



WBE 4110



BOSCH

de Originalbetriebsanleitung
Radauswuchtmaschine

es Manual original
Máquina de equilibrado de ruedas

nl Oorspronkelijke gebruiksaanwijzing
wielbalanceermachine

cs Původní návod k používání
Stroj pro vyvažování kol

en Original instructions
Wheel Balancing Machine

it Istruzioni originali
Equilibratrice per ruote

pt Manual original
Máquina de balanceamento de rodas

tr Orijinal işletme talimatı
Tekerlek balans makinesi

fr Notice originale
Banc d'équilibrage de roues

sv Bruksanvisning i original
Hjulbalanseringsmaskin

pl Instrukcja oryginalną
Wyważarka

zh 原始的指南
车轮动平衡机

Contents

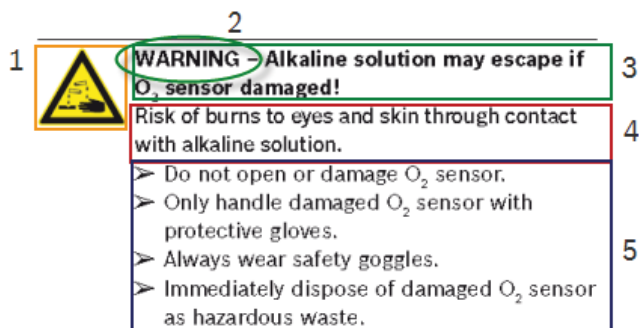
1. Symbols used	25	8. Balancing a wheel	33
1.1 In this documentation	25	8.1 Selecting the balancing program	33
1.1.1 Warning notices	25	8.2 Entering the wheel data	33
1.1.2 Additional notes	25	8.3 Measuring unbalance	33
1.2 On the product	25	8.4 Securing the balancing weights	34
		8.4.1 Splitting the balancing weights (Split program)	34
		8.4.2 Clip-on weights and adhesive weights	34
2. User information	26	8.5 Manual vernier caliper	35
2.1 Important notes	26	8.5.1 Determining rim width	35
2.2 Safety instructions	26	8.5.2 Attaching balance weights	35
2.3 Electromagnetic compatibility (EMC)	26		
		9. Minimizing unbalance	36
3. Product description	26		
3.1 Intended use	26	10. Settings	37
3.2 Prerequisites	26	10.1 User settings	37
3.3 Scope of delivery	26	10.2 Basic settings	37
3.4 Special accessories	26		
3.5 WBE 4110	27	11. Faults	38
4. Commissioning	28	12. Maintenance	40
4.1 Unpacking	28	12.1 Cleaning and servicing	40
4.2 Setting up	28	12.2 Spare and wearing parts	40
4.3 Fitting the wheel guard	29	12.3 Calibration	40
4.4 Electrical connection	29	12.3.1 Call-up of calibration menu	40
4.5 Checking the direction of rotation	29	12.3.2 Shaft unbalance correction	40
4.6 Calibration of WBE 4110	29	12.3.3 Calibrating the electronic vernier caliper	41
		12.3.4 WBE 4110 calibration	41
5. Fitting and removing the flange	30	12.3.5 Reference measurement	42
5.1 Removing flange	30	12.4 Self-diagnosis	42
5.2 Fitting flange	30		
		13. Decommissioning	43
6. Fitting and removing the wheel	31	13.1 Temporary shutdown	43
6.1 Securing the wheel	31	13.2 Change of location	43
6.2 Removing the wheel	31	13.3 Disposal and scrapping	43
		13.3.1 Substances hazardous to water	43
7. Operation	32	13.3.2 WBE 4110 and accessories	43
7.1 Control/display panel	32		
7.1.1 Overview of LEDs	32	14. Technical data	43
7.1.2 Control buttons	32	14.1 WBE 4110	43
7.2 Balancing programs	32	14.2 Dimensions and weights	43
		14.3 Operating range	43

1. Symbols used

1.1 In this documentation

1.1.1 Warning notices

Warning notices indicate a danger to the user or persons in the vicinity and are comprised as follows:



Item	Designation	Explanation / Content
1	Warning symbol	Symbol provides graphic description of an existing or potential danger.
2	Signal word	Indicates the severity and probability of occurrence of the danger (see Signal word and danger level table).
3	Type and source of danger	Describes the danger and the context in which it occurs.
4	Consequences	Possible consequences of the danger if instructions are not followed.
5	Actions	Action(s) and tip(s) on averting the danger or rules of conduct.

Signal word and danger level

Signal word	Probability of occurrence	Severity of danger if instructions not observed
DANGER	Immediate impending danger	Death or severe injury
WARNING	Possible impending danger	Death or severe injury
CAUTION	Possible dangerous situation	Minor injury

1.1.2 Additional notes

Symbol	Designation	Explanation
!	Attention	Warns about possible property damage.
o II	Information	Practical hints and other useful information.
1. 2.	Multi-step operation	Instruction consisting of several steps
➤	One-step operation	Instruction consisting of one step.
⇨	Intermediate result	An instruction produces a visible intermediate result.
➔	Final result	There is a visible final result on completion of the instruction.

1.2 On the product

! Observe all warning notices on products and ensure they remain legible!



DANGER – Exposure of live parts on opening the WBE 4110!

Risk of (fatal) injury or heart failure from electric shocks on contact with live components (e.g. master switch, printed circuit boards).

- Work on electrical installations or equipment is only to be performed by qualified electricians or trained personnel under the guidance and supervision of an electrician.
- Disconnect the WBE 4110 from the mains before opening.



Disposal

Dispose of used electrical and electronic devices, including cables, accessories and batteries, separately from household waste.



Direction of wheel rotation

Wheel must turn in direction indicated. (see chapter 4.5)

2. User information

2.1 Important notes


Important information on copyright, liability and warranty provisions, as well as on equipment users and company obligations, can be found in the separate manual "Important notes on and safety instructions for Bosch Tire Service Equipment". These instructions must be carefully studied prior to start-up, connection and operation of the WBE 4110 and must always be heeded.

2.2 Safety instructions

All the pertinent safety instructions can be found in the separate manual "Important notes on and safety instructions for Bosch Tire Service Equipment". These instructions must be carefully studied prior to start-up, connection and operation of the WBE 4110 and must always be heeded.

2.3 Electromagnetic compatibility (EMC)


The WBE 4110 satisfies the requirements of the EMC directive 2004/108/EG.

 The WBE 4110 is a class/category A product as defined by EN 61 326. The WBE 4110 may cause high-frequency household interference (radio interference) so that interference suppression may be necessary. In such cases the user may be required to take the appropriate action.

3. Product description


3.1 Intended use

The WBE 4110 is a wheel balancing machine with mechanical attachment for the balancing of passenger vehicle and motorcycle wheels with a rim diameter of 8" – 24" and a rim width of 2" – 19". The WBE 4110 is to be used exclusively for this purpose and solely for the range of applications specified in these instructions. Any other purpose is not consistent with the intended use and is therefore not permissible.

 The manufacturer cannot accept any liability for possible damage arising from improper use.

3.2 Prerequisites

The WBE 4110 must be installed on a flat surface made of concrete or similar material and anchored in position.

 An uneven or vibrating surface can lead to inaccurate unbalance measurements.

3.3 Scope of delivery

Designation	Order number
WBE 4110	Refer to rating plate
Quick-action clamping nut	1 695 616 200
Centering flange	1 695 602 400
Centering cones (3x) and adapters	–
Manual vernier caliper	1 695 629 400
Weight pliers	1 695 606 500
Measuring compasses	1 695 602 700
Calibrating weight	1 695 654 377

3.4 Special accessories

Designation	Order number
Wheel lift	1 695 900 004
Set of quick-action clamping cones M10x1.25	1 695 612 100
Third centering cone dia. 89 to 132 mm	1 695 653 449
Fourth centering cone dia. 120 to 174 mm	1 695 606 300
Spacer ring for rims (large rim offset)	1 695 606 200
Three-arm flange for light commercial vehicles	1 695 653 420
Clamping kit for swinging arms (dia. 19 mm)	1 695 654 060
Infinitely variable universal flange for cars (3-4-5 hole)	1 695 654 043
Motorcycle flange	1 695 654 039
Shaft kit, dia. 10 mm	1 695 653 430
Calibration weight (calibrated)	1 695 654 376

3.5 WBE 4110

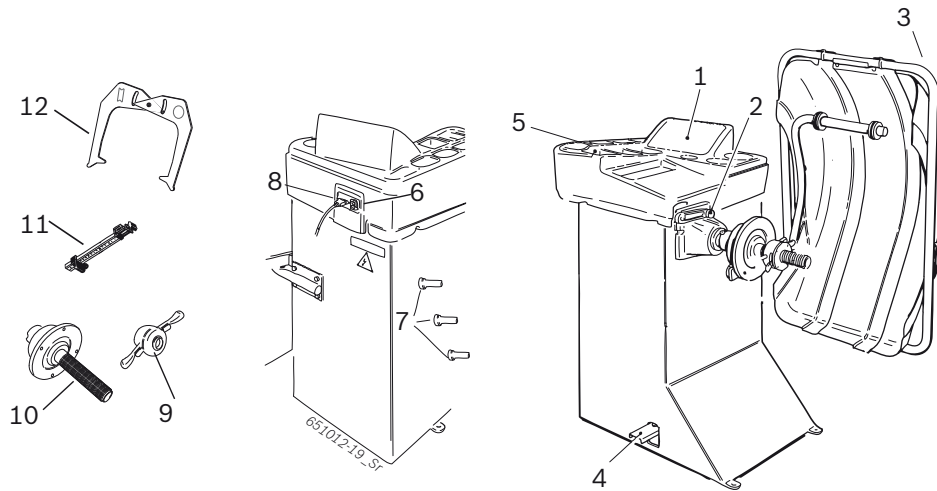



Fig. 1: WBE 4110


Item	Designation	Functions
1	Control/display panel	<ul style="list-style-type: none"> • Operation of WBE 4110, refer to Section 7 • Software display (measured values and operating instructions)
2	Vernier caliper (electronic)	<ul style="list-style-type: none"> • Recording of rim distance and rim diameter. • Determination of positions for attachment of adhesive weights.
3	Wheel guard	<ul style="list-style-type: none"> • Protects the operator against flying particles (e. g. dirt, water). • Starting and stopping measurement, refer to Section 10.1
4	Pedal	Locking of shaft / wheel.
5	Tray	For storing balance weights and accessories
6	On/Off switch	Switching on and off.
7	Clamping tool holders	For storing accessories
8	Mains socket	Connection for power cord.
9	Quick-action clamping nut	Centering and attachment of wheel on cone
10	Centering flange	Wheel attachment.
11	Manual vernier caliper	Can be used as substitute if the electronic vernier caliper is defective.
12	Measuring compasses	Can be used as substitute if the rim width and rim diameter cannot be recorded electronically.

4. Commissioning

4.1 Unpacking

1. Remove the steel bands and fasteners.
2. Carefully lift off the packaging.
3. Remove the wheel guard, accessories and packaging material from the packaging unit.

 Check that the WBE 4110 and the accessories are in proper working order and that there are no visible signs of component damage. In case of doubt, do not start up the unit and consult customer service.

 Remove the accessories and packaging material from the packaging unit.

4.2 Setting up

1. Unscrew the screws that secure the WBE 4110 to the pallet.

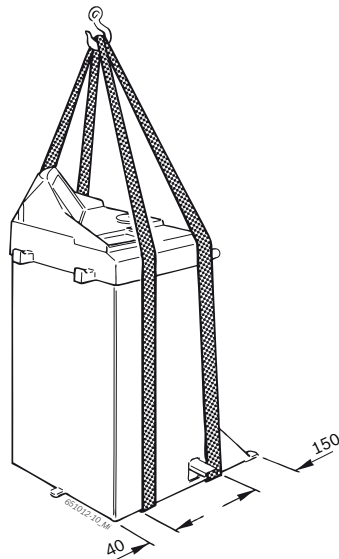


WARNING – Defective or incorrectly attached lifting straps!

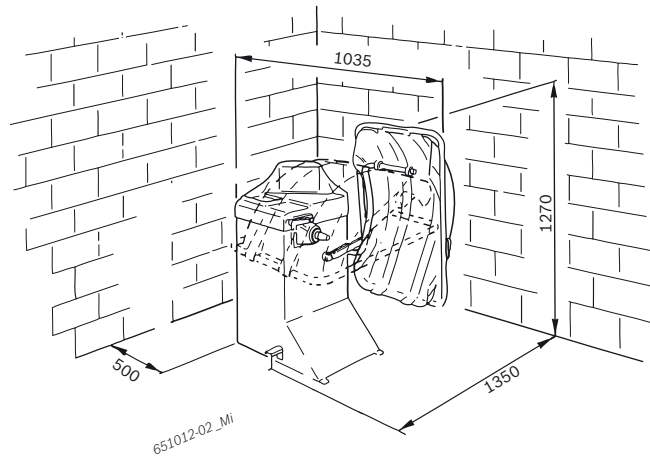
Risk of injury due to WBE 4110 falling down.


- Check lifting straps for physical damage before attaching.
- Tighten lifting straps uniformly.
- Lift WBE 4110 carefully.

2. Attach slings of the same length and sufficient load bearing capacity (min. 100 kg) as shown in the drawing.




3. Hoist the WBE 4110 with a crane. Erect in the intended area, taking care to comply with the specified minimum distances.



 To ensure reliable, ergonomic use of the WBE 4110, we advise setting it up at a distance of 500 mm from the nearest wall.

4. Secure the WBE 4110 to at least 3 points on the floor.

4.3 Fitting the wheel guard

 The back of the WBE 4110 contains 4 blind rivet nuts countersunk in the housing wall.

1. Fasten the supporting arm to the WBE 4110. To do so, screw the 4 supplied Allen screws and 4 washers into the blind rivet nuts and tighten (width A/F 6).

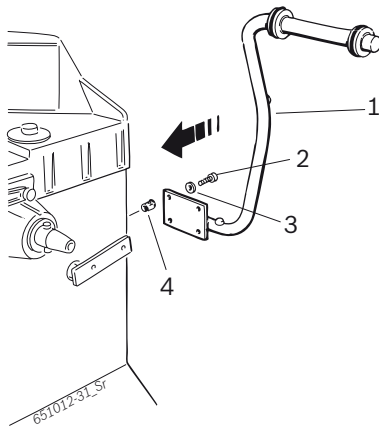



Fig. 2: Fastening the supporting arm to the WBE 4110.

- 1 Supporting arm
- 2 Allen screw
- 3 Washer
- 4 Blind rivet nut

2. Screw the wheel guard loosely to the supporting journal with 2 screws and 2 washers (width A/F 6).

 Make sure that the open wheel guard is lying on the supporting arm (rubber buffer).

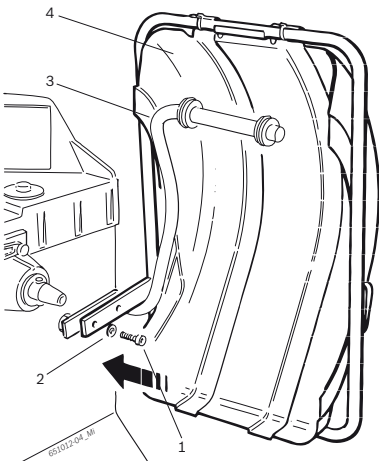



Fig. 3: Securing the wheel guard

- 1 Screw
- 2 Washer
- 3 Supporting arm
- 4 Wheel guard

3. Firmly tighten the screws.

4.4 Electrical connection

 The WBE 4110 is only to be connected to the power supply if the mains voltage available corresponds to the rated voltage given on the rating plate.

1. Check whether the mains voltage corresponds to the rated voltage given on the rating plate.
2. Provide fuse protection for the WBE 4110 mains connection in line with locally applicable standards. The customer is responsible for providing fuse protection for the mains connection.
3. Connect the power cord to the WBE 4110.

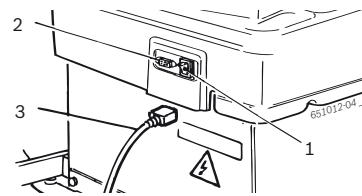




Fig. 4: Electrical connection

- 1 On/off switch
- 2 Mains connection
- 3 Power cord


4.5 Checking the direction of rotation

1. Check that the WBE 4110 is correctly connected to the mains power supply.
2. Switch on the WBE 4110 with the On/Off switch.
3. Close the wheel guard or press the <START> button).
⇒ The shaft rotates.
4. Check the direction of rotation of the shaft.

 The correct direction of rotation is indicated by a yellow arrow on the WBE 4110. This arrow is situated to the right of the flange.

 If the direction of rotation is incorrect, the WBE 4110 comes to an immediate stop and displays the error message **Err 3** (see section 11).

4.6 Calibration of WBE 4110

 Calibration must be performed after initial commissioning.

1. Flange calibration.
2. Vernier caliper calibration.
3. WBE 4110 calibration.
4. Perform reference measurement.

 Calibration is described in Section 12.3 .


5. Fitting and removing the flange

Fitting of the flange is necessary in the following situations:

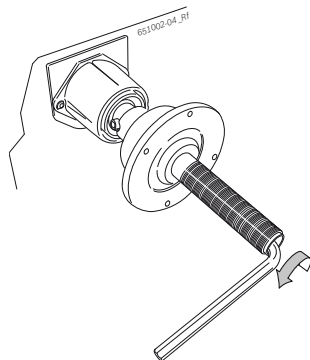
- Commissioning
- When changing the type of flange (universal - 3/4/5 hole)
- When changing the type of wheel (passenger car - motorcycle)

! Balancing accuracy will be impaired if the flange has not been properly fitted to the shaft. Before fitting the flange, clean and degrease (remove corrosion protection) the cone of the shaft and the flange opening.

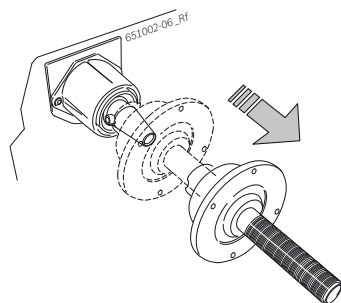
5.1 Removing flange

 The WBE 4110 must be switched on.

1. Press the pedal.
⇒ This blocks the shaft.
2. Slacken off the hexagon socket head bolt.




3. Unfasten the flange by tapping with a rubber-headed hammer on the cone end.
4. Pull the flange off the cone.

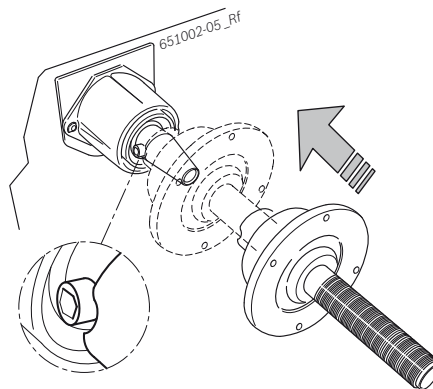


→ Flange detached.

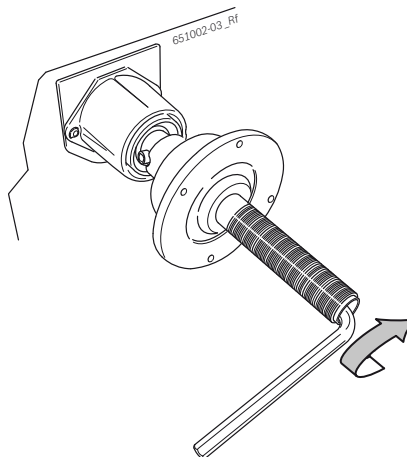
5.2 Fitting flange

 Clean and degrease the cone of the shaft and the flange opening.

1. Press the pedal.
⇒ This blocks the shaft.
2. Slide the flange onto the shaft.



3. Tighten the hexagon socket head bolt.



→ Flange fitted.

6. Fitting and removing the wheel



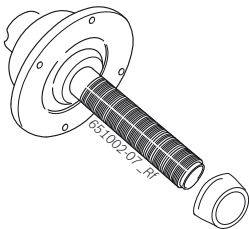
WARNING – Wheel slip!

Risk of crushing of fingers and other body parts when attaching and removing wheel.

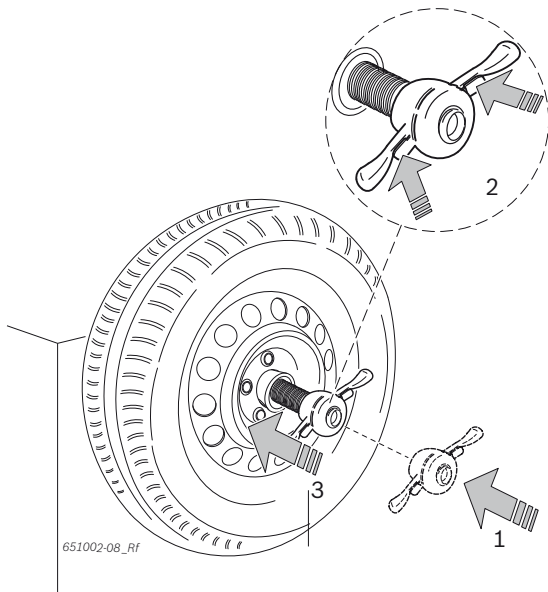
- Wear protective gloves.
- Wear safety shoes.
- Do not place fingers between the wheel and the shaft.
- Heavy wheels should always be handled by two people.

6.1 Securing the wheel

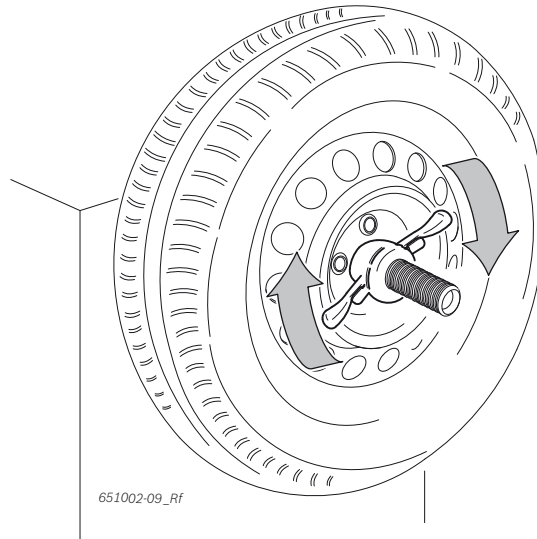
1. Switch on the WBE 4110 with the On/Off switch.
2. Position a suitable cone on the shaft (flange).



3. Use a wire brush to remove any dirt.
4. Place the wheel on the shaft against the cone.
5. Push the unlocked quick-action clamping nut onto the shaft and press firmly against the wheel.



6. Release the lock and turn the quick-action clamping nut clockwise until the wheel is firmly braced.



→ The wheel is secure.

6.2 Removing the wheel

1. Turn the quick-action clamping nut anti-clockwise and release the wheel.
2. Unlock and take off the quick-action clamping nut.
3. Remove the wheel.

7. Operation

After the WBE 4110 is switched on, the software version appears in the control/display panel for several seconds. After this, both displays show the value 0.



7.1 Control/display panel

7.1.1 Overview of LEDs

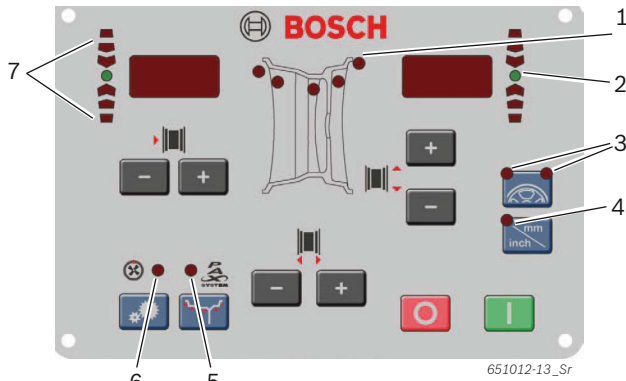


Fig. 5: LEDs on control/display panel

Item	Description
1	Displays the active (selected) balancing program and balancing positions (see section 7.2)
2	Displays the balancing point, lights up green when the balancing position is reached
3	Displays the Split program and Match program, lights up when programs are active (see sections 8.4.2 and 9)
4	Displays the unit of measurement for the rim width and rim diameter, lit = mm, not lit = inch
5	Displays the balancing program, lights up when Pax program is selected
6	Displays the Match program, lights up when Match program is active
7	Displays the direction of rotation to reach the balancing position, top = turn clockwise, bottom = turn anti-clockwise

7.1.2 Control buttons

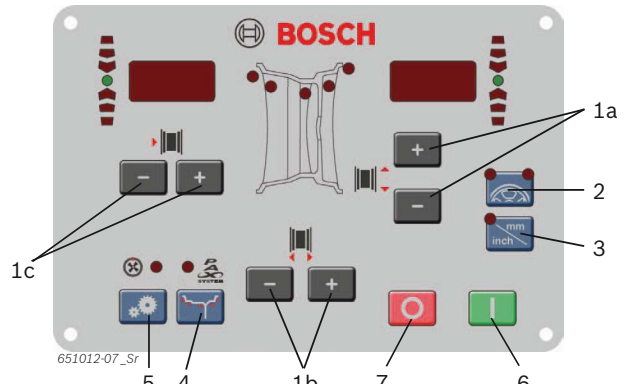


Fig. 6: Buttons on the control/display panel

Item	Button	Description
1a	<->	Changes the rim diameter
1b	'or	Changes the rim width values.
1c	<+>	Changes the rim distance,
2	<SPLIT>	Opens and closes the program for splitting the balancing weights.
3	<mm/ inch>	Selects the unit of measurement for the manual input of rim diameter and rim width. No function in the case of rim distance.
4	<MODE>	Selects the balancing program
5	<MENU>	Performs basic settings.
6	<START>	Starts measurement.
7	<STOPP>	Stops measurement, locks the WBE 4110 in case of emergency.

Tab. 1: Function of control buttons

7.2 Balancing programs


Symbol	Button
	Standard program for clip-on weights
	Alu1: Standard program for adhesive weights
	Alu2: Concealed adhesive weights
	Alu3: Inside clip-on weights / outside concealed adhesive weights
	Alu4: Inside clip-on weights / outside adhesive weights
	Alu5: Inside adhesive weights / outside clip-on weights
	Static balancing on level 1
	Static balancing on level 2
	Static balancing on level 3
	Pax1: (Pax rim) for adhesive weights
	Pax2: (Pax rim) for concealed adhesive weights

8. Balancing a wheel




WARNING – Incorrectly balanced wheels
Risk of injury due to change in handling characteristics of vehicle.

- WBE 4220 must be positioned on a flat surface and must be firmly bolted to the floor.
- Specified flange must be mounted on clean and grease-free shaft.
- Use the specified accessories (cone, spacer rings).
- Rim must contact flange accurately, remove any dirt.
- Perform a check measurement after applying balancing weights.


 In the description below, sound and automatic start are active (see section 10).

- Switch on the WBE 4110 at the on/off switch.
 - ⇒ The hardware version (e.g. 0.2) and the software version (e.g. 1.19) are briefly displayed.

8.1 Selecting the balancing program

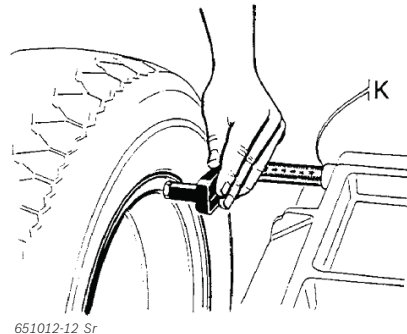
 Static balancing is recommended for wheels with a width of less than 3.5". In this case, only the rim diameter value is entered. The rim distance and width values can be set to any value in inches or mm.

- Press the <MODE> button to select the various balancing programs one after the other.
- The LEDs (Fig. 5, Item 1) indicate the positions of the balancing levels for each balancing program.

 When a PAX balancing program is selected, the Pax LED (Fig. 5, Item 5) also lights up.


8.2 Entering the wheel data


1. Place the electronic vernier caliper for measuring the rim distance and diameter on the rim and hold in position for one second.




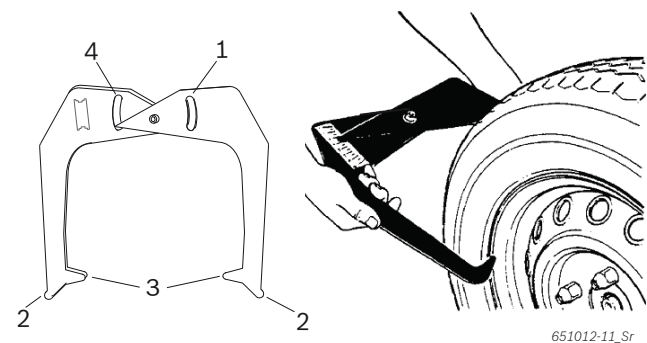
651012-12_Sr

- ⇒ The measurement location display depends on the balancing program selected.
- ⇒ An acoustic signal sounds to indicate that the position has been registered. The right-hand display shows the rim width, the left-hand display the rim diameter.

 The rim distance is not displayed. You can check that the value has been correctly registered via Fig. 6, Item 1, however.

 If the rim distance and rim diameter cannot be electronically measured, the wheel data may also be entered manually (Fig. 6, Item 1).

 The rim width can be read on the rim or measured with the compass.



651012-11_Sr


Fig. 7: Determining the wheel data with a compass


- 1 Scale for rim diameter
- 2 Outer tip for rim diameter
- 3 Inner tip for rim width
- 4 Scale for rim width

2. Select the measured rim width using the <-> or <+> button for rim width (Fig. 6, Item 1).

→ All the required wheel data have been recorded.

8.3 Measuring unbalance

 A wheel can only be correctly balanced if all the settings correspond to the mounted wheel.

 Measurement can be stopped at any time:


- Press the <STOP> key.
- Press the pedal.
- Open the wheel guard.

1. Close the wheel guard.


- ⇒ The unbalance measurement commences automatically.
- ⇒ On completion of measurement the values of the balance weights required are shown on the display.
On left of display inner balancing plane,
on right of display outer balancing plane.

2. Open the wheel guard.

8.4 Securing the balancing weights

 If the measured wheel unbalance is very high (e.g. static unbalance in excess of 50 g), we recommend matching the wheel by compensating the static unbalance of the tire with the unbalance of the rim (minimizing unbalance).

8.4.1 Splitting the balancing weights (Split program)

 If the balancing weights are to be attached behind one or two spokes, start the Split program after measurement.

1. Press the <SPLIT> button.

- ⇒ n appears in the left-hand display, the number of currently preset spokes on the right.
- ⇒ Both <SPLIT> button LEDs (Fig. 5, Item 3) light up.

2. Enter the actual number of spokes using the <-> or <+> button (Fig. 6, Item 1).

- ⇒ The value is shown in the right-hand display.

3. Turn a spoke to the 12 o'clock position and press the <SPLIT> button.


- ⇒ The position of the spoke is now saved.
- ⇒ Only one <SPLIT> button LED lights up.
- ⇒ The value of the required balancing weight is shown in the right-hand display.


4. Turn the wheel by hand.

- ⇒ As soon as the position for attaching the balancing weight is reached, the LED (Fig.5, Item 2) lights up. An acoustic signal confirms that the position is correct (behind a spoke).


5. Fasten the balancing weight with the required value in the uppermost (12 o'clock) position of the wheel.


6. Continue to turn the wheel by hand, so that you can attach another balancing weight behind a spoke (if the displayed value is lower than the initial value).
⇒ The other <SPLIT> button LED lights up.

 For 2 balancing levels, repeat the procedure for the 2nd balancing level from step 4.

 To exit the Split program and view the display of a balancing weight, press the <SPLIT> button again.

8.4.2 Clip-on weights and adhesive weights

 LEDs in arrow form (Fig. 5, Item 7) indicate the direction in which the wheel has to be turned in order to reach the 12 o'clock position for securing the balancing weight.


 In the description below, sound and automatic start are active (see section 10)

1. Turn the wheel by hand.

- ⇒ As soon as the correct position for attaching a balancing weight is reached, the LED (Fig.5, Item 2) lights up and an acoustic signal confirms that the position is correct.

2. Fasten the balancing weight with the required value in the uppermost (12 o'clock) position of the wheel.

3. Repeat the procedure for the 2nd balancing level.

 After you have secured the balancing weights, repeat the unbalance measurement for checking purposes.

8.5 Manual vernier caliper

In the balancing programs Alu2, Alu3 and Pax2 the manual vernier caliper permits determination of the rim width as well as simple positioning and attachment of the adhesive weights.

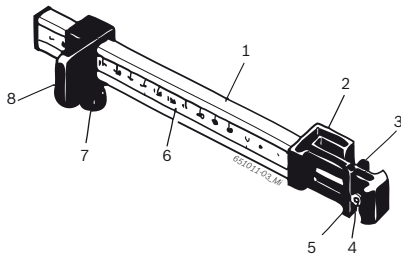
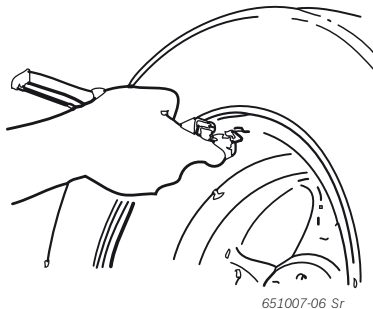


Fig. 8: Manual vernier caliper

- 1 Vernier caliper grip
- 2 Vernier caliper head
- 3 Inner weight pliers
- 4 Ejector
- 5 Outer weight pliers
- 6 Scale
- 7 Knurled screw
- 8 Slider with stop

8.5.1 Determining rim width

1. Position the manual vernier caliper with the slider at the inner rim edge.



2. Move the outer weight pliers to the position at which the balance weights are to be attached.
3. Secure the slider with the knurled screw.
4. Read off the dimension and enter as rim width in "mm".
5. Start measurement "Balancing wheel".
6. Measurement evaluation:
 - ⇒ The value for the adhesive weight to be attached by way of the inner weight pliers (Alu2 and Pax2) or as clip-on weight (Alu3) appears in the left-hand display.
 - ⇒ The value for the adhesive weight to be attached by way of the outer weight pliers appears in the right-hand display.

8.5.2 Attaching balance weights

1. Move the wheel to the corresponding position 12 o'clock.
2. Insert the adhesive weight required in the outer weight pliers.
3. Position the slider at the edge of the rim.
4. Place the adhesive weight with the ejector at the corresponding position and press on.



5. Insert the second adhesive weight required in the inner weight pliers.
6. Position the slider at the edge of the rim.
7. Position the adhesive weight with the ejector and press on.

i The clip-on weight is positioned and secured in the balancing program Alu3.

9. Minimizing unbalance

If the measured wheel unbalance is very high (e.g. static unbalance in excess of 50 g), we recommend matching the wheel by compensating the static unbalance of the tire with the unbalance of the rim (minimizing unbalance). To do this, as the first step turn the tire on the rim 180 degrees. Additional minimization can be achieved by turning the wheel further. The Match program assists you with this minimization.

! Carry out the entire process with the highest degree of accuracy!

i If the error message **oPE** and **Err** appear in the display, you must repeat the Match program.

i Exit the Match program by pressing the **<MODE>** button.

i In the description below, sound and automatic start are active (see section 10).

Step 1: Start the Match program

1. Press and hold the **<MENU>** button.
2. Release the **<MENU>** button when **oPE** appears in the display.
 - ⇒ **oPE** and **1** are displayed.

Step 2: First measurement

- Close the wheel guard.
 - ⇒ Measurement begins.
- ⇒ **oPE** and **2** are displayed.

Step 3: Turning the tire on the rim

i In order to turn the tire on the rim, it may be necessary to let air out, lever the tire off and fill with air again when rotation is complete.

1. Turn the wheel until the valve is at 12 o'clock.
2. Press the **<SPLIT>** button.
 - ⇒ When the machine is started for the first time, the reference position of the wheel is saved.
- ⇒ **oPE** and **3** are displayed.
3. Mark the reference position on the tire (at the valve position).
4. Remove the wheel from the flange.

5. Turn the tire on the rim 180 degrees, so that the mark you have made is situated opposite the valve.

Step 4: Saving the new position

1. Fasten the wheel.
2. Turn the valve to 12 o'clock.
3. Press the **<SPLIT>** button.
 - ⇒ The new position of the wheel on the flange is saved.
 - ⇒ **oPE** and **4** are displayed.

Step 5: 1. Checking measurement

1. Close the wheel guard.
 - ⇒ Measurement begins.
2. Evaluate the measurement result:
 - oPE** and **YES** displayed => minimization successful, minimization can be concluded.
 - oPE** and **5** displayed => minimization unsuccessful, minimization may be interrupted or continued (from Step 6 onwards).

i Pressing the **<STOPP>** button displays the following values:
 Left display: minimum residual unbalance
 Right display: static current unbalance value

i If the static unbalance value is close to the minimum residual unbalance (below 10 g), minimization can be ended by pressing the **<MODE>** button.

Step 6: Turning the tire further on the rim


1. Turn the wheel until the green balancing position LED lights up.
2. Mark the reference position on the tire (at 12 o'clock).
3. Remove the wheel from the flange.
4. Turn the tire on the rim so that the mark you have made is situated where the valve is.
5. Fasten the wheel.
6. Turn the valve to 12 o'clock.
7. Press the **<SPLIT>** button.
 - ⇒ The new position of the wheel on the flange is saved.
 - ⇒ **oPE** and **6** are displayed.

Step 7: 2. Checking measurement

- Close the wheel guard.
 - ⇒ Measurement begins.
 - ⇒ See Step 5 for evaluation and further procedure.

10. Settings

10.1 User settings

 Settings which can be made by the user.

1. Press and hold the <MENU> key.
 2. As soon as **SEt** appears in the left-hand display, release the <MENU> key.
- **tol** appears in the left-hand display and the current value in the right-hand display.

Function	Key
Change of setting/value	<-> or <+>
Access to next setting, altered settings are stored	<START> or <MENU>
Exit from menu. Attention: Altered setting is however stored	<STOP>

Setting	Left display	Right display	Description
Tolerance for display value "0"	<i>tol</i>	Current value in grams / ounces	Entry of balance weight value below which the value "0" is to be displayed. Standard value 4,5 g (0,25 oz), maximum value 25 g (0,25 oz)
Display resolution Balance weight	<i>rES</i>	<i>lor 5</i>	<i>5 g / 0 25 oz</i> - Standard resolution <i>ig / 0 05 oz</i> - Fine resolution
Unit for balance weight	<i>unb</i>	<i>grR</i> <i>oun</i>	<i>grR</i> = Display in grams <i>oun</i> = Display in ounces
Acoustic signal	<i>Snd</i>	<i>on</i> <i>oFF</i>	<i>on</i> = An acoustic signal sounds on storing the data determined <i>oFF</i> = No acoustic signal sounds on storing the data determined
Automatic start	<i>LRr</i>	<i>on</i> <i>oFF</i>	<i>on</i> = Start of measurement by closing wheel guard <i>oFF</i> = Start of measurement by pressing <START> key (with wheel guard closed)
Data arm selection	<i>not</i>	<i>on</i> <i>oFF</i>	<i>on</i> = Use is made of standard data arm <i>oFF</i> = Use is made of long data arm for balancing of motorcycle wheels


10.2 Basic settings


 Basic settings which can only be made following consultation with or by customer service.

1. Press and hold the <MENU> key.
 2. As soon as **SEt** appears in the left-hand display, release the <MENU> key.
 3. Press the <mm/inch> key within 1.5 seconds.
- **PDE** appears in the left-hand display and the current setting in the right-hand display.

Left display	Right display	Setting	Description
<i>PDE</i>	<i>on</i> <i>oFF</i>	Switch-on and switch-off of electronic vernier caliper	<i>on</i> = Electronic storage of rim data determined with vernier caliper <i>oFF</i> = Rim data must be entered manually
<i>rnd</i>	<i>on</i> <i>oFF</i>	Special rounding-off with higher display of weights in ounces	<i>on</i> = Special rounding-off of ounces <i>oFF</i> = Standard rounding

11. Faults

 Other possible malfunctions are primarily of a technical nature and are to be checked and if necessary rectified by a qualified engineer. Always contact the customer service of your authorized Bosch equipment dealer.

 To enable action to be taken quickly, it is important to inform customer service of the specifications on the rating plate (label on the flange end of the WBE 4110) and the nature of the problem.

Faults	Causes	Remedy
The displays do not light on switch-on	<ol style="list-style-type: none"> 1. Defective fuse or missing phase 2. Damaged fuse in electrical connection 3. Damaged fuse in control/display panel 	<ol style="list-style-type: none"> 1. Check the mains connection. 2. Replace the fuse in the electrical connection. 3. Replace the fuse in the control/display panel. Inform customer service. <p>Caution: Repeated fuse damage is an indication of a malfunction.</p>
1	<ol style="list-style-type: none"> 1. Setting and calibration data lost from PCB memory 2. One or more calibration operations (setting, calibration of electronic vernier caliper/gauge arm) not performed 	Check and correct calibration and settings.
2	Wheel guard raised prior to completion of measurement	Wait for end of measurement before raising wheel guard.
3	<ol style="list-style-type: none"> 1. Backward rotation of wheel on start of measurement 2. Incorrect connection of motor 	<ol style="list-style-type: none"> 1. Check that wheel is stationary on starting and stop it turning backwards on starting. 2. Check proper connection of motor.
4	<ol style="list-style-type: none"> 1. No motor operation, motor does not attain the necessary speed 2. Fault in electrical connection 3. Fault in PCB 	<ol style="list-style-type: none"> 1. Check mains voltage (probably too low). 2. Check electrical connection or power cord. 3. Replace the PCB.
5	<ol style="list-style-type: none"> 1. Balance weight not attached to wheel 2. Measurement sensors not correctly connected 	<ol style="list-style-type: none"> 1. Repeat calibration from the start and attach balance weight as specified by the process. (refer to 11.3). 2. Check the connection of the measurement sensors.
6	<ol style="list-style-type: none"> 1. Wheel guard not lowered 2. Damage to wheel guard safety switch 	<ol style="list-style-type: none"> 1. Lower wheel guard with wheel attached. 2. Replace wheel guard switch.
7	Excessive phase difference between the 2 measurement sensors	<ol style="list-style-type: none"> 1. Check for correct attachment of calibration weight. 2. Check machine connection; WBE 4110 probably not stable and vibrating excessively. 3. Check contact between measurement sensor and PCB. 4. Replace measurement sensor. 5. Replace PCB.
8	Inner measurement sensor not correctly connected, defective or open circuit in wire	<ol style="list-style-type: none"> 1. Check connection of left measurement sensor. 2. Replace measurement sensor.
9	Outer measurement sensor not correctly connected, defective or open circuit in wire	<ol style="list-style-type: none"> 1. Check connection of right measurement sensor. 2. Replace measurement sensor.
10	<ol style="list-style-type: none"> 1. Measurement sensor for position recognition defective 2. No motor operation 	<ol style="list-style-type: none"> 1. Check connection of light barrier PCB. 2. Check that the light barrier PCB is protected against light and provide a cover if necessary. 3. If the fault persists, check and if necessary replace the light barrier PCB. 4. Check the mains connection.
11	<ol style="list-style-type: none"> 1. Measurement sensor for phase recognition defective 2. No motor operation 	<ol style="list-style-type: none"> 1. Check connection of light barrier PCB. 2. Make sure the light barrier PCB is protected against light and provide a cover if necessary. 3. Check and if necessary replace the light barrier PCB. 4. Check the mains connection.
17	Weight outside setting range (weight required for balancing is more than 250 g)	<ol style="list-style-type: none"> 1. Check whether the wheel is correctly attached to the flange. 2. Determine the outer weight position (nevertheless), attach a 100 g weight and start a different measurement.
18	Wheel data not entered	Enter wheel data before performing measurement.
19	Input signal of right measurement sensor lower than that of left sensor	Interchange the connections of the two measurement sensors.

Faults	Causes	Remedy
20	<ol style="list-style-type: none"> 1. Pedal pressed during measurement 2. Irregular rotational speed of motor 3. Wheel speed below minimum value 	<ol style="list-style-type: none"> 1. Do not press pedal whilst motor is in operation. 2. Make sure the WBE 4110 is not subjected to any impact during measurement. 3. Check mains voltage (probably too low).
21	The PCB has detected an excessively high wheel speed with the wheel guard open (shaft rotating at high speed although the machine has not been started): Power supply unit is deactivated	<ol style="list-style-type: none"> 1. Switch off the WBE 4110 . 2. Lower the wheel guard, switch the WBE 4110 on again without moving the wheel. 3. If the error message persists, contact customer service.
22	Irregular measurement sensor signals	<ol style="list-style-type: none"> 1. Check that the light barrier PCB is protected against light and provide a cover if necessary. 2. Check and if necessary replace the light barrier PCB. 3. Check and if necessary replace the display PCB.
23	Vernier caliper not in rest position	<ol style="list-style-type: none"> 1. Move the vernier caliper to rest position. 2. Repeat the calibration of the electronic vernier caliper
<i>EEE EEE</i>	<ol style="list-style-type: none"> 1. Two keys pressed simultaneously 2. Display PCB defective 	<ol style="list-style-type: none"> 1. Only ever press one key at a time. 2. Check and if necessary replace the display PCB.

12. Maintenance

12.1 Cleaning and servicing

! Before cleaning and servicing, switch off WBE 4110 and disconnect mains plug.

! Do not use any solvent-based cleaning agents. Use alcohol or similar cleaning agents for plastic parts.

The following work is essential to ensure proper operation and high performance of the WBE 4110:

Servicing	Weekly
Clean moving mechanical parts, treat with spray oil or kerosene and lubricate with engine oil or a suitable grease.	x

12.2 Spare and wearing parts

The manufacturer cannot accept any liability for damage arising from the use of non-genuine replacement parts.

Designation	Order number
Standard centering flange	1 695 602 400
Quick-action clamping nut	1 695 616 200
Centering cone 42 - 64,5 mm	1 695 632 500
Centering cone 54 - 79,5 mm	1 695 652 862
Centering cone 74 - 111,5 mm	1 695 605 600
Weight pliers	1 695 606 500
Manual vernier caliper	1 695 629 400
Test clip	1 695 602 700
Calibration weight	1 695 654 377
Calibration weight (calibrated)	1 695 654 376
Voltage sticker	1 695 100 789
Direction of wheel rotation sticker	1 695 653 878

Tab. 2: Spare and wearing parts

12.3 Calibration

i As part of service and upkeep (every six months), on flange replacement or in the event of measurement inaccuracies, it is advisable to calibrate the WBE 4110 in the following sequence:

1. Flange calibration.
2. Vernier caliper calibration.
3. WBE 4110 calibration.
4. Perform reference measurement.

12.3.1 Call-up of calibration menu

i Sound and automatic start are active in the following description (refer to Section 10).

1. Press and hold the <MENU> key.
2. As soon as **[RL]** appears on the left-hand display, release the <MENU> key.
3. Press the <mm/inch> key within 1.5 seconds.
⇒ Left-hand display shows **[- /]**

12.3.2 Shaft unbalance correction

i Sound and automatic start are active in the following description (refer to Section 10).

1. Fit the flange (refer to Section 5).

i Do not clamp the wheel, do not use any clamping tools.

2. Close the wheel guard.
⇒ Measurement commences.

i The unbalance measured is stored on completion of measurement.


⇒ Electronic compensation is provided for any residual shaft unbalance.

⇒ Left-hand display shows **[- 2]**.

12.3.3 Calibrating the electronic vernier caliper


1. Press the <MENU> button until **CAL** appears in the left-hand display.
 2. Press the <mm/inch> button within 1.5 seconds.
 3. Press <MENU> twice.
 - ⇒ **d-** appears in the left-hand display.
 4. Move the vernier caliper to rest position.
 5. Read the value on the millimeter scale of the vernier caliper and enter with the <-> or <+> buttons (Fig. 6, Item 1a).
 - ⇒ The value is shown on the right-hand display.
 6. Confirm with <+> (Fig. 6, Item 1c).
 - ⇒ **d-2** appears in the left-hand display
 7. Open the vernier caliper as far as possible and hold in this position.
 8. Read the value and enter with the <-> or <+> buttons (Fig. 6, Item 1a).
 9. Confirm with <+> (Fig. 6, Item 1c).
 - ⇒ **h-** appears in the left-hand display.
 10. Clamp the test wheel (min. 15").
 11. Position the vernier caliper against the rim flange.
 12. Enter the height of the clamped wheel in inches with the <-> or <+> buttons (Fig. 6, Item 1a).
 13. Hold the wheel in this position and confirm with <+> (Fig. 6, Item 1c).
 - ⇒ **[-2]** appears in the left-hand display.
- Calibration of the vernier caliper is complete.

12.3.4 WBE 4110 calibration


 Sound and automatic start are active in the following description (refer to Section 10).


1. Attach a motor vehicle wheel of medium size (e. g. width 5.5", diameter 14") and in very good condition to the flange.
2. Enter the wheel data (refer to Section 8.2).
3. Close the wheel guard.
 - ⇒ Measurement commences.
4. Enter the balance weight (automatically proposed value is 60 g).
 - ⇒ Left-hand display shows **[-3]**, right-hand display shows **60**.
 - ⇒ The new value is displayed on altering the balance weight.
5. Attach a balance weight of the value entered to the inner side of the wheel.
6. Close the wheel guard.
 - ⇒ Measurement commences.
7. Turn the wheel until the balance weight is in the 12 o'clock position.
8. Remove the balance weight from the inner side of the wheel and attach it to the outer side (12 o'clock position).
 - ⇒ Left-hand display shows **[-4]**.
9. Close the wheel guard.
 - ⇒ Measurement commences.
10. Turn the wheel until the balance weight is in the 6 o'clock position.
 - ⇒ Left-hand display shows **[-5]**.
 - ⇒ The calibration angle value is displayed.
11. Press the <SPLIT> key.

→ This completes calibration.


 The calibration made is permanently stored automatically.


12.3.5 Reference measurement

 Exact centering of the wheel is a basic prerequisite for this reference measurement and for all balancing operations.

 Sound and automatic start are active in the following description (refer to Section 10).

1. Attach a motor vehicle wheel of medium size (e. g. width 5.5", diameter 14") and in very good condition to the flange.
2. Enter the wheel data (refer to Section 8.2).
3. Close the wheel guard.
 - ⇒ Measurement commences.
4. Create an artificial unbalance by attaching a test weight of e. g. 60 g to one of the two sides.
5. Close the wheel guard.
 - ⇒ Measurement commences.
 - ⇒ The WBE 4110 must display precisely this unbalance (value and position) on this side. The value indicated for the other side must not exceed 5 g.

 To check the position of the unbalance, turn the wheel until the position recommended for attachment of the balance weights is attained. The test weight attached must be vertically beneath the axis of rotation (6 o'clock position).

 Calibration must be repeated in the following cases:


- Deviation from specified unbalance value (greater than 1 g on test weight side, more than 5 g on other side).
- Deviation from specified unbalance position (test weight not between 5:30 and 6:30 position).

6. Remove the test weight.
7. Release the wheel and turn it through approx. 35°.
8. Re-attach the wheel.
9. Close the wheel guard.
 - ⇒ Measurement commences.

→ On completion of this reference measurement, the display must not exceed a maximum unbalance of 10 g per side (15 g for particularly heavy wheels). This error may be caused by the rim centering tolerances. If this reference measurement indicates greater unbalance, the components used for centering the wheel must be checked for wear, play and contamination.

12.4 Self-diagnosis

1. Press and hold the <MENU> key.
2. As soon as **ESL** appears in the left-hand display, release the <MENU> key.
3. Press the <mm/inch> key within 1.5 seconds.

 Press the <MENU> key to switch from one function to the other.

→ The following information is displayed:

- Pick-up voltage
 - The display shows **75r**
- Angular position of shaft
 - The display shows **ErL**
- Shaft speed
 - The display shows **SP**
- Character readout
- Wheel guard microswitch input readout
 - The display shows **JnP**
- Start counter
 - The display shows **CrL**
- Display test
 - The display shows **LEd**
- Calibration data
 - The display shows **ERR**
- Instantaneous wheel balancing
 - The display shows **rEL**

Proceed as follows to check correct operation of the pick-ups:

1. Clamp a balanced test wheel in position.
2. Attach a test weight (e.g. 100 g Pb or 60 g Zn).
3. Perform reference measurement.

On completion of the reference measurement

- The voltage value of the inner pick-up must be lower than that of the outer pick-up.
- The ratio between the outer and inner pick-up value must be between 1.2 and 1.8.
- The phase difference must be $180^\circ \pm 1^\circ$.

13. Decommissioning

13.1 Temporary shutdown

In the event of lengthy periods of non-use:

- Unplug the electrical connection.

13.2 Change of location

- If the WBE 4110 is passed on, all the documentation included in the scope of delivery must be handed over together with the unit.
- The WBE 4110 is only ever to be transported in the original or equivalent packaging.
- Unplug the electrical connection.
- Heed the notes on initial commissioning.
- Bolt the WBE 4110 back onto the pallet.

13.3 Disposal and scrapping

13.3.1 Substances hazardous to water

! Oils and greases as well as refuse containing oil and grease (e.g. filters) represent a hazard to water.

1. Substances hazardous to water must not be allowed to enter the sewage system.
2. Substances hazardous to water must be disposed of in accordance with the applicable regulations.

13.3.2 WBE 4110 and accessories

1. Disconnect the WBE 4110 from the mains and detach the power cord.
2. Dismantle the WBE 4110 and sort out and dispose of the different materials in accordance with the applicable regulations.



The WBE 4110 is subject to the European directive 2002/96/EC (WEEE).

Dispose of used electrical and electronic devices, including cables, accessories and batteries, separately from household waste.

- Make use of the local return and collection systems for disposal.
- Proper disposal of the WBE 4110 prevents environmental pollution and possible health hazards.

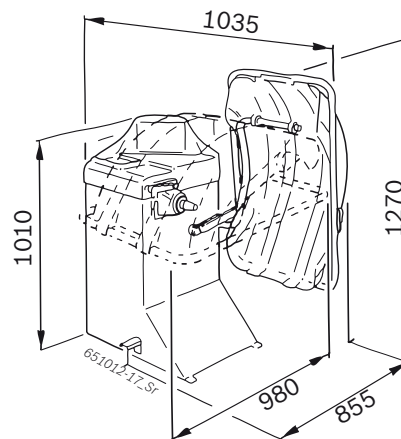
14. Technical data

14.1 WBE 4110

Function	Specification
Balancing speed	190 U/min 50 Hz / 200 U/min 60 Hz
Measurement resolution	1/5 g (0.01/0.25 oz)
Noise level	< 75 dB
Power	0,35 kW
Voltage (depending on version ordered)	115 V 1~ (60 Hz) / 230 V 1~ (50 Hz) / 230 V 1~ (60 Hz) 230 V 1~ (60 Hz)
Degree of protection	IP 22

14.2 Dimensions and weights

Function	Specification
WBE 4110 (H x W x D) max.	1800 x 1300 x 650 mm
Weight	76 kg



14.3 Operating range

Function	min – max
Rim width	2" – 19"
Rim diameter	8" – 24"
Maximum wheel diameter	1200 mm
Maximum wheel weight	80 kg