 Using the USB Serial Converter

If you are using the USB serial converter you will need to install the driver first that comes on the provided CD. Please read the **Quick Installation Guide'** booklet to get further instruction on how to proceed.

After you plug in the USB cable you will see a new communication port in your device manager, called **'Prolific USB-to-Serial Comm Port'**. Make sure that the port is enabled and select the appropriate port in **SeaStar**.

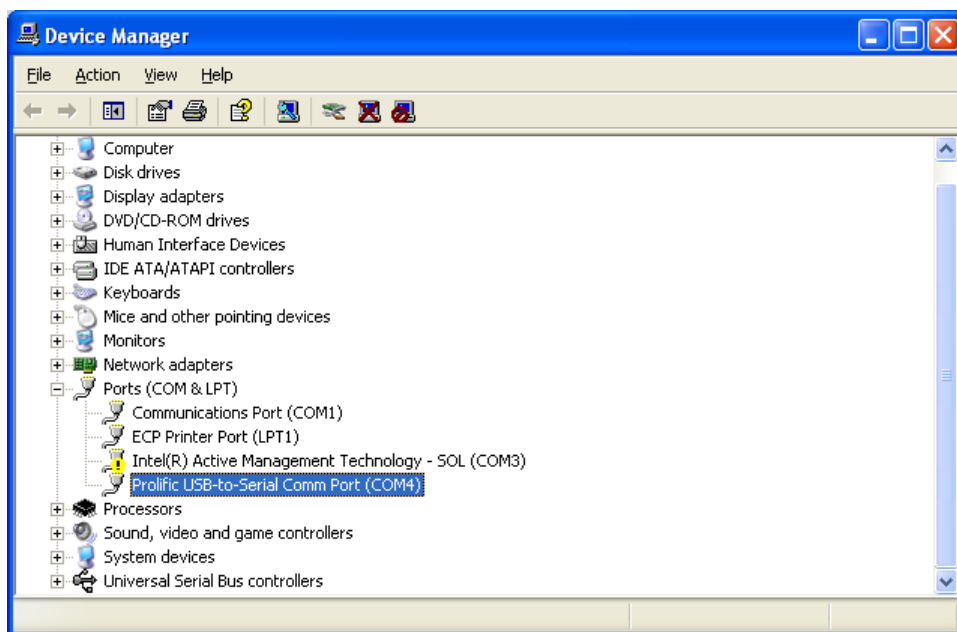


Figure 2.4 USB Communication Port in Device Manager

3. Hardware Connections

This chapter provides details concerning the communication cable and how to connect the cable to the recorder.

3.1 Communication Cable

The **Starmon** communication cable is an RS-232C compatible cable, specially designed to communicate with **Starmon** recorders. The cable will feed power to the recorder while communicating with the PC. A USB serial converter cable is also available.

If the battery inside the recorder is dead, the PC and cable are still able to connect to the recorder and retrieve data.

3.2 Connecting

Unscrew the end cap on **Starmon mini**. The socket becomes accessible as shown in the following figure:

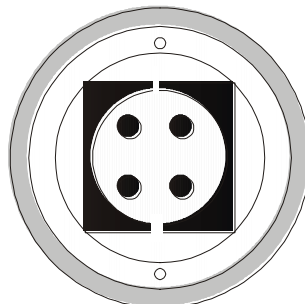


Figure 3.1 Connector Socket under the Cap

Connect the communication cable between the serial port of the computer and the socket inside the recorder.

When data upload is completed and/or new measurement settings have been downloaded to the recorder, the user should disconnect the recorder and close the housing. It should be adequate to tighten the cap firmly by hand. Occasional lubrication of the o-ring seal is recommended.

3.3 COM Connection

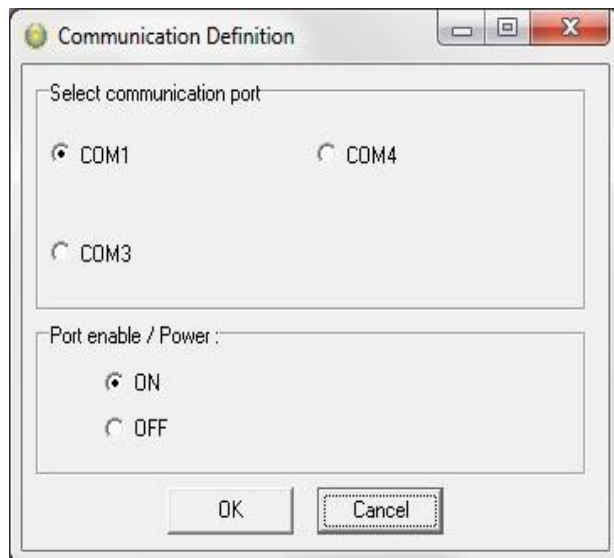


Figure 3.2 Communication Definition

Choose **Settings-Communication-Serial Ports** to display available ports (see figure 3.2). Com ports up to COM255 can be selected.

3.4 Com Port Wizard

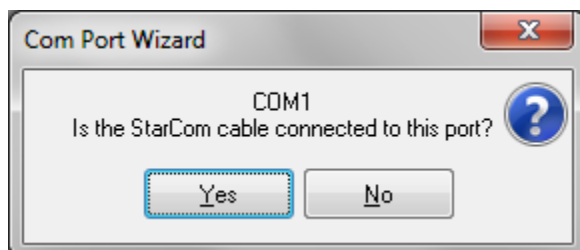


Figure 3.3 Com Port Wizard

Choose **Wizards- Com Box Connection** to enter the Com Port wizard (see figure 3.3). The wizard goes through available ports and activates them one at a time and asks the user to confirm that the communication cable is connected to a specific port.

4. Using Starmon mini - Tutorial

This chapter guides users through the process of utilizing SeaStar to set up Starmon mini prior to recording and data retrieval.

4.1 Starmon mini Set Up

Step 1 - Start Program

Start the **SeaStar** software. Remember to carry out the software preparation outlined in chapter 2.

Step 2 - Connect

Unscrew the end cap on **Starmon mini**. Connect the communication cable between the serial port of the computer and the socket inside the recorder.

Step 3 - Connect to the Recorder

Choose the **Recorder** menu and the **Connect** command. The window in figure 4.1 appears.

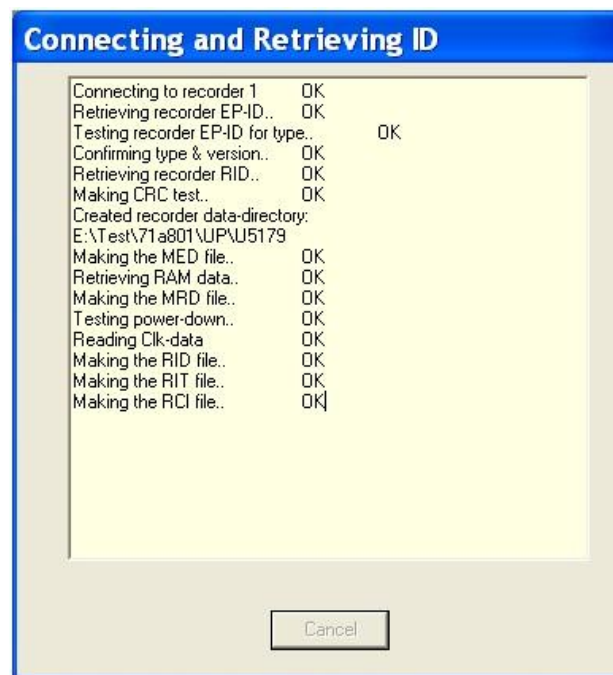


Figure 4.1 Connecting and Retrieving

Once the connection has been established, a window appears with information on the recorder's mode (see figure 4.2).

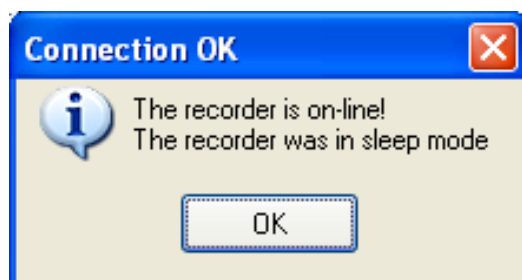


Figure 4.2 Connecting to the Recorder

Press **OK**. The Recorder is now on-line, as indicated at the bottom of the **SeaStar** window.

SeaStar checks which version of firmware is in the recorder. If the software does not recognize the firmware the user will be asked to update **SeaStar** as there might be a new functionality in the firmware which **SeaStar** does not support.

Connection time registration

Each time **SeaStar** connects to a Recorder, the PC time and recorder time is registered to a binary file, with a CLK extension. This information is also saved to a text file with the extension CCT.

Another text file is created with the extension CCD, containing various information, for example on previous connection and time comparisons, depending on the status of recorder.

If a previous CCT file exists and the recorder was in sleep or slumber mode, a PC vs. recorder clock comparison is calculated, indicating difference in seconds and ppm.

If the recorder was in measurement mode, then a drift calculation is performed, based upon **PC-time comparison to the recorder's clock** and measurement sequence.

The RIT file contains partly the same information as the CCD file.

Upon retrieving data from a recorder and converting the data, the last measurement retrieved time and the next scheduled measurement time is compared to the PC time.

The results are added to the CCD file and the MIT file.

Note: If the retrieved number of data does not match the last measured number of data, erroneous results are to be expected.

Step 4 - Set New Measurement Parameters

(If the recorder has already been set up to record data and you want to retrieve data, go directly to **step 6**).

Choose the **Edit** menu and the **New Measurement Sequence Definition** command. The following window appears:

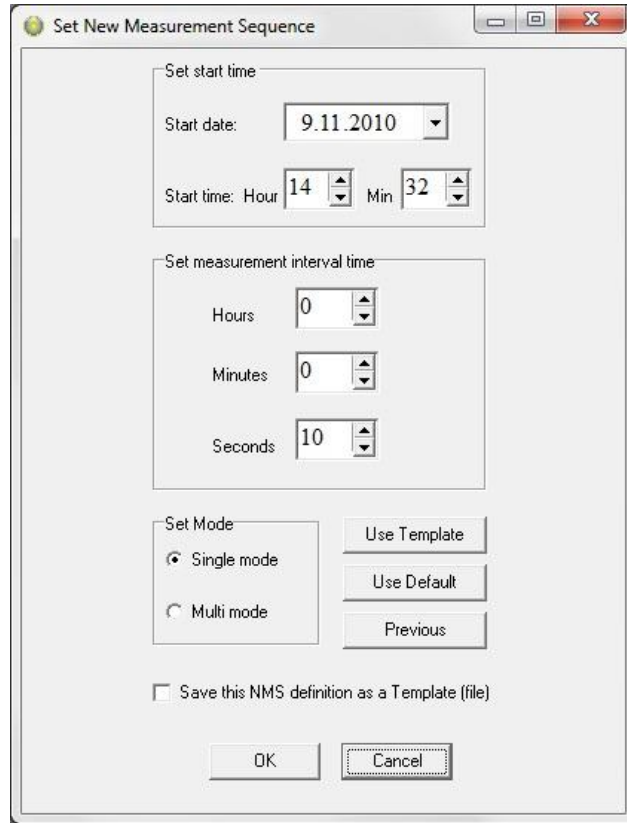


Figure 4.3 Measurement Sequence Definition

Select the start time of recordings (**date-month-year, hours-minutes**). The start time of the new measurement sequence must be set at a minimum of three minutes in advance. Set the sampling interval (**hours-minutes-seconds**).

If the user wants to program many recorders with the same sampling interval and start time, it is recommended to select **Multi mode**. By choosing **Multi mode**, the settings are fixed; giving each recorder connected to thereafter, the same settings. The recorders that are connected to, following the first recorder, automatically get the same settings as the first recorder. This saves time in the programming process. The multi mode can be deactivated by clicking **Cancel** when connecting to the recorder (see figure 4.4).

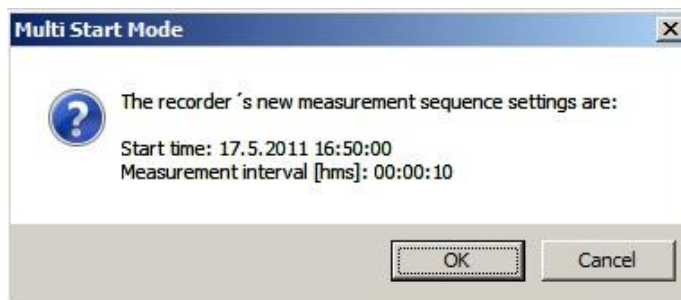


Figure 4.4 Multi Start Mode

The three buttons **Use Template**, **Use Sequence**, and **Previous** are not commonly used. They can be used when one wants to use a previously programmed sequence. The **Use Template** can be used if older definitions have been saved by enabling the 'Save this NMS as a template (file)'. That way it's possible to get templates that have been set up in the past. With the **Use Sequence** button it is possible to get same settings as from other recorders, by browsing for their serial no. By hitting the **Previous** button the settings go back to previous, before changes were made. To read more about templates see chapter 7.

After the settings have been selected, press the **OK** button.

Step 5 - Start a New Measurement Sequence

To set the recorder in Measurement Mode (start recording), choose the **Recorder** menu and **Start New Measurement Sequence** command. The window in figure 4.5 appears.

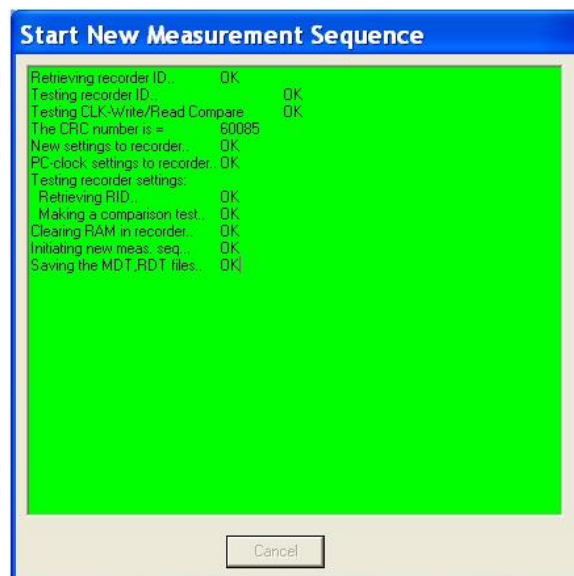


Figure 4.5 Start New Measurement Sequence

Once the new measurement sequence has been downloaded into the recorder, a window appears on the screen in order to verify the settings (see figure 4.6):

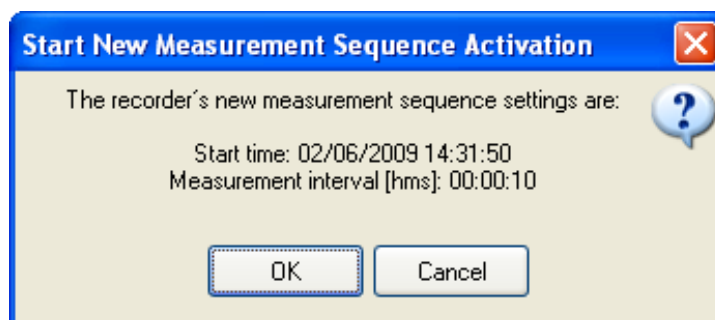


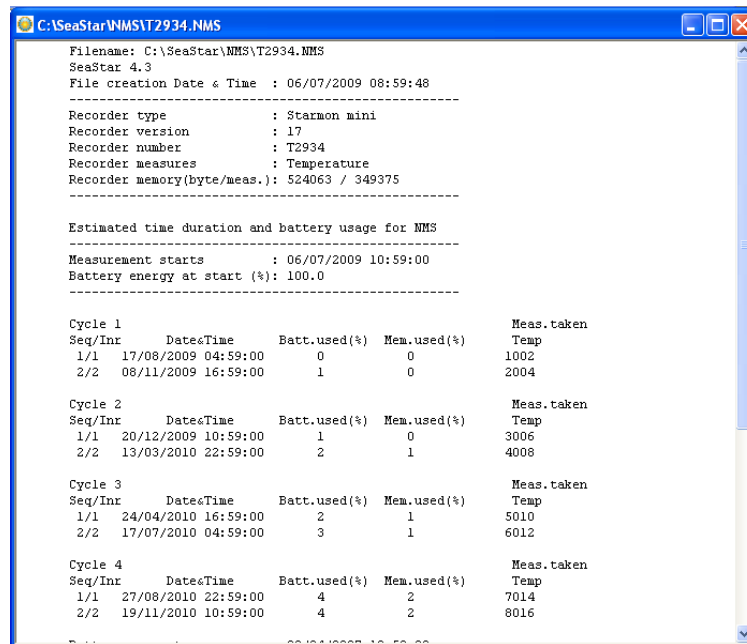
Figure 4.6 Start New Measurement Sequence

Press **OK** and the recorder will be set in Measurement Mode.

NMS Calculation

Upon setting up a NMS the estimated measurement sequence is calculated and memory and battery energy usage predicted. The results are written to a text file, bearing the recorder name with a NMS extension. If a recorder has not been selected then the file bears the recorder type name, still the NMS extension.

An example of the *.NMS file is shown in fig. 4.7. The file is placed in the **SeaStar\NMS** directory.



```

C:\SeaStar\NMS\T2934.NMS
-----
Filename: C:\SeaStar\NMS\T2934.NMS
SeaStar 4.3
File creation Date & Time : 06/07/2009 08:59:48
-----
Recorder type      : Starmon mini
Recorder version   : 17
Recorder number    : T2934
Recorder measures  : Temperature
Recorder memory(byte/meas.): 524063 / 349375
-----
Estimated time duration and battery usage for NMS
-----
Measurement starts : 06/07/2009 10:59:00
Battery energy at start (%): 100.0
-----

Cycle 1
Seq/Inr  Date&Time      Batt.used(%)  Mem.used(%)  Meas. taken
Temp
1/1      17/08/2009 04:59:00    0             0             1002
2/2      08/11/2009 16:59:00    1             0             2004

Cycle 2
Seq/Inr  Date&Time      Batt.used(%)  Mem.used(%)  Meas. taken
Temp
1/1      20/12/2009 10:59:00    1             0             3006
2/2      13/03/2010 22:59:00    2             1             4008

Cycle 3
Seq/Inr  Date&Time      Batt.used(%)  Mem.used(%)  Meas. taken
Temp
1/1      24/04/2010 16:59:00    2             1             5010
2/2      17/07/2010 04:59:00    3             1             6012

Cycle 4
Seq/Inr  Date&Time      Batt.used(%)  Mem.used(%)  Meas. taken
Temp
1/1      27/08/2010 22:59:00    4             2             7014
2/2      19/11/2010 10:59:00    4             2             8016

```

Figure 4.7 Results from NMS Calculation

When starting the recorder in a NMS, the *.RDT file now shows the sequence settings, plus information on the sequence time duration and battery usage (same as in the *.NMS file).

Step 6 - Retrieve Data

Choose the **Recorder** menu and the **Retrieve Data** command. The following window appears:

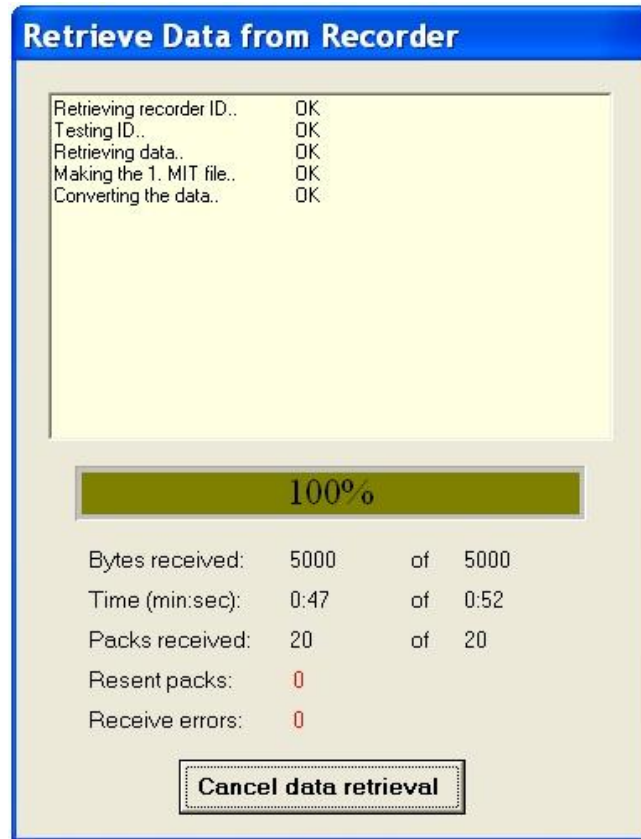


Figure 4.8 Retrieve Data from Recorder

The window in figure 4.8 shows the data retrieval progress in bytes, time elapsed and number of packs received.

Data will be uploaded from the recorder and presented in graphical and tabular form. With default settings, **SeaStar** automatically creates a sub-directory in the '**SeaStar**' directory, named '**Starmon mini**'. In the '**Starmon mini**' directory, a directory named after the recorder's serial number (**Tnnnn**) is created. All files related to the recorder are automatically saved in the serial number directory. The default data directory can be viewed in the **Settings** menu, and **Directories**. The user has the option to define a new data directory path if desired.

The data is retrieved in a non-destructive manner. This means that you can repeatedly read the data without erasing it from the memory. Each time data is retrieved, a new file will automatically be created. The name of the data file consists of the measurement sequence number and the serial number of the recorder. The recorder cannot be loaded with new settings if it contains data that has not been retrieved. This is a safety feature which prevents data from being accidentally lost.

After data retrieval, the recorder can be set up to measure again, or it can be put into Sleep Mode. Minimum power is depleted from the battery while the recorder is in Sleep Mode. When the recorder is on-line, the user can put it into Sleep Mode by disconnecting the recorder, or by choosing the **Recorder** menu, and **Put Recorder in Sleep Mode**. To set the recorder in Measurement Mode, repeat steps 3, 4 and 5.

Step 7 - Disconnect

Disconnect the cable and close the housing. The cap should be tightened firmly. Occasional lubrication of the O-ring seal is recommended.

Note that the old types of Starmon (up to serial no. 549) don't go into sleep mode when being disconnected from the computer but will continue consuming battery. To put your Starmon into sleep mode select Recorder > Disconnect.

Step 8 - View Data

When data is retrieved from the recorder, a new file will automatically be created and opened in graphical and tabular form. To open existing data files on the computer, choose the File menu, Select Recorder command, and then the Select Measurement command. When a data file has been opened, a new window appears with the data shown as a chart and a table. The next chapter will describe in detail how to view and process data.

5. View Data

This chapter describes how to open a data file and the options available in SeaStar for viewing the data.

5.1 Open Data

To open an existing data file that has already been retrieved, do the following:

1. Choose the File menu and the Select Recorder command. When a recorder has been selected, its serial number will be displayed in the blue top bar of the software.
2. Select the data file by choosing the File menu and the Select Measurement command.

The name of the data file consists of the number of times the recorder has been set up to measure plus the serial number of the recorder. When the data file (.mid) has been selected, the chart and data tables are opened. The following figure shows a chart and data table which have been opened:

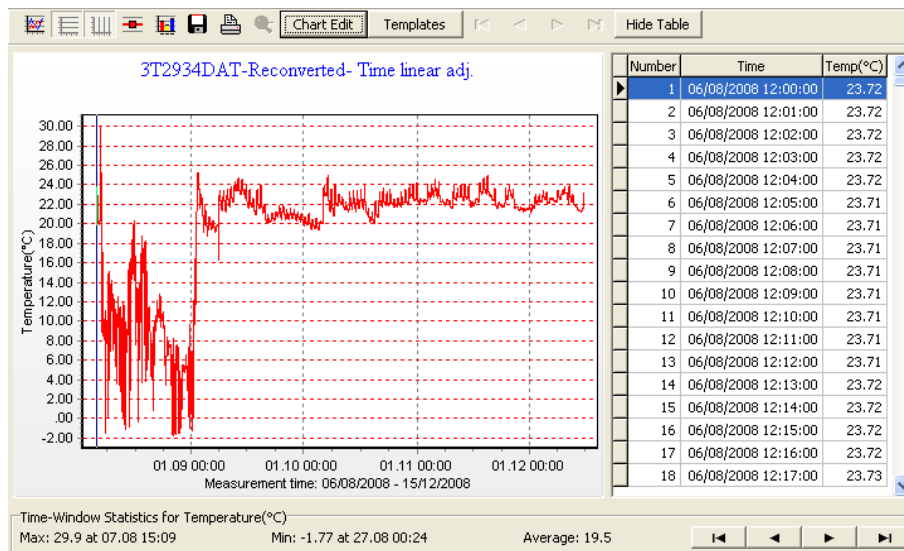


Figure 5.1 Chart and Data Table of an open File

At the bottom of the SeaStar window you can view the measurement sequence number, which indicates the number of times the recorder has been set up to measure.

5.2 Import

Data files from other recorders than **Starmon** can be imported into **SeaStar** and viewed as charts and tables. The imported file must be a text file with the extension

DAT, and with SeaStar's conventional DAT file structure. See more about data files and headers in the Appendix.

5.3 Buttons

When the chart is opened, buttons related to the chart are displayed.



Active Series List

This button can be useful when working with a multi-sensor recorder, in order to select which parameters to display in the chart. Click the button and the following window appears:

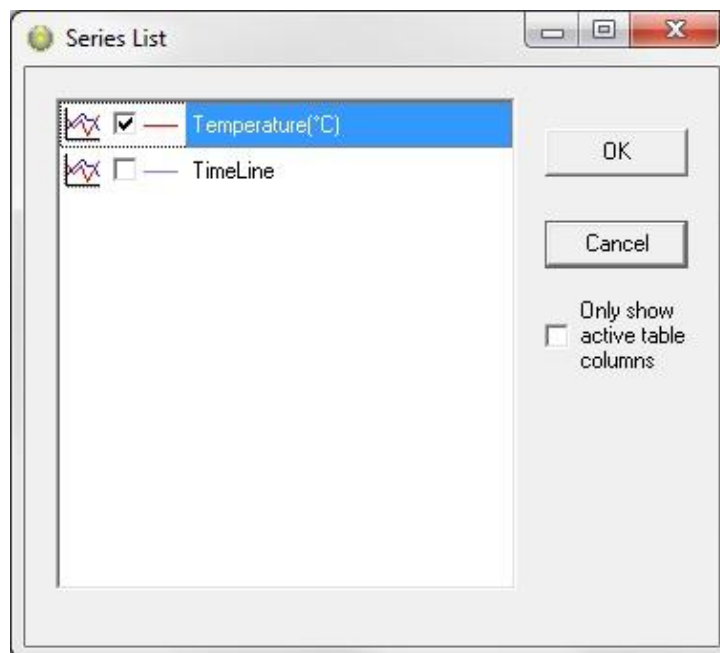
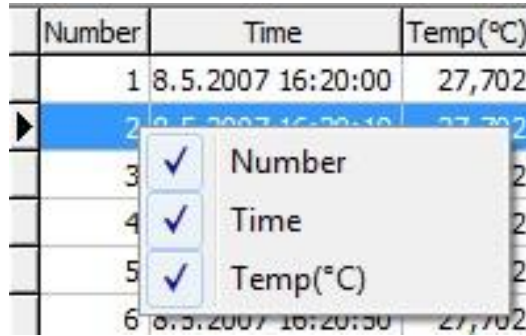


Figure 5.2 Series list

By selecting **Only show active table columns** only the selected series will be displayed in the chart table.

The table columns can also be changed manually by right-clicking on the table (see figure 5.3).



Number	Time	Temp(°C)
1	8.5.2007 16:20:00	27,702
2	8.5.2007 16:20:10	27,702
3		2
4		2
5		2
6	8.5.2007 16:20:30	27,702

Figure 5.3 Table



Horizontal/Vertical Gridlines

These two buttons give the option of hiding/displaying the horizontal/vertical gridlines in the chart.

A drop-down menu appears when clicking the **horizontal gridlines** button.

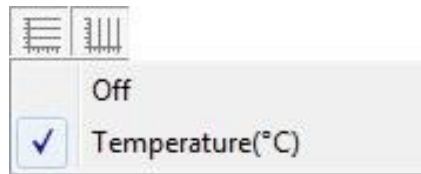


Figure 5.4 horizontal gridlines

Select the series gridline.

A drop-down menu also appears when clicking the **Vertical gridlines** button



Figure 5.5 vertical gridlines

Select the minimum grid size.



Data Point Marker

This button gives the option of displaying/hiding data points in the chart.



Histogram

The chart can be shown as histogram, displaying the distribution of values by percentage.

Click the **Histogram** button and the following window appears:

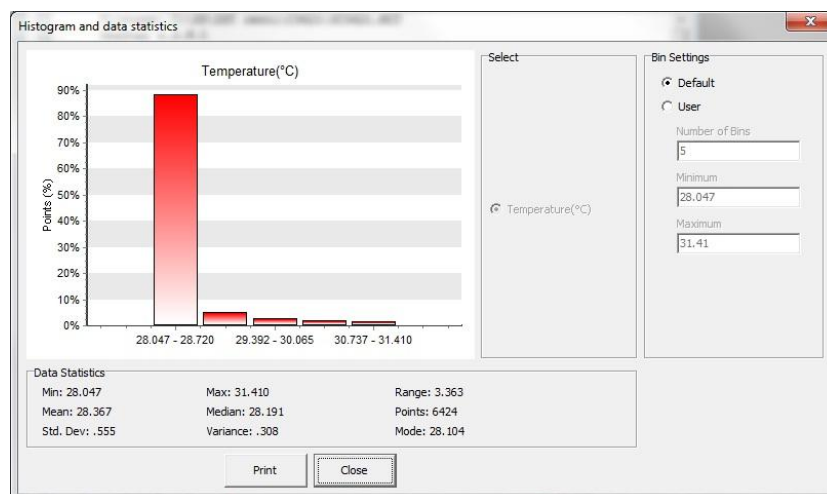


Figure 5.6 Histogram and data statistics

Under **Bin Settings** there are two options, **Default** and **User**. Choose **User** to select the number of bins and the minimum and maximum values you wish to display.

The **Histogram** can be printed out by clicking the **Print** button.



Save Window Data

Retrieved data is automatically saved, but if changes are made with the graph, for example with the time scale, the save button enables the user to save the graph (as a DAT file).



Print Chart

The chart can be printed. For more details see chapter *6.Printing*.



Zoom Out

Click this button to zoom out the chart.



Zoom In

Click this button to zoom in on a previous view.



Adjust Axis

This button adjusts the axis in order to display all data within the zoomed timeline.



Open file in PatternFinder

Click this button to transfer data to **PatternFinder**



Chart Edit

By clicking this button, the following window appears:

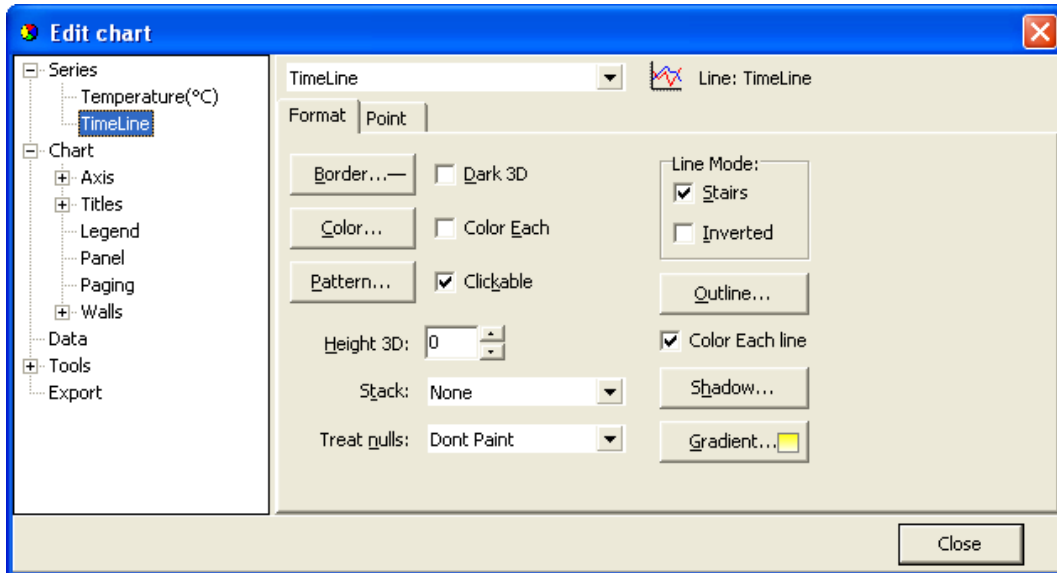


Figure 5.7 Editing Chart

This button gives several options regarding the look of the graph. The axis can be defined (max. and min.), titles and legend can be set visible. Under 'Panel' the color of background, borders and gradient can be selected. Under 'Walls - Back' the colors and gradient of the graph itself can be selected. The 'Visible' option must be enabled to activate the features. The graph can be exported in formats as jpg, gif, bitmap, metafile, pdf, htm and svg.



Templates

If the changes have been made to the graph under 'Chart Edit', it is possible to save that template. It is also possible to load a previously saved template.



Display table completely



Partial table display



Hide table

5.4 Using the Mouse

Min and Max Values

Click once on the temperature line in the chart, and the maximum and minimum values are shown. A straight vertical line should be visible in the graph (to the left). By clicking on this line and holding the left button on your mouse down, the line can be dragged through the chart and the data-table will scroll along with the position of the line.

Zoom

The chart can be zoomed in on by holding down the left button of the mouse, and using the cursor to create a box to the right, around the desired area to zoom in on.

Scroll the Chart

The chart can be scrolled upward, downwards and to the sides, by holding down the right button of the mouse and moving the cursor in the desired direction.

Go Back to Initial View

To go back to the initial view of the chart, simply hold down the left button of the mouse and make a box to the left with the cursor. The position of the box on the chart is irrelevant.

Change the Axis

By double clicking on the X and Y-axis, the measurement time and temperature range can be changed.

Change the Title

To change the title of the chart, double click on the title of the chart.

5.5 The View Menu

When a recorder has been selected, the files in the View menu can be opened.

Data Trend and Table

This view is automatically selected when data is retrieved or a data file is opened. If the chart is closed, but a recorder has been selected, this command can be selected to view the chart. The software will open the latest chart that was viewed for that recorder.

Recorder Information (RIT)

This is a text file containing basic information about the recorder, serial number, production date, estimated battery life etc.

Recorder Calibration Information (RCI)

This text file contains information about the calibration constants of the recorder, calibration range of the parameters. The range is both showed as decimal values (DV) and unit values (UV). The survival depth of the recorder is also shown.

Recorder Download Information (RDT)

This text file contains information about the measurement sequence that was last downloaded into the recorder, including the start time, sampling interval and the measurement sequence number.

Viewing Text Files

Under <View\Text files> the user can select a text file, via a file browser, for viewing. This option is meant to give the (advanced) user a chance to view files that are not directly supported for viewing in **SeaStar**, but are a part of the **SeaStar** documentation system.

The files that the file browser accepts must have the following extensions:

- **TXT**
Frequently, users copy **SeaStar** data to text processors and spreadsheets, like Word and Excel, and later save the data as TXT files for viewing in other applications.
- **INI**
There are a number of INI files that **SeaStar** uses for store settings. These files **are described in the Appendix under 'Information files'**. The latest members in the INI files family are the Template files.
- **DAD**
This is the original data file. It contains the raw data (in Ascii format) retrieved from recorder. The DAD together with the MID are converted to the DAT file. A word of warning: The DAD file should never be tempered with, as that might give cause to erroneous data conversion.
- **CCT**
Every time **SeaStar** connects to a recorder, the PC time and the recorder's clock data are stored in a <recorder name>.CCT file.
- **CCD**
Every time **SeaStar** connects to a recorder, the PC time and the recorder's time are compared to the last CCT, if found, and stored in <recorder name>.CCD file, <measurement sequence name>.CCD.
- **NMS**
Upon completion of a NMS editing session, estimation of memory and battery usage is calculated and the results placed in a NMS file, which is then displayed to the user.

SNMS LOG File

To improve the “Start New Measurement Sequence”, SNMS, indication/registration of success or failure, a log file for each recorder type is placed in the **SeaStar** directory. The log file name, for **Starmon mini**, is DSTT.LOG, i.e. the same naming convention as for the type INI files.

Each time a SNMS is performed then the appropriate LOG file is updated. The LOG file can be viewed via “View\SNMS Log file (LOG)”.

In addition to the LOG file, if an error occurs during the SNMS, the MDD file is created as a text file, with a description of what went wrong. This MDD file is displayed as a clear message for the user (figure 5.8). Usually the MDD file is a binary file, and the MDT is created from the MDD. If the SNMS is repeated successfully the MDD file is overwritten and the MDT file created.

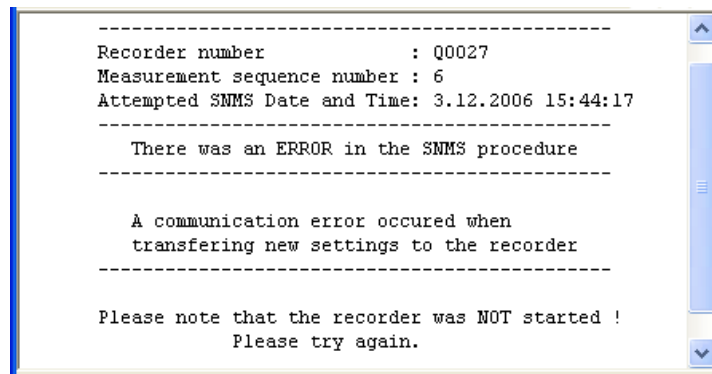


Figure 5.8 The MDD SMNS Error Message

Measurement Data

Measurement Download Definition (MDT)

This text file contains information on data downloaded into the recorder for the measurement file being viewed, including the start time and sampling interval.

Measurement Information (MIT)

This text file contains information concerning the measurement upload time, start date, start time and number of measurements in the measurement data file.

Conversion Information (CIT)

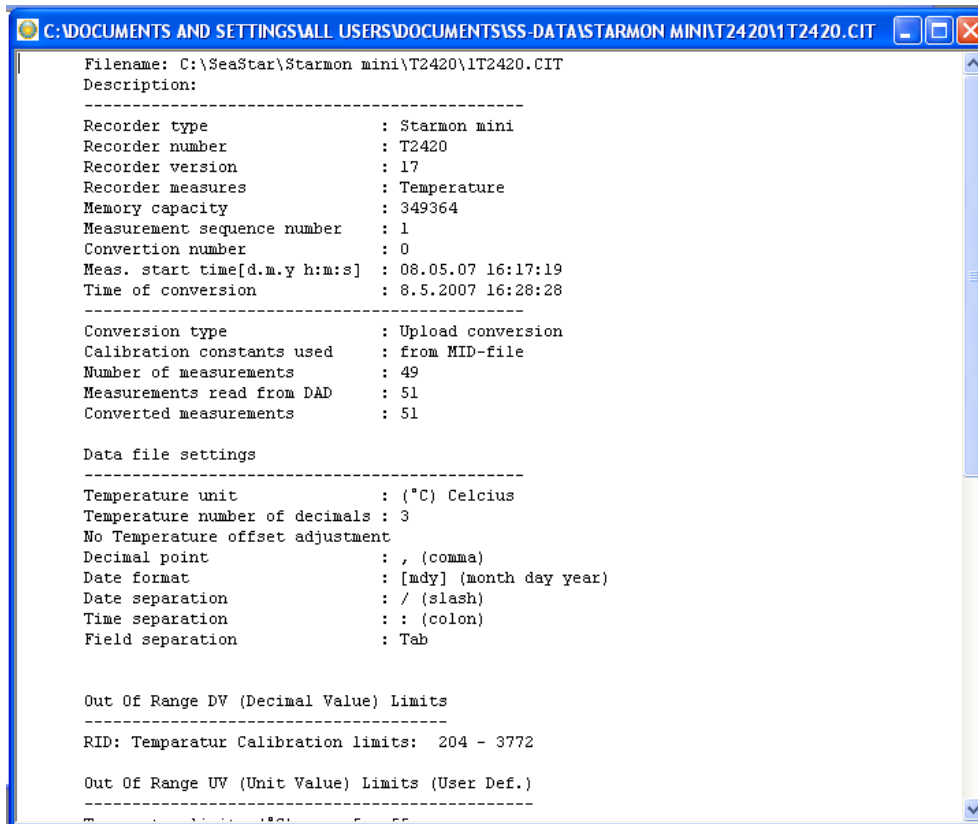
This text file contains conversion information on the units and the data file format.

Statistics in CIT:

The CIT, has been enhanced with more detailed information on the converted data.

As can be seen in figure 5.9, the statistical data, that have been tabulated, are split into two sections, the Unit values statistics and the Decimal value statistics. Values are given for each parameter. The file can be viewed under ‘View\Measurement Data\Conversion Information (CIT)’.

A one line description/comment is available for the user to fill out in the Reconvert data menu. This description is placed in line two of the CIT file.



```

C:\DOCUMENTS AND SETTINGS\ALL USERS\DOCUMENTS\SS-DATA\STARMON MINI\T2420\1T2420.CIT
-----
Filename: C:\SeaStar\Starmon mini\T2420\1T2420.CIT
Description:
-----
Recorder type       : Starmon mini
Recorder number    : T2420
Recorder version   : 17
Recorder measures  : Temperature
Memory capacity    : 349364
Measurement sequence number : 1
Conversion number  : 0
Meas. start time[d.m.y h:m:s] : 08.05.07 16:17:19
Time of conversion : 8.5.2007 16:28:28
-----
Conversion type     : Upload conversion
Calibration constants used : from MID-file
Number of measurements : 49
Measurements read from DAD : 51
Converted measurements : 51

Data file settings
-----
Temperature unit    : (°C) Celcius
Temperature number of decimals : 3
No Temperature offset adjustment
Decimal point       : , (comma)
Date format         : [mdy] (month day year)
Date separation     : / (slash)
Time separation     : : (colon)
Field separation    : Tab

Out Of Range DV (Decimal Value) Limits
-----
RID: Temperatur Calibration limits: 204 - 3772

Out Of Range UV (Unit Value) Limits (User Def.)
-----

```

Figure 5.9 Statistics in CIT File

Out of Range (OOR)

This text file shows the number of measurements recorded that were outside the calibration range.

Binary Data (DAB)

This file contains raw data of the measurements in the data file. Calibration files are not calculated into the data.

View DAB Files as Trend

When converting the DAD -> DAT the DAB file is created simultaneously.

The DAB shows the recorder's native data, i.e. decimal values in the range 0-4095. These values originate from the recorders 12 bit ADC (Analog to Digital Converter). It can be of interest to view the data in its native form, for example to spot saturation/out of range intervals.

The DAB can be viewed graphically as a trend via:

'View\Data Trend and Table\Decimal (Binary) data (DAB)'

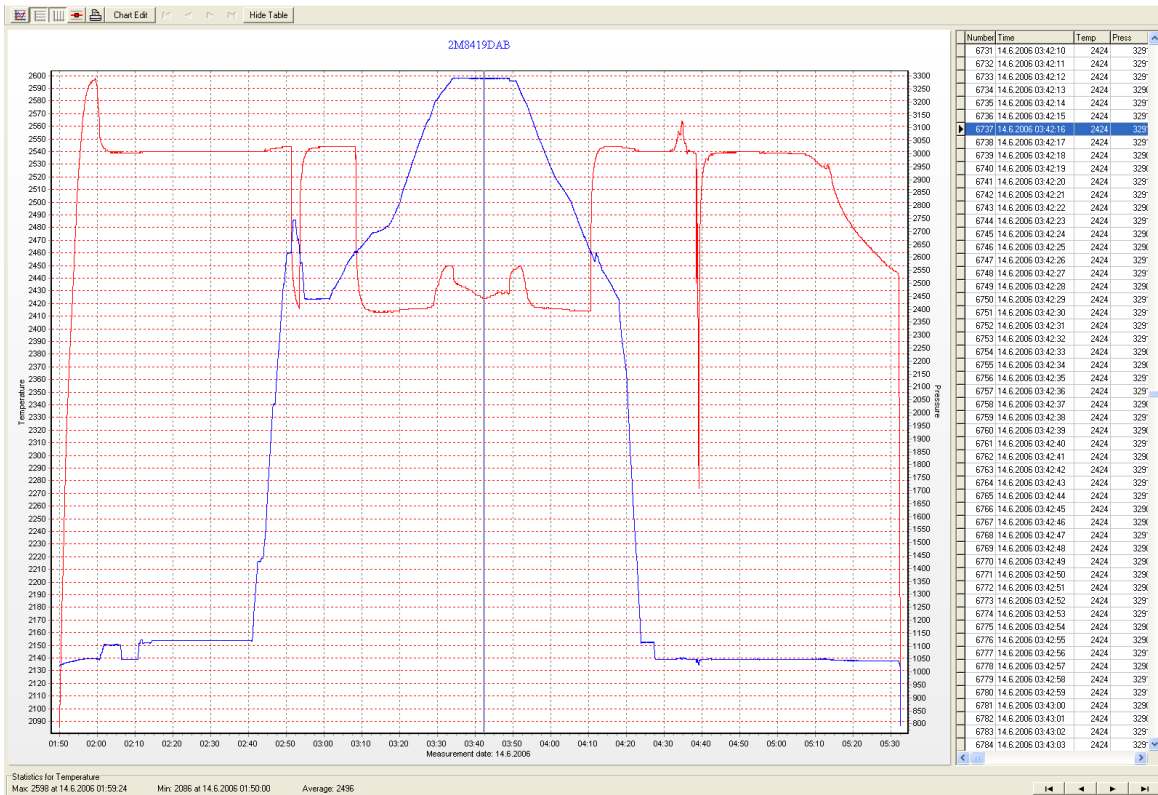


Figure 5.10 DAB Trended

SeaStar cannot view older DAB files, and will inform the user to that effect, if an attempt to view an older DAB file is performed. By reconvertng the data, a viewable file is produced.

Binary Pressure Temperature Corrected Data (BPD)
 Pressure measurement circuitries are calibrated against measurement errors due to temperature changes.

Raw decimal values from the recorder can be seen in the DAB file. The first step in converting decimal values to unit values is the circuitry temperature correction. The result of this first correction can now be seen in a new file in SeaStar, *.BPD. The file contains the corrected decimal value and the difference between the original value and the corrected one.

The file can be viewed graphically or as tabulated lists.

Converted Data (DAT)

This is the text file for the converted data. The DAT file as well as the other text files can be opened in other programs (Excel, Notepad, Word etc.).

Time Synchronone Data (TSD) and Rate of Change (ROC)

If the TSD and/or ROC file creation has been enabled under the Settings menu, then **it's possible to view these files.** More information about TSD and ROC can be found in chapter 7.

Online Measurements

It's possible to view measurements from the recorder online (Recorder\Online Measurements). If the recorder has been set up for online measurements, then it's possible to view the last (current) sequence or select a previous sequence. More about files in the 'Appendix'.

SeaStar Log

SeaStar stores events in the file <SeaStar.log>. The events are:

- Recorder Connected
- Retrieving data from a recorder
- Uploading a measurement sequence to a recorder
- Recorder disconnected.

This file can be opened in SeaStar under <View/SeaStar Log> or by opening it with a text editor.

Screenshots

By pressing the **Print Screen** keyboard button while in the application a screenshot of the desktop is taken and stored in a subfolder, **Screenshots**.

The user can name the screenshot file as can be seen in the following figure.

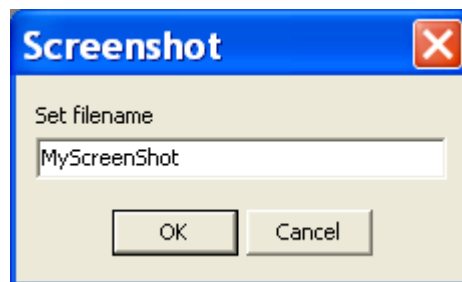


Figure 5.11 Name the Screenshot

The screenshots can be viewed in **View-Screenshots** or by browsing the screenshot folder, <\SeaStar\ScreenShots\>.

The button also performs its normal operation which is to store the screenshot in the clipboard.

5.6 Opening Data in Excel

When retrieving data, the **SeaStar** software automatically creates a text file with the data, called *.DAT. This text file can be opened in Excel and in other programs.

Joined Date and Time

Under the 'Settings' menu, 'Preferences – Data File Format', the default factory settings is set to 'joined date and time'. If this option is not disabled, the following is performed, for opening data in Excel:

1. Excel is started.
2. The *.dat file is found from 'File\Open'.
3. Excel comes up with the 'Text import wizard'. This is a three step process:
 - a. No changes should be made in first step, so hit the next button.
 - b. 'Text qualifier' should be set as 'None'. Hit the next button.
 - c. Column 2, that is date and time, is set as 'Text'. Hit the finish button.
4. You can now create the graph with columns B and C.

6. Printing

All charts and text files can be printed from the **SeaStar** software.

6.1 Charts

Open the chart you want to print out and select **File-Print** on the menu bar. The following window appears:

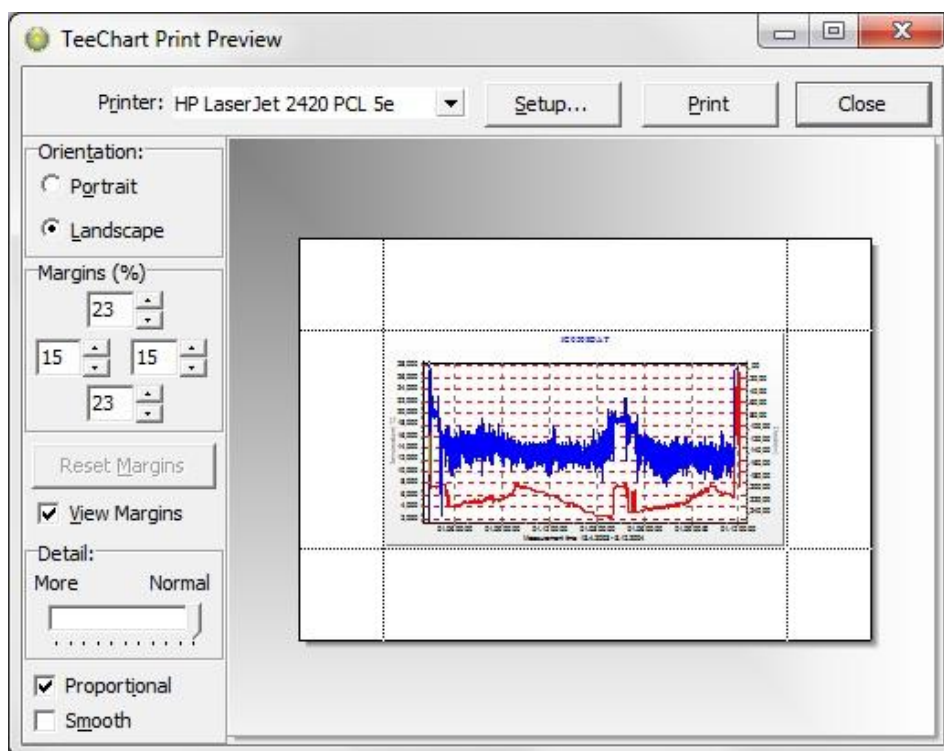


Figure 6.1 Print Preview

Orientation

The chart can be printed in either portrait or landscape format.

Margins

By changing the margins, the chart's length and width can be re-scaled. The margins can be varied by either changing the numbers given for the left, right, top and bottom margins, or by moving the margin lines with the mouse by pressing and holding the left button as the lines are dragged.

Move

When the cursor is located on the chart, a hand becomes visible. By clicking on the chart and holding down the left button of the mouse, the chart can be moved around the page to a desired position.

Details

The size of horizontal and vertical gridlines as well as the texts on the X and Y-axis can be re-scaled by using the scroll bar. The number of gridlines is increased when the bar is moved to the left.

Another way of printing out a chart is opening the chart you want to print out and clicking the **Print Chart** button on the chart bar.

6.2 Histogram

To print out a histogram, open the chart which histogram you want to print out and click on the **Histogram** button on the chart bar. The following window appears:

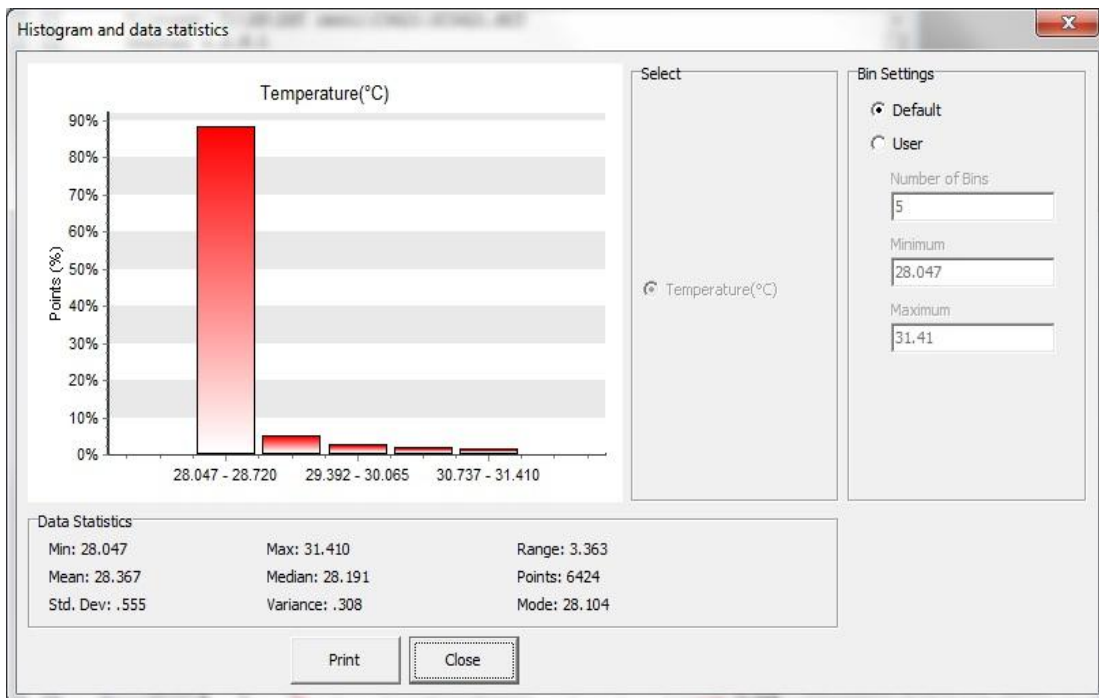


Figure 6.2 Histogram

Click **Print** and the window in figure 6.3 appears:

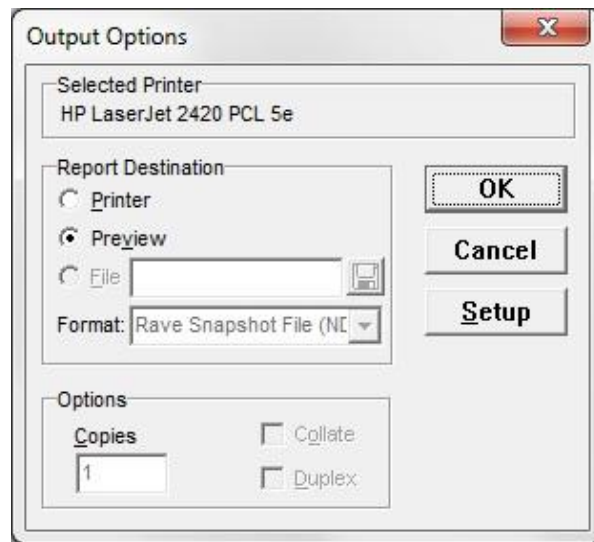


Figure 6.3 Output Options

To change the selected printer, click **Setup** and select another printer.

To see a preview of the print out, select **Preview** under **Report Destination** and click **OK** (see figure 6.3 and 6.4).

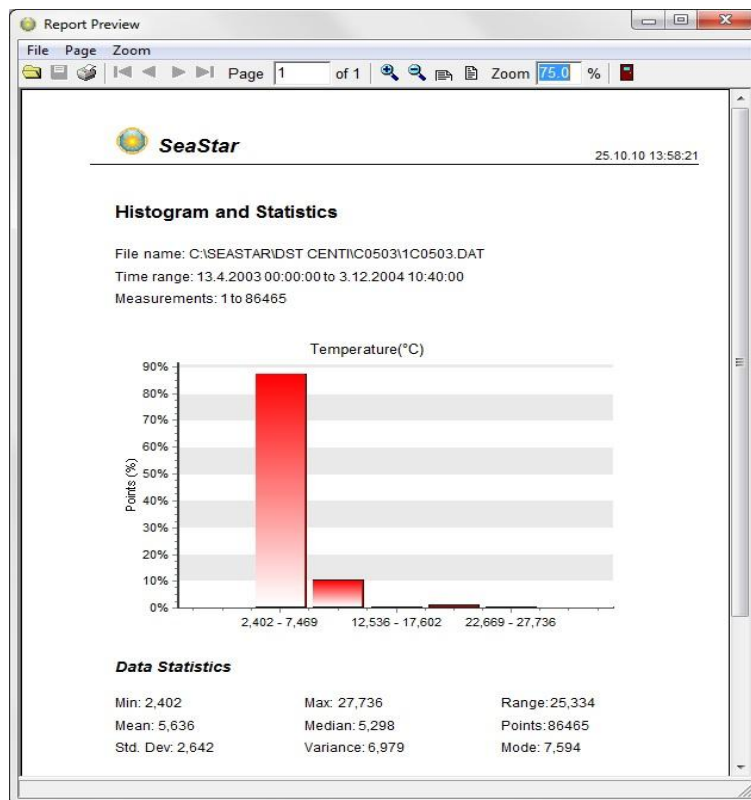


Figure 6.4 Report Preview

6.3 Files

Activate the file you want to print out and select **File-Print** on the menu bar. The following window appears:

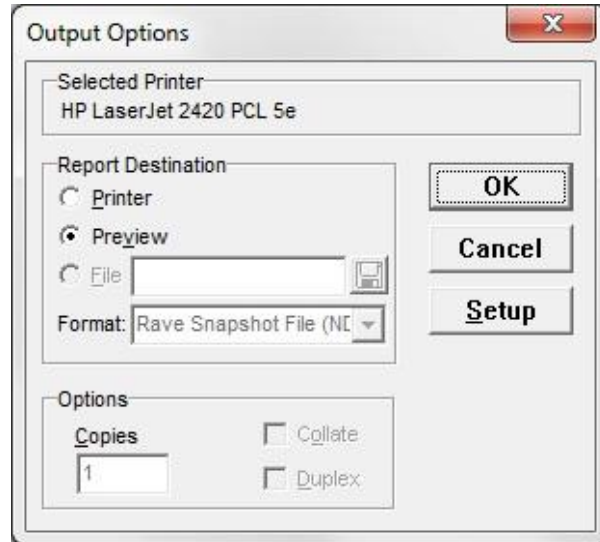


Figure 6.5 Output Options

The dialog window in figure 6.5 has the same functions as the one in figure 6.3.

Note that as some of the files are very large, it is recommended to highlight the data you want to print out before printing.

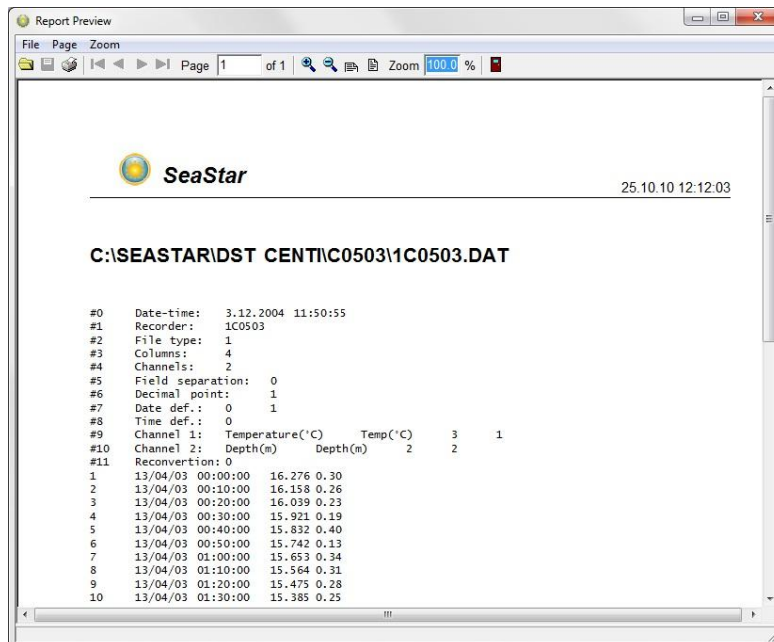


Figure 6.6 Report Preview

7. Settings

This chapter describes the options in the **Settings** menu. These settings are automatically saved when exiting the program.

7.1 Directories

The path definition can be set as **Default SeaStar path structure** or **User defined paths**. Choose the **Settings** menu and the **Directories** command. A dialog box appears:

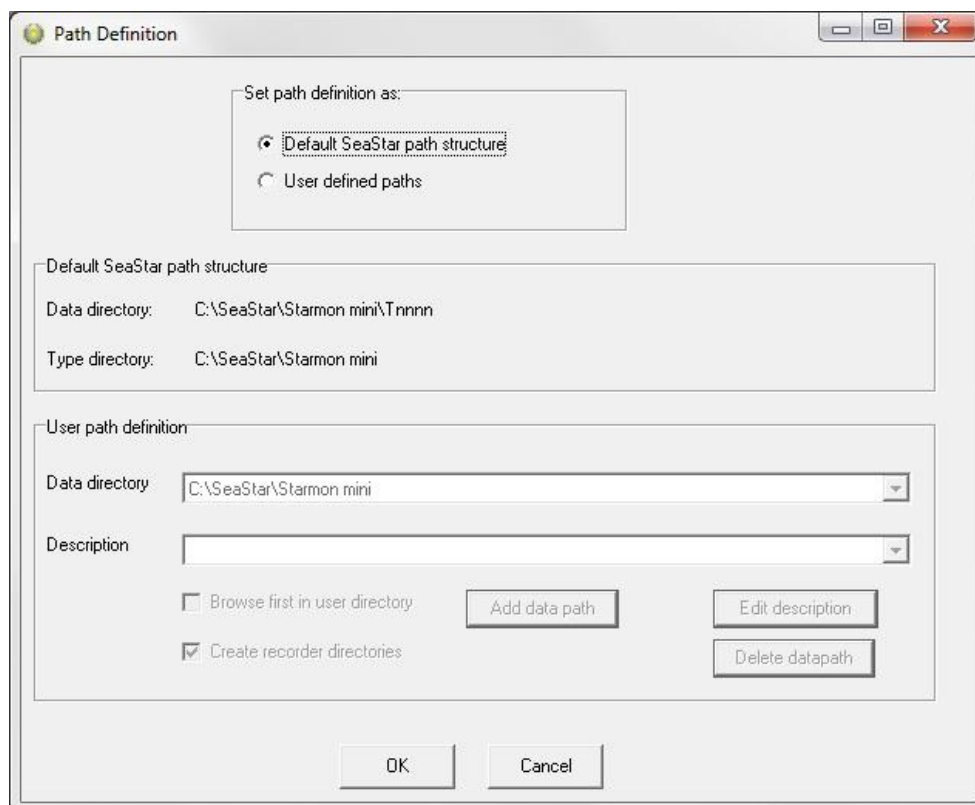


Figure 7.1 Directory Path Definition

Default SeaStar Path Structure

With default settings, SeaStar automatically creates a 'Starmon mini' type directory in the 'SeaStar' directory that was created when the software was installed on the computer. After connecting to a recorder, another directory is automatically created in the 'Starmon mini' directory, which is named after the serial number of the recorder. All data files and other files related to that recorder are stored in this 'serial number' directory. Each Starmon mini recorder has its own data directory.

User Defined Paths

If this option is selected, the **User definition** data directory becomes active as shown in figure 7.1. The data path/directory can be defined by the user. For defining a path

on the network, the particular drive must be mapped (under Windows Explorer) in order to browse for the drive under 'Add data path'.

Create recorder directories

This option is default on, and means that a recorder type and serial number directory is created for every recorder connected to.

Browse first in user directory

With default off, the user is first directed to the path where **SeaStar** was installed, to look for the INI file for a particular recorder. If this option is enabled, **SeaStar** will start looking for the INI file in the user-defined directory. More information on files and their structure can be found in the Appendix.

7.2 Preferences

Units

By choosing the **Settings** menu, the **Preferences** command, and **Units**, a dialog box appears:

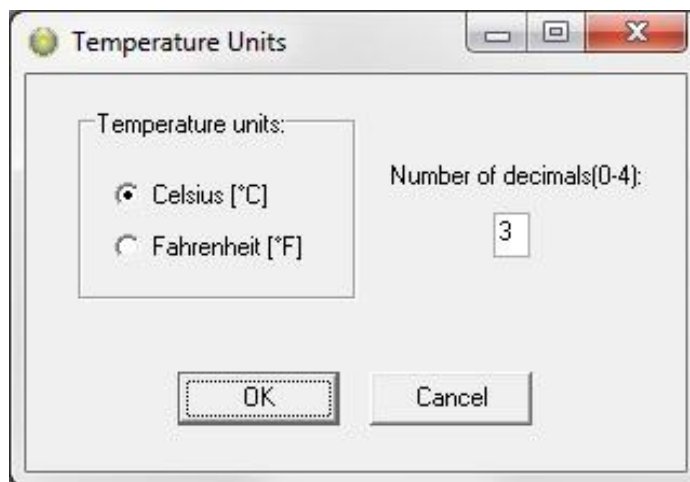


Figure 7.2 Temperature Unit Dialog Box

Select Units

The user defines whether degrees Celsius or Fahrenheit are used as a unit for temperature measurements.

Select Number of Decimals

The user defines the number of decimals for temperature values displayed in **SeaStar** and for text files that are created.

7.3 Data File Format

By choosing the **Settings** menu, the **Preferences** command, and **Data File Format**, a dialog box appears:

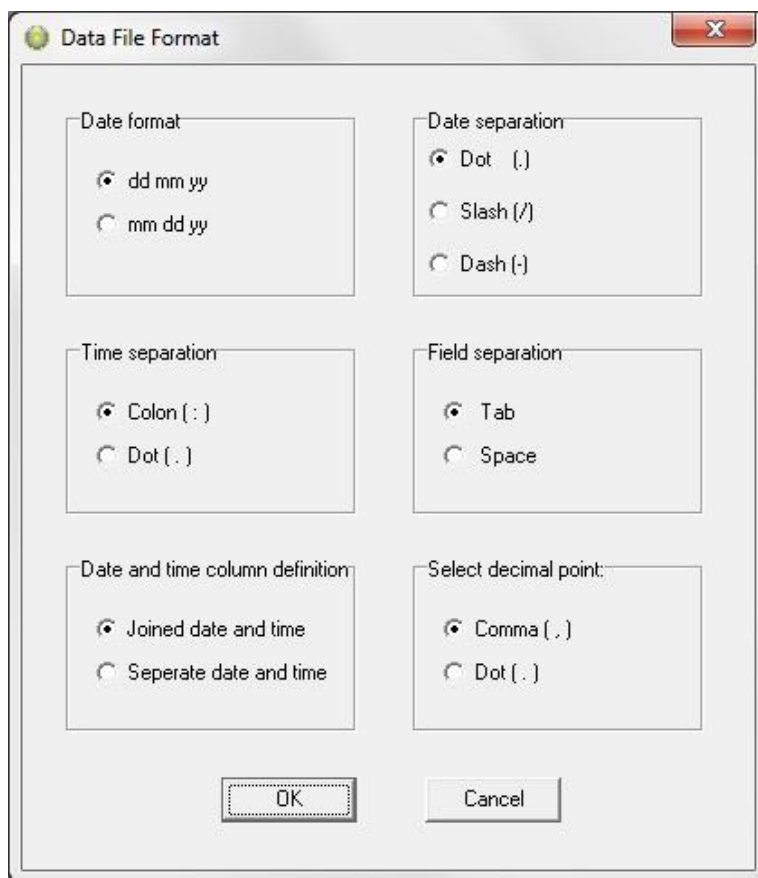


Figure 7.3 Data File Format Dialog Box

Date Format

The user defines whether the date should be shown as dd mm yy (day, month, year), or mm dd yy (month, day, year).

Date Separation

The user defines whether a dot, slash or dash should be used to separate the date.

Time Separation

The user defines whether a colon or a dot should be used for the time separation.

Field Separation

For the text files created, the user defines whether a tab or a space should be used to separate the fields.

Date and Time Column Definition

If data is to be exported to other programs, it is recommended that the date and time be joined in one column.

Select Decimal Point

The user defines whether a comma or period is used for the values displayed in **SeaStar** and for text files that are created.

Measurement Interval

The default setting in the software is set to 'Single interval', as most users utilize. By choosing 'Multiple intervals' the software enables programming of several different sampling intervals, enabling memory saving efficiency. By choosing the **Settings** menu, the **Preferences** command, and then **Sampling Intervals**, the following dialog box appears:

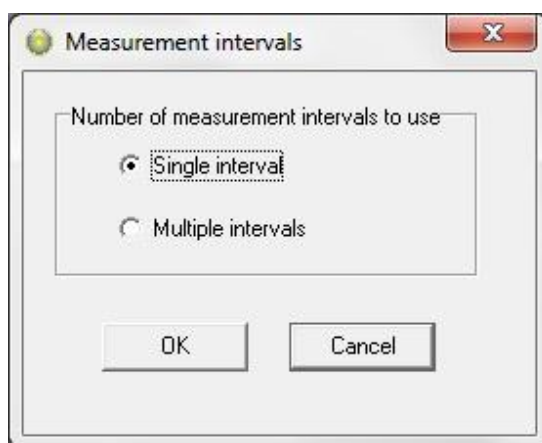


Figure 7.4 Measurement Intervals

By choosing 'Multiple intervals' the effects are shown in the dialog box that appears when you choose the **New Measurement Sequence Definition** command under the **Edit** menu. With 'Multiple intervals' the user can define two different sampling intervals, and number of measurements within each interval. The recorder can, for example, be programmed to switch between a narrow and a wider sampling interval. This may be convenient for saving memory space in between. See chapter 8 about multiple intervals.

7.4 Connection

Choose the **Settings** menu and the **Connection** command. A dialog box appears:



Figure 7.5 Connect and Retrieve Data Options

Perform CRC Test When Retrieving RID

The CRC test is a safety check performed by the software when retrieving Recorder Information Data (RID). If the CRC test is not successfully carried out, it means that some errors have occurred in the transfer of files or constants, between the recorder and the computer. If a CRC test failure occurs, the user is notified. Normally, this option should always be selected.

Check Data Echo in SNMS

Normally the *Check Data Echo in SNMS* and updating settings in Disconnect and Retrieve Data should be enabled (figure 7.5). In case of communication problems using a USB serial converter the user can try to disable this option, as it will bypass data echo checks, resulting in less restriction on communication protocol.

Automatic Data Retrieval upon Connection

By enabling this option, the software will automatically check for data in the recorder upon connection. If this option is not enabled, data retrieval is done manually by choosing the 'File' menu, and 'Retrieve Data' command.

7.5 Retrieve Data

Choose the **Settings** menu and the **Retrieve Data** command. A dialog box appears:

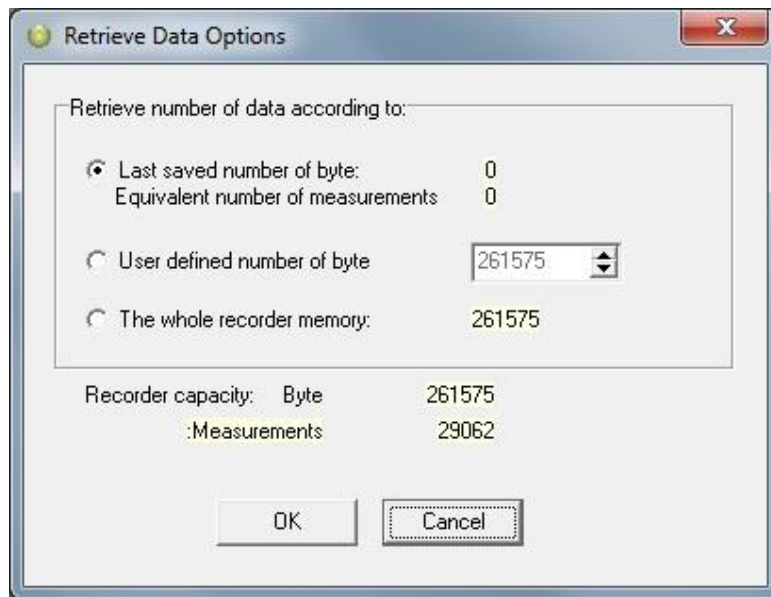


Figure 7.6 Retrieve Data Options

Retrieve Number of Data

With default settings, the software retrieves the last measurement sequence recorded. The user has the option of retrieving older data that **is still in the recorder's memory**. By choosing the **User defined number of data**, the number of measurements retrieved from the recorder can be set.

As the complexity of measurement intervals give incoherence in the calculation from measurement number to the number of data byte to retrieve, the user has the option to define number of bytes to retrieve.

If for some reason or another it becomes necessary to retrieve data more than once or even several times, the previous DAD and MIT files are not overwritten before a **backup has been made**. The backup files are in the same directory as the "original" or the last DAD file.

A backup number system is in use that marks the first retrieved file as number one, the second number two etc. The number sign #, is used to identify the backup up files.

Thus if a data file has for example the name 25M1106.DAD then the backup file, that was the first retrieval, gets the name 1#25M1106.DAD, and the 25M1106.MIT file that is associated with the DAD file, is backed up as 1#25M1106.MIT.

7.6 View Data

Choose the **Settings** menu and the **View Data** command. A dialog box appears:

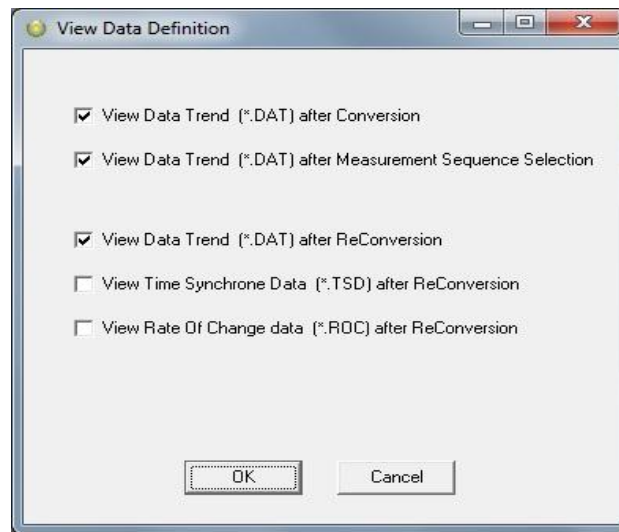


Figure 7.7 View Data

Select **View Data Trend after data retrieval/conversion** to view the data right after data retrieval.

Select **View Data Trend after Measurement Sequence Selection** to work with measurement data while offline.

With all the options in **SeaStar**, the user may want to do a lot of reconverting (<File\Reconvert Data>) on data files after defining the preferences; changing units, data formats, OOR settings, TSD settings, ROC settings, offset settings and converting different sections of the data file, all of which result in numerous files. To ease the task of remembering settings and results and/or renaming and copying files, a backup system of reconverted files has been implemented.

A reconvert number is now associated with each sequence. This number is saved in **the recorder's INI file and updated each time a reconvert is implemented. A copy is made of the DAT, CIT, DAB, OOR, TSD and the ROC files with the reconvert number attached to the filename.**

Thus if a data file is for example named 5M1024.DAT, then after the first reconvert, a copy of the DAT is named 1-5M1024.DAT, and the same naming convention is applied to the other files.

Each time data retrieval is performed, a subdirectory, which name is the sequence number, is created in the data directory, where a copy of the "original" DAT, DAB, CIT and OOR files is placed. These files have a "0-" in their names. All the reconverted files are placed in the sequence directory. The reconvert number system is optional, and the user can disable it in the reconvert menu. When the reconvert number system is in use, and when viewing trended reconverted data, the reconverted "backup" file is displayed, thus eliminating the need to close the "last" converted trend data window.

7.7 Out Of Range

If measurements are outside the calibrated range, they may seem inaccurate. The out of range measurements are shown in the OOR file (View – Measurement Data – Out Of Range Data). The min. and max. calibration points are given in the RID file, and in this case it should be sufficient to go directly to 'Edit – Reconvert Definition – Data Definition', and choose 'RID values' under 'Out of range decimal values settings'.

Data is then reconverted by choosing 'File – Reconvert Data'. See chapter 9 for more.

The user can also define the ranges. Choose the **Settings** menu, **Out Of Range - UV and DV** definition command. A dialog box appears:

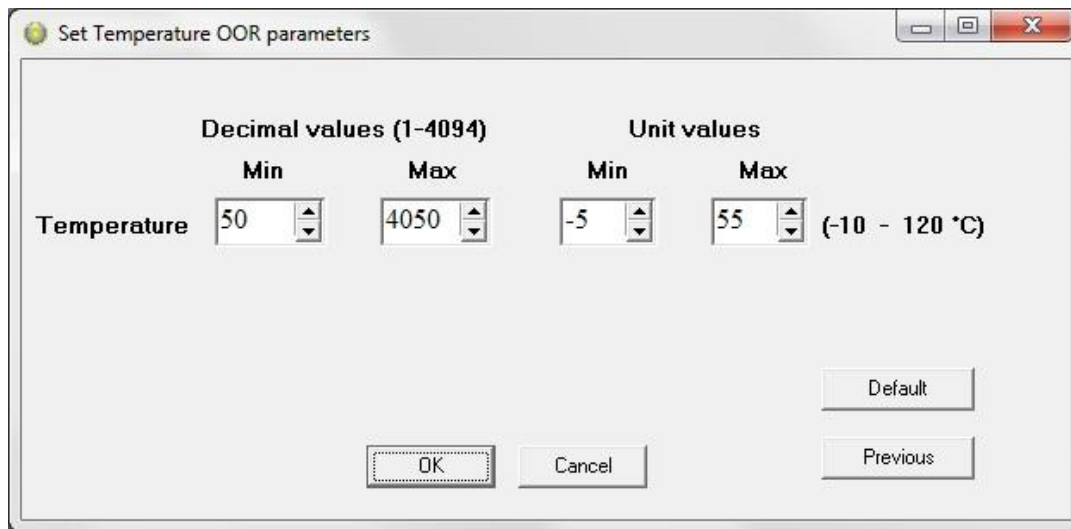


Figure 7.8 Set Temperature Out Of Range (OOR) Parameters

Decimal Values

Decimal Values (DV) are raw measurements, sometimes referred to as binary data. The decimal value is between 0 and 4095, which is the range for the 12 bit AD converter. **The decimal values are the recorder's calibration range.** The user should not define the decimal value range, unless he has obtained these values for that particular recorder from Star-Oddi.

Unit Values

The decimal values are converted to Unit Values (UV), for example a decimal value of 2000 could give 20°C. The user can select a specified range for temperature and pressure. If unit values in the data are outside the measurement calibration range of the recorder, the user has the option to set a max and min range for these unit values.

After selecting the unit value ranges and pressing the OK button, the following window appears:

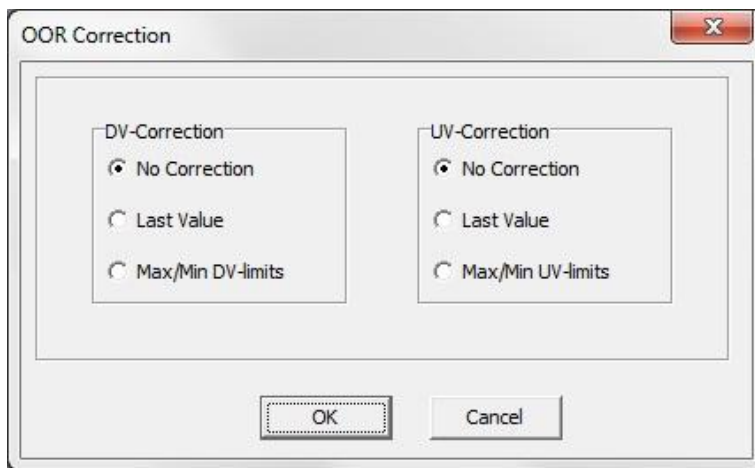


Figure 7.9 Out Of Range (OOR) Correction

If no values have been selected for the Decimal Value (DV), no correction should be selected. If Unit Values (UV) ranges were specified, the user has the option to change the out of range measurements to the last value that was recorded before the out of range measurement was recorded, or have it according to the max/min unit value as specified earlier. In this case the software will know if the value is under the minimum or maximum limit. After the correction has been made, the data needs to be reconverted under File – Reconvert Data, and data will be changed accordingly.

7.8 Time Synchronize Data (TSD)

Choose the **Settings** menu, **TSD** definition command. A dialog box appears:

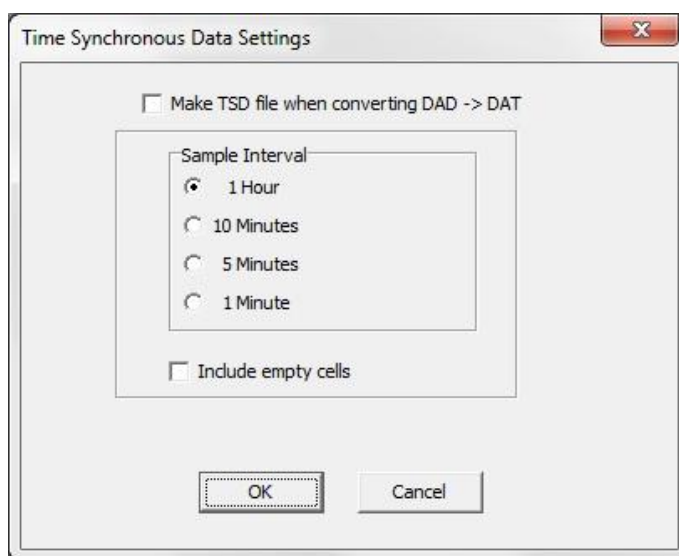


Figure 7.10 Time Synchronous Data Settings

If the user wants to time synchronize two or more data files, it is possible to select three options: 1 hour, 10 minutes, or 5 minutes. The restriction is that the sampling interval selected must be greater than the initial interval, and it must also be dividable

by the initial interval. For example, if the initial interval was 15 minutes, only the 1 hour option can be selected for time synchronous.

If the 'Include empty cells' is enabled, the data tables will be empty for those measurements in the original file that are not to be shown.

If the user wants to activate this feature, the 'Make TSD file when converting DAD-DAT' must be enabled. For changing the current measurement file with one of the three intervals, the data must be reconverted by 'File – Reconvert Data'.

7.9 Rate Of Change (ROC)

This new feature gives the user a chance to see how fast the signal is changing, i.e. the estimated velocity of the signal. This applies to all measured parameters. The ROC is calculated via a two point numerical differentiation:

$$\text{ROC} = (P2 - P1) / (t2 - t1)$$

P: Parameter expressed in a user defined unit

t: Time (hour, minute or second)

The way the ROC is set up and viewed is very similar to the TSD. Under 'Settings\ROC' the ROC options can be set:

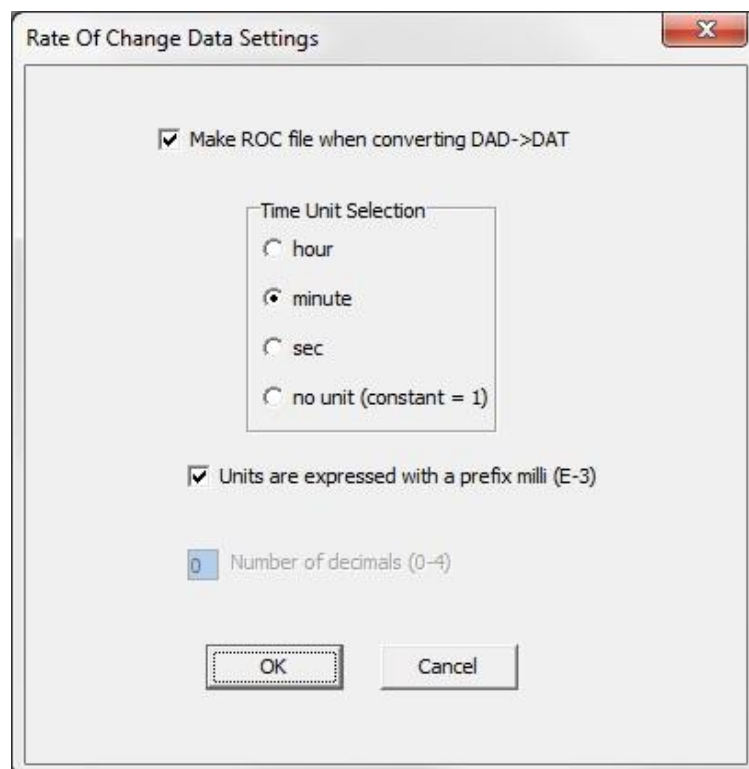


Figure 7.11 ROC Definition

The ROC is only computed when a DAD->DAT conversion is performed, and when the user wishes. The time units are selectable as hour, minute or seconds. For small

changes it can be convenient to express the ROC as a milli (10^{-3}) unit. For example if the depth is in meters (m) then millimeters are expressed as (mm).

The ROC can be viewed as a trend under 'View\Data Trend and Table\Rate Of Change (ROC)' or as tabulated data via 'View\Measurement Data\Rate Of Change'.

7.10 Chart

Title

To change the title of the chart, click on the title name. A dialog box appears:



Figure 7.12 Chart Title Dialog Box

The chart is automatically assigned the data file number as a chart title. To change the chart title, enter a new text string and press the OK button.

Time Axis

To change the time scale of the chart click on the X axis. A dialog box appears:

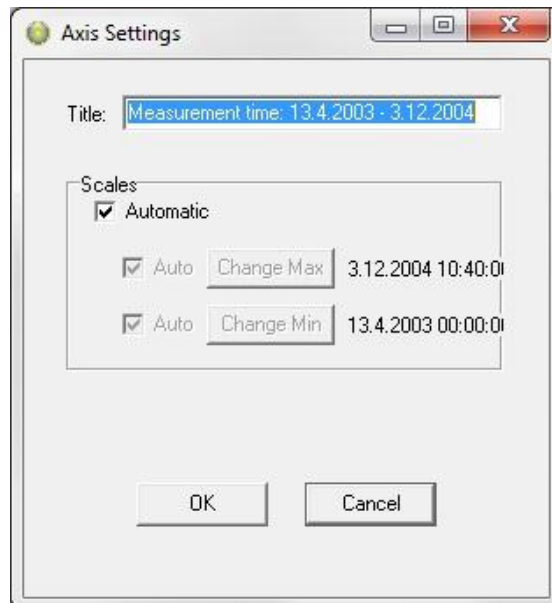


Figure 7.13 X-Axis Settings Dialog Box

By disabling the Automatic option, the minimum and maximum time values become active. By clicking on the **Change** buttons for the maximum and minimum values, the time range can be specified. By enabling the Automatic option, the measurement time will go back to the initial range.

Value Axis

To change the scale settings for the value axis, click on the Y axis scale. A dialog box appears:

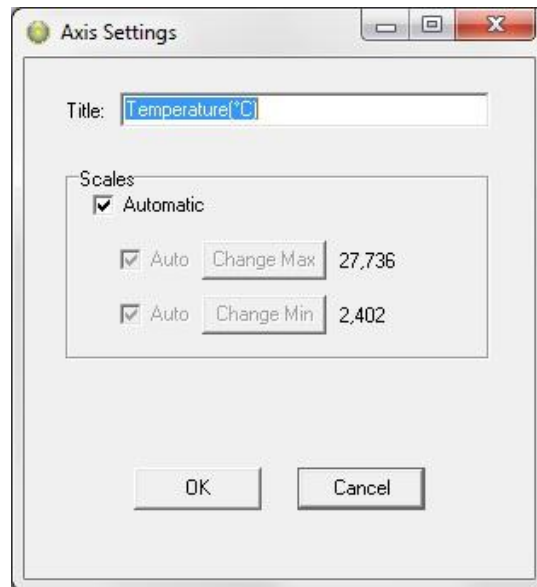


Figure 7.14 Y-Axis Settings Dialog Box

By disabling the Automatic option, the minimum and maximum measurement values become active. By clicking on the **Change** buttons for the maximum and minimum values, the temperature range to be shown on the chart can be specified. By enabling the Automatic option, the temperature will go back to the initial range.

7.11 Chart Editor

The Chart Edit button (on every graph) gives access to the Chart Editor, a multi-option menu, now with a Tree View interface, as can be seen in figure 7.15.

There are five main branches on the tree:

- Series
- Chart
- Data
- Tools
- Export

The tree menu gives access to the same features as the tab menu described in the user's manual. **Most of the changes invoked are viewable immediately.**

All format and style changes made to the chart, are lost if the data are viewed again or “Reconverted”, as the *.DAD and the *.DAT file are not affected by changes made to the chart or the database.

Series

The Series window offers the same features as the “Active Series List” button.

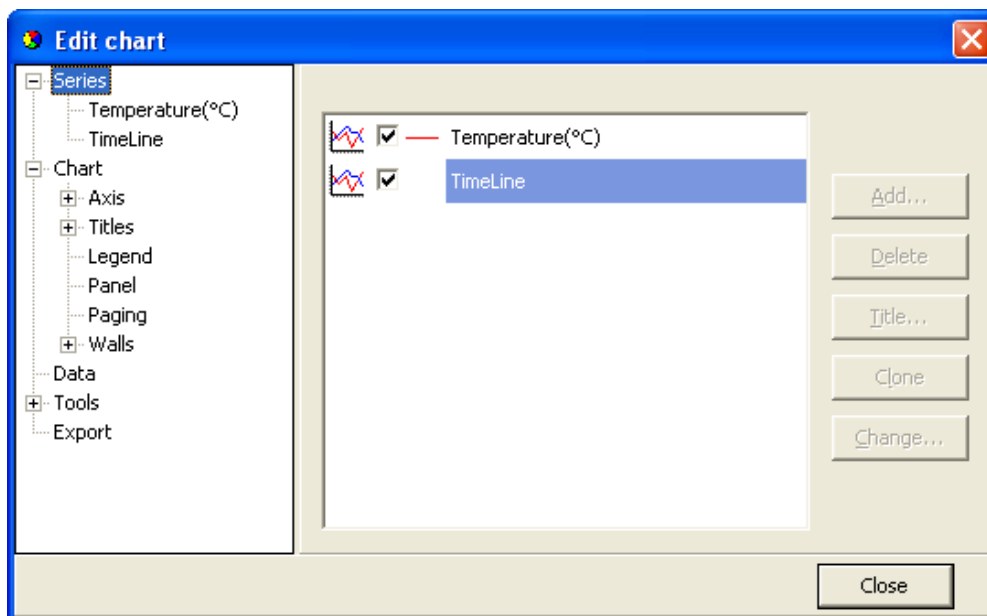


Figure 7.15 Chart Editor

When a particular series is selected, like the Temperature series for example, a two tab menu is revealed, as seen in fig. 7.16, where the user can “format” each series, and set “points” in the graph. The tab “Point” offers visibility to points as the “Data Point Marker” button on the graph, plus formatting of the points.

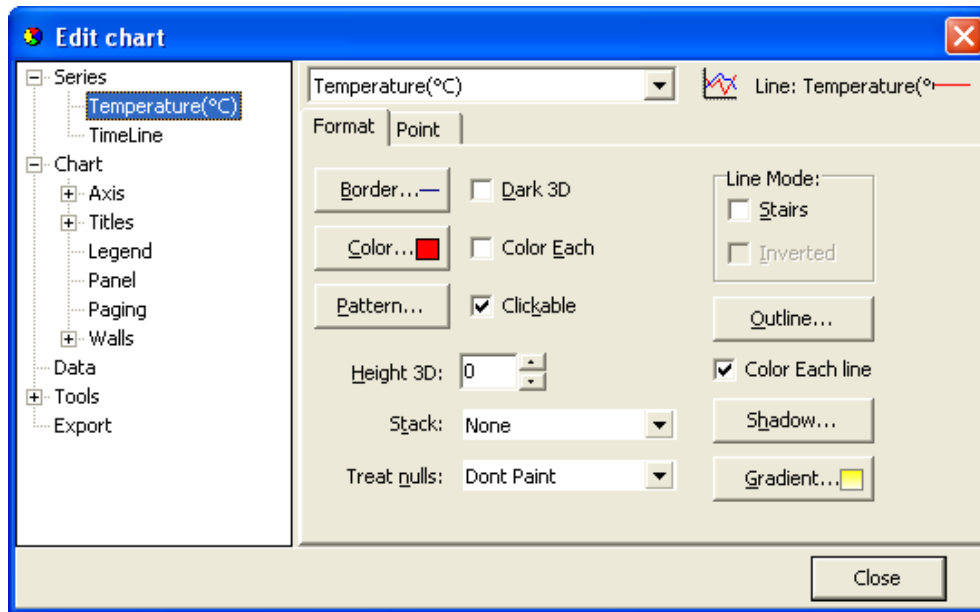


Figure 7.16 Format Series

Chart

The chart branch has six sub branches

- Axis
- Titles
- Legend
- Panel
- Paging
- Walls

Axis

There are 8 axes in a normal **SeaStar** chart, the number in use depends on the recorder type. The Left Axis and Custom 1 axis are always in use, the latter is reserved for the timeline.

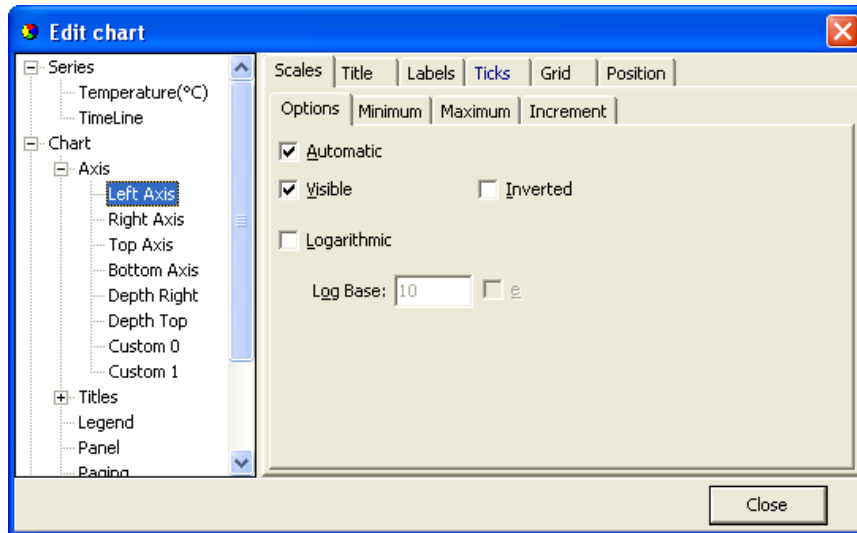


Figure 7.17 Axis Formatting

Figure 7.17 shows a six tab Axis menu. There are numerous options, some of which can drastically change the behavior of the graph. The Minimum and Maximum tabs give options similar to the menu offered when clicking an axis on the graph, the ticks tab gives access to enable and disable gridlines, just as in the “Horizontal gridline” and “Vertical gridline” buttons in the graph.

Titles

The Titles menu shown in figure 7.18, gives access to 4 tiles, each title a multi line text window, which can be positioned anywhere on the chart. There are multiple formatting options, six tabs, for each title.

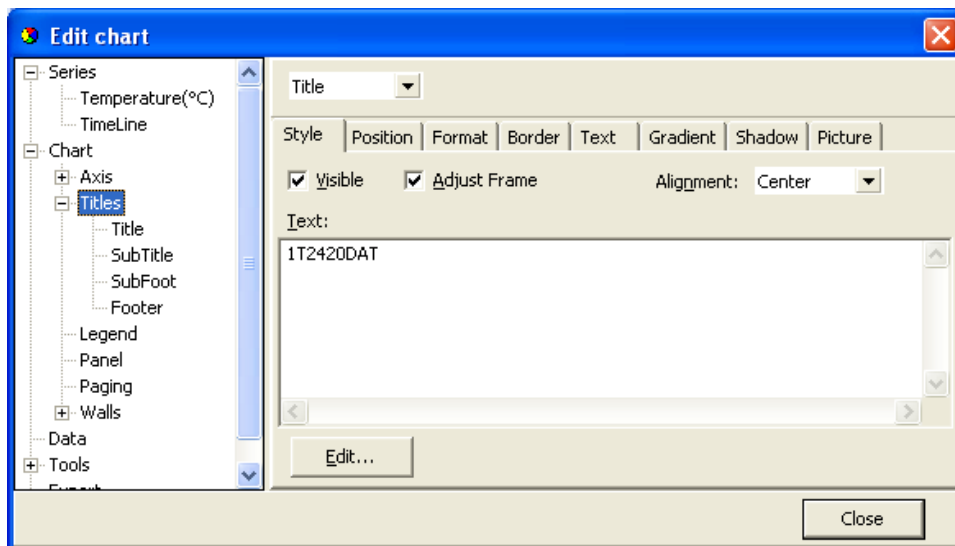


Figure 7.18 Title Menu

Legend

The legend menu (see figure 7.19) gives the user an option of showing a series legend.

The 8 tab menu gives options in styling positioning and formatting the legend.

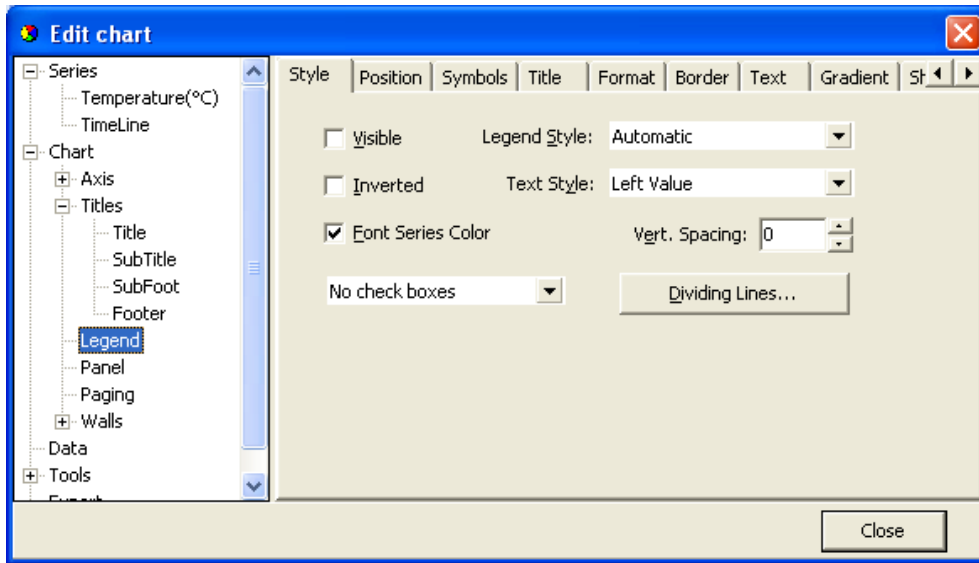


Figure 7.19 Legend Menu

Panel

The Panel menu (see figure 7.20) offers panel format options. Images, pictures and icons can be imported onto the panel as a back image.

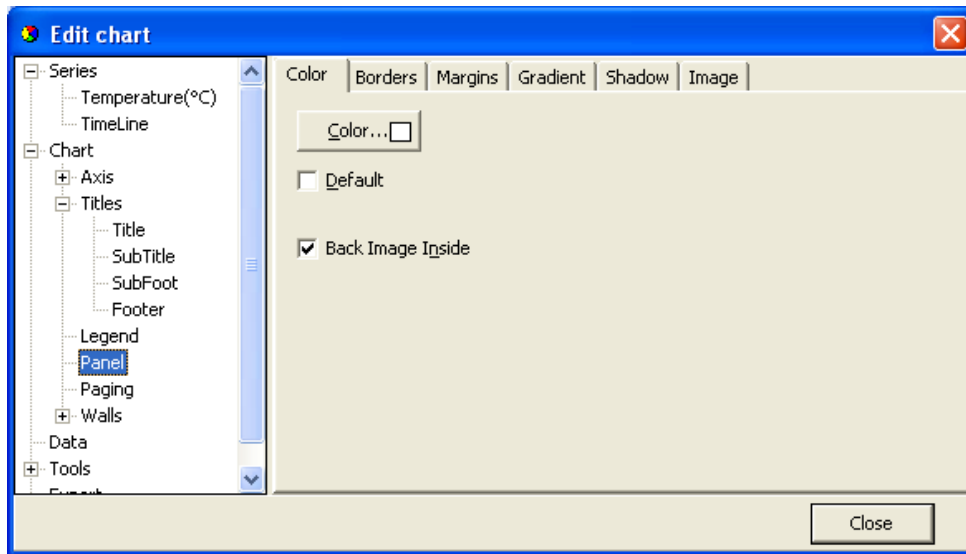


Figure 7.20 Panel Menu

Paging

With the Paging menu, shown in figure 7.21, the data series can be chopped into pages, with a user defined number of points per page. Only one page is shown at a time, and the user can scroll through the pages via the page buttons, that appear (are enabled) on the chart to the right of the Edit Chart button, when paging is selected. Paging can be useful for viewing distinct time periods, one at a time, days or hours for example. No offset is offered and sampling periods and start time can limit the usefulness of this option.

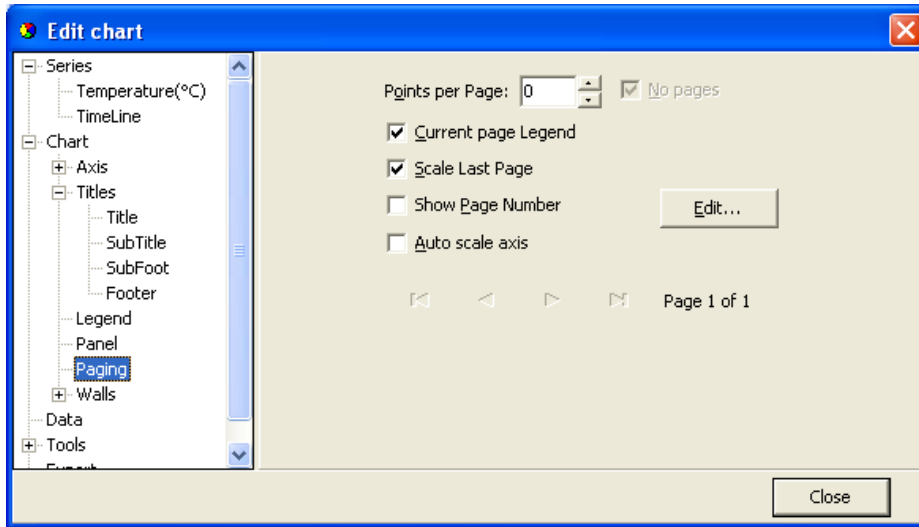


Figure 7.21 Paging Menu

Walls

The walls menu, as seen in figure 7.22, gives access to configuration of four walls, but as SeaStar charts are default defined as 2D, only the “Back” wall is visible

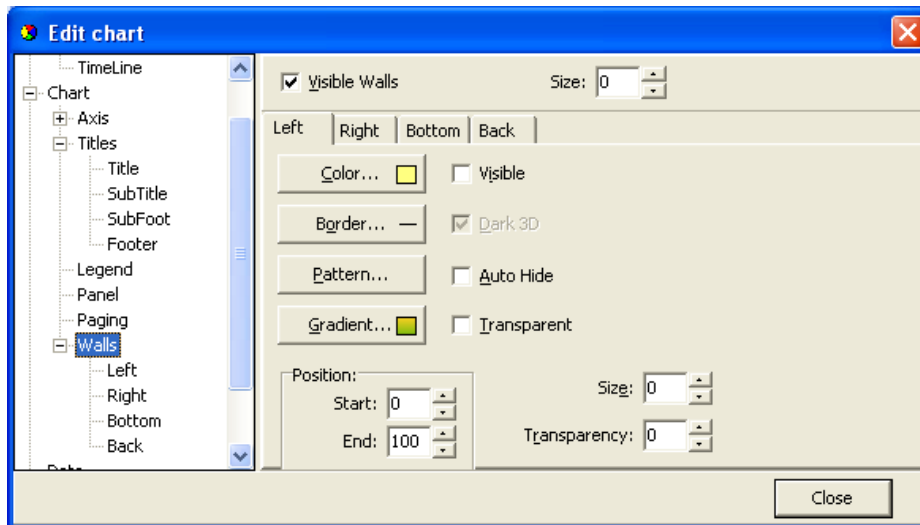


Figure 7.22 Walls Menu

The Walls menu, has similar options as the Panel menu, when defining a pattern, via the “Pattern...” button, an image can be imported and placed on the wall. In fact, as the Back Wall lies “on top” off the panel, a pattern or an image can enhance an image on the panel, or the image on the panel can be seen through the wall with the Transparency option.

Data

In the data menu, seen in Figure 7.23, gives the user access to the database, upon which the chart rests. Here text labels can be set to each measurement point. Changes can be made to the time and measurement values. Changes made to the data, are included when the data is exported, but if the data are viewed again or “Reconverted” all changes are lost, as the *.DAD and the *.DAT file are not affected by changes made to the database.

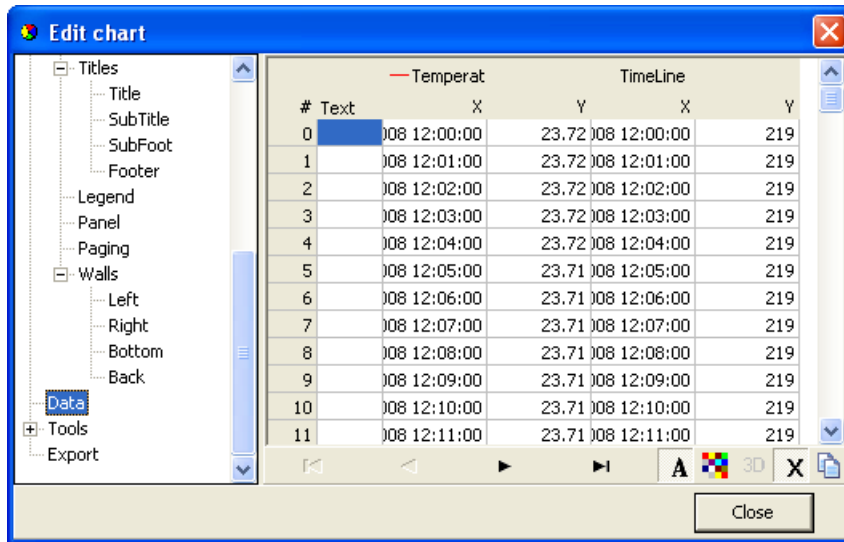


Figure 7.23 Data Menu

Tools

Under 'Tools' you will find several options to customize the setting of the cursor and the appearance of the graph, such as page numbering, font, font size etc. To active/deactivate the chosen setting check/uncheck the 'Active' box on top of the first page of this menu.

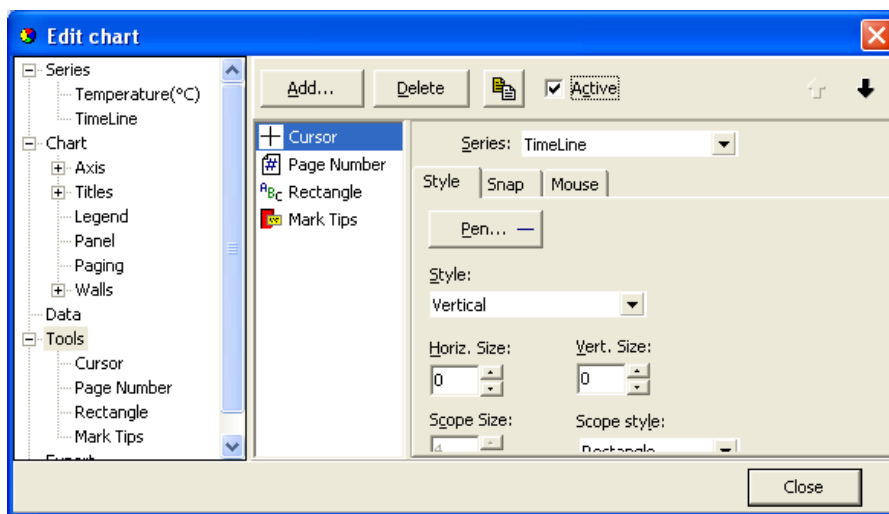


Figure 7.24 First Page of Tools Menu

Export

Under the Export menu, three tabs offer as many menus for saving data as

- Pictures
- Native (data)
- Data (file)

Pictures

Figure 7.25 shows options when saving the chart as a picture to a file, or copy the picture to the clipboard. There are seven format possibilities.

- Metafile
- Bitmap
- JPEG
- GIF
- PDF
- VML
- SVG

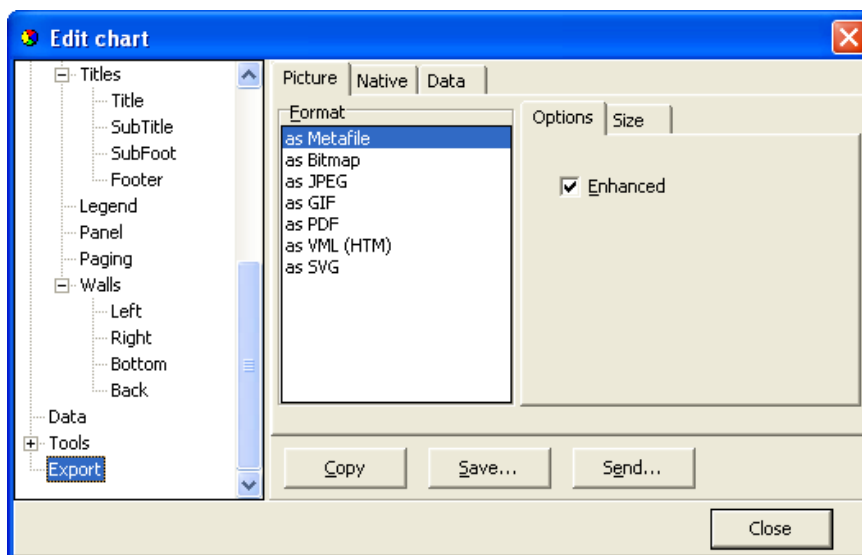


Figure 7.25 Export Menu: Picture

Native

The Native menu, see figure 7.26, data is saved as "Native" *.tee chart files. Import of these files is not supported in SeaStar at the moment.

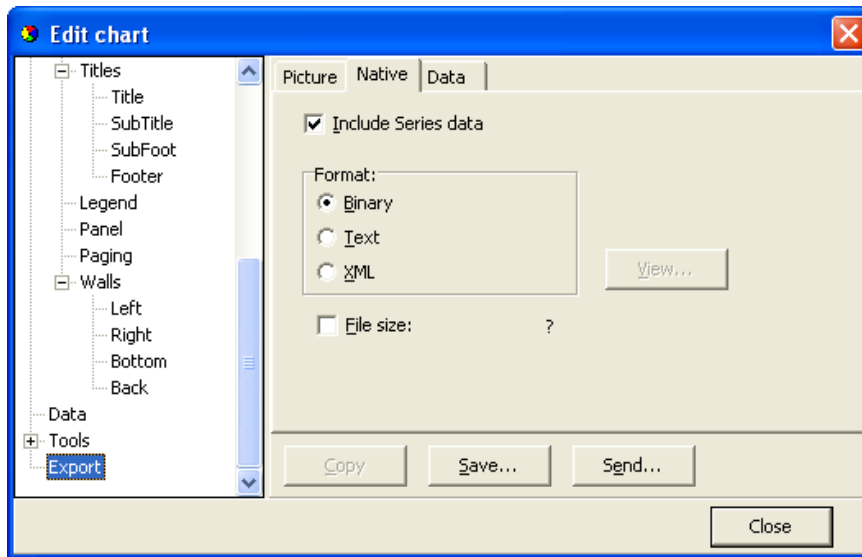


Figure 7.26 Export Menu: Native

Data

Data can be exported to files in four formats, see figure 7.27.

- Text file (.txt)
- XML (.xml)
- HTML (.hml)
- Excel (.xls)

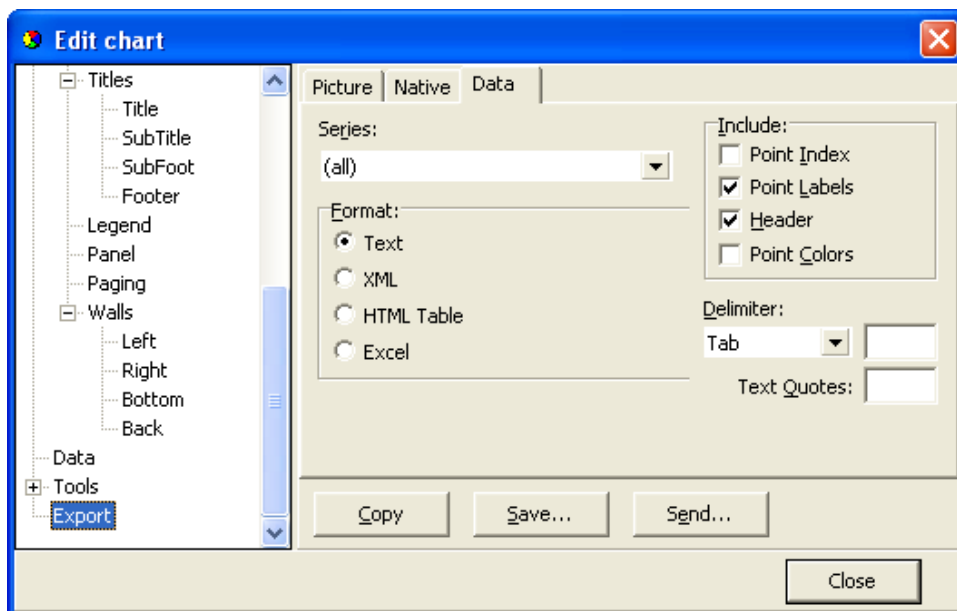


Figure 7.27 Export Menu: Data

There are four Include options:

1. **Point Index**
The point index is the same as the measurement number, but offset by -1, as it starts in 0 instead of 1.
2. **Point Labels**
If the user has added text labels to points in the DATA menu, these can be included.
3. **Header**
The same headers as are in the DATA menu.
4. **Point Colors**
This option is not relevant in SeaStar.

Another method for exporting is to use the Alt+PrintScreen keyboard buttons to copy an image of the **SeaStar** window to the clipboard, thereafter to paste it to another Windows application. When a dialog box is open, then only that frame is copied to the clipboard.

To copy a part of a data file, for example from a DAT file, then highlight the part you want to copy and use the Ctrl+C keyboard buttons to copy the data snippet to the clipboard. Then use the paste-option in another Windows application to transfer the data from the clipboard.

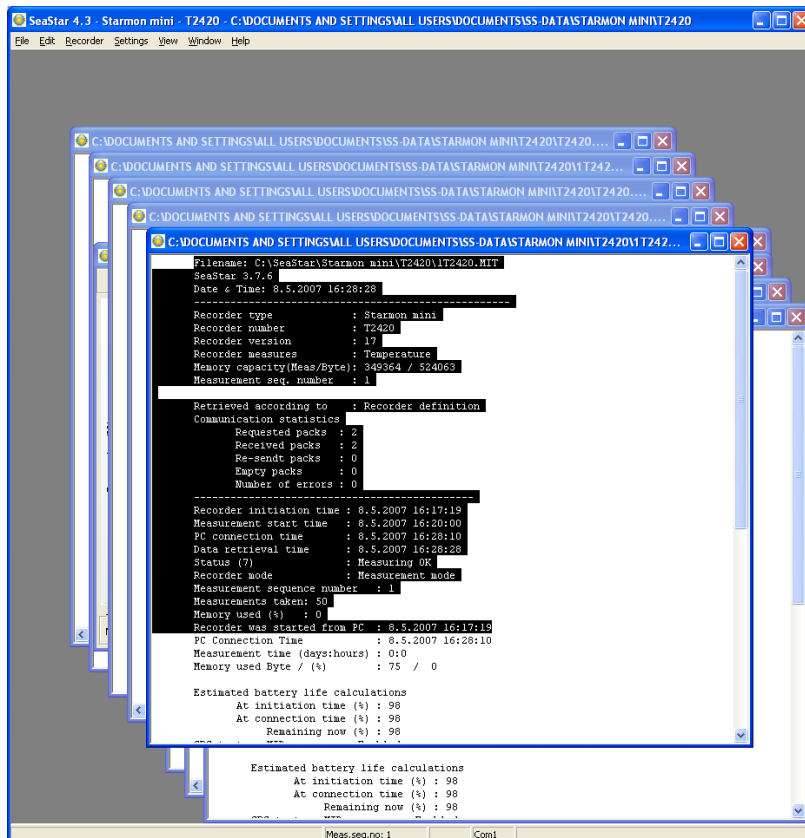


Figure 7.28 Highlighted Text to be Copied

7.12 Timeline

The timeline is a graphical viewing aide. Every time a file is loaded for trending, an extra time value is calculated for every measurement point. These time values form the Timeline. The Timeline is an extra series that follows the rules of the other measurement series. When the graph first appears, the Timeline is inactive. By selecting the Timeline in the Series List (see fig. 7.29), the Timeline becomes visible as shown in figure 7.30.

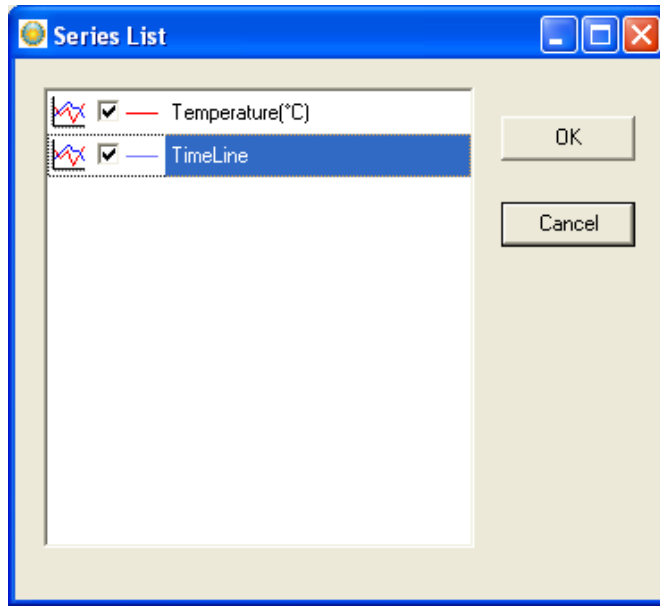


Figure 7.29 Timeline Selection

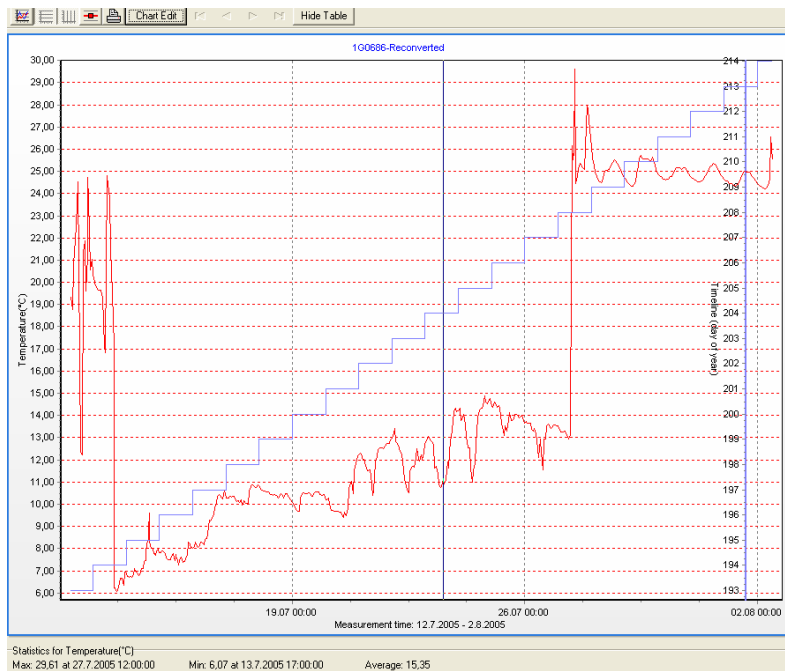


Fig. 7.30 Timeline on a Graph Showing "Day of the Year"

The Timeline is defined under Settings\Preferences\Timeline.
There are several options for the Timeline, as can be seen in fig. 7.31.

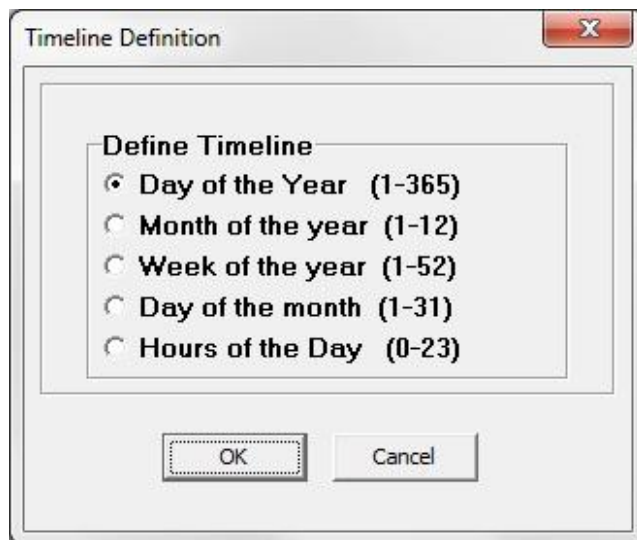


Figure 7.31 Timeline Options

There is no need to reconvert the data, as every time a data file is loaded the Timeline is calculated in accordance with Timeline settings. The Timeline is not a part of the *.DAT or the *.TSD files. If the data is exported (see the Export section), then the Timeline (if selected) will be included. Thus, the Timeline can also be used for statistical purposes.

7.13 Templates

There are two scenarios where templates come in handy:

1. When many recorders are programmed with the same settings (multi mode), and circumstances are in a way that the user cannot complete the setup of all the recorders in one session, and he has to exit **SeaStar** (to continue later).
2. When the user wants to reuse, partly or completely, presumably a complex and/or lengthy measurement setting.

Saving a Template

The user can now, when editing New Measurement Settings (NMS), save his work by **enabling “Save this NMS as a Template (file)” option (see fig. 7.32)**, before acknowledging OK from the Edit NMS menu. Having selected this option and the NMS are OK, the user has an option to write a description for the template (see fig. 7.33). **Canceling this option cancels the ‘save template’ operation. The template is an INI file and saved in the SeaStar\NMS directory. The name of the file is MST<date><type letter>time<Interval mode>.INI.**

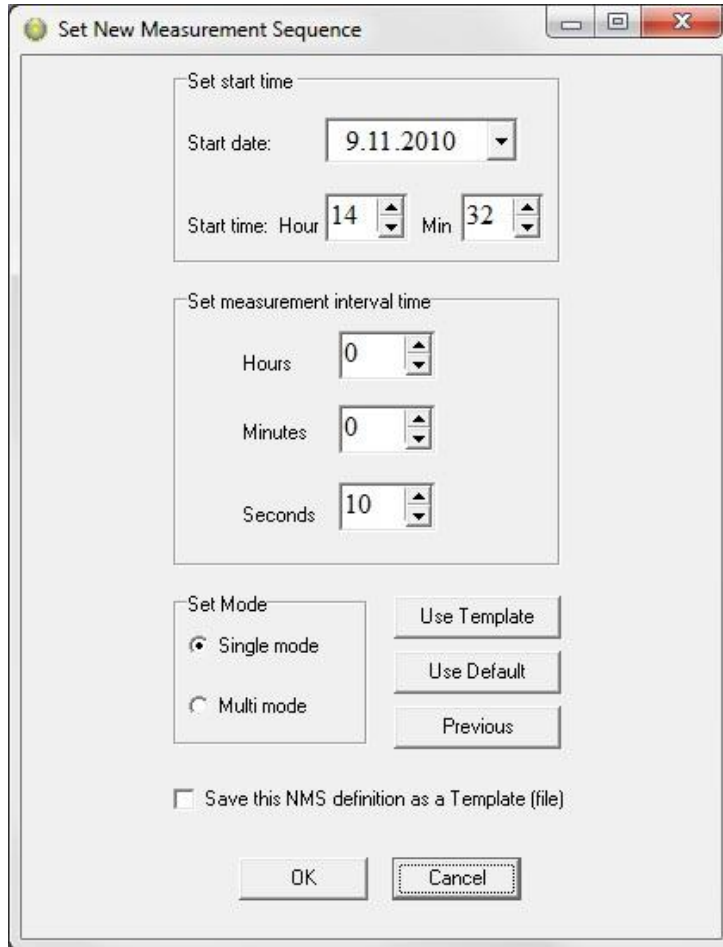


Fig. 7.32 Template Options in Edit\New Measurement Sequence

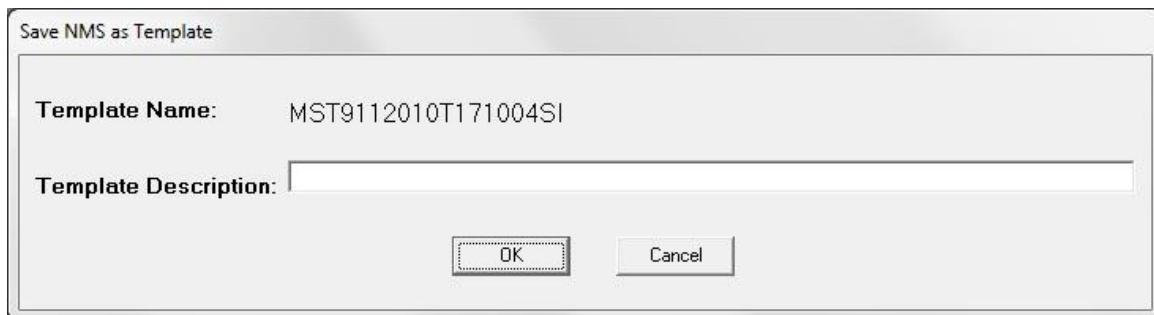


Figure 7.33 Saving NMS as a Template

Using a Template

Templates can be retrieved at a later time to be used directly or modified. The list of templates is kept in the SeaStar\templets.ini file.

There are three buttons in the Edit NMS window, see fig. 7.32. The top button is used for retrieving a template.

As can be seen in fig. 7.34, templates are selected via template name or description. Parallel to selecting a template, descriptions can be edited and eventually templates deleted.

The recorder type and interval type, which the template was based on, are visible for each template.

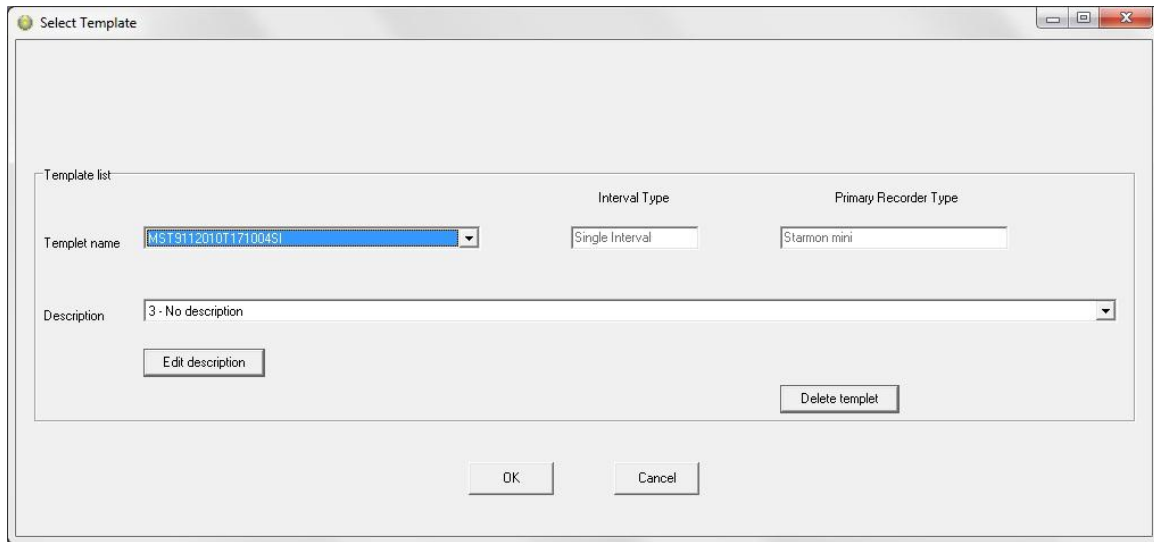


Figure 7.34 Template Selection

Templates can be used across recorder type boundaries and interval types.

Things to keep in mind when selecting a template are:

- Single interval templates converted to a multiple interval NMS. All seven intervals are the same.
- Multiple interval templates converted to a single interval NMS, set the interval as interval one.
- Start time in the past is not allowed as will be apparent when exiting the Edit NMS window.
- Some recorder types are less compatible than others, an example of that is a DST milli template converted to a DST GPS NMS.

After selecting a template, the user is returned to the edit window. If the selection is **not as what the user expected the “Previous” button will return the previous setting.**

The user has one more option to quickly set up the NMS. The button in fig. 1, marked **“Use Default”, will return default NMS settings. The button** can have four descriptions and return four different settings depending on the status of recorder and measurement selection.

1. Use Default: No recorder selected.
2. Use Recorder: Recorder selected but not a measurement sequence.
3. Use Sequence: Measurement sequence selected.
4. Use Online: Recorder is on-line.

8. Multiple Intervals

SeaStar has the option for setting up more than one sampling interval within a measurement sequence. Reasons for wanting multiple intervals can be to save memory, but still be able to have frequent measurements in between.

Choose the **Edit** menu and the **New Measurement Sequence Definition** command. Select **Multiple Intervals** and the following dialog box appears:

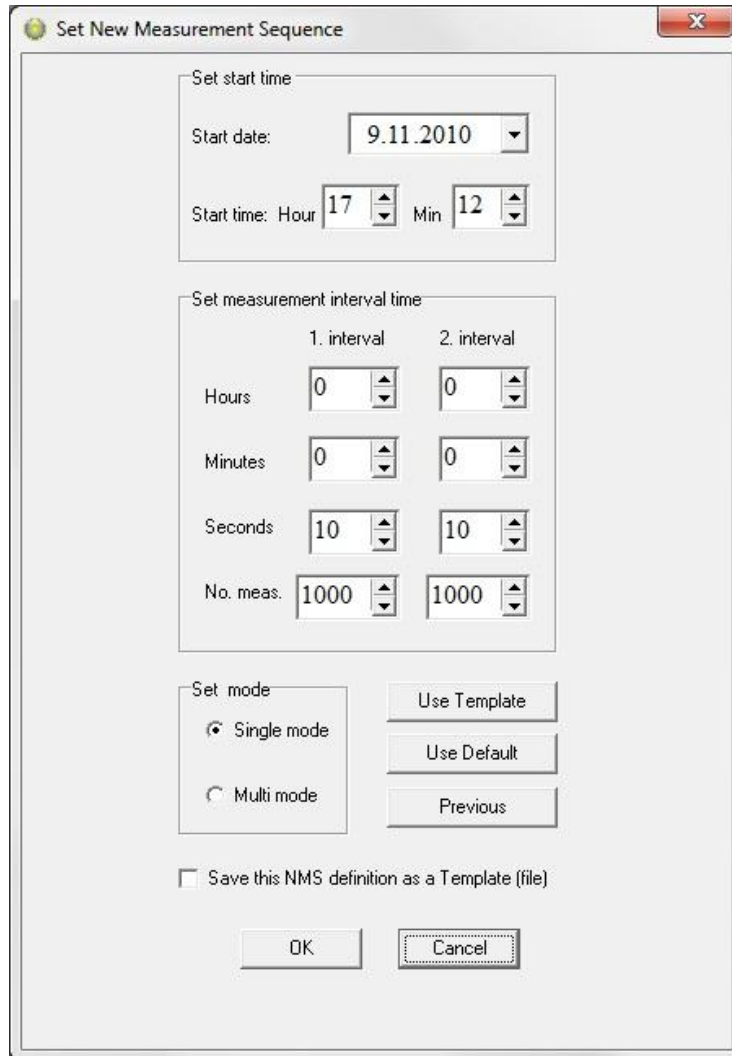


Figure 8.1 Multiple Interval Selection

8.1 Start Time

The user defines the date and time when recordings should start.

8.2 Measurement Interval

The first and the second interval is defined. Number of measurements must be defined within each interval. The recorder will first take the defined number of recordings within the first interval, and then shift to the second interval to record the defined number of recordings for that interval. The recordings will shift between two intervals and continue until memory is filled or connection with recorder is established.

8.3 Set Mode

The option for 'Multi mode' is to enable the user to fix the settings, in case many recorders are being programmed with the same settings. When the 'Multi mode' option has been selected, the same settings will automatically be downloaded into the following recorders that connection is made with.

The **Use Template** can be used if older definitions have been saved by enabling the 'Save this NMS as a template (file)'. That way it's possible to get templates that have been set up in the past. With the **Use Sequence** button it is possible to get same settings as from other recorders, by browsing for their serial no. By hitting the **Previous** button the settings go back to previous, before changes were made.

9. Reconvert Data

In **SeaStar** you have the option of re-converting data that has already been retrieved. After re-defining **parameters**, the data is reconverted by 'File – Reconvert Data'. The main reasons for re-converting data are:

- Incorrect PC-time at measurement start-time.
- Need for temperature unit alteration.

Need for data file format alteration.

9.1 Data Definition

By choosing the Edit menu and Reconvert Data Definition, a dialog box appears:

Figure 9.1 Reconvert Data Definition

Set Reconversion Measurement Sequence Start-Time

If the user notifies from retrieved data that the date and clock are incorrect at the start of measurements, then it is possible here to specify a new start date and time.

In Reconversion Definition Use Measurement Intervals from

The measurement interval is either the interval settings as shown in the measurement (MID) file, or if that interval is incorrect, a new and correct sampling interval is **specified in the 'New Measurement Sequence Definition' command in the 'Edit' menu.**

In Reconversion Use Constants from

The user can choose to use calibration constants from:

- MID file. This option should normally be selected, as it contains information on the constants from the measurement sequence.
- RID file. The recorder information file contains the same calibration constants as the MID file, except if it has been re-calibrated. If it has been re-calibrated, and the user wants to use the new constants on older measurements, the RID option should be selected.
- RBD file. This option rarely needs to be selected. If the constants from the MID and RID file are corrupt, the user should contact Star-Oddi for an RBD file. See chapter A.3 for instructions on how to transmit the RBD files to the recorder.

Convert Number of Data According To

You can reconvert all the data in the last measurement sequence, or you can define the number of measurements to be reconverted. The user has the option to define what measurement range should be reconverted (for example to exclude data points when the recorder was above water).

Time Linear Adjustment

The real time clock inside Starmon has an accuracy of approximately +/- 1 minute per month. This slight variation might accumulate over time and influence the measurement results. To correct the gradual time shift **first check „linear adjustment time“ then type in the time offset value and the length of the measuring period.**

Out of Range Decimal Value Settings

Measurements that are outside the calibration range are inaccurate, and may give erroneous results. The out of range (OOR) measurements can be seen in the OOR file. The user has the following decimal value out of range detection options when reconverting:

Full scale (no boundaries). **This means that literally no 'out of range' detection will be made.**

User definition. **With this selection the range definition under 'Settings - Out Of Range - DV definition' will be used. This option is selected when the decimal values (DV) are not available in the RID file. This would normally require the user to contact Star-Oddi for the decimal values.**

RID values. The calibration decimal range is given in the RID file. This is the default option and should normally be selected.

If an RBD file exists in the \Seastar\RBD folder, then SeaStar recognizes this file as a primary source for DV calibration range. In this case, the fourth option appears and is set as default.

9.2 Temperature Definition

Under the **Edit** menu and **Reconvert Definition**, choose the **Temperature Definition** command, and the following dialog box appears:

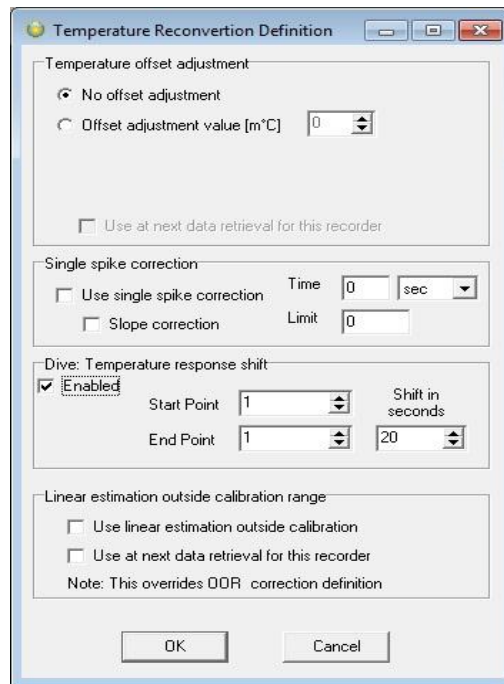


Figure 9.2 Temperature Reconversion Definition

9.3 Offset Adjustment

When **Starmon mini** recorders are used over a longer period of time the temperature measurements can start to deviate from correct values. This is usually due to aging and Star-Oddi recommends the recorders to be calibrated after 2-3 years.

When recalibrating, the battery can be replaced as well, so the recorders are good as new. When checking older recorders, it has come apparent that the error in the measurements is mainly due to an offset. Some users feel they can benefit from an offset correction option in **SeaStar**, for example when a recorder has been in the water for a long time and is later tested to show an offset.

To correct for a temperature offset, use the temperature reconvert definition menu.

Using the **Settings** menu and **Preferences**, you can also change the format of the temperature unit and the data file. For reconvert the data, the data file must be open. To start reconvert the data according to the new settings, choose the **File** menu and the **Reconvert Data** command. The data file is reconverted and conversion data files are created (CIT, DAB, DAT). A new chart file is now open.

Single spike correction

Check **Use Single Spike Correction**. There are two variables, **Time** and **Limit**. The **Limit** defines how much difference can be between two points over a defined **Time**.

If a point is outside the range, +/- the limit of adjacent points. That point is then calculated as the average of the adjacent points.

Temperature response shift

It is possible to set the desired start/end point to be shifted by X seconds. This shift can only be performed on data with an interval of 1 second.

Linear estimation outside calibration range

Check this option to linearly estimate temperature measurements outside of calibration range.

View Previous Conversions

Each time a reconversion is performed, a numbered file is created in the sequence folder. To view previous conversions select a file under **View** and choose **Previous** as can be seen in figure 9.3.

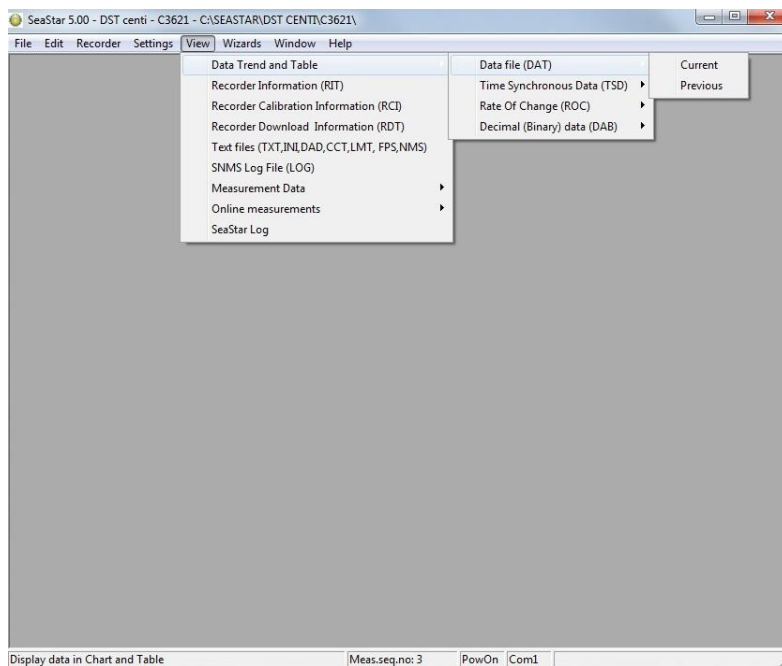


Figure 9.3 Previous Conversions

The window in figure 9.4 appears. Select a numbered file from the drop-down list.

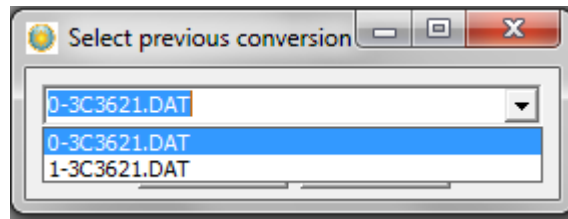


Figure 9.4 Select Previous Conversions

Reconvert Previously Retrieved Data

If data from the same sequence is retrieved more than once, a bookmarked data sequence file (DAD) is created. These files can be accessed and reconverted by choosing **File-Reconvert data-Previous** as can be seen in figure 9.5.

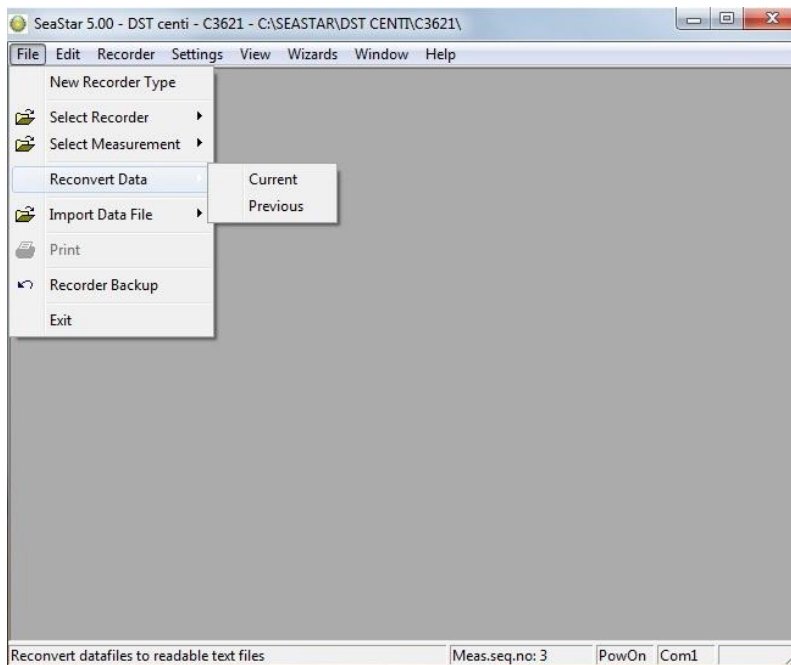


Figure 9.5 Reconvert Previously Retrieved Data

10. Recorder Modes

10.1 PC Mode

If the recorder is plugged into a PC computer with the communication cable, by choosing the Recorder menu and the Connect command, the recorder is put into PC Mode. At the bottom of the SeaStar window, the text On-line is displayed, indicating that the recorder is on-line and in PC Mode.

While in PC Mode, the recorder will remain in an active listening stage. The communication protocol is a simple master/slave arrangement, in which the recorder is the slave. The slave will perform every command the PC issues, and after execution of a command, it will return to listening.

10.2 Sleep Mode

The user receives the recorder in Sleep Mode, but it can easily be awakened by the Connect command in the Recorder menu. The recorder is put into Sleep Mode when the recorder is disconnected without putting it into Measurement Mode or by choosing the Recorder menu and then Put Recorder in Sleep Mode. When the recorder is in this mode, less power is depleted from the battery than in other modes.

Note: Older types of Starmon (up to Nr. 549) don't go into sleep mode automatically. In this case select Recorder > Disconnect.

10.3 Measurement Mode

The recorder is put into Measurement Mode by choosing the Recorder menu, and Start New Measurements Sequence. The recorder starts recording measurements according to the start time (date/month/year) and sampling interval (hours/min.) defined by the user.

When the memory is full, the recorder shifts automatically into Sleep Mode. Upon connection and command from the PC, the recorder is put into PC Mode.

11. Memory and Battery

11.1 Memory Organization

Data is kept in an EEPROM memory and will not be lost if the battery fails or expires. The memory of the recorder is organized as shown in the figure below:

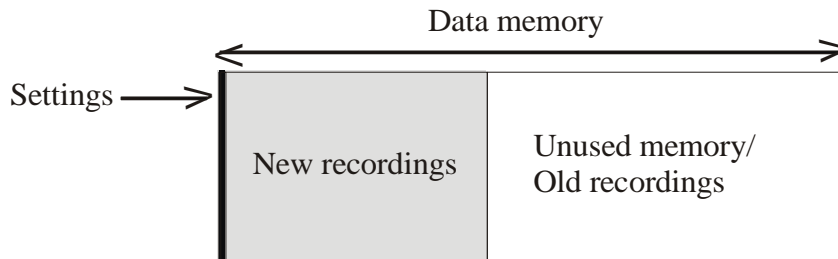


Figure 11.1 Data Memory Organization

When data is retrieved from the recorder, the following occurs:

1. The computer retrieves the data from the recorder and writes the data to the **computer's hard drive**.

The recorder has stopped recording, but still holds the recorded data.

When new settings are sent to the recorder, the following will occur:

New settings are sent to the recorder.

The data memory pointer is reset to the beginning of the data memory and starts to write over older recordings.

The organization of the memory is now as follows:

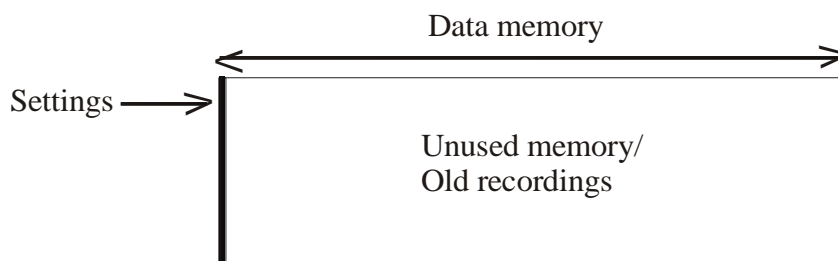


Figure 11.2 Data Memory with New Settings

11.2 Battery Calculations

The voltage characteristics of the batteries used in our recorders make it almost impossible to measure the energy available in the batteries, therefore we estimate the energy consumption by calculation. All the energy consuming functions of the recorder, like sleep, decay, running (microprocessor awake), measurements and saving data are measured beforehand and used in our calculations. The calculations **are performed by the application software's, SeaStar, Mercury and FoodStar.** The recorders themselves do not perform any energy calculations, but in order to start the recorder in one computer and retrieve data in another while still having the battery energy information, they carry the percentage of remaining energy with them in a register file (in the RID). At the time the recorder is in production (when the battery is new) the energy number is set to 100%.

Each time the recorder is started up in a new measurement sequence, the energy consumption, since last sequence-start, is calculated and subtracted from the energy number retrieved from the recorder, and this new **energy-left** number is downloaded into the recorder.

The **energy-left** register in the recorder can be corrupted for reasons such as:

- The CRC check is turned off when connecting to the recorder and a communication error occurs
- When a write error occurs when starting up a new sequence or updating a status to the recorder and a reconnection is performed instead of performing the operation again.
- Energy estimation calculations are not in accordance with actual energy consumption.

To change/correct the battery energy numbers in the recorder refer to chapter 13.5.

12. Technical Specifications

Starmon mini

Underwater temperature recorder

Measuring range	-2°C to +40°C (28°F to 104°F). Outside ranges available at request
Average resolution	0.013°C (0.023°F)
Measuring accuracy	+/-0.05°C (0.09°F)
Response time	Plastic: Time constant is 18 sec. and final value (100%) reached in 3 min. Titanium: Time constant (67%) is 6 sec. and final value (100%) reached in 35 sec.*
Memory size	350000 measurements**
Memory type	Non-volatile EEPROM
Data retention	20 years
Clock	Real time clock. Accuracy +/-1 min/month***
Sampling interval	Any value from: 1-99 seconds or 1min to 24hrs with increments of 1 minute
First recording	At once or at any future time
Computer interface	RS-232C standard serial interface
Battery life	10 years****
Size	Length 130mm, diameter 25mm
Wight in air	Plastic version: 80g Titanium version: 170g
Pressure	Plastic version: 400m (40 bar) Titanium version: 11000m (1100 bar)

*For a 40°C (104°F) temp. step response in stirred liquid.

**Memory size can optionally be increased to 524000 or 699000 measurements.

***The recorder automatically downloads the PC clock.

****For sampling interval of 10 min. or greater.

Specifications may change without notice.

13. Wizards

There are four wizards in **SeaStar**:

13.1 Com Box Connection



Figure 13.1 Com Port Wizard

Choose the **Wizards** menu and the **Com Box Connection** command to enter the Com Port wizard (see figure 13.1). The wizard goes through available ports and activates them one at a time and asks the user to confirm that the communication box displays a yellow light (see figure 13.2).



Figure 13.2 Com Port Wizard

13.2 Start Recorder

Choose the **Wizards** menu and the **Start Recorder** command to enter the wizard (see figure 13.3).

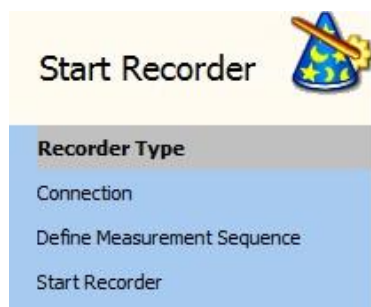


Figure 13.3 Start Recorder Wizard

This wizard starts the recorder with a new user defined measurement sequence.

13.3 Retrieve and View Data

Choose the **Wizards** menu and the **Retrieve Data** command to enter the wizard (see figure 13.4).



Figure 13.4 Retrieve Data Wizard

This wizard retrieves data from the recorder and offers the user to start it again with a new measurement sequence.

13.4 Quick Retrieve and Restart Recorder

Choose the **Wizards** menu and the **Quick Retrieve** command to enter the wizard (see figure 13.5).



Figure 13.5 Quick Retrieve Wizard

This wizard retrieves data from the recorder without graphically displaying it and offers the user to start it again with a new measurement sequence.

13.5 Change Battery Life

A new wizard has been added to the **Wizards** menu, the **Change battery life** wizard.

Choose the **Wizards** menu and the **Change battery life** command to enter the Change battery life wizard (see figure 13.6).



Figure 13.6 Change battery life

Select the recorder type and insert the recorder in the Communication Box. Once a connection has been established a window appears (see figure 13.7). If the recorder is already on-line then the wizard will start in step 4 (**Set New Battery Life**).

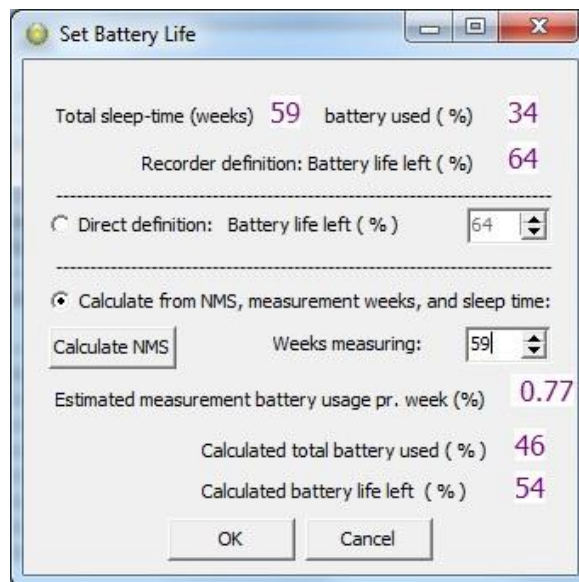


Figure 13.7 Set Battery Life

The top line shows how long the recorder has been in use since (last) calibration, and how much energy sleep and decay combined have used up over that time.

The second line shows **Battery left** based on the register in the recorder.

There are two ways to set the battery life, **Direct definition** and **Calculate from NMS**.

Direct definition:

Check the **Direct definition** option and set the battery life (in %) manually based on **for example, the last known “good” value and an estimated/guessed value on energy** used since then. The user can also refer to other same type recorders working under similar conditions.

Calculate from NMS:

Check the **Calculate from NMS** option and click on **Calculate NMS**. The user is now transferred to the **Set New Measurement Definition** window where a sequence can be defined. Once the measurement sequence has been defined an **Estimated measurement battery usage pr week (%)** is calculated and shown in the **Set New battery Life** window, note that sleep and decay energy use is included in this number. Also the **Calculated total battery used (%)**, which is based on the NMS definition times number of weeks, plus the energy used by sleep and decay.

Now insert for how many weeks the recorder (since produced) has been measuring. Each time the number of weeks is changed, the **Calculated total battery used(%)** is recalculated, note that the **Calculated total battery used(%)** value will not show a directly weeks * energy pr week, as the sleep + delay values must be accounted for.

14. Group

Creating a group is a way to gather multiple measurement sequences which are part of the same research project into one group. In a group the user can track when the logger was started, the data retrieved and the data converted/reconverted. Groups can be transferred to **PatternFinder** for further data analysis

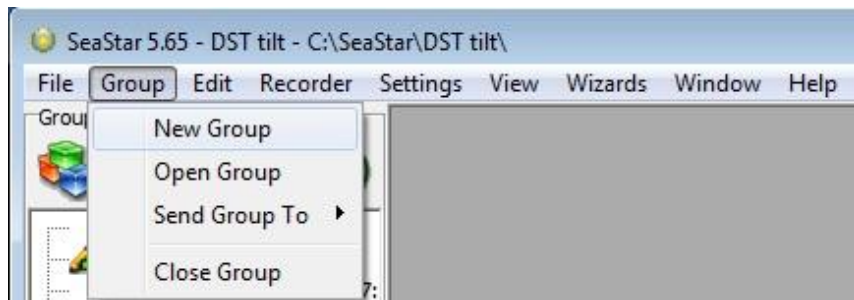



Figure 14.1 Group menu

New Group

Select **New Group** to create a new group. Please note that it is also possible to

create a new group by clicking the **New Group** button  in the group view pane. The following window appears:

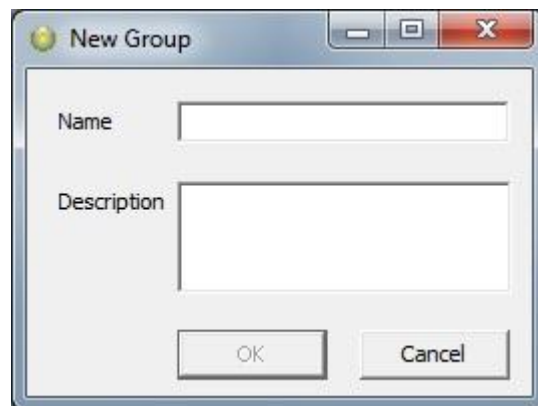



Figure 14.2 New Group

Name the group and enter a description. The group file will be saved under the directory: C:\SeaStar\Groups. Each group has its own subfolder where data files from each sequence in the group are stored, this way the data can be accessed from **PatternFinder** and **Gná**.

Open Group

Select **Open Group** to open the Group directory. It is also possible to open the directory by clicking the **Open Group** button  in the group view pane.

Once a group has been selected the group view pane appears:



Figure 14.3 Group view

Adding sequences to group

To add a sequence to the group connect to a logger and define and start a new measurement sequence. When starting the new sequence the following window appears:

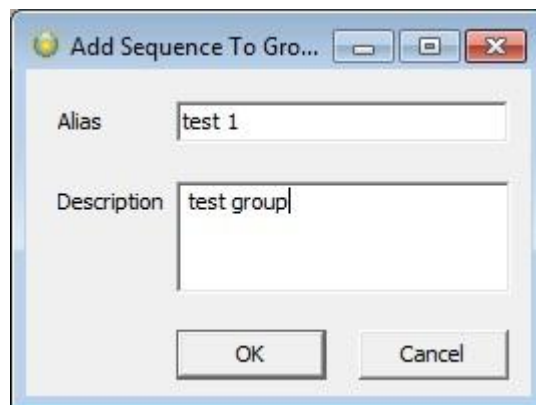


Figure 14.4 Add Sequence to Group

Set an alias for the sequence and enter a description. Click OK and the sequence will be added to the group (see figure 14.5).

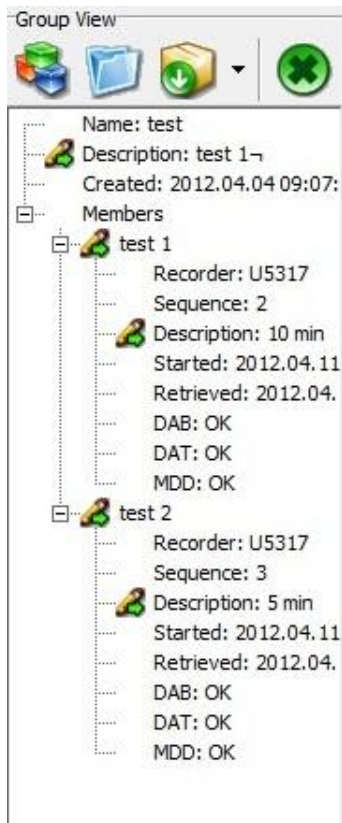


Figure 14.5 Group view pane

If a group is open when starting up a logger the new measurement sequence will be automatically registered in the group. If no group is open the sequence will not be registered in any group.

Retrieving data

When retrieving data from a logger and the sequence is already in a group the data retrieval time is registered in the group. Also when the data is converted/reconverted a copy of the *.DAT file is stored in the group folder.

Send Group To

Select **Send Group To** to transfer a group to another software.

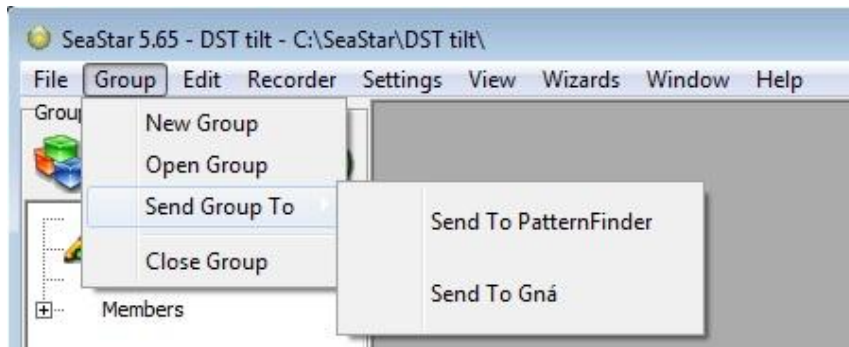



Figure 14.6 Send Group

It is also possible to transfer a group by clicking the **Send Group to** button  in the group view pane.

Close Group

Select **Close Group** to close an open group.

Appendix

A.1 Directories and Files

Directory Structure

The user can choose between SeaStar's default data directory structure (path) or define his own data path. As the SeaStar program is a multi recorder type program, the directory structure branches from the directory where SeaStar is positioned down **to type directories**, i.e. 'Starmon mini', 'DST milli' etc. **From there it branches again into recorder directories**, named after the serial numbers of the recorders, designed to hold data for each individual recorder (data directory). All in all it is a three level directory structure.

An example of this directory structure for Starmon mini is:

C:\Seastar\ The installation directory, SeaStar.exe location.

C:\Seastar\Starmon mini\ The type directory for Starmon mini.

C:\Seastar\Starmon mini\T0801\ The directory for the T0801 recorder.

When connecting to a recorder for the first time, SeaStar creates the recorder directory, named after the serial number of the recorder.

Information Files

SeaStar uses information files to store and retrieve settings. There are two types of information files:

The type-INI files, (for example StarmonT.ini for Starmon mini).

The information type files are all in the installation directory, they contain information on specific settings for each type.

The type-INI files for Star-Oddi products are:

StarmonT.ini	Starmon mini
DSTm.ini	DST milli
DSTr.ini	DST milli recycle
DSTu.ini	DST micro
DSTc.ini	DST centi/centi-ex
DSTs.ini	DST CTD
DSTg.ini	DST GPS

The recorder-INI files, for example T0801.ini contains settings information and data file positioning for the T0801 recorder. The recorder-INI files are located in the **appropriate type directory**, i.e. **all the Txxx.INI files are in the 'Starmon mini' directory**.

Files Locations

As stated previously, the **type-INI files are placed in the 'SeaStar' directory**, and the recorder-INI files are placed in the recorder type directory. All other recorder and

measurement related files created by SeaStar, are placed in the appropriate **recorder's directory**. For example: C:\SeaStar\Starmon mini\T0801\ is a directory for the T0801 recorder and all files belonging to T0801 are placed there.

If the user wishes to use his own defined data path, for example C:\Data\, then all the files for all the recorders, except for the INI files, are placed there. If the user has **enabled the "Create recorder directories" in the user path definition**, individual recorder directories, irrelative of type, are created under the user defined path, for example: C:\DATA\T0801\ for the T0801 recorder. The T0801.ini file (located in the C:\SeaStar\Starmon mini\) contains the path to the C:\DATA\T0801\ directory, and all files related to the T0801 recorder will be placed in that particular directory.

Browsing for a Recorder

When browsing for a new recorder from the 'Select recorder' under the files menu, the default method is to find a recorder-INI file in the type directory. The INI file will then point to the data directory (the recorder's directory). If the user has enabled the "Browse first in the user directory" in the user path definitions, the search starts in the user defined directory, where a *.RID file must be selected.

Recorder Related Files

Every file for Starmon mini that is recorder related has the following name format: Txxxx
- The name is the recorder ID (serial no.)

Ext	Description	File type
RID	Recorder information data	Binary
RIT	Recorder information text	Text
RBD	Recorder backup data	Binary
RDD	Recorder SNMS* download information data	Binary
RDT	Recorder SNMS* download information text	Text

*SNMS: Start New Measurement Sequence

The recorder ID (RIT) can at a later time be opened, and the related measurement data can be viewed, printed and reconverted. The RDD, RDT and DIR are download information files, created when a new measurement sequence is started.

Measurement Related Files

Every file that is specifically measurement related has the following name format:
mmmTxxxx - The name is the measurement number + serial no.

Ext	Description	File type
MID	Measurement information data	Binary
MIT	Measurement information text	Text
MDD	Measurement download information data	Binary
MDT	Measurement download information text	Text
CIT	Measurement conversion information text	Text

DAD	Measurement Data Binary file	Binary
DAB	Measurement Data Binary file	Text
DAT	Measurement Data Binary data	Text

The MID, MIT and DAD files are created upon measurement data retrieval from the recorder. The DAB, DAT and CIT files are created when converting the data. The MDD and MDT are download information files and created when a new measurement sequence is started.

Data Files

Upon data retrieval, three main data files are created.

The *.DAD File

This file is the raw data source file. The data is in mixed binary form. The user cannot access this file in the **SeaStar** program. When converting these raw data into measurements, the *.MID file is needed. The result from the conversion are two data files, the *.DAB and the *.DAT.

The *.DAB File

This file contains sequential binary representation of the data in columns. The first column is the measurement number. The other columns contain the measured parameters in a binary form.

The *.DAT File

This is the actual result file, where the measurements are converted to their natural units and timed. This is a text file with columns. The first column is the measurement number, the second column the date and the time, depending on the set-up. The third column is the time or the first measured parameter, depending on set-up. The following column(s) contain the converted measured parameters with units and number of decimals according to set-up. Number of parameters can range from 1-3, and number of columns 3-6 accordingly.

Data Header

The *.DAT file contains a data header, which is a detailed description of how the *.DAT file is configured. This feature is used by **SeaStar** when graphically representing the data, and is practical if the user wants to import the data into other applications or databases. Most of these descriptive items are derived from the **'Settings' menu and the recorder type definition in the 'File' menu.**

Each header item is contained in one line, and all header lines start with a # (bookmark) and a number. Then follows a description of the header item, and then 1-4 directives, all separated by tabs. Eventually a comment trails the directives, preceded by a semicolon (;).

The following is a description of the directives contained in the data header.

Item Description number of directives

- #0 Date-time: 1**
The date and time of that particular*.DAT file creation.
- #1 Recorder: 1**
The recorder and sequence number, f. example 12T0801.
Used for confirmation and as a graph header.
- #2 File type: 1**
Describes file column structure, mainly if Date and Time are joined (0-3).
- | | | | | |
|----------------|--------|-------------|------|--------------|
| 0: Result file | Number | Date | Time | Channels 1-3 |
| 1: Result file | Number | Date & Time | | Channels 1-3 |
| 2: Binary file | Number | Binary | | Channels 1-3 |
- #3 Columns: 1**
Total number of columns (3-6).
- #4 Channels: 1**
Number of measurement parameters (1-3).
- #5 Field separation: 1**
Separation between columns (0,1).
0: Tab
1: space
- #6 Decimal point: 1**
(0,1)
0: Comma
1: Dot
- #7 Date def.: 1**
Date format (0,1)
0: dd mm yy
1: mm dd yy
- #8 Time def.: 1**
Time separation (0,1)
0: Colon (:)
1: Dot (.)
- #9 Channel 1: 4**
Set as left axis, normally temperature. The four directives are:
- | | |
|----------------------|------------|
| Axis header, unit: | Text |
| Column header, unit: | Text |
| Number of decimals: | (0-3) |
| Axis direction | (1,2) |
| 1: | Ascending |
| 2: | Descending |

#10 Channel 2: 4

Set as right axis, normally pressure. The four directives are:

Axis header, unit: Text

Column header, unit: Text

Number of decimals: (0-3)

Axis direction (1,2)

1: Ascending

2: Descending

#11 Re-conversion: 1

Definition on conversion / Extra header in graph (0,1)

0: Original conversion

1: Reconverted

#12 No temperature correction: 1

Only in re-conversion, temperature correction in pressure calculations, is used as extra header information (0,1).

0: Normal correction

1: Correction was disabled

#13 Pressure offset correction:2

In pressure calculation, a zero offset can be adjusted. The two directives are:7

Applied: (0,1)

0: No adjustment was made

1: A zero offset was adjusted.

Adjustment value: An integer value in mbar

#14 Channel 3: 4

Set as extra right axis, normally salinity. The four directives are:

Axis header, unit: Text

Column header, unit: Text

Number of decimals: (0-3)

Axis direction (1,2)

1: Ascending

2: Descending

A.2 Help Menu

Choose **Help** and the following window appears:

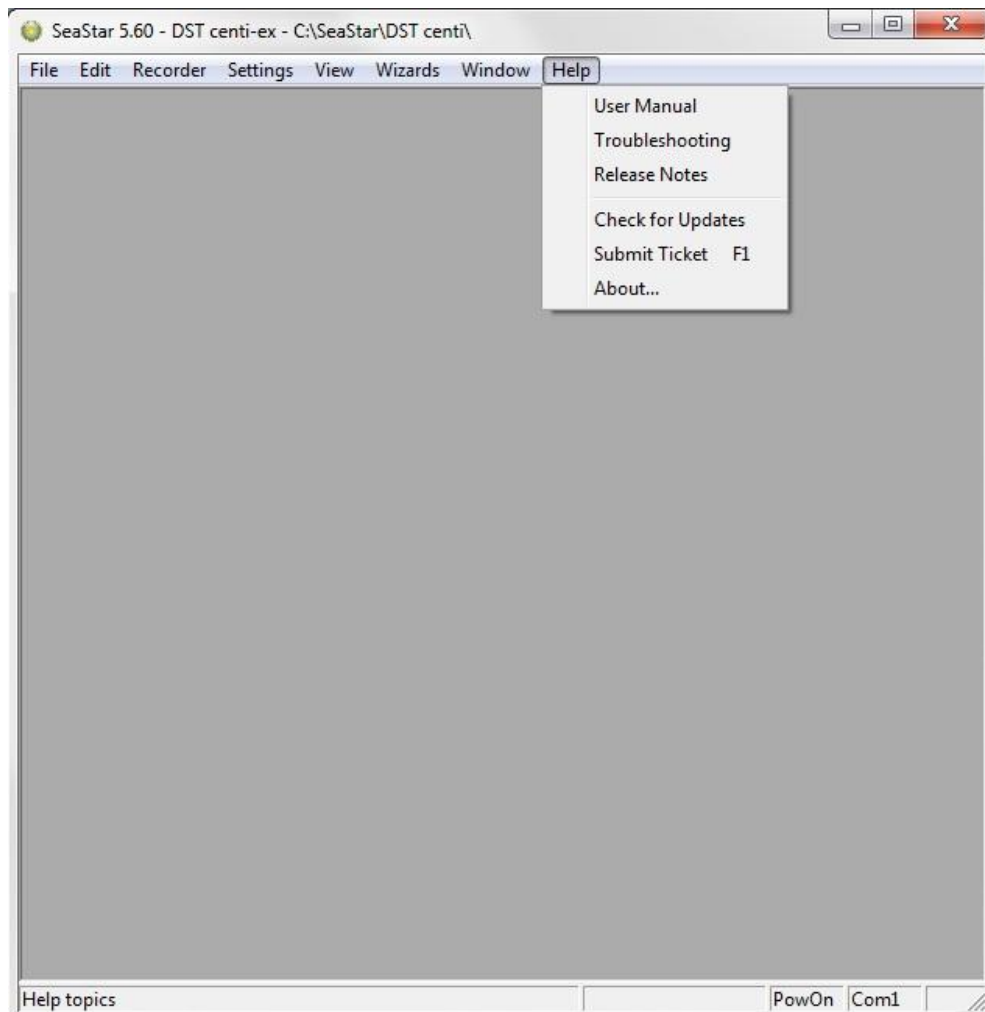


Figure A.1 Help Menu

User Manual

Select **User Manual** to open the Starmon mini user manual.

Troubleshooting

Select **Troubleshooting** to open the Trouble-Shooter.

Release Notes

Select **Release Notes** to view a description of the latest features added to SeaStar, the date when they were added and a reference to the chapter number of each manual where the additions can be found.

Check for Updates

Select **Check for Updates** to manually update the latest version of **SeaStar**, User Manual, Trouble-Shooter and Release Notes. The following window appears:

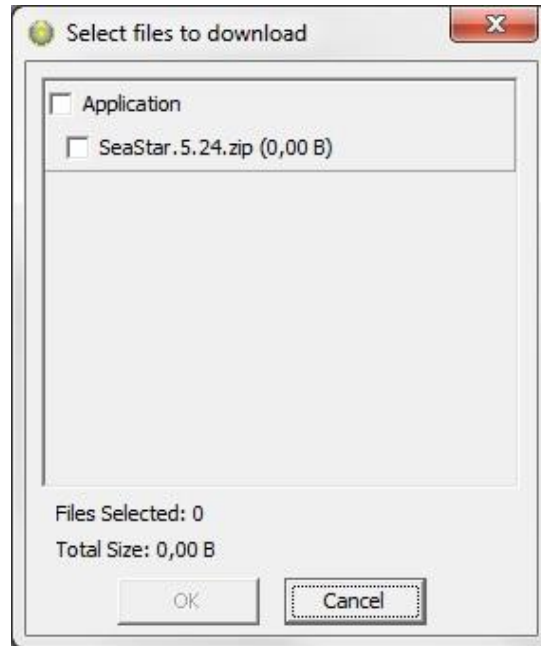


Figure A.2 Select files to download

Select the files you want to download and click **OK**. The program downloads and installs the latest updates to the software. Please note that this can only be done when the program is offline i.e. when no recorder is connected to the program.

Change Log is displayed if a new application version is available while updating (see figure A.3)

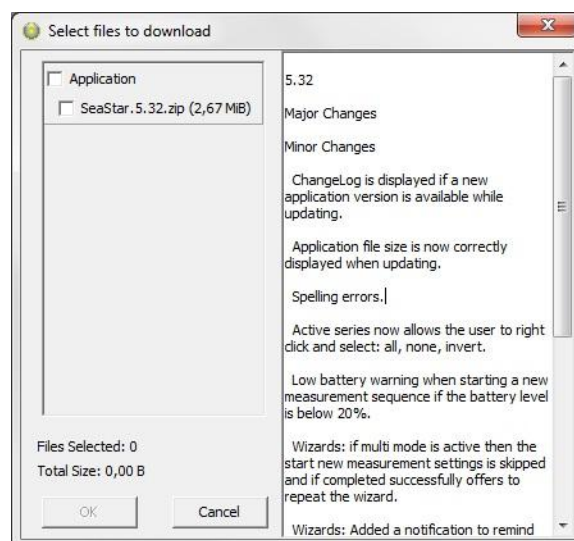


Figure A.3 Change Log

By selecting **Settings-Update** you can now choose whether you want to update **SeaStar** manually, every X number of days or every time **SeaStar** is run.

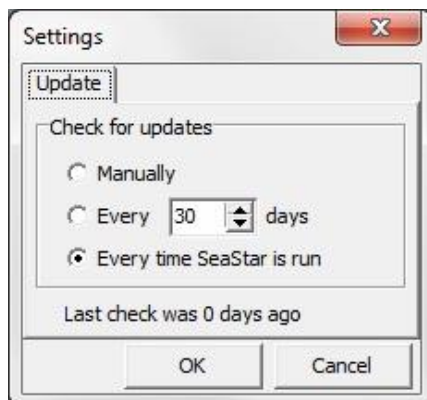


Figure A.4 Update

Submit ticket

Tickets can now be sent directly from the application to our support department by selecting **Help-Submit Ticket**. A shortcut key, F1, can also be used at any time while in the application and is especially useful when the menu bar is disabled.

In the ticket form (see figure A.5) you can add your name and email. Select a category that best describes your problem and write a subject and description. If you like you can select **Images (screenshots)** and browse for images in the screenshots folder and send them with the ticket. By selecting **Other files** you can also add files to the ticket. To automatically add recorder data use the **Include Recorder Data** option. By default the following files are included: screenshot, system information, logs and settings. These can be excluded with options in **Other files**.

To receive a response we require that you include a valid email address. Tickets can also be created by e-mailing support@star-oddi.com with the problem description and files attached.

If you want to add more information to a previously created ticket you can reply to the support response.

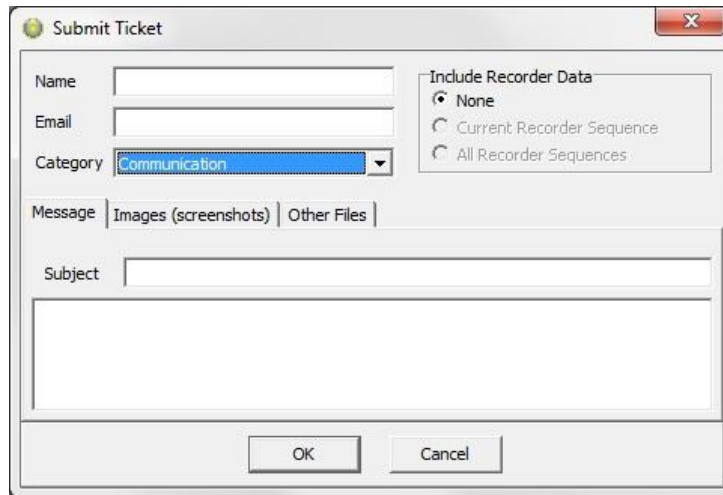


Figure A.5 Submit ticket

About

Select **About** for general information about SeaStar.

A.3 Recorder Backup

When replacing the battery, new recorder sessions have to be transmitted to the recorder. The user should contact Star-Oddi for a RBD file. The name of the backup file is Txxx.RBD (serial no. of the recorder plus the .RBD ending).

Downloading the backup file:

1. Copy the backup files (RBD) into the SeaStar RBD directory.
2. Open the SeaStar software.
3. Plug a recorder to the PC computer.
4. Select the 'File' menu and 'Recorder backup' command and the following window appears:

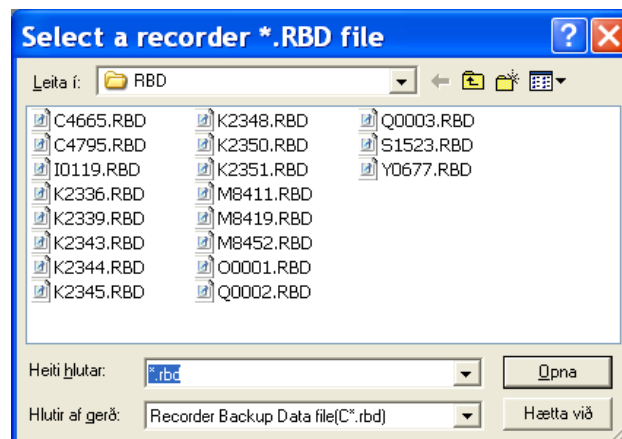


Figure A.6 Select a Recorder *.RBD File

- Browse for the correct RBD file on the computer and click OK.
5. Insert the sequence number and remaining battery life (see figure A.7). Note that if the sequence number is set too low, data will be overwritten.

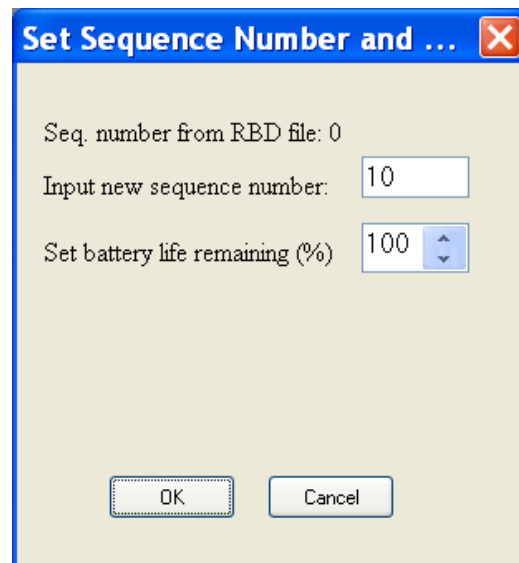


Figure A.7 Set Sequence Number

6. The SeaStar software downloads the RBD file into the recorder and the window in figure A.8 appears. Click OK.

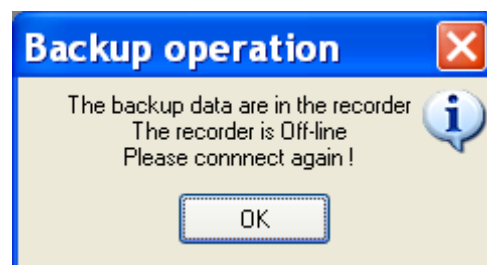


Figure A.8 Backup Operation