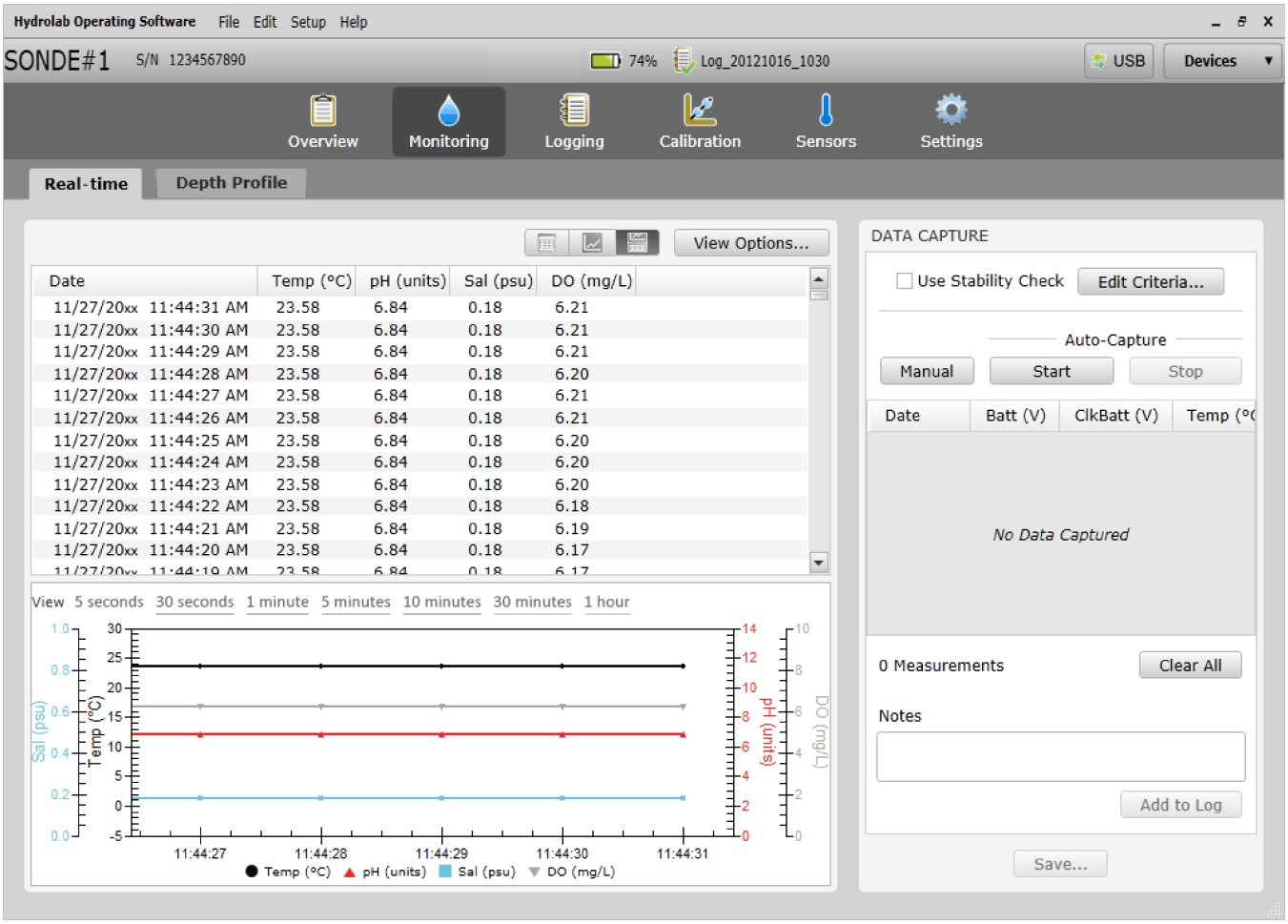
DOC026.53.80346

Hydrolab Operating Software

Software Manual

11/2013, Edition 1



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Section 1 Product overview

Hydrolab operating software is a Windows application for the capture and display of sensor measurements from supported water monitoring instruments. Hydrolab operating software also supplies system status, sensor calibration and firmware update information for supported instruments.

- System status—alerts, battery level (if applicable) and log status (active or completed)
- Sensor calibration—reminders, history, checks and step-by-step instructions
- Firmware update—available updates

Measurements are shown in real time in tabular and/or graph format. The measurement interval, parameters and measurement units shown are selected by the user. Real-time measurements can be manually captured and saved to log files on a PC.

For long-term (unattended) monitoring, measurements are saved to a log that is configured by the user. Measurements are automatically completed and recorded to the log on the supported instrument according to the selected measurement interval and date range.

Section 2 User interface and navigation

2.1 Device connection window

At startup, the device connection window shows.

On the left side of the window is a list of the log files that have been recently saved to the PC. To open a log file, click the log file and then refer to Look at a log file on page 25.

Select an instrument in the Device Connection field, then click **Connect** to connect the PC and instrument. If an instrument has an active alert, a status icon shows. Refer to Table 1.

Table 1 Status icons

Icon	Description	Status
	Warning	There is a problem that can affect instrument operation (e.g., a sensor calibration is necessary).
	Critical	There is a problem that it is necessary to correct before instrument deployment (e.g., a sensor failure has occurred).

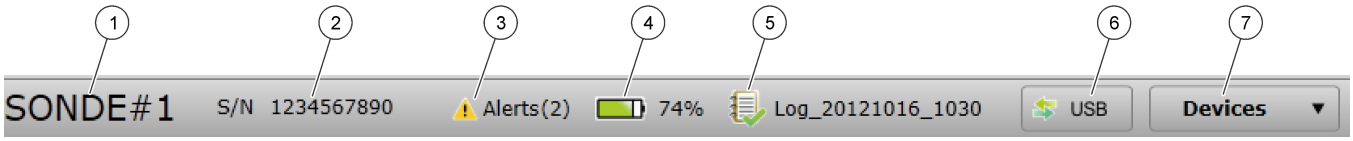
2.2 Status bar

The status bar at the top of the window shows the status of the instrument. Refer to Figure 1.

If there is a new version of the Hydrolab Operating Software available, a pop-up window will open. Click **Yes** to install the software update.

Note: *The available software and firmware updates are identified each time the PC is connected to the internet.*

Figure 1 Status bar



1 Instrument name (configurable)	**5** Log status (active or completed). Click **Logging** for details.
2 Serial number of the instrument	**6** Type of communications module used. Click to see and/or change the configuration setting for the communications module.
3 Number and type (warning or critical) of active alerts[1]	**7** Click to show the devices connected to the PC
4 Battery level[2]	

[1] Only shows when there is an active alert.
[2] Only shows when the instrument has the internal battery pack option.

2.3 Navigation bar

Click the icons on the navigation bar to go to the different windows. Refer to Figure 2 and Table 2.

Figure 2 Navigation bar

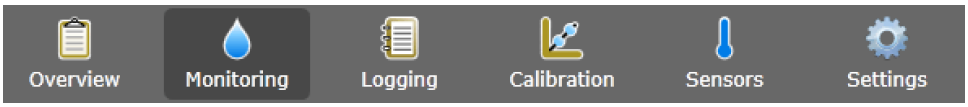


Table 2 Windows

Window	Shows
Overview	• Status of the instrument and sensors installed and any active alerts • Last calibration date of each sensor installed and time until calibration expires, if applicable. • Status of the last log made (start time, in progress or completed). Click **Logging** for details. • A list of the completed logs kept on the instrument ***Note:*** *Logs cannot be opened from this window. Refer to* Look at a log file *on page 25.*
Monitoring	Real-time measurements in tabular and/or graph format. Refer to Look at real-time measurements on page 17.
Logging	• Status of the last log made (start time, in progress or completed) • A list of the completed logs kept on the instrument ***Note:*** *Logs cannot be opened from this window. Refer to* Look at a log file *on page 25.*
Calibration	Calibration information for each sensor—date and type of the last calibration, calibration interval and the date of the next calibration, if applicable.
Sensors	• Sensor settings and sensor information • Calibration information for each sensor—date and type of the last calibration, calibration interval and the date of the next calibration, if applicable.
Settings	• Instrument information • General settings—Instrument name, sound and date and time settings • Firmware—The firmware versions installed and available firmware updates • Security—The features that are password protected. • External Dependencies—Environmental values entered to increase the accuracy of some measurements.

Section 3 Configuration

3.1 Software settings

The software settings are configured on the menu bar and are saved on the PC. The software settings are applied to all instruments connected to the PC.

3.1.1 Select the language and calibration mode

1. Select Edit>Preferences.

   Note: *The Preferences menu option cannot be selected when Calibration is selected on the Navigation bar.*

   Note: *Not all the parameters shown apply to the connected instrument.*
2. Select the Language tab. Select the language.
3. Select the Calibration Mode tab. Select an option.

Option	Description
Manual	The user manually accepts the calibration measurement at the end of each step.
Auto	The instrument automatically accepts the calibration measurement at the end of each step after the measurement is stable.

4. Click **OK** to save the changes.

   The device connection window shows.
5. Select the instrument, then click **Connect**.

3.1.2 Select the measurement units for calibration

1. Select Edit>Preferences. All the parameters that can be measured by the supported instruments are shown.

   Note: *The Preferences menu option cannot be selected when Calibration is selected on the Navigation bar.*

   Note: *Not all the parameters shown apply to the connected instrument.*
2. Select the measurement units shown during calibration and calibration checks.

   Note: *The selected measurement unit does not change what is recorded to log files. All measurement units are recorded to log files.*
3. Click **OK** to save the changes.

   The device connection window shows.
4. Select the instrument, then click **Connect**.

3.1.3 Add or remove users, locations and offices

User, location and office information can be manually added to logs and log files. User information can be manually added to calibrations and calibration check records.

- User—Name of a user
- Location—Name, description and GPS coordinates of a measurement location
- Office—Name and description of an office that collects measurements

Note: *This software does not have user accounts. Login is necessary only to change features that are password protected. Refer to* Configure the security settings *on page 9*.

1. To add, change or remove a user:
   a. Select Setup>Users. The list of users shows.
   b. To add a user, click **Add**.
   c. To edit or delete a user, select the user, then click **Edit** or **Delete**.
2. To add, change or remove a location:
   a. Select Setup>Locations. The list of locations shows.

b. To add a location, click **Add**.

Note: *To add a location with the same values as an existing location, select a location and click* ***Copy to New****.*

c. To edit or delete a location, select the location, then click **Edit** or **Delete**.

3. To add, change or remove an office:

a. Select Setup>Offices. The list of offices shows.

b. To add an office, click **Add**.

Note: *To add an office with the same values as an existing office, select an office and click* ***Copy to New****.*

c. To edit or delete an office, select the office, then click **Edit** or **Delete**.

3.1.4 Select the stability check settings

The stability check settings are used by the software to identify when measurements are stable. The stability status of measurements (stable or unstable) shows on the Monitoring window when Use Stability Check is selected.

Note: *Stability check settings are not used for calibrations.*

1. Select Setup>Stability Check.
2. Select the applicable tab (Real-time or Depth Profile).

   Note: *The parameters that are available on the connected instrument are black. The parameters that are not available on the connected instrument are blue.*
3. Select a checkbox to enable stability check for that parameter.
4. Select the stability check criteria for the parameter.

Option	Description
Maximum Delta	Select the maximum difference between the current measurement and the average measurement for a measurement to be identified as stable. For example, if the current measurement is 10 and the average measurement is 15. The current measurement is identified as stable if the maximum delta is 5 or more.
Number of Samples	Select the number of measurements that are used to calculate the average measurement used for stability checks.

5. Click **Save**.

3.1.5 Copy the software settings to another PC (optional)

Save the software settings (users, locations and offices) to a tab-separated value (.tsv) text file, and then transfer the software settings to another PC for quick configuration.

1. Select Setup>Export Settings File.
2. Enter a filename, then click **Save**.
3. Copy the file to another PC with Hydrolab Operating Software.
4. On the other PC, open the Hydrolab Operating Software.
5. Select Setup>Import Settings File to import the software settings.

3.2 Instrument settings

The instrument settings are configured on the Settings window and are saved on the instrument.

The model, serial number, firmware version, manufacture date and last service date of the instrument are shown on the Settings window.

3.2.1 Configure the date, time and sounds

The date and time are recorded in measurement records and the calibration history. The date and time are used to identify when sensor calibration or maintenance is necessary.

1. Click **Settings** in the navigation bar.
2. Optional: In the SONDE NAME field, enter a descriptive name for the instrument (default = serial number of the instrument).

   The name and serial number are used to identify the instrument in log files and show on the status bar.
3. In the SOUNDS field, enable or disable sounds from the instrument (default = enabled).

   When enabled, the instrument makes sounds when it goes into low-power (sleep) mode, when it comes on and one time every second while there is an active log.
4. In the SONDE DATE AND TIME field, set the correct date and time. Select the hour, minute or second interval to change the value.

   Note: *To enter the date and time shown on the PC, click* ***Sync with PC****.*

3.2.2 Install firmware updates

The Update Firmware button is on when firmware updates are available.

1. Click **Settings** in the navigation bar.
2. Click **Firmware**.

   The firmware versions installed for the instrument and sensors show.
3. Click **Update Firmware**.
4. Select the firmware updates to install.
5. Click **Install Selected**. The selected firmware is installed.
6. When the firmware installation is complete, click **OK**.

   Note: *To uninstall a firmware update, get the previous firmware version from technical support. Save the file to the PC, then click* ***Revert firmware****.*

3.2.3 Configure the security settings

The features shown in Table 3 can be password protected to prevent unauthorized changes. Table 3 shows the features that are password protected by default. There is one security password.

1. Click **Settings** in the navigation bar.
2. Click **Security**. The features that are currently password protected are shown.
3. Click **Edit**.
4. Enter the password.

   Note: *The security password is set the first time the security settings are changed.*
5. Select the features to be password protected.
6. Click **Save**.

Table 3 Features

Feature	Defaults	Prevents
Calibration Intervals		Changes to the sensor calibration intervals
Calibration Type		Changes to the selected calibration types
Firmware Update		Changes to the firmware
Modify Log File		• Changes to a log after it is made and before it has started • The active log from being stopped

Table 3 Features (continued)

Feature	Defaults	Prevents
Maintenance Intervals		Changes to the sensor maintenance intervals
Calibration		Calibration
Delete Log File from Sonde	X	Removal of log files from the instrument
Sensor Settings	X	Changes to the sensor settings
Stability Check		Changes to the stability check criteria or stability check setting (enabled or disabled)

3.2.4 Change the security password

1. Click **Settings** in the navigation bar.
2. Click **Security**. The features that are password protected show.
3. Click **Edit**.
4. Enter the security password.
5. Click **Change Password**.
6. Enter the new security password in each field, then cllck **OK**.
7. Click **OK** to close the window.

3.2.5 Enter the external dependencies

Enter the external dependencies (e.g., barometric pressure, altitude) of the measurement location to increase the accuracy of some measurements, if applicable.

1. Click **Settings** in the navigation bar.
2. Click **External Dependencies**.
3. Enter the external dependencies of the measurement location in the applicable fields. Enter the barometric pressure at sea level if applicable. Enter the altitude used for depth measurements if applicable.

   Note: *NaN = not a number*

3.3 Sensor settings

Configure the sensor settings before initial use and as necessary. The sensor settings are configured on the Sensors window and are saved on the instrument.

Note: *By default, login is necessary to change the sensor settings. Refer to* Configure the security settings *on page 9.*

3.3.1 Configure the sensor maintenance alerts

Enter the sensor maintenance intervals to get sensor maintenance alerts. A sensor maintenance alert stays active until the date of last service is manually changed.

1. Click **Sensors** in the navigation bar.
2. Select a sensor to configure.

   The model, serial number, firmware version and manufacture date of the sensor show. The parameters and measurement units measured by the sensor show.
3. In the Maintenance area, enter the date of the last service and a maintenance interval for the sensor.

3.3.2 Configure the sensor settings

1. Click **Sensors** in the navigation bar.
2. Select a sensor to configure.

The model, serial number, firmware version and manufacture date of the sensor show. The parameters and measurement units measured by the sensor show.

3. For the turbidity sensor, to manually start a cleaning cycle, click **Clean Now**.
4. In the Settings area, select an option. Not all of the settings that follow apply to all the sensors.

Option	Description
Revolutions per clean	Set the number of wiper revolutions per cleaning cycle. Options: 0 (disabled) to 10 (default = 1). ***Note:*** *One revolution is approximately 6 seconds. Make sure that the cleaning cycle time is not more than the sensor warm-up time for logging.*
Measurements Averaged	Select the number of measurements used to calculate the average measurement (default = 10). For example, if measurements averaged is set to 10, the value shown for measurement 10 will be the average of the current measurement plus the 9 previous measurements. Set to 1 to not do measurement averaging.
Compensation method	Select the method for conductivity temperature compensation or select None (no temperature compensation). Refer to the sections that follow. Specific conductivity = conductivity × f(T), where f(T) is a function of temperature (T) in °C. To remove any temperature compensation, select None. Specific conductivity: f(T) = 1

3.3.2.1 Hydrolab fresh

Hydrolab fresh (default) is the temperature compensation method based on the freshwater temperature compensation of the manufacturer.

$f(T) = c_1T^5 + c_2T^4 + c_3T^3 + c_4T^2 + c_5T + c_6$

Where:

$c_1 = 1.4326 \times 10^{-9}$

$c_2 = -6.0716 \times 10^{-8}$

$c_3 = -1.0665 \times 10^{-5}$

$c_4 = 1.0943 \times 10^{-3}$

$c_5 = -5.3091 \times 10^{-2}$

$c_6 = 1.8199$

3.3.2.2 Hydrolab salt

Hydrolab salt is the temperature compensation method based on the saltwater temperature compensation of the manufacturer.

$f(T) = c_1T^7 + c_2T^6 + c_3T^5 + c_4T^4 + c_5T^3 + c_6T^2 + c_7T + c_8$

Where:

$c_1 = 1.2813 \times 10^{-11}$

$c_2 = -2.2129 \times 10^{-9}$

$c_3 = 1.4771 \times 10^{-7}$

$c_4 = -4.6475 \times 10^{-6}$

$c_5 = 5.6170 \times 10^{-5}$

$c_6 = 8.7699 \times 10^{-4}$

$c_7 = -6.1736 \times 10^{-2}$

$c_8 = 1.9524$

3.3.2.3 Standard Methods 2510

Std Methods 2510 is the temperature compensation method based on compensation published in Standard Methods for the Examination of Water and Wastewater.

$f(T) = 1 \div [1 + 0.0191 (T – 25)]$

3.3.2.4 DIN EN 27888

DIN EN 27888 is the temperature compensation method based on DIN standard EN 27888.

$f(T) = [(1 – a) + a \times (\eta_{\Theta} \div \eta_{25})^{n}] \times 1.116$

$(\eta_{\Theta} \div \eta_{25}) = A + exp(B + (C \div (\Theta + D)))$

Where:

$a = 0.962144$

η = the viscosity of the solution

Θ = temperature (°C) at which the measurement was made

$n = 0.965078$

$A = –0.198058$

$B = –1.992186$

$C = 231.17628$

$D = 86.39123$

3.3.2.5 Custom

Custom is the temperature compensation method based on values that the user identifies. The user identifies the values a, b, c, d, e, f, g and h.

$f(T) = aT^7 + bT^6 + cT^5 + dT^4 + eT^3 + fT^2 + gT + h$

3.4 Communications module settings

Configure the applicable communications module before initial use. The settings are saved on the individual communications module.

Note: *The USB communications module does not have any settings to configure.*

The communications modules are optional accessories, with the exception of the USB communications module that is supplied with the instrument. Only one communications module can be connected to the instrument at one time.

The model, serial number, firmware version and manufacture date of the communications module are shown on the communications module window.

3.4.1 Configure the SDI-12 communications module

1. Connect the USB connector of the SDI-12 communications module to the PC.
2. Start the Hydrolab Operating Software. The communications module shows in the Connect to Device field.
3. Select the communications module, then click **Connect**. The configuration window for the communications module shows.
4. In the Communications area, select the:
   - Address for the instrument (0–9)
   - Delay between data transmissions (0–999 seconds)
5. In the Parameter Order area, add the parameters to transmit to the data logger (maximum of 10).
   a. To add a parameter, click **Add**.
   b. In the Parameter field, select the parameter to add.

c. In the Resolution field, set the resolution (number of significant digits) for the parameter (1–9), then click **OK**.

6. To remove a parameter, select the parameter and click **Delete**.
7. Put the parameters in the order that they will be transmitted to the data logger. The parameter at the top is transmitted first. To move a parameter up or down in the list, select the parameter and click the **UP** and **DOWN** arrows.
8. Click **Back to Sonde** to go back to the instrument window.

3.4.2 Configure the RS232 or RS485 Modbus communications module

1. Connect the USB connector of the Modbus communications module to the PC.
2. Start the Hydrolab Operating Software. The communications module shows in the Connect to Device field.
3. Select the communications module, then click **Connect**. The configuration window for the communications module shows.
4. In the Communications area, select the:
   - Address for the instrument (1–254)
   - Baud rate (1200, 2400, 4800, 9600 or 19,200)
   - Data bits (7 or 8)
   - Stop bits (1 or 2)
   - Parity (none, odd or even)
5. In the Parameter Order area, add the parameters to transmit to the data logger (maximum of 10).
   a. To add a parameter, click **Add**.
   b. In the Parameter field, select the parameter to add.
   c. In the Resolution field, set the resolution (number of significant digits) for the parameter (1–9).
6. To remove a parameter, select the parameter and click **Delete**.
7. Put the parameters in the order that they will be transmitted. The parameter at the top is transmitted first. To move a parameter up or down in the list, select the parameter and click the **UP** and **DOWN** arrows.
8. Click **Back to Sonde** to go back to the instrument window.

3.4.3 Configure the RS232 TTY communications module

1. Connect the USB connector of the RS232 TTY communications module to the PC.
2. Start the Hydrolab Operating Software. The communications module shows in the Connect to Device field.
3. Select the communications module, then click **Connect**. The configuration window for the communications module shows.
4. In the Communications area, select the:
   - Sample rate (1–3600 seconds)
   - Baud rate
   - Data bits (7 or 8)
   - Stop bits (1 or 2)
   - Parity (none, odd or even)
   - Update interval (1–3600 seconds)
   - Time Stamp format (e.g., HHMMSS or DDMMYYYYHHMMSS)

5. In the Parameter Order area, add the parameters to transmit to the data logger (maximum of 10).
   a. To add a parameter, click **Add**.
   b. In the Parameter field, select the parameter to add.
   c. In the Resolution field, set the resolution (number of significant digits) for the parameter (1–9).
   d. In the Field Width field, set the number of characters sent back for each parameter (1–9), then click **OK**.
6. To remove a parameter, select the parameter and click **Delete**.
7. Put the parameters in the order that they will be transmitted. The parameter at the top is transmitted first. To move a parameter up or down in the list, select the parameter and click the **UP** and **DOWN** arrows.
8. Click **Back to Sonde** to go back to the instrument window.

Section 4 Calibration

4.1 Calibrate the sensors

Calibrate the sensors before initial use, at regular intervals and after sensor maintenance or modifications.

1. Click **Calibration** in the navigation bar.
2. Select the sensor to calibrate.
3. When the External Dependencies field shows, make sure that the value in the field is correct for the measurement location. External dependency (e.g., barometric pressure) values are used in measurement and calibration calculations.

   Note: *NaN = not a number*
4. Select the calibration type as necessary.

   Note: *Only one type of calibration can be used at a time. The previous calibration is lost when a new calibration is done.*
5. Click **Start Calibration**.
6. Complete the instructions shown for each step, then click **Next** to go to the next step.
7. When the calibration is complete:
   a. In the Calibration Interval field, enter the time interval before the next calibration is necessary. Calibration intervals are different for different types of sensors and environmental conditions. Calibrate as necessary.
   b. Optional: In the User ID field, select the user that did the calibration.
   c. Optional: In the Log Note field, enter a note for the calibration.
8. Click **Save Calibration**.
9. If the calibration fails:
   a. Click **Cancel** to not save a record of the calibration.
   b. Click **Redo Point** to do the last measurement again.
   c. Click **Save** to record the failed calibration. Select the user that did the calibration and enter a note for the calibration (optional).

4.2 Do a sensor calibration check

A sensor calibration check is done between calibrations to identify if a sensor is still calibrated. Adjust the calibration interval setting of the sensor as necessary based on the results of the calibration check.

One calibration standard is measured during a calibration check. At the end of the check, the software shows the actual (entered) value of the calibration standard and the measured value of the calibration standard. Calculate the difference between the values to identify if the sensor is still calibrated.

1. Click **Calibration** in the navigation bar.
2. Select the sensor.
3. When the External Dependencies field shows, make sure that the value in the field is correct for the measurement location. External dependency (e.g., barometric pressure) values are used in measurement and calibration calculations.
4. Click **Check Calibration**.
5. Complete the instructions shown for each step, then click **Next** to go to the next step.
6. When the difference between the values shown identifies that the sensor is not calibrated, click **Save and Recalibrate** to record the calibration check.

   Note: *To not record the calibration check, click* ***Cancel****.*

7. When the difference between the values shown identifies that the sensor is still calibrated:
   a. In the Calibration Interval field, enter the time interval before the next calibration is necessary. Calibration intervals are different for different types of sensors and environmental conditions. Calibrate as necessary.
   b. In the User ID field, select the user that did the calibration check.
   c. Optional: In the Log Note field, enter a note for the calibration check.
8. Click **Save**.

4.3 Look at the calibration history

The calibration history shows the sensor serial number and the date, time, calibration type (if applicable), standard(s), slope, offset, user information and calibration notes for each calibration done (completed or failed) and calibration check done.

1. Click **Calibration** in the navigation bar.
2. Select the sensor.
3. Click **Calibration History**. The calibration history for the selected sensor shows.
4. To show the calibrations for all the sensors, click **All Sensors**.
5. To save the current view of the calibration history to the PC as a comma-separated value (.csv) text file, click **Export**.

Section 5 Operation

5.1 Monitoring

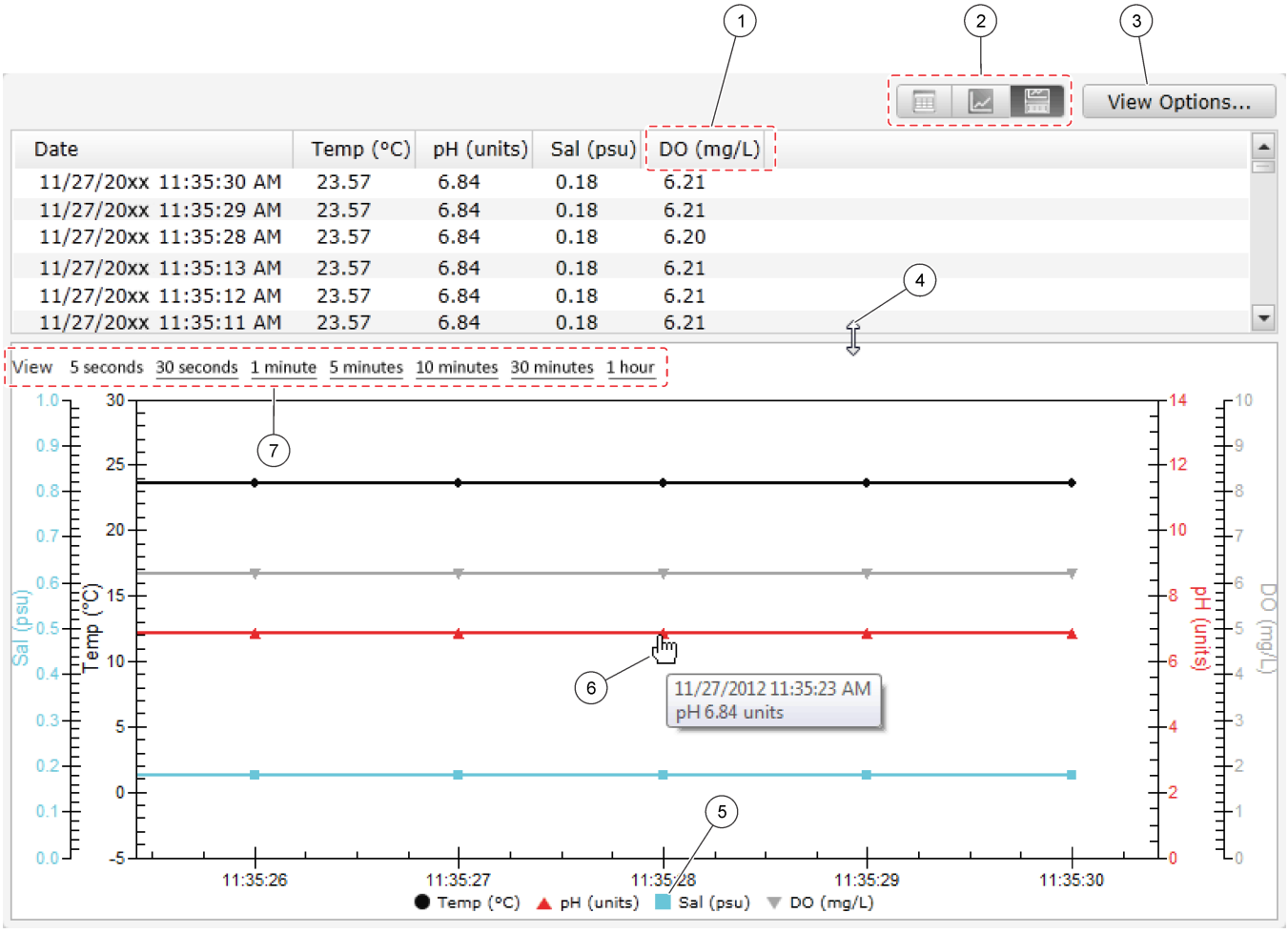
Monitoring is used for spot measuring with a deployment cable and a PC. All measurements are done at the same time and are shown in real time. Real-time measurements can be manually captured and saved to log files on a PC.

5.1.1 Real-time monitoring

5.1.1.1 Look at real-time measurements

Click **Monitoring** in the navigation bar. Real-time measurements show in tabular and/or graph format. Refer to Figure 3. The parameters, measurement units and measurement time interval shown are configurable.

Figure 3 Real-time window



Item	Description
1	Click and pull a table column heading to change the column order.
2	Click the view icons to change the view. Options: Table only, graph only, table and graph

Item	Description
3	Click **View Options** to change the: • Measurement interval (1 second minimum) • Parameters shown in the table and/or graph[1] • Graph line color and/or Y-axis scale for a parameter • Thickness (weight) of the lines in the graph Click **View Options** to add or remove symbols (data points) or a grid from the graph. ***Note:*** *The view options settings do not change what is recorded to log files. All measurements are recorded to log files.*
4	Click and pull the split pane divider to change the height of the table and graph.
5	Click to change the color for the parameter.
6	Put the cursor on a data point in the graph to see the time, date and measured value.
7	Click an option to change the time interval shown on the graph.

[1] The NTU units shown are based on FNU measurement.

5.1.1.2 Capture and save real-time measurements

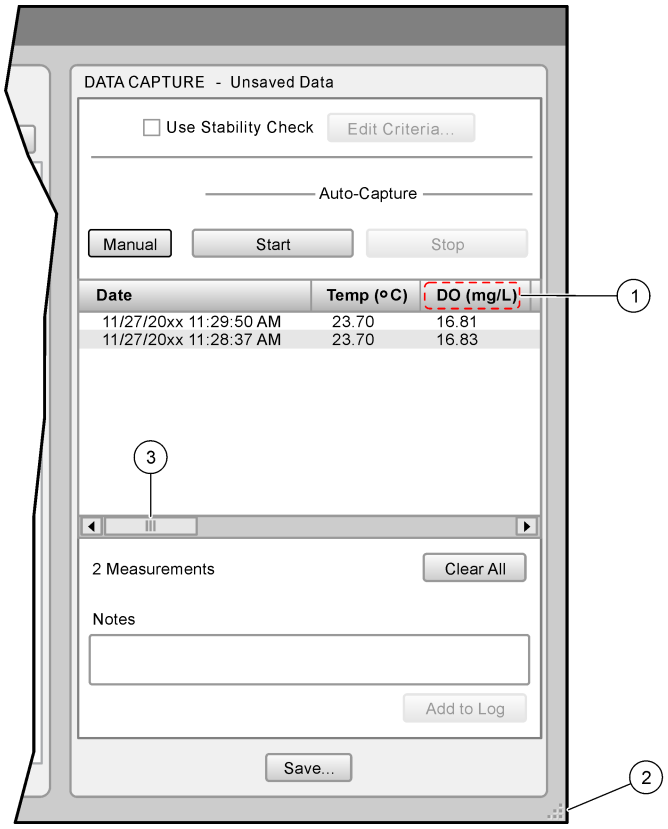
Capture real-time measurements individually or for a time interval, then save them to a log file(s) on the PC. Optional: Record notes and user, location and office information in the log files.

Note: *The view options settings do not change what is recorded to log files. All measurements are recorded to log files.*

1. Click **Monitoring** in the navigation bar.
2. To show the stability status of real-time measurements (stable or unstable), select Use Stability Check. A stability status icon shows. Measurements that are not stable are highlighted in the table and are identified in log files.
   Note: *A measurement is identified as stable when it is within the selected stability criteria for the parameter. To look at the stability check criteria, click* ***Edit Criteria****. Refer to* Select the stability check settings *on page 8.*
3. To capture the next measurement, click **Manual**. The next measurement is shown in the right pane. Refer to Figure 4.
4. To capture measurements for a time interval, click **Start** and then **Stop** after the necessary time interval. The captured measurements are shown in the right pane as they occur. Refer to Figure 4.
5. To add a note(s) to the captured measurements, enter a note in the Notes field, then click **Add to Log**. The note is shown in the right pane, above the last captured measurement.
6. To save the captured measurements and notes (if added) shown in the right pane:
   a. Click **Save**.
   b. Select a folder on the PC, then enter a filename for the log file in the File Name field.
   c. Optional: In the User field, select a user.
      Note: *To add a new user, select New User in the User field.*
   d. Optional: In the Office field, select an office.
      Note: *To add a new office, select New Office in the Office field.*
   e. Optional: In the Location field, select a location.
      Note: *To add a new location, select New Location in the Location field.*
   f. Click **Save**.

After the captured measurements are saved to a log file, the log file can be looked at until **Clear All** is clicked. Click **View Log File**. Refer to Look at a log file on page 25.

Figure 4 Real-time window – right pane



Item	Description
1	Click and pull a table column heading to change the column order.
2	Click and pull to resize the window.
3	Click and pull to see all the parameter measurements captured.

5.1.2 Depth profile monitoring

Use depth profile monitoring to capture and save measurements at selected depths.

Note: *An instrument with the optional depth sensor is necessary to do depth profile monitoring.*

5.1.2.1 Make a new depth profile

Select the settings for the depth profile.

1. Click **Monitoring** in the navigation bar.
2. Select the Depth Profile tab.
3. Select the depth profile settings.

   Optional: In the Template field, select a saved depth profile template to use the template settings.

Option	Description
Surface Measurement	Set the minimum measurement depth.
Depth Increment	Set the depth increment between measurements. For example, the depth increment is 10 m and the direction is top to bottom, the first measurement is at the surface measurement depth, the second measurement is at 10 m.

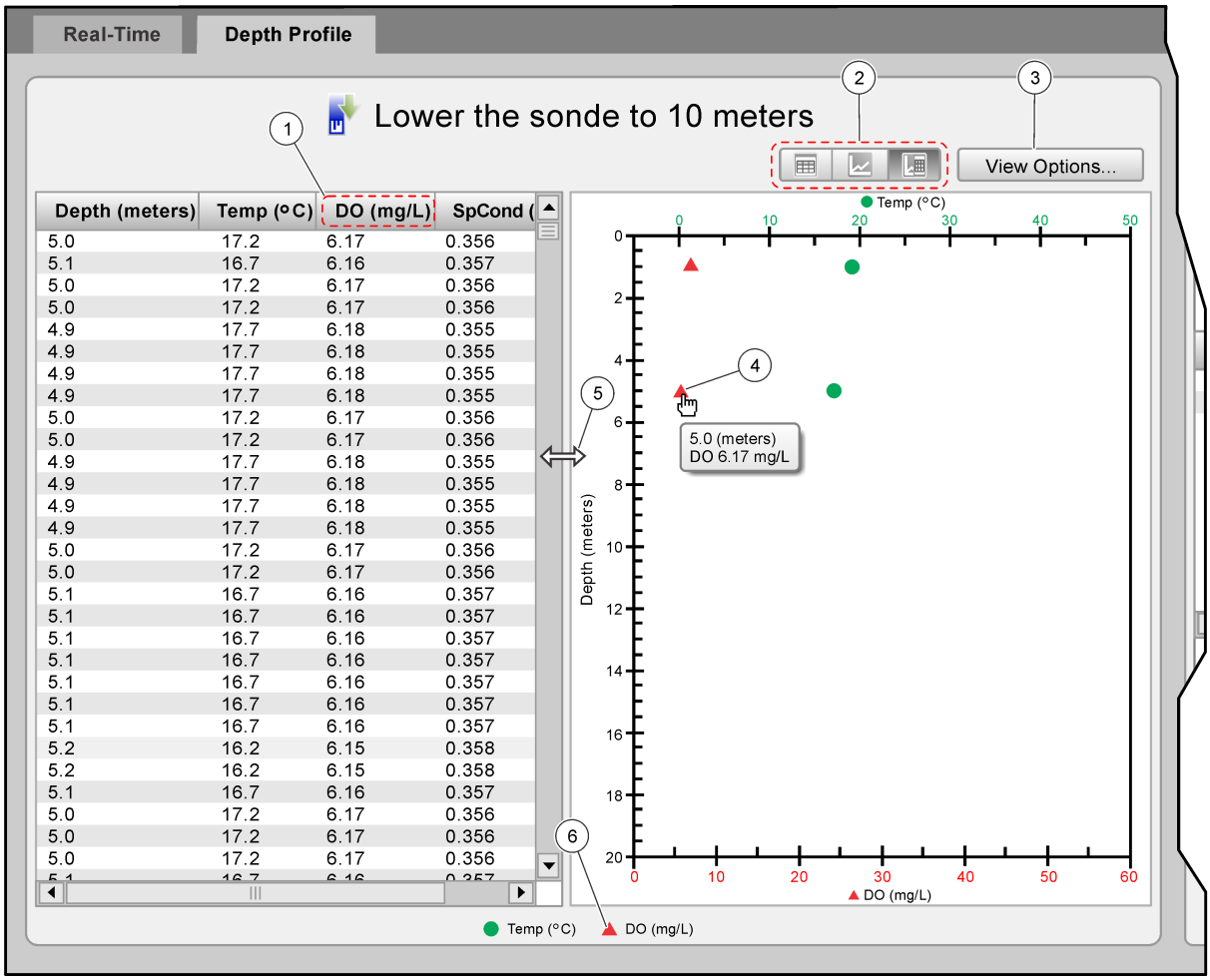
Option	Description
Bottom Measurement	Set the maximum measurement depth.
Direction	**Top to Bottom**—Measurements are done from the surface measurement depth to the bottom measurement depth. **Bottom to Top**—Measurements are done from the bottom measurement depth to the surface measurement depth.
Use Stability Check	When selected, a measurement is accepted after the measurement is stable. ***Note:*** *A measurement is identified as stable when it is within the selected stability criteria for the parameter. To look at the stability check criteria, click* ***Edit Criteria****. Refer to* Select the stability check settings on page 8.
Capture Mode	**Auto**—The instrument automatically accepts a measurement after the measurement is stable. **Manual**—The user manually accepts a measurement after the measurement is stable. ***Note:*** *This option is only available when Use Stability Check is selected.*

4. To save the selected settings to a template for use in the future, click **Save as New**.
   Note: *To delete a template, select Setup>Delete Templates.*
5. Click **Start Monitoring**.

5.1.2.2 Look at depth profile measurements

Real-time measurements show in tabular format. Captured measurements show in graph format and in the right pane. Refer to Figure 5. The parameters, measurement units and measurement time interval shown are configurable.

Figure 5 Depth profile window



Item	Description
1	Click and pull a table column heading to change the column order.
2	Click the view icons to change the view. Options: Table only, graph only, table and graph
3	Click **View Options** to change the: • Measurement interval (1 second minimum) • Parameters shown in the table and/or graph • Graph line color and/or Y-axis scale for a parameter • Thickness (weight) of the lines in the graph Click **View Options** to add or remove symbols (data points) or a grid from the graph. ***Note:*** *The view options settings do not change what is recorded to log files. All measurements are recorded to log files.*
4	Put the cursor on a data point in the graph to see the time, date and measured value.
5	Click and pull the split pane divider to change the width of the table and graph.
6	Click to change the color for the parameter.

5.1.2.3 Capture and save depth profile measurements

Measurements occur when the instrument is at the depths selected in the depth profile settings. When a measurement is completed, it is captured manually or automatically based on the depth profile settings. In addition, real-time measurements can be manually captured as necessary.

Save the captured measurements to a log file(s) on the PC. Optional: Record notes and user, location and office information in the log files.

Note: *The view options settings do not change what is recorded to log files. All measurements are recorded to log files.*

1. Move the instrument to the depth shown on the screen.

   When the instrument is at the specified depth, a measurement is done.
2. When the measurement is stable, the measurement is captured. Click **Capture Reading** if Manual is selected in the depth profile.

   The captured measurement shows on the graph and in the right pane. Refer to Figure 6.
3. Do steps 1–2 again until all the measurements in the depth profile are completed.
4. To manually capture a real-time measurement, click **Manual Capture**. The next measurement is shown in the right pane and the graph.
5. To add a note(s) to the captured measurements, enter a note in the Notes field, then click **Add to Log**. The note is shown in the right pane, above the last captured measurement.
6. To show the stability status of the real-time measurements (stable or unstable), select Use Stability Check. A stability status icon shows. Measurements that are not stable are highlighted in the table and are identified in log files.
   Note: *A measurement is identified as stable when it is within the selected stability criteria for the parameter. To look at the stability check criteria, click* ***Edit Criteria****. Refer to* Select the stability check settings *on page 8.*
7. To save the captured measurements and notes (if added) shown in the right pane:
   a. Click **Save**.
   b. Select a folder on the PC, then enter a filename for the log file in the File Name field.
   c. Optional: In the User field, select a user.

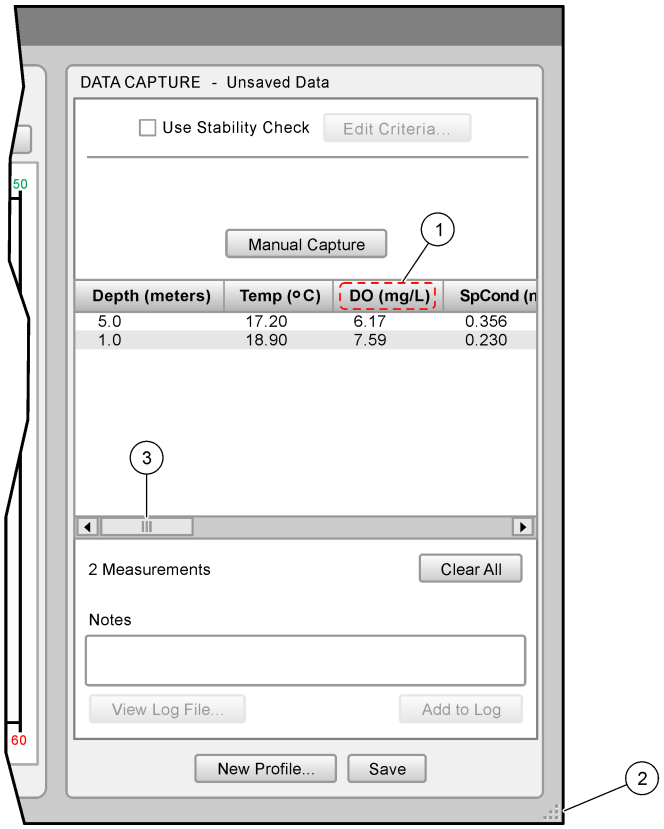
      Note: *To add a new user, select New User in the User field.*
   d. Optional: In the Office field, select an office.

      Note: *To add a new office, select New Office in the Office field.*
   e. Optional: In the Location field, select a location.

      Note: *To add a new location, select New Location in the Location field.*
   f. Click **Save**.
8. To do another depth profile, click **New Profile**.

After the captured measurements are saved to a log file, the log file can be looked at until **Clear All** or **New Profile** is clicked. Click **View Log File**. Refer to Look at a log file on page 25.

Figure 6 Depth Profile window – right pane



Item	Description
1	Click and pull a table column heading to change the column order.
2	Click and pull to resize the window.
3	Click and pull to see all the parameter measurements captured.

5.2 Logging

Logging is used for long-term (unattended) monitoring. Measurements are recorded to a log that is configured by the user. Measurements are automatically completed and recorded to the log on the instrument according to the selected measurement interval and date range. All measurements are done at the same time.

The status of the last log made is shown on the Logging window and in the status bar.

Notes:

- The settings of a log can be changed until the first measurement is done.
- A log can be stopped before it is completed. The recorded log measurements are saved.
- The contents of a log can be transferred to a PC at any time before the log is completed without stopping the log.

5.2.1 Make a new log

Note: *Only one log file can be made (active) at a time. After the log is completed or stopped, another log can be made.*

1. Click **Logging** in the navigation bar.
2. Click **Create New Log**. The last log made must be completed or stopped to make a new log.

   Note: *To reuse the log values of a completed log, select the log in the right pane, then click* ***Copy to New*** *before Create New Log is clicked.*
3. Optional: In the Template field, select a log template to add frequently used log settings and information to the new log.
4. Enter the log settings.

Option	Description
Start Date	Sets the date and time for the measurements to start.
End Date	Sets the date and time for the measurements to stop.
Sensor Warm-Up Time	Sets the time interval before measurements are done after the instrument switches on. The instrument switches off or goes into low-power (sleep) mode between measurements.
Primary Interval	Sets the time interval between measurements (1 second minimum). Make sure that the primary interval is longer than the sensor warm-up time. ***Note:*** *For deployment with the mooring cap, the time interval affects the battery life. The longer the time interval the longer the battery life. The life of a new battery is approximately 75 days of use with a 15-minute logging interval and a 30-second warm-up time with temperature, conductivity, pH and LDO sensors installed.*
Secondary Interval	Enables a second time interval between measurements to become active when the selected parameter(s) (e.g., temperature) is within the selected range. A maximum of 4 triggers can be selected at one time. The primary interval becomes inactive when the secondary interval is active. The secondary interval is typically shorter than the primary interval. Make sure that the secondary interval is longer than the sensor warm-up time.

5. Optional: Change the default filename for the log in the File Name field.
6. Optional: In the User field, select a user.

   Note: *To add a new user, select New User in the User field.*
7. Optional: In the Office field, select an office.

   Note: *To add a new office, select New Office in the Office field.*
8. Optional: In the Location field, select a location.

   Note: *To add a new location, select New Location in the Location field.*
9. To start the log, click **Save Log**. The log becomes active. The time remaining before the first measurement is done shows.

5.2.2 Make a log template (optional)

Make a log template(s) to add frequently used log settings and information to new logs. A log template can include:

- Sensor warm-up time
- Primary interval
- Secondary interval
- User
- Office

- Location

1. Click **Logging** in the navigation bar.
2. Click **Create New Log**. The last log made must be completed or stopped to make a new log.
3. With the Template field blank, enter the log settings to be included in the template.
4. Click **Save as New** and enter a name for the template.
5. To delete a template, select it in the Template field, then click **Delete**. As an alternative, select Setup>Delete Templates.

5.2.3 Transfer logs to a PC

Logs must be saved to a PC before they can be viewed, sent to a printer or saved as a comma-separated value (.csv) text file.

1. Click **Logging** in the navigation bar. The completed logs are shown in the right pane.
   Note: *As an alternative, click* ***Overview****.*
2. Select a log, then click **Transfer**.
   Note: *To select more than one log, use the* ***Ctrl*** *or* ***Shift*** *key.*
3. Select a folder on the PC, then click **Save**.

5.3 Look at a log file

Log files are shown in the same tabular and/or graph format as real-time measurements and depth profile measurements. All the view options that are available in the Monitoring window are available to change the view of the log file. Refer to Look at real-time measurements on page 17.

Log files can be sent to a printer or saved as comma-separated (.csv) text files.

Note: *Logs must be saved to the PC before they can be opened, sent to a printer or saved as a comma-separated (.csv) text file. Refer to* Transfer logs to a PC *on page 25.*

1. Select File>Open Log File.
   Note: *Log files can also be opened from the Device connection window. Refer to* Device connection window *on page 5.*
2. Select the log file, then click **Open**.
3. To show an enlargement of a specific area of the graph, click and drag the cursor to select the area.
4. To print the current view of the log file, click **Print Page**.
5. To save the log file as a comma-separated (.csv) text file, click **Export**. Select the parameters to export and the parameter order.
6. To close the log file, click **Close**.
   Note: *As an alternative, select File>Close Log File.*

Section 6 SDI-12 commands

Connect the instrument to the optional SDI-12 communications module for SDI-12 communications as applicable. Table 4 is a summary of the SDI-12 user commands supported by the instrument. For more details on use, refer to the SDI-12 V1.3 specification.

The 'a' used in the SDI-12 commands is the SDI-12 address. The factory default SDI-12 address of the transmitter is 0.

Table 4 SDI-12 commands

Command	Response	Description
?!	*a*<crlf>	Address query
a!	*a*<crlf>	Address acknowledge
aI!	*aXX*Hydrolab*YYYYYYZZZZserialnumber* <crlf>	Identify XX—SDI–12 support version YYYYYY—Instrument ID ZZZZ—Software version
aAb!	*b*<crlf>	Change the SDI-12 address (0–9)
aM!	*adddn*<crlf>	Measure n values in ddd seconds
aDx!	*a*SvalueSvalue...<crlf>	Report data
aRx!	*a*SvalueSvalue...<crlf>	Report continuous data
aC!	*adddnn*<crlf>	Concurrent measure, nn values in ddd seconds
aX1!	*a*X1<crlf>	Enable continuous mode
aX0!	*a*X0<crlf>	Disable continuous mode

Section 7 TTY commands

Connect the instrument to the optional RS232 TTY communications module for TTY communications as applicable. Table 5 is a summary of the TTY user commands supported by the instrument.

To send a TTY command to the instrument, push the spacebar (or sending an ASCII space character). The instrument will complete the last line, then send "<cr><lf>" and the command menu (H, M, ?).

<cr><lf>HM?:<sp>

Enter one of the commands in Table 5 (e.g., <sp>H<cr><lf>). The instrument will send the same command back if the command is accepted.

Note: *If a command is not accepted, an ASCII BEL character is sent back. An ASCII escape character will abort the menu after a cancel message is shown.*

If the TTY menu is not used, a line of data is periodically shown on the next available line. If the screen is full, the lines are scrolled. All data lines stop with <cr><lf> and have the same formatting as the (M)easure command.

Table 5 TTY command menu

Command	Description	Reply	Notes
H	Show the instrument ID, then a header that identifies the data fields with the names and units	<cr><lf>Instrument Id<cr><lf> <cr><lf><sp><sp>Time<sp><sp><sp>Temp<sp><sp>Ibatt<cr><lf> HHMMSS<sp><sp><sp><sp><sp>°C<sp><sp>Volts<cr><lf> **First line**—Free-field text (maximum of 20 characters in length) **Second line**—Skipped and the data names given. **Last line**—Corresponding units for the data fields	Data names and units are right-justified and 5 to 8 characters wide (6 typical). Any name can show in any field when configured in ANSI mode.
M	Force the instrument to send one line of data before the next data display interval.[1]	231302<sp><sp>24.59<sp><sp><sp>12.0<cr><lf>	Data values can be followed by a special character (*, ~, @, #, or ?). Data values with an appended character may not have a space separator. Data values are right-justified and 5 to 8 characters. Data values are adjusted as necessary to fit in the width field (##.##). The sign and decimal point are kept.
?	Show the detailed command menu	<cr><lf>Main Menu<cr><lf> (H)eader<cr><lf> (M)easure<cr><lf> (Q)uit TTY Mode<cr><lf> Please enter your choice:<sp>	
Q or q	Quit TTY mode and set the instrument to full terminal mode		Enter Q before the instrument is connected to the Hydrolab Operating Software.

[1] Use this command to synchronize the data acquisition software with the instrument data output.

Section 8 Troubleshooting

Contact technical support if the troubleshooting steps that follow do not correct the problem.

Problem	Possible cause	Solution
Not able to connect to the instrument	The software driver for the communications module has not been installed on the USB port. ***Note:*** *If a different USB port is used on a PC, the software driver for the communications module must be installed again.*	Do the initial installation steps in *Connect to a PC* of the sonde user manual.
	A cable is faulty.	Replace the cables one at a time to identify the faulty cable. Replace the faulty cable.
	No power is supplied to the instrument.	Make sure that sufficient power is supplied to the communications module. Refer to *Specifications* in the sonde user manual for power requirements. If the instrument has the internal battery pack option, replace the battery. Refer to *Replace the battery* in the sonde user manual.
Instrument disconnects from software	The battery level is low.	Replace the battery. Refer to *Replace the battery* in the sonde user manual.
	The AC power adapter is not connected to power and/or the communications module.	Connect the AC power adapter to a power source and the communications module.
Slow stabilization time or inaccurate readings	The sensor is contaminated or damaged.	Do sensor maintenance. Refer to the sensor user manual.
	The measurement value is outside the range of the sensor.	Make sure that the water is within the range of the sensor.
	The reference sensor is not operating correctly.[1]	Do sensor maintenance. Refer to the sensor user manual.
Calibration failed	Refer to the instructions shown in the Calibration window.	

[1] Not all instruments include a reference sensor.

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