SediMeter™ Software Manual

version 6.0

Formalities

Document Scope

This is a user manual for the SediMeter™ software, version 6.0. It is intended as a reference to assist users in getting the most out of the software. It is, however, not exhaustive, as the application inherits many features and shortcuts from its development platform (LabView) that are not documented here. Right-clicking on different parts of the user interface brings up context sensitive menus that provide a wealth of options that are beyond the scope of this manual to document.

Document Version

Present version rev. 6.0, 2024-04-04.

Software Scope

SediMeter.exe ver. 6 is the communication and data management application for SediMeter™ SM4 instruments having firmware revision 2. It will also support SediTrans™ ST1 instruments, and SM3 instruments rev 2. SediMeter.exe 3.7 is the last version that supports SM3 firmware revision 1, and 5.2 is the latest that supports SM4 firmware rev. 1 but not rev. 2.

Supported Operating Systems

The application has been developed and tested under Windows 10.

Installation

Insert the memory stick and follow the instructions. Do not change the default directories, as it may prevent the software from working properly. You will get warnings that the software has not being certified; this is normal (it would be cost prohibitive to certify the software, since every time an update or customization was made it would have to be re-certified).

Drivers

The communication with the SediMeter™ instrument is through a USB to RS-485 adapter. Download and install the driver from http://www.ftdichip.com/Drivers/VCP.htm

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Warranty

This software is supplied for free. No express or implied warranty is made regarding the usefulness for a specific purpose, beyond to communicate with Lindorm's SediMeter™ instruments.

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Please Note

Window Behavior

Windows in this application are "modal," which means that you have to close the last window opened to return to the previous window (the control is passed to the last window, so the underlying window is non-responsive). Use the File → Close method to close a window; do *not* try to close it using the Windows operating system (the ✘ mark is turned off for that reason).

Advice for project leaders

1. Have one person who has received training on the SediMeter available for the project at all times. Taking the Lindorm course IA00 gives access to VIP support.
2. Take a photo (or video) using a wide angle camera of the point where the SediMeter enters the seabed (or lakebed, etc) at the time of installation, and if possible also at the time of retrieval.
3. If downloading data in real time via a third party system, download the entire raw data record (with *.ld2 extension). This way the SediMeter software can open the data for analysis.

Changes in version 6.0

Version 5.2 introduced the possibility for adjusting the accelerometer, and that version is recommended for SediMeter with firmware rev. 1. The 6.0 version is made explicitly for SM4 firmware rev. 2.

Burst Samples

SM4 with firmware rev. 2 supports burst samples of the entire data record with with a rate from 1/8th to 20 Hz (interval 8 to 0.05 s). The bursts can be enabled individually for timed and for accelerometer-triggered (conditions-based) measurements, see Modes.

Continuous Accelerometer Data

The burst feature combined with the updated firmware in SM4, rev. 2, allows for the continous recording of accelerometer data (up to 5,100 samples at 25 to 400 Hz with 10 bit resolution). The recording can be triggered by the internal clock, by shock, or by freefall.

SediSond Mode

The SediMeter SM4P rev. 2 can be used as a sond that is allowed to fall into soft sediments and record the deceleration together with the turbidity from the OBS sensors of the sedimeter.

Changes in version 5.2

There is one useful change, and this is the recommended verison for SM4 rev. 1.

Accelerometer Reconfiguration

This version allows the accelerometer to be reprogrammed and is intended for the SediMeter SM4 with firmware revision 1. This allows the user to turn the CBM function off, and to change the threshold.

Changes in version 5.1

Version 5.1 contains the COM driver that was missing in version 5.0, why this should be installed by all users as the base version 5.

Real Time Monitoring

The maximum rate for real-time monitoring has been increased to more than once per second for the first time. The only instrument that supports such high rates at the time of releasing this software is SM3 in the latest firmware release. To enable rates up to 15 Hz the communication protocol has been slightly modified in SM3, so that the instrument replies with data after a Cmd-N (new measurement command) without waiting for explicit instruction to send the data. Only if no data is arriving does the software request them, so as to be compatible also with other instruments.

Changes in version 5.0

The changes are many, and only the most important are mentioned here.

File Format

The software now saves the data in the instrument binary format (*.ld2) during download. This means that the Net Address is not saved, but when reading the files again the software interprets characters 6 and 7 as a hexadecimal NetAddr (a convention from the LogDator logger, which creates file names of the form YYMDDNNx.ld2 where YY is decimal year, M is hexadecimal month, DD is decimal day, NN is hexadecimal net address, and x is a character from A to Z to separate multiple files created the same day.

The user can also manually save a “work file” *.sm5, similar to the old file formats *.sm2, *.sm3, and *.sm4. The advantage with *.ld2 is space, and that it retains the most original record of the data.

Data View

The Data View window has been completely redesigned, featuring multiple tabs instead of graphs side by side. This enables each graph to be larger, while at the same time making the window smaller so it fits even inside a small laptop screen.

The internal manipulation of data has also changed so as to allow for future expansion of sensors and instruments, with dynamic rather than static allocation of channel names and units.

The data plot graph that assumed constant time interval has been replaced with an X-Y graph, so that missing data or extra (CBM) measurements are plotted correctly on the time scale. The sacrifice that had to be made was to give up the secondary Y-axis.

There is a new method of real-time monitoring, for those instruments that send out data over RS485 while measuring. SediTrans supports this, and SediMeter SM4 will in the future. The software simply listends to the network and presents, and optionally saves, whatever it picks up.

Control

The main change is that the Timing tab now also has a button for starting and stopping logging, so that you don't have to go back and forth to the System tab (which is still there, for independent control over the mode and baud rate). Three tabs now control the three most important things: Connect, set up, and download. In most cases you will only need to use those three tabs.

Change in version 4.2

This is based on a new runtime engine, LabVIEW 2018.

Changes from version 4.0 to version 4.1

Data Flow

In 4.1 the Data window is the center of operations as regards the analyzis of data and monitoring. Opening files, editing files, exporting files, real time monitoring; all of it is done, initiated, terminated in this window (or in windows opened from and closed back to this window). *The data in memory is not automatically sent back to the Control window* when the Data window is closed.

In comparison, the Control window was the center of all operations in version 4.0. Now it is only used for communication to the instruments, and for initiating contact for master monitoring (the actual monitoring being started subsequenctly from the Data window).

Slave Monitoring

Version 4.1 can read raw memory files (i.e., direct copies of the SediMeter data record saved to file by a third party logger or application) and present the data in real time. The master monitoring mode from version 4.0 is of course also available. This allows users to connect the SediMeter to third party loggers, side by side with other sensors, and still take benefit of the SediMeter software for analysis.

Web Server, Auto Rotate

The web server has been reactivated, and an auto rotate between IDs has been added to make it more useful in a network.

Turbidity Units

Throughout the manual and the software, a number of units for turbidity are mentioned. They are all variants of FTU and the use of different abbreviations is done in order to distinguish between measurement methods, since different methods (light wavelength, and angle of measurement in relation to incident light) affects the results.

Standard units

FTU = Formazin Turbidity Units, signifies that the instrument has been calibrated using Formazin, regardless of measurement method.
NTU = Nephelometric Turbidity Units, as FTU but measured according to the EPA method, i.e., white light scattered at 90º angle.
FNU = Formazin Nephelometric Units, as FTU but measured according to the ISO 7027 method of near infrared (NIR) light scattered at 90º angle. The wavelength should be centered around 850 nm.
FBU = Formazin Backscatter Units, as FTU but measured as close to 180º scattered back to towards the light source. In the SediMeter this is measured with NIR light centered around 945 nm.

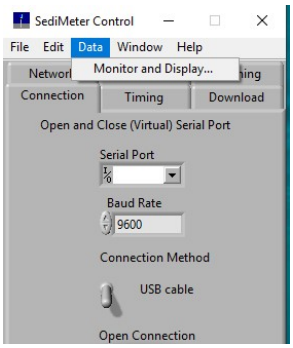
Proprietory units

FNMU = Formazin Nephelometric Mixed Unit, this is a mixture calculated in the software from the SediMeter SM3 data by taking the average of the top 6 straight backscatter measurements, and the top 6 oblique (nephelometric) measurements, all taken in 945 nm NIR light, and combined so that at low FTU only the oblique values are used, at high FTU only the straight values, and in between they are smoothly mixed.

NFU = Nephelometric Fluorescence Units, this unit is used for measurements where UVA light (365 nm) is measured as 90º scattered visible (white) light and calibrated using Formazin. The UVA LED emits some visible light above 400 nm, and the photodetector is somewhat sensitive to wavelengths shorter than 400 nm, why the NFU value may be larger than zero even in the total absence of fluorescence. This value should be evaluated in conjunction with the NTU value (which is measured coaxially and using the same photodetector) and BFU (see below).

BFU = Backscatter Fluorescence Units, this unit is used for measurements where UVA light (365 nm) is measured as 180º backscattered visible (white) light and calibrated using Formazin. The UVA LED emits some visible light above 400 nm, and the photodetector is somewhat sensitive to wavelengths shorter than 400 nm, why the BFU value may be larger than zero even in the total absence of fluorescence. This value is measured using the same photodetector as the NFU value (see above) but a different UV LED.

The Two Essential Windows



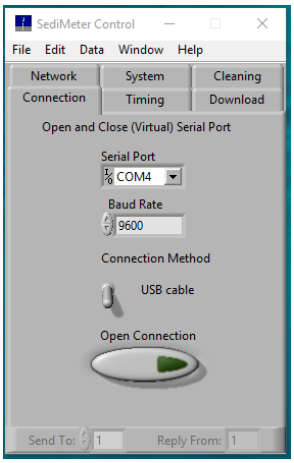
The **Control** window is the window that opens with the application. It is used for establishing communication with the instrument, to set up logging, and to download data. To use the Control window you must have a USB-to-RS485 cable connected, and an instrument in the other end (to avoid just getting error messages back).

The **Data** window is used for displaying the data, both logged data, data from files, and data in real time. You can open the Data window even without an instrument connected. You do that through the **Data → Monitor and Display…** menu as shown to the right. You can skip directly to read about the Data window here.

SediMeter Control window

When starting the application, the SediMeter Control window appears. The Connection tab is open, and the other tabs are inaccessible until a connection is established as described below.

Connection tab

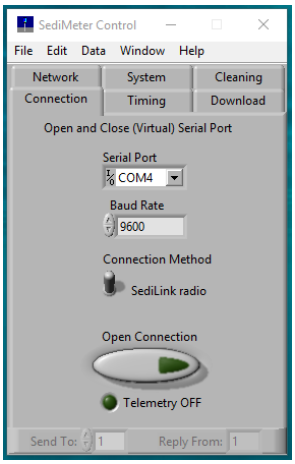


Serial Port pull-down menu

Select the COM port the SediMeter is connected to. Use the Refresh option if you connect the cable after the application was started.

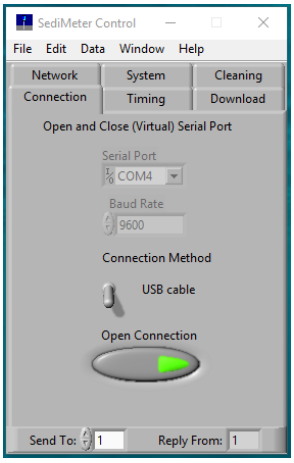
Baud Rate

The default baud rate of the SediMeter after a Reset is 9600. If you have set an instrument to another baud rate previously, then you must set that baud rate here before connecting.



Connection Method

Select USB cable (which is actually an adapter to RS485) or SediLink radio, depending on how you have connected the SediMeter(s). If you select radio an indicator for successful establishment of Telemetry connection will appear.



Open Connection button

Click to open the serial port after plugging in the USB connector of the cable or the radio. If there is no error the remaining tabs get unlocked, and the footer of the window becomes un-dimmed.

Footnote

Most users can ignore the footer. Only those using real time monitoring with more than one instrument need to bother.

Every message that is transmitted starts with a one-byte address code, the NetAddr (aka SediMeter ID, or RS485 ID). A value of 0 (zero) signifies a broadcast to all connected instruments. A value of 1 to 255 is used to address a specific SediMeter.

Use 0 for broadcast commands (e.g., if you want to synchronize the time of all connected units). However, to get a reply from an instrument, you must enter that SediMeter's NetAddr in the Send To field. The Reply From field will show which unit replied.

Timing tab

As this tab is opened, the software automatically performs a GET operation (similar to the user pressing the GET button) and populates the indicators with the values if there is an instrument connected with a network address that matches the Send To number.

Computer Time indicator

This indicates the present date and time that the computer is set to.

When you click SET, the software always updates the SediMeter clock from the computer clock, so make sure your computer clock is set correctly.

SediMeter Time indicator

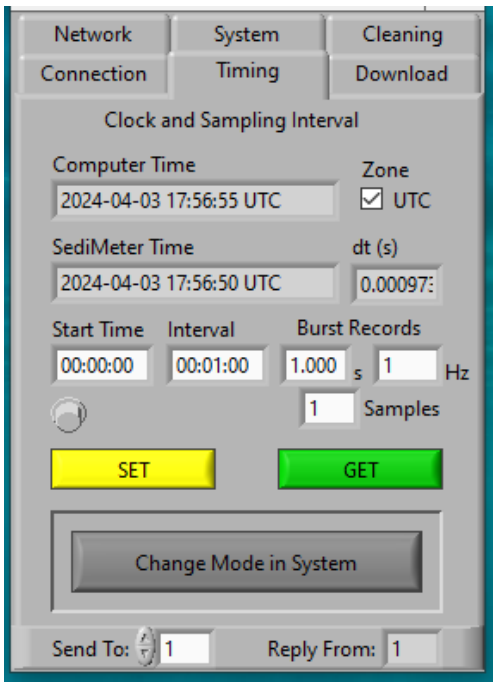
This indicates the date and time in the SediMeter the last time GET was pressed (or the pane opened).

dt (s) indicator

When the SediMeter clock is read, the difference compared to the computer clock is calculated and the number of seconds is shown in this indicator. A positive value means that the SediMeter is ahead of the computer clock.

Start Time control/indicator

The start time for self-timed logging in the format hh:mm:ss. The next time that the SediMeter clock reaches this time, and it is in Logging Mode, it will start logging. Each time a measurement is made, this setting in the SediMeter will be increased by the amount specified as the Interval. As an indicator, it always shows the time of the *next* measurement.



The push button under the Start Time is simply an aid for instantly filling the Start Time with the next even minute, or to increase it with one minute per push.

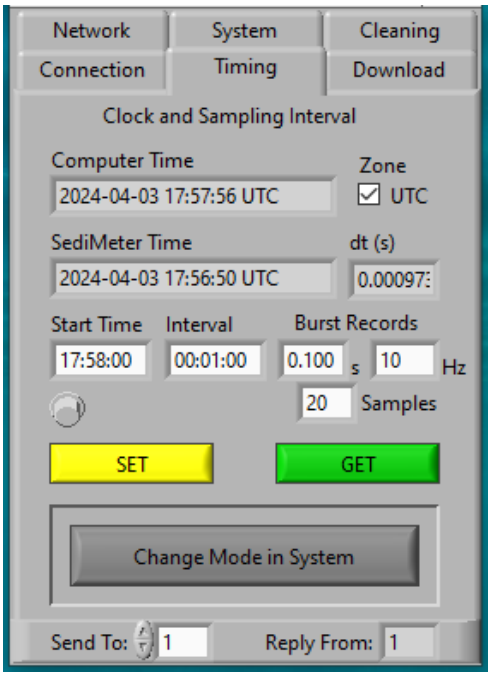
Interval control/indicator

The interval between measurements in hh:mm:ss. The minimum value you can set is 1 s. However, the software will not allow you to set a shorter value than the Min Interval that it calculates (see below). Since in SM4 the burst sampling of accelerometer data is fixed (in the calibration), the minimum is typically 2 or 3 seconds. In SM3 you can set it to 1 s but it is not recommended, since you will have a very short time window for re-establishing control over the instrument (as it does not listen to commands while measuring).

Zone

Selects whether to display the time as UTC or local time. This affects the values in Computer Time, SediMeter Time, and Start Time. (Internally in the SediMeter the time is always stored as UTC to avoid having to deal with time zones or seasonal time changes).

Burst Records and Samples controls/indicators



SediMeter SM4 firmware rev. 2

The burst rate can be set either as interval in seconds with range 8 to 0.05 s, or as frequency with range 0.125 to 20 Hz. The number of samples can be from 1 (bursts are off) to 255. The bursts apply to either the timed measurements, the CBM triggered measurements, or both, depending on which mode you select in the next step.

SediMeter SM4 instruments firmware rev. 1

These are indicators only since the values are determined by the calibration file. In SM4 these refer to accelerometer measurements. These samples are taken *before* the end of the measurement. This is to allow a measurement to be triggered by an accelerometer event, and the triggering event to be captured in the data.

SediMeter SM3 instruments

Software version 5.2 supported bursts for this model, but it only repeates the level and top OBS measurements with an interval of 1 to 16 seconds. The function has not been verified in ver. 6.0.

SediTrans ST1 instruments

In this instrument the interval can be 1 or 2 seconds, and the number of samples can be 1 or 60. The parameter read is pressure. The function has not been verified in ver. 6.0.

SET button

Sends the timing values from the controls to the instrument in the Send To field, or to all connected instruments if the Send To field equals 0.

GET button

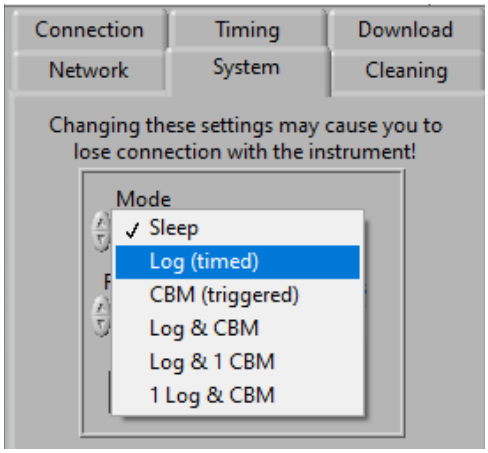
Retrieves the settings from the instrument whose NetAddr is selected in the Send To, and updates all the indicators. When this tab is opened, a GET command is sent automatically.

Change Mode in System-button

This button is a shortcut to the System tab, which is where you change Mode in order to start logging.

If the instrument is in an active mode when this pane is opened, the button will appear bright green immediately. Notice that while the instrument is in any active mode you cannot download data; you must first put it back to Sleep.

System tab



This is where you actually start internal measurements. It also hosts an advanced network setting that many users will never need.

Mode control/indicator

There are six modes as follows. The applicability depends on the instrument and firmware version. To select a mode or to change the baud rate, make your selection and click SET. Only the first two modes are applicable for SM3, ST1, and SM4 rev 1.

Sleep

When the instrument is in Sleep you can communicate with it fully. Any other mode will limit the ability to change settings, to request, and to download data. Thus, before attempting to download, change to Sleep here and press SET.

Log (timed)

This mode starts internally timed measurements. The instrument does not arm itself until the Start Time has passed, and then it takes measurements with the set Interval. Bursts are allowed. No CBM are carried out in SM4 rev. 2, but in SM4 rev. 1 the CBM is active.

CBM (triggered)

This mode only records data when triggered by an event from the accelerometer (see that section). CBM means conditions-based monitoring, and the SM4 rev. 2 allows for two conditions, freefall wake-up (shock). Bursts are allowed. The Interval is ignored, but the instrument does not arm itself until the Start Time has passed.

Log & CBM

This mode is a combination of the previous two, with bursts allowed in both timed and triggered measurements.

Log & 1 CBM

In this mode bursts are only applied to timed measurements.

1 Log & CBM

In this mode bursts are only applied to triggered measurements.

RS-485 Baud Rate control/indicator

This refers to the baud rate in the instrument. The default is 9600 baud (with 8 data bits, 1 stop bit, and no parity). If you reset the instrument it will return to this value.

The higher baud rates allows for faster data download, and less current drain when using radios. If you have a network with several instruments it may also be necessary to increase the baud rate to speed up data transfer.

The lower baud rate gives greater range when using radios, and allows for longer cables when doing real-time monitoring in a physically connected network.

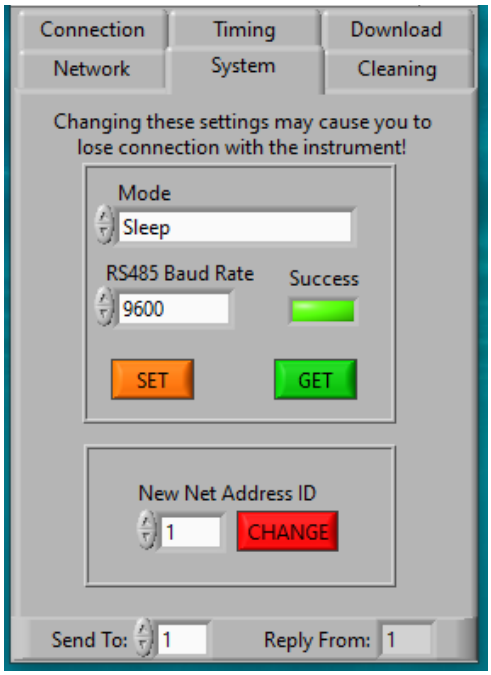
If you are servicing an instrument used for stand-alone logging you will also want to charge the battery. Charging the battery takes about as much time as downloading data over 9600 baud, so you might as well use the lower baud rate in that case.

SET button

Clicking this button sends the values of the mode and baud rate.

Success indicator

The Success indicator turns green if the instrument accepted the changes, but it turns red (and the mode setting reverts) if the change was not accepted.



GET button

Clicking this retrieves the mode and baud rate setting from the selected SediMeter and updates the respective fields. This command is sent automatically when the tab is opened.

New NetAddr control

This changes the NetAddr (aka SediMeter ID) in the instrument. Each instrument on an RS-485 network must have a unique number in the range $1 \leq \text{NetAddr} \leq 255$.

CHANGE button

Click to change the NetAddr in a SediMeter. The usage depends on how you are connected, as follows. The new NetAddr

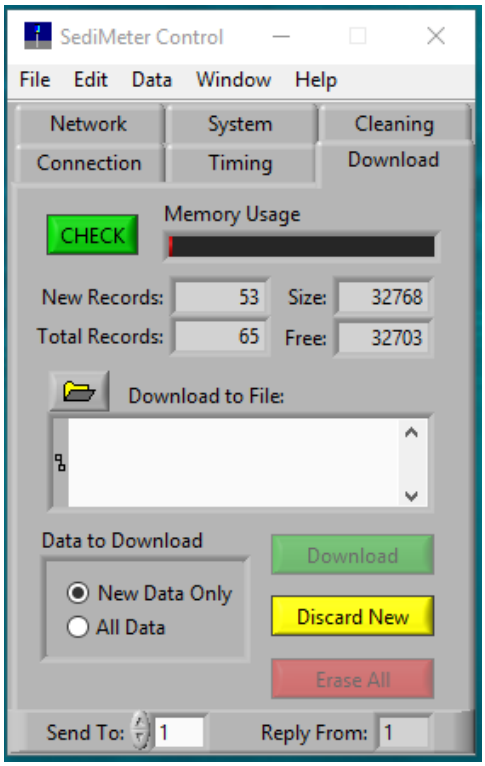
number remains in the instrument even after a Reset. Only change this if you need to have more than one instrument on the same real-time network. **WARNING**: Clicking this button may cause you to lose contact with the instrument! You must follow the instructions below to the letter if you decide to change ID. We highly recommend you do this BEFORE deployment.

Method for changing NetAddr (SediMeter ID) in an instrument:

1. Enter the new value in the New NetAddr field.
2. Enter the old value in the Send To field.
3. Click SET. The Reply From field will say 0, since no reply is sent.
4. Enter the new NetAddr in the Send To field.
5. Click the GET button, which updates the Reply From field.
6. Verify that communication works by checking that Reply From equals Send To.

Download tab

This is for downloading data from the instrument, and for erasing the memory. (Broadcasts are not supported for any action on this tab, which means that you cannot put 0 in the Send To control.)



CHECK button

Click this to request information from the SediMeter and update the associated indicators. It is also automatically done when you open the pane. The following indicators are populated by this command:

Memory Usage indicator

Blue color indicates new data, whereas red color indicates old data (blue = new, red = read). Data may be marked as old in three ways: by being downloaded, by being discarded (see below); or after an instrument Reset.

Total Records indicator

The number of records currently in the internal memory.

New Records indicator

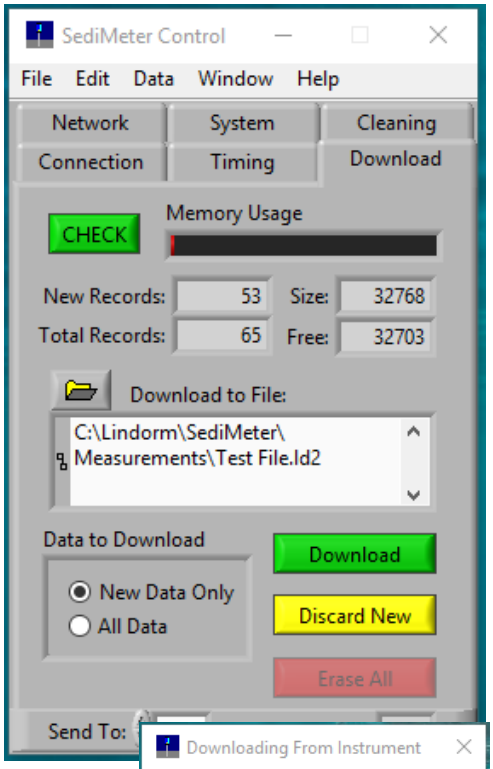
The number of records that have been recorded but not yet marked as read. When full, the instrument stops recording.

Size indicator

The total number of records the memory can hold.

Free indicator

The number of records that are still unused.



Download to File control

Click on the folder button and enter the path and file name for where to save the downloaded data.

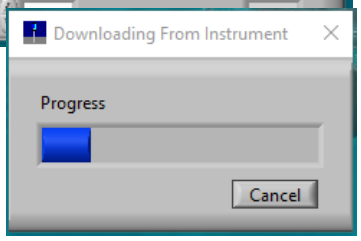
The data will be saved as a raw copy of the instrument memory using an *.sd2 file extension. You are free to create any name you want, but if you want to keep track of the Network Address of the instrument you should put that in position 6 and 7 (this is a legacy of the LogDator file naming method of YYMDDNNx.ld2, where NN is the network address in hexadecimal notation).

Data to Download radio buttons

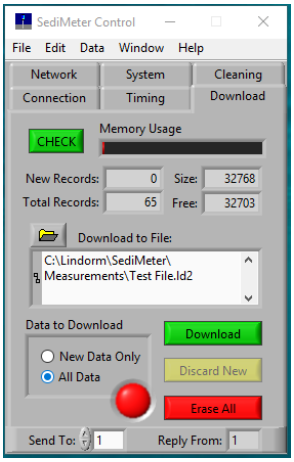
Select whether to download only the new data, or all data. Do this before clicking the Download button.

Download button

Clicking this button downloads the new records from the selected SediMeter to the indicated file. (You may have to click on the folder button in order for this button to get active, even if there is a file path in the box.)



While the data is being downloaded a progress window will appear. When done this window closes and you can use the menu to open the data window to inspect the data.

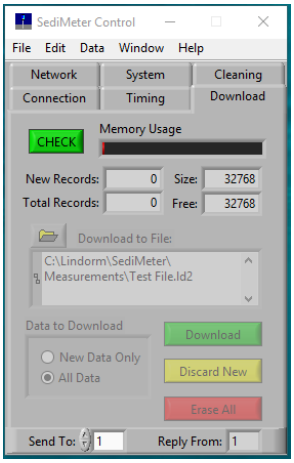


Discard New button

If you want to erase the memory without having to download the new data first, then you can use this button to mark them as read.

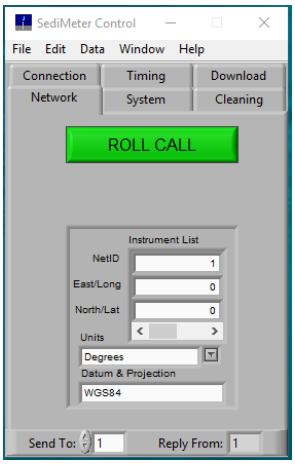
Erase All button

This erases all records, freeing up the memory. While this is going on a red indicator appears (left). When done, the indicator disappears and an automatic CHECK is executed, which will dim out all the buttons and controls (right).



An erase cannot be executed while there are new data in memory. If you don't want to download the new data, use the Discard New button.

Network tab

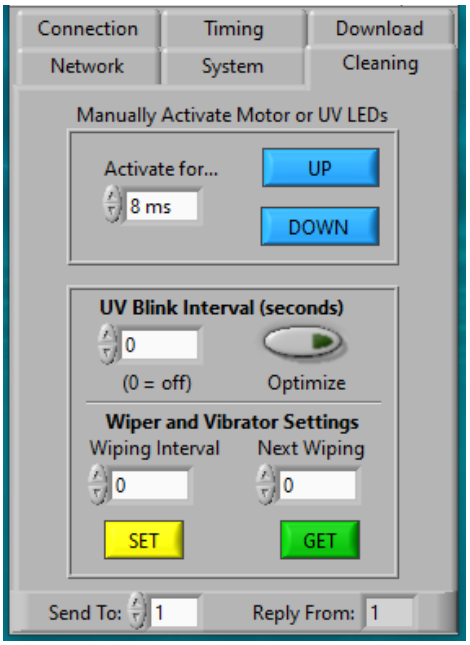


This tab contains a list of the instruments that will be interrogated for data in real time monitoring. As the default instrument ID (NetAddr) is 1, the default SediMeter list contains a single record with NetAddr 1, for convenience. However, if you change the instrument NetAddr or add additional instruments with other IDs, then you must edit this setting. The setting is stored as a separate file, and can also be edited in the Edit menu (see below) so that you don't have to redo it every time you open the application.

You can also press the Roll Call button to automatically populate the records with the NetAddr (ID) list.

The location of the instruments is optional to enter. If entered, they permit you to see a map of the instruments (it is available as a menu item in the Data View window).

Cleaning tab



This tab contains the control for the UV LEDs of SM4, the vibrator of SM4, and the mechanical cleaning shuttle of SM3B (legacy). The usage depends on the type of cleaner on the instrument.

Manually Activate Motor or UV LEDs

These buttons permits manually activating the UV LEDs or the motor.

UV Blink Interval (seconds)

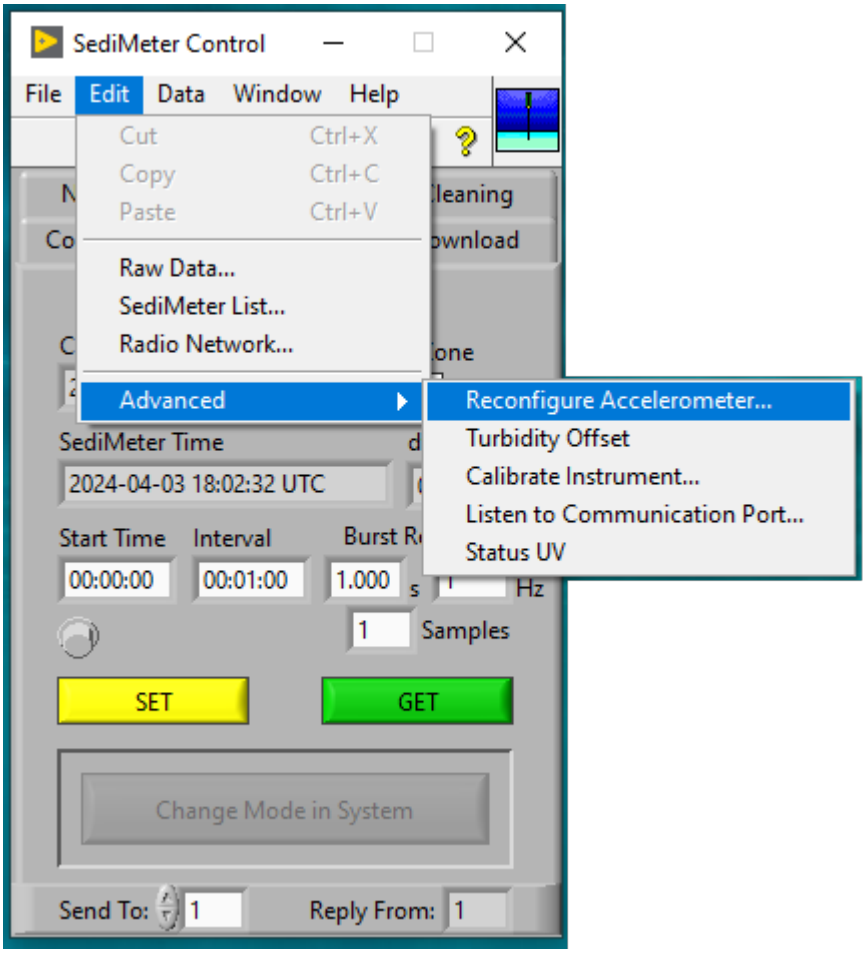
In SM4, the UV lights will blink with the interval in seconds selected here. By activating **Optimize** the instrument attempts to improve the interval as needed, in an attempt to keep fouling at bay while not excessively drain the battery (experimental).

Wiper and Vibrator Settings (legacy)

In SM4 it refers to the vibrator motor while in SM3B it is the setting for the mechanical wiper. Wiping Interval is in units of measurements. That is, if set to 2, it will activate every second measurement. A setting of 0 turns it off.

The Next Wiping allows specifying an initial period without cleanings. If set to 0, there will be no activation; 1 means it will activate at the 1st measurement, and so on.

Control Window Menus



File menu

Exit Ctrl+Q

Quits the application.

Edit menu

Cut, Copy, Paste

The normal system function.

Raw Data…

Opens the File view window (see below) with the data presently in memory. If there are no data in memory, it opens as untitled.sm4.

SediMeter List…

Opens the SediMeter List window, for editing the list of connected instruments (see below).

Radio Network…

Opens a window for changing settings in the radio in connected SediLink radio modems. The radios are XBee radios from Digi, and for commands refer to their documentation. If Telemetry is not connected (i.e., you are using a cable and not radio) then this dialog will serve no purpose.

Advanced > Reconfigure Accelerometer…

This opends a new window in which you can change the settings of the built-in accelerometer. As a side benefit, it also allows you to save to file all the calibration settings, both for the accelerometer and for the instrument settings as such, to file (and later to retrieve them).

Advanced > Turbidity Offset

Opens the Turbidity Offset window (see below). Allows for recalibration of the turbidimeter offset without changing the slope. This can be done by the operator and even in the field if a suitable tank is available (known FTU, sufficiently large, darkness). It is advisable to first save the previous calibration to file, which you can do using the Reconfigure Accelerometer window.

Advanced > Calibrate Instrument…

Opens the Recalibrate Instrument window. The Recalibrate window is password protected, allowing for access being limited to only authorized personnel.

Advanced > Listen to Communication Port…

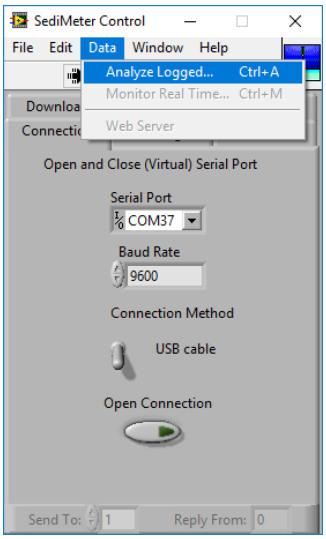
The window that opens (see below) is intended for debugging an RS-485 network between some other master, and one or more SediMeters. The software passively displays the data on the communication port.

Advanced > Status UV

This is for following up on the optimization of the UV blinking interval (expeimental).

Data menu

Monitor and Display… Ctrl+M



Opens the SediMeter Data window (see below). For real time monitoring in Master mode, you must Connect to an instrument or instrument network *before* opening this window.

Window menu

The content of this menu is a list of the currently open windows of the application. Do not use this menu to switch between windows. You must instead close the last opened window from its File menu in order to return to the previous window.

Help menu

Show Tip Strips Ctrl+T

Turns off or back on the tip strips that appear when you idle the mouse above a control or indicator.

Show Context Help Ctrl+H

Turns on or back off a context-sensitive help window. It displays more in depth help about the items you idle over with the mouse, than the tip strips provide.

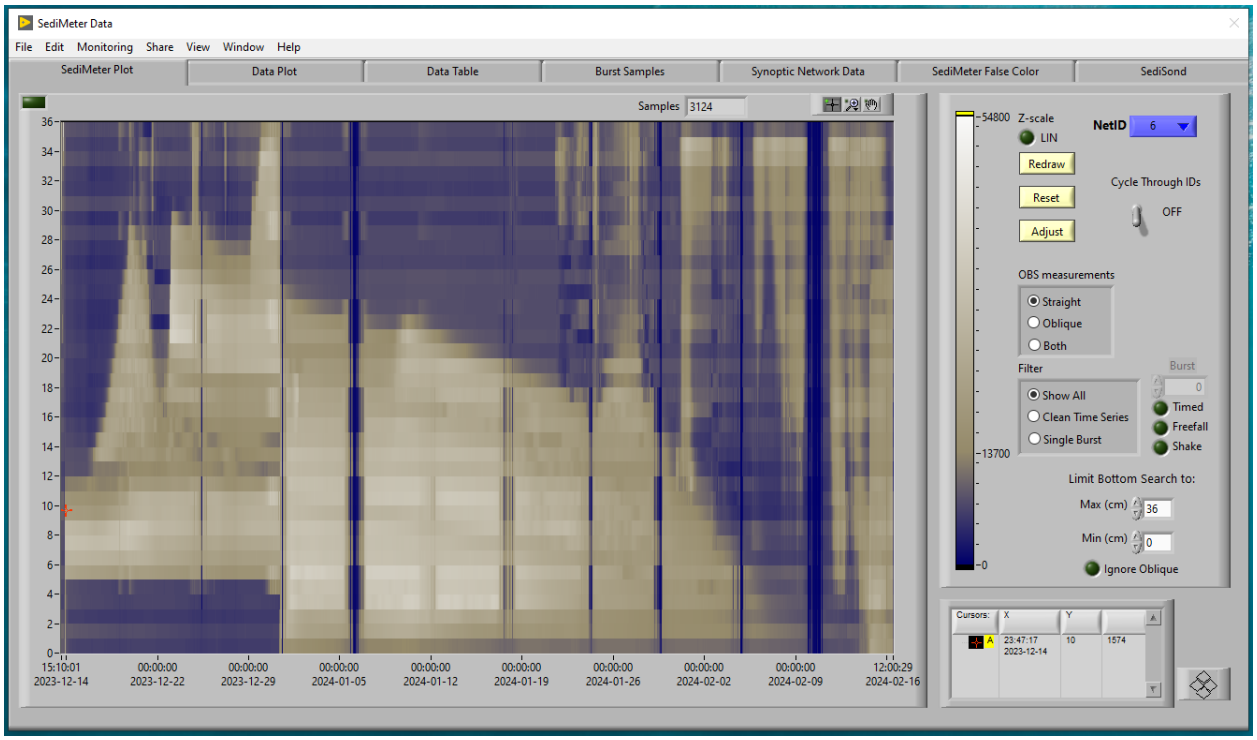
About…

Shows the About window. Click anywhere in it to close it.

SediMeter Data window

This window is for viewing and interacting with SediMeter data, whether downloaded data from the logger, or for real time monitoring. It has a number of tabs for presenting the data and controlling real-time monitoring. Two of the tabs are only relevant for SediMeter instruments, but the rest are relevant also for SediTrans instruments.

SediMeter Plot tab



This graph shows the SediMeter data with time on the X-axis, turbidity detector on the Y-axis, and signal level as color. The color scale is indicated on the Z-scale ramp to the right of the graph itself.

The color scale is editable. Move the mouse over a scale marker. When the cursor changes to a double arrow you can drag the scale marker up or down. You can also right-click it and change its color. If you drag from the end markers you get new intermediate points.

In the top margin of the window the number of samples is shown. In real time monitoring, the date and time appears to the left of Samples.

NetID control

If data from more than one instrument is analyzed simultaneously, this control is used for selecting which instrument to display. The control is repeated in the following tabs.

Redraw, Reset, Adjust buttons

Redraw simply redraws everything. Reset changes the color scale of the Z-scale ramp to the default and redraws. Adjust changes the color scale to the range present in the straight backscatter data and redraws.

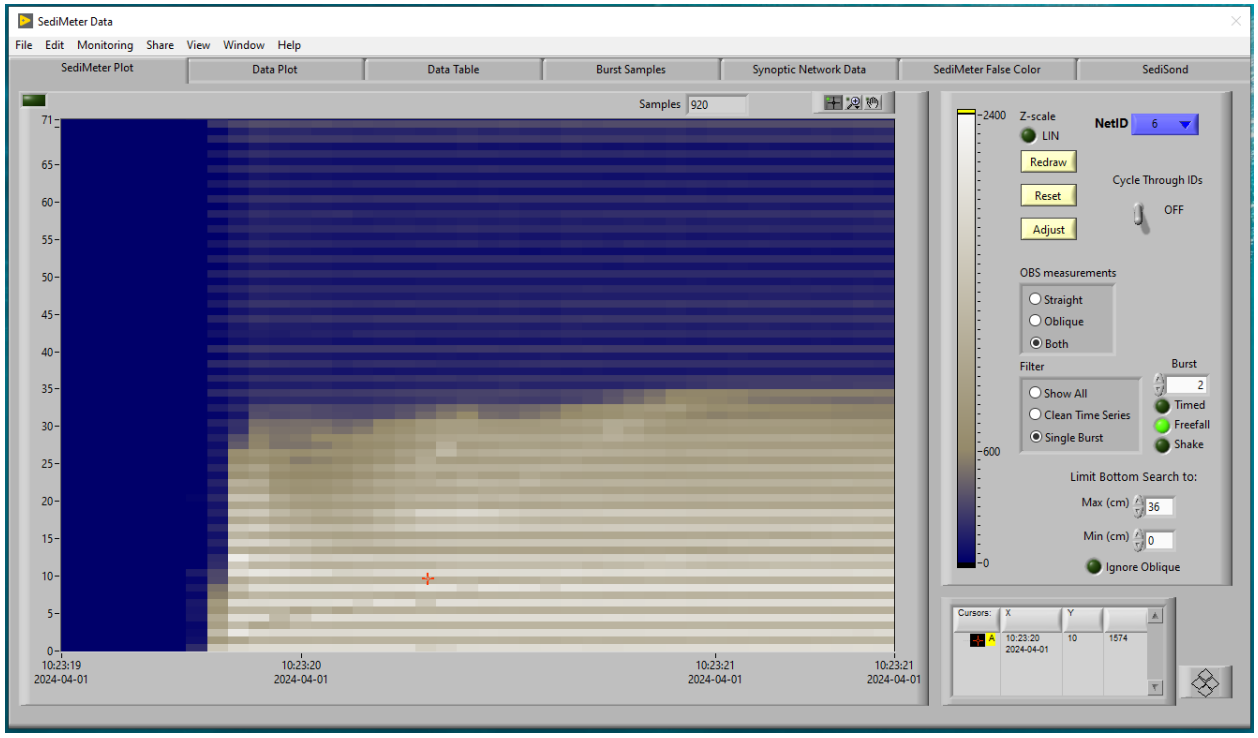
OBS measurements radio buttons

Select whether to display only the straight backscatter (36 values), only the oblique scatter (35 values), or both (71 values).

Filter functions

The three options are to Show All the records regardless of wether they are timed or triggered; to show a Clean Time Series consisting only of timed measurements and only of the first in any burst; or to show Single Bursts only, whether timed or triggered.

In the latter case the burst to be shown is selected to the right, and the indicators below will show which kind of burst it is: Timed, triggered by a Freefall interrupt, or triggered by a wakeup interrupt (Shake). The image below shows a freefall burst in SediSond mode into lake sediments.



Limit Bottom Search

In some cases there are conditions that confuse the automatic bottom-tracking algorithm, such as anoxic (black) sediments under the surface, or a piece of seagrass that has got stuck in the sensor. These controls allow you to force the software to look for the bottom only in the region you specify.

Cycle Through IDs

Rotates through the IDs with the rate selected in the control that opens when active. This is only relevant for real-time monitoring.

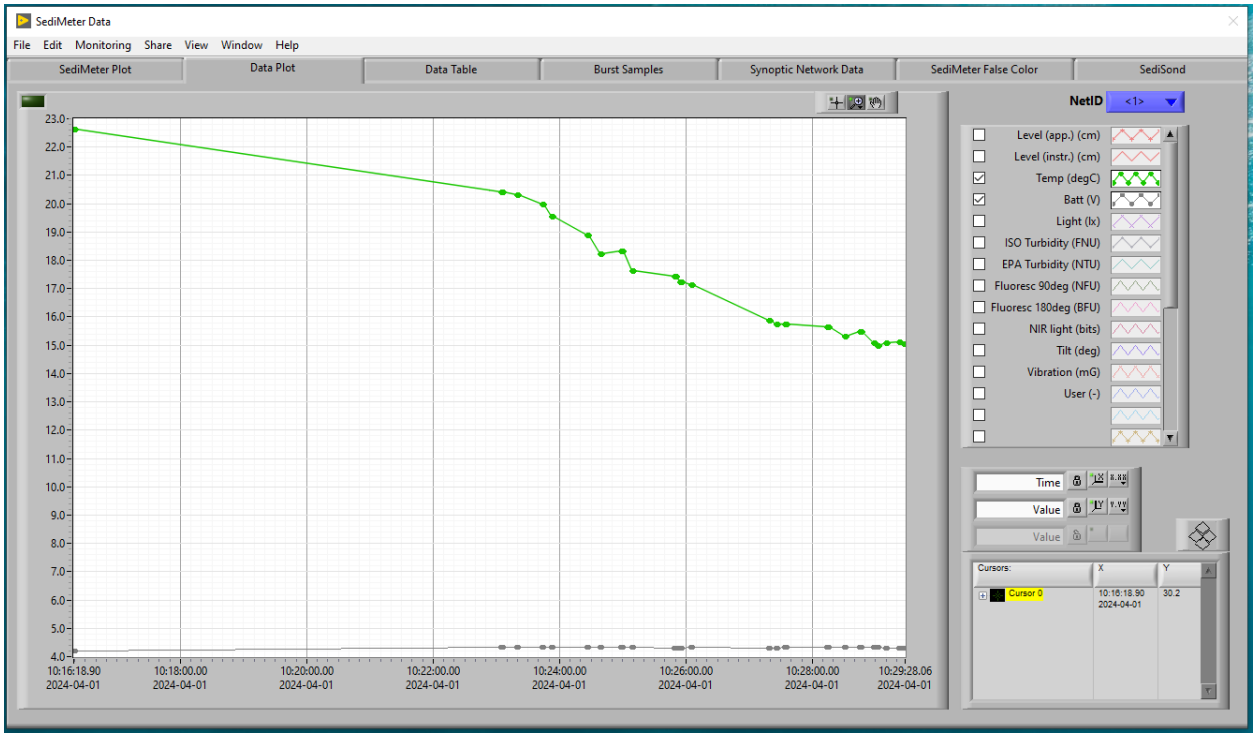
Manipulating the Graph

The graphs share many features, see below in the section Graph controls.

Data Plot tab

This graph plots the measurement data with one value per measurement. The quantities, or channels, are listed in the legend to the right. The parameters depend on the instrument currently shown. Each channel can be turned on and off in the plot, its color and type changed, etc.

Note that the SediMeter level is calculated both in the instrument firmware and in this software. The software is by default automatic but can be changed to interactive mode (see Adjustments tab).



Graph controls

A number of controls are common for the different graphs. They are explained here.

In the top left corner of the graph is a square button that fixes the scale to 0 to 36 and disables vertical autoscaling. This is a useful default scale for SediMeter level.

Graph cursor

One or more cursors can be defined for each graph. To the right of the cursor name and icon there are columns for the cursor's current X position, Y position, and in the case of the intensity graph, the Z value at that point.

If the cursor is not visible in the graph, right-click the cursor (+) in the cursor control and select "Bring to Center". To be able to drag the cursor in the chart, make sure the cursor symbol (+) is selected in the Graph Palette (see below). You can also move the cursor by clicking on the diamond-shaped controls to the right of the cursor control.

The cursor for the line graph will snap to a line. Right-click on the cursor in the cursor control to bring up the context-sensitive menu and select which line to snap to.

Graph Palette

In the top right corner there is a palette with three choices; cursor, magnifying glass, and a hand for dragging. The magnifying choices are, from left to right on the first line: Zoom in in both dimensions, zoom in in the X dimension, zoom in in the Y dimension. On the second line: Fit all data to the graph, zoom in to the point of clicking, zoom out around the point of clicking.

Changing X and Y axis scales

The X-axes all have auto scale as default. To turn off auto scaling right-click on the graph or on the X-axis to bring up a menu where you can turn off "AutoScale X" or, in the Data Plot tab, use the scale palette.

The intensity graph has manual scaling on the Y-axis, from 0 to 36. If you change the scale and want to restore it, simply click the green square button in the top left.

Other features

You can change the legend color, line type etc., and edit the names in the legend.

The intensity graph can be exported as an image by using the Copy Data command in the context-sensitive menu. The exported image includes all items that presently are visible. You may wish to turn off the Graph Palette and the Cursor Legend prior to copying the image. You do that by bringing up the context-sensitive menu (right-click) and de-select them under Visible Items.

The other graphs can be exported as a simplified image (better for including in a report) in a similar way.

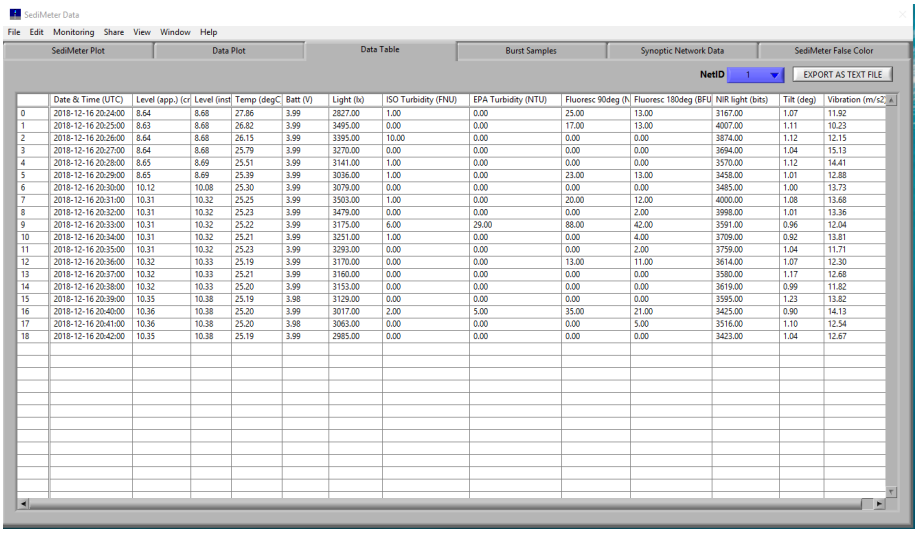
Each graph also has a Scale Legend, although it is off as default in the SediMeter Plot tab. The scale legend provides a graphical user interface for setting AutoScale, to scale-to-data once, and for accessing menus for changing a number of settings of the graphs. To turn it on, right-click the graph and select Visible Items -> Scale Legend.

The line graphs have an Annotation feature. Right-click on a line to bring up a context-sensitive menu with Create Annotation as one choice. After you have created it you can change its color and other attributes. This may be used for marking in the graph when certain things happened, such as taking a calibration reading with another method.

Data Table tab

This is a table of the same data as in the Data Plot tab. The column labels depend on the instrument, just as the Legend in the Data Plot.

You can save the contents of this table at any time as a tab-delimited text file by clicking the EXPORT AS TEXT FILE button. You can also save *all* data from the File menu; that export will include the SediMeter OBS data and the

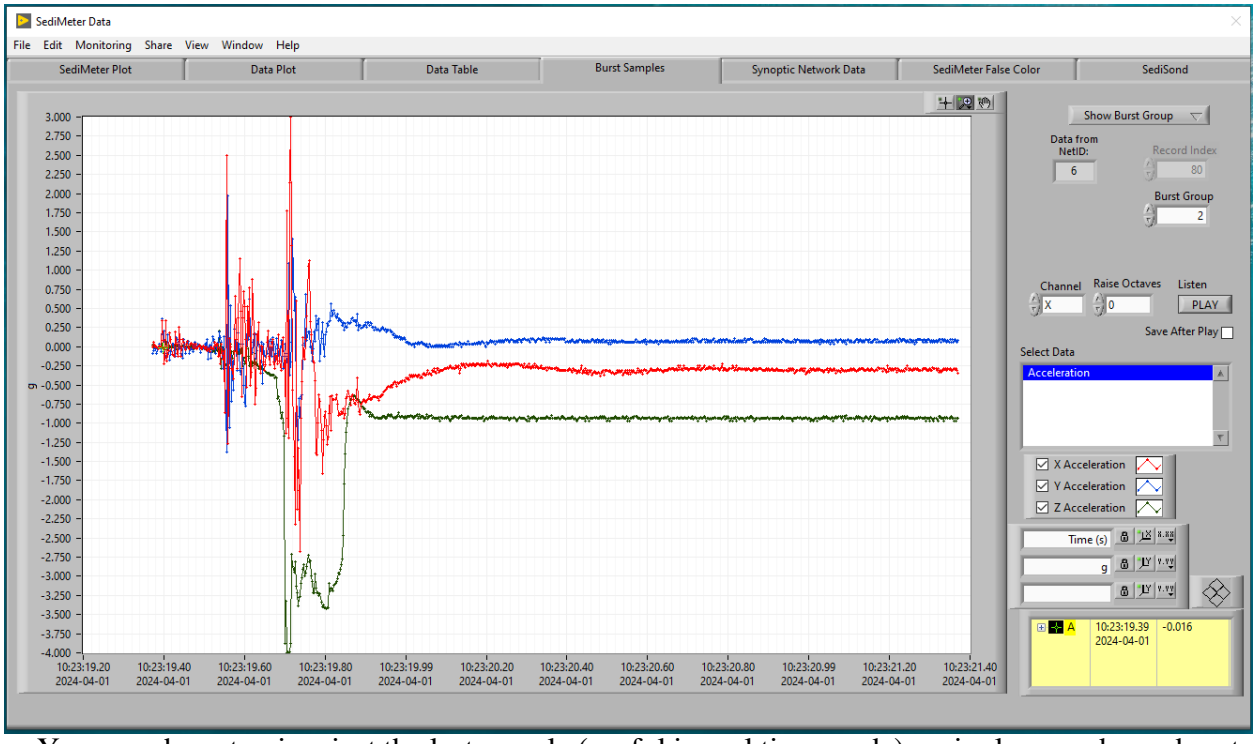


	Date & Time (UTC)	Level (app.) (cr	Level (inst	Temp (degC	Batt (V)	Light (lx)	ISO Turbidity (FNU)	EPA Turbidity (NTU)	Fluoresc 90deg (N	Fluoresc 180deg (BFU	NIR light (bits)	Tilt (deg)	Vibration (m/s2
0	2018-12-16 20:24:00	8.64	8.68	27.86	3.99	2827.00	1.00	0.00	25.00	13.00	3167.00	1.07	11.92
1	2018-12-16 20:25:00	8.63	8.68	26.82	3.99	3495.00	0.00	0.00	17.00	13.00	4007.00	1.11	10.23
2	2018-12-16 20:26:00	8.64	8.68	26.15	3.99	3395.00	10.00	0.00	0.00	0.00	3874.00	1.12	12.15
3	2018-12-16 20:27:00	8.64	8.68	25.79	3.99	3270.00	0.00	0.00	0.00	0.00	3694.00	1.04	15.13
4	2018-12-16 20:28:00	8.65	8.69	25.51	3.99	3141.00	1.00	0.00	0.00	0.00	3570.00	1.12	14.41
5	2018-12-16 20:29:00	8.65	8.69	25.39	3.99	3036.00	1.00	0.00	23.00	13.00	3458.00	1.01	12.88
6	2018-12-16 20:30:00	10.12	10.08	25.30	3.99	3079.00	0.00	0.00	0.00	0.00	3485.00	1.00	13.73
7	2018-12-16 20:31:00	10.31	10.32	25.25	3.99	3503.00	1.00	0.00	20.00	12.00	4000.00	1.08	13.68
8	2018-12-16 20:32:00	10.31	10.32	25.23	3.99	3479.00	0.00	0.00	0.00	2.00	3998.00	1.01	13.36
9	2018-12-16 20:33:00	10.31	10.32	25.22	3.99	3175.00	6.00	29.00	88.00	42.00	3591.00	0.96	12.04
10	2018-12-16 20:34:00	10.31	10.32	25.21	3.99	3251.00	1.00	0.00	0.00	4.00	3709.00	0.92	13.81
11	2018-12-16 20:35:00	10.31	10.32	25.23	3.99	3293.00	0.00	0.00	0.00	2.00	3759.00	1.04	11.71
12	2018-12-16 20:36:00	10.32	10.33	25.19	3.99	3170.00	0.00	0.00	13.00	11.00	3614.00	1.07	12.30
13	2018-12-16 20:37:00	10.32	10.33	25.21	3.99	3160.00	0.00	0.00	0.00	0.00	3580.00	1.17	12.68
14	2018-12-16 20:38:00	10.32	10.33	25.20	3.99	3153.00	0.00	0.00	0.00	0.00	3619.00	0.99	11.82
15	2018-12-16 20:39:00	10.35	10.38	25.19	3.98	3129.00	0.00	0.00	0.00	0.00	3595.00	1.23	13.82
16	2018-12-16 20:40:00	10.36	10.38	25.20	3.99	3017.00	2.00	5.00	35.00	21.00	3425.00	0.90	14.13
17	2018-12-16 20:41:00	10.36	10.38	25.20	3.98	3063.00	0.00	0.00	0.00	5.00	3516.00	1.10	12.54
18	2018-12-16 20:42:00	10.35	10.38	25.19	3.99	2985.00	0.00	0.00	0.00	0.00	3423.00	1.04	12.67

burst data, which are not included here. Furthermore, in all tables and charts, you can right-click and save the data to Excel and other formats.

Burst Samples tab

This graph contains the burst sample data from one measurement at a time. In SM4 it is accelerometer data, in ST1 it is pressure data, and in SM3 it is level and turbidity from OBS #37. Select which variable to display by clicking its name in the Select Data list.



You can chose to view just the last sample (useful in real time mode), a single record, or a burst of records. You can also listen to the accelerometer data (mono or stereo) as an audio, and optionally save it as a WAV file. In case of low frequency data you may want to raise the sound (i.e., increase the playback sample rate) by an octave or two.

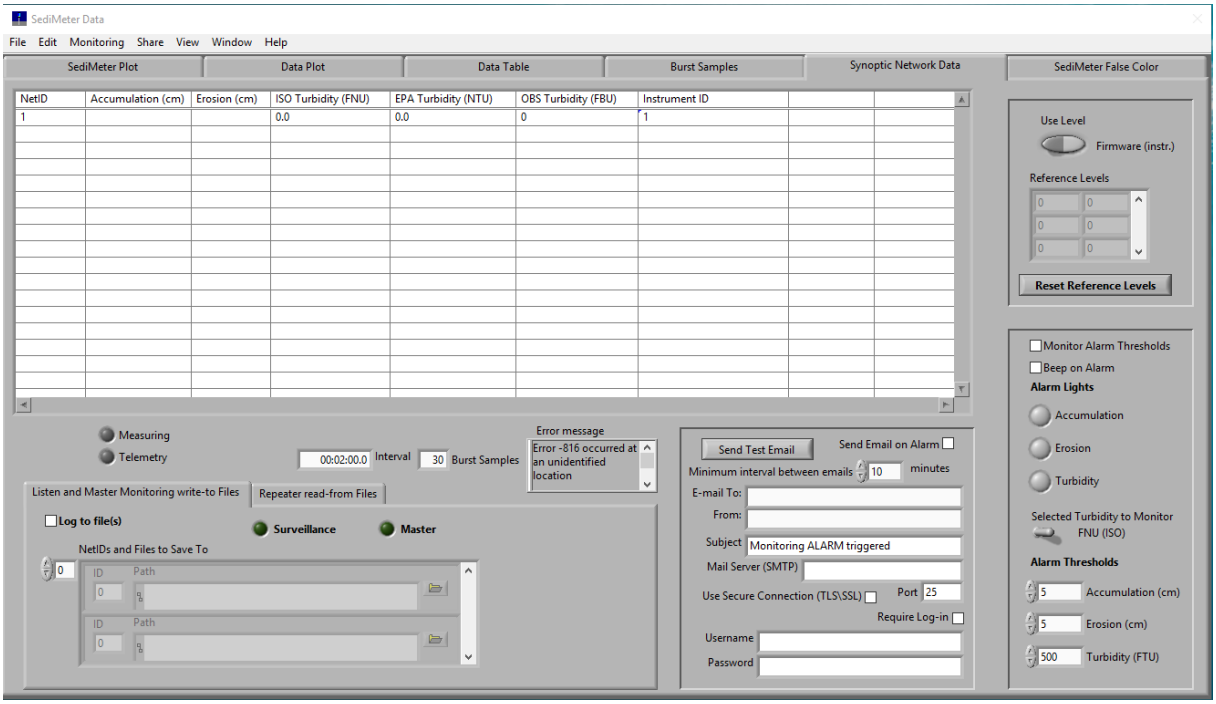
The screen capture shows data captured at 400 Hz in SediSond mode, the same record as shown in the Filter section.

Synoptic Network Data tab

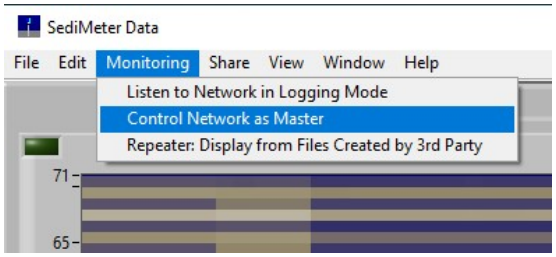
This tab is for real time monitoring. It has three real-time modes (selectable under the Monitoring menu), and they are

1. Listen mode (instruments in Logging mode control their timing internally, and store the values in their internal memory but it can also be stored by the computer),
2. Control mode (the computer is the master that controls the timing and stores the data), and
3. Repeater mode (a third-party device transmits the data to a file on the hard-disk, which is then read by the software for presentation in nearly real time).

The first mode is not supported by all instruments, and the third mode is a special case for custom monitoring systems, so we will focus on the second mode, the default one.



Quick Instructions



Enter the desired Interval in hh:mm:ss (maybe 1 minute, 00:01:00). It is a good idea to make sure the instrument is connected and with the clock set correctly, and if relevant, the burst sampling is set as desired as well. To start, select **Monitoring → Control Network as Master** and wait for data to come in. To turn off, go again to the same menu item and unselect it. This is an expedient way to check the function before a deployment; however, your Network Definition must contain the ID of the instrument you have connected (unless you have changed some default, it will).

Overview of the window

The main feature is the data table. Below it we have to the left the controls for real-time monitoring and the files to otionally write to (or read from, the in the case of repeater mode). Below the table to the right are the settings for sending e-mails in the case of alarms, and further to the right are the settings for generating said alarms. Above that, in the top right, are the tools for setting the reference level for each SediMeter (since erosion and accumulation must be calculated as a difference to a reference level). We now present the individual elements of the window.

Data Table

The table shows the last measurement from each connected instrument in a real-time monitoring network. Whereas the Data Plot tab shows all the measurements from the one instrument, this tab shows one measurement from all the instruments.

It calculates the change in elevation from a reference level, and displays it as either accumulation or erosion. Select with the switch in the top right of the tab whether to use the values from the instrument firmware, or the ones calculated in software (when using software values, the displayed accumulation and erosion values reflect the *previous* measurement). Click the Reset Reference Levels button to use the value from the first record in memory as reference, or edit the reference levels manually in the table.

The turbidimeter columns may vary in content depending on the connected instrument(s).

Measuring indicator

This is green during a measurement, and grey in between, in real time monitoring.

Telemetry indicator

This is green when telemetry is on (communication via SediLink radio modem).

Interval

Write the desired measurement interval in Control mode, or the interval between checking the files in Repeater mode. It has no function in Listen mode. The actual maximum measurement rate that can be achieved depends on the hardware used (instrument and computer).

Burst Samples

The number of burst samples. It is strongly recommended to set this first in each instrument from the Control window.

Error Message

An information used for debugging. You may find something useful displayed here, but many messages you can safely ignore.

Listen and Master Monitoring write-to Files tab

Surveillance indicator

Indicates that the window is in Listen monitoring mode, listening to a network of one or many instruments.

Master indicator

Indicates that the window is in Control monitoring mode, controlling a network of one or many instruments.

Log to File checkbox

A combined control and indicator for saving monitoring data to file.

Log File control

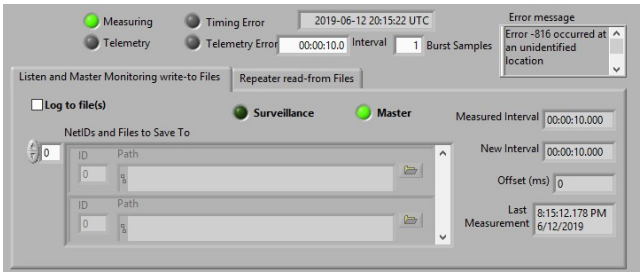
The Log File path control is used for creating or selecting one or more files to which to write monitoring data. The files are written in *.ld2 format, so you must specify which instrument data (the network ID of that instrument, or NetAddr) goes to which file.

Timing Error indicator

This is a warning for timing errors. It is only visible during real time monitoring.

Telemetry Error indicator

This is a warning for telemetry errors. It is only visible during real time monitoring.



Waiting, Offset, Measurement Interval, New Interval, Last Measurement

These aids for debugging telemetry are only visible during real time monitoring.

Repeater read-from Files tab

Slave indicator

Indicates that the window is acting as a slave in repeater monitoring mode, reading raw data files from one or many insruments. The files would typically be periodically updated by software of a third party data logger.

Log File control

The Log File path control is used for selecting one or more files from which to read monitoring data. The files are in *.ld2 format, so you must specify which instrument ID you want to assign to which file (the IDs are used by the software for presenting data, and can be any number from 1 to 255). The record size and pointer are populated by the software. (*NB. In version 5.0 the software reads the entire file each update, so avoid creating excessively large files or using an unnecessarily short Interval*.)

Alarms

This tab is also for defining alarm conditions and what to do in case they are triggered.

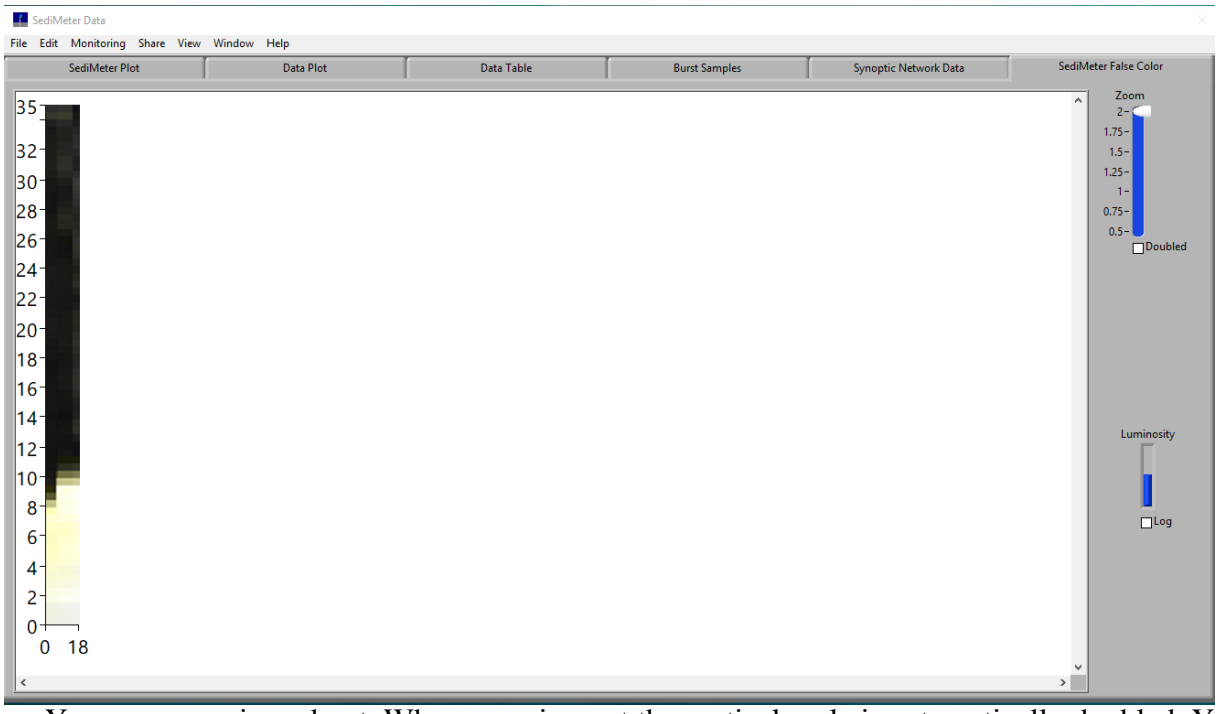
The Alarm Thresholds refer to the accumulation and erosion values. The switch for Turbidity selects which turbidity value to use, the ISO or U.S. EPA standard (both nephelometric).

When any instrument in the network exceeds the set threshold, the corresponding alarm light goes red. If the Audible Alarm checkbox is ticked, the computer will also beep for each measurement when an alarm is triggered.

If the Send Email on Alarm checkbox is ticked (and the relevant fields filled in) an email will be sent the first time any instrument triggers an alarm. The email will say which alarm was triggered, and by which instrument. To avoid having an email sent too often, a minimum interval between emails can be specified. Contact your network administrator if you need help with the server settings.

SediMeter False Color tab

The false color plot is created by combining the straight and oblique scatter turbidity into a single image with 5 mm vertical resolution, where yellow represents straight backscatter and blue represents oblique scatter. Due to the total reflection against air, an exposed sensor will create a blue image. This color plot is therefore an easy visual aid for those who deploy the instruments in the intertidal zone.



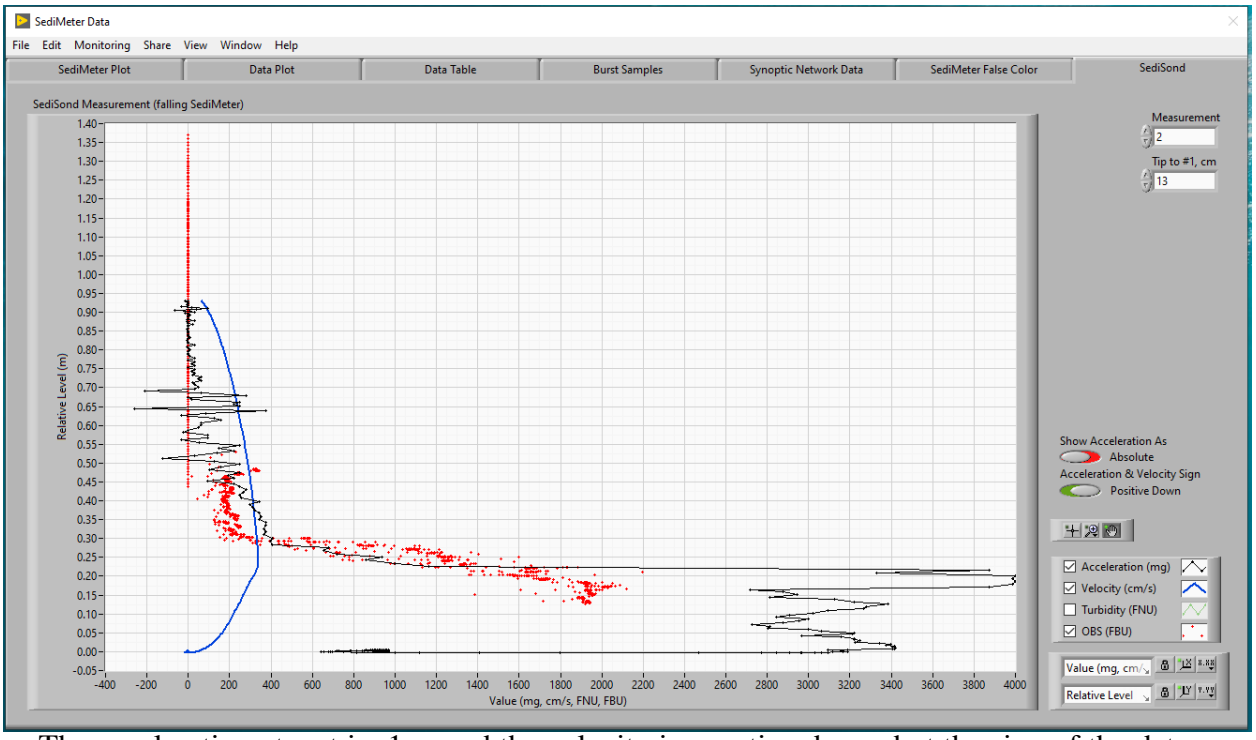
You can zoom in and out. When zooming out the vertical scale is automatically doubled. You can also change the luminosity, and make the color scale logarithmic. Like the first tab, this is only relevant for SediMeter instruments, and will be blank when using e.g. a SediTrans instrument.

SediSond tab

This graph presents data from a freefall burst in a chart with acceleration, velocity, ISO turbidity and OBS turbidity as a function of vertical position. The vertical position of these parameters is calculated by interpolating the acceleration from the final resting position in a freefall.

The example shown represents the same data as previously used in the Filter and Burst illustrations. The Measurement control selects the burst to show. Depending on the length of the tip used under the instrument, the setting Tip to #1 should be entered by the user (13 cm for the standard 8 cm brass extension with rubber tip and bushing).

In case the measurement resulted in a shock beyond the selected range of the accelerometer, the calculation of velocity will yield an upward start velocity. The software reports this as an error and advices approximately how high the range would need to be.

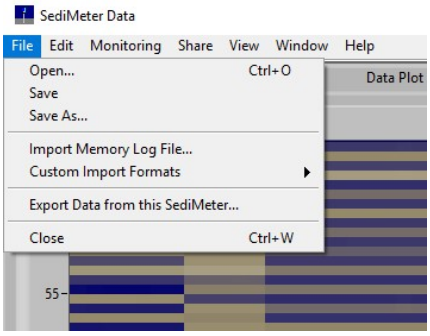


The acceleration at rest is -1 g, and the velocity is negative down, but the sign of the data can be changed and the acceleration values can be shown as relative (0 g representing rest) for presentation purposes. As always, you can right-click the chart to export the data.

Menus

The menu system pf the Data window is described in the following.

File menu



Open… Ctrl+O

Opens an *.sm5 file. Also works for importing older *.sm2 and *sm.3 and *.sm4 files, with some limitations for the older ones. The *smX file format contains somewhat processed data from one to many instruments.

Save

Saves changes to the open (*.sm5) file.

Save As…

Save data in memory as an *.sm5 file to a new path or with a new name.

Import Memory Log File…

Imports a data file of type *.ld2 (see Download tab). Note that from version 5.0 of the software this is the format in which the data is saved during download. The *.ld2 files contain **raw instrument data from a single instrument**.

Custom Import Formats

This submenu is for customized import formats. Contact us if you require a customization.

Export Data from this SediMeter…

This item exports the data from the selected instrument as a tab-delimited file. The columns vary depending on instrument version. The file can be opened by many Spreadsheet applications.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	CG	CH	CI	FR	FS
1	SediMeter ID	1	Burst sample interval (s)	0.1																	
2	Date & Time (UTC)	Level {firmware} (cm)	Level {software} (cm)	Turbidity (FNU)	Turbidity (NTU)	Temperature (ºC)	Battery (V)	Light (lux)	NIR background	Tilt (deg)	Vibration RMS (mg)	Peak Acc (mg)	Fluorescence (FFU)	#0	#1	#2	#71	X g #1	X g #2	Z g #29	Z g #30
3	2018-01-06 17:55	13.788	13.762	0	0	23.29	4.076	345	90	88	17.56	42.16	88	3929	3563	3780	0	-1	-1	0	0
4	2018-01-06 17:56	13.786	13.769	0	0	23.33	4.078	332	91	89	16.82	30.93	93	3945	3548	3762	0	-1	-1	0	0
5	2018-01-06 17:57	17.592	17.713	1	1	23.34	4.036	344	89	89	16.7	40.16	84	3920	3557	3766	1	-0.984	-0.984	0	0
6	2018-01-06 17:58	17.597	17.724	0	0	23.36	4.039	335	92	89	16.22	33.65	95	3917	3550	3766	0	-1	-1	0	0
7	2018-01-06 17:59	17.604	17.736	0	0	23.38	4.082	359	90	89	14.96	26.89	88	3915	3553	3761	0	-1	-1.016	0	0

Close… Ctrl+W

Closes the window. This item is not active during an ongoing monitoring. First stop the monitoring (in the Monitoring menu).

Edit menu

Cut, copy, and Paste work as previously described.

Raw Data

Opens the file view window with the data currently in memory.

Monitoring menu

This menu has three items, one for each monitoring mode. Regardless of which is selected, a number of menu items will be dimmed during the duration of the monitoring.

Listen to Network in Logging Mode

In this mode the software will passively listen to the RS485 network and display the data received, using the time code of the data. If you so specify the data will also be saved to file, thus generating data redundancy. This mode has not been designed for, or tested with, the use of radios.

Control Network as Master

Starts or stops master monitoring mode. You must define the network first, and connect to the instrument network. To save the data to file, you must also specify a file and start logging in the Monitoring tab. This mode works with radios.

Repeater: Display from Files Creted by 3rd Party (Slave)

Starts or stops slave monitoring mode. You must specify the files to read first. The data transmission from the instruments to the files is the responsibility of third party devices.

Share menu

Web

This item turns on and off the web server with default port 8000. A checkmark indicates when it is on.

When on, the web server presents the SediMeter Data window as an image, automatically updated every 10 seconds. The page can be viewed from any web browser by entering the domain or IP of the computer in the browser address field. For instance, if the IP is 127.0.0.1, type http://127.0.0.1:8000/SediMeter.html to view the web page.

The actual document is C:\Lindorm\SediMeter\www\SediMeter.html (provided that C: is the Windows volume). You can edit that document in a text editor to put in your custom information before and after the SediMeter Data window.

URL

This menu item displays the address to enter in a local browser to see the data from the web server: http://localhost:8000/SediMeter.html.

View menu

3D View…

Opens the 3D display window.

Network Map…

This opens the Map of SediMeters window. The coordinates are the ones entered in the Network window (or imported from file in that window).

Window menu

The content is as previously described.

Help menu

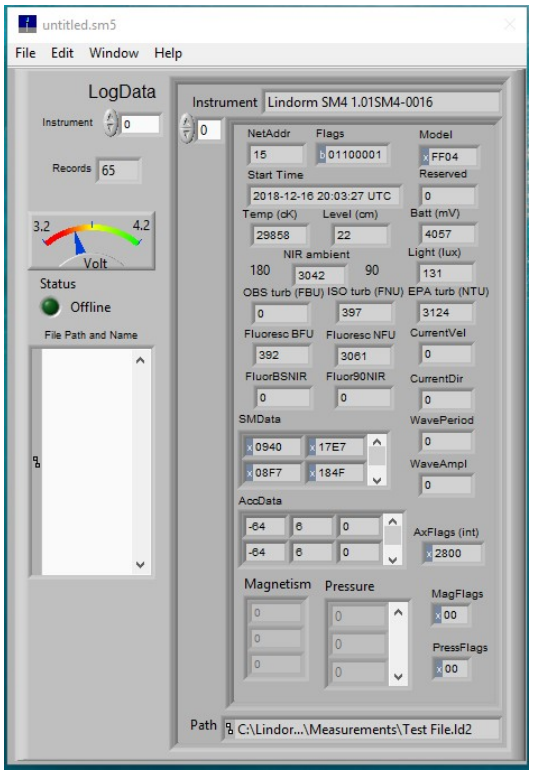
The content is as previously described.

Other Windows

File window

This window shows the raw data files. The data has been reorganized in the software, but this section has not yet been updated in the manual.

Front panel objects



An *.sm4 file may contain data from a single instrument, or from a network of up to 255 SediMeters. For each instrument there is one record per measurement. This creates a 2D matrix of measurements, which occupies the main portion of the front panel. The right-hand side of the window represents a single record.

Record selector

Use this to step through the records from one and the same instrument. To find the last record, right-click in the white field to open a context-sensitive menu and select “Show Last Element”.

Instrument selector

Use this to step through synchronous records from different instruments (such as created by a real-time monitoring network).

Cluster indicator

Each record is a cluster of various elements. This is an indicator, meaning that the data are not editable. The only possible edit in this window is to remove records from both ends (see below). This is by design, so as to preserve data integrity.

You don’t need to know what these values mean. They are translated to human-readable form in the Data View window. If you still want to see what each thing represents, either turn on tip strips (Ctrl-T) or help (Ctrl-H) and hover over each field.

Records

The total number of records per instrument.

Volt meter

This indicates the minimum voltage in all the records. If the voltage falls close to 3.2 V the SediMeter will turn off monitoring. If so, you may not have data from the entire deployment period.

Status

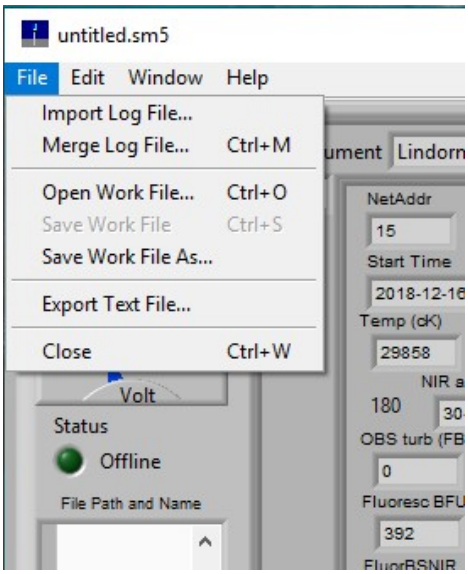
This indicator is currently not used.

File Path and Name

The full path and filename of the present data.

Menus

File menu



Open… Ctrl+O

Use this to open a previously created *.sm4 file.

Merge… Ctrl+M

Not presently supported, the purpose is to join files from different instruments recorded with the same timing settings.

Save Ctrl+S

Saves the current data to the same file as last time. Use this to save the data after deleting records since the edits are not automatically committed to file.

Save As…

Opens a browser dialog for picking a new path and file where to save the current data.

Import Memory Log File…

Use this for importing data from the SD or MMC card of a LogDator logger, or *.ld2 files saved in the Download tab of the Control window.

Export Text File…

This item is mainly provided for development and debugging purposes. A more user-friendly export method is provided in the Data View window (see above).

This method exports the SediMeter data table as a tab-delimited ASCII file (in decimal, not hexadecimal, number format). Column one is the FTU value of the straight backscatter data at levels 0 cm, 1 cm, etc. Column two is the FTU value of oblique backscatter at levels 0.5 cm, 1.5 cm, etc. Row one is OBS #1, row 36 is OBS #36, of the first measurement of the first SediMeter. If there are more than one instruments in the *.sm4 file, the first measurements of all the instruments are first output, followed by the second measurements of all the instruments.

Close Ctrl+W

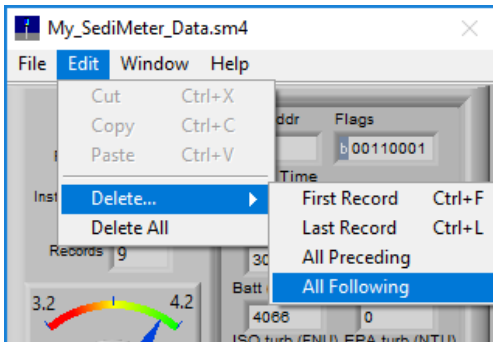
Closes the window (while keeping the data in memory).

Edit menu

Cut, Copy, and Paste function as previously described.

Delete submenu

These commands permit removing records in either end of the monitoring period. It is useful if you have data recorded before deployment or after retrieval. To commit any change to disk, you must select Save or Save As after the deletion.



First Record Ctrl+F

Deletes the first record (with index 0).

Last Record Ctrl+L

Deletes the last record (with index [Records – 1]).

All Preceding

Deletes all records before the one currently showing.

All Following

Deletes all records after the one currently showing.

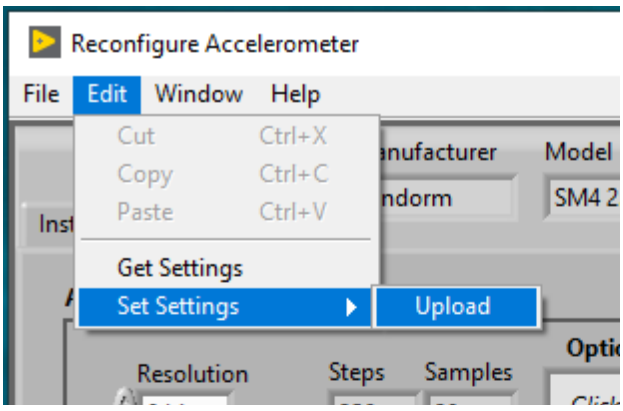
Window menu

The Window menu functions as previously described.

Help menu

The Help menu functions as previously described.

Reconfigure Accelerometer



This window allows the user to change the settings of the accelerometer in SM4 instruments. For SM4 rev. 1, we recommend you use software version 5.2 (in rev. 1 the two interrupt sources were combined as AND, but from rev. 2 they are combined as OR, and this is reflected in this window).

You access this windown from the Edit -> Advanced menu in the Control window. The window will open in the Instructions tab. Go the the Edit -> Get Settings to download the Calibration data from the connected Lindorm instrument. Regardless of which instrument you have, you can then proceed to save the calibration to file, and later recover it. However, the main purpose of the window is to set up the accelerometer for the task at hand.

To upload the settings to the instrument and reprogram the acelerometer, select Edit -> Set Settings -> Upload. In SM4 rev. 1 you also have to RESET the instrument. If you wish to restore saved data from file, you must first Get data from the instrument, then Open from file, and finally Upload to the instrument.

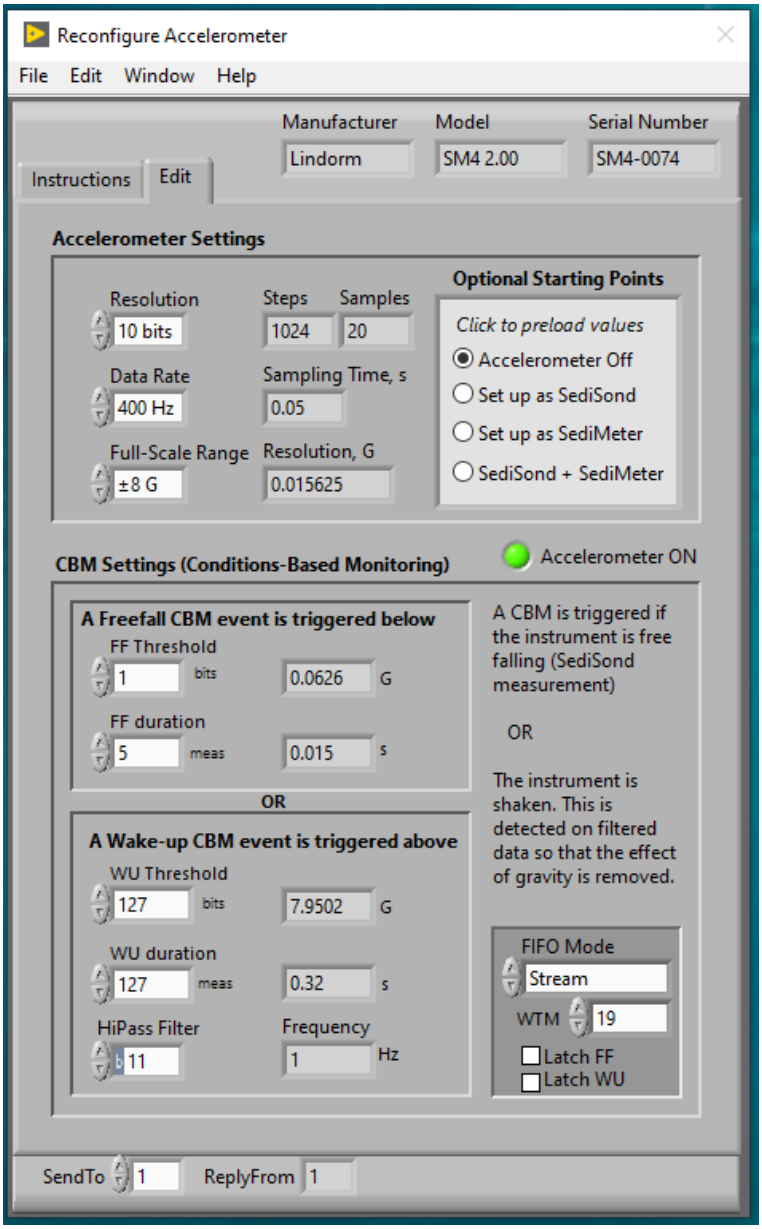
Accelerometer Settings

The Normal mode for the accelerometer is 10 bits of resolution, but for power-savings it can be set to 8 bits low power mode (LPM). The SediMeter saves 20 samples per record in Normal mode and 30 samples in LPM. These are taken from the start of a 32 sample FIFO (first in, first out) memory, so they represent a time *before* the trig event. If you want continuous data from before, during and after the trig event, use Normal mode and take at the very least 2 samples in a burst.

The data rate can be set from 1 Hz to 400 Hz. Setting it to 0 disactivates the accelerometer. The power the accelerometer uses in 1 or 10 Hz LPM is negligable, so there is no need to turn it off to save power, and the data is useful for quality control.

The full scale range options are ±2 G, ±4 G, ±8 G, and ±16 G. The vertical axis will always be subject to -1 G, so the available range in SediSond use is 1 G less than this.

Three presets are provided for convencience. After selecting a preset you can fine tune the settings as you please.



CBM Settings – Trig Conditions

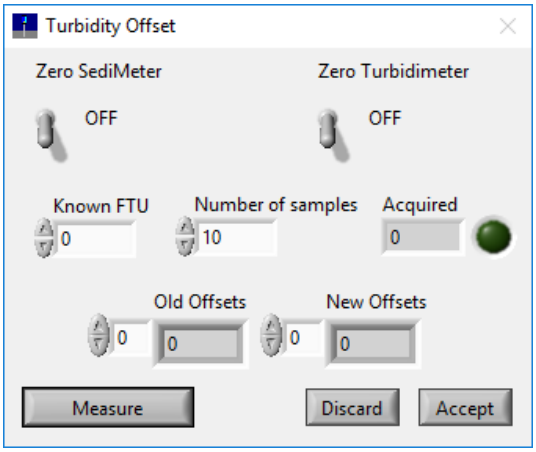
The accelerometer in SM4 rev. 2 has two interrupts that can be set up to trigger a conditions-based measurement in the SediMeter.

The freefall interrupt acts on absolute accelerometer values (Z = -1 G in rest) and is triggered when all three axes show less than **FF Threshold** during the number of measurements set in **FF duration**.

The wake-up (or shake) interrupt acts on relative (filtered) accelerometer values and is triggered when any axis shows more than WU Threshold during the number of measurements set

in **WU duration**. The high pass filter frequency can be adjusted to any of 4 settings (which depend on Data Rate).

Turbidity Offset window



NB. This is not yet fully debugged. This window allows for adjusting the offset of the turbidimeters, both in the SediMeter array, and in the #37 OBS of SM3, as well as the ISO and EPA turbidimeters of SM4.

You will need a calibration tank with a liquid of known turbidity, such as pure, filtered, and de-gassed water. The tank needs to have at least 20 cm of water in front of the backscatter detectors and ambient NIR light must be kept out. A suitably sized tank is a 50-gallon black garbage bin (round, for strength), or a bathtub lined with black garbage bags (with the instrument suspended horizontally near the surface, sensors facing down). The black color is an additional protection against reflection.

You are adviced to first save the old calibration data using the method presented in the Accelerometer window above.

Important Notice

You must close this window by clicking either Discard or Accept. If you close the window or the application by any other means, the instrument will be left uncalibrated.

Instructions

To zero the OBS array of the SediMeter sensor, as well as the ISO turbidimeter of the SM4, turn on Zero SediMeter. To zero the #37 turbidimeter of SM3, or the EPA turbidimeter of SM4, turn on Zero Turbidimeter.

Known FTU

Enter the FTU value of the liquid in the tank. It is 0 for pure water. Depending on your standard operating procedures you may want to enter a small positive value to create a deliberate bias. Let us say that there is ±2 FTU in noise. Negative values get reported as 0, which means that you cannot calculate a meaningful average when the real value is 0 since half the measurements have been truncated to 0. If you instead introduce a +3 FTU bias, so that 0 is reported as 3, and you get values from 1 to 5 with the normal noise, then you will know from the data that there was no truncating and you can calculate a true average.

Number of Measurements

Enter the number of measurements you wish to include in the average. Each measurement takes a few seconds.

Click Measure to start measuring. When the green light turns on it is ready and you can inspect the values. Notice that the offset is not in FTU units but in raw bits, which is a numerical value about 2 to 10 times larger than the FTU offset value, depending on the scaling of each sensor.

Discard or Accept

Finish by either discarding or accepting the new values. YOU MUST DO ONE OF THE TWO or the instrument will be restored to an uncalibrated situation.

SediMeter List window

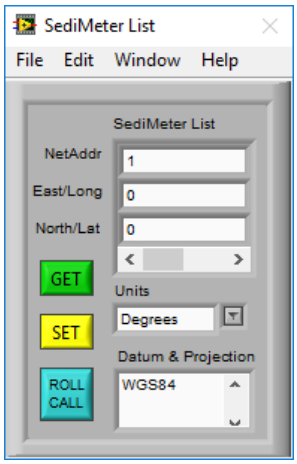
When the application is started it reads the file C:\Lindorm\SediMeter\SM_Network.smnt. The contents of that file can be inspected and edited in this window, although it is also available in the Real Time tab of the Control window.

The *.smnt file contains a definition of the SediMeter network, for the purpose of real time monitoring. **The SediMeters listed here will be polled during Master monitoring**. If one of them is not on the network, a time-out error will result. If a SediMeter on the network is not listed here, it will not get polled.

Front panel objects

SediMeter List

This is a one-dimensional table that you can navigate through using the horizontal scroll bar. In the right-most position, you see the next unused position, where you can make a new entry.



NetAddr

The NetAddr (ID) of a SediMeter, or another compatible instrument on the network.

East/Long (optional)

The easting or longitude of this instrument.

North/Lat (optional)

The northing or latitude of this instrument.

Units

The units for East/Long and North/Lat. The options are degrees and meters.

Datum & Projection

A free text description of the projection parameters associated with East/Long and North/Lat.

GET button

Reads the NetList in an attached LogDator logger and updates the SediMeter List accordingly. The coordinates are not affected. (The LogDator is a separate logger sold by Lindorm, Inc.)

SET button

Writes the NetList to an attached LogDator logger based on the NetAddr values in the SediMeter List. The coordinates are not copied.

ROLL CALL button

This button queries each of the possible 255 NetAddr values, and updates the SediMeter List. If a SediMeter in the list does not respond, it is removed; if one responds that was not in the list, it is added to it; and finally, the list is sorted in NetAddr order. Newly added NetAddr entries get coordinates (0,0).

You can use this feature to automatically edit the list, and to verify that all units communicate.

Menus

File menu

Open… Ctrl+O

Opens a *.smnt file that you choose. Use this and the Save Copy As… commands to maintain records of different networks on the same computer.

Save Ctrl+S

Saves the data to the file C:\Lindorm\SediMeter\SM_Network.smnt (provided C: is the Windows startup volume).

Save Copy As…

Saves a copy of the data to a file and path you select.

Close Ctrl+W

Closes the window (but leaves the data in memory).

Edit menu

Cut, Copy, and Paste work as previously described.

Delete All

Deletes all entries in the SediMeter List (but leaves Units and Datum intact).

Window menu

As previously described.

Help menu

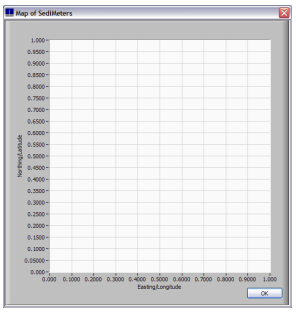
As previously described.

3D display window

This window contains an Active X control showing a 3D view of the SediMeter straight backscatter data.

Dragging with the mouse changes the point of view. Dragging with the Alt key depressed zooms in and out. Dragging with the Shift key depressed pans the image.

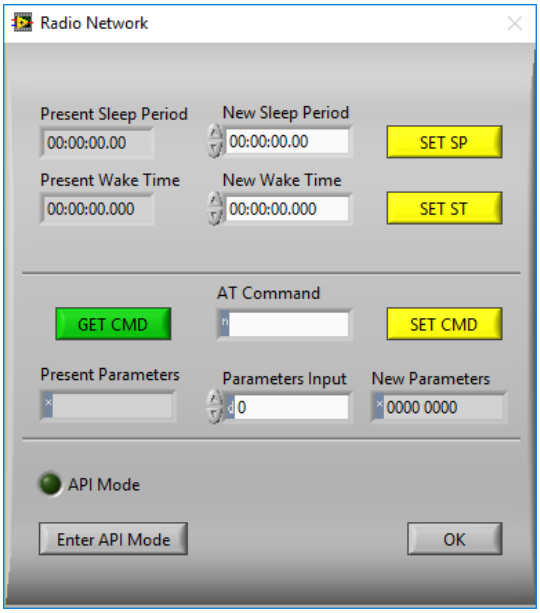
Map of SediMeters window



This window contains a single object, a map showing the relative position of the SediMeters in the network. The positions are those entered in the SediMeter List window (if no coordinates are entered, the map will be empty as in this example).

Radio Click OK to close.

Radio Network window



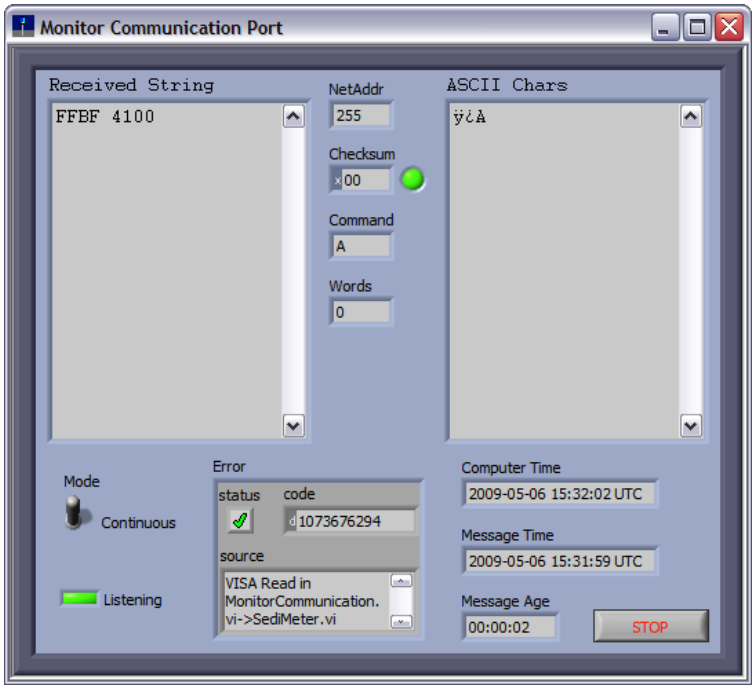
This window allows the settings in the SediLink radios to be changed from the SediMeter application. Refer to the SediLink documentation for settings.

Sleep period and wake time affects the communication and also the blinking rate of the white LEDs in the SediLink.

The bottom half of the window allows generic commands to be sent and settings to be queried.

The button Enter API Mode and the indicator above it are used to enable API communication. When done, click OK. Note that if no radio is present, an error will result.

Monitor Communication Port window



The purpose of this window is to monitor the traffic on an RS-485 network. It can be used for debugging when setting up communication between a third-party logger and the SediMeter (note that it can *not* be used to monitor the communication between the same instance of SediMeter.exe and a SediMeter instrument). The traffic is displayed in hexadecimal code to the left, and as ASCII characters to the right.

The first 4 bytes are the message header. In the center these 4 bytes are decoded, although the checksum is analyzed so a value of 00 indicates a valid checksum. The indicator turns green for valid, and red for invalid checksum.

The window can operate in two modes, continuous and one shot. In continuous mode, it replaces the content as soon as a new message is received. In one-shot mode, it displays the latest message until it is rearmed. When the rectangle is green and reads Listening it is waiting for new traffic.

When the rectangle is red and reads Rearm it is keeping the last message displayed. It is still receiving messages in the background, queuing them until the rearm button is pressed. One can thus step through the messages one by one.

Recalibrate

Since the recalibration functions are password protected in order to be accessible only by qualified and trained personnel, they are left out of this user manual on purpose.

Demo File

Calpe, Spain, 2018

The folder ../Lindorm/Measurements contains an example file recorded with an SM3.2 instrument off Spain in 2018. The screen capture below shows data from that file in version 4.2 of this software.

