

# **LOGGER 5.1 Software**

## for Windows

by KELLER AG für Druckmesstechnik

The Logger 5 Software is designed for the KELLER autonomeous data collectors DCX, the digital manometer LEO Record and the remote data transmission unit and data logger GSM-2.

## Logger 5.1 Help

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## 1 Logger 5.1

- 1.1 Introduction
- 1.1.1 Welcome

Welcome to the Logger 5.1 Software
<ul> <li>The Logger 5 Software is designed for:</li> <li>Reading data from a logger device</li> <li>Configuration and programming a logger device</li> <li>Online measurements and chart visualization</li> <li>Graphical chart Viewer to inspect measurements and data analysis</li> <li>Printing reports</li> <li>Exporting data in different formats to access your measurements in other applications</li> <li>Calculating water level</li> </ul>

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#### **Getting Started** 1.1.2

Logger 5 Help	
To run the Logger 5 Software wi the following hardware and syst	th full functionality, your computer should meet em requirements:
A CONTRACTOR	For communication with the logger hardware you need an interface converter
	<ul> <li>A logger device i.e., DCX-22,DCX-16, LEO Record, etc.</li> <li>The Logger 5 Software supports the following Keller Data Logger products:</li> <li>DCX autonomous data collectors</li> <li>DCX autonomous data collectors with conductivity sensor</li> <li>LEO Record digital manometer with record function</li> <li>GSM-2 remote data transmission unit and data logger</li> </ul>
	If you are using the K104-A Converter with USB connector you need to install the appropriate

USB Driver installed

YP USB driver.

You may download the driver here: Driver K104

## 1.1.3 Contacting Us

KEL	LER	
Headquar	ters	
÷	<u>Switzerland</u>	KELLER AG für Druckmesstechnik
Subsidiari	ies	
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<b>C</b> *	Turkey	Zeta Enerji Ltd. Sti.

### 1.1.4 About Keller

#### KELLER



The integrated silicon measuring cell was developed at the Honeywell research centre in Minneapolis/USA at the end of the 1960s.

Hannes W. Keller, a graduate in physics from the Swiss Federal Institute of Technology (ETH) and named by Honeywell as the inventor, brought the technology to Switzerland in 1971, to the company Kistler, which launched the first piezoresistive pressure transducers with isolated measuring cell on the market in 1973. This was followed in 1974 by the establishment of KELLER AG, a company specialising in pressure measuring technology.

In 2008, more than 1,1 million isolated measuring cells were produced. Of these, 250'000 were delivered to OEMs, 750'000 were used in the production of industrial pressure transmitters, and the rest were distributed among the 500 or so other standard products.

- largest manufacturer of industrial pressure transmitters in Europe
- Our strengths: High volumes at low prices, high flexibility
- Pressure ranges: 5 mbar to 2000 bar
- KELLER is certified according to ISO 9001



Keller Promo Video about the Company

Short Info on KELLER Technology / Headquarters

**Digital Brochure** 

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## 1.1.5 About Waterlevel and Pressure



#### The hydrostatic pressure

If you swim under the water and dive, you will feel the water pressure acting on your eardrums. The deeper you dive the greater the pressure.

This pressure depends on the depth or, in other words, the height of water column above you.

The pressure also depends on the density of the liquid.

The hydrostatic pressure can be determined with the help of the following formula:

$$P = \rho * g * h$$

where

 ${\sf P}$  is pressure  $\rho$  is the density g is gravity h is height of liquid column or depth within the liquid



For accurate water level measurements, the density of the liquid has to be taken into consideration. Solute substances in the water have an influence on the density. Clean, pure water has a different density than the sea water in the Mediterranean Sea.

Pure water at 20 °C has a density of 998.2 kg/m<sup>3</sup> and sea water (depending on degree of salinity) 1020 ... 1030 kg/m<sup>3.</sup>

#### Calculating water column height from pressure and density

For the sake of completeness, a short remark concerning the calculation of water column height from pressure measured in bar.

The equitation for hydrostatic pressure transformed to height is:

$$h = \frac{P}{\rho * g}$$

I

Please note that 1 bar is equal 1\*10<sup>5</sup> N/m<sup>2</sup>

Reviewing the physical units yields meters for the water column height.

 $p = \rho * g * h$ 

- p = hydrostatic pressure (1 bar = 1E5 N/m<sup>2</sup>)<math>p = Density (kg/m<sup>3</sup>)
- h = height or level (m)

$$h = \frac{p^* 1E5 \frac{N}{m^2}}{\rho^* g \frac{kg}{m^3} \frac{m}{s^2} \to \frac{Ns^2m}{mm^3s^2}} \to \frac{Nm^4s^2}{m^2Ns^2m} \to m$$



#### Example with single device

The *absolute* pressure  $P_1$  is the sum of the hydrostatic pressure of the water column above sensor 1 and the atmospheric or barometric pressure  $P_2$  weighing on the



To achieve accurate surveying of the water level (height of water column above sensor) the fluctuations of barometric pressure due to weather changes have to be taken into consideration.

The Keller DCX22-AA data collector uses two absolute sensors.

The submersible depth sensor measures the water level while barometric pressure variations are measured and compensated with the built-in waterproof air pressure sensor which is mounted in the electronics housing at the top of the borehole.

For the calculation of the water level h we need to build the pressure difference P1-P2. The influence of barometric pressure changes are herewith eliminated and we get the absolute hydrostatic pressure representing the height of water column above sensor 1.

The DCX22-AA provides the calculated pressure difference P1-P2 as a separate channel.

The Logger 5 Software can use the P1-P2 channel for calculation of water level or the pressure difference can be calculated from channel P1 and channel P2.



#### Example with 2 devices

Another possibility is to use 2 independent devices measuring the absolute pressures P1 and P2. One device submersed in the water and the second one for monitoring barometric pressure located in the air close to the borehole.

The Logger 5 Software also provides functionalities to calculate water level based on readings originating from different devices.

*Please note:* The device monitoring barometric pressure should be located in close proximity to the borehole, presumably at the same height as the water surface.

Taking a look at the following barometric formula (International Standard Atmosphere)

$$p(h) = 1013,25 \left(1 - \frac{0,0065 \cdot h}{288,15}\right)^{5,255} hPa$$

shows that already 10 meter of height above sea level yields approx. 1.2 mbar pressure drop and spoken in terms of water level an error of approx. 1 cm in the calculated water column height can result if the device for monitoring barometric pressure is not wellplaced.

*Please note:* The picture on the left side shows that both devices have the same upright position. The position of the device and herewith of the pressure sensor has influence on the measuring result as well.

Water level data is usually stated using on one of the following methods:

- height above sensor
- depth to water surface measured down from a reference level
- height above sea level

All these methods are supported by the Logger 5 Software.

#### Logger 5.1

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## 1.1.6 Assembly Instructions and First Startup

#### Assembly Instructions



#### Suitable conditions for the measuring location



- The logger device should be mounted in a stable environment
- For surface level installations, care should be taken to ensure free movement of the water in the borehole or tube so that the system can "breathe." A sealed volume of air above the water surface must be avoided !
- Lateral movements of the pressure sensor housing (P1) can lead to erroneous pressure readings. If possible, avoid turbulent locations or stabilize the device with a stilling tube.
- High temperatures should be avoided. For instance, dark painted enclosures and intense sunshine can heat the environment beyond the compensated temperature range of the logger hardware. The resulting errors will impact measurement accuracy and

subsequent water level calculations.

The picture below shows a GSM-2 unit installed in a typical outdoor housing. While this housing is ideal for installation, dark colors and exposure to sunshine can heat up the logger device.



#### First Setup:

The Logger 5 Software can determine correct system length or installation length B with the help of manual reference measurement.

Such initial measurement during first setup is necessary for accurate water level measurement..

Measuring the water level is presumably carried out with the help of a electric contact gauge:



Reference Plane	Installation length <b>B</b> is the sum of depth to water <b>F</b> measured manually from reference plane and the height of water column above the sensor <b>E</b> .
F	<ul> <li>The calculation of height E depends on the density -&gt; Please verify that density is set to correct value.</li> </ul>
	<ul> <li>The submerged sensor should be in upright / vertical position with minimal side to side movement.</li> <li>Verify that cable is hanging straight and that sensor is not blocked by any obstacles.</li> </ul>
	<ul> <li>Make sure that no air bubbles are trapped under the sensor diaphragm. You may need to lift the sensor by the cable and shake slightly to relase any trapped air.</li> <li>Do not lift the sensor above the water surface as air might be captured again underneath the sensor.</li> </ul>

For more information about programming water level parameters see also <u>Programming Water Level</u> <u>Configuration</u>

Logger 5.0	
File Read Data Programming Graph Data stored Tools GSM2 Settings Support Help	
🗼 Wizzard 📑 Read Data 🔀 Programming 📝 Chart Viewer	
💭 Device Identity 🛛 🕝 Simple Logging 🛛 🗠 Event Controlled Logging 📃 Water Level Configu	uration
Reference Level	ion Show Waterlevel Graph $G = A - B + E = A - B + \frac{\Delta p * 10^5}{\rho * g}$ el
COM Port Device Identity	device detected Activate
Image: Class 5 Group 5 Year.Week 3.43 5N :2310         Wa_01	17.08.2012 08:56:04 Activate
O DeviceAddr:250 Record active Online Mode active	17.08.2012 09:41:38

Press the button "Show Waterlevel Graph" to activate the window as shown in the figure below.



The red colored edit field allows to enter the manually measured depth to water  ${\sf F}$ . Then press the button "Accept" to copy the calculated value for length  ${\sf B}$ . You will find the value then in the field "Installation Length"



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It is recommended to check the "Waterlevel Graph" showing the calculated water level according to the selected calculation method.

The Logger 5 Software retrieves pressure readings from the device every second and displays the calculated water level in the graph.

In the example the "Height of water above Sea level" method is shown.

• Please allows time for measurements to stabilize. If they do not, check sensor installation and repeat the reference measurement.



## 1.2 The Wizard

1.2.1 The Wizard



The Wizard gives you direct access to some of the main functions and provides easier navigation when starting the software for the first time.

The Wizard allows direct call of the following functions:

e,	Reading Data from Device	Read the latest data from the device.
×	Programming Device	Simple programming of the logger divided up into easy steps: Selecting channels to be logged, start time and logging interval
1	Wizard Inspect Data Chart	A simple browser showing the content in the working directory. Selecting a file will invoke the data Viewer.
<u></u>	Online Graph	The application retrieves measurements from the device in 1 s interval and displays a graph.
Q	Search Data	The Logger 5 Software drives a small database where information about the different devices and files stored on the hard-disc is easily accessible.
	Convert Data	Export raw data in different ASCII formats (Excel,CSV,XML,WISKI, Hydras,TNO)
	USB/RS232 COM-Port	Overview of the available COM-Ports (USB and RS232). You may select your favorite COM-Port to read data from devices.



## 1.2.2 Wizard Reading Data from Device

Shortcut to read one or several records from a device.

A left mouse click on the icon or the caption leads you to the following screen:

🚟 KELLER	R Logg	erDCX 5.1.0				-		_	
File Rea	d Data	Programming	Graph	Data stored	Tools	GSM2	Settings	Support	Help
🝌 Wiz	zard	Read Data	- X	Programming	1	Chart	Viewer		
2	<u>Readin</u>	g Data from Dev	/ices						
Read Newest Record									
	Table of Content								

Read Newest Record	Pressing the first button will read the latest record from the device.
Table of Content	You may click on "Table of Content" to display all available records stored in the device. This can help to read any selected record from the device

Pressing the "Table of Content" button leads you to the table of content or list of stored records in the device.

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KELLER LoggerDCX 5.1.0							
File Read Data Programming	File Read Data Programming Graph Data stored Tools GSM2 Settings Support Help						
🗼 Wizzard 📑 Read Da	ta 🔀 Programmin	ng 📝 Chart Vie	ewer				
Reading Data from De	evices						
Read News	est Record	Rec No Star	rt Date Start Time	Size	🕐 Read (F4)		
Table of	Content	2 05.0	04.2011 10:55:17	0.0			
🔍 scan ports (F2	)	3 02,1	04.2011 23:28:40	74.8			
				N			
🔍 scan ports (F2)		J	The "Scan Po Ports and refre helpful when y device or even port of your co	rts" button eshes the ou have re plugged th omputer.	rereads the available COM- table of content. This is econnected or changed the he converter to another USB		
🥐 Read (F4)			The "Read" bu selected recor	itton starts ds from th	s the procedure of reading the le device.		
Rec No         Start Date           1         05.05.2011           2         05.04.2011           3         02.04.2011	Start Time 14:02:06 10:55:17 23:28:40	Size 25.2 0.0 74.8	The table of content gives an overview of the data stored in the device. Record number 1 reflects always the newest data. Each entry in the table of content shows Start Date and Time and the record size in % of the total memory. You may select any number of records to be read out.				

#### Logger 5.1 Help

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### 1.2.3 Wizard Programming Device

Shortcut to the simple programming of a device.

This shortcut leads you to the simple programming options of a logger device. You can select the channels which should be stored, a start time and the logging intervall.

The application first scans again the COM-Ports to detect the available channels of the device. The list on the left hand side shows you the current step and progress of the programming procedure.

$\times$	Program	ming Device	
	$\Rightarrow$	Scanning Channels	Please wait detecting device/(devices) !
		Select Channels	
		Select Start Mode	
		Set Start Time	
		Set Logging Speed	
		Programming Device	

After successful detection, you may select the channels which should be logged.

$\times$	Program	ming Device				
		Scanning Channels				٦
	$\Rightarrow$	Select Channels	P1	Pressure1		
		Select Start Mode	TOB1	Temperature TOB1		
		Set Start Time				
		Set Logging Speed				
		Programming Device				
			$\square$			
			~~			
					Next >	

Press now "Next" to jump to the following programming step.

There are two possibilities to start logging data into the record.

- The record starts immediately when the configuration is written to the device
- The record starts on a certain date and time

You can press "Next" to proceed to the following step or you may press "Back" to return to the selected channels.

X	Program	mina Device		
	riogram	Scanning Channels	E-Start Record	
	<b>x</b> >	Select Start Mode	C immediately when writing config	
		Set Start Time Set Logging Speed	C certain date and time	
		Programming Device		
			< Back	Next >

Having selected "Certain Date and Time" the following screen appears. This step will be unavailable if "Immediately when writing Configuration" is selected .



Please note the button "Now" sets date to the current date and time rounded up on the next full quarter of an hour i.e. 10:32:14 will be rounded up to 10:45:00 to make data easier to read. However, you may edit and adjust the time to any desired value.

$\times$	<u>Program</u>	ming Device		
		Scanning Channels		
		Select Channels	Start Time	
		Select Start Mode		
	⇒	Set Start Time	09.05.2011	08:45:00
		Set Logging Speed		Now
		Programming Device		
			< Back	Next >

The last programming step includes the adjustment of the desired logging speed. The first edit field represents days and the second a time interval with the format "hh:mm:ss" . Sliding the Trackbar

sets the logging interval from 00:00:01 increasing over 00:00:30, and 00:15:00 to 12:00:00. The Trackbar supports fast selection of typical intervals, or you may specify any alternate value, as needed.

Pro Pro	ogramming Device	
	Scanning Channels	Log Intervall
	Select Channels	
	Select Start Mode	
	Set Start Time	
Σ	Set Logging Speed	Is Im Ih Id
	Programming Device	• • • • • • • • • • • • • • • • • • •
		< Back Next >

The last programming step completes the procedure by writing and transferring configuration to the device.

A window showing all parameters which will be written to the device can now be confirmed or canceled. Cancel will stop the programming procedure.

Confirm Device Configuration		
The following Configuartion will be written	to Device	
Start Time and Date		
Start Date/Time	09.05.2011	08:45:00
Measure Intervall		
0 days	00:10:00	hh:mm:ss
Event Controlled Logging		
Event Detection Intervall	NOT enabled	hh:mm:ss
Recording Intervall after Event	NOT enabled	hh:mm:ss
Event	NOT enabled	
Channel	NOT enabled	
Value 1	NOT enabled	
Value 2	NOT enabled	
Calculate Meanvalue	NOT enabled	
Water Level Configuration	N	2
NOT enabled	15	
Device Identity		
Device Identity	KellerDemoLeoRecord	
Comment		
Comment	Presentation LEO Record Feb2011	

## 1.2.4 Wizard Inspect Data Chart



This is just a simple directory and file browser which shows the content of the current working directory.

Read Data         Programming         Graph           Wizzard         Insect Data Chart         Image: Cilic Cilic Control Contrecontro Contrecontrol Control Contreconte Control Control Contro	Logger 5.0		
Witzard           Inspect Data Chart         Image: City Dokumente und Einstellungen Steiner G         Image: City Graph           Steiner G         Anwendungsdaten Doka         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph         Image: City Graph           Image: City Gold         Image: City Graph         Image: City Graph </th <th>ile Read Data Programming Graph Data stored Tools G5M2 Settings Support Help</th> <th></th> <th></th>	ile Read Data Programming Graph Data stored Tools G5M2 Settings Support Help		
Inspect Data Chart          C1       Dokumente und Einstellungen          Steiner G       Anwendungsdaten          Dosgen E          data          back          back          Water-Pressure_19,04,2011_17,49,00.DX5       102734         Water-Pressure_29,04,2011_11,50,00.DX5       102734         Water-Pressure_29,04,2011_17,19,00.DX5       282524         Water-Pressure_29,04,2011_17,00,00.DX5       7741388         Water-Pressure_29,04,2011_17,00,00.DX5       774152         Water-Pressure_30,08,2011_11,00,00.0.DX5       774152         Water-Pressure_30,08,2011_11,00,00.0.DX5       774152         Water-Pressure_30,08,2011_11,00,00.0.DX5       774152         Water-Pressure_30,08,2011_11,00,00.0.DX5       774152         Water-Pressure_30,08,2011_11,00,00.0.DX5       774152         Water-Pressure_30,08,2011_15,2040.DX5       6144         Water-Pressure_10,05,2011_15,2040.DX5       1132702         Water-Pressure_19,05,2011_15,2040.DX5       9105102         Water-Pressure_10,05,2011_15,2040.DX5       689622         Water-Pressure_10,05,2011_15,2040.DX5       689622         Water-Pressure_10,05,2011_19,53,05.DX5       1103700 <t< td=""><td>🛦 Wizzard</td><td></td><td></td></t<>	🛦 Wizzard		
Inspect Data Chart			
C:1          Pokumente und Einstellungen          Steiner G       Anwendungsdaten         LogGER_5          Badk          Badk          Water-Pressure_19,04,2011_17,49,00.0X5       102/734         Water-Pressure_20,04,2011_11,50,00.0X5       741/388         Water-Pressure_20,04,2011_17,19,00.0X5       282/524         Water-Pressure_30,08,2011_11,00,00_00.0X5       7816         Water-Pressure_30,08,2011_11,00,00_00.0X5       7816         Water-Pressure_30,08,2011_11,00,00_00.0X5       102/734         Water-Pressure_30,08,2011_11,00,00_00.0X5       102/734         Water-Pressure_30,08,2011_11,00,00_00.0X5       102/734         Water-Pressure_30,08,2011_11,00,00_00.0X5       102/734         Water-Pressure_16,05,2011_15,20,40.0X5       102/702         Water-Pressure_16,05,2011_17,72,00.0X5       918/512	Inspect Data Chart		
Image: Science G       Image: Science G         Image: Anwendungsdaten       Image: Graph         Image: DodgER_5       Image: Graph         Image: Boddenland       Image: Science G         Image			
Image: Steiner G       Image: Steiner G         Image: Anwendungsdaten       Image: Steiner G         Image: LogGER_5       Image: Steiner G         Image: Steiner G       Image: Steiner G         Image: Steiner G<	🕞 Dokumente und Einstellungen		
	🗁 SteinerG	🤯 Graph	
Filename         Size         YYYY.MM.DD HH:MM.S5           Water-Pressure_19,04,2011_17,49,00.DX5         102734         2011.10.12         11:42:48           Water-Pressure_22,04,2011_11,50,00.DX5         741'388         2011.00.12         11:42:48           Water-Pressure_29,04,2011_17,19,00.DX5         282'524         2011.00.29         11:65.29           Water-Pressure_30,08,2011_11,00,00_00.DX5         282'524         2011.05.10         9:25:58           Water-Pressure_30,08,2011_15,20,40.DX5         7816         2011.05.10         9:25:58           Water-Pressure_16,05,2011_15,20,40.DX5         6'144         2012.07.30         16:57:40           Water-Pressure_16,05,2011_17,72,00.DX5         9:18'512         2011.05.16         17:18:24           Water_Pressure_16,05,2011_17,72,00.DX5         9:18'512         2011.05.12         10:57:06           Water_Pressure_16,05,2011_17,72,00.DX5         10'37'000         2011.05.20         11:54:18           Water_Pressure_16,05,2011_19,53,05.DX5         10'37'000         2011.05.12         11:54:18           Water_Pressure_25,06,2011_08,44,00.DX5         689'622         2011.05.12         11:22:32           Wa_01_05_01_2012.02.09_30_0.DX5         6'588         2011.12.05         11:22:32           Wa_01_05_01_2011.13_25_00.DX5         6'588         2011.12.0	Anwendungsdaten		
Back           back           boddenland           Fliename         Size         YYYY.MM.DD HH:MM.S5           Water-Pressure_19,04,2011_17,49,00.0X5         102'734         2011.10.12         11:42:48           Water-Pressure_22,04,2011_11,50,00.0X5         741'388         2011.04.29         14:18:24           Water-Pressure_30,08,2011_17,19,00.0X5         282'524         2011.05.02         09:25:58           Water-Pressure_30,07_2012-16_55_41.0X5         6'144         2012.07.30         16:57:40           Water-Pressure_16,05,2011_15,20,40.0X5         132'702         2011.05.10         17:18:24           Water-Pressure_16,05,2011_17,17,20.0X5         918'512         2011.05.17         08:17:06           Water-Pressure_10,05,2011_19,53,05.0X5         1'037'000         2011.05.20         11:54:18           Water-Pressure_19,05,2011_08,044,00.0X5         689'622         2011.06.27         11:22:32           Wa out of 5 12 2011.013,25 00.0X5         689'622         2011.05.10         12:22:06           Wa out of 5 12 2011.13,25 00.0X5         6788         2011.12.05         14:26:22           Wa out of 5 12 2011.13,25 00.0X5         6788         2011.12.05         14:26:22           Wa out of 5 12 2011.13,25 00.0X5         67888         2011.12.05         14:26:22	COGGER_5		
Filename         Size         YYYY.MM.DD HH:MM.SS           Water-Pressure_19,04,2011_17,49,00.DX5         102734         2011.10.12         11:42:48           Water-Pressure_2,04,2011_17,19,00.DX5         741'388         2011.04.29         14:18:24           Water-Pressure_30,06,2011_17,19,00.DX5         282'524         2011.05.02         09:25:58           Water-Pressure_30,06,2011_01.0,00_00.DX5         7816         2011.05.02         09:25:58           Water-Pressure_30_07_2012-16.55_41.DX5         6'144         2012.07.30         16:57:40           Water_Pressure_16,05,2011_15/20,40.DX5         132'702         2011.05.10         17:82:41           Water_Pressure_16,05,2011_17,7,20.DX5         918'512         2011.05.17         08:17:06           Water_Pressure_19,05,2011_19,53,05.DX5         1'037'000         2011.05.20         11:52:32           Wa 0.01_05_01_2012-0_3_0_00.DX5         6'89'622         2011.06.71         11:22:32           Wa 0.01_05_01_2012-0_3_0_00.DX5         6'588         2011.12.05         14:26:22           Wa 0.01_05_12_2011-13_25_00.DX5         6'588         2011.12.05         14:26:22           Wa 0.01_05_15_2_2011-13_25_00.DX5         6'588         2011.12.05         14:26:22           Wa 0.01_05_15_2_2011-13_25_00.DX5         112'734         2011.12.05         14	m back		
Filename         Size         YYYY.MM.DD HH:MM.SS           Water-Pressure_19,04,2011_17,49,00.DX5         102734         2011.10.12         11:42:48           Water-Pressure_2,04,2011_11,50,00.DX5         741'38         2011.04.29         14:18:24           Water-Pressure_29,04,2011_17,19,00.DX5         282'524         2011.05.00         09:25:58           Water-Pressure_30,08,2011_11,00,00_00.DX5         7816         2011.08.30         10:39:48           Water-Pressure_30_07_2012-16_55_41.DX5         6'144         2012.07.30         16:57:40           Water_Pressure_16,05;2011_15,20,40.DX5         132'702         2011.05.16         17:18:24           Water_Pressure_16,05;2011_17,17,20.DX5         918'512         2011.05.17         61:746           Water_Pressure_16,05;2011_19,53,05.DX5         1'037'000         2011.05.20         11:54:18           Water_Pressure_19,05,2011_08,44,00.DX5         689'622         2011.06.27         11:22:32           Wa_01_05_01_2012-09_3_0.D.DX5         6'368         2011.12.05         14:26:22           Wa_01_05_01_2011-13_25_00.DX5         6'588         2011.12.05         14:26:22           Wa_01_05_01_2011-13_25_00.DX5         6'588         2011.12.05         14:26:22           Wa_01_05_05_12_2011-13_25_00.DX5         112734         2011.12.05         14:26:2			
Filename         Size         YYY.MM.DD HH:MM.S5           Water-Pressure_19,04,2011_17,49,00.DX5         102'734         2011.10.12         11:42:48           Water-Pressure_20,04,2011_11,50,00.DX5         741'388         2011.04.29         14:18:24           Water-Pressure_29,04,2011_17,19,00.DX5         282'524         2011.05.02         09:25:58           Water-Pressure_30,08,2011_11,00,00_00.DX5         7816         2011.06.30         10:39:48           Water-Pressure_30,07_2012-16,55_41.DX5         6'144         2012.07.30         16:57:40           Water_Pressure_16,05,2011_15,20,40.DX5         132'702         2011.05.16         17:18:24           Water_Pressure_10,05,2011_17,17,20,00.DX5         918'512         2011.05.17         6'17:06           Water_Pressure_10,05,2011_17,17,20,00.DX5         918'512         2011.05.20         11:54:18           Water_Pressure_10,05,2011_10,73,00.DX5         1'037'000         2011.05.20         11:54:18           Water_Pressure_10,05,2011_0,74,72,00.DX5         1'037'000         2011.05.20         11:54:18           Water_Pressure_20,06,2011_08,44,00.DX5         689'622         2011.06.27         11:22:32           Wa_01_05_01_2012-09_30_0.DX5         6'5'88         2011.12.05         14:26:22           Wa_01_05_01_22011-13_2_5_00.DX5         6'5'88         2			
Water-Pressure_19,04,2011_17,49,00.DX5       112734       2011.10.12       1142:43         Water-Pressure_22,04,2011_17,19,00.DX5       741'388       2011.10.5.02       9:25:58         Water-Pressure_30,08,2011_17,19,00.DX5       282'524       2011.05.02       9:25:58         Water-Pressure_30,08,2011_11,00,00_00.DX5       7816       2011.05.02       9:25:58         Water-Pressure_30,08,2011_11,00,00_00.DX5       7816       2011.05.10       0:39:48         Water-Pressure_30,07_2012:16,55_41.DX5       6144       2012.07.30       16:57:40         Water_Pressure_16,05,2011_15,20,40.DX5       132'002       2011.05.16       17:18:24         Water_Pressure_16,05,2011_17,17,20,00.DX5       918'512       2011.05.17       0:17:06         Water_Pressure_19,05,2011_19,53,05.DX5       1'037'000       2011.05.20       11:54:18         Water_Pressure_25,06,2011_08,44,00.DX5       689'622       2011.06.27       11:22:32         Wa_01_05_01_2012-09_30_0.DX5       6'588       2011.12.05       12:22:06         Wa_01_05_12_2011-13_25_00.DX5       112734       2011.12.05       14:26:22         Wa_01_05_12_2011-13_25_00.DX5       6'588       2011.12.05       14:26:22         Wa_01_05_12_2011-13_25_00.DX5       112734       2011.12.05       14:26:22	Filename	Size	YYYY.MM.DD HH:MM.SS
water-Pressure_29,04,2011_17,19,00.DX5       741368       2011.06.29       14116:24         water-Pressure_29,04,2011_17,19,00.DX5       282524       2011.05.20       99:25:58         water-Pressure_30,08,2011_11,00,00_00.DX5       7816       2011.06.30       10:39:48         water-Pressure_30_07_2012-16_55_41.DX5       6144       2012.07.30       16:57:40         water-Pressure_16,05,2011_17,17,20,040.DX5       1122702       2011.05.16       17:18:24         water_Pressure_16,05,2011_19,53,05.DX5       1037000       2011.05.20       11:54:18         water_Pressure_25,06,2011_08,44,00.DX5       689622       2011.06.27       11:22:32         wa_01_05_12_2011-09_30_00.DX5       6588       2011.12.05       12:22:06         wa_01_05_12_2011-13_25_00.DX5       6588       2011.12.05       12:232         wa_01_05_12_2011-13_25_00.DX5       6588       2011.12.05       12:232         wa_01_05_12_2011-13_25_00.DX5       6588       2011.12.05       14:26:22	Water-Pressure_19,04,2011_17,49,00.DX5	102'734	2011.10.12 11:42:48
water-Pressure_30,04,2011_17,19,00.DX5       222 524       2011.05.12       09125:55         Water-Pressure_30,08,2011_11,00,00_00.DX5       77816       2011.05.12       09125:55         Water-Pressure_30_07_2012:16_55_41.DX5       6144       2012.07.30       16:57:40         Water-Pressure_16,05,2011_15,20,40.DX5       132702       2011.05.16       17:18:24         Water-Pressure_16,05,2011_17,17,20.DX5       9187512       2011.05.17       08:17:06         Water-Pressure_25,06,2011_08,305.DX5       1'037000       2011.05.20       11:54:18         Water_Pressure_25,06,2011_08,305.DX5       1'037000       2011.05.21       11:54:18         Water_Pressure_25,06,2011_08,44,00.DX5       689/622       2011.05.27       11:22:32         Wa_01_05_01_2012:09_30_0.0DX5       45768       2011.10.51       12:22:06         Wa_01_05_12_2011:13_25_00.DX5       6588       2011.12.05       14:26:22         Wa_01_05_12_2011:13_55_00.DX5       112/734       2011.12.05       14:26:22         Wa_01_05_12_2011:13_55_00.DX5       112/734       2011.12.05       14:26:22	Water-Pressure_22,04,2011_11,50,00.DX5	/41.388	2011.04.29 14:18:24
Water Pressure _30_07_2012-16_55_41_DX5       6/144       2017.00.16       16.57.40         Water Pressure _16,05,2011_15,20,40.DX5       132702       2011.05.16       17.18:24         Water Pressure _16,05,2011_15,20,40.DX5       918*512       2011.05.16       17.18:24         Water Pressure _16,05,2011_17,17,20.DX5       918*512       2011.05.17       08:17:06         Water Pressure _25,06,2011_08,44,00.DX5       689*622       2011.05.20       11:54:18         Water Pressure _25,06,2011_09,30,0.DX5       689*622       2011.05.27       11:22:32         Wa 01_05_01_2012-09_30_00.DX5       45'268       2011.12.05       14:26:622         Wa 01_05_12_2011-13_25_00.DX5       61588       2011.12.05       14:26:622         Wa 01_05_12_2011-13_25_00.DX5       112'734       2011.12.05       14:26:622	Water-Pressure_29,04,2011_17,19,00.0X5	202 324	2011.05.02 09:25:50
Water_Pressure_16,05,2011_15,20,40.0X5         132702         2011.05.16         17.18:24           Water_Pressure_16,05,2011_17,17,20.0X5         132702         2011.05.16         17.18:24           Water_Pressure_19,05,2011_19,53,05.0X5         1'037'000         2011.05.20         11:54:18           Water_Pressure_25,06,2011_08,44,00.0X5         689'622         2011.06.27         11:22:32           Wa_01_05_01_2012-09_30_00.0X5         45'268         2011.05.16         12:22:06           Wa_01_05_01_2012-09_30_00.0X5         65'88         2011.12.05         14:26:22           Wa_01_05_12_2011-13_25_00.0X5         65'88         2011.12.05         14:26:22	Water-Pressure_30,00,2011_11,00,00_00.0x3	6'144	2012.07.30 16:57:40
Water_Pressure_16,05,2011_17,17,2010X5         918512         2011.05.17         08:17:06           Water_Pressure_19,05,2011_19,53,05,0X5         1'037'000         2011.05.17         08:17:06           Water_Pressure_25,06,2011_08,44,00.0X5         689'622         2011.06.27         11:22:32           Wa_01_05_012_2012-09_30_0,0X5         45'268         2012.01.05         12:22:06           Wa_01_05_12_2011-13_25_00,0X5         6'588         2011.12.05         14:26:22           Wa_01_05_12_2011-13_25_00,0X5         11'2734         2011.12.05         14:26:22	Water Pressure 16.05 2011 15 20 40 DX5	132'702	2012.07.30 10:37.40
Water_Pressure_19,05,2011_19,53,05.DX5         1'037'000         2011.05.20         11:54:18           Water_Pressure_25,06,2011_08,44,00.DX5         689'622         2011.06.27         11:22:32           Wa_01_05_01_2012-09_30_00.DX5         45'268         2012.01.05         12:22:06           Wa_01_05_12_2011-13_25_00.DX5         6'588         2011.12.05         14:26:22           Wa_01_05_12_2011-13_25_00.DX5         112'734         2011.12.05         14:26:22	Water Pressure 16.05.2011 17.17.20.DX5	918'512	2011.05.17 08:17:06
Water_Pressure_25,06,2011_08,44,00.DX5       689622       2011.06.27       11:22:32         Wa_01_05_01_2012-09_30_00.DX5       45'268       2012.01.05       12:22:06         Wa_01_05_12_2011-13_25_00.DX5       6'588       2011.12.05       14:26:22         Wa_01_05_12_2011-13_55_00.DX5       112'734       2011.12.05       15:31:28	Water Pressure 19,05,2011 19,53,05.DX5	1'037'000	2011.05.20 11:54:18
Wa_01_05_01_2012-09_30_00.DX5       45268       2012.01.05       12:22:06         Wa_01_05_12_2011-13_25_00.DX5       6'588       2011.12.05       14:26:22         Wa_01_05_12_2011-13_55_00_DX5       112'734       2011.12.05       15:31:28	Water_Pressure_25,06,2011_08,44,00.DX5	689'622	2011.06.27 11:22:32
■ Wa_01_05_12_2011-13_25_00.DX5       6'588       2011.12.05       14:26:22         ■ Wa_01_05_12_2011-13_55_00.DX5       112'734       2011.12.05       15:31:28	Wa_01_05_01_2012-09_30_00.DX5	45'268	2012.01.05 12:22:06
₩ Wa 01 05 12 2011-13 55 00 DX5 112/734 2011 12 05 15:31:28	Wa_01_05_12_2011-13_25_00.DX5	6'588	2011.12.05 14:26:22
	Wa 01 05 12 2011-13 55 00 DX5	112'734	2011 12 05 15:31:28
C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data\Water_Pressure_16,05,2011_17,17,20.DX5	C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data\Water_Pres	sure_16,05,2011_17,17,20.DX5	

	This button will directly call the window for general settings where you may specify the application default data and working directory.
Graph	The "Graph" button opens the Viewer and loads the selected file.

#### 1.2.5 Wizard Online Graph

	Wizard Online Graph
--	---------------------

The Online Graph is a tool to monitor all available channels of a device - the measurements are retrieved and displayed in a line chart every second. The Online Graph tool maintains a table view as well, where you have access to the numeric values. The table can be copied to the clipboard, so the measurement values can be pasted into other applications.

You can enable and disable channels and assign a preferred color to each line series. The scaling of the vertical axis (left hand = pressure, right hand = temperature) has an autoscale function, automatically adapting charts to the current minimum and maximum measured values. The default scaling is based on the fixed minimum and maximum compensated pressure range of the device.

The example below shows the view with a connected DCX22- AA. The chart on the top becomes visible if the channel P1-P2 pressure difference is available.



				On the left hand side you wil find the list of available channels. The checkboxes
	P1-P2	Press	0,0003 bar	allow to enable and disable
	P1	Press	0,9734 bar	channels.
	P2	Press	0,9731 bar	Clicking on one of the colore
$\overline{\mathbf{v}}$	TOB1	Temp	29,0 °C	channel short names calls t color dialog where you may
•	TOB2	Temp	24,7 °C	change the color according
				your preferences.



active). Values higher than 1 will enable the calculation of a floating average. Please refer to "Settings" -> "General" -> "Online Measurement" to change the filter value.

The picture below shows an example of the table view.

Conline Measurement : Table									
	A	6	c	D	ε	F	G	н	
1				CH0	CH1	CH2	OH4	CHS	_
2				Pressure1-Pressure2	Pressure1	Pressure2	Temperature TOB1	Temperature TOB2	
3				bar	bar	bar	∘⊂	°C	
4	#No	Date	Time	P1-P2	P1	P2	TOB1	TOB2	
5	1	16.05.2011	08:34:15	0,0002	0,9733	0,9731	30,5	24,8	-
6	2	16.05.2011	08:34:16	0,0069	0,98	0,973	30,5	24,8	
7	3	16.05.2011	08:34:17	0,0119	0,985	0,9731	30,5	24,8	
8	4	16.05.2011	08:34:18	0,0003	0,9733	0,9731	30,5	24,8	
9	5	16.05.2011	08:34:19	0,0003	0,9734	0,9731	30,6	24,8	
10	6	16.05.2011	08:34:20	0,0077	0,9808	0,973	30,6	24,8	
11	7	16.05.2011	08:34:21	0,0103	0,9834	0,9731	30,6	24,8	
12	8	16.05.2011	08:34:22	0,0118	0,9849	0,9731	30,6	24,8	
13	9	16.05.2011	08:34:23	0,0733	1,0464	0,973	30,7	24,8	
14	10	16.05.2011	08:34:24	0,0004	0,9735	0,9731	30,7	24,8	
15	11	16.05.2011	08:34:25	0,0003	0,9734	0,9731	30,8	24,8	
16	12	16.05.2011	08:34:26	0,0003	0,9734	0,9731	30,8	24,8	
17									
18									
19									-
Close Window									

📴 Copy Data into ClipBoard	Pressing the "Copy" button will copy the table values to the clipboard for transfer to a document or spreadsheet of
	another application.

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### 1.2.6 Wizard Search Data



The Logger 5 application maintains a small SQLite Database storing information about measurement files stored on the hard-disc of the computer. Reading a record from a device the application will automatically create a dataset in the database storing from which device the record was read (Serial number), the device identity, available and active channels, record size in % of the device memory, file age and file size.

At anytime you can scan a distinct directory or the complete hard-disc for information concerning stored measuring data retrieved from a logger device. The application reads the headers from the \*. DX5 files and fills the database accordingly.

You may select (double click) any item in the grid view to view the corresponding chart in the Viewer tool.

	Search Data	6	Scan Hard	disc					
	Serialnumbers	NO	Туре	<ul> <li>Identity</li> </ul>	▲ Start Time	A Record Size%	Active Channels	<ul> <li>Available Channels</li> </ul>	Filename
	116	0	DCX22	Air-Pressure	17.03.2011 21:36:05	26,6 %	P1 TOB1	P1 TOB1	Air-Pressure_17,03,
	2310	1	DCX22	Air-Pressure	17.03.2011 21:36:05	26,6 %	P1 TOB1	P1 TOB1	Air-Pressure_17,03,2
	2792	2	DCX22	Air-Pressure	20.03.2011 22:31:40	24,9 %	P1 TOB1	P1 TOB1	Air-Pressure_20,03,2
	2907	3	DCX22	Air-Pressure	20.03.2011 22:31:40	24,9 %	P1 TOB1	P1 TOB1	Air-Pressure_20,03,2
	29572	4	DCX22	Air-Pressure	21.03.2011 08:27:10	25,7 %	P1 TOB1	P1 TOB1	Air-Pressure_21,03,2
	4567	5	DCX22	Air-Pressure	21.03.2011 08:27:10	25,7 %	P1 TOB1	P1 TOB1	Air-Pressure_21,03,2
	4685	6	DCX22	Air-Pressure	12.04.2011 09:00:00	0,2 %	P1 TOB1	P1 TOB1	Air-Pressure_12,04,2
	5444	7	DCX22	Air-Pressure	12.04.2011 09:00:00	0,2 %	P1 TOB1	P1 TOB1	Air-Pressure_12,04,2
	55755	8	DCX22	Water-Pressure	15.04.2011 14:05:00	1,6 %	P1 TOB1	P1 TOB1	Water-Pressure_15,
-	8405	9	DCX22	Water-Pressure	15.04.2011 14:05:00	1,6 %	P1 TOB1	P1 TOB1	Water-Pressure_15,i
	9	10	DCX22	Water-Pressure	15.04.2011 16:46:30	57,0 %	P1 TOB1	P1 TOB1	Water-Pressure_15,
		11	DCX22	Water-Pressure	15.04.2011 16:46:30	57,0 %	P1 TOB1	P1 TOB1	Water-Pressure_15,
		12 ◀	DCX22	Water-Pressure	19.04.2011 17:49:00	13.1 %	P1ITOB1	P1ITOB1	Water-Pressure 19.



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## 1.2.7 Wizard Convert Data

$\forall$	Wizard Convert Data
NIF .	Wizard Convert Data

This is a shortcut to invoke the data converter tool.

Universal Text Converter	
General       Output File       File Info         Format       Supported Format         Supported Format       Supported Format         Wiski       Supported Format         Supported Format       S	Codec   Open File   Convert   Convert   UTF-8   UTF-16LE     Excel   CSV1   CSV2   XML Delft FEWS   HYDRAS   TNO   WISKI   No additional information required   Export Directory   C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LC
Status Report Format successfully set to : XL Format successfully set to : XL	×

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	Open File Convert	Press the "Open File" to choose and read a *.DX5 file. Press "Convert" to export the measuring data to a file written in the selected format.		
	Codec C ASCII C UTF-8 © UTF-16LE	The text converter tool can write the ASCII files according to three different character encoding types. (Standard ASCII and Unicode multi-byte encoding)		
	Excel       CSV1       CSV2       XML Delft FEWS       HYDRAS       TNO       WISKI         No additional information required       Image: Comparison of the second seco	For each format you will find a separate tab sheet. The export file formats XML, Hydras, TNO and WISKI allow additional information to be stored into the file.		
		Press the "Favorite" button to tell the text converter tool which file format should be the preferred format.		
		This button allows to select the directory where the exported data should be stored.		
		Press the "Open Folder" button and a Windows Explorer window showing the content of the corresponding directory will open.		

After converting and exporting a measuring file you can inspect the output on the tab sheet "Output File". It's possible to copy and paste the data via clipboard to other applications.
Cup Data Not Support           2310         Water Pressure           Device LefentHy         Xin Pressure           C:Dolumente und Einstellungen/SteinerG/Anwendungsdaten/LOGGER_CTRL_CENTER_5(data Record Start Time         C:Dolumente und Einstellungen/SteinerG/Anwendungsdaten/LOGGER_CTRL_CENTER_5(data Record Start Time           No         Date         Time         Pressure1         Pressure1         Pressure2         Term mbar           No         Date         Time         P1-P2         P1         P2         COI         Col           1         28.04.2011         201:116-0.000         95,9900 955,9900 25,5         26,1         26,1           2         28.04.2011         201:116-0.000         955,9200 955,9900 25,5         26,1         26,1           3         28.04.2011         201:112-0.0100         955,9700 955,9900 25,5         26,1         26,0           6         28.04.2011         201:113-0.0100         955,9700 955,9900 25,5         26,1         26,0           7         28.04.2011         201:115-0.0100         955,9700 955,9900 25,5         26,1         26,0           10         28.04.2011         201:115-0.0100         955,9700 955,9900 25,5         26,0         26,0           11         28.04.2011         201:12:0-0.1100         955,9700 9						Copy Data into Cli	Board
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11 28.04.2011 2012;45-0,1300 955,6700 955,0100 26,5 26,0 22 28.04.2011 2012;55-0,100 955,6800 955,9900 26,5 26,0 33 28.04.2011 2012;55-0,1300 955,9800 26,5 26,0 44 28.04.2011 2013;05-0,1100 955,7900 26,5 26,0 55 28.04.2011 2013;10-0,100 955,7900 26,5 26,1 72 28.04.2011 2013;10-0,100 955,7900 26,5 26,1 73 28.04.2011 2013;10-0,100 955,7900 26,5 26,1 74 28.04.2011 2013;10-0,700 955,9800 26,5 26,1 74 28.04.2011 2013;12-0,700 955,9800 26,5 26,1 75 28.04.2011 2013;12-0,700 955,9800 26,5 26,0 9 28.04.2011 2013;12-0,700 955,9700 955,9500 26,5 26,0 9 28.04.2011 2013;12-0,700 955,9700 955,9500 26,5 26,0 9 28.04.2011 2013;12-0,700 955,9700 955,9500 26,5 26,0 2012 atus Report atus Report atus Report	:0	28.04.2011	20:12:40 -0,0900	955,8700	955,960026	5 26,1	
2 28.04.2011 20:12:50 -0;100 955;6000 955;9000 26;5 26;0 3 28.04.2011 20:12:55 -0;100 955;6000 955;9000 26;5 26;0 4 28.04.2011 20:13:00 -0;100 955;9000 26;5 26;1 5 28.04.2011 20:13:00 -0;100 955;9700 955;9000 26;5 26;1 6 28.04.2011 20:13:10 -0;100 955;9700 955;9000 26;5 26;1 8 28.04.2011 20:13:25 -0;000 955;9900 26;5 26;1 8 28.04.2011 20:13:25 -0;000 955;9900 26;5 26;1 9 28.04.2011 20:13:25 -0;0700 955;9700 26;5 26;0 4 4 5 20 4 2011 20:13:25 -0;0700 955;9700 26;5 26;0 9 28.04.2011 20:13:25 -0;0700 955;9700 26;5 26;0 4 5	1	28.04.2011	20:12:45 -0,1300	955,8700	956,010026	5 26,0	
3 28.04.2011 20:12:55-0,1300 955,9600 26,5 26,0 4 28.04.2011 20:13:05-0,1100 955,9700 255,9900 26,5 26,0 5 28.04.2011 20:13:05-0,1100 955,9700 955,9900 26,5 26,1 7 28.04.2011 20:13:10-1,000 955,9700 955,9900 26,5 26,1 7 28.04.2011 20:13:15-0,0700 955,9900 26,5 26,0 9 28.04.2011 20:13:25-0,0700 955,9700 955,9900 26,5 26,0 9 28.04.2011 20:13:25-0,0700 955,9700 955,9500 26,5 26,0 9 28.04.2011 20:13:25-0,0700 955,9700 955,9500 26,5 26,0 9 28.04.2011 20:13:25-0,0700 955,9700 955,9500 26,5 26,0 1 200 200 200 200 200 200 200 200 200 20	2	28.04.2011	20:12:50 -0,1100	955,8600	955,960026	,5 26,0	
4 28.04.2011 20:13:00 -0,1100 955,8700 955,9800 26,5 26,0 5 28.04.2011 20:13:05 -0,1100 955,8700 955,9900 26,5 26,1 6 28.04.2011 20:13:10 -0,1300 955,9700 955,9900 26,5 26,1 7 28.04.2011 20:13:20 -0,000 955,9900 26,5 26,0 8 28.04.2011 20:13:25 -0,0700 955,9900 26,5 26,0 9 28.04.2011 20:13:25 -0,0700 955,9900 26,5 26,0 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	3	28.04.2011	20:12:55 -0,1300	955,8600	955,980026	,5 26,0	
5 28.04.2011 20:13:05-0,1100 955,9700 955,9700 955,9700 25,5 26,1 7 28.04.2011 20:13:10-1000 955,9700 955,9700 25,5 26,1 7 28.04.2011 20:13:15-0,0500 955,9700 955,9900 25,5 26,0 9 28.04.2011 20:13:25-0,0700 955,9700 955,9500 25,5 26,0 9 28.04.2011 20:13:25-0,0700 955,9700 955,9500 25,5 26,0 1 20:13:25-0,0700 955,9700 955,9500 25,5 26,0 20:12 20:12 20:13:25-0,0700 955,9700 955,9700 955,9500 25,5 26,0 20:12 20:	:4	28.04.2011	20:13:00 -0,1100	955,8700	955,980026	,5 26,0	
6 28.04.2011 2013:10-0,1300 955,8700 955,9100 25,5 26,1 7 28.04.2011 2013:15-0,0600 955,9900 25,5 26,0 8 28.04.2011 2013:20-0,0700 955,8900 25,5 26,0 9 28.04.2011 2013:25-0,0700 955,8700 955,5900 26,5 26,0 atus Report atus Report atus Report 1 2013:25-0,0700 955,8700 955,9500 26,5 26,0 1 2013:25-0,0700 955,9500 26,5 26,0 1 2014:25-0,0700 955,9500 26,5 26,0 1 2014:25-0,0	5	28.04.2011	20:13:05 -0,1100	955,8700	955,980026	,5 26,1	
28.04.2011 2013:15-0,0500 955,9500 25,5 26,0 9 28.04.2011 2013:20-0,0700 955,9700 955,9500 26,5 26,0 9 28.04.2011 2013:25-0,0700 955,9700 955,9500 26,5 26,0      atus Report  atus Report  armat successfully set to : XI. armat succesfully set to : X	:6	28.04.2011	20:13:10 -0,1300	955,8700	956,010026	,5 26,1	
8 28.04.2011 20:13:20 -0,0700 955,9900 955,9900 25,5 26,0 9 28.04.2011 20:13:25 -0,0700 955,9700 955,9500 26,5 26,0 atus Report atus Report ormat successfully set to : XL ormat successfully set to : XL 0 mark successfully set to : XL 10 bit warenet und Einstellungen Steiner GAnwendungsdaten (LOGGER_CTRL_CENTER_5 4 atus Water Resource 20 40 20.075	7	28.04.2011	20:13:15 -0,0500	955,8900	955,950026	,5 26,1	
9 28.04.2011 20:13:25 -0,0700 955,8700 955,9500 26,5 26,0	8	28.04.2011	20:13:20 -0,0700	955,8900	955,960026	,5 26,0	
atus Report atus Report ormat successfully set to : XL ormat successfully set to : XL inpokumente und Einstellungen/SteinerG/Anwendungsdaten/LOGGER_CTRL_CENTER_5 dirat/Water_Resource 20 AB 201 DV5	:9	28.04.2011	20:13:25 -0,0700	955,8700	955,950026	,5 26,0	
atus Report  armat successfully set to : XI. armat successfull							Þ
atus Report ormat successfully set to : XL ormat successfully set to : XL :(Dokumente und Einstellungen/SteinerG)Anwendungsdaten/LOGGER_CTRL_CENTER_5 ddat/Water_Resource 20 AG 2011_20 JB 20 DV5							
ormat successfully set to : XI. ormat successfully set to : XI. Tjaurumente over the set to : XI. Tjaurumente over the set are a roll_collection of American Staten (LOGGER_CTRL_CENTER_5).	atus Report						
ormat successfully set to : XL :/pokumente und Einstellungen/SteinerG/Anwendungsdaten/LOGGER_CTRL_CENTER_5 dataWater Preserver 28 AB 2011 20 AB 20 DV5	ormat sussassfully	i cot to i VI					
(Nokamente und Einstellungen/SteinerG/Anwendungsdaten/LOGGER_CTRL_CENTER_5	ormat successfully	set to : YI					
Applyment of an empty and an applyment of the manipage of the content of the cont	"Dokumente und	Finstellungen)Steir	herG\Anwenduposda	ten'il OGGER		TER 5	
	data\Water_Press	ure 28.04.2011 3	101 G (HI MICHOULINGSOC	Confeodder	C	101_0	
ard/under_lease/_color/colorense	adia/match_r1655	2.20,01,20112	0,00,20,20,000				

The tab sheet "File Info" shows information about the device from which the data was retrieved.

🚟 Universal Text Converter		_ 🗆 ×
Help		
General Output File File Info		
Serial Number 2310	Record Start Time	28.04.2011 20:08:20
Device Identity Water_Pressure	Number of Measurements	11446
	2	
Comment		
located in medium		
Record Configuration		
Record Start Time	28.04.2011 20:0	08:20
Record Intervall	0 day 00:00:05	
Device Memory	endless (circul	ar memory)
Water Level Configuration		
Density	998,2000 kg/m	13
Conversion to	Height of wate	r above Sea Level (G)
Installation Length (B)	12,250m	
Height of wellhead above sea level (A	A) 240,000m	
Offset	0,500m	
Status Report		
Format successfully set to : XL C'\Dokumente und Einstellungen\SteinerC\Opword		5
\data\Water_Pressure_28,04,2011_20,08,20.DX5	angeadon product_CIRE_CENTER_	, ,
1		<b>V</b>
File Data successfully exported to :	C:\Dokumente und Einstellungen\Ste	inerG\Anwendungsdaten\LOG /

### 1.2.8 USB/RS232 COM Port



Ì

Wizard USB/RS232 COM-Port

To simplify the COM Port handling the application supports different modes. With the USB/RS232 COM-Port section of the wizard you have direct access to influence the behavior of the application.

Senavior at Application Start	toprobe Eulortion 2
O you wish to enable the Au	
O YES	() NO
JSB Port Events	
Do you wish to enable the au	itomatic detection of USB Port Events ?
O YES	⊙ NO
Default COM-Port	
Default COM-Port	ort only
Default COM-Port	ort only COM-Ports found on this Computer
Default COM-Port	ort only COM-Ports found on this Computer Refresh List
Default COM-Port	ort only COM-Ports found on this Comp Refresh List

"Behavior at Application Start"	Activating the Auto-Probe function with "Yes", the application will search for connected logger devices on all available COM-Ports at application start.
"USB Port Events"	You can enable the automatic detection of USB Ports. Windows generates an event whenever a USB device is connected or disconnected. Mark "Yes" to activate this feature.
"Default COM-Port"	Enable the checkbox "Use manually set COM-Port only" if you wish to work with one COM-Port only and the application should not search for connected devices on other available COM-Ports. You should then select one of the listed check boxes to set the preferred COM-Port.

## 1.3 Read Data

### 1.3.1 Reading Data from connected Device Part 1

Read Data	Read data from logger device	
-----------	------------------------------	--

#### Press on the "Read Data" button



to activate the following view:



Battery		73%	
Rec No	Start Date	Start Time	Size
<b>7</b> 1	16.05.2011	15:20:40	0,8
2	30.05.1269	00:00:00	99,2

			The table of content shows star date, start time and the size of the records found in the memor of the logger device. The numbered check boxes allow to select one or more of available records to be transferred to the computer and stored as *.DX5-File. The table of content is sorted descending. Record number 1 i always the latest record.
🔍 Scan	Ports (F2)		Press "Scan Ports" or the shortcut key "F2" to start the scan procedure of the available COM-Ports.
🈥 Refre	sh table of content (F3)		You may press the "Refresh Table of Content" button to clea the table of content and to reread the record structure from the device. The shortcut F3 has the same effect.
🗹 Select	: all records		The "Select all Records" buttor is a help in the case you wish t read all records from the device
🔗 Read	(F4)		Press the button "Read" or the shortcut key F4 to start reading data from the device.
Device	Channels		On the right hand side you will find a list of the available
D1-D2	Pressure1-Pressure?	-0.0006 bar	channels of the connected
		0.0721 bar	device. The list is built and
P1	Pressure2	0,9721 bar	the table of content showing th
TOBI	Temperature TOB1	0,9727 Udr	record structure.
TOB2	Temperature TOB2	23,4 *C	The list of available channels
1	Temperature repr	21,0 C	long name and current measuring value scaled and

The channel long name can be customized - you may enter any suitable name in the white edit field. To change the physical unit you should select the menu command "Settings" -> "Units" The current values are read from the device every second if you press the button "Start Online Meas" at the bottom of the channel list. To stop retrieving measurements press the button "Stop Online Meas".	displayed with the selected
The channel long name can be customized - you may enter any suitable name in the white edit field. To change the physical unit you should select the menu command "Settings" -> "Units" The current values are read from the device every second if you press the button "Start Online Meas" at the bottom of the channel list. To stop retrieving measurements press the button "Stop Online Meas".	
To change the physical unit you should select the menu command "Settings" -> "Units" The current values are read from the device every second if you press the button "Start Online Meas" at the bottom of the channel list. To stop retrieving measurements press the button "Stop Online Meas".	Ine channel long name can be customized - you may enter any suitable name in the white edit field.
The current values are read from the device every second if you press the button "Start Online Meas" at the bottom of the channel list. To stop retrieving measurements press the button "Stop Online Meas".	To change the physical unit you should select the menu command "Settings" -> "Units"
	The current values are read from the device every second if you press the button "Start Online Meas" at the bottom of the channel list. To stop retrieving measurements press the button "Stop Online Meas".

	For each record successfully read from the device and stored on the hard-disc a box appears in the middle of the GUI, showing the device identity, start time and date and the size of the record measured in % of the total amount of memory.
2310_1_2011_05_15_23_26_20 DevID : Water_Pressure Start : 15.05.2011 23:26:20 100,00 %	Move the mouse cursor over the number displayed on the first line in the box to see path and name of the file. The number visible on the top of such box has the following structure:
	"Serialnumber_Recordnumber_Year_Month_Day_Hour_Min ute"
	eg. 2310_1_2011_05_15_23_26_20

Logger 5.1 Help

### **1.3.2 Reading Data from connected Device Part 2**

🔡 Read Data	Read data from logger device	
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The Logger 5 application can work with more than one device connected to the PC. When the application performs a scan of the COM-Ports all connected and recognized logger devices will be listed in the table as shown in the figure below.

_	Working Dire	ctory Dokur	nente und Einstellungen\SteinerG\Anwendungsdaten\LO	GGER_CTRL_CENTER_5\data			
	COM Port	Devid	te in the second se	Identity	device detected	Activate	
	🕰 <mark>20</mark>	DCX	Class 5 Group 5 Year. Week 3.43 SN :2310	Water_Pressure	17.05.2011 15:38:36	Activate	
	<b>6</b> 23	DCX	Class 5 Group 5 Year.Week 3.43 SN :55755	****	17.05.2011 15:38:37	Activate	
	🕰 22	LEO	Class 10 Group 2 Year.Week 4.45 SN :9	****	17.05.2011 15:38:38	Activate	
Ľ							
	eviceAddr)	:250	Record active			17.	05.2011 15:41:41

The table includes the following columns:

- COM-Port The COM-Port number and a small icon showing the COM-Port type USB or RS232
- Device

The device internal descriptor class, group, year and week and the serial number of the device connected to the listed COM-Port. A small icon shows which kind of logger device is connected (DCX, LEO Record or GSM-2 Unit)

Identity

The device identity. The list item belonging to the active COM-Port shows the device identity only. The active COM-Port is marked with green background color.

- Device Detected This column shows when the device has been recognized on the COM-Port
- Activate

You may click on one of the "Activate" buttons to set the preferred COM-Port



Please note mouse clicks in the table grid have the same effect as clicking on such button.

Above the list of COM-Ports the path to the active working directory is visible.

Working	Directory
	C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_CTRL_CENTER_5\data

A double click on the path to open the general settings dialog where you may change the path of the working directory.

In the case you wish to navigate directly to the working directory, press on the browse juice button to open Windows Explorer.

### **1.3.3 Reading Data from connected Device Part 3**

Read Data Read Data from logger device	
--	--

When reading a record from a logger device the behavior of the application depends on the current status of the connected logger.

If a record is active, the logger is in progress to collect data, the status panel will show "Record active".

Working Directory C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_CTRL_CENTER_5\data							
COM Port	Device	Identity					
🛱 20	Class 5 Group 5 Year. Week 3.43 SN :2310	Water_Pressure					
<b>6 2</b> 3	Class 5 Group 5 Year. Week 3,43 SN :55755	****					
🚔 22	LEO Class 10 Group 2 Year.Weak 4.45 SN :9	****					
, DeviceAddr	:250 Record active	, 					

The application gives you two possibilities when reading record data from a logger device with an active record.

1. The measuring data of the running record will be transferred to the PC and the same record will continue to run.



2. The measuring data of the current record will be transferred to the PC and the record will stop and a new record with new start time will be created on the logger device. The new record will to continue with the same settings as the previous record.



The following window will be shown.

Set a Mark	
You are about to read an active Record from device.	<u>~</u>
Do you wish to set a mark ?	
Setting a mark starts a new Record and next time new read from device.	v measurements will be
Device time will only be synchronized with PC Clock wh	nen you set a mark.
Synchronize Time with PC-Clock	
17.05.2011 07:21:49	Do NOT set a Mark

Leaving the check box "Synchronize Time with PC-Clock" enabled and pressing "Set a Mark" the time on the device will be adjusted to the time of the PC-Clock and a new record will be started. The start time of the new record will be set such that the logger will maintain the assigned measuring interval. A new record will appear now as first item in the table of content showing the record structure - please refer to Reading data from connected device Part 1

Assuming the fixed measuring interval is 1 measurement per hour and you read out a active record at 9:30, the start time for the new record will be set at 10:00.

Disabling the check box "Synchronize Time with PC-Clock" the button "Do NOT set a Mark"

becomes enabled. If you don't set a mark, the running record will continue and the application will read the data from the logger until the actual time.

The next time you read active record, the application will retrieve the same data plus any measurements collected since the last record read procedure was performed.

While it is possible to disable the "Synchronize Time with PC-Clock" and set a mark manually, it is recommended to let the application synchronize the device time with PC-Clock. If a manual mark is set, the logger device time will not be adjusted and a new record will be prepared.

The Logger 5 application allows to store user measurements and notes together with the measuring data in a data file.

After the Record was successfully transferred to the PC you may add your own information to the measuring file. The following window will be shown:

🚟 User Measureme	nts			
Measurements				
Rows	Colums			
2	2			Clear
*	Param 1	Param 2		
measurement 1				
measurement 2				
Remark			Clear	🖻 🕑
				<b>A</b>
				<b>v</b>
1				
				ок

The table can be customized by setting the number of rows and columns. Additionally, clicking in the header rows will allow you to assign names for columns and rows.

🚟 User Measureme	nts		
Measurements			
Rows	Colums		
2	2		
*	Param 1 N	Param 2	
measurement 1	b <u>ż</u>		
measurement 2			

The picture below shows the edit dialog for the first header cell.

🚟 User Measureme	nts			_ 0
Measurements				
Rows	Colums			
2	2			Clear
*	Param 1	Param 2		
measurement 1				
measurement 2	🚟 Caption for Ce	ll [1 0]		
	Param 1			
		Cancel	ок	

You may add your own remarks and notes in the "Remark" field. The two buttons with calendar and clock icon allow to insert date and time in the text.

🚟 User Measureme	nts			
Measurements				
Rows	Colums			
2 📼	2 💽			Clear
*	Param 1	Param 2		
measurement 1	3,1415	2,71828		
measurement 2	5,645	6,320		
<u> </u>				
Remark		_	Clear	
Dienstag, 17. Mai 20 08:16:31	011			<u> </u>
any remark can be w	vritten here			
ज				
				ОК

### 1.3.4 Reading Data from GSM2 Logger Device

The Logger 5 Software allows to read data from GSM-2 remote data transmission unit and data logger.

If the GSM-2 is connected via converter cable, you need to select "GSM-2" -> "Treat device as GSM-2 logger" in the main menu.

-						
Data / Site Info	Tools	GSM2	Settings	Support	Help	
Durantea	<b>≫</b> 6 c	Tre	at Device	as GSM2-L	ogger	
Programming	1 L	Shi	ow Data Ta	able		N

The Logger 5 Software will restart the communication with the appropriate RS485 BUS address to detect connected GSM-2 units.

After the table of content was successfully built, an icon informs you that a GSM-2 unit is connected as shown in the figure below.

Start Viewer after reading completed	
🔍 Scan Ports (F2)	
😥 Refresh table of content (F3)	M2 Log
🗹 Select all records	e is GSI
🔗 Read (F4)	device

On the bottom of the window the GSM-2 unit appears in the device list.

	COM Port	Device		Identity	device detected	Activate	
	🕰 <mark>29</mark>	🚓 29 🛛 🛱 🔯 Class 9 Group 5 Year. Week 9.49 SN : 789		****	28.08.2012 09:15:36	Activate	
1	O DeviceAddr:254 Record stopped						



Please note: The Logger 5 Software does not allow programming of a GSM-2 unit. Reading data is the only supported function.

# 1.4 Programming

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### 1.4.1 Programming Device Identity

🔀 Progra	mming		Programming the logger device
----------	-------	--	-------------------------------

The application interface is divided up into 4 units accessible on tab sheets.

- Device Identity
- Simple Logging
- Water Level Configuration
- Event Controlled Logging

The "Programming" option in the main menu opens the 4 different tab sheets.



Programming: Device Identity

The view of the tab sheet "Device Identity"

CongerDCX 5.1.0	Cablings Conserve Units		_ 🗆 🗙				
	File Read Data Programming Graph Data stored Tools GSM2 Settings Support Help						
🔺 Wizzard 📑 Read Data 🕺 Yogramming 🏏 Chart Vi	ewer						
💭 Device Identity 🔗 Simple Logging 🛛 🗠 Event Controlled Logging	g 🚺 Water Level Configuration						
Battery and Memory Battery	7						
73%							
Memory size 2 MBit							
Device Identity	7						
Water_Pressure							
Edit Davies Ideative							
Comment	-						
located in medium							
Show device ranges							
COM Port Device	Identity	device detected	Activate				
20 DCX Class 5 Group 5 Year.Week 3.43 SN :2310	Water_Pressure	18.05.2011 11:11:04	Activate				
4 22 LE <sup>®</sup> Class 10 Group 2 Year.Week 4.45 SN :9 ***********************************							
Class 5 Group 5 Year.Week 3.43 SN :55755	****	18.05.2011 11:11:07	Activate				
DeviceAddr:250 Record active		1	8.05.2011 11:12:39				
•							

Battery and Memory Battery 73% Memory size 2 MBit	The first panel shows the battery capacity and the memory size of the logger device.
	Press the "Edit Device Identity" button to change the field Device Identity.
Device Identity Water_Pressure Edit Device Identity	
	Please note that the length is limited to 65 characters and will only be stored in the device if you write a configuration.
	You may add a comment that will be stored in the device memory as well.
Compat	Pressing the "Show device ranges" button will
located in medium	open a new panel showing the compensated pressure and temperature ranges of the device channels.
	These are the minimum and maximum values for pressure and temperature between which the
Chany device yes	device can measure with the specified linearity.
	Please see picture below which shows the compensated pressure and temperature ranges of a DCX22-AA logger. Views may differ if different devices are connected.

Compens	Compensated Pressure- and Temperature-Range(s)				
	Pressure [bar]				
MIN MAX					
P1	Pressure1		0,800		1,800
P2	Pressure2		0,800		1,800
	Temperature [°C]				
	MIN MAX				
TOB1	Temperature TOB1		-10,000		40,000
TOB2	Temperature TOB2		-10,000		40,000

### 1.4.2 Programming Simple Logging

Rrogramming	Programming the logger device	
Programming: Simple Logging		

"Simple Logging" means that the logger monitors the selected channels at a fixed time interval. The measurements can start at a specified time or immediately after a configuration was written to the device.

The LEO Record can be started by the hardware keys "SELECT" and "ENTER" on the front panel of the device as well.

The programming of "Simple Logging" can be done in the Wizard as well. Please refer to Wizard Programming Device

EoggerDCX 5.1.0						
File Read Data Programming Graph Data stored Tools GSM2	File Read Data Programming Graph Data stored Tools G5M2 Settings Support Help					
🛦 Wizzard 🔚 Read Data 🔀 Programming 💯 Chart Viewer						
📖 Device Identity 🕝 Simple Logging 🔟 Event Controlled Loggin	ing 🛛 🛃	Water	Level Configuration			
Device Memory	Chan	nels				
endless (circular memory)						
C linear (record stops at end of memory)		P1-P2	Pressure1-Pressure2			
Device Clock		1112				
Adjust Device Clock according PC-Clock		P1	Pressure1			
device time read		P2	Pressure2			
dd.mm.yyyy hh:mm:ss		TOB1	Temperature TOB1			
Start Record			Tone meters TOP2			
Certain Date and Time		TOB2	Temperacure TOB2			
Date Time 11:30:00 *						
Measure Intervall						
🔽 Use fixed save Intervall						
► 0 00:01:00 ÷						
1s 1m 1h 1d						
COM Port Device	Ide	entity		device deter	ted	Activate
20 Dex Class 5 Group 5 Year. Week 3.43 SN :2310	Wa	ater_Pre	ssure	18.05.2011	11:11:04	Activate
Class 10 Group 2 Year.Week 4.45 SN :9	**	******	*	18.05.2011	11:11:05	Activate
Class 5 Group 5 Year. Week 3.43 SN :55755	**>	******	*	18.05.2011	11:11:07	Activate
Memory 2MBit Maximum Recording Time 0 y - 0 m - 7 d -	Memory 2MBit Maximum Recording Time 0 y - 0 m - 7 d - 2 h - 23' - 0" 18.05.2011 11:17:19					
0						

A screen shot of the user interface is shown in the figure below.



Device Clock Adjust Device Clock according PC-Clock device time read dd.mm.yyyy hh:mm:ss	It is recommended to leave the check box "Adjust Device Clock according PC-Clock" enabled. Whenever a configuration is written to the device, the device clock will be set according to the current local time read from the Windows system. The item "Device Time read" will be updated every second provided the online mode is active. To enable online mode please refer to Reading Data from connected Device Part 1 The current device time will turn red if the difference between the PC-Clock and device time is greater than 30 seconds.
Start Record Certain Date and Time Date Time 18.05.2011 Now	The logging procedure can be programmed to start at a specified date and time or immediately after configuration was written to device. The time field has the format "hh:mm: ss" Press the button "Now" and a reasonable start time will be filled into the "Time" field. The application detects the current time from the Windows system and rounds the value up to the next quarter of an hour. Or you may manually edit the "Time" field to set a start time with a recording interval of one second. The "Time" field will turn yellow if the specified start time has passed.

		Logger 5.1	53
Measure Intervall	The fixed save interval consist parts or values. This is the first field shows the number of day picture left the value is set to The field has the format "hh:m You may also use the slider the fill in values for the time intervistarting at 1 second increasing left to right position up to 7 day	ts of two st edit vs (in the 0 days) nm:ss" pelow to al ng from ays.	
Channels		Please enable and disable the	e check
P1-P2 Pressure1-Pressure2	-0,0004 bar	boxes to select the channels	which
P1 Pressure1	0,9653 bar	you wish to include in the rec	ord.
P2 Pressure2	0,9657 bar	The channel list looks identic	al to the
TOB1 Temperature TOB1	25,7 °C	one shown in Reading Data fr	om
TOB2 Temperature TOB2	25,8 ℃	connected Device Part 1	

Logger 5.1 Help

# 1.4.3 Programming Event Controlled Logging

🔆 Programming	Р	rogramming the lo	ogger devi	ce	
<u>1</u>	Pr	ogramming: Event Co	ontrolled Log	ging	
Logger 5.0					
le Read Data Programming Graph	Data stored Tools GSM2 Se	ettings Support Help			
🗼 Wizzard 🛛 📑 Read Data 📄	Programming 🛛 🏹 Chart Vie	wer			
	ng 🗛 Event Controlled Longing	Water Level Configuration			
Enable event controlled logging     Event Handling	ing the second se				🔇 Write configuration
Event Detection Interval	Event	Channel Value 1	. mbar Value 2	mbar	
00:00:01	On @ Value1 / Off @ Value2	▼ P1-P2 ▼ 50.00	20.0000		
ls 1m 1h	Explanation				
	Calculate Meanvalue				
	use X values monitored in 1 se	ec interval	10	<b></b>	
Enable Recording Interval after	Event On if Ch > Val	1, Off if Ch < Val2 On if Ch < - Recention Val1 < Val2	Val1, Off if Ch > Val	2	
00:00:01	сн	= measured Value Ch	= measure	d Value	
	$\sim$				
Y	Vall	Val2		Hysteresis	
is im ih	Val2	Val1			
		$ \xrightarrow{t} \rightarrow$		$\rightarrow$	
COM Port Device		Identity	device detected	Activate	
Class 5 Group 5 Year	r.Week 3.43 SN :2310	Wa_01	20.08.2012 15:38:15	Activate	_
					20.00.2012 15:20.57
DeviceAddr:250 Recor	a active				20.08.2012 15:38:57

Enable event controlled logging	The Event Controlled Logging has to be enabled by the check box in the top left corner. All control elements stay disabled until the check box is disabled as well.
Event Detection Intervall	First you should decide how fast the logger should test for the event criteria. For example on the picture on the left the Event Detection Interval is adjusted to 30". This means that the logger device evaluates every 30" if the

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Logger	5.1	55
the event criteria is t	ılfill	ed.
Event         Following events / si can be selected as a recording:         Interval         Interval is so special "Event         is used in convint the cale mean value.         intervals (Event)         Interval is so special "Event         is used in convint the cale mean value.         intervals (Event)         interval	Iffili art o rite mel nt C mb ulat In r snt ogg ber oles a is a	ed. conditions ria for how a Criteria". It ination tion of a egular Detection ger device of 1 s, verage average
Event       • On @ Value 2         On @ Value1 / Off @ Value2       Start record respectively certain value         • Save if Delta Value 1       • Save if Delta Value 1         • Start Rec. no Value 1       • Start Rec. no Value 1         • Start Rec. no Value 1       • Start Rec. no Value 1         • Start Rec. no Value 1       • Start Rec. no Value 1         • Start Rec. no Value 1       • Start Rec. no Value 1         • Start Rec. no Value 1       • Start Rec. no Value 1	1 C ng a belo arts ase <i>her</i> ng a <i>hen</i>	Off @ above ow a hannel > s if rate of es above n Channel above Channel pelow
Channel     Value 1     bar     Value 2     bar       P1     I,2000     I,0000     Any channel of the I can serve as a trigger	o be ger ogge r cł	e ) channel. er device nannel.

# Logger 5.1 Help

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	-
Units used for Logger and programming         Please select units used for Logger Programming         Units       Conversion       Decimals         Pressure       mbar       1       arr       1       arr       g       x         Temperature       °C       x       1 °C =       I       occ       3       x         Length       m       x       1 m =       I       m       5       x         User defined Units       Conversion       Decimals       4       x         Pressure       mthyraulcoli       1 bar =       11.24       4       x         Length       Fathom       1 m =       0.546607       5       x	You can change the physical units according to your preferences. The main menu command "Settings" -> "Units" leads you to the following dialog:
Calculate Meanvalue use X values monitored in 1 sec interval	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.
Enable Recording Intervall after Event Recording Intervall after Event 00:00:10 1s 1m 1h	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 applies.
Event Channel On @ Value1 / Off @ Value2  Explanation Channel P1-P2	Press the button "Explanation" to receive more information concerning Event Controlled monitoring.
On if Ch > Val1, Off if Ch < Val2 Val1 ≥ Val2 Ch Val1 Val2 Val1 Val2 t t t Ch Val2 Val1 < Val2 Val1 < Val2 Val2 Val2 Val2 Val1 < Val2 Val2 Val1 < Val2 Val2 Val1 < Val2 Val2 Val2 Val2 Val2 Val2 Val2 Val2	On at Val1, Off at Val2 - If <b>Val1 &lt; Val2</b> , recording takes place if the measured value of the specified channel is less than Val, until the measured value is greater than Val2. (Hysteresis =Val2 - Val1) - If <b>Val1 = Val2</b> , recording takes place if the measured value of the specified channel is greater than Val1,until the measured value is less than Val2. (Hysteresis = Val1 - Val2)

	Logger 5.1 57
Recording if delta Ch > Val1	Save if delta Channel > Val1
= Reforence measuring	Recording only takes place if the
= Recording	measured value of the specified
Val1	channel is greater by Val1 than
Val1	the last recorded value. After
Val1	"Write Configuration," a reference
Val1	value will be recorded.
Start Recording if Ch > Val1	Start recording if Channel > Val1
= Recording	Recording is started as soon as
Ch	the measured value of the
Val1	specified channel is greater
t	than Val1.
Start Recording if Ch < Val1	Start recording if Channel < Val1
Ch = Recording	Recording is started as soon as
Val1	the measured value of the
Val1	specified channel is less than
t	Val1.

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## 1.4.4 Programming Water Level Configuration

X Programming	Programming the logger device
	Programming: Water level configuration
File       Read Data       Programming       Graph       Data stored       Tools       GSM2       Settings       Support         Wizzard       Read Data       Chart Viewer       Settings       Support	rt Help
Water Surface	evel Configuration

Recorded (hydrostatic) pressure values can be converted into length values (water level values). The appropriate geometry parameters can be stored in the logger device.



Please note: The logger saves pressure measured in bar only - the installation (geometry) parameters will be taken into consideration if a water level conversion is carried out.

You can change the physical units according to your preferences. The "Settings" -> "Units" command in the main menu opens the following dialog:

Logger 5.1	

Units used for Lo	ogger and programming			
4	Please select units used for Lo	igger _Programming		
Units		Conversion		Decimals
Pressure	mbar	1 bar = 1000	mbar	4
Temperature	∘⊂ ▼	1°⊂ = 1	•⊂	3 💌
Length	m	1 m = 1	m	5
User defined Unit	s			
Pressure	mHyraulicOil	1 bar = 11.24		Decimals
Length	fathom	1 m = 0.546807		5 💌
				OK

Please see <u>About Waterlevel and Pressure</u> and <u>Assembly Instructions and First Startup</u> for further information.

Enable WaterLevel Configuration	check box is enabled. The installation parameters of the logger will be stored on the device.
Conversion to Height of water above Sea Level (G)	<ul> <li>There are the following conversion settings available:</li> <li>Height of water (E) <ul> <li>Height of water describes the linear measure (E) from reference line of pressure sensor to the water surface.</li> <li>The height (E) is directly determined from the hydrostatic pressure, the density of the medium and acceleration due to gravity.</li> </ul> </li> <li>Depth to water (F) <ul> <li>This is the distance measured from the reference level down to the water surface.</li> <li>F = B - E</li> <li>Height of water above Sea Level (G)</li> </ul> </li> </ul>



# Calculation of Water Level

$$p = \rho^* g^* h$$

- p = hydrostatic pressure (1 bar = 1E5 N/m²) ρ = Density (kg/m³) h = height or level (m)

$$h = \frac{p * 1E5 \frac{N}{m^2}}{\rho * g \frac{kg}{m^3} \frac{m}{s^2} \rightarrow \frac{Ns^2m}{mm^3s^2}} \rightarrow \frac{Nm^4s^2}{m^2Ns^2m} \rightarrow m$$

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### 1.4.5 Programming Table Logging

There are 2 additional types of logger devices which support a table based logging regime.

The logger devices are identified by the Logger 5 Software by the device class and group. The device group 6 and 8 as shown in the figure below support the table logging regime.

COM Port	Devi	ice	Ider
<b>€</b> 29	DCX	Class 5 Group 8 Year.Week 9.24 SN :112233	
<b>e</b> 25	DCX	Class 5 Group 6 Year.Week 2.44 SN :24020909	***
A	DCY		

Whenever one of the logger device in these groups is connected, the Logger 5 Software allows the user to choose between "Standard Logging Mode" and "Logging Table Mode".

<b>T</b> 1 1
na Lable -

Selecting "Logging Table" will change the user interface as illustrated below.

🏅 Logger 5	.0						_ 🗆 🗙	
File Read D	ata Pro	gramming	Graph Data / Site I	nfo Tools GSM2 Se	ttings Support Help			
🗼 Wizzar	🗼 Wizzard 📃 Read Data 🔀 Programming 💯 Chart Viewer							
💭 Device	Device Identity 💭 Table Logging							
C Standa	ide rd	(	Logging Table					
Logging Ta	ble Loga	arithmic Logo	aina l					
#No.	Count	Interval	Total Time	Required Memory %	Selected Table Item	Channels / Start Record		
1	1000	00:00:01	00:16:40	3.495%	Selected Table Item	7		
2	500	00:00:10	01:23:20	1.748%	Count	Total Time		
3	250	00:00:30	02:05:00	1.311%	24	1 day(s) 00:00:00		
4	200	00:01:00	03:20:00	1.049%	Interval			
5	100	00:05:00	08:20:00	0.524%	01:00:00			
6	50	00:30:00	1 day(s) 01:00:00	0.262%		is im ih id		
7	24	01:00:00	1 day(s) 00:00:00	0.126%	Total			
8	0	00:00:00	00:00:00	0.000%	Total Running Time	Required Memory		
9	0	00:00:00	00:00:00	0.000%	2 day(s) 16:25:00	8.51 % Reset Table		
10	0	00:00:00	00:00:00	0.000%				
11	0	00:00:00	00:00:00	0.000%				
12	0	00:00:00	00:00:00	0.000%				
13	0	00:00:00	00:00:00	0.000%				
14	0	00:00:00	00:00:00	0.000%				
15	0	00:00:00	00:00:00	0.000%	1			
COM Port	Device			hī	entity	device detected Activate	-	
<b>€</b> 29	DCX Cla	iss 5 Group (	8 Year.Week 9.24 SM	V:112233		29.08.2012 10:53:35 Activate		
<b>1 2</b> 5	DCX Cla	iss 5 Group (	6 Year.Week 2.44 SN	N :24020909 **	****	29.08.2012 10:53:37 Activate		
Device.	DeviceAddr:250         Record stopped         29.08.2012 11:02:35							

The logging table consists of up to 15 entries.

Each row in the table defines how many measurements and at what measurement interval should be recorded by the logger.

You may specify "Count" and "Interval". The application calculates the total time and required memory for each pair of "Count" and "Interval".

As visible above the selected row is highlighted in yellow. If additional "Count" and "Interval" pairs are

required, you may select the top row of the gray colored table area only.

The Logger 5 Software calculates the total measurement time and total required memory to complete the logging table.

Total		
Total Running Time	Required Memory	
2 day(s) 16:25:00	8.51 %	Reset Table

If the total required memory exceeds 100% of device memory capacity, the memory gauge indicator changes the color from green to red.

Writing such logging table to the device is not permitted and the corresponding menu command "Programming" - "Write Configuration" is disabled.

Required Memory	
102.76 %	

The tab sheet "Channels / Start Record" allows to define the start condition and to select which channels should be recorded.

Selected Table Item Channels / Start Record	
Start Record	
29.08.2012 Inne 11:30:00	
Start Time	
Channels	
TOB1 TOB1	

There is an additional option for Table Logging. Selecting the "Logarithmic Logging" tab opens the following window.



It's possible to specify a "Target Time" and a "Target Interval". These parameters set the logger device to collect data at the specified measuring time and at the specified fixed interval.

Pressing the "Calculate" button, the application calculates and generates the chart accordingly.

The units for the vertical and horizontal chart axis are seconds. The chart shows the exact course and calculated course.

The calculated course is an approximation to the theoretical curve shape. The logger device supports discrete time interval steps of one second. To achieve the exact course, integral variation of the measuring interval would be necessary.



Each section of the semi-transparent column chart can be adjusted with the mouse. You can change interval and count by changing the size of a column.



A floating panel indicates the interval, measurements count and total measuring time, if a column is selected and resized.

Press the "Accept Table" button to copy the table rows to the "Logging Table" tab sheet. You can adapt and modify "Count-Interval" pairs manually, if necessary.

	Accept Ta			
	Intervall	count	TotalTime	Sum Time
1	2	49	98	98
2	5	9	45	143
3	7	4	28	171
4	9	2	18	189
				211

The calculated course may include table rows where count is equal to zero. The calculation distributes interval/count pairs on a table with 15 rows. To achieve best fit to the exact course some discrete intervals might be not reasonable.

These table rows are eliminated when pressing "Accept Table" and copy the values to the "Logging Table" tab sheet.



Please note the calculation of a possible logarithmic logging regime reserves 10 measurements ("Count") with "Target Interval" on the last row of the logging table.

You may adapt this value to a suitable number of measurements carried with a logging rate corresponding with "Target Interval".

C Stand	lode lard	(	Logging Tab	le	
Logging T	able Loga	arithmic Logg	ing		
#No.	Count	Interval	Total Time	Required Memory %	Selected Table Item Channe
1	49	00:00:02	00:01:38	0.171%	Selected Table Item 10
2	9	00:00:05	00:00:45	0.031%	Count
3	4	00:00:07	00:00:28	0.014%	10
4	2	00:00:09	00:00:18	0.007%	Interval
5	2	00:00:11	00:00:22	0.007%	00:00:30
6	1	00:00:13	00:00:13	0.003%	
7	1	00:00:15	00:00:15	0.003%	Total
8	1	00:00:17	00:00:17	0.005%	Total Running Time
9	1	00:00:19	00:00:19	0.005%	00 09:35
10	10 🖣	0:00:30	00:05:00	0.052%	
11	0	00:00:00	00:00:00	0.000%	
12	0	00:00:00	00:00:00	0.000%	
13	0	00:00:00	00:00:00	0.000%	
14	0	00:00:00	00:00:00	0.000%	
15	0			0.000%	

### 1.4.6 Programming Logger Device with Conductivity Sensor

When the Logger 5.1 software detects a data logger with conductivity sensor, the main window of the application looks similar to the screen dump shown in the figure below.

File Read Data Programming Graph Data / Site Info Tools GSM-	2 Settings Support Help			
Wizzard Read Data Regramming 💥 Chart Vi	iewer			
Reading Data from Device	USB/RS232 COM Port			
Programming Device	Check Device Status			
Dev	ice Status Record prepared Simple Logging			
Online Graph Snap	-Shot Channel Values -4.496 mbar			
PI Search Data P2	960.711 mbar 965.207 mbar 23.404 %	87%		
Convert Data TOE	23.372 °C 31 23.372 °C 32 24.445 °C			
2	Tc 0.4424 m5			
	Raw 0.4266 m5			
COM Part Device	Identity	device detected	Activate	
Class 5 Group 10 Year, Week 13,43 5N :4174	Test Device	04.03.2014.08:39:03	Activate	
	103_00110	011001201100100100		
O Device Adr:250 Record prepared		·	· ·	04.03.2014 08:39:19

Logger devices belonging to device class 5 and device group 10 have a built-in conductivity sensor
 There are two additional channels measuring conductivity:

 Channel "ConTc" represents the temperature compensated measuring value
 Channel "ConRaw" shows the raw measuring value. The output of this channel is not subject of temperature compensation
 Logger devices with a conductivity sensor also provide a seperate temperature channel "T". Temperature readings from this channel are used internally for the determination of the temperature compensated conductivity channel "ConTc"

On the tab sheet "Programming" ->"Simple Logging" you will find above a group box called "Conductivity Sensor Measuring Range".

The current selection for the active measuring range is shown if the device has successfully been recognized.

You will find a button "Set Range" as well.

Pressing the button

suitable measuring range.

will call a dialog window where you may select a

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Logger 5.1 File Read Data Programming Graph Data / Site Info Tools GSI	1-2 Settings Support Help			<u>_</u> _×		
🛦 Wizzard 🙀 Read Data 🔀 Programming 💯 Chart Viewer						
Device Identity 🕝 Simple Logging 🔀 Conductivity Sensor S	ettings					
evice Memory     endless (circular memory)     [inear (Decord stops at the end of Memory)				🔇 Write configuration		
Pevice Clock     Povice Clock     Povice Clock     Povice Time read     04.03.2014 08:39:17	-Conductivity Sensor Measuring Range	• 020000 uS/cm (20 mS/cm)	Set Range 0 µS/cm			
Start Record	Channels					
Date Time	V P1-P2 P1-P2					
04.03.2014	P1 P1					
Board miles	₽2 P2					
Measure Interval	ТТ					
✓ Use fixed save Interval day(s) bb mm cc	TOB1 TOB1					
	TOB2 TOB2					
	ConTc ConTc					
	ConRaw ConRaw					
1s 1m 1h 1d						
COM Port Device	Identity	device detected Activate				
Class 5 Group 10 Year.Week 13.43 SN :4174	Test_Device	04.03.2014 08:39:03 Activate				
Device Adr:250 Record prepared 04.03.2014 09:08:10						

The conductivity sensor provides the following measuring ranges:

Range1 0200 uS/cm	00.2 mS/cm
Range2 02000 uS/cm	02 mS/cm
Range3 020000 uS/cm	020 mS/cm
Range4 0200000 uS/cm	0200 mS/cm

The dialog window serves to set one of the available measuring ranges of the conductivity sensor (see figure below). The example shows that measuring range 3 is currently activated. Activated means that the sensor operates in this measuring range.

Conductivity			<u>_0×</u>
<u>Measuring Rang</u>	<u>e</u>		σ μS/cm
C Range 1		0200 uS/cm	(0.2 mS/cm)
C Range 2		02000 uS/cm	(2 m5/cm)
Range 3		020000 uS/cm	(20 mS/cm)
C Range 4		. 0200000 uS/cm	(200 mS/cm)
			Close

Selecting a different measuring range than currently activated, a button "Write" will become visible.

5 Conductivity			- I X
<u>Measuring Rang</u>	<u>e</u>		σ <sub>µS/cm</sub>
C Range 1	(	0200 uS/cm	(0.2 m5/cm)
C Range 2	(	02000 uS/cm	(2 m5/cm)
C Range 3		020000 uS/cm	(20 mS/cm)
Range 4	(	0200000 uS/cm	(200 mS/cm)
Write			Close

Please note: Changing the measuring range while an active record is running will require that logging activity will be stopped!

The following warning message will be shown:

ľ	Warning	×
	⚠	Please Note ! Logging will be disabled. Active Record will be stopped
		Cancel

You can proceed by pressing the "OK" button which will stop a running record. The selected measuring range then becomes activated.

The application confirms the successfull change of measuring range by hiding the "Write" button in the left lower corner of the dialog window.

Simultaneously the new selected measuring range will be displayed on the main form as shown in the picture below:

Current I	Device Settings		
Mea	suring Range	Range 4 -> 02000	00 uS/cm (200 mS/cm)
Temp	perature Coefficient Media	2.2500 %/K	
	Conductivity		
Ce Conc	<u>Measuring Range</u>		<b>σ</b> μS/cm
Ra	© Range 1	0200 uS/cm	(0.2 mS/cm)
		02000 uS/cm	(2 m5/cm)
			(20 m5/cm)

You may also select the tab sheet "Conductivity Sensor Settings" where you can find a possibility to select measuring range of the conductivity sensor.



Please find a more detailed description in the section: Calibration of Conductivity Sensor

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### 1.5 Viewer

1.5.1 Viewer Part 1

🥎 Chart Viewer	Charting with the Viewer Tool

Press the button

or the shortcut key "F5" to invoke the Viewer Chart tool.

You will find a main menu item as well:

🚟 Le	oggerDCX 5	.1.0					
File	Read Data	Programming	Graph	Data stored	Tools	GSM2	
			Online Graph		-		
		Read Date	Wa	Waterlevel Graph			
		loc.	Dat	a Graph View	er F5	Loop	
						Z	

Chart Viewer

The Viewer Chart tool allows users to view measuring data, including several files at the same time. The measuring data can come from the same device or you may inspect data retrieved from different logger devices.

The Viewer Tool consists of two main windows as seen below. On the left, you can see the "Record Overview" window and the "Viewer" window on the right.

The "Record Overview" helps navigation and identification of the loaded data files. The "Viewer" contains the chart and includes advanced printing options to generate printed reports.


The description of the main menu commands of the Viewer can be found here <u>Menu Commands</u> <u>Viewer</u>

<b>₽</b>	Press the "Lock" icon located in the top left corner to influence the behavior of the vertical axis. If lock is open, the scaling of the left and right vertical axis is automatic. The axes are scaled according to minimum and maximum value of the visible line series. The zoom-function is enabled and panning in all directions is allowed.
<b>A</b>	If lock is closed, the axes maximum and minimum must be set manually. You have direct access to the chart properties if you move the mouse over the tool icon in the top left corner of the charting area. Panning is only allowed in horizontal direction. Zoom is disabled.
8	

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	-	The lock is closed and red colored. The application will permanently store the axes scaling. After closing and restarting the application, the Viewer will keep the scaling and settings for the vertical axes.	
		This can be helpful to compare data.	
		Click on the icon to hide the "Record Overview" window.	
		The icon becomes colored if the "Record Overview" is hidden. Press on the icon to open the "Record Overview" window.	
	<mark>©</mark> .	The "Lamp-lcon" enables or disables the automatic highlighting function. If two or more data files are open, placing the cursor over a line series, then all line series belonging to the same file become highlighted in color. The rest of the data remains gray. This helps identify the origin of the selected data. Simultaneously, the corresponding item in the "Record Overview" list becomes highlighted as well.	
-	Ø	Click on the "Pencil" icon to repaint the complete chart. The highlighting will be disabled and all line series appear colored.	

#### **Zoom-Function**

Provided the axes are in automatic mode 🛱 (the lock icon shows a open lock) the chart allows zooming.

To zoom-in press left mouse button in the left upper corner of the chart region you are interested in (Point 1). Now move the mouse cursor to the bottom right corner (Point 2) and release the mouse button.



To zoom-out press left mouse button in bottom right corner (Point 1) and move towards left upper corner (Point 2) then release the mouse button.



#### Moving Chart

Pressing the right mouse button allows you to move the chart. The ability to move depends on the current state of locking the chart.

If the lock icon shows the following symbols and or a you can move the chart in horizontal direction only.

To move the chart in any direction, click on the lock icon 🔀 until it shows the open lock.

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#### 1.5.2 Viewer Part 2



The chart makes use of the record overview-tool, which displays the currently loaded files (records).

The list is divided up into two sections. The upper part "Records read from device" shows you records which have been recently read directly from a device by cable connection.

The lower part contains records loaded from file.

The record overview-tool helps navigation, data inspection, and raw data exporting according to one of the available ASCII formats. Each item is assigned a button that enables or disables the corresponding line series in the chart.

Please see Menu Commands Record Overview for further explanation of the main menu commands.



**Record Overview Tool** 

The buttons in the header of the Record Overview-Tool:



	Moving the mouse cursor over a line series in the chart, the selected series is highlighted in color. All other line series showing data from other records are gray. The bulb-on icon shows that a part of the line series are highlighted.
	be colored. The button changes again to the bulb-off icon.
À	The Record Overview-Tool window can be set to stay always on top. Changing to another window does not influence the appearance of the record overview-tool window. The gray thumbtack icon shows that the window is set on top. Pressing the button will change the state and the behavior. The window can be overlapped by another window, if desired.
*	The green thumbtack icon shows that the record overview-tool window is not set to stay always on top.
<<	Press this button to minimize the record overview-tool window. Press the button again restore the window.
?	Click on the Help button to activate context help.

2310_1_2011_06_07_12_22_00 DevID : Water_Pressure Start : 07.06.2011 12:22:00	Each record loaded to the program is represented by a container box. The container box works like a button. You may click on the box to enable/disable a record. In the chart, the line series belonging to the selected record will be shown or hidden as selected. If you mouse-over a line series in the chart, the corresponding container box is highlighted. Each container box shows in the header the record number. The
	<ul> <li>2310 is the serial number of the device</li> <li>1 is the number of the record in the device memory see <u>Reading Data from connected Device Part 1</u></li> <li>2011_06_07 is the record start date: 7th June 2011</li> <li>12_22_00 is the record start time in the format "hh_mm_ss"</li> </ul>

r





The "trash bin" removes a record from the list. The data will be removed from the chart.

□ Using the docking function in Viewer

The Viewer allows two different ways of displaying the data tables. You can choose between independent floating windows or windows docked to the bottom of the chart window.

Eile     Data     Tables     Waterlevel       Image: Show Tables in floating Window     Image: Show Tables in floating Window	X			
♀     ✓       ✓     Show Tables in floating Window	<u>File D</u> ata <u>T</u> ables <u>W</u> aterlevel			
Show Tables in floating Window	<u>♀ ≫ &lt;&lt;</u> <u>₹</u>			
Show Tables in floating Window				
Records read from Device				

If the checkbox "Show Tables in floating Window" is not checked and you press one of the buttons

with the table icon is, the corresponding table view will be shown as a docked window on the bottom of the chart window as shown in the figure below.





The table views can be released from the chart window either by pressing the "Float" button



or you simply click on the title of the tab sheet and drag the window to any desired position on the desktop. Any floating window can be selected in the window header and dragged to the drop target in the bottom of the chart window. A gray border around the drop target shows you that the window can be released

The figure below shows the drop target areas for the table views (green) and for the record overview tool (red). You may dock the record overview tool to the left side of the chart window.



## 1.5.3 Menu Commands Viewer

	VIEWER         Ejle       Edit       Print       Iools       View       Set         Open       F2       po         Import IDC-File       F3       po         Close Window       F4       po         Close Application       Strg+F4       Ch			
File	Open	Load data from file (extension *.DX5). You may use the shortcut F2 to call the file open dialog.		
	Import IDC-File	You can load data from files stored in the old IDC file format. F3 is the corresponding shortcut.		
	Close Window	"Close Window" hides the Viewer and the record overview tool.		
	Close Application	"Close Application" quits the program.		
	VIEWER         File       Edit       Print       Iools       View         A       [       Export       Chart to Excel         Copy       Chart into Clipbo	v <u>S</u> ettings tion management availe		
Edit	Export Chart to Excel	With this menu command you can create a copy of the chart. Excel will automatically be started and the chart pasted into a new Excel worksheet.		
	Copy Chart into Clipboard	You may create a copy of the current chart in the clipboard. The chart is then available in other applications which support paste function.		
Print	VIEWER         File       Edit       Print       Iools       View         Image: Tir       Print       F9			
	Print	The Viewer supports special print functionalities. Multiple charts, text elements, tables and pictures can		

This is the list of available commands in the main menu of the Viewer window.

Logger	Help		
		interactively arranged on the page. There is a print preview and option to create a PDF document.	
		Further explanations can be found in the <u>Printing a</u> <u>Chart</u> subsection.	
Tools	VIEWER         File       Edit       Print       Tools       View         Image: Time       Record L	v <u>S</u> ettings ist F5 pre	
	Record List	The menu command or F5 opens the record overview tool.	
	VIEWER         File       Edit       Print       Tools       View         Time       Yes       Yes	w <u>S</u> ettings <u>H</u> elp /iew Calculated Waterlevel(s) Strg+W	
View	View Calculated Waterlevel (s)	Provided you have loaded at least one file that specifies a water level configuration for the logger device, then the menu command becomes enabled. You can switch between raw data and calculated water levels.	
	VIEWER         File       Edit       Print       Tools       View         Image: Time       Time       3	Settings     Help       Units     F6       Graph properties     F7       enable automatic Graph selection	
Settings	Units	The menu command "Units" (shortcut F6) calls the dialog where you can select the preferred physical unit for pressure and temperature.	
	Graph properties	Pressing F7 on the keyboard or selecting "Graph properties" from the main menu calls the dialog for the general properties of the chart.	
	enable automatic Graph selection	This menu command has the same effect as is you press on the icon 😡 see also Viewer Part 2	
Help	File Edit Print Tools View	v <u>S</u> ettings <u>H</u> elp position Context Help	

Context Help	Selecting "Context Help" changes the Mouse cursor to ? - in this state you may click on any element of the graphical user interface. The help function leads you to the corresponding description in the online help.
--------------	---

# Logger 5.1 Help

## 1.5.4 Menu Commands Record Overview

This is the list of available commands in the window main menu.

File	"Close Window" hides the Record Overview Window		
	File       Data       Tables       Waterlevel         Export Record List with ASCII Formats       Export Record List with IDC-FileFormat       Image: Comparison of the second List with IDC-FileFormat         Store IDC Files in DX5-File Format       Image: Comparison of the second List       Image: Comparison of the second List		
	Export Record List with ASCII Formats	Each open record will be exported in the preferred ASCII-Format to the corresponding directory.	
Data	Export List with IDC- FileFormat	Open records will be stored in the old IDC file format compatible with previous software version Logger DCX 4_11.	
	Store IDC Files in DX5-File Format	Whenever a file in the old IDC file format is loaded, the menu command becomes enabled. You can store this data in the new file format used by this software release.	
	Clear Record List	Select the menu command "Clear Record List" to empty the list of loaded data.	
	Record Overview         File       Data       Tables       Waterlevel         Image: Show all Tables       Show all Tables       Close all Tables         Image: Show Tables in moating window       Show Tables       Show Tables		
Tables	Show all Tables	Use the menu command "Show all Tables" to show the data table view for each loaded record.	
	Close all Tables	"Close all Tables" will hide all data table views which are currently opened.	

	Record Overview	×	
	<u>File D</u> ata <u>T</u> ables <u>W</u> aterlevel	Ele	
	Close all	Schemas	
	Show Tables, in treating wind	ater Level Calculation List	
Waterlevel	Tables in Hoading window		
	Close all Schemas	With this menu command, you can close all opened windows showing water level configurations.	
	Show Water Level Calculation List	The application maintains a list of calculations. The list stores which pressure channels should be taken into consideration to calculate water levels.	
	L		

#### 1.5.5 Printing a Chart

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The menu command "Print" or shortcut "F9" starts the interactive print report designer.



The current chart will be copied to the print report designer as shown in the figure below.



The print report designer allows interactive positioning and resizing of any element. You may add any number of annotations, tables and pictures to a print report.

Custom reports can be stored as a template to generate future reports more easily. The print report designer can generate PDF output as well.

The window is divided up into the element list on the left side and the interactive design workspace. You may select an item in the list to activate the corresponding element.

	Element selected	A selected or activated element becomes marked with 8 blue squares
Image_7 [124,296]	Element moving	A left click and drag allows to move the element across the design workspace. A yellow panel indicates the name of the element and the absolute coordinates of left upper element corner. The origin of ordinates is located in the upper left corner of the design workspace.
[62,64]	Element resizing	Selecting one of the square markers allows resizing of the element. The yellow panel indicates height and width of the element.

	Text Box	Select the "Text Box" tool button to add a new annotation		
	Picture	Select the "Picture" tool button to add a new image. You may load any existing image file of one of the following formats: *.jpg, *.jpeg, *.bmp, *.ico, *.emf, *.wmf		
	Table	Select the "Table" tool button to add a new table element. A dialog will be shown where the number of columns and rows can be specified.		
×	Printer Setup	The "Printer Setup" tool button opens the printer dialog to select one of the installed printer devices. Please note the page orientation used in the print report designer is indicated on the paper format/orientation settings of the selected printing device. You may choose portrait or landscape paper orientation. The supported paper size is A4. If a different paper size is required, generate a PDF document first. PDF allows to fit the print result to the desired page size.		
	Move up	The "Move up" tool button shifts a selected element one position up in the element list. The elements are painted in descending order in the element list. "Text_2" follows "Text_1" and is herewith painted after "Text_1" . In the picture below "Text_2" overlaps the element area of "Text_1". <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Print</b> <b>Pr</b>		

	1			
		5 Print		
		Text 1 Text Box 2		
		· 御 !		
	Move down	The "Move down" tool button shifts a selected element one position down in the		
		element list.		
命	Delete	Press the "Delete" tool button to delete any selected element. You may also press the {Del} key on keyboard to remove any item from the element list and		
		design workspace.		
E	Align left	The "Align left" tool button moves any selected element to the left margin. The		
		upper left corner of the element aligns with left margin.		
		The "Align conter" tool button mayne any colocted element to conter residen		
	Align center	between left and right margin.		
티	Alian riaht	The "Align right" tool button moves any selected element to the right margin.		
틔	, agri rigit	Right upper corner of the element alignes with right margin.		

Additional tools are available under "Text Box" and "Table." Please note: additional functions will only be available if an element is selected.

	Text Box Border	The border of a Text Box can be enabled or disabled	
F	Font Style and Size	Font size, type and style	
>>	Element background color	Choose any color for the background of a selected element	
	Table header color	Choose any background color for table header	
٩	List of files	The "List" tool button opens a new dialog window where all currently loaded files	

		are listed.
<b>B</b>	Template Elements	Whenever a Text Box contains text elements (entities) like serial number or device identity the "Template Elements" tool button becomes visible. A Text Box may contain text edited by user and / or text originating from file or device.

The list of loaded files gives access to distinct information stored in each file. Pressing the "List" tool button activates the dialog window shown in figure below.

😤 File List		
1 Water_Pressure_16,05,2011_15,20,40.DX5 ->	Device Comment	->
2 Water_Pressure_16,05,2011_17,17,20.DX5 ->	2	
3 Wa_01_06_08_2012-10_04_00.DX5 ->		
4	Measurements FileNo#1: Water_Pressure_16,05,2011_15,20,40.DX5	->
1	* reference height depth [m]	
	1st measurement 1 2	
	2nd measurement 3 4	
<[	Montag, 16. Mai 2011 17:18:22	->

1	The file list displays the filenames and the number of loaded files.		
2	Comment which is stored in the logger device		
3	User measurements and annotations added to the file while reading out the data from logger device.		

Selecting one of the files in the list expands the panel to show further details. The selected panel becomes highlighted in yellow.

		L	
<mark>🏅</mark> Fil	e List		<u>_                                    </u>
1	Water_Pressure_16,05,2011_15,20,40.DX5         ->           Start Time:         ->           16.05.2011 15:20:40         ->           Serial Number: Identity:         ->	Device Comment Iocated in medium	->
2	2310         Water_Pressure           ->         ->           Water_Pressure_16,05,2011_17,17,20.DX5         ->           Start Time:         ->	Measurements FileNo#2:         Water_Pressure_16,05,2011_17,17,20.DX5           *         reference height         depth [m]           1st measurement         3,1415         2,71828           2nd measurement         5,645         6,320	->
	16.05.2011 17:17:20     ->       Serial Number:     Identity:       2310     Water_Pressure       ->     ->		->
3	Wa_01_06_08_2012-10_04_00.DX5 ->	Dienstag, 17. Mai 2011 08:16:31 any remark can be written here	

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Using the arrow buttons \_\_\_\_\_ allow you to copy content into the text of the selected text box.

The copy function does not copy the plain content into the text box - only a reference to the selected entity is assigned. Another tool button becomes available for text boxes containing template elements.

Here is an example of a text box with template elements:

User Annotation Water_Pressure SN: 2310 (some user text.) Dienstag, 17. Mai 2011 08:16:31 any remark can be written here	Template Structure         Template Elements <serialnumber> <deviceid>         Image: SerialNumber &gt;         Image: SerialSerial=1; (some user text )         %template_user_comment=1;</deviceid></serialnumber>
	Red text represents template elements in the format: % template_elementname=index number of file;
	User text can be mixed with template elements. In the example above "User Annotation", "SN:" and "(some user text)" is manually edited text.
	Select one of the template elements in the list on the left to

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	highlight only the selected element.		
	Press tool button 🧾 to highlight all template elements.		
	Press delete tool button to remove any element		

The template elements work like variables referring to information found in the corresponding file(s). This mechanism is suitable for recurring report jobs.

The page layout visible in the design workspace can be stored as a template file. A template file stores a description of the design workspace as XML structure.

If you load a template file, the print report designer processes the description of the page layout and generates the previously stored page.

🔭 Print			
<u>F</u> ile	<u>T</u> emplate		
Layc	Load F2		
<u>م</u>	<u>S</u> ave <sup>r</sup> \F3		
		21	
Text	_2		
	h_t		

Use the main menu command "Template" -> "Load" to restore a previously designed page layout. Use "Template" -> "Save" to store the current page layout as template for later print jobs.

On the tab sheet "Print Preview" the page can be inspected before printing or generating a PDF document.



	Preview Tools	You can zoom in and out, drag the page with the mouse and select different scaling for the print preview.
	PDF Tool button	Press the PDF Tool button to generate a PDF document.
<b>%</b>	Printer Setup Tool button	The Printer Setup Tool button allows selection of the desired printer.
int	Print	The "Print" button sends the page to the printer.

### 1.5.6 Viewer and Water Level

The Viewer allows inspecting calculated water level in the chart. In the main menu you can switch between raw data and calculated water level chart.

5 VIEWER	
File Edit Print Tools View Settings Help	
Time <u>V</u> iew Calculated Waterlevel(s) Strg+W	
08.2011 10:57:14 1046.498 mbar	
75 VIEWER	
File Edit Print Tools View Settings Help	
👸 🌇 Time View Raw Data Strg+W s	
👩 🥖 11:02 not available	

In those cases where raw data from two devices was loaded to the Viewer and only one pressure channel can be found in both files, the Viewer assumes that barometric pressure compensation should be carried out.

Here is an example:

The raw data originates from two DCX-22 devices - one monitored pressure in the water and the other logger recorded the barometric pressure.



The "Record Overview Tool" contains two blocks representing the loaded raw data files as shown in the figure below.







That's why the following tool button is enabled in the corresponding box of the Record Overview Tool.

Press this button to view the water level configuration of the device.

<b>WL 55755_1_2011_08_30_11</b>	_00_00 C:\Dokument	te und Einstellungen\S	teinerG\Anwe	endungsdaten\LOGGER_5\data\	Water
Reference Level		Height of water (E)		•	⊆lose
<b>_</b>	-St	andard Waterlevel Configu	uration		
				use original values	
ſ		USER		original values	
		Installation Length			
Wat	ter Surface	0.00000	m see level	0.00000	
		0.00000	m	0.00000	
i i i		Offset			
╶╶╾╾┛╧╌╴		Density	m	0.00000	
		998.200	(kg/m^3)	998.200	
Sea Level	8.	P1 P1			
		Use Channel from ot	her device		
		😑 available devices w	ith pressure ch	annels	
		⊡- 29572_1_2011	_08_30_11_00	_00	
•	<b>▼</b>				

On the bottom right corner a tree view listing all available or currently loaded files allows to select any desired pressure channel.

The checkbox "Use Channel from other device" is activated. You need to tell the Viewer from which device or file the barometric pressure should be derived from for water level calculation.

Another window showing the list of water level calculations becomes visible. The column "Use additional Channel from" is marked with "NIL", Pressure Channel is "-1" and column "Execute Calculations" says "No".

👸 Wate	er Level C	alculations				_ [	Ľ
Eile							
#No.	Schema	WL-Config from Device	Pressure Channel	Use additional Channel from	Pressure Channel	Execute Calculation	1
0	WL	55755_1_2011_08_30_11_00_00	P1	NIL	-1	NO	0

As soon a valid channel is selected in the tree view, in the example it's the P1 channel of the device called "Air-Pressure", the corresponding reference to the raw data will be filled into the column "Use additional Channel from" and column "Pressure Channel" shows the channel name.



The list of water level calculations indicates that a valid second channel has been assigned to the calculation rule.

👸 Wate	🖌 Water Level Calculations							
Eile								
#No.	Schema	WL-Config from Device	Pressure Channel	Use additional Channel from	Pressure Channel	Execute Calculation		
0		55755_1_2011_08_30_11_00_00	P1	29572_1_2011_08_30_11_00_00	P1	YES 🗹		

The column "Use additional Channel from" contains now a reference to the appropriate device. "Pressure Channel" indicates that channel P1 should be used and the column "Execute Calculation" turns to "Yes".

Select now the main menu command "View Calculated Water level(s)"



Þ WL 55755\_1\_2011\_08\_30\_11\_00\_00 Height of water (E) 0.650 0.600 0.550 0.500 E Water Level : 0.64131 m 0.450 0.400 0.350 11:10 11:12 11:13-11:15 11:16 11:18-11:19-11:00 11:02 11:03 11:05 11:06 11:07 11:08 11:09 11:14 11:17 11:20 11:22 11:23 11:24 11:25 11:26 11:27 11:01 11:04 11:11 11:21 tim 

And the chart displays the calculated water level.

Press the "Table tool button" if you wish to inspect the calculated water level in a table view.



If you move the mouse over the line series, a hint shows the calculated water level value belonging to the current position of the mouse cursor and the data table scrolls in a way that the corresponding value is displayed on the top row.



# 1.6 Data Conversion

### 1.6.1 Data Export

The Logger 5 Software supports 7 different text formats to export data to 3rd party software.

List of file formats:

XL Excel	Text file which can be used for Microsoft Excel. Columns are separated with tabulators. Each column represents a channel.
CSV-1	Text file with 3 columns Date; Time; value . The columns are separated by semicolon. The channels are listed in order, starting with channel number, channel short name, long name, and physical unit. A line "" seperates channels from the next Date; Time; value row.
CSV-2	The CSV-2 file format is very similar to the Excel export format. The coulumns are separated with a semicolon.
XML	The Delft FEWS export filter generates an XML file according to the Delft FEWS published interface. The exported data is treated as Time Series and satisfies the Delft FEWS XML Schema and Namespaces.
	The HYDRAS export filter generates text-based files which are suitable for the automatic import functionalities of Hydras. The files contain an XML-like header describing the measuring location and channel as follows:
Hydras	<station>000000706</station> <sensor>0010</sensor> The data is structured in tabulator-separated columns: <i>Date</i> TAB <i>Time</i> TAB <i>Value</i> Each channel is exported to an independent file.
τνο	The TNO export filter generates a specific file format for TNO loacted in Holland
wiski	The WISKI export filter generates files for the WISKI software by Kisters
BNA	The BNA export filter generates a specific file format for Banco Nacional de Aguas (BNA) in Chile

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For more information about the text converter tool, see section Wizard Convert Data	

You may start the text Conversion Tool by selecting the "Convert Data" Icon or the main menu command "Tools" -> "Data Export Converter"

5 L	ogger 5.0								
File	Read Data	Programming (	Graph [	Data stored	Tools	GSM2	Settings	Support	Help
		Read Date	1.4	D	Da	ata Expo	rt Converti	er	
	Wizzard	Read Data	3	Programming	W	ater Lev	elÈonvert	er	

The following window will be activated:

🔓 Universal Text Converter	
Help	
General   Output File   File Info	
Supported File-Formats CSV-1 CSV-2 XML Delft FEWS Hydras TNO Wiski BNA	Open File       Codec         Convert       UTF-8         Convert       UTF-16LE         Excel       CSV1       CSV2       XML Delft FEWS       HYDRAS       TNO       WISKI       BNA         No additional information required       Image: Convert       Image: Convert       Image: Convert       Image: Convert         Export Directory       C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_E       Image: Convert       Image: Convert
Status Report Format successfully set to : BNA	
Format successfully set to : BNA	
OK Output Format selected	-> XL Excel

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	Supported File-Formats Supported File-Formats CSV-1 CSV-2 XML Delft FEWS Hydras TNO Wiski BNA	The tree view on the left shows available or supported file output formats and the currently selected format. The current selection is marked by a yellow icon.					
	Open File	Press the "Open File" button to browse for available "*.DX5" measuring files to load into the memory for file conversion.					
	Convert	Press the "Convert" button to generate a text file with the selected file format.					
	Codec C ASCII C UTF-8 O UTF-16LE	<ul> <li>The Universal Text Converter supports different text file encoding methods. They are:</li> <li>ASCII</li> <li>UTF-8</li> <li>UTF-16LE</li> <li>The UTF-8 and UTF-16LE encoding supports Unicode. These methods might be useful when customized channel names use extended character sets i.e. Cyrillic alphabet or Chinese letters.</li> </ul>					
	Excel       CSV1       CSV2       XML Delft FEWS       HVDRAS       TNO       WISK1         No additional information required	Each file format is available on an individual tab. Some formats allow additional information to be stored in the output text file. The Excel output format does not require additional information but others, like the XML Delft FEWS, provide the ability to mark missing values with a specific text or number. Other content elements include <longname>, <stationname>,<source organisation=""/> , <sourcesystem> and <region> . These elements are specific for the Delft FEWS application according to the time series definition forXML document types.</region></sourcesystem></stationname></longname>					
	*	The button with the star icon allows user to select a favorite format or default file format. Your selection will be permanently stored and activated for future data conversions.					
	Export Directory C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\de	For each file format you may configure a specific path where converted text files should be stored.					
		The browse button allows users to specify a file save location.					

You can launch the Windows Explorer showing the content of the
directory specified as "Export Directory"

After successful file conversion you can inspect the content of the text file by selecting the "Output File" tab.

The "Copy Data into Clip Board" button copies the content onto the clip board so measurement data can be pasted into other applications, including Excel.

🐮 Universal Text	Converter						_	
Help								
General Output Fil	e File Info							
						Copy Dat	a into ClipBoard	
Serial Number Device Identity Exported from File Record Start Time	2310 Wa_01 C:\Dokumente un 13.08.2012 09:05	d Einstellungen\Steii 5:58	nerG\Anwe	ndungsdal	ten\LOG	iGER_5\data\GW-To	GA-DAH-3_13_08_	_20
No 1 2 3 4 5 6 7 8 9 10 11 12 13 14 ◀ Status Report XML> <sourcec< td=""><td>Date Time 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 Drganisation&gt;&lt;<sou< td=""><td>CH0 CH1 PI-P2 P1 mbar mbar PI-P2 P1 09:05:58 6.4863 09:06:58 6.5297 09:07:58 6.5496 09:09:58 6.5590 09:09:58 6.5590 09:10:58 6.5592 09:11:58 6.5551 09:11:58 6.5552 09:11:58 6.5552 09:11:58 6.5582 09:16:58 6.5887 09:16:58 6.5424</td><td>CH2 P2 mbar P2 967.778 967.788 967.788 967.789 967.789 967.789 967.789 967.789 967.788 967.788 967.788</td><td>CH4 TOB1 *C TOB1 4961.288 7961.257 7961.242 7961.242 7961.242 7961.242 7961.242 2961.257 5961.242 7961.242 7961.242 7961.212 2961.227</td><td>CH5 TOB2 \$C 525.4 925.4 925.4 725.4 725.4 725.4 725.4 725.4 725.3 925.3 925.3 925.3 925.3 925.3 425.3</td><td>24.8 24.8 24.8 24.8 24.8 24.8 24.7 24.7 24.8 24.8 24.8 24.8 24.8 24.7 24.7 24.7 24.7 24.7</td><td></td><td>×</td></sou<></td></sourcec<>	Date Time 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 13.08,2012 Drganisation>< <sou< td=""><td>CH0 CH1 PI-P2 P1 mbar mbar PI-P2 P1 09:05:58 6.4863 09:06:58 6.5297 09:07:58 6.5496 09:09:58 6.5590 09:09:58 6.5590 09:10:58 6.5592 09:11:58 6.5551 09:11:58 6.5552 09:11:58 6.5552 09:11:58 6.5582 09:16:58 6.5887 09:16:58 6.5424</td><td>CH2 P2 mbar P2 967.778 967.788 967.788 967.789 967.789 967.789 967.789 967.789 967.788 967.788 967.788</td><td>CH4 TOB1 *C TOB1 4961.288 7961.257 7961.242 7961.242 7961.242 7961.242 7961.242 2961.257 5961.242 7961.242 7961.242 7961.212 2961.227</td><td>CH5 TOB2 \$C 525.4 925.4 925.4 725.4 725.4 725.4 725.4 725.4 725.3 925.3 925.3 925.3 925.3 925.3 425.3</td><td>24.8 24.8 24.8 24.8 24.8 24.8 24.7 24.7 24.8 24.8 24.8 24.8 24.8 24.7 24.7 24.7 24.7 24.7</td><td></td><td>×</td></sou<>	CH0 CH1 PI-P2 P1 mbar mbar PI-P2 P1 09:05:58 6.4863 09:06:58 6.5297 09:07:58 6.5496 09:09:58 6.5590 09:09:58 6.5590 09:10:58 6.5592 09:11:58 6.5551 09:11:58 6.5552 09:11:58 6.5552 09:11:58 6.5582 09:16:58 6.5887 09:16:58 6.5424	CH2 P2 mbar P2 967.778 967.788 967.788 967.789 967.789 967.789 967.789 967.789 967.788 967.788 967.788	CH4 TOB1 *C TOB1 4961.288 7961.257 7961.242 7961.242 7961.242 7961.242 7961.242 2961.257 5961.242 7961.242 7961.242 7961.212 2961.227	CH5 TOB2 \$C 525.4 925.4 925.4 725.4 725.4 725.4 725.4 725.4 725.3 925.3 925.3 925.3 925.3 925.3 425.3	24.8 24.8 24.8 24.8 24.8 24.8 24.7 24.7 24.8 24.8 24.8 24.8 24.8 24.7 24.7 24.7 24.7 24.7		×
XML> <sources XML&gt; <region> Preferred Format s</region></sources 	iystem> <sourcesy <region> et to :XL</region></sourcesy 	/stem>						T
File	Data successfully e	exported to : C:\Dok	umente un	d Einstellu	ngen\St	einerG\Anwendung	sdaten\LOGGER_5	i\data //

The tab labeled "File Info" contains detailed information about the logger device and settings.

# 106 Logger 5.1 Help

Universal Text Converter Help		
General Output File File Info		
Serial Number 2310 Device Identity Wa_01	Record Start Time Number of Measurements	13.08.2012 09:05:58 1849
	<b>-</b>	·
Device Memory		endless (circular memory)
Event Controlled Logging		enabled
Event Detection Interval		00:00:01
Calculate meanvalue with		10 measurements monitored
Event		On @ Value1 / Off @ Value2
Event Channel		P1-P2
Value 1 Value 2		0.0500 bar = 0.0200 bar =
•		
Status Report		
XML> <sourceorganisation><source XML&gt; <sourcesystem><sourcesyst XML&gt; <region><region></region></region></sourcesyst </sourcesystem></source </sourceorganisation>	eOrganisation> em>	<b>A</b>
Preferred Format set to :XL		<b>_</b>
File Data successfully exp	ported to : C:\Dokumente und Einstellungen\S	teinerG\Anwendungsdaten\LOGGER_5\data //

### 1.6.2 Waterlevel Calculation

The main menu command "Tools" -> "Waterlevel Converter"

File     Read Data     Programming     Graph     Data stored     Tools     GSM2     Settings     Support     Help       Wizzard     Wizzard     Read Data     Programming     Data Export Converter       Water Level Converter     Water Level Converter	5 L	ogger 5.0								
Wizzard Read Data Read Data Read Data Wizzard	File	Read Data	Programming	Graph	Data stored	Tools	GSM2	Settings	Support	Help
Wizzard Read Data Wizzard Water Level Converter	Δ		Developet	1.4	Due en en el el el	Da	Data Export Converter			
	- 65	Wizzard	Read Dat	a 🔨	Programming	W	ater Lev	el Convert	er	

starts the following window shown in the figure below.

The Water Level Conversion Tool performs two basic operations:

- Calculating water level from pressure raw values based on the water level configuration and the calculation method
- Performing the text file conversion to the specified format. For more information about the default format see <u>Data Export</u>

Water Level Conversion		<u>_                                    </u>
	*****	
Convert	유 Unlock Data Export Converter	
····	Conversion to	
Peference level	Height of water (E)	
	Standard Waterlevel Configuration	
	Installation Length	
<b>\$</b> \$ " \$	Height of weihead above sea level	
Water Surface	Offset	
Ġ	Density	
	998.2 (kg/m^3)	
Sea Level		
	J	
Stable Depart		
Diatus Report		
Open File Press th	e "Open File" button to load an existing measurement file.	

The measurement file can contain information about installation parameters which are necessary for the calculation of water level. Whenever you load a file that does not include a water level configuration, then a warning window will appear.



OK

If required you may calculate water level from raw pressure data. But first you will need to press the "Unlock" button to enable the edit fields and the calculation method box.

The alert message, "Data was retrieved from a device without Water Level Configuration" will appear.

It's important to know that the logger device was not initially programmed with water level parameters.

Data was retrieved from a device witho	ut Water Level Configuration
0 Unlock	

The user now may edit manually "Installation length", "Height above sea level", "Offset" and "Density" and select one of the available calculation methods.

The Logger 5 Software can not verify if the manually set parameters are correct. This is the user's responsibility.

If a measurement file is loaded containing a valid water level configuration, no warning will be displayed. The edit fields display the values from file and the combo box "Conversion to" shows the calculation method. The edit fields and combo box are still disabled. If you wish to modify any value or the conversion method, press the "Unlock" button.

To launch the calculation process to convert pressure to water level, press the button "Convert"

Convert

#### Important facts about the Water Level Converter:

To achieve reasonable results from water level calculation, the influence of barometric pressure has to be eliminated. Please see <u>About Waterlevel and Pressure</u> for detailed explanations and examples.

The Water Level Conversion tool analyzes the pressure channels which can be found in the measurement file. If the pressure difference channel P1-P2 is available, the conversion tool automatically selects the P1-P2 channel.

The figure below illustrates such a situation. P1-P2 channel was found and the checkbox "Perform Calculation based on Pressure Difference" is checked or activated.
Logger 5.1

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Channels   Water Level	: Result Of Calculation   Format			
ailable Pressure Channels In L	oaded File			
Available Pressure Channels				
Pressure1-Pressure2	Perform Calculation based on Pressu	ure Difference		
P1	Perform Calculation based on P1- Me	easurements	Calculation Method	
P2	Perform Calculation based on P2- M	easurements	Use Selected Pressure Channel Only	
hannels Included in Export				
▼ P1-P2 ▼ P1	✓ P2			
☐ T TOB1	TOB2 PulseC CH7 min	🗖 max 🗖 CH10		
formation rate a				
rormation File 1				
File Info				
File Info	Montag, 20, August 2012 10:00:00	Device Identity : Wa 01		
rormation File 1 File Info Record Start Time : Record Stop Time :	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59	Device Identity : Wa_01 Serial Number : 2310		
rormation File 1 ile Info Record Start Time : Record Stop Time : Number of Measurements :	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266	Device Identity : Wa_01 Serial Number : 2310 Comment : im Wa	sser : : :	
rormation File 1 Info Record Start Time : Record Stop Time : Number of Measurements : User Measurements And Comm	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 ment:	Device Identity : Wa_01 Serial Number : 2310 Comment : [im Wa	sser	
Information File I File Info Record Start Time : Record Stop Time : Number of Measurements : User Measurements And Comm	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 hento:	Device Identity : Wa_01 Serial Number : 2310 Comment : Im Wa	sser	
Information File I	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 mento:	Device Identity : Wa_01 Serial Number : 2310 Comment : Im Wa	sser	
Record Start Time : Record Start Time : Record Stop Time : Number of Measurements : User Measurements And Comm	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 mento:	Device Identity : Wa_01 Serial Number : 2310 Comment : Im Wa	sser	×
Record Start Time : Record Start Time : Number of Measurements : User Measurements And Comm	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 rent::	Device Identity : Wa_01 Serial Number : 2310 Comment : im Wa	sser	4
Information File I	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 eent::	Device Identity : Wa_01 Serial Number : 2310 Comment : im Wa	sser	
Record Start Time : Record Start Time : Record Stop Time : Number of Measurements : User Measurements And Comm	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 rent::	Device Identity : Wa_01 Serial Number : 2310 Comment : im Wa	sser	×
Record Start Time : Record Start Time : Record Stop Time : Number of Measurements : User Measurements And Comm	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 ment :	Device Identity : Wa_01 Serial Number : 2310 Comment : Im Wa	sser	×
Information File I	Montag, 20. August 2012 10:00:00 Montag, 20. August 2012 10:37:59 266 Pents: 	Device Identity : Wa_01 Serial Number : 2310 Comment : im Wa	sser	4

This is a meaningful pre-selection because the P1-P2 channel is available for the DCX-22 AA logger device only. You may find further information about the DCX-22 AA in section <u>About Waterlevel and</u> <u>Pressure</u>.

The P1-P2 channel, if available, measures and eliminates the influence of barometric pressure variations to produce correct water level calculation values.

If the P1-P2 channel on the DCX-22 AA is not enabled, but the device recorded the 2 pressure channels P1 and P2, the Conversion tool will automatically preselect the calculation method as "Calculate Pressure Difference".

5	Water Level Conversion					
File	File Channels Water Level : Result Of Calculation Format					
A	Available Pressure Channels In Loaded File					
A	Available Pressure Channels					
	Pressure1-Pressure2	Perform Calculation based on Pressure Difference				
	P1	✓ Perform Calculation based on P1- Measurements	Calculation Method			
	P2	✓ Perform Calculation based on P2- Measurements	C Use Selected Pressure Channel Only			

The other two check boxes "Perform Calculation on P1-Measurements" and "Perform Calculation on P2-Measurements" become then available.



Please note: Overriding this pre-selection can lead to incorrect water level results. The Water Level Conversion tool allows that only one channel "P1" or "P2" is selected and the radio button "Use Selected Pressure Channel only" is activated. If the P1 sensor is absolute, Pressure 1 channel measurements will include variations in barometric pressure.

However, if the P1 sensor is a relative pressure sensor, like the DCX-22 VG, the P1 channel only will provide correct calculated water level values. *VG* in the product name means *vented gauge* where the cable is equipped with an integral vent tube. This tube exposes the backside of relative pressure sensor P1 to barometric pressure and therefore allows for real time compensation for changes in barometric pressure.

Depending on your requirements you may select raw data of each available channel to be included in the resulting text file as well.

1	Channels Includ	ed in Export										
	▼ P1-P2	🔽 P1	✓ P2									
	ΠT	🔽 TOB1	▼ TOB2	🔲 PulseC 🛛 🔲 CH	7 🔲 min	🕅 max	CH10	CH11	CH12	🔲 CH13	CH14	

The figure above shows that all available channels "P1-P2", "P1", "P2", "TOB1" and "TOB2" are selected. These channels will appear in the Excel text file format as following:

	A	В	С	D	E	F	G	Н	1	J
1	Serial Number	2310								
2	Device Identity	Wa_01								
3	Exported from File	C:IDokument	e und Einstellu	ngen\SteinerG\	Anwendungsdaten\LOGGER_5\data\Wa	_01_20_08_2012-10_00_0	0.DX5			
4	Record Start Time	20.08.2012 10:0	00:00							
5										
6					WL .	CH0	CH1	CH2	CH4	CH5
- 7					Height of water above Sea Level (G)	Pressure1-Pressure2	P1	P2	TOB1	TOB2
8					inch	mbar	mbar	mbar	°C	°C
9	No		Date	Time		P1-P2	P1	P2	TOB1	TOB2
10	1		20.08.2012	10:00:00	431.78696	54.1887	1022.7356	968.5669	25.8	25.5
11	2		20.08.2012	10:00:09	431.79307	54.1897	1022.7966	968.6127	25.8	25.5
12	3		20.08.2012	10:00:19	431.79307	54.1744	1022.7966	968.6127	25.8	25.5

All data appears scaled to the selected physical units for length, pressure and temperature.



Please note: The physical units correspond to the settings chosen in the Logger 5 main application menu "Settings" -> "Units"

Units used for Lo	ogger and programming				
<b>a</b>	Please select units used for Logge	r _Progra	Imming		
Units			Conversion		Decimals
Pressure	mbar	1 bar =	1000	mbar	4
Temperature	∘⊂	1°⊂ =	1	°C	3 💌
Length	m	1 m =	1	m	5 💌
Lucer defined Linit.	e				
Oser derined onic	2		Conversion		Decimals
Pressure	mHyraulicOil	1 bar =	11.24		4
Length	fathom	1 m =	0.546807		5 💌
					ОК

You may even use your own definitions for pressure and length. The example above shows a specific pressure unit for "Meter Oil Column" and an old British length unit called "fathom".

#### Working with two files:

The Water Level Converter allows to calculate water level data from pressure raw values derived from two separate devices.

Please see "Example with 2 devices" in section <u>About Waterlevel and Pressure</u>

One absolute logger device (for instance a DCX-22) is used to record barometric pressure and another device to record absolute pressure in the water (hydrostatic pressure of water column plus barometric pressure).

The Water Level Converter will then calculate the pressure difference between the corresponding pressure values.

If a file is loaded which contains one pressure channel only, the following information window becomes visible:

Informa	tion X
(į)	The currently loaded file contains P1 or P2 channel only Do you wish to load another file for Airpressure Compensation ?
	<u>Y</u> es <u>N</u> o

Confirming the dialog with "Yes" will give you the possibility to browse for the second file.



Please note: The Water Level Converter assumes that **first file** contains data from the device located in the **water** and the **second file** represents **barometric pressure**.

If two files were loaded, the Water Level Converter looks as shown in the picture below.

Water Level Conversion		<u> </u>
File Channels   Water Level : Result Of Calculation   Format		
Available Channels In Loaded Files		
File 1	File 2	
Pressure1-Pressure2	Pressure1-Pressure2	Convert
₩ P1	▼ P1	$= \Delta \mathbf{P}$
<b>□</b> P2	₽2	
Channels Included in Export		
P1-P2 P1 P2	P1-P2 P1 P2	
Т Т ТОВ1 ТОВ2	Т Т ТОВ1 ТОВ2	
Information File 1 Information File 2		
Record Start Time : Dienstag, 30. August 2011 11:00:00	Device Identity : Water-Pressure	
Record Stop Time : Dienstag, 30. August 2011 11:38:30	Serial Number : 55755	
Number of Measurements : 78	Comment :	
User Measurements And Comment :		
		<u> </u>
Status Report		
C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data\Water-Pr	essure_30,08,2011_11,00,00_00.DX5	A
C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data\Air-Press	ure_30,08,2011_11,00,00_00.DX5	
0K Successfully loaded - C/Dokumente und Einstellungen/Steiner/C/0nu	vendungsdeten)  OCCED_5)dete) für Dressure_30_08_2011_11_00_00_00_	<u></u>
Sk jourcessi airy loaded - Cripokanience and Einsteliangen preihera (Anv	<pre>voidangsdaton(co/aact_staata/mi=/1655016_50,00/2011_11,00,00_00</pre>	14

The Water Level Converter selects the P1 channel from each file. In the example all available raw data channels are selected as well.

The resulting Excel export will look as shown in the figure below.

	1			WL	CH1	CH4				CH1	CH4
				Height of water (E)	P1	TOB1				P1	TOB1
				m	mbar	°C				mbar	°C
No		Date	Time	Height of water (E)	P1	TOB1	No	Date	Time	P1	TOB1
	1	30.08.2011	11:00:00	0.66048	1029.2358	21.891	1	30.08.2011	11:00:00	13.9901	24.3
	2	30.08.2011	11:00:30	0.65892	1029.2358	21.85	2	30.08.2011	11:00:30	13.9924	23.2
:	3	30.08.2011	11:01:00	0.6583	1029.2358	21.85	3	30.08.2011	11:01:00	13.9932	22.1
	4	30.08.2011	11:01:30	0.65721	1029.2358	21.823	4	30.08.2011	11:01:30	13.9948	21.1
	5	30.08.2011	11:02:00	0.65799	1029.2969	21.823	5	30.08.2011	11:02:00	13.9946	20
	3	30.08.2011	11:02:30	0.65565	1029.2358	21.821	6	30.08.2011	11:02:30	13.997	19.1

Working with two files requires that pressure values or their timestamps match. The Water Level Converter checks if the two time series correlate with each other.

Whenever you try to load two files which do not share a common time interval, then the Water Level Converter will complain and calculation of water level will be refused.

In such case you can use the button "Load different Pressure Data for File 2" to select an appropriate measuring file which matches to the observation period of file 1.

ailable Channels In Loaded Files		
The Calculation is NOT POSSIBLE . The two Files do not match in time ! There is no common time axis		
	Load Different Pressure Data for File 2	
File 1 File 2		
Time		

File 1 File 2 Time	<u>Case A</u> Time series found in file 1 ends before time series of file 2 starts.
File 2 Time	<u>Case B</u> Time series found in file 1 starts when time series of file 2 already ended.

The water level conversion can be carried out when the two files overlap each other on the common time axis.



#### Files contain data with different monitoring speed:

It is possible that the two time series from file 1 and file 2 have been recorded with different monitoring speeds or logging intervals.

For instance, device 1 was running with a fixed interval of 1 hour whereas device 2 was running twice as fast with a fixed interval of 30 minutes.



## 1.6.3 Calculating Flow

Typical applications in the field of hydrometry are flow measurements through V-notch weirs or overfall weirs.

The Logger 5 Software includes functionalities to calculate flow rate.

Flow can be calculated if height of water at a measuring location behind the weir and the geometry of weir is known.



The Combo Box "Conversion to" on the top of the tab sheet "Programming" -> "Water Level Configuration" allows selection of "Flow / Calculation of Overfall". The design of the GUI changes and edit fields for "Form Factor" and "Form Width" become visible.

These two parameters describe the geometrical and hydraulic properties of the weir. The Combo Box "Form Factor" gives a choice of typical factors describing the shape of the top edge of the overfall weir or overflow spillway.

Cogger 5.0	
File Read Data Programming Graph Data stored Tools GSM2 Settings Support Help	
🗼 Wizzard 🙀 Read Data 🔆 Programming 🚀 Chart Viewer	
📖 Device Identity 🛛 😔 Simple Logging 🛛 🗠 Event Controlled Logging 📃 Water Level Configuration	
Reference Level	Write configuration
Flow / Calculation of Overfall Form Factor Schema	
Water Surface         0.87           Form Width (b)         0           Offset         0           0.00000         m	
Sea Level Density 998.200 (kg/m^3) Explanation	
Event Channel Value 1 mbar Value 2	mbar Value 3 mbar
on @ value1 / on @ value2 ▼ [P1-P2 ▼ [Su.uuu0 20.uu00	55,0000
Current I Device     Identity     device detected     Activate       Class 5 Group 5 Year.Week 3.43 SN :2310     Wa_01     22.08.2012 15:04:35     Activate	
O DeviceAddr:250 Record active	22.08.2012 15:11:21

The programming of the logger device for such applications is presumably combined with event controlled monitoring. See also <u>Programming Event Controlled Logging</u>

"Flow / Calculation of Overfall" offers 3 values in combination with a device channel. In the example above, pressure difference P1-P2 channel is selected. The logger device will record with fixed logging interval if pressure difference drops below 20 mbar (value 2). As the pressure difference exceeds 50 mbar (value 1), the logger device will collect data according to the "interval after event". The "interval after event" should be smaller than the "fixed intervall", so that the logger device will record the interesting phase with a higher resolution.

Value 3 is a threshold value used to trigger effective flow calculation. Measuring values greater or equal than value 3 will be subject to flow calculation.

The idea behind is that the logger device collects data with a higher logging rate when water starts to flow over the weir and calculation can be carried out when flow over the weir has reached stable conditions. The approximation formulas according to Poleni and Thomson require appropriate or minimum flow rate at stable hydraulic conditions to ensure accurate flow calculations.

Monitored channel gives measurements below Value 2. The logger device records data with fixed time interval.
Water level has increased and channel values exceed the threshold value 2. The event condition has become true and logger device records data with "interval after event". Precise flow calculation is not yet possible, as not enough water has flowed over the overfall weir.
Measuring values exceed value 3 and flow over the weir has reached a certain minimum rate such that flow calculation yields correct and reasonable results. The logger device records data still with monitoring speed corresponding to "interval after event". Value 3 has no influence on the monitoring regime of the device. Value 3 is a threshold value to decide if a measuring value should be taken

Inspecting recorded data in the Viewer

The figure below shows an example of calculated water levels in the Viewer chart. The coloring of the markers corresponds with threshold values value1...value3.

	Standard logging regime with fixed time interval.
-	Logger device recorded in event controlled logging regime.
-	Water level exceeds threshold value for flow calculation.

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You must select "View" -> "View Calculated Water level" in the main menu before you can see a similar presentation. The series marker size should not be to small and in the Graph Properties menu, static coloring should be disabled.

The flow calculation window can be activated as follows:

If an appropriate file has been loaded, the record -overview tool (see  $\underline{\text{Viewer Part 2}}$ ) displays an item from the list of loaded files as shown in the figure below.



Press the tool button with the overfall icon *to open the flow calculation window*.



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There are three different calculation methods available:

$Q = \frac{2}{3} * \mu * \sqrt{2g} * b * h^{\frac{3}{2}}$	<ul> <li>Poleni</li> <li>For overfall weirs or spillways the approximation formula according to Poleni is required to calculate flow.</li> <li>Q = Flow Rate [m<sup>3</sup>/s]</li> <li>μ_ = dimensionless overfall factor</li> <li>g = gravity [m/s<sup>2</sup>]</li> <li>b = Form width / width of the weir [m]</li> <li>h = height of water above the top edge or head of the weir. The zero point of this height is situated exactely on the overfall beginning point.</li> </ul>
$Q = \frac{8}{15} * \mu * \tan(\frac{\Theta}{2}) * \sqrt{2g} * h^{\frac{5}{2}}$	<ul> <li><u>Thomson</u></li> <li>[1] <u>List of References</u></li> <li>One more special weir shape is the V-Notch weir, also called Thomson weir or Gourley weir. This weir features a weir plate standing vertical to the flow direction with a sharpedged triangular cutout.</li> <li>The backwater level in front of the weir is directly proportional to the flow volume.</li> <li>Θ = Angle of the triangular cutout. The angle is in the range 3090°</li> </ul>



Press on the "Calculation" button to execute the calculation of flow rate and total volume according to the activated calculation method.



You will receive a preview of a report which can be stored as a PDF-File for the Acrobat Reader.

# **Overflow Calculation (Poleni)**

Date Time	:	Friday, 24. August 2012 14:28:34			
Device Identity	:	Wa_01			
Type Device Version Device Serial Number	:	5.5 3.43 2310			
Comment					
located in water					
Configuration of Datalogger					
Density	:	999.7000 kg/m^3			
Trigger ON	:	39.2130 mbar = 0.4000 [m] =			
Trigger OFF	:	29.4098 mbar = 0.3000 [m] =			
Trigger Calculation 0.45000 [m]	:	44.1147 mbar = 0.4500 [m] =			
Acceleration of gravity	:	9.80620 m/s^2			
Calculation parameters					
Form Factor Form Width (b)	:	0.8700 20.0000			
Formula	:				
Summary					
#No. Start End Duration (d:h:m:s) Flow [m^3/s] Volume[m^3]					
- 1 05.01.2012 09:41:07 05.0 2 05.01.2012 09:43:00 05.0 3 05.01.2012 10:03:46 05.0 4 05.01.2012 10:28:08 05.0	1.2012 09:42:500 / 00:01:421.2012 09:43:230 / 00:00:221.2012 10:04:390 / 00:00:531.2012 10:28:410 / 00:00:33	ø 1.2331 128.2377 ø 1.0221 24.5042 ø 1.1159 60.1937 ø 1.4185 46.3857			
-					

Total = 259.3212 [m^3]

Each period where water level exceeded the threshold value 3 <sup>–</sup> for the calculation creates a line in the summary at the bottom of the report.

This line outputs Start/End Date and Time of flow period, duration, average flow, and the total volume.

The Logger 5 Software provides you also table views where all calculation results for the flow can be examined in detail.

🏅 Pol	eni / Thomson / Venturi 2310_:	1_2012_01_05_09_30_0	00 C:\Dokumente und Einstellungen\9	iteinerG\Anwendungsdat	ten\LOGGER_5\data\ 💶 🗙
Calcula	ation Method Report Table				
					Сору
#No.	Date	Time	Height of water (E)[m]	Flow [m^3/s]	×
57	05.01.2012	09:41:05	0.42613		
58	05.01.2012	09:41:06	0.42551		
59	05.01.2012	09:41:07	0.42841		
60	05.01.2012	09:41:08	0.45184	0.0041	
61	05.01.2012	09:41:09	0.48295	0.3073	
62	05.01.2012	09:41:10	0.47538	0.2078	
63	05.01.2012	09:41:11	0.47455	0.1976	
		09:41:12	0.47476	0.2002	
		09:41:13	0.47518	0.2053	
			0.47560	0.2104	

_	
_	

Lines with "---" for the flow rate indicate that the water level was below the threshold value 3

at that time.

## 1.7 Database

## 1.7.1 Organizing Data

The Logger 5 Software maintains a simple sqLite - database helping you to organize your measurement files and information about the logger device.

See also Wizard Search Data

The database helps you:

- To search for data files stored on any mass storage device accessible from your computer.
- To find and inspect a distinct measurement in the Viewer
- To retrieve information about file size and storage location
- To store additional information about the installation site of the logger device and maintain a history of you own notes

•	Search Data		<b>6</b> 6 -	Scan Harddisc					(
	Serialnumbers	No#	Туре 🔺	Identity	▲ Start Time	Record Size%	<ul> <li>Active Channels</li> </ul>	Available Channels	<b>^</b>
	0	 0	DCX22AA	Wa_01	19.08.2012 05:47:27	100.0 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	112233	1	DCX22AA	Water_Pressure	19.05.2011 19:53:05	100.0 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	11872	2	DCX22AA	Wa_01	30.07.2012 19:06:00	100.0 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	1325	3	DCX22AA	Wa_01	19.08.2012 05:47:27	100.0 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
Þ	2310	4	DCX22AA	Water_Pressure	16.05.2011 17:17:20	88.5 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
1	24020909	5	DCX22AA	Water_Pressure	25.06.2011 08:44:00	74.2 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	2918	6	DCX22AA	06008009-7CAN-SAUZAL	22.08.2012 17:45:00	67.3 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	29572	7	DCX22AA	06008009-7CAN-SAUZAL	22.08.2012 17:45:00	67.3 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	3643	8	DCX22AA	Wa_01	06.08.2012 10:04:00	32.2 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	3645	9	DCX22AA	Wa_01	06.08.2012 10:04:00	32.2 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	
	3646	10	DCX22AA	Wa_01	13.08.2012 09:05:58	19.4 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	
		_							

The grid on the left side displays the serial numbers of the logger devices. You may select a serial number to receive a table of all data files corresponding to the selected serial number.

The table consists of the following columns:

No#	The table rows receive a consecutive numbering				
Туре	The device type - for instance DCX-22 AA, DCX-22, LEO RECORD, GSM-2 Logger				
Identity The customizable device identity assigned to the logger device when programming is done					
Start Time	Start date and time when recording period started				
Record Size	The Record size in % of the total available memory of the logger device				
Active Channels	The recorded or active channels				
Available	The available channels for the device type				
Channels					
Filename	The name of the data file				
Path	The path where data file is stored				

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File Age	The timestamp of the data file when it was created
File Size	The filesize in kB
File Conversion	A marker storing if a data originating from the logger device was subject to text
	conversion. The marker stores which text file format was used.

Clicking into one of the header cells, the table rows will be sorted into ascending or descending order, as indicated by the triangle.

Click in the header again to change from/to ascending or descending order.

The main menu command "Data / Site Info" -> "Database" opens the following window:

<mark>∑ Data</mark> Eile Da	a <b>C:\Dokumente u</b> ata w Data  🚷 Edit D.	ind Ein	stellu	ngen\Stein	erG\Anwendungsdaten\Li	OGGER_5\SQLite -> logg	er5_neu.db3			
		T	N	Turne	Tal-140.	Chank Time		Antius Channels	Ausiable Channels	▲ Ciana una
	Senainumbers	1-1	140#	туре –		- start fille	- Record Size % -	Active channels	- Available Charmers	
	0		0	DCX22AA	06008009-7CAN-SAUZAL	22.08.2012 17:45:00	67.3 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	06008009-7CAN-SAUZAL_
	112233		1	DCX22AA	Wa_01	10.08.2012 07:49:00	2.1 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	11872		2	DCX22AA	Wa_01	10.08.2012 07:49:00	2.1 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	1325		3	DCX22AA	Wa_01	10.08.2012 11:09:00	0.1 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	2310		4	DCX22AA	Wa_01	10.08.2012 11:18:00	0.0 %	P1-P2 P1 P2 TOB1 TOB2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	24020909		5	DCX22AA	Wa_01	10.08.2012 11:20:00	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	2918		6	DCX22AA	Wa_01	10.08.2012 11:26:00	1.6 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	29572		7	DCX22AA	Wa_01	10.08.2012 13:58:51	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	3643		8	DCX22AA	Wa_01	10.08.2012 15:46:02	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	3645		9	DCX22AA	Wa_01	10.08.2012 15:53:33	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	3646		10	DCX22AA	Wa_01	13.08.2012 08:16:20	0.0 %	P1-P2 P1 P2 TOB1	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	3647		11	DCX22AA	Wa_01	13.08.2012 08:20:16	0.0 %	P1-P2 P1 P2 TOB1	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	4057		12	DCX22AA	Wa_01	13.08.2012 08:23:00	0.3 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	4131		13	DCX22AA	Wa_01	13.08.2012 08:38:14	0.1 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	4132		14	DCX22AA	Wa_01	13.08.2012 08:46:42	0.3 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	4133	•	•	1						

Select one of the serial numbers in the list on the left to retrieve information about data files from the selected serial number.



Press the button wit the eye icon to open a floating panel showing all columns belonging to the currently selected row in the table.

	100.4 111		17.1.20	IPT-PZIPTIPZTUBI	
ł	Serialnumbers	Туре		3 <	F
:	2310	DCX22AA		•	l,
1	Identity				ľ
1	06008009-7CAN-SAUZAL		67%		T
:	Start Time				T
÷	22.08.2012	17:45:00			T
÷	Filename				T
-	06008009-7CAN-SAUZAL_2	2_08_2012-17_45_00.DX5			T
÷	Path			1	T
÷	C:\Dokumente und Einstellur	ngen\SteinerG\Anwendungsd	aten\LOGGER_5\data	· · · · · · · · · · · · · · · · · · ·	ŀ
÷	File Size File Age		File Conversion		ŀ
:	684 23.08.201	2 12:13:24		•	ł
÷			🝠 Show C	hart in Viewer 🙎	ł
					ľ
	Wa UI	13.00.2012 00:40:42	0.3 %	PI-PZ[PI]PZ[10D1	

Left click on the panel to move the floating window for easier viewing of the table beneath.

1	Starts the Windows Explorer and navigates directly to the directory visible in the field "Path"
2	Starts the Viewer and loads the data file into the chart
3	Hides the floating panel

The menu command "Scan Hard disc" starts a recursive file search in any start directory and all subdirectories.

5 D	ata C:\	Dokument	e und Ein	stellu	
<u>F</u> ile	Data				
$\bigcirc$	💕 So	an Hard <mark>d</mark> isc	e		
-		h2			
	Ser	rialnumbers	<b>^</b>	No#	Туре

The "Edit Data" tab sheet gives the possibility to delete single entries belonging to a selected serial number, or to remove a serial number and all assigned data file entries.

<mark>75</mark> Dal Eile [	Data C\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\SQLite -> logger5_neu.db3       Image: Comparison of the second seco									
ĸ										
	Serialnumbers	-	No#	Туре 🔺	Identity	▲ Start Time ▲	Record Size%	Active Channels	Available Channels	Filename 🔺
	0		0	DCX22AA	06008009-7CAN-SAUZAL	22.08.2012 17:45:00	67.3 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	06008009-7CAN-SAUZAL_2
	112233		1	DCX22AA	Wa_01	10.08.2012 07:49:00	2.1 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	11872		2	DCX22AA	Wa_01	10.08.2012 07:49:00	2.1 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	1325		3	DCX22AA	Wa_01	10.08.2012 11:09:00	0.1 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	2310		4	DCX22AA	Wa_01	10.08.2012 11:18:00	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	24020909		5	DCX22AA	Wa_01	10.08.2012 11:20:00	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	2918		6	DCX22AA	Wa_01	10.08.2012 11:26:00	1.6 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	29572		7	DCX22AA	Wa_01	10.08.2012 13:58:51	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	3643		8	DCX22AA	Wa_01	10.08.2012 15:46:02	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	3645		9	DCX22AA	Wa_01	10.08.2012 15:53:33	0.0 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_10_08_20
	3646		10	DCX22AA	Wa_01	13.08.2012 08:16:20	0.0 %	P1-P2 P1 P2 TOB1	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	3647		11	DCX22AA	Wa_01	13.08.2012 08:20:16	0.0 %	P1-P2 P1 P2 TOB1	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	4057		12	DCX22AA	Wa_01	13.08.2012 08:23:00	0.3 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	4131		13	DCX22AA	Wa_01	13.08.2012 08:38:14	0.2 %	P1-P2 P1 P2 T0B1 T0B2	P1-P2 P1 P2 TOB1 TOB2	GW-TGA-DAH-3_13_08_20
	4132	•	14 ◀	DCX22AA	Wa Ol	13.08.2012 08:46:42	0.3 %	P1-P2IP1IP2IT0B1IT0B2	P1-P2IP1IP2ITOB1ITOB2	GW-TGA-DAH-3 13 08 20

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- 1 The left navigation button block is connected with the list of serial numbers.
- 2 The right navigation button block is connected with the table of data files.

## Navigation in the Database



## 1.7.2 Site Info

Select the main menu command "Site Info" to open the information window.



#### Site Info

The site info window displays information assigned to a device serial number. Selecting one of the available serial numbers on the right, the Logger 5 Software queries the database to retrieve the corresponding information.



The "Site Info" maintains additional information concerning the measuring station where the logger device is located in the field.

You may assign an individual name to the location and, if desired, the coordinates and altitude. For each serial number one or more pictures can be organized in an image list. You will find the image list on the bottom of the picture area. Select one of the small images from the list to load it into the picture area.



Please note: The pictures are not stored in the database itself. The database just remembers where a picture file is located on the hard disc of your PC.

Moving a file on hard disc to another storage location will hide the corresponding picture from the image list.



Please note: Before you close the "Site-Info" Window or you switch to another serial number you need to confirm any change with the "Save-Button" !



Click on the "Google Maps" link and the Logger 5 Software starts your default internet browser with Google Maps and performs a query with the given coordinates.

You can use the button with the globe icon as well \_\_\_\_\_ and the Logger 5 Software will show the location on the map in the internal window.

Site Info	Connection History Google Maps	
		Back
	EGO E Eggwald	Karte Satellit
	5 Wiesendange	en
2 + 21 =	DCX22-AA Keller Latitude: 47.498094444444 Longitude 8.7477999999999983	id Call
Oberteidstrasse Wartse	at Zoom Level: 13	Elsau
Brüelwald Stillosstalstro	52 55 75 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	G. Gallerstrasse
	Constantings	G
	15 P Höhwald	
Steigholz		
Wingertenholz	Widpark Brudenaus	
	Schicklerholz	AN
Coogle	70 52 antendation 620112 GanBasis DE/BKG (62009) Google	egstrasse Te

The comment field allows to store a comment about the measuring location.

🌃 Site Info			
Site Info Notes	Settings for Data Export Connection	n History   Google Maps	
Site Name	DCX22-AA Keller		🔡 Save
Format	Degree	Device SN :2310 registered in Database on : Donnerstag, 23. August 2012 14:57:04 Identiv: -6060009-7CAN-SAI [72]	<u>_</u>
Latitude	047° 29' 53.140000" N		
Longitude	008° 44' 52.080000" E		
altitude	453		
	Google Maps	T	

The comment field is automatically filled in "Device Serial Number", " Date and Time" and "Identity" stored in the device memory when the data file was registered in the database. This automatic completion of the comment field takes place when:

- a mass storage device is being scanned and the corresponding serial number was found the first time (see also: <u>Organizing Data</u>)
- a data record was read from logger device for the first time and the corresponding serial number does not yet exists in the database the Logger 5 Software automatically generates a new entry for the serial number.

Notes:

🏅 Site Inf	Site Info						
Site Info	Notes Settings for Data Expor	t 🗍 Connection History	Google Maps				
* * * * * +			*				
#No	Date	Time	Air-Temperature = 16 ℃				
0	Montag, 27. August 2012	08:27:19	Barometer = 975 mbar				
1	Montag, 27. August 2012	14:45:50					

K	Jump to the first row in the chronology of notes
<	Navigate to the previous note
>	Navigate to the next note
≥	Jump to the last row in the chronology of notes
-	Delete the currently selected note
+	Add a new line to the chronology of notes

### Sub-editing existing notes:

Two further navigation buttons are located on the top of the text field. If an already existing note becomes changed the buttons look as shown in the figure below.



This is the "Confirm" button in inactive state, indicating that no changes have been made to the selected note.

As changes are made, the "Confirm" button becomes active. Click the "confirm" button to save changes.

The "Cancel" button dismisses the changes made to the note. The original content will return to the text edit field.

#### Settings for Data Export:

The Logger 5 Software supports some text export formats which include information that is not part of the set of parameters stored in the Keller logger devices.

These formats are:

- XML for Delft FEWS
- WISKI by Kisters
- and the proprietary format for TNO in Holland

Please see also <u>Data Export</u> for more information about the supported text file data export formats.

Because these additional parameters are not stored in the logger device, the Logger 5 Software can store the parameters in the database, assigned to the respective serial numbers. Whenever a text export to one of these formats takes place, the Logger 5 Software looks for the additional parameters.

Here is an example for the XML Delft FEWS format:

🏅 Site Info		
Site Info Notes Settings	for Data Export Connection History Google Maps	
XML Delft FEWS		
<longname></longname>	Spillway fresh water upper lake	🔚 Save
<stationname></stationname>	Valve A3	
<sourceorganisation></sourceorganisation>	Keller	
<sourcesystem></sourcesystem>	DCX22-AA	
<region></region>	Kanton Zürich	
WISKI		
#sname		📮 Save
#swater		
TNO		
	🗖 Include Header	
	Treshold Value :	📙 Save
	0 m	
	Write "dry" when Water Level +/- Treshold Value	

The Text Converter Tool loads the appropriate set of additional parameters, if a raw data file (\*.DX5 file extension) from a device, previously registered in the database, is loaded.

📅 Universal Text Converter					
Help					
General Output File File Info					
Format  Supported File-Formats  Supported File-Format	Covert       Codec         Convert       CuTF-8         Close       CuTF-8         UTF-16LE       UTF-16LE         C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data\06008009-7CA         Excel       CSV1         CSV1       CSV2         YML Delft FEWS       HYDRAS         YmssVal>       -999 <longname>       Spillway fresh water upper lake         <sourceorganisation>       Keller         <sourcesystem>       DCX22-AA         <region>       Kanton Zürich         Export Directory       C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data_ex         C:\Dokumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data_ex</region></sourcesystem></sourceorganisation></longname>				
<u> </u>					
Status Report          XML> <stationname>Valve A3<stationname>         XML&gt; <sourceorganisation>Keller<sourceorganisation>         XML&gt; <sourcesystem>DCX22-AA<sourcesystem>         XML&gt; <region>Kanton Zürich<region></region></region></sourcesystem></sourcesystem></sourceorganisation></sourceorganisation></stationname></stationname>					
OK Successfully loaded : C:\E	)okumente und Einstellungen\SteinerG\Anwendungsdaten\LOGGER_5\data\06008009-7CAN-: //				

For more information about the Text Converter Tool, see section Data Export

#### Connection History:

Reading a record from a logger device the Logger 5 Software stores date, time and the battery capacity in the database.

Over time, this can be helpful for planning device maintenance, including battery replacement.

5 Site Info		_ <b>_ _</b> ×
Site Info Notes Settings fo	r Data Export Connection H	listory Google Maps
Battery Status : Reading Rec	ord from Device	
Dienstag, 28. August 2012 Dienstag, 28. August 2012 Dienstag, 28. August 2012	07:55:25 : 95 % 08:04:43 : 95 % 08:05:59 : 95 %	
		<b>_</b>
8	Battery	8
100 80 % 60 ## 40 20 0		
28.08.2012 07:55:00	28.08.2012 08:00:00	28.08.2012 08:05:00

## 1.8 Logger Device

## 1.8.1 Device Calibration

The pressure channels of the KELLER logger devices can be calibrated.

**CAUTION:** Incorrect calibration of the pressure channels will result in faulty pressure readings !

From the main menu command, select "Programming" -> "Programming Options" -> "Device Calibration" .



Before the device calibration window opens, a warning message appears:

Warning	×
⚠	Please Note ! Incorrect Device Calibration may result in erroneus measurements!
	Cancel

Confirm with "OK" only if you are sure to proceed with the calibration. The following window will then be displayed:

Device Calibration					
Pressure P1					
Current Value New Value	1019.1882 0	mbar			
Adjust		Set Factory Zero			
Pressure 2					
Current Value New Value	965.6447	mbar mbar			
Adjust	]	Set Factory Zero			
Pressure P1 And Press	ure 2				
New Value	0	mbar			
Adjust	]				
Measure		⊆lose			

"Current Value"	"Current Value" displays the actual pressure reading. The physical unit may be different, depending on the selected pressure unit. The number of digits is depends on the settings for the physical unit as well.
"New Value"	"New Value" is an edit field where you can type in the desired pressure value for channel P1 and/or P2.
Adjust	Press the "Adjust" button to write the "New Value" to the logger device.
Set Factory Zero	Press "Set Factory Zero" to restore the initial device adjustment (factory setting).
Measure	Press the "Measure" button to update the pressure readings and to retrieve the current values from the device.
	For the DCX-22 AA device type you may adjust both pressure channels simultaneously. The "New Value" will be written to both channels.
Pressure1 and Pressure 2	This should only be done if sensor 1 and sensor 2 are exposed to identical pressure, i.e. barometric pressure. Do not assign a new value to both channels when sensor 1 is still plunged in the water !
	Please verify that the housings of the two pressure sensors have the same orientation - upright position or the orientation how the housings will be mounted during the period of observation.

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## 1.8.2 Calibration of the Conductivity Sensor

There exists a separate tab sheet covering all the necessary functions to calibrate and adjust the conductivity sensor.

The tab sheet is divided up into two sections. On the left side you will find four functions and the right side lists all parameters describing the conductivity sensor.

🖐 Logger 5.1							
File Read Data Programming Graph Data / Site Info Tools GS	ile Read Data Programming Graph Data/SiteInfo Tools GSM-2 Settings Support Help						
🛦 Wizzard 📑 Read Data 🔀 Programming 😿 Chart Viewer							
📖 Device Identity 🔗 Simple Logging 📸 Conductivity Sensor S	Settings						
Curr	rent Device Settings						
12 Set Measuring Range Conductivity	Measuring Range A	Range 4 -> 0200000 uS/cm (200 mS	/cm) 18.0/1.4				
	Temperature Coefficient Media B	2.2500 %/K	E				
Set Temperature Coefficent Media 2	Cell-Constant C	1.000 1/cm					
Calibration Conductivity Sensor 3	onductivity Sensor Corrections Factors						
Factory Reset 4	Range 1 :	1.000					
RESET	Range 2 :	1.000					
	Range 3 :	1.000					
	Range 4 :	1.000					
COM Port Device Identity device detected Activate							
Class 5 Group 10 Year.Week 13.43 SN :4174	Test_Device	04.03.2014 09:58:04 Activate					
DeviceAddr:250 Record stopped 04.03.2014.10:46:56							

## **Functions**

<sup>1</sup> "Set Measuring Range" allows to choose and activate one of the four available measuring ranges of the conductivity sensor

The liquid media has specific material properties. Depending on the composition of disolved salts, or in other words depending on the chemistry, the conductivity of a liquid depends on temperature

<sup>2</sup> influences. The "Set Temperature Coefficient Media" function offers the possibility to adjust the conductivity sensor to the specific temperature dependence of the liquid media.

This function leads you step by step through the process of calibration. Calibrating the

- 3 conductivity sensor can be carried out for a selected measuring range or globally for all measuring ranges by adjusting the cell constant.
- 4 The "Factory Reset" function initializes the sensor settings to their default values.

#### Parameters describing the conductivity sensor

Α	The selected and active measuring range.
В	The temperature coefficient of the liquid media. Default value is 2.25%/K
С	The cell-constant of the conductivity sensor. The default value is 1.0.
D	The gain or correction factors for each measuring range. The default values are 1.0.

**E** The version number of the conductivity sensors firmware.



Press this button to change the measuring range of the conductivity sensor. The description can be found in the section : <u>Programming Logger Device with Conductivity Sensor</u>



Press this button if you need to adjust the temperature coefficient of the liquid media. If the device is active and a record is running, then it is necessary that the active record will be stopped.

A message dialog will be shown in order to proceed or cancel the action.

Warning	×
1	Please Note ! Logging will be disabled. Active Record will be stopped
	OK Cancel

Confirming the warning with "OK" will stop the active record and a dialog window will be shown.

🖐 Temperature Coefficient Media		×
Temperature Coefficient Media 2.2500 ( 0 20 %/K )	%/K	
Cancel		ок

Proceed with the button "OK" to confirm new value for the temperature coefficient. Pressing "Cancel" will not store the value.

Anyway you will need to check the programmed logging regime and to start a new record.



Press this button if calibration of the conductivity sensor is required. If you are not sure and familiar with such calibration, then it's better to leave the conductivity sensor operate with factory settings.

For correct and accurate calibration of a conductivity sensor you will need a test reference solution with a well known conductivity and temperature coefficient.

The test reference solution has a well defined conductivity at 25°C and 20°C respectively.



Make sure that all equipment (glasses, containers, spoons, stirring rods, thermometers etc.) is very clean!

Any contamination of the reference solution with dirt, salt or even tap water may lead to wrong calibration.

The housing and the conductivity sensor of the data logger needs to be cleaned as well. Normal tap water is not an appropriate cleaning liquid, because tap water contains also soluted substances and gases which have an influence on the conductivity. You will need distilled water.

Please note: The sensor housing and the conductivity sensor needs to be dry before you insert the sensor into a reference test solution (residual distilled water on the data logger could influence the reference solution).

You will need an accurate thermometer to determine the temperature of the reference solution. You will need to calculate the conductivity of thereference solution by taking the correct temperature into consideration. Another possibility is to carry out calibration in an air-conditioned well known environment (preferably a laboratory) where clean working space can be expected.

Calibration of the conductivity sensor is an operation which should preferably not be done out in the field.

Warning	×
1	Please Note ! Logging will be disabled. Active Record will be stopped
	OK Cancel

The logging needs to be stopped if an active record is running.

If you wish to proceed, press "OK" and the following dialog will be displayed:

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Calibrating Cel	-Constant or a selected Measuring Range	
	Calibrate Sensor for a selected Measuring Range	
Z	🔘 Calibrate Cell-Constant	
Cancel		ок

Two different options are offered for the desired calibration method.

The first item "Calibrate Sensor for a selected Measuring Range" allows to perform calibration of the sensor for a selected measuring range. The second item "Calibrate Cell-Constant" leads you to a calibration procedure adjusting the cell constant.

Selecting the first calibration method of calibrating the sensor for a distinct measuring range and proceeding with the "OK" button , then the following information window will become visible:

LOGGER_5
Cell-Constant has successfully been initialized with 1.0
OK

The Cell-Constant has been initialized to a value of 1.0.

It does not make sense to continue with calibration of a measuring range if the device still operates with a cell constant different from 1.0.

Now you may select the appropriate measuring range:

<mark>芳</mark> Select Measuri	ng Range			×
Please select the	measuring range t	o be calibrated		
Measuring Ran	<u>ge of the Condu</u>	ctivity Sensor		
C Range 1		0200 uS/cm	(0.2 mS/cm)	
C Range 2		02000 uS/cm	(2 mS/cm)	
C Range 3		020000 uS/cm	(20 mS/cm)	
Range 4		0200000 uS/cm	(200 mS/cm)	
Cancel			Next	

The following window shows the importance that the the conductivity sensor needs to be fully covered with the reference test solution.

<b>5</b> Information		×
	Please submerse the conductivity sensor completely into the reference solution for the calibration of the sensor.	
€ E	It's highly important that the whole area of the sensor is fully covered with the liquid reference solution !	
	If this rule for the calibration of the sensor is not strictly followed wrong measuring results may result.	
Cancel	Next	

Press the button "Next" to proceed.

Now you need to specify the correct parameters of the reference test solution.

Calibration of Conductivity Temperature Compens	ated @ 25°
Temperature coefficient of calibration solution	
2.1000	%/K
(020%/K)	
Conductivity of the reference solution @ 25°C	
50	mS/cm
selected range (0200.0 ms/cm )	
	1
Cancel	Next

These two parameters are:

- Temperature coefficient of test solution
- Conductivity at 25°C

In the case a value is given, which does not match to the currently selected measuring range, a yellow warning will pop-up and the "Next" button will be disabled.

Calibration of Co	onductivity Temperture Compensa	ited @ 25°
-Temperature Coe	efficient of Calibration Solution	
	2.5000	%/K
	(020%/K)	
-Conductivity of R	eference Solution @25°C	
	500	mS/cm
	selected range (0200.0 ms/cm )	
	The value does not match with selected 500,000 > 200 ms/cml	d measuring range !
Cancel		

Press the button "Next" to proceed.

The software will carry out 10 measurements. The application will retrieve the temperature and the raw value measured by the conductivity sensor every two seconds.

For each pair of sample values the software calculates the conductivity at measured temperature with respect to the given temperature coefficient and a value for the gain required to achieve the target conductivity.

Press the "Run Test" button located in the top left corner to start the test measuring procedure.

Conductivity	of reference solution @ 25°	Temperature coeffic	tient of calibration solut	tion		
50.0 ms/cm 2.500 %/K						
R	tun Test					
Measured Va	lues		Calculated V	alues		
Measure	Temperature	Conductivity raw value ms/cm	Measure	Calculated Conductivity ms/cm	Calculated Gain	
#1			#1			
#2			#2			
#3			#3			
#4			#4			
#5			#5			
#6			#6			
#7			#7			
#8			#8			
#9			#9			
#10			#10			
						Þ
			Average	Calculated Conductivity	Calculated Gain	
			55.02521		0.90867	
Can	ncel					Accept

After approx. 20 seconds the window looks similar to the example shown in figure below:

uring Con	ductivity for Calibration					
Conductivity of reference solution @ 25° Temperature coefficient			of calibration solu	tion		
50.0 ms/cm		2.500 %/K	2.500 %/K			
Run Test						
	la hua a		Caladabadu	tel vez		
Measureu	Temperature	Conductivity raw value ms/cm	Calculated Values		frm Calculated Cain	
an a	25.27		an a	EE 029140E7		
#1	25.37	55.54043140	#1	55.02014957	0.90002300	
#2	25.37	55.54843140	#2	55.03700436	0.90847968	
#3	25.37	55.52556610	#3	55.00549844	0.90900003	
#4	25.37	55.53128052	#4	55.02001139	0.90876026	
#5	25.37	55.54843140	#5	55.02814957	0.90862586	
#6	25.37	55.54270172	#6	55.03132744	0.90857339	
#7	25.37	55.53128052	#7	55.02001139	0.90876026	
#8	25.37	55.54843140	#8	55.02814957	0.90862586	
#9	25.37	55.54843140	#9	55.03700436	0.90847968	
#10	25.37	55.53699112	#10	55.01681645	0.90881304	
				-	Þ	
			Average Calculated Conductivity Calculated Gain			
			55.02521		0.90867	
			J			
Ca	ncel				Accept	

The software retrieves 10 samples and at the end an average of the calculated conductivity and herewith a calculated gain is determined.

You may press the button "Accept" and the new gain will be written to the logger device memory.

Drastic deviations in the calculated gain for more than 10% calculated from factory default value 1.0 are a clear indication that calibration process went wrong, or the conductivity sensor is out of order.

If new settings have been transferred to the hardware, a step for verification of the calibration should be carried out.

Another window will be shown.

Please press the button "Start" and the software will measure every two seconds temperature, the conductivity raw value and the temperature compensated conductivity.

The measuring values of the temperature compensated conductivity should remain stable over minutes. When you observe variations in the measuring values you should not trust the calibration process.

Does temperature change during the observation period? Is the temperature during calibration process clearly above or below 25° C? Can it be possible that concentration of test solution is not homogeneous? Does water evaporate and herewith concentration in test solution increases?

5	erification of Calibration					_ 🗆 X
	Conductivity of reference solution @ 25° 50.0000 ms/cm 		Temperature Coefficient of Calibration S	olution	Gain read from device	
			2.500 %/K		0.87050	
			Cell-Constant read from device			
			1.00000 1/cm		ОК	
			Conductivity raw value Conductivity value compe		sated @25°C	
				1		

After verification of the current calibration settings you may press the button "OK". This will stop the online measuring procedure and a final information window will be displayed.



For correct calibration, the temperature coefficient of the test reference solution was required, but this value does not necessarily match with the physical properties of the water or medium you want to monitor with the logger device. Please verify the correct and appropriate temperature coefficient is stored in the device while running measurements on site.

At this point calibration has been carried out for one of the available measuring ranges. The gain or correction factors of the other three measuring ranges remain on their values before calibration process.

You may also calibrate the conductivity sensor by changing the Cell-Constant.

Press the button: "Calibration Conductivity Sensor"



and select in the dialog window the second option "Calibrate Cell-Constant" as shown in the figure below:

Calibrating Cell-Constant or a selected Measuring Range				
	Calibrate Sensor for a selected Measuring Range			
Z	Calibrate Cell-Constant			
Cancel		ОК		

Pressing the button"OK" will initialize all gain or correction factors from measuring range 1 to 4 with a value of 1.0.

Depending on the conductivity of the test reference solution you will need to select the appropriate measuring range which fits best to the conductivity test solution.
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Conductivity			<u>_0×</u>
<u>Measuring Rang</u>	<u>e</u>		σ μS/cm
C Range 1		0200 uS/cm	(0.2 mS/cm)
C Range 2		02000 uS/cm	(2 mS/cm)
Range 3		020000 uS/cm	(20 mS/cm)
C Range 4		0200000 uS/cm	(200 mS/cm)
			Close

The following steps for calibration are identical to the calibration process for a selected measuring range.

There is only a minor difference: The caption in the header of the measuring table changes from "Calculated Gain" to "Calculated Cell-Constant"

Calculated V	'alues	
Measure	Calculated Conductivity ms/cm	Calculated Cell-Constant



If you wish to initialize the hardware with the factory default values, then please press the button "Factory Reset".

Communication with hardware takes several seconds, that's why the user interface of the software shows an information panel for a while.

Image: S.1         Image: Set Measuring Range Conductivity Sensor Settings         Image: Set Measuring Range Conductivity         Image: Set Measuring Range         Image: Set Measuring Range Conductivity         Image: Set Measuring Range Conductivity         Image: Set Measuring Range	Logger 5.1 Help					
Wtzard       Read Data       Programming       Chart Viewer         Device Identity       Simple Logging       Conductivity Sensor Settings         Image: Set Measuring Range Conductivity       Sensor Settings         Image: Set Measuring Range Conductivity       Sensor Settings         Image: Set Measuring Range Conductivity       Sensor Settings         Image: Set Measuring Range Conductivity       Sensor Settings         Image: Set Measuring Range Conductivity       Sensor Settings         Image: Set Measuring Range Conductivity Sensor       Please wait         Image: Set Measuring Range Conductivity Sensor       Please wait         Image: Set Measuring Range Conductivity Sensor       Please wait         Image: Set Measuring Range Conductivity Sensor       Communication with conductivity sensor in progress         Image: Set Measuring Range Conductivity       Sensor         Image: Set Measuring Range Conductivity Sensor       Communication with conductivity sensor in progress         Image: Set Measuring Range Conductivity Sensor       Set Measuring Range Conductivity Sensor         Image: Set Measuring Range Conductivity Sensor       Set Measuring Range Conductivity Sensor         Image: Set Measuring Range Conductivity Sensor       Set Measuring Range Conductivity Sensor         Image: Set Measuring Range Conductivity Sensor       Set Measuring Range Conductivity Sensor <th>Logger 5.1</th> <th></th> <th></th> <th></th> <th></th> <th></th>	Logger 5.1					
COM Port     Device     Identity     device detected     Activate       25     Class 5 Group 10 Year.Week 13.43 SN :4174     Test_Device     05.03.2014 09:30:31     Activate	Wizzard Read Data Programm Device Identity Simple Logging Si Con Set Measuring Range Conductivity Set Temperature Coefficent Media Calibration Conductivity Sensor RESET Factory Reset	ng 😿 Chart Vie ductivity Sensor Setti Current Ple Cor	wer ngs Device Settings wase wait mmunication with conduct	ctivity sensor ir	n progress	
Class 5 Group 10 Year. Week 13.43 SN :4174 Test_Device 05.03.2014 09:30:31 Activate	COM Port Device		Identity	device detected	Activate	
	Class 5 Group 10 Year. Week 13.4	3 SN :4174	Test_Device	05.03.2014 09:30:31	Activate	

When initialization has been completed, the information panel will disappear and the "Current Device Settings" show the default values for all settings of the conductivity sensor.

Current Device Settings	
Measuring Range	Range 4 -> 0200000 uS/cm (200 mS/cm)
Temperature Coefficient Media	2.2500 %/K
Cell-Constant	1.000 1/cm
Conductivity Sensor Corrections Factors	
Range 1 :	1.000
Range 2 :	1.000
Range 3 :	1.000
Range 4 :	1.000

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# 1.9 Appendix

### 1.9.1 Troubleshooting

Before trouble shooting, please be aware of some important steps that should be taken to avoid difficulty.

• High temperatures should be avoided. Intense sunshine and no shadow can heat the environment beyond the compensated temperature range of the logger hardware. The resulting measurement errors will have impact on the measurement accuracy and derived calculated water levels.

The picture below shows a GSM-2 unit installed in such typical outdoor housing. Of course such housing is perfect for installation but keep in mind that black painting and exposed to sunshine can heat up the logger device.



• Cable lengths exceeding 100 m can cause mechanical stress at the suspension point. The use of strain relief equipment is recommended.

• Opening the Logger; Battery replacement

It is important that you open the logger device in a clean and dry environment only. Moisture can damage the hardware!

Dry the data logger before opening! It's recommended to carry out maintenance in dry ambient air. Great care should be taken in handling the O-rings sealing the battery compartment. Whenever a O-ring is damaged it has to be replaced before reassembling the logger device.

Applying silicone grease to protect the O-rings is recommended. Ensure that the tube is clean inside and free of sharp edges before pushing the sleeve back onto the device.



- For sea water applications or liquid media with soluted salt (ions), the choice and combination of materials for mechanical fixation can be very important. The housing of the logger device is built in stainless steel. The diaphragm of pressure sensor 1 is electrically connected with the electronics housing and pressure sensor 2 (DCX-22 AA). During intstallation special care should be taken for installation that the media (electrolyte) in combination with different pairings of materials (electrodes) do not unintentionally build a "battery" or "galvanic cell". Unfavourable installation conditions can support electro-chemical processes (closed electric circuit) resulting in severe corrosion damages or production of hydrogen on the surface of the sensor diaphragm. Hydrogen atoms can diffuse into the stainless steel and cause hydrogen embrittlement !
- Polluted water, sediment or sand may influence the measurements. The space between diaphragm and protection cap should be cleaned to prevent sand or algae buildup.



CAUTION: The diaphragm of the pressure sensor is extremely sensitive. Do not touch the diaphragm!



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 When installing logger devices in active sea habitats, care should be taken to keep sea fauna from entering the opening between diaphragm and protection cap.
 Wrong pressure readings and strange drift may result.

A protection tube with sieves or grille should be used to ensure that only water can contact the diaphragm.

Aspects concerning the use of the Logger 5 Software:

- During online measurements, the software retrieves measurements each second. Extended periods of online measuring activities should be avoided with respect to battery lifetime. Active communication increases the power consumption compared to normal operation of collecting data.
- The power-on reset after battery replacement initializes the logger device.



You should check the active configuration of the device, including activated channels, measuring intervals and the device time.

The device clock will stop if power is disconnected during battery exchange.

The battery capacity indicator is automatically reset to 99% whenever the battery is changed (power supply interruption).

This also occurs if the same battery or a discharged battery is re-inserted.

If communication problems occurs when connecting logger device with computer, check if USB plug and Fischer plug are correctly inserted.
 Check the converter cable for damage. Check the USB socket if there is a physical defect. Unplug the USB connector from computer and check communication with a different USB socket of the PC.

A heavily discharged battery may also cause communication problems.

 If channel readings are incorrect, verify barometric pressure. Do pressure channels give reasonable measuring values? What are the temperatures?
 Verify TOB1 /TOB2 channels. Is temperature in an acceptable range?

Completely wrong readings from pressure **and** temperature of the same sensor are an indicator that sensor is damaged.

In the case of DCX-22 AA logger device verify barometric pressure. Verify that pressure 1 and pressure 2 channel give identical and reasonable pressure readings.

Sensor 1 should be out of the water and exposed to air only. Keep in mind that the orientation of the two sensors have influence on the measuring results.

The pressure sensor will give slightly different pressure readings when you compare the two orientations where diaphragm of sensor points downwards and then upwards.

Verify the device calibration when pressure 1 and pressure 2 differ from each other. For more information see <u>Device Calibration</u>

# 1.9.2 Default Directory Structure and File Location

The installation setup of the Logger 5 Software will create the following default directory structure:

After installation you will find in the program files folder a "KELLER\Logger5" directory.



Logger5	LOGGER_5.exe logger5_2.ico logger.ico wd.ini sqlite3.dll vpec3260.dll	the main application the main application icon icon assigned to the *.DX5 data files initialization file library for the sqLite- Database library for printing	
cfg	Directory with basic configuration files. At first startup of the Logger 5 application these files will be copied to the users documents and settings folder.		
help	Directory where the	e help files are located.	
img	Directory where pic	ctures and images used by the application are stored.	
languages	Directory where the	e language files for multi lingual support are stored.	

• Windows XP

User data is stored in the "Documents and Settings\<\*user\_name\*>\ApplicationData\LOGGER\_5" directory

• Windows 7

Depending on installation

User data is stored in the "user\<\*user\_name\*>\AppData\Local\LOGGER\_5" or in the "user\<\*user\_name\*>\AppData\Roaming\LOGGER\_5" directory

LOGGER_5	This directory contains all initialization files to store user settings, physical units, names, window sizes and positions, working directories and file locations, colors
configurations	By default, logger device configurations are usually expected in the configurations directory when stored on disc.
data	Here, the Logger 5 Software stores data files read from logger devices.
data_export	Text file data exports will be stored here. For each text file export format you will find a separate directory.
graphics	Here the users individual picture and graphic files are expected by default.
html	Location where temporary hyper text files are stored.
IDC	The default directory to store data files stored in the old IDC-file format of the Logger 4 application.
logs	Location where the log file is stored.
SQLite	Directory for the sqLite-Database
templates	Directory where templates for printed reports are stored.

### 1.9.3 DX5 File Format

The new DX5 data file format of the Logger 5 application is based on the following structure.



The XML header describing the logger device and its channels is separated by a marker from the binary data.

The XML part is UTF-16 LE encoded such that extended character sets used, like in the Chinese or Russian languages, are fully supported.

The XML header is well formed but 3rd-party applications commonly used for XML are confused by the marker and following binary data.

#### Document Type Definition (DTD) for the XML header:

```
<!ELEMENT MeasureConfig (Transmitters)>
<!ATTLIST MeasureConfig
xmlns:xsi CDATA #REQUIRED
xmlns:xsd CDATA #REQUIRED>
```

<!ELEMENT Transmitters (Transmitter) +>

<!ATTLIST Transmitter xsi:type CDATA #REQUIRED>

<!ELEMENT Transmitter (GSM,SN,Adress,DeviceClass,DeviceGroup,DeviceYear, DeviceWeek,DeviceIdentity,BatteryCapacity,Comment,CircularMemory, AvailableChannels,AvailableCh\_Text,ActiveChannels,ActiveCh\_Text, CompPressRange\_P1\_min,CompPressRange\_P1\_max,CompPressRange\_P2\_min, CompPressRange\_P2\_max,CompTempRange\_TOB1\_min,CompTempRange\_TOB1\_max, CompTempRange\_TOB2\_min,CompTempRange\_TOB2\_max,User\_Value\_0,User\_Value\_1, User\_Value\_2,User\_Value\_3,User\_Value\_4,User\_Value\_5,User\_Value\_6,User\_Value\_7, User\_Value\_8,User\_Value\_9,User\_Value\_10,User\_Value\_11,RecordNumber,RecordSize, StartTime,StartTDateTime,FixedRecordIntervall,RecordModus,RecordModCounter, RecordFastModCounter,RecordSaveCounter,RecordModChannel,RecordVal1,RecordVal2, WaterLevel,Conversion,FormFactor,User\_Measurements\_Included,ChannelList)>

```
<!ELEMENT GSM (#PCDATA)>
<!ELEMENT SN (#PCDATA)>
<!ELEMENT Adress (#PCDATA)>
<!ELEMENT DeviceClass (#PCDATA)>
<!ELEMENT DeviceGroup (#PCDATA)>
<!ELEMENT DeviceYear (#PCDATA)>
<!ELEMENT DeviceWeek (#PCDATA)>
<!ELEMENT DeviceIdentity (#PCDATA)>
<!ELEMENT BatteryCapacity (#PCDATA)>
<!ELEMENT Comment (#PCDATA)>
<!ELEMENT CircularMemory (#PCDATA)>
<!ELEMENT AvailableChannels (#PCDATA)>
<!ELEMENT AvailableCh Text (#PCDATA)>
<!ELEMENT ActiveChannels (#PCDATA)>
<!ELEMENT ActiveCh Text (#PCDATA)>
<!ELEMENT CompPressRange_P1_min (#PCDATA)>
<!ELEMENT CompPressRange_P1_max (#PCDATA)>
<!ELEMENT CompPressRange P2 min (#PCDATA)>
<!ELEMENT CompPressRange P2 max (#PCDATA)>
<!ELEMENT CompTempRange TOB1 min (#PCDATA)>
<!ELEMENT CompTempRange TOB1 max (#PCDATA)>
<!ELEMENT CompTempRange TOB2 min (#PCDATA)>
<!ELEMENT CompTempRange_TOB2_max (#PCDATA)>
<!ELEMENT User_Value_0 (#PCDATA)>
<!ELEMENT User_Value 1 (#PCDATA)>
<!ELEMENT User_Value_2 (#PCDATA)>
<!ELEMENT User_Value_3 (#PCDATA)>
<!ELEMENT User_Value_4 (#PCDATA)>
<!ELEMENT User Value 5 (#PCDATA)>
<!ELEMENT User Value 6 (#PCDATA)>
<!ELEMENT User_Value_7 (#PCDATA)>
<!ELEMENT User_Value_8 (#PCDATA)>
<!ELEMENT User Value 9 (#PCDATA)>
```

```
<!ELEMENT User Value 10 (#PCDATA)>
<!ELEMENT User Value 11 (#PCDATA)>
<!ELEMENT RecordNumber (#PCDATA)>
<!ELEMENT RecordSize (#PCDATA)>
<!ELEMENT StartTime (#PCDATA)>
<!ELEMENT StartTDateTime (#PCDATA)>
<!ELEMENT FixedRecordIntervall (#PCDATA)>
<!ELEMENT RecordModus (#PCDATA)>
<!ELEMENT RecordModCounter (#PCDATA)>
<!ELEMENT RecordFastModCounter (#PCDATA)>
<!ELEMENT RecordSaveCounter (#PCDATA)>
<!ELEMENT RecordModChannel (#PCDATA)>
<!ELEMENT RecordVal1 (#PCDATA)>
<!ELEMENT RecordVal2 (#PCDATA)>
<!ELEMENT WaterLevel (#PCDATA)>
<!ELEMENT Conversion (#PCDATA)>
<!ELEMENT FormFactor (#PCDATA)>
<!ELEMENT User_Measurements_Included (#PCDATA)>
<!ELEMENT ChannelList (ChannelCount, (Channel)+)>
<!ELEMENT Channel (Name, ChNo, Key)>
<!ELEMENT ChannelCount (#PCDATA)>
<!ELEMENT Name (#PCDATA)>
<!ELEMENT ChNo (#PCDATA)>
<!ELEMENT Key (#PCDATA)>
```

#### The Marker

The marker to separate the XML header from binary data consists of a sequence of 4 characters ÿÿÿÿ

Decimal : 255 255 255 255 Hexadecimal : ff ff ff

The binary data

Each measuring value is a block of: Channel-Key, Timestamp, Value

 Channel-Key is a unique number defining to which device channel the data block belongs. The channel key references the XML Element
 <!ELEMENT Key (#PCDATA)>

Type: Word -> 2 Bytes

• Timestamp

Type: Float/Double -> 8 Bytes

Where the value is the number of days that have passed since 12/30/1899 12:00 am. The fractional part is the time of the day. 1 hour is equal 1/24

• Value

Type: Float -> 8 Bytes

The advantage of storing the data in such way is that the XML header is human readable and can be inspected in a simple text editor. It is also optimized for automatic processing.

The order of the binary data blocks is not important. The unique channel key identifies the measurement value and the timestamp defines the chronological order.

The file format can easily be extended in the future without loosing backwards compatibility.

# 1.9.4 List of References

 Methods of Flow Measurement for Water and Wastewater Riyaz Jiwani, M.Sc., P.E., Steffen Lucas, Dip. Eng. 21.02.2002

