WHEEL BALANCER
Model: 80-901 L3D

Operation manual

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Declaration of conformity ..... Error! Bookmark not defined.

1 WHEEL BALANCER APPLICATION

1.1 The wheel balancer 80-901 L3D (hereinafter referred to as the “machine”), is designed for balancing car wheels with rim diameter up to 28”, width – up to 20” at forwarding companies, vehicle service and repair stations, stations and points of vehicle diagnostics and vehicle repairing plants.

1.2 The wheel balancer is equipped with:

- color LCD-monitor ensuring high quality image;
- two electronic gauge arms for automatic input of 4 parameters;
- clip for adhesive weights exact setting.

High accuracy of imbalance measurements allows to balance wheels by one cycle.

For exacting customers there is the Split function (behind-the-spoke-weight placement) and optimization of tyre position on the rim.

A thoroughly developed interface facilitates the machine mastering and makes further operation convenient and efficient. There is a useful possibility of three operators’ working on the machine.

1.3 Imbalance measurements may be fulfilled automatically while lowering the wheel cover. After measurements the wheel braking is fulfilled automatically.

1.4 The machine is equipped with overvoltage protection device in the supply mains (PowerGuard technology).

1.5 For the machine functionality enhancement accessories and attachments of other producers, for example Haweka (Germany), Femas (Italy) may be mounted on the shaft. In particular, adaptors for motorcycle wheels mounting, adaptors for wheels without the central hole.

The shaft threaded part length (200 mm) allows to use flanged adaptors of these producers for better wheels centering.

The shaft diameter – 40 mm, thread pitch – 3 mm.

1.6 The machine is driven by 3-phase electric motor. It’s controlled by the intellectual drive circuit (S-Drive technology). This ensures:

- low vibration level;
- steady rotation speed during measurements;
- automatic turn to the place of the weight setting;
- gradual acceleration;
- soft electronic braking and partial braking during wheel mounting/dismounting without impact effect on the shaft.

1.7 Wheel balancing is proceeded by taking one measurement for both correction planes with simultaneous indication of placing locations and corrective weights masses.

2 TECHNICAL DATA

2.1 Machine type	stationary
2.2 Drive type	electromechanical with belt transmission
2.3 Wheel weight range, kg	10...70
2.4 Maximum wheel outer diameter, mm	900
2.5 Absolute error limit of imbalance measuring, gr*mm	800
2.6 Imbalance measurements range, gr*mm	0÷31000
2.7 Power supply	(191…242) VAC, (50…60) Hz
2.9 Power consumption, W, max	350
2.10 Weight of the machine, kg, max	140
2.11 Overall dimensions with lowered/raised wheel cover, mm, max	
- Length	1050 (1210)
- Width	1360
- Height	1300 (1590)
2.12 Operating temperature range, °C	+10 ÷ +35
2.13 Relative air humidity, %, max	80
2.14 Shaft rotation speed, RPM	150 ÷ 200
2.15 Continuous operation durability	not limited

3 ACCESSORIES

Table 3.1

No	Name	Quantity, pieces	Remarks
1	Wheel balancer	1	
2	Operator manual	1	
3	Shaft	1	
4	Bolt	1	
5	Cover	1	
6	2nd gauge	1	
7	Cone ∅ 78…114, ∅ 62…82, ∅ 43…70	3	
8	Nut with plastic ring, cup and rubber ring	1	
9	Power supply wire	1	
10	Gauges calibre	1	
11	Weight pliers	1	
12	Shaft spacer (plastic)	1	
13	Bolt M12	1	
14	Washer M12	1	
15	Bolt M10	4	
16	Washer M10	4	
17	Spring washer M10	4	
18	Plastic scrapper for adhesive weights	1	
19	Monitor fastening bracket	1	
20	Rubber support	3	depending on configuration
21	Packing	1	
22	Monitor with DVI-cable and power supply cable		on request
23	Cone ∅ 97...160 with ring	1	on request
24	Flange Plate Adapter with studs	1	on request
25	Silica gel	1 kg	at transportation by sea
26	Adapter six-sided	1	Depending on modification of a threaded shaft bolt

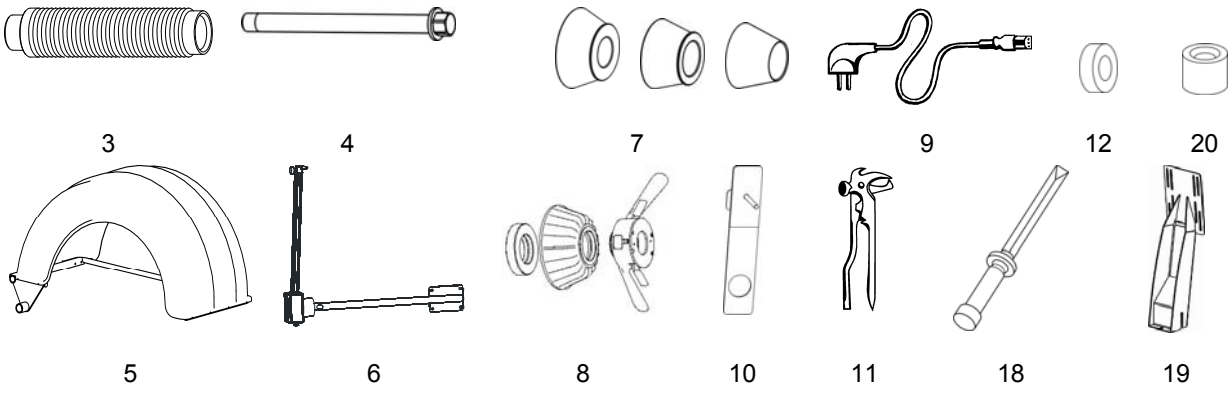


Figure 3.1 - Accessories

4 STRUCTURE OF THE WHEEL BALANCER

4.1 General machine structure

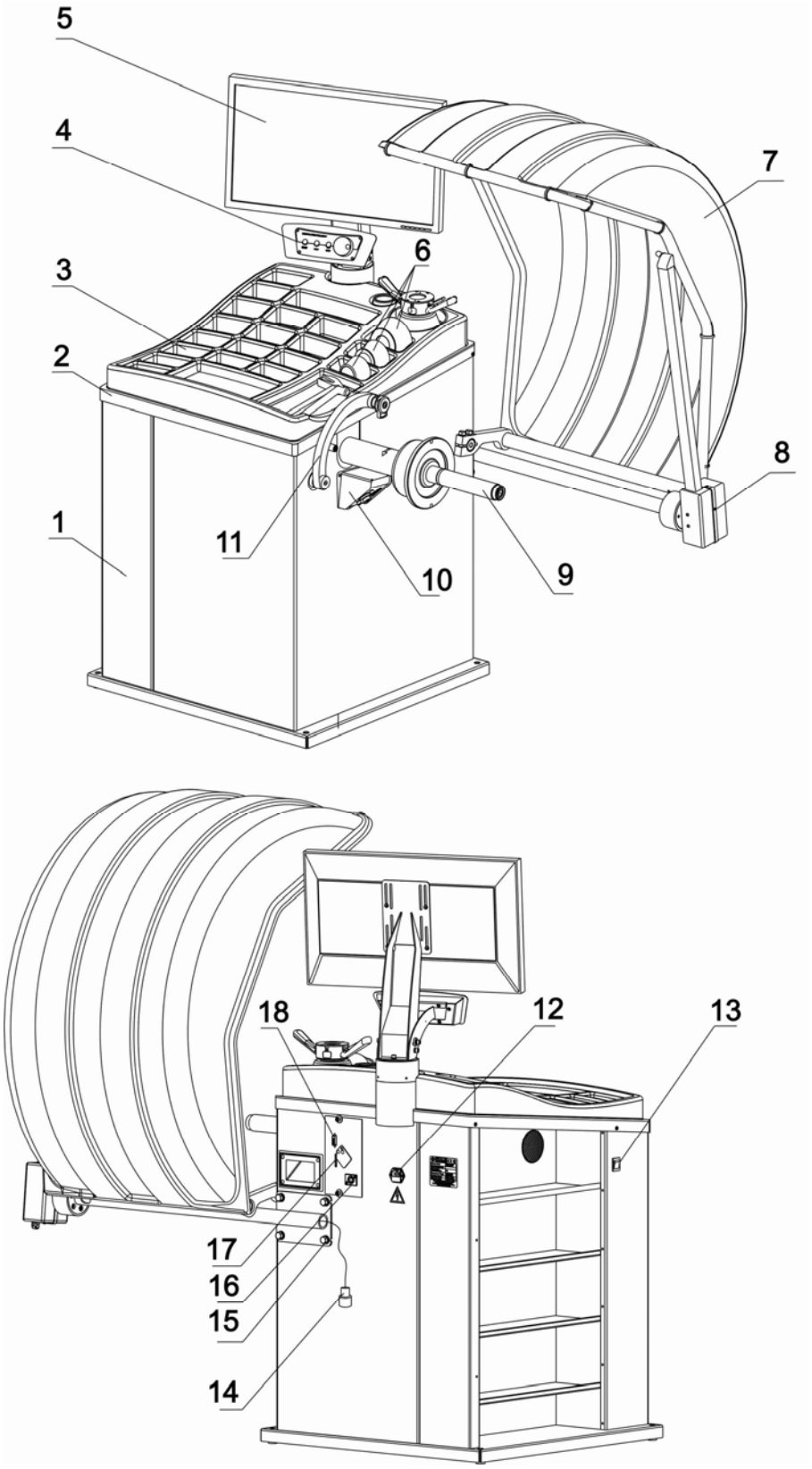


Figure 4.1

The machine consists of:

1 – body;
2 – plastic cover;
3 – cells for balancing weights, 17 ps;
4 – control panel;
5 – display;
6 - cells for cones, 3 ps;
7 – wheel cover;
8 – second electronic gauge arm;
9 – shaft, ∅40x3;
10 – LED light and laser pointer unit (option)
11 – first electronic gauge arm;
12 – electrical power plug with fuse;
13 – main switch;
14 – socket of the second gauge arm.
15 – screws M8 for mounting the second gauge arm, 4 ps;
16 – socket for second gauge arm;
17 - cardreader;
18 - socket for DVI monitor cable

The wheel to be balanced is fixed on drive shaft 9 by locking nut with centering cone or flange. The measurement of diameter and distances to the correction planes is made by the built-in first electronic gauge arm 11. The second electronic gauge arm 8 is designed for the distance measurement to the second correction plane or the wheel width. For protection from splashes and safe operation there is wheel cover 7 fixed on the machine body.

There are LED light to illuminate 10 working space inside the wheel. The light is switched on when the wheel is in the position of cleaning or setting the weight at “6 h”.

The initial position of the gauge arm is shown in Figure 4.2. The gauge arm should be in the initial position during each activation of the machine and after each wheel measure by the gauge.

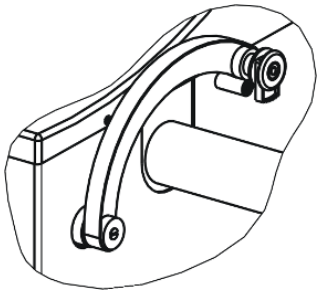


Figure 4.2 – Initial position of the gauge arm

4.2 Preparation of the machine for operation

4.2.1 Unpack the machine. During the unpacking it’s necessary to pay careful attention in order not to damage the machine by unpacking tools.

After unpacking make visual check of the machine in order to find damages, which may occur during transportation, become familiar with technical documentation enclosed to the machine, check the availability of accessories in accordance with the delivery set.

After transportation or storage of the machine at an air temperature lower than +5°C it’s necessary to keep the machine at a temperature (25±10) °C during minimum 4 hours before unpacking.

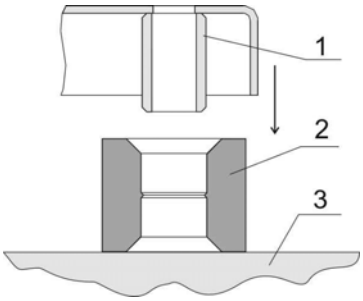
4.2.2 Place the machine on an even rigid foundation, admissible deviation of the foundation from the horizontal line is 0.5° (8mm per 1m), so that all supports of the machine touch the foundation.

For safe and convenient operation of the machine it’s recommended to locate it minimum 700mm from walls.

It’s prohibited to locate the machine near sources of vibration, heat and electromagnetic fields, as it may reduce the accuracy of measurements of the machine.

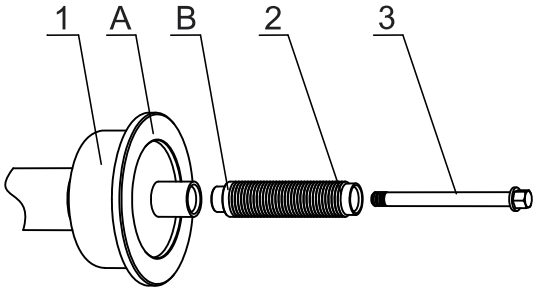
4.2.3 In case of rubber support availability install them. For installation each of rubber support necessary to lift the machine from one side and place rubber supports under sleeves as it shown on picture 4.3 a, then lower the machine taking precautionary measures.

4.2.4 Clean the machine spindle hole and shaft from preserving grease by rag moistened in petrol or white spirit. In accordance with Figure 4.3b set shaft 2 on machine spindle 1 fastening it by bolt 3 with torque 40 N·m, using adapter six-sided if necessary. During removal of the shaft it's allowed to tip slightly on the surface "B" (on horizontal surface) by a rubber or wooden hammer. Do not apply force along the spindle axis (for example, during transportation, during wheel mounting and dismounting)!



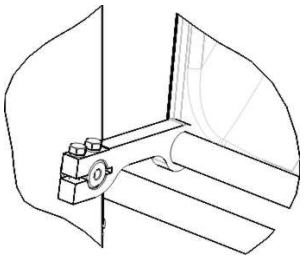
1 – sleeve; 2 – rubber support; 3 – floor

a



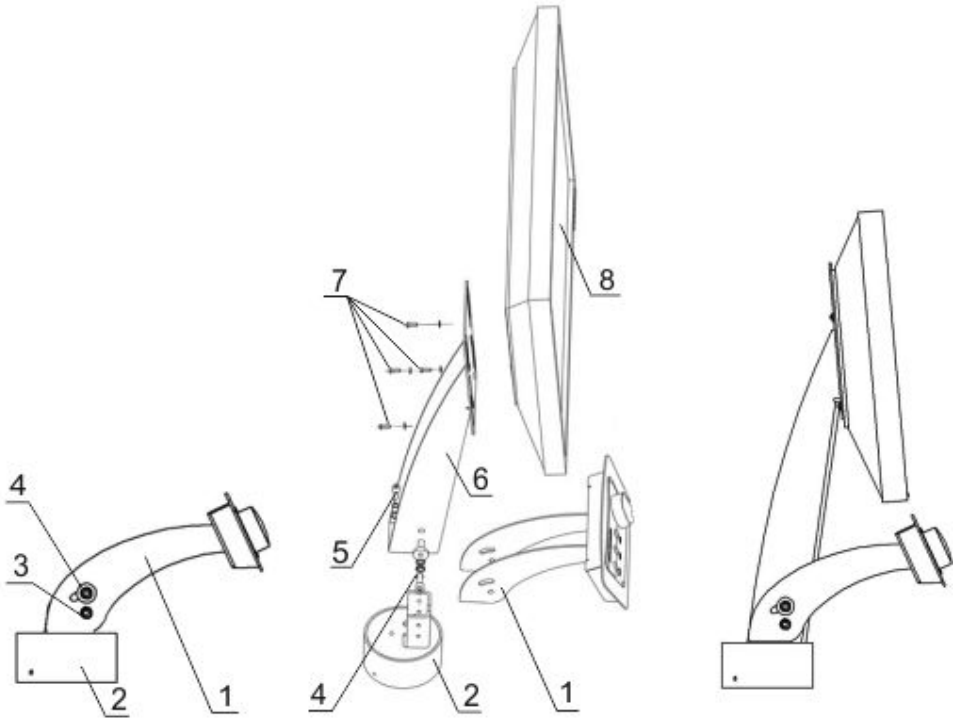
1 - spindle; 2 – shaft; 3 – bolt

b



c

Figure 4.3



a b c

Figure 4.4

4.2.5 Mount the wheel cover with the rubber dust cap, fastening it by bolt M12 with a washer In accordance with Figure 4.3c. During the mounting be guided by the pin located on the shaft which should get into the cover groove.

4.2.6 Fasten the bracket of the gauge arm by four bolts with a spring washer and washer. Plug the electric connector of the gauge arm to the socket on the machine body (Figure 4.1).

ⓘ *While dismantling, press the pusher for the connector deactivation.*

4.2.7 Set monitor in accordance with Figure 4.4:

- loose the screws 3 by 5 mm;
- turn off the screws 4;

- set the bracket 6;
- fasten the screws 4 lightly;
- turn supporting arm 1 into upward position;
- fasten screws 3 and 4;
- fasten monitor bracket 6 by screws 5;
- fasten monitor 8 to monitor bracket 4 by screws 7;
- plug DVI cable to monitor socket and jack 18 on machine body, shown on Figure 4.1.

4.2.8 Check the mains voltage conformity to the voltage indicated on the machine nameplate.

4.2.9 Connect the power supply wire to the machine jack, located on the rear panel of the machine body (Figure 4.1) and to the supply mains equipped with the mains socket with the grounding contact. Connect monitor to supply mains, equipped with the mains socket with the grounding contact according to maintenance documentation.

ⓘ Connecting machine and monitor to the supply mains without grounding is dangerous for the personnel and may reduce the accuracy of measurements and damage the machine!

4.2.10 Fulfill the gauge arms and imbalance sensors calibration after the machine installation.

4.3 Control and display elements

Figure 4.5 shows the example of display image.

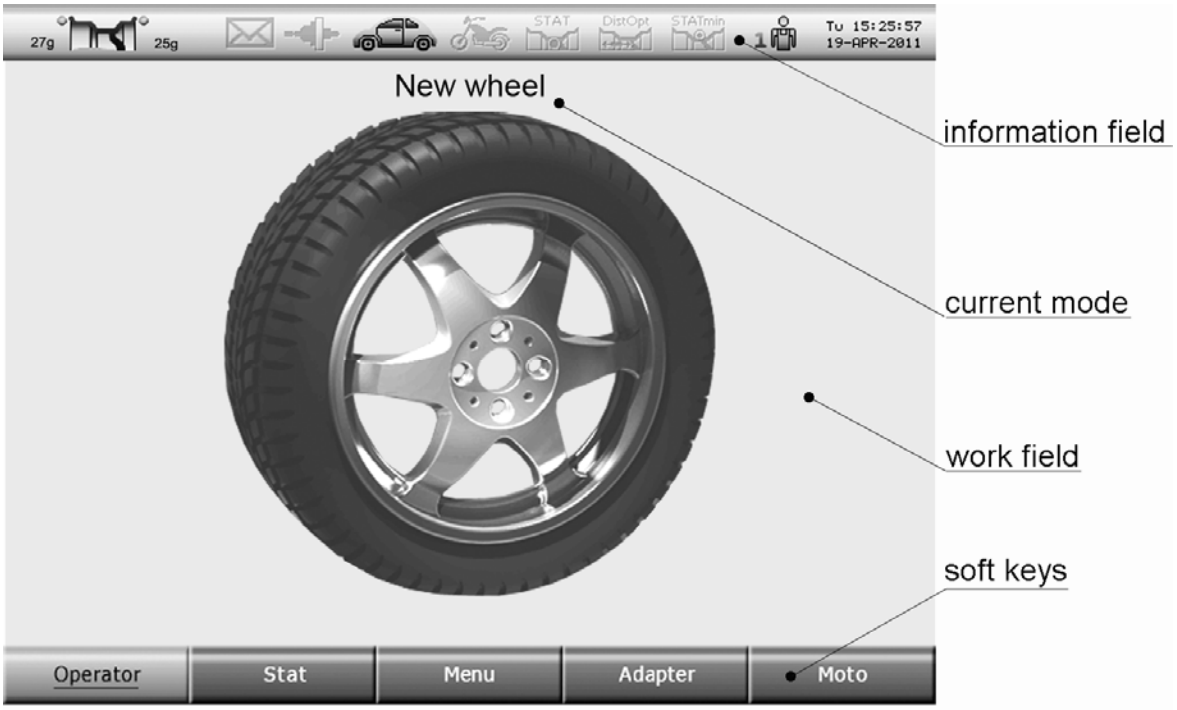


Figure 4.5

The information field is located in the upper part of the display. Meanings of the information field icons are shown in Figure 4.6.

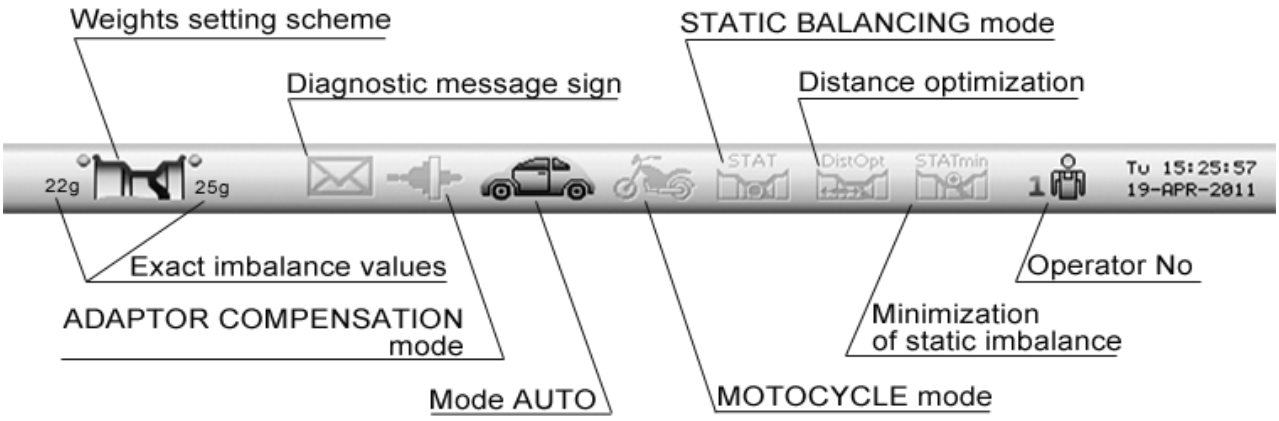


Figure 4.6 – Information field

The icons “Weights setting scheme” and “Operator No” are always activated and show the current state.

The rest icons indicate the mode state.

The line with the current mode name is located under the information field.

The soft key images are located in the lower part of the display. Further the soft keys are indicated in the frame, for example **MENU**.

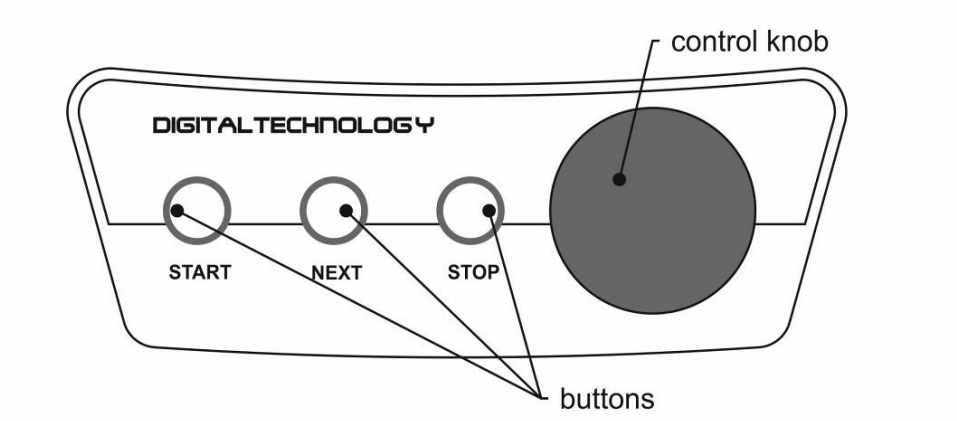


Figure 4.7

Figure 4.7 shows the control panel. By turning the control knob one can make selection of soft keys, menu items, change parameter values. Pressing the control knob may lead to:

- pressing a soft key;
- fulfillment of a menu item;
- completion of values input.

Buttons assignment:

START - imbalance measurements start;

NEXT - wheel turning into the next position of the weight setting;

STOP - emergency wheel stop during the imbalance measurement, temporary brake engagement while wheel dismounting and mounting.

4.4 Switching the wheel balancer

Before switching it’s necessary to make sure that the gauge arm is in the initial position (Figure 4.8).

*Move the mains switch to the position **ON**.*

On the monitor screen for some seconds there will be information on version number of the machine, then - page of a choice of language in the form of several flags. The current choice is shown by a flag of the increased size. For changing language to rotate and press the control knob. If changes are not necessary, the machine tool in some seconds automatically leaves this mode. After that the image shown in Figure 4.9 will appear on the display. The machine will be in the mode «New wheel».

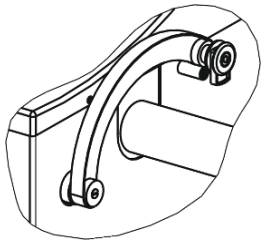


Figure 4.8

Figure 4.9

5 WHEEL BALANCING

ⓘ *The technology Direct3D is applied in this machine.*

The application of the technology Direct3D raises the operation efficiency of the machine at the expense of the exact conformity of the set weight to the rated one.

This technology is based on two factors.

The first one – precise direct measurement of correction planes parameters – diameters and distances. This is achieved by placing the gauge arms directly to the places of weight setting.

The second one – precise setting of tape weights by means of the gauge arm. The weight is set precisely as per the distance and as per the angle. Apparent complexity of the weight setting by means of the gauge arm gives in the result a significant saving of time and in case of skilful work – it's more convenient.

In the result the balancing is fulfilled during one cycle: measurement, weights setting, control measurement.

The technology Direct3D is the most effective while alloy wheel balancing.

5.1 Wheel balancing procedure

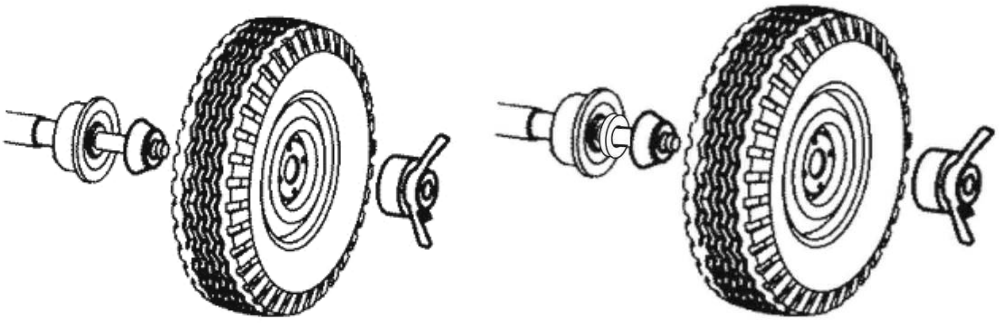
Balance the wheel in accordance with the following procedure.

- activate the machine mode "New wheel";
- prepare and mount the wheel (5.2);
- in case of necessity change the type of balancing: static or dynamic, motor car or motorcycle wheel (5.3);
- input wheel data (5.4);
- fulfill the imbalance measurement (5.5);
- set weights if necessary (5.6);
- make check measurement (5.5).

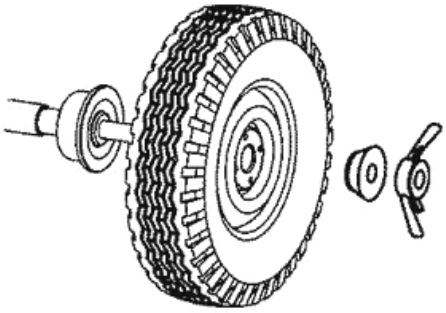
5.2 Wheel mounting

ⓘ *While wheel mounting it's necessary to remember that the machine should be kept clean. Avoid dust and moisture penetration inside the machine, water pouring and splashing on control panels and openings in the machine body.*

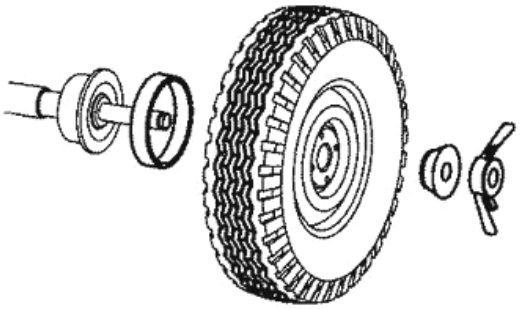
Clean the wheel of mud and remove weights set earlier. Mount the wheel to be balanced on the machine drive shaft in accordance with Figure 5.1 depending on the wheel rim design.



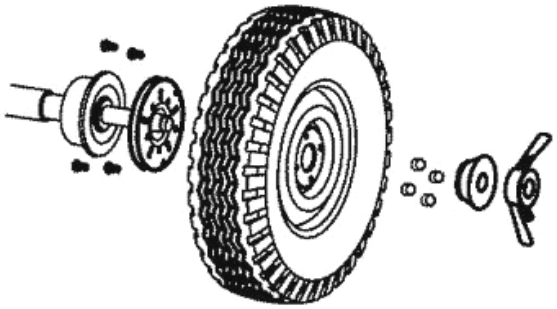
a - cone from inside b - cone from inside with shaft spacer



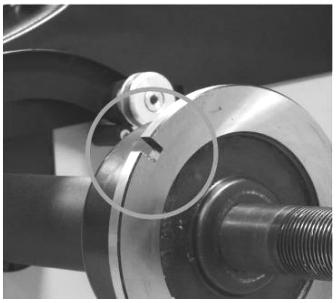
c - cone from outside



d - cone ∅97...170 with ring



e - flange plate (option)



f - daps for adaptors fixing

Figure 5.1 - Wheel mounting

Wheel mounting with shaft spacer (Figure 5.1b) is recommended when the cone is mounted from inside, if the cone is set deeply in the wheel opening and insufficiently compresses the spindle spring while tightening up the wheel nut. The stronger the spring is compressed, the better is the wheel centering.

Wheel mounting on the flange plate adapter (Figure 5.1e) imitates the wheel fastening on the car hub and allows to balance the wheel more precisely. Initially, it's necessary to fasten the flange on the wheel, and then mount the wheel with the flange on the machine spindle.

Parameters of the flange holes arrangement for wheel fastening bolts and the list of car models the wheels of which have the same fastening parameters is given in Appendix A.

For mounting wheels without the central hole it's necessary to use special adaptors to be purchased separately. The adaptors should be mounted using daps or holes in the shaft cup shown in Figure 5.1f.

After mounting the adaptors, fastened on the shaft in fixed position it's necessary to fulfill the procedure of their imbalance compensation according to clause 7.4. Deactivate the adaptor compensation mode after removing the adaptor.

ⓘ *The adaptor compensation procedure should be fulfilled before the wheel mounting!*

While mounting the wheel it's initially recommended to draw it slightly by clamping nut. Then turn the wheel for one revolution, rocking it by hands. After that completely tighten the nut.

ⓘ *In order to facilitate the wheel mounting and dismounting in mode «New wheel" it's possible to activate the shaft braking mode by pressing the button* STOP.

5.2.1 Motorcycle wheel adaptor mounting

Mount the adaptor for balancing motorcycle wheels according the adapter instruction (Figure 5.2) using daps or holes in the shaft cup shown in Figure 5.1f.

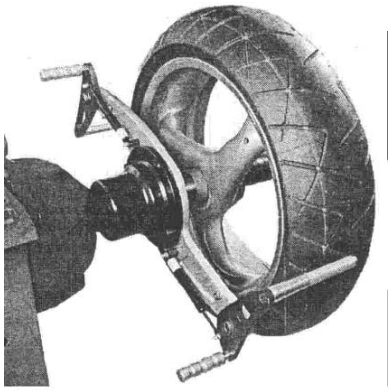


Figure 5.2

5.3 Type of balancing: dynamic or static, motor car or motorcycle wheel

The machine allows to fulfill two types of balancing: dynamic and static. While the dynamic balancing the weight setting is performed on two planes, and while the static balancing only one weight is set on one plane.

The selected method is displayed on the information panel by the icon 

.

To change the balancing method is possible in the mode “New wheel”.

For this purpose press the soft key **STAT**. With switched static balancing the key remains sunken and the icon 

is activated. With switched dynamic balancing the icon is inactive.

The wheel type change is fulfilled by the soft key **MOTO**. If the motorcycle wheel is selected, then the key MOTO is sunken and the icon  on the information panel is active and contrasting.

5.4 Wheel parameters input

Wheel dimensions and weight setting scheme are necessary for the calculation of mass and place of the weight setting.

5.4.1 Dimensions input

Input dimensions in the mode “New wheel” by means of the electronic gauge arms.

Fulfill the first measurement. For this purpose place the first gauge arm to the left weight setting point, Figure 5.3. The image will appear on the display, shown in Figure 5.4. Wait for a sound signal.

a b

Figure 5.3 - Gauge arm placing during the first measurement

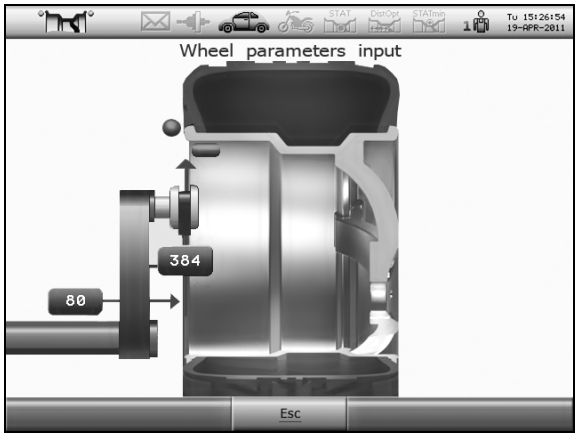
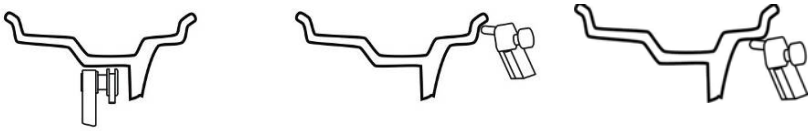


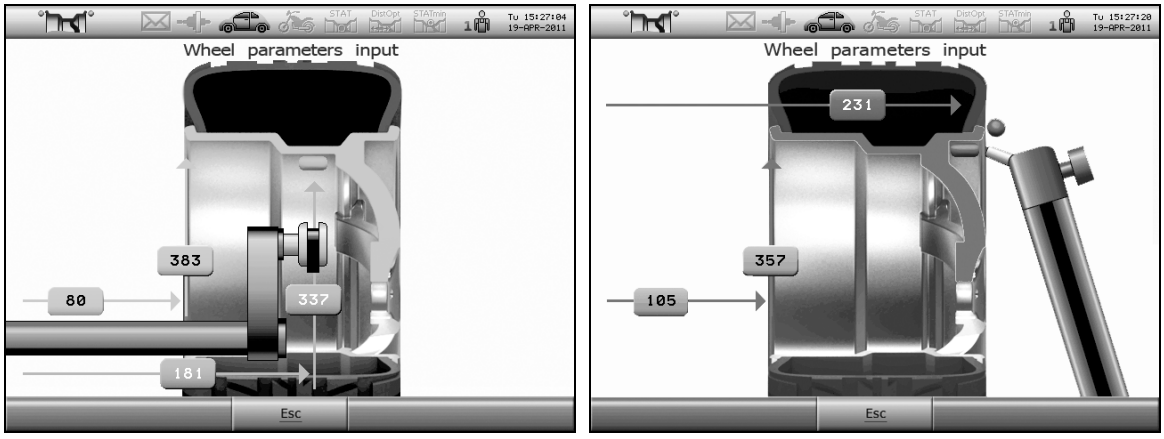
Figure 5.4 - Display image during the first measurement

While dynamic balancing fulfill the second measurement. For this purpose place the first or the second gauge arm to the right weight setting point, shown in Figure 5.5. The image will appear on the display, shown in Figure 5.6.



a b c

Figure 5.5 - Gauge arm placing during the second measurement



a b

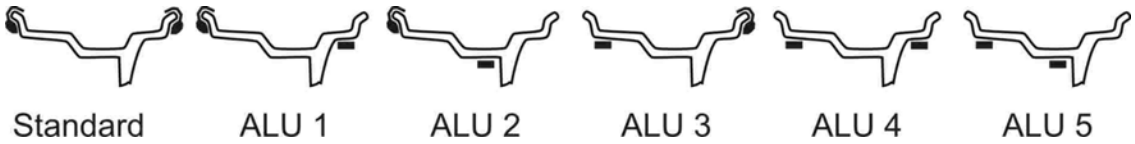
Figure 5.6 - Display image during the second measurement

Wait for a sound signal and information appearing on the display relative to the weight setting scheme. Smoothly return the gauge arm into the starting position.

After pressing the button **ESC** the dimensions will return to the initial values as before the measurement start and the machine will be switched over to the mode “New wheel”.

5.4.2 Weight setting scheme input

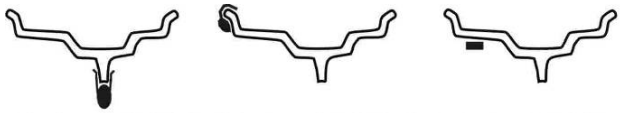
The machine operates with the weight setting schemes, shown in Figure 5.7.



a - motor car wheels dynamic balancing

b - motor car wheels static balancing

c - motorcycle wheels dynamic balancing



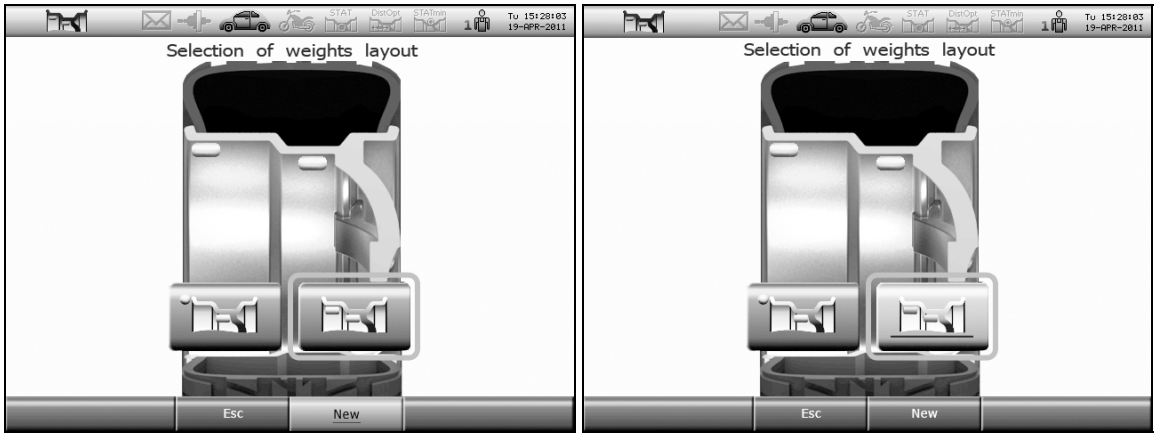
d - motorcycle wheels static balancing

Figure 5.7 - Weight setting scheme

Possible weight setting schemes will appear on the display automatically after the dimensions input. The current scheme is marked by the red frame, Figure 5.8a. If the scheme is defined correctly, then it's possible to fulfill the imbalance measurement at once.

If it's necessary to change the scheme – then rotate the control knob until the desired scheme is marked by dark background, Figure 5.8b. Then press the knob. The scheme should be marked by the red frame.

After the scheme changing it's possible to fulfill the imbalance measurement.



a b

Figure 5.8 – Weight setting scheme selection

After pressing the button **ESC** the dimensions will return to the initial values as before the measurement start and the machine will be switched over to the mode "New wheel".

5.5 Imbalance measurement

For the imbalance measurement lower the cover or press the button START *with the lowered cover. Wait for the complete wheel stop. Raise the cover.*

For emergency stop without completing the measurement press the button STOP.

ⓘ *During measurements mechanical effects on the machine are not allowed, it's not allowed to lean on the machine body, take from the machine and put on the machine accessories, tools and other objects.*

ⓘ *ATTENTION! Before the first measurement after switching the machine, the shaft automatically rotates on one turn with small speed.*

5.6 Weight setting

The machine will be switched over to the weight setting mode after the imbalance measurement and wheel stop. The shaft with the wheel will automatically turn to a desired position: for the *weight setting* or *cleaning* the weight setting place. While the dynamic balancing the left and right weight masses will be shown on the display, while the static balancing - of only one weight, Figure 5.9.

ⓘ *To select the unit of weight (gram or ounce) use " Menu -> Interface", see 8.4.*

a - weight setting to the position "12 h" b - weight setting by the gauge arm c - cleaning

Figure 5.9

After the wheel stop in the desired position the mass of that weight which is to be set now is displayed by yellow color.

To transfer to the other weight setting (cleaning the place) it's possible:

- to press the button NEXT on the control panel;

- turning the control knob select on the soft key ◀ **SET** ▶ the relative pointer and press the control knob;

- turning the control knob select on the soft key ◀ **CLEAN** ▶ the relative pointer and press the control knob;

- push the wheel by hand with the force sufficient to overcome brake resistance in direction shown on the display by symbols as in Figure 5.10.

Figure 5.10 - Direction of wheel rotation by hand

ⓘ *Exact (not rounded) value of the weight masses is always shown on the information field.*

5.6.1 Clip-on weight setting

Wait for the wheel stop in the desired position.

Apply the weight to the rim in the position "12 h" "by eye", as it's shown in Figure 5.11, and fix it on the rim by slight knocking by the tool.

a - display image while clip-on weight setting b - weight is set in the position "12 h"

Figure 5.11

5.6.2 Tape weight setting

Tape weights can be set by 3 methods:

- in the position "12 h";
- in the position "6 h";
- by the gauge arm.

The method depends on the machine adjustment as per 8.3.7. The setting by the gauge arm is the most preferable method, as it allows setting the weight in the most precise way as per the distance and angle position.

Cleaning the tape weight setting place

At first it's necessary to clean and degrease the place of gluing.

For convenience it's recommended to switch over the machine to the cleaning state. In this state the wheel will automatically turn by the place of the weight setting downwards (to the position "6 h"). To switch over to the cleaning state it's possible:

- to adjust the machine in such a manner so that the wheel will automatically stop in the cleaning position as per 8.3.8;
- turn the control knob select on the key **◀ CLEAN ▶** the pointer relative to the side and press the knob.

The cleaning state is possible only on the tape weight setting plane.

The cleaning state is possible only on the tape weight setting plane.

The brush image indicated under the weight mass value and cleaning area picture on the wheel image are the signs of switching over to the cleaning state, as it's shown in Figure 5.12.

Figure 5.12 - Cleaning state

Clean the place of the weight setting.

To exit from the cleaning to the weight setting mode, turning the control knob select on the key ◀ **SET** ▶ the pointer relative to the side and press the control knob.

Tape weight setting by the gauge arm

ⓘ *It's possible to set weights by the gauge arm on the wheel plane accessible from the side of the machine body.*

In case of the weight setting by the gauge arm the image will appear on the display, as it's shown in Figure 5.13.

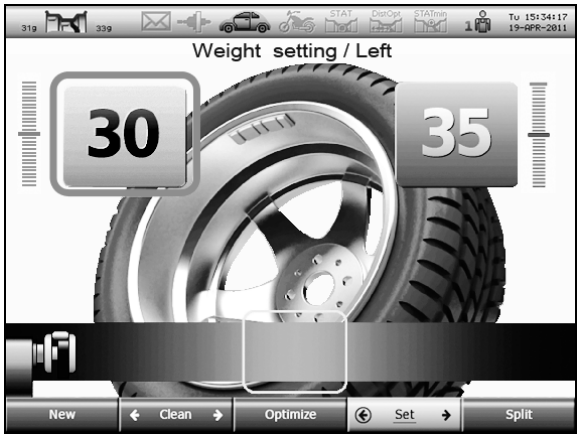


Figure 5.13 - Display image while the weight setting by the gauge arm

Wait till the wheel stop in the desired position.

Remove the protective film from the weight. Place the weight to the gauge arm clamp, as it's shown in Figure 5.14.

Extend the gauge arm to the position when an interrupted sound signal is heard or when the gauge arm image on the display will enter inside the red rectangle. Press the tip to the wheel surface. Press the pusher for pushing out the weight from the gauge arm clamp and for gluing to the wheel. Return the gauge arm to the initial position.

Figure 5.14 - Weight setting by the gauge arm

ⓘ *While the weight setting by means of the gauge arm the weight angle position differs from "12 h".*

Tape weight setting to the position "12 h" or "6 h"

In this state the display image is as shown in Figure 5.15.

a - setting to "12 h" on the right b - setting to "6 h" on the right

Figure 5.15

Remove the protective film from the weight. Fasten the weight in the upper position of the wheel ("12 h") or in the lower position ("6 h") on the distance according the entered dimensions by the gauge (to the place, where the gauge arm tip was placed). If the machine is equipped with laser pointer, the one draws a line in the "6 h" position. The laser line must be on the middle of the weight. For some wheels, length of the line may be short and don't reach the place of the weight. In this case continue the line mentally.

6 EXAMPLES OF WHEEL BALANCING

6.1 Standard wheel balancing

An example of the standard car wheel balancing with clip-on weights is given below.

If the machine is not in the mode "New wheel" (Figure 6.1), and it's for example, in the weight setting mode, then enter the mode "New wheel" by pressing the button ***NEW****.*

Press the button STOP *for temporary brake actuation.*

Mount the clean wheel on the shaft (Figure 6.2).

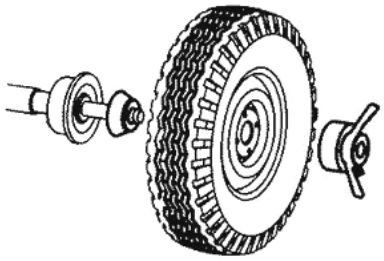
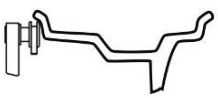
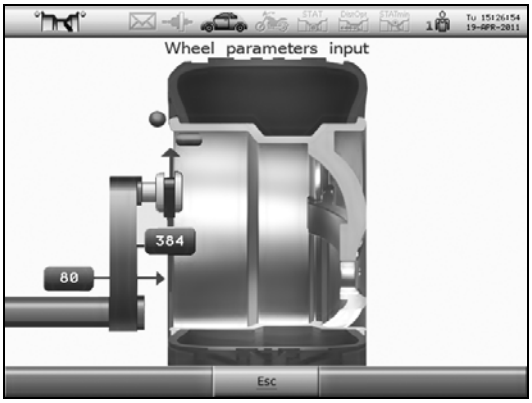
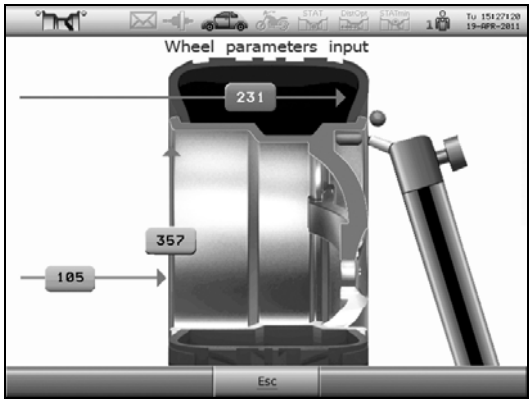


Figure 6.1 - Display image of the mode "New wheel" Figure 6.2 - Wheel mounting

Input dimensions. For this purpose place the first gauge arm to the rim (Figure 6.3a) and hold it in this position until a signal is heard. Return the gauge arm to the initial position.







a b

Figure 6.3 - First measurement

Place the second gauge arm to the rim (Figure 6.3b), Wait for a signal and imaging of the weight setting schemes on the display. Withdraw the second gauge arm back to the initial position.

Possible weight setting schemes will appear on the display with the marked standard scheme (Figure 6.4).

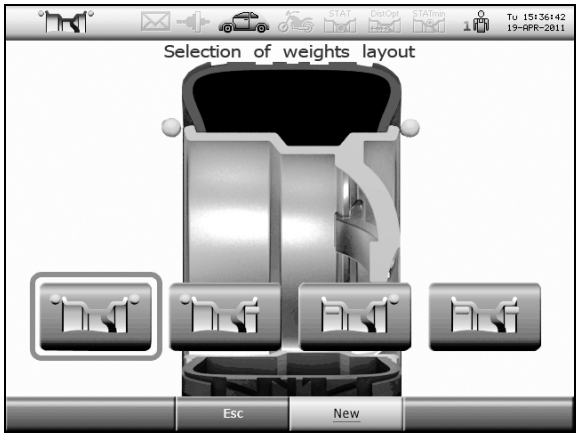


Figure 6.4 - Weight setting schemes

Lower the cover for the imbalance measurement. Wait for the wheel stop. Raise the cover.

The information on weights will appear on the display (Figure 6.5 a). The wheel will stop in the position for the weight setting on one of the sides. Determine the weight mass and setting side as per information given on the display. The mass of the weight to be set is marked on the display by yellow color.

Set the weight of the indicated mass to the position "12 h", as it's shown in Figure 6.6, on one side. Press the button NEXT*, wait for the wheel stop. Set the weight to the position "12 h" on the other side.*

a - set the weight of 30 gr. on the left

b - set the weight of 25 gr. on the right

Figure 6.5

Figure 6.6 - The weight is set in the position "12 h"

Lower the cover for check measurement. Wait for the wheel stop. Raise the cover.

The information on weights will be imaged on the display. In case of necessity (if the result is no equal «0 - 0») set additional weights or change the position of the existing ones and repeat the check measurement.

6.2 Alloy wheel (ALU) balancing

Let's consider the wheel balancing with the weight scheme shown in Figure 6.7, without cleaning the tape weight setting point.

ALU 5

Figure 6.7

If the machine is not in the mode "New wheel" (Figure 6.8), and it's for example, in the weight setting mode, then enter the mode "New wheel" by pressing the button ***NEW*** *.*

Press the button STOP *for temporary brake actuation.*

Mount the clean wheel on the shaft (Figure 6.9). If the cone deeply gets into the wheel hole, then first put on the shaft the shaft spacer then – the cone.

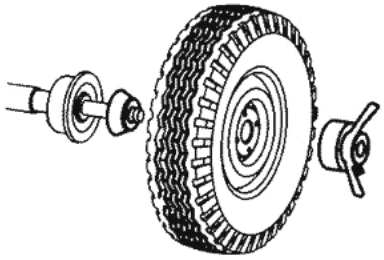
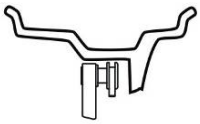
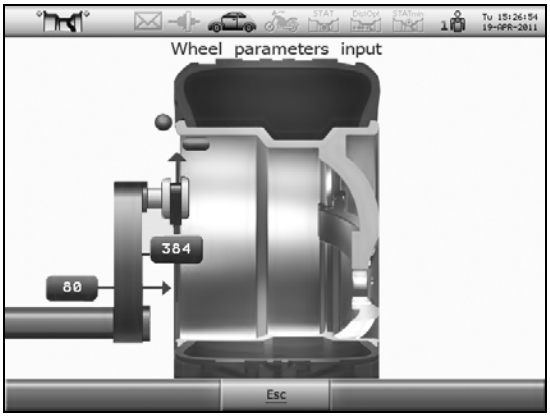
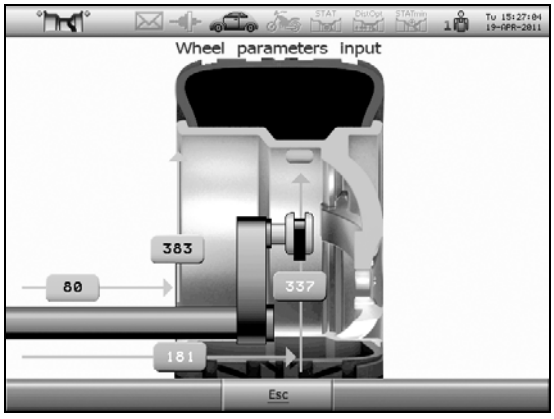


Figure 6.8 - Display image of the node "New wheel" Figure 6.9 - Wheel mounting

Input dimensions. For this purpose place the tip of the first gauge arm to the supposed left weight setting point - rim of the wheel and hold it till the sound signal is heard (Figure 6.10a).







a b

Figure 6.10 - Input dimensions

Then place the same gauge arm to the right weight setting point (Figure 6.10b), wait for the sound signal and imaging on the display of the weight setting schemes (Figure 6.11).

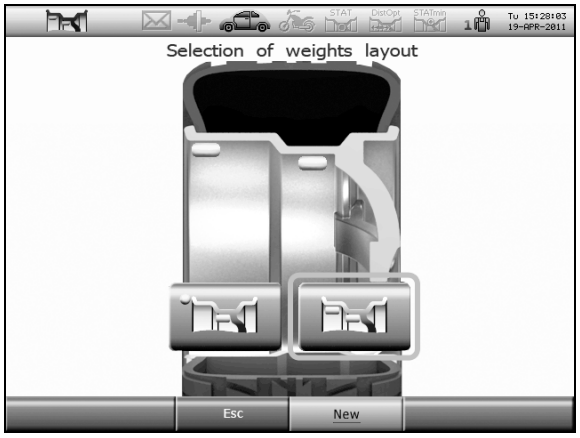
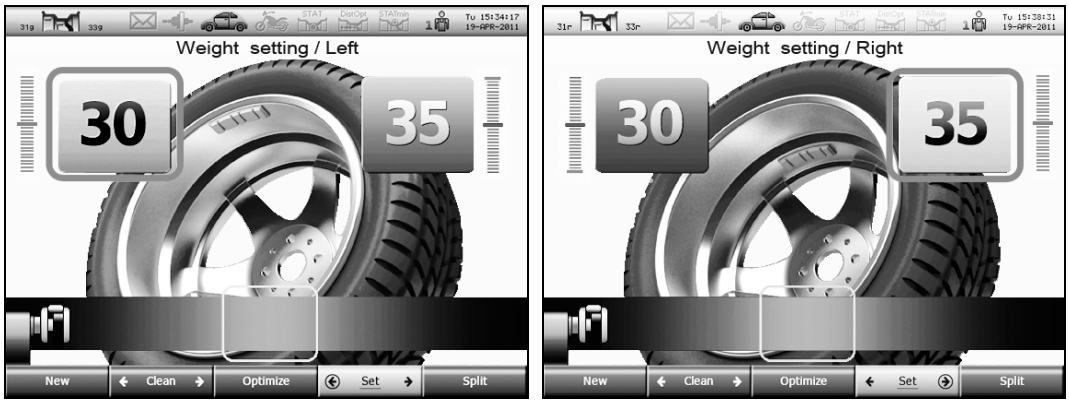


Figure 6.11 - Weight setting scheme

The scheme determined automatically will be marked by the red rectangle.

Lower the cover for making measurement. Wait for the wheel stop. Raise the cover.

The wheel will stop automatically in the setting position of one of the weights. The information on weights will appear on the display (Figure 6.12).



a - set the clip-on weight of 30 gr. on the left b - set the tape weight of 35 gr. on the right

Figure 6.12 - Display images of the weight setting

Set the tape weight on the right inside the wheel as follows.

Remove the protective film from the weight. Place the weight to the gauge arm clamp, as it's shown in Figure 6.13.

Extend the gauge arm to the position when an interrupted sound signal is heard and when the gauge arm image on the display will enter inside the red rectangle. Press the tip to the wheel surface. Press the pusher for pushing out the weight from the gauge arm clamp and for gluing to the wheel. Return the gauge arm to the initial position.

Figure 6.13 - Weight setting by gauge arm

Press the button NEXT*, wait for the wheel stop. Set the weight on the other side.*

Lower the cover for check measurement. Wait for the wheel stop. Raise the cover.

The information on weights will be imaged on the display. In case of necessity (if the result is no equal «0 - 0») - set additional weights or change the position of the existing ones and repeat the check measurement.

7 ADDITIONAL POSSIBILITIES

7.1 Split - "hidden weight"

ⓘ *The Split mode allows maintaining the good appearance of the wheel at the expense of the tape weights setting behind spokes. This mode may be used for the right plane in schemes shown in Figure 7.1, i.e. the weight hiding is performed only for one plane – the plane located behind spokes. In the majority of cases this is achieved by splitting one weight into two.*

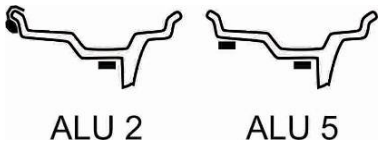


Figure 7.1 - Permissible weight setting schemes for the Split mode

For entering the Split mode it's necessary to press the button **SPLIT** in the weight setting mode. The display image will correspond to Figure 7.2. Place any of spokes to the position "12 h" rotating the wheel by hand. Turning the control knob, select the spokes quantity. Press the control knob. Press the button **ENTER**. The operation can be interrupted by pressing the button **ESC**.

Figure 7.2 - Data input for the Split mode

If after this operation on the right side of the display two values of mass are shown (Figure 7.3), it means that two weights are to be set on the right plane. Their setting is similar to the usual setting of tape weights.

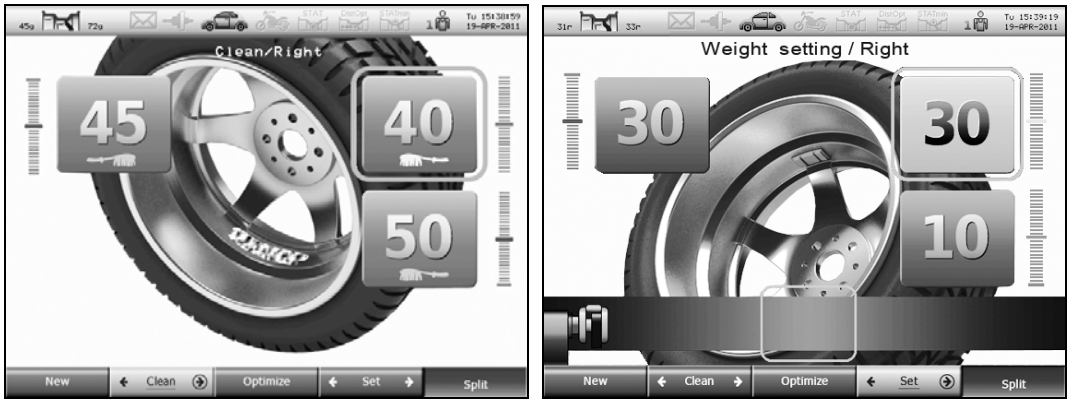


Figure 7.3 - Display images of cleaning and weight setting in the Split mode

Using the button NEXT, ◀ SET ▶, ◀CLEAN ▶ *clean the weight setting points and set weights in accordance with the displayed information.*

ⓘ *The Split operation will be fulfilled in accordance with indicated number and position of spokes in all subsequent measurements till the transition to the mode "New wheel".*

In order to exit the SPLIT mode before the transition to the mode "New wheel" press the button ***SPLIT****, then -* ***ESC****.*

7.2 Effective work of three operators

The machine ensures effective operation of three operators – tyre fitters. For example, during the service of two-three cars as per the principle "one car – one operator" the operators have to balance different wheels one by one. At the same time in order not to input the wheel data once more it's sufficiently for each operator to switch over to his own mode (operator 1, 2 or 3) and the dimensions will be restored.

Especially it's useful to switch over "operators" while making the optimization of the tyre position. This is a long procedure but it can be interrupted temporarily: while "operator 1" changes the tyre position on the tyre changer, "operator 2" can balance other wheel.

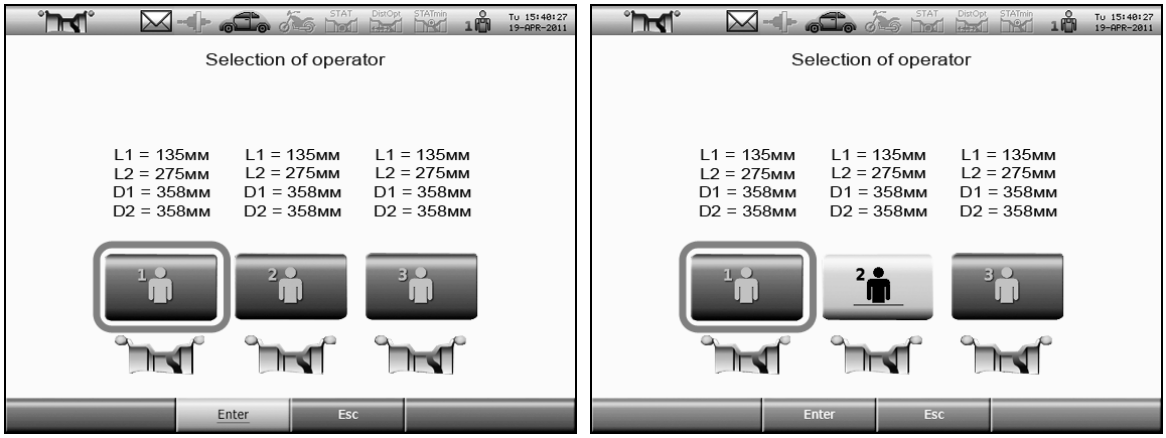
While "operator" changing over, for example, from 1 into 2:

- the current mode of the machine and wheel parameters for "operator 1" are maintained;

- the machine mode and wheel parameters for "operator 2" are restored.

The current number of "operator" is always displayed in the information field.

For "operator" change over press ***OPERATOR****. The image shown in Figure 7.4a will appear on the display.*



a b

Figure 7.4 - Operator selection

The current scheme is marked by the red frame, Figure 7.4a. To change operator turn the control knob until the desired scheme is marked by the yellow background, Figure 7.4b. Then press the knob. The scheme should be marked by the yellow frame.

ⓘ *"Operator" changing is possible in the mode "New wheel" and during optimization.*

7.3 Optimization

Optimization allows finding the tyre position relative to the wheel rim when the static imbalance of the wheel will be minimal. This will allow:

- to reduce the mass of the balancing weights to be set;

- to improve smoothness of the wheel movement.

Movement smoothness may be improved if in the result of the optimization the heaviest place of the tyre (more solid or higher) will align to the place of the minimal rim diameter.

It's recommended to fulfill the optimization in case of the large wheel imbalance and high requirements to movement smoothness.

The optimization process is fulfilled in the optimization mode in the following way:

- measure the initial imbalance;
- turn the tyre relative to the rim by 180°;
- measure the imbalance;
- the machine calculates the new tyre position;
- turn the tyre relative to the rim to the new position;
- fulfill the imbalance control measurement.

During all measurements of the imbalance the wheel should be pumped up to the norm, all weights should be taken off.

The optimization may be fulfilled after the imbalance measurement before the weights setting.

Press the button ***OPTIMIZATION****.*

Fulfill operations in accordance with displayed instructions.

After termination - balance the wheel in accordance with the usual procedure.

In the process of optimization while the tyre turning the other tyre fitter may balance another wheel on the machine. For this purpose it's necessary to switch over to the other "operator" - press the button **OPERATOR** (as per 7.2). In order to continue the optimization it's necessary to revert to your "operator" - press the button **OPERATOR** again.

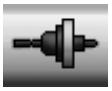
7.4 Adaptor imbalance compensation

Any adaptor mounted on the shaft introduces its own imbalance.

For adaptors mounted on the shaft by means of bolts through slots in the shaft cup, influence of this imbalance on the wheel balancing quality may be eliminated.

For this purpose it's necessary to fulfill the procedure of the adaptor imbalance compensation.

Fasten the adaptor on the shaft.

Press ***ADAPTER****. Then after the request on the display lower the cover for the imbalance measurement. After the shaft stops the indicator of the adaptor compensation mode*  *will glow (will become contrast) in the information field and the button* ***ADAPTER*** *will remain in "sunken" condition.*

Mount wheels on the adaptor and balance them according to the usual procedure.

Disable the adaptor compensation mode after the adaptor removal.

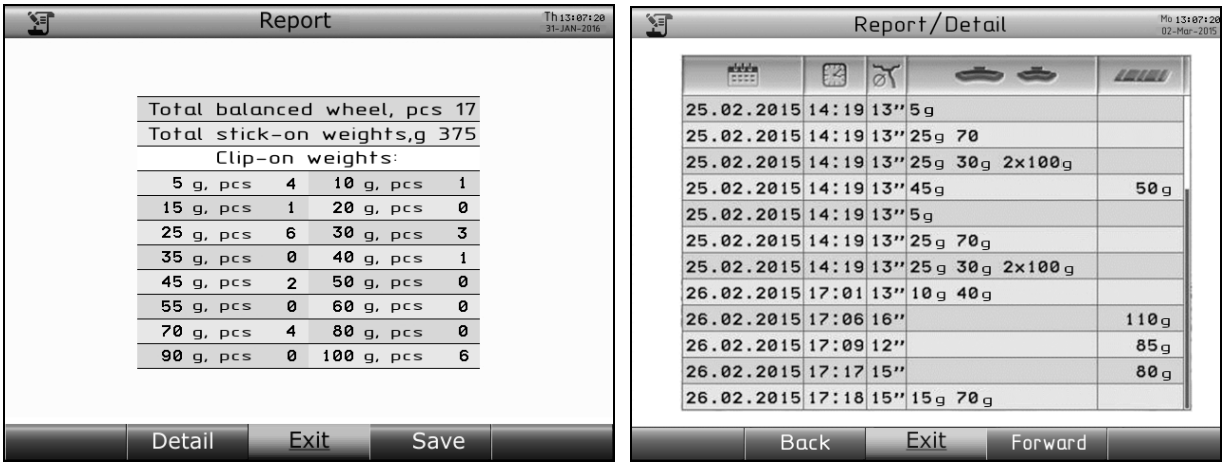
Press ***ADAPTER****. After that the adaptor compensation mode indicator will go out (will become pale)*  *, and the button* ***ADAPTER*** *will return to the initial position.*

7.5 Records

The machine keeps records of balanced wheels number and the total weight of installed tape weights and weights with clamps. Besides, detailed report with data on each wheel: date, time, size, installed weights is keeping. Data on the 2800 last balanced wheels is stored.

Reports can be viewed on the screen, and detailed report can also be saved on SD-memory card as a file for later viewing and analysis on the computer in MS Excel.

*In the mode "New wheel" press the button **MENU**. In the appeared list select **REPORT**. Look through the displayed information (the report since the beginning of machine operation), as shown in Figure 7.5a.*



a b

Figure 7.5 - Record

*Pressing **DETAIL**, you can view a detailed report, Figure 7.5 b. To save a detailed report on the SD-card as a file, press **SAVE**. Then, at the request of the screen, insert the SD-card into the card slot at the rear of the machine, as shown in Figure 7.6, and press **OK**. Wait for the completion of recording the information (message "The report was saved successfully " will appear on the screen). After that, remove the card, first by pressing on it slightly, and then pulling out the card reader. For dust protection close the card reader slot with cover.*

ⓘ SD-card must first be formatted in FAT32 or FAT16 format. SD-card storage capacity - 32 GB.

ⓘ Do not remove the card until the record is completed! This may cause loss of all data on the SD-card!

On SD-card the file named <number> <month> <year> .xml will be recorded, for example, 14022016.xml.

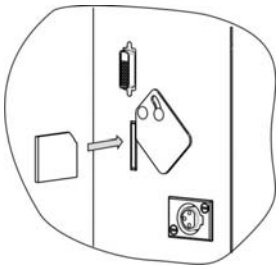


Figure 7.6 – SD-card orientation

For viewing on a computer, open the file in MS Excel.

ⓘ *The registration is made as per the imbalance measurement results on the basis of a selected weight setting scheme. After exceeding the value 65535 any counter is set to zero.*

7.6 Wheel balancing recommendations

If during the control measurement after the weights setting it's required to set a small weight to the position shifted by 90 degrees from the set weight, it means that there is an error only in the angle position of the set weight. Shift the previously set weight by 5…10 mm.

If the error of the angle position appears constantly, it's necessary to re-calibrate the imbalance sensors more thoroughly observing the angle position "12 h" while setting the weight on the right, or set weights while balancing at once with a shift, also shifting the tape weight in the gauge arm clip.

During the wheel mounting it's firstly recommended to pull it by the nut. Then rotate the wheel by one turn rocking it by hands. After that finally tighten the nut.

If the wheel design allows and hole external edge quality doesn't raise doubts, then it's recommended to mount the wheel with the outside cone, Figure 5.1 c. At the same time more precise wheel centering is achieved and decreasing shaft and nut thread wear.

8 WHEEL BALANCER SETTING

8.1 Menu

*To enter the main menu, being in the mode "New wheel" it's necessary to press the button **MENU**. The list of several items will appear on the display, Figure 8.1:*

- Report,

- Parameters,

- Interface,

- Testing and calibration.

Turning the control knob select necessary item. Then pressing knob to enter item.

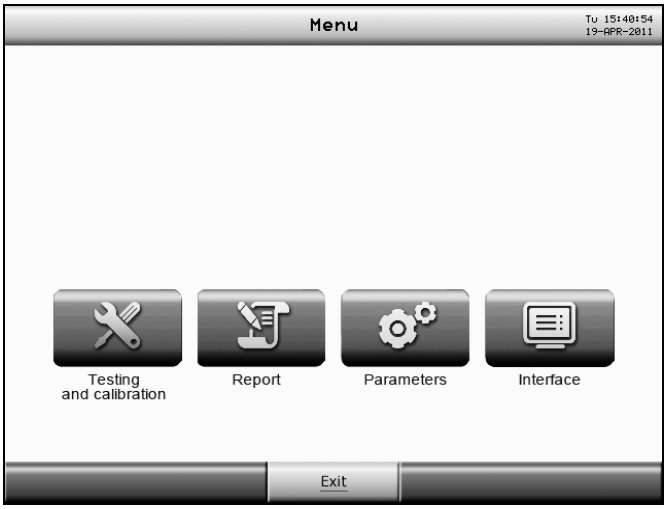


Figure 8.1

8.2 Parameters

In this mode it's possible to see the current parameters values and to change them.

*To enter the mode "Parameters", being in the mode "New wheel" it's necessary to press the button **MENU**, then - **PARAMETERS**. The list of several items will appear on the display, Figure 8.2.*

Turning the control knob and pressing it select necessary item.

Turning the control knob change the value and press the knob.

*To exit the mode "Parameters" with saving inputted changes press the button **ENTER**.*

*To exit the mode without saving inputted changes press the button **ESC**.*

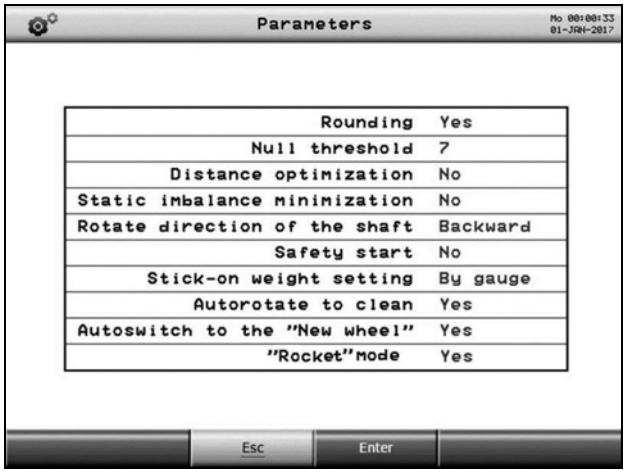


Figure 8.2

ⓘ *To change over from the parameters list to the buttons located in the lower part of the display and vice versa it's necessary to turn the control knob.*

Explanations of each parameter are given below.

8.2.1 Rounding: yes, no

If the rounding is ON the weight mass is rounded to 5 gr. Besides, the mass "nulling" is performed.

ⓘ *The weight masses are voiced only if the mass rounding is ON.*

Default value - yes.

8.2.2 Null threshold: *0…15*

If the rated weight mass is lower than the null threshold, then the indicator will display "0". For example, if the threshold is fixed equal to 10 grams, then with the weights mass from 1 to 9 grams the indicator will display "0".

ⓘ *Nulling acts only if the rounding mode is ON.*

Default value - 7.

8.2.3 Distance optimization: *yes, no*

The distance optimization allows fulfilling balancing more precisely and quicker but may be the design of some wheels will not allow realizing this possibility.

As the weight masses are divisible by 5 gr., so in majority cases there is a rounding error. Another error is explained by discreteness of the disk rotation angle determination. One of the methods of this error reduction is the correction of distances to correction planes. Received distance may differ from inputted dimensions by 10 mm maximum. Such correction may be fulfilled only for tape weights and in case of their setting by the gauge arm.

ⓘ *In the activated mode of the distance optimization while measuring it's necessary to predetermine the possibility of the weight setting closer or further by 10 mm from the indicated point.*

While activating the mode "Standard range of weights" the rated mass 63 gr. will be rounded to 60 gr., and the rated mass 67 gr. - till 70 gr. The error will be 3 gr.

ⓘ *Rounding as per the standard range is performed only for clip-on weights according to the weight setting scheme.*

Default value - no.

8.2.4 Minimization of static imbalance: *yes, no*

The static imbalance minimization allows to raise the balancing quality, but in some cases may increase the duration of the wheel balancing.

As the weight masses are divisible by 5 gr., and also because of using the null threshold, when the indicators of mass display “0 0”, a residual static imbalance (if the null threshold is 5 gr. – till 9 gr., if the null threshold is 10 gr. - till 19 gr.) is possible on the balanced wheel, which is the most harmful for the car suspension. With the activated mode “Static imbalance minimization” the calculation of weight setting points and masses is performed according to special methods, in order not to increase the static imbalance in the result of rounding.

Default value - no.

8.2.5 Rotate direction of the shaft: *forward, backward*

It allows to select the shaft rotation direction while imbalance measuring.

After changing the rotation direction it’s necessary to fulfill:

- shaft calibration;
- imbalance sensors calibration.

8.2.6 Safety start: *yes, no*

If the value is “yes” then the imbalance measurement start-up is possible only with the lowered cover.

ⓘ *WARNING! It’s not allowed to operate the machine if the value of the “Safety start” is “no”.*

Set the value “no” of the “Safety start” only for the duration of maintenance, observing all necessary safety rules!

Default value - yes.

8.2.7 Stick-on weight setting: *by gauge arm, 6 h, 12 h*

Selection of the stick-on weight setting method.

Setting by the gauge arm is the most precise method. It allows to balance any wheels on the first try. Only weights inside the wheel can be set by means of the gauge arm. While selecting this method the tape weights outside the rim will be set to the position “12 h”.

Setting to the position “6 h” allows to make cleaning of the weight setting point and set the weight when the wheel in one position. If the machine is equipped with laser pointer, there is laser line on the wheel in “6 h” position. But, because the weight is set manually “by eye”, the probability of the wheel balancing with the first try is not so high.

The tape weight setting to the position “12 h” is the traditional method. The method is not convenient due to the fact that the place of the weight setting inside the wheel is seen poorly. The weight setting accuracy is low.

Default value: by gauge arm.

8.2.8 Autorotate to clean: *yes, no*

It controls automatically the transition of the machine into the cleaning mode of the tape weight setting point.

If the value is “yes”, then the wheel will turn automatically for cleaning after the imbalance measurement.

Default value: yes.

8.2.9 Autoswitch to the “New wheel” mode: *yes, no*

It allows the automatic transition to the mode “New wheel” after imbalance achievement equal to “0” on both planes.

8.2.10 “Rocket” mode: yes,no

“Rocket” mode allows to accelerate the wheel spinning and reduce measuring time. When “Rocket” mode is activated, scrolling of wheel on a shaft should be eliminated by tightening the locking wheel nut.

Default value - yes

8.3 Interface setting: clock, volume, unit of weight

The main menu item “Interface” is for setting the parameters shown in the Figure 8.3.

Parameter “Brightness” has no effect.

Figure 8.3

Turning the control knob and pressing it select necessary item. Turning the control knob change the value and press the knob.

*To exit the mode “Interface” with saving inputted changes press the button **ENTER**.*

*To exit the mode without saving inputted changes press the button **ESC**.*

8.4 Testing and calibration

Following menu appears on the display after selecting "Testing and Calibration" (Figure 8.4).

The menu item "Testing and calibration wizard” is assigned for users.

The menu items “Shaft Calibration", "Imbalance Sensor calibration ", "Gauges calibration” are assigned for service specialists and experienced users.

The menu items "Testing", "Messages" are assigned for service specialists.

The menu item "Statistical measurements” are assigned for technological purposes during production.

Description of testing and calibration of the machine is given below. The menu item "Messages" is described in Section 9.1.

To select menu item rotate the encoder handle, select the desired item and press the handle.

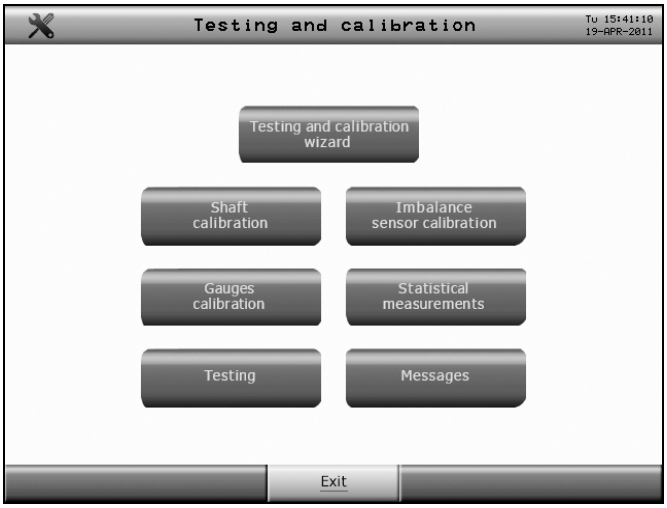


Figure 8.4

8.4.1 The order of testing and calibration of the machine

One time per month it's necessary to test the shaft balancing quality. For this purpose after switching on the wheel balancer without mounting anything on the shaft fulfill three imbalance measurements. The average imbalance values should not exceed 1 gr from each side. Otherwise, fulfill the shaft calibration.

In case of an unsatisfactory operation of the machine, for example, when several measurement cycles are required for the wheel balancing, it's necessary to fulfill the complete testing of the machine.

The complete machine testing is fulfilled using the program **TESTING AND CALIBRATION WIZARD**, which fulfils the machine testing and in case of necessity offers to perform calibration. After the calibration the program fulfils testing once more. The operation in this program is made according to step-by-step instructions shown on the display.

It's necessary to prepare in advance:

- gauge caliber included into the machine delivery set,
- wheel 13"…16" in diameter with the conditioned (without damages etc) rim, allowing to set clip-on weights on both sides; permissible radial and face runout of the weights setting point – maximum 1,5 mm.
- weight - 50...100 r; weigh the weigh in advance with 1 gr accuracy.

*Being in the mode "New wheel" press the button **MENU**, then – **TESTING AND CALIBRATION**, then- **TESTING AND CALIBRATION WIZARD**.*

After that fulfill the instructions shown on the display.

ⓘ *At testing and calibration the first gauge to bring to deepenings on caliber, as at wheel measurement – from below upwards. The second gauge to bring to each point from left to right.*

8.5 Testing and calibration for a service maintenance specialist

8.5.1 Diagnostic screen

One of the main means during service maintenance of the machine is diagnostic screen. Select "Testing" to log in the main menu.

The screen will display the information shown on the Figure 8.5.

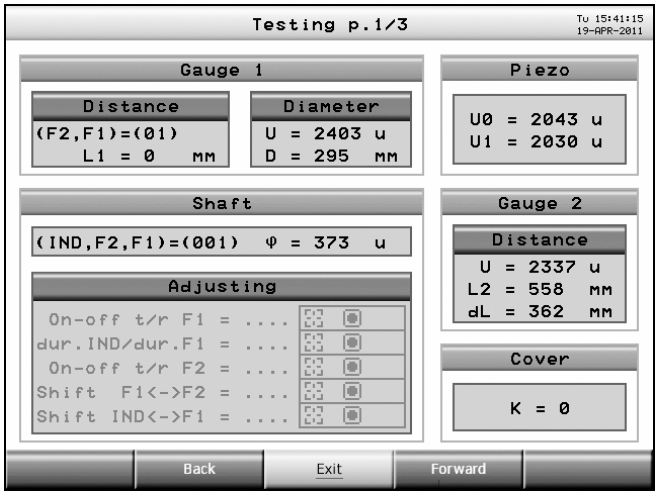


Figure 8.5

8.5.2 Gauge arms: testing and calibration

The imbalance calculation accuracy substantially depends on the geometric parameters measurement accuracy. Inaccurate readings of the gauge arm may lead to the increase of measurement cycle number during one wheel balancing. The measurement accuracy with a small distance between correction planes is especially important, i.e. while alloy wheels balancing. That's why it's necessary to fulfill thoroughly the gauge arm calibration and test them at regular intervals.

Gauge arm diagnostics

The gauge arms testing is performed using the gauge caliber included into the machine delivery set.

Being in the mode "New wheel" press the button ***MENU****, then –* ***TESTING AND CALIBRATION****, then* ***TESTING****. Put the gauge caliber on the shaft, as shown in Figure 8.6. Press it slightly till the touch with the end spindle surface by means of a cup nut.*

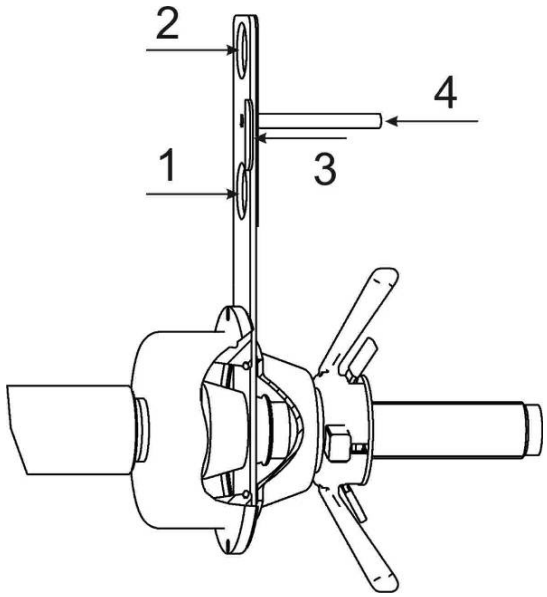


Figure 8.6

Moving the first gauge arm tip from the shaft (in the direction of a diameter increase) insert it to hole "1" of the caliber. The value 380±3 mm should be displayed in the line "Diameter D=".

Moving the first gauge arm tip from the shaft (in the direction of a diameter increase) insert it to hole «2» of the caliber. The value 580±3 mm should be displayed in the line "Diameter D=".

Move the second gauge arm tip from the right to the left place it to point 3 of the caliber. The value 0±3 mm should be displayed in the line «Distance dL=».

Move the second gauge arm tip from the right to the left place it to point 4 of the caliber. The value 100±3 mm should be displayed in the line « Distance dL=».

In case of readings inconsistency fulfill the gauge arms calibration without removing the caliber.

If there is no need to fulfill calibration, then remove the caliber.

Gauge arm calibration

The calibration is performed using the special gauge caliber included into the machine delivery set.

Put the gauge caliber on the shaft as it's shown in Figure 8.6. Press it slightly till the touch with the end spindle surface by means of a cup nut.

To enter the mode "Gauge arm calibration" from the mode "New wheel" press the buttons: ***MENU*** *>* ***TESTING AND CALIBRATION*** *>* ***GAUGES CALIBRATION****. The gauge caliber image and text window will be shown on the display. Fulfill the calibration according to the displayed instructions.*

Without removing the gauge caliber fulfill the gauge arm diagnostics.

Remove the gauge caliber.

ⓘ *At testing and calibration the first gauge to bring to deepenings on caliber, as at wheel measurement - from below upwards. The second gauge to bring to each point from left to right.*

8.5.3 Imbalance sensors: testing and calibration

Shaft calibration testing

Testing should be performed minimum 1 time per months.

While testing the imbalance sensors use precise (unrounded) imbalance values, displayed in the information filed or disable the rounding in advance (8.3.1).

Remove all accessories from the shaft. Switch on the machine. Fulfill 3…5 imbalance measurements without the registration of results.

Fulfill three imbalance measurements with the registration of results, otherwise

The average imbalance values shouldn't exceed 1 gr. on each side. Otherwise, it's necessary to fulfill the shaft calibration.

Shaft calibration

Remove all accessories from the shaft. Fulfill several measurements of imbalance.

Press the buttons: ***MENU*** *>* ***TESTING AND CALIBRATION*** *>* ***SHAFT CALIBRATION****. Follow the displayed instructions.*

Test the shaft calibration.

Imbalance measurement error testing (simplified)

For the imbalance measurement error testing it's necessary to take the wheel 13"…16" in diameter with the conditioned (without damages etc) rim, allowing to set clip-on weights on both sides. Permissible radial and face runout of the weights setting point - maximum 1,5 mm.

Also it's necessary to take the weight - 50...100 gr. Weigh the weight in advance with 1 gr. accuracy.

While testing the imbalance sensors use precise (unrounded) imbalance values, displayed in the information filed.

Mount the wheel on the machine. Input the wheel dimensions. Balance the wheel.

Without the wheel dismantling fulfill the procedure of the adaptor compensation, for this purpose press ***ADAPTER****, then according to the displayed request lower the cover or press* START *for the imbalance measurement. Then fulfill the usual measurement by pressing the button* START *- the result should not exceed 1 gr. on each side. Otherwise, repeat the adaptor compensation procedure.*

Fasten the reference weight on the right plane of the rim. Fulfill the measurement by pressing the button START *or lower the cover, register the result.*

Reset the weight to the left plane, fulfill the measurement, register the result.

Disable the adaptor compensation by pressing ***ADAPTER****.*

Deviations of the measured weight mass shouldn't exceed 2 gr. +2% of the reference weight mass.

Otherwise:

- fulfill the gauge arm diagnostics and in case of necessity - their calibration (8.6.2);
- fulfill the imbalance sensors calibration;
- repeat testing.

Imbalance sensors calibration

The imbalance sensors calibration is fulfilled as per the results of the imbalance measurement error testing, after transportation and during verification. Preliminarily it's recommended to fulfill the gauge arms calibration.

The calibration is fulfilled by 3 measurements: without weight, with weight on the right side, with weight on the left side.

For the calibration it's necessary the wheel 13"…16" in diameter with the conditioned (without damages etc) non-alloy rim (radial and face runout of the weights setting point - maximum 1,5 mm) and weight - $100 \pm 0{,}2$ gr. Weigh the weight in advance.

Mount the wheel on the machine. Balance the wheel if the machine error allows to do it.

Enter the imbalance sensors calibration mode form the mode "New wheel": ***MENU*** > ***TESTING AND CALIBRATION*** > ***IMBALANCE SENSORS CALIBRATION****.*

Follow the displayed instructions.

Remove the calibrating weight.

Fulfill imbalance measurement error testing.

ⓘ *During the calibration the angle position "12 h" should be especially observed while positioning the weight on the right. This angle error will lead to a constant angle displacement during measurements!*

9 TROUBLESHOOTING

9.1 Messages

The built-in fault detection system allows to promptly detect and precisely determine any fault or malfunctioning.

In case of fault or incorrect usage the machine generates messages that are memorized by the machine. The envelope icon activation in the information field indicates the occurrence of messages.

To view the messages, being in the mode "New wheel" press the buttons ***MENU*** *>* ***TESTING AND CALIBRATION*** *>* ***MESSAGES****. Look through the messages. Use the control knob for the messages list scrolling. Eliminate causes acting in accordance with table 9.1. Delete the messages by pressing the button* ***CLEAR****.*

T a b l e 9.1

Code	Description	Remedy
F00	Unknown fault	Contact after-sales service office.
F01	Electronics are not tested	Contact after-sales service office.
F02	Shaft is not calibrated	Calibrate the shaft
F03	Imbalance sensors are not calibrated	Calibrate imbalance sensors
F04	Gauges are not calibrated	Calibrate gauge arms
F05	Motor is on, but shaft don't rotate	To eliminate an external hindrance of rotation of a shaft
		Contact after-sales service office.
F06	Protection in the drive control block (an overheat, shortcut, a high voltage/low voltage	Switch off, then switch on wheel balancer. Try to start motor. If the wheel balancer doesn't work as intended, provide normal operating conditions in accordance with machine's specification
		If result fails, contact after-sales service office.
F07	Noise on lines of the gauge of position of a shaft	Only the PRECAUTIONARY MESSAGE. Working capacity of the machine tool does not influence.
F08	Shaft position sensor fault	Contact after-sales service office.
F09	Not enough memory	Contact after-sales service office.

ⓘ *The error message in itself is not a guarantee case, and is only the tool for revealing of the reasons of the malfunctions leading to wrong functioning of the machine tool.*

9.2 Other fault events and remedies

T a b l e 9.2

	Fault description	Cause	Remedy
1	No display image upon switching-on the machine	No power supply	Check the power wire
		Fuse is burn out	Replace the fuse
		Power unit is damaged (LED on the power unit board is OFF)	Replace the power unit
		The battery is discharged	Replace the battery (CR2032) on the CPU board
2	The machine is not switched on or switched off during operation, the signal sounds	The overvoltage protection device is activated.	Switch off the machine. Eliminate the reason of the overvoltage. Switch on the machine.
3	The results of several measurements differ more than 10g. (without reinstallation of wheel)	Incorrect installation of the machine.	Install the machine in accordance with requirements
		Impact of vibration and blows through the base	Eliminate the impact of vibration and blows during measurements
		Wheel slip on the shaft	Clean and degrease installation surfaces of the shaft with the cup and wheel rim. Mount the wheel, set the aligning marks on the wheel and shaft, check the slip absence after measurement
		Bad fixing of the wheel	Fasten the wheel
		Dirt in the spindle cup	Clean the dirt removing the retaining ring and spindle cup cover
		Foreign objects in the shaft cup	Clean the shaft cup inner surface
		Foreign objects, wastes, water under the tubeless tire cover	Detach the tire and clean it.
		Insufficient shaft fastening	Remove the shaft and then mount it according to the requirements of section 5.
4	After the wheel is reinstalled, the results of measurements differ more than 15g. (for a wheel 13", width 5)	Dirty mounting surfaces of the rim and shaft	Clean mounting surfaces
		Foreign objects, water in the tire	Detach the tire, withdraw the objects and dewater it.
		Incorrect selection of the wheel fastening method or substandard wheel	Change the wheel fastening method or replace the wheel
		Shaft calibration failure	Check shaft calibration. Bare shaft imbalance must not exceed 2 g. Calibrate the shaft again if needed.
5	After calibration the imbalance measurement accuracy doesn't conform to the requirements of this operations manual	Errors in operations during calibration, mechanical effects on the machine during calibration measurements	Repeat calibration
		Reasons described in clauses 2, 3 of this table.	Eliminate in accordance with the given recommendations.
6	Failure of width measurement with second gauge arm	2nd gauge arm adapter is not connected to the jack, located on the machine body	Perform connection (4.2.5)

10 MAINTENANCE AND SAFETY REQUIREMENTS

10.1 Maintenance

10.1.1 The maintenance of the machine is the necessary condition for providing the correct operation of the machine; the maintenance shall be fulfilled by the operating staff in accordance with the present manual.

10.1.2 IMPORTANT! DEENERGIZE THE MACHINE BEFORE PERFORMING THE MAINTENANCE.

10.1.3 Keep the machine clean and free of dust and moisture. Do not flood or sprinkle the machine with water. Do not use acetone or other solvents for wiping the machine.

10.1.4 Check the spindle bolt tightening frequently.

10.1.5 Keep the thread segment of shaft clean and lubricated.

10.1.6 Eliminate the faults, indicated in the Table 10.2. Other defects shall be eliminated by a representative of the manufacturing plant.

10.1.7 It is not allowed to dismount the machine till the end of the warranty period.

10.1.8 In case of insufficient precision of measurements during the operation, check the machine and, if necessary, calibrate the machine.

10.1.9 Monthly check shaft imbalance and make shaft calibration by necessity.

10.2 Safety requirements

10.2.1 The operating personnel shall read the present Manual and be aware of the machine operation features. The operating staff shall be also given the safety guidance instructions.

10.2.2 The machine should be grounded in accordance with electrical equipment operation rules. The grounding of the machine is effected automatically upon plugging in. When installing the machine, make sure that the plug grounding is in good condition.

10.2.3 The machine shall be operated in accordance with the Safety Rules related to operation of electrical equipment.

10.2.4 IMPORTANT! THE VOLTAGE INSIDE THE MACHINE CAN BE UNSAFE. MAKE SURE THAT THE UPPER COVER OF THE MACHINE IS CLOSED DURING THE OPERATION.

10.2.5 De-energize the machine before starting the maintenance works.

10.2.6 IMPORTANT! IT IS NOT ALLOWED TO STAND IN THE AREA OF ROTATING PARTS DURING THE OPERATION. During the wheel setting on the machine it's necessary to check the security of wheel attachment in order to avoid skipping of the wheel.

It is not allowed to brake the wheel with the hand.

10.2.7 WARNING! It's not allowed to operate the machine if the value of the "Safe start-up" is "no". Set the value "no" of the "Safe start-up" only for the duration of maintenance, observing all necessary safety rules!

10.3 Instructions for emergency cases

10.3.1 If an emergency situation in tire fitting area occurs, immediately de-energize the machine.

10.3.2 Conduct further actions in accordance with the safety instructions established on the Customer's plant.

11 STORAGE AND TRANSPORTATION

11.1 Storage

Whenever the machine is to be stored temporarily and during periods in which it is not in use, remove the electrical plug from the socket.

If the storage period does not exceed 1 month, the machine shall be stored in the enclosed space under the ambient temperature +10° - +35°C, and relative air humidity not more than 80% (under the temperature +25°C). The air shall be free from impurities, which can cause corrosion.

In case of impossibility of providing the abovementioned conditions, the machine shall be stored in the manufacturer's packing or in the package similar to the manufacturer's.

To prepare the machine to the long-term storage, clean and degrease the shaft extension with gasoline or white spirit. After the complete dryout of the solvent, coat the shaft with a flash of grease and wrap it in water-proof packing paper. Cover the machine with polyethylene film.

If the storage period exceeds 1 month, the machine shall be stored in the enclosed space with natural ventilation under the ambient temperature from -50° to +50°C and the relative air humidity not more than 90% (under the temperature +20°C) with no moisture condensation.

If the decision is taken to stop using the machine it should be made inoperative by detaching the electrical supply cable after removing the plug from the socket.

11.2 Transportation

11.2.1 The packed machine can be conveyed in covered transport (railway cars, containers, covered motors) under the temperature -50° to +50°C.

11.2.2 If conveyed by water transport, the packed machine shall be transported in waterproof cover.

11.2.3 Effect the transportation, loading and discharge carefully; do not turn the container over; do not put the container on its edge; avoid blows. If the machine is unpacked, avoid applying force to the spindle.

11.3 Information on recycling

The wheel balancer is categorized as special refuse and it should therefore be divided into homogenous parts and disposed of according to the laws in force.

12 MANUFACTURER'S WARRANTY

The Manufacturer guarantees that the wheel balancer 80-901 L3D conforms to specifications, provided that all the storage, transportation, installation and mounting conditions are fulfilled properly.

The warranty period is 12 months of the day of sale, but not more than 18 months of the day of production.

Manufacturer's address: 6950 EAST N AVENUE., KALAMAZOO, MI 49048

Tel: 269-382-5080 Fax: 269-382-5087

E-mail: customerservice@cartek.com www.cartek.com

13 CERTIFICATE OF ACCEPTANCE

The wheel balancer 80-901 L3D _____ version _____

Serial number _____, electronic module serial number _____

□ Manufactured and accepted in accordance with the requirements of the technical documents and considered fit for use.

□ Laid up in accordance with the requirements of the technical documents.

Laying-up period 18 months

The laying-up is fulfilled by _____ _____
(signature) (written name)

□ It is completed according to documentation requirements.

Acquisition has made by _____ _____
(signature) (written name)

Quality control responsible _____ _____
(signature) (written name)

Stamp

_____ 20 __

APPENDIX A - FLANGE PLATE ADAPTER WITH STUDS

(for reference)

T a b l e A1

Diameter, mm	Bolts
139,7	5
115	5
170	3
108	5

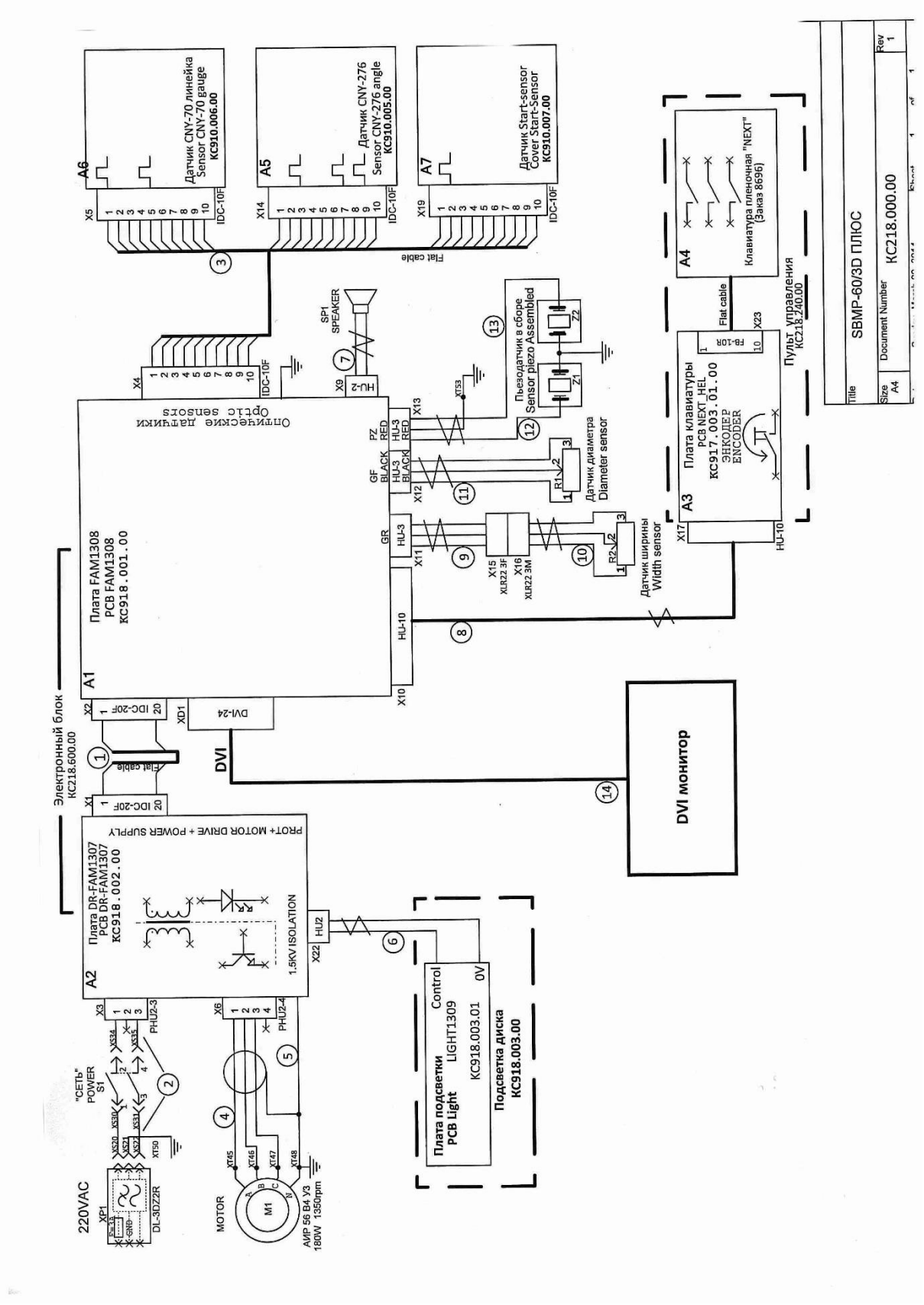
Information on wheel mounting holes of some car models

T a b l e A2

5 holes on rim of diameter 108 mm
GAZ: Volga 3110
ALFA ROMEO: 166
CITROEN XM, XM-XM BREAK
JAGUAR: X-TYPE
FERRARI: 324, 512TR-MONDIAL-348-TESTAROSSA
FORD: MONDEO-TRANSIT Connect, TRANSIT Connect Tourneo
LANCIA Gamma, Kappa
PEUGEOT: 605('89-)
RENAULT: R21/R25/Safrane/Espace/Laguna
ROMEO MONTREAL
VOLVO: 200,700,900
VOLVO: C70-S60-S70-S80-S90-V70-V70-XC 740-760-940-960, 850-V90
6 holes on rim 170 mm in diameter
GAZ: Gazel
MITSUBISHI: CANTER T35
OPEL: Bedford CF350
5 holes on rim 139,7 mm in diameter
GAZ: Volga
VAZ: Niva
UAZ
DAIHATSU: Wildcat/Rocky/Feroza
FORD: Bronco
KIA: ROCSTA-SORENTO, RETONA-SPORTAGE
ROLLS ROYCE: Silver Cloud/Phantom
SUZUKI: LJ80/SJ410/Vitara/SJSamurai/X90
5 holes on rim 115 mm in diameter
Moskvich 2140, 412
GENERAL MOTORS CHEVROLET: PONTIAC TRANS-SPORT-CHEVROLET AURORA-CADILLAC CTS (02-04)
OPEL: SINTRA

APPENDIX B - ELECTRIC SCHEME

(for reference)



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