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BMD-400

The device for measurement of the braking delay

USER MANUAL

Issue 1.0, Sep 16, 2019

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0. SAFETY

Considering your own and customers' safety, it is necessary to obey the following rules which determine hazardous situations and specify ways in which accidents should be avoided and potential damages of devices should be prevented.

Read the User Manual before first usage and apply all the safety and operational rules specified in the document.

1) Only trained and competent persons are permitted to use theBMD-400 device.
2) The tested vehicle may be driven only by a person with driving license of the appropriate category.
3) The device must be used in accordance with following User Manual.
4) The access to the test area for the third parties is prohibited.
5) Do not use the BMD-400 device in the near of strong magnetic fields and high voltages.
6) Keep the device dry.
7) Never use the device that is not in good working order or one with defective parts, in case of any damage or defect contact with the Unimetal Sp. z o.o. Service Department at: serwis@unimetal.pl, or wit authorized distributor.
8) The test area should be designated and secured. The surface must be flat, dry and hardened (made of concrete, asphalt or bituminous).
9) The opening of device cover or disassembly may void the warranty.
10) In case of changing the batteries use the same type to replace them. Dispose used batteries according to the battery manufacturer’s instructions.
11) Keep the device clean. Turn the device after each use and place them in the case with foam.
12) The device holder must be affixed to the windscreen so that the view out of the windscreen is not restricted.

NOTE: The start-up of the device, troubleshooting and all repairs of the device must be perform only by the authorized service of the Manufacturer or its authorized representative. Electrical works must only be carried out by electricians with the appropriate competence and permissions. Improper use or unintentional destruction of the device may void the warranty. Operation and use of the device is only permitted by trained personnel. In the case of issue with the device, please inform the Unimetal Sp. z o.o. Service Department at: serwis@unimetal.pl.

NOTE: In the case of user's interference in the construction, design, software, security systems or operating principle, it is considered as a significant modification. Such actions exclude the manufacturer from liability for incorrect operation of the device, damage or accidents. As a result of the described actions, the device guarantee is discontinued.

NOTE: The Unimetal company placing the device on the market has exclusive copyrights and manages of them with every right. In the case of the violation of any of the provisions of this document, it results in criminal and civil liability within the limits set by law. In the case of changes in the construction of the device, a natural or corporate person is obliged to inform the manufacturer about relevant changes, to which the Manufacturer must give one’s asset

1. TECHNICAL DESCRIPTION

1.1. BMD-400 device description

The BMD-400 is multifunction device (Fig. 1), which is designed to measure the braking delay of all vehicle type (e.g. vehicles up and to 3,5 t, motorcycles, buses, tractors).

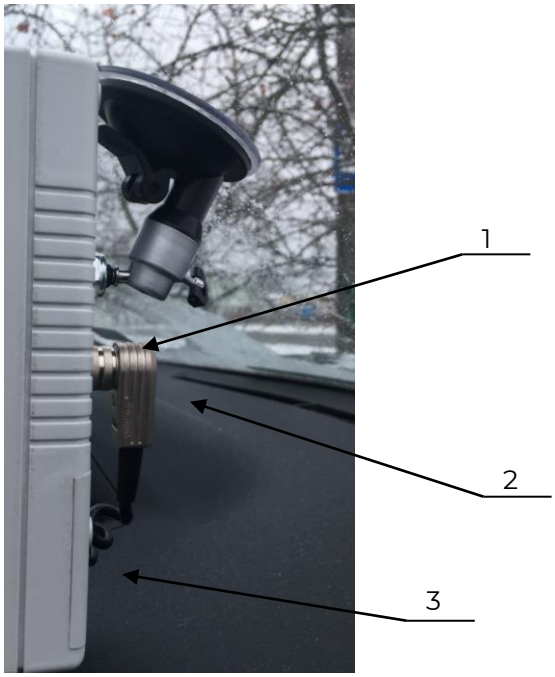
For the BMD-400 device is dedicated application installed on PC, which allows for preview and printout the test report. The test report presents graphs which allows for analysis and evaluation of measurement results. The communication between the device and application on PC is realized wireless by Wi-Fi.

The decelerometer is equipped with brake pedal pressure meter (Fig. 2).

Fig. 1 – BMD-400 device; 1 – LCD screen, 2 – buttons

Fig. 2 – Brake pedal pressure meter

The socket to connect the brake pedal pressure meter is located on the back of the BMD-400 device (Fig. 3).



Rys. 3 – Connection the brake pedal pressure meter to BMD-400 device socket;
1 – socket , 2 – plug of brake pedal pressure meter, 3 – batteries

Test results are displayed on the LCD screen. To controll the BMD-400 device operator use the butons (Fig. 4).

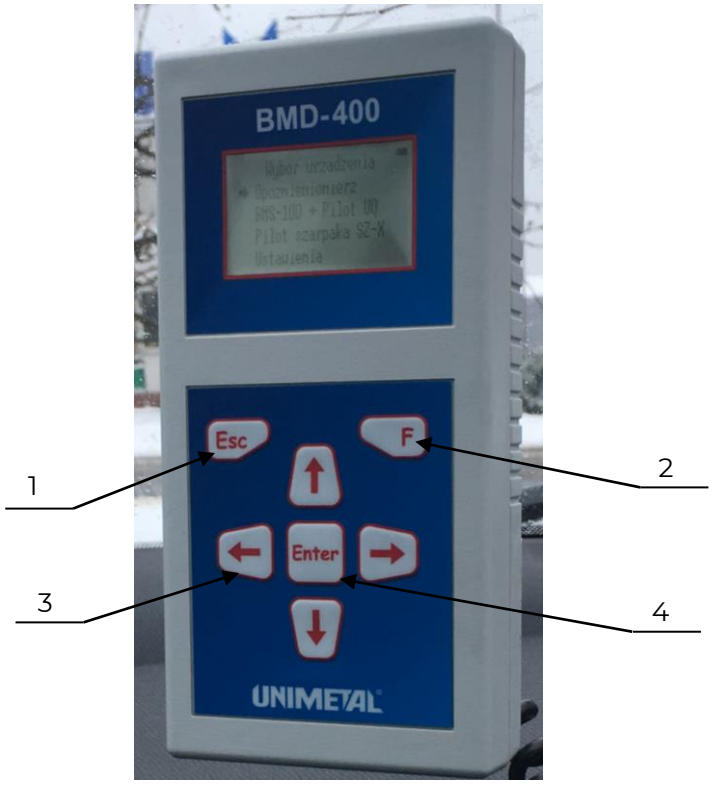


Fig. 4 – BMD-400 devices key functions;
1 – ESC - end of function, 2 – F – reset/ new test initiation, 3 – arrows switching the menu functions, 4 – ENTER - select of function or confirm the data

The devices dimensions are present in table below.

Parameter	Value
Weight	1.5 kg
Length	190 mm
Width	90 mm
Height	40 mm
Dimensions of strain gauge force transducer	1000 x 80 x 340 mm

The decelorometer is powered by 6 batteries (R6 type) ora rechargeable cells. (NI-MH). The battery charge level is displayed at the top right corner of the device screen.

If the information „BAT LOW" is displayed, it means that the batteries should be immediately replaced. In case of measurment by device with low battery, the test results could be inaccurates.

The BMD-400 device measures the braking delay based on the integrated acceleration sensor, it allows you to measure dynamic and static accelerations in the

range from -9.81m/s² to +9.81m/s². The BMD-400 can measure braking delay by dynamically registering data during breaking by taking into account parameters such as:

- maximum delay,
- average delay,
- speed at the start of breaking,
- distance covered during breaking, i.e. from the start of breaking until vehicle stops,
- force applied to brake.

1.2. Technical data

1.2.1. Metrological data

BMD-400	
Decelerometer maasuring range	± 100 % / ±9,81 m/s²
Decelerometer resolutions	1 % / 0,01 m/s²
Decelerometer accuraccy	1 %
Force measurement range	0-100 daN
Force measurement accuracy	± 1 %
Force measurement resolutions	0,01 daN

1.2.2. Power supply

BMD-400	
Power supply	6-12 V DC (of the R6 type batteries or rechargeable cells).

1.2.3. Environmental conditions

Working environmental	outdoor
Temperature range	5÷40°C
Relative humidity	up to 90 % in temperature +30°C
Atmospheric pressure	860 - 1060 hPa
Sun exposure	avoid direct sunlight
Radioelectric interference	negligibly small

2. USAGE OF THE BMD-400 DEVICE

2.1. Preparing to use

Before commencing the measurement, the operator should:

– ensure, that the surface in test area is flat, dry and hardened,
– check battery level, if the batteries are low replace them,
– secure the test area to prevent from access of third parties, ,
– fix the holder to device case and place them on windscreen, ensure that the holder with device is stable mounted,
– connect the BMD-400 device with application installed on PC.

Connection the decelerometer with the application could be realized in two modes. The AP mode use the devices Wi-Fi network:

(1) Choose the Wi-Fi icon (1) from notification area on the task bar. W pasku sterowania na komputerze należy rozwinąć dostępne sieci Wi-Fi (1)

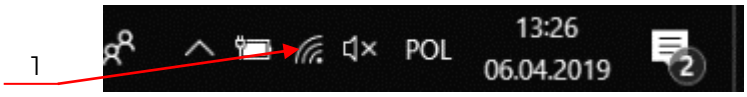


Fig. 5 – Notification area on the task bar

(2) Choose the „BMD-400-xxxxxxxxxxxx" (2) network from the list of available Wi-Fi networks. Symbol „x" means, the devices MAC address.

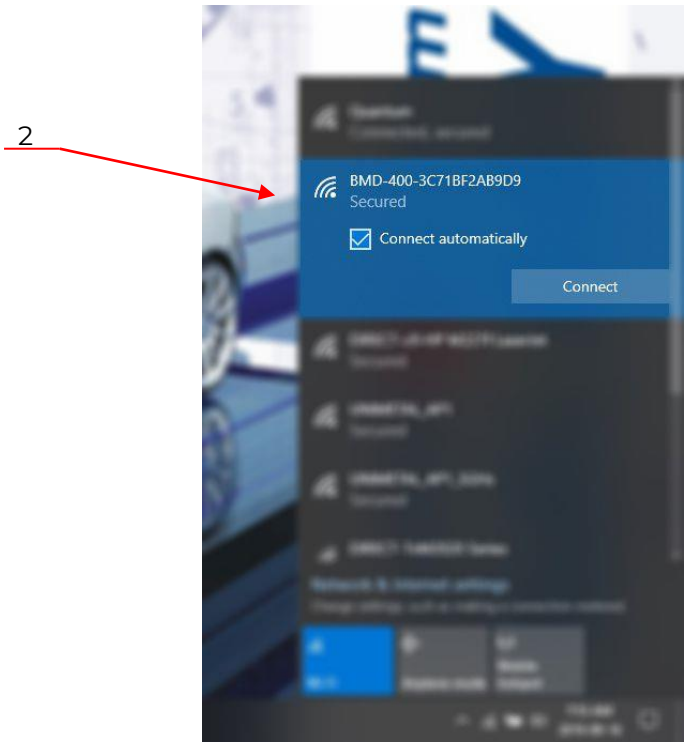


Fig. 6 – List of available Wi-Fi networks

(3) Enter the following IP address “192.168.4.1” At setting tab on computer, and save the changes.

Second option is connect the device with User’s Wi-Fi network (e.g. router). The advantage of this mode of connection is that there is no need to switch between Wi-Fi networks in case of using more devices with this this type of communication.

To connect the device to the User's WiFi network:

(1) Start the BMD-400 devices application installed on the computer.

(2) Enter the IP address in the application, the IP address depends on the configuration of the device’s network settings. To configure the device network settings, connect with them in the AP mode. After connect in the AP mode, enter in the browser (1) (Fig.7) the address: "192.168.4.1" and click "enter". After this the tab with text field to enter the password will be displayed (Fig.7).

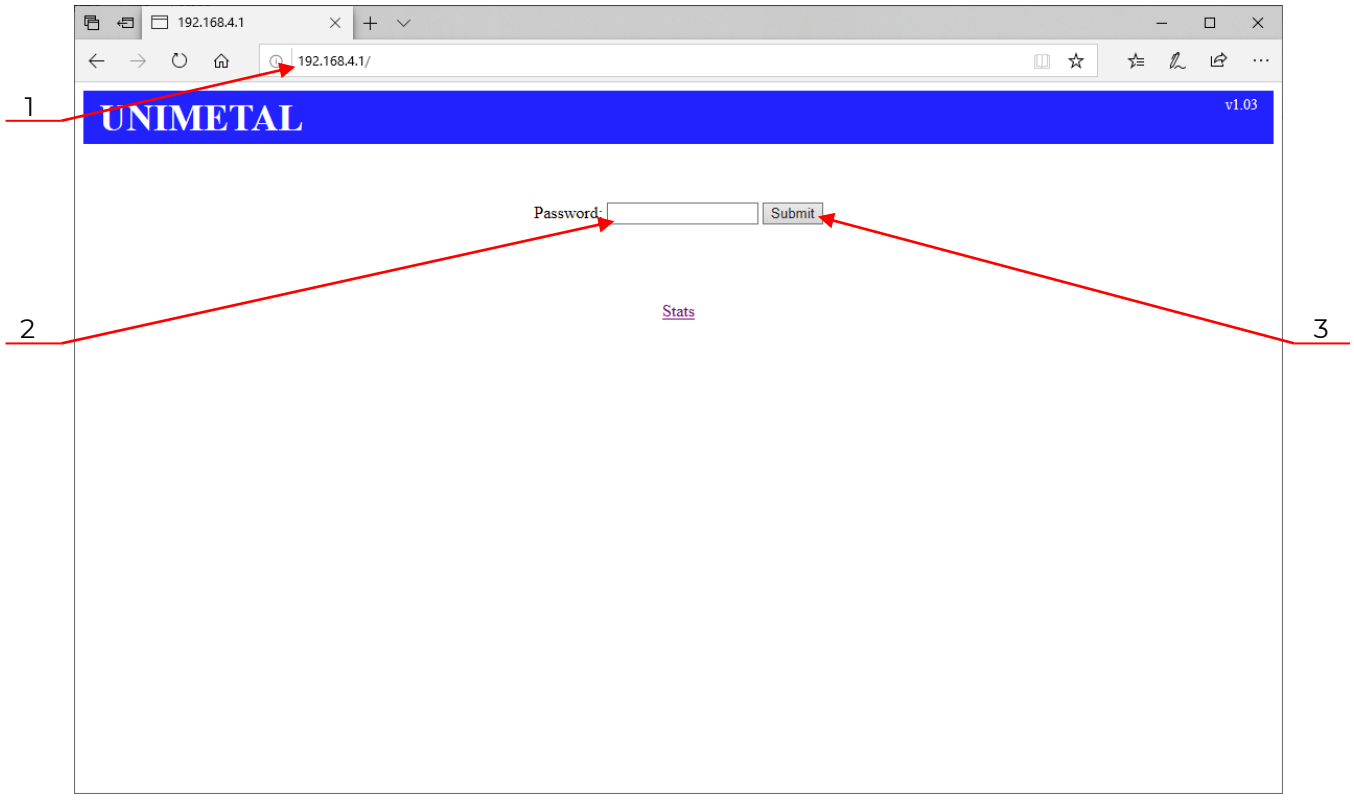


Fig. 7 – Browser tab

(3) In text field „Password” (2) enter „unimetal12” and click „Submit” (3) (Fig.7).

(4) If previous steps was done correct, the tab like in Fig. 8 is displayed. It allows for enter the WI-Fi network settings, and IP addresses. The settings depends on configuration of User’s network. To confirm the entered data click „Save” (5).

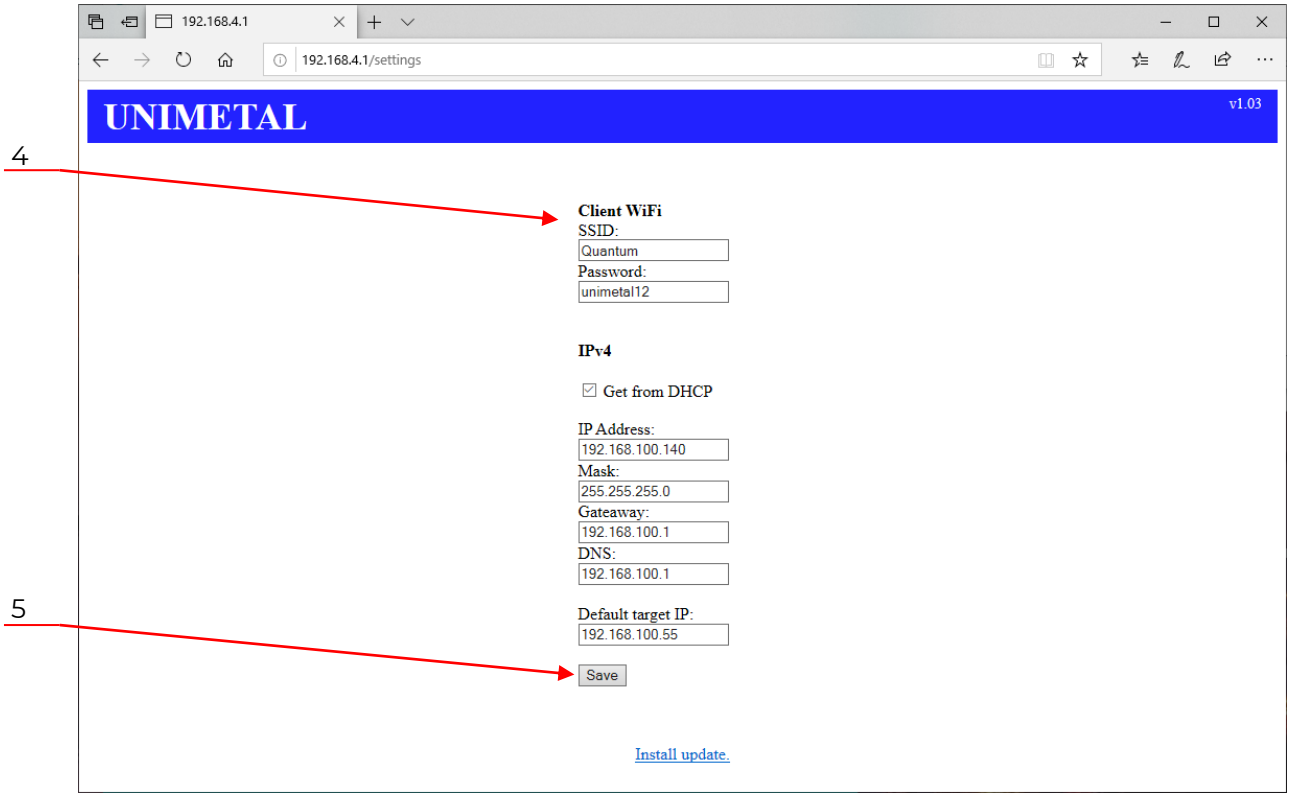


Fig. 8 – Settings tab

(5) Restart the device. The computer with installed application should be connected with the same LAN network. In application on PC at settings tab enter the same IP address like was entered in device's settings. Save the changes.

2.2. Test description

2.2.1. Deceleration test description

The test must be carried out by use of BMD-400 on a flat hardened surface. The device should be robustly fixed to the vehicle windscreen by use of the handle (Fig. 9).

1) Connect the plug of the brake pedal force transducer to the socket (Fig. 9) on the back of the BMD-400 device.
2) Mount the transducer on the brake pedal (Fig. 10).
3) Fix the BMD-400 device to the windscreen by use of the handle (Fig. 9). The device must be positioned properly: the X axis of the device must be placed horizontally with respect to the ground and perpendicularly to the drive direction.

Fig. 9 – BMD-400 device mounted on a vehicle windscreen;
1 – Handle, 2 – Plug of brake pedal pressure meter, 3 – Display, 4 – Keyboard

Fig. 10 – Brake pedal force transducer installed on a brake pedal

4) To switch-on the BMD-400 press the ENTER button on the device keyboard (Fig. 9). Choose the appropriate function in the device menu (Fig. 11).

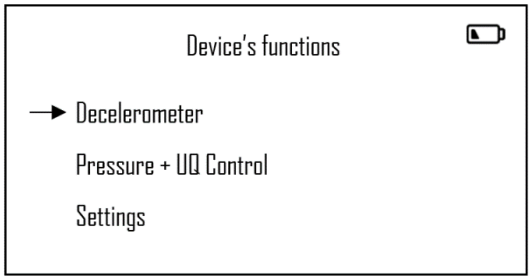


Fig. 11 – Screen of choosing the device

5) By using the arrows ↑ and ↓ pick "Decelerometer" and confirm the choice by pressing the "ENTER" button. Then the "Set braking start" screen appears (Fig. 12).

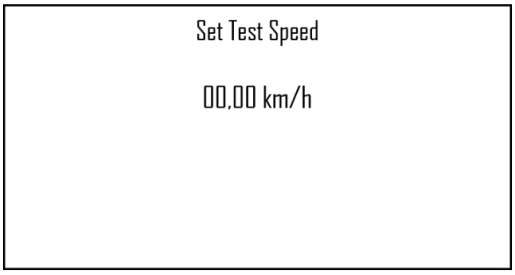


Fig. 12 – "Set test speed" screen

6) By use of the arrows ↑ and ↓ set the speed value from which the braking will be started and confirm the value by pressing the ENTER button.

7) Next start accelerating the vehicle to reach the speed that was set in (6). Operator could change the type of tested brake “Service/ Parking/ Emergency” by use → and← arrows.

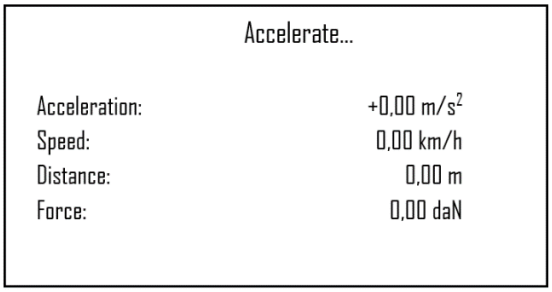


Fig. 13 – Test start screen

Fig. 14 – Screen during acceleration

8) Once the desired speed is reached start to brake until the vehicle is stopped. The summary of all the measurements will be displayed (Fig. 15). If the brake pedal force transducer has been installed the device will display the readings (Fig. 15).

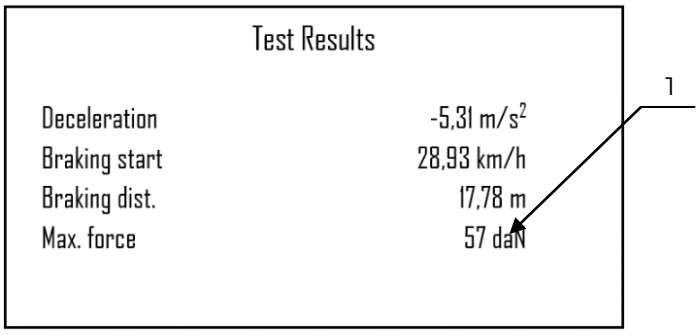


Fig. 15 –Screen with Test Results; 1 – force measured by brake pedal pressure meter

After the test is completed, press ENTER to send the results to the Uniline Quantum application. Data transmission is realized by Wi-Fi connection.

In case of need to change the unit of deceleration result (% to m/s² or contrariwise) use the arrow ↑.

2.2.2. Preview and printout the test report

On the BMD-400 application main screen (Fig.16) the graph with course of deceleration test appears (Fig 16, 1).

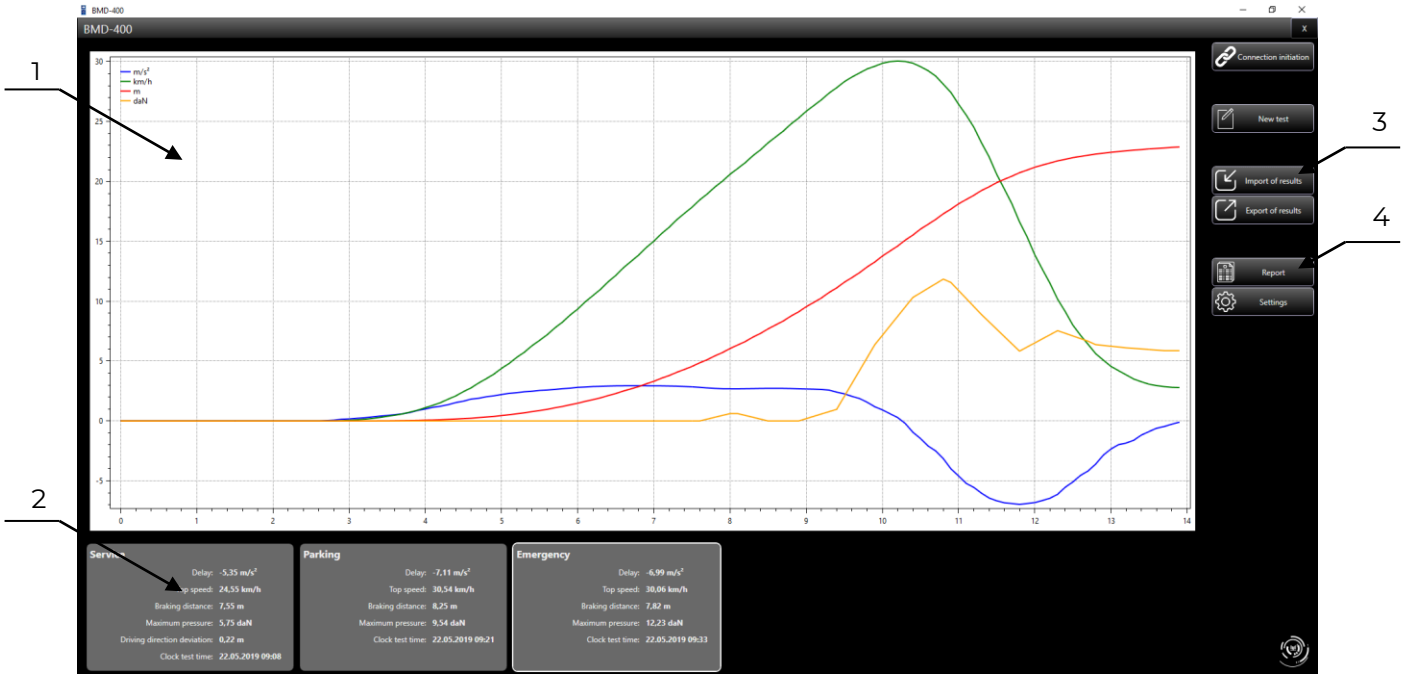


Fig. 16 – View of the braking delay test results;

1 – graph with course of deceleration, 2 – test results, 3 – results import / export,

4 – „Report" icon

The test results, like maximum speed, braking distance, and brake pedal pressure are presented below the graph (Fig.16, 2).

On the right side of the graph is the menu. By use the options from this menu Operator could import or export the test results (e. g. to import for printout the copy of test report, or export, and create the database of tests results). (Fig. 16, 3).

To printout the test report click the "Report" icon (Fig. 16, 4), the report preview appears (Fig. 17). Then click the printer icon (Fig.17, 1).

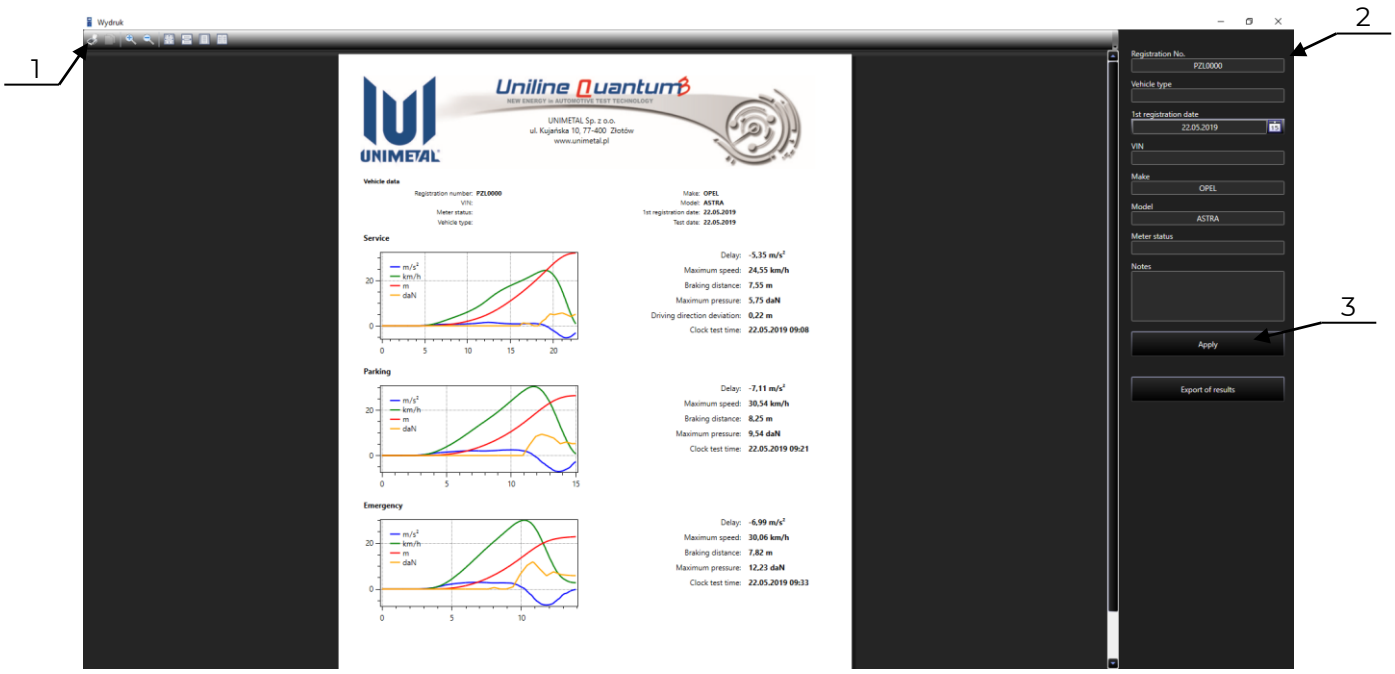


Fig. 17 – Preview of test report;

1 – printer icon, 2 – menu of vehicle data, 3 – confirm entered vehicle data

During preview of test report operator could enter or edit the data of tested vehicle (e. g. registration number, VIN number, make, model, meter status and notes) at the menu by right side (Fig.17, 2). To confirm the entered data click „Apply" (Rys. 17, 3).

3. MAINTENANCE

3.1. Spare parts list

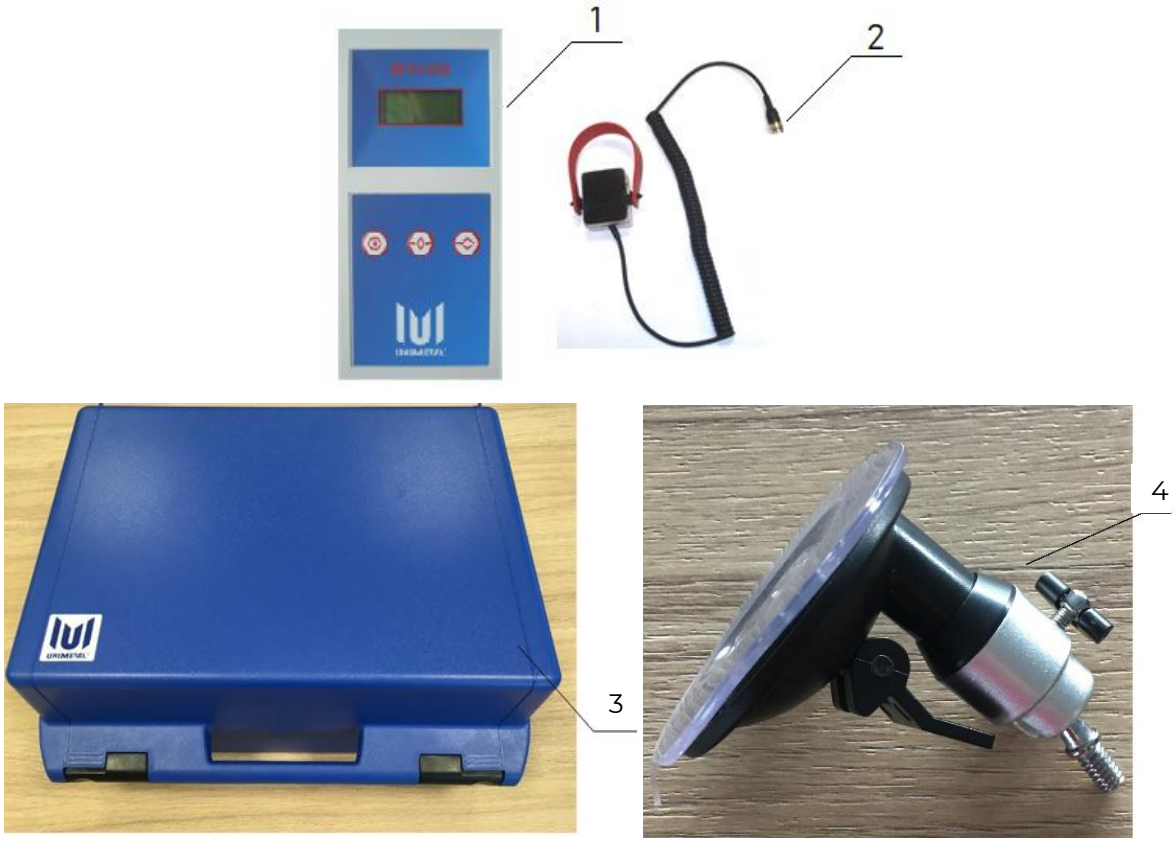


Fig. 18 – Części zamienne do urządzenia BMD-400

L.p.	Spare parts of decelerometer BMD-400
1	BMD-400 device
2	Brake pedal pressure meter
3	Case with foam filing
4	Handle

3.2. Daily maintenance

During everyday use of the BMD-400 control the battery level. If battery is low, replace or recharge them.

3.3. Monthly maintenance

(1) One time per month Operator should check the accuracy of BMD-400 device indications in according to procedure below:

– Turn on the device by press the ENTER button,

– By use the ↑ and ↓ arrows choose “Settings” (Fig.19), and confirm by press ENTER,

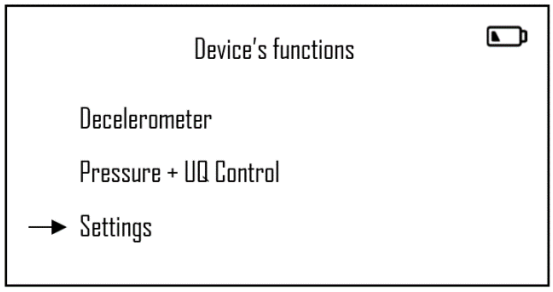


Fig. 19 – Device’s functions screen

– Then by use ↓ and ↑ arrows choose „Accelerometer test” Fig.20) and confirm by press ENTER,

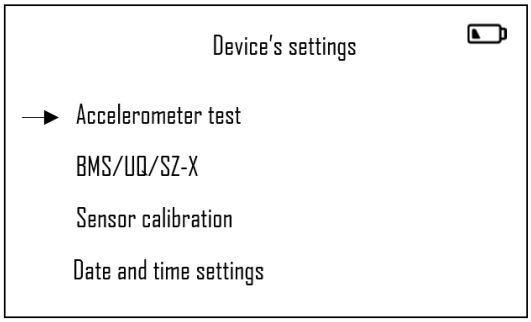


Fig. 20 – Device’s settings

– On screen appears the coordinates, like on Fig. 21, Operator should check if the coordinates corresponds to the actual location of device.

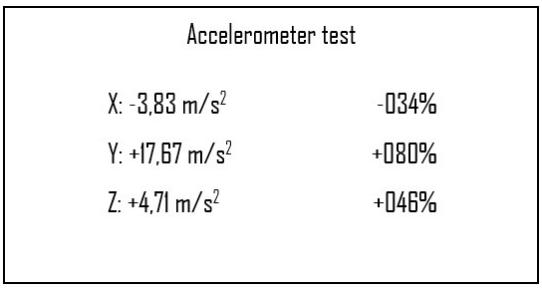


Fig. 21 – Test akcelerometru

4. MANUFACTURER'S DETAILS

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