

# *BIA Class 2*



Pinch Force Meter  
for Bus and Train Doors

Manual

## CONTENT

<b>1 PURPOSE OF USE.....</b>	<b>3</b>
<b>2 BASICS OF PINCH FORCE MEASUREMENT .....</b>	<b>3</b>
2.1 LAWS AND STANDARDS.....	4
<b>3 DESCRIPTION .....</b>	<b>5</b>
3.1 MECHANIC .....	5
3.1.1 Basic construction .....	5
3.1.2 Mechanical Dimensions.....	6
<b>4 MEASURE .....</b>	<b>7</b>
4.1 ENVIRONMENTAL REQUIREMENTS .....	7
4.2 HANDLING OF THE INSTRUMENT.....	7
<b>5 MAINTENANCE AND CALIBRATION.....</b>	<b>8</b>
<b>6 SERVICE ADDRESS .....</b>	<b>8</b>
<b>7 DECLARATION OF CE - CONFORMITY .....</b>	<b>9</b>
<b>8 TECHNICAL DATA .....</b>	<b>10</b>
<b>9 APPENDIX.....</b>	<b>FEHLER! TEXTMARKE NICHT DEFINIERT.</b>
9.1 CE-LABEL .....	<b>FEHLER! TEXTMARKE NICHT DEFINIERT.</b>

## 1 PURPOSE OF USE

The purpose of the Pinch Force Meter BIA Class 2 with a deflection rate of 10 N/mm is to measure the pinch (force) of power operated bus and train doors or comparable applications.

The instrument has to be protected from moisture. It is designed to withstand normal handling and transporting, nevertheless excessive shock or load (>500 N) can demolish it and should be avoided.

## 2 BASICS OF PINCH FORCE MEASUREMENT

A characteristic diagram of a pinch force measurement is shown in figure 1:

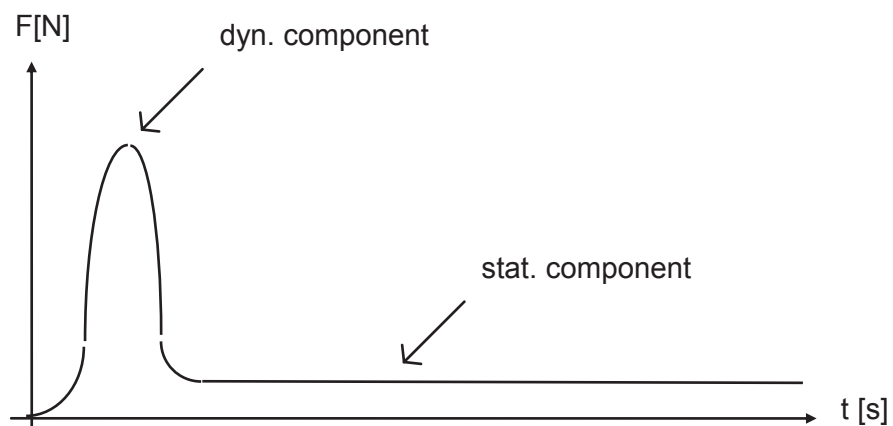


Figure 1: Characteristic pinch force diagram

The characteristic pinch force diagramm is the result of a dynamic und a static part:

- Dynamic component:  
Additional to the force of the drive motor the inertia of the door has an effect on the pinch force. This force depends on the stopping time. The elasticity of the instrument and the closing edges influates the acceleration and therefore the maximum value of the pinch force. The stiffness of the spring of the pinch force meter should have the average value of probably pinched human body parts. The BIA Class 2 has a trailling pointer so that only the measurement of the peakforce is possible.
- Static component:  
After the door has been stopped (and the reopening system has not instantly opened the door) the static component caused of the driving force can be measured.

## 2.1 LAWS AND STANDARDS

The characteristic values have as a result of biomechanic considerations certain limits to minimize the danger of human damage.

In the Federal Republic of Germany in 1989 an law relating the pinch force measuring at bus doors (§ 35e StVZO) came into force. The instrument BIA Class 2 has been designed for this field. Meanwhile the specification has fully or partly been taken over in other fields.

Before using the instrument we recommend to compare the technical data of the instrument with your specific needs according to national and international laws and standards. Important features are: Spring Stiffnes (deflection rate), gap width and size of the initiation areas.

### 3 DESCRIPTION

#### 3.1 MECHANIC

##### 3.1.1 Basic construction

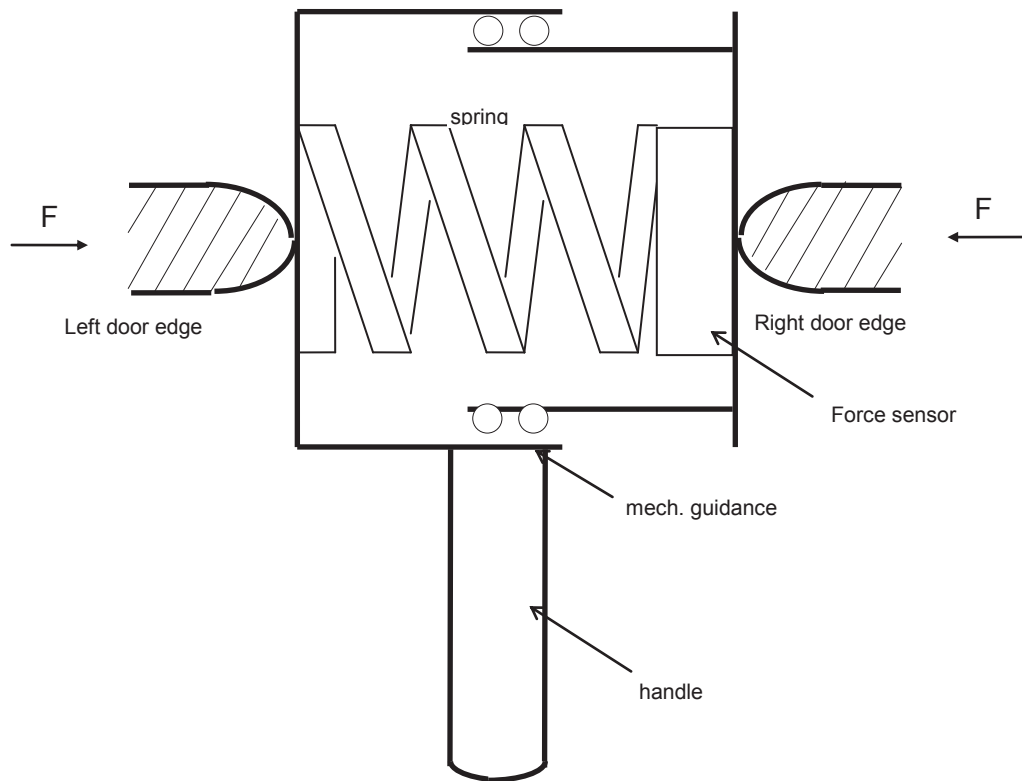


Figure 3: Basic construction

The instrument consists of a static and a moveable part. Both parts are pressed apart by a spring, located between the parts. The spring has a defined stiffness. In order to get a good platform quality (i.e. independence of the force measure result from the location of the force initiation), the moveable part is guided by six ball bearings.

Without load the spring is spanned with about 20 N. The scale ranges from 50 to 300 N.

### 3.1.2 Mechanical Dimensions

The force is initiated on areas on both sides of 100 mm diameter each. In rest position the distance between the right and left initiation area is 115 mm. The maximum displacement is 30 mm, i.e. the minimum area distance is 85 mm.

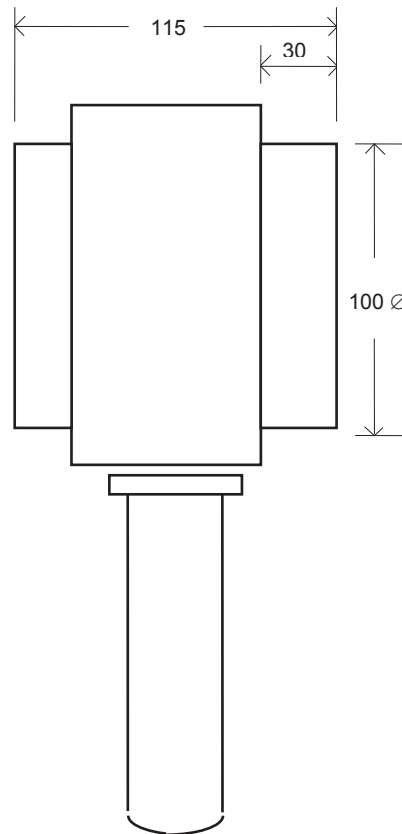


Figure 4: Mechanical dimensions in mm

## 4 MEASURE

### 4.1 ENVIRONMENTAL REQUIREMENTS

- The permissible variation of the temperature of the device is between + 10 °C + 30 °C .
- The vehicle has to be in a horizontal position.

### 4.2 HANDLING OF THE INSTRUMENT

Before measuring move the pointer to the origin of the scale.

For measuring put the instrument between the closing edges. Be careful to contact the initiation area in parallelum to the closing edges. When testing doors with two moving wings, you are recommended to press the static part of the instrument to one wing and follow the moving door until the other wing contacts the moveable part of the instrument. Be careful not to tilt the instrument. Try to prevent any force to the handle; it would distort the measure.

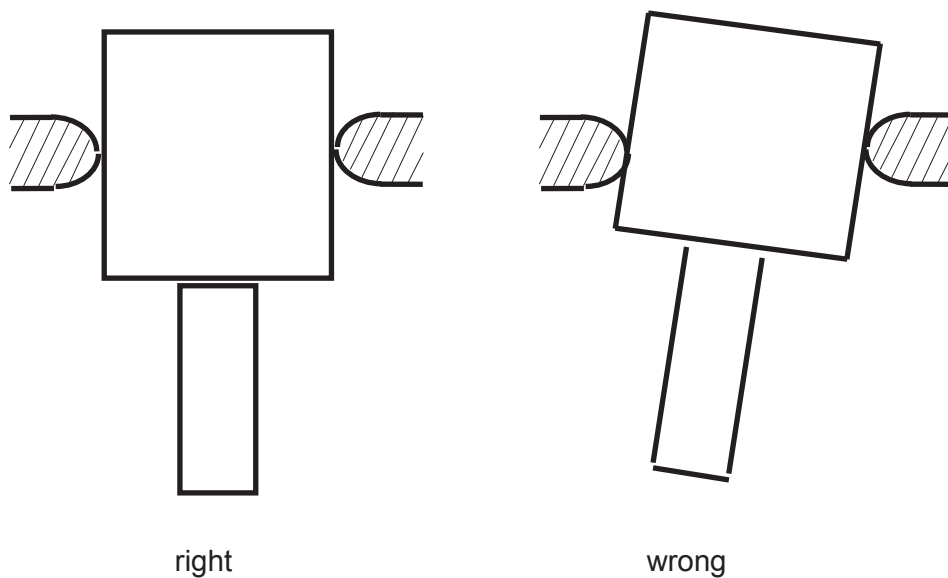


Figure 7: Positionning of the instrument for measuring

## 5 MAINTENANCE AND CALIBRATION

You don't need special maintenance for the BIA Class 2. Prevent beats, solar radiation, humidity and dirt. Most parts of the instrument are made of plastics (POM). Therefore it is important to avoid contact to acids, lyes and thinner. In case of soiling clean it carefully with a moist cloth and some soap. Repeating load exposure of greater 500 N can demolish the instrument. The force indication has to be tested regularly. To do this the BIA Class 2 must have room temperature (20 - 25 degrees centigrade). Place it with the fixed part of the housing on a horizontal plane and put the test weight on it.

weight 10 kg indication 100 +/- 5N  
 (10 kg are equivalent to 98 N; due to the measure position 225 gr have to be added, caused by case, spring etc. The resulting weight is equivalent to 100 N)

**Important:** The instrument should not be disassembled, because the basic adjustment is lost. In case of a defect please send the instrument with a short description of the failure to the manufacturer.

To ensure the correct function of the instrument, you are advised to send it regularly to the manufacturer for maintenance and calibration. The calibration period depends on the extent of usage. In any case the period should be less or equal 2 years.

## 6 SERVICE ADDRESS

**Drive Test GmbH**  
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D-81373 München / Germany

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## 7 DECLARATION OF CE - CONFORMITY

We,

Drive Test GmbH  
Hansastr. 31  
81373 Muenchen  
Germany

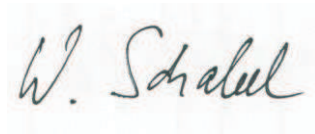
declare that the Pinch Force Meter:

- BIA Class 2

meet the intend of the applicable EC directives:

2006/42/EC

Machinery Directive

A handwritten signature in black ink, appearing to read 'W. Schabel', is written on a light blue rectangular background.

Wolfgang Schabel, Managing Director

## 8 TECHNICAL DATA

Name	Value
<b>Mechanic:</b>	
Spring deflection rates	10 N/mm
Gap width	115 mm
Force initiation area	100 mm Durchmesser
Precision of spring deflection rate	- 10% .. +10%
Overload protection	yes
weight	ca. 1300 g
Measures	Round body, max. Diameter:130mm, Height: 115 mm
<b>Force Measurement:</b>	
Range	50 – 300 N
Accuracy	+/- 10 N
Resolution	20 N
<b>Enviroment:</b>	260 x 130 x 115 mm
Range of Tempreture	+10 bis +30 °C
Humidity	max. 90% rel.F, not condensing

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