

Partial Translation of the german original instructions

## Operating Manual

Plate Bearing Tester AX<sup>®</sup> 01a

acc. to DIN 18134:2012-04  
acc. to CNR BU 146 1992-12, Consiglio Nazionale delle Ricerche  
acc. to TSC 06.720:2003, REPUBLIKA SLOVENIJA  
acc. to NF P94-117-1:2000-04, Norme française  
acc. to SN 670 317b:1998, Norme Suisse  
acc. to ÖNORM B4417:1979-12, Austrian Standards Institute  
acc. to SB250 Hoofdstuk 4.16 – SB2000 D 50.01, Belgien  
acc. to MSZ 2509-3 : 1989, Hungary



Anix GmbH, Subject to change without notice, V4.0 – April 2014

**Settings of your device at delivery:**

device no:	
lever ratio:	1:-1.00
plate diameter:	300 mm
standard:	DIN 18134: 2012-04
language:	English

Please get the calibration factors from the calibration certificate in the appendix.

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## 1. Application

The purpose of the Plate Bearing Tester AX<sup>®</sup> 01a is to determine load-settlement curves of soils and sub-bases. The obtained load-settlement curves enable the user to evaluate deformability and load-bearing capacity.

The following standards are supported:

- DIN 18134:2012-04 (Germany, strain moduli  $E_{v1}$ ,  $E_{v2}$ )
- CNR BU 146 1992-12 (Italy,  $M_{dr}$ ,  $M'_{d}$ )
- TSC 06.720:2003 (Slovenia,  $E_{v1}$ ,  $E_{v2}$ )
- NF P94-117-1:2004-04 (France,  $E_{v2}$ )
- SN 670 317b:1998 , (Switzerland,  $E_{v1}$ ,  $E_{v2}$ ,  $M_{E1}$ ,  $M_{E2}$ )
- ÖNORM B4417:1979-12, (Austria,  $k_s$ ,  $E_{v1}$ ,  $E_{v2}$ ,  $M_{E1}$ ,  $M_{E2}$ )
- SB250 Hoofdstuk 4.16 – SB2000 D 50.01, Belgien
- NF P94-117-1:2000-04, Norme française
- MSZ 2509-3:1989, Hungary

Load-settlement curve parameters are measured by sensors. Sensors comprise a load cell and an inductive displacement transducer. The measured variables are shown in the display during the test and can be saved by simply pressing a button at the end of each load increment. Upon completion of testing, results can be output on a small built-in printer and automatically saved on a memory card.

All data can be uploaded to a PC via a card reader. A template is provided to import data directly into Excel<sup>®</sup>. Optionally, software is available to save data in export formats (ASCII \*.csv file, GGU \*.pdr file).

### Technical data

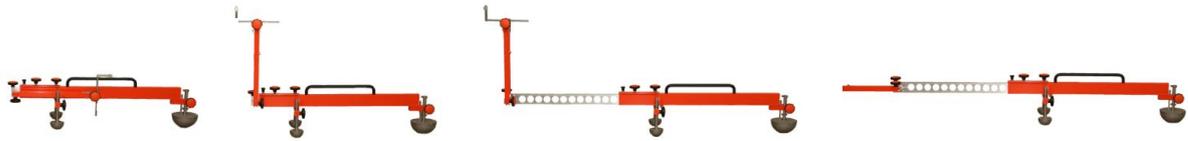
Electrical parameters:

Load cell measuring range	0-100 kN
Displacement transducer measuring range	1:-1 - +2,5 mm, -12,5mm 1: 2 - -2,5 mm, +27,5mm
Voltage supply	Built-in rechargeable NiMH battery 4.8 V 3.8 Ah, charging time 2 h, 12-V power pack (100-240 V, 50-60 Hz), 12-V/24-V car power cable
Printer	Thermo-printer, Paper width 58 mm, roller diameter 60 mm
Memory card	SD (Secure Digital) Memory Card for approx. 200 measurements
Operating temperature	0 °C - +38 °C
Lager temperature	-5 °C - +45 °C, observe battery charge!
Air humidity	20 % - 70 % RH, non-condensing

Mechanical parameters:

Measuring bridge	Length: 1139-2300 mm Width: 352 mm Height: approx. 300 mm
Hydraulic system	Load: min. 100 kN, hand pump Pump stroke: min. 150 mm
Pressure gauge	0 – 390 bar, 0 - 0.8 MN/m <sup>2</sup>
Loading plate	Steel, Ø300 mm x 25 mm

## 2. Test set-up

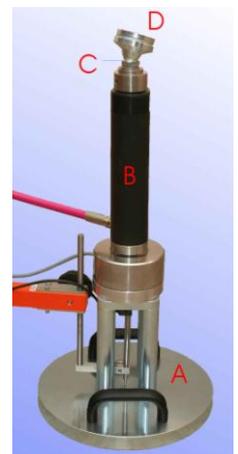


### 2.1. Actions prior to test set-up

Inspect the measuring device, cables, load cells, displacement transducers, plug connectors, pump, hose, cylinder and measuring bridge for visible damage! Do not mount and use the system if any damage is found! Risk of death! Please, consult Anix GmbH. Charge the battery of the measuring device with the supplied power pack before using the Plate Bearing Tester.

### 2.2. Setting up the loading plate

- Prepare a test area of sufficient size to accommodate the loading plate.
- Level the test area to a smooth plane (e.g. with a trowel or a spatula).
- Remove all loose materials (e.g. with a brush).
- Place the module 'Loading plate / Load cell A' on the test area (press in place with a slight rotary movement).
- For rough surfaces, pour a thin layer of fine medium-grained sand to improve the contact area between plate A and sub-grade.
- Horizontally align the adjustable level indicator in order to detect any tilting of loading plate A during the test.

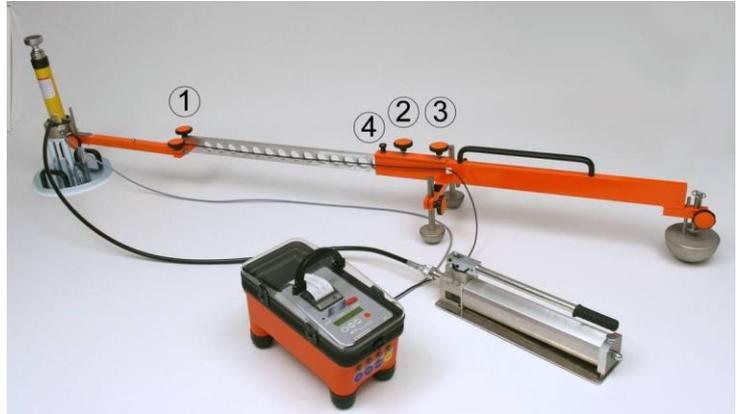


### 2.3. Setting up the loading device

- Arrange a stable girder of a loaded truck (axle load >4.5 t), a roller or another counter-weight above the plate with sufficient space to place the loading device underneath.
- Slip the hydraulic cylinder B onto the module Loading plate A.
- Attach the magnetic ball joint D to a stable point at the truck or roller.
- Operate the hydraulic pump until piston C of cylinder A projects so far that it contacts the upper ball joint D but do not yet exert a load! Avoid jamming of the ball joint bolt in piston C.
- Use spacers to extend the piston of cylinder B.

## 2.4. Setting up the deflection beam

- Place the measuring bridge on the soil at a distance of ca. 1.5m from loading plate A.
- Loosen star knob 1. Swing out the front support arm by ca. 90°. Retighten star knob 1.
- Loosen star knob 2+3. Briefly lift stop bolt 4 and pull out the perforated section until stop bolt 4 engages. Retighten star knobs 2+3.



- Loosen star knob 1, swing out the front support arm by another 90°. Retighten star knob 1.
- Select the holder for the displacement transducer (250mm / 500mm). Fasten the holder to the support arm E.
- Mount the displacement transducer to holder E (cable direction towards measuring bridge).
- Place the cable loosely from the displacement transducer into the two provided cable brackets on the measuring bridge side to the front feet of the measuring bridge.

- Align the measuring bridge so that the tip of the displacement transducer is placed at the centre of the loading plate.
  - Align the system carefully. Avoid damage to the displacement transducer.
  - Use the adjustable feet for height adjustment and rough alignment.
  - Align the front support arm (Loosen/tighten star knob 1). Use the mounted level indicator.
  - Check all star knobs, bolts and nuts for firm tightening.
  - Later on, use the measuring device for exact vertical alignment of the displacement sensor.
- Insert the plugs of the two sensors into the measuring device (observe colour coding!).

**Now the system setting has been completed.**

### Informative note regarding application of loads to the loading plate / load cell:

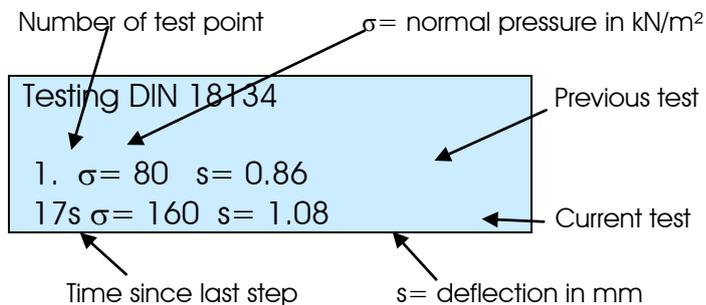
- Close the pressure relief valve at the hydraulic pump.
- Operate the hydraulic pump until piston C of cylinder A projects so far that it contacts the upper ball joint D.
- Avoid jamming of the ball joint bolt in piston C.
- Pressure is built up by further actuation of the hydraulic pump. The corresponding force is displayed on the measuring device.

### Informative note regarding unloading the loading plate / load cell:

- Hold cylinder A.
- Carefully open the pressure relief valve at the hydraulic pump so that piston C maintains contact with the upper ball joint D and does not topple.
- The residual force is displayed on the measuring device.

### 3. Procedure (road construction, DIN 18134, Germany)

#### 3.1. Description of the display during measurement



Pressure [MN/m <sup>2</sup> ] Plate: 300mm	Pressure in display [kN/m <sup>2</sup> ]	Time to hold pressure [s]
pre load		
0,010	10	30
first load cycle		
0,080	80	60
0,160	160	60
0,250	250	60
0,330	330	60
0,420	420	60
0,500	500	60
unload		
0,250	250	60
0,125	125	60
0,000	10	60
second load cycle		
0,080	80	60
0,160	160	60
0,250	250	60
0,330	330	60
0,420	420	60

#### 3.2. Perform the test

Apply the load using the hand pump in steps according to the table, use the vent at the pump to lower the load. If the memory card is not inserted before the start of the test, the results of the measurement are not saved (but can be printed). After switching off it will be lost.

Press **ON/OFF** for at least one second to switch the device on.

	<ul style="list-style-type: none"> <li>- <b>SD</b> appears when SD-card is plugged in</li> <li>-  battery state (about 80 % full in this example)</li> <li>-  charger is applied, flashing when charging</li> <li>- press <b>OK</b> to start a test</li> </ul>
<p>Testing DIN 18134 -&gt; SD-card Testing-Adjust σ = 0      s = 0.51</p>	<ul style="list-style-type: none"> <li>- test will be stored at SD-card</li> <li>- Adjust the displacement transducer to approx. 0 mm using the tripod screws - press <b>OK</b> <i>(s will be set to 0 mm automatically)</i></li> </ul>
<p>If the normal stress displayed is not zero, reset it to zero before! (See Additional Functions - Reset force to zero)</p>	
<p>Testing-Preload.30s 14s    σ = 10      s = 0.17</p>	<ul style="list-style-type: none"> <li>- Apply preload 0.01 MN/m<sup>2</sup> (Display: σ = 10 kN/m<sup>2</sup>) hold it for <b>30 s</b>, than press <b>OK</b> <i>(s will be set to 0 mm automatically)</i></li> </ul>
<p>Testing 0.      σ = 10      s = 0.00 79s    σ = 80      s = 0.86</p>	<ul style="list-style-type: none"> <li>- Apply load 0.08 MN/m<sup>2</sup> (Display: σ = 80 kN/m<sup>2</sup>) hold it for <b>60 s</b>, than press <b>OK</b></li> <li>- apply all other loads in the same way (see table)</li> </ul>

**Important:** the last measurement (0.42 MN/m<sup>2</sup>, 420 kN/m<sup>2</sup>) must be stored with **OK**, before pressing **MENU** to finish and save the test.

**ON/OFF** will terminate the test immediately with no storage (hold key for about 2 s).

**While loading keep attention to the tilt of the hydraulic cylinder and the extension!**

### 3.3. Result of the test

```
# 3 07.01.10 08:59
Ev1:29.0 MN/m2
Ev2:78.9 MN/m2
Ev2/Ev1 = 2.71
```

- **PRINT** print the test record
- **OK** display graphik
- **ON/OFF** to switch to the start-screen

The result at the display:

- Number of the test record (at the SD Card), date and time of the test
- Strain modulus  $E_{v1}$  and  $E_{v2}$ ,
- Ratio of Modulus  $E_{v2}/E_{v1}$

If the test was not completely done, the deformation modulus  $E_{v1}$  or  $E_{v2}$  and the ratio  $E_{v2}/E_{v1}$  can not be determined and will not be displayed.

## 4. Westergaard modulus

The Westergaard modulus  $k_s$  is determined by the AX 01a and shown in the print-out.

In road and airport construction, the Westergaard modulus  $k_s$  with a loading plate of 762 mm diameter is calculated as follows:

$$k_{s762} = \frac{\sigma_0}{s} \left[ \frac{MN}{m^3} \right]$$

$\sigma_0$  is the compressive strain that corresponds to a mean settlement of  $s = 1.25$  mm.

The compressive strain is determined at the parabola branch of the initial loading.

In case of a plate diameter of 300 mm,  $k_s$  is corrected with a quotient of  $d=2.22$ . The ideal quotient is  $d=2.54$  (the ratio of 762 mm / 300 mm). Literature, based on experimental studies, recommends the use of a quotient of  $d=2.22$  in the place of the ideal quotient  $d=2.54$ .

$$k_{s300} = \frac{\sigma_0}{s \times 2,22} \left[ \frac{MN}{m^3} \right]$$

The latter plate diameter may be used when the layer below the loading plate is homogeneous to a depth of 1.5 x plate diameter (information without liability).

## 5. Menu - additional functions

Switch on the AX 01a while pressing **ON/OFF** for 1 second.

<pre> AX01A Fr 04.06.10 18:39:09 [SD] [Battery] [Charger] ANIX GmbH         </pre>	<ul style="list-style-type: none"> <li>- <b>[SD]</b> appears when SD-card is plugged in</li> <li>- <b>[Battery]</b> battery state (about 80 % full in this example)</li> <li>- <b>[Charger]</b> charger is applied, flashing when charging</li> <li>- press <b>[MENU]</b> to select additional functions</li> </ul>
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<pre> Menu &gt;Read card   Card info &lt;Ok&gt; choose         </pre>	<ul style="list-style-type: none"> <li>- <b>[MENU]</b> to scroll through the menu functions</li> <li>- <b>[OK]</b> to choose the function at the "&gt;" symbol</li> </ul>
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- **ON/OFF** to leave this function

<pre> Menu &gt;Reset force   Read card   Card info   Delete Card   Settings   Set clock   Info   Calibration   Demo   Update firmware         </pre>	<p><b>available functions:</b></p> <ul style="list-style-type: none"> <li>- set force readings permanently to zero</li> <li>- show and print stored test data</li> <li>- show used and free space on file</li> <li>- delete all data</li> <li>- set language, contrast, test parameters ...</li> <li>- adjust time and date</li> <li>- show/print firmware version, device information ...</li> <li>- show raw sensor readings and calibration factors</li> <li>- start demo test series</li> <li>- update the software in the device</li> </ul>
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### Description of the functions:

#### 5.1. View card (read stored measurements)

<pre> #4 07.01.10 13:45 Ev1:29.0 MN/m² Ev2:78.9 MN/m² Ev2/Ev1 = 2.71         </pre>	<ul style="list-style-type: none"> <li>- <b>[+]</b> changes to the next record</li> <li>- <b>[-]</b> changes to the previous record</li> <li>- <b>[PRINT]</b> prints a test</li> <li>- <b>ON/OFF</b> to leave this function</li> </ul>
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#### 5.2. Card info

<pre> Card info  #230903115428 181/212         </pre>	<ul style="list-style-type: none"> <li>- <b>[OK]</b> to choose this function</li> <li>- <b>ON/OFF</b> to leave this function</li> </ul>
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The card number (here #230903115428) is displayed. On the bottom line the actual number of test-records and the maximal possible number of test records is shown (here 181 of 212 possible records). The number of maximal possible test records is estimation. It depends on the number of test points that are stored in each test.

The card number is created from the date and time at the deletion of the card.

### 5.3. Delete card (delete all stored measurements)

>Delete card	- <input type="button" value="OK"/> to choose this function
Delete card Contain data! Are you sure? Press <Ok>	- <input type="button" value="OK"/> to confirm the function - <input type="button" value="ON/OFF"/> to leave this function
Deleted!	- <input type="button" value="OK"/> resp. <input type="button" value="ON/OFF"/> to leave this function

In the AX 01a all tests are stored in a file called X:\AX01\PDG.CRD on the SD-card.

### 5.4. Reset force to zero

Menu >Reset force	- <input type="button" value="MENU"/> to choose this function
Reset force Unload force! <OK>	- unload the force sensor, press <input type="button" value="OK"/>
Reset force F= 0.02 kN <Ok> selects.	- <input type="button" value="OK"/> to set the force to zero
Reset force F= 0.00 kN <Ok> selects.	- <input type="button" value="ON/OFF"/> to leave this function

Because of temperature changes the zero reading of the force sensor can differ from the zero value a little bit. You can set it back to zero here - permanently. Be sure to unload the force sensor before you use this function.

### 5.5. Settings

Menu >Settings	- <input type="button" value="OK"/> to choose this function
Settings >Language: English Probe: 300mm Lever ratio: 1:-1.00 Norm: DIN 18134 Print: completely LCD contrast: 30 <Off> Store	- <input type="button" value="MENU"/> scroll to the next function - <input type="button" value="PRINT"/> scroll to previous function  - <input type="button" value="+"/> resp. <input type="button" value="-"/> changes the parameter of the chosen function - <input type="button" value="ON/OFF"/> to save the value and to leave this function

#### 5.5.1. Change language

Einstellungen >Sprache: Deutsch ..... <Off> Speichern	
Settings >Language: English ..... <Off> Store	- <input type="button" value="+"/> / <input type="button" value="OK"/> resp. <input type="button" value="-"/> changes the parameter of the chosen function - <input type="button" value="ON/OFF"/> to save the value and to leave this function

You select the language for the display and the print here.  
The standard/norm for your country will be changed in the menu settings – change standard 5.5.4.

### 5.5.2. Change standard / change norm

Settings >Norm: DIN 18134 ..... <Off> Speichern	
Settings >Norm: DIN 18134 ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function
Settings >Norm: TSC 06.720 ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function
Settings >Norm: CNR BU 146 ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function

Changing the testing standards has a direct impact to the plate diameter.  
It selects the smallest diameter for the test standard.

### 5.5.3. Change plate diameter

Settings >Probe: 300mm ..... <Off> Store	
Settings >Probe: 600mm ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function
Settings >Probe: 762mm ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function

### 5.5.4. Change lever ratio

Setting >Lever ratio: 1:-1.00 ..... <Off> Store	
Setting >Lever ratio: 1:-0.90 ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function
Setting >Lever ratio: 1:-0.80 ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function

For the original (orange) tripod of the AX 01a a lever ratio of 1:-1.00 must be set (direct measuring of displacement). For special tripods usually a lever ratio of 1:2.00 is set (indirect measuring using a lever). Please refer to the appropriate device-specific documentation. It is important that the displacement measured is increasing when the plate is moving downwards. The ratio only can be changed in calibration mode by authorized persons.

### 5.5.5. Change Print-Mode

Setting >Print: complete ..... <Off> Store	
Setting >Print: short ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function
Setting >Print: simple ..... <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> changes the parameter of the chosen function - <input type="checkbox"/> ON/OFF to save the value and to leave this function

Set the complexity of the printout. Examples see Appendix A

### 5.6. Adjust the clock

Mode >Set clock ..... <Ok> selects.	
Set clock Th 07.01.10 08:05:30 <u>0.0</u> ppm <Off> Store	- <input type="checkbox"/> MENU changes the position of the cursor
Set clock Th <u>07.01.10</u> 08:05:30 0.0 ppm <Off> Store	
Set clock Th <u>07.01.10</u> 08:05:30 0.0 ppm <Off> Store	- <input type="checkbox"/> / <input type="checkbox"/> resp. <input type="checkbox"/> / <input type="checkbox"/> PRINT changes the value
Set clock Fr <u>08.01.10</u> 08:05:30 0.0 ppm <Off> Store	- <input type="checkbox"/> ON/OFF to save the value and to leave this function

The ppm (parts per million) setting is used to adjust the accuracy of the clock. To adjust it do the following steps:

- Adjust the clock the first time using an accurate reference clock (e.g. radio clock, GPS-clock)
- Wait one month (at least a week)
- Open the adjust menu again, (do not move the cursor to another position than ppm!)
- When you now change the ppm-setting the time is also changed
- Adjust the ppm until the right time is shown (using the accurate reference clock)

Press  ON/OFF to store and exit.

### 5.7. Info (Show version, device number and date of calibration)

<pre>Mode &gt;Info ..... &lt;Ok&gt; selects.</pre>	<ul style="list-style-type: none"> <li>- <input type="button" value="OK"/> selects the function</li> </ul>
<pre>Info Version: V1.00 Device no: #3315 Press &lt;Ok&gt;</pre>	<ul style="list-style-type: none"> <li>- Firmware-version und device number will be shown</li> <li>- <input type="button" value="OK"/> changes to the next screen</li> <li>- <input type="button" value="ON/OFF"/> to leave this function</li> </ul>
<pre>Info Calib.date: 05.01.10 Language: English &lt;Print&gt; Print</pre>	<ul style="list-style-type: none"> <li>-date of calibration and chosen language will be shown</li> <li>- <input type="button" value="PRINT"/> prints the version information</li> <li>- <input type="button" value="ON/OFF"/> to leave this function</li> </ul>

#### Calibration-Mode

In the calibration mode the measurement values of the force sensor and the displacement gauge are shown. The lever ratio or plate diameter is not used here. On the right side the calibration factors are displayed. These factors are adjusted during calibration at the authorized calibration institute.

#### Demo-Mode

In demo mode, it is possible to simulate the measurement. The sensors are switched of in this mode.

#### Firmware Update

If a firmware update is available, a trained person can install it on the AX 01a.

## 6. Software installation

Measured data on the SD card can be directly imported into Excel® by means of the supplied Excel® template.

Please use the Microsoft Excel® files on the SD card.

(System requirement: Microsoft Excel®, version 2000 or higher).

(**ax.xlt** is for using Excel® 2000, XP and 2003, **ax.xltm** is for using Excel® 2007 and higher)

Please, enable macros:

**(Older Excel® versions:** Menu Tools - Macros – Security – Medium or Low,

**Excel® 2007/2010:** Main Menu – "Excel® Options" – Trust Center - " Trust Center Settings" – "Macro Settings" - "Enable All Macros")

### 7. Excel®-template

In the sheet - press the button **<read card>**. A dialog window is opened (see screenshot at the top right).

For the AX 01a ignore the buttons **<card info>** and **<read card>** and **<card reader>**. Just open the file from the SD-drive **<read file>**.

The test data are stored in a file on the SD card X:\AX01\PDG.CRD. A special card reader is only needed for chip cards of the previous version of AX 01a.

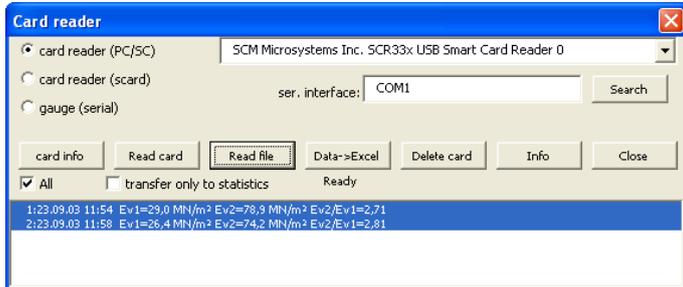
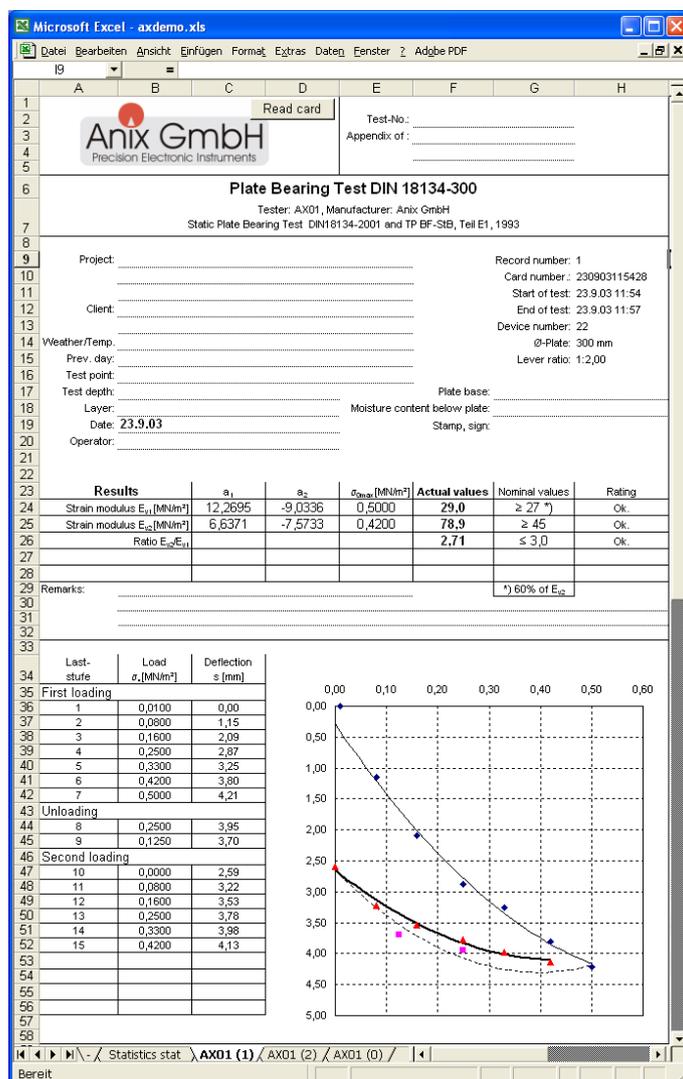
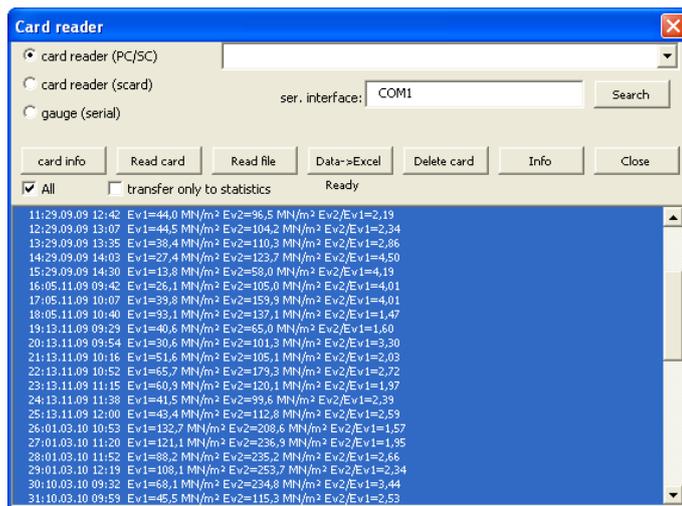
Description of the functions in the dialog  
**Card reader:**

- **<card info>** show the number of data sets on the card.
- **<read card>** read the content of the card, the datasets are shown in short form (see picture). Please mark all the sets you want to transfer (blue selection is toggled by clicking on it)

- **<read file>** open the file from the hard disc or SD-card X:\AX01\PDG.CRD (it is always a good idea to copy the file from the SD-card to the hard disc and use this working copy.) Please mark all the sets you want to use (blue selection is toggled by clicking on it). Use button **<all>** to select/deselect all.

- **<Data -> Excel>** will transfer all selected sets in separate Excel® sheets. For each set a single Excel® sheet is created. (See snapshot at the bottom).
- The sheet is static. Do not change any values. If you change values in the table, the modulus and the corresponding points in the graph do not change!

- **<Close>** closes the window.



## 8. Actions after completion of measurement

- Hold cylinder A. (see illustrations in chapter Test Set-up)
- Depressurise the hydraulic pump. The piston has retracted.
- Remove the plugs of the two sensors from the measuring device.
- Carefully pull back the measuring bridge by approx. 20 cm so that the displacement transducer is accessible.
- Remove the measuring line from the cable brackets and dismantle the displacement transducer.
- If a 500mm displacement sensor holder was used, refasten the holder to the brackets provided at the measuring bridge.
- Loosen star knob 1. Swing the front support arm upwards by approx. 90°. Retighten star knob 1.
- Loosen star knob 2+3. Briefly lift stop bolt 4 and push the perforated section into the measuring bridge until stop bolt 4 engages. Retighten star knobs 2+3.
- Loosen star knob 1. Swing the complete front support arm backwards by another 90°. Retighten star knob 1.
- Clean the system components with a dry cloth.
- Package the components.

## 9. Cleaning

Keep the equipment clean. Do not use cleaning agents.

Clean the displacement transducer with a dry cloth after completion of testing and store it in the compartment provided in the measuring device.

Do not use lubricants! Lubricants may impair proper functioning of movable parts and distort measurement results.

## 10. Storage

Store the Plate Bearing Tester only in dry rooms. Check the charging status of the measuring device battery at regular intervals. Charge the battery of the measuring device with the supplied power pack before utilisation of the Plate Bearing Tester.

## 11. Preventive maintenance and inspection

Preventive maintenance and inspection are indispensable for appropriate safety.

Oil changes of the hydraulic systems should be made at least once a year. Only oil provided by manufacturer may be used.

The recommended replacement interval for hydraulic hoses under normal stress is six years, as defined in German Statutory Accident Prevention Insurance regulations (operating period, including max. two years storage period).

Repairs at system components may only be carried out by Anix GmbH specialist staff or specialist staff authorised by Anix GmbH.

Fundamental standards relating to tests/inspections of electrical equipment, plants and machines and deadlines for repeat tests/inspections must be kept.

Requirement in DIN 18134:2001-09: Calibration of the Plate Bearing Tester after any repair. Calibration has to be repeated once per year.

**12. The following generally accepted technical regulations must be observed**

- Industrial safety acts
- Operational safety ordinances
- Accident prevention regulations, rules and information
- Valid national and international standards

**13. Re-packaging to avoid damage during transport**

If maintenance work at manufacturer's shop is required, ensure that all shipments are safely packaged in terms of contents, type and scope of shipping. Insufficient packaging which results in damage will waive warranty claims! Transport companies may refuse acceptance of inappropriately packaged consignments.

**14. Operation of the AX® 01a**

Do not expose the system to heavy rain – the system is only spray water-proof!  
Inspect the measuring device, cables, load cells, displacement transducers, plug connectors, pump, hose, cylinder and measuring bridge for visible damage! Do not mount and use the system if any damage is found! Risk of death! Please, consult Anix GmbH.

**15. Address of the manufacturer**

Anix GmbH  
Hintern Hecken 1  
39179 Barleben - Meitzendorf - Germany  
USt-IdNr.: DE814067577  
District Court Stendal HRB 114389, managing director: Dipl.-Ing. Matthias Weingart

**16. Frequently required accessories:**

Model	Description
552	SD Memory Card
1038	Paper roll 58 mm x 60 mm (thermal paper)
116	Load plate 600 mm
117	Load plate 762 mm
136	Extension 330 mm (for the hydraulic cylinder)
137	Extension 570 mm (for the hydraulic cylinder)

Please order through phone: +49-39202-8792-52, fax: +49-39202-8792-57 or biz@anix.biz.

**Available components for the service: All components of the AX ® 01a are available as spare parts.**

**17. Information relating to safe disposal**

Anix GmbH will accept your AX® 01 Plate Bearing Tester or your AX® 01 Evaluator Unit free of charge for disposal. Costs of packaging and transport shall be borne by customer.

## 18. Safety Instructions

### GENERAL

Check the meter, the cables, load cells, displacement transducers, connectors, pump hose, cylinder and measuring bridge for signs of damage! In case of damage, the system should not be mounted and used! It can be fatal! Contact the Anix GmbH.

### IMPORTANT RECEIVING INSTRUCTIONS

Visually inspect all components for shipping damage. Shipping damage is not covered by warranty. If shipping damage is found, notify carrier at once. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

### SAFETY PRECAUTIONS

Read all instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation. Anix GmbH cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Anix GmbH when in doubt as to the safety precautions and operations. Failure to comply with the following cautions and warnings could cause equipment damage and personal injury.

CAUTION is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

WARNING indicates a potential danger that requires correct procedures or practices to avoid personal injury.

DANGER is only used when your action or lack of action may cause serious injury or even death.

.....  
WARNING: Wear proper personal protective gear when operating hydraulic equipment.

WARNING: Stay clear of loads supported by hydraulics. A cylinder, when used as a load lifting device, should never be used as a load holding device. After the load has been raised or lowered, it must always be blocked mechanically.

WARNING: USE ONLY RIGID PIECES TO HOLD LOADS. Carefully select steel or wood blocks that are capable of supporting the load. Never use a hydraulic cylinder as a shim or spacer in any lifting or pressing application.

DANGER: To avoid personal injury keep hands and feet away from cylinder and work piece during operation.

WARNING: Do not exceed equipment ratings. Never attempt to lift a load weighing more than the capacity of the cylinder. Overloading causes equipment failure and possible personal injury. The cylinders are designed for a max. pressure of 700 bar [10,000 psi]. Do not connect a jack or cylinder to a pump with a higher pressure rating. Never set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.

WARNING: The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.

**CAUTION:** Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe backpressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure. Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.

**IMPORTANT:** Do not lift hydraulic equipment by the hoses or swivel couplers. Use the carrying handle or other means of safe transport.

**CAUTION:** Keep hydraulic equipment away from flames and heat. Excessive heat will soften pickings and seals, resulting in fluid leaks. Heat also weakens hose materials and pickings. For optimum performance do not expose equipment to temperatures of 65°C [150°F] or higher. Protect hoses and cylinders from weld spatter.

**DANGER:** DO NOT HANDLE PRESSURIZED HOSES. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.

**WARNING:** Only use hydraulic cylinders in a coupled system. Never use a cylinder with unconnected couplers. If the cylinder becomes extremely overloaded, components can fail catastrophically causing severe personal injury.

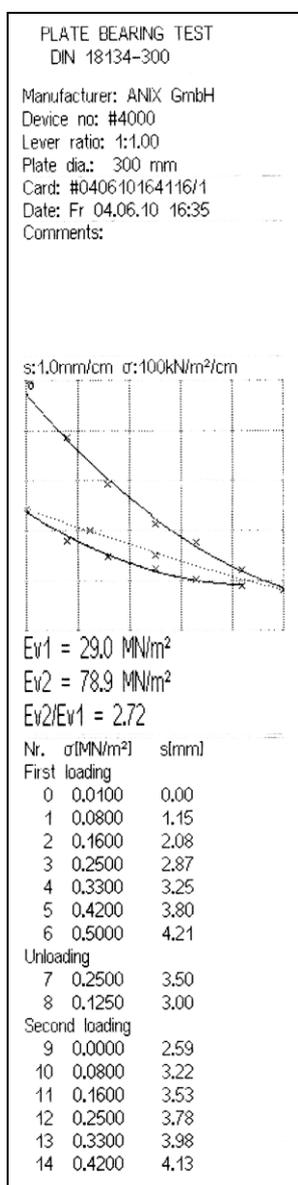
**WARNING:** BE SURE SETUP IS STABLE BEFORE LIFTING LOAD. Cylinders should be placed on a flat surface that can support the load. Where applicable, use a cylinder base for added stability. Do not weld or otherwise modify the cylinder to attach a base or other support. Avoid situations where loads are not directly centered on the cylinder plunger. Off-center loads produce considerable strain on cylinders and plungers. In addition, the load may slip or fall, causing potentially dangerous results. Distribute the load evenly across the entire saddle surface. Always use a saddle to protect the plunger.

**IMPORTANT:** Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the authorized Anix GmbH Service Center in your area. To protect your warranty, use only oil recommended from Anix.

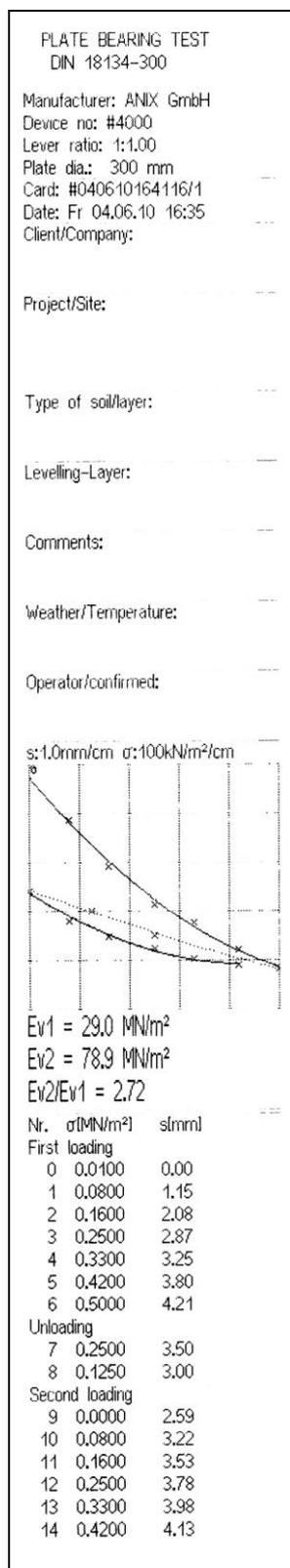
**WARNING:** Immediately replace worn or damaged parts by genuine parts. Standard grade parts will break causing personal injury and property damage. Genuine parts are designed to fit properly and withstand high loads.

PROBLEM	POSSIBLE CAUSE
Cylinder will not advance.	Pump release valve open. Coupler not fully tightened. Oil level in pump is low. Pump malfunctioning. Load is too heavy for cylinder. Cylinder seals leaking.
Cylinder advances part way.	Oil level in pump is low. Coupler not fully tightened. Cylinder plunger binding.
Cylinder advances in spurts.	Air in hydraulic system. Cylinder plunger binding.
Cylinder advances slower than normal.	Leaking connection. Coupler not fully tightened. Pump malfunctioning.
Cylinder advances but will not hold.	Pump malfunctioning. Leaking connection. Incorrect system set-up. Cylinder seals leaking.
Cylinder leaks oil.	Worn or damaged seals. Internal cylinder damage. Loose connection.
Cylinder will not retract	Pump release valve is closed.
or retracts slower than normal.	Coupler not fully tightened. Pump reservoir over-filled. Narrow hose restricting flow. Broken or weak retraction spring (if equipped). Cylinder damaged internally.
Oil leaking from external relief valve.	Coupler not fully tightened. Restriction in return line.

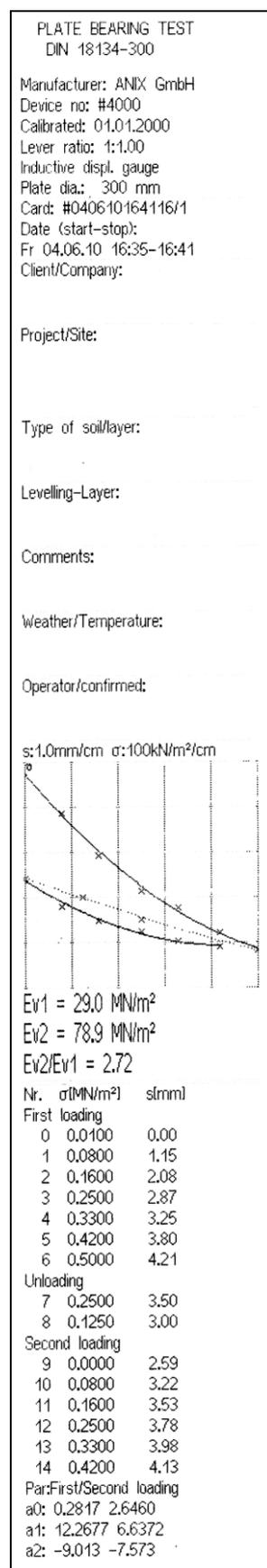
19. Appendix A - thermal printer printout



short

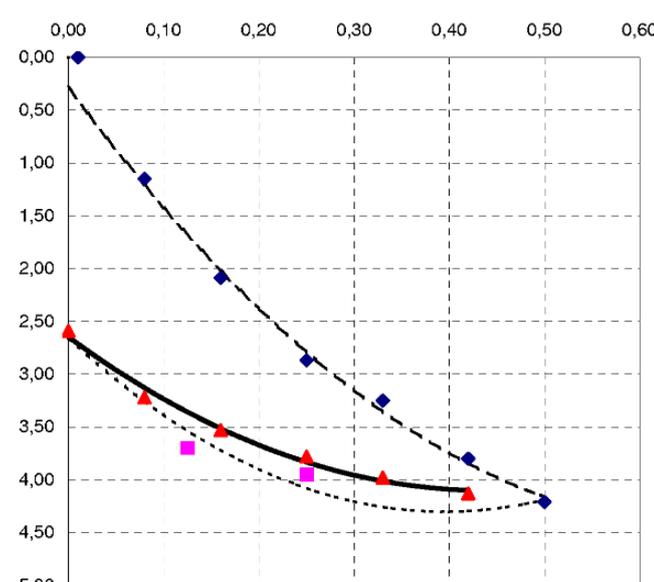


simple

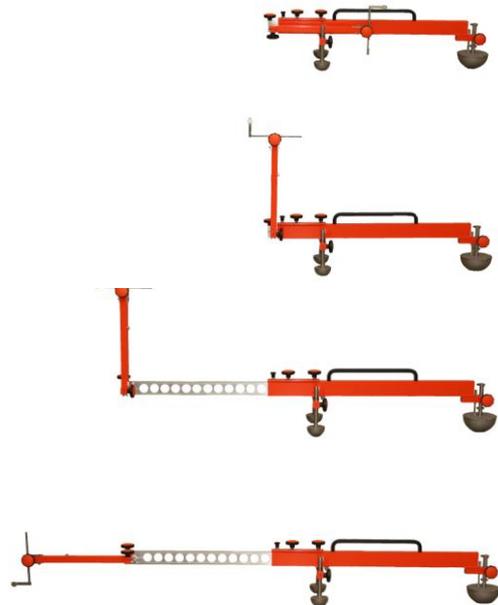


complete

20. Appendix B - Excel® printout

 <p><b>Anix GmbH</b> Precision Electronic Instruments</p>	Test-No.: _____ Appendix of: _____ _____																																																																		
<p><b>Plate Bearing Test DIN 18134-300</b></p> <p>Tester: AX01, Manufacturer: Anix GmbH                  Static Plate Bearing Test DIN18134-2001 and TP BF-StB, Teil E1, 1993</p>																																																																			
Project: _____ _____ Client: _____ _____ Weather/Temp. _____ Prev. day: _____ Test point: _____ Test depth: _____ Layer: _____ Date: <b>23.9.03</b> Operator: _____	Record number: 1 Card number.: 230903115428 Start of test: 23.9.03 11:54 End of test: 23.9.03 11:57 Device number: 22 Ø-Plate: 300 mm Lever ratio: 1:2,00 Plate base: _____ Moisture content below plate: _____ Stamp, sign: _____																																																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Results</th> <th style="width: 10%;">a<sub>1</sub></th> <th style="width: 10%;">a<sub>2</sub></th> <th style="width: 10%;">σ<sub>0max</sub> [MN/m<sup>2</sup>]</th> <th style="width: 10%;">Actual values</th> <th style="width: 10%;">Nominal values</th> <th style="width: 10%;">Rating</th> </tr> </thead> <tbody> <tr> <td>Strain modulus E<sub>v1</sub> [MN/m<sup>2</sup>]</td> <td>12,2695</td> <td>-9,0336</td> <td>0,5000</td> <td><b>29,0</b></td> <td>≥ 27 *)</td> <td>OK.</td> </tr> <tr> <td>Strain modulus E<sub>v2</sub> [MN/m<sup>2</sup>]</td> <td>6,6371</td> <td>-7,5733</td> <td>0,4200</td> <td><b>78,9</b></td> <td>≥ 45</td> <td>OK.</td> </tr> <tr> <td>Ratio E<sub>v2</sub>/E<sub>v1</sub></td> <td></td> <td></td> <td></td> <td><b>2,71</b></td> <td>≤ 3,0</td> <td>OK.</td> </tr> <tr> <td> </td> </tr> <tr> <td> </td> </tr> </tbody> </table>		Results	a <sub>1</sub>	a <sub>2</sub>	σ <sub>0max</sub> [MN/m <sup>2</sup> ]	Actual values	Nominal values	Rating	Strain modulus E <sub>v1</sub> [MN/m <sup>2</sup> ]	12,2695	-9,0336	0,5000	<b>29,0</b>	≥ 27 *)	OK.	Strain modulus E <sub>v2</sub> [MN/m <sup>2</sup> ]	6,6371	-7,5733	0,4200	<b>78,9</b>	≥ 45	OK.	Ratio E <sub>v2</sub> /E <sub>v1</sub>				<b>2,71</b>	≤ 3,0	OK.																																						
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21. Appendix C - pictures of the usage



22. Appendix D - transport boxes

