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## **Schleibinger SLIPER - SLiding Pipe Rheometer**

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## 1 Introduction

Congratulations! You have just purchased the concrete tester SLIPER. The new SLIPER measuring device (SLiding Pipe RhEometeR), developed by Putzmeister and produced by Schleibinger, allows the user to quickly assess the pumping characteristics of concrete and other materials in the laboratory and on the construction site before they are used.

The SLIPER provides a vertical standing standard pipe which is filled with fresh concrete.

In the pipe is a piston standing on a tripod. Integrated into the top of the piston is a pressure sensor. If the pipe is sliding downwards, the pressure in the pipe is measured. Also the speed of the pipe is recorded. The measurement data are sent wirelessly to a common Android smart phone. The data are stored and displayed graphically on the smart phone.

The properties of the fresh concrete are evaluated by the software app included. With this software the design and parameters for the pump application may be estimated. Therefore a computational model is used which calculates the expected pressure loss in the concrete pump.

The system is portable, robust, battery driven and designed for using at the construction site.

The SLIPER set includes the following components:

1. The measuring system itself
2. A set of weights
3. Two rechargeable accu packs and a charging device
4. A smart phone, controlling the SLIPER over a Bluetooth interface, saving measured data, computing the forecast and transferring them to a common PC.
5. A transport case



Figure 1: The Schleibinger SLIPER

## 2 Theory of operation

1. Performs a series of strokes at different loads (one measurement) to determine pumping ability of the sample (SLIPER Tab)
2. Compute forecast for required delivery pressure at given parameters of the pipeline (DATA Tab)

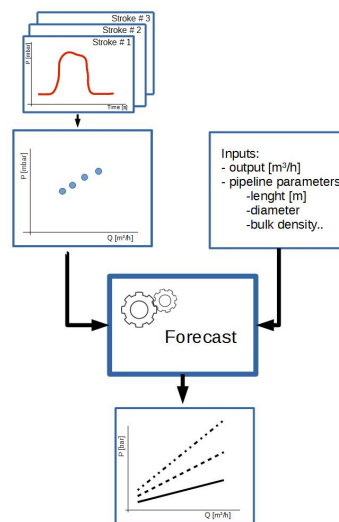


Figure 2: The measurement procedure

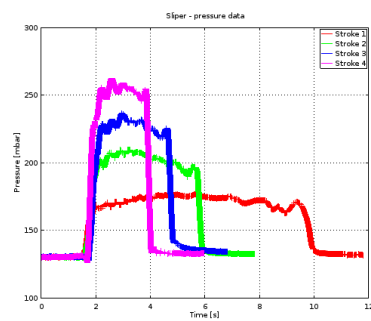


Figure 3: Different pressure curves at different loads

### 3 Installation of soft- and hardware

#### 3.1 Smart phone

The SLIPER app is pre-installed, the SLIPER and smart phone are paired (Bluetooth).

We strongly recommend to disable the automatic screen rotation. The app is designed for optimum display in portrait format.

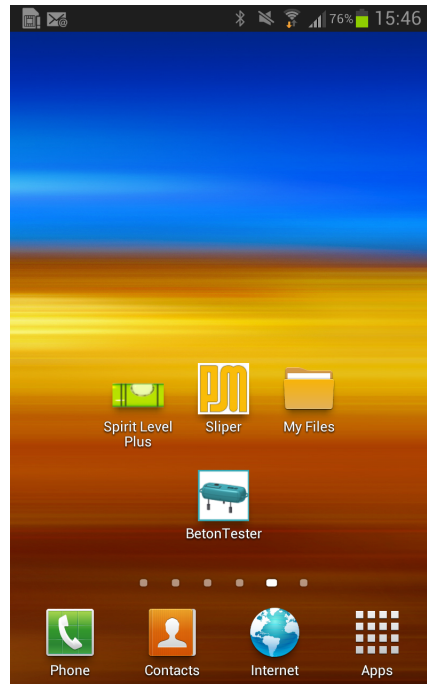


Figure 4: The SLIPER app on the smart phone screen

Tap to the SLIPER icon (see figure 4) on the smart phone to open the application. There are two tabs (see figure 5):

- **DATA** - for the transferred measurements stored in the internal database of the smart phone app and for the forecast computing
- **SLIPER** - is a dashboard for the remote control of the SLIPER via Bluetooth and displays the current measured data

By switching to the SLIPER tab the app will try to connect the SLIPER via Bluetooth.

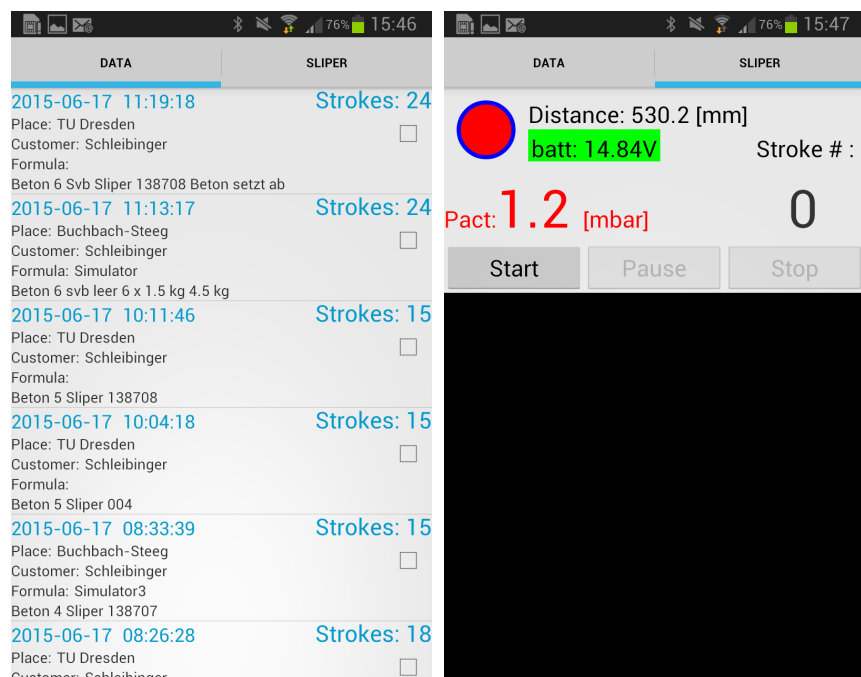
If Bluetooth is not enabled, the app will ask the user to enable it ("Bluetooth permission request" window). When the connection is established, the blue LED "BLUETOOTH" on the SLIPER is lightning constantly.

For more details about Bluetooth see chapter 8.

#### 3.2 Requirements for a smart phone

Any smart phone with Android 4.4 and higher and the integrated Bluetooth transceiver can be used.

The SLIPER smart phone app is a non-market app. To allow installation of non-market apps on other smart phones then delivered, please enable "Unknown sources" on your Android device (Settings -> Security -> Device administration).



(a) DATA tab - for the transferred measure- (b) SLIPER tab is a dashboard for the remote  
ments stored in the internal database of the control of the SLIPER via Bluetooth and dis-  
smart phone app and for the forecast comput- plays the current measured data  
ing

Figure 5: The data and the SLIPER tab of the app. You can switch between the tabs by taping the index tab or just by sweeping to left or right

### 3.3 Download of the Sliper app

The latest version of the SLIPER app for the smart phone `sliper.apk` can be downloaded from the SLIPER download page.



Figure 6: Scan QR code to open the SLIPER app download page.

## 4 Preparation of the SLIPER

Unpacking and assembling of the SLIPER are shown in a short video. See chapter 5 for QR code.

### 4.1 Placing the batteries into the SLIPER

The SLIPER is operating with a rechargeable battery pack (LiPo 14,8V - 4600mAh). The battery pack is inserted on the side of the electronic unit and good for more than 24 hours of continuous measurements.

- Put the battery pack in the right direction. Observe the space for the contact, keep it clean and dry.
- Use only a genuine battery pack!
- If not using the device for longer time, take out the battery pack!
- Recharge the battery pack using the delivered charger.

After placing the battery pack, switch on the electronic unit to test if the blue diode is lighting! If yes, the battery pack is placed correctly.

Preparation of the SLIPER

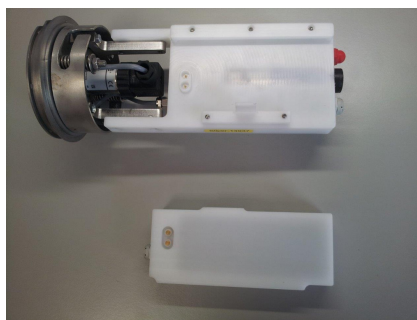


Figure 7: Mounting the battery pack: Keep the electrical contacts clean and dry.

Battery pack warnings!

The settings of the SLIPER are saved even if the battery pack is changed.

- Do not mutilate, puncture, or dispose a battery pack in fire. The battery pack can burst or explode, releasing hazardous chemicals.
- Discard used battery packs according to the manufacturer's instructions and in accordance with your local regulations.





Figure 8: Insert the battery pack until the tongue snaps

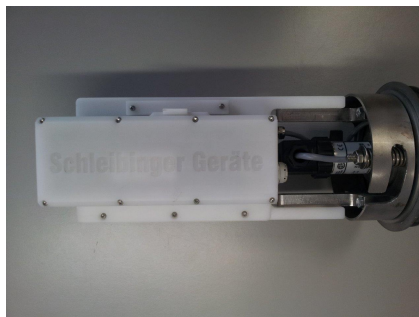


Figure 9: Mounting the battery pack: Battery pack is inserted in the final position.



Figure 10: The power switch of the SLIPER: For Power-ON push the red button on the control unit. The blue LED is blinking if a Bluetooth connection is not established. The black ring in the middle is the head of the ultrasonic distance sensor. The grey button on the far left is the vent flap.

## 4.2 Control of the battery status

Open the SLIPER app, choose the **SLIPER** tab. An actual value of the supply voltage of the SLIPER in the form Battery: = 14,79 V will be shown.

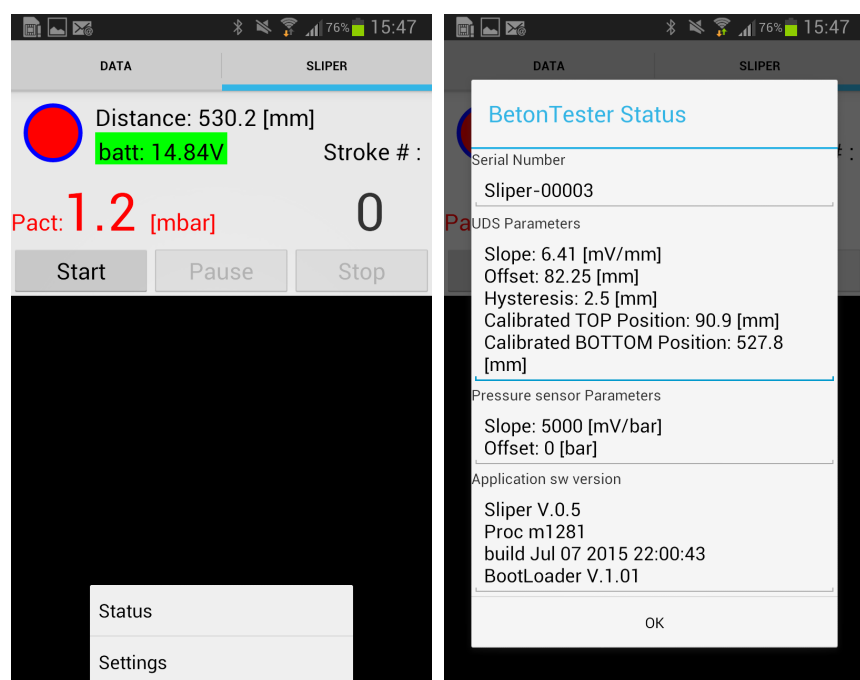
The value should be higher than 14,5 Volt (green background) if a longer series of the measurements is planned. If the supply voltage is lower than 14 V (red background), change the battery pack immediately.

If the SLIPER is switched on, the supply voltage is checked every two minutes and sent to the smart phone.

Before you start a series of measurement, we advice you to control the SLIPER settings.

Open the SLIPER app, choose the **SLIPER** tab, tap the Menu button (left down corner) and tap the command button Status. Just a few seconds later you receive information about the actual settings of the SLIPER on the smart phone display.

For more setups see chapter 7.



(a) Tap the Menu button (left down corner) and choose the command button Status (b) SLIPER status window shows current settings.

Figure 11: The status window shows you actual informations about the SLIPER

## 4.3 Power-ON, Power-DOWN and Power-OFF

For Power-ON push the red button on the control unit. The blue LED is blinking. The SLIPER is now ready for use.

You can switch off the SLIPER by pressing the red button.

The SLIPER is going to power save state after 20 minutes without activity. Restart is possible by switching the red button off and on.

#### 4.4 LED indicators

LEDs	Notation	off	blinking	on
LED - blue	Bluetooth	SLIPER off, no battery	SLIPER on, discon- nected	connected

#### 4.5 Inserting the electronic unit into the SLIPER

After placing the accu pack, switch on the power and test the connection to the smart phone. The electronic unit can be inserted and fixed in the stand tube.



Figure 12: Turn the electronic unit until the bayonet snaps.

#### 4.6 Leveling the SLIPER

The SLIPER must be **vertical**. Turn the adjustable feet to set it up properly. You can use also a pre-installed spirit level app on the smart phone.

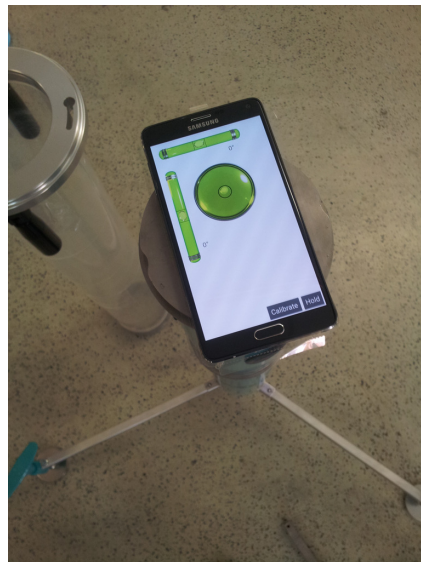


Figure 13: Leveling by means of a spirit level app.

## 5 Handling

A short video about unpacking, preparing and operation can be seen here:



Figure 14: Scan QR code to watch the video

From the SLIPER dashboard (tab SLIPER) starts the data acquisition, sensors are activated and the display shows information (about 5x per second) of the current pressure, distance (position of the pipe), number of transferred hubs and battery voltage. Data is continuously written in the measurement data storage. The oldest data is overwritten with the current, so that the stored data for the last 57 seconds are always present.

The pipe is in the upper position (traffic light turns green). When the distance of the pipe to the bottom falls below the reference point for the upper position, the actual pair of measured values is marked as start time with a time stamp and the traffic light on the dashboard changes to yellow.

When the pipe hits to the lower position, the actual pair of measured values is marked as the end point with a time stamp and the traffic light on the dashboard turns red. From the start time a reserve is (currently 2 sec.) taken off and added to the end time. The measured values recorded during this interval are now transferred to the control unit and stored there as a hub. You can move the pipe to the upper position and make additional measurements. If the current series of measurements is completed, the STOP button on the keypad must be pressed. To start a new series of measurements to acquire new data press START. The PAUSE button disables/enables automatic stroke recognition to e.g. perform changes on the measuring equipment.

### 5.1 Preparing the hardware (SLIPER) and software (SLIPER app)

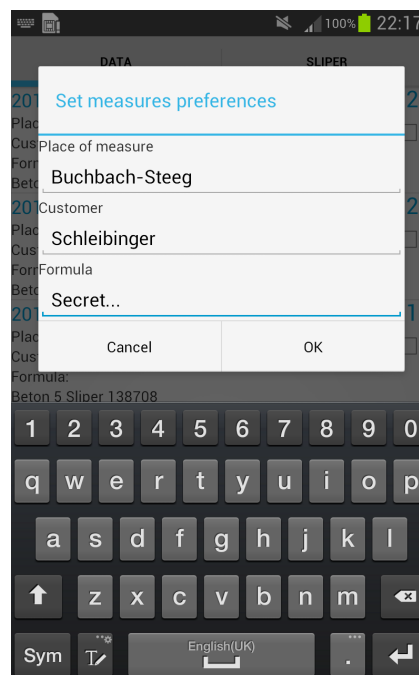
- Open the SLIPER app and switch to tab **DATA**. Tap to Menu button and tap to Measure Preferences. You can set the preferences for the next series of measurements like place of measurements, customer name or description of the tested recipe. These can be modified later as well.
- Switch on the SLIPER electronic unit with the red button. After a few seconds the blue LED is blinking.
- Insert the electronic unit into the SLIPER, set the lower tube piece on the SLIPER and insert the reflector bar (square) in the designated cut in the tube.
- Move the tube into the bottom position
- In the SLIPER app switch to tab **SLIPER**. A Bluetooth connection is established, the blue LED on the electronic unit lights up continuously and on the SLIPER dashboard around the traffic light lights a blue ring.

- Tap to the **“Start”** and **“Pause”** and check, if the position traffic light is red (distance value about 540 mm)
- Move the pipe into the top position, the traffic light changes to yellow and in the end position to green (distance value about 85 mm)
- Check also the battery status - battery indicator on the dashboard should be on a green background
- Mount the upper piece of the tube
- Move the tube to the bottom position for the filling
- Fill the upper half of the tube with ca. 6.5 litres specimen
- Move the tube to the top position and lock the pipe by turning the pipe counter clockwise
- Tap to **“Continue”** button on the SLIPER dashboard.  
The position traffic light is green, the stroke counter is set to 0 and the pressure shows the static pressure of the specimen. The SLIPER is now ready for the first stroke.

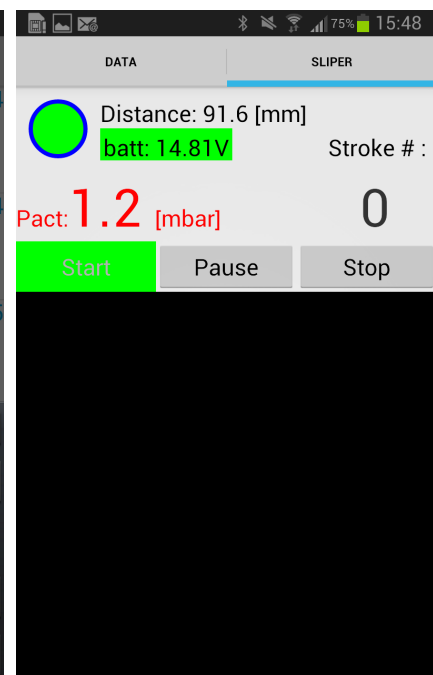
## 5.2 Performing a measurement

### Hints about measurements

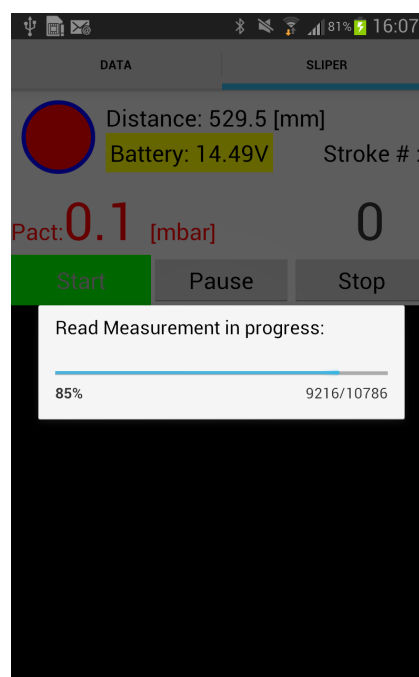
- Unlock the tube by turning the pipe clockwise and let it slide down
- When the tube is sliding, the traffic light changes to yellow and when the tube reaches the bottom, the traffic light changes to red. The stroke is finished, the dataset will be transferred to the smart phone indicated by a progress bar.
- When the data transfer is finished, the pipe can be moved into the top position, repeat the stroke or change the rate of fall by putting on additional weight.
- Each stroke is inserted in a measurement until you stop the data acquisition. When re-starting data acquisition a new measurement will be created.
- When you tap to the PAUSE button, the data acquisition (automatically stroke recognition) is interrupted but the measurement values are still transferred to the smart phone. So you can make a test, if the pipe is sliding or if the positions on top or bottom are recognized correctly.
- During the measurement, all strokes are transmitted. Evaluation of the data takes place on the smart phone.



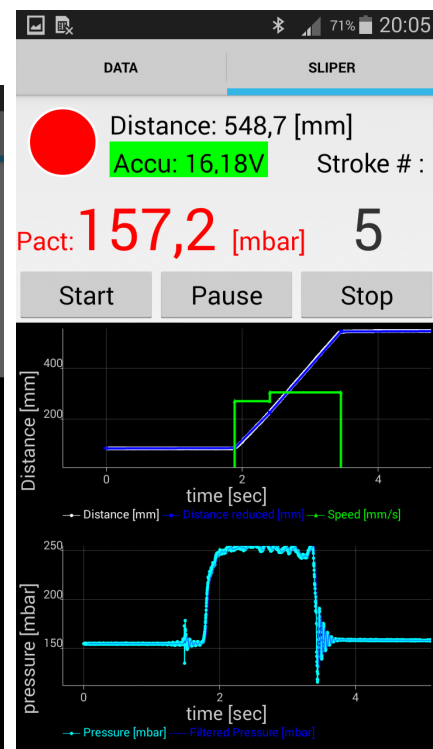
(a) Set preferences



(b) Start measurement



(c) Read a data set



(d) Stop data acquisition

Figure 15: The dataset of the last stroke is automatically transferred to the smart phone. Recently transferred stroke is displayed graphically in the SLIPER dashboard

### 5.3 Evaluation of measurement data

To create a reliable forecast as many strokes as possible are necessary. At least three strokes for each load are recommended.

- In the SLIPER app switch to tab DATA. Tap to Menu button and tap to Forecast Preferences. Forecast preferences can be set for the next series of measurements like diameter or length of the pipe, delivery output e.t.c. These can be modified later as well.
- Go back to tab DATA and tap to the measurement to be evaluated.
- A menu window appears. A comment can be entered or the forecast preferences for the selected measurement(s) can be changed.
- Choose view results/calculate forecast.
- A table of strokes appears.
- Invalid strokes are marked.
- By swiping the screen to the left the p-Q chart of strokes comes up.
- By swiping the screen further shows charts of individual strokes

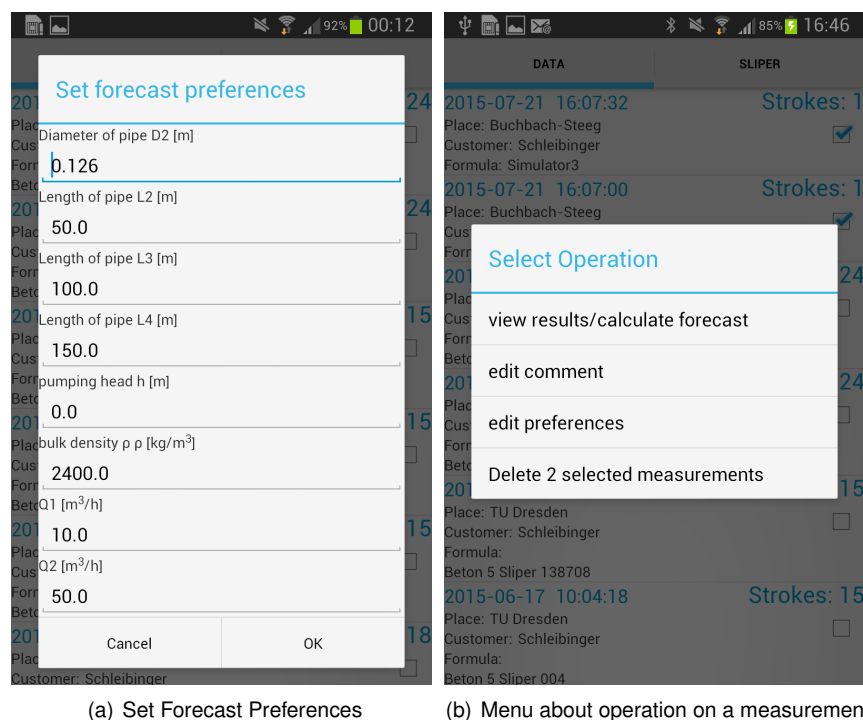
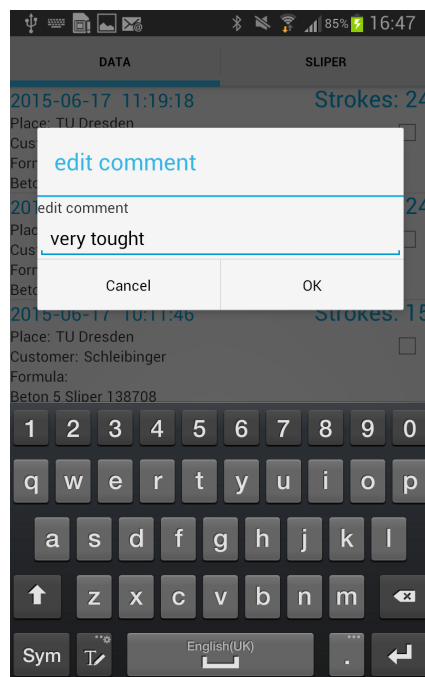


Figure 16: Tap and hold the selected measurement. A menu about operation on a measurement appears.

#### 5.3.1 Invalid stroke

The SLIPER does detect an invalid stroke automatically. A stroke is invalid when the detected speed is negative or zero. Invalid strokes are removed from the forecast calculation and marked automatically in the table of strokes. You can irretrievably delete marked strokes by tapping to the trash can icon in the left bottom corner or you can de-select it for forecast calculation.





(a) Edit a comment: You can change preferences for the forecast computing or you can enter a meaningful note for better identification.

Measurement: 2015-06-17 11:19:18

**Table of Strokes**

Place: TU Dresden  
 Customer: Schleibinger  
 Formula:  
 Comment: Beton 6 Svb Sliper 138708 Beton setzt ab

Strokes:

Stroke	Px [mbar]	Qx [m³/h]
1	19.8	7.76
2	25.7	8.39
3	34.7	8.74
4	37.1	12.87
5	42.2	12.77
6	39.3	12.38
7	53.6	15.83
8	58.6	16.24
9	50.6	16.01
10	59.8	19.88
11	65.2	20.53
12	57.1	20.53

(b) Table of strokes

Figure 17: Table of strokes: When you choose “view results/calculate forecast” a new level appears. Here you can manage (de-select for the forecast calculation or delete) the strokes within a measurement. Selected strokes with the grey background are ignored for the forecast calculation. You can irretrievably delete it by tapping to the trash can icon in the left bottom corner. Trash can icon appears only when a stroke is selected.

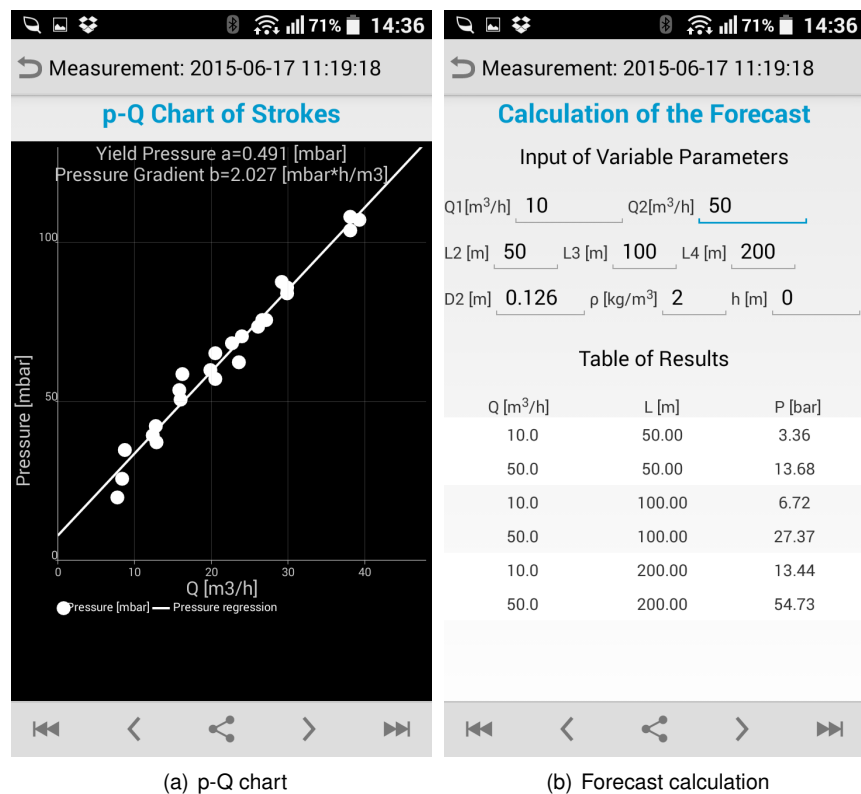
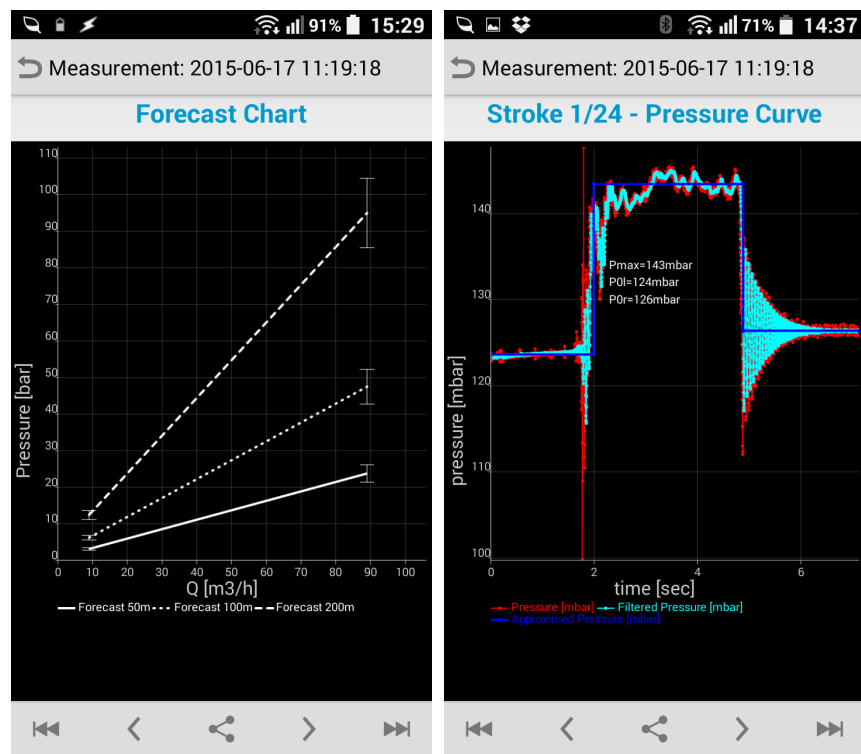


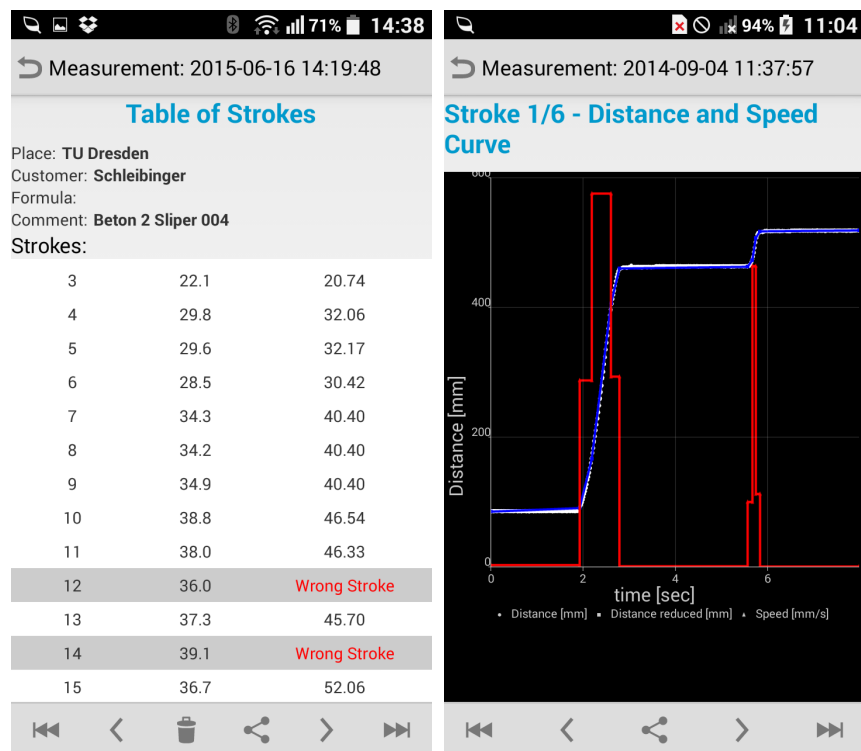
Figure 18: The table of strokes in a p-Q chart and the calculation of the forecast in the numerical format (in the lower half of the screen the forecast for two prescribed volume outputs and three different pipe lengths is shown. In the section Input you can change the variables for the forecast calculation.



(a) Forecast chart

(b) Pressure curve

Figure 19: Results of the forecast computing in the graphical representation. By swiping the screen to the left a detailed graphical representation of the distance and pressure curve of each stroke will come up.



(a) Invalid strokes in the table of strokes. Invalid strokes are removed from the forecast calculation and marked automatically in the table of strokes.

(b) Example of an invalid stroke

Figure 20: Invalid strokes.

### 5.3.2 Error bars

Calculating the needed pump pressure is a forecast. To show possible variations in the results graphically, you can display error bars in the forecast chart (also from the measurement generated report). In the Data menu go to Forecast Preferences and set the Error Bar Tolerance to 10 or 20 percent (last entry at the bottom).

### 5.4 Deleting selected measurements

You can delete selected measurements (multiple choice) or all measurements at once.

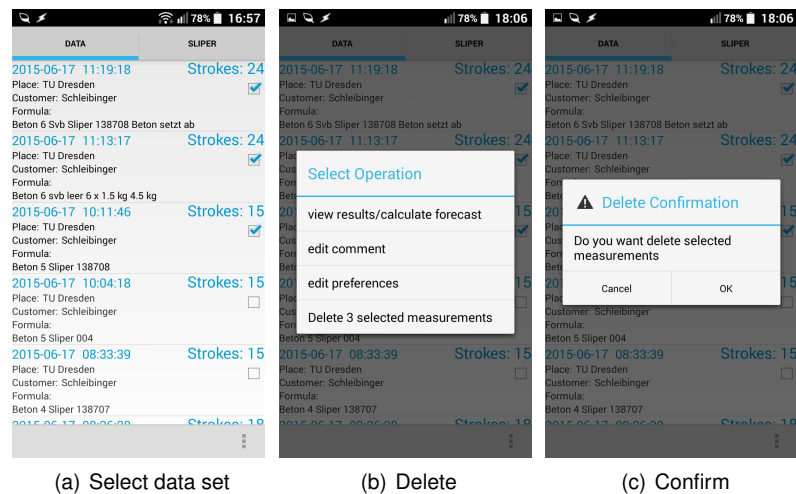


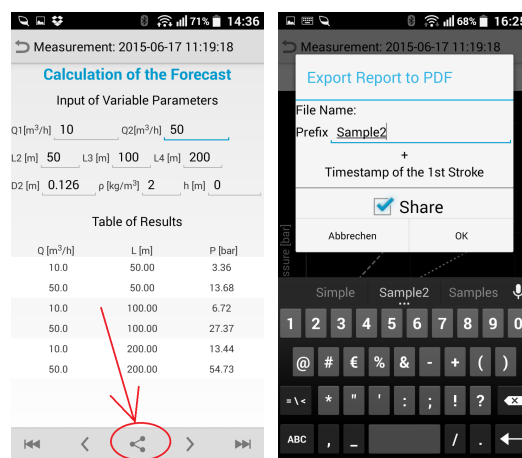
Figure 21: Select the data set you want delete, tap and hold on the selected item. Chose “Delete” and confirm if you are really sure.

## 5.5 Create a report

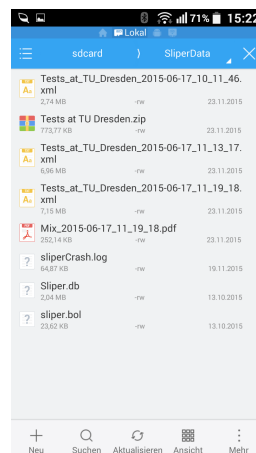
Using the share button a pdf - report can be generated including stroke and forecast charts, basic data, stroke overview, forecast table at preferences input data and all device parameters during the measurements. Name of the generated report file can consist of two parts:

- optional from a free selectable prefix of character string
- mandatory from a time stamp of the first stroke

Pdf report files are stored in the folder sdcard0/SliperData on the smart phone. You can immediately share the generated pdf-file using your preferred way.



(a) Tap and hold the share button (b) Enter a name for the report file



(c) pdf report files are stored in the folder sd-card0/SliperData

Figure 22: Report file in a pdf-format

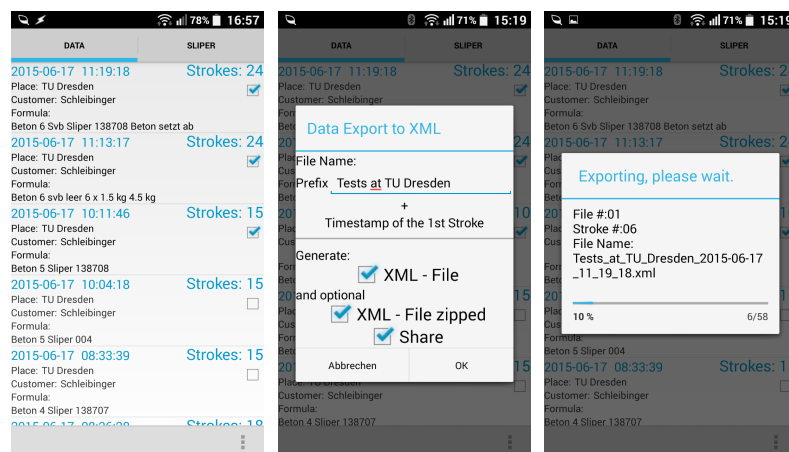
## 5.6 Export data into Microsoft Excel

The SLIPER app provides a way to export all data of each measurement into Microsoft Excel. In the **DATA** tab select the measurements to be exported and tap to the MENU button (left corner on the bottom of the smart phone) and select “**Data Export**”. A dialog box appears. Name of the generated XML-file can consist of two parts:

- optional from a free selectable prefix of character string
- mandatory from a time stamp of the first stroke

Because the generated XML files can be large (> 5 MB), there is the option for zipping it automatically to make the mobile sharing more effective.

Just enter a meaningful prefix for the name of the generated XML-file and choose if you want to generate also a file with zipped XML-files or sharing of the results. A dialog box shows the export progress.



(a) Select measurement(s) to be exported. Open MENU; tap "Data Export" XML-file.  
(b) Here you can enter a meaningful name for the XML-file.  
(c) The export may take several seconds to minutes. A dialog box shows the export progress

Figure 23: Export data to Excel

The export may take several seconds to minutes. XML-files are stored in the folder `sdcard0/SliperData` on the smart phone. This is a central exchange folder also for all other files like update files for the device or database of the measurement data. This folder is created by the SLIPER app in the internal storage of the smart phones. "sdcard0" in the path above is not the external memory card, it means the **internal** device storage.

We suggest to connect the smart phone to the host PC via USB for file handling. The modern operating systems map the storage space of the smart phone as two drives: phone and card (if inserted). Look up on the internal phone drive for the SliperData folder.

On the PC with installed Microsoft Excel just open the xml file. Each measurement data set is presented as a separate xml file.

In the first sheet called "Results" of the xml file are stored basic data, stroke overview, forecast table at preferences input data and all device parameters during the measurements. Raw data for each stroke is stored in next sheets "Stroke\_1" to "Stroke\_N".

A1		f <sub>x</sub>		Export Date						
	A	B	C	D	E	F	G	H	I	
1	Export Date	2015-07-15								
2	Export Time	16:48:29								
3	Comment									
4	Place	Regensburg								
5	Customer	Afran								
6	Formula	Workshop 2015 -4								
7										
8	Stroke	Date [yyyy-n	Time [hh:mm	Duration [se	pmax [mbar]	P0l [mbar]	P0r [mbar]	p [mbar]	Q [m3/h]	
9		1 2015-03-12	15:29:19	4,64	196,36	152,74	157,75	43,61	4,76	
10		2 2015-03-12	15:29:42	3,43	204,71	153,97	157,86	50,74	6,44	
11		3 2015-03-12	15:30:05	2,87	212,25	153,64	157,99	58,61	7,69	
12		4 2015-03-12	15:30:31	2,45	219,39	153,95	158,22	65,45	9,01	
13		5 2015-03-12	15:31:00	1,56	252,99	154,73	158,26	98,26	14,12	
14										
15	Forecast at following input parameters									
16	Output Q1 [r	10								
17	Output Q2 [r	89								
18	Length of pi <sub>j</sub>	50								
19	Length of pi <sub>j</sub>	100								
20	Length of pi <sub>j</sub>	200								
21	Diameter of	0,13								
22	bulk density	2,4000001								
23	pumping hei	0								
24										
25	a [mbar]	0,84								
26	b [mbar*h/n	4,55								
27	u [mbar]	5,93								
28	v [mbar*h/n	13,48								
29										
30	Output Q [m	Length of pi <sub>j</sub>	Pressure [bar]							
31	10	50	7,13							
32	89	50	52,90							
33	10	100	14,26							
34	89	100	105,80							
35	10	200	28,52							
36	89	200	211,60							
37										
38	Device parameters									
39	Serial Numb	Sliper-00004								
40	Diameter of	0,13								
41	Length of rhi	0,5								
42										
43	UDS - Slope [	6,4								
44	UDS - Offset	82,3								
45	Pressure Ser	5000								
46	Pressure Ser	10								
47										
48										
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51										
52										
53										
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Figure 24: A measurement data set shown in Excel



If you start a new series of measurements, it is the best to delete all previous measured data from the smart phone (assuming they are already transferred to a PC). See chapter 5.4 for deleting data sets from the smart phone.

## 5.7 Data transfer to the PC

Back to the office you can transfer the measurement data or report files to a common PC under Windows, MacOS or Linux. To export the measurements, the XML-file format is specified. How to create a XML-file of the dataset transmitted from the SLIPER and stored on the smart phone internally see previous chapter 5.6 Export data into Microsoft Excel. How to create a report file see chapter Create a report 5.5 .

There are several ways to transfer data to the PC

- USB - cable
- By e-mail
- Share by Dropbox or other cloud services
- Download by AirDroid (a pre-installed app to transfer files to and from your smart phone device via web browser)

The dialog box for generating a report or XML-file offers a way for direct share of the results by preferred and installed services (as an E-mail attachment in E-mail or G-mail, Google Drive, Dropbox, AirDroid etc.).

## 6 Database management on the smart phone

On the smart phone all measurements are saved in the internal database of the application program.

You can

- export the database with all measurements to secure them, archive or transfer to another smart phone. Exported database file is called `sliper.db` and is saved in the folder `sdcard0/SliperData` on the smart phone.
- import the database from another smart phone. It is expected a file `sliper.db` in the folder `sdcard0/SliperData` on the smart phone.
- delete the database with all current measurements

### 6.1 Export/Import the database

Commands for the database management are in the Expert Settings Menu and protected by a password (2603).

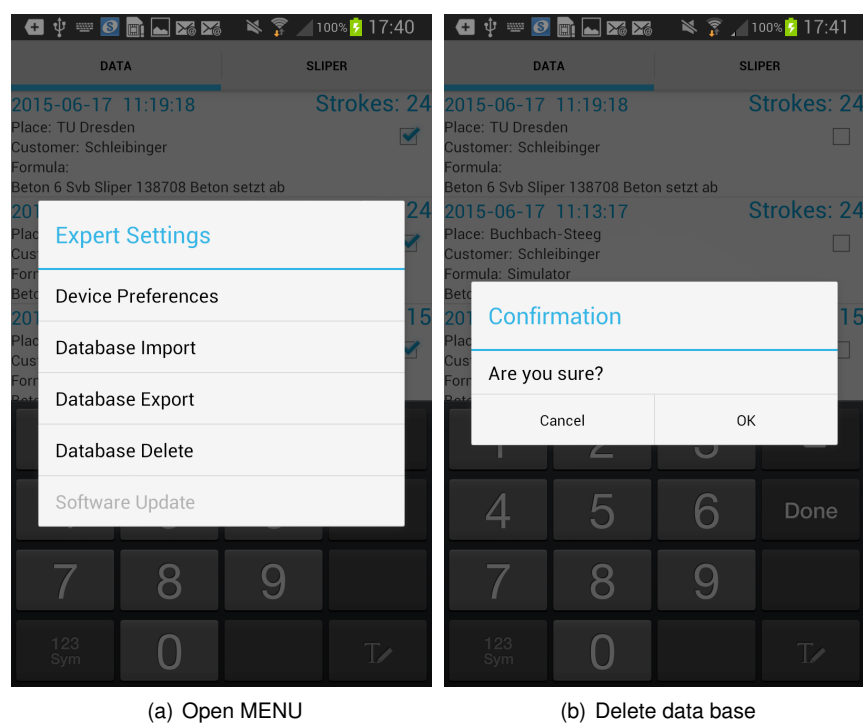
The imported database is expected in the folder `sdcard0/SliperData` on the smart phone.

In the DATA tab tap to the MENU button (left or right corner on the bottom of the smart phone) and select “Expert Settings”, enter password (2603) and choose “**Database Import**” for importing a `sliper.db` database or choose “**Database Export**” for exporting a `sliper.db` database to the folder `SliperData`. The previous database will be overwritten without notice.

### 6.2 Deleting the whole data base

You can also delete all data sets in the smart phone at once by deleting the internal database.

In the DATA tab tap to the MENU button (left or right corner on the bottom of the smart phone) and select “Expert Settings”, enter password (2603) and choose “**Database Delete**”.



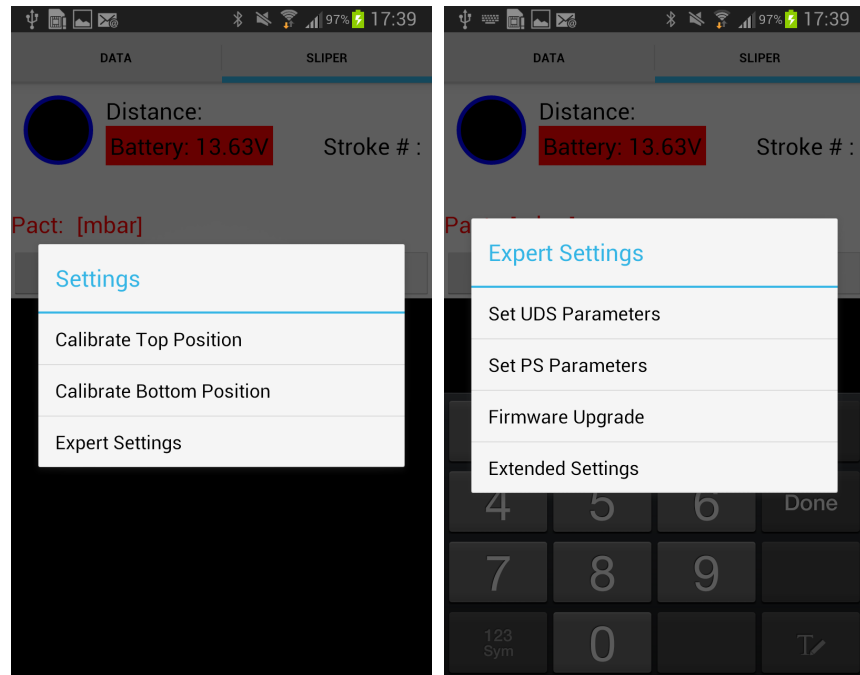
(a) Open MENU

(b) Delete data base

Figure 25: Deleting a data base: Open MENU, in the “Expert Settings” tap “Database Delete” Confirm if you are really sure

## 7 Settings

In this menu the basic settings of the SLIPER can be changed. All functions require a data transfer between smart phone and SLIPER. Switch to the **SLIPER** tab and tap to the MENU button (left or right corner on bottom) and select “**Settings**”



(a) Settings - Level 1

(b) Expert Settings - Level 2

Figure 26: SLIPER settings

### 7.1 User settings

These options are for the user and have the following means:

- Calibration of the top position of the pipe
- Calibration of the bottom position of the pipe
- Expert Settings - next settings level. Protected by password.

### 7.2 Expert settings

These options are for the service. Contact please the company Schleibinger Geräte before you make any changes. The password is 2603. The means are as follows:

- Set UDS Parameters - to set the parameters for the Ultrasonic Distance Sensor
- Set PS Parameters - to set the parameters for the Pressure Sensor
- Firmware Update - to update the firmware in the electronic unit
- Extended Settings - next settings level to set the deep machine configuration. Protected by another password. Reserved for service purposes only!

### 7.3 Menu structure for the SLIPER tab

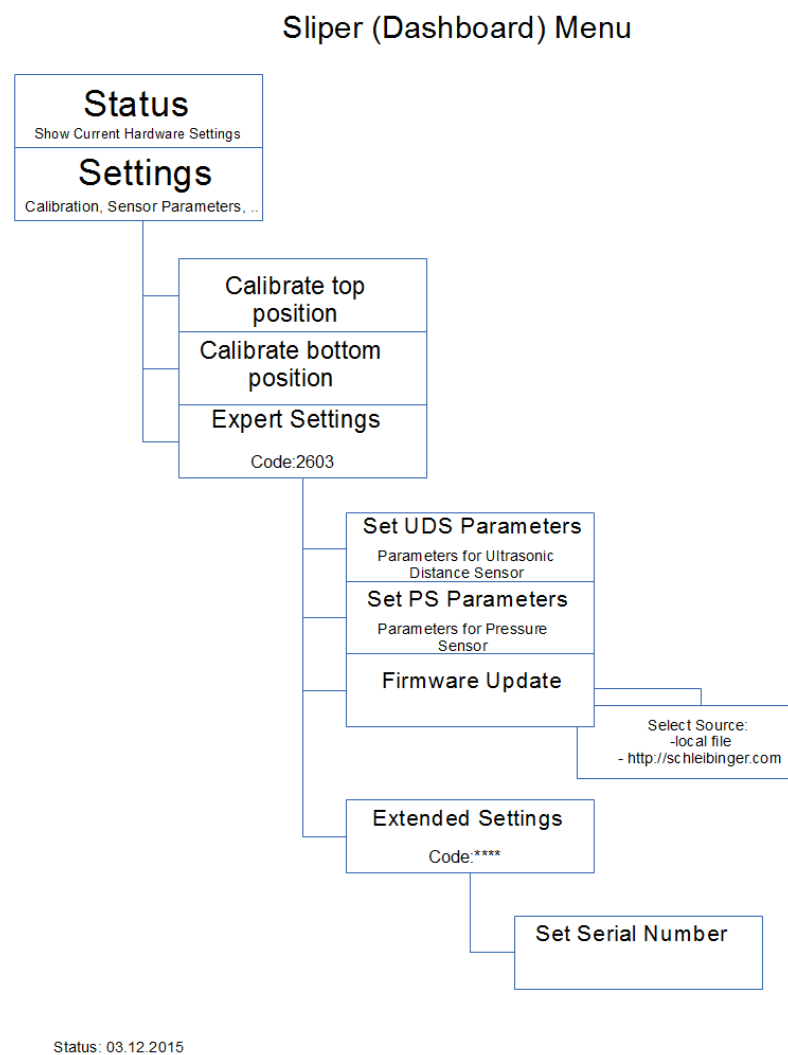


Figure 27: Menu structure SLIPER tab

7.4 Menu structure for the DATA tab

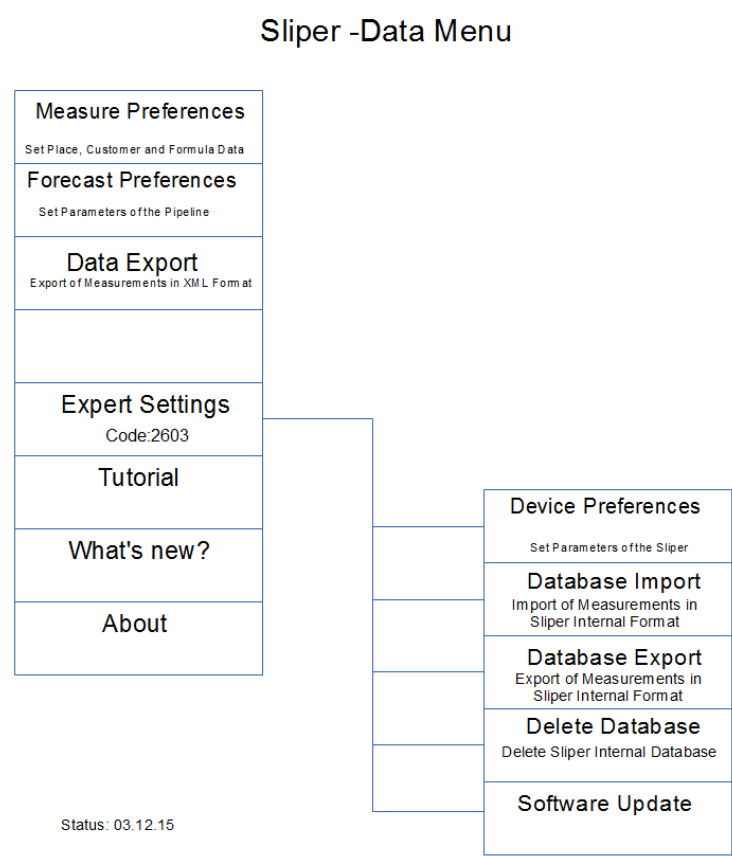


Figure 28: Menu structure data tab

## 8 Bluetooth

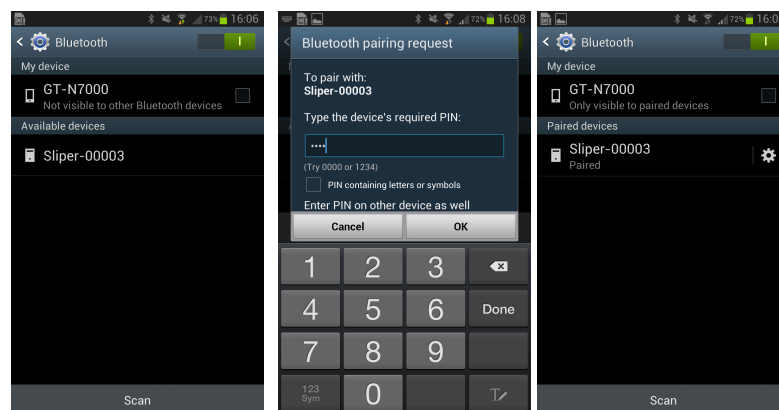
Any smart phone with integrated Bluetooth transceiver can be used. The SLIPER can be connected only with one smart phone at the same time.

To activate Bluetooth on the smart phone, on the Applications screen tap Settings → Bluetooth, and drag the Bluetooth switch to the right.

### 8.1 Pairing with other smart phones

On the Applications screen of the smart phone, tap Settings → Bluetooth → Scan, and detected devices are listed.

Select the device “Sliper-XXXX”, and enter the required PIN = 1234



(a) Scan for Bluetooth devices

(b) PIN input

(c) Paired devices

Figure 29: Pairing procedure

### 8.2 Bluetooth range

Because it is not easy to transmit data from a metal tube (functions like a shield), therefore don't use the smart phone at the limit of the transmission range.

The data transfer works best when the smart phone is towards the slits of the metal tube.

Right order to connect a smart phone with the SLIPER:

- on the smart phone exit the SLIPER app. By closing the SLIPER app the Bluetooth connection on the smart phone is disconnected (defined initial state).
- switch on the power on the SLIPER - the blue LED will be blinking
- open the SLIPER app and go to the dashboard (SLIPER tab) - the Bluetooth connection is established - the blue LED is on, on the dashboard a small window "Connected to Sliper-XXXXX" appears.

At this point you can send a command to the SLIPER (for example a status check or start a measurement). SLIPER answers with a simple confirmation or sends back a small data packet (ping-pong communication).

If you start the measurement, the smart phone is going into receive mode. The SLIPER sends every 284,5 ms (3,5 times a sec.) a short

data packet with current value of the pressure and distance. These values are shown on the display. On the SLIPER dashboard around the traffic light lights a blue ring - this is an indication of incoming data.

If the data stream is interrupted (smart phone too far from the SLIPER) a small window "Data transfer interrupted - Move closer to the SLIPER" appears.

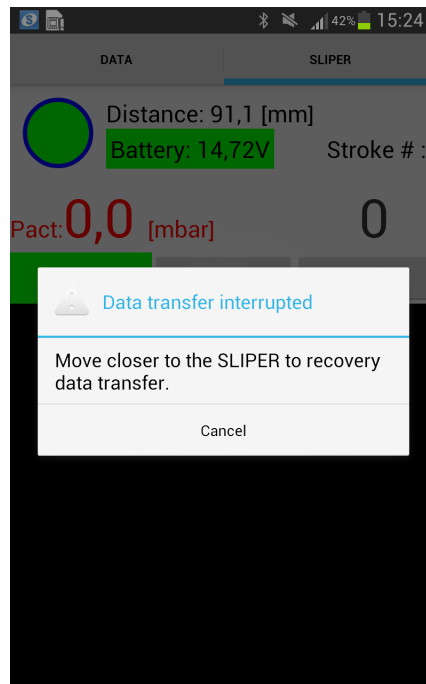


Figure 30: Data transfer interrupted

By going closer to the SLIPER, the user can recover the data flow without losing the connection during a small time window which depends on the type of the smart phone. It is not optimal if the data flow is interrupted during the stroke and the following data transfer to the smart phone.

When a stroke is finished, the dataset will be transferred to the smart phone indicated by a progress bar. In this moment a datastream is sent to the smartphone. The length of the datastream depends on the duration of the stroke. 1800 bytes are transmitted per second of the stroke.



## 9 Technical specifications

Pipe diameter: 125 mm  
Filling height: 500 mm  
Pressure range: 0- 1 mbar  
Handling: Power switch + external smart phone (part of the delivery!)  
Interface to the smart phone: Bluetooth 2.0  
Power supply: LiPo power rechargeable battery pack 14,8 V 4600mAh  
Weight: ca. 9,9 kg

Weights: 2 x 2,5 kg and 2 x 5 kg

Smart phone:  
Samsung GalaxyNote (current model)  
Display: HD Graphic AMOLED 5,5" LCDisplay (1280 x 720)  
or  
Kyocera Torq (current model)  
Display: 4,5" LCDisplay (1280 x 720)



CE Compliance Statement This product was tested by Schleibinger Geräte Teubert u. Greim GmbH. and found to comply with all the requirements of the EMC Directive 89/336/EEC as amended.

## 10 Contact to the manufacturer

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84428 BUCHBACH  
Germany  
Tel. ++49-(0)8086 94010  
Fax. ++49-(0)8086 94014  
info(at)schleibinger.com

<http://www.schleibinger.com>

Version: 04.02.2016 14:02:00 The latest version of this manual can be obtained here.



Just scan the QR code !

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