**Manual**

# MJK **800 / 900** *Expert*™ Log
# Expert Level Loggers

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Dear Customer,

Congratulations on your purchase of MJK Expert Data Loggers, the next generation Data Logger!

Before installation and use of your new device as per your requirements, it is recommended that you read these instructions carefully. They contain important information for successful operation of the MJK Log Link software.

Sections in the manual:

- Table of contents
- Installation instructions (Data Logger)
- Installation of the software
- Configuration of the Data Logger (Writer / WriterWL)
- Read-out of stored measured values (Reader)
- Processing of measured values read (Modules)
- Appendix (Sample application, Pressure Conversion Table, Messages)

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# Manual

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# Installation of Expert 900 Logger

## General information

Fluid levels or fluctuations of a liquid can be determined by measuring the prevailing pressure at a lower depth and comparing it with the pressure at the surface. This enables an approximate calculation based on the density of the liquid. For example, in the case of water:
100mbar ≙ 100cm water column (WC).

Measuring is always realized in relation to the ambient pressure (the pressure on the surface) in the case of open systems or classical filling level measurement. This is achieved in conventional water level sensors through a reference tube integrated in the sensor cable, which determines the relationship to the ambient pressure. Measurement of air pressure fluctuations is thus independent. An alternative option exists in intelligent systems, involving the realization of an absolute pressure measurement and calculation of the air pressure correction using an additional barometer. This means that the special cable (with the reference tube) need not be utilized.

## Measuring methods

### Relative measurement (Expert 900)



The Expert 900 is based on the classical level measuring method. The instrument is equipped with a relative pressure sensor. The air pressure is conveyed through the reference tube integrated in the sensor cable at the rear of the sensor. The cable should therefore not be bent or crushed! The upper end of the reference tube is fitted with a GORE-TEX® membrane. This prevents dirt or liquid entering the instrument, while still ensuring the air exchange.

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### Absolute measurement (Expert 800)

The Expert 800 instruments utilize an absolute pressure sensor. A second Expert 800 is positioned on the surface as a barometer where low water depths are involved (as the influence of air pressure fluctuations must also be taken into consideration), and the air pressure characteristic is recorded. The water level is then calculated in the PC program (MJK Log Link) as the difference between the two measured values.

The Expert 800 should be pulled out of the measuring position to read out the data. The interface connector is located in the instrument itself. The Expert 800 can be utilized with extreme flexibility, due to the fact that it has no cable.

In contrast to the Expert 800, the Expert 900 is fitted with a cable with a read-out connector on its end. It is therefore possible to read out the Expert 900 without removing it from the measuring position.

The Expert 900 utilizes a reference tube for air pressure compensation (which acts as a barometer) and automatically calculates the difference between the two measuring values. This enables a direct read-out of the water level.

Expert 900                                         Expert 800

## Installation

Read-out units

Rope

Water surface

Reference- line of sensor

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Adapter ring
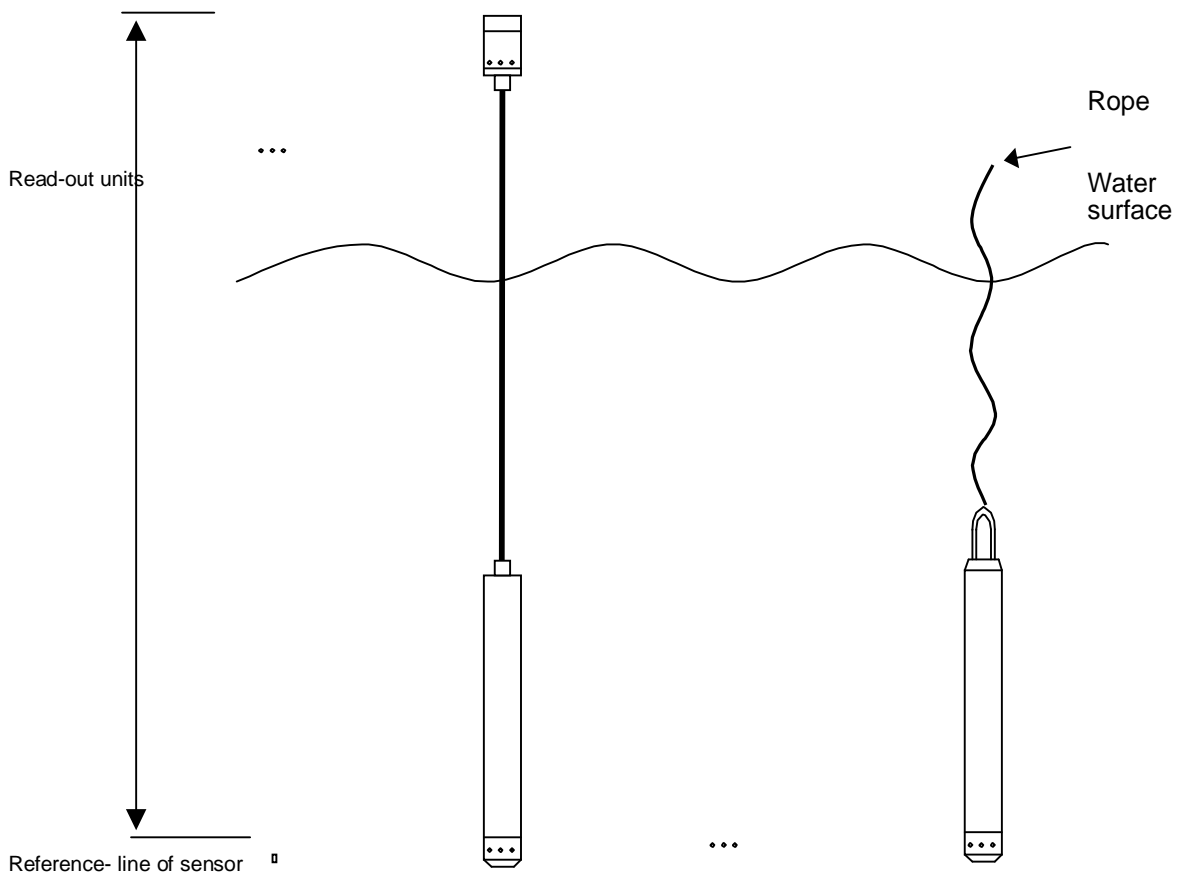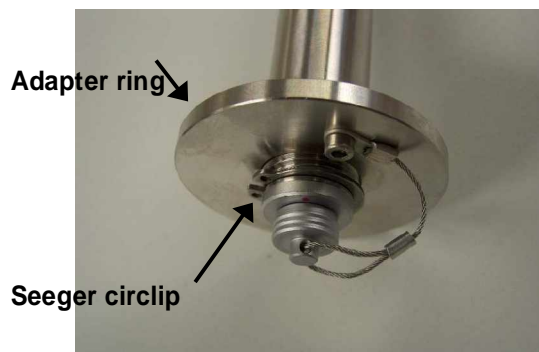
Seeger circlip

The Expert 900 data loggers are lowered into the sinking pipe and fixed in position with an adapter ring. The respective adapter ring is screwed onto the Expert 900 and secured with the Seeger circlip ring supplied.

It should be noted that the cable length selected initially for expert 900 is a fixed dimension and cannot be changed.  The desired cable length should therefore be specified when ordering.

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## Replacing the battery

Battery: Sonnenschein 3.6V lithium AA type

The Expert should be dried prior to opening to prevent water entering the instrument during opening. The data logger should only be opened or closed in dry ambient air!

### Expert 900

The battery is replaced by first removing the knurled nut, followed by the battery sleeve:

**O-rings**                                                      **Battery sleeve**



### Expert 800

The bracket and knurled nut should be unscrewed first in the case of the Expert 800. The battery sleeve can then be removed:

**Bracket**
**Knurled nut**



**Note:**

It is recommended that the battery be first shorted (for approx. a half a second) prior to insertion. This is necessary because the voltage is no longer at nominal level after a longer period of storage. The battery is effectively "reactivated" by shorting it.

Please note the correct polarity when inserting the new battery (see symbol on battery bracket). This opportunity should also be used to check the black O-rings which seal the battery chamber. The ring seals must be replaced if they show evidence of damage. It is also important to ensure that the O-rings are not damaged when remounting the sleeve.

The battery capacity indicator is automatically set to 99% again each time a battery is replaced (voltage interruption). This also occurs if the same battery or a discharged battery is inserted. The battery should for this reason only be replaced when it has been ascertained that it is truly flat.

It is recommended that the pressure sensor be cleaned carefully from time to time if the data logger is being used in extremely dirty or contaminated media:

## Caution:

**The pressure sensor membrane is extremely delicate. The membrane must therefore never be touched!!**

The protective cap cannot be removed. Simply rinse the sensor off under flowing water.

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# Dip pipe installation

Revolution in level metrology:
Gone are the days of the costly measuring stations at the lakes and rivers. The new generation of level measuring stations presents itself inconspicuously and vandal-proof and can be set up at considerably lower costs compared to conventional systems. Here is an application example at a barrage:

The dip pipe is firmly mounted at the measuring place. If the dip pipe is being sunk into the ground, openings have to ensure that water can enter the pipe.

The level sensor, connected by a cable to the electronics housing, is immersed into the pipe. The housing incorporates the electronics, the battery and the air pressure sensor.

The electronics housing is mounted onto the end of the pipe.
The protective cap of the interface must be cleaned from dirt and water prior to removing.

Via data cable, a Laptop is connected to the system on site. The stored measuring values with the programmed parameters can now be read out or the instrument can be reconfigured.

The system is set up for a wireless data transfer via modem.

A vandal-proof metal cap mounted at the end of the system prevents unauthorised access.

The level sensor and the electronics housing form a leak-proof unit and are thus protected against flooding and brackish water.

**Warning!**

A check of pressure offset values is recommended after each installation with resetting if necessary (see Set Pressure Offset in the description of Writer/WriterWL)!

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## Additional recommendations:

- The battery capacity is not measured but calculated from the average current used. If the battery is replaced, as also upon Power-On-Reset, the display will be reset to 100%. A battery replacement is recommended if the battery capacity indicator displays a status of less than 30%. Continued read-out of large volumes of data is thereby guaranteed. (During read-outs, the battery status indicator is not updated, consequently it is possible that a critical battery condition may not be recognized or may be recognized too late).
- The measuring head should be checked at least once a year for dirt.

# Installation of the Expert Log Link software

## System Prerequisites:

| | |
|---|---|
| Processor | minimum Pentium 75 MHz |
| Screen resolution | minimum 1024 x 768 |
| Main memory | minimum 16 MB RAM |
| Free disk space | minimum 20 MB recommended |
| Serial Port | 1 free serial port for communication with the Data Logger |
| | |
| Operating system (tested) | Windows9x, Windows NT, Windows 2000, Windows XP |

## Installation of the software

On our homepage www.mjk.com you will always find the latest version of the Expert Log Link software.

Double-click the file "MJK Log-Link V 4.0.exe" to start the installation program.
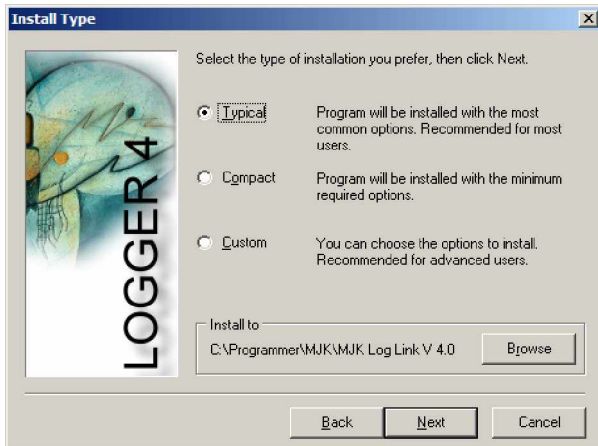
On the first screen, you can make your choice of language to be used during the installation.

In the third screen, the Destination Directory can be specified (Default: "C:\Program Files\MJK\MJK Log Link").

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Under Install Type, you may choose the type of installation:

Typical and Compact: Default installation without additional modules



Custom: Installation of additional modules like Conversion of data to e.g. CSV format and storm flow calculation.



## Files installed

Expert Log Link for Windows consists of the following files:
- Writer (general configuration)*
- Writer WL (configuration for water level sensors)
- Reader (Reader program)
- Viewer (Display program)
- Air pressure compensation (Air pressure compensation module)
- Water level converter (module for conversion to water level values)
- Text-Converter (module for generation of text data)
- WISKI-Converter (module for conversion into ZRXP / CSV – Format (D))
- Overstort (module for generation of an storm flow report (NL))

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Finally, you can specify the Program
Folder to be created under Programs in the Start menu.
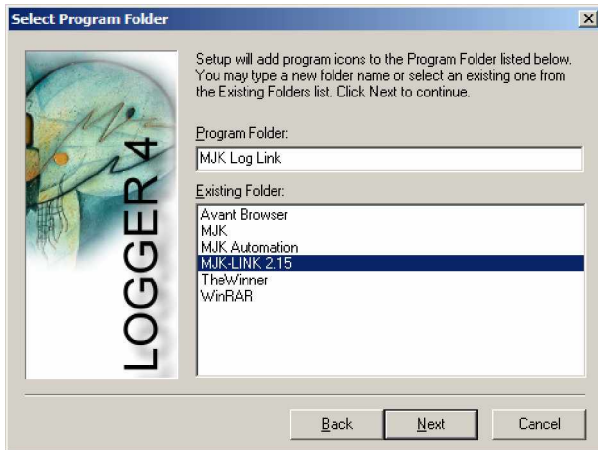


* Non-water level applications such as the rain logger are configured with the Writer.

# The Expert Log Link software package

The software consists of three main programs and additional modules.

Both the configuration programs **Writer** and **WriterWL** are used to read and update the settings of
the connected device, as also to start and end recording.
WriterWL configures devices for water level applications, while the Writer is used for making general
recordings.

The **Reader** gives an overview of all records present in the connected device, and reads in the records
selected. Each record read in is stored in a separate file with the suffix ".idc". These files can be read
by all modules for further processing or display.

Each module can be either executed directly from the Reader, or as a separate stand-alone program.
(The desired module can be found in the program folder created during installation).

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## The configuration program (Writer / WriterWL)

These programs are used for the configuration and starting/stopping of recordings as desired. Since the only difference between these programs is the water level configuration feature additionally provided in WriterWL, it is the latter's operation that is primarily described in detail in this manual.
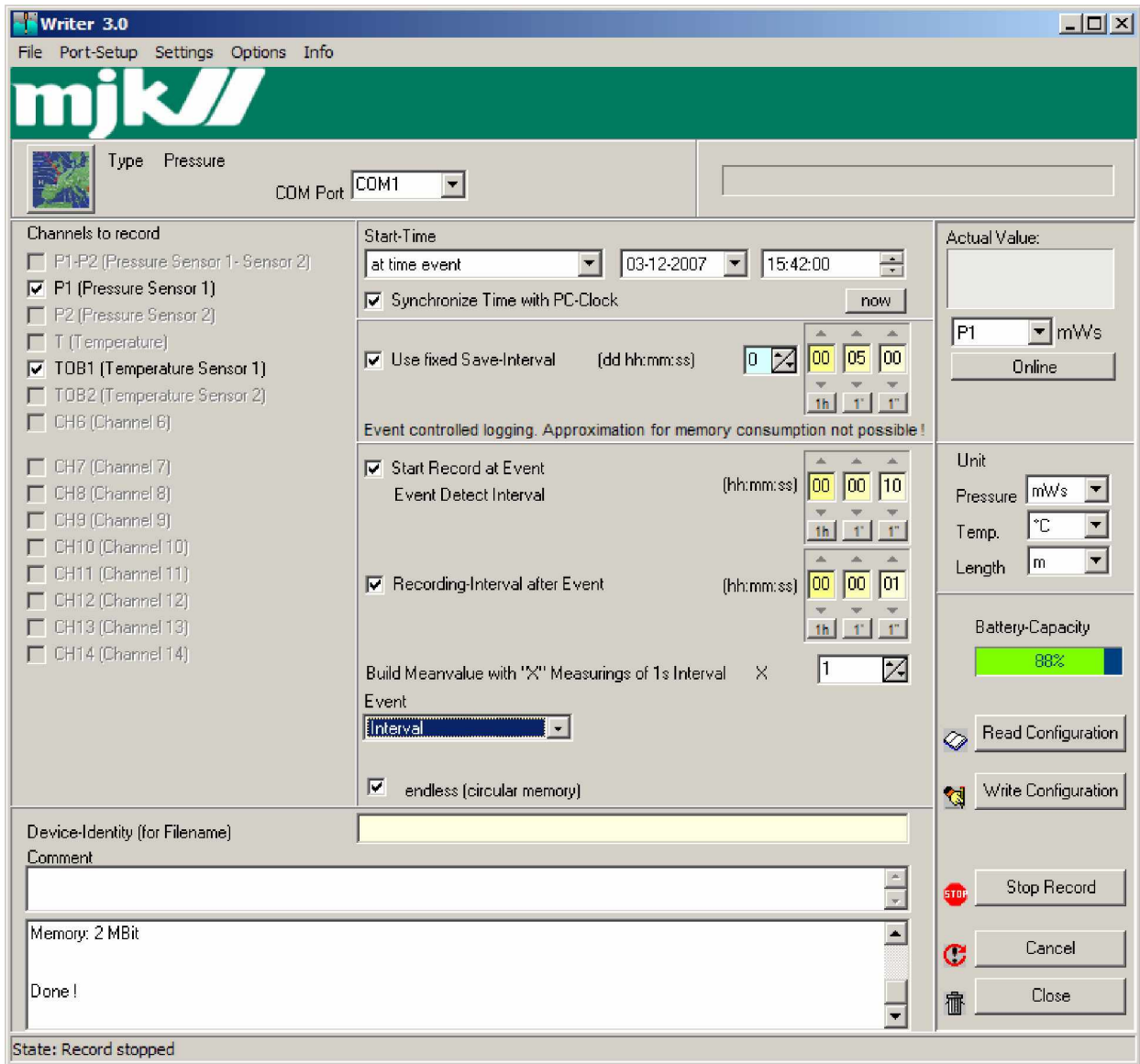


WriterWL

**Manual**

## Initialization

The Expert Log needs to be initialized before communication can be established with it. This can be done by clicking **Read Configuration**. If a device is present, its settings are read in and displayed in WriterWL. The device type, serial number, device time and PC time as well as the (total) memory available in the device are listed in the status window. The status bar shows the current recording status as well as the current time.

## The menus

### File

*Save configuration*: The current configuration is backed up to a file (*.cfx)
*Open configuration:* A saved configuration file is opened and loaded.
*Exit:* Exit the program

### Port-Setup

*Port* Selection of the serial interface
*Modem:* Upon activation, the communication protocol for data transfer via a modem is negotiated.
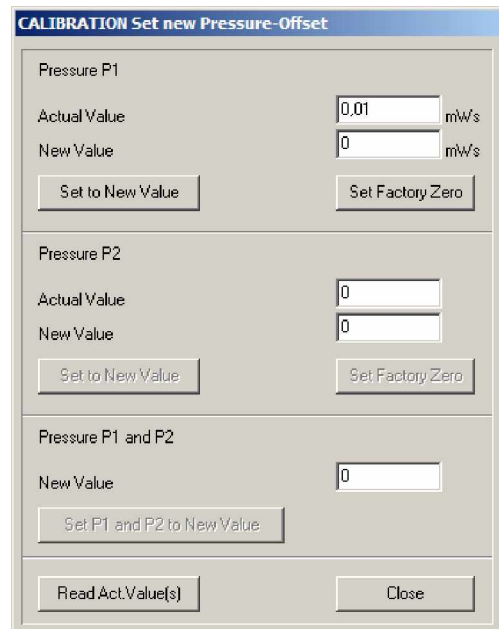
### Settings

*Editing the device identity:*

On this screen you may enter a description (max. 63 characters) by which the device can be uniquely identified. This identification, along with the current date/time and index, is used to form the name of the file that the reader creates after reading in recorded data.
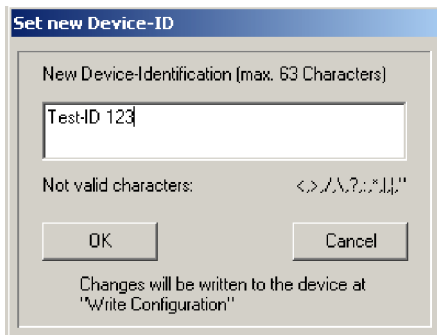
*Setting the Pressure-Offset:*

It is possible to recalibrate the pressure offset of the existing sensors. This can become necessary if, for example, the original values do not tally exactly due to the measuring setup. Either an individual sensor, or both sensors simultaneously if installed, can be set to a new value.
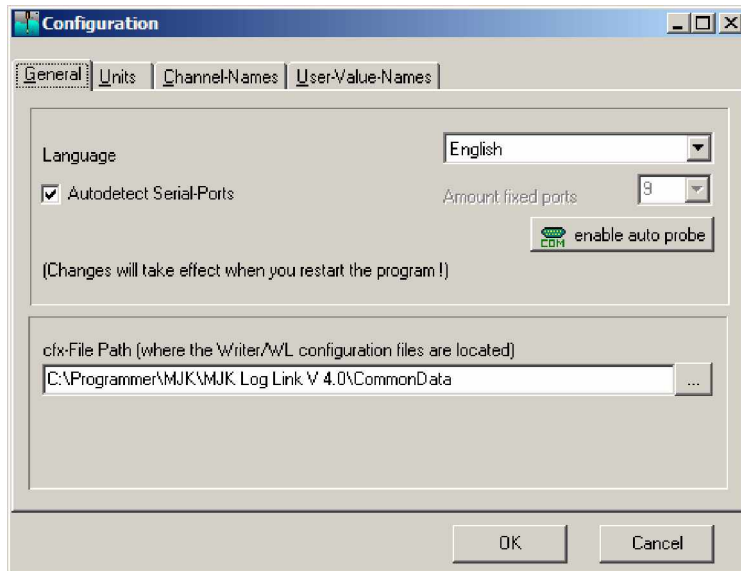
To reset a sensor to its factory setting, click **Set Factory Zero** respectively.

To update the pressure values displayed, click **Read Act Value(s).**

**Options**

*Configuration*



General:
Setting the program language, activation/deactivation of auto detection of existing serial ports (changes will take place only upon program restart), and showing/hiding the picture.

Units:
The number of decimal places for the predefined units of pressure, temperature and length is specified here. In addition one user-defined pressure and length unit each can be specified, with details about conversion factors and decimal places.

Channel-Names:
The user can customize the descriptions of individual channels as per his requirements.

Modem:
This page is needed for specification of a telephone number and additional initialization commands.

**The information entered under General, Units and Channel Names is reflected throughout the Expert Log Link program!**

**Modem**

*Connecting:*      Connect to a modem by dialing the previously recorded telephone number and initialization commands
*Disconnecting:*  Disconnect from the modem

**Info**
Information about the software version and contact details for the company MJK is displayed.

Clicking OK causes the values specified in the WriterWL to be updated and the configuration screen to be exited. CANCEL causes return to the main program without saving any changes.

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## Configuration functions

### Channels to record

Here, the channels to record are selected by checking off the corresponding boxes:

P1-P2        Pressure Sensor 1 – Pressure Sensor 2
P1           Pressure Sensor 1
P2           Pressure Sensor 2
T            Optional temperature sensor
TOB1         Temperature Sensor 1 (Top of bridge)
TOB2         Temperature Sensor 2 (Top of bridge)

### Start time
Specifies the time at which the device goes into recording mode at the earliest.

*- at "write configuration"*:        starts recording mode after **Write Configuration**
*- at time event*:           starts recording mode at the time set

If the option Synchronize *Time with PC-Clock* is selected, the current PC time is written into the device during **Write Configuration**. Multiple data loggers can simultaneously each be set to the current time with this function.

### Use Fixed Save-Interval
If this option is selected, the selected channels are recorded continuously at the interval specified in the time field. The maximal settable interval depends on the device version and is either 18 hours, 12 min, 15 sec, or 99 days, 23 hours, 59 min, 59 sec.

### Start Record at Event
When this function is activated, the selected channels are recorded only if a definite event has occurred, for example, pressure exceeds *-or-* drops below a selectable pressure level, change in pressure greater than a selected value, etc. The following additional functions appear when this option is selected:

### Event Detect Interval
In order to be able to detect an event, the device must read the current value at regular intervals and compare with the selected event value. These regular intervals are specified in the time field. The maximum interval is 18 hours 12 minutes 15 seconds

### Recording-Interval after Event
After event detection, it is possible for recording of measured values to take place in another interval. This parameter is set in this function and is independent of the value specified in **Fixed Save-Interval**. The maximum interval is 18 hours 12 minutes 15 seconds

### Example:
By enabling these functions, a device can be configured, such that every 30 minutes (Event Detect Interval) the current measured value is compared with the selected event value, every 2 hours (Fixed Save-Interval) a control recording is made, and as soon as the event has occurred, values are recorded after an interval of 1 minute. (Recording-Interval after Event).

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**Building Mean value after X measurements at 1 second intervals**
This function enables the averaging over "X" measurements at intervals of one second each.
Recording is initiated only after the average has been determined, even if the recording interval chosen is smaller.

For example, "Recording interval after event" = 1 second, X = 5:A measured value is recorded once
every 5 seconds.

**Event**
Following events / start conditions can be selected as conditions for recording:

- Interval                              (continuous recording without startcondition)
- On at Val1, Off at Val2               (recording above resp. below a certain level)
- Save if delta Channel > Val1          (recording on changing of the signal)
- Start recording if Channel > Val1     (Start recording above a certain level)
- Start recording if Channel < Val1     (Start recording below a certain level)

Interval
In addition to **Building Mean value after X measurements at 1 second intervals**, this function is
meant to record the mean values of the selected channels.

Recording is done at a fixed interval independent of **Fixed Save-Interval**. If **Recording interval after
event** has been selected in addition to **Event Detect Interval**, the smaller of the two intervals shall
always apply.

On at Val1, Off at Val2

- If **Val1 < Val2** respectively recording below a certain level
Recording takes place if the measured value of the channel where event-driven recording is
scheduled is less than Val1, until the measured value is greater than Val2. (Hysteresis = Val2-Val1)
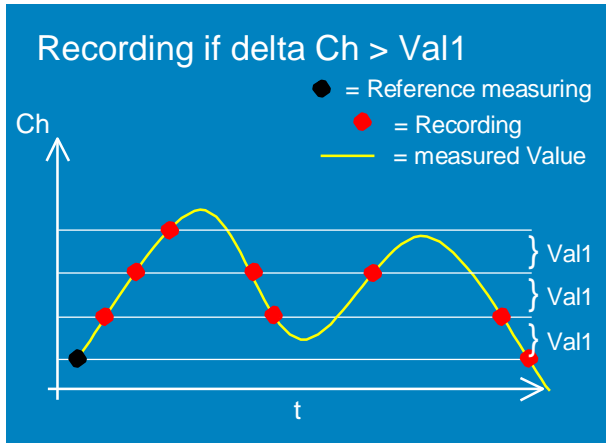
- If **Val1 ≥ Val2** respectively recording above a certain level
Recording takes place if the measured value of the channel where event-driven recording is
scheduled is greater than Val1, until the measured value is less than Val2. (Hysteresis = Val1-Val2)

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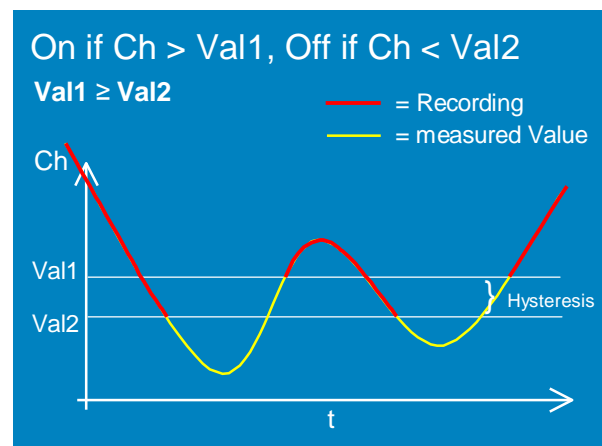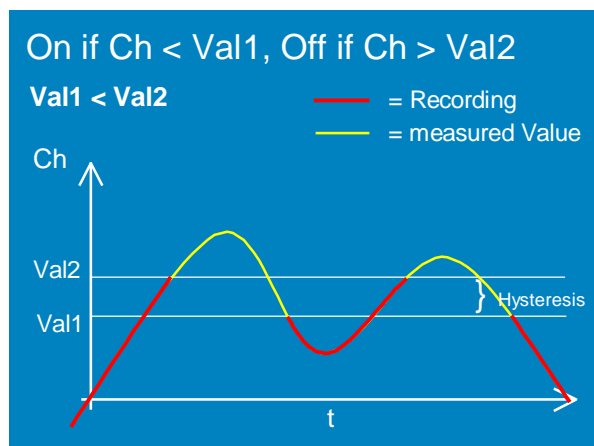
Save if delta Channel > Val1

Recording only takes place if the measured value of the channel where event-driven recording is scheduled is greater by Val1 than the last recorded value. After **Write Configuration** a reference value will be recorded.

## Recording if delta Ch > Val1

● = Reference measuring
● = Recording
── = measured Value

Ch

} Val1
} Val1
} Val1

t

Start recording if Channel > Val1

Recording is started as soon as the measured value of the channel where event-driven recording is scheduled is greater than Val1.

## Start Recording if Ch > Val1

── = Recording
── = measured Value

Ch

Val1

t
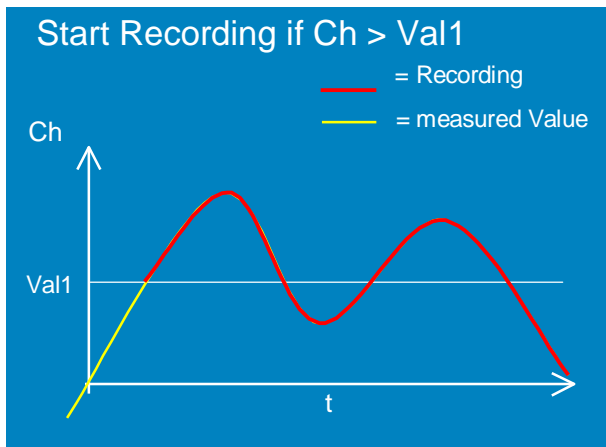
Start recording if Channel < Val1

Recording is started as soon as the measured value of the channel where event-driven recording is scheduled is less than Val1.

### Endless (circular memory)

This function is enabled by the user for continuous recording by the device. That is to say, earlier values get overwritten when the memory is full. Without this setting, the device stops recording when the memory is full.

From the following table, we can see what the **approximate** data volumes and recording times are:

| Interval | Number of channels | 1 MBit | | 2 MBit | |
|---|---|---|---|---|---|
| | | Number of measured values per channel | Recording time | Number of measured values per channel | Recording time |
| 1 second | 1 | 28560 | 8 hours | 57232 | 16 hours |
| 1 second | 4 | 7140 | 2 hours | 14307 | 4 hours |
| 10 sec. | 1 | 28560 | 80 hours | 57232 | 160 hours |
| 10 sec. | 4 | 7140 | 20 hours | 14308 | 40 hours |
| 1 min. | 1 | 14280 | 10 days | 28616 | 20 days |
| 1 min. | 4 | 6120 | 100 hours | 12264 | 200 hours |
| 10 min. | 1 | 14280 | 100 days | 28616 | 200 days |
| 10 min. | 4 | 6120 | 43 days | 12264 | 86 days |
| 1 hour | 1 | 14280 | 1.6 years | 28616 | 3.2 years |
| 1 hour | 4 | 6120 | 0.7 years | 12264 | 1.4 years |
| 8 hours | 1 | 14280 | 13 years | 28616 | 26 years |
| 8 hours | 4 | 6120 | 5.7 years | 12264 | 11.4 years |

**Note:**
The amount of memory available in the connected device (total), is displayed after **Read Contents** in Reader and after **Read Configuration** in Writer / WL.

The difference in data volumes and recording times are due to the storage structure. Time intervals up to and including 15 seconds can be saved along with the measured value, larger intervals need as much extra storage space as a measured value. This structure enables data to be recorded at various points in time, and not only continuously.

**Device-Identity (for file name)**
Display of the device description, which can be specified by clicking the menu command "Edit Device Identity".

**Comment**
Entry field for any desired comment which will be written to the device after **Write Configuration** is clicked.

**Actual value**

If the Online function is activated by clicking **Online**, this field displays the current value of the selected channel. Updating takes place every second. In online mode, the recording status and memory status (in the status bar) as well as the battery capacity display are updated. It is likewise possible to display the current height to the desired length specification, taking into account the water level configuration settings.

**Device type**

The type of connected Data Logger is indicated under Device type:

- sealed gauge, air pressure compensated in each case (Expert Log 900)
- absolute (Expert Log 800), air pressure must be compensated separately (see Air pressure- Compensation-module)

**Conversion to**

Recorded hydrostatic pressures can be converted into length values as per the water level configuration settings. This conversion is carried out by means of the module Waterlevel-Converter.

Height of water above water level sensor (e):

- Linear measure (e) from the water level sensor to the water surface. The height (e) is directly determined from the hydrostatic pressure, the density of the medium and acceleration due to gravity.

Depth to water (f):

- $f = B - e = C + D - e$

Height of water above sea level (g):

- $g = A - f = A - (B - e) = A - (C + D - e)$

**Starting conditions at installation**

Height of wellhead above sea level (A):

- During conversion to "Height of water above Sea Level (g)", the height of the wellhead above sea level must also be specified. Any other desired reference point may also be used.
  If the sea level, or the reference point selected instead, is located above the well head, the value must be entered with a negative sign.

Installation Depth (B):

- This value must be determined at sensor installation. It should correspond to the length from the upper edge of the wellhead to the sensor-membrane. The membrane is identified by a mark on the sensor.

Depth to water. (C):

- If this start condition is selected, the sensor measures the water height above the sensor (D) at the start of the recording **Write Configuration** and uses the value entered here to determine the installation depth of the water level sensor. (B).

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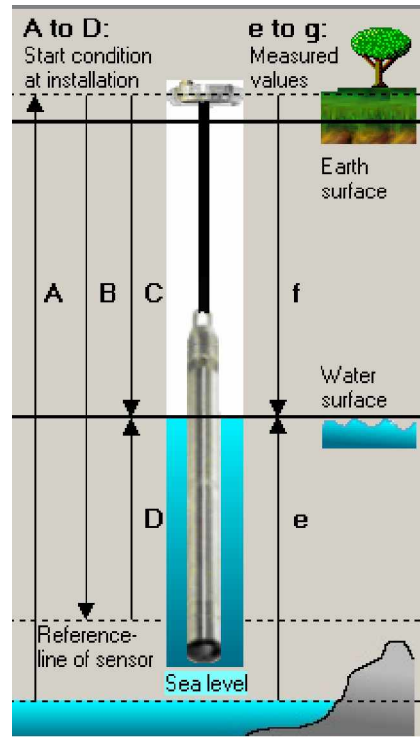
Offset:
- Offset is a freely selectable value (positive or negative) which is added to the length calculated. The default value is 0. For example, by giving a value for Offset, the distance between the upper edge of the wellhead and the earth's surface can be specified and therefore taken into consideration during the calculation.

**Water density / Calculate water density**
Entering the water density (for example. fresh water (20 °C) = 998.2 kg/m3)

If the user does not know the water density, the software supports its calculation:

By clicking **Calculate water density** the following screen appears.

For the calculation we need the installation depth (B), the depth to water (C) as well as the current pressure value (D). The air pressure must also be entered if the device does not compensate for it. If the air pressure is not known, the sensor can be taken out of the water and the air pressure can be read out by clicking "Current value (P1)".

Calculations take place according to the following formula:

$$\text{water density} = \frac{\text{Current value (D)}}{(B - C) * 9.80665}$$

All conversions into water level values are made with a constant value for gravity:
$$g = 9.80665 \ [m/s^2].$$

Clicking on **Calculate** starts the calculation. Click OK to update the values in WriterWL and exit, or click Cancel to return to the main program without saving any changes.

**Warning:**
The correctness of the calculated water density is wholly dependent on the correctness of the depth figures. It is recommended that the sensor be located in a minimum depth of 3m of water.

**Set User-Values (only in Writer)**
This dialog box enables the entry of 7 user-defined values: for example, installation depth, water density, height above sea level, fixed coefficient, etc.

These values are written into the file created by the Text-Converter if desired. This file can then be imported to Microsoft Excel and a macro can be created by the user to further process these values.
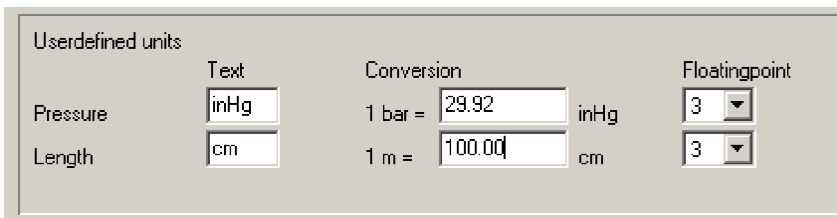
GB Manual Expert Log 800-900.doc
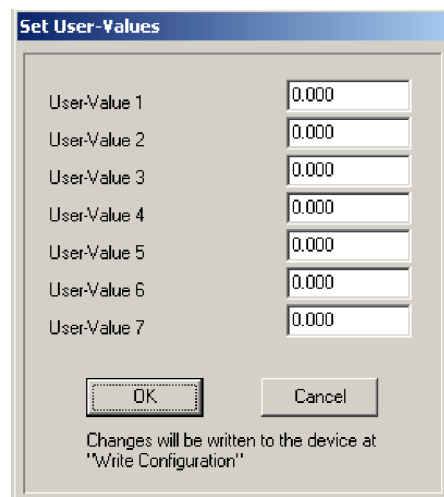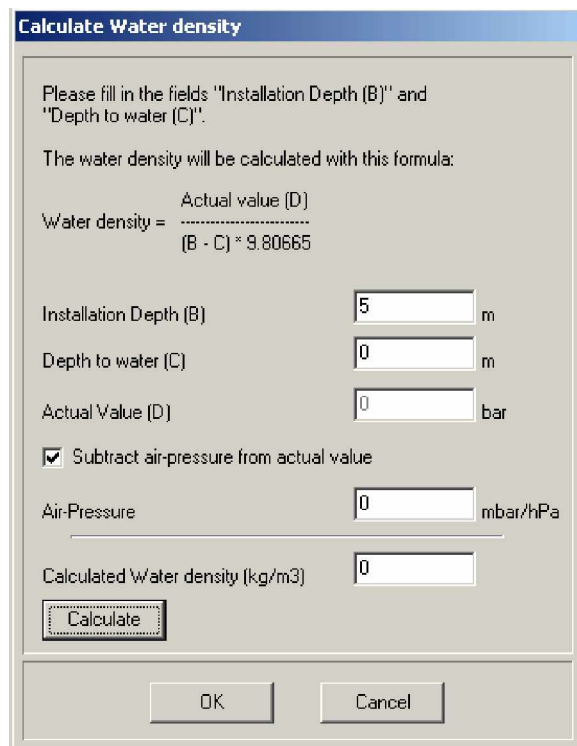
## Operation of Writer / WriterWL

### Units

| | Fixed units | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pressure | Bar | mBar | mWs | PSI | Pa | kPa | MPa | mmHg | ATM |
| Temperature | °C | °K | °F | | | | | | |
| Length/height | m | inch | foot | yard | | | | | |

Userdefined units

| | Text | Conversion | | Floatingpoint |
|---|---|---|---|---|
| Pressure | inHg | 1 bar = 29.92 | inHg | 3 |
| Length | cm | 1 m = 100.00 | cm | 3 |

Sample specification of user-defined units on the configuration screen

The units set in the main window are used in all further dialog boxes.

### Read Configuration
Initialization of the connected data logger is commenced by clicking this button.

### Stop Record
Clicking this stops any recording already started.

### Write Configuration
By clicking this, the configuration settings are written out to the connected device.

The status of the recording can be checked in the status bar by going into online-mode immediately after **Write Configuration**.

Example: Recording stopped >> recording ready >> recording started (provided the start-event has occurred).

### Cancel
Communication with the connected device is broken off.

### Exit
The program is exited

### Warning!
**Don't ever forget to initiate the recording by clicking on "Write Configuration"!**

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## The Reader program (Reader)

All recordings available in the device are listed by means of this program. Each recording selected is read out of the device and stored in a separate file. Depending on the selection of executing modules, these files are either further processed or only displayed. The files can also be processed later with the help of the individual modules.

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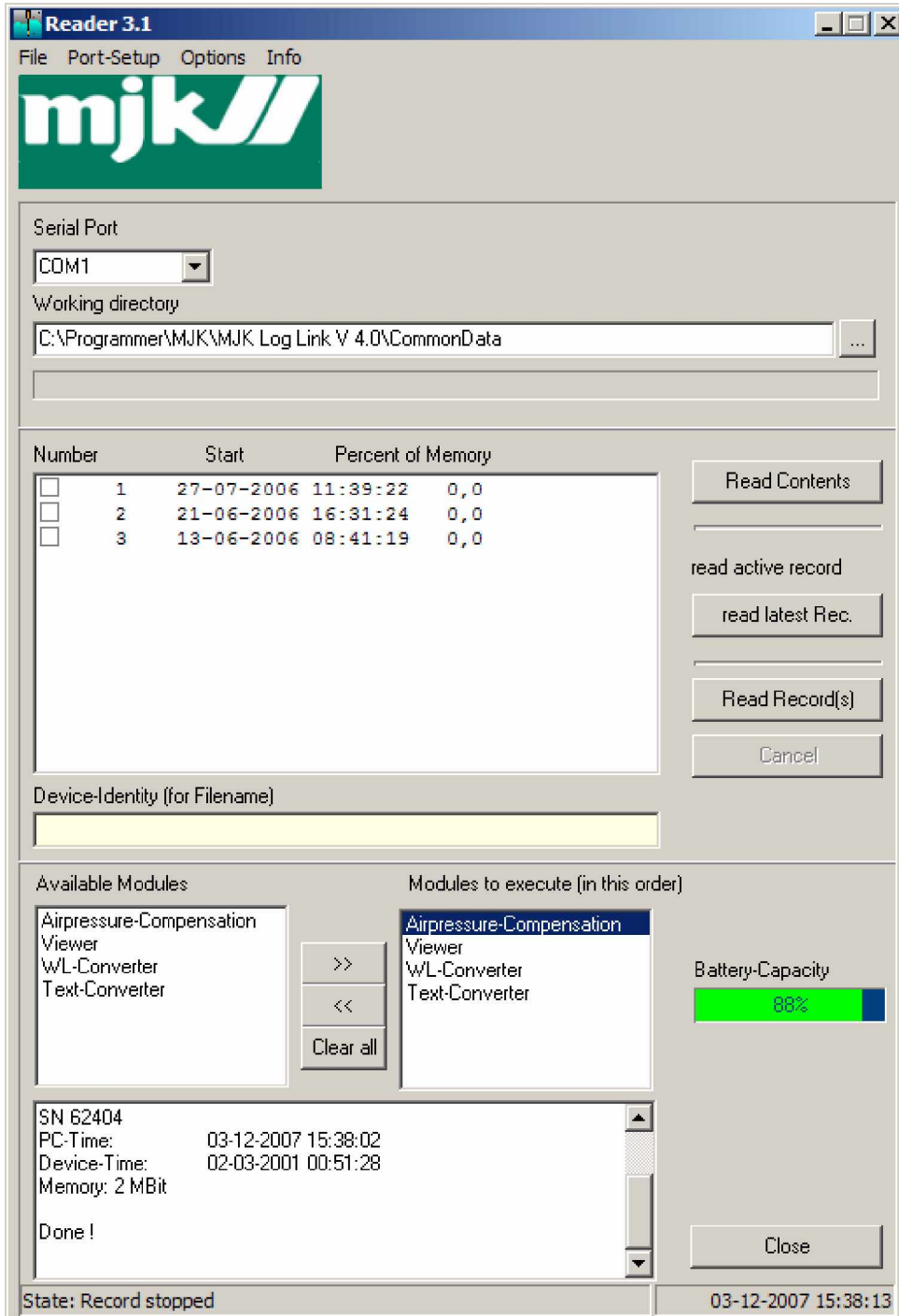
## Initialization

Before communications with the Expert Log can be established, the latter needs to be initialized. This is done by clicking on **Read Contents**. If a device is present, a table of all stored recordings is displayed. The device type, serial number, device time and PC-time as well as the (total) memory available in the device are listed in the status window. The status bar shows the current recording status as well as the current time.

## The menus

### File

*Exit:*　　　　　　　　Exit the program
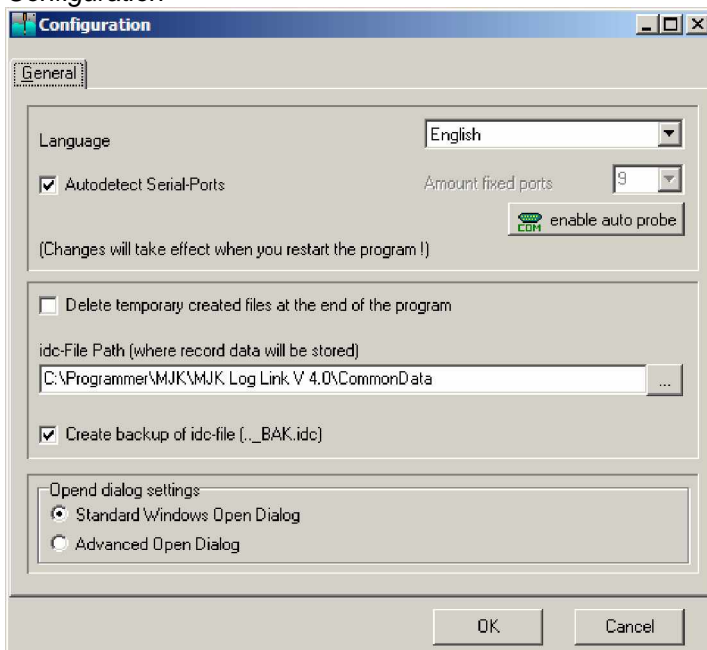
### Port-Setup

*Port:*　　　　　　　　Selection of the serial interface
*Modem:*　　　　　　　Upon activation, the communication protocol for data transfer via a modem is negotiated.

### Options

*Configuration*



General:

Setting the program language, activation/deactivation of auto detection of existing serial ports (changes will take place only upon program restart). Another option is to delete all the "*.idc"-files created when the program is exited. This should be set only if the memory available is very low.

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Modem:

This page is needed for specification of a telephone number and additional initialization commands.

**Modem**

*Connect:*    Connecting to a modem by dialling the previously recorded telephone number
              and initialization commands
*Disconnect:* Disconnecting the modem

**Info**
Information about the software version and contact details for the company MJK is displayed.

## Read-out of stored data

After initialization, a list of all available recordings is displayed.

Every recording is shown with a selection check box, a sequence number, start date and time, as well as memory used as a percent of total memory.

The recordings to be read can be selected by checking off the box next to the recording number.

Various modules can be selected for the display or further processing of the data. The list "Modules to be execute (in this order)" is built by clicking "**>>**" and "**<<**" and reset with "**Clear All**". The same module can be invoked multiple times (see illustration).
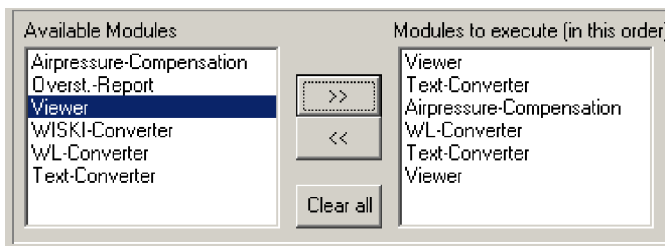


After selecting the recordings to be read out and modules to be executed, the read-out procedure is initiated by clicking **Read Record(s)**.

For each recording read out, a file is created with a filename based on the following pattern:

"(Device ID+date+time+Index).idc"

The files are saved in the directory "Common Data" created during installation. This is located in the destination directory (Default:" C:\Programmer\MJK\MJK Log Link V 4.0\CommonData") specified at installation.

Thereafter, all selected modules in the list are executed one after another. Depending on the module, the user may asked to provide additional details (see module description)

**Setting a mark**
If a recording that was not yet stopped is read out, (only possible for recording No. 1) the following dialog window appears:

---

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If a mark is set, a new recording starts. This means that at the next read-out of the active recording (only No. 1) only data recorded after the mark was set is included in the read-out.

## Description of individual modules

Each module can be directly invoked from the reader (data is transferred automatically). If the module is invoked directly, the file to be processed can be read by clicking "File – Open...".

### Air pressure-compensation (Air pressure-Comp.)

In this module one or more (if invoked from the Reader) files are compensated for air pressure. The air pressure is taken either from a previously created "*.idc" File, or a fixed air pressure (constant) is used for compensation.

If the air pressure data file read in contains measured values from a device of the type Expert Log, then Channel P2 is the "Channel with air pressure".

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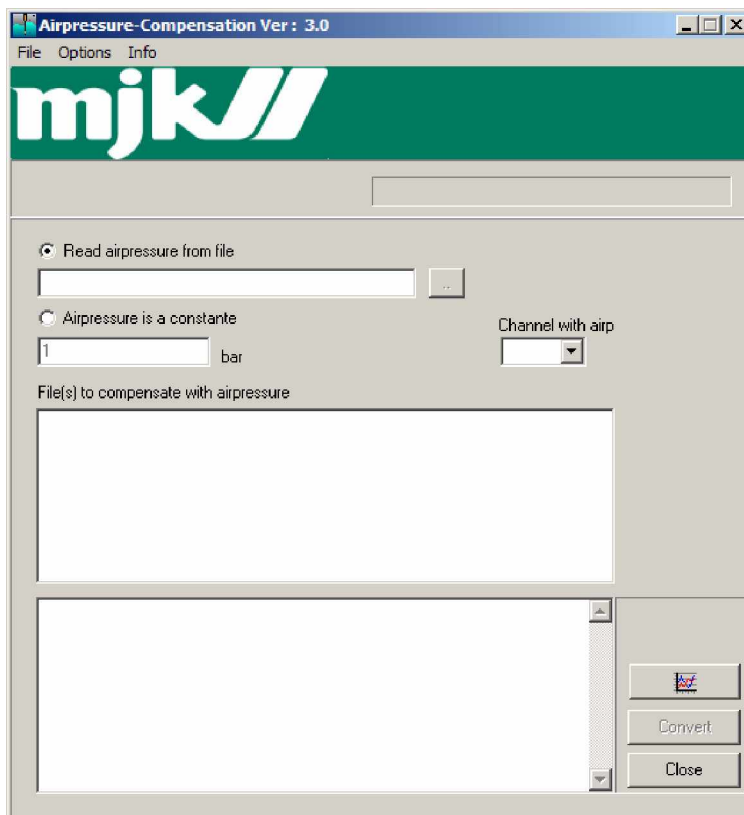
Click **Convert** to compensate each file with the selected air pressure.

**Warning!**
No new files are created; instead the values in the current files are overwritten. In addition a mark is set preventing second air pressure compensation.

### Conversion to Water level values (WL-Converter)

Since the data logger pressure values are always measured and recorded in bar, this module is necessary for conversion to water level values. The configuration settings specified in WriterWL are re-displayed for verification.
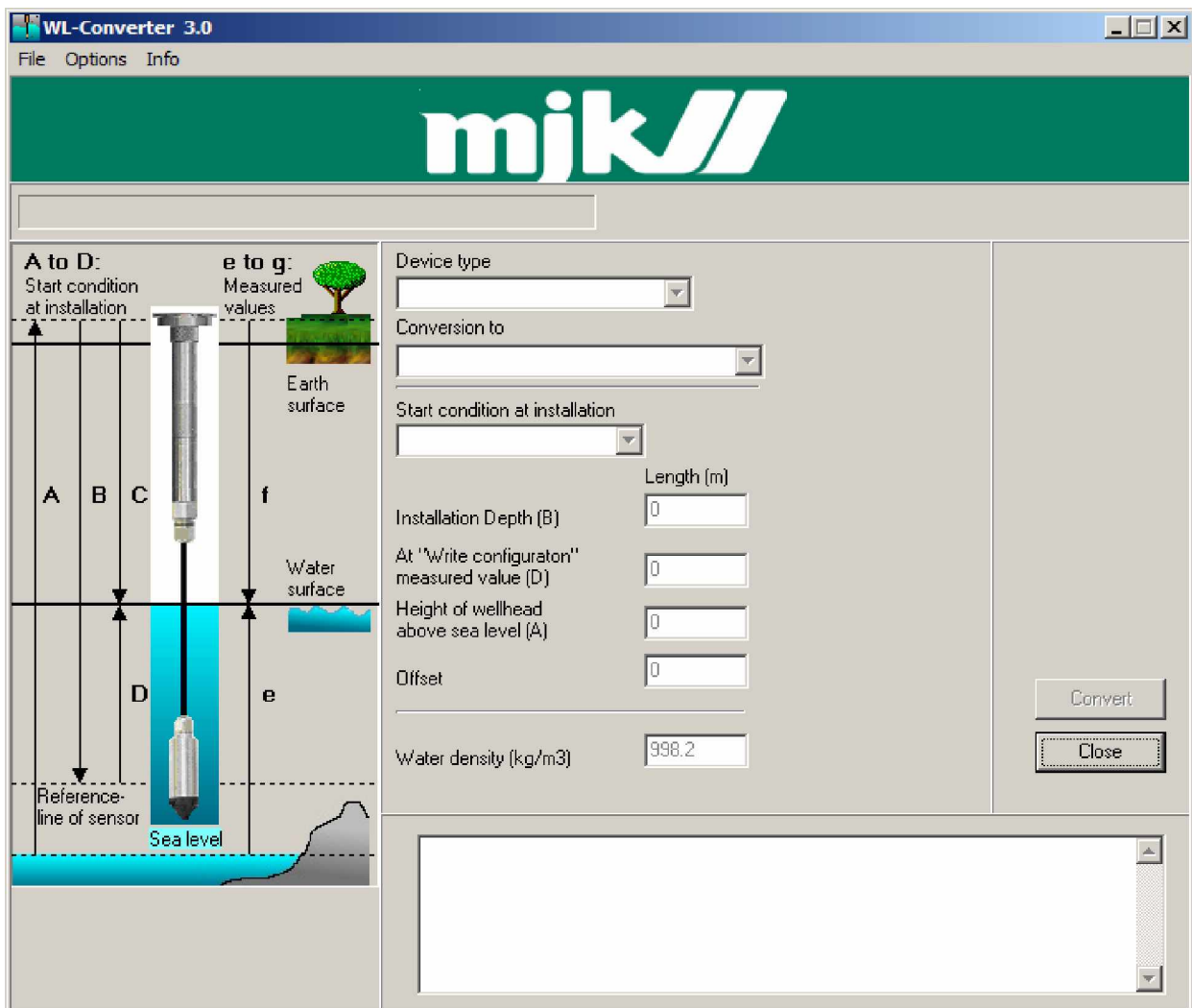


Clicking **Convert** leads to all measured values being converted into water levels. The unit for converted values is always meter (m).

**Warning!**
No new files are created; instead values in the current files are overwritten. In addition a mark is set preventing a second calculation of water level values.

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### Creation of text data (Text-Converter)

For display and/or further processing of measured values if required, conversion into a text file is necessary. This module creates such a file in tab-delimited format with the suffix ".txt". The file can be opened with any desired editor. It is however recommended that the file be imported into a commonly used spreadsheet program such as Microsoft Excel for a better overview.
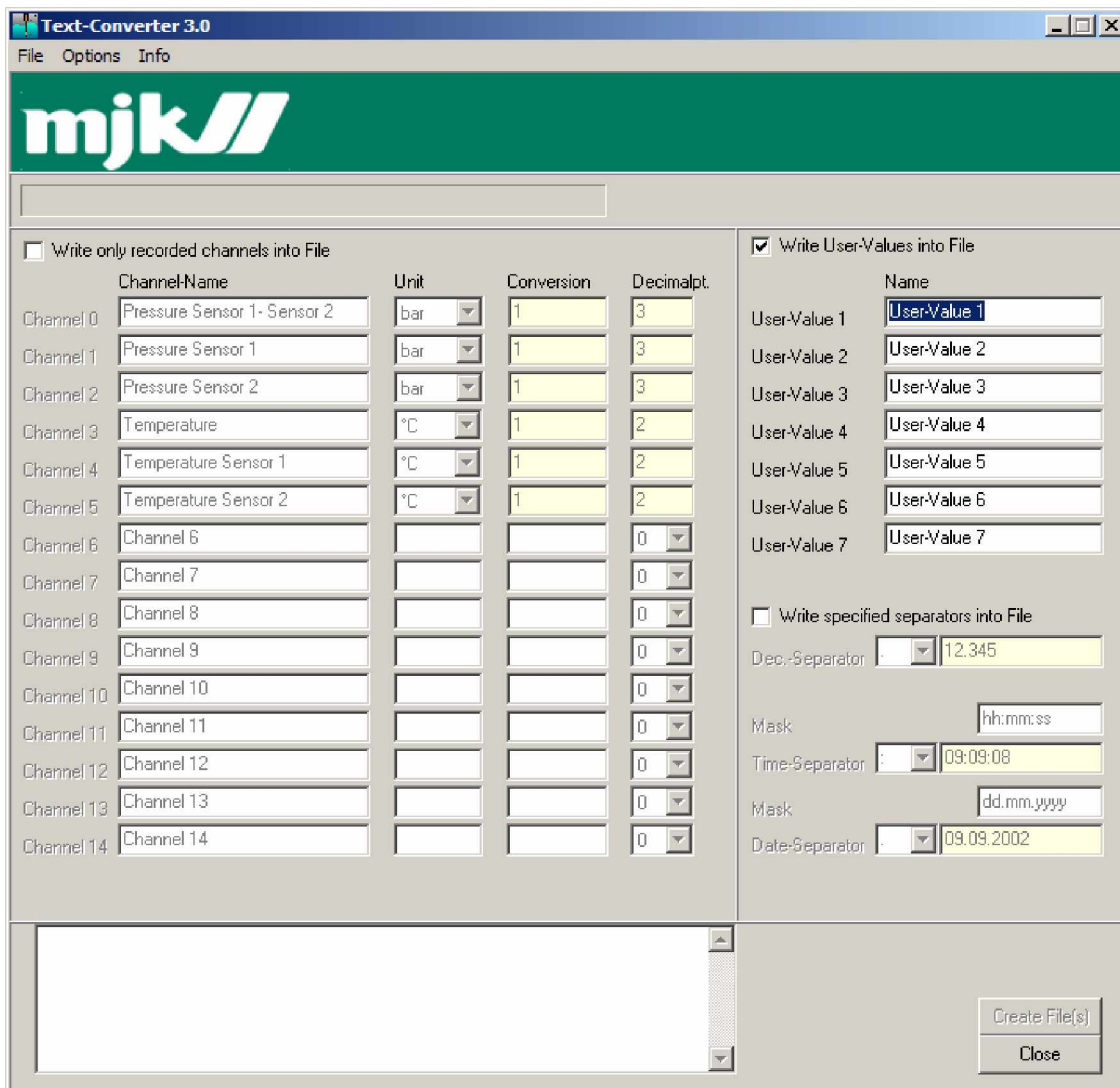


The user has several options:

Write specified channel-names and units into File:

- To extract a smaller set of data, specific channels can be selected.
- Other units can also be specified. A user-defined unit can be specified under "Options – Configuration – Units", which will be applied to the entire Expert Log Link – package.

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Write only recorded channels into File:

- The Data Logger was designed for recording 15 channels (at present a maximum of 7 channels are implemented). If this option is not selected, all 15 channels are written out, whether they contain data or not. Due to this fixed assignment, a user macro or other program can always access the desired measured values. If this option is checked off, only recorded channels are written to the file.

Write User-Values into File:

- Specify whether user-defined values created with the Writer are written into the file. Each value can also be given its own description. This description can in turn be used by a user macro or program to read in the required values.

Write specified separators into File:

- Since number, date and time formats are country-specific, they have to be localized, which can be done using this option. The user can choose the desired character from an existing drop-down list, or specify another character. The mask used for the date and time formats can be changed (e.g. from dd.mm.yyyy to yyyy.mm.dd). Short or long names can also be selected, depending on the number of characters (mmm= short form of the month e.g. Sep., mmmm = month written out fully e.g. September).

On clicking **Convert** the user is asked to change or confirm the default file name. The default file name is based on the following pattern:

"(DeviceID+date+time+Index).txt"          -          date and time that the text data was created!

Upon clicking Save, the file is created.

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Sample file created using the Text-Converter, displayed in Microsoft Excel

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### Display module (Viewer)

This module is used for displaying the measured values read out. The user can select the following options to customize the view:

- Channels to be displayed
- Pressure and temperature units
- Zoom in and zoom out of the graph
- Display of cross-hair, grid and legend
- For better view ability, the pressure values can be inverted and displayed. This is especially recommended for files with water level values (virtual representation of the water height).

Under "File – Save as Bitmap..." the graph is saved in the default format (*.bmp).

The status bar displays the x- and y-values per unit respectively.
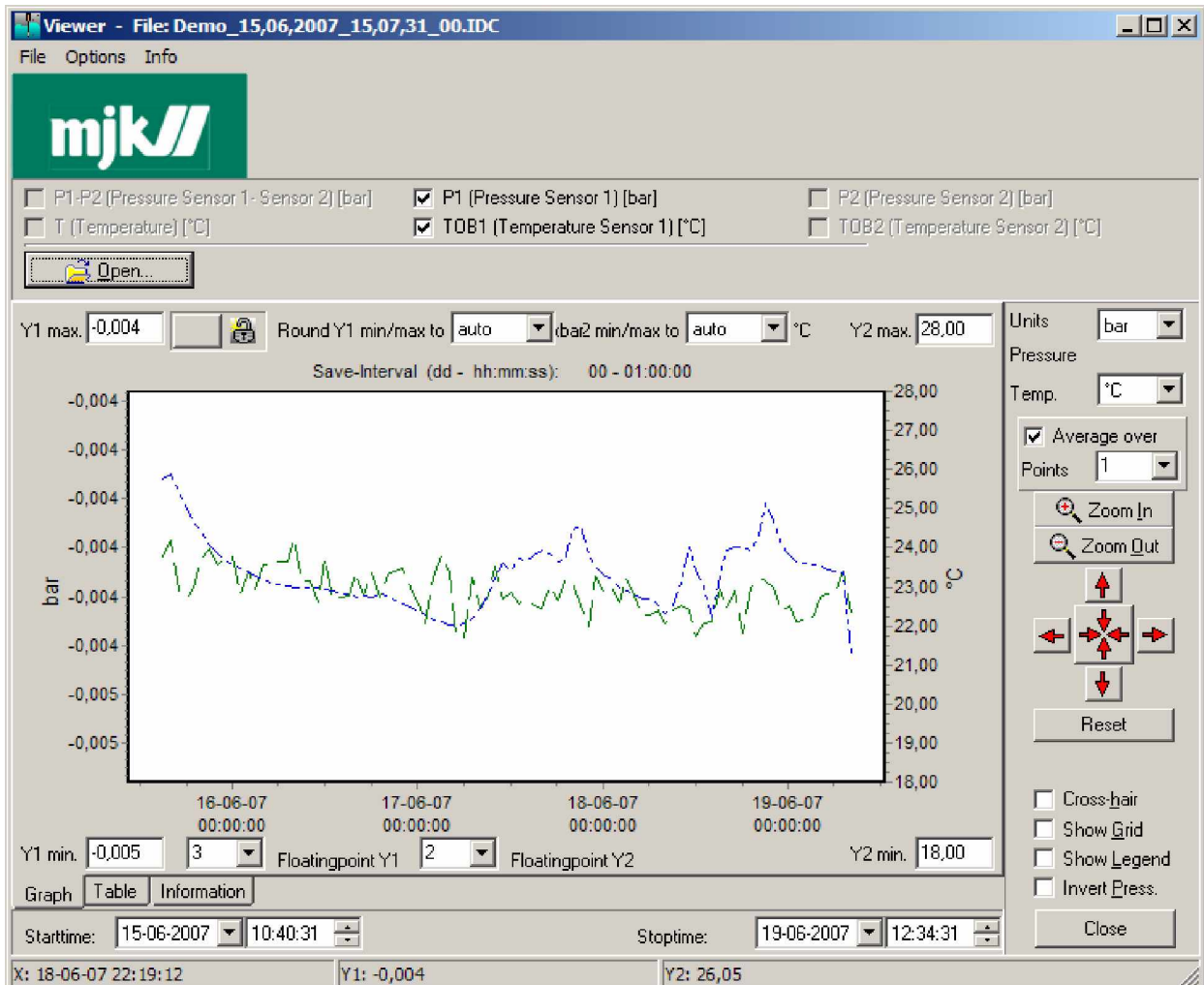


Clicking this button resets the display to its starting state.

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**Files with water level values:**

If a file with converted water level readings is displayed, in older versions of the viewer, the pressure unit cannot be changed thereafter. This is indicated by the display of unit details [m] alongside the pressure channel.
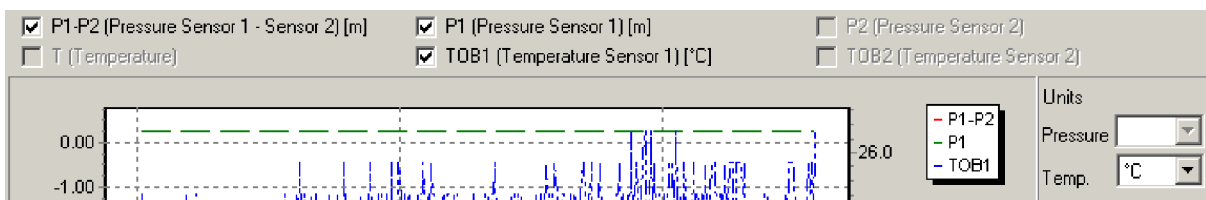


Example of a file converted into water level readings

**Hint:**
In Windows Explorer under "Extras – Folder options" specify Viewer as the program for opening files with the suffix "*.idc". Thereafter each .idc file created by the Reader can be displayed in the Viewer by double-clicking.

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## WISKI-Converter

The design of this module is very similar to that of the Text-Converter. It is also used for creation of a text-file which can be used for further processing or for display.
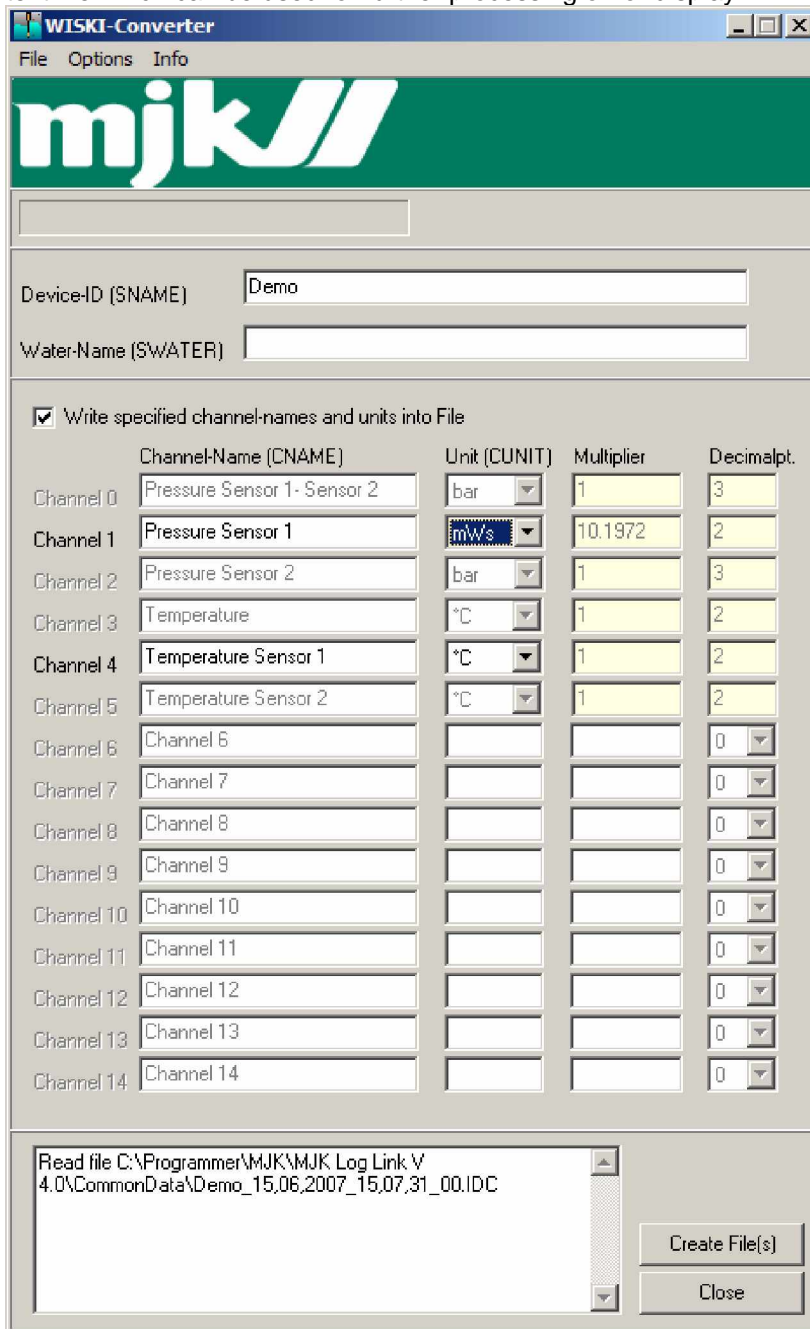
Under "Options – Configuration - General" there are two selectable formats.

ZRXP-Format:       If the data is converted into this format, it can be displayed and processed with the WISKI - TimeSeriesViewer from the firm Kisters (30-day demo version available here).

CSV-Format:        This format is a widely-used general semicolon-separated format with the following pattern:

Date; Time; P1-P2 [bar];P1 [bar];P2 [bar];TOB1 [°C];TOB2 [°C]
29.11.2002;13:15:05;0,0001;0,9628;0,9626;22,9336;23,3125
...

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## Overstort-calculation (storm flow, Overflow calculation)

In some countries (e.g. Holland, Belgium) water consumption is measured with the help of an overstort wall. The volume of water consumed is calculated from the measured water level minus the Trigger-in-value (Val1) configured with the WriterWL. This Trigger-in-value corresponds to the distance of the sensor from the overstort wall. Trigger-out (Val2) should be set to the value Trigger-in – 3cm, in order to attain a turn-off hysteresis.

Poleni's formula is used for flow calculations:     $Q = 1.7 \times m \times b \times h^{3/2}$

| | | |
|---|---|---|
| Q | = | flow |
| 1.7 | = | fixed correction factor |
| m | = | construction factor |
| b | = | width of the overstort wall |
| h | = | water level above the overstort wall (Recorded value – Trigger-in-value) |

The total overstort-volume is calculated using all calculated and intermediary flows and the corresponding duration of the overstort.

The module creates a detailed record, which can be printed as a report under "File – Print...".

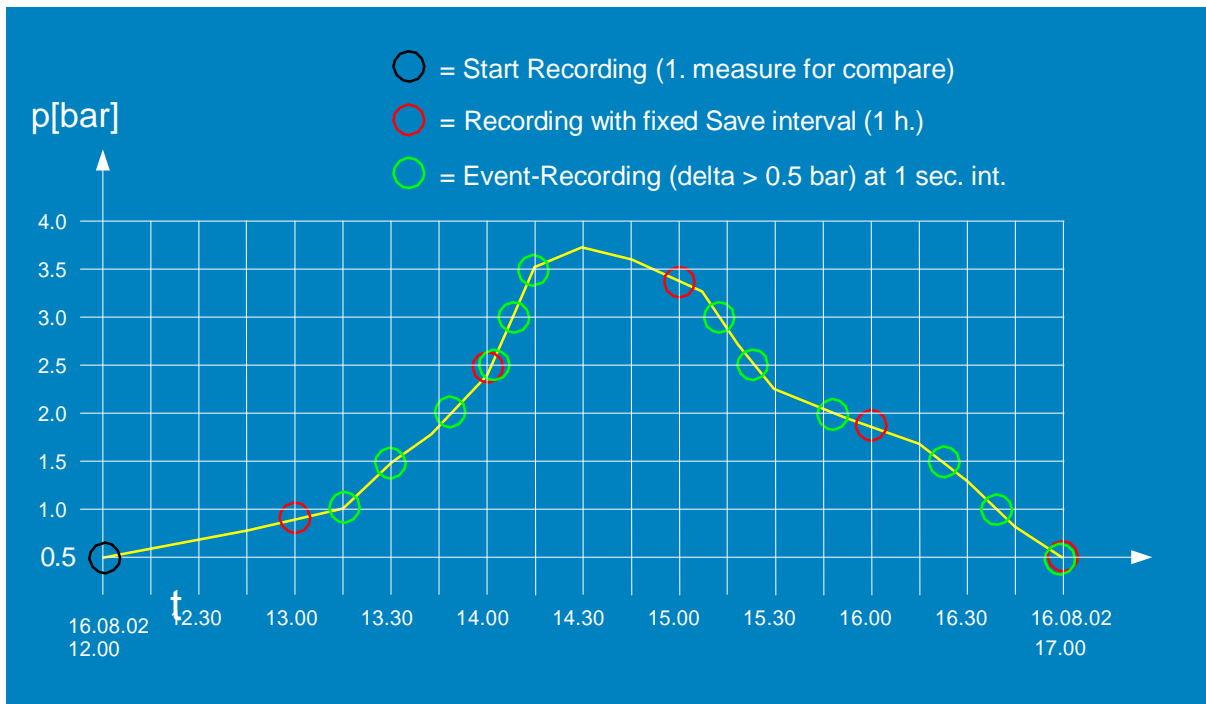GB Manual Expert Log 800-900.doc
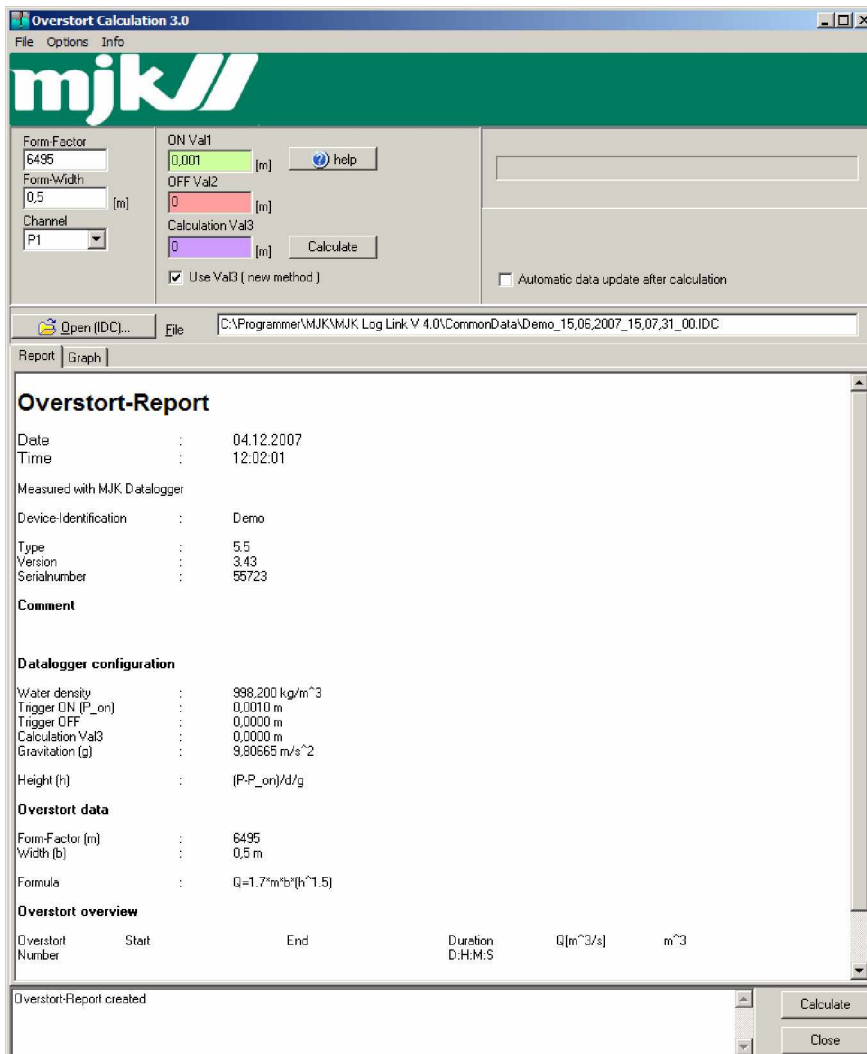
# APPENDIX

## Sample application
Recording configuration:

Fixed Save-Interval        = 1 hour
Event                      = Save if delta Channel > Val1, Val1 = 0.5 bar
Event-Detect Interval      = 1 second
Save-Interval during the Event: = deactivated, correspondingly also 1 second

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As soon as the configuration has been written into the device, a first measured value is recorded (in the sample:Start recording at 12.00 p.m.). As per configuration, this measured value is compared every second with the current measured value, till the difference is 0.5 bar. This first happens at 13.15. The next recording takes place at 13.30, etc... Independent of that, each fixed Save-Interval (1 hour), an additional recording is done.

At 17.00 both a recording at the fixed Save-Interval as well as an event recording occur simultaneously. Only one measured value is stored however.

**Warning!**

With the Event "Save if delta Channel > Val1" the interval "Recording interval after Event" is always taken into account. This means that in the following configuration example, the interval time is always 1 second, that is both for event detection as well as for recording!

Event Detect Interval          = 5 seconds
Recording interval after Event:   = 1 second

The time value specified under **Fixed Save-Interval** is however independent and in addition to the above mentioned interval.

**Pressure Conversion Table**

| | bar | kPa | mWs/mH$_2$O | inchH$_2$O | mmHg(Torr) | inchHg | psi |
|---|---|---|---|---|---|---|---|
| bar | **1** | 100 | 10,1972 | 401,463 | 750,062 | 29,530 | 14,5038 |
| kPa | 0.01 | **1** | 0,101972 | 4,01463 | 7,50062 | 0,29530 | 0,145038 |
| mWs/mH$_2$O | $9{,}8067*10^{-2}$ | 9,8067 | **1** | 39,3701 | 73,5559 | 2,8959 | 1,42233 |
| inchH$_2$O | $2{,}49089*10^{-3}$ | 0,249089 | $2{,}540*10^{-2}$ | **1** | 1,86832 | $7{,}35559*10^{-2}$ | $3{,}613*10^{-2}$ |
| mmHg(Torr) | $1{,}33322*10^{-3}$ | 0,133322 | $1{,}35951*10^{-2}$ | 0,535240 | **1** | $3{,}9370*10^{-2}$ | $1{,}9337*10^{-2}$ |
| inchHg | $3{,}38639*10^{-2}$ | 3,38639 | 0,345316 | 13,5951 | 25.40 | **1** | 0,491154 |
| psi | $6{,}89476*10^{-2}$ | 6,89476 | 0,70307 | 27.68 | 51,7149 | 2,03602 | **1** |

**Messages:**

| Message | Significance |
|---|---|
| REC-ERROR: Please perform a power-on reset ! | **A problem occurred during the recording. The battery must be removed and reinstalled.** |
| BAT-ERROR: Please replace battery ! | **The battery must be replaced** |
| ACK-ERROR: Please perform a power-on reset ! | There was a problem in saving during the recording. The battery must be removed and reinstalled. |
| Device has changed, please read configuration first! | The connected device was swapped out. It must be reinitialized with **Read Configuration** |
| No communication! Please check connection and port-no. | No communication with the connected device. The serial ports at the device and PC need to be checked. |
|  |  |
| State: Record active | **Device is in recording mode** |
| State: Record prepared | Device is being prepared for recording mode |
| State: Record stopped | Recording mode is stopped |
| Memory full! | The memory is completely full (only possible, if "Endless recording (circular memory)" has not been activated) |