"Drulo Control" Operating Instructions

Version 1.0.3.20 and higher

Contents

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1 Introduction

1.1 General Information

Pipeline networks designed to supply vital goods such as drinking-water require special and very thorough monitoring. The pressure values gathered reveal important information about the fire safety and about the supply reliability of such a supply network. Guaranteeing supply reliability even during peak times requires prior measurements to be carried out with pressure loggers.

Pressure loggers are mounted at several spots at the pipeline section. Simulating consumption leads to a situation of different pressure levels, and the pressure pattern on the particular pipeline section reveals information about the condition of the pipe. Graphical editing and comparability of the measurement-related data is reasonable to provide the user with an overview of the pressure situation found at the single pressure logger locations.

F.A.S.T GmbH has developed the DRULO software to support the user by evaluating the measurement-related data acquired by the receiver. Due to the software, pressure loggers can also be programmed for certain measurement purposes. For the user's convenience, the acquired measurement-related data can be displayed as a curve, if requested. In addition, the software features a function that enables the user to eclipse different measurement curves and to export entire measurements into Excel for further processing.

1.2 Overview of Chapters

This manual has four chapters. First, the Introduction followed by the chapter Programme Design. The third chapter is to provide information on the single menus and on the particular sub-menus. Chapter four lists all the functions available in the various programme fields.

2 Programme Design

2.1 Menu

Various menu options available in the "File", "Settings", "Mode", and "Help" menu levels are to control the single programme functions. The "File" menu level contains functions which are to help you to save or to load measurement procedures. Furthermore, the programme can be terminated either through this menu level or by pressing the "CTRL" + "E" key combination as a shortcut. For a visualization of the expanded menu level, please refer to Illustration 2-1 below.
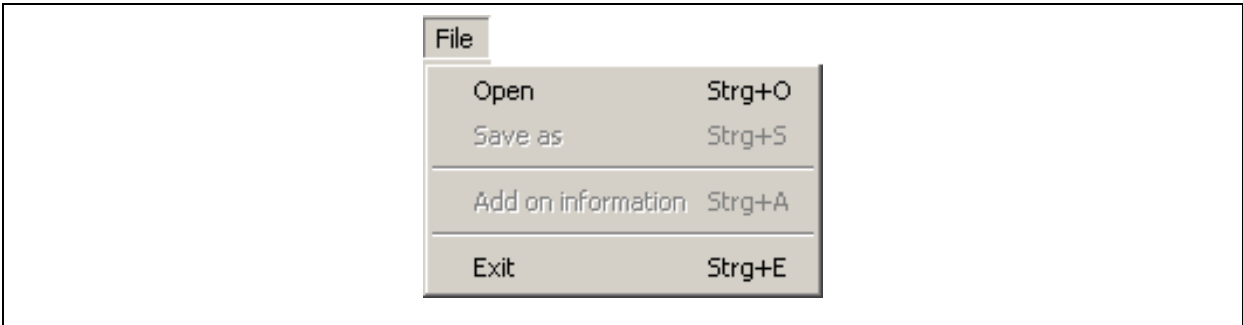
Illustration 2-1: Close file

In the "Settings" menu level, various features of the programme can be changed. An essential functionality which can be changed through this menu level is the display, i.e. the language and the graphical layout of the diagram. Furthermore, the configuration of the communication parameters which control the data exchange with the read-out units can be changed here. This menu level also leads you to the mask for the GSM modem administration. The final menu level of this menu (Illustration 2-3) allows you to call the Database Assistant, which is required to initialise and to update the database. For a detailed description of the single menu levels, please refer to Chapter 3.2.
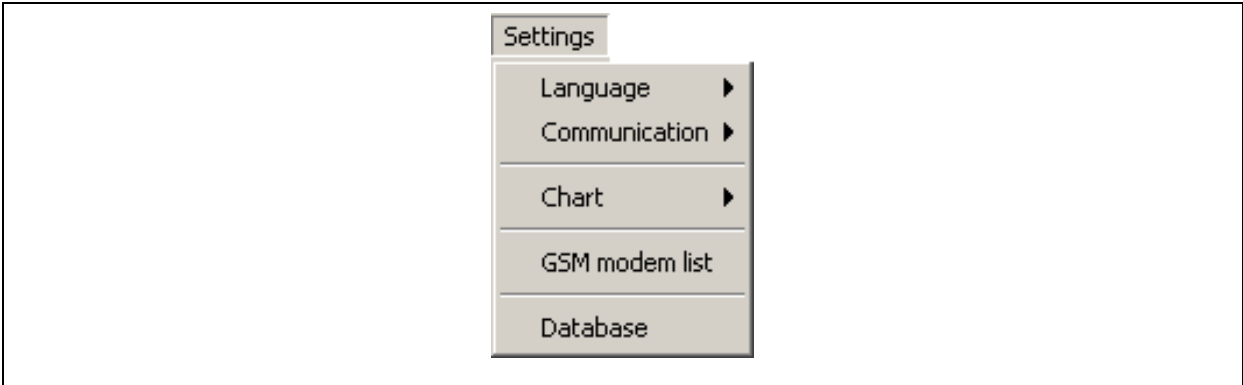
Illustration 2-2: Settings

In the "Mode" menu level, the operator can select between the two programme transmission modes. The "serial" mode, which is the second mode shown in Illustration 2-3, is the standard mode used in the programme to control the read-out boards connected to the USB. The "GSM" mode is used to read out pressure loggers which are equipped with GSM modems. However, the GSM modems have to be configured beforehand, and the configuration data has to be entered into the programme. The settings of the modems can be configured through the "GSM modem list" menu level in the "Settings" menu.
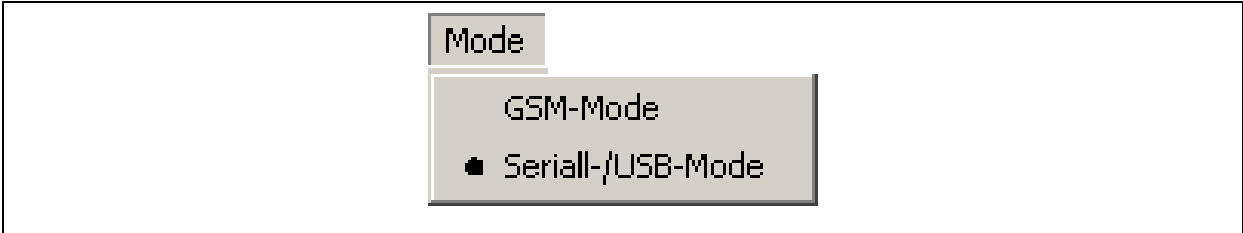
Illustration 2-3: Mode menu

Another feature is the menu "Help". Here the user can access any information on the programme version, contact data, and hardware-related information about the read-out board. For a detailed description concerning the information available please refer to Chapter 3.4. Illustration 2-4 shows the menu as soon as the menu has been activated.
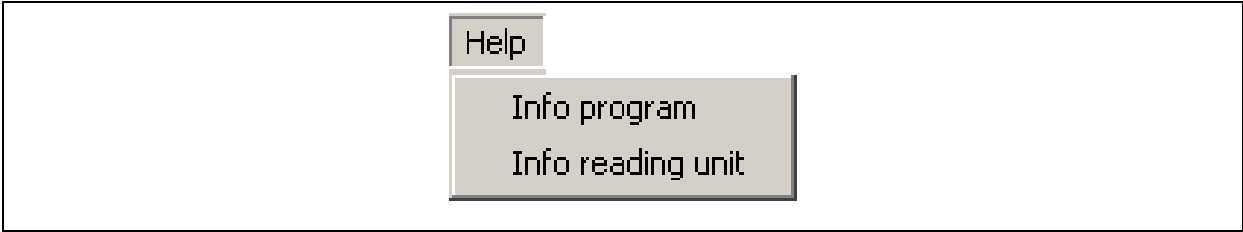
Illustration 2-4: Help menu

2.2 Menu Bar

The menu bar below the "Files" and "Settings" menus offers further functions. However, the usable functions are context-related and thus only available for certain constellations. When certain functions cannot be used due to the particular context, these de-activated functions will be shadowed in grey in the menu bar. Illustration 2-5 below shows the menu bar. For further information on the single functions, please refer to section 3.5.

Illustration 2-5: Menu bar

2.3 State Bar

The state bar informs the user about the progress made by the particular functions called. On the one hand, the user will see a written description of the tasks done and on the other hand, on the left- hand side, the user can see the progress made displayed in a graphical way.
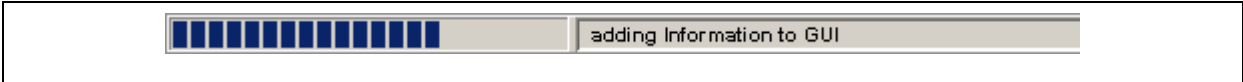
Illustration 2-6: State bar

2.4 Fields

There are two fields offering different functions in the Drulo Control programme. These two fields are "`Drulo and Measurements`" and "`Measurement Curve`". The particular functions of each field are context-related and thus only available for specific constellations.

2.4.1 Drulo and Measurement

This is the part of the programme where the measurements saved in the database and the pressure loggers connected to the read-out board as well as the latest measurements are displayed (Illustration 2-7). The user will receive detailed information on a particular measurement or a pressure logger by selecting this measurement or logger. This information will then be displayed below the field "`Drulo and Measurements`" and can be used as additional information on the selected object (Table 2-1).

Furthermore, the context-related functions of the menu bar (Chapter 2.2) will be released as soon as an object has been selected. On selecting the pressure logger, the buttons (Illustration 2-5) one to six will be released and on selecting a measurement, the buttons seven to nine and eleven to fifteen will be released to provide the user with extended functions. For further information on the single functions, please refer to Chapter 3.5.

Measurement	Pressure Logger
Start time	serial no.
End time	measured value
measure. period	measurements
Intervals time	software version
measured values	pressure sensor
battery voltage int. / ext.	calibration
min air preassure	battery voltage

max air preassure	
absolut Max.	
absolute Min.	
absolute differ.	
maximum pressure	
minimum pressure	
difference in pressure	

Table 2-1: Additional information

Illustration 2-7: Drulo and Measurement field

2.4.2 Measurement Curve

The "Measurement Curve" field displays the values acquired by the pressure loggers as a line diagram, with the Y-axis showing the pressure at the particular measuring spots on the time / X-axis (Illustration 2-8). The time unit is hours, minutes, and seconds (HH:mm:ss). If several curves are to be eclipsed, the time unit can also be set to months or even years according to the intervals of the single measurements.

Further functions of this section can be activated through the buttons as shown in Illustration 2-8. When you are looking at a single curve and intend to divide this particular curve into several curves or to determine the difference between the minimum pressure and the maximum pressure of a measurement, go to the "Split" and "Calculate" buttons respectively. Even several diffusing curves can be eclipsed and marked through the "Overlap" and "Mark" buttons respectively, and certain data sections can be selected and exported to Excel. For further information on the single functions of this field, please refer to Chapter 4.
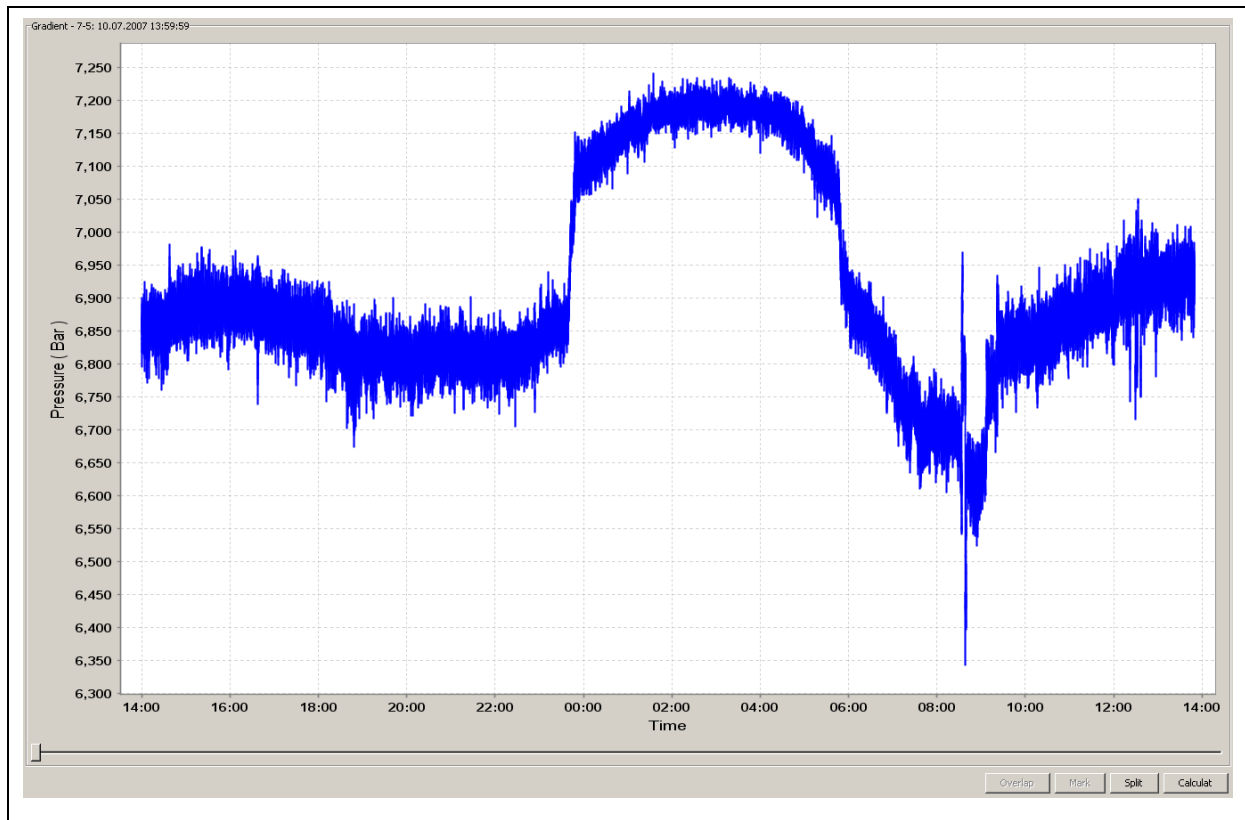
Illustration 2-8: Measurement curve

3 Menu Functionality

Chapter 3 is to explain the single menus and their submenus in detail. Chapter 3.1 starts with the functions available in the "File" menu, Chapter 3.2 then deals with the "Settings" and Chapter 3.3 the menu "Mode". Finally, Chapter 3.4 is to describe the functions of the "Help" menu. The menu bar as well as the affiliated functions is described in Chapter 3.5.

3.1 Files

3.1.1 Open File

Programme version 1.0.1.5 and higher enables you to save measurements in a separate file in order to realize any exchange of measurements in connection with another Drulo operation programme, if requested. If you intend to open a file which always has the ending of "dfl", select "Open" in the "File" menu or use the "CTRL" + "O" shortcut. A dialogue will then be displayed where you can select the file to be opened. Click on "Open" in order to load the file into the programme.

Please note that not every "dfl" file can be opened with every programme version of the Drulo operating programme. The latest programme version such as version 1.0.3.20 is generally capable of opening the data saved by any previous version (versions 1.0.1.1 to 1.0.2.17). A previous version, however, is not capable of opening the data of a newer version.

Loading the file may take a few seconds and depends on the size of the file. Once the file has been loaded it can be seen in the "Drulo and Measurements" section (Chapter 4.1). When you have opened the file, the measurement-related information are saved in the database and will be displayed every time the programme is started. If you do not wish to have this information indicated with every start of the programme, delete the measurement as described in Chapter 3.5.11.

3.1.2 Save File

In order to make the loading of files feasible, the measurement-related files have to have the ending "dfl". The "Save as" features and the "CTRL" + "S" shortcut respectively helps you to create such files.

Just mark the particular file to be saved as described in Chapter 4.1. When you have marked the file, the "Save as" menu option in the "File" menu will be available. Calling this menu

option makes dialogue window appear where you can input the saving path as well as the allocated name of the measurement concerned. Once you have entered the file name and selected the saving path, click on "Save" to save the measurement in the new file. When a measurement has been saved, it is still available in the "Drulo and Measurements" section (Chapter 4.1). If, however, the measurement you have just saved does not have to appear in this section, you can delete the measurement as described in Chapter 3.5.11.

3.1.3 Enter Additional Information

As described in Chapter 4.2.3 the programme offers the option to save additional information on each measurement in the database. This procedure has, so far, been implemented as described in Chapter 4.2.3. From programme version 1.0.1.5, the Drulo programme offers simplified access to this information window through "Add on Information" in the "File" menu. Please note that the selection procedure as described in Chapter 4.2.3 still has to be carried out.

3.1.4 Close the Programme

Select "Exit" from the "Files" menu or press "CTRL" + "E" to close the programme. The measurements do not need to be saved separately as the programme saves them automatically. Only those measurements showing a red exclamation mark are not saved due to a read-out error.

3.2 Settings

3.2.1 Language

You can select the desired language for all texts at "Settings" -> "Language". The software supports up to fourteen languages as shown in Illustration 3-1. As soon as the programme has been installed, English and German are available immediately as these two languages have been firmly integrated into the programme and cannot be deleted. Consequently, you can only select English or German in the "Language" menu.

Illustration 3-1: Menu Language

If you want to select another language, a so-called language file has to be created beforehand. For your support, the programme generates a template for the language file in the "lang" folder while the programme is being installed. The "lang" folder is located in the setup directory of the Drulo Control programme. For example, if you have installed the programme at "C:\Programmes", the setup directory of the programme will be found at "C:\Programmes\Drulo" and the template for the language file will be found at "C:\Programmes\Drulo\lang". Once you have opened the "lang" folder, you will see the template called "Sprache.properties". This file can be opened and edited either with the "Editor" programme or with the "Wordpad" programme. However, before you start editing the file, you will have to make a copy of the "Sprache.properties" file and save this copy file in the folder as the original template must not be changed to prevent programme errors. **So please never change the template, always change the copy only.**

You can create a copy of the file by clicking on and marking the file with the left mouse key. Then move the cursor across the marked file and press the right mouse key to open a so-called pop-up menu. Select "Copy" and press the left mouse key again. Make sure that you insert the copy into the same folder by going to "Edit" and selecting "Past". You should now have

another language file in the "`lang`" folder called "`Copy of Sprache.properties`". This copy can now be adapted to your language. When the language has been adapted, the name of the language file has to be adapted so that the programme can identify and load the file. Please rename the copy of your language file ("`Copy of Sprache.properties`") according to the following convention:

- French -> "`Sprach_fr_FR.properties`"
- Spanish -> "`Sprach_es_ES.properties`"
- Italian -> "`Sprach_it_IT.properties`"
- Danish -> "`Sprach_da_DK.properties`"
- Norwegian -> "`Sprach_no_NO.properties`"
- Swedish -> "`Sprach_sv_SE.properties`"
- Portuguese -> "`Sprach_pt_PT.properties`"
- Polnisch->"`Sprache_pl_PL.properties`"
- Russisch->"`Sprache_ru_RU.properties`"
- Chinesisch->"`Sprache_zh_CN.properties`"
- Tschechisch->"`Sprache_cs_CZ.properties`"
- Slowenisch->"`Sprache_sl_SI.properties`"

3.2.2 Communication

In version 1.0.3.2, the "`Communication`" menu has been extended and now offers additional configuration parameters for the GSM communication. In contrast to the "`GSM modem`" menu level described in detail in Chapter 3.2.4, the following hardware components directly connected to the computer are configured through these menu levels: the read-out unit which is used to directly read out the pressure logger and a modem which is used to transfer the data to a pressure logger.
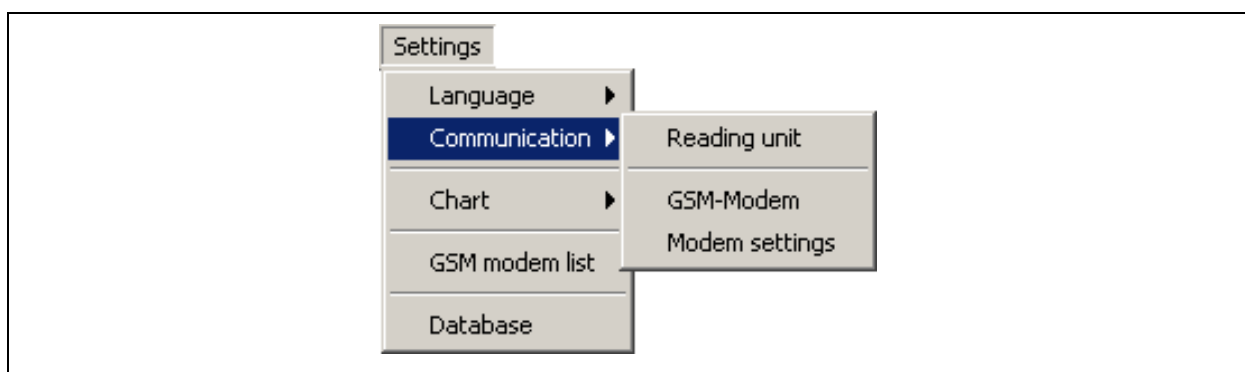
Illustration 3-2: Menue Communication

Before reading the data from the pressure logger through the read-out unit into the Drulo programme, you will have to configure the parameters of the interface. The read-out unit will be connected to the computer via USB and generates a virtual interface in the operation system. This virtual interface is called "Comm-Port". If you click on the "Settings" -> "Communication" -> "Reading unit" menu levels, the dialogue as shown in Illustration 3-3. will appear, and the "Comm-Port" can be selected in the first box. All parameter settings following the Comm-Port as shown in Illustration 3-3 represent the standard values and should not be changed. The settings will be saved by clicking on the "Save" button. The pressure logger can then be read out as described in Chapter 3.5.1.

If the Comm-Port cannot be selected in this dialogue once the read-out unit has been connected and the Drulo programme has been started, the driver for the hardware has to be installed. In this case, please terminate the Drulo programme and install the USB driver from the installation CD. Another reason why the Comm-Port is not indicated in the dialogue may be a change in the Java periphery, e.g. by means of an update or due to a new installation. In this case as well, please terminate the Drulo programme and execute the "ComFixPatch" from the installation CD.

Illustration 3-3: Dialogue for the interface settings

The programme requires a modem for the communication with any pressure logger which is read out with a GSM modem in order to establish a connection between the programme and the GSM modem of the pressure logger. Such a connection to a GSM modem can either be established by means of a cable modem or by means of another GSM modem. Similar to the

read-out unit, the interface parameters for the modem connected to the computer have to be configured through the "Settings" -> "Communication" -> "GSM modem" menu level. After clicking on the menu level, the dialogue as shown in Illustration 3-3 will appear. This dialogue is similar to the dialogue for the read-out unit. The only difference between these two dialogues is the parameterisation of the interface settings.

The Comm-Port also depends on the applied operation system and is determined by the system. However, the Comm-Port definitely differs from the Comm-Port used for the read-out unit. If you have purchased a modem from F.A.S.T. GmbH for the above communication, you have the option to use the following parameters for the configuration of this interface and to regard these parameters as standards parameters:

- **baud:** 9,600
- **data bits:** 8
- **stop bits:** 1
- **equality:** none
- **flow control:** none
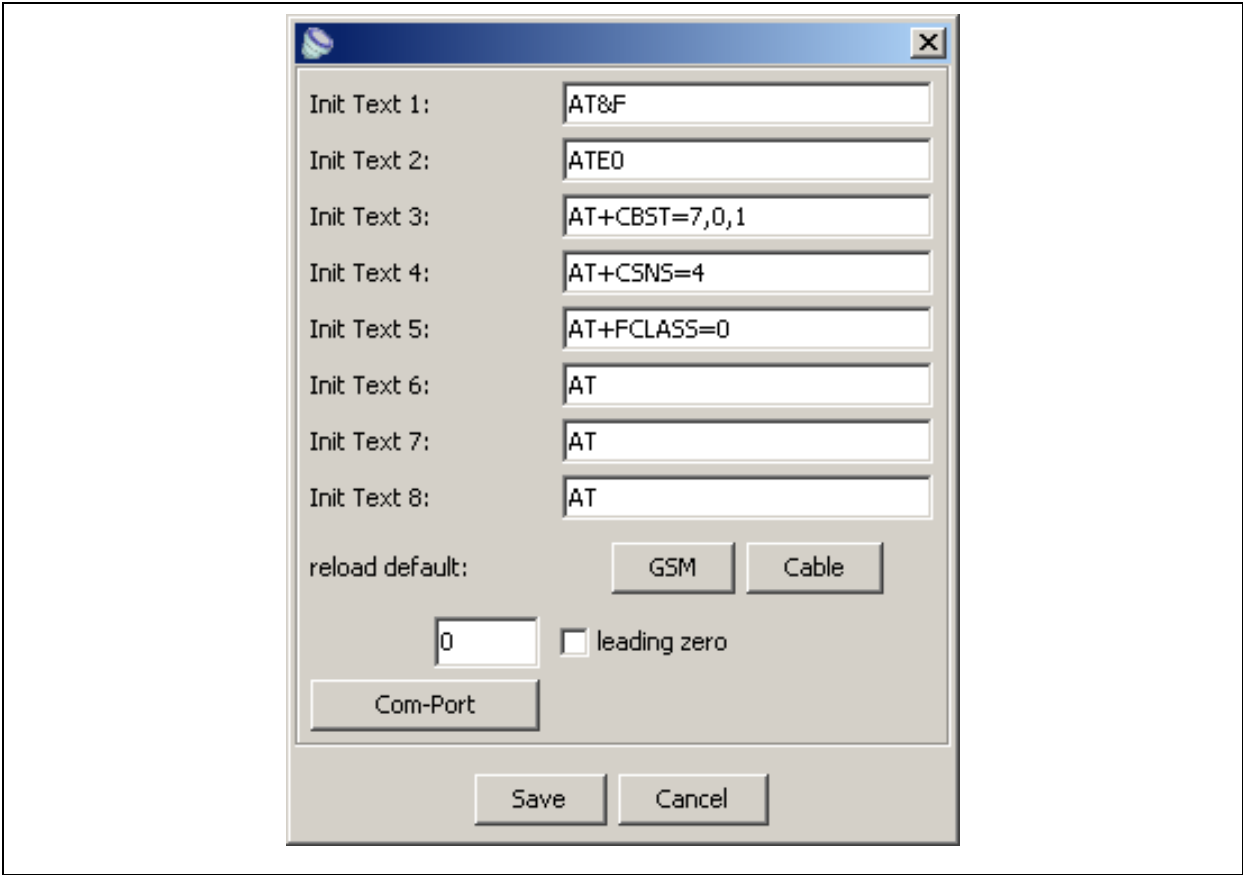
Illustration 3-4: Dialog Modemsettings

The "`Settings`" -> "`Communication`" -> "`Modem settings`" menu level will take you to the dialogue as shown in Illustration 3-4. This dialogue contains the initialisation parameters which are transmitted to the modem connected to the computer during the connection establishment process. If you have purchased a modem from F.A.S.T. GmbH, you can call the standard parameters of the modems through the "`GSM`" and "`CABLE`" buttons. The denomination of the two buttons reflects the kind of the connected modem. Also, you can determine the pre-selection code for the modem if the modem is operated in combination with a telephone system, i.e. if it is necessary to dial a certain number, e.g. an `8`, in order to get a free line, enter an `8` into the box which reads "`leading zero`". Then click on the box for the tick to mark this box with a tick. From now on, the modem dials an `8` to get a free line. All changes made in this dialogue can be accepted by clicking on "`Save`" or can be deleted by clicking on "`Cancel`".

3.2.3 Diagram

This menu level is to provide you with functions affecting the layout of the diagram. The "`Settings`" -> "`Chart`" -> "`Marker`" menu level allows you to switch on / off the display of the measurement points. This means that the measurement points are either displayed with little circles ("`on`") or there will be only connecting lines between the single measurement values ("`off`"). The second menu level "`Settings`" -> "`Diagram`" -> "`Level marker`" deactivates the display of the threshold limits when event-controlled measurements are selected. So the limits displayed as a chain line will no longer be displayed in the diagram in the "`off`" position.
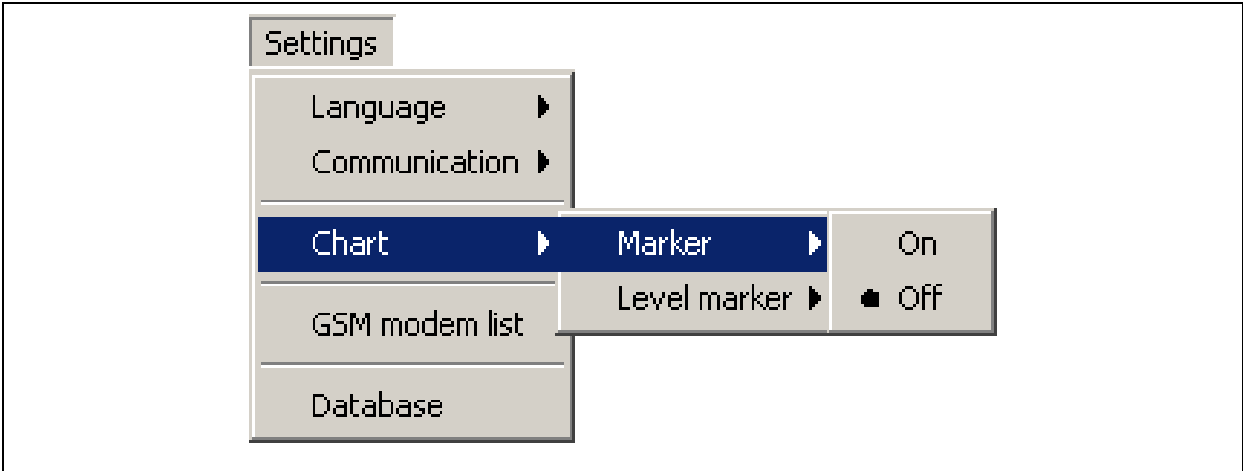
Illustration 3-5: Menu Settings -> Chart

3.2.4 List of GSM Modems

A basic display of the information flow between the programme and the pressure logger is illustrated in Illustration 3-6. As you can see, two modems are involved in the read-out procedure at the pressure logger. One modem is directly connected with the computer; the other modem is directly connected with the pressure logger. The modem connected with the computer by means of a cable is called "`cable modem`" in Illustration 3-6 and can be set through the menus described in Chapter 3.2.2. This modem operates fully independently in contrast to the "`GSM modem`" concerning the settings in the programme. The settings for the "`GSM modem`", which allows the pressure logger to establish a connection through the GSM network, are configured through the dialogue as shown in Illustration 3-7 which is explained in detail in the following sections.
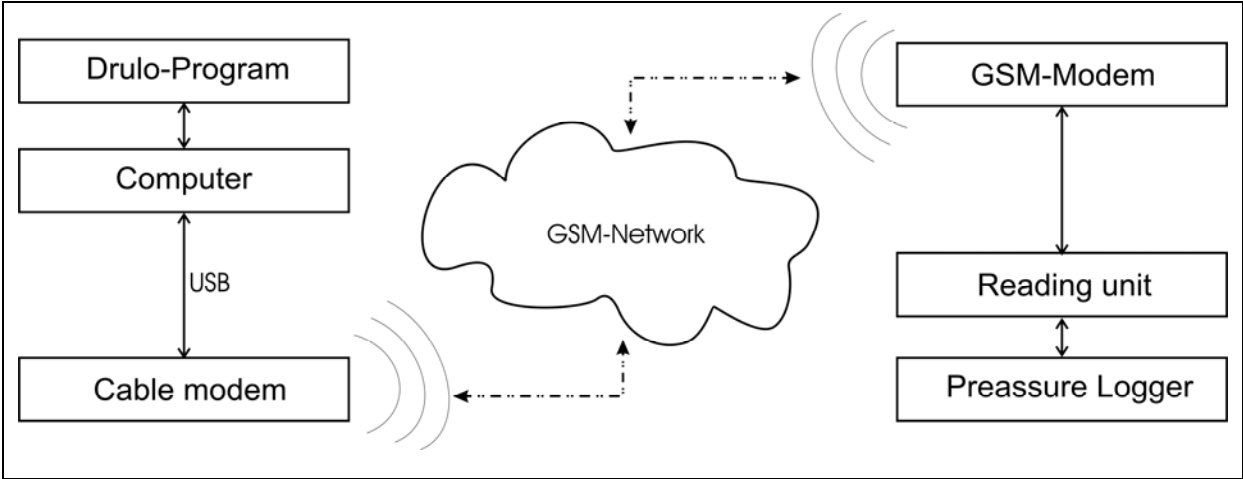
Illustration 3-6: GSM - Connection scheme

The dialogue "`Online times GSM modem`" (the modem directly connected at the pressure logger) shows how to set the modems. In order to do so, the window offers three sections. The first section is the menu bar, which offers functions used to read out information such as "`SIM-ID`", "`Time`", "`Battery power`" and "`Failure record`" from the GSM modem. The second section is to the left of the window below the menu bar. (Illustration 3-7) and indicates the connection parameters of the GSM modems. These parameters are saved in the database. To the right, you will find the third section of the window. In this section, the online times of the modems are configured and saved, and also the parameters of the SMS status reports can be changed here.

If you intend to program or change the online times, the modem has to be connected with the computer by means of the USB cable, which is part of the delivery. In order to do so, the

connection between the modem and the programme has to be configured as "Reading unit" as described in Chapter 3.2.2. You have to press the key on the modem before you connect the modem with the computer through the USB cable. As soon as the key has been pressed, the green LED on the modem starts to flicker and thus indicates that the modem is now ready for communication. You can now connect the modem with the computer and configure the interface between the programme and the modem. Once you have finished this step, you can call the "Online times GSM modems" dialogue.
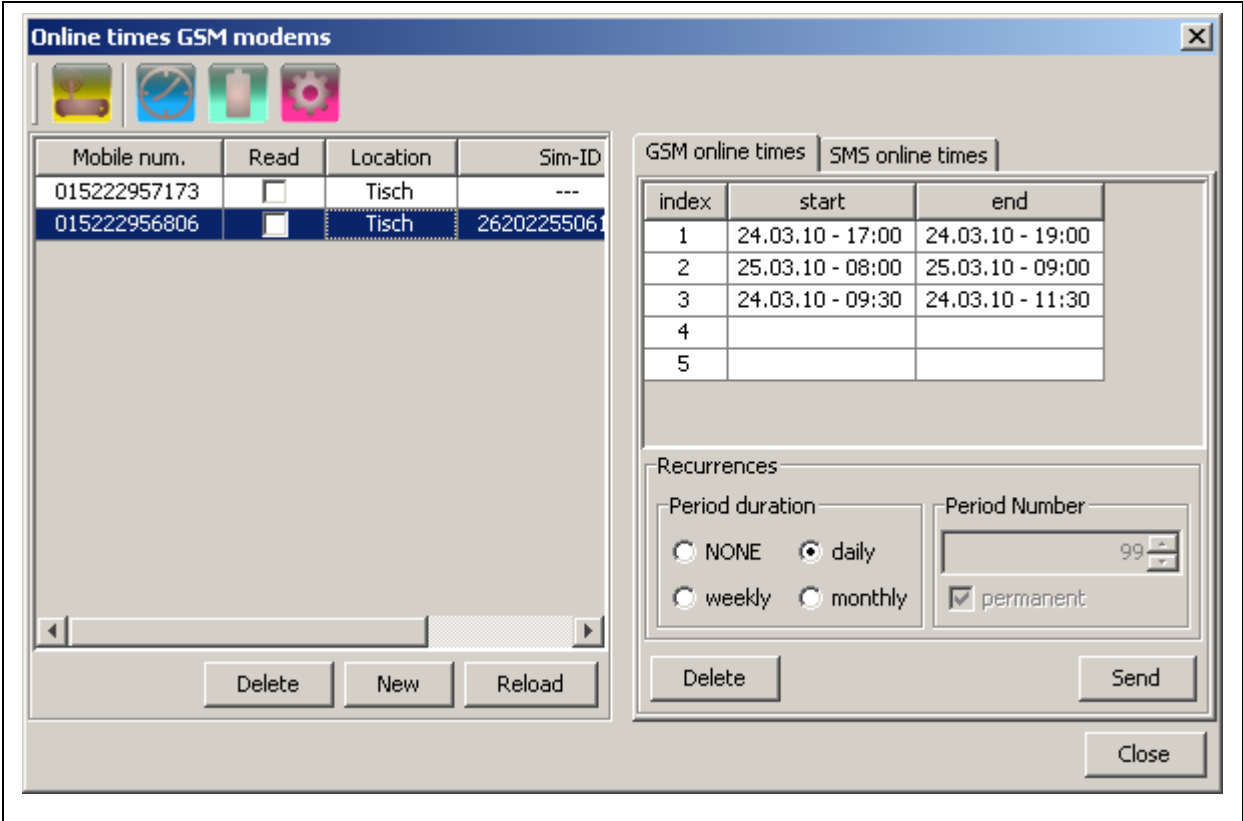
Illustration 3-7: Dialog Online times

Menu bar

As already mentioned, this menu bar offers four functions as shown in Illustration 3-7. The first function –the yellow icon– allows you to read out the SIM-ID of the modem. If data stored in the modem has been read out and the database contains a data record with the SIM-ID just read out, the corresponding data record will be marked in the chart and the online times of the modem will be displayed provided these times have already been configured. If there is no data record with SIM-ID available in the chart, the dialogue as shown in Illustration 3-8 will be displayed.

In the "`Modem number`" dialogue, (Illustration 3-8) you can enter the mobile number of the modem as well as a short text describing the particular location of the modem. By ticking "`Yes`" or "`No`", you can activate the connection to the pressure logger as described in Chapter 3.5.1. If you don't tick "`Yes`", the programme will read out the pressure logger only if the connection times of the pressure logger modem match the connection times of the computer. The data will be saved in the database by clicking on "`Accept`". The data will not be saved, if you click on "`Close`".
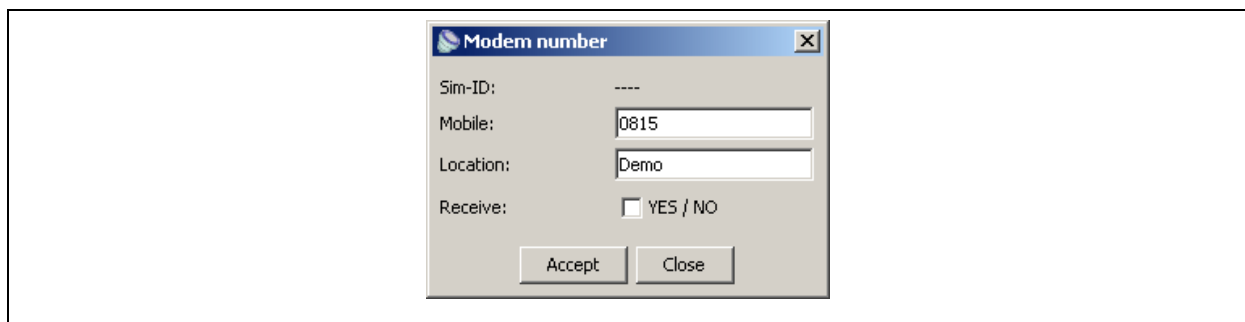
Illustration 3-8: Dialog Mobilenumber

The second icon (bluish) offers a function which allows you to change the modem time. The currently activated time will be displayed in a dialogue after clicking on the icon. In this dialogue, you can change the time and save the changed time in the modem by clicking on "`Save`".

The third function (turquoise icon) is to indicate the current battery status of the modem. Clicking on the icon activates a dialogue which indicates the voltage provided by the external and internal batteries.

Clicking on the last icon in the menu bar allows you to read out the fault memory of the modem. This fault memory saves all relevant information on a connection set-up and also saves information on basic incidents concerning the power supply.

Left-hand area

As already described, the area in the left of the window (Illustration 3-7) shows the modems available, i.e. those modems which can be queried by the programme as soon as the particular mobile numbers have been entered in the "Mobile Number" dialogue (Illustration 3-8) and the configuration of the connection times has been completed. The table also holds all information of the dialogue as shown in Illustration 3-8. If you click on "`Delete`", you can delete a data record from the table, i.e. you can delete the modem settings from the

programme. By clicking on "New", you have the option to create manually a new data record in the table. After pressing this icon, the programme will try to read out the modem connected, i.e. the programme will query the SIM-ID of the modem. If there is no modem available, the "Mobile Number" dialogue will open without any SIM-ID being entered automatically. You can now add any missing information and save this information in the table by clicking on "Save". The "Update" icon function is to update a data record marked in the table with data from a modem. In order to do so, please connect the modem to the computer so that the pressure logger at the modem as described in Chapter 3.5.1 can be read out. As soon as the modem has been connected, you can open the dialogue, select a data record in the table, and click on "Update". This update process updates both the so-called online times (connection times) and the SMS settings in the database.

Right-hand area

The right-hand area of the window is divided into the "GSM online times" and into the "SMS online times". As the GSM modem currently features only rudimentary SMS message support, this part of the programme is not described in further detail in these Operation Instructions.

The "GSM online times" field allows you to programme up to five time slots on the modem. A time slot has a start-up date (including time) and a finish date (including time). Double-clicking on one line of the table opens the dialogue as shown in Illustration 3-9. This dialogue allows you to determine the start-up and finish times of a time slot. Please note that the time slots must not overlap. If two or more time slots overlap, the particular time slots will not be accepted by the modem.
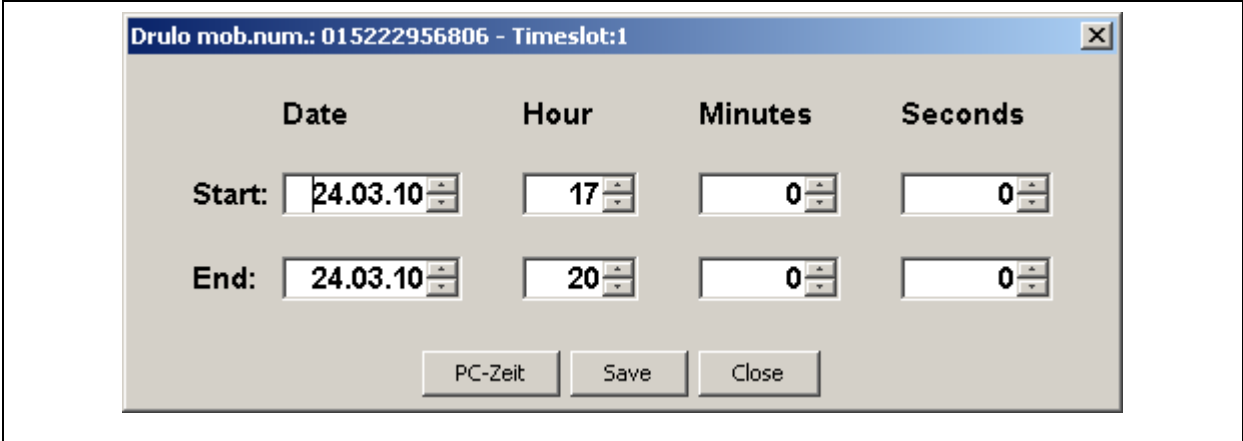
Illustration 3-9: Dialog Online time settings

If you click on "PC time", the current time given by the computer will appear in the fields. The set values will be saved by clicking on "Save" or can be rejected by clicking on "Close". The values shown in the single fields can be changed either by entering the desired values or by pressing the arrow keys (right to the fields)

Below the table, you will see the "Repeat" segment, where the set connection periods can be repeated in fixed intervals. If the field "NONE" (Illustration 3-7) has been selected, the measurements will be executed only at the set times. If the field "Daily" has been selected, the measurements will be repeated on the following day. The field "Period Number" you can set the number of repetitions, from one single repetition of the measurement up to a continuous repetition of the measurement ("permanent" box ticked) at the set interval.

Please note that the settings are saved in the database first, and not in the modem automatically. Saving the settings in the modem requires an explicit data transfer to the modem by clicking on the "Send" button. Once the data has been transferred, the programme will generate a message indicating the number of measurements saved in the modem. If the number of measurements saved differs from the number of measurements shown in the table, this indicates that there is an overlap in connection times. If so, please remedy the overlap by re-setting adjusted connection times and transmit the re-set connection times to the modem again as the modem will go online only at the saved times

3.2.5 Database

Start the Assistant at "Settings" -> „Database" (Illustration 3-10). The main window of the Assistant will open up.
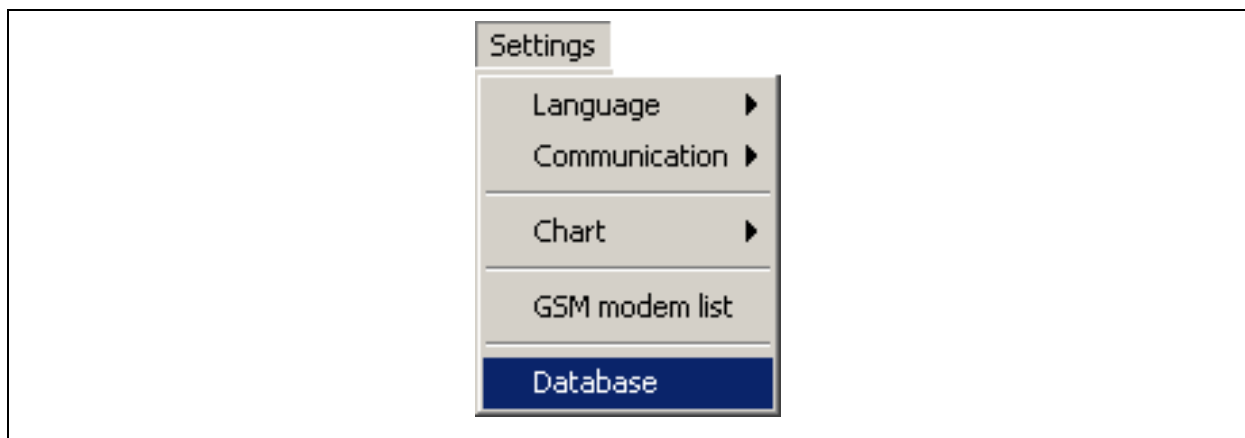
Illustration 3-10: Settings -> Database

Initialising the Database

Click on the "User" button to enter the username and the keyword for database access (Illustration 3-11).
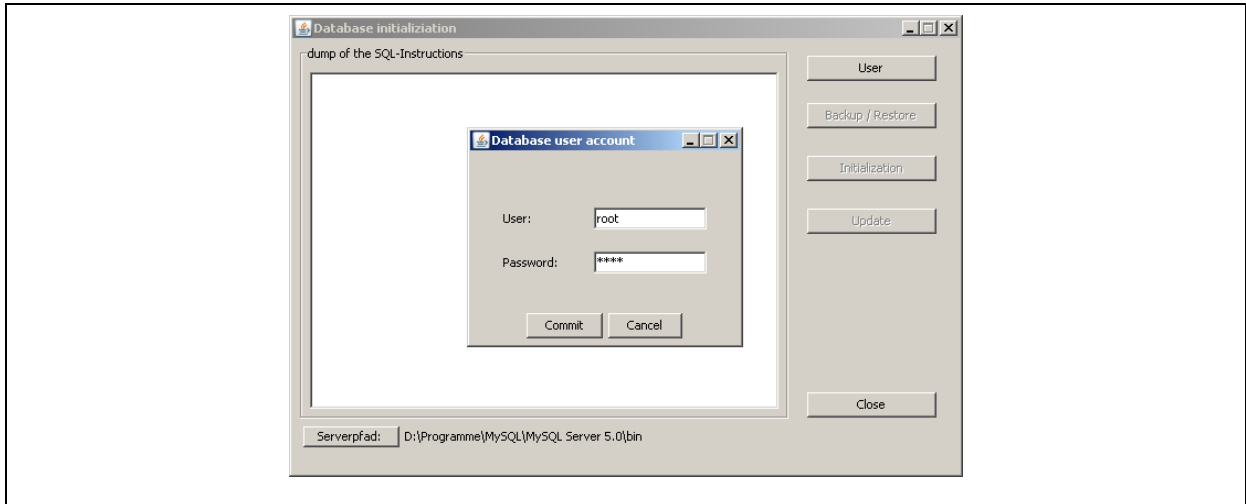
Illustration 3-11: Database Assistant

In order to initialise the database, please click on the "Commit" button and then on "Initialisation". This will start the creation of the tables (Illustration 3-11). If you do not want to initialise the database, click on "Cancel" and then on "Close".

Note: Any existing data in the database will be deleted when you start the initialisation process. Therefore, initialise the database only once after the software has been installed. If , at a later point of time, the database is updated, the data saved in the database will not be deleted.
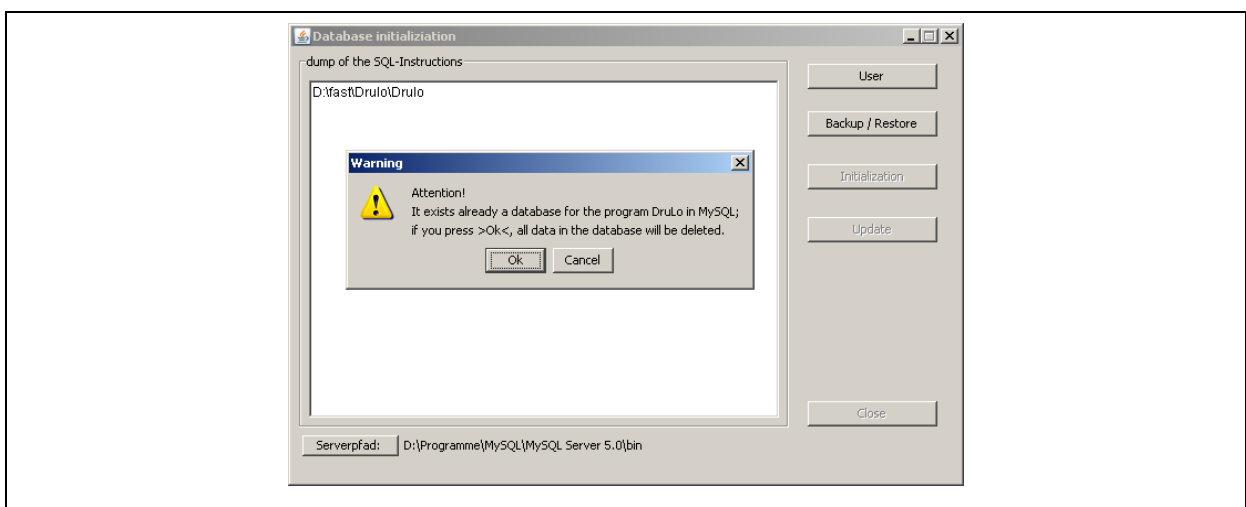
Illustration 3-12: Database message

If the database exists already, confirm the message by clicking on "OK" to continue with the Assistant. Please note, that all data saved in the database will be deleted. If, however, you want to cancel the database initialisation at this point, click on "Cancel".

Updating the Database

Sometimes it is necessary to update the database when the entire programme has been updated. In this case, the Database Assistant will provide the functions required for the database update. If a programme updates has generated the message that the database has to be updated, the database update has to be started through the "Update" button as shown in Illustration 3-11. It is not required for a database update to key in the username or the keyword for the database. Also, there will be no data deleted during a database update.

Possible Errors occurring during the Update Process

The Assistant does not find the appropriate path. Please check whether or not the stated paths exists (Illustration 3-13). If the path does not exist, you will have to install the Drulo Control programme again or contact F.A.S.T. GmbH.
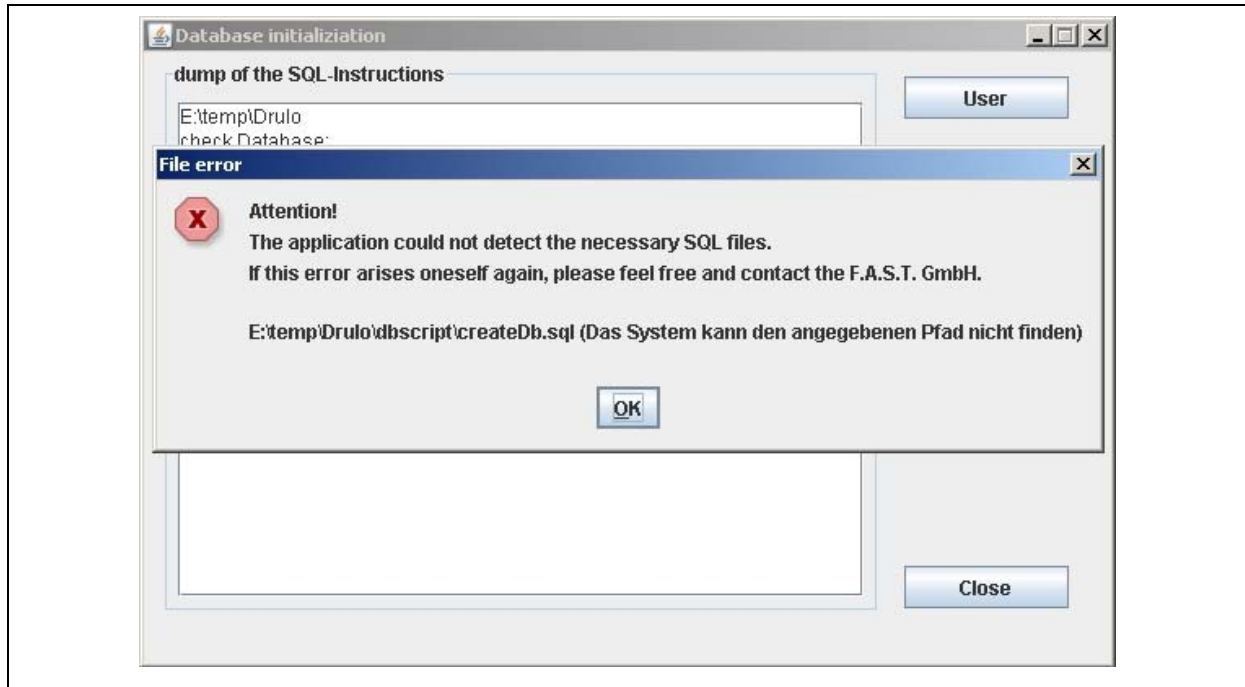
Illustration 3-13: Database error 1

The Assistant could not establish a connection to the database. A possible reason may be an incorrect keyword, or the "MySQL" service was discontinued or incorrectly started, or the database is blocked by a firewall (Illustration 3-14).
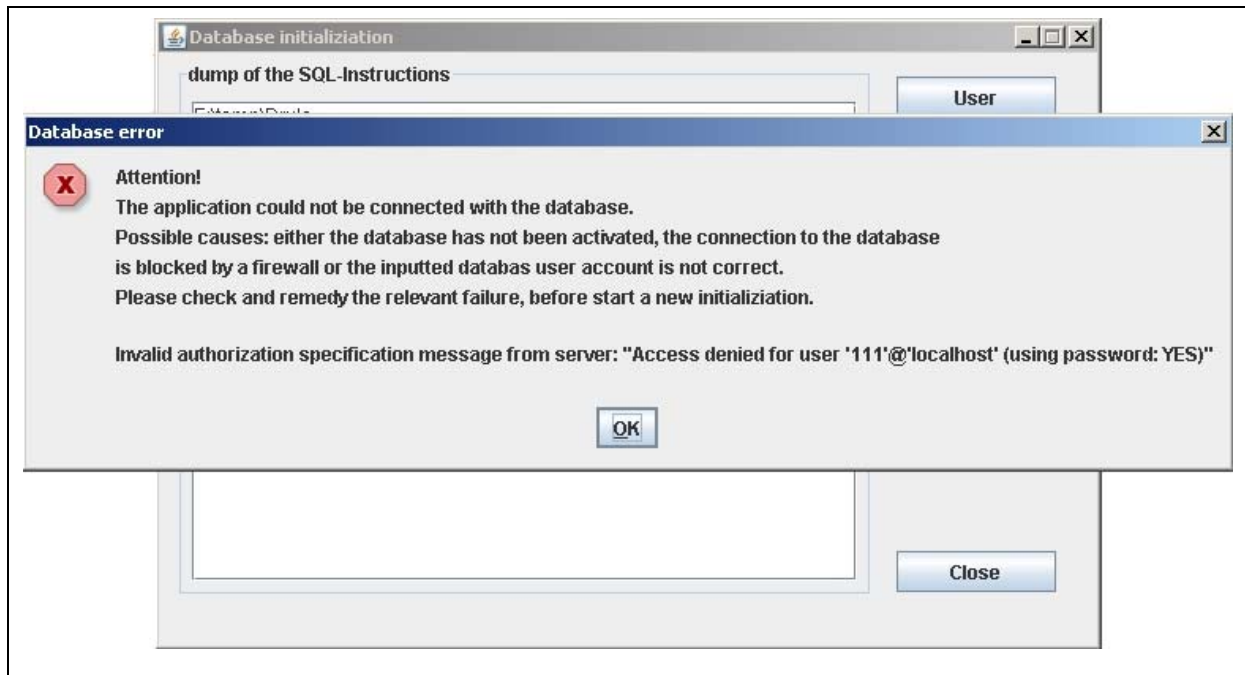
Illustration 3-14: Database error 2

Please check if you have entered the correct keyword and if "MySQL" has been started. If you have installed a firewall, please keep this firewall deactivated during the entire update process.

3.2.6 Backup Assistant

The Backup and Restoration Assistant allows the operator to create backup copies and to restore already generated backup copies. The backup copies contain the project folder as well as all measurement data available in the database when the backup was carried out. Please note that measurement data can be lost during the restoration process as the data saved in the database as well as the project folder with all its data will be overwritten during backup. Therefore, it is recommended to back up the data on a regular basis in order to guarantee an almost-up-to-date status of the data saved.

The Backup and Restoration Assistant is started through the Database Assistant, which can be opened via "Database" in the "Settings" menu (see Chapter 3.2.5). When the Database Assistant has been called, the mask as shown in Illustration 3-11 will be displayed. Similar to the database initialisation process, the Backup Assistant requires administration access to the database. Therefore, it is necessary to press the "User" button before the user name and the password are entered for database access. When the entries have been accepted in the database user window, the "Backup/Restore" button is activated, and the Backup Assistant can be started with this button.

Please note: The MySOL setup directory has to be entered into the Drulo programme prior to the initial use of the Backup Assistant so that the Assistant can carry out any backup processes. To implement the set directory, click on "`Server Path:`" in the lower left-hand part of the mask as shown in Illustration 3-11. A window will be displayed. In these window you can select the installation path. Now select the corresponding setup path for the file "`mysqldump.exe`". If, for example, MySOL has been setup at "`C:\Programme\MySQL`", the directory for the file "`mysqldump.exe`" can be found at "`C:\Programme\MySQL\bin`". As soon as the correct directory has been selected, the requested file will be displayed in the dialogue window. Please mark this file and then press the "`Open`" button. If the directory path has been selected properly, the path will be displayed behind the "`Server Path:`" button as shown in Illustration 3-11.

When the Backup and Restoration Assistant has been started, the window as shown in Illustration 3-15 will be displayed. This window has a navigation bar on the left featuring the buttons "`Backup`" and "`Restore`". By pressing these buttons, the operator will call the particular function for backup or restoration purposes. The right-hand part of the window is context-related and will change subject to the selected backup or restoration function. You can leave the Backup and restoration Assistant by pressing the "`Close`" button.
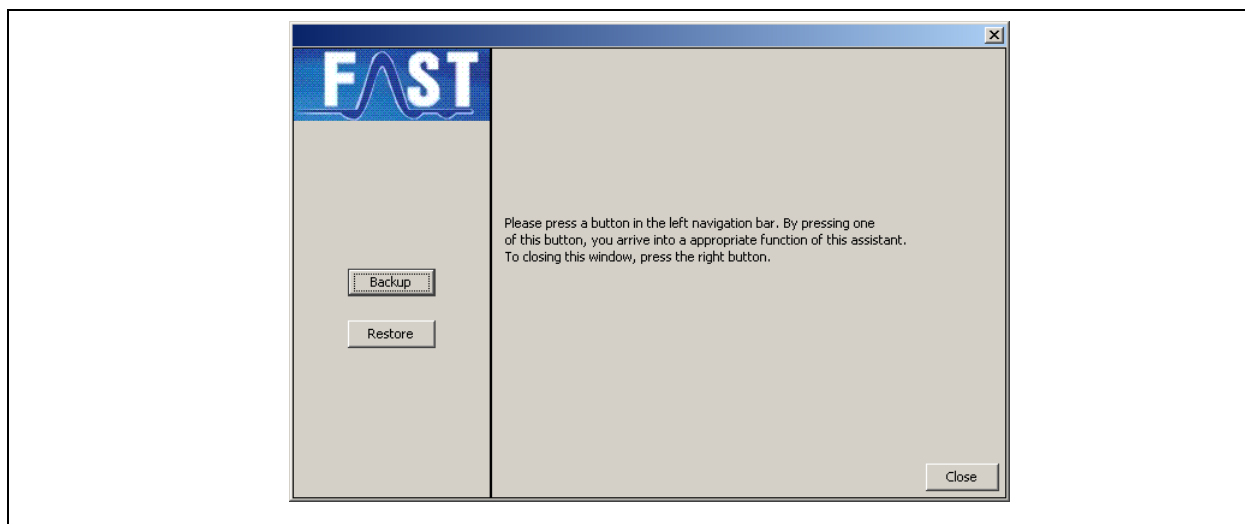
Illustration 3-15: Backup Assistant

Backup

If you want to back up the data, press the „`Backup`" button on the left-hand navigation bar. The right-hand part of the window (context-oriented) will change and now offers further functions to support the backup process. First press ". . ." to determine the storage place for

the backup file. The "Restore" button will be deactivated during the backup process. You can leave the Backup Assistant by pressing "Cancel" and return to the main view of this dialogue (see Illustration 3-16).
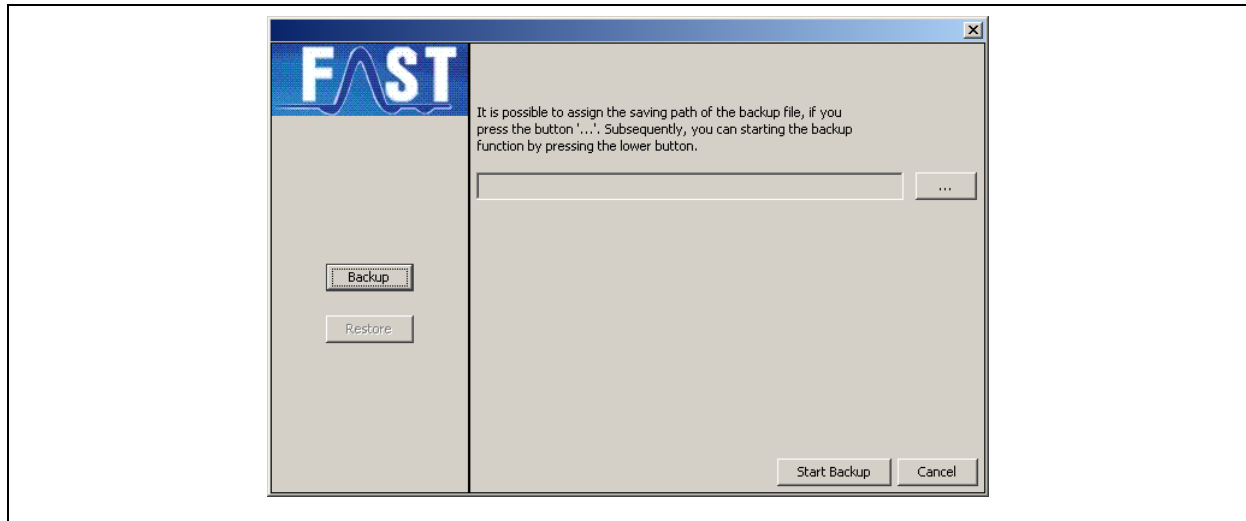
Illustration 3-16: Backup mask

The "Start Backup" button cannot be used until the operator has selected the storage place for the backup file. If the operator has clicked on the "Start Backup" button without having determined the storage place for the backup file, a message will be generated to advise the operator to determine the storage place before he can continue. Press "OK" to leave the message window and select a storage place for the backup file. Clicking on "...", a dialogue window opens where the operator has to enter the storage space for the backup file. Now a path has to be entered where the backup file has to be saved. The name of the backup file will be created automatically by the programme and consists of the name of the programme in connection with the current time and date as well as the Drulo programme version number.

Example: `Backup_drulo_10-12-47_10.05.2010_Ver. 1.0.3.25.zip`

When the operator has selected the desired storage place, he/she has to press the "Save" button. The selected path will be accepted and will be displayed in the text field (Illustration 3-16). In addition, the file name created by the programme will be added. Now the operator can create the backup file through the "Start Backup" button. As soon as the Assistant has created the backup file, a message will be generated by the system. Click on "OK" to close the window containing the message and then click on "Cancel" to return to the main navigation window (Illustration 3-15).

Restoring the Data

Press the "Restore" button on the right-hand navigation side if you intend to restore the data. The right-hand part of the window (context-related) will change and now offers additional functions to support the restoration process. The window and the functions are analogous to those used for the backup process. Click on the "Cancel" button if you want to return to the main menu. The "Backup" button will be deactivated during the restoration process. By clicking on "...", you can select a previous backup file for restoration purposes.
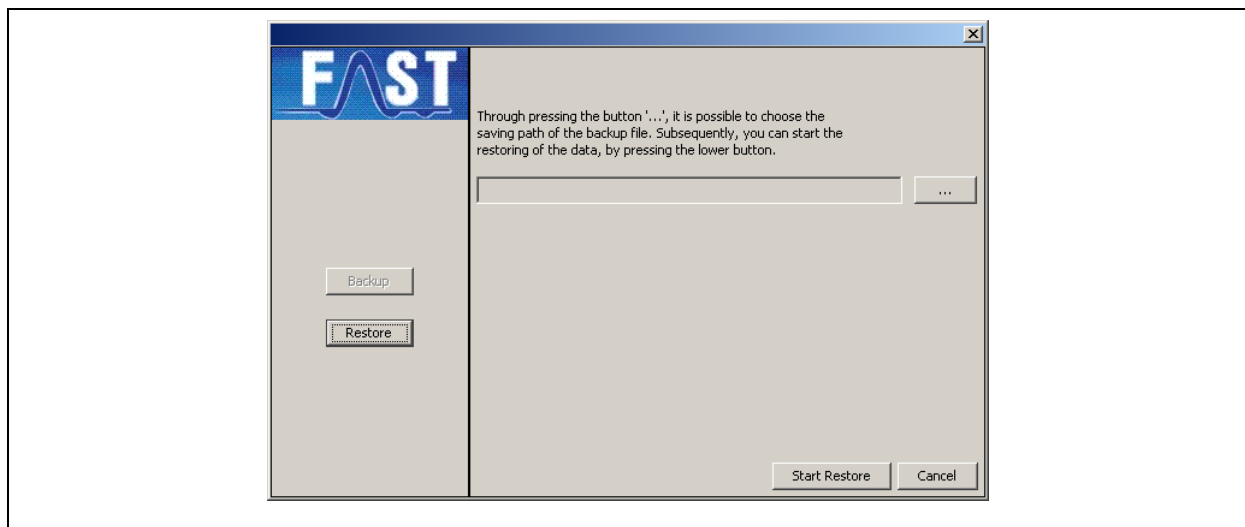
Illustration 3-17: Restoration mask

If you pressed the "Start Restore" button before you selected the backup file, a message will be generated informing you that you have to select a backup file first. Close this message window by pressing "OK" and open a file selection dialogue by clicking on the "..." button where you can pick the desired backup file. Select the backup file you request and click on "Open". The backup file you selected will now be displayed in the text field (Illustration 3-17). In order to start the restoration process, click on "Start Restore". Please note that all data relevant for the programme saved in the FAST directory as well as all values saved in the database will be deleted and will be overwritten with the data contained in the backup. The operator will be asked if he/she intends to continue the process. If a continuation is not requested, click on "No" and you will return to the window which was displayed before. Clicking on "Yes" will start the restoration process. If the operator has selected an invalid backup file, the restoration process cannot be continued and an error message will be generated. If the Version-number of the Backup-file on the 3rd digit not the same as in the Program-version, a Restore is also not possible.

Program-version	Backup-File	
1.0.**3**.24	1.0.**3**.20	Restore possible
1.0.**3**.24	1.0.**2**.16	Restore not possible

Click on "OK" and select a valid backup file for the restoration process. If the backup file version is not identical to the current programme version, the restoration process cannot be started and a corresponding error message will also be generated. Click on "OK" to close the error message and select a valid backup file. Then click on the "Start Restore" button to start the restoration process. This data restoration will now overwrite the FAST directory as well as the database with the backup file data. The progression indicator reveals the level of restoration. When the restoration process has been successfully finished, a corresponding message will be generated. Close this message by clicking on "OK" and you have fully finished the restoration process. Click on the "Cancel" button to return to the main navigation page.

3.3 Menu Modus

The programme offers two communication modes in the "Mode" menu. One mode is the "Serial / USB Mode", which is the standard mode of the programme. The "Serial / USB Mode" is set automatically when the programme is booted up (Illustration 3-18). All former versions of the Drulo Control Programme operate in this mode.
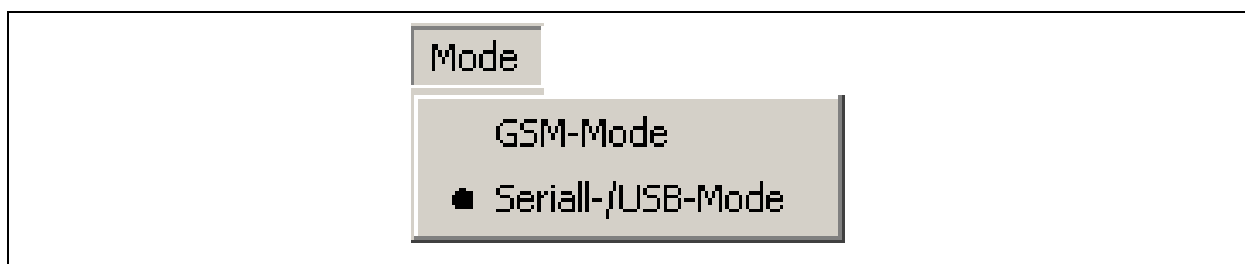
Illustration 3-18: Menue Setting -> Mode

This means that the application and the pressure logger communicate solely through a USB read-out unit connected to the computer. The second mode of the programme (available from programme version 1.0.3.20) features the so-called "GSM Mode". This mode enables the programme to communicate with a pressure logger through a modem which has been connected to the computer. This modem connected to the computer, however, has to be

configured as described in Chapter 3.2.2 before it becomes operational. Of course, the modem to be read out also needs to be equipped with a GSM modem, which has to be configured and to be introduced to the programme before operation as described in Chapter 3.2.4. As soon as these two configurations have been carried out, the equipment is able to operate in the GSM Mode. The actual operation of the programme remains the same in this mode, but communication to a pressure logger is effected through a modem (see also Chapter 3.5.1). The operator can switch between the two modes as required.

Illustration 3-19: Menu Bar on USB-Mode

For the operator's convenience, the current mode of the programme is displayed graphically in the menu bar (Chapter 3.5). At the right end of the menu bar, you will see a yellow button (Illustration 3-19) which indicates that the programme is operated in the "Serial / USB Mode". If the programme runs in the "GSM Mode", the colour of the button in the menu bar changes and a pink and a red button will be displayed as shown in Illustration 3-20.

Illustration 3-20: Menu Bar on GSM-Mode

3.4 Help Menu

3.4.1 Programme-related Information

"Info Program" in the "Help" menu contains detailed information on the programme version of the programme installed as well as the contact data if you wish to get in touch with F.A.S.T. GmbH. Clicking on "Info Programme" opens the window as shown in Illustration 3-21. The first line of the dialogue window contains the programme version of the programme installed. The following windows contain our contact data if you wish to get in touch with us. Especially the indicated internet address is important for you as you there can download any possible programme updates. Please note that the internet site will give you some helpful information on the particular updates your convenience.

Illustration 3-21: Information program version

3.4.2 Read-out unit

Another useful window, which you can call under "Info reading unit", is the window containing the information about the read-out unit connected to the device. This information is required if you intend to carry out any programme update as some new features for the PC programme demand a prior update of the read-out unit and of the pressure logger.

Once this function has been called, the window as shown in Illustration 3-22 appears. This window contains some information about the software and hardware status of the read-out board and will only appear if the read-out board was connected to the computer, the interface in the programme was correctly set (see also Chapter 3.2.2), and a pressure logger was connected to the read-out unit when this function was to be executed. Otherwise an error message will appear on the screen. Also, an error may occur while reading out the information if the read-out board is operated with an older software version.
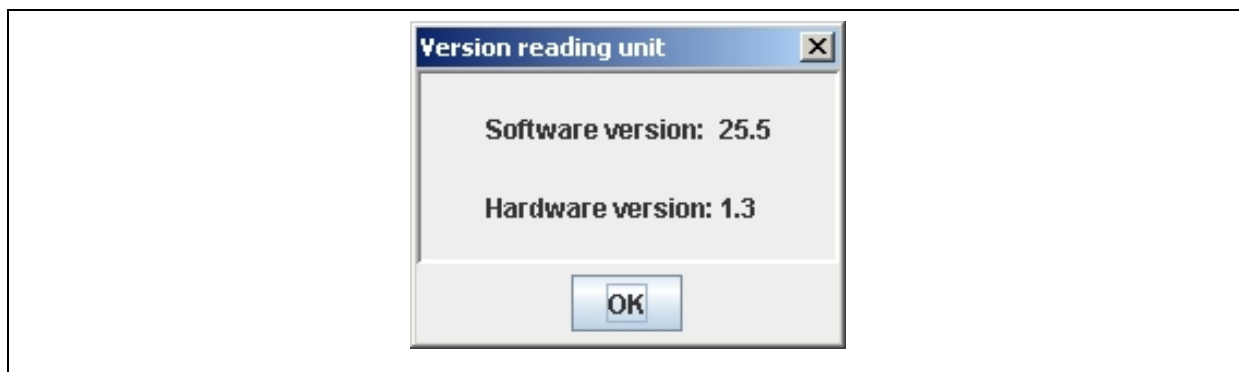
Illustration 3-22: Info reading unit

As already mentioned above, an update for the pressure logger components may be required if you intend to make use of all the functions offered by the Drulo programme. The new functions for the pressure logger (see Chapter 3.5.3 and Chapter 3.5.4) require the application of at least software version 1.4 for the pressure logger and at least version 1.3 for the read-out board.

3.5 Menu Bar

The following chapter is to explain the single functions available in the menu bar. Similar to the functions as described in Chapter 2.2, availability of the functions depends on the object selected through "`Drulo and Measurements`" (Chapter 2.4.1). The functions "`Read out the pressure logger`" and "`Eclipse measurement curves`" are not subject to a certain context and are available permanently.

3.5.1 Reading out the Pressure Logger

This menu level is to assist you if you intend to read out the pressure logger. Please note that the pressure logger has to be connected to the programme either through a read-out unit or through a modem. If you use a read-out unit to read out the data from the pressure logger, make sure that all drivers and the Comm-Port, as described in Chapter 3.2.2, have been installed and configured. If the programme operates in the USB mode, the read-out process will start immediately after the operator has clicked on the button. Progress and status of the read-out process can be observed through the status bar as described in Chapter 2.3. As soon as the read-out process has been finished, a pressure logger symbol will appear in the "`Pressure logger and measurements`" box. And if the pressure logger has saved any measurements, the symbol of past measurements will be displayed as well.

Reading out a pressure logger by means of a GSM modem is also effected through this button. However, the telephone numbers and data receiving times of the modem have to be configured beforehand as described in Chapter 3.2.4. If the numbers and times have not been configured prior to the read-out process, the programme will generate an error message after the button has been clicked on. This error message will indicate that the telephone number list is empty and that the pressure logger cannot be contacted. The same message will be generated if you click on the button and the pressure logger modem is not ready-to-receive at that particular point of time. If all settings have been made correctly and if at least one GSM modem is ready-to-receive, the equipment will start to re-establish the connection and to

query the pressure logger as soon as the button has been clicked on. Just as in the "`Serial / USB Mode`", any progress of the connection re-establishment and the data query of the logger can be observed through the status bar of the programme. If several modems are ready-to-receive at the same time, the programme will connect to one GSM modem after the other, i.e. subsequently.

3.5.2 Setting the Time of the Pressure Logger

Just as the "`Read out pressure logger`" function, this function requires a connection of a pressure logger to the computer via a read-out unit or a GSM connection to a pressure logger (see Chapter 4.1). If this is given, a new window will open after clicking on "`Setting the pressure logger time`". In this window, you can set the time and the date for the logger. The settings you selected now have to be transmitted to the pressure logger. In order to do so, click on "`Save`". If you want to cancel the entered data, click on "`Cancel`".
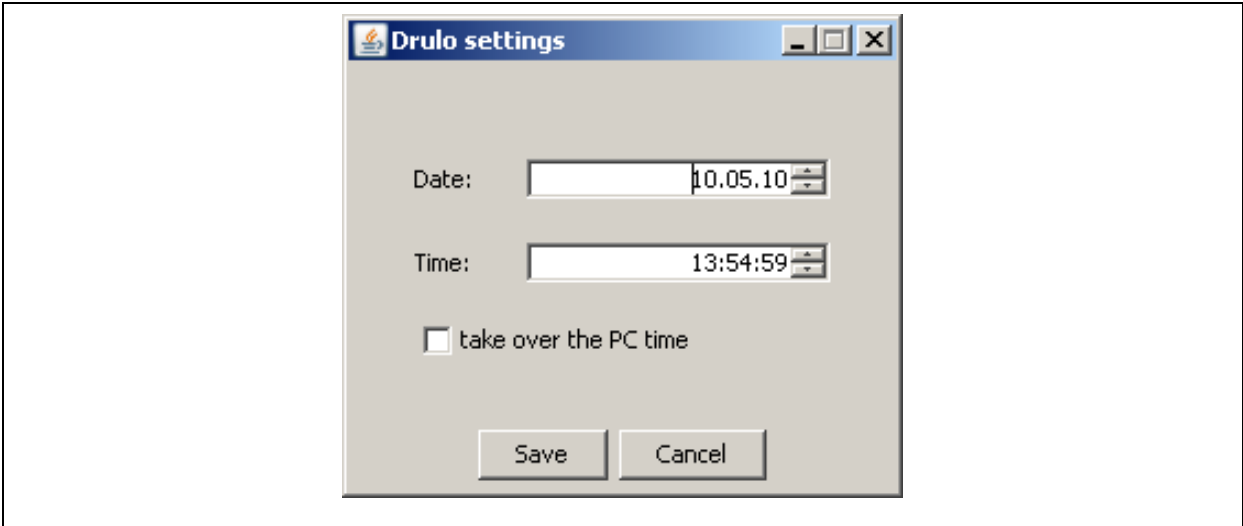
Illustration 3-23: Settings of the pressure logger

3.5.3 Resetting the Pressure Logger

With this function, the operator can delete all completed measurements saved in the pressure logger. Those measurements which are still to be executed or which are being executed (see Chapter 3.5.5) will not be deleted and the particular data remains available. Such data has to be explicitly deleted through the pressure logger's keyboard, if requested. Please note that the conditions as stated in Chapter 3.5.1 have to be met in order to apply this function.

3.5.4 Real-time Read-out (Pressure logger)

Another new function from programme version 1.0.1.5 and higher is the *real-time read-out function*. This function enables the operator to closely follow a measurement which is just in process. This means the pressure logger is used in a way similar to a printer.

Usually this function is applied when the pressure logger is integrated (in-built) in the pipeline section to be monitored. In this case it has to be noted that communication between the PC and the logger is not established right away as the pressure logger is equipped with an inclination sensor which prevents communication when in-built. This is to extend the lifetime of the battery. However, the pressure logger can be put in the communication mode when in-built by pressing one of the three operating keys of the pressure logger. As soon as one of the three keys is pressed, some information about the current measurement is displayed. this mode, communication between the PC and the pressure logger can be established. Put the read-out board, which is connected to the PC, on the logger display and then read out the logger as described in Chapter 3.5.1. After a short period of synchronization between the PC and the logger, the pressure logger will appear as a symbol in the "Drulo and Measurements" field (Chapter 4.1). Select this symbol and then call the "Real-time Read-out" function through the task bar. As a consequence, the measurement-related data of the current measurement will appear according to the particular intervals in the "Measurement Curve" field (Chapter 4.2).

A manual coupling between the pressure logger and the modem is not required in the GSM mode as the two devices can be interconnected permanently. Just establish a connection to the GSM modem and to the pressure logger as described in Chapter 3.5.1 or 4.1, then select the pressure logger symbol in the "Pressure logger and measurements" window and execute the real-time read-out process by clicking on the button.

3.5.5 Programming the Measurement

This function is to enable you to program the pressure logger either with five time-controlled measurements (abbr. ZKM) or with one event-controlled measurement (abbr. EKM), which then can be read out with the Drulo Control programme. The two types of measurement differ significantly in kind: the time-controlled measurement requires prior setting of the duration and the starting time of the measurement, i.e. the time-related data (starting time and termination time) for the measurent itself is clearly defined by the operator through the set

intervals and the number of measurement values. For the event-controlled measurement, the operator can only determine the start of the pressure monitoring process. The start of the actual measurement procedure is initiated if the set upper pressure limit is exceeded or if the pressure falls below the set minimum pressure limit. If any of these two pressure limits has been exceeded and undercut respectively, the pressure logger will acquire 5,500 measurement values per measurement triggered.

Please note that the pressure logger is equipped with a ring buffer which is capable of saving the 240,000 possible measurement values. This means that previous measurements are overwritten as soon as the number of 240,000 values is being exceeded. The currently saved measurements as well as the corresponding measurement values are displayed in the "Measurement programming" window (Illustration 3-24) beneath the table which shows the measurements to be programmed. It is also required to keep the pressure logger and the read-out board connected to the computer during the entire process of measurement programming. For GSM mode operation, a permanent GSM connection is required.

Setting the Measurement Parameters

The left-hand part of the window (Illustration 3-24) shows a calendar indicating the present month. The calendar also provides the timetable for the setting of the dates for the particular measurements. Just move the cursor to the desired date on the calendar and shadow the particular day by clicking on the left mouse key.
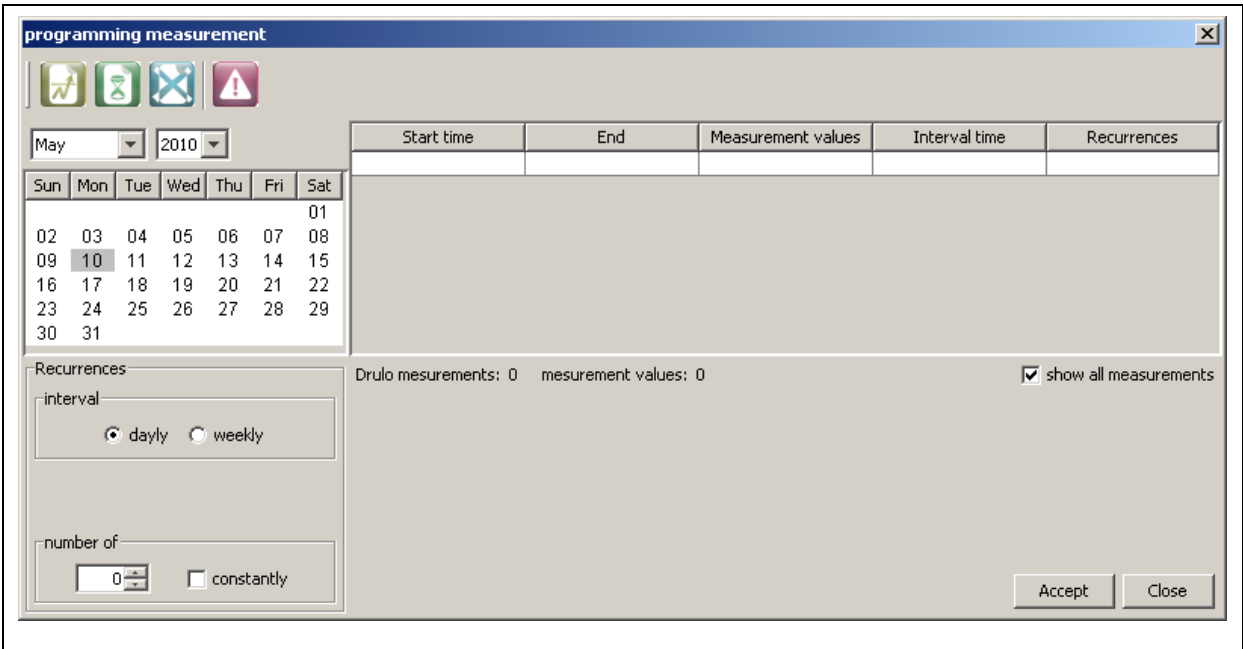
Illustration 3-24: Programming a measurement

If a certain date has been selected, you can open the window as shown in Illustration 3-24 by clicking on the ⏳ button (Illustration 3-25) and set the parameters for a ZKM measurement. By clicking on 📈 you will open up the window as shown in Illustration 3-26, where you can program an EKM measurement. Please note that the two kinds of measurement modes cannot be combined with each other, i.e. you can program either one EKM measurement or a maximum of five ZKM measurements. Setting the measurement parameters is described in detail in the following two sections.

Parameterizing a Time-controlled Measurement (ZKM) ⏳

In the upper part of the "`Measurement parameters`" window (Illustration 3-25) you can see the date when the measurement will start. The "`Starting time`" window allows you the change the starting time according to your requirements by clicking on the figure to be changed (hours, minutes, seconds) and by setting the requested values through the arrow keys on the left-hand side.

The same procedure is required to change the parameters in the "`Finishing Time`" (date and time) and "`Interval`" (time between two measurements) lines. Concerning the intervals this means that the higher the interval time is set, the fewer measurement values will be available for a certain fixed measurement time.

Click on the "`Accept`" button to accept the set measurement-related parameters and on "`Close`" (Illustration 3-25) to discontinue the process. If you have clicked on "`Accept`", the measurement will be displayed in the table of the main window (Illustration 3-24), and the day of the measurement is highlighted blue in the calendar.
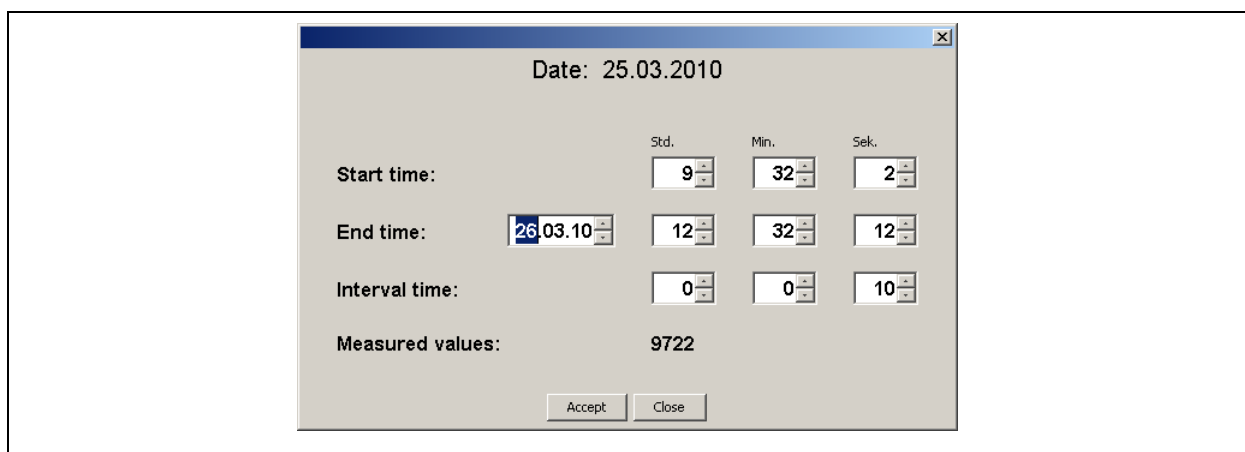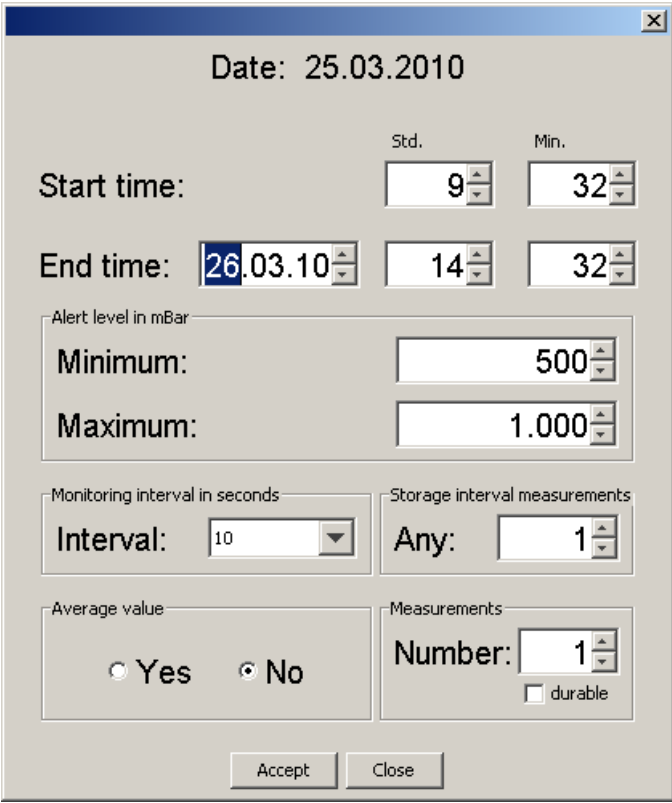
Illustration 3-25: Measurement-related parameters

Parameterizing an Event-controlled Measurement (EKM)

If you wish to set the EKM-related parameters, please use the window as shown in Illustration 3-26. In the upper part of the window you can see the starting date of the pressure monitoring process. In the boxes below you can change this date and also determine the end of the monitoring process. You can either enter the requested data directly into the boxes, or you can change the already set values through the arrow keys on the right-hand side. The same procedure is applied when changing any data for the ”Maximum“, ”Minimum“, ”Saving interval“ and ”Measurements“ sections. The “Monitoring interval“ section offers pre-determined values, which are indicated by clicking on the triangle located to the right. The list which comes up then offers the selectable values.

Please consider that for an EKM measurement you can only determine the start of the pressure monitoring process but not the end of the measurement itself as you have set the upper und lower pressure limits in the ”Minimum“ and ”Maximum“ windows. The unit of the values is mbar so that, for example, 1.5 bar equals 1.500 mbar. The monitoring interval is displayed in seconds and determines after how many seconds a measurement is acquired and saved.

Illustration 3-26: Window Meassurementparameter EKM

As the number of values per event recording is limited to 5,500 values, you can record data after an event has occurred for the maximum of 15 hours and 15 minutes if you leave the "Storage interval" to position one. By increasing the saving interval you can make the logger save only every xth measurement value of the measurement and thus extend the time for the monitoring process. Up to every 10th value can thus be saved by the pressure logger. If you also set the monitoring interval to 10 seconds, a maximum of 100 seconds is the longest possible interval between two measurement values to be saved. Furthermore, it is possible to average those values which cannot be saved and then save this average value as a measurement value. You can activate this calculation by clicking on "Yes" in the "Average values" window.

In the "Measurements" window you can determine the number of the measurements to by saved, and you can select between one and forty measurements. As the pressure logger is capable of managing up to 40 measurements, it overwrites the oldest measurement if you set the device to "durable" of event-controlled measurements.

Deleting a Measurement

If you do not want to send this message to the pressure logger, you can also delete a measurement directly from the table. Only those measurements which are listed in the table will be transmitted to the pressure logger when the "Accept" button (Illustration 3-24) is clicked on. If you want to delete a measurement from the table, you will have to highlight the particular measurement to be deleted by clicking on the line in which the measurement is listed. Then click on "Delete" to delete the measurement from the table. If no measurements are indicated in the table and press "Accept", all measurements for which the starting date has to be entered in the pressure logger will be deleted. This means that with this function the operator has the option to delete an incorrectly programmed measurement parameter list from the pressure logger.

Programming a Measurement

Programming the measurements in the pressure logger is started by clicking on "Accept" (Illustration 3-24) and will be executed only if at least one and a maximum of five ZKM measurements are listed in the table of the window. In case of five measurement being listed, the "Add" button will not be activated. Deleting one or more measurements from the table will activate the "Add" button and enable the user to add one or more measurements until a

total of five measurements is listed (see section Setting the Measurement Parameters). The same will happen to the button if you have programmed an event-controlled measurement through the "Add EKM" button. Also, and in contrast to the ZKM measurements, only one EKM measurement can be added to the parameter list. When all preconditions are fulfilled, the measurements will be transferred to the pressure logger as soon as the "Accept" button has been clicked on. When all measurement data has been transferred properly, the starting time for the next measurement will be displayed.

"Repetitions"

With the "Recurrences" feature (Illustration 3-24), the user can repeat a ZKM measurement. Please note that the requested interval ("daily" or "weekly") has to be set before the first measurement is added. If a measurement has already been added to the table, the above setting cannot be changed anymore. However, the number of repetitions can be set before the measurement parameters are determined.

When the "daily" option for a particular measurement has been selected, the measurement will be repeated every day at the same time. The "number" box shows the number of days on which the measurement is repeated. For example, if "0" is selected in this box, the measurement will be carried out once on the particular day as set, but it will not be repeated on any other day. If "4" repetitions have been chosen, the initial measurement will be carried out as set, and, additionally, another 4 repetitions of the same measurement will be carried out. This means that the user will receive a total of five measurements, carried out on 5 subsequent days. The same applies to the "weekly" setting with the measurement being repeated on a weekly basis instead of on a daily basis.

Please note: If a measurement has been set and a repetition has been determined for this particular measurement, no additional measurement can be set for the time between the initial measurement and the repetition of the measurement. Carrying out two measurements at the same point of time is not feasible.

Setting the Alarm-triggering Parameters

The pressure logger has been equipped with the feature to trigger and to save an alarm as soon as the pressure has fallen below the set minimum pressure limit and as soon as the pressure exceeds the set maximum pressure limit respectively especially for operation in the GSM

mode, irrespective of the kind of measurement (EKM or ZKM). If the pressure logger is interconnected with a GSM modem, any alarm signal can be transmitted to a mobile phone automatically (see Chapter 3.2.4) as soon as the pressure has fallen below or exceeded the set pressure limits.
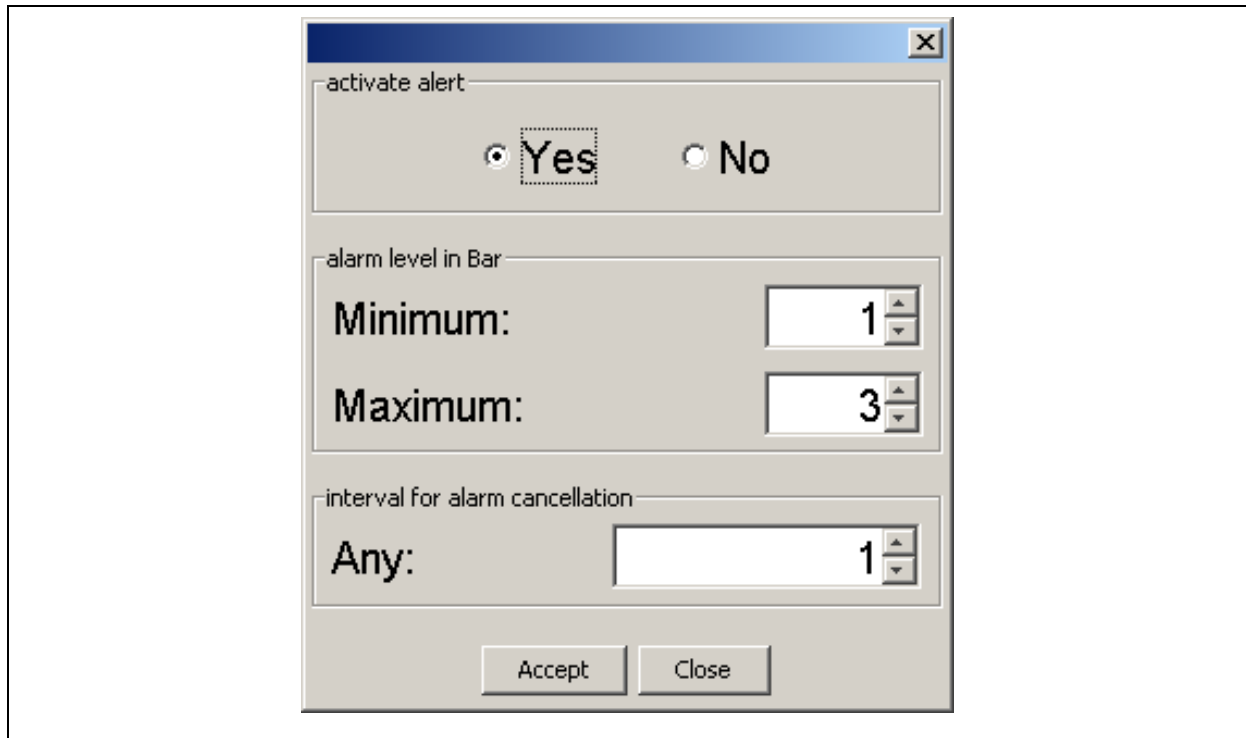
Illustration 3-27: Dialogue Alarm-triggering Parameters

In order to activate the alarm-monitoring feature, please click on the icon shown in Illustration 3-24 "`Setting alarm-triggering parameters`". As soon as the icon has been clicked on, the dialogue as shown in illustration Illustration 3-27 will appear. With this dialogue, the pressure limits can be set and the alarm-monitoring mode can be activated and de-activated respectively. The interval limit for the cancellation of the alarm determines how many measurement points have to be queried when the pressure level is back to normal in order to reset the alarm.

Clicking on "`Accept`" will now save the data temporarily; however, the data will not be transmitted to the pressure logger. When the measurement parameter list has been transmitted to the pressure logger (see Chapter >Programming a Measurement<), the alarm-triggering parameters will be uploaded into the pressure logger. Clicking on "`Close`" does not generate any alarm-triggering parameter transmission to the pressure logger.

3.5.6 Changing the Language for the Pressure Logger

Another context-related function in the menu bar is the option to select the language. This function allows you to change the language of the display of the pressure logger and to adapt the language to your national language as long as your native language is supported by the pressure logger. The language settings for the pressure logger cannot be changed on the physical device but through the programme only. Firmware 2.1 or 3.1 currently supports German, English, French, Slovenian and Italian. The unlimited utilization of this function makes it necessary that all the requirements listed in Chapter 3.5.1 are fully met.

3.5.7 Stopping the current Measurement Process

If a measurement parameter list has been saved in the pressure logger for further process purposes (Chapter 3.5.5), this function is to assist you in deleting the programmed list. In doing so, not only all measurements indicated on the parameter list (i.e. those measurements which are to be executed) will be deleted but also the measurement currently in progress will be discontinued, and the corresponding values will be saved in the pressure logger.

3.5.8 Resetting the Alarm Recorder

The alarm recorder described in Section >Setting the Alarm-triggering Parameters < above permanently acquires alarm signals as soon as the pressure has fallen below the set minimum pressure limit and exceeds the set maximum pressure limit respectively. These alarm signals are then saved in the logger. This function is to assist you in deleting the saved alarm signals and in resetting the alarm recorder.

3.5.9 Print out the selected Measurement

This function is also a context-related function and provides a number of different results depending on the objects selected in the "Drulo and Measurements" (section 2.4.1). If a pressure logger has been selected, some information on the pressure logger itself can be printed out. If a measurement has been selected, the diagram as shown in the "Measurement Curve" field will be printed out as well as the additional information which were input in the "Additional Information" dialogue box (section 4.2.3). As soon as the "Print out the selected Measurement" button has been clicked on, the dialogue window as shown

in Illustration 3-28 below will appear. This window primarily constitutes a preview of the document to be printed out.
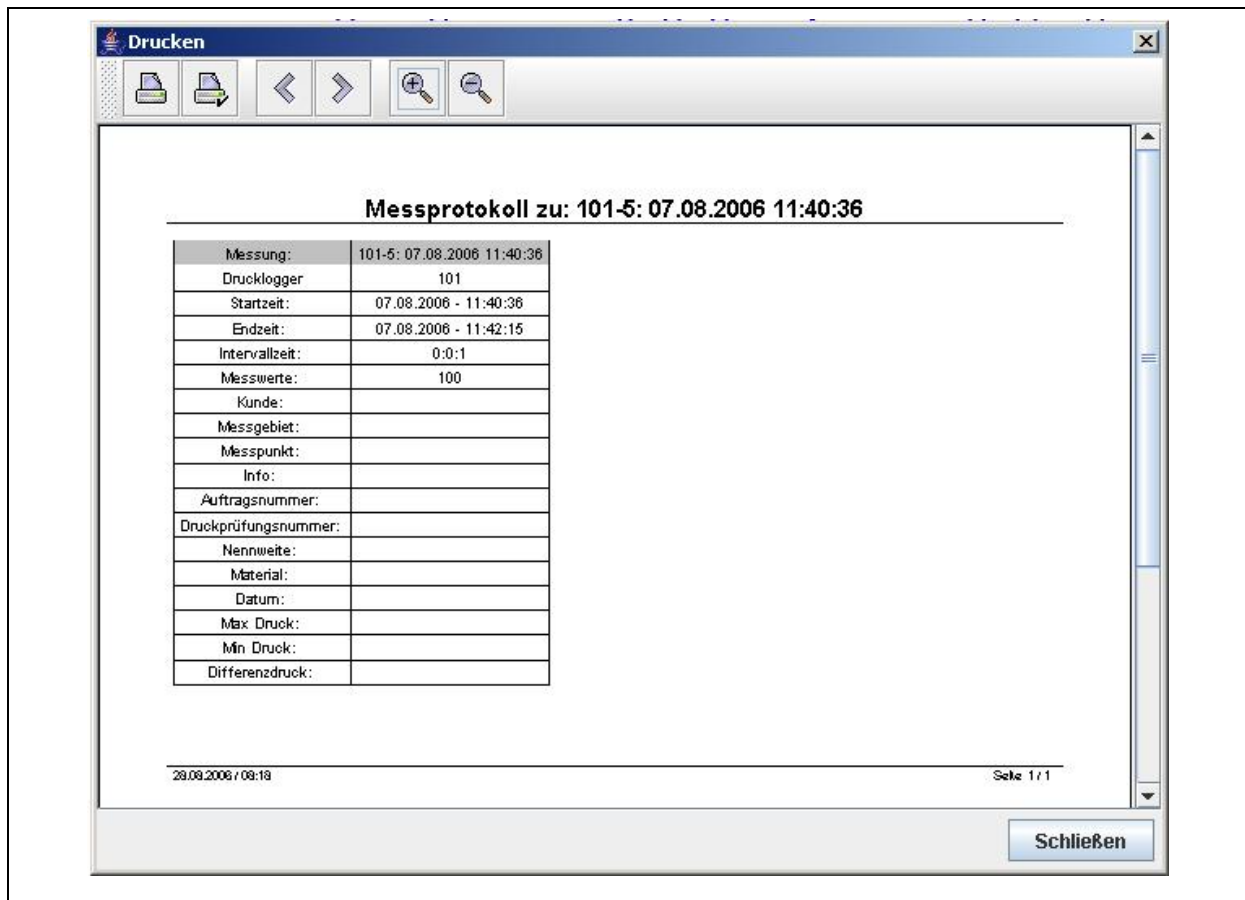
Illustration 3-28: Print-out dialogue

There are several functions for further document processing available through the menu bar (Illustration 3-29). The buttons with the magnifying glass enlarge or reduce the size of the document in the preview dialogue. If the document to be printed out has more than one page, the user can leaf through the particular pages with the "<" and ">" buttons. The second box (Illustration 3-29, from left to right) opens up a dialogue where the user can set the parameters for the page to be printed out. Here the user can determine the size of the page and the format of the paper (horizontal or landscape format). Press the first button if you want to print out the document.
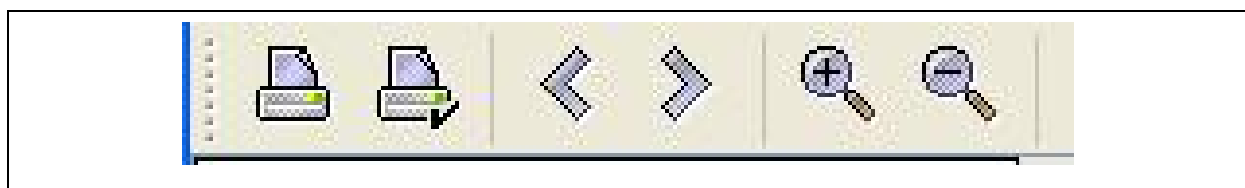
Illustration 3-29: Menu bar Print-out dialogue

3.5.10 Export into Excel

Here you can export certain measurement values into a *Colon Separated Values* –CSV– file. CSV is a data representation procedure where the single values are separated with semicolons and saved in a file which can be further processed in Excel. Clicking on "Export selected Measurement" makes a window open up where the storage location and the file name of the exported file have to be determined. Clicking on "Save" finishes the exporting process. The functionality of this button is directly available in the detailed view (section 4.2.1). In the eclipsed version, however, it is necessary to define the section to be exported beforehand. For further information about the exporting process in the eclipsed mode, please refer to section 4.2.2.
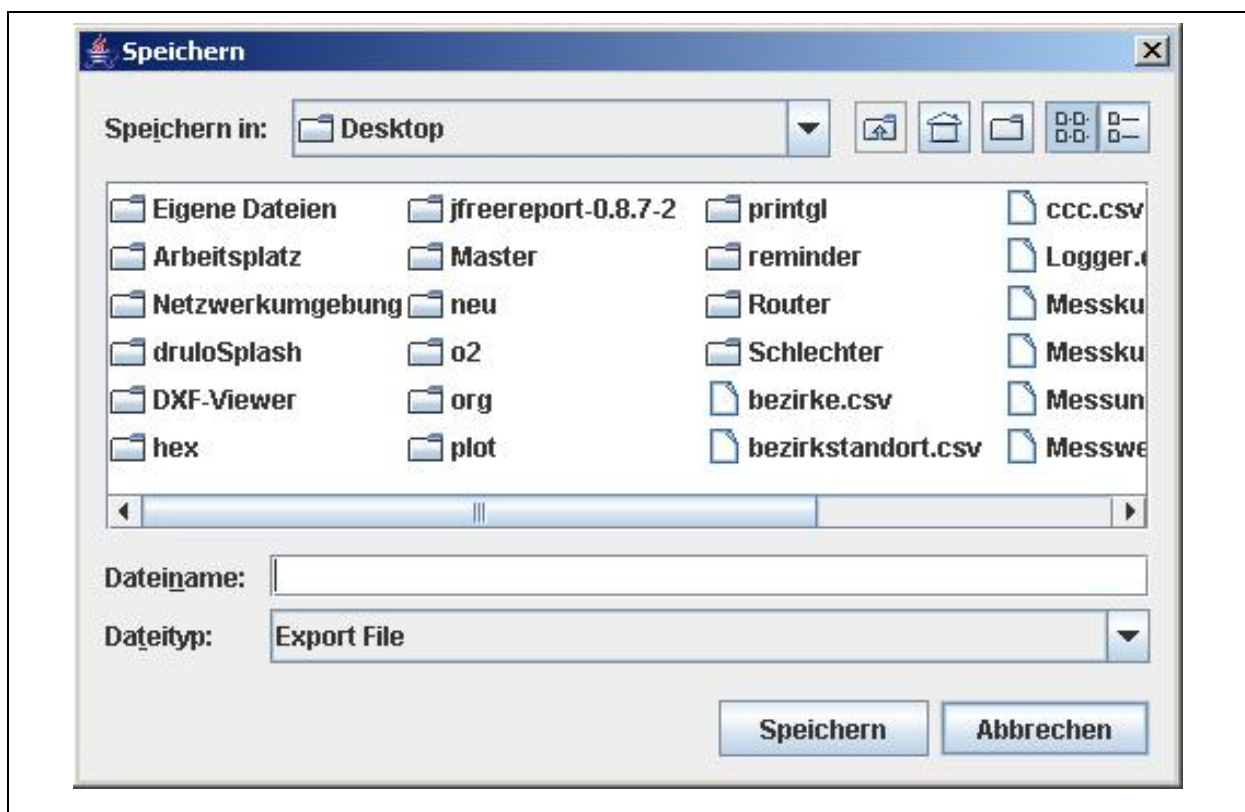
Illustration 3-30: Export dialogue

3.5.11 Deleting a Measurement

Measurements which are not required any longer can be deleted. Just highlight the measurement to be deleted by clicking on it with the left mouse key. Then confirm the button "Delete selected measurement" to delete the particular measurement from the database.

3.5.12 Eclipsing Measurement Curves

If you intend to eclipse some measurement curves, you will have to use this button. It enables you to display measurement curves featuring varying starting times and to equate certain measurement points and to eclipse the curves in one diagram. As soon as you have clicked on "Eclipse Measurement Curves", a new window will open up where you can select the curves to be eclipsed (Illustration 3-31). You have to tick the curves to be displayed in the diagram as shown in Illustration 3-31. Then click on the "Accept" button to preview your selection in the "Measurement Curve" field. If the "Selection of Measurement Curves" window shows too many measurements, you can assort the table by clicking on the table head. The assorting criteria are: "starting time", "finishing time", "intervals", and "Id". For further information on the functions as described above, please refer to section 4.2.2.

Programme Version 1.0.3.20 currently can only swap ZKM measurements, i.e. the dialogue as shown in Illustration 3 37 does not display any EKM measurements to choose from. Therefore, swapping EKM measurements is not yet feasible.

	Start	End	Interval	Id
☐	03.05.2007 12:48	03.05.2007 12:58	0:0:1	1-1: 03.05.2007 12:48:21
☐	03.05.2007 11:49	03.05.2007 11:59	0:0:1	1-0: 03.05.2007 11:49:59
☐	03.05.2007 13:11	03.05.2007 13:21	0:0:1	1-2: 03.05.2007 13:11:13
☐	04.05.2007 08:41	04.05.2007 08:51	0:0:1	1-4: 04.05.2007 08:41:02
☐	03.05.2007 13:25	03.05.2007 13:35	0:0:1	1-3: 03.05.2007 13:25:41
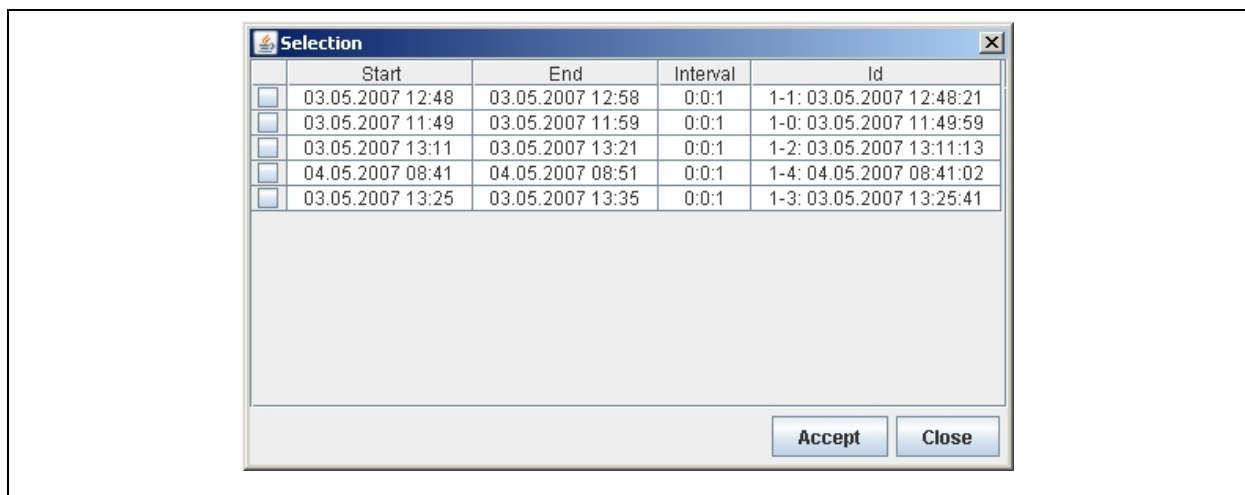
Illustration 3-31: Selection of the Measurement Curves

3.5.13 Autojustage Zoom

If you have changed the zooming factor for the diagram in the "Measurement curve" section, you can reset the zoom for the diagram with this function. The measurement curve will then be displayed with all its measurement values in the diagram. This function, however, is only available if a particular measurement has been selected in the "Pressure logger and measurements" section beforehand.

3.5.14 Zoom In

The button with the so-called "Zoom-in" function allows you to enlarge the scale for the diagram so that more details are disclosed. As the diagram has a vertical and a horizontal axis, there are two symbols on the menu bar, one for each axis. With the first „Zoom-in" symbol, you will enlarge the vertical axis (pressure axis), and with the second symbol, you will enlarge the horizontal axis (time axis).

3.5.15 Zoom Out

The opposite to the above function is to decrease the scale (zooming out). Here as well the programme offers two symbols, one for each axis. Both axes can be adjusted separately according to the same pattern as described above in the "Zoom In" section.

3.5.16 USB-Mode

As already described in Chapter 3.3, the programme can be operated in two different modes. In the „Serial / USB mode", the pressure logger can be read out through the read-out unit directly connected to the computer. The current communication mode of the programme is displayed through this button. Moreover, you can also switch from one mode to the other by clicking on this button, and also through the menu as described in Chapter 3.3.

3.5.17 GSM-Mode

The second communication mode is the "GSM mode". If the programme operates in this mode, communication between the programme and the pressure logger is carried out through a GSM connection. This button as well indicates the current communication mode of the programme. Just as described in the section above, you can also directly change to this communication mode by clicking on this button.

3.5.18 Hanging up

In case of any failure occurring during the connection-establishing procedure or during the communication process with the pressure logger, this function allows you to terminate any connection-establishing process or to cut an already running communication. Clicking on the button makes the programme hang up after a few seconds and releases the communication

port. Another situation where this function may be required is if you wish to establish a connection to another pressure logger. The programme knows whether a communication line has already been established and can also terminate this line automatically, but you can also terminate an existing communication line manually through this button.

4 Programme functions

The following chapter is to provide you with an overview of the window functionality of the programme. In section 4.1, the "Drulo and Measurements" field is explained. Here the data read out at the pressure logger and the corresponding measurement values are indicated. Section 4.2 is to explain the "Measurement Curve" field where the measurement values acquired by the pressure loggers are graphically displayed as line diagrams.

4.1 Drulo and Measurements

This field indicates the pressure loggers and measurements connected to the read-out boards (Illustration 4-1, on the left-hand side). Any measurements which have already been input into the database will be listed automatically under the particular icon of the pressure logger board upon start of the programme. They have green icons which are to prescind a paper document. Those pressure loggers which have been read out are listed according to the measurements saved and have a bluish icon which looks like a logger. If there are any new measurements listed on the pressure logger which have not yet been saved in the database, these measurements will be read out automatically by the programme and positioned below the logger icons in the display.

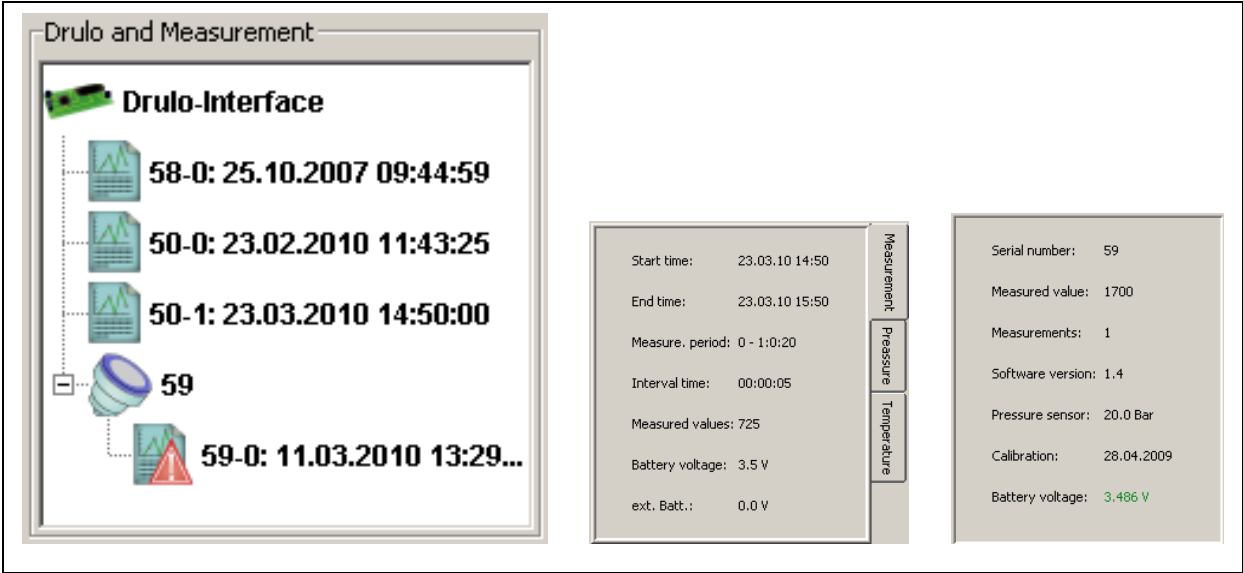**Illustration 4-1: Drulo and Measurements**

In case of any error occurred during the read-out process, the programme will indicate this error to the user by displaying an error message on the screen. Under certain circumstances, this message may be generated during the read-out process. If a data set of a measurement has been read out incompletely, the particular measurement will be marked with a corresponding

icon in the programme. These icons contain a red triangle and a white exclamation mark. You should then read out the data again by selecting the particular measurement again.

Please note: The programme will not save any measurement with an icon containing a red triangle and a white exclamation mark. This means that as soon as the computer is re-started, the particular measurement will not be listed again as it has not been saved in database.

After the programme has been started, only the "Read out Pressure Logger" and the "Eclipse Measurement Curves" buttons will be activated in the menu bar (section 3.5) if neither a pressure logger nor a measurement has been selected. Therefore, you can read out only those pressure loggers in this mode which have been saved to the read-out board (section 3.5.1) or eclipse only those measurements which are already available in the database (section 3.5.12).

In order to use any further functions of the menu bar, you will either have to mark a measurement or a pressure logger. If you have already marked a measurement by clicking on it with the left mouse key, the functions "Print out selected Measurement" (section 0), „Export into Excel" (section 3.5.10), and "Delete Measurement" (section 3.5.11) will be available. If you have already marked a pressure logger, the functions "Setting the Pressure Logger Time" (section 3.5.2) and "Programming the Measurement" (section 3.5.5) will be available. Furthermore, the functions "Reset pressure logger" (Chapter 3.5.3), "Real-time read-out" (Chapter 3.5.4) and "Change language" (Chapter 3.5.6) are available. The functions "Read out the Pressure Logger" and "Eclipsing Measurement Curves" are not selection context-related and are thus available irrespective of the object selected in the display.

Detailed information will be displayed below the "Drulo and Measurements" window (Illustration 4-1, on the right-hand side) after a pressure logger or a measurement has been selected. This information depends on the object selected (see also section 2.4.1).

If the programme is operating in the GSM mode (see Chapter 3.3), the programme will check if a pressure logger is already connected by means of GSM connection with the programme, whenever a pressure logger is selected. If the pressure logger has not yet been connected with the programme, the programme will ask you whether or not a connection line is to be established. This query can be answered with either "Yes" or "No". If you click on "Yes", the programme will automatically start to establish connection to the pressure logger. Then the

corresponding buttons on the menu bar (see Chapter 3.5) will be activated and can be used. If a GSM connection has already been established to any of the pre-selected pressure loggers, the programme will ask you whether or not this connection is to be terminated before a connection to another pressure logger is established.

4.2 Measurement Curve

The "Measurement Curves" field shows the values of those pressure loggers as a diagram which have been selected in the "Drulo and Measurements" field (Illustration 4-1). However, there will be no information displayed in the "Drulo and Measurements" field. The measurement values will be displayed as a line diagram. The Y-axis shows the pressure, and the X-axis shows the time in hours, minutes, and seconds (HH:mm:ss) for a measurement curve. If several measurement curves are to be eclipsed, the time unit can also be changed to months or years depending on the time between the starting times of the particular measurements. This field also enables the user to gain detailed information about a certain measurement value by positioning the cursor on the value in question for a short while. The programme will then issue a so-called "Tool Tip" which reveals the date of the measurement and the exact value acquired at the particular measurement point.

The diagram features a so-called „pop-up menu" (Illustration 4-2), which can be activated by clicking on the diagram with the right mouse key. This menu is to assist you in changing the scale of the vertical axis and in transforming the pressure-related values into altitude readings. Not only the scale but also the unit for the vertical axis will be changed from "mbar" into "metre".
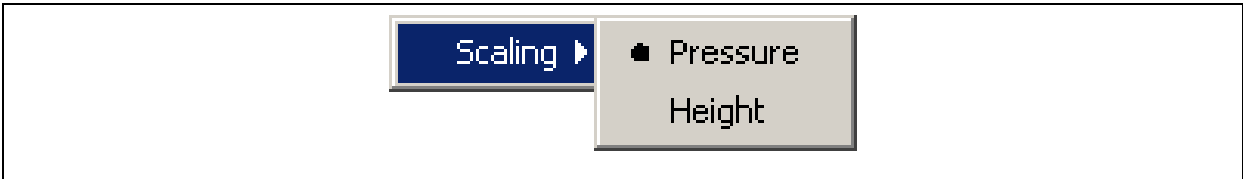

Illustration 4-2: Menu Scaling

Further functions are available through the "Split", "Calculate", "Overlap", or "Mark" buttons. Section 4.2.1 is to describe the "Split" and "Calculate" functions as these functions are only available for this particular view, whereas section 4.2.2 is to describe the remaining two functions.

4.2.1 Detailed View

Additional functions for this field are available through the buttons as shown in Illustration 2-1. If you are working in the Detailed View field, i.e. you are working on the display of a single measurement curve, you can use the "Split" and "Calculate" buttons to divide the measurement curve into several curves or to determine the difference in pressure between the maximum pressure level and the minimum pressure level occurred during the measurement procedure.

Dividing the Curve into Sections

The "Split" feature offers the option to extract a certain part or several parts of a curve. Click on the button and move the mouse cursor into the line diagram. A broken vertical blue line will be created in the diagram. This line will follow the horizontal movements of the cursor and is to define both limits (beginning and end) of the section to be extracted. When you now click on the diagram with the left mouse key and move the cursor to the left, the programme will create a yellow field in the diagram. This yellow field can be enlarged or reduced in size by moving the cursor. Another click on the diagram finishes the creation of the section to be extracted. Now it is only the blue line which follows the movements of the cursor. You can repeat this process a couple of times to extract a number of sections into a separate measurement curve.
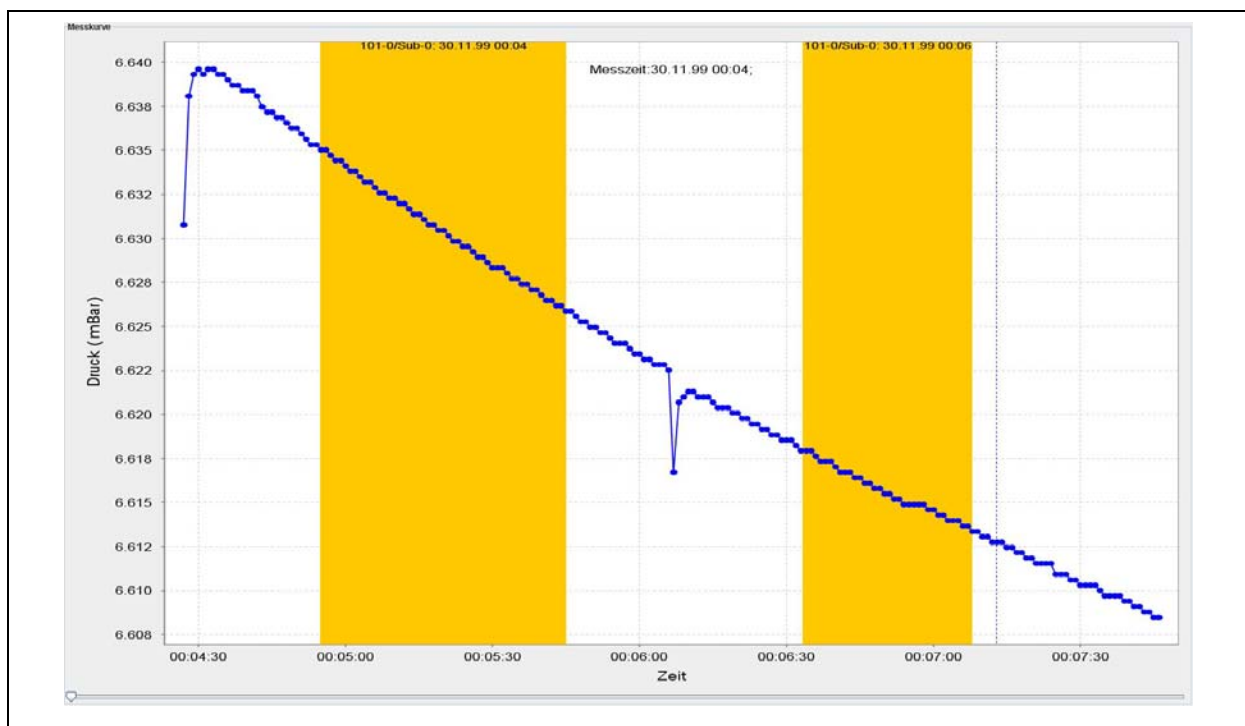

Illustration 4-3: Dividing a Measurement Curve into several Sections

When all sections to be extracted have been marked (Illustration 4-3), click again on the "Split" button to close the process. The marked sections will be removed from the diagram, and the new measurements will be integrated into the "Drulo and Measurements" field.

Determining the Difference in Pressure

This function enables the user to determine the difference in pressure for a certain measurement curve. You require two selection areas in the diagram: one red area representing the high-pressure area and a green area for the low-pressure area. All measurement values within a selection area will be used for the determination of the pressure difference. This difference in pressure is calculated on the basis of the average measurement values of the particular selection area. Illustration 4-4 shows the two marked areas. Once the calculation process is finished, the results will be displayed in the "Drulo and Measurements" field (see Illustration 2-7).

To start the calculation process, click on "Calculate" and move the cursor into the line diagram. This will generate a broken bluish line in the diagram. This line will follow the horizontal cursor movements and represents the two section limits (beginning and end).
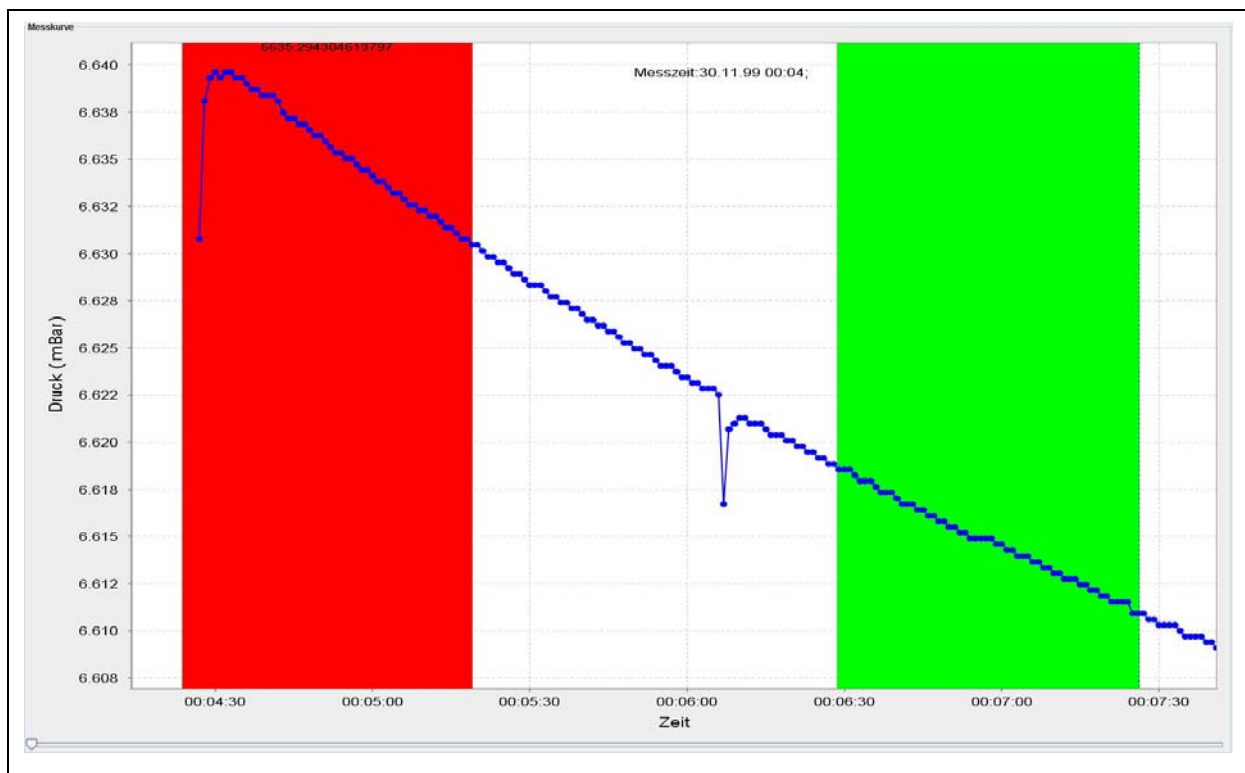

Illustration 4-4: Determining the Difference in Pressure

Click on the diagram with the left mouse key. When you move the cursor to the left, a red area will be created which can be enlarged or reduced in size by moving the cursor. Clicking on the diagram again finishes the creation of the marking section. The measurement values required to determine the high pressure level have been marked now. Now it's the blue line again that follows the movements of the cursor. The next step is to create the green area in the diagram to determine the low-pressure average value, which requires the same procedure as described above with the red area. When you click on the diagram the second time to close the marking area, the function automatically deletes the marked areas and indicates the calculated values as shown in Illustration 2-7.

4.2.2 View of eclipsed Curves

In this mode, several diffusing measurement curves can be eclipsed through the "Overlap" or "Mark" buttons. Also, certain data sections can be selected and then exported into Excel. The following sections are to describe the above functions in detail.

Eclipsing

As soon as you have selected the display mode with various measurement series (section 3.5.12), you have the option to eclipse several measurement curves. This function enables you to eclipse any measurement point of the measurement series (one measurement point per measurement series). Just highlight the measurement points to be eclipsed by clicking on them and thus marking them with the left mouse key. Now a vertical red line to cross the marked point is created in the diagram. Marking another measurement series requires the same procedure. The set markings as shown in Illustration 4-5 can be deleted by clicking with the left mouse key on the empty part of the diagram. The markings you had set are deleted and you can start on new markings. As soon as all new markings have been set, you can start eclipsing the measurement curves by clicking on the "Overlap" button.
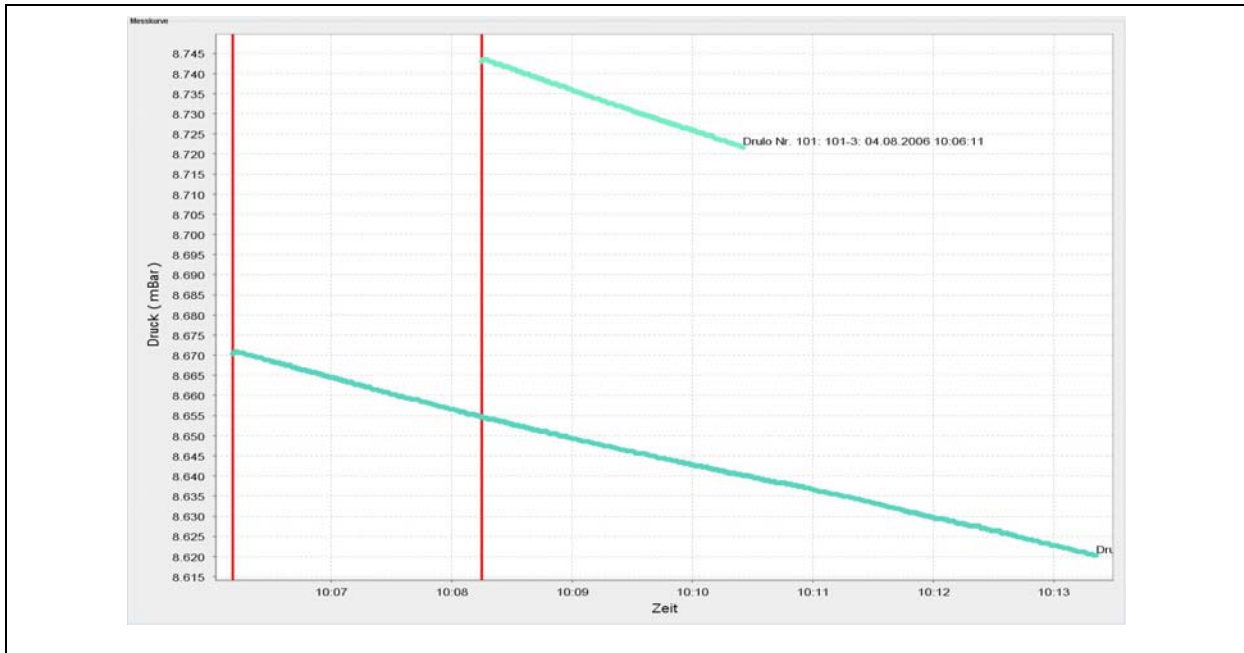
Illustration 4-5: Eclipsing measurement curves

Marking

This eclipse mode also offers the option to export potential measurement values. However, only those values are exported which have been marked beforehand. As a standard feature, the function "`Export selected Measurement`" (section 3.5.10) in this view has not been activated and cannot be activated before the particular measurement values have been marked.
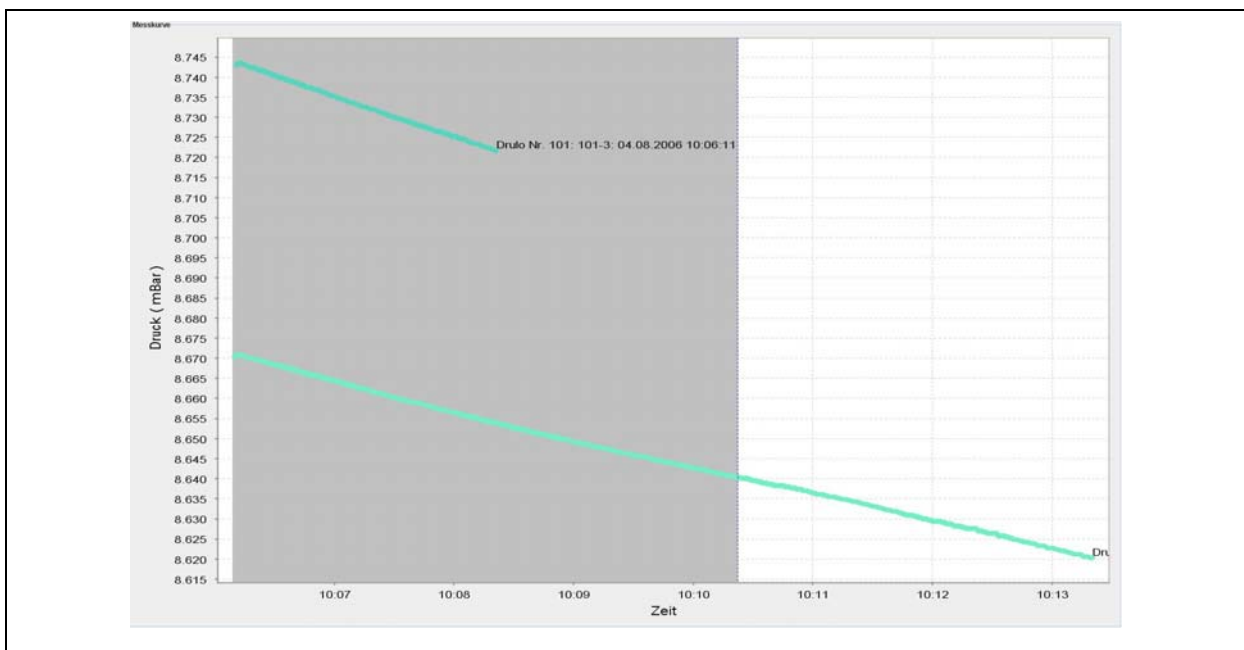

Illustration 4-6: Marking the sections to be exported

To activate the function, click on the "Mark" button. Now a vertical broken blue line is created in the diagram and follows the horizontal cursor movements when the cursor is moved across the diagram. This line defines the limits (beginning and end) of the marking area. When you now click on the diagram with the left mouse key and move the cursor to the left, the programme will create a grey area in the diagram. This grey area can be enlarged or reduced in size by moving the cursor. Another click on the diagram will finish the creation of the marking area (Illustration 4-6). The function "Export selected Measurement" is available to the user now. Concerning the export of the marked area, please proceed as described in section 3.5.10 above. When you have finish the exporting procedure, you can leave the marking function by clicking on the "Mark" button. The created marking area will be deleted from the diagram, and the function "Export selected Measurement" will no longer be available.

4.2.3 Additional Information

The detailed view enables the user (section Detailed View) to lodge additional information on a certain diagram with the database. This additional information will be printed out when the diagram is printed out (see Illustration 3-28). If there is no measurement-related information lodged, the corresponding fields in the measurement protocol remain empty and can be complemented manually at a later point of time, if required.

If you want to add certain information to a measurement, please select the particular measurement in the "Drulo and Measurements" field to make it appear in the "Measurement Curve" field. Then double-click on the diagram with the left mouse key to open the "Additional Information" window. Now you can complement the information required in the window. Confirming by clicking on the "Accept" button will save the input in the database. The input can be rejected by clicking on "Close", the process will be discontinued.

Illustration 4-7: Additional information

VIVAX

Informazioni dalle reti interrate

www.vivax.it

- Radiodetection
- Riser Bond
- Bicotest
- Pearpoint
- Telespec

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