



**PAULWEGENER**  
MESSTECHNIK SEIT 1921

**Operating manual**

Data acquisition system

**PWBlogg**

PC Software

**PWB-Soft 3.0 RLB**

For Windows

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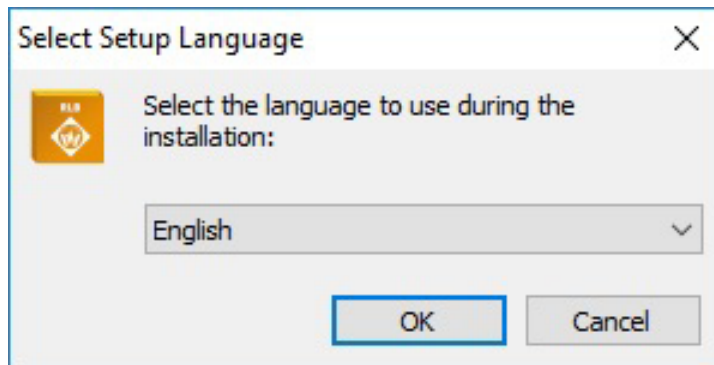
## 1 Installation

To be able to operate the Windows software **PWB-Soft**, following requirements must be met:

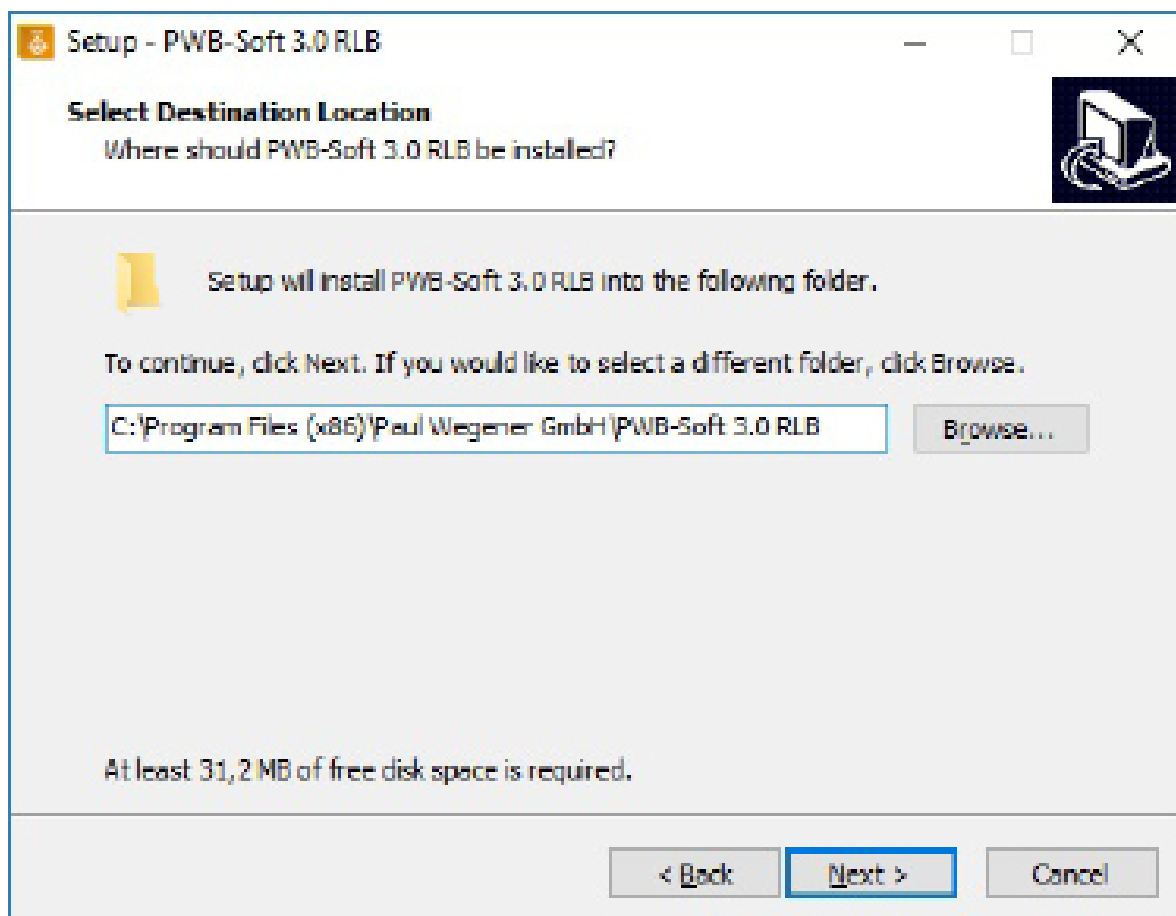
- Windows as of version Windows 7
- Internet access

### 1.1 Software setup

Please insert the CD and start the program *Setup PWB-Soft 3.0 RLB*.



After confirming by „OK“, the setup assistant will appear, which leads you through setup. After the dialog for selecting the licence file PWB.ini has opened, see that you select the correct file. Confirm every dialog. The path to the target folder can individually be changed (not recommended).



Before quitting, check your specifications and start setup using the button „setup“.

After setup has been done, you can get the software started automatically.

### Instructions für subsequent software updates without administrator rights:

1. Do not install the software in the Windows program folder, but e.g. under C:\PWB-Soft.
2. The administrator must enable the software and the update program in the firewall (e.g. calling the function „update“ once after installation).
3. The program option „execute as administrator“ must be deactivated.

## 1.2 Activating test specifications

After program setup, any desired test specification must be released. For this purpose, select „Info“ in the menu „Program“.

Info

### PWB-Soft RLB

Version	3.0.14.33	
Serial no.	P30-0C0-00A-09Z-NRK	
Air/Duct	P30-0C0-00A-09Z-NRK	
W 400/G469	P30-0C0-00A-09Z-NRK	

Ok

Activation dialog

The test specifications are divided into two categories: „Air/Duct“ (includes air, water and separator-tests) and „W 400-2/G 469“, which have to be activated separately. For this purpose, click on the dedicated button and enter the release code.

Activation

### Air/Duct

Serial no.  
P30-0C0-00A-09Z-NRK

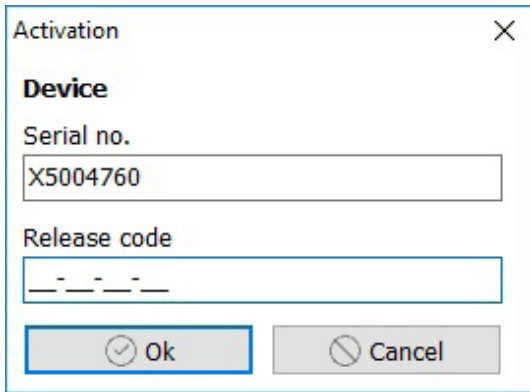
Release code  
\_ \_ \_ \_ \_

Ok Cancel

Dialog release code for one test specification

The codes are written in the software's delivery note.

Furthermore, any data logger which shall be used with the program (read, online, configure, evaluate) must be released. This also applies in case of opening reading files only. A dialog appears before first reading, configuring or evaluating that prompts you to enter the release code.



Dialog release code for one device

### 1.3 USB online cable installation

You find the link for the driver in the email on your order. Download it and start the executable file and follow the instructions.

If you have received a CD, you will find the driver in the folder „USB Drivers“. Open the subfolder „Driver USB - FTDI 2.12.xx“ and start the program „CDM212xx\_Setup.exe“.

You also have the option to find the latest driver for your operating system on <http://www.ftdichip.com>.

Select the link „Drivers“ here and under it the link „VCP Drivers“. You will find the appropriate driver for your operating system in the table „Currently Supported VCP-Drivers“. The column „Comments“ provides a link to an executable file in each case („setup executable“). When using this link, you only need to download the provided file. The driver will install itself automatically and your cable will be automatically recognized when plugging it next time.

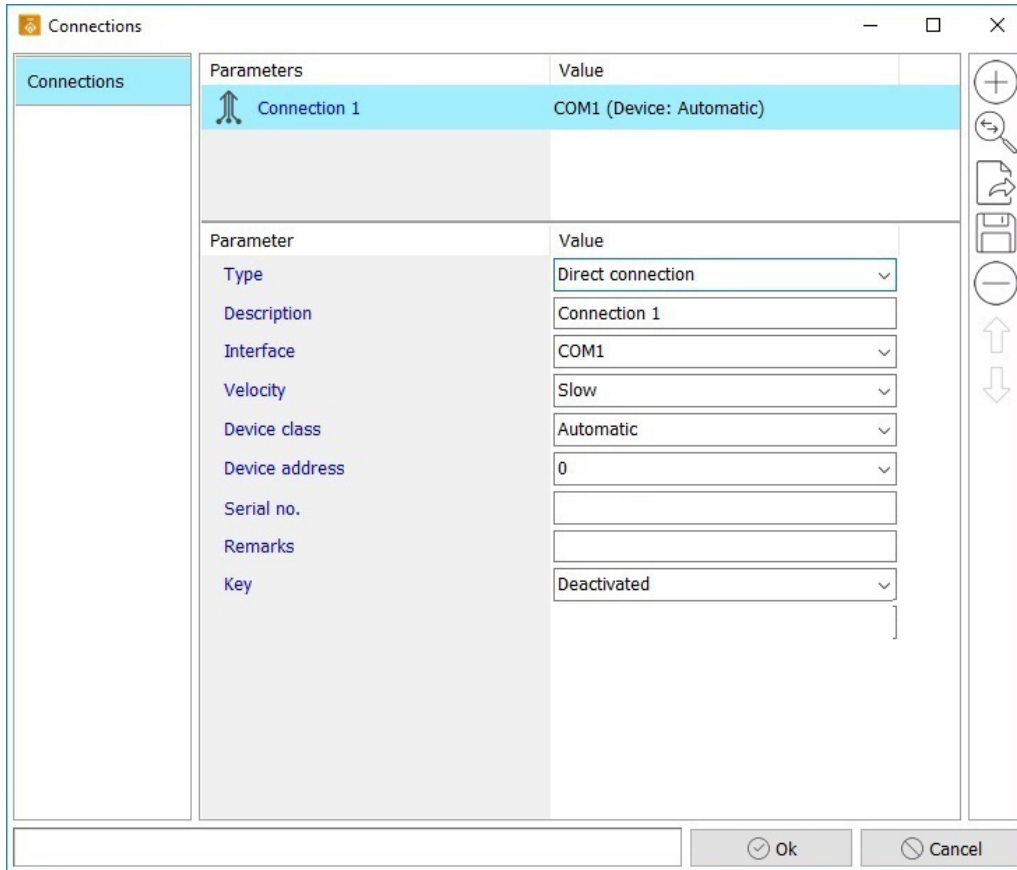
## 2 First steps

After software and online cable installation have been done, the software must be customized for the first use. For this purpose, plug the USB cable at any USB port of the PC and start the software.

### 2.1 Setting a connection

To configure the software, open the settings dialog (menu „Program“ → „Connections“).


Following window will open itself:



Initially, an entry for the USB online cable must be made. Leave the other settings unchanged for the time being.

You can get any available interface established by the software (pressing the button „Automatic“, or make the entries manually. When automatically setting, any available interface will be entered, even if it is not used for connection to a device!

Manually setting connections:

Select „Connections“ and thereafter push the button 

A list including the parameters of the new connection will open itself.

Type	Direct connection
Description	Connection 1
Interface	COM1
Velocity	Slow
Device class	Automatic
Device address	0
Serial no.	
Remarks	
Key	Deactivated

**Description**

Enter a description text on the interface here. The connection is named as „Connection 1“ as example. The description „USB online cable“ would also be useful.

After entry confirmation, the new description will also be used as node description.

Parameters	Value
USB Online Cable	COM1 (Device: Automatic)

Parameter	Value
Description	USB Online Cable

### Type

The connection type is specified here. The default „Direct connection“ is the correct setting for an USB online cable.

### Interface

Here is specified which interface number is used by the USB online cable. The choice is created as drop down menu and includes the entries „COM1“ up to „COM50“. When, upon software start, a USB online cable was found, then the respective COM number in the list will be marked as USB port. The following example shows the connection to „COM 10“. Select the valid entry for your PC.

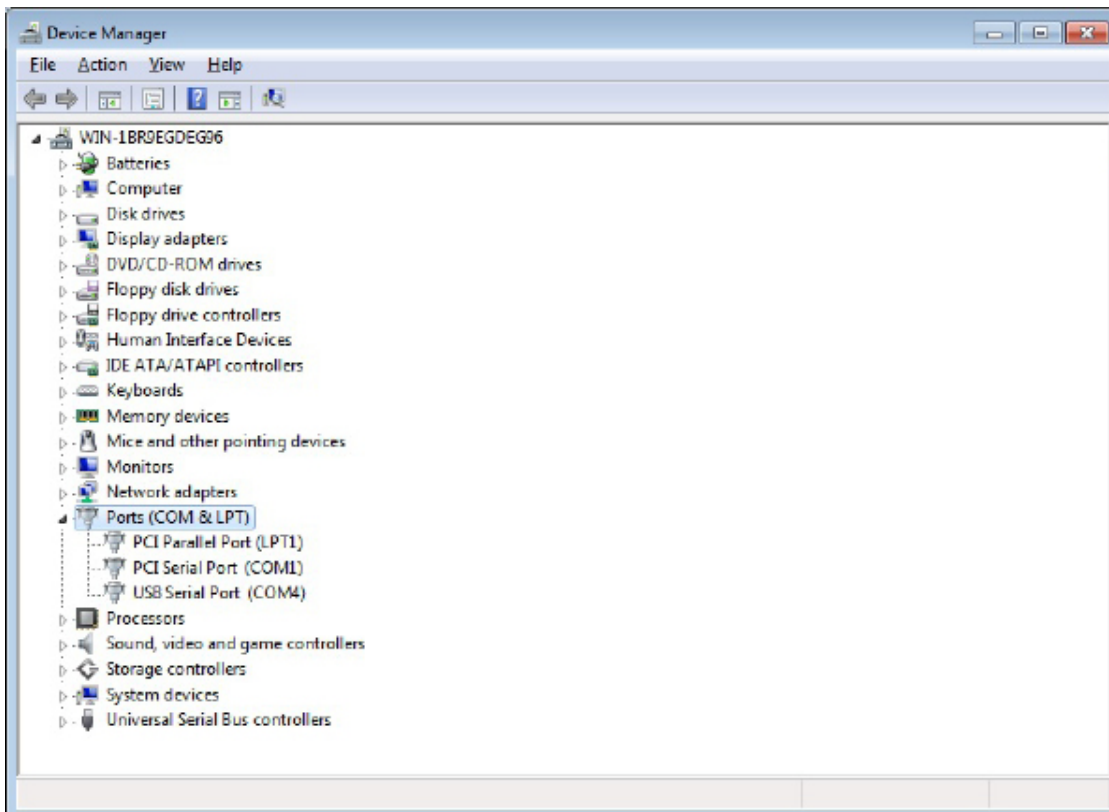
Parameters	Value
USB Online Cable	COM1 (Device: Automatic)

Parameter	Value
Type	Direct connection
Description	USB Online Cable
Interface	COM1
Velocity	COM1
Device class	COM2 (USB)
Device address	COM4

### Note:

The COM number for the USB cable can also be seen in the PC's system control. When using Windows 7, simply enter „Device Manager“ in the description field of the start menu and confirm it with „Enter“. When using Windows 8 and 10, press the „Windows key“ and „X“ to call the system menu where you can start the „Device Manager“.



You will find the entry „USB Serial Port“ including the dedicated COM number under „Ports (COM & LPT)!

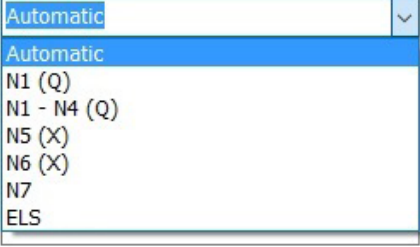
### *Velocity*

You can specify the data reading velocity of a device connected at the respective interface here. When using N6 data loggers and more recent ones, you can set the velocity to „very fast“. Older ones or loggers equipped with infrared interface can only be read with „normal“ velocity“.

### *Device class*

Select the type of the connected logger here. If you have different devices in use, set the device class to „automatic“. Otherwise, you can specify the device type here (e.g. N6).

Device class	Automatic
Device address	
Serial no.	
Remarks	
Key	



### *Device address*

Any data logger has a device address, which enables connecting several data loggers within a logger network. This one is factory-adjusted and „0“ in general. For individual loggers, always specify „0“ or „automatic“ here. Different settings should only be made within a logger network.

### *Serial no.*

The serial number is just a comments field at present, which you can use to enter the serial number of the logger to be connected. This entry has no further use in the program at the moment.

### *Remarks*

This field is available to store information on the interface.

### *Key*

You can assign a quick start key to the connection. The numeric keys 0...9 can be occupied for this purpose. When pressing one of these assigned keys, then the software will start a connecting attempt using the specified connection!

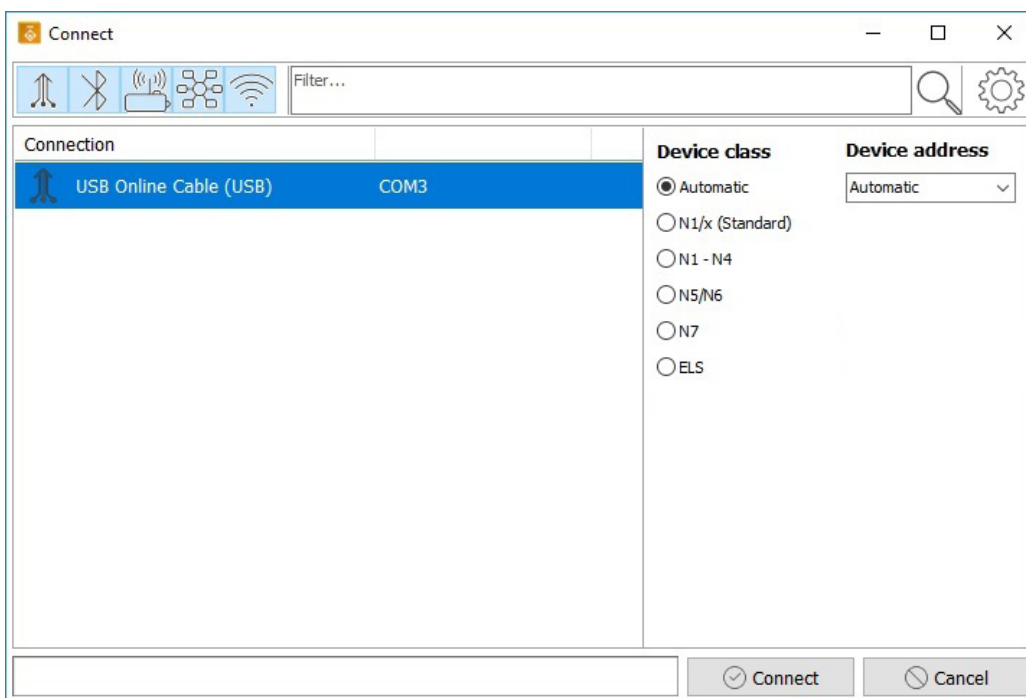
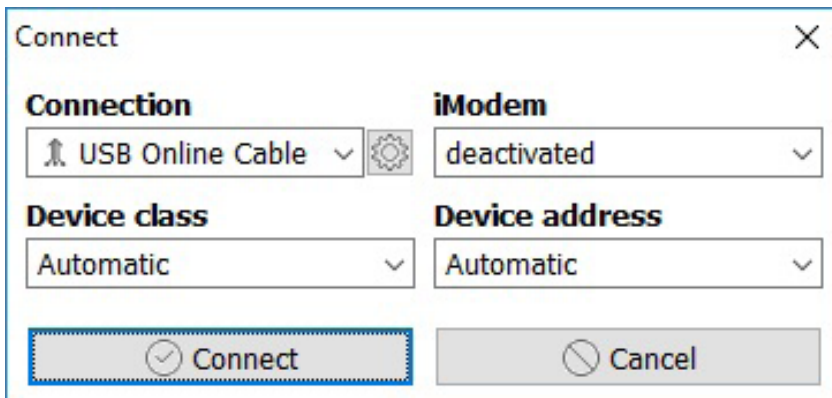
The here introduced settings are only for the new installation of the software and for preparing data logger connection. Further advice on software settings are described in the chapter „Settings“ of this manual.

After setting your 1. connection, quit the settings dialog via „OK“



## 2.2 Connecting and reading data logger

A standard dialog and an advanced dialog are available here. After setting connection, the data logger can be connected and read at the specified interface. Push the button „Connect“.

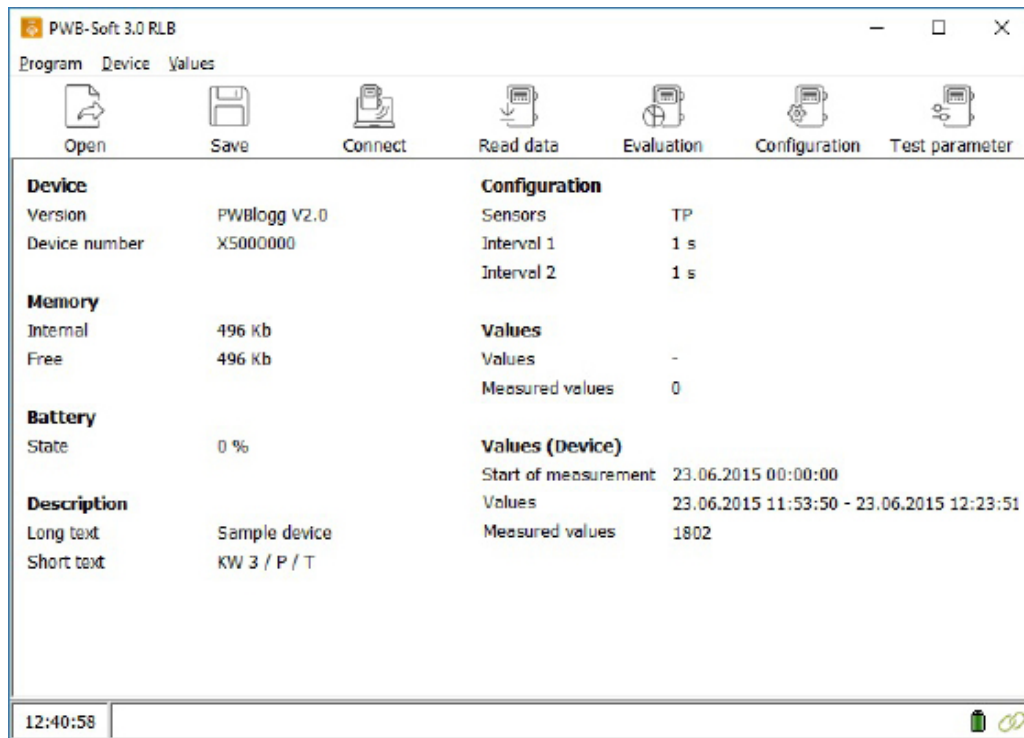


Initially, the chosen connection dialog will appear showing important defaults which can be specified again and adapted. Changes made here become defaults for the next connecting attempt.

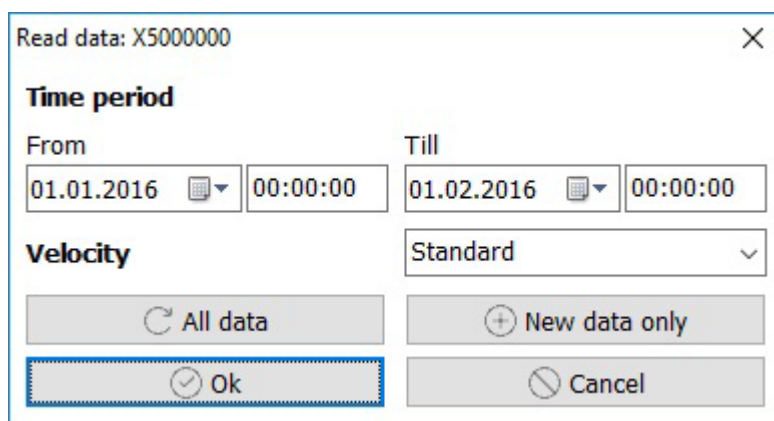
The drop down menu „Connection“ includes any connection specified in the settings dialog. The example shows the just now specified connection „USB Online Cable“.

If you use the button „Connect“, a data logger will be searched at the specified interface.

After establishing connection, the data logger will appear in the device list. The below shown type label shows information on specified logger parameters and current status information.

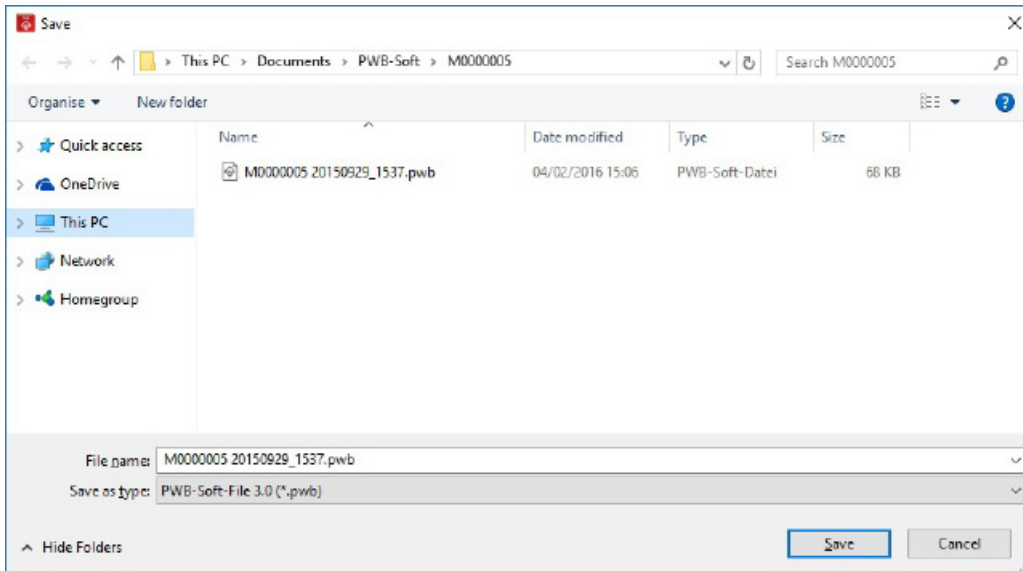


After successfully establishing connection, performance data of the logger can be read. For this purpose, use the button „Read data“.



The dialog on reading the device shows the found data range. Clicking on „OK“ starts reading the data of the shown period. The period can also be restricted to read part of the saved data only. You will find further information in chapter „5 Reading and restarting data logger“.

The dialog „Save“ appears after any reading process. The just read data can be saved in a file here. If the saving process is not necessary, you can quit the dialog by „Cancel“. Anyway, data will be available for evaluation.



## 2.3 Data evaluation

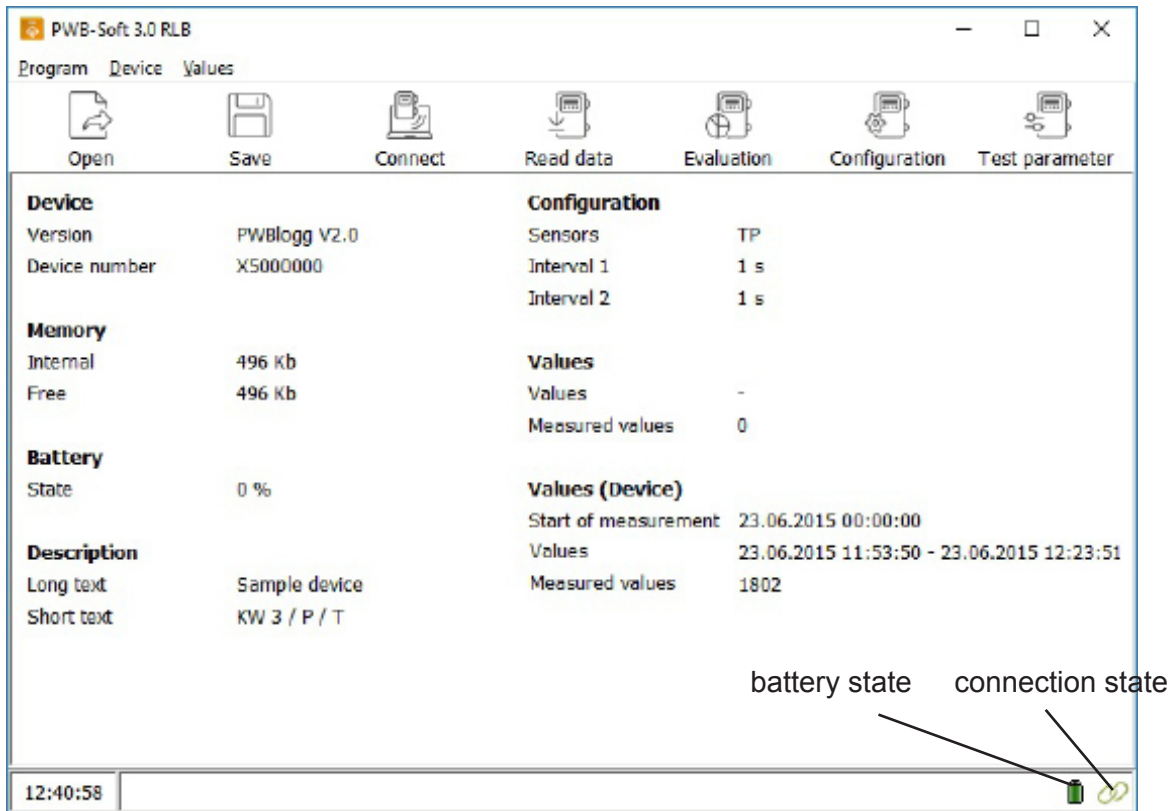
After data reading, you can evaluate them tabularly and graphically using the button „Evaluation“. A register will open itself showing the read data tabularly.

Date/Time	Pressure 1 [mbar]	Pressure 2 [mbar]	Impulse [m3]	Flow [m3/h]
06.02.2006 09:27:54	22,8	69,5	000560440	0
06.02.2006 09:32:54	22,8	70,4	000560451	143
06.02.2006 09:37:54	23,2	70,8	000560461	92
06.02.2006 09:42:54	23,0	70,4	000560468	81
06.02.2006 09:47:54	22,8	70,4	000560476	102
06.02.2006 09:52:54	23,0	70,4	000560481	38
06.02.2006 09:57:54	22,8	70,8	000560486	97
06.02.2006 10:02:54	22,8	70,4	000560490	38
06.02.2006 10:07:54	23,4	70,4	000560494	32
06.02.2006 10:12:54	23,0	70,8	000560497	41
06.02.2006 10:17:54	22,8	71,3	000560500	44
06.02.2006 10:22:54	23,4	70,8	000560504	28
06.02.2006 10:27:54	23,0	70,4	000560506	58
06.02.2006 10:32:54	23,0	70,8	000560509	31
06.02.2006 10:37:54	23,2	71,3	000560511	26
06.02.2006 10:42:54	23,2	69,9	000560514	27
06.02.2006 10:47:54	23,2	70,4	000560515	20
06.02.2006 10:52:54	23,4	70,8	000560518	31
06.02.2006 10:57:54	23,0	69,9	000560519	16
06.02.2006 11:02:54	23,4	71,7	000560522	33
06.02.2006 11:07:54	23,0	70,4	000560524	31
06.02.2006 11:12:54	22,8	69,9	000560528	39
06.02.2006 11:17:54	23,2	70,4	000560531	45
06.02.2006 11:22:54	23,2	69,9	000560535	98
06.02.2006 11:27:54	22,8	70,4	000560538	75

The button  opens the chart.

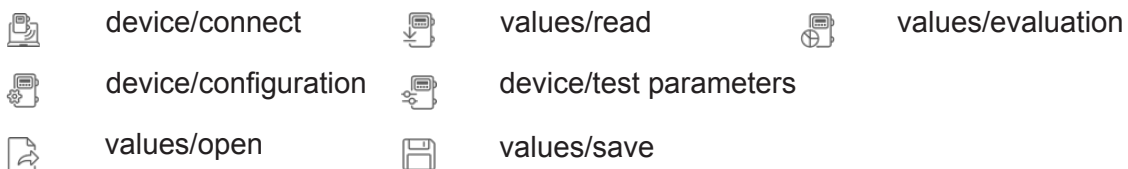
You will find notes on using the evaluation dialog in chapter „5 Reading and restarting data logger“.

### 3 General notes on the software PWB-Soft



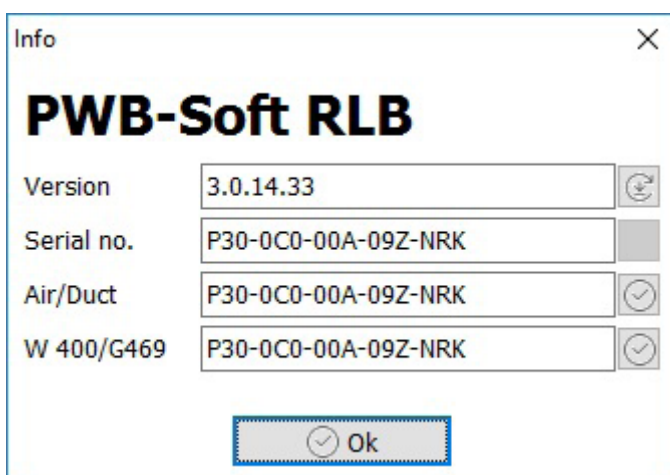
If one entry in the list is highlighted and the right mouse button is used, a popup menu will appear including crucial menu functions on the chosen entry (e.g. to call „Configuration“, „Evaluation“ or to „Save“ performance data).


The open-ended toolbar at the top of the dialog window includes most frequently used menu commands. When moving the mouse pointer over the buttons, a legend on the respective function will appear:



#### 3.1 Program version, updating

The „Info“ dialog (menu „Program“ → „Info“ or via PWB symbol in the quick launch toolbar) is available in all software versions and, besides program type and serial number, it also shows the software version number.



The button  starts searching for a current program version which can be automatically loaded and installed (you must have necessary rights).

## 4 Settings

The menu item „Program“ → „Settings“ calls the settings dialog of the software. Any important setting is made here.

### 4.1 General

The parameters to be adjusted here include the time basis (*program time*) used in the program. The system time (PC time) or a defined time basis (UTC - universal time coordinated can be set here. UTC+1 corresponds to the wintertime in Germany. If data loggers are supposed to be operated using wintertime only, then it would make sense to set the program time to UTC+1. When transmitting the time to a data logger, the wintertime is used even on a PC where daylight saving time is set.

#### View

Here can be selected the parameters to be seen in the dialog.

#### Formatting

This menu item includes the settings on font and dialog colour.

#### Device

##### When connecting

Selection	The standard dialog or the advanced one can be chosen here.
Device	Synchronizes the time of a connected logger to the PC time. Time deviations only up to 2,5 min are corrected. Most logger types and firmware versions support this correction function, but some do not!
Measuring	When connecting, device time and program time are compared to each other. If the data logger time differs from PC time by more than 15 min, then time differences can automatically be corrected!
Battery alert	Upon establishing connection to a device, it specifies whether a warning shall be displayed in case the battery falls below particular values.

##### Reading

Method	Choice between different methods for reading devices in case of problems.
Allowed number of errors	Specifies the number of allowed errors when reading out before the process is cancelled (if <i>limit data read error</i> is activated).
Restart	Specifies, whether the device shall be restarted after successfully reading.
Restart: method	Choice between different methods for restating devices in case of problems.

##### Battery status

Method	Automatic - method is determined by program. Status - verifying by means of battery charge. Date - verifying by means of battery date.
--------	--

Warning level yellow from [%]	First warning when battery charge < specified percentage.
Warning level yellow from [months]	First warning when battery is longer in the device than specified number of months.
Warning level red from [%]	Second warning when battery charge < specified percentage.
Warning level red from [months]	Second warning when battery is longer in the device than specified number of months.

## Data storage

### Files

Standard data path Concerning the following settings, the standard data path is the selectable folder path for opening and saving as default. Individual options provide different path specifications too.

Filemask When saving read performance data, the filename suggestion can be adapted to own defaults using the filemask. The above-mentioned standard data path is used as basis path! The filemask is adjustable via different variables. When using the arrow sign right, a dialog will open for comfortable filemask input with sample path output.

When opening the dialog on Opening/saving files, the above specified standard path will always be shown.

**File mask editor** ✕

**File mask**

<SERIAL NO.>\<SERIAL NO.> <DATE>\_<TIME>

**Example**

... \X00000000\X00000000 20160208\_1055.pwb

**Legend**

Serial no.	<SERIAL NO.>	Year: two-digit	<YEAR:yy>
Short text	<SHORT TEXT>	Year: four-digit	<YEAR:yyyy>
Station	<STATION>	Month: without leading zero	<MONTH:m>
Date	<DATE>	Month: with leading zero	<MONTH:mm>
Date: short format	<DATE:SHORT>	Month: Abbreviation	<MONTH:mmm>
Date: long format	<DATE:LONG>	Month: Name	<MONTH:mmm>
Time	<TIME>	Day: without leading zero	<DAY:d>
Time: short format	<TIME:SHORT>	Day: with leading zero	<DAY:dd>
Time: long format	<TIME:LONG>	Day: Abbreviation	<DAY:ddd>
Gas day	<GAS DAY>	Day: Name	<DAY:ddd>
Weekday	<WEEKDAY>	Hour: without leading zero	<DAY:h>
Calendar week	<CALENDAR WEEK>	Hour: with leading zero	<HOUR:hh>
Start	<START>	Minute: without leading zero	<HOUR:m>
End	<END>	Minute: with leading zero	<MINUTE:mm>
		Second: without leading zero	<SECOND:s>
		Second: with leading zero	<SECOND:ss>

Individual variable names define themselves. The sample text always specifies „X0000000“ as serial number. Subfolders are specified by backslash (see sample). Own fixed texts or characters (as shown space character and underscore) can also be used in the name suggestion.

#### *Type plate*

When opening and saving, specifies whether additional information on the selected reading file shall be used.

### **Evaluation**

#### *Table+chart*

Specifies whether table or chart shall be shown at the same time.

#### *Buttons*

The button of the chart view can be activated/deactivated here. Their function will be explained in detail in the chapter „8.3 Chart view“.

### **Program**

The here specified parameters include the release codes of the modules. The currentness of the software can be checked. If needed, an update can be done via the specified options.

## **4.2 Connections**

Connections define the interface to the devices. To establish connection to a device, the dedicated interface (e.g. serial interface COM1) must be selected and set. The necessary settings are saved in „Connections“.

The *description* is used for clear connection specification. Instead of the USB cable COM number, e.g. the description „USB online cable“ can be selected here.

Direct and Bluetooth connections are provided as physical interfaces (type) to data loggers:

- The direct connection describes direct available PC interfaces such as serial ones or USB online cables.
- Bluetooth is used to connect a data logger via Bluetooth module.

#### *Device class*

Used for clear selection of the device to be connected. Data logger types N1 to N7, and ELS are available. If an RS232 interface is set where different device types shall be connected, the setting „automatic“ is recommended. In this case, the software will search automatically for any known device type after calling connection. As this can take time, if possible, the device type should be specified.

#### *Device address*

The address is important only when using data logger networks. Devices are not generally networked during normal operation. They have the address „0“. If there are doubts, the setting „automatic“ can also be selected here.

#### *Serial number*

The serial number is just a wild-card character for a potential function extension. No entry is needed here at the moment.

#### *Remarks*

Any text can be entered here. Useful e.g. for saving activating periods of a station modem.

#### *Key*

A quick operating key can be assigned to the connection. The numerical keys 0...9 can be used for quick operating. If one of the assigned keys is confirmed, then the software including saved connection will start a connecting attempt at once!

Depending on connection type, further settings are possible:

#### Type direct connection

##### *Velocity*

The „velocity“ specifies what data rate shall be used when reading performance data from a connected logger. When using direct connection with USB cable, the setting „very fast“ can be selected. Older logger types or the ones equipped with infrared interface should be read using „normal“.

#### Type Bluetooth

The same settings as for direct connection also apply when selecting „Bluetooth“. Just the velocity selection does not apply.

Connecting can be done as type „Bluetooth“ or as „Bluetooth“ (internal). The „outgoing“ interface adjusted for the adapter must be entered as „interface“ in the COM settings. The adapter can be addressed based on its explicit BT-MAC address in the setting „Bluetooth“ (internal).

##### *RFC mode*

If the RFC mode is supported by the device's Bluetooth adapter, then this option facilitates faster data transmission, in particular when reading devices. If the RFC mode is not used, the velocity setting of the connection will be ignored!

##### *Coupled device („Bluetooth (internal“ only)*

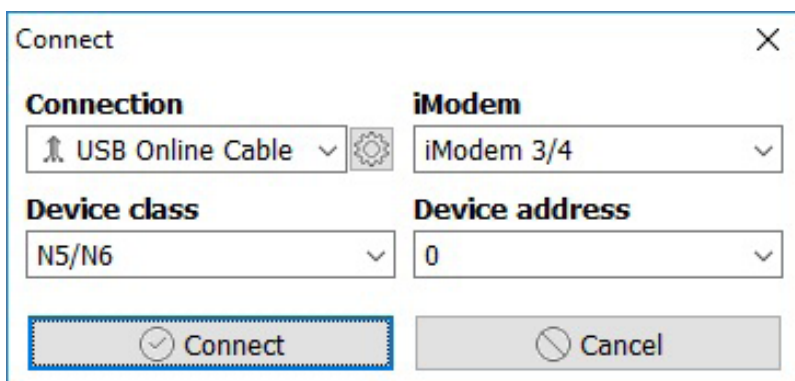
Selecting the device's BTA using this type is done via dialog which shows any potential active coupled Bluetooth device.

The selection made there can permanently be saved using the option „remember“. Hence, new search is not necessary. If „keep“ is not activated, the interface can e.g. be used with different BTA's. This is useful for example if the Bluetooth interface is firmly fitted in the data logger.

## 5 Read and restart data logger

Initially, a „Connection“ to the device must be established for reading and making settings of data loggers.

After using the button „Connect“ or the menu item „Device“ → „Connect“, a dialog will open itself for selecting the connection.

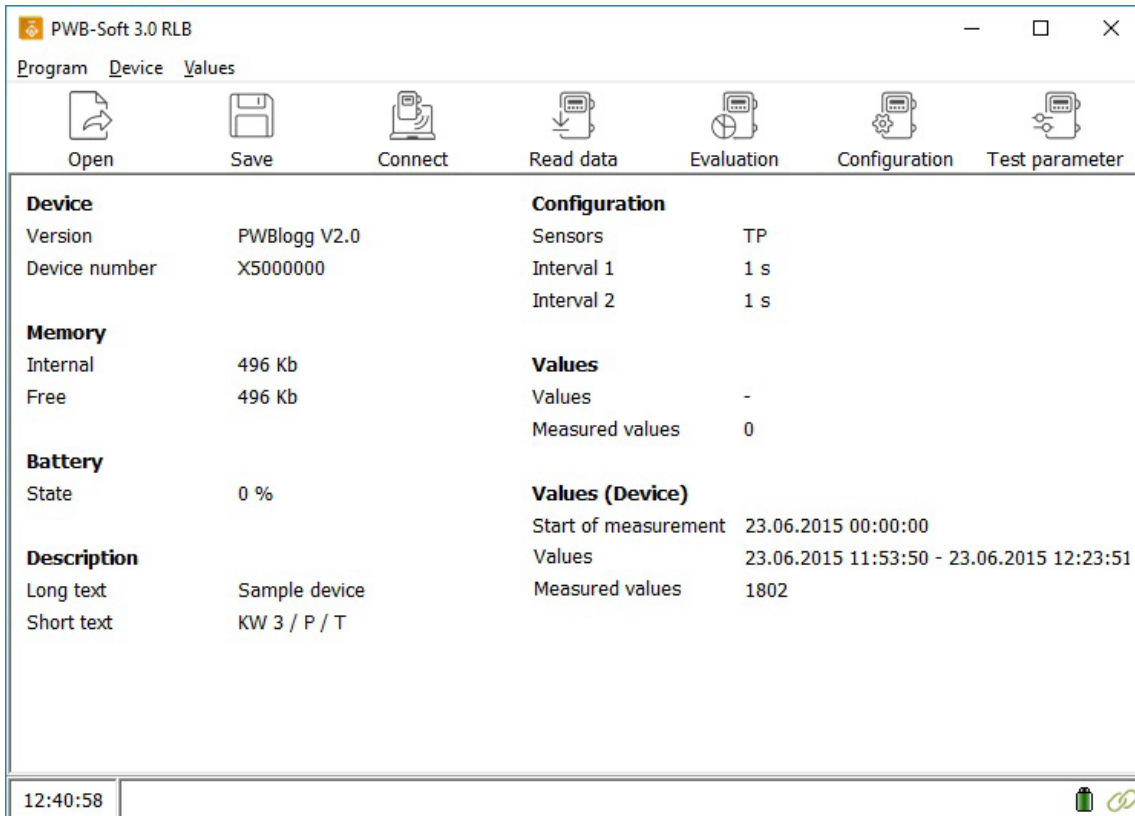


The choice box „Connection“ lists any connection registered in the settings dialog. If the field is empty, please create a connection in the settings dialog first!

After the connection has been selected, the settings on the chosen connection will be selected in the choice fields „Device class“ and „Device address“. The settings can be adapted here. If e.g. an N7 instead of an N5 or N6 data logger shall be connected, this can be shifted in the setting „Device class“. Changes will be saved.

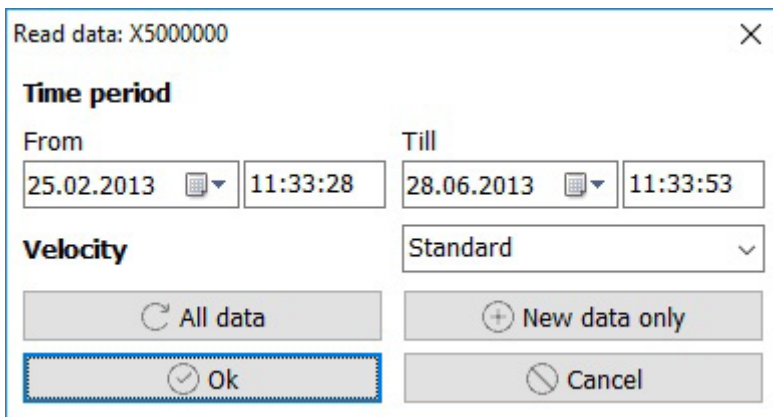
Clicking on „Connect“ starts search for the device. The device will be called in case of a modem connection.





A double click on this LED symbol or using the menu function „Device“ → „Hang-Up“ separates the connection. Thereby the serial interface will be closed. The device itself remains in the list. If applicable, the already read data can be evaluated further. „Device“ → „Reconnect“ calls the connection to the device again. Thereby status information and parameters will be newly imported.

After establishing connection, logger data can be read using the button „Read data“ or by the menu item „Values“ → „Read data“. Initially, a selection dialog will open for choosing the data to be imported.

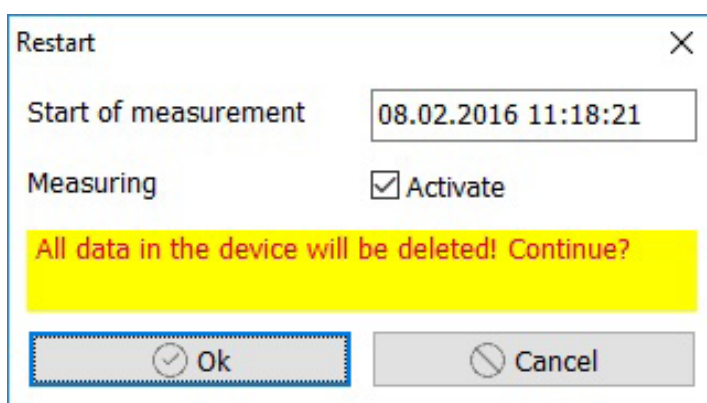


The example shows the saved performance data from 20.08.2014 10:36 to 29.08.2014 11.54. These data will be read by clicking „Ok“. The period can also be restricted to read a part of the saved data only.

The maximum period is set by the button „All data“ and, hence, any available data will be read. If the logger has already been read and current data should be added only, you can just have missing data found and read by „New values only“.

The dialog „Save“ appears after any reading process. The just read data can be saved in a PWB file here. If saving in a file is not necessary, the dialog can be quitted by „Cancel“. Nevertheless, these data are available for later evaluation and storage! However, it is recommended to save important performance data in a file just after importing them!

If performance data have been imported and, if applicable, saved, the data logger can be configured for the next measurement task or just restarted. When restarting (menu „Device“ → „Restart“ or the button „Restart“), device parameters remain unchanged. The memory of the device will be deleted, the device time will be set to the software system time and, if necessary, the moment for measurement will be set.



Thereby, the data logger can be activated/deactivated using the choice boxes „activate“ and „deactivate“.

## 6 Configuration

### 6.1 Configuring data loggers

Settings of the data logger can be changed and logging can be restarted in the menu item *device/configuration*. If a password for the data logger is specified, the window will appear after the correct password has been entered!

The screenshot shows a 'Configuration' window with a sidebar on the left containing 'Device', 'Measuring', and 'Channels'. The main area is divided into two sections. The top section is a table with columns: Channel, No., Measuring range, Lower limit value, and Upper limit value. The bottom section is a 'Parameters' table with various settings for the selected channel.

Channel	No.	Measuring range	Lower limit value	Upper limit value
<input checked="" type="checkbox"/> Temperature [°C]	1	-21,5 - 60,0 °C		20,0 °C
<input checked="" type="checkbox"/> Pressure [mbar]	2	0,0 - 100,0 mbar		

Parameters	Value
Sensor	T (Temperature)
Name	Temperature
Unit	°C
Saving	<input checked="" type="checkbox"/> Activated
Resolution	8 bit
Comma	x,x
Display range	-21,5 ... 60,0 °C
Upper limit value	20,0 °C
Lower limit value	°C
Hysteresis	0,0 °C

At the bottom right of the window are buttons for 'Transmit' and 'Close'.

Configuration window

If the button *transmit* is pressed, after confirmation prompt, any data saved in the logger will be deleted. Data are also deleted if no parameter change has been made (restart).

The buttons „open“ and „save“ are for saving parameters in a file or for loading saved parameters. Only parameter files of the connected data logger can be read! Saving parameters can be used to facilitate entering frequently used ones. This function is also used to transmit parameters via SD card when using data loggers which have an appropriate SD interface.

Adjusted device parameters can be printed out via button „Print“.

### 6.1.1 Device

#### *Address*

The *address* of the data logger is factory-set and can not be changed. It is important for operating a data logger network (RS485). A unique address must be allocated to each data logger here.

#### *Password*

A password can be allocated to a data logger by *password*. If a valid password is specified, configuring and deleting data can only be done by authorized persons. When entering a new password, the old one must be known. N5 data loggers have the password „0“ factory-set.

#### *Clock change*

Daylight-saving time/wintertime change can be activated here.

#### **Description**

##### *Long text*

The arbitrary description of the data logger. There are 160 characters allowed at most.

##### *Short text*

The arbitrary short description of the data logger. There are 20 characters allowed at most.

## Battery

### *Date*

The installation date of the battery is shown here. It should be refreshed by user at any battery change.

### *Type (only N4 and lesser)*

Selection of battery type (9 or 7,2 volt).

### *Capacity [mAh] (only N5 and higher)*

The battery capacity.

### *State [%]*

Current battery state.

## LCD

### *Permanent (N7 only)*

Deactivated: the LCD deactivates itself after a while.

Activated: the LCD is permanently activated.

### *Turn-on time*

N6 and lesser: The *turn-on time* specifies the period where the LCD is on. It can be selected between permanent display (increases permanently power consumption) and runtime of 1,5 minutes.

N7: Period for activating the LCD in seconds.

### *Contrast*

The field *contrast* facilitates the display contrast of the data logger. Changing contrast should be done step by step. Too high adjusted contrast leads to so-called black blocks. Too little adjusted contrast pretends a defect.

### *Infoline (only N4 and lesser)*

*Infoline* provides what additional information shall be shown in the second LCD line of the data logger during online display.

## 6.1.2 Measurement

### *Measurement start*

The measurement start determines when the device shall start recording. If the current or a time in the past is specified, measurement starts at once. Otherwise, measurement will start at the adjusted time, **provided that measurement is activated!**

### *Interval 1*

The time interval for logging readings. It is done in form of hours:minutes: seconds or as selection of predefined intervals (N5 and higher).

### *Interval 2*

The alarm interval. Specifies what sample interval is used for reading recording if an alert threshold is exceeded.

### *Interval 2 permanent*

Determines, whether the data logger shall switch over to the alarm interval only in case of limit violation (deactivated) or shall operate permanently using the alarm interval (activated).

### *Economical storage mode (only N4 and lesser)*

If *economical storage mode* is activated, a data record will only be saved (without information loss) if it differs from the last saved one.

### *Store only during alarm (only N5 and higher)*

If *store only during alarm* is activated, a data record will only be saved in case of alarm state.

### *Overwrite oldest data*

If *overwrite oldest data* is activated, in case of full memory, oldest readings will be overwritten by new ones. Otherwise, when reaching memory capacity, saving process will not continue.

### *Short alert saving*

If *short alert saving* is activated, in case of alert, N5 data loggers only log in the first two periods of interval 1 using interval 2. That means, transition from normal to troubled operation will only be temporary logged using the short interval 2. Thereafter, logging will be continued by interval 1. This process allows a sufficiently verified statement on temporal memory depth of the data logger, even if during operation an alert state occurs.

## **6.1.3 Channels**

Configurations of individual channels are listed here. The shown parameters depend on sensor type.

*Save* activates/deactivates the channel.

*Sensor* shows the sensor type.

*Name* specifies the sensor name.

*Unit* specifies the reading unit.

*Resolution* means sensor resolution in bit.

*Comma* shows displayed commas.

*Display range* means lower limit of measuring range.

### Limit values

An upper and lower threshold can be specified for each channel. An alert will be triggered and shown on display when exceeding/falling below this threshold.

When using N7 devices, this alert incident can be linked with an „event“. This way, in case of an alarm, different outputs can be switched or alert messages can be generated via modem.

When using status channels, an alert will be allocated to a status change.

Thereby, the hysteresis inhibits fluctuations of the alarm output if the reading is within the threshold range.

*Upper limit value* is the value where its exceeding activates alarm.

*Lower limit value* is the value where falling below it activates alarm.

*Hysteresis* - tolerance value. Thereby, it inhibits fluctuations of the alarm output when exceeding/falling below thresholds.

*Turn-on value* - threshold for activating measurement.

### Characteristics for pulse channels

The pulse value of devices up to N6 is entered as decimal (e.g. 2,5l/Imp). When using N7 devices, pulse value is entered as numerator and denominator in whole numbers. 2,5l/Imp must be entered here as 25 (numerator) and 10 (denominator) (25 liters per 10 pulses)!

*Puls value* - The pulse value as decimal.

When using N7, the unit of the pulse value is always quantity unit/pulses. When using N5/N6 devices, there the unit can be switched over between pulses/quantity unit and quantity unit/pulses. Depending on pulse value, this way very small and very big decimals can arise.

In order that input with fixed pulse value unit is possible, even when using N7 devices, numerator and denominator are separately entered here!

*Type* - Type of pulse value.

*Numerator* - Integer, which determines the numerator of the pulse value.

*Denominator* - Integer, which determines the denominator of the pulse value.

*Pulse frequency* - Specifies type of frequency of a pulse channel.

### Characteristics for status channels

Status channels have only two states which are saved and shown in the device as text. So a door contact can message „Closed“ and „Open“.

*Time base*

Time basis for flow calculating.

*Time base: comma* - decimal places of the time basis for calculating flow.

*State 1*

Text for the first state.

*State 2*

Text for the second state.

*Alert if changing: 1 → 2* specifies whether alert shall be triggered when the state of one sensor switches over from state 1 to state 2.

*Alert if changing: 2 → 1* Specifies whether alert shall be triggered when the state of one sensor switches over from state 2 to state 1.

## **6.1.4 Events**

**Visible only if a device is connected.**

*Events* includes actions which can trigger the channels of the logger in case of alert.

*Allow external activation:* facilitates triggering this event e.g. via external device.

*Switch port:* When the event is occurring, an output will be switched which is declared including the fields „Address“ and „PIN“. Address = 0 provides the pins of the data logger switching themselves. When using Addresses > 0, pins can be switched according configured external digital output modules.

*Data backup to MMC/SD:* Saving performance data on MMC/SD.

*Description:* Arbitrary event description. Will be shown in the channels when selecting.

## 7 Master data input and storage in the data logger

Master data input in preparation for the test is done via menu item „Device“ → „Test parameters“. First of all, the leaktest of water pipelines subject to W400-2, the leak test subject to G 469, the leak test of sewerage and the duct test will be available for selection as general standards/specifications.

Shall no test previously be selected, the option „deactivated“ can also be selected. Master data input is done in this case during data evaluation, subsequent to the test.

The screenshot shows a window titled "Test parameter: PWB-N7 V7.1 M0000005". Inside, there is a "Test regulation" section with a "General" tab selected. The parameters are listed in a table:

Parameters	Value
Test object	RLB Sample
Client	Public devices
Contractor	Sample Company
Project management	Mr. Smith
Device manager	Mr. Doe
Place	Town
Address	Main street 1
Section	Main street
Bearing number	H1
Device	D1
Miscellaneous	Test parameter sample

At the bottom of the dialog, there are two buttons: "Accept" (highlighted with a blue border) and "Close". On the right side of the dialog, there are icons for printing, saving, and deleting.

Loggers with dedicated firmware provide using these specifications for evaluation and logging on-site. Besides, these specifications facilitate logging including printout (to be used for filling on-site) prior to the test. The protocol includes most important defaults on the test.

If the button „Transmit“ is used, parameters are saved in the data logger. They will be available as default for each test section when reading data next time.

Any entry can be saved as file and/or printed out as a protocol to be filled out manually.

Entering data of the test object can also be done in line with data evaluation. Entered parameters can be altered during evaluation as well.

## 7.1 Air tests

Test parameter: PWB-N7 V7.1 M0000005

**Test regulation** EN 1610 LA Dry concrete pipes

Parameters	Value
Test type	Test for leaks
Groundwater-level	0 m
Length	100 m
Diameter	1200 mm
Test sensor	Pressure [bar]
Stabilisation time	00:05:00 hh:mm:ss
Test time	00:22:00 hh:mm:ss
Test pressure	10 bar
Allowable pressure difference	2,5 bar

Accept Close

### *Test type*

The type of leak test (leak test in sections, pipe joint test, duct test).

### *Groundwater level*

The height of the groundwater level relating to the ground of the test object in meters.

### *Length*

The length of the test object in meters.

### *Diameter*

The diameter of the test object in meters.

### *Test sensor*

The used sensor.

### *Stabilisation time*

The ascertained stabilisation time.

### *Test time*

The ascertained test time.

### *Test pressure*

The test pressure given by the test specification.

### *Allowable pressure difference*

The ascertained allowable pressure variation.



## 7.2 Duct tests

Parameters	Value
Test type	Complete test (Norm)
Groundwater-level	10,00 mm
Filling height	0,00 mm
Measuring inaccuracy	1 mm
Test sensor	Pressue [bar]
Stabilisation time	00:05:00 hh:mm:ss
Test time	01:38:03 hh:mm:ss
Allowable water pull	0,820 l
Allowable height difference	1,04 mm

Buttons: Accept, Close

### *Test type (separator tests only)*

The type of leak test (comprehensive test, test of individual components, test as normal case, test as special case).

### *Groundwater level*

The height of the groundwater level relating to the ground of the test object in meters. When conducting separator tests, the groundwater level indicates the point at the top of the equipment/element where the metrologically recorded water surface is ascertained.

### *Filling height (separator tests only)*

Specifies the height of the area of the water wetted inner surface of the duct area above the zero water level.

### *Measurement accuracy (separator tests only)*

The measurement accuracy of the procedure.

### *Test sensor*

The used sensor.

### *Stabilisation time*

The ascertained stabilisation time.

### *Test time*

The ascertained test time.

### *Allowable water pull*

The ascertained allowable water pull.

### *Allowable height difference*

The ascertained maximum allowable difference in height, that is the maximum distance that the water level must not fall below.

## 7.2.1 Advanced specifications on test object

When conducting duct tests, the test object is divided in one or several sections for better specification of the dimensions.

Test regulation	1999-100 light liquid separator					
General	Type	Length/Ø1	Width/Ø2	Height	Angle	Inner surface
Test parameter	625 mm	1000 mm	600 mm	90 °	1,60 m <sup>2</sup>	
Pipeline data	d1: Ø Top [mm] 625 d2: Ø Bottom [mm] 1000 h: Height [mm] 600 α: Angle [°] 90					<input type="checkbox"/> rectangular <input type="checkbox"/> include bottom <input type="checkbox"/> include top <input type="checkbox"/> horizontal <input type="checkbox"/> one straight side <input type="checkbox"/> exclude surface
Total inner surface		1,60 m <sup>2</sup>				

Individual parts of the test object are specified in the list. Thus defined, the order in the list corresponds to the real body of the object, that is, the first/on top entry corresponds to the top part of the object. The buttons  $\uparrow$  and  $\downarrow$  are used to facilitate moving individual parts in their sequential arrangement and hence the layout of the test object. The button  $+$  allows including a further part and  $-$  removes the highlighted entry from the list.

When extending the selection of a section, an area will appear where the properties of a section can be entered.

Each section is described as follows:

The drawing on the left shows the geometric structure, the dedicated dimensions and the position of the section.

The dimensions of the section are entered in the middle. Entering the angle  $\alpha$  is necessary if the section is an asymmetric duct.

The options on the right mean:

*rectangular*

The bottom part or bottom opening of the section is not circular, but rectangular.

*horizontal*

The openings of the section are not on top and bottom, but left and right e.g. at a horizontal pipeline.

*include bottom*: Determines whether the bottom part of the section is supposed to be included when calculating the surface. This option is always activated for the bottom part of the test object but for other parts deactivated.

*include top*: Determines whether the top opening of the section is supposed to be included when calculating the surface. This option is always deactivated.

*include right/left part*: Determines whether the right or left opening of the section is supposed to be included when calculating the surface. This one appears only if the option "horizontal" is activated.

*one straight side*: Determines that one side of the section is straightly vertical/horizontal. If top and bottom opening (right and left) dimensions are different, the section will become asymmetric. The needed angle  $\alpha$  will automatically be calculated.

*exclude surface*: If a specification on the entire surface of the test object is needed for the selected test specification, when calculating this surface, the one of the section will not be included.

## 7.3 W 400-2

Test parameter: PWB-N7 V7.1 M0000005

Test regulation: W 400 procedure of contraction

Parameters	Value
Test sensor	Pressure [bar]
Sensor: quantity of discharge	-
STP	12 bar
MDP	16 bar
Pressure drop	2,2 bar

No.	Length [m]	OD [mm]	ID [mm]	Material	Wall thicknes...
1	100	420	400	PE 80 SDR 1:	10,00
2	150	420	400	PE 80 SDR 1:	10,00
3	0	0	0		0,00
4	0	0	0		0,00

**Total length** 250,00 m  
**Geom. volume** 31,416 m<sup>3</sup>

Buttons: Accept, Close

### Test sensor

The used sensor for the pressure test.

### Sensor: quantity of discharge/water quantity

The used sensor for measuring the discharged amount of water.

### STP

System test pressure. The hydrostatic pressure which is used for the test of intactness and tightness of a newly laid pipeline.

### MDP

Highest system operating pressure. The highest system operating pressure (specified by operator) or a pressure zone in consideration of prospective processing and pressure surges.

### Pressure drop

Pressure drop to be made.

Besides general specifications on test location, entering the parameters includes up to 4 test sections. These can consist of different lengths, materials and dimensions.

Depending on procedure, the W 400-2 restricts the options of a compilation of sections with different materials and/or dimensions! The parameter input does not verify these restrictions! It is the users job to enter meaningful terms only.

## 7.4 G 469

Parameters	Value
Sensor: Pressure	Pressure [bar] <input type="checkbox"/> Absolute pressure
Sensor: Temperature	-
Length	100 m
Diameter	400 mm
Wall thickness	10 mm
Nominal diameter	0
Geom. volume	11,341 m <sup>3</sup>
Bare	0 %
Test pressure	12 bar
Stabilisation time	01:00:00 hh:mm:ss
Test time	24:00:00 hh:mm:ss
Allowable pressure change	2,20 bar

**Sensor: Pressure**

The sensor used for the pressure measurement. This can be an absolute pressure transducer („absolute pressure“) or a relative pressure transducer.

**Sensor: Temperature**

The transducer for temperature measurement at exposed portions of pipings.

**Stabilisation time**

The ascertained stabilisation time.

**Length**

The pipeline length in meters.

**Diameter**

The outer diameter of the pipeline.

**Wall thickness**

The wall thickness of the pipeline.

**Nominal diameter**

The nominal diameter of the pipe. This is just an informative value. The diameter and the wall thickness are used for the needed volumes.

**Bare**

Percentage of the bare pipe parts in %.

**Test pressure**

The test pressure given by the test specification.

**Test time**

The ascertained test period.

**Allowable pressure change**

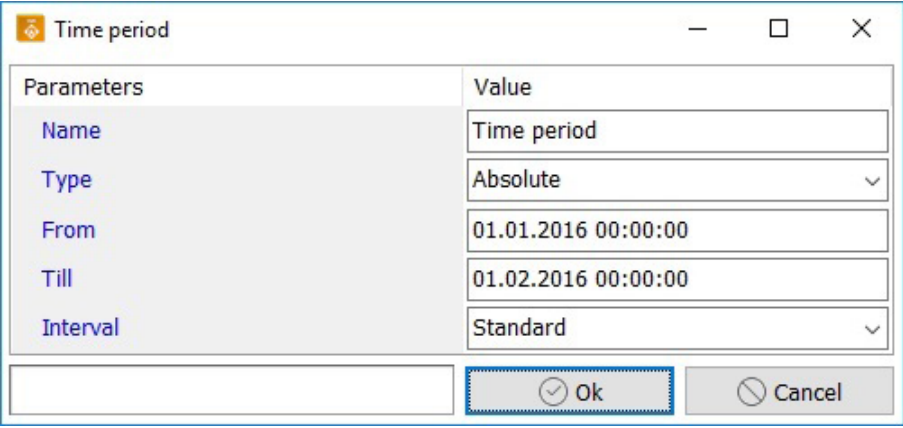
The ascertained maximum allowable pressure change.

## 8 Evaluation

A separate evaluation dialog opens here including test protocol. Performance data as opened file or read data can be displayed as table or chart. For that purpose, the respective entry is selected in the overview list and evaluation is started by the button „Evaluation“ or via the menu „Values“ → „Evaluation“.

### 8.1 Time periods

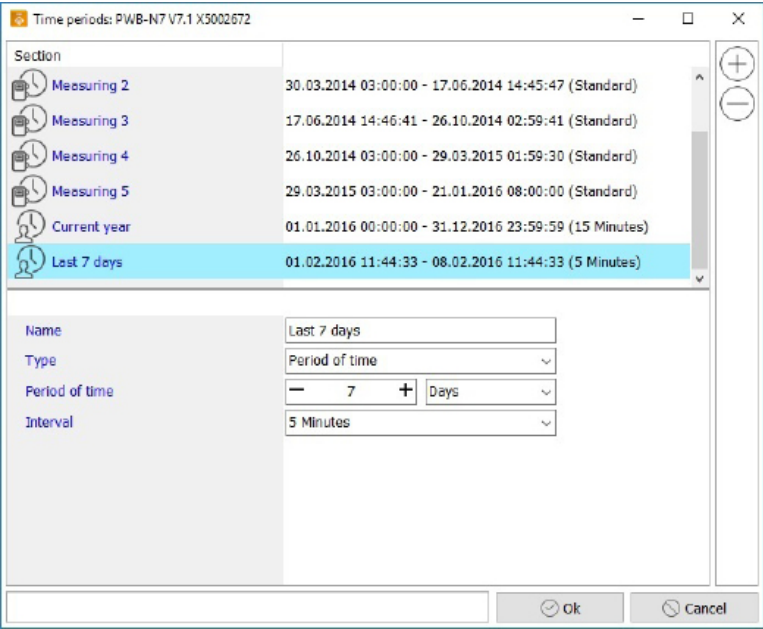
Data records of a logger can be subdivided into individual periods (e.g. measurements at different locations) by activating/deactivating measurement. After double click on an entry, the periods recognized by the software will be shown in the overview. A right mouse click on the entry or using the menu „device“ opens the menu „time periods“. A dialog opens above „overview“ which lists the recognized periods.



Parameters	Value
Name	Time period
Type	Absolute
From	01.01.2016 00:00:00
Till	01.02.2016 00:00:00
Interval	Standard

Ok Cancel

Even own periods can you define via „Add“. This can be useful if only a particular period of a long data record is of concern.



Section	Start - End (Interval)
Measuring 2	30.03.2014 03:00:00 - 17.06.2014 14:45:47 (Standard)
Measuring 3	17.06.2014 14:46:41 - 26.10.2014 02:59:41 (Standard)
Measuring 4	26.10.2014 03:00:00 - 29.03.2015 01:59:30 (Standard)
Measuring 5	29.03.2015 03:00:00 - 21.01.2016 08:00:00 (Standard)
Current year	01.01.2016 00:00:00 - 31.12.2016 23:59:59 (15 Minutes)
Last 7 days	01.02.2016 11:44:33 - 08.02.2016 11:44:33 (5 Minutes)

Name	Last 7 days
Type	Period of time
Period of time	7 Days
Interval	5 Minutes

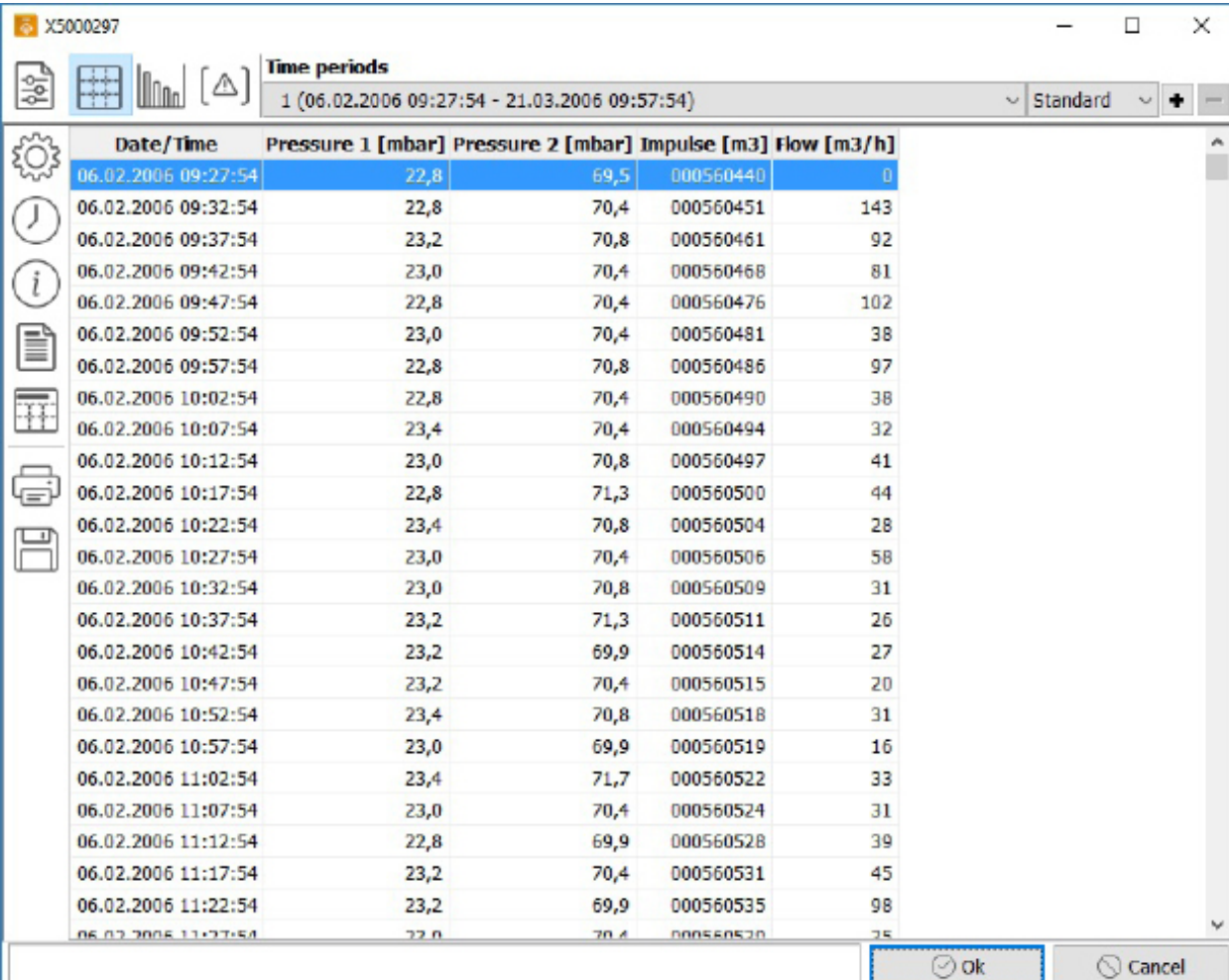
Ok Cancel

For this purpose, a new period will be created via „Add“. This period will appear at the end of the list which includes already existing ones. Initially, a useful name should be given to this period (e.g. „the last 7 days“), Thereafter, the type of the period will be specified.

The type can be determined absolutely (including fixed start and end time), recently (number of recent hours, days, weeks or months), currently (today, this week, current month, this year) or beginning as of a particular point in time. If you select such periods, only the there included data will be used for showing table and chart.

Even specified periods can be changed or deleted in the dialog. Periods of the data record recognized by the software can not be changed or modified! But it is possible to select the time interval for displaying the data in any time period. Data of the setting „Standard“ are shown in the way they are available in the memory. If e.g. „15 min“ as interval is selected, then 15 min average values will be created of the data and shown.

## 8.2 Table










Date/Time	Pressure 1 [mbar]	Pressure 2 [mbar]	Impulse [m3]	Flow [m3/h]
06.02.2006 09:27:54	22,8	69,5	000560440	0
06.02.2006 09:32:54	22,8	70,4	000560451	143
06.02.2006 09:37:54	23,2	70,8	000560461	92
06.02.2006 09:42:54	23,0	70,4	000560468	81
06.02.2006 09:47:54	22,8	70,4	000560476	102
06.02.2006 09:52:54	23,0	70,4	000560481	38
06.02.2006 09:57:54	22,8	70,8	000560486	97
06.02.2006 10:02:54	22,8	70,4	000560490	38
06.02.2006 10:07:54	23,4	70,4	000560494	32
06.02.2006 10:12:54	23,0	70,8	000560497	41
06.02.2006 10:17:54	22,8	71,3	000560500	44
06.02.2006 10:22:54	23,4	70,8	000560504	28
06.02.2006 10:27:54	23,0	70,4	000560506	58
06.02.2006 10:32:54	23,0	70,8	000560509	31
06.02.2006 10:37:54	23,2	71,3	000560511	26
06.02.2006 10:42:54	23,2	69,9	000560514	27
06.02.2006 10:47:54	23,2	70,4	000560515	20
06.02.2006 10:52:54	23,4	70,8	000560518	31
06.02.2006 10:57:54	23,0	69,9	000560519	16
06.02.2006 11:02:54	23,4	71,7	000560522	33
06.02.2006 11:07:54	23,0	70,4	000560524	31
06.02.2006 11:12:54	22,8	69,9	000560528	39
06.02.2006 11:17:54	23,2	70,4	000560531	45
06.02.2006 11:22:54	23,2	69,9	000560535	98
06.02.2006 11:27:54	22,8	70,4	000560538	75

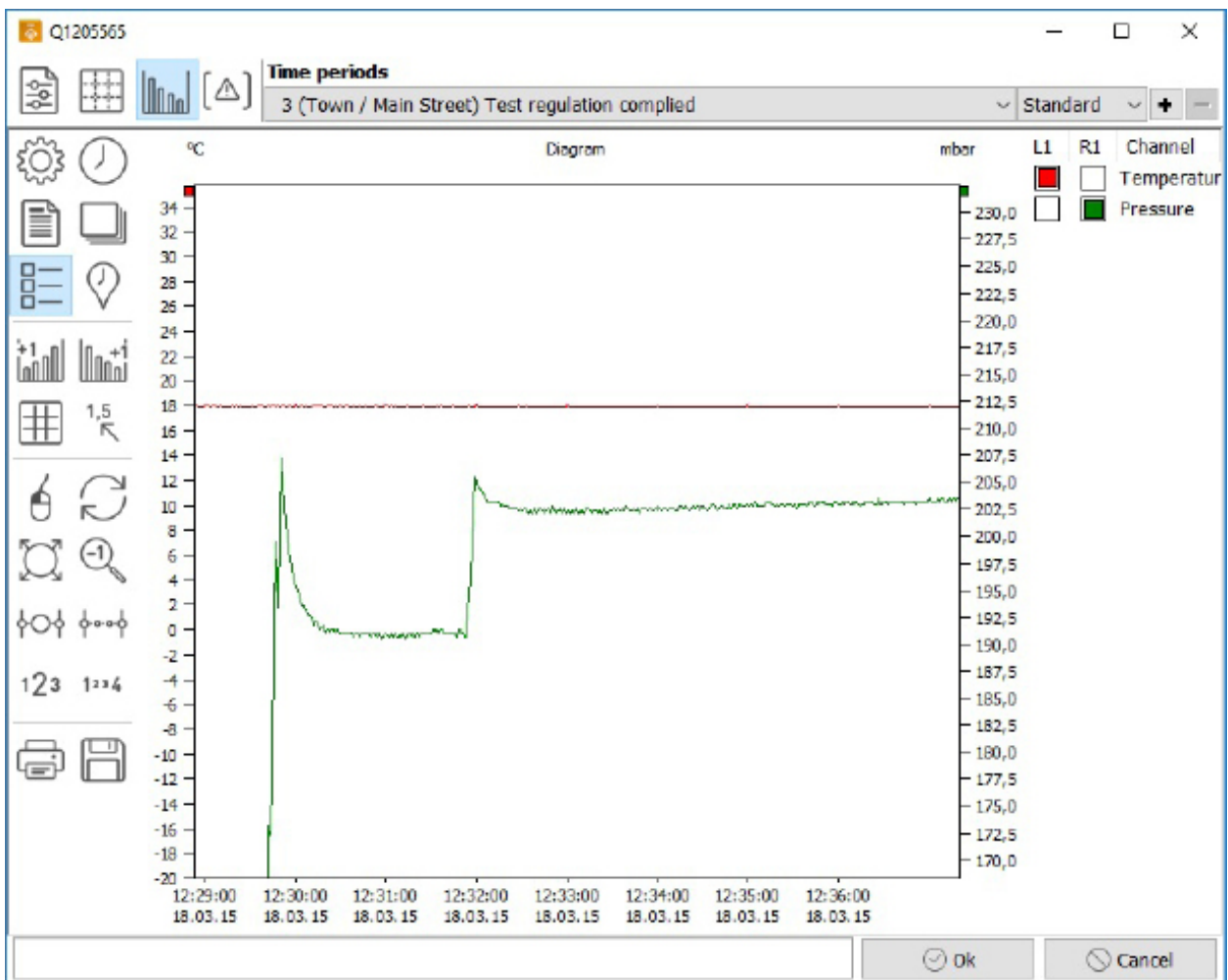
Evaluation window, page table

The upper area shows the currently selected period of the value set.

Further periods can be defined or removed by + and -. Furthermore, there can be selected whether any data or just particular mean values are shown.

-  Opens the settings dialog for evaluation.
-  Switches over between absolute and relative time view.
-  Switches on/off the view of info values for the selected period.
-  Opens the header data submenu
  - show: shows/hides header data above the table (chart).
  - load: loads header data from a file.
  - save: saves header data in a new file.
-  Shows a caption for the table which can be edited by double click.
-  Prints the shown values. You can have it printed out as table, chart or both combined.
-  Exports evaluation data optionally into a spreadsheet, a PWB-Soft file or a text file.

### 8.3 Chart view

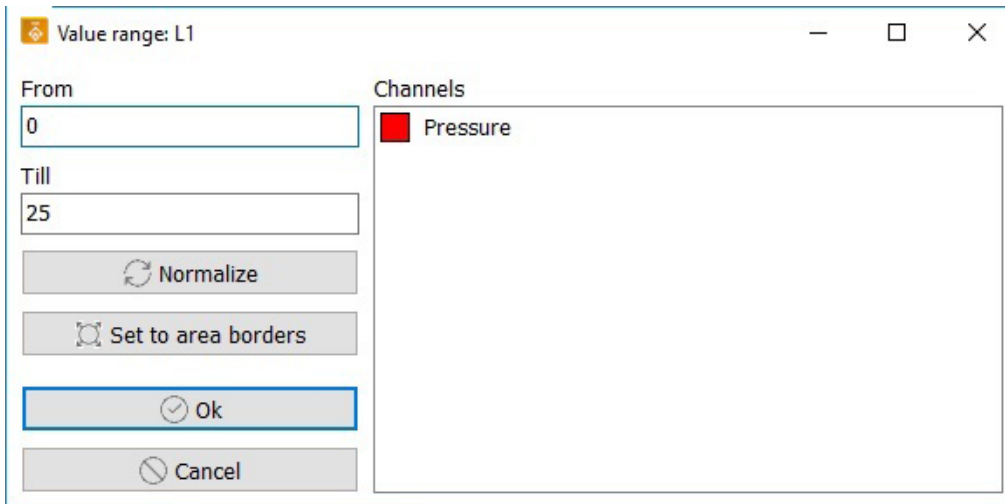


Evaluation window, page chart

The chart display provides enlarging a detail (zoom by dragging a frame with the mouse (left button)). This detail can be moved by pressed right mouse button. Dragging a frame on one of the axes leads to a zoom of this channel value or the time, but leaves the remaining axes in initial state.

The selection of the channels to be shown is done by activate/deactivate in the legend. If the mouse pointer is within the chart, in the status bar time and values will be shown at mouse position. Upon double click on axes inscription, a dialog opens for entering the range limits


























Dialog value range

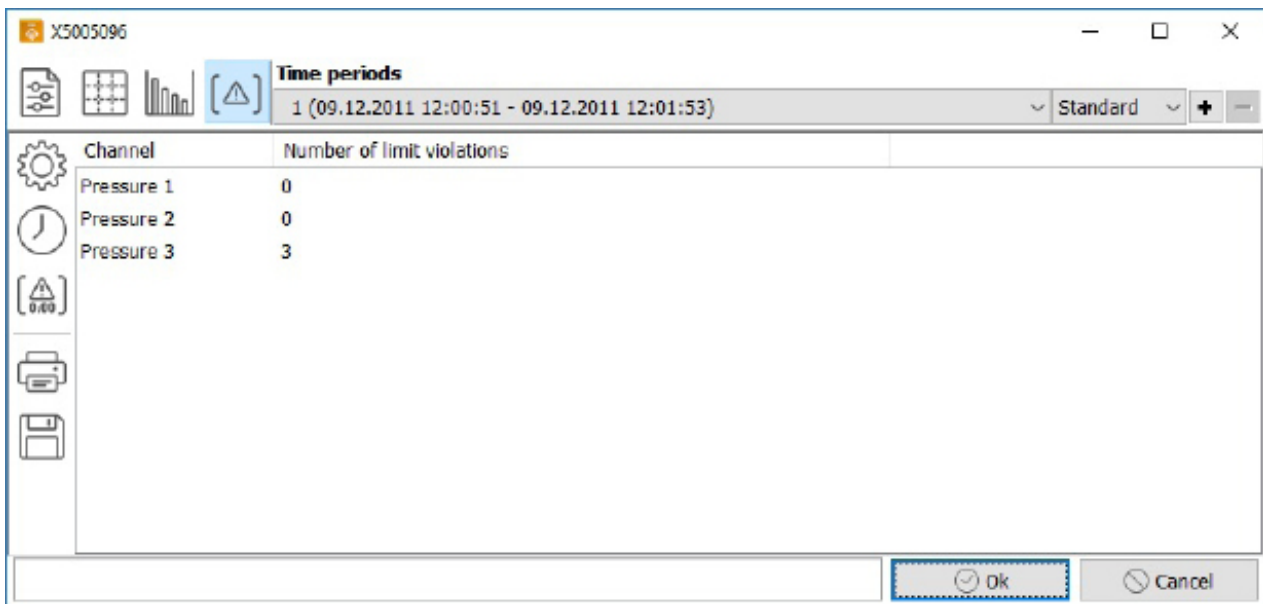
„Normalize“ sets the value area to values between highest and lowest value within the shown period, „Set to area borders“ on the highest one which is determined by measurement ranges of the shown channels and a double click in the list on the measurement range of the respective channel.

Right click on a highlighted channel in the legend opens a setting dialog for displaying the channel.

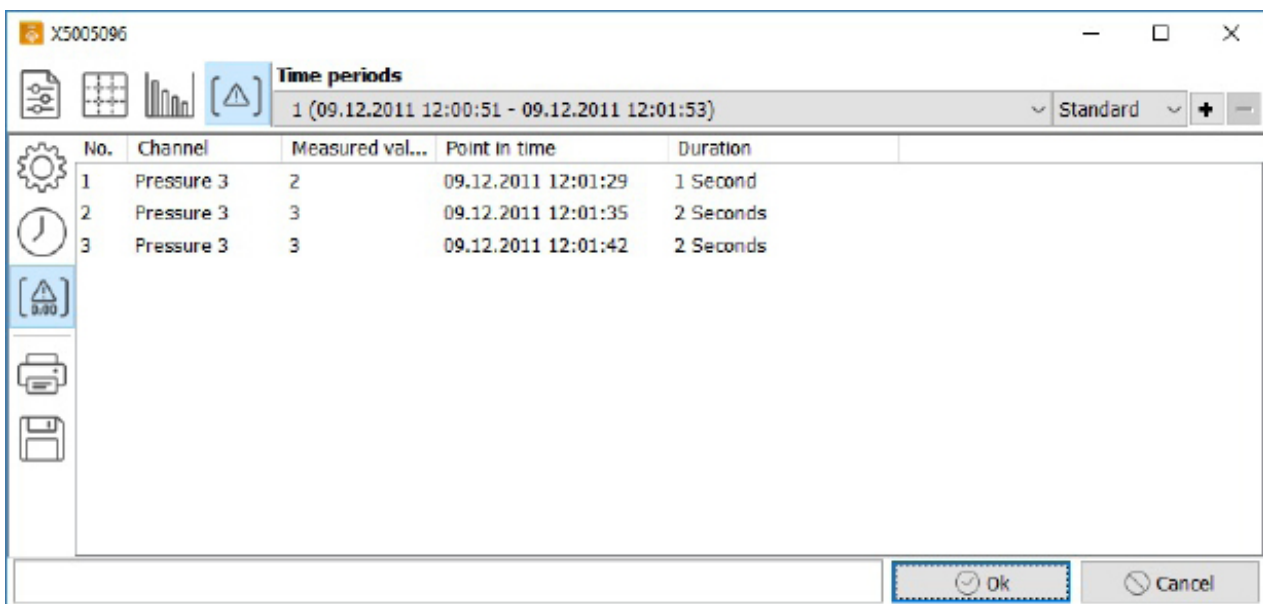
-  Opens the setting dialog for evaluation.
-  Opens the header data submenu.
  - Show: shows/hides header data above the table and chart respectively.
  - Load: loads header data from a file.
  - Save: saves header data to a file.
-  Switches over between absolute and relative time indication.
-  Copies chart into clipboard (alternative: Ctrl+C).
-  Shows/hides the legend.
-  Shows/hides a second y-axis on the left side.
-  Shows/hides a second y-axis on the right side.
-  Shows/hides horizontal auxiliary lines.
-  Shows/hides vertical auxiliary lines.
-  Shows/hides a text within the chart which shows the reading at mouse position.
-  Shows/hides a reticle at mouse position in the chart. If the reading view at mouse position is not activated, an auxiliary value line can be set by double-click on the chart.
-  Activates/deactivates moving the chart when pressing left mouse key.
-  The value range for each axis will be set to the ones between the highest and lowest value within the shown period.
-  Sets area borders to highest possible area.
-  Resets zoom by one step.
-  Enlarges the detail only related to time axis.
-  Minimizes the detail only related to time axis.
-  Enlarges the detail only related to the value axes.
-  Minimizes the detail only related to the value axes.
-  Prints displayed values. You can have printed out table, chart or both combined.
-  Exports alternatively evaluation data in an Excel table, in a PWB-Soft file or in a text file.

## 8.4 Page limit violations






This page provides an overview of occurred limit violations during the selected period.



Evaluation window, page limit violation, view channels



Evaluation window, page limit violation, view point in time

-  Opens setting dialog for evaluation.
-  Switches over between absolute and relative time indication.
-  Switches over between view of number of limit violations per channel and chronology of limit violations.
-  Prints shown values. You can have printed out as table, chart or both combined.
-  Exports alternatively evaluation data in an Excel table, in a PWB-Soft file or in a text file.

## 8.5 Online view

Measured data of the selected device are continuously enquired and shown via *Measured data/Online*. After activating the data logger and establishing connection between logger and PC, current performance data can be online displayed on PC as table or chart.

Measurement at data logger must be activated as basis for online view! When evaluating connected devices, current device data can be recorded „online“ and displayed as table or chart. The view is done analogue to the above described graphical/tabular view.

Date/Time	Temperature [°C]	Pressure [mbar]
19.02.2013 11:14:28	20,0	0,4
19.02.2013 11:14:53	20,0	0,0
19.02.2013 11:14:53	19,7	0,0
19.02.2013 11:15:03	20,4	0,0
19.02.2013 11:15:13	20,4	0,4
19.02.2013 11:15:23	19,4	0,0
19.02.2013 11:15:33	20,4	0,0
19.02.2013 11:15:43	19,7	0,0
19.02.2013 11:15:53	20,4	0,0
19.02.2013 11:16:03	20,4	0,0
19.02.2013 11:16:13	20,4	0,4
19.02.2013 11:16:23	20,0	0,4
19.02.2013 11:16:33	19,4	0,0
19.02.2013 11:16:43	20,0	0,4
19.02.2013 11:16:54	19,7	0,0
19.02.2013 11:17:04	20,0	0,4
19.02.2013 11:17:14	20,4	0,4
19.02.2013 11:17:24	20,4	0,4
19.02.2013 11:17:34	20,0	0,0

Online evaluation

☺ Activates/deactivates online query.

☹ Deletes existing values.

### Interval

Determines the query rate.

### Display range

Restricts the maximum number of displayed values, either to a particular number (range: values) or to a particular period (range: time).

### Display

Current value: reading.


Delta value: difference of readings.

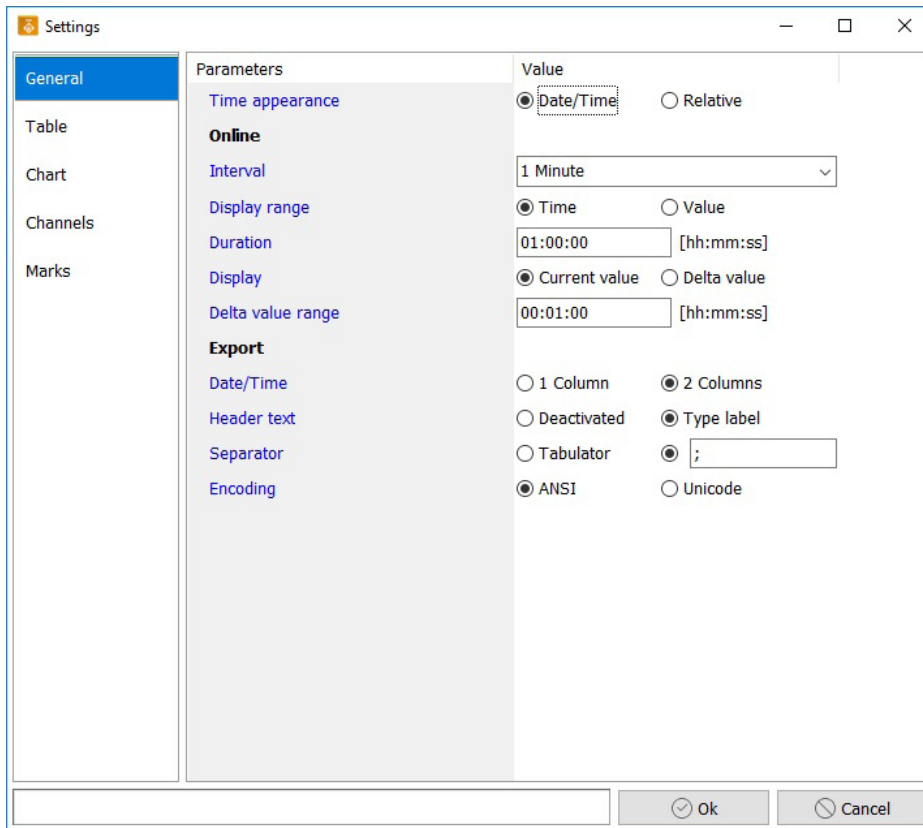
### Delta value range

Determines the period between the current reading and the one which is used for calculation the delta value.

The other functions correspond to the ones of the → evaluation window.

## 8.6 Evaluation settings

The  symbols in each evaluation dialog open the evaluation settings.



Evaluation dialog, settings

### General

Time appearance      Date/time: absolute time display.  
Relative: relative time display.

Online                      Online evaluation settings.

Export                      Export settings.

### Table

Caption                      Caption for the table.

Info values                Particular values for the selected period.

### Chart

Caption                      Caption for the chart.

Show legend                Deactivated, show legend on right/left border.

Alternative axis            Option right/left.

Grid                          Shows/hides auxiliary lines.

Zoom: scale up [%]        Enlargement factor of the detail by pressing  $\phi\phi$  and  $1^{23}$ .

Zoom: scale down [%]     Minimizing factor of the detail by pressing  $\phi\phi\phi$  and  $1^{234}$ .

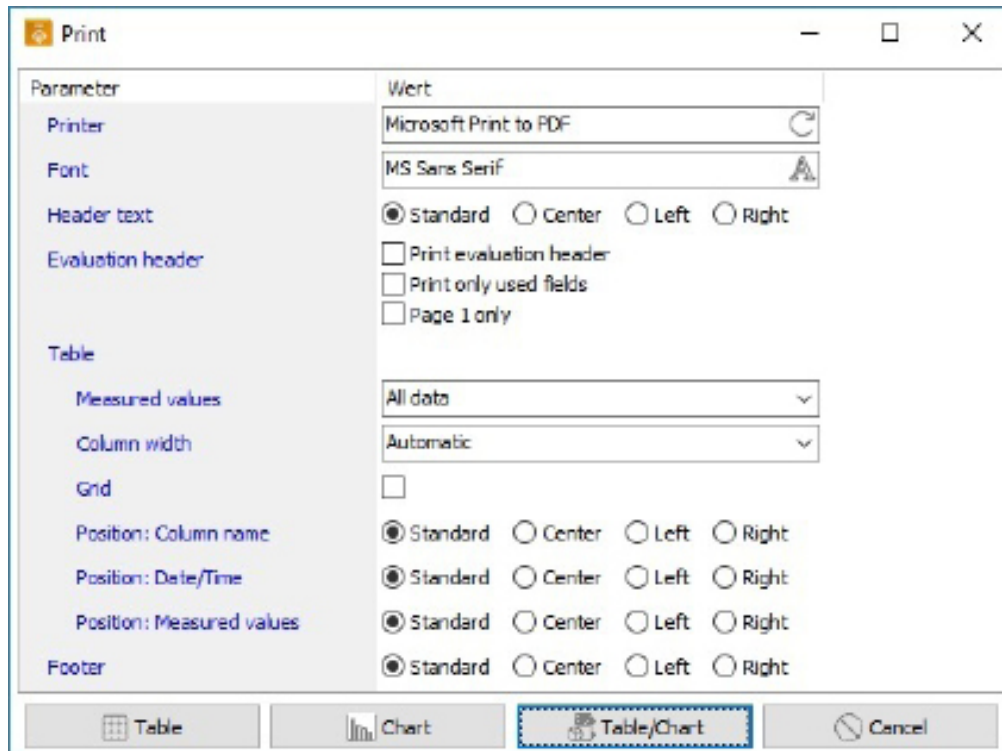
Move                          Activates/deactivates moving the chart by pressed left mouse key.

Display: status              Options: reading curve or histogram.

Show value at mouse position      Shows/hides a text in the chart which shows the reading at mouse position.

Time mark control mode	Shows time marks.
Buttons	Specified options are available.
<b>Channels</b>	Lists existing channels. Additional to the original channels of the device, calculated channels can be added and removed here.
Name	The name of the channel in the evaluation.
Unit	The unit of the channel in the evaluation.
Comma	Decimal places for display.
Colour	Channel colour in the chart.
Auxiliary value 1/2	Two auxiliary values can be specified per channel.
- Show	Specifies whether the chart shall include a horizontal line for the value and whether this value shall receive attention in the table view.
- Value	The auxiliary value.
- Highlight values	Specifies, whether and how values are highlighted in the table („=“, „>“, „>=“, „<“ and „<=“ refer to the auxiliary value).
Symbol	The formula symbol which refers to this channel when calculating.
Formula	Specifies the calculation rules of calculated channels. Formula symbols are: K[x] value of channel x. SV[x] start value of channel x. DEA[x] end-start difference of channel x. D[x] difference between value and previous value of channel x. SQRT() root of the term in brackets. + - * / ( ) The general rules for the four basic arithmetics and parenthesis apply.
<b>Marks</b>	Individual sections of the chart can be marked („+“ → add „-“ → remove marks). Any number of position marks can be shown in the chart to mark particularly relevant points of a measured curve. These can be minima, maxima or even values at a particular point in time. Each position mark consists of a circle around the reading and a text display which includes reading, time data and optionally two freely definable text lines. Circle and point can be moved to an arbitrary position in the chart by pressed right mouse key.
Channel	The selected channel to be marked.
State	Selection: deactivated, activated, minimum and maximum value.
Show	The selected axes to be shown.
Text1	The entered text which shall be shown at the mark.
Text2	The entered text which shall be shown at the mark.

## 8.7 Print options



Settings dialog on printing

### Printer

**Name** The name of the printer to be used. Even the native printer settings dialog can be called here.

**Font** The font for the printout.

### Header text

**Position** Determines the alignment of the header.

**Evaluation header** Deactivated: no header data will be printed.  
Activated: all header data will be printed.  
Print only used fields: only header data which include texts will be printed.

### Footer

Determines the alignment of the footer.

### Table

**Measured values** All data: any performance data of the selected time period are printed.  
Adapt to page: between start and end of the selected time period stepwise only so many performance data are printed as there is space in one page.

**Column width** Automatic: the column width is determined by the length of the column caption. Adapt to page: the column width is determined by the page width.

**Grid** Specifies, whether table lines shall also be printed.

**Position: column name** Determines the alignment of the column name.

**Position: date/time** Determines the alignment of the time text.

**Position: Measured values** Determines the alignment of the measured value text.

## Logo

- Print Specifies, whether the printout includes a logo.
- File The image file which includes the logo.
- Position Standard: the logo is adapted to the side width.  
 Top: the logo is centered.  
 Left: the logo is aligned at the left border.  
 Right: the logo is aligned at the right border.

**Note:** Print options for the test protocol vary from the above-mentioned ones!

## 9 Test protocol

Pressure tests regularly include several measurement sequences. Pressing the button “On/Off” at the data logger or via keypad finishes the current measurement sequence and starts a new one when activating again.









Parameters	Value
Date	18.03.2015
Test object	20L50325003
Client	Public services
Contractor	Sample company
Project management	Mr Smith
Device manager	Mr Doe
Place	Town
Address	Main street 1
Section	Main Street
Bearing number	H1
Device	
Miscellaneous	
Duct 1	S1
Duct 2	AP
Material	Concrete
Canal type	Sewage
Pipeline shape	Circle
Direction	Direction of flow

Result: Test regulation complied

An own master data record is created for each of the generated measurement sequences when reading out. That way it is possible to log each measurement sequence individually.

The first data record is shown in the dialog at first. The choice box „time periods“ (upper select list) initially shows number, date and time of measurement (beginning - end). When entering „place“ and „section“, time specification will be replaced by location and section. If there are many data records, access to a searched data record can quickly be done this way.

The buttons operate as follows:

-  Changes to performance data view as chart.
-  Changes to performance data view as table.
-  Changes to the view of occurred threshold violations.
-  Opens settings dialog for evaluation.
-  Starts test evaluation of data records.
-  Copies one data record.
-  Starts dialog for printing out protocols.
-  Exports evaluation data either into a spreadsheet, a PWB-Soft file or a text file.

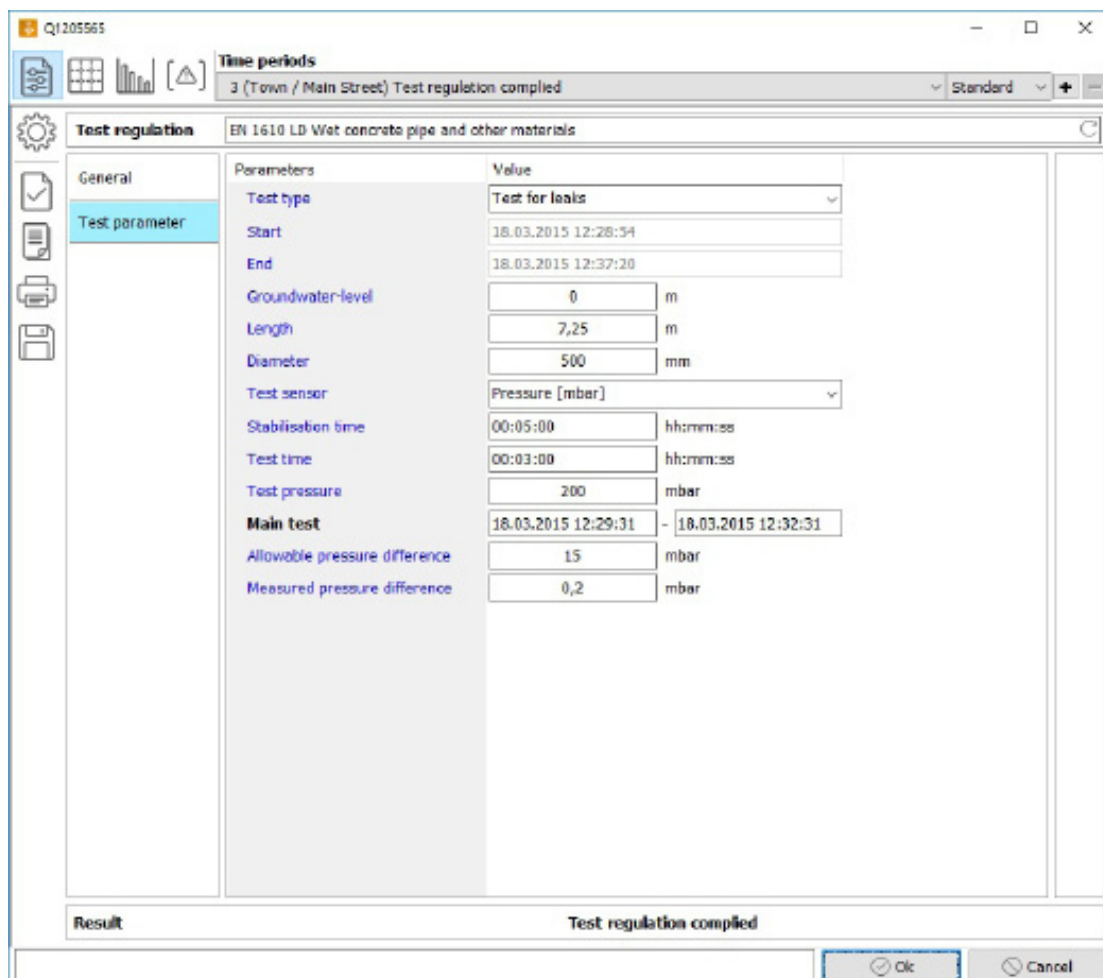
### Saving master data

Specifications on test object (section, client, contractor, machine operator etc.) can be saved in the program. The button on the right is used for that purpose. The dialog facilitates both saving new data and loading already saved entries. No longer needed data can be deleted.

If new entries are made in the fields „material“, „channel type“, „pipeline shape“ or „direction“, these can permanently be saved. When quitting, the program verifies whether new entries have been made and provides savings them.

## 9.1 Standard tests

### Specifications on test object



The screenshot shows a software window titled 'Q1205565' with a 'Time periods' header. The main content is a 'Test regulation' dialog for 'EN 1610 LD Wet concrete pipe and other materials'. The dialog is divided into a left sidebar with icons for settings, document, printer, and save, and a main area with a table of parameters. The 'Result' field at the bottom shows 'Test regulation complied'.

Parameters	Value
Test type	Test for leaks
Start	18.03.2015 12:28:54
End	18.03.2015 12:37:20
Groundwater-level	0 m
Length	7,25 m
Diameter	500 mm
Test sensor	Pressure [mbar]
Stabilisation time	00:05:00 hh:mm:ss
Test time	00:03:00 hh:mm:ss
Test pressure	200 mbar
Main test	18.03.2015 12:29:31 - 18.03.2015 12:32:31
Allowable pressure difference	15 mbar
Measured pressure difference	0,2 mbar

Result: Test regulation complied

Buttons: Ok, Cancel



To be able to evaluate the test, specifications on the test objects are necessary. Entering **test pressure**, **allowable pressure difference** and **test time** are crucial. The choice box *Test regulation* includes some test standards which partly determine test pressure, max. allowed pressure difference and test time if the dimensions of the test object are known. Manual input or correction of default values, given by the client, can therefore be done at any time. So, not stored standards can be applied at any time. The used transducer is selected in the field *Test sensor*.

### Exception duct test

If a water test regulation is selected in the choice box *Test regulation*, the field *valid pressure difference* will change into *valid water addition*. A further input page „pipe data“ appears, which facilitates entering the dimensions of the test object (see chapter „Advanced specifications on test object“).

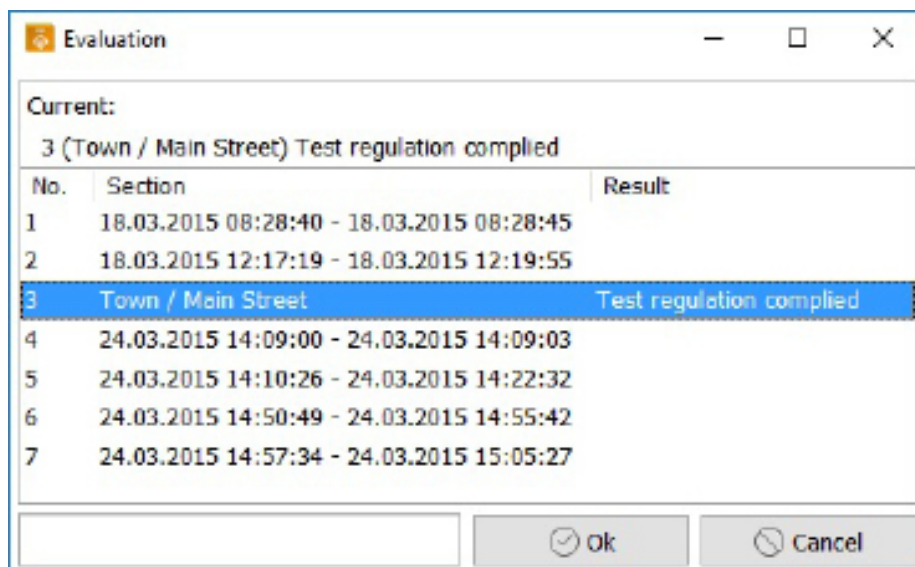
The test object can include several sections. The maximum valid water addition is calculated by means of the sum of the moistured inner surfaces and the test regulation defaults. The entries optionally appear when printing the protocol too. When evaluating the water test, it is necessary to enter the added water amount in the field „measured water amount“ (earlier „measured pressure difference“) manually.

### Exception separating equipment

When testing separators, a level transducer will be selected as test sensor, so that test pressure and valid pressure difference are not relevant but level and maximum allowed difference in height.

### Evaluation

After entering any necessary master data, evaluation can start. After pressing the button *Evaluation*, following dialog will appear:



The list field includes any data records. Already evaluated data records also show the results. If several data records are supposed to be evaluated at the same time, they can simply be highlighted by mouse.

Connected ranges can be highlighted by the Shift key, individual not connected data records by the Ctrl key. A connected range can also be highlighted by the pressed Shift key and arrow keys.

Any highlighted data record will be evaluated after pressing the button „Ok“.

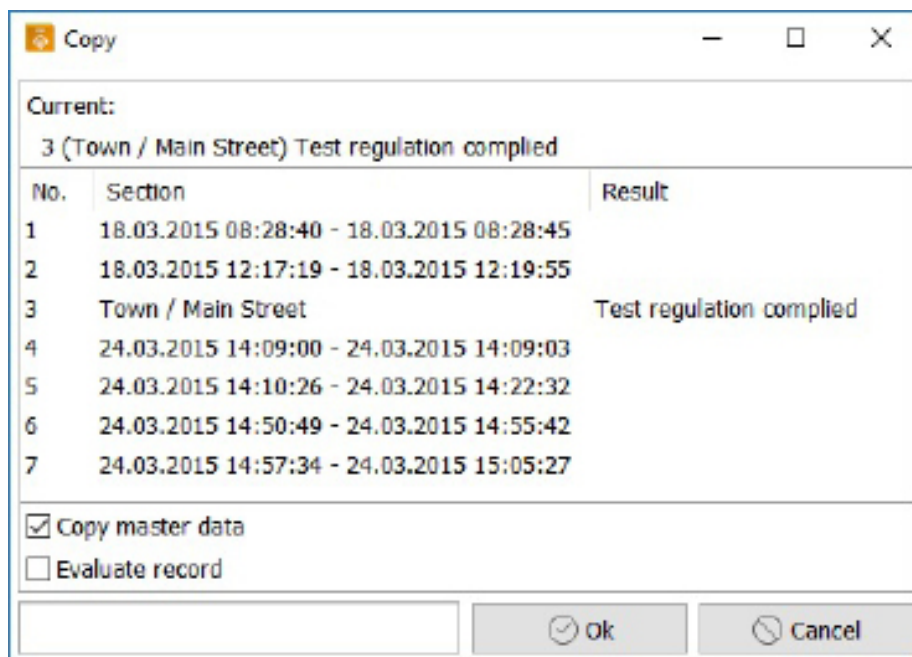
Following table shows potential evaluation messages and their interpretations:

Test result	Interpretation
Test regulations complied	All test criteria have been met. Pressure drop has been within defaulted thresholds.
Test regulations not complied	Test time has been met and test pressure has been reached. Pressure drop exceeded maximum allowable pressure drop.
Test time not complied	Time difference measured from moment where test pressure reached to end of test is less than defaulted test time.
Test pressure out of test specification	Adjusted test pressure has not been within the range of tolerance ( $\pm 10\%$ ) around default test pressure. It could have been too low or too high.
Invalid test parameters	Appears if test pressure and allowable pressure drop have different algebraic signs!
Water-level decrease higher than allowed	The difference in height, measured by level transducer, is greater than maximum allowable difference in height.

### Copying


To facilitate entering master data of individual data records, a once given data record can be assigned to any other one by means of the copy function.

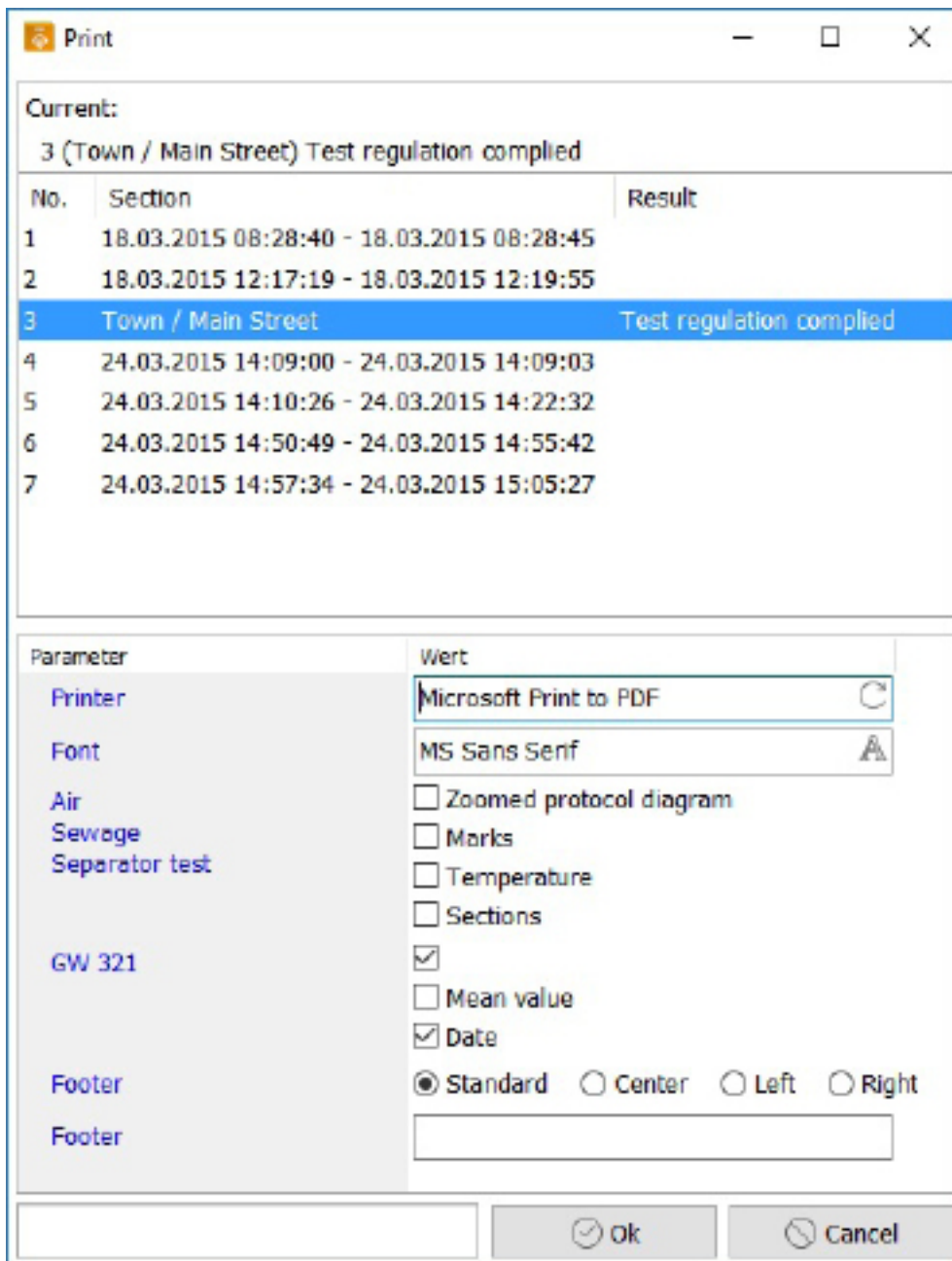
After pressing the *Copy* button, following dialog will appear:



Highlighting data records is done as above mentioned in the evaluation dialog. Over and above the copy function, automatic evaluation of highlighted data records can also be done as option (mark the tick box *Evaluate record*).

## Printing

The logs can be printed out on a DIN standard A4 printer connected to PC. For that purpose, after pressing the *Print* button , following dialog will be opened:



Even here data records from the list field to be printed out can be selected. Depending on the selected test regulation in the data record, additional options apply.

If *Zoomed protocol diagram* is activated, only the used section for evaluation will be shown in the log chart. Besides pressure curve, temperature can also be shown in the protocol chart.

There can also be specified whether reference lines for the view of the test pressure, the allowed pressure drop as well as test start and end time shall also be printed .

If *duct parameters* is activated, section data will be printed as table. The protocol can have a logo (see „Settings“ → “General“ → “Program“). The position of the logo in the sheet can be specified in the field *Position*.

The text entered in *Footer* appears as footer in each sheet of the printout.

## Pressure test protocol

**Test regulation:** EN 1610 Water 0,15 l/m<sup>2</sup>



**Test type:** Duct test

Test object:	Sample	Date:	_____
Client:	Public services	Project management:	Mr. Smith
Contractor:	Sample company	Device manager:	Mr. Doe
Place:	Town	Address:	Main street 1
Section:	Main street		
Device:	D1	Bearing number:	H1
Miscellaneous:	Test parameter sample		

Start: \_\_\_\_\_  
 End: \_\_\_\_\_

Duct 1:  
 Duct 2:  
 Material: Concrete  
 Canal type: Regenwasser  
 Pipeline shape: Circle  
 Direction: Direction of flow  
 Groundwater-level: 10 m  
 Measured water addition:  
 Measured height difference:

Test sensor: -  
 Stabilisation time: 01:00:00  
 Test time: 00:30:00  
 Test pressure:  
 Allowable water pull: 0,170 l  
 Allowable height difference: 3,73 mm

Type	Length(l1) [mm]	Width(l2) [mm]	Height [mm]	Angle [°]	Inner surface [m <sup>2</sup> ]
	400	420	100	90	0,13 m <sup>2</sup>
	420	1400	150	90	3,00 m <sup>2</sup>

**Result:**

**Test note:**

Device manager

Adept

Client

## 9.2 Data evaluation subject to W400-2


Evaluation of tests subject to W400-2 is done in the evaluation dialog after reading performance data in the test log dialog. Evaluation also includes filling the logs based on performance data. Assessment is not intended and must be done by an expert!

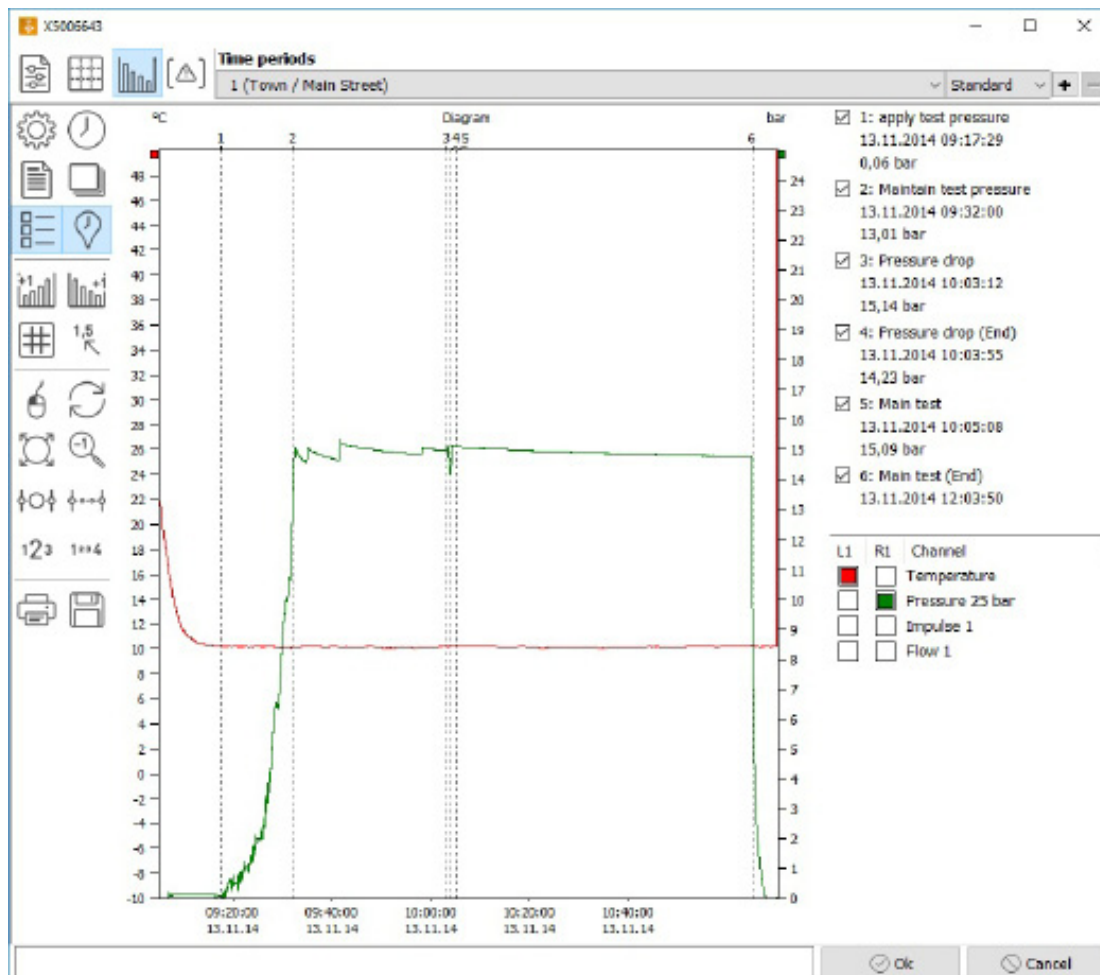
Parameters	Value
apply test pressure	13.11.2014 09:17:29 - 13.11.2014 09:27:29
Maintain test pressure	13.11.2014 09:27:29 - 13.11.2014 09:57:29
Holding time (in acc. with Tbl.)	00:30
<input checked="" type="checkbox"/> Pressure holded	
<input type="checkbox"/> Time interval between pumping corrections of same decreases of pressure	
Decrease of pressure test	13.11.2014 09:57:29 - 13.11.2014 10:57:29
Pressure change	0,06 bar
Minimum pressure decrease	-1,00 bar
Comparison	Measured decrease of pressure > Minimum pressure decrease
quantity of discharge	0 ml
- Necessary (DN<sub>L</sub>/100)	ml
Main test	13.11.2014 10:57:29 - 13.11.2014 11:57:29
Measured decrease after 1 h	14,78 bar
Max. allowable pressure decrease after 1 h	0,00 bar
<input type="checkbox"/> test pressure reapplied immediately and pump connection eliminated	
Comparison	Measured decrease of pressure > Allowable decrease
<input type="checkbox"/> Decrease of pressure becomes smaller over same time intervals	

Depending on default test procedure (or selected one while evaluating), different input boxes are available which provide test evaluation on PC. Entered data can be stored in reading files combined with performance data and can subsequently be called again.

Tables and formulas on individual test regulations are provided in the program. To be able to evaluate/select all test parameters, complete and correct input of dimensions of the test object is necessary! Description and evaluation is done on the basis of the contraction procedure. The other procedures are similarly evaluated.

Test evaluation can manually be done or on the basis of chart and test data. If manual input is selected, all times and pressure values must manually be entered in the log.

Depending on test procedure, marks can be placed at individual test sections in the chart dialog. For this purpose, „Mark control“ must be activated via button .



For that purpose, marks will be sequentially superimposed and moved to the correct position by right mouse button. The arrow keys next to the mask can be used for fine-tuning. The section can also be enlarged by the zoom function.

When setting any marks, times (and values) will automatically be entered in the log. Necessary calculations will automatically be done after setting respective marks.

After filling protocol mask has been completed, test protocol can be printed out.

Test assessment can be done by an expert on the basis of the protocol.

Separate printout of performance data can be done for completing protocol data!

## **Leak test (BNV BWB)**

### **I. Pipeline data**

Date:	13.11.2014	MDF:	15
Test object:	Auswechslung VSL DN	Length (m):	0
Client:	Public services	Project management:	Mr Smith
Contractor:	Sample company	Device manager:	Mr Doe
Place:	Town	Address:	Main street 1
Section:	Main Street		
Device:	X5006643	Bearing number:	
Miscellaneous:			

### **II. Saturation phase**

apply test pressure:		Start: 09:17	End: 09:32
Quantity of water (1..2 bar):	= .....	m <sup>3</sup>	
Quantity of water (2..3 bar):	= .....	m <sup>3</sup>	
Air content:	= 0,0 %		
Maintain test pressure:		Start: 09:32	End: 10:03
Test pressure maintained for 30 min:			<input type="checkbox"/>
Time interval between pumping corrections of same decreases of pressure becomes larger:			<input type="checkbox"/>

### **III. Decrease of pressure test**

measured drain off quantity:	= 0 ml
quantity of discharge (DN=1/100):	= ..... ml
Measured decrease of pressure:	= 0,91 bar
Minimum pressure decrease:	= -1,00 bar
Measured decrease of pressure > Minimum pressure decrease:	<input type="checkbox"/>
Point in time:	10:03

### **IV. Main test**

test pressure reapplied immediately and pump connection eliminated:	<input type="checkbox"/>
Starting the leak test:	10:05
measured decrease after 1 h:	= 7,30 bar
max. allow. pressure decrease after 1 h:	= 0,86 bar
Measured decrease of pressure < Allowable decrease of pressure:	<input type="checkbox"/>
Decrease of pressure becomes smaller over same time intervals:	<input type="checkbox"/>

### **V. Confirmation**

_____	_____
Place, Date	Executor
_____	_____
Place, Date	Adept

### 9.3 Data evaluation subject to G 469

Test evaluation, subject to **G 469** is done in the evaluation dialog after reading performance data. The evaluation also includes filling protocols on the basis of performance data.

The screenshot shows a software window titled 'XS009978' with a 'Time periods' header. Below this, the 'Test regulation' section is active, showing parameters for a 'G469 Pressure test (B 3 Extended)'. The parameters are organized into three main test phases: Preliminary test, Stabilisation phase, and Main test. Each phase has several parameters with input fields and units. The 'Result' field at the bottom indicates 'seal according to standard of control'. Buttons for 'Ok' and 'Cancel' are visible at the bottom right.

Parameters	Value
<b>Preliminary test</b>	
Test pressure	01.10.2014 12:34:27 - 01.10.2014 13:56:17
Test pressure	6,5 bar
Test time	01:00:00 hh:mm:ss
Pressure (Minimum/Maximum)	6,010 - 6,033 bar
Pressure change	0,023 bar
Allowable pressure change	0,050 bar
Temperature	24,48 ... 22,50 °C
<b>Stabilisation phase</b>	
Stabilisation phase	01.10.2014 12:28:04
Pressure	6,035 bar
Stabilisation time	00:30:00 hh:mm:ss
<b>Main test</b>	
Main test	01.10.2014 14:15:26 - 02.10.2014 02:51:03
Test pressure	3,5 bar
Test time	12:00:00 hh:mm:ss
Pressure	3,571 ... 3,519 bar
Pressure change	0,052 bar
Allowable pressure change	0,055 bar
Temperature	21,02 ... 11,29 °C

**Result** seal according to standard of control

Ok Cancel



## Leak test G469

<b>Test type:</b>		<b>Pressure test (Extended)</b>	
Test object:	Sample	Date:	01.10.2014
Client:	Public services	Project management:	Mr Smith
Contractor:	Sample company	Device manager:	Mr Doe
Place:	Town	Address:	Main street 1
Section:	Main Street	Bearing number:	
Device:	PWBlogg N7/1550/E		
Miscellaneous:			
<b>Values:</b>			
Start:	01.10.2014 12:28:01	End:	01.10.2014 12:28:05
<b>Preliminary test:</b>			
Start:	01.10.2014 12:34:27	End:	01.10.2014 13:58:17
Duration:	01:21	Temperature (End):	22,50 °C
Temperature (Start):	24,48 °C	Pressure (Maximum):	6,033 bar
Pressure (Minimum):	6,010 bar	Measured pressure change at system:	0,023 bar
Allowable pressure change at evaluation time range:			0,050 bar
<b>Stabilisation phase:</b>			
Start:	01.10.2014 12:28:04	Pressure:	6,035 bar
<b>Main test:</b>			
Start:	01.10.2014 14:15:26	End:	02.10.2014 02:51:03
Duration:	12:35	Temperature (End):	11,39 °C
Temperature (Start):	21,02 °C	Pressure (Maximum):	3,519 bar
Pressure (Minimum):	3,571 bar	Measured pressure change at system:	0,052 bar
Allowable pressure change at evaluation time range:			0,055 bar
<b>Result:</b>			
In the preliminary test a pressure change of 0,023 bar and in the main test a pressure change of 0,052 bar were determined. These pressure changes are lower than or equal the valid pressure changes, so this pipeline can be designated as <b>leakproof</b> .			

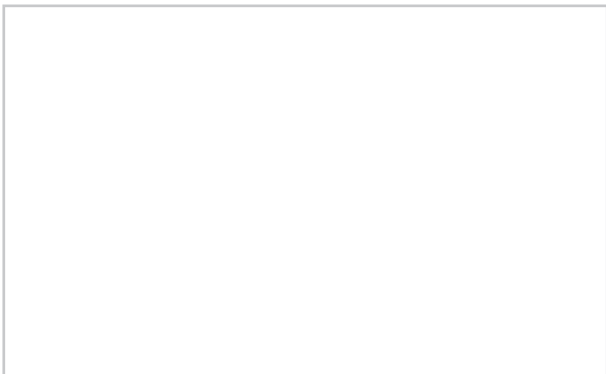
Town, 01.10.2014

Place, Date

Signature







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