



# BIA 600

Pinch Force Meter for Railway Doors  
(EN14752)



Manual

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## 1. GENERAL

### 1.1 PURPOSE OF USE

The purpose of use of the Force Meter BIA600 is to measure the closing force of power operated doors and evaluate the measured results with respect to the requirements of applicable standards (refer to chapter "Standards").

### 1.2 PROPER USE

Only use the device as described in this manual. Any other usage will be deemed as not in accordance with the instructions and may lead to damage of property or even persons. The manufacturer accepts no liability for damage caused by improper use.

### 1.3 OLD DEVICES

Old devices must not be disposed with household waste. They should be disposed in a local recycling centre.

### 1.4 BATTERIES AND RECHARGEABLE BATTERIES

Every user is required to bring all batteries to local recycling centres.

### 1.5 TRANSPORT

For any transport of the instrument the transport case should be used.

## **2. SYSTEM ARCHITECTURE**

### 2.1 TETHERED

#### 2.1.1 Sensor - SEB2

#### 2.1.2 Sensor - SEB2 - RS232 – Windows-PC (PinchPilot)

#### 2.1.3 Sensor - SEB2.2 - USB – Windows-PC (PinchPilot)

#### 2.1.4 Sensor - SEB2.2 - USB – Windows-PC (DLL)

### 2.2 WIRELESS

#### 2.2.1 Sensor-BT – Bluetooth – Android Endgerät (ForceMeter)

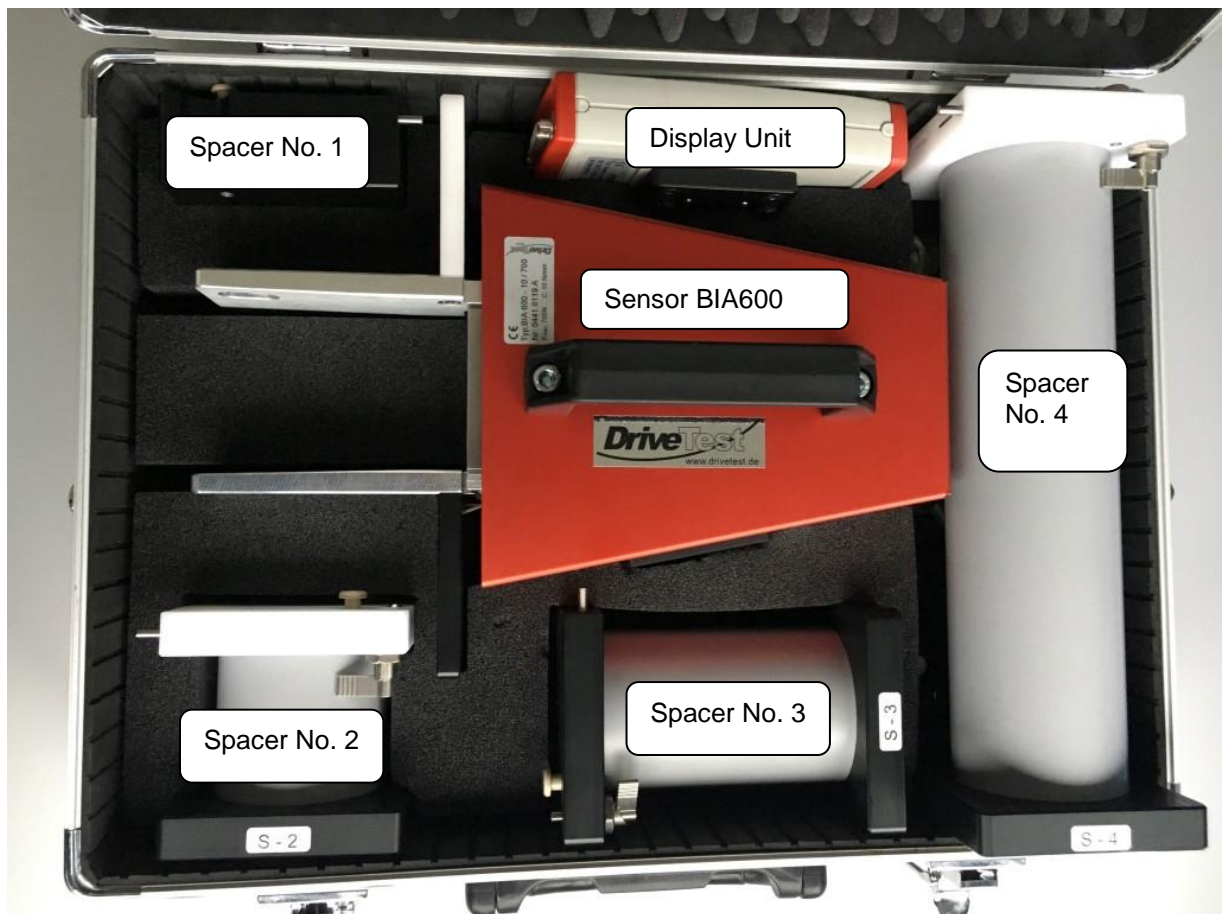
#### 2.2.2 Sensor-BT – Bluetooth – Windows-PC (PinchPilot)

### 3. STARTING UP

#### 3.1 BIA600-(TETHERED)

##### 3.1.1 Determining completeness

- Sensor BIA600
- Display unit SEB2 or SEB2.2
- USB-cable, USB charger (SEB2.2)
- PinchPilot-software (USB Stick)
- Set of spacers (4 pieces)
- Manual, calibration certificate (placed in the cover of the transport case)
- Transport case





### 3.1.2 Function test

- Load display unit battery via USB charger
- connect sensor to display unit,
- turn on the display unit by briefly pressing the display unit push button,
- after initialisation start a measurement by pressing the push button of the display unit,
- apply/remove load to sensor, force is displayed

## 3.2 BIA600 BT (WIRELESS)

### 3.2.1 Determining completeness

- sensor BIA600-BT
- USB-cable, USB charger
- PinchPilot-software (USB Stick)
- set of spacers (4 pieces)
- calibration certificate (placed in the cover of the transport case)
- transport case

### 3.2.2 Function test (PinchPilot – PC)

- Load sensor battery via USB charger
- turn on sensor
- connect sensor to PC via Bluetooth (refer chapter “PinchPilot)
- install PC-software PinchPilot, connect PinchPilot to sensor (refer chapter “PinchPilot)
- start a measurement via PinchPilot (sensor/Measure/start button)
- apply/remove a load to sensor, measured force is displayed

### 3.2.3 Function test (ForceMeter App – tablet)

- Load sensor battery via USB charger
- Install ForceMeter App on Tablet (refer to chapter ForceMeter-App)
- start a measurement via ForceMeter App
- apply/remove a load to sensor; measured force is displayed

## 3.3 PLACING OUT OF OPERATION

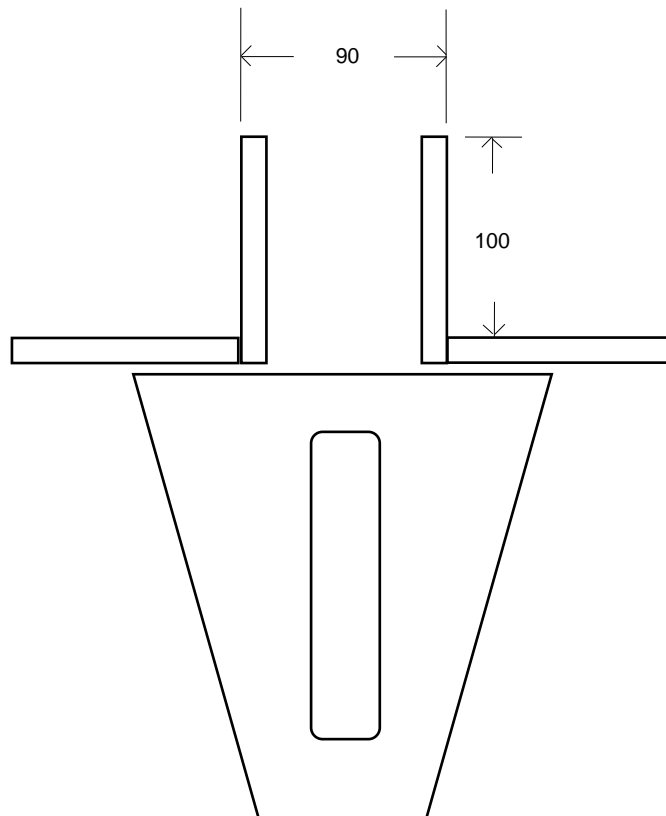
When the instrument will not be used for a longer period of time, please regard these measures:

- Check if data to be used is still stored in the display unit (if so, upload data)
- SEB2: remove battery; SEB2.2: Charge battery
- The instrument should be stored in a dry environment within the limits of storage temperature (refer to “Technical Data”).

## 4. PINCH FORCE SENSOR

### 4.1 BASIC CONSTRUCTION

The instrument consists of a right and a left force initiation area of 100x100 mm. The link between the two parts is performed by a leaf spring system including a strain gauge



Mechanical dimensions in mm

## 4.2 SPACER

The EN14752:2015 standard requires to measure the closing force at different apertures. The BIA600 spacer set facilitates these measurements.

The spacers can be mounted onto the BIA600 sensor without any tool. The applied spacers are automatically detected. This information is added to the measurement properties thus enabling the software to calculate the sensor width and applying the appropriate limit for compliance check.

The spacer set ensures fast and easy measurements. Confusions concerning opening width are avoided.



## 4.3 SENSOR DATA

Important sensor specific data is stored in a non-volatile memory (EEPROM), situated in the sensors connector (15-pol. Sub-D). The sensor data in detail is:

- Force adjustment data,
- Sensor-ID, Version, Serial-No. ,
- Guidelines category,
- Date of last calibration,
- Number of measurements.

## 4.4 MAINTENANCE

The instrument has to be protected from moisture, dirt and solar radiation. It is designed to withstand normal handling and transportation, nevertheless excessive shock or load (>1000 N) can damage it and should be avoided. Most of the parts are fabricated from durable aluminium or POM. To clean the device, wipe it with a damp cloth. Avoid contact to acids and thinner.

## 5. CALIBRATION

Drive Test meters are very precise instruments, but can be easily damaged by inappropriate treatment like dropping etc. .

To ensure proper function, calibration in intervals of one year is recommended. The calibration date and state appear on the report.

## 6. DECLARATION OF CE - CONFORMITY

We,

Drive Test GmbH  
Adi-Maislinger-Str. 9  
81373 Muenchen  
Germany

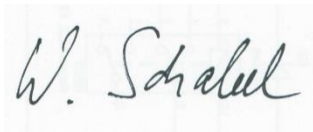
declare that the Pinch Force Meter:

- BIA600

meet the intend of the applicable EC directives:

2006/42/EC  
2006/95/EC

Machinery Directive  
Low Voltage Directive



München, 18.08.2015  
Wolfgang Schabel, CEO

## 7. DISPLAY UNIT SEB2 / SEB2.2

The display unit is used to display, evaluate and store the measurements. A short guide to measure is attached to the back of the display unit.

The functions of the display unit are:

- Controlling measurements
- Storing measurements
- Display measured peak force and evaluate measurements
- Upload measured data to a PC

### 7.1 DISPLAY, OPERATING ELEMENTS



The display unit elements are three LEDs and a 3.5 digits LCD display.

The meanings of the LEDs are:

|   |                    |
|---|--------------------|
| ! | State LED          |
| x | Result LED: not OK |
| ✓ | Result LED: OK     |

There is one button to operate the display unit:

|   |                  |
|---|------------------|
| ← | Operating button |
|---|------------------|

The function of the operating button is different, according to the state of the display unit. In the “off” state the display unit can be turned on. In the “on” state the display unit can be turned off by pressing the button longer than two seconds.

By a short push on the operating button (with a connected sensor) a measurement is started. Afterwards the result can be stored by a short push, or by a long push being rejected. When not in measurement state the SEB2 can be switched off by a long push on the operating button.

After initialisation, the display unit will enter the ready state. The state LED flashes slowly. The number of the next free memory location is displayed.

In case of an expired calibration period (> 15 months), the red result LED flashes (refer to chapter “General details/ Calibration”).

Display of the next free memory no.

| Type of measurement   | Memory no. | Measurement no. | Display |
|-----------------------|------------|-----------------|---------|
| Single measurement    | 1          | 1               | .01.    |
| Double measurement    | 1          | 1               | .01.1   |
| Double measurement    | 1          | 2               | .01.2   |
| Triple measurement    | 1          | 1               | .01.1   |
| Triple measurement    | 1          | 2               | .01.2   |
| Triple measurement    | 1          | 3               | .01.3   |
| Quintuple measurement | 1          | 1               | .01.1   |
| Quintuple measurement | 1          | 2               | .01.2   |
| Quintuple measurement | 1          | 3               | .01.3   |
| Quintuple measurement | 1          | 4               | .01.4   |
| Quintuple measurement | 1          | 5               | .01.5   |

## 7.2 MEMORY CAPACITY

Measurement data is stored in a compressed format. The capacity of the memory is app. 80 single or triple measurements.

## 7.3 DISPLAY UNIT EVALUATION

The peak force over the entire measurement period is displayed. This value is compared with the permissible peak force. Additionally, the pulse duration is compared with the actual limit value. Depending on this comparison, the red or green LED will be lit up. A complete evaluation is performed by the PC-software PinchPilot.

## 7.4 DATA TRANSFER

The display unit has to be connected to the USB port and is turned on by pressing briefly on the operating button. The data transfer is controlled by the PC software PinchPilot.

The display unit and the software do normally detect each other (Plug and Play). If not, please connect the USB adapter and check the available connections in the device manager ("Control panel" on your PC).

- Open the Windows Device Manager
- Open "Ports.(COM & LPT)"
- Select COM-port (USB plug is displayed as virtual COM port)

For initial setting procedure refer to chapter "Software PinchPilot/ Installation/ Interface setting related to display unit".

## 7.5 BASIC SETTINGS

Basically all settings may be set within the PC-software PinchPilot (refer chapter "PinchPilot/ Sensor/ Configuration) . Nevertheless, some settings may be modified directly at the display unit SEB2 without connecting the PinchPilot-PC.

### 7.5.1 Erase memory

To erase all stored data in the display unit, make sure the display unit is turned off. Now press the operating button for a time period longer than two seconds. This will turn the display unit on, and for a short time period three dashes (- - -) will appear, indicating that all data is erased. After this action, the next available memory no. will be 01.

### 7.5.2 Peak force limit

Precondition: limit value selectable (PinchPilot: sensor/configuration/extended).

Depending on the guideline different peak force limits may be applied. Up to three different limits are available. It makes sense to set the applicable peak force before measuring in order to simplify later evaluations.

Settings:

(requires activation via PinchPilot: Sensor/Configuration/extended: O Limit value selectable)

- SEB2.2: After turning on the actual battery status is displayed for 2s. Press during this phase the button again for 2s. Then the actual limit is displayed for 2s.
- SEB2: After turning on the actual limit is displayed for 2s.
- Press the operating button briefly to switch to the next limit value.  
(Peak force limit setting will be omitted in case of guidelines with just one limit).

### 7.5.3 Mode of measurement

Precondition: selectable mode (PinchPilot: sensor/configuration/extended).

Depending on the standard, a single, a dual or a triple measurement is required. An additional setting is the option "auto sequence". In this case, the next measurement is started automatically. The user can fully concentrate on the closing system to be tested.

Settings:

(requires activation via PinchPilot: Sensor/Configuration/extended: O selectable mode)

- SEB2.2: After turning on the actual battery status is displayed for 2s. Press during this phase the button again for 2s. Then the actual limit is displayed for 2s.
- SEB2: After turning on the actual limit is displayed for 2s.
- Press operating button again for two seconds. The actual mode is displayed for two seconds.
- Press briefly to switch to the next mode and repeat until the desired mode is set.

| Display | Meaning   |
|---------|---|
| 1       | Single measurement  |
| +1      | Single measurement with auto sequence<br>permanent restart, display of last peak force, no graphic data acquisition |
| 2       | Dual measurement  |
| +2      | Dual measurement with auto sequence<br>automatic start of second measurement  |
| 3       | Triple measurement  |
| 3+      | Triple measurement with auto sequence<br>automatic start of second and third measurement                            |
| 5       | Quintuple measurement   |
| 5+      | Quintuple measurement with auto sequence<br>automatic start of second, third, fourth and fifth measurement          |

## 7.6 ERROR MESSAGES

If the display unit detects a malfunction, an error message is displayed (E:xx). The meaning of the two digits error no. is explained in the appendix table "Error messages display unit".

## 7.7 DISPLAY UNIT MAINTENANCE

The display unit does not need any special maintenance. It should not be exposed to direct sunlight for a longer time. Working range is temperature 0° to +40° Celsius at maximum 90% humidity non-condensing. When dirty, clean it carefully with a soft, damp cloth. Avoid contact to acids and thinner. For more information see section "Technical data".



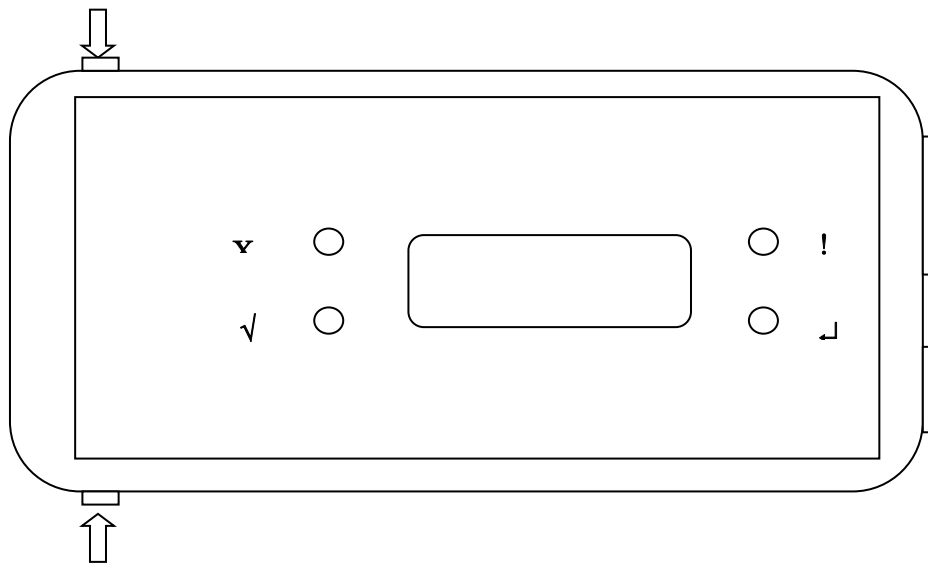
## 7.8 BATTERY SEB2

The SEB2 is equipped with a non rechargeable Alkaline battery.

### 7.8.1 Battery load state

When the message „BAT“ is permanently indicated on the LCD display, it is time for a battery exchange. A special capacitor ensures that no measurement data will be lost and the real time clock does not stop running.

Change the battery by removing the cap on left hand side of the display unit. Pressing the two locking buttons does this.



Battery change

Caution! Do not tilt one of the caps sideways; this can damage the locking element.

### 7.8.2 Transportation

The SEB 2 contains an alkaline battery cell. These are not classified as dangerous goods in transportation.

## 7.9 BATTERY SEB2.2

The display unit SEB2.2 is equipped with a rechargeable Lithium-Polymer battery.

### 7.9.1 Battery loading

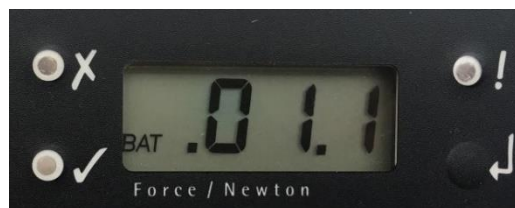
The battery is loaded via USB interface. Loading source can be either a PC or a USB charging device. The time to charge the battery from 0% to 100% is about four hours.

### 7.9.2 Battery load state

During initialization (turning on display unit SEB2.2) with sensor connected and USB disconnected the battery's load state is displayed in percent (0% ... 100%) for two seconds



During operation, the battery's state is permanently examined. If the load state falls below 30%, the display's BAT indicator is activated (see Fig. 3.3).



### 7.9.3 Transportation

The display unit SEB 2.2 contains a Lithium-Polymer battery cell. These are classified as dangerous goods in transportation. As this is a build-in battery cell please follow guidelines UN3481 and respect your local law.

Consider the package labelling requirements therefore by putting a label outside on the package looking like Figure 3.4. The size should be min. 120mm x 110mm, on small boxes (where it does not fit on one side) it can be 105mm x 74mm. It has to be printed in colour.



Please find further information on our website (refer chapter “Contact information”).

### 7.9.4 Disposal

It is not allowed to dispose Lithium-Polymer battery cells or equipment with a build-in battery cell in standard garbage, and also electronic devices in general require a special handling for disposal.

You can resend the complete display unit to us for disposal, but please contact us first (see “Contact information”). You are free to follow your local rules for local disposal or contact the battery’s supplier on his website [www.dynamis-batterien.de](http://www.dynamis-batterien.de) for a local agent which is able to help you with the disposal.

### 7.9.5 Safety data sheet for Lithium-Polymer batteries

Please find the battery cell's safety notice on the website of our battery supplier [www.dynamis-batterien.de](http://www.dynamis-batterien.de).

## 7.10 SEB2.2 OPTION: ANALOG INTERFACE 0509

The optional analog interface 0509 is available only for SEB2.2 display unit.



Features of the analog interface 0509 are:

- BNC output connector, isolated from display unit SEB2.2
- Output of analog value during measurement
- Range: 0 – 4000 mV
- Refresh rate according to sensor used (250 or 500 S/s)
- Adjustable force range: 250N, 500N, 1000N, 2000N

### 7.10.1 Turn off/ on

To turn on and turn off the analog interface, please follow these steps:

- Turn on: Move the sliding switch to the left side (towards the BNC connector).
- Turn off: Move the sliding switch to the right side.

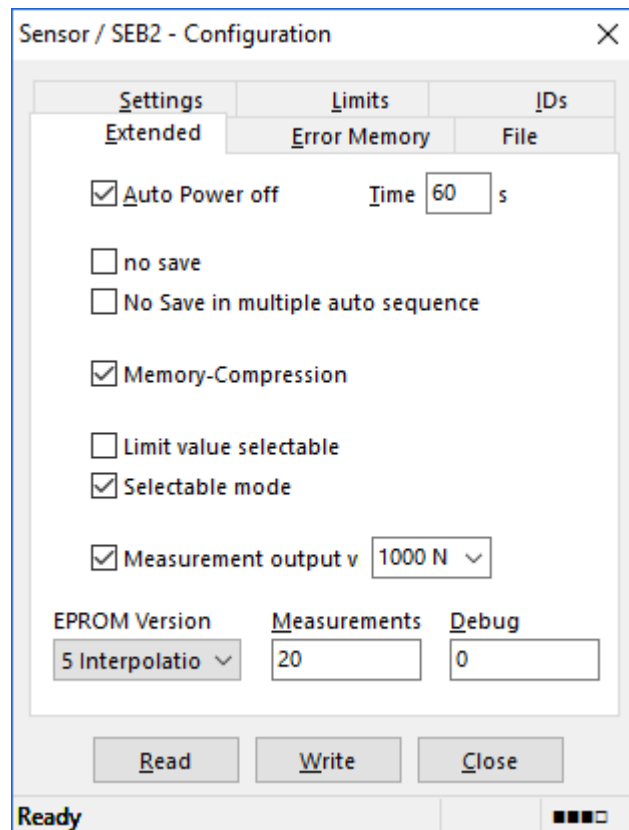
In order to reduce current consumption, turn the analog interface off when not used.

### 7.10.2 Settings

An initial setting is required before start of operation. This procedure has to be performed for each sensor separately:

- Connect sensor to display unit SEB2.2
- Connect display unit SEB2.2 to PC
- Start PinchPilot
- In the menu go to “Sensor/ Configuration/ Extended”
- Activate “Measurement output via Analog Interfaces”
- Set maximum force: 250N, 500N, 1000N, 2000N
- Push “Write” button

Repeat procedure for each sensor to be used.



## 7.11 MEASURING SEB2 / SEB2.2

### 7.11.1 Preparation

#### 7.11.1.1 Configuration

Check configuration settings: Refer to chapter „Software PinchPilot/ PinchPilot settings/ Sensor/ Configuration“.

#### 7.11.1.2 Measuring with display unit and sensor

Display unit and sensor are required to perform measurements.

Both have to be connected. Before measuring it is recommended to check battery's state (refer chapter "Display Unit/ Battery").

#### 7.11.1.3 List of measurements

To allow the identification of measurements, prepare a list containing all measuring points. During measuring the measurement no. should be entered into the list of measurements.

### 7.11.2 Turn on display unit, set limit

Press the operating button to turn on display unit.

It is a good idea to set the applicable force limit in the display unit depending on the guideline and the properties of the point to be measured. Without a valid limit, the evaluation of the display unit makes no sense. It is possible, to change the limit during the PinchPilot evaluation, but it saves time to do it before the measurement.

The setting of the limit is performed during the turn on phase of the display unit (refer to chapter "Display Unit/ Basic Settings/ Peak force limit").

The display unit is now in the ready state; the yellow LED flashes slowly.

### 7.11.3 Measuring process

First put sensor in measuring position. For details please see chapter "Pinch Force Sensor/ Measuring position".

Activate force measuring by briefly pressing the operating button. The display unit will tare the force, i.e. the actual force is set to zero. Thus, all tare weights are compensated. The state LED blinks rapidly.

The measurement starts as soon as the force trigger value is exceeded. The duration may vary. In any case, the end of the measurement is reached when the measurement time has expired.

The peak force is displayed over the whole measurement period. This value is compared with the permissible peak force. Additionally, the pulse duration is compared with the actual limit value. When one of the limits is exceeded, the red LED will be lit up; otherwise the green LED will be lit up.

For some reason a measurement may need to be repeated. Therefore, the decision step “measurement valid/ not valid” has been added:

- Valid: Press operating button shortly. The measurement will be stored. The display shows the next free memory number.
- Not valid/ repeat: Press operating button for a longer time period than two seconds. The measurement will be deleted. The display shows the current memory number again.

All further measurements are to be executed in the same manner.

#### 7.11.4 Load measured data into PC (upload)

Connect display unit to PC and turn display unit on. Start the software PinchPilot.

Select “Sensor/ Load Measure Data”. The data destination in the PC will be indicated and can be changed (with “Search”).

The number of measurements stored in the sensor and the estimated transfer time is indicated. The upload is started by clicking the “Start” button.

When the upload is finished, the last uploaded measurement is displayed. The arrow buttons in the tool bar can be used for scrolling through all measurements in the active folder.

#### 7.11.5 Enter measurement properties

Properties are measurement attributes like customers name, tester, door system etc. All properties appear on the measurement report.

Via “File/ Properties” the property fields can be filled. For more details refer to chapter “Software PinchPilot/ Measurement data/ Properties”.

For further information see chapter “Software PinchPilot/ Measurement data/ Properties”.

#### 7.11.6 Print measurement report

For documentation purposes a measurement report can be printed. It contains the presentation displayed on the screen and all properties.

The printout is initiated by “File/ Print“ and applies to the currently shown measurement.

## 7.11.7 Short operating instructions

## 7.11.7.1 Measuring

| Step | Function                      | Instruction  |
|------|-------------------------------|--|
| 0    | <b>Turn off</b>               | Press operating button for longer than 2 sec.  |
| 1    | <b>Turn on</b>                | Connect sensor to display unit<br>Briefly press operating button<br>Set limit if needed<br>Yellow LED flashes slowly |
| 2    | <b>Note</b>                   | Note memory no. of display unit, together with point of measurement  |
| 3    | <b>Measuring position</b>     | Hold static sensor side to static side of closing system   |
| 4    | <b>Start measuring</b>        | Briefly press operating button<br>System tares, Yellow LED flashes fast  |
| 5    | <b>Start closing process</b>  | Start closing and wait for end of measurement; green or red LED is on (OK/ not OK)                                   |
| 6    | <b>Is measurement valid ?</b> | Yes: Briefly press operating button<br>No: Press operating button for a longer time                                  |

## 7.11.7.2 Data evaluation

| Step | Function                | Instruction  |
|------|-------------------------|--|
| 1    | <b>Connect</b>          | Start PinchPilot<br>Connect display unit to PC<br>Briefly press operating button of display unit |
| 2    | <b>Upload</b>           | Load measurements into the PC (tool bar: cube with red arrow)                                    |
| 3    | <b>Enter properties</b> | Select measurements (tool bar: arrows)<br>Enter properties                                       |
| 4    | <b>Print</b>            | Start print-out (tool bar: printer symbol) or start export                                       |



## 8. PC SOFTWARE PINCHPILOT

The software PinchPilot is capable to:

- Readout of measurement data stored in the display unit
- Graphical visualisation
- Calculation of important characteristic values
- Evaluation of measurements on the base of guidelines
- Creation of measurement reports and storage of measurement data
- Control measurements

### 8.1 INSTALLATION

Installation and licensing requires an Admin account.

#### 8.1.1 System requirements

The software PinchPilot can be installed on any PC that meets the following requirements:

- Operating system: Windows 7 or higher
- Windows system locale: English, German
- USB port

#### 8.1.2 Installation steps

Connect the USB stick and start setup application of PinchPilot using the Windows explorer. During the installation process you have to enter the license key. The license key is a combination of numbers and letters. It is located in the box of the USB stick. If the license key is not accepted by the installer, licensing should be repeated later in PinchPilot program. We recommend choosing the standard installation option.

For demonstration purposes the PinchPilot software can be started without entering a license key (enter "Ignore"). Then you can only view or print out the supplied samples.

After a successful installation PinchPilot can be started via "Start/ Programs/ PinchPilot/ PinchPilot.exe". Alternatively, the user may install a desktop link to the application.

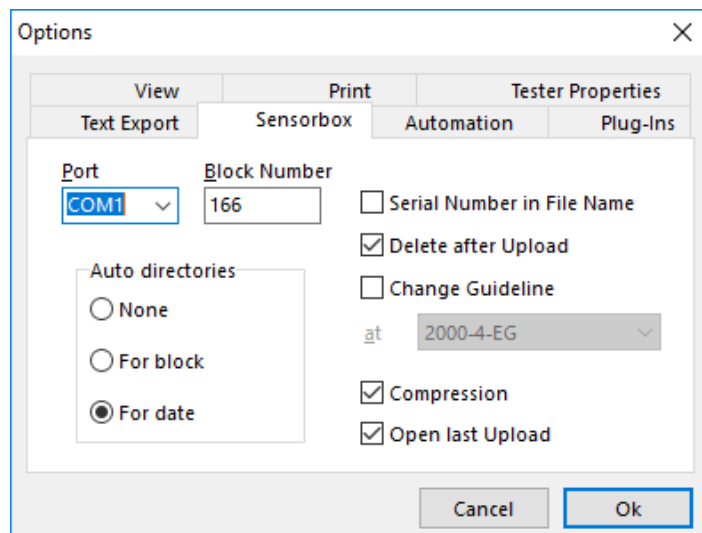
#### 8.1.3 Language

Available languages are German, English, French, Italian and Spanish. The setting is found under: "Extras/ Language" ("Extras/ Sprache").

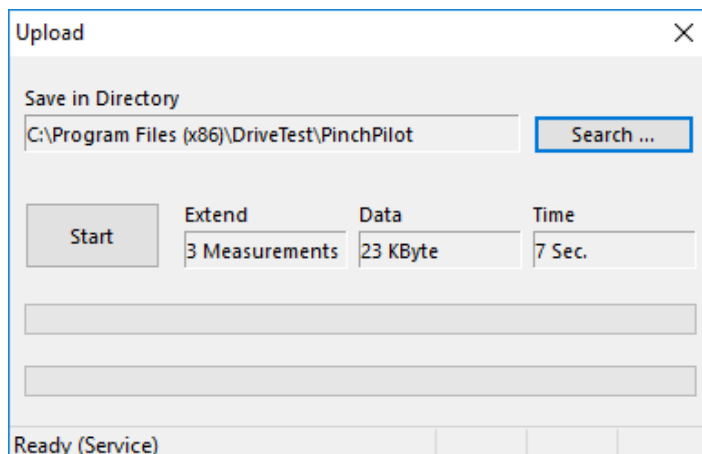
### 8.1.4 Interface setting related to display unit

Please follow these steps:

- Connect display unit to your PC (COM, USB)
- For Bluetooth interface install a connection via in Windows settings.
- Normally, the display device is automatically detected by the PC. If not, please check COM port of USB to serial converter on your PC: “Settings/ Control panel/ Device manager/ COM ports”
- Driver software installed :
  - SEB2: Prolific USB to serial COM-port (COM x)
  - SEB2.2: USB Serial Port (COM x)
- Check the function by disconnecting/connecting.
- Connect/ disconnect USB connector and note no. of COM port used
- Start PinchPilot, go to “Extras/ Options/ Sensorbox/ Port” and select appropriate port no.. For Bluetooth select Auto.



- Check connection to display unit: Turn on display unit, go to “Sensor/ upload measurement data”; state message in lower left corner must be “Ready”:



### 8.1.5 Software updates

The update installation procedure is the same as the original installation. It is not necessary to uninstall the former version of PinchPilot. License key is located on the box of USB stick or you can get it via e-mail after downloading the software from our website.

Each new version of the software PinchPilot requires a new license key. This involves additional costs. Please contact our support team (see "Contact information") to get a quotation.

### 8.1.6 Uninstalling software

To uninstall PinchPilot, please follow the steps below:

- Go to "Settings/ Control panel/ Software/ PinchPilot"
- Select "Add/ Remove": all PinchPilot components will be removed from PC

## 8.2 END USER LICENSE AGREEMENT

By installing the software on his PC the end user accepts the conditions of this agreement:

- The end user has the right to install the software on one PC at a time. There is no time limit for using the software. The user can copy the software for backup purposes.
- The software is licensed and not sold. The holder of all rights is Drive Test GmbH.
- Drive Test warrants that the software is substantially free from defects for a period of one year.
- Drive Test doesn't take any liability for resulting damages resulting from the usage of the software as far as it can be legally excluded.
- Drive Test doesn't warrant that the software will run on every PC system.

## 8.3 GENERAL OPERATING STANDARD

The operation of the software is based on the Windows standard and should be known to most of the users. The easiest way to operate the software is a mouse-based operation; nevertheless, a keyboard-based operation is also possible. In the following description only specific functions are explained, general functions like "save" etc. are considered as known to the user. The access description below is based on the menu bar. Frequently used functions may also be activated directly via tool bar.

## 8.4 MAIN MENU

After starting PinchPilot by double click on the PinchPilot icon the main menu is displayed:

### *Menu bar:*

At the upper screen margin there is the menu bar. This bar offers access to all PinchPilot functions.

### *Tool bar:*

The tool bar is below the menu bar. This bar offers a fast mouse access to often used functions. All functions can also be activated in several steps via menu bar. The tool bar can be modified by the user (right mouse click opens menu).

### *Four diagrams:*

In the middle of the screen there are four diagrams. They represent three single measurements and additionally a fourth diagram displaying all three measurements. Each of the four diagrams can be displayed in a single diagram view.

### *Results:*

The result values are displayed in a table in the lower screen area. Result values are discrete values needed for evaluation purposes based on the active guideline, such as the peak force of a measurement. Each of these values is evaluated on the basis of the active guideline and indicated to be OK or not OK. Besides the values of single measurements, the average values of the three measurements are also evaluated. The total evaluation result is displayed in a separate result field with a significant OK / not OK display.

## 8.5 MEASUREMENT DATA

Measurement data is found in measurement data files. Within the software PinchPilot the expression "file" is equivalent with measurement data file.

### 8.5.1 File name

The name of measurement data files is composed of several components:

aaaa bbb cc (dd).ppd

aaaa .. Serial no. of the sensor. This part of the name can be activated or deactivated. It is set under "Extras/ Options/ Sensor/ Serial No. in file name". The serial no. as part of the name is especially important when more than one sensor is in use. When only one sensor is used, this feature should be deactivated.

bbb ... Continuous block number. This number is incremented at every upload session (transfer of measurement data from display unit to the PC). The block no. can be set under "Extras/ Options/ Sensor/ Bloc No."

cc ... Number of the measurement (00-99)

(dd) ... Index for single auto-sequence (00-99)

ppd ... Type specific file extension: PinchPilot data

### 8.5.2 Location of files

Before uploading data, a destination directory can be selected ("Sensor/ Load Measure Data/ Search"). At next upload the selected directory will be used.

When loading measurement data files stored in the PC, the location can be selected freely. At the next loading the selected directory will be used.

### 8.5.3 Properties

Properties of measurement data are important attributes like the name of the customer, point of measurement etc. All properties appear on the printed report. Without properties measurement data can be easily mixed up and has little information value.

Properties are set under “File/ Properties“. Changes are valid for the currently shown measurement. Default settings will be inserted automatically during upload process.

Properties of a measurement data file:

| Property      | Meaning                               | Example          |
|---------------|---------------------------------------|------------------|
| Guideline     | Name of the applicable standard       | EN14752:2015     |
| Tester        | Name or code of testing person        | Charles Clamp    |
| Customer      | Name or code of customer/ dep. etc.   | London City Ltd. |
| Item          | Identification of the item            | Door 1           |
| System        | Identification of the system          | Automatic        |
| Measure Point | Identification of the measuring point | Middle edge      |

Depending on the guideline, the names may vary.

Additional properties are:

- Remarks: Additional measurement information
- Measuring Points: Designation of frequently used measurement points.

These names could be selected under “Measuring/ Measure Point”.

All inputs are valid for the currently shown measurement. In addition, a set of properties can be defined as a default setting. Default settings are inserted automatically when measurements are uploaded. Default settings are guideline specific, i.e. only available in the corresponding guideline.

For measurements that have to be executed periodically and include several measurement points, usage of the sequence option is recommended. The sequence properties will be inserted automatically into the property fields of all measurements of the sequence. Refer to chapter “Software PinchPilot/ Sequence of measurements”.

### 8.5.4 Details

In addition to the course of the force and the result values displayed in the main menu, there is a variety of information details linked to the measurement. These details can be displayed under “View/ Details”. In case of malfunction, this information can be useful.

### 8.5.5 Data administration

The administration of measurement data files has to be organised externally via the Windows Explorer. By this means, files can be deleted, moved or saved. We recommend creating an adequate folder structure for clearly arranging data.

### 8.5.6 Single/ double/ triple/ quintuple measurement

Depending on the setting “Sensor/ Configuration/ Mode“, a measurement data file can consist of one, two or three measurements.

### 8.5.7 Export

Depending on the intended purpose, measurement data can be exported in different formats. The following options are offered under “File/ Export“:

#### *Text:*

Unformatted text, which can be imported by programs like MS Excel or MS Word.

#### *PDF:*

The measurement protocol is saved in a PDF formatted file. Advantages of this format are:

- It can be sent via e-mail.
- It cannot be changed.
- It is readable with Acrobat Reader without any other software needed.

#### *PNG:*

The measurement report and the diagram can be exported in a PNG formatted image file.

#### *CSV:*

The result values (of result table) are exported into the result file. The details are defined under “Extras/ Result export options“.

### 8.5.8 Print

The printing features can be accessed under “File/ Print“:

- Selection and setting of a printer
- Preview before printing
- Starting the print

## 8.6 PINCHPILOT SETTINGS

PinchPilot offers versatile settings. The default software installation settings ensure reasonable values so that the user has to adapt very few values.

### 8.6.1 Extras/ Options

Setting options and their meanings

| Submenu           | Value                                 | Meaning  |
|-------------------|---------------------------------------|--|
| Sensorbox         | Port (PC interface)                   | Depending on COM port used (for changes to become effective, a restart of PinchPilot is required)            |
| Sensorbox         | Bloc. No.                             | Number of upload session; adapt when needed  |
| Sensorbox         | Serial No. in file name               | Select this feature when several sensors are in use with one display unit                                    |
| Sensorbox         | Delete after upload                   | Delete measurement data after uploading data into PC (should be set)   |
| Sensorbox         | Change Guideline                      | Redefines guideline when uploading (refer to chapter "Changing the guidelines")                              |
| Sensorbox         | Compression                           | Compressed data transfer for shorter transfer duration, set active   |
| Sensorbox         | Open last Upload                      | Load and display the last measurement after an upload session  |
| Sensorbox         | Auto directories/ None                | No automatic folder creation   |
| Sensorbox         | Auto directories/ For Block           | Automatic folder creation according to bloc no.  |
| Sensorbox         | Auto directories/ For Date            | Automatic folder creation according to date  |
| Tester Properties | Logo                                  | Corporate logo, if available and desired   |
| Tester Properties | Properties appear in report           | Text appears in the right, upper field of the report, e.g. postal address etc.                               |
| Print             | Margins, Logo margins                 | Set margins for printed report   |
| Print             | Charts                                | One or all diagrams printed; set all   |
| Print             | Punch marks                           | Punch marks, set active  |
| View              | Display options                       | Display options  |
| View              | Appearance                            | Display appearance   |
| View              | Average                               | Time for averaging of force values for PC controlled measuring, refer to chapter "Measuring with PinchPilot" |
| Plug-ins          | Export result data                    | Refer to chapter "Software plug-ins"   |
| Plug-ins          | Import label data                     | Reserved   |
| Plug-ins          | PLC remote control                    | Reserved   |
| Plug-ins          | Database export, production           | Reserved   |
| Automation        | Allow several instances of PinchPilot | DrivePilot may be started several times in order to serve several sensors on one PC.                         |

|               |   |                           |
|---------------|---|---------------------------|
| Automation    | Move measurement automatically            | Valid for automation mode |
| Automation    | Upload previous measurement automatically | Valid for automation mode |
| Text export   | Measuring distance                        | Time between measurements |
| Result export | File format                               | CSV or Q-DAS              |
| Result report | Automatic export                          | On/off, file path         |

### 8.6.2 Extras/ Settings

These settings are guideline specific and depend on the guideline of the actually loaded measurement. The user can modify the scaling and setting values which are not defined in the standard the guideline is based on.

Changes are only valid after you quit the window with the OK button. Other measurements are not affected. If the parameters shall be changed for future measurements, the actual setting must be stored as default.

#### *Scaling:*

Scaling changes the graphic representation of measured data. Time and force axes can be automatically scaled or scaled with fixed parameters. In general, it is better to have fixed scaling in order to be able to compare different measurement diagrams.

#### *Limits:*

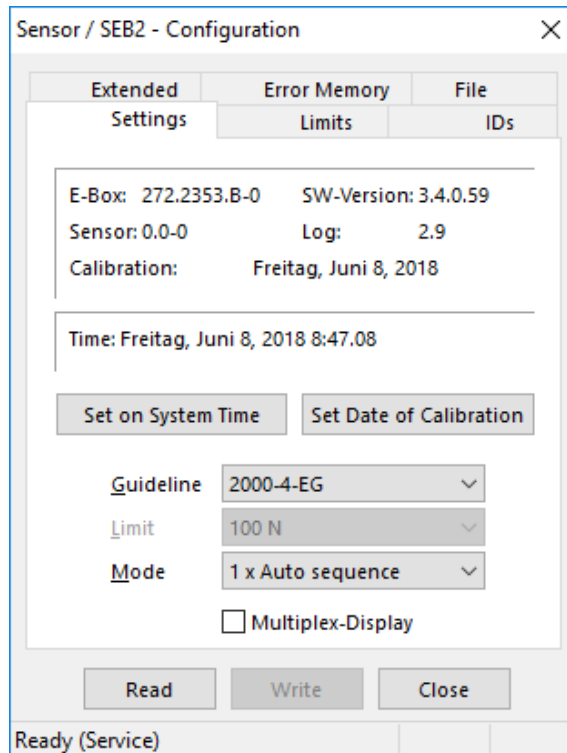
Limits defined by the standard the guideline is based cannot be modified (grey representation). Values not defined in the standard can be modified (black representation).



### 8.6.3 Sensor/ Configuration

Important: For configuring the sensor, the display unit has to be connected to the PC and the sensor has to be connected to the display unit. The display unit has to be turned on.

The configuration setting is stored in the display unit or in the connector of the sensor. The actual setting can be read out and rewritten.



#### *Set on system time:*

The real-time clock contained in the display unit is set to the PC's system time. This setting is of great importance since every measurement gets a time stamp, thus the time of the measurement is documented.

#### *Guideline:*

According to the sensor type the appropriate guidelines are selectable.

#### *Limit:*

According to the guideline the appropriate force limit values are selectable.

#### *Mode:*

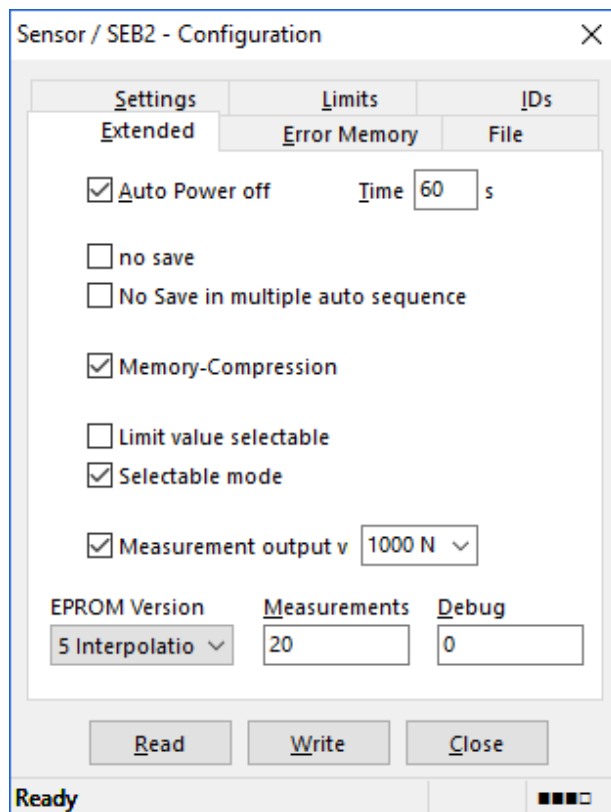
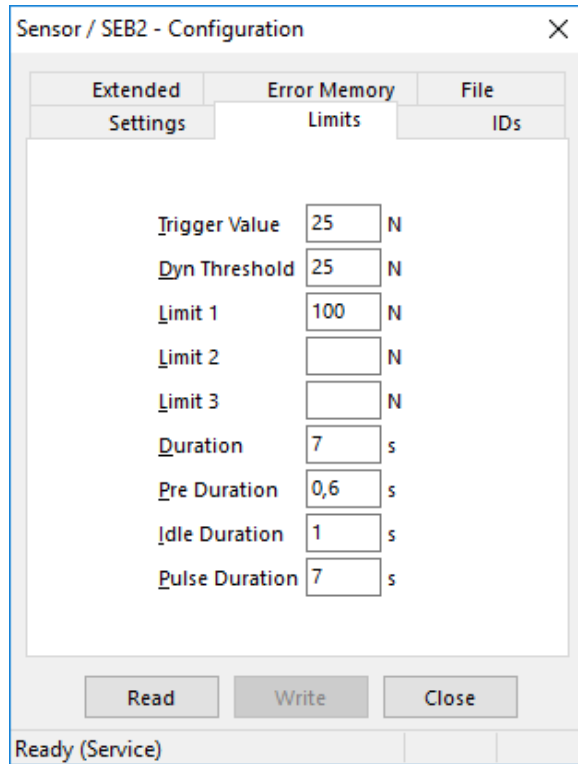
Selectable modes are:

- Single measurement, single measurement with auto sequence
- Dual measurement, dual measurement with auto sequence
- Triple measurement, triple measurement with auto sequence
- Quintuple measurement, quintuple measurement with auto sequence

This setting can also be modified via the display unit.

#### *Multiplex-Display:*

If this option is active, the display of the display unit will toggle between the peak and the effective force. The effective force is the average force during which the force is greater than the trigger value.



*Limit value selectable:*

Enables/ disables limit modification during power on sequence.

*Selectable Mode:*

Enables/ disables mode selection during power on sequence.

*Measurement output (requires the optional analog interface):*

Enables/ disables output and defines force range.

#### 8.6.4 Operating bars

The menu bar and the tool bar may be customized by the user. The procedure is:

- Move the mouse into the area of menu/ tool bar
- Click the right hand sided mouse key (context menu)

The menu displayed allows activation/ deactivation of the menu bar, tool bar and state bar. Additionally, the graphic view may be defined.

More settings are available by selecting "Customize".

*Operating bars (tool bar):*

Activating/ deactivating the entire tool bar. It is also possible to reset the tool bar to a default state.

*Actions:*

Individual setting of the tool bar.

*Options:*

More individual view settings.

## 8.7 MEASURING WITH PINCHPILOT

### 8.7.1 Normal operation

To carry out a normal measurement, the sensor and the display unit are the components in use. It is not necessary, to connect the display unit to a PC. The measurement procedure is described in the chapter “Measuring”.

### 8.7.2 Controlled by PinchPilot

Beside the mentioned method above, it is possible to control a measurement from the PC. For this, the display unit has to be connected to the PC.

Turn on display unit and set PinchPilot into measurement mode.

The screenshot shows a software dialog box titled "Measurement" with a close button (X) in the top right corner. The dialog is organized into several sections:

- Force:** A large empty text input field.
- Duration:** A text input field with the unit "S" (seconds) to its right.
- Span:** A text input field with the unit "mm" (millimeters) to its right.
- Number:** A text input field containing the value "1.1".
- Limit:** A dropdown menu currently set to "100 N".
- Mode:** A dropdown menu currently set to "Triple Measureme".
- Result:** Three radio button options: "Manually" (selected), "Save", and "Discard".
- Checkboxes:** "Average values" (unchecked), "autom. Upload" (checked), and "Auto-Sequence" (unchecked).
- Save in Directory:** A text field containing the path "C:\Program Files (x86)\DriveTest\PinchPilot" and a browse button (...).
- Buttons:** A row of five buttons: "Duration" (with a double right arrow icon), "Start" (with a single right arrow icon and a blue dashed border), "Stop" (with a right-angle icon), "Save" (with a floppy disk icon), and "Abort" (with an X icon).
- Bottom Buttons:** "Power off" and "Close".

At the bottom left of the dialog, the status "Ready" is displayed.

For settings for measuring mode please see the following table (Tab. 5.3):

Tab. 5.3: Settings for measuring mode

| Setting       | Meaning                                      | Selectable values  |
|---------------|--|--|
| Limit         | Limit to be used                             | Limit designation  |
| Autom. Upload | Automatic upload at the end of a measurement | Active/ not active   |
| Modus         | No. of measurements per measuring point      | Single/ double/ triple measurement                         |
| Auto sequence | Automatic start of subsequent measurements   | Active/ not active   |
| Averaging     | Averaging of force *                         | Active/ not active   |
| Result        | Saving of measurements                       | Manual (button "Save")<br>Save (always)<br>Discard (never) |

\* Setting of averaging time refer to "Extras/ Options/ Display/ Averaging"

The measurement can be started as soon as the PC starts communicating with the display unit and the ready state is indicated.

A normal measurement is initiated by clicking the start button which has the same function as the operating button of the display unit. The measurement process complies with the one of the normal measurement. The saving of the measurement depends on the result setting.

A permanent measurement is started by the "Permanent" button. Here the values are displayed but not saved.

## 8.8 SOFTWARE MAINTENANCE

During its life time, the software is maintained by the manufacturer, i.e. known bugs will be corrected, functions enhanced or new functions added. Therefore, PinchPilot updates will be available from time to time. New releases can be delivered, e.g. when the device is calibrated by the manufacturer or an authorised partner. Please ask about a quotation (see "Contact information").

## 8.9 SOFTWARE PLUG-INS

Additional functions can be added via plug-ins. Installed plug-ins can be activated/ deactivated in menu "Extras/ Options/ Plug-Ins". A detailed setting is offered in the lower display of the menu "Extras".

A useful option for evaluating result data is the export function. All values of the result table of a measurement are exported (appended) into an export data file.

The setting details are found under "Extras/ Result export options".

*File format:*

Standard setting is CSV format. Further processing with MS Excel is possible. An alternative format is Q-DAS.

*Automatic Export:*

The automatic export is performed during uploading of measured data from display unit. Details can be set in this menu.

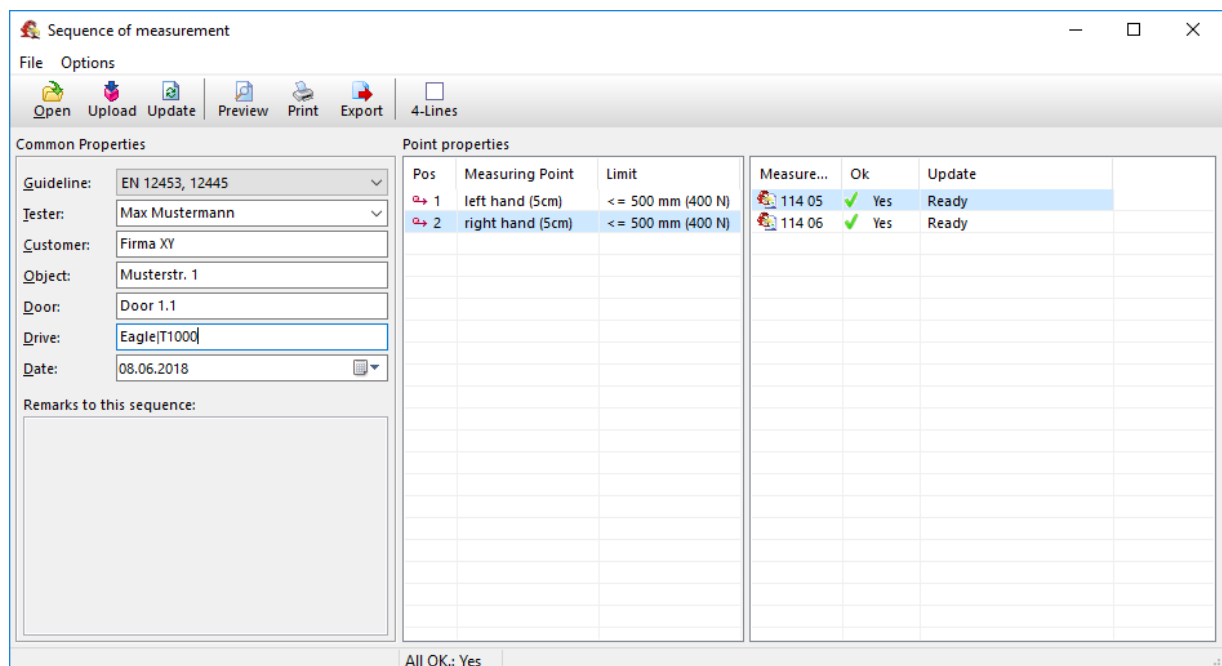
*Manually controlled export:*

Alternatively to the automatic export, it is possible to trigger the export manually ("File/ Export/ CSV Export").

## 8.10 SEQUENCE OF MEASUREMENTS

Measurement sequence is intended for all those objects, who have to be measured at several points like train doors, bus doors, automatic doors, etc.

Measurement sequence can be found under: "File/ Sequence" or clicking on the sequence symbol "Symbol" (hand with a sheet of paper).



Measurements can be uploaded into the PC within the sequence window.

On the right, the loaded measurements are displayed in a table.

The middle area is to specify the measurement points including the limit to be applied. On the left side area sequence properties and remarks can be entered, like guideline to be applied, tester, customer, etc.

After entering all properties, the property setting can be applied to the measurements. The details of this action are:

- Transfer of sequence properties into the property fields of all measurements. The content of remarks is an exception. It appears only in the remarks field of the report.
- Application of the guideline and the limits for all measurements.

A printable table is now available which can be inspected (previewed) on the screen.

The results of the measurements can be displayed in two different ways:

- 4 Lines: Displays three measurements per point plus the average values or
- 1 Line: Displays only average values per point.

### 8.10.1 Templates

An essential method to ease working with sequences is the usage of templates. Templates contain the properties of a sequence including the measurement points.

After having entered a set of properties for a certain type, it can be stored in a template file under a freely definable name. Next time, when this type is to be measured, the properties can be loaded from the appropriate template ("File/ Open template").

For clear arrangement reasons templates should be kept in a separate folder, e.g. "C:\PinchPilot\Sequence\Templates".

If the measurements are executed in the sequence defined in the appropriate template, the effort to get the result report is reduced to a few mouse clicks.

### 8.10.2 Details to work with sequences

After uploading from the display unit, measurements appear in the right table. Alternatively, measurements can be loaded by using the open function. Only one measurement file can be marked, but all files with the same block no. (i.e. all measurements of the same upload session) will be loaded. These are normally the measurements related to one object.

An important tool within the sequence window is the right mouse key. By clicking the right mouse key, in many situations a context menu is opened, offering appropriate actions like moving, deleting, etc.

Groups can be defined by using the combination of shift and right mouse key. Context menus are also for those groups available.

The documentation of a measurement sequence is the print-out of a report. If the user wishes to get another copy of the report on another day, all steps have to be repeated. A possibility of keeping reports is to use one of the export functions (e.g. PDF format).

By arranging windows, the sequence and the graphic windows can be displayed at the same time on the screen. A double click on a measurement in the sequence window will cause the display of this measurement in the graphic display.

PinchPilot supports "drag and drop". With this method, lines or a group of lines in the sequence window can be moved. When Windows explorer is on the monitor, some loading processes can be elegantly executed:

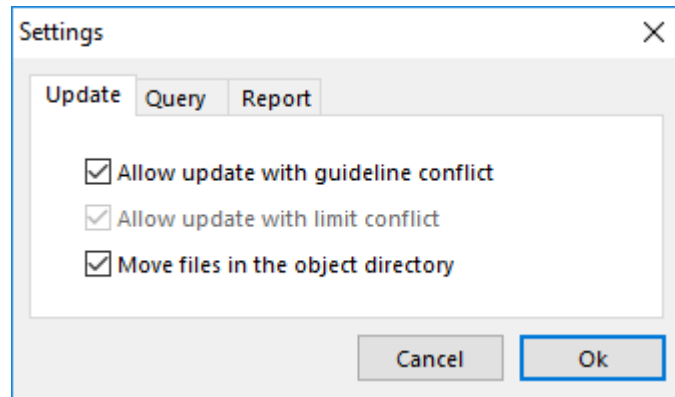
- Get measurements into the graphic display or into the sequence window.
- Get templates into the sequence window.

### 8.10.3 Options of sequences

#### *4-Lines vs. 1-Line:*

In case of triple measurements, the 4-lines representation makes sense. The table contains the results of all three measurements plus the average values. The alternative is the 1-line representation. Each measurement is represented in one line which contains the average values. With this method it is possible to present many measurements on one sheet.

#### *Settings:*



#### *Update (matching):*

Every measurement gets at the time of its creation a guideline and a limit property according to the sensor used and the setting of the display unit. Normally, the application of sequence properties to the measurement is disabled, if guideline or limit property from the sequence and measurement do not comply.

However, the user can allow the application by changing the option settings:

- Allow update (matching) with guideline conflict
- Allow update (matching) with limit conflict

#### *Move files in the object directory:*

The measurement directory is a folder carrying the name entered into the object field of sequence properties. The object directory is located below the upload directory. Moving measurement data files is performed during the matching (update) process. If the object directory does not exist, it will be created automatically. Eventually existing subdirectories will be moved as well.

Example for the matching (update) process (object 1105):

| Directory structure before matching (updating)                    | Directory structure after matching (updating)                             |
|---|---|
| Pinchdata<br>2016-12-19<br>165 01.ppd<br>165 02.ppd<br>165 03.ppd | Pinchdata<br>1105<br>2016-12-19<br>165 01.ppd<br>165 02.ppd<br>165 03.ppd |



*Query:*

In case of danger of data loss, a message appears and offers the possibility to cancel the required action. This warning message can be suppressed.

*Report:*

In case of three or less single measurements a graphic presentation can be activated in addition to the result table.

*Routing slip:*

A routing slip can be created including all measuring points. It can be used to guide through all measurements. To ease later identification the number of the measurement should be entered into the routing slip. The template of the routing slip is a HTML file. It can be replaced or modified by the user.

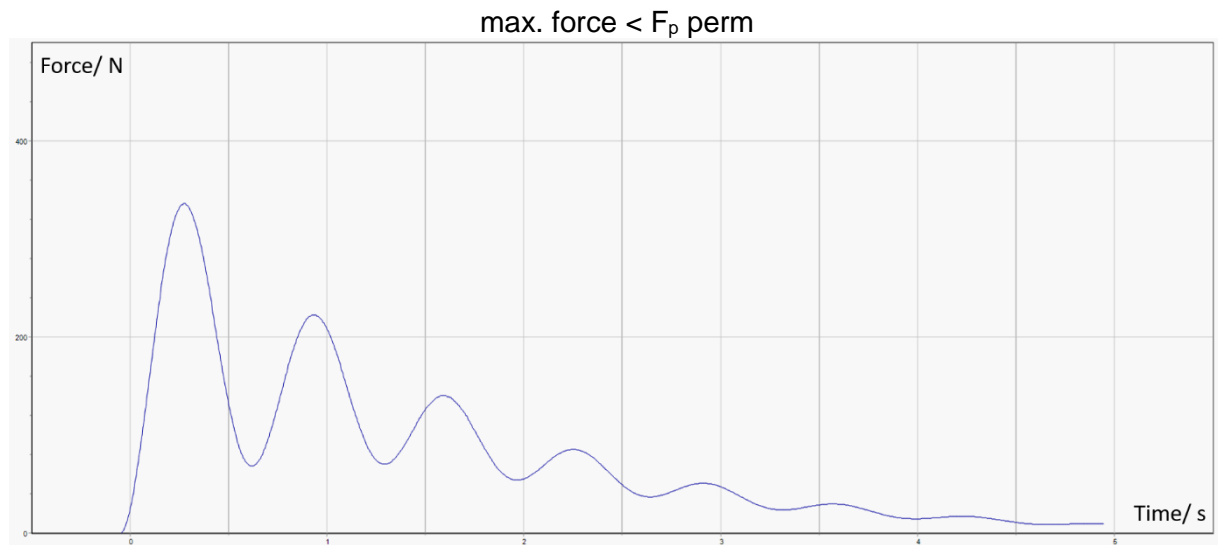
## 8.11 CHANGE OF GUIDELINES

In case of standard changes applicable to pinch force measurement, Drive Test will adapt the related PinchPilot guidelines. This is ensured by permanent observation of the relevant standards. PinchPilot software upgrades could be done e.g. when the device is calibrated by Drive Test or by an authorised partner. Please ask about a quotation (see "Contact information").

The evaluation result of the display unit may differ from the one of the PinchPilot software, due to the fact that a complete implementation of all details and exception of the standard requirements is performed only by PinchPilot.

## 8.12 SOFTWARE EVALUATION

Typical force flow. Es gilt:



PinchPilot shows the result table:  $F_{\max}/ N(F_p)$ ,  $F_{\text{eff}}/ N$  and  $T_p/ s$ ::  
 $F_{\max}$  peak force,  $F_{\text{eff}}$  effective force,  $T_p$  pulse duration.

## 9. GUIDELINES, STANDARDS

The expressions used in this manual are defined as follows:

**Standard:**

General term for a directive for measuring and evaluating the closing force. This can be laws, European standards etc. .

**Guideline:**

Referred to as a set of parameters and limit values that define the execution of measurements and the way the results are tested. Basis of guidelines are standards.

Parameters defined by the standard applied cannot be changed by the user. Parameters not defined by the standard may be user modified.

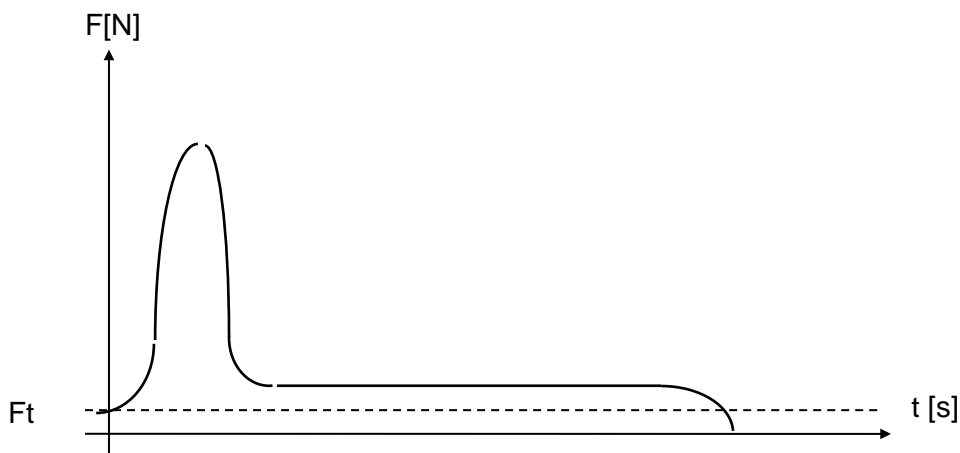
In addition to the guidelines provided by Drive Test, the user can define one user-defined guideline. All settings of the user-defined guideline can be changed by the user.

The guideline to be applied for measurements is stored in a memory device in the connector of every sensor. All measurements inherit this guideline as a property.

In case of standard changes applicable to closing force measurement , Drive Test will adapt the related PinchPilot guidelines. This is ensured by permanent observation of the relevant standards. PinchPilot software upgrades are carried out when the device is calibrated by Drive Test or by an authorised partner.

Below the essential requirements of applicable standards are described. No claim is raised concerning completeness and correctness. For exact details refer to the original standard text.

The evaluation result of the display unit may differ from the one of the PinchPilot PC software due to the fact that a complete implementation of all details and exception of the standard requirements is performed only by PinchPilot.



Schematic course of force

## 9.1 GENERAL DEFINITION OF TERMS

**Trigger threshold (Ft):**

A force above the trigger threshold starts the measurement.

**Peak force (Fp):**

Maximum force to be found during the measurement.

**Effective force (Fe):**

Average force during time T.

**Pulse duration (T):**

Time between t1 and t2 , where t1 marks increasing and t2 decreasing the force trigger threshold.

**Clamping force (FE):**

Mean value of effective forces, measured sequentially at the same measuring point.

**Remaining force (Fk):**

Remaining force is the force 1 s after decreasing or 5 s after increasing the trigger threshold (whichever occurs first).

**Aperture width (S):**

Distance between main closing edge to side closing edge.

**Initial sensor width (S0):**

Sensor width, uncompressed, including spacers applied.

**Limit width (S perm):**

Aperture width, compressed, including spacers applied.

**Limit force (Fp perm):**

Permissible peak force at limit width.

## 9.2 EN14752:2015

EN14752:2015 is a European standard for  
Railway application - Bodyside entrance systems, released in 2015.

### 9.2.1 Test methods

#### 9.2.1.1 Position of vehicle

The vehicle must be in horizontal position.

#### 9.2.1.2 Number of measurements per measuring point

For each measuring point at least three measurements have to be performed. The average and the single values must comply with the requirements.

#### 9.2.1.3 Location of measuring points

Main closing edges at middle height.

#### 9.2.1.4 Calibration

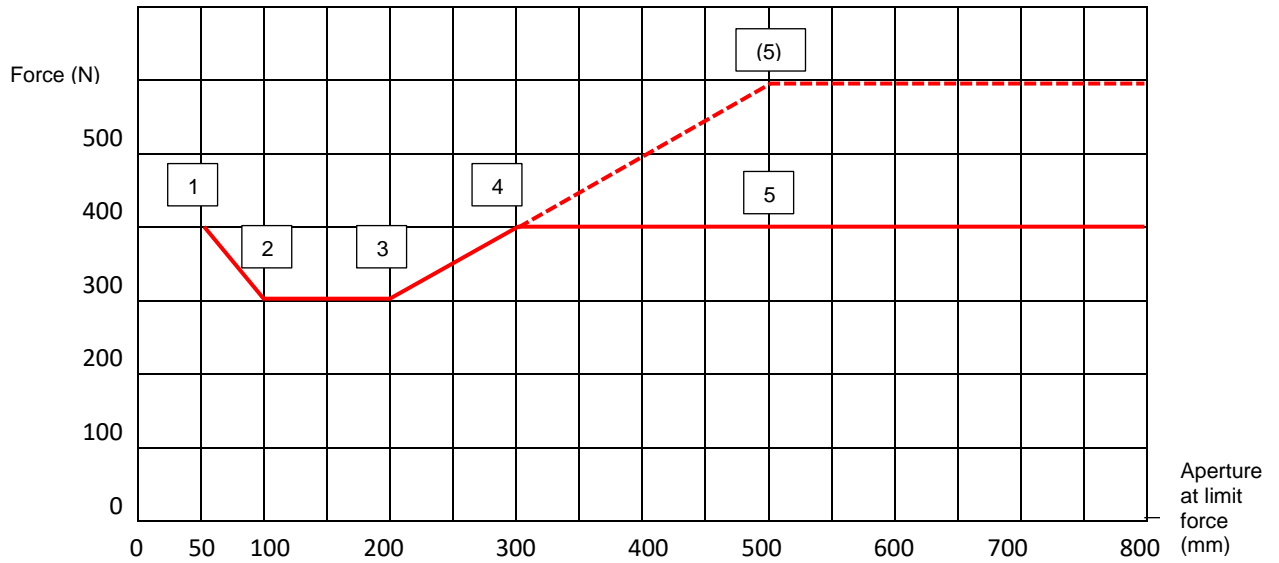
Not specified.

### 9.2.2 Requirements

Trigger threshold (Ft): 100 N

### 9.2.2.1 Test criteria

#### Permissible peak force



#### Aperture Setting

| Setting   | left side   | right side  | Initial Width<br>uncompressed<br>(force = 0 N) | Limit Width,<br>Compressed<br>S perm<br>(force = limit) | Limit Force<br>Fp perm |
|---|---|---|--|---|------------------------|
| 1   | -   | -   | 90 mm  | 50 mm   | 400 N                  |
| 2  | S1<br> | -   | 130 mm   | 100 mm  | 300 N                  |
| 3  | S1<br> | S2<br> | 230 mm   | 200 mm  | 300 N                  |
| 4  | S3<br> | S2<br> | 340 mm   | 300 mm  | 400 N                  |
| 5  | S3<br> | S4<br> | 560 mm   | 500 mm  | 400 N<br>(600 N)       |

### 9.2.3 Spacer detection

The applied spacers are detected and the appropriate value is entered automatically.

Manual spacer setting: After turning on the display unit, the actual limit width is displayed for a time of 2 seconds. Every short press of the push button during this phase will change the limit to next value. Possible entries are 50, 100, 150, 200, 250, 300, 350, 400, 450, 500 N.

### 9.2.4 Evaluation display unit

- Max. Force <  $F_p$
- Pulse duration  $\leq 1$  s

### 9.2.5 Evaluation PC-software PinchPilot

The evaluation is identical to the one of the display unit SEB2.

#### Result table PinchPilot

| Measurement | $F_{max}$ / N<br>( $F_p$ ) | $T_p$ / s | E / J |
|-------------|----------------------------|-----------|-------|
|-------------|----------------------------|-----------|-------|

$F_p$  ... Peak force <  $F_p$

$T_p$  ... pulse duration  $\leq 1$  s

E ... Energy (peak energy stored in BAI600 spring)

## 9.3 EN14752:2019

The requirement relating to the peak force evaluation has been modified:

2015: average value of all peak forces measured in one point.

2019: highest value of all peak forces measured in one point.

All other requirements concerning pinch force measurement are identical to edition.

## 9.4 EN14752:2022

All requirements concerning pinch force measurement are identical to edition 2019.

## 9.5 EN14752:2005

EN14752:2005 is a European standard for  
Railway application - Bodyside entrance systems.

### 9.5.1 Sensor width

EN14752:2005 requires a sensor width of 115 mm. The BIA600 sensor width is 90 mm. Therefore a spacer of 25mm is required (BIA600-BT-FX-25).

### 9.5.2 Test methods

#### 9.5.2.1 Position of vehicle

The vehicle must be in horizontal position.

#### 9.5.2.2 Number of measurements per measuring point

For each measuring point at least three measurements have to be performed. The average and the single values must comply with the requirements.

#### 9.5.2.3 Measuring points

Main closing edge of the door panel in medium height.

#### 9.5.2.4 Calibration

No specification.

### 9.5.3 Requirements

Trigger threshold (Ft): 50 N

#### 9.5.3.1 Test criteria

##### Permissible forces:

| Measurement     | Peak force<br>F <sub>p</sub> perm | Effective force<br>F <sub>e</sub> perm | Clamping force<br>F <sub>E</sub> perm |
|-----------------|-----------------------------------|--|---------------------------------------|
| 1st Measurement | < 300 N                           | < 150 N                                | < 200 N                               |
| 2nd Measurement | < 300 N                           | -                                      |                                       |
| 3rd Measurement | < 300 N                           | -                                      |                                       |

The pulse duration is limited to 5 s. If the force has not decreased the trigger threshold 5 s after increasing it, an error is detected.



#### 9.5.4 Evaluation display unit

Only valid for triple measurement with auto sequence !

- max. Force <  $F_p$  perm
- effective force of 1st measurement <  $F_e$  perm
- clamping force  $F_E$  <  $F_E$  perm
- pulse duration  $\leq 5$  s

#### 9.5.5 Evaluation PinchPilot

The evaluation is identical with the one of the display unit.

Result table PinchPilot

| Measurement | $F_{max}$ / N<br>( $F_p$ ) | $F_{eff}$ / N | $T_p$ / s | $F_k$ / N |
|-------------|----------------------------|---------------|-----------|-----------|
|-------------|----------------------------|---------------|-----------|-----------|

$F_{max}$  ... Peak force

$F_{eff}$  ... effective force

$T_p$  ... pulse duration

$F_k$  ... remaining force

## 9.6 §35E, ABS. 5 STVZO

§35e, Abs.5 StVZO is a German law for power operated bus doors.

### 9.6.1 Test methods

#### 9.6.1.1 Position of vehicle

The vehicle must be in level position.

#### 9.6.1.2 Number of measurements per measuring point

For each measuring point three measurements have to be performed. The average values of the three measurements must comply with the requirements.

#### 9.6.1.3 Measuring points

| Edge  | Position of measuring point  |
|---|--|
| Main closing edge                                   | <ul style="list-style-type: none"><li>• 150 mm above lower door panel limit</li><li>• middle of door</li></ul> |
| Side closing edge<br>(only with existing safeguard) | <ul style="list-style-type: none"><li>• possible pinch locations</li></ul>                                     |

#### 9.6.1.4 Calibration

Recommendation of manufacturer: 1 year.

### 9.6.2 Requirements

Trigger threshold (Ft): 50 N

### 9.6.2.1 Test criteria

#### Permissible peak force $F_p$ perm, Permissible effective force $F_E$ perm:

| Edge   | Peak force $F_p$ perm | Effective Force<br>$F_E$ perm |
|--|-----------------------|-------------------------------|
| Main closing edge                                      | 200 N                 | 150 N                         |
| Side closing edge<br>(only with existing<br>safeguard) | 250 N                 | 150 N                         |

The pulse duration is limited to 5 s. If the force has not decreased the trigger threshold 5 s after increasing it, an error is detected.

### 9.6.3 Evaluation display unit

- max. Force  $\leq F_p$  perm
- pulse duration  $\leq 5$  s

### 9.6.4 Evaluation PinchPilot

The evaluation covers all requirements of the standard:

- max. dynamic force  $\leq F_p$  perm
- max. effective force  $\leq F_E$  perm
- pulse duration  $\leq 5$  s
- remaining force  $\leq F_t$

#### Result table PinchPilot

| Measurement | $F_{max}$ / N<br>( $F_p$ ) | $F_{eff}$ / N | $T_p$ / s | $F_k$ / N |
|-------------|----------------------------|---------------|-----------|-----------|
|-------------|----------------------------|---------------|-----------|-----------|

$F_{max}$  ... Peak force

$F_{eff}$  ... effective force

$T_p$  ... pulse duration

$F_k$  ... remaining force

## 9.7 EN14752-DB

The PinchPilot guideline EN14752-DB has been provided for the requirements of Deutsche Bahn. It mainly matches with EN14752:2005 but allows a series of higher limits for the effective force of the first measurement.

| Measurement    | Peak force<br>$F_{p \text{ perm}}$ | Effective force<br>$F_{e \text{ perm}}$                        | Averaged effective<br>force $F_{E \text{ perm}}$ |
|----------------|------------------------------------|--|--|
| 1. Measurement | < 300 N                            | < 150 N<br>< 170 N<br>< 190 N<br>< 200 N<br>< 250 N<br>< 300 N | < 200 N  |
| 2. Measurement | < 300 N                            | -  |  |
| 3. Measurement | < 300 N                            | -  |  |

## 10. TECHNICAL DATA

Technical specifications subject to change without notice.

### 10.1 SENSOR

| Größe                        | Wert        |
|------------------------------|-------------|
| Spring deflection rate       | 10 N/mm     |
| Tolerance of deflection rate | - 5% .. +5% |
| Gap                          | 90 mm       |
| Force initiation area        | 100x100 mm  |
| Overload protection          | Ja          |
| Weight                       | ca. 2800 g  |

### 10.2 FORCE MEASUREMENT

| Quantity                          | Value                       |
|-----------------------------------|-----------------------------|
| Resolution                        | 1 N SEB2; 0,1N PinchPilot   |
| Accuracy (greater value is valid) | ± 3 N or ± 3% of meas.value |
| Sample rate                       | 250 S/s (4 ms)              |
| Memory                            | Ca. 80 measurements         |

### 10.3 POWER SUPPLY

#### 10.3.1 SEB2

| Quantity                              | Value                 |
|---------------------------------------|-----------------------|
| Battery                               | 9 V-Block, i.e. 6LR61 |
| Battery voltage supervision (warning) | yes                   |

#### 10.3.2 SEB2.2

| Quantity                              | Value                         |
|---------------------------------------|-------------------------------|
| Battery, reloadable                   | Lithium-Polymer, 3.7V, 350mAh |
| Battery voltage supervision (warning) | Yes                           |

#### 10.3.3 SEB2.2B

| Quantity                              | Value                         |
|---------------------------------------|-------------------------------|
| Battery, reloadable                   | Lithium-Polymer, 3.7V, 700mAh |
| Battery voltage supervision (warning) | Yes                           |

### 10.4 ENVIRONMENT

| Quantity                    | Value                        |
|-----------------------------|------------------------------|
| Operating temperature range | 0 bis +40 °C                 |
| Storage temperature range   | 0 bis +40 °C                 |
| Humidity                    | max. 90% rel.H, non condens. |

## 10.5 ANALOG INTERFACE (OPTIONAL, ONLY FOR SEB2.2)

| Größe   | Wert                   |
|---|------------------------|
| Connector   | BNC, female            |
| Output isolation  | 5000 VRMS              |
| Output voltage range  | 4 ... 4000 mV          |
| Resolution  | 1 mV                   |
| Sample rate   | 250 oder 500 S/s       |
| Force range; setting via PC-program PinchPilot:<br>„Sensor/Configuration/extended/measurement output” | 250, 500, 1000, 2000 N |

## 11. GUARANTEE

The manufacturer grants the buyer a two years guarantee. Beginning of the guarantee time is the delivery date (date of delivery note).

Defect or non-functioning parts are either repaired or exchanged. Excepted from the guarantee are damages due to improper treatment, wear and tear parts and injuries by non-authorized personal.

Place of repair is Munich (Germany). For all justified claims the cost of repair (working time and exchange parts) will be paid by Drive Test. Transport will be paid by the buyer.

The liability of Drive Test is limited to the repair of the delivered equipment. Further liability is excluded.

## 12. CONTACT INFORMATION

Drive Test GmbH  
Adi-Maislinger-Str. 9  
81373 Munich  
Germany

Phone: +49 89 7434094-0

Fax: +49 89 7434094-9

E-mail: [info@drivetest.de](mailto:info@drivetest.de)

Website: [www.drivetest.de](http://www.drivetest.de)

## 13. APPENDIX

### 13.1 ERROR MESSAGES DISPLAY UNIT

| Display | Service    | Meaning  |
|---------|------------|--|
| E:0x    |            | Protocol error   |
| E:1x    |            | Serial interface error (x: Bit0=Parity, Bit1=Framing, Bit2=Overflow)                   |
| E:18    |            | Baudrate error   |
| E:20    |            | Sensor connector change  |
| E:21    |            | Wrong sensor (version conflict)  |
| E:30    |            | Sensor supply error  |
|         |            | Bit0=IES invalid, Bit1=IES instable, Bit2=DMS invalid, Bit3=DMS instable, Bit4=timeout |
|         | C:xx       | xx format is decimal, has to be converted into binary format                           |
| E:31    |            | Missing measure data (Time Out)  |
| E:32    |            | Low Bat  |
| E:40    |            | LCD - test error   |
|         | n          | Number of successfully tests   |
| E:41    |            | SRAM memory fast test error  |
|         | n          | Number of successfully tests   |
| E:42    |            | SRAM memory test error   |
|         | 3:xx       | Hexadecimal number of errors MSB   |
|         | 2:xx, 1:xx | ..   |
|         | 0:xx       | Hexadecimal number of errors LSB   |
| E:43    |            | EEPROM test error  |
|         | nn         | Number of error bytes  |
| E:44    |            | EEPROM system parameter initialisation error   |
|         | nn         | Number of error bytes  |
| E:45    |            | EEPROM test error sensor data  |
|         | nn         | Number of error bytes  |
| E:46    |            | EEPROM initialisation error sensor data  |
|         | nn         | Number of error bytes  |
| E:47    |            | A/D-converter does not react   |
|         | n          | Number of successful tests   |
| E:48    |            | Real Time Clock does not react   |
|         | C:00       | Data line constantly 0   |
|         | C:01       | Data line constantly 1   |
| E:50    |            | Message Queue overflow   |
| E:51    |            | Queue for schedule data overflow   |
| E:52    |            | Queue for long term messages overflow  |
| E:53    |            | System died (Watchdog)   |
| E:54    |            | Stack overflow   |
| E:55    |            | Serial transmit data overflow  |
| E:60    |            | Bus arbitration error  |
|         | C:xx       | Demanding client   |
|         | B:xx       | Actual bus activity  |
| E:70    |            | Overflow force measure data  |
| E:71    |            | Overflow position measure data   |
| E:80    |            | Access violation SRAM  |
|         | C:01       | memory address invalid   |
|         | C:02       | Bloc length invalid  |
|         | C:03       | Bloc out of valid range  |
|         | C:04       | SRAM-address invalid   |
|         | C:05       | SRAM-length invalid  |
|         | C:06       | SRAM-overflow  |
|         | C:07       | Align – error  |
| E:81    |            | Access violation at EEPROM   |
|         | C:0x       | Error code, see E:80   |
| E:82    |            | Memory Access violation  |
|         | C:0x       | Error code, see E:80   |
| E:88    |            | EEPROM does not react (not busy)   |
|         | C:0x       | 0 = system parameter, 1 = sensor data  |
| E:89    |            | EEPROM does not react no longer (constantly busy)                                      |
|         | C:0x       | 0 = system parameter, 1 = sensor data  |
| E:8A    |            | Denied write access on EEPROM for sensor data  |
| E:FF    |            | Error cause unknown  |

(\*) with service button additional error code is available