



# FM100

Pinch Force Meter for Doors and Gates



Manual

## Inhalt

<b>1</b>	<b>GENERAL .....</b>	<b>5</b>
1.1	PURPOSE OF USE .....	5
1.2	PROPER USE .....	5
1.3	OLD DEVICES .....	5
1.4	BATTERIES AND RECHARGEABLE BATTERIES .....	5
1.5	TRANSPORT .....	5
<b>2</b>	<b>SYSTEM ARCHITECTURE .....</b>	<b>6</b>
2.1	TETHERED .....	6
2.1.1	Sensor - SEB2 .....	6
2.1.2	Sensor - SEB2 - RS232 – Windows-PC (PinchPilot) .....	6
2.1.3	Sensor - SEB2.2 - USB – Windows-PC (PinchPilot) .....	6
2.1.4	Sensor - SEB2.2 - USB – Windows-PC (DLL) .....	6
2.2	WIRELESS .....	6
2.2.1	Sensor-BT – Bluetooth – Android Endgerät (ForceMeter) .....	6
2.2.2	Sensor-BT – Bluetooth – Windows-PC (PinchPilot) .....	6
<b>3</b>	<b>STARTING UP .....</b>	<b>7</b>
3.1	FM100-(TETHERED) .....	7
3.1.1	Determining the completeness of the system .....	7
3.1.2	Function test .....	7
3.2	FM100-BT (WIRELESS) .....	8
3.2.1	Determining completeness .....	8
3.2.2	Function test (PinchPilot – PC) .....	8
3.2.3	Function test (ForceMeter App – tablet) .....	8
3.3	PLACING OUT OF OPERATION .....	8
<b>4</b>	<b>FORCE SENSOR FM100 .....</b>	<b>9</b>
4.1	BASIC CONSTRUCTION .....	9
4.2	MEASURING POSITION .....	10
4.3	SPACER SET (OPTION) .....	11
4.4	SENSOR DATA .....	12
4.5	SENSOR MAINTENANCE .....	12
4.6	CALIBRATION .....	13
4.7	EC CERTIFICATE FOR CONFORMITY .....	13
<b>5</b>	<b>DISPLAY UNIT SEB2 / SEB2.2 .....</b>	<b>14</b>
5.1	DISPLAY, OPERATING ELEMENTS .....	14
5.2	MEMORY CAPACITY .....	15
5.3	DISPLAY UNIT EVALUATION .....	15
5.4	DATA TRANSFER .....	16
5.5	BASIC SETTINGS .....	16

5.5.1	Erase memory .....	16
5.5.2	Peak force limit .....	16
5.5.3	Mode of measurement .....	17
5.6	ERROR MESSAGES .....	17
5.7	DISPLAY UNIT MAINTENANCE .....	17
5.8	BATTERY SEB2 .....	18
5.8.1	Battery load state .....	18
5.8.2	Transportation .....	18
5.9	BATTERY SEB2.2 .....	19
5.9.1	Battery loading .....	19
5.9.2	Battery load state .....	19
5.9.3	Transportation .....	20
5.9.4	Disposal .....	20
5.9.5	Safety data sheet for Lithium-Polymer batteries .....	20
5.10	SEB2.2 OPTION: ANALOG INTERFACE 0509 .....	21
5.10.1	Turn off/ on .....	21
5.10.2	Settings .....	22
5.11	MEASURING SEB2 / SEB2.2 .....	23
5.11.1	Preparation .....	23
5.11.2	Turn on display unit, set limit .....	23
5.11.3	Measuring process .....	23
5.11.4	Load measured data into PC (upload) .....	24
5.11.5	Enter measurement properties .....	24
5.11.6	Print measurement report .....	24
5.11.7	Short operating instructions .....	25
<b>6</b>	<b>PC SOFTWARE PINCHPILOT .....</b>	<b>26</b>
6.1	INSTALLATION .....	26
6.1.1	System requirements .....	26
6.1.2	Installation steps .....	26
6.1.3	Language .....	26
6.1.4	Interface setting related to display unit .....	27
6.1.5	Software updates .....	28
6.1.6	Uninstalling software .....	28
6.2	END USER LICENSE AGREEMENT .....	28
6.3	GENERAL OPERATING STANDARD .....	28
6.4	MAIN MENU .....	29
6.5	MEASUREMENT DATA .....	29
6.5.1	File name .....	29
6.5.2	Location of files .....	29
6.5.3	Properties .....	30
6.5.4	Details .....	30
6.5.5	Data administration .....	30
6.5.6	Single/ double/ triple/ quintuple measurement .....	31
6.5.7	Export .....	31
6.5.8	Print .....	31
6.6	PINCHPILOT SETTINGS .....	32
6.6.1	Extras/ Options .....	32
6.6.2	Extras/ Settings .....	33

6.6.3	Sensor/ Configuration .....	34
6.6.4	Operating bars .....	36
6.7	MEASURING WITH PINCHPILOT .....	37
6.7.1	Normal operation .....	37
6.7.2	Controlled by PinchPilot .....	37
6.8	SOFTWARE MAINTENANCE .....	38
6.9	SOFTWARE PLUG-INS .....	38
6.10	SEQUENCE OF MEASUREMENTS .....	39
6.10.1	Templates .....	40
6.10.2	Details to work with sequences .....	40
6.10.3	Options of sequences .....	41
6.11	CHANGE OF GUIDELINES .....	42
6.12	SOFTWARE EVALUATION .....	43
<b>7</b>	<b>GUIDELINES, STANDARDS .....</b>	<b>44</b>
7.1	GENERAL DEFINITION OF TERMS .....	45
7.2	EN12445 / EN12453 .....	46
7.2.1	Test methods (EN12445) .....	46
7.2.2	Requirements (EN12453) .....	47
7.2.3	Evaluation display unit .....	48
7.2.4	Evaluation PinchPilot .....	48
7.3	PREN12650-1 .....	49
7.3.1	Test methods .....	49
7.3.2	Requirements .....	49
7.3.3	Evaluation unit .....	50
7.3.4	Evaluation PinchPilot .....	50
7.4	DIN 18650-1 .....	51
7.4.1	Test methods .....	51
7.4.2	Requirements .....	51
7.4.3	Evaluation display unit .....	52
7.4.4	Evaluation PinchPilot .....	52
7.5	DIN 16005-1 .....	53
7.5.1	Test methods .....	53
7.5.2	Requirements .....	53
7.5.3	Evaluation display unit .....	54
7.5.4	Evaluation PinchPilot .....	54
<b>8</b>	<b>TECHNICAL DATA .....</b>	<b>56</b>
8.1	MECHANIC .....	56
8.2	FORCE MEASUREMENT .....	56
8.3	POWER SUPPLY .....	56
8.3.1	SEB2 .....	56
8.3.2	SEB2.2 .....	56
8.3.3	SEB2.2B .....	56
8.4	ENVIRONMENT .....	56
8.5	ANALOG INTERFACE (OPTIONAL, ONLY FOR SEB2.2) .....	57
<b>9</b>	<b>GUARANTEE .....</b>	<b>58</b>

<b>10</b>	<b>CONTACT INFORMATION .....</b>	<b>58</b>
<b>11</b>	<b>APPENDIX .....</b>	<b>59</b>
11.1	ERROR MESSAGES DISPLAY UNIT .....	59

## **1 GENERAL**

### **1.1 PURPOSE OF USE**

The purpose of use of the pinch force meter system FM100 is to measure the closing force of power operated closing systems in facilities and evaluating the result regarding applicable standards (refer chapter "Guidelines, 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 transportation of the system the transportation 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 FM100-(TETHERED)

##### 3.1.1 Determining the completeness of the system

The FM200-system consists of the following parts:

- FM100 sensor, tethered
- Display unit SEB2.2
- USB-cable, USB charger (SEB2.2)
- Software PinchPilot (USB stick)
- Manual, calibration certificate (placed in the cover of the transport case)
- Transportation case



##### 3.1.2 Function test

- Load display unit battery via USB charger
- connect sensor to display unit,
- turn on 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 FM100-BT (WIRELESS)

### 3.2.1 Determining completeness

- FM100 sensor-BT
- USB-cable, USB charger
- Software PinchPilot (USB stick)
- Manual, calibration certificate (placed in the cover of the transport case)
- Transportation 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:

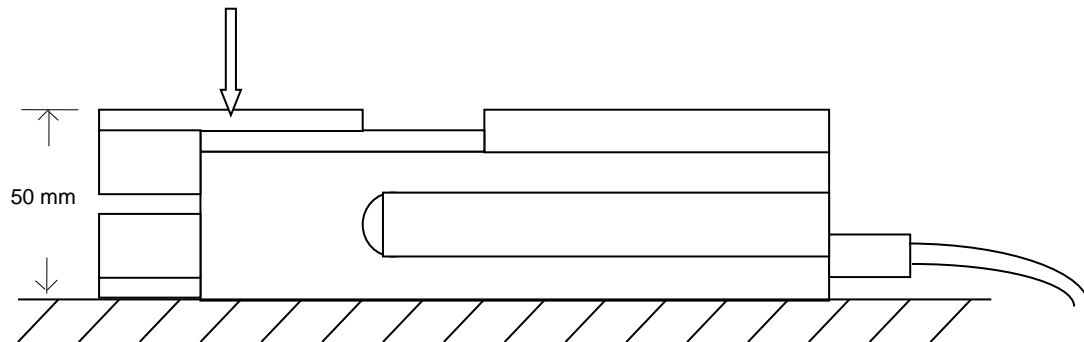
- Check if data to be used is still stored in the display unit (if so, upload data)
- SEB2: remove battery; SEB2.2: batterie partly loaded, reload every 6 month.
- The instrument should be stored in a dry environment within the limits of storage temperature (refer to “Technical Data”).

## 4 FORCE SENSOR FM100

### 4.1 BASIC CONSTRUCTION

The instrument consists of a static and a moveable part. Both parts are linked by a strain gauge sensor and two leaf springs. The leaf springs have a defined stiffness.

The sensor is housed by an aluminium profile which performs the static part. On the upper side there is a disc 80 mm in diameter. This is the movable force initiation of the sensor.



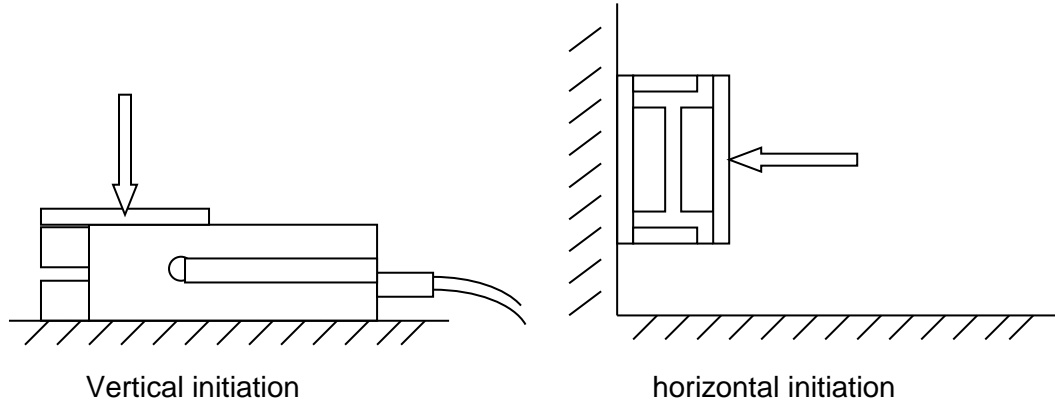
Side view FM100

## 4.2 MEASURING POSITION

The instrument is to be used such that the static part is connected to the stop of the closing system and the movable part faces towards the moving edge.

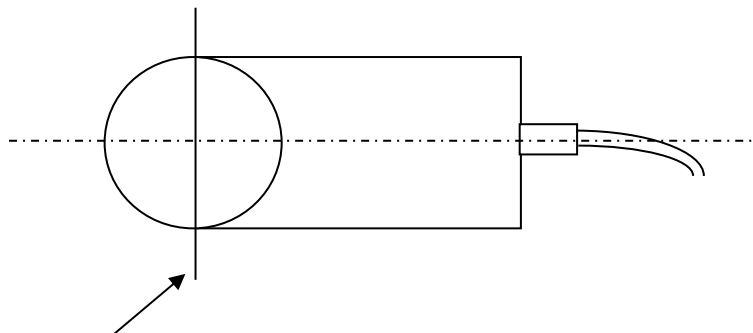
In case of two moving edges, choose one of the edges for the static part and follow the movement of this edge manually. Select a solid and even underlay.

### Vertical / horizontal force initiation:



### Lined Force Initiation:

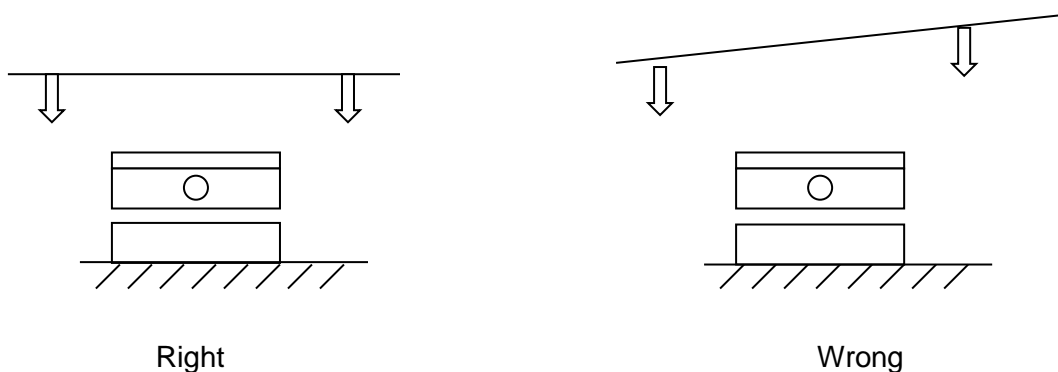
The force should be initiated in the form of a line in an angle of  $90^\circ$  to the symmetrical axis of the sensor. The line should go through the centre of the initiation disc.



Best force initiations line

### Parallel Force Initiation:

The force initiation area and the moving edge should be parallel to each other.



### 4.3 SPACER SET (OPTION)

EN12445/12453 requires different opening gaps (300 and 500 mm). The FM100 spacer set facilitates these measurements. No tools are required.

Spacer combinations:

Spacers applied	Total aperture
None	50 mm
1 (50 + 250 mm)	300 mm
1 + 2 (50 + 250 + 200 mm)	500 mm



vertical measurement  
upper side mounting



horizontal measurement  
lower (static) side mounting

#### 4.4 SENSOR DATA

Basic sensor specific data is stored in a non-volatile memory (EEPROM), situated in the sensor's connector (15-pol. Sub-D):

- Force adjustment data
- Sensor ID, version, serial no.
- Guidelines category
- Date of last calibration
- Number of measurements

#### 4.5 SENSOR MAINTENANCE

The device has to be protected from moisture, dirt and solar radiation. It is designed to withstand normal handling and transportation, nevertheless excessive shock or load (>2500 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.

## 4.6 CALIBRATION

Drive Test pinch force meters are very precise devices, but can be damaged by inappropriate treatment like dropping etc.

To ensure proper function, Drive Test recommend a calibration once a year. (For more information, please refer to the corresponding standard.) The calibration date and state appear on the report.

The calibration certificate can be found in the transportation case cover.

For calibration please always send us the sensor and the display unit (see "Contact information").

## 4.7 EC CERTIFICATE FOR CONFORMITY

We,

Drive Test GmbH  
Hansastr. 31  
81373 Muenchen  
Germany

declare that the pinch force meter

**FM200**

meet the intend of the applicable EC directives:

2006/95/EC  
2004/108/EC

Niederspannungsrichtlinie  
EMV-Richtlinie



München, 18.03.2010  
Wolfgang Schabel, Geschäftsführer

## 5 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

### 5.1 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

## 5.2 MEMORY CAPACITY

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

## 5.3 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.



## 5.4 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".

## 5.5 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.

### 5.5.1 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.

### 5.5.2 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).

### 5.5.3 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 permanent restart, display of last peak force, no graphic data acquisition
2	Dual measurement
+2	Dual measurement with auto sequence automatic start of second measurement
3	Triple measurement
3+	Triple measurement with auto sequence automatic start of second and third measurement
5	Quintuple measurement
5+	Quintuple measurement with auto sequence automatic start of second, third, fourth and fifth measurement

## 5.6 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".

## 5.7 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".

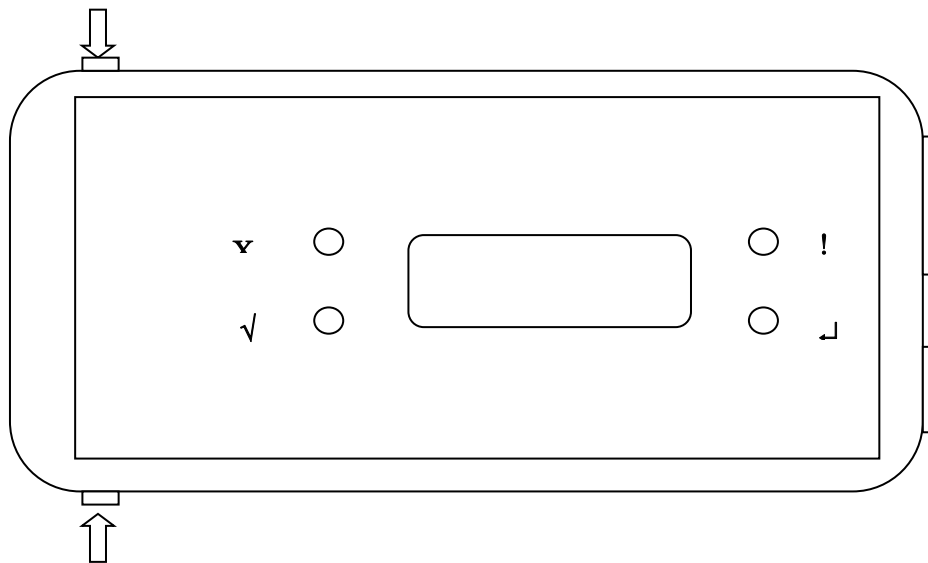
## 5.8 BATTERY SEB2

The SEB2 is equipped with a non rechargeable Alkaline battery.

### 5.8.1 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.

### 5.8.2 Transportation

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

## 5.9 BATTERY SEB2.2

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

### 5.9.1 Battery loading

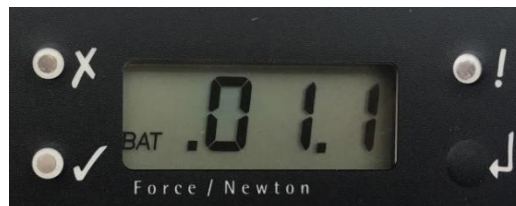
The battery is loaded via USB interface. Loading source can be either a PC or a USB charging device. The time to charge the battery from 0% to 100% is about four hours.

### 5.9.2 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).



### 5.9.3 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”).

### 5.9.4 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.

### 5.9.5 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).

## 5.10 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

### 5.10.1 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.

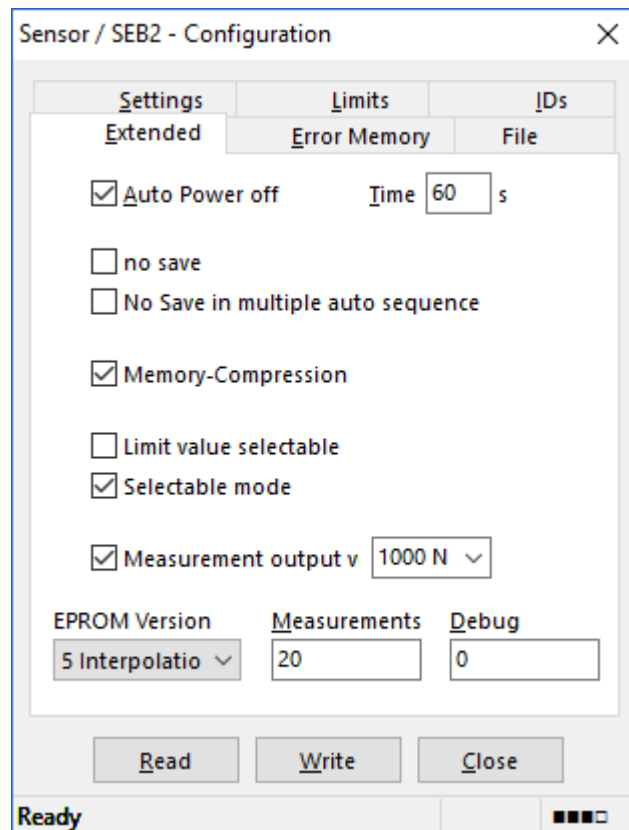
In order to reduce current consumption, turn the analog interface off when not used.

### 5.10.2 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.



## 5.11 MEASURING SEB2 / SEB2.2

### 5.11.1 Preparation

#### 5.11.1.1 Configuration

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

#### 5.11.1.2 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").

#### 5.11.1.3 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.

### 5.11.2 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.

### 5.11.3 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.

#### 5.11.4 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.

#### 5.11.5 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”.

#### 5.11.6 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.

## 5.11.7 Short operating instructions

## 5.11.7.1 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 Briefly press operating button Set limit if needed 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 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 No: Press operating button for a longer time

## 5.11.7.2 Data evaluation

Step	Function	Instruction
1	<b>Connect</b>	Start PinchPilot Connect display unit to PC 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) Enter properties
4	<b>Print</b>	Start print-out (tool bar: printer symbol) or start export

## 6 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

### 6.1 INSTALLATION

Installation and licensing requires an Admin account.

#### 6.1.1 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

#### 6.1.2 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.

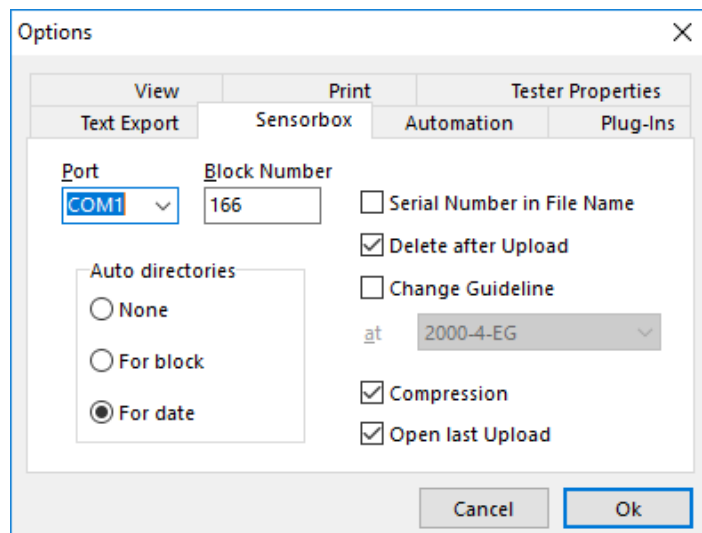
#### 6.1.3 Language

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

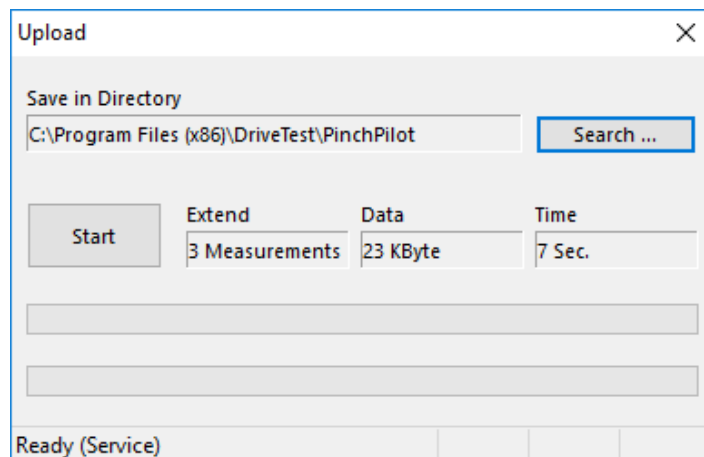
#### 6.1.4 Interface setting related to display unit

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”:



### 6.1.5 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.

### 6.1.6 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

## 6.2 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.

## 6.3 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.

## 6.4 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.

## 6.5 MEASUREMENT DATA

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

### 6.5.1 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

### 6.5.2 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.

### 6.5.3 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”.

### 6.5.4 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.

### 6.5.5 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.

### 6.5.6 Single/ double/ triple/ quintuple measurement

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

### 6.5.7 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”.

### 6.5.8 Print

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

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



## 6.6 PINCHPILOT SETTINGS

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

### 6.6.1 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

### 6.6.2 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).

### 6.6.3 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, tripel 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.

Sensor / SEB2 - Configuration

Extended Settings Error Memory Limits File IDs

Trigger Value 25 N

Dyn Threshold 25 N

Limit 1 100 N

Limit 2 N

Limit 3 N

Duration 7 s

Pre Duration 0,6 s

Idle Duration 1 s

Pulse Duration 7 s

Read Write Close

Ready (Service)

Sensor / SEB2 - Configuration

Settings Limits IDs

Extended Error Memory File

☒ Auto Power off Time 60 s

☐ no save

☐ No Save in multiple auto sequence

☒ Memory-Compression

☐ Limit value selectable

☒ Selectable mode

☒ Measurement output v 1000 N

EPROM Version Measurements Debug

5 Interpolatio 20 0

Read Write Close

Ready

*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.

#### 6.6.4 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.

## 6.7 MEASURING WITH PINCHPILOT

### 6.7.1 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”.

### 6.7.2 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 the 'Measurement' dialog box with the following fields and controls:

- Force:** A large empty text box for input, with a unit 'N' displayed next to it.
- Duration:** A text box for input, with a unit 'S' displayed next to it.
- Span:** A text box for input, with a unit 'mm' displayed next to it.
- Number:** A text box containing the value '1.1'.
- Limit:** A dropdown menu showing '100 N'.
- Mode:** A dropdown menu showing 'Triple Measureme'.
- Result:** Three radio buttons: 'Manually' (selected), 'Save', and 'Discard'.
- Checkboxes:** 'Average values' (unchecked), 'autom. Upload' (checked), and 'Auto-Sequence' (unchecked).
- Save in Directory:** A text box showing 'C:\Program Files (x86)\DriveTest\PinchPilot' with a browse button '...'.
- Buttons:** 'Duration' (with a green double arrow icon), 'Start' (with a green single arrow icon and a blue border), 'Stop' (with a green L-shaped icon), 'Save' (with a green curved arrow icon), 'Abort' (with a green X icon), 'Power off', and 'Close'.
- Status Bar:** A bar at the bottom showing 'Ready'.

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") Save (always) 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.

## 6.8 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").

## 6.9 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").

## 6.10 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).

Pos	Measuring Point	Limit	Measure...	Ok	Update
1	left hand (5cm)	<= 500 mm (400 N)	114 05	Yes	Ready
2	right hand (5cm)	<= 500 mm (400 N)	114 06	Yes	Ready

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.

### 6.10.1 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.

### 6.10.2 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:

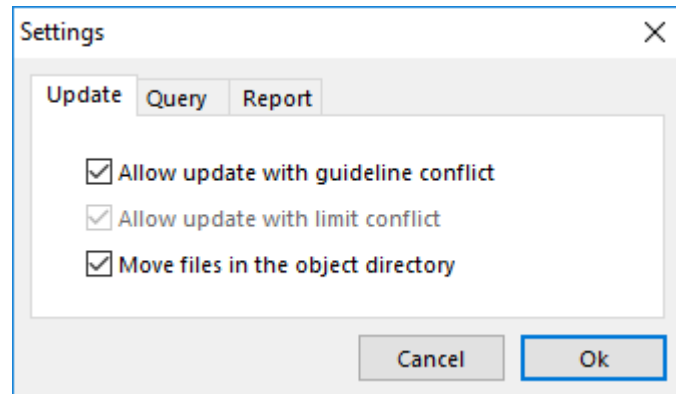
- Get measurements into the graphic display or into the sequence window.
- Get templates into the sequence window.

### 6.10.3 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 2016-12-19 165 01.ppd 165 02.ppd 165 03.ppd	Pinchdata 1105 2016-12-19 165 01.ppd 165 02.ppd 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.

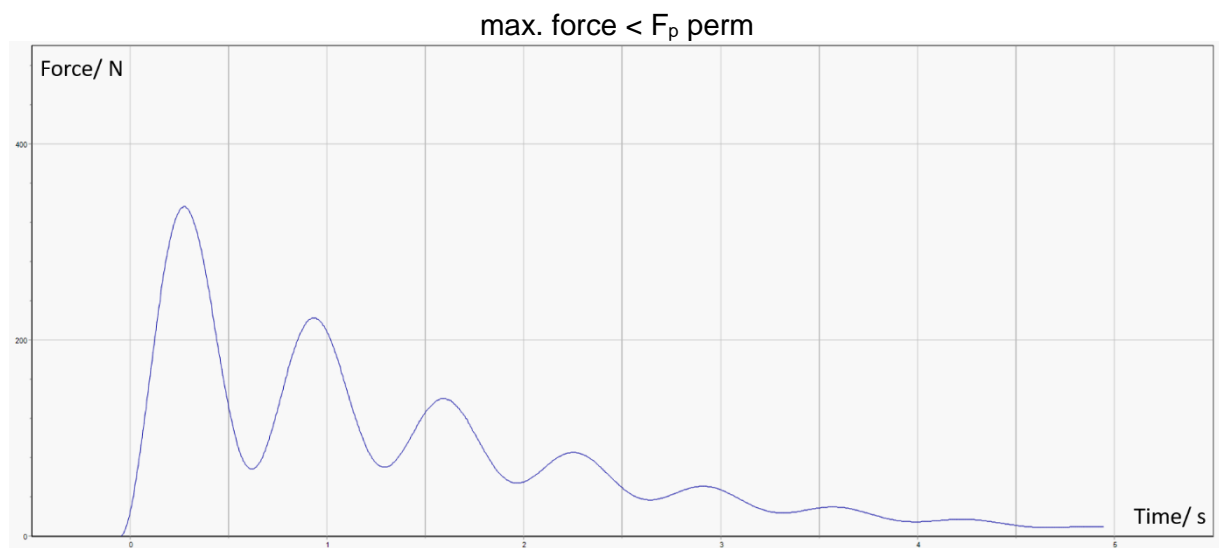
## 6.11 CHANGE OF GUIDELINES

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.

## 6.12 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.

## 7 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 can not be changed by the user. Parameters not defined by the standard may be user modified.

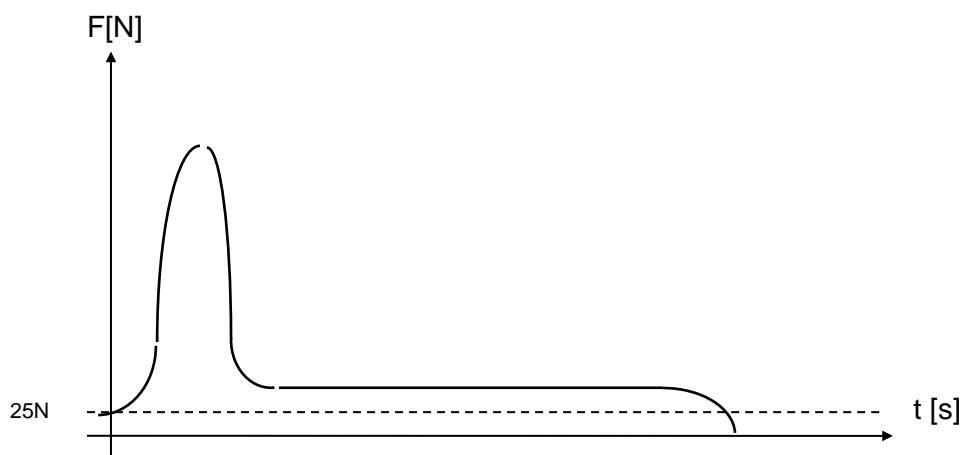
In addition to the guidelines provided by Drive Test, the user can define one user-defined guideline. All settings of the user-defined guideline can be changed by the user.

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

## 7.1 GENERAL DEFINITION OF TERMS

**Trigger threshold ( $F_t$ ):**

A force above the trigger threshold starts the measurement.

**Peak force ( $F_p$ ):**

Maximum force to be found during the measurement.

**Effective force ( $F_e$ ):**

Average force during time T.

**Pulse duration (T):**

Time between  $t_1$  and  $t_2$ , where  $t_1$  marks increasing and  $t_2$  decreasing the force trigger threshold.

**Clamping force ( $F_E$ ):**

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

**Remaining force ( $F_k$ ):**

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

## 7.2 EN12445 / EN12453

EN12445 / EN12453 are European standards for power operated doors and gates.

### 7.2.1 Test methods (EN12445)

EN12445 defines the testing methods to be applied.

#### 7.2.1.1 Number of measurements per measuring point

Every measuring point has to be measured three times. The averaged values of the three single measurements have to comply with the standard requirements defined in EN12445.

#### 7.2.1.2 Calibration

At least once per year.

#### 7.2.1.3 Measuring points

Edge	Position of the measuring point	Opening gap	Number of triple M.
<b>Horizontally moving door</b>			
Main edge	<ul style="list-style-type: none"> <li>• 50 mm above lower panel limit</li> <li>• middle of edge</li> <li>• 300 mm below upper panel limit</li> </ul>	Per meas. point: <ul style="list-style-type: none"> <li>• 50 mm,</li> <li>• 300 mm,</li> <li>• 500 mm</li> </ul>	9
Side closing edge	<ul style="list-style-type: none"> <li>• 50 mm above lower panel limit</li> <li>• middle of edge</li> <li>• 300 mm below upper panel limit</li> </ul>	Per meas. point: <ul style="list-style-type: none"> <li>• 50 mm,</li> <li>• 300 mm,</li> <li>• 500 mm</li> </ul>	9
<b>Rotational door</b>			
main closing edge, 1 panel	<ul style="list-style-type: none"> <li>• 50 mm above lower panel limit</li> <li>• middle of edge</li> <li>• 300 mm below upper panel limit</li> </ul>	Per meas. point: <ul style="list-style-type: none"> <li>• 50 mm</li> <li>• 300 mm</li> <li>• 500 mm</li> </ul>	9
main closing edge, 2 panels, counter rotation	<ul style="list-style-type: none"> <li>• 50 mm above lower panel limit</li> <li>• middle of edge</li> <li>• 300 mm below upper panel limit</li> </ul>	Per meas. point: <ul style="list-style-type: none"> <li>• 50 mm</li> </ul>	3
Panel towards walls etc.	• 1000 mm distance to the hinge and 1000 mm height	• 500 mm	1
<b>Vertically moving door</b>			
Main closing edge	<ul style="list-style-type: none"> <li>• 200 mm distance to the left side</li> <li>• middle of edge,</li> <li>• 200 mm distance to the right side</li> </ul>	Per meas. point: <ul style="list-style-type: none"> <li>• 50 mm height</li> <li>• 300 mm height</li> <li>• 2500 mm height or 300 mm below panel opening</li> </ul>	9
Side closing edge, tilting door with force limit	<ul style="list-style-type: none"> <li>• shear position right side,</li> <li>• shear position left side</li> </ul>	300 mm distance to intersection and 30 ° inclination of panel	2

## 7.2.2 Requirements (EN12453)

### Total duration Tt:

The total duration starts when the force exceeds the first time the trigger level of 25N and ends with the last decreasing of the remaining force.

### Dynamic duration Td:

The dynamic time duration starts when the force exceeds the first time 150N and ends with the last decreasing of the 150N limit.

Excluded are force peaks which meets the exceptions\* are mentioned below. This time belongs to the static duration.

### Static duration Ts:

The static duration starts after the dynamic duration and ends with the last decreasing of the 25N limit.

#### 7.2.2.1 Test criteria

**Permissible dynamic duration Td perm: 0,75 s**

**Permissible total duration Tt perm: 5,0 s**

Exception: Force is always < 50 N and a Motion of the door of at least 50 mm backwards with a force < 50N is possible.

### Permissible dynamic Force Fd perm:

Door type	Measurement between		
	Edges		Areas
	Opening gap 50 ... 500 mm	Opening gap > ... 500 mm	
Horizontally moved gate	<b>400 N</b>	<b>1400 N</b>	<b>1400 N</b>
Rotational door, axis at right angle to the floor	<b>400 N</b>	<b>1400 N</b>	<b>1400 N</b>
Vertically moved door	<b>400 N</b>	<b>400 N</b>	<b>1400 N</b>
Rotational door, axis parallel to the floor, barrier	<b>400 N</b>	<b>400 N</b>	<b>1400 N</b>

**Permissible static Force Fs perm: 150 N**

### \*Exception:

Force peaks > 150 N are allowed, if the requirement below are fulfilled:

- F < Fd perm
- The peaks decrease in amplitude
- The period duration of the oscillation is <= 1 s
- The averaged force of the static period (Fs avg) is <= 150 N

If this exception requirements are fulfilled, the duration of force periods above 150 N are not added to the dynamic duration.



### 7.2.3 Evaluation display unit

- max. Force  $\leq F_d \text{ perm}$
- pulse duration  $\leq T_d \text{ perm}$
- total duration  $\leq T_t \text{ perm}$

### 7.2.4 Evaluation PinchPilot

The evaluation covers all requirements of the standard:

- Permissible dynamic force
- Permissible dynamic duration
- Permissible static force
- Exception for decreasing oscillations

#### Result table PinchPilot

Measurement	F max / N (F <sub>d</sub> )	F stat / N (F <sub>s</sub> avg)	T dyn / s (T <sub>d</sub> )	T tot / s (T <sub>t</sub> )
-------------	--------------------------------	------------------------------------	--------------------------------	--------------------------------

F max ... Peak force during dynamic phase

F stat ... averaged force of static phase

T dyn ... duration of dynamic phase

T tot ... total duration

### 7.3 prEN12650-1

prEN12650-1 is a preliminary European standard for powered pedestrian doors.

#### 7.3.1 Test methods

##### 7.3.1.1 Number of measurements per measuring point

No requirement, i.e. one measurement per point is sufficient.

##### 7.3.1.2 Measuring points

Edge/Area	Position of measuring points	Opening gap	Number of measurements
Main and side edge	1200 mm from floor	<ul style="list-style-type: none"> <li>• 100 .. 200 mm</li> <li>• 350 mm</li> <li>• &gt; 500 mm</li> </ul>	3
Door panel area	1200 mm from floor	<ul style="list-style-type: none"> <li>• 500 mm</li> </ul>	1

##### 7.3.1.3 Calibration

Not specified.

#### 7.3.2 Requirements

##### **Total duration $T_t$ :**

The total duration starts when the force exceeds the first time the dynamic trigger level of 150N and ends with the last decreasing of the remaining force 75N.

##### **Dynamic duration $T_d$ :**

The dynamic time duration starts when the force exceeds the first time 150N and ends with the last decreasing of the 150N limit.

##### **Static duration $T_s$ :**

The static time duration starts after the dynamic duration and ends with the last decreasing of the remaining force 75N.

##### **Maximum dynamic Force $F_d$ (Peakforce):**

Maximum force within the dynamic duration.

##### **Maximum static Force $F_s$ :**

Maximum force within the static duration.

##### **Remaining force $F_r$ :**

Force after the static duration  $T_s$  has expired.

### 7.3.2.1 Test criteria

**Permissible dynamic duration  $T_d$  perm:** **0,5 s**

**Permissible total duration  $T_t$  perm:** **4,5 s**

Exception: Force is always < 50 N and a Motion of the door of at least 50 mm backwards with a force < 50N is possible.

**Permissible dynamic Force  $F_d$  perm:**

Door type	Measurement between			
	Edges			even areas 1)
	Opening gap < 200 mm	Opening gap 350 mm	Opening gap > ... 500 mm	
Horizontally moved gate	<b>400 N</b>	<b>700 N</b>	<b>1400 N</b>	
Rotational door Folding doors	<b>400 N</b>	<b>700 N</b>	<b>1400 N</b>	<b>1400 N</b>
Carousel door	<b>400 N</b>	<b>700 N</b>	<b>400 N</b>	

1) Even areas are walls without ledges with an area of < 0,1 sqm or a ledge side length of max. 0,05 m .

**Permissible static force  $F_s$  perm:** **150 N**

**Permissible remaining force  $F_r$  perm:** **75 N**

### 7.3.3 Evaluation unit

- max. Force  $\leq F_d$  perm
- duration between  $F > 150$  N and  $F < 150$  N  $\leq T_d$
- duration between  $F > 25$  N and  $F < 25$  N  $\leq (T_d + T_s)$

### 7.3.4 Evaluation PinchPilot

The evaluation covers all requirements of the standard:

- Permissible maximum dynamic force
- Permissible maximum static force
- Permissible remaining force

Result table PinchPilot

Measurement	F max / N ( $F_d$ )	F stat / N ( $F_s$ )	F rest / N ( $F_r$ )	T tot / s ( $T_t$ )
-------------	------------------------	-------------------------	-------------------------	------------------------

F max ... Peak force during dynamic phase

F max ... Peak force during static phase

F rest ... remaining force after expired static phase

T tot ... total duration

## 7.4 DIN 18650-1

DIN 18650-1 is a German standard for powered pedestrian doors.

### 7.4.1 Test methods

#### 7.4.1.1 Number of measurements per measuring point

No requirement, i.e. one measurement per point is sufficient.

#### 7.4.1.2 Measuring points

Edge/Area	Position of measuring points	Opening gap	Number of measurements
Main and side edge	1200 mm from floor	<ul style="list-style-type: none"> <li>• 100 .. 200 mm</li> <li>• 350 mm</li> <li>• &gt; 500 mm</li> </ul>	3
Door panel area	1200 mm from floor	<ul style="list-style-type: none"> <li>• 500 mm</li> </ul>	1

#### 7.4.1.3 Calibration

No specification.

### 7.4.2 Requirements

#### 7.4.2.1 Definition of terms

##### **Total duration $T_t$ :**

The total duration starts when the force exceeds the first time the dynamic trigger level of 150N and ends with the last decreasing of the remaining force 80N.

##### **Dynamic duration $T_d$ :**

The dynamic time duration starts when the force exceeds the first time 150N and ends with the last decreasing of the 150N limit.

Excluded are force peaks which meets the exceptions are mentioned below. This time belongs to the static duration.

##### **Static duration $T_s$ :**

The static time duration starts after the dynamic duration and ends with the last decreasing of the remaining force 80N.

##### **Maximum dynamic Force $F_d$ (Peakforce):**

Maximum force within the dynamic duration.

##### **Maximum static Force $F_s$ :**

Maximum force within the static duration.

##### **Remaining force $F_r$ :**

Force after the static duration  $T_s$  has expired.

### 7.4.2.2 Test criteria

**Permissible dynamic duration  $T_d$  perm:** **0,75 s**

**Permissible total duration  $T_t$  perm:** **4,5 s**

Exception: Force is always < 50 N and a Motion of the door of at least 50 mm backwards with a force < 50N is possible.

**Permissible dynamic Force  $F_d$  perm:**

Door type	Measurement between			
	Edges			Even areas 1)
	Opening gap < 200 mm	Opening gap 350 mm	Opening gap > ... 500 mm	
Horizontally moved gate	<b>400 N</b>	<b>700 N</b>	<b>1400 N</b>	
Rotational door Folding doors	<b>400 N</b>	<b>700 N</b>	<b>1400 N</b>	<b>1400 N</b>
Carousel door	<b>400 N</b>	<b>700 N</b>	<b>400 N</b>	

1) Even areas are walls without ledges with an area of < 0,1 sqm or a ledge side length of max. 0,05 m .

**Permissible static force  $F_s$  perm:** **150 N**

**Permissible remaining force  $F_r$  perm:** **80 N**

**Exception for static phase:**

Force peaks > 150 N are allowed, if the requirement below are fulfilled:

- $F < F_d$  perm
- The peaks decrease in amplitude
- The duration period of the oscillation is  $\leq 1$  s
- The averaged force of the static period ( $F_s$  avg) is  $\leq 150$  N

### 7.4.3 Evaluation display unit

- max. Force  $\leq F_d$  perm
- duration between  $F > 150$  N and  $F < 150$  N  $\leq T_d$  perm
- duration between  $F > 25$  N and  $F < 25$  N  $\leq (T_d + T_s)$

### 7.4.4 Evaluation PinchPilot

The evaluation covers all requirements of the standard:

- Permissible dynamic force
- Permissible static force
- Permissible remaining force
- Exception for decreasing oscillations

Result table PinchPilot

Measurement	F max / N ( $F_d$ )	F stat / N ( $F_s$ )	F rest / N ( $F_r$ )	T dyn / s ( $T_d$ )
-------------	------------------------	-------------------------	-------------------------	------------------------

F max ... peak force during dynamic phase

F stat ... peak force during static phase

F rest ... remaining force after static duration has expired

T tot ... total duration

## 7.5 DIN 16005-1

DIN 16005-1 is an European standard for powered pedestrian doors.

### 7.5.1 Test methods

#### 7.5.1.1 Number of measurements per measuring point

No requirement, i.e. one measurement per point is sufficient.

#### 7.5.1.2 Measuring points

Edge/Area	Position of measuring points	Opening gap	Number of measurements
Main and side edge	1200 mm from floor	<ul style="list-style-type: none"> <li>• 100 .. 200 mm</li> <li>• 350 mm</li> <li>• &gt; 500 mm</li> </ul>	3
Door panel area	1200 mm from floor	<ul style="list-style-type: none"> <li>• 500 mm</li> </ul>	1

#### 7.5.1.3 Calibration

At least once per year.

### 7.5.2 Requirements

#### 7.5.2.1 Definition of terms

##### **Total duration $T_t$ :**

The total duration starts when the force exceeds the first time the dynamic trigger level of 150N and ends with the last decreasing of the remaining force 80N.

##### **Dynamic duration $T_d$ :**

The dynamic time duration starts when the force exceeds the first time 150N and ends with the last decreasing of the 150N limit.

Excluded are force peaks which meets the exceptions are mentioned below. This time belongs to the static duration.

##### **Static duration $T_s$ :**

The static time duration starts after the dynamic duration and ends with the last decreasing of the remaining force 80N.

##### **Maximum dynamic Force $F_d$ (Peakforce):**

Maximum force within the dynamic duration.

##### **Maximum static Force $F_s$ :**

Maximum force within the static duration.

##### **Remaining force $F_r$ :**

Force after the static duration  $T_s$  has expired.

### 7.5.2.2 Test criteria

**Permissible dynamic duration  $T_d$  perm:** **0,75 s**

**Permissible total duration  $T_t$  perm:** **4,5 s**

Exception: Force is always < 50 N and a Motion of the door of at least 50 mm backwards with a force < 50N is possible.

**Permissible dynamic Force  $F_d$  perm:**

Door type	Measurement between			
	Edges			Even areas 1)
	Opening gap < 200 mm	Opening gap 350 mm	Opening gap > ... 500 mm	
Horizontally moved gate	<b>400 N</b>	<b>700 N</b>	<b>1400 N</b>	
Rotational door Folding doors	<b>400 N</b>	<b>700 N</b>	<b>1400 N</b>	<b>1400 N</b>
Carousel door	<b>400 N</b>	<b>700 N</b>	<b>400 N</b>	

1) Even areas are walls without ledges with an area of < 0,1 sqm or a ledge side length of max. 0,05 m .

**Permissible static force  $F_s$  perm:** **150 N**

**Permissible remaining force  $F_r$  perm:** **80 N**

**Exception for static phase:**

Force peaks > 150 N are allowed, if the requirement below are fulfilled:

- $F < F_d$  perm
- The peaks decrease in amplitude
- The duration period of the oscillation is  $\leq 1$  s
- The averaged force of the static period ( $F_s$  avg) is  $\leq 150$  N

### 7.5.3 Evaluation display unit

- max. Force  $\leq F_d$  perm
- duration between  $F > 150$  N and  $F < 150$  N  $\leq T_d$  perm
- duration between  $F > 25$  N and  $F < 25$  N  $\leq (T_d + T_s)$

### 7.5.4 Evaluation PinchPilot

The evaluation covers all requirements of the standard:

- Permissible dynamic force
- Permissible static force
- Permissible remaining force
- Exception for decreasing oscillations

Result table PinchPilot

Measurement	F max / N ( $F_d$ )	F stat / N ( $F_s$ )	F rest / N ( $F_r$ )	T dyn / s ( $T_d$ )
-------------	------------------------	-------------------------	-------------------------	------------------------

F max ... peak force during dynamic phase

F stat ... peak force during static phase

F rest ... remaining force after static duration has expired

T tot ... total duration





## 8 TECHNICAL DATA

### 8.1 MECHANIC

Quantity	Value
Deflection rate	500 N/mm
Tolerance of deflection rate	±10 %
Max. force	2500 N
Overload protection	yes
Max. gap width	50 mm
Force initiation area	80 mm diameter
Size	ca. 210 x 50 x 80 mm
Weight	ca. 2100 g

### 8.2 FORCE MEASUREMENT

Quantity	Value
Range	0 - 2000 N
Resolution	1 N
Precision (greater tolerance is valid)	± 3 N or ± 3% of measured value
Sample frequency / -rate	500 Hz / 2 ms
Memory	80 measurements

### 8.3 POWER SUPPLY

#### 8.3.1 SEB2

Größe	Wert
Battery	9 V-Block, i.e. 6LR61
Battery voltage supervision (warning)	Yes

#### 8.3.2 SEB2.2

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

#### 8.3.3 SEB2.2B

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

### 8.4 ENVIRONMENT

Quantity	Value
Operating temperature range	-10 bis +40 °C
Storage temperature range	-40 bis +50 °C
Humidity	max. 90% rel.H, non condens.

## 8.5 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: „Sensor/Configuration/extended/measurement output”	250, 500, 1000, 2000 N

## 9 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-authorised 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.

## 10 CONTACT INFORMATION

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## 11 APPENDIX

### 11.1 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