LoggerDataManager

User manual

Van Essen Instruments
Delftechpark 20
PO Box 553
NL-2600 AN Delft
The Netherlands
Phone: +31 (0)15 – 275 5000
Fax: +31 (0)15 – 275 5055
vanessen@slb.com
www.vanessen.com
www.water.slb.com

A Schlumberger Company

HL344v7, August 2005

Table of contents

1 Introduction 1

2 Installing LoggerDataManager 3

3 Introduction to LoggerDataManager 4

3.1 LoggerDataManager and EnviroMon 4
3.2 The program window 4
3.3 Requesting help 8

4 Customizing LoggerDataManager 9

4.1 About customizing LoggerDataManager 9
4.2 Define measuring locations 9
4.3 Adjust program settings 12

5 Taking measurements with a Diver 16

5.1 About taking measurements with a Diver 16
5.2 Connect a Diver to your computer 16
5.3 Read out measurement settings 18
5.4 Adjust measurement settings 19
5.5 Program measurement settings to a Diver 26
5.6 Use measurement settings as defaults 26
5.7 Start measurements 27

6 Reading out a Diver 30

6.1 About reading out a Diver 30
6.2 Stop measurements 30
6.3 Read out a Diver 31
6.4 Import measurement files 33

7 Working with measurements 35

7.1 About working with measurements 35
7.2 View measurements 35
7.3 View measurements in a table 37
7.4 View measurements in a graph 38
7.5 Print the measurements 43
7.6 Export measurements 44
7.7 Delete measurements 47

7.8 Merge measurement series 49

8 Compensation of Diver level measurements 51

8.1 About the compensation of level measurements 51
8.2 Compensating measurements 53

9 Calibrating a Diver 62

9.1 About calibrating a Diver 62
9.2 Calibrate a CTD-Diver 62
9.3 Calibration History 66

10 Solving problems 67

10.1 Communication interrupted 67
10.2 Incidental communication error 67
10.3 Corrupt database 68

Appendix – System requirements

1 Introduction

LoggerDataManager is a computer program used with Van Essen Instruments' Diver to program and calibrate (if applicable) the meters as well as download, view and process collected data. In combination with one or more Divers, LoggerDataManager constitutes a complete and flexible measurement system.

Once programmed these meters operate independently.

Basic and Advanced version

The Basic is the field version while the Advanced functions are used for more complex adjustments and are notated with the following stamp.

Advanced

Available documentation

The available documentation for LoggerDataManager consists of:

- Quick Reference Card
- Online Help file
- Manual

The Quick Reference Card is made for field use. This card describes how to start LoggerDataManager on your laptop/PC and how to read out the measurements from a Diver.

The online help file can be accessed through the **Help** menu of LoggerDataManager or by pressing F1. The content of this file is similar to this printed manual.

This manual will be of assistance in working with LoggerDataManager; it contains step-by-step explanations of the procedures used with LoggerDataManager. It is assumed that the reader is familiar with the construction and operation of Divers as described in the Divers' product manuals.

1 Introduction

This manual explains how to…

- install LoggerDataManager;
- adjust LoggerDataManager to your situation;
- program and start Divers;
- read out Divers;
- view, print and export measurements;
- compensate level measurements made by Divers for variations in barometric pressure;
- calibrate CTD- Divers.

2 Installing LoggerDataManager

You install LoggerDataManager as follows:

1. Open Windows Explorer.
2. Browse to the CD-ROM or the folder containing the installation files.
3. Double click the *Setup.exe* file. The InstallShield Wizard is started.
4. Follow the directions given in the InstallShield Wizard.

You will find more information about the installation of LoggerDataManager in the Readme.txt on the CD-ROM.

Installing a new version

Two shortcuts (**LDM** and **LDMrepair**) will be created in the **Programs** folder of the Windows **Start** menu.

When you install the program for the first time, it will automatically create a **DB** folder. The data files accompanying the program will be stored in this DB folder.

When you install a new version of LoggerDataManager, your DB folder will not be replaced; however, it is recommended to create a back-up copy of these files before installation.

In the event that the new version requires structural changes to the data files, existing files would be migrated to the new DB files

3 Introduction to LoggerDataManager

3.1 LoggerDataManager

LoggerDataManager enables you to:

- program settings to Divers,
- read out measurements from Divers,
- view measurements in either table or graph form.

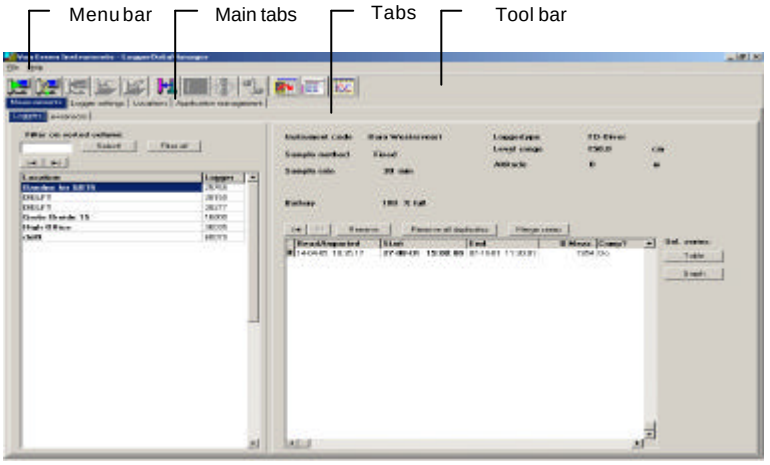
When you read out the measurements from a Diver, the data series is automatically stored in a DB under a unique combination of location code, logger serial number, date and time of reading. This precludes the accidental overwriting of old measurements with new measurements.

LoggerDataManager allows the user to save the default settings, not solely the measurement settings, but also the location settings, such as the altitude above sea level.

The elements contained in LoggerDataManager's program window are reviewed in the following section.

3.2 The program window

Here you find a summary of the various components of the program window, followed by a brief explanation of each component. The various components will be discussed in more detail in the procedures.



Menu bar

The menu bar provides access to some tasks that cannot be accessed via buttons on the toolbar.

Tool bar

The buttons on the tool bar access other tasks that can be performed with LoggerDataManager (or use the hotkeys):


Read settings from connected logger (Alt+S);


Read settings and measurements from connected logger (Alt+M);


Program settings to connected logger (Alt+P);


Save logger settings as defaults;


Retrieve (default) logger settings;


Access Barometer wizard (Alt+B);


View Data as Table (Alt+T)


View Data as Graph (Alt+G)

Advanced

The following tasks are only available in the Advanced version:


CTD Calibration wizard (Alt+C);


Export Data (Alt+E);

Occasionally, some buttons are displayed in grey. This means that these functions are not available. The availability depends on the selected type of Diver, the status of the connected logger and the selected tab.

Formatted: English (U.S.)

Formatted: English (U.S.)

Main tabs

The tabs in the main form structure the functionality of LoggerDataManager. There are four main tabs: **Measurements**, **Logger settings**, **Location** and **Application management**.

The main tab **Measurements** is used to select which measurements and format to view. See section 7, Working with measurements for more information.

The tabs on the main tab **Logger settings** are used to view and adjust the logger settings. See section 5, Taking measurements with a Diver for more information.

The tab **Locations, visible in the Advanced mode only,** is used to enter the data specific to each measuring location. When programming Divers the location may be selected from this location list or if a new location is entered it is automatically added to this list, with default location properties.

The bottom of this tab contains a panel for **Location defaults**. It is used to enter defaults to be assigned to new locations, such as the altitude of the measuring locations above sea level.

The tab **Application management** provides access to the tabs used to adjust LoggerDataManager to your situation. See section 4, Customizing LoggerDataManager for more information.

Browse bar

Some of the tabs contain a browse bar:

 Go to first record in list;

 Go to previous record in list;

 Go to next record in list;

 Go to last record in list

 Add one record to list;

 Delete selected record from list;

 Cancel new record; changes since the last save will not be saved to the database.

Tabs under Measurements

The left-hand side of the tab displays a list of the logger-location combinations for which a measurement series has been read out at least once. The right-hand side lists each data set for selected logger. Above these the Diver information is displayed.

To view a data set, highlight desired logger, select data set then click on the **Table** or **Graph** button or use shortcuts Alt+T, Ctrl+T, Alt+G or Ctrl+G.

Table displays measurements in a tabular form and allows user to print all or selected time defined readings

Graph displays the selected measurement series as a graph which the user is then able to customize as desired.

Tabs under Logger settings

The tab **Logger list,** visible in the Advanced mode only, displays all Divers in database. A Diver can be selected from this list for the display of the measurement settings on the tab **Read/program logger**.

Baro's only button allows you to display BaroDivers only

Read/program logger can also be used to adjust the settings and to write them to the logger– provided that the logger is connected to the PC.

The tab **Read/program logger** contains two subtabs: **Live update** and **Default settings**. Once the logger is connected to the PC, the logger's measurements can be displayed in real-time on the tab **Live update**. The defaults for use in programming a logger can be entered on the tab **Default settings**. These defaults simplify the programming of more than one Diver using the same settings.

Tab Application management

This tab contains a variety of program settings, such as the communications port used to connect the Diver.

The tab can also be used to specify:

- the user type: Basic or Advanced; the basic version only contains functionality you need in the field;
- the language for the user interface and help files (English, French, Dutch, German or Spanish);

- the title for the reports you want to print;
- user name you wish to insert into printed reports and export files.

Advanced Advanced specification is possible for:

- data and backup directory;
- maximum storage space;
- the backup warning when closing LoggerDataManager;
- logger units:

	Unit
temperature	Celsius, Fahrenheit, Kelvin
level	mm, cm, inch, ft, m, bar and mbar

Note! It is not possible to select the unit 'mm' once at least one Diver is entered in the database of LoggerDataManager with a measuring range of more than 30 m.

3.3 Requesting help

You can request help at any time LoggerDataManager is in use. Press F1, or in the **Help** menu select the **Help** option to request help. The information in the online help is largely identical to the contents of this Manual.

The table of contents of the help function can be used to browse to the required subject. Its index and search function can be used for a rapid search for a specific subject.

4 Customizing LoggerDataManager

4.1 About customizing LoggerDataManager

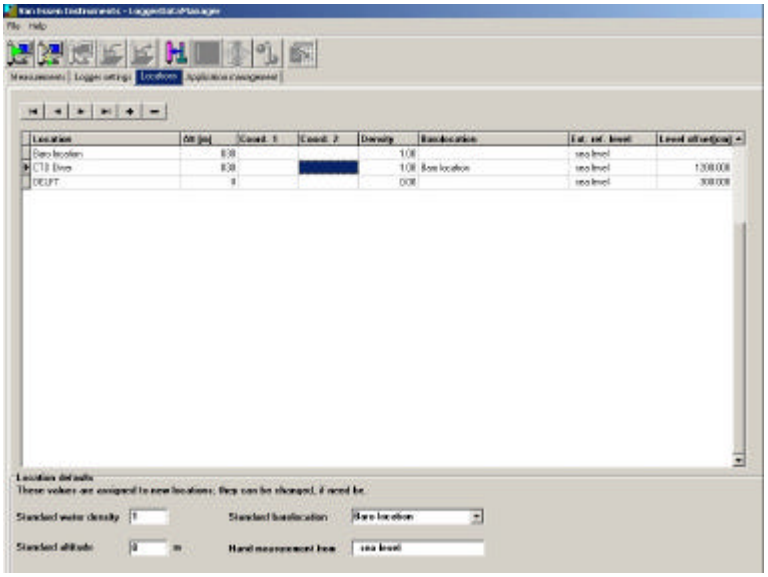
Prior to use LoggerDataManager will need to be adjusted to your situation. Adjustments can be made for:

- the measuring location (tab **Locations**)
- the program settings (tab **Program settings**)

4.2 Define measuring locations

Advanced

You use the tab **Locations** to define the measuring locations that you use. On reading out measurements from a logger that is not yet included in this list the logger's location will automatically be added to the list.



A number of buttons displayed above the location list can be used to browse through the list, and to enter or delete locations.

The tab **Locations** includes the area **Location defaults**. These settings will be applied to any new locations by default. These defaults can be changed at any time.

4.2.1 Enter a measuring location

1. Click the  button. A new line will be displayed in the locations list.
2. Enter the name of the location; any default values will be assigned to this new location.
3. Complete the other fields in the line in the event that these parameters are applicable to your situation or if they differ from the default values:
   - **Alt** is used to enter the altitude of the measuring location above or below sea level. This is desirable because of the lower barometric pressure at high altitudes Values can be entered between -300 m and 3000 m. The offset is 10 cm water column per 100 metres altitude. The altitude may also be expressed in feet.

   Note! If the level unit on the **Application management > Program settings** tab is set to feet or inches, the altitude on the **Locations** tab is displayed automatically in feet [ft]. For all other level units, the altitude is displayed in metres [m].

   - **Coord.1** and **Coord.2** are used to enter the optional coordinates of the location, based on a system of coordinates of your choice.
   - You can enter a correction factor for contaminated or salt water under **Density**. In the case of more or less pure fresh water, this factor can keep the default value as defined at installation of the LoggerDataManager: '1'.
   - Under **BaroLocation**, you can enter the location of the BaroDiver you wish to use to compensate level measurements of a Diver for air pressure variations or double click on desired Baro from drop down list and it will be added to BaroLocation field.
   -

   Note! For loggers that require no barometer compensation the **BaroLocation** column can remain empty.

When you read out the settings of a Baro Diver, its location is added automatically to the location list and also added to the picklist of the BaroLocation column. See section 8, Compensation of Diver level measurements for details about using the Barometer wizard for compensating measurements.

Note! Because the air pressure measured by a barometer will be subtracted from the absolute pressure measurement taken by Divers, it is essential for barometers to be positioned as closely as possible to the altitude above sea level of the Divers they are being used to compensate.

- **Ext. ref. level** (text field) is used to enter a description of the reference level used in calculating level measurements made by Divers. This imparts the measurements with a practical significance; examples are an ordnance level or the top of the borehole.
- The height of the pressure sensor in relation to the selected external reference level is displayed under **Level offset** (numerical field) on the **Locations** tab.

4. Click the ✓ button. The location has now been added.

4.2.2 Enter default location settings

Location settings applicable to a number of measuring locations can be set as defaults. The defaults are automatically assigned to any location when you define a new location.

You fill in the default settings on the tab **Location defaults** at the bottom of the tab **Locations**.

The following location settings can be entered as defaults:

Standard water density	standard specific gravity of the water; correction for the density of water, e.g. in brackish water.
Altitude	the altitude above sea level
Baro-Location	the location of the Baro Diver
Manual measurement from	the description of the reference level for the master level measurement

A description of these settings is given in the previous sub-section.

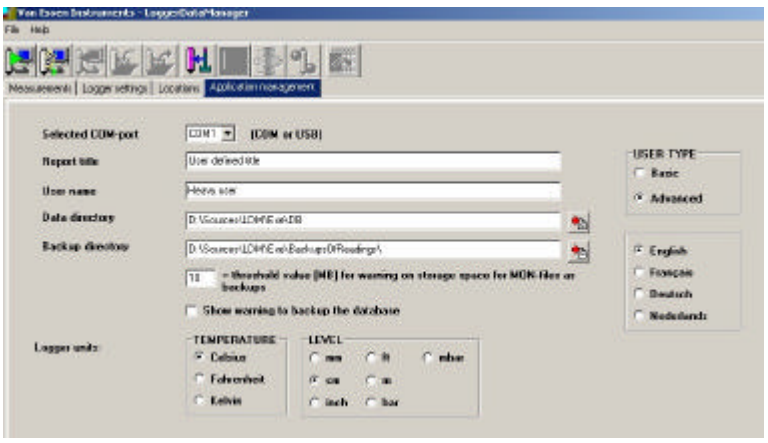
4.2.3 Delete a measuring location

1. Select the location you want to delete.
2. Click the − button. The **Confirm** dialogue box is displayed.
3. Click **OK** to delete the location.

   A message will be displayed in the event that there are still measurement series or loggers stored by LoggerDataManager which refer to this location and the location will not be deleted.

4.3 Adjust program settings

A number of program settings can be adjusted on the **Application management** tab



Selected COM-port

Select the communications port (COM or USB) that will be used to connect the Divers. If you want to use the USB-port, refer to the Windows system information which COM-port is used as USB-port.

Report title

Entering a report title is optional. The report title is included in printouts of the measurements (reports).

User name

This name is incorporated into the headings of printed reports, and export files in MON format.

User type

Select the Basic or Advanced version of LoggerDataManager. These advanced functions are disabled when the Basic version has been selected:

- the tab **Logger list** (under tab **Logger Settings**);
- the tab **Locations**
- the selection buttons for units of level, temperature and altitude (under tab **Application management**);
- the function **Calibrate CTD** (on the tool bar);
- the tool button **Export files** and the menu option **Import files**

Language

Select your language of preference. It takes a few seconds for the user interface to adapt to the new language. The Help function (F1) will always call help texts in the selected language.

Advanced The following settings are only available in the Advanced version:

Data directory

The default directories to where the database files with all logger settings and measurements are stored are 'DB', a subfolder of your installation folder.\LDM\Exe. To store or access DB files in a different location use the **Browse** button to locate the folder.

After changing the database directory, LoggerDataManager will notify you that the new database will be used at restart. **LoggerDataManager closes automatically after confirmation of this message.**

Note: If you select a directory where no complete database is available, LoggerDataManager reports this and resets itself to the default database that was created at installation. This database is always assumed to exist.

Backup directory

LoggerDataManager automatically makes backup MON-files of all data read from the loggers. Those MON-files are stored in a backup directory (always on a local drive) when you read loggers in the field. The default backup directory is subdirectory:
C:\Program Files\LDM\Exe\BackupsOfReadings\.

Use the **Browse** button to change the directory.

Note: it is recommended to save the MON-file backups regularly on a network drive in the office after each outdoor reading of loggers. The MON-file backups can be imported into LoggerDataManager (**File > Import**) if data lost.

Threshold value warning on storage space for MON-files as backups

This feature has a value of 10 MB disk space for storing MON-files at installation. If the contents of the back-up folder exceeds the threshold value, LoggerDataManager will warn you that this value has been exceeded.

You can save storage space by moving the backup MON-files regularly to a tape or cd-rom in the office.

Show warning to backup the database

Select this check box if you want LoggerDataManager to remind you to make a backup of the database files Logger units

Select Units of Measurement

Enter the units to be used for the presentation of temperatures and levels. The units that are selected do not need to be

identical to the units used in the programming of the Divers. When the measurements are read from a logger, they will automatically be converted into the selected logger units if the logger's units differ from the units in LoggerDataManager.

A change in the level unit will result in the conversion of all level data currently stored in the system – a procedure that may require some time! A progress bar will appear during conversion.

Note! It is not possible to select the unit 'mm' if at least one Diver has been entered in the database of LoggerDataManager with a level range of 30 m or more. The reason is the Diver's finite resolution of the absolute pressure measurement.

Changes to units **bar** and **mbar** are special, because these are pressure units, not level units. These units are suitable to measure absolute pressures, which are useful for some industrial applications. This means that barometric compensation, physical corrections and conversion to an external reference level are irrelevant.

5 Taking measurements with a Diver

5.1 About taking measurements with a Diver

To take measurements with a Diver, follow these steps as listed below. Each step is explained in more detail in the following sub-sections.

1. Connect the Diver to the computer.
2. Read the measurement settings from the Diver.
3. Adjust the measurement settings.
4. Program the new settings to the Diver.

   If so required the measurement settings can be saved as defaults for programming other loggers of the same type.
5. Set the Diver to the correct time, and start the measurements immediately or in the future.

5.2 Connect a Diver to your computer

The Diver must be connected to the computer before the measurement settings can be read out from the Diver and the Diver can be programmed.

The method used to connect a Diver depends on the Diver type, the application and the manner in which the logger is installed. The following sections explain the connection method for each type of Diver.

5.2.1 Connect a Diver

The method used to connect Divers depends on the manner in which the Diver is installed in the borehole:

- Divers suspended in the borehole on a steel cable will need to be removed from the borehole prior to connection. The Diver is connected to the computer using a Reading Unit.
- Divers suspended on a DRC (Direct Read Cable or Diver Data Cable) do not need to be removed from the borehole, simply use an interface cable to connect the Diver to the computer.

To connect a Diver suspended on a steel cable:

1. Connect the read-out unit to the computer.
2. Remove the Diver from the borehole.
3. Unscrew the protection cap.
4. Fit the inverted Diver into the read-out unit.

To connect a Diver suspended on a DRC or DDC:

1. Connect the interface cable to the computer.
2. Unscrew the protective cap from the head of the DRC or DDC
3. Connect the other connector of the interface cable to the head of the DRC or DDC.

Note! Replace protective cap as soon as possible. The Diver consumes power when the optical connector is exposed to light, reducing the life of the battery.

5.3 Read out measurement settings

The Diver is now connected to the computer. Before you can program the instrument you need to read out the current measurement settings.

To read out measurement settings:

- Click the **Read settings from connected logger** button.

What happens now?

Tab Read/program logger is automatically displayed.

Logger is already known to LoggerDataManager
LoggerDataManager locates the corresponding record in its database; LoggerDataManager reads the logger's current measurement settings and replaces the old values in the database.

Logger is new to LoggerDataManager
When LoggerDataManager does not recognize the logger the program will display the message "Warning: settings for a new logger will be inserted. Divers with a level range of 150 cm (BaroDivers) are immediately recognized as barometers, and are assigned with a 'B' in the column **Baro?** in the logger list. The message "Is the connected diver being used as a barometer" will be displayed if not a BaroDiver. Then a message giving location name will appear with a reminder to modify default properties.

In the event that the *location code* of the logger that has been read is also new, LoggerDataManager will add this location to the locations list .

LoggerDataManager assigns the default location settings to the new location. However, in the event that the altitude read out from the Diver differs from the default altitude then the actual altitude will be saved instead.

If the location code is already known but the altitude differs from the former altitude, a new location code is automatically

Note! Altitude may not be altered once readings have been taken unless location code changes.

The sub tab **Live update** at the bottom of the tab displays information about the logger's status.

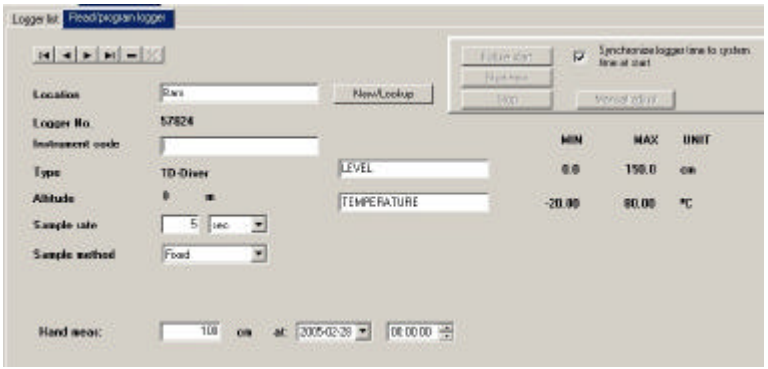
Note! If you encounter reading problems, please refer to section 10, Solving problems.

5.4 Adjust measurement settings

You have connected the Diver to your computer and read out the current settings. Now you want to change the settings. See section 5.4.2 for more information about the measurement settings of a CTD-Diver.

After adjusting the measurement settings, you program those settings to the Diver (see also 5.5 Program measurement settings to a Diver).

5.4.1 Adjust measurement settings of a Diver



On the tab **Read/program logger** in the **Logger Settings tab** you can change the settings of the selected logger.

Location

Here you can enter the location of the selected Diver. With the button **New/Lookup** you can toggle between entering a new location and selecting an existing one. The settings of a new location can be changed on the tab **Locations**.

Note! Avoid characters colon (:), greater than (>), less than (<), double quote (“), pipe (|), question mark (?), slash forward (/) and slash backward (\ ) in your location codes. Location codes are often used in names of export files, which are stored in the Windows directory system. These characters are not allowed in filenames under Windows.

Logger No. & Type

The instrument type and corresponding logger number (serial number) cannot be changed; they are programmed into the Diver. This data is also present on the Diver itself (see section 'Technical information' in the Diver manual).

Instrument code

Here you can enter your own identification code for the connected Diver.

Altitude

This is the altitude of the measuring location in relation to sea level. Because altitude is a characteristic of the location, you can adjust it via **Locations**.

PLEASE NOTE: Divers of Part Number Series 400 or greater are not affected by altitudinal changes.

Sample rate

This field appears when you select the sample method **Event based** or **Fixed** (minimum: 0.5 sec; maximum: 99 hours). You receive an error message at an attempt to enter a value outside these limits.

Sample method

Here you can choose the sample method; the way in which the Diver takes measurements and stores them. Depending on the chosen method, other fields you need to fill in will appear. You can read more about sample methods in **Select a sample method**.

Variation of range

This field appears when you select the sample method **Event based**.

Manual measurement

Enables the user to enter a manual measurement value and its date/time right away after the start of a new series of measurements; it is stored as a logger setting and automatically assigned to the next series that is read out from this logger.

Channel settings

On the right-hand side of the window, you can see the channels and the ranges. In the white fields you can enter

your own names for the channels; numerical values of the ranges cannot be changed.

Select a sample method

A sample method is the method a Diver uses to take samples and store them. The following methods are available for a Diver:

- Fixed
- Event based
- Setup A, B or C
- User defined (Cera-diver & Micro-Diver only)

Fixed
When you select this method, the Diver takes and stores samples on a regular basis.

If you select this method in the field **Sample method**, the field **Sample rate** appears. There you choose the time between two consecutive measurements.

> ***Example***
> *With a 10-second sample rate or period, the Diver takes a measurement every 10 seconds on both channel settings (water level and temperature) and stores this value in its internal memory. The maximum number of measurements is 24,000. In this case, the internal memory will be full after 2 days, 18 hours and 40 minutes. The Diver stops taking measurements when the memory is full.*
>
> **Note!** A measurement will be stored as a record with the data date + time + level + temperature. All measurements are imported **together** as one series in LoggerDataManager.

Event based
When you select this method, the Diver compares each sample to the last stored sample. A new sample is only stored when the water level in the new sample differs at least a given percentage from the level in the last stored sample. If you select this method, thef fields **Sample method**, **Variation** & **Sample rate** must be completed. The **Variation** is entered as a percentage of the range of the Diver. The percentage must lie between 0.1% and 25%.

Example
Suppose you entered a variation of 10% for a Diver with a 5m measuring range and a sample rate of 30 minutes. The Diver will then measure the water level every half-hour and compare it with the last stored level. It will only store the new level if it differs 50 cm (i.e. 10% of 5m) from the last recorded level.

Note! Taking samples costs energy, even when the samples aren't always stored. It is therefore more likely that this sample method causes the battery to be empty before the Diver memory is full.

Setup A
This method for a short-term pump test consists of three steps with fixed sample rates and time intervals.

Step	Time interval	Sample rate	Measurements
1	0-10 min.	0.5 sec.	1,200
2	10-100 min	1 sec.	5,400
3	100-1,550 min.	5 sec.	17,400 (41,400)*
	25.8 hrs.		max 24,000 (48,000)*

Setup B
This method for a standard pump test consists of four steps with fixed sample rates and time intervals.

Step	Time interval	Sample rate	Measurements
1	0-10 min.	1 sec.	600
2	10-100 min	5 sec.	1,080
3	100-1,000 min.	10 sec.	5,400
4	1,000-9,460 min.	30 sec.	16,920 (40,900)*
	157 hrs. and 40 min.		max 24,000 (48,000)*

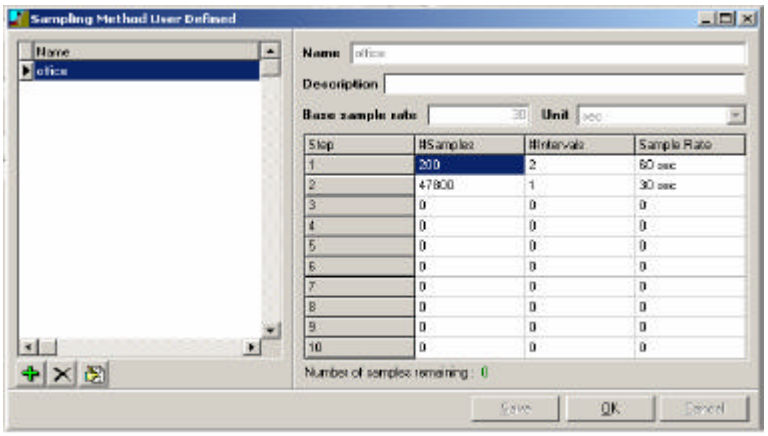
Setup C
This method for a long-term pump test consists of five steps with fixed sample rates and time intervals.

Step	Time interval	Sample rate	Measurements
1	0-10 min.	5 sec.	120
2	10-100 min	20 sec.	270
3	100-1,000 min.	1 min.	900
4	1,000-10,000 min.	5 min.	1,800
5	10,000- 428,200 min.	20 min.	20,910 (44,910)*
	297 days		max 24,000 (48,000)*

*** applies to CeraDiver & MicroDiver only**

User Defined (Cera-Diver & Micro-Diver only)

By using the **EDIT** button you can create a custom sampling protocol. In lower left corner of the template you may select add a new row, delete an existing row or edit an existing row. You may give each protocol a unique name and description for easy identification. After defining a base sample rate, you can program the number of samples to be taken at various intervals (which are multiplied by base sample rate to determine sampling rate) until samples remaining are 0. Maximum number of steps is 10. Maximum interval is 250.



Example: Define the base sample rate as 30 sec. Interval column is number of base sample rates between recording samples. If interval selected is 1, sample rate is 30 sec., if interval is 2 sample rate is 60 sec. Program number of desired samples at various intervals until number of samples remaining reads 0.

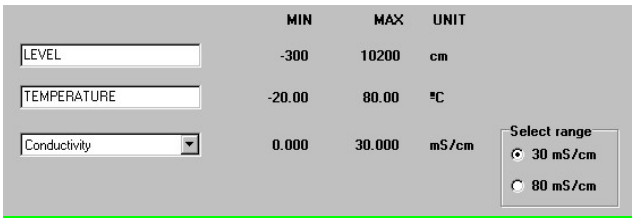
5.4.2. Adjust conductivity measurement settings for a CTD-Diver

Conductivity Channel settings

On the right-hand side of the window, you can see the available channels and ranges. In the fields you can enter your own names for the channels; numerical values of the ranges cannot be changed.

For the conductivity channel, you can select the type of conductivity you want to measure. (See figure below.) You choose between conductivity and specific conductivity, and also between measuring ranges 0 - 30 mS/cm or 0 - 80 mS/cm (in the **Select range** box).

If you choose **Conductivity**, the CTD-Diver measures the conductivity of the liquid. If you choose **Specific conductivity**, the CTD-Diver immediately converts the measured conductivity to conductivity at 25°C (77°F).



Note! A CTD-measurement will be stored as a record with the data date + time + level + conductivity. All measurements are imported **together** as one series in LoggerDataManager.

Event based

When you select this method, the CTD-Diver compares each sample to the last stored sample. A new sample is only stored when the new sample differs at least a given percentage in conductivity from the last stored sample. The maximum number of samples in a range is 16,000.

Example
Suppose you entered a variation of 10% for a CTD-Diver with a 0-80 mS/cm measuring range and a Sample rate of 30 minutes. The CTD-Diver will then take a measurement every half-hour and compare it with the last stored conductivity. It will only store the new measurement (conductivity, temperature and depth) if the conductivity differs 0.8 mS/cm (i.e. 10% of 80 mS/cm) from the last stored conductivity.

Note! Taking samples costs energy, even when the samples aren't always stored. It is therefore more likely that this sample method causes the battery to be empty before the Diver memory is full.

5.5 Program measurement settings to a Diver

The measurement settings of the Diver connected to the PC have now been read out and adjusted. The next step is to program the new measurement settings to the Diver connected to the PC.

Note! When the Diver still contains data in storage, it is vital you first read out these measurements before you start the Diver. When a Diver is started, the stored data in the memory is deleted. Once the measurements are read, they are automatically saved in LoggerDataManager. See sub-section 6.1.

To program measurement settings to a Diver:

- Click the **Program settings to connected logger** button.
  

  LoggerDataManager detects the status of the connected logger; if it is not 'STOPPED', this is reported to you and the programming is cancelled. If the programming actually takes place, the buttons **Start now** and **Future start** are activated; the Diver can now be started.

5.6 Use measurement settings as defaults

Measurement settings of the selected Diver can be saved as defaults. They can be retrieved when programming a different logger of the same type in the same manner. This feature is particularly convenient when several Divers are to be programmed with the same settings.

It is, however, not necessary to make use of all the defaults when you program a Diver. You can make the retrieval selective by unchecking one or more 'active' checkboxes of the default settings. After this retrieval you can change the logger settings.

The defaults can be entered on the tab **Default settings** at the bottom of the tab **Read/program logger**.

5.6.1 Save measurement settings as defaults

- Click the **Save logger settings to defaults** button in the tool bar once the settings have been written to the logger.

5.6.2 Use default measurement settings

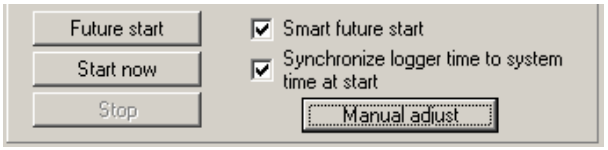
1. On the bottom of the **Read/program data logger** tab, click the **Default settings** tab.
2. Check or uncheck the **Active** boxes of the default settings, according to your needs.
3. Read the Diver's current measurement settings. See sub-section 5.3, Read out measurement settings for details.
4. Click the **Retrieve logger settings from defaults** button in the tool bar once the current measurement settings have been read out.

   If necessary, enter additional changes to the settings.
5. Program the Diver with the settings. See sub-section 5.5 Program measurement settings to a Diver for details.

5.7 Start measurements

The Diver can be started immediately after the instrument has been programmed with the new measurement settings. You start the Diver on the **Read/program logger** tab, under the **Logger settings** main tab.



A Diver can be programmed to start immediately, or with a future start date/time. In the latter case you have to program the future start date and time into the Diver .

It is important to ensure that the logger's internal clock is set to the right time before starting the logger, since each measurement is marked with the date/time at which it was made.

5.7.1 Set the correct time

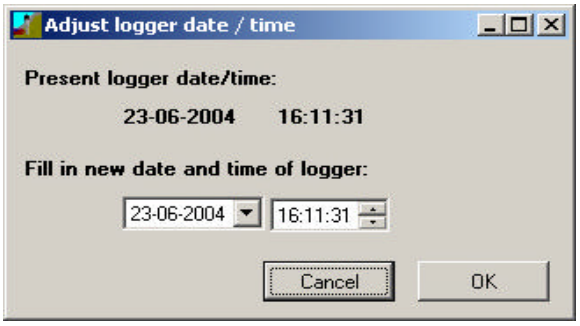
To synchronize the logger's clock with the system clock:

- Check the **Synchronize logger time to system time at start** box.

  When the Diver is started the logger's clock will be synchronized with the system clock of your computer.

To set the logger's clock to any required date and time:

1. Click the **Manual adjust** button. This will display the **Adjust logger date / time** dialogue box.



   This displays the current date and time.

2. Select the required date and time.
3. Click **OK**.

   The date/time settings will automatically be transferred to the logger's internal clock.

5.7.2 Start a Diver

A Diver can be started immediately, or at a time you set.

Note! When the Diver still contains data in storage, it is vital you first read out these measurements before you start the Diver. When a Diver is started, the stored data in the memory is deleted automatically. Once the measurements are read, they are then automatically saved in LoggerDataManager. See chapter 6.

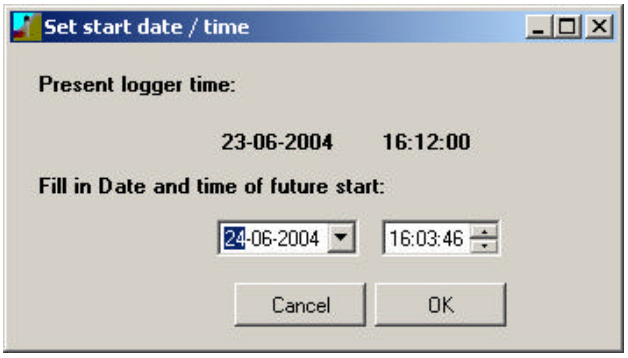
You can easily check how many measurements a Diver still contains. Click the **Start live updating** button on the tab **Live update** on the bottom of the tab **Read/program logger**. The information then displayed includes the current value in the field **Space left for.. [meas.] in logger memory**.

To start the Diver immediately:

- Click the **Start now** button. LoggerDataManager warns you about saving the data. It also calculates when the logger memory will be full.
- The **Status** field on the tab **Live update** indicates that the logger has been started, and displays the first measurement. The measurements can be followed in real-time. See sub-section 6.3.2 Read out current measurements for details.

To start the Diver at some date/time in the future:

1. Click the **Future start** button. This will display the **Future start** dialogue box.



2. Enter the required date and time.
3. Click **OK**. The time setting will be transferred to the logger.

   The **Status** field on the tab **Live update** indicates that the logger will be started at the some time in the future, followed by a display of the time setting.

Smart Future Start option:

Selecting the Smart Future Start option tells the diver to resume sampling at the previously designated intervals.

Example: Measurements were recorded at 24 hr intervals at 8 a.m. daily. The diver is stopped, Memory downloaded & restarted. If **Smart Future Start** option selected next recorded measurement will be @ 8 a.m. the following day regardless of the time the Diver restarted.

NOTE: This feature will only work correctly is scheduling sampling does not occur while diver stopped.

6 Reading out a Diver

6.1 About reading out a Diver

This chapter explains how you can read out measurement values from a Diver.

You can read out the measurement settings of a logger, or the measurement settings **combined with** the stored measurement values. By only reading in the measurement settings, you can check how the logger has been programmed, e.g. whether it has started or stopped. In this case, the stored measurement values are not read into LoggerDataManager.

The Diver can be stopped prior to reading out the data, and then restarted; however this is not necessary, since the data can be read out while the logger continues to store measurements. This implies that when the same Diver is read out again some of the measurements will be duplicated. In that case the duplicate measurements can be deleted. See sub-section 7.7, Delete measurements for details.

Subsequent to reading out the Diver data the measurements will automatically be saved in LoggerDataManager's database. Measurement values can be exported manually in a number of different formats. See sub-section 7.6, Export measurements for details.

Reading out the Diver adds measurements to LoggerDataManager's database.

6.2 Stop measurements

The Diver is connected to the computer. Prior to reading the measurements the logger can be stopped. It reduces the risk of interference between the reading process and a measurement action.

1. Read the measurement settings from the logger with the **Read settings from connected logger** button.

   LoggerDataManager reads out the logger measurement settings but not the measurements themselves. See sub-section 5.3, Read out measurement settings for details.

Note! If you encounter reading problems, see section 10 Solving problems .

2. Click the **Stop** button on the **Read/program logger** tab. The logger will stop immediately. The logger status in the Live Update tab with now read stopped.

6.3 Read out a Diver

The Diver has been connected to the computer and, when necessary, Diver measurements have been stopped. You can now read out the measurements; they will be automatically saved.

The system can be tested with a direct read-out of measurements the Diver has just taken. The Diver needs to have been started for this. LoggerDataManager repeatedly displays the current measurements, but does not save them.

Note! When the Diver's memory still contains measurement data, it is vital you first read them out before you start the Diver. When a Diver is started, the stored data in the memory is deleted automatically. Once the measurements are read, they are then automatically saved in LoggerDataManager.

6.3.1 Read out all measurements

- Click the **Read settings and measurements from connected logger** button.

What happens now?

LoggerDataManager locates the corresponding record in its database.

When LoggerDataManager does not recognize the logger, it displays a message stating that a new logger needs to be added to the list of loggers. Divers with a level range of 150 cm (BaroDivers) are immediately recognized as barometers, and are assigned with a 'B' in the column **Baro?** in the logger list. For all others LoggerData Manager asks 'Is the connected logger being used as a barometer?' *This question is not displayed when using CTD-Diver* . If answered yes, it will

then be added to logger list as a Baro. The indicator can always be changed by the user in column **Baro?** in the logger list.

In the event that the *location code* of the logger is new, then LoggerDataManager will add this location to the locations list. LoggerDataManager assigns the default location settings to the new location. However in the event that the altitude read out from the Diver differs from the default altitude then the actual altitude will be saved instead.

If the location code is already known but the altitude differs from the former altitude then a new location code is automatically generated. The new altitude is assigned to it, replacing the last 4 characters of the location code with "~nnn", where nnn stand for a sequence number, starting at 000. This is augmented as much as necessary to maintain uniqueness of the location codes.

It is recommended to change the automatically generated location code immediately into a code that fits your coding system.

Progress reading data
The measurements and relevant settings, will now be read out and automatically saved in LoggerDataManager. The **Progress reading logger data** dialogue box displayed in the middle of the screen shows the read-out progress. Click **Cancel** to stop the read out. Measurements read out until that time will not be saved by LoggerDataManager.

Note! If you encounter reading problems please refer to section 10 Solving problems .

The measurements have now been read out and stored, and can now be viewed. The Diver can be restarted if it was stopped to read out the measurements. See section 7, Working with measurements and sub-section 5.7, Start measurements for details.

6.3.2 Read out current measurements

Make sure the logger is properly connected to the computer.

1. Click the **Read/program logger** tab.

   The tab **Live update** displayed on the bottom of the tab indicates the logger's status and the value of the latest measurement.

2. In the **Update period** field, enter the update period between two consecutive retrievals of the latest measured values.

   For example, when the Diver connected to the computer makes a measurement once a minute the update period can be set to 60 seconds – obviously a shorter period serves no purpose.

3. Click the **Start live updating** button to continually read out the current value. The button text will change to **Stop Updating**.

6.4 Import measurement files

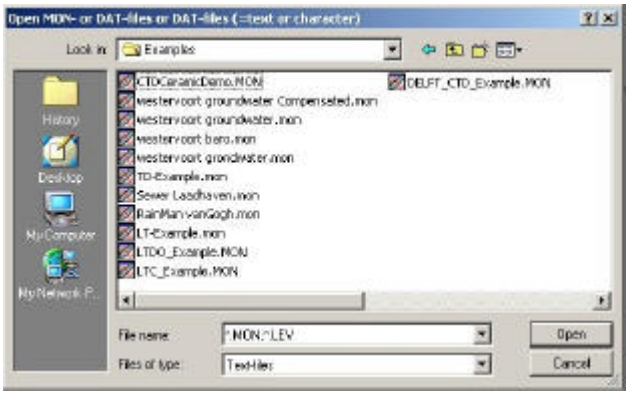
Advanced

Measurements with the following file formats can be imported:

- Text files with the extension .MON or .LEV
- Character-based files usually have the extension .DAT

To import measurement files:

1. In the **File** menu, click **Import files**. The **Open MON- or DAT-files (-text or character)** dialogue box is displayed. The import folder that was used last is then displayed.



2. Browse, if needed, to the folder containing the file(s) to be imported.

3. At first, the MON-files are visible. If you want to import a DAT-file, select **Char-files** in the field **File type**.

4. Select the file you want to import. You can also select multiple files to import. Press down and hold the CTRL key and click the files you want to import or press and hold the SHIFT key and click the first and the last file of the range of files you want to import.

5. Click the **Open** button. The measurements in the file will be imported into LoggerDataManager database. If you select more than one file in step 4, the data will be imported file by file. It is not possible to cancel the import.

What happens now?

Logger is known to LoggerDataManager
You will be asked to confirm if the data is compensated. The column **Comp?** will read "**Do**" for non-compensated date, "**Done**" for compensated data and "**Not** appl" for Baro data.

Logger is new to LoggerDataManager
The message will be displayed, "Settings for a new logger will be added" LoggerDataManager assigns the default location settings to the new location. However, in the event that the altitude read out from the Diver differs from the default altitude, then the actual altitude will be saved

If the location code is in use with a different altitude assigned, a 3 digit suffix will be affixed to the code to maintain the uniqueness of the location codes.

The measurements have now been imported and saved.

7 Working with measurements

7.1 About working with measurements

Once the measurements have been imported or read from the logger then LoggerDataManager can be used to view, print and export the measurements for use in other programs. Here we explain how you can do that.

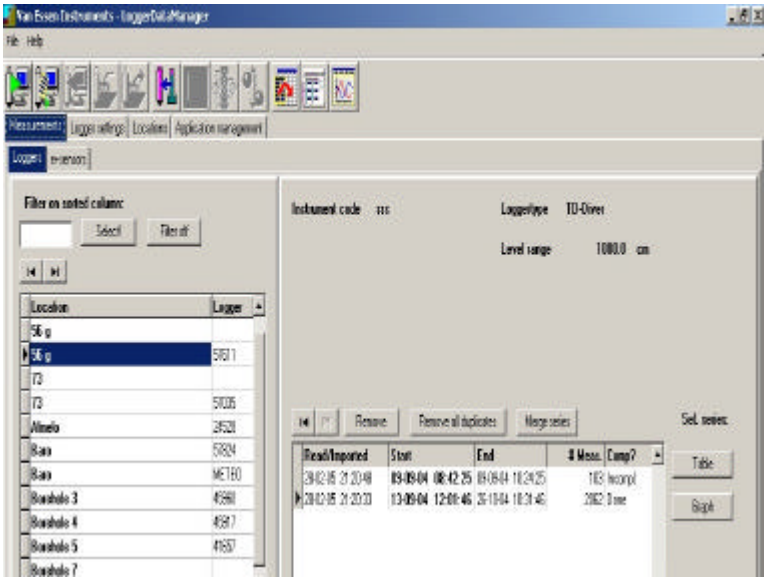
Measurement series that are no longer required can be deleted. Duplicate measurements in overlapping measurement series can be deleted using a special function.

7.2 View measurements

In order to view measurements, you need to select a measurement series. The measurements can then be viewed either in the form of a table or a graph.

To view measurements:

1. Click the tab **Measurements > Loggers**.



The left-hand side of the window displays the logger-location combinations that have been read out or imported. The default display is sorted by location code (shown in bold face). To sort by logger serial number double click the header of the right-hand column.

The right-hand side displays the measurement series for the selected logger location combination. The measurement settings for the selected series are also displayed. The measurement settings are sorted according to start date/time, displayed in the **Start** column in bold type. If necessary, you can sort these series according to import date/time. To do so, click on the column title **Read / Imported**.

The **Comp?** column displays the barometer compensation status. Series with statuses other than Not Applicable can be changed in the barometer wizard (see subsection 8.2: Compensating measurements).

2. Select the location or Diver for which the measurements are to be viewed from the logger location list. The measurement series that have been read out from the selected Diver are displayed at the right-hand side of the screen.

Tip: The list may be refined by filtering the selected column. For example, you wish to select all locations beginning with a 'g'. Select the **Location column**. Enter 'g*' in the **Filter on sorted column** field and click the **Select!** button. LoggerDataManager will display all logger-location combinations with a location beginning with 'g'. The wildcard (*) must be placed at the end of the filter parameter. Undo the filter by selecting the other column, or the **Filter off** button.

---

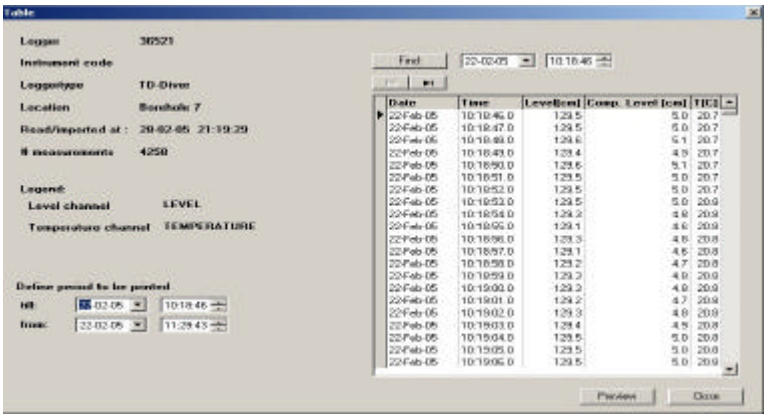
3. Select the series to be viewed from the list of measurement series.

4. Click the button **Table** to view the measurements in a table, or click the button **Graph** to view the measurements in a graph.

   The following sub-sections contain more details about viewing measurements in a table or a graph.

7.3 View measurements in a table

Once a measurement series has been selected it is possible to view the measurements. Use the button **Table** to view measurements in a table and print measurements in a report. The left-hand side of the screen displays data about the measurement series, and the right-hand side displays the actual measurements.



You can jump to the top and the bottom of the table with the two browse buttons above the table; you can scroll through the table with the scroll bar at the right-hand side of the table. When the selected measurement series contains a large number of measurements, the **Find** function offers a convenient method to search for the required measurement(s). Searches can be made based on date and time.

To search for a specific measurement:

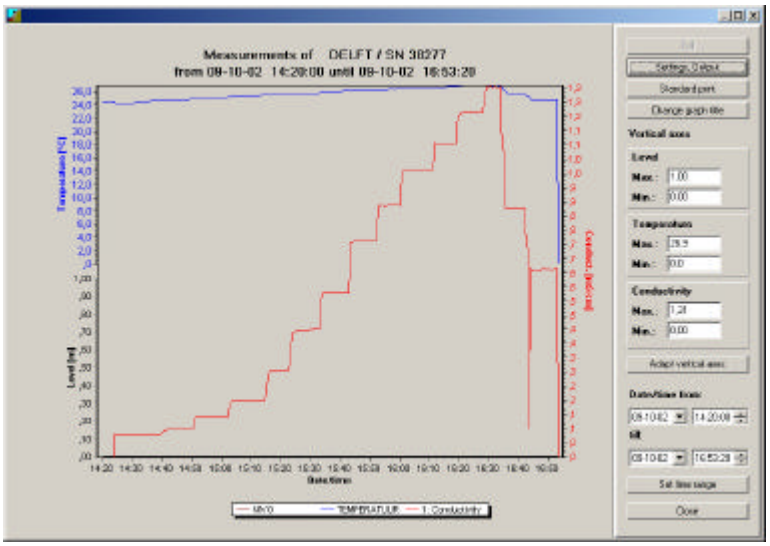
1. Click on the arrow to the right of the date field. A calendar will be displayed.
2. Select the required date.
3. Click on the hour, minute or second of the time field. The arrows to the right of the field can be used to adjust the time.
4. Click the **Find:** button once the date and time have been set to the required values.

   LoggerDataManager searches for the measurement made at that time. In the event that there is no measurement at this time LoggerDataManager will search for the first measurement **after** the specified time.

Generate a Print preview of the measurement data via the **Preview** button (see subsection 7.5 Print).

7.4 View measurements in a graph

Use the button **Graph** in the toolbar to view the measurements in a graph.



A number of modifications can be made to the presentation in the graph. It is possible to:

- zoom in (sub section 7.4.1);
- increase or decrease the scales (sub section 7.4.2);
- shift the graph (sub section 7.4.3);
- adjust the presentation of the graph (sub section 7.4.4);
- adjust the graph title (sub section 7.4.5).

In order to adjust the presentation of the graph you use the **Settings, Output** button (tab **Measurements**, button **Graph**). Use this dialog also to:

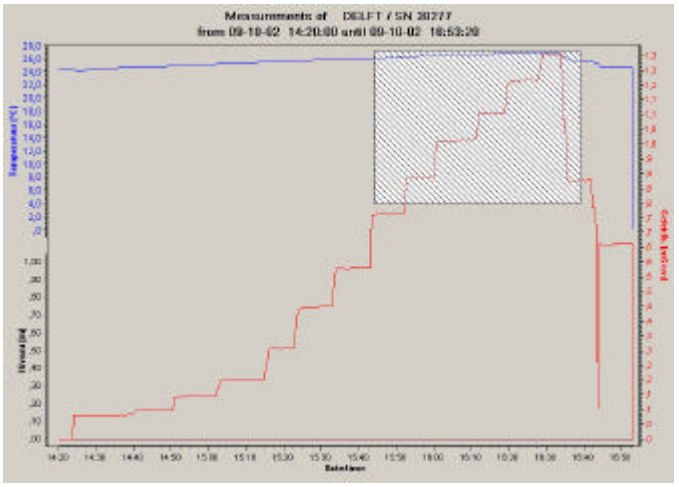
- print the graph (sub section 7.5.2);
- export the graph data or the graph as bitmap

7.4.1 Zoom in

Details of a graph can be enlarged.

To zoom in on a graph:

1. Click the left mouse button at the top left-hand corner of the region of the graph to be enlarged.
2. Move the mouse cursor to the bottom right-hand corner of the required region. Only the width of the selected rectangle is relevant.



When the left mouse button is released the selected time interval will be shown full scale; the vertical scales will be adjusted to the data of the graph. The **Full** button will be enabled.

To view the entire graph again:

- Click the **Full** button at the top right of the tab. The entire graph will once again be displayed. The **Full** button will then disable itself.

7.4.2 Increase or decrease the scales

The scales of the horizontal time axis and the vertical variable axes can be adjusted by direct entry of the minimal and maximal value of the scale.

To set the scale of the vertical axes:

1. The fields below the **Vertical axes** heading at the right-hand side of the graph displays the names and current minimal and

maximal values of the vertical axes. Adjust the minimal and maximal scales as required.

2. Click the **Adapt vertical axes** button. The vertical scales of the graph will be modified accordingly. The **Full** button will then be enabled.

To set the scale of the horizontal axis:

1. The fields below the **Date/time from** heading at the right-hand side of the graph display the current start and finish times employed in the presentation of the graph. Adjust the start and finish time as required.

   You can adjust the date by clicking on the arrow. The calendar that is then displayed can be used to select the required date.

   You can adjust the time by clicking on the hour, minute or second of the time field and then using the arrows at the right-hand side of the field to adjust the time.

2. Click the **Set time range** button. The vertical scales of the graph will be modified accordingly. The **Full** button will then be enabled.

To show the normal scales again:

- Click the **Full** button at the top right-hand side of the tab. The entire graph will once again be displayed. The **Full** button will then disable itself.

7.4.3 Shift the graph

The graph can be shifted to the left or right without changing the width of the displayed time interval.

To shift the graph:

1. Click the right mouse button on the graph, and keep the button pressed.

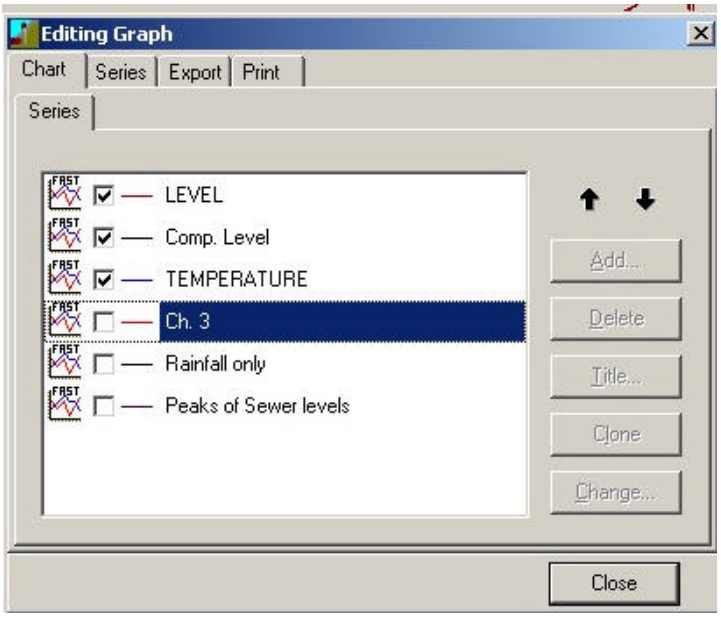
2. Move the mouse cursor in the required direction, and then release the mouse button.

7.4.4 Adjust the curves in the graph

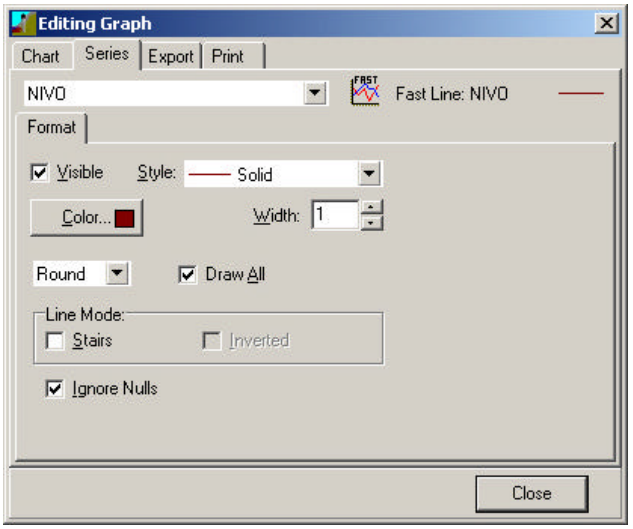
The appearance of the curves in the graph can be modified.

To adjust the curves:

1. Click the **Settings, Output** button to the right of the window. The **Editing graph** dialogue box is displayed.



2. The tab **Chart** can be used to specify the measurements to be displayed in the graph.
3. The tab **Series** can be used to adjust the presentation of the measurements in the graph.



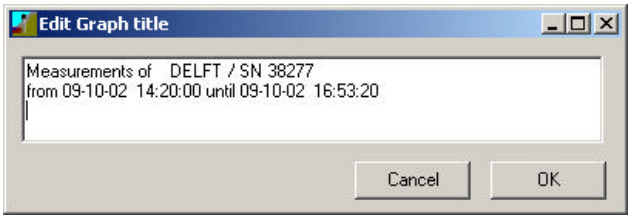
Use the selection field at the top of the window to select the measurement series that is to be adjusted. It is then possible to specify which data to display and the manner in which the curve is to be displayed (the colour, line style, marker style, and the curve width).

4. Click the **Close** button to implement the changes.

7.4.5 Adjust the graph title

The title mentioned above the graph can be adjusted.

1. Click the button **Update graph title** at the right of the graph.



2. Select the text and fill in the new title.
3. Click the **OK** button.

7.5 Print reports

The measurements and the graph can be printed separately.

Advanced

7.5.1 Print measurements

1. View the measurements in the form of a table. Enter the limits of the time interval for which the measurements have to be printed. The arrow buttons under the **Define period to be printed** heading can be used to modify the print selection. The maximum number of measurements per print preview is 1000.
2. Click the **Preview** button. The print preview is displayed in the dialog **Report preview from logger [logger number]/[instrument code]**. You can type in any changes in the previewed report before you actually print it. The default standard report header is defined in the "Application Manager" tab. You can make a sub selection before printing by right-clicking and dragging. The modification procedure is given in sub-section 4.3, Adjust program settings (field **Report title**).
3. Click the **Print** button to print the report. You can also close the preview dialog without printing the report.

7.5.2 Print graphs

Advanced

Graphs can be printed using one of two procedures:

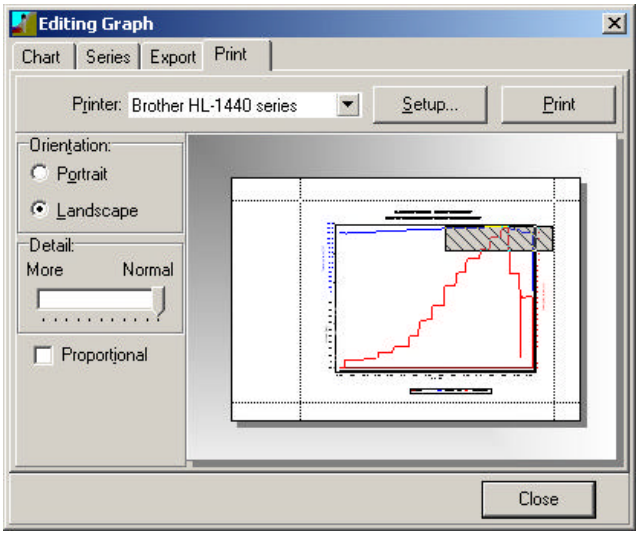
- immediately (a sort of 'print screen' command)
- using a Graph dialog which offers an opportunity to modify the printout

To print the graph immediately:

- Whilst the graph is displayed click the **Standard print** button. The graph will now be printed with the default printer as defined in Windows.

To print the graph using the dialogue box:

1. Whilst the graph is displayed click the **Settings, Output** button to the right of the window. The **Editing graph** dialogue box will be displayed.
2. Click the tab **Print**.



3. The tab can be employed to specify the printer to be used, as well as the appearance of the printout. Any changes will be displayed immediately in the preview.
   - Select the appropriate printer, and if so required adjust the printer settings via the **Setup...** button.
   - Select the page setting in the **Orientation** block.
   - Select the required degree of detail in the **Detail** block.
   - Check the **Proportional** box if the original proportions of the width to length are to be retained.
4. Click the **Print** button to print the graph.
5. Exit the **Editing graph** dialogue box with the **Close** button.

7.6 Export measurements

Both the measurements in a measurement series and the associated graph can be exported for use in other programs, such as a spreadsheet program. When you are on the tab **Measurements > Loggers** the export dialog is accessible via the **Export selected series** button on the toolbar.

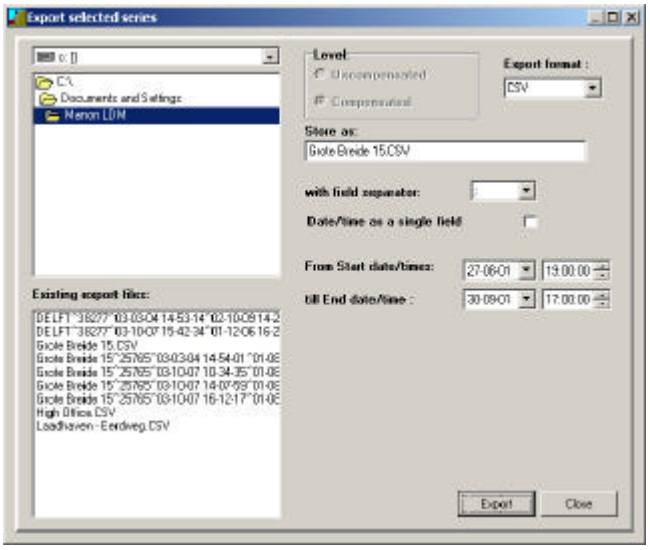
The measurements can be exported to a MON, CSV, SEBA, CSV Abstich, NITG, A4H, BOSKOP and HYMOS formatted file.

1. Click the tab **Measurements**.

2. Select the desired location-logger combination and then highlight the measurement series you with to export. Multiple selections may be made by keeping the Ctrl key pressed while left-clicking on the required combination(s) and measurement series. If you prefer working with the keyboard, keep the Shift key pressed while you press the cursor key ↑ or ↓.

3. Click the **Export selected series** button on the tool bar.

The **Export selected series** dialogue box is displayed. The default export directory is the most recently used directory; however, it may be changed manually. See sub-section 4.3 Adjust program settings for details.



4. Specify the folder where the exported data file is to be saved.

5. In the **Export format** box specify the format to which the file is to be exported.

   If CSV-format, you must specify a field separator. You also have the options Date & Time as a single field & Excel friendly available.

Formats for specific users:
The export formats A4H, BOSKOP, NITG, SEBA, HYMOS and CSV Abstich are special export formats that enable databases of specific customers to import the measurement series.

6. When exporting data from a Diver you should also indicate whether the compensated or uncompensated measurement values are to be exported. This part of the dialog is not accessible when exporting data of BaroDiver.
7. If you are only exporting one measurement series, indicate in the **Store as** field the name under which the exported data is to be saved. If you have selected more than one series, you cannot enter a file name. The name is generated automatically according to the following format:

   <Location code^Logger No^ImportDate/time>.<extension export format>

   Example:
   Grote Breide 15^25765^03-03-04 14-54-01^01-08-27 19-00-00.CSV
   You can export multiple series to all series if you widen the date-time interval; all series at the selected location with a start date/time AFTER or AT the entered value and an end date-time BEFORE or At the entered value will be exported to files with automatically generated filenames, in the specified directory.

   Tip: The field **Existing export files** shows the files which are present in the selected directory. Click one of the names to copy it to the field **Store as:**. Adjust the name if you like.

8. Click the **Export** button. The measurements will now be exported. Cancellation is not possible.

Now you can import, view and adjust the CSV file in Excel.

Making CSV file readable in Excel worksheet

1. Open Excel and open the CSV file (**File** menu or double click the CSV file in Windows Explorer).
2. Select column A from 'Date' to the last value in column A.
3. Select the **Data** menu and choose option **Text to columns**.

4. Check the radio button **Separated**.
5. Click the **Next** button.
6. Finally click the **Finish** button.

Making graph in Excel

After exporting data from LoggerDataManager in a CSV file (where date and time are one field), it is possible to make a graph in Excel.

1. Open Excel and open the CSV file (**File** menu or double click the CSV file in Windows Explorer).
2. Select all columns.
3. Choose the **Insert** menu and select option **Chart**. The **Chart Wizard** dialog appears.
4. Follow the instructions of the wizard.

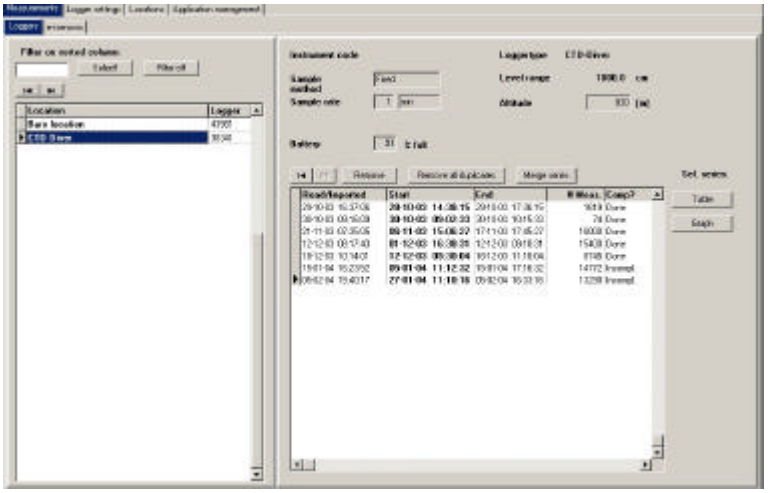
7.7 Delete measurements

A specific measurement series stored in LoggerDataManager's database can be deleted once it is no longer required for whatever reason.

Subsequent to a period in which several read-outs have been made from a logger that has not been restarted during that period, LoggerDataManager database will contain overlapping measurement series (duplicates). These duplicates can be deleted from the database.

7.7.1 Delete measurement series

1. Click the tab **Measurements**.



The left-hand side of the window displays the logger-location combinations that have been read out. The right-hand side displays the measurement series for the selected logger location combination. The measurement settings for the selected series are displayed above the measurement series.

2. Select the logger -location combination at which a measurement series is to be deleted. The measurement series for the combination are displayed at the right-hand side of the screen.
3. Select the measurement series to be deleted.
4. Click the **Remove** button. The **Confirm** dialogue box is displayed.
5. Click **Yes** to confirm deletion of the measurement series if you are really sure. This action cannot be undone! Click **No** if you do not want to delete the series.

7.7.2 Delete overlapping measurements (duplicates)

1. Click the tab **Measurements**.

   The left-hand side of the window displays the logger-location combinations for which series are available in the database. The right-hand side displays the measurement series for the

selected logger-location combination. The measurement settings for the selected series are displayed above the measurement series.

2. Select the logger -location combination for which overlapping measurements are to be deleted. The measurement series for the combination are displayed at the right-hand side of the screen.
3. Click the **Remove duplicates** button.

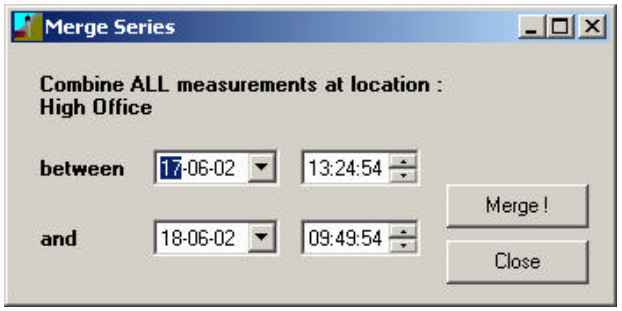
   LoggerDataManager searches for groups of measurement series with identical start dates and times, but with different read-out dates and times. When such measurement series are found, the longest measurement series will be retained. All the shorter series will be deleted.

7.8 Merge measurement series

Sometimes it is necessary to replace a logger between two series at a particular location. Since every logger has its unique logger serial number, this results in two (or more) sets of measurement series for the same location. This partition between several loggers hinders a good analysis. To solve this problem, you can merge all or any measurements of series at one location, within a chosen time interval, regardless of the serial numbers of the loggers.

To merge measurement series

1. Click the tab **Measurements>Loggers**
2. Select the location of which you want to merge the measurements.
3. Click the **Merge series** button. The **Merge Series** dialogue appears.



4. Enter a start date, - time, end date and - time. You can use the calendar by clic king the button:

   You can also enter the date and time numerically, or modify them with the arrow buttons on your keyboard.

5. Click the **Merge!** button. LoggerDataManager now creates a new series with all available measurements from the selected location within the defined period, regardless of the loggers' serial number.

   A merged series is recognized by the ***** in the **Instrument code** field. No settings like sample method and sample rate are displayed for this series, since they may not be unique for all measurements in the merged data.

8 Compensation of Diver level measurements

8.1 About the compensation of level measurements

The Diver measures the groundwater level with a highly accurate pressure sensor that measures an absolute pressure. This pressure is equal to the 'weight' of the water column above the measuring instrument plus the prevailing air pressure. Subtracting these air pressure measurements from the absolute pressure measurement 'compensates' for these air pressure variations. This is done quickly and easily using a special LoggerDataManager wizard. Van Essen Instruments has introduced the special BaroDiver for registering the air pressure.

The wizard uses linear interpolation for air pressure values if they are not measured at the same time as the water level. The sampling speed of the BaroDiver does not have to be the same as the Diver measurements it compensates. It only has to register the variations in the atmospheric pressure; a measurement with a fixed sampling speed of 1 per 30 minutes is usually good enough.

Example
LoggerDataManager deducts the barometric pressure (P-barometer) from each measurement of the water pressure (P-water), as shown in the following example.

Date	***Time***	***P-water***	***P-barometer***	***Pw-Pb***
22-01-03	*9:00*	*110*	*50*	*110-50 = 60*
22-01-03	*10:00*	*110*	*40*	*110-40 = 70*
22-01-03	*11:00*	*130*	*60*	*130-60 = 70*

Table 1: Compensation for barometric pressure

Converting measurements to a fixed reference level

Level measurements taken by a Diver are always registered in relation to its pressure sensor. You can, however, also relate these measurements to another level so they acquire more significance. In the Netherlands, for example, it is customary to express groundwater levels in centimetres in relation to the New Amsterdam Ordnance Datum or to the top edge of the monitoring well.

Relating the measurements to the external reference level means that you equate a compensated level measurement at a certain point in time to the actual water level (which is determined by means of a **manual measurement**, expressed in relation to an external reference level). When this water level is *below* this external reference level, its numerical value is *negative*.

On the basis of the distance between the water level and the reference level, the LoggerDataManager compensation wizard determines a correction value, called a **level offset**, for the location of the measurement value in question, so that all compensated values are related to the external reference level. This level offset is the vertical distance between the pressure sensor and the external reference level.

The level offset becomes a **characteristic of the location** of the measurement series, which means that LoggerDataManager uses the calculated level offset to correct not only the current measurement series, but also all future measurement series at that particular location.

LoggerDataManager uses the calculated level offset until a new manual measurement is entered, or until another level offset value is directly entered by the user. A new manual measurement or a new directly entered level offset will be required when the Diver at the location is suspended at a different depth.

If you forget to perform a manual measurement during a measurement series or if it is not possible to do so for one reason or another, you can calculate the level offset yourself from the distance from the mark on the Diver to the suspension point at the top of the monitoring well. If the top of the monitoring well is your external reference level, the level offset is the negative value of this distance. If you are using something else as an

external reference level (NAP, for example), you have to know the height of the top of the well in relation to it. This will enable you to calculate the level offset in relation to this external reference level. This data can be entered on the **Locations** tab in the compensation wizard..

Example

You can specify that from a manual measurement made on 22 January 2003 at 10:00 it is apparent that the water level is 200 cm below the borehole cap. The master level is then -200. When the elevation of the borehole cap is adopted as reference level for the example for the barometric-pressure compensation (see Table 1 Compensation for barometric pressure) it can then be concluded that a compensated water level of 70 is equivalent to –200 cm water column from the borehole cap. The conversion of this water level to the water level in comparison with the borehole cap will require the application of a correction (level offset) of –270. LoggerDataManager recalculates all values in the compensated file using the conversion factor of –270. In the above example this yields the following compensated and converted level measurements:

Date	**Time**	***Pw-Pb***	**Water column from the borehole cap (in cm)**
22-01-03	9:00	*110-50 = 60*	-210
22-01-03	10:00	*110-40 = 70*	-200
22-01-03	11:00	*130-60 = 70*	-200

Table 2: Conversion to reference level

8.2 Compensating measurements

To compensate level measurements for Divers and/or CTD Divers, use the barometer wizard. If at least one logger requiring compensation is known in the database, you can start the wizard in two ways via the **Barometer wizard** button in the toolbar.

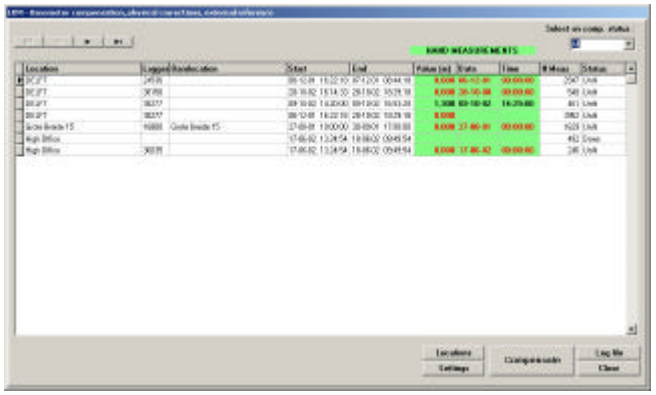
Note! Before compensating measurements, it is advisable to assign a barometer location to each Diver location on the **Locations** tab. You will find more information about this in subsection 4.2, Define measuring locations.

8.2.1 Standard compensation (without manual measurements)

1. Open the Barometer wizard.

   The dialog Barometer compensation, physical corrections and external reference appears.

2. The Diver measurement series that require compensation are displayed. These measurement series had the **Do** status for air pressure compensation in the **Status** column already on the **Measurements** tab of the main form. A Diver measurement series is given this status automatically when it is read out. Measurement series that do not require compensation (measurement series taken by a BaroDiver)) are automatically given the status **Not appl.** (not applicable).

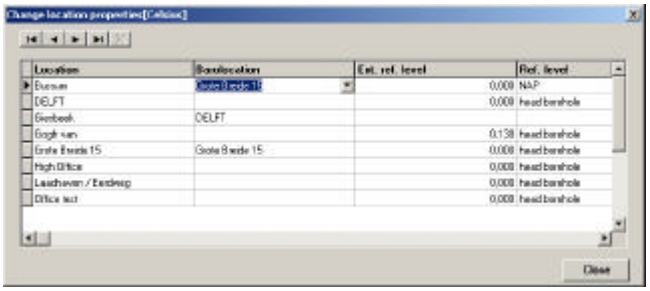
   If you wish to see all measurement series in the barometer wizard, select the option **All** in the **Select on comp. status** field. The following statuses may be present:

Status	**Explanation**
Do	Compensation is still to be performed.
Done	Compensation is complete.
Unfit	Compensation is not possible due to a lack of data.
Incompl.	Series has been partially compensated despite the lack of barometer data throughout the entire series period.

Status	Explanation
Not yet	Series is theoretically due for compensation but has been temporarily excluded from compensation by you or another user.

Series with the **Not appl.** status are not displayed at all in the barometer wizard.

3. If necessary, change the status of one or more series in the **Status** column. To select more than one series, use the Shift key in combination with the ↓ or ↑ cursor key or the Ctrl key in combination with the left mouse button. Now choose the required status for the selected series in the **Select on comp. status** field (above the **Status** column). The status is changed and the series that already had this status are displayed.
4. If the Barolocation is not on the list, you can add it using the **Locations** button. The **Change location properties** dialog box appears.



Click on the **Barolocation** field, select the correct location and click on **Close**. You cannot delete or add Barolocations here.

5. If necessary, change the other settings of the barometer wizard. To do so, click on the **Settings** button. For more information, see subsection 8.2.2 Adjusting the settings of barometer wizard.

Note! The selected settings will be applied to all series requiring compensation. If you only want to compensate one or a few measurement series with a particular setting, you have to allocate a different status to the other series, such as **Not yet**, for example.

6. Click on the **Compensate** button.

   What happens now?

   The compensation process starts up.

   Phase 1
   In the first phase, a progress bar appears in the bottom right-hand corner.

   This phase does not usually take long unless you have selected many dozens of series with **Do** or **Incomplete** status. During the process, the system will look for relevant barometer locations and data, optional manual measurements and optional offsets. Any shortcoming is reported for each series in a log file, and series get a status 'Unfit'.

   Phase 2
   If there is at least one suitable series, the second phase begins and the progress bar starts up again.

   This usually takes much longer. The duration depends on the total number of measurements in the database (this may be in the millions) and on the number of different barometer locations of the Diver series to be processed .

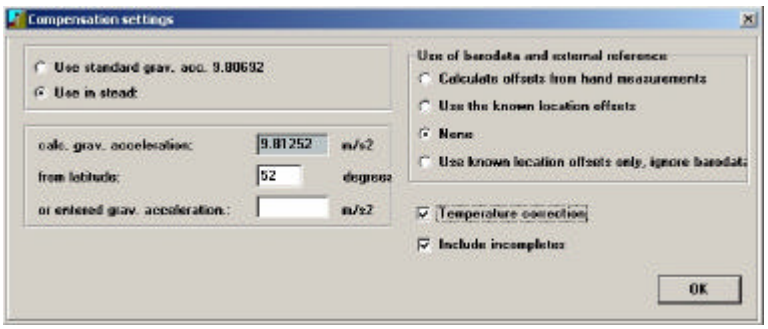
   Once the process is finished, you will see the message 'Compensation completed. See log file', which must be confirmed. You will now see that the barometer wizard displays only series with the **Done** status, if any.

7. Click on **Close** to return to the main window of LoggerDataManager.

8. Details of the compensation process such as the settings and the reasons why some series are found to be unfit or incomplete can be accessed via the **Log file** button in the barometer wizard. LoggerDataManager then opens the Compensation.Log text file with Windows' Notepad. This file is stored in the Exe subfolder, in C:\Program Files\LDM\Exe, for example.

8.2.2 Adjusting the settings of barometer wizard

You can alter a number of options for the compensation process in the barometer wizard. To do so, click on the **Settings** button. The **Compensation settings** dialog box appears:

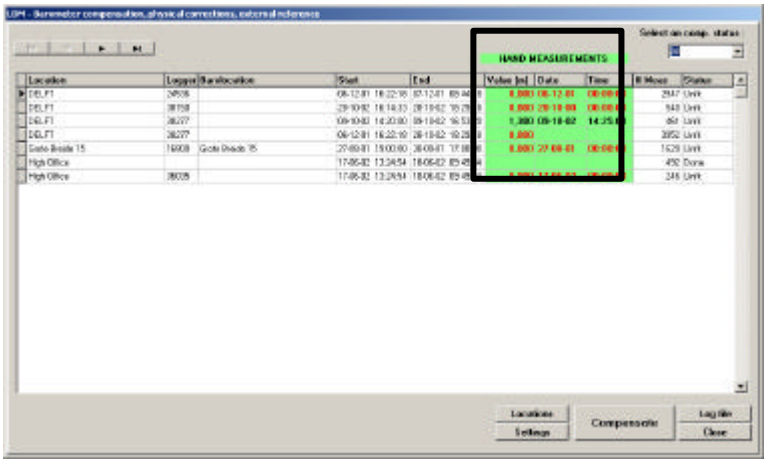


Once you have altered the settings, close the box with the **OK** button. The LoggerDataManager saves the settings for subsequent sessions.

Using an external reference

You can select one of the following options:

- **Calculate offsets from manual measurements**
  On page 51, you will find an explanation of how to use offsets from manual measurements. In this case, the compensation wizard will display extra columns in the list of measurement series for entering manual measurements. Double-click on a cell in the column to enter a value (which may be a negative figure). Manual measurements that were entered on tab **Logger settings > Read/program logger** before a series was read out for the logger, are automatically copied to the correct series in the list below. They can be modified here, if necessary.



The program checks whether the date and time of the manual measurement are within the interval of the measurement series and - if the barometer data is incomplete - within the interval of the barometer series. If not, the status is changed to **Unfit** and no compensated values are calculated for that particular series. If the series is found to be 'fit', a level offset is calculated for the location of the measurement series that indicates the height of the Diver's pressure sensor in relation to the external reference level. This offset is not only used for the compensation of the series, but is also assigned to the location of that series. This can be verified in the location lists. As long as the Diver remains suspended at the same height, a new manual measurement is theoretically unnecessary.

Note! If the date and time of the manual measurement are not between the start date/time and the end date/time of the series in question (in the **Start** and **End** columns), the data in the **Value**, **Date** and **Time** columns will be displayed in red.

- **Use the known location level offsets**
  If your Diver has been suspended on a stainless steel cable or a Direct Read Cable (DRC), you can enter a value via **Locations** in the **Level offset** field. If no value has been entered or the value is '0', the series at this location will be given the status "Unfit".
  The value in the **Level offset** field indicates the exact elevation of the Diver's pressure sensor in relation to an external reference level.
  If the DRC is 200 cm long, for example, the distance between the top of the monitoring well and the Diver's pressure sensor is exactly 200 cm. If the elevation of the head of the monitoring well was measured at +100 cm NAP, the value you enter in the **Level offset** field is: -100 cm (+100 cm NAP – 200 cm = -100 cm NAP). This method makes the use of manual measurements unnecessary.!

- **Use BaroData only**

  The result is a water column height in relation to the pressure sensor. The advantage of this is that a measurement series can never be found unfit due to the absence of a manual

measurement or a level offset equal to zero. The lack of a barometer location and/or a lack of data may still result in the assignment of the **Unfit** status.

- **Use known location's level offsets only; ignore barometer data**
  For some pump tests with a short duration, it is pointless to use barometer compensation and it is skipped for that reason, as are manual measurements. Only level offsets of the measurement series locations are used to establish a relationship with an external reference level.

About the gravitational acceleration

Divers are programmed with a gravitational acceleration of 9.806 m/s^2. The gravitational acceleration is a proportionality factor used by the Diver to convert the pressure measured by the pressure sensor to an equivalent water level above the pressure sensor.

The gravitational acceleration is dependent on the latitude. The gravitational acceleration varies by about 0.5% between the Pole and the Equator (with latitudes of 90 and 0 degrees). The pressure sensor has an inaccuracy of 0.1% of the full range. Consequently, it may be beneficial to correct the level measurements for a difference in the gravitational acceleration. For this, you can enter the latitude; LoggerDataManager will then calculate the appropriate gravitational acceleration.

However, the gravitational acceleration is also dependent on the inhomogeneity of the earth. In situations in which an extremely accurate correction is required, and a more accurate gravitational acceleration is available for the location than the figure calculated from the latitude, then this value can also be entered and will be used by LoggerDataManager, overruling the default value of the Diver AND any calculated value.

To enter a correction for gravitational acceleration:

1. In the barometer wizard tick the **Use instead:** box.
2. Enter the degree of latitude of the measuring area in the **from latitude** field. LoggerDataManager calculates the corresponding gravitational acceleration; the value is shown in the **calc. grav. acceleration** field.

   or

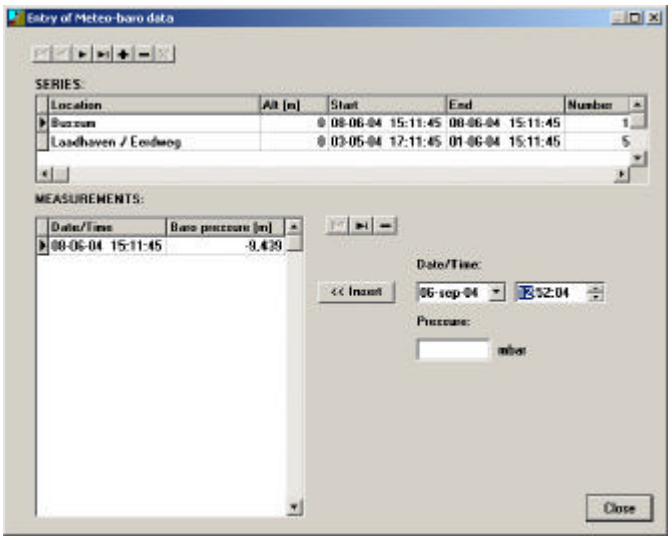
   Enter the correct gravitational acceleration in the **or entered grav. acceleration** field.

8.2.3 Entering barometer levels manually

It is sometimes necessary to add air pressure measurements manually to a location in LoggerDataManager, because the barometer was not started in time or stopped to early because its memory was full, for example. Manually entered barodata entered at a particular Barolocation will be used by the compensation wizard like any normal barometer series at that location.

A condition for doing so is that the location to which you want to assign barometer levels manually is included on the **Locations** tab.

1. In the menu bar, click on **File > User entry barodata** (or use hotkey Ctrl+B). The dialog box **Entry of Meteo-baro data** appears



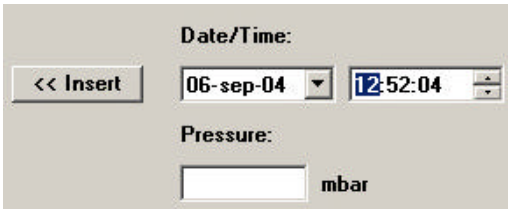
The first time you wish to enter barometer data in this way, the form will be empty. Only the system date and time have been filled in. If measurements have been added previously, you can select a series from the MEASUREMENT SERIES overview and then add or delete air pressure measurements.

2. In the **Location** column, click on the empty field and select the location that relates to the barometer levels you wish to enter. LoggerDataManager then automatically creates a measurement series to which you can assign the air pressure

levels. Only one series can be entered for each location; the intervals between consecutive measurements do not have to be constant. The other fields in the MEASUREMENT SERIES overview cannot be changed. The **Number** column indicates how many air pressure measurements have been entered manually for the location in question.

Note! If you select a location where no BaroDiver is registered (yet), this location will assume the character of a Barolocation. To use this series for compensation, you should assign this Barolocation to the locations of the series to be compensated. It is, however, inadvisable to use a location where normal Divers are already registered, since this may cause confusion.

3. Now enter your manual measurement in the **Date/Time** and **Pressure** fields. The air pressure is always entered in mbar.



4. Click on the **<<Insert** button. The measurement is added to the MEASUREMENTS list and the pressure is converted into a water column in the selected level unit.

   Each time you add a measurement, the values in the **Start**, **End** and **Number** columns are automatically modified (in the MEASUREMENT SERIES overview).

   If you want to delete an air pressure measurement, click on delete:

   You cannot delete a complete measurement series in the **Entry of Meteo-baro data** dialog. This is done in the main LoggerDataManager window, on the **Measurements** tab. You can recognise a location with measurement series that have been entered manually by the 'METEO' code in the Logger column.

9 Calibrating a Diver

9.1 About calibrating a Diver

Advanced

The **CTD-Diver,** the only Diver type requiring calibration, needs to be recalibrated regularly to guarantee their reliability. You can read more about the calibration in the product manual of the Diver.

9.2 Calibrate a CTD-Diver

It is extremely easy to calibrate CTD-Divers (DI261/263/265) with LoggerDataManager: the calibration wizard does it automatically for you. You only need to place the CTD-Diver in a calibration solution with a standard conductance. These solutions can be obtained from suppliers of laboratory equipment.

The CTD-Diver can be calibrated at a maximum of four points

The solution must have a temperature between 5°C (41°F) and 30°C (84°F). It is, therefore, advisable to place the fluid(s) in the room where the calibration is to take place long before actual calibration to allow the fluid temperature to stabilise.

9.2.1 Calibrating a CTD-Diver

Note! For all concentrations that you select for the CTD-Diver in the CTD calibration wizard, the calibration fluids should be put out ready for calibration. The CTD-Diver should then be immersed in the first fluid, i.e. the one with the lowest concentration. Then calibrate the selected calibration points in a sequence of increasing conductivity.

A CTD-Diver (DI261/263/265) is calibrated as follows:

1. Connect the CTD-Diver to your computer. See section 5.2 Connect a Diver to your computer for details.
2. Click the button **Read settings from connected logger** to read the sample settings from the Diver. See section 5.3 Read out measurement settings for details.

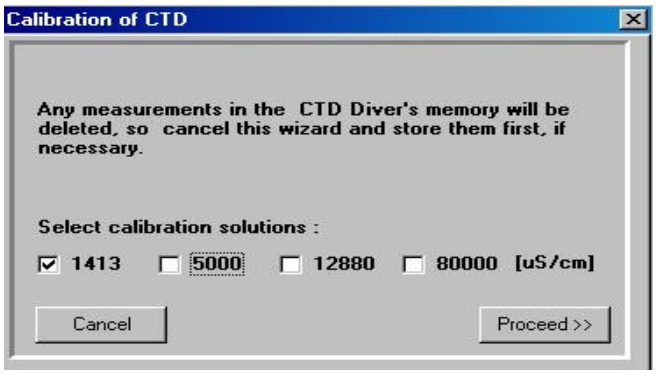
If the CTD-Diver is not in database, the settings are still saved and displayed on the **Logger settings > Read/program logger** tab. At the bottom of the screen on the left of the **Live update** subtab you will see the current status of the connected CTD-Diver. This must be **STOPPED** to be able to calibrate. If it is not, you can use the active **Stop** button. You can also read out any measurements present, as described in subsection 5.3 Read out measurement settings.

Note! Problems reading out data? Look for possible solutions in Chapter 10 Solving problems.

---

3. Start the calibration wizard with the **CTD calibration wizard** button in the toolbar or via the menu bar with **Communication > Calibrate CTD**. This button and menu option are only active when a CTD-Diver has been selected in the **Logger settings > Read/program logger** tab.

The **Calibration of CTD** dialog box appears.

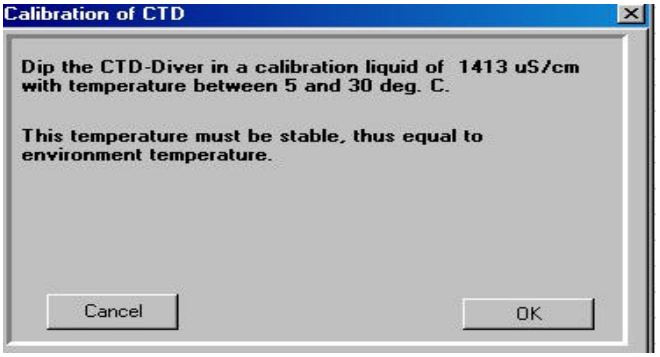


4. Select one or more calibration solutions for which you wish to calibrate the CTD-Diver. Your selection is stored in the program settings until the next session.

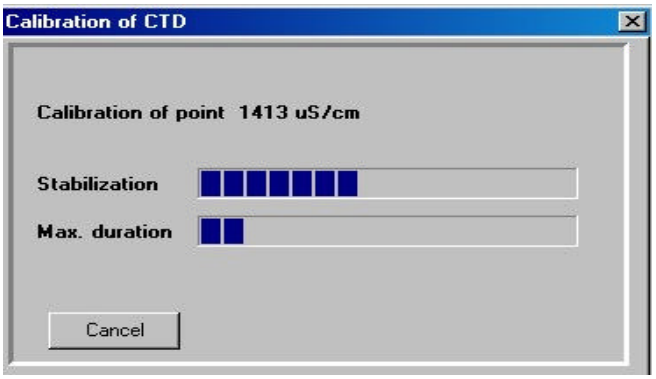
   Measurements will be most accurate near the selected calibration points. If you are measuring in water with a value between two calibration points, 8,000µS/cm for example, it is enough to calibrate at two points: 5,000µS/cm and 12,880µS/cm.

If you want evenly spread accuracy across the entire measurement range, you should select all calibration points within that range. If you are only interested in a high degree of accuracy of a small section of the measurement range, near 1,413µS/cm for example, only select calibration point 1,413 µS/cm.

5. Click on **Proceed>>**. This contains information on what calibration fluid the CTD-Diver should be immersed in.



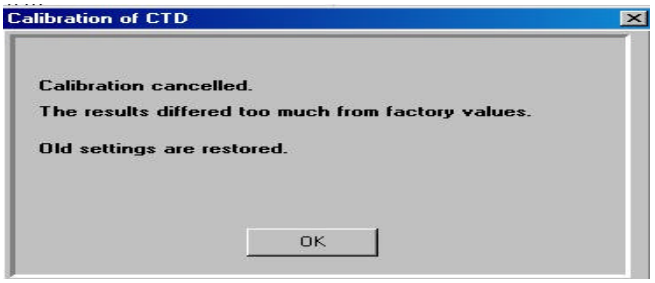
6. If you think the temperature is suitable, click on **OK**. The following step appears:



The bottom stabilization bar displays a one-minute interval in which the CTD-Diver is given the chance to create a stable calibration at the current calibration point. The progress of the stabilization is shown in the top stabilization bar. You can stop the process by clicking on the **Cancel** button.

Aborted calibration

If the calibration fails because the temperature was not stable, wrong solution used or process aborted by user, you will see the following message:

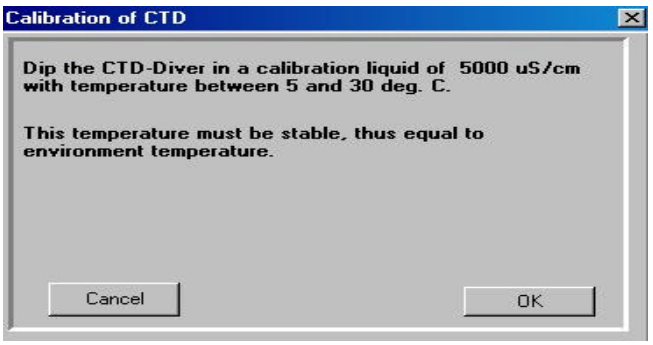


If you click on **OK**, the CTD-Diver is restored to its original condition and the wizard is closed.

Successful calibration

If the CTD-Diver does converge on the calibration point within the set time, one of two situations will occur:

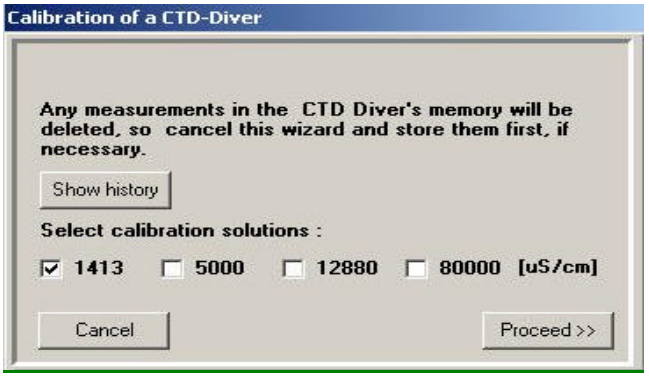
- you will see a message telling you that the calibration has been successful.
- the immersion step for the next calibration point appears if you have set more than one calibration point in the first step.



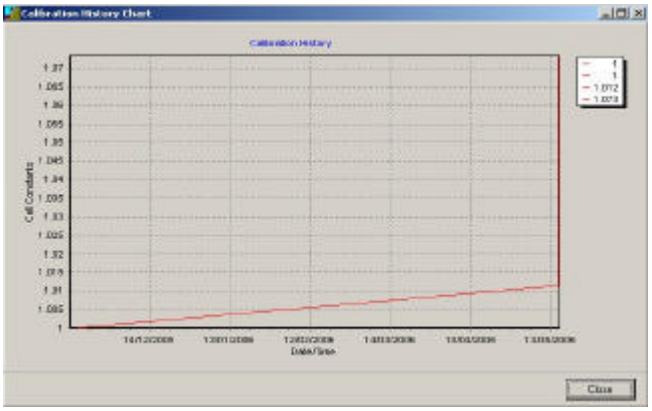
Once all of the calibration points have been dealt with, you can close the wizard by clicking on **Cancel** or return to the first step in the wizard by clicking on **Another CTD**. This enables you to calibrate several CTD of the same type without leaving the CTD calibration wizard.

9.3 Calibration History:

The calibration history is accessed by clicking the show history button on the calibration template.



A graph showing dates and cell constants for the connected CTD-Diver will then by displayed.



10 Solving problems

10.1 Communication interrupted

LoggerDataManager will inform you with a message if communication between the computer and the Diver is disturbed. For instance, when there is no Diver connected at all.

You can confirm the message, take action to solve the problem and then try again. Communication may be disturbed for the following reasons:

- The read out unit is not properly connected to the computer.
  Action: Ensure the read-out unit is connected to the correct serial port or select the correct port in LoggerDataManager. See the section 4.3, Adjust program settings for details.
- LoggerDataManager tried to communicate with the Diver just as it was taking a measurement.
  Action: Confirm the message and try again.
- The Diver is not properly connected to the read out unit.
  Action: Ensure that the optical connectors on both the Diver and the read-out unit are clean. If not, you can clean them with a soft cloth.

10.2 Incidental communication error

If the sample rate is less than 10 seconds, there is a chance a communication error occurs when reading out the Diver. This error is due to the way your personal computer deals with the communication by the RS232 port. Communication may be disturbed for the following reasons:

- There is not enough delay in the communication between the Diver and the computer.

  Action:

  1. Go to **Windows Explorer**.
  2. Open the directory **Program Files** and open subdirectory LDM\Exe (C:\Program Files\LDM\Exe).
  3. Open the file LDMSettings.ini in **Notepad** or **WordPad**.
  4. Add as last line: Delay=35
  5. Save the file and close **Notepad** or **WordPad**.

- The configuration of the COM port in your computer for receiving and transmitting data is set too high (FIFO buffers).

  Action: To resolve this problem it is necessary to change the settings of the COM port. Instructions for Windows XP:

  1. Go to **Start > Control Panel**
  2. Select **System** and click the tab **Hardware**.
  3. Click the button **Device Manager**.
  4. Select **Ports, COM1** (or COM2).
  5. Click on the tab **Port Settings** on the button **Advanced**.
  6. Select **Receive Buffer** or **Transmit Buffer** and move the bar from high to low.

10.3 Corrupt database

When the database is damaged, e.g. because LoggerDataManager has been aborted during a major database transaction with the Windows Task manager or with CTRL+ALT+DEL (see section 7.4), you can restore the database with the **LDMrepair** tool. You can create an error log during the repair process. This log file may help you to determine what is wrong with the database.

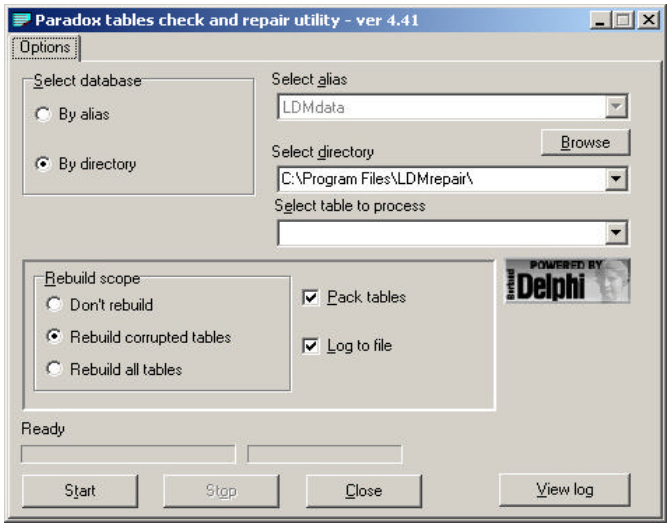
Start LDMrepair

1. Click the **Start** menu.
2. Select **Programs > LDMrepair**.

or:

Double-click the LDMrepair icon on your desktop:

The window **Paradox tables check and repair utility – ver 4.41** appears.



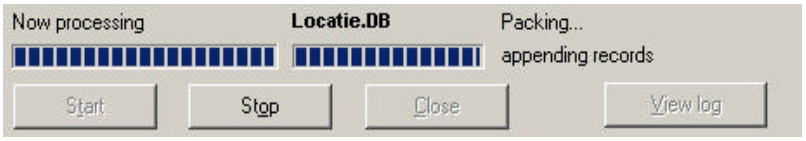
Repair the database

1. The default setting in the **Select directory** field is the path in which LDMrepair is installed (e.g. C:\Program Files\LDM\Exe\DB). Use the **Browse** button, if need be, to select the directory with the relevant database tables. From then on **LDMrepair** checks and repairs the Paradox tables in the selected directory.
2. Set the rebuild scope to **Rebuild the corrupted tables** or **Rebuild all tables**. Leave the option **Select tables to process** blank, or on <ALL TABLES>.
3. Check the **Pack tables** field if you want to remove all deleted records in LoggerDataManager (deleted records are not actually deleted in LoggerDataManager, but marked as 'deleted' so you do not see those records anymore). Checking this option will reduce the disk space of the database.

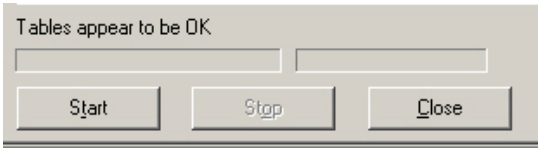
Note! The **Select alias** option and field can be ignored. LoggerDataManager databases are not equipped with alias identification. However, they could be used to select and repair other Paradox databases on your computer, if these databases have an Alias identification.

4. Click the **Start** button. LDMrepair checks all tables in the LoggerDataManager database directory and r epairs the tables if needed. In the progress bar you can see the status of the check-and-repair action.

5. Check the option Log to file if you want to append the list of errors (if any are found) to a log file.



At the end the result will be shown above the progress bar, e.g.:



If errors are found, the message “There were errors” is displayed instead. At the right of the tab **Options** another tab appears, with caption **Errors**. A list of the found errors is displayed on the tab sheet under this tab. If you had checked the option **Log to file** , this list of errors -with date and time- is appended to the error log file. This file is an ordinary text file, that can be viewed with Windows’ Notepad by clicking on button **View log** . You could mail this file to your supplier, if necessary.

Note! If the database cannot be repaired with **LDMrepair** (this is a very rare worst case scenario), you might consider importing the MON-file backups into LoggerDataManager again from the backup directory (see section 4.3 for settings). You must be sure that you still have MON-file backups of all data; first you must delete ALL loggers from the list of allocated loggers and ALL series of measurements, then repair and pack the database with **LDMrepair** before you start importing the MON-file backups. If you don’t want to do this yourself, consult your supplier.

Appendix – System requirements

Processor	Pentium® or better
Operating system	Windows 2000 or XP
Internal memory needed	10 MB
Disk space needed	7 MB or more
Display	• VGA : 1024 x 768, 256 colors; at lower resolutions you can still scroll through the user interface. • screen diagonal: 12 inch minimum 14 inch recommended
Pointing device	mouse or other pointing device

Index

Adjust
graph ... 38
measurement settings ... 19
program settings ... 12
Advanced ... 1
Altitude ... 10
Backup directory ... 14
BaroLocation ... 10
Barometer wizard ... 51
Basic ... 1
Browse bar ... 6
Buttons
browse bar ... 6
tool bar ... 5
Calculate offsets from manual measurements ... 57
Calibrating
CTD-Diver ... 62
COM port ... 13
Communication problems ... 69
Communications port ... 13
Connect
CTD-Diver ... 16
Diver ... 16
Coordinates system ... 10
Correction for
gravitational acceleration ... 59
CTD-Diver ... 2
adjust measurements settings ... 19
calibrating ... 62
connect to computer ... 16
program measurement settings ... 25
read out ... 31
select sample method ... 21
start ... 27
stop measurements ... 30
Customize LoggerDataManager ... 9
Database repair ... 67
Database switching ... 13
Defaults
using default location settings ... 11
Delete
measurements ... 47
measuring location ... 12
Density ... 10
Direct start ... 27
Directory
Backup ... 14
Data ... 13
Diver ... 2
adjust measurement settings ... 19
compensating level measurements ... 53
connect to computer ... 16
program measurement settings ... 25
reading out ... 31
select sample method ... 21
set correct time ... 27
start ... 27
stop measurements ... 30
DRC ... 17
Duplicates ... 47
Export measurements ... 55
Fixed sample method ... 21
Future start ... 28
Graph
adjust curves ... 40
set scales ... 39
shift ... 40
zoom in ... 39
Gravitational acceleration ... 59
Help ... 8
Import measurement files ... 33
Incidental communication error ... 67
Installation
first installation ... 3
new release ... 3
Instrument type and number ... 20
Latitude ... 59
LDM version
Advanced ... 1
Basic ... 1
Level measurements
compensating air pressure ... 51
relating to fixed reference level ... 51
Level offset ... 52
Location ... *See Measuring location*
Logger clock ... 27
Logger units ... 14
Master level ... 51
Master offset ... 52
Measurement settings
adjust ... 19
read out ... 18
save as default ... 26
use default settings ... 26

Measurements
delete ... 47
delete duplicates ... 49
export ... 44
import ... 33
merge ... 49
print ... 43
read current measurements ... 31
search ... 37
store ... 34
view ... 35
view in graph ... 38
view in table ... 37
Measuring ... 16
Measuring location
add a location ... 9
default settings ... 11
delete ... 12
Menu bar ... 5
Merge measurements ... 49
METEO ... 60
On line help ... 8
Print
graph ... 43
measurements ... 43
table ... 43
Problems ... 67
Program window ... 4
Programming measurement settings ... 25
Read out
Diver (measurements) ... 30
measurement settings ... 18
Repair database ... 67
Report title ... 13
Sample methods ... 21
Sample rate ... 20
Scale axes ... 39
Set time ... 27
Setup A, B, C ... 22
Shift the graph ... 40
Smart future start ... 29
Solve communication problems ... 67
Specific conductivity ... 24
Stop measurements ... 30
Store measurements ... 34
Switching databases ... 13
Tabs
Application management ... 7
Default settings ... 11, 26
Live update ... 8
Location defaults ... 9
Locations ... 9
Logger list ... 7
Measurements ... 6
Program settings ... 12
Read/program logger ... 18, 25
Settings ... 12
Take measurements ... 27
Title report ... 13
Tool bar ... 4
Trouble shooting ... 67
Units ... 10
User Defined Sample method ... 23
Variable sample method ... 21
Wizard
barometer ... 51
CTD calibration ... 62
Zoom in ... 39