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Luminoscope®

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Luminoscope® PLA 35 - Belgian garage type (Renault model)

User manual

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Notice

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1 Regulations

Please read the following regulations before using the system and setting it on a powered status.

1.1 Safety Regulations

This headlamp tester complies with the necessary safety regulations.

- Improper use or handling of the appliance can compromise the safety of the operator and the environment, as well as the reliability of the measurement.
- Repairs may only be done by the Service engineers of L.E.T. Automotive. Inexpert repairs can result in danger to the operator and environment.
- Repairs and/or spare parts exchange may only be done with units which are delivered by L.E.T. Automotive.

Besides the above mentioned safety regulations, the following must also be observed:

- Damaged electrical cables of the appliance or the charging adaptor must immediately be replaced.
- Only use the supplied 12VDC/60W adaptor to charge the battery of the optical block.
- Only use the supplied 12VDC/60W adaptor to charge the battery of the optional alignment laser.
- Do not put or hang objects on the appliance (tools, clothes, …).
- Make sure the wheels of the base are always clean. Obstructions on the rails or wheels can bring the system off-balance during a movement.
- The equipment is not water-proof. Keep it safely out from water spills, soaking or submersion into water and any other liquid.
- The equipment is not shock-proof. Protect it againt heavy shocks or impacts. Do not drop or let it fall.

1.2 Danger of localized heating

Warning:

- During the seasons of the year when the sun is very low in the sky, there is a risk of the sun shining directly into the collecting lens of the Luminoscope®, so that the focusing effect which is used to complete the headlights tests may cause focalized overheating inside the machine.
- The generated heating may in extreme cases severely damage the Luminoscope®!
- To avoid any possible damage, it is strongly recommended that the dust/sun cover is used whenever the Luminoscope® is not operational.

1.3 Danger laser beam

Green alignment line laser

The headlamp tester may be equipped with an optional green alignment laser with the following characteristics:

Warning:

- Laser class 2M, wavelength: 520nm, output power < 5mW
- Staring into the laser can lead to severe damage!
- Do not stare into the laser beam of the laser!

1.4 Environmental regulations

Notice:

- Be aware of the consequences of incorrect waste disposal.
- Incorrect disposal of recoverable materials may negatively impact the environment.
- When the service life of the Luminoscope® expires, the appliance should not be discarded with normal household waste. It should be offered for recycling according to the local currently valid regulations instead.

The following materials are used for the main parts of the Luminoscope® PLA 35:

Part	Material
Fresnel lens	Polymethyl methacrylate (PMMA)
Stand	Aluminium
Optical block	Polystyrene (PS) with high resistance
Base	Steel
Alignment mirror	Glass with a layer of aluminium
Alignment laser	Steel sheet
Battery	Nickel-metal-hydride (NiMH) technology based

2 Basic Principles

What follows is a general explanation of the principles involved in the design and use of Luminoscope® devices and their environment.

2.1 Headlamp criteria

During an international conference in Vienna in 1958 was agreed that the headlamps on vehicles should comply with the following criteria:

- A high beam should illuminate the road in front of the vehicle for at least 100m (300ft).
- A low beam should illuminate the road in front of the vehicle for at least 40m (120ft) without blinding the oncoming vehicles.

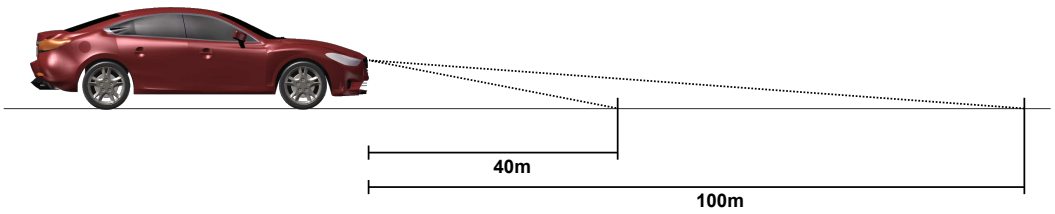


Figure 1: Headlamp criteria

These fundamental criteria don't describe the intensity values, any measuring procedure or how to prevent blinding the oncoming traffic. Therefore, different countries have developed their own standards and technical requirements.

The definition of a headlamp is determined by those standards. In Europe for instance the low beam is described by a “cut off” line which distributes the light beam in a sharp divided light and dark zone, while a low beam in America has to have minimal and maximal intensities in a number of predefined points.

2.2 Adjusting headlamps

The beam from a headlamp is normally directed towards the ground ahead of the vehicle for a low beam (approximately 40m), and straight ahead for a high beam (approximately 100m).

In order to better determine beam orientation, a perpendicular screen is placed in front of the vehicle at a somewhat shorter distance (a minimum of 10m). On this screen, at the same height, and relative to the vehicle axis, the position of the headlamps are indicated.

The lamps can thus be adjusted and checked, taking in account the required inclination settings.

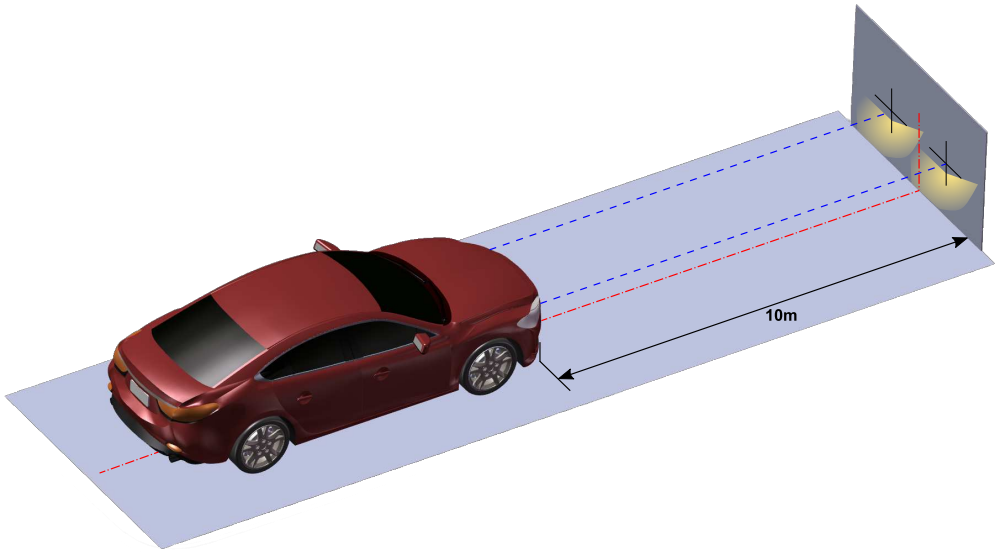


Figure 2: Basic principle of headlamp aiming on a 10m wall

If a white screen is placed at a distance of 10m in front of the headlamp, the inclination angle (slope) of the headlamp under test can be determined and expressed in *cm/10m* or *%*. This kind of projection screen is also called a *10m wall*.

L is the distance between the headlamp and the projection screen and is equal to 10m. The horizontal blue dotted line in the image below indicates the *mounting height* of the headlamp. This height should be marked on the 10m wall. The slopped dotted line represents the beam projection of the *cut-off line* of the low beam. The inclination angle (slope) of the headlamp is indicated as **α** and can be expressed in degrees.

H represents the distance between the *mounting height* of the headlamp and the beam projection of the *cutoff line*, measured on the 10m wall. If L=10m and H=10cm, the headlamp inclination is equal to 10cm/10m, or 1%.

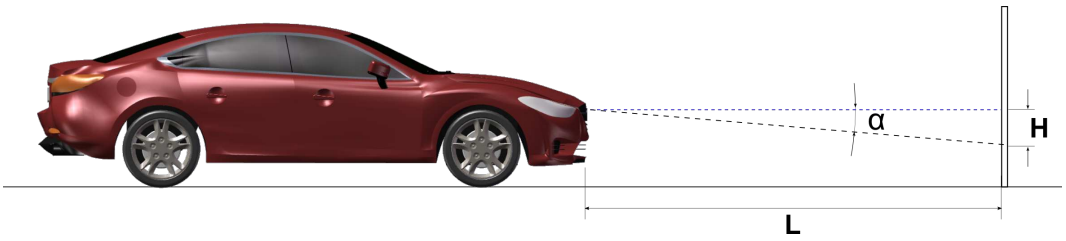


Figure 3: Beam slope

The following table provides the eventually needed conversion between the different units.

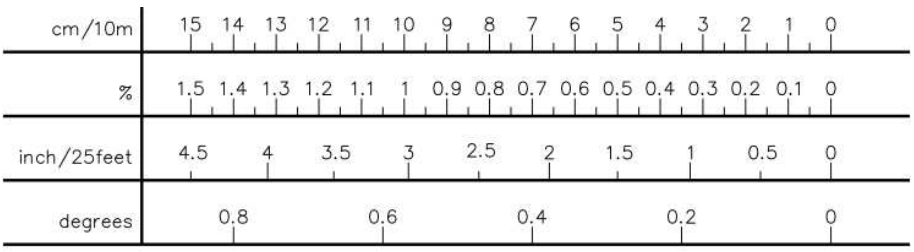


Figure 4: Unit conversion

This method has some disadvantages:

- It requires an indoor open area, over 10 meters long.
- The illumination level of that area has to be constant, mainly dimmed and independent from the varying conditions of natural light.
- The axes must be meticulously specified for each and every different vehicle and for any new vehicle alignment process.
- The method is purely visual and highly dependent on the operator skills and interpretation.

2.3 Lens Principle

The use of a converging lens placed at the focal length reduces the distance to the screen dramatically and eliminates the need of a dark room.

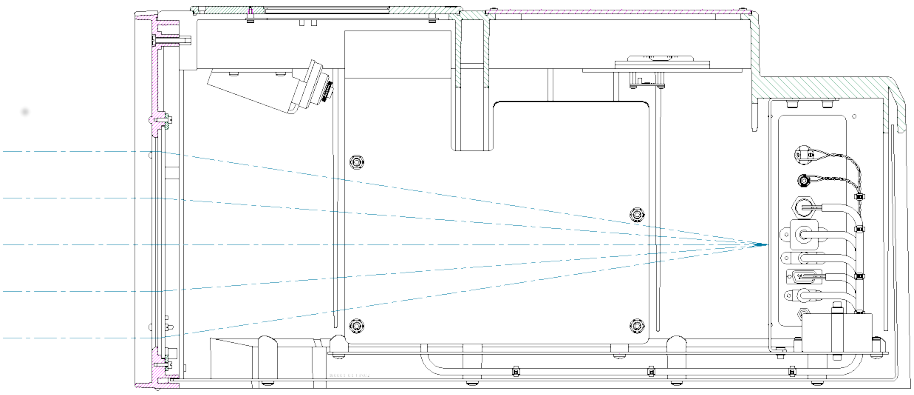


Figure 5: Parallel light rays entering the lens

All parallel rays from the same direction are concentrated in one point on the white projection screen inside the Luminoscope®.

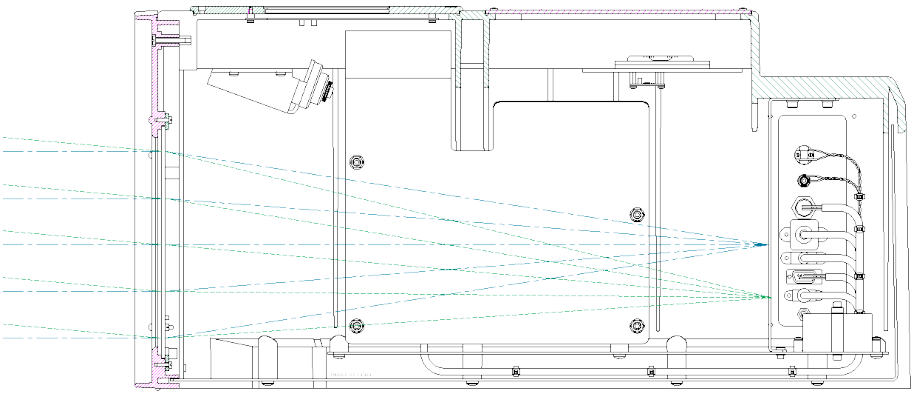


Figure 6: Parallel light rays from different angles entering the lens

Every point on the screen represents a collection of rays from the same direction.

2.4 Advantages of optical block with lens

The use of a collecting lens has advantages over the 10m wall projection method.

- The distance to the screen is dramatically reduced: from 10m to 0.5m.
- The beam intensity is much higher, dimming or cancelling the ambient light is no longer necessary.
- The white projection screen is positioned at the focal distance of the lens. All parallel rays from the same direction are concentrated in one point. Consequently, the relative position of the system in relationship to the lamp becomes less important as the beam projection of the screen remains identical, independent of the place where the rays enter the lens.

Actually, each point on the screen is thus representing the light emitted in the corresponding direction. This is the *candela meter principle*. The luminance ***E*** of a point on the screen (in lumen/meter² = Lux, or lumen/foot² = foot candle) represents the luminous intensity ***I*** (in lumen/steradian = candela) of the source in the corresponding direction.

It can be mathematically demonstrated that $I = F^2 x E$, where ***F*** is the focal length of the lens.

Where ***F*** is the focal length of the lens.

Luminous intensity measurements in candela can thus easily be made. The result is the same, regardless of the place where the rays enter the lens, at the top or at the bottom.

Care should be taken, nevertheless, to capture a maximum of the light from the beam, since any light from the beam not entering the Luminoscope® will not be available for measurements and pattern building. To achieve it, the Luminoscope® is equipped with an electronic *Position Check* system which continuously monitors the position in front of the headlamp and guides the operator to determine the ideal position of the optical block lens in front of the headlamp.

2.5 Image processing

A CMOS camera points to the internal white projection screen and acquires the reflected image for further process.

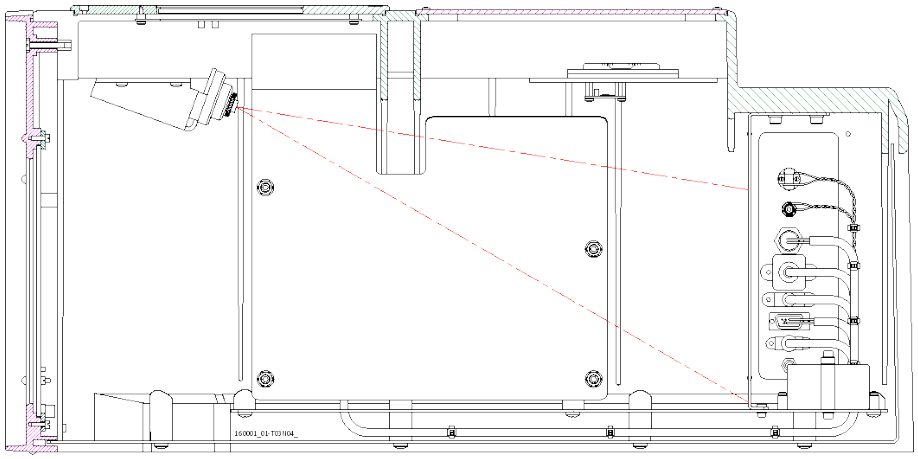


Figure 7: CMOS camera pointing at white projection screen

The horizontal and vertical lamp projection range is ±100cm/10m.

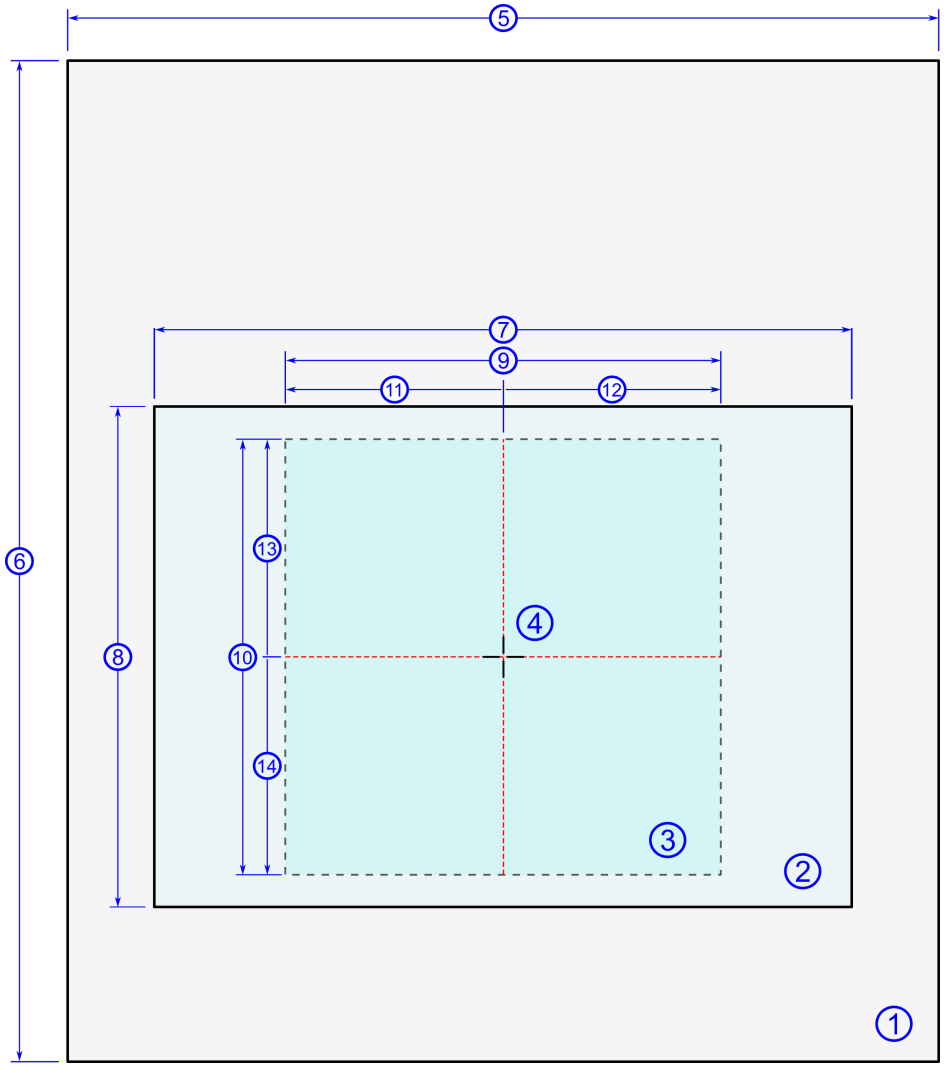


Figure 8: Projection screen with areas identification

1	Projection screen area		2	Camera viewing area	
3	Lamp testing area		4	Absolute zero reference	
5	Horizontal projection screen range		6	Vertical projection screen range	
7	Horizontal viewing range	340cm/10m	8	Vertical viewing range	270cm/10m
9	Horizontal lamp testing range	200cm/10m	10	Vertical lamp testing range	200cm/10m
11	Leftwards testing range	-100cm/10m	12	Rightwards testing range	+100cm/10m
13	Upwards testing range	+100cm/10m	14	Downwards testing range	-100cm/10m

The shutter setting of the camera is automatically controlled to provide an unclipped image under any circumstance. This allows absolute intensity measurements in kCd.

Camera data is analyzed by powerful algorithms to determine the position of the beam and to obtain other relevant data.

2.6 Alignment with the vehicle

In order to obtain a reliable measurement of the headlamp, it is necessary to achieve a good alignment of the Luminoscope® with the slope of the ground on which the vehicle stands and the longitudinal axis of the vehicle.

In the horizontal plane

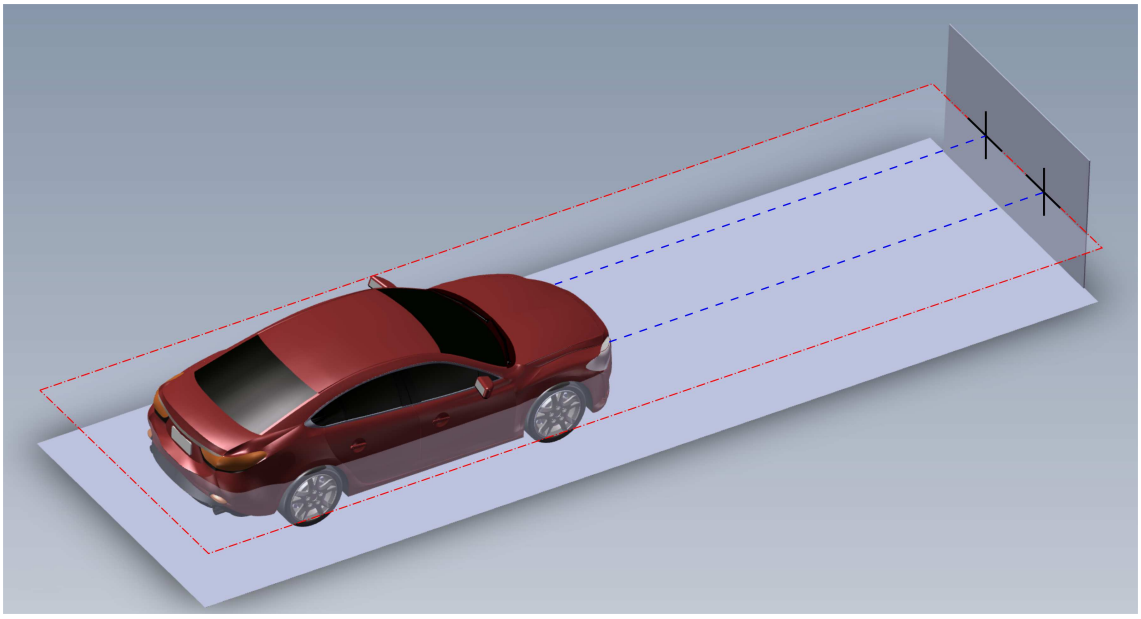


Figure 9: Horizontal plane alignment

The easiest way to achieve a good horizontal alignment with the vehicle is to place the vehicle on a horizontal floor and set the optical block also horizontal with the aid of the spirit level. In practice not so many floors are perfectly horizontal. There are two practical methods to achieve it:

- Measure the floor slope (check corresponding manual) and tilt the optical block in the same direction with the same slope.
- Measure the floor slope and add or subtract that value (depending on the direction of the floor slope) to the computed value of the beam position by the optical block.

In the vertical plane

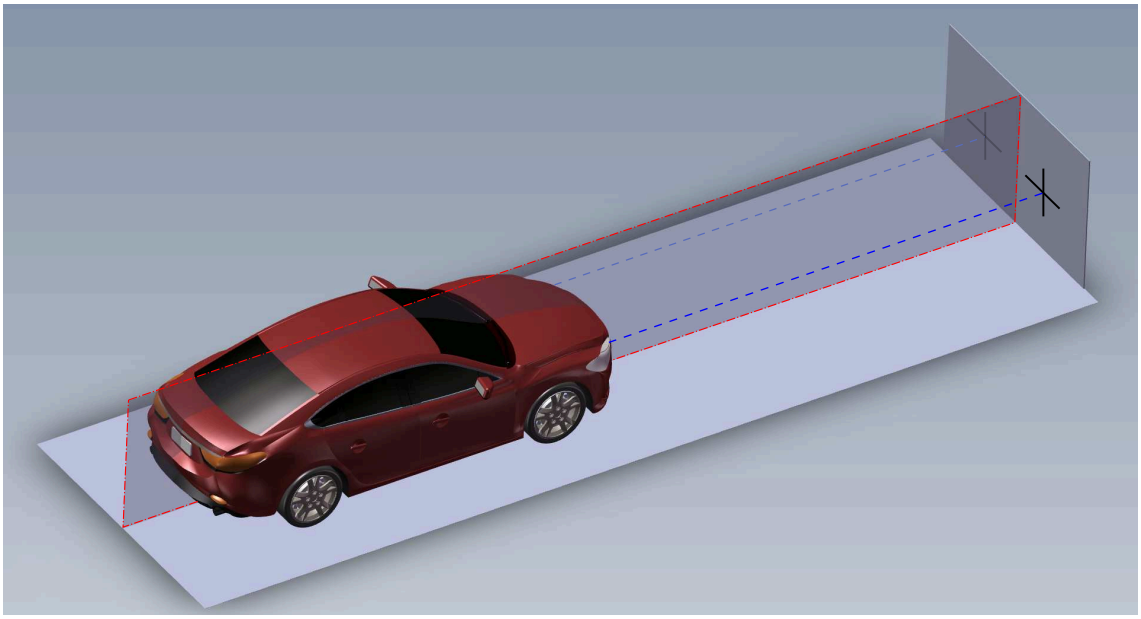


Figure 10: Vertical plane alignment

The precision of the measurement of the L/R position of the beam depends mainly on the vertical alignment of the vehicle towards the optical block. As an example, a simple misalignment of 5mm on a wheelbase of 2m will give an error of 5 x 5mm = 2.5cm/10m in the L/R measurement of the beam.

The vertical plane is also called the *longitudinal direction* of the car.

In order to help the operator to correctly align the Luminoscope® with the longitudinal axis of the car, the system is equipped with an alignment mirror, and optionally with an alignment laser. The green reference lines on the mirror, as well as the optional laser line, should be calibrated perpendicular with the optical axis of the headlamp tester.

The operator rotates the stand, looking for the intersection point of the reference line(s), either those on the mirror or the laser projection, with two symmetrical points on the vehicle which are also considered as perpendicular with the longitudinal axis of the vehicle.

This procedure ensures the longitudinal alignment between the Luminoscope® and the vehicule longitudinal axis.

2.7 Positioning in front of the headlamp

It is of great importance that the lens of the Luminoscope® is correctly positioned in front of the headlamp to ensure that as many light rays as possible are entering the lens.

This guarantees that the beam image is displayed realistically on the white projection screen inside the Luminoscope® to be able to perform a correct headlamp measurement.

With this purpose, the Luminoscope® system is provided with the electronic *Position Check* system that uses twelve photocells around the lens 1.

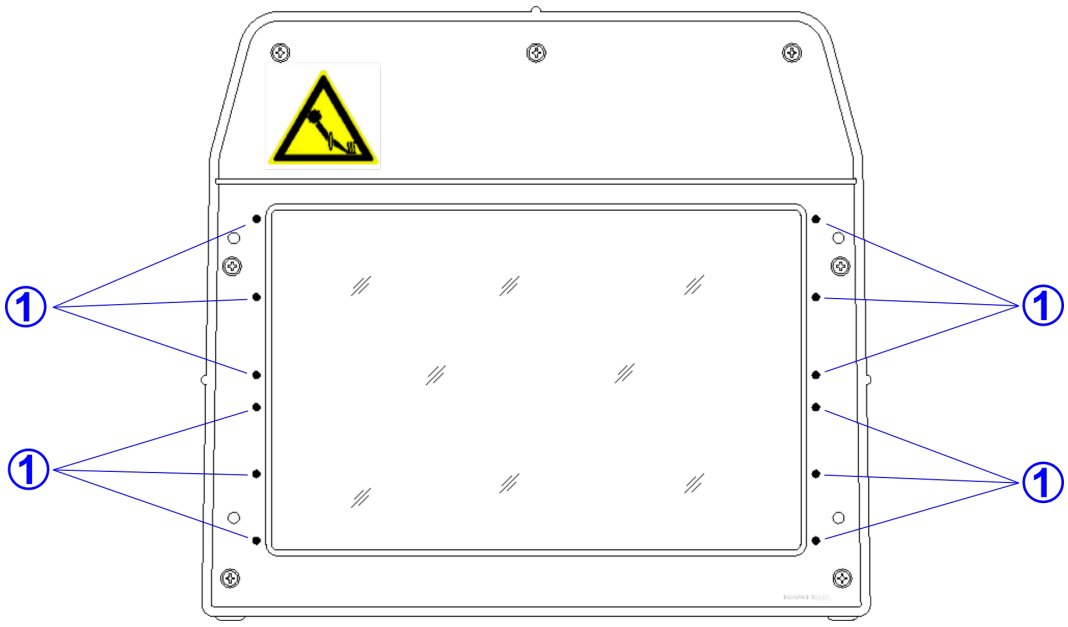


Figure 11: Position Check cells around the lens

3 Headlamps

This is a review of the illumination patterns that different headlamps produce.

3.1 ECE or European low beam

Note: The terms *low beam* and *dipped beam* also refer to the same type of headlamp and are used interchangeably.

The purpose of the low beam is to illuminate the road ahead of the vehicle and traffic signs up to a distance of approximately 40m without blinding oncoming traffic. The asymmetrical low beam must be adjusted on a predefined inclination value. In Europe e.g. it's an inclination of -1,2% or -12cm/10m. The reference point of the beam is the intersection of the horizontal part with the sloped part and is referred to as *V-point*. It is also called *kink point* and *elbow point*.

There exist two types of ECE low beams, depending on which side of the road the vehicle is driving:

LHD (Left Hand Drive)

The steering wheel is positioned on the left side of the vehicle and the driver uses the right side of the road. Some examples of countries on which this driving type is implemented include (but are not limited to) Belgium, France and Germany, among many others.

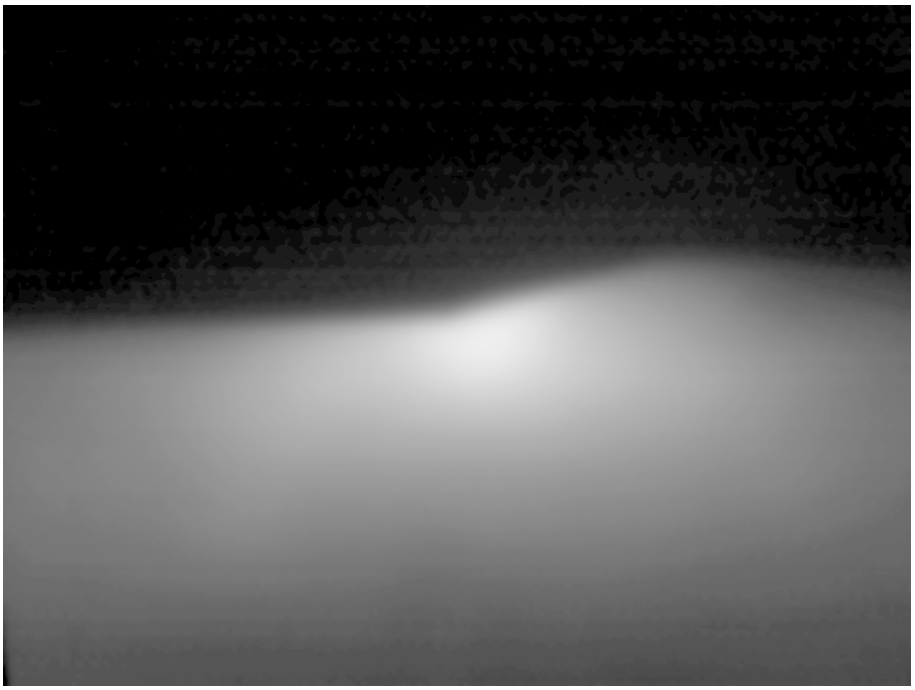


Figure 12: Low beam LHD

RHD (Right Hand Drive)

The steering wheel is positioned on the right side of the vehicle and the driver uses the left side of the road. Some examples of countries on which this driving type is implemented include Great Britain, Ireland, Japan, Thailand, Malaysia, Indonesia, New Zealand, Australia, India, South Africa, among many others.

Figure 13: Low beam RHD

The world map below shows the implemented driving types for each country.

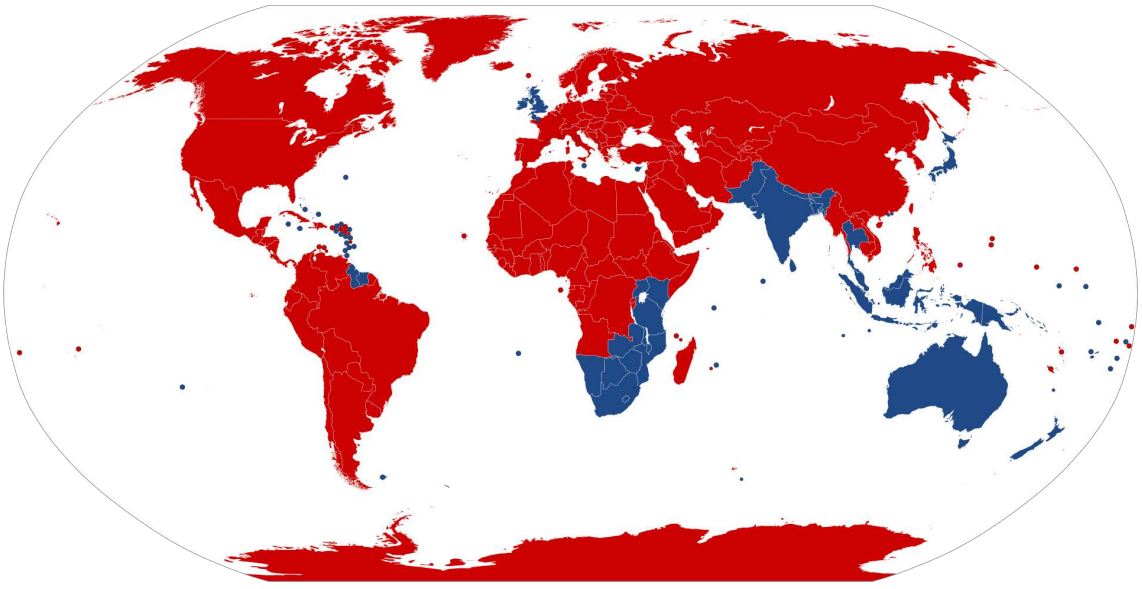


Figure 14: Implementation of LHD and RHD driving types across the world

3.2 High beam

Note: The terms *high beam* and *main beam* refer to the same type of headlamp and are used interchangeably.

The purpose of the high beam is to illuminate the road ahead of the vehicle at a further distance of approximately 100m. The form of the beam is rather oval. The reference point is the point with the highest intensity (hotspot).

There are two different ways of construction:

- The high beam is integrated in the same housing of the low beam. So it is not possible to separately adjust high and low beam. In most countries, the low beam is adjusted because this is the driving beam. Due to the construction of the headlamp, the high beam will be at an inclination value that is ±1% or 10cm/10m higher than the low beam value.
- The high beam is a standalone headlamp so both beams can be separately adjusted with their own adjusting screws. Adjustment of the high beam is done at a value of 1% or 10cm/10m higher than the low beam value.

Figure 15: High beam

3.3 Fog beam

Fog beams are mounted at the front bottom of the vehicle and illuminate the road as far as possible under fog, heavy rain or snow conditions.

The form of the beam is a broad band of light, where the reference is the flat horizontal top line (cut-off line) which is normally adjusted at 1% or 10cm/10m below the low beam value. A fog beam only has one adjusting screw controlling the inclination.

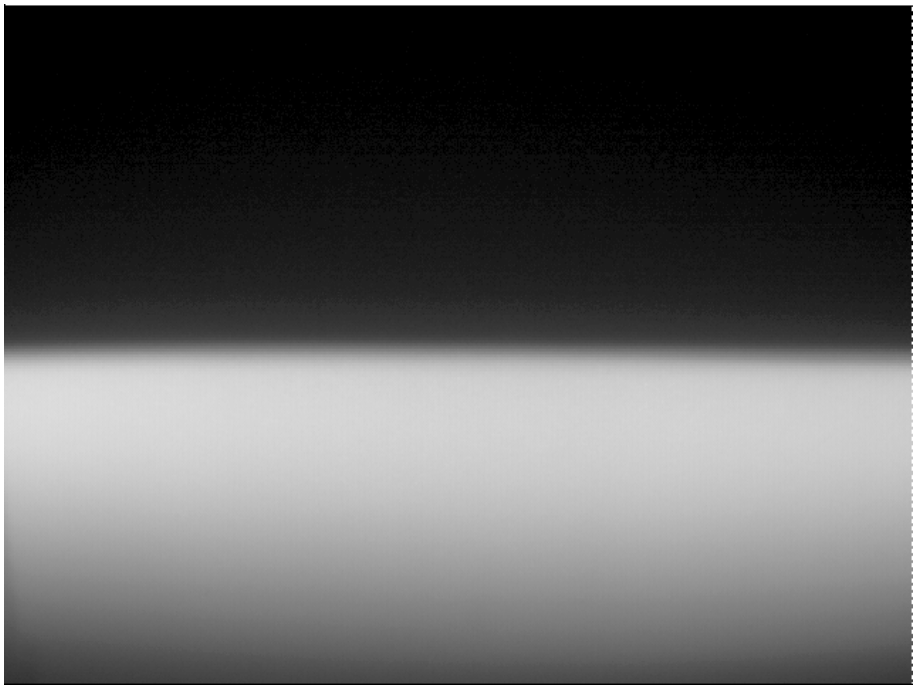


Figure 16: Fog beam

3.4 SAE or American low beam

Note: The terms *low beam* and *dipped beam* also refer to the same type of headlamp and are used interchangeably.

SAE (Society of Automotive Engineers)/ American low beams have an *LHD shaped cut-off line* with a small step and a zone of high intensity (*hotspot*) on the right side of the small step.

American low beams must be aimed – according to the marking on the glass – referring to the left or right side of the cut-off line.

There are two types of American low beams, requiring different adjustment methods:

VOL - Visually Optical Left	The left part of the cut-off line should be aimed at an inclination of -0,7%.
VOR - Visually Optical Right	The right part of the cut-off line should be aimed at an inclination of 0%.

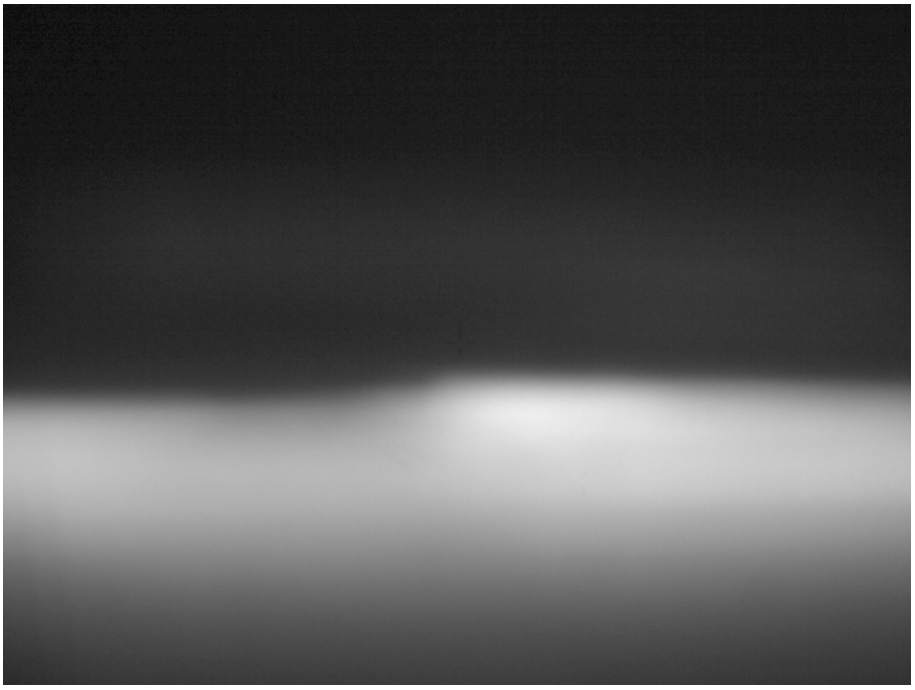


Figure 17: SAE low beam VOL or VOR

3.5 Japanese low beam

Note: The terms *low beam* and *dipped beam* also refer to the same type of headlamp and are used interchangeably.

The Japanese low beam has some similarities with a mirrored image of the SAE low beam, because the Japanese driver uses the left side of the road (RHD). However there are subtle details regarding the different heights of the zones at both sides of the step which make them different.

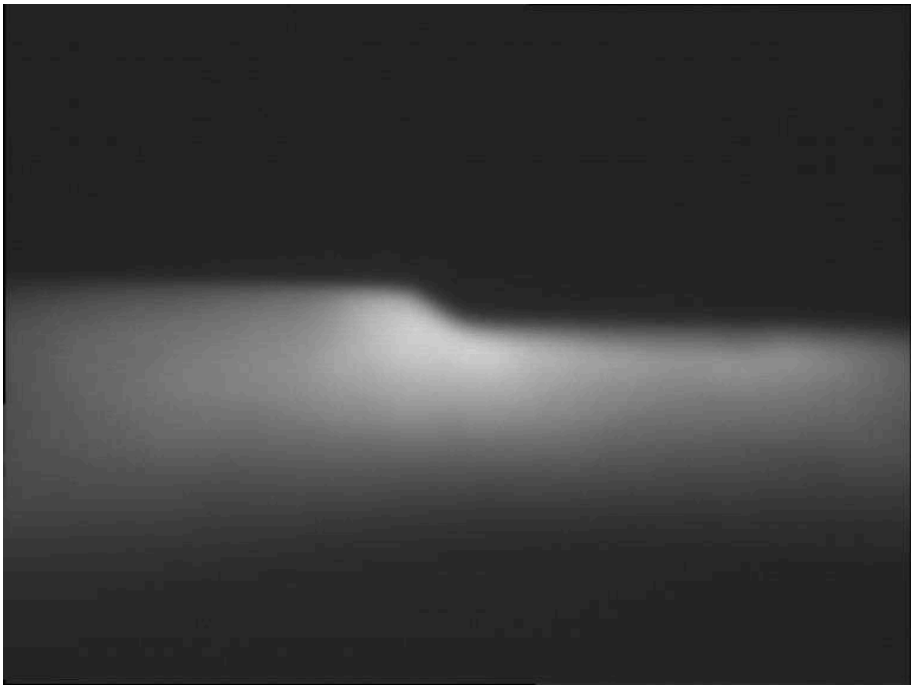


Figure 18: Japanese low beam

3.6 Dynamic headlamps and intelligent lighting systems

In order to improve road safety, sophisticated technologies are introduced to make lighting systems more intelligent.

These new technologies include *adaptive front lighting*, *variable intelligent lighting*, *dynamic bending lights*, *dynamic light spots*, *glare free high beam*, etc.

Most of these headlamps are controlled by other electronic systems of the car, such as intelligent cameras, radars, steering angle detection, etc. These kind of headlamps need special adjustment sequences and mostly require a calibration set-up of the vehicle (through vehicle specific diagnosis link). The calibration values should be stored afterwards in the electronic control unit (*ECU*) of the vehicle.

3.6.1 Glare free high beam with beam motorisation

Note: The terms *high beam* and *main beam* refer to the same type of headlamp and are used interchangeably.

An intelligent camera, fitted behind the windscreen, detects both vehicles in front of the car and oncoming vehicles. The high beam zone that might cause glare is darkened by adjusting the light image (by means of a servomotor). The beam images underneath can be moved horizontally in order to avoid glare at one specific zone on the road.

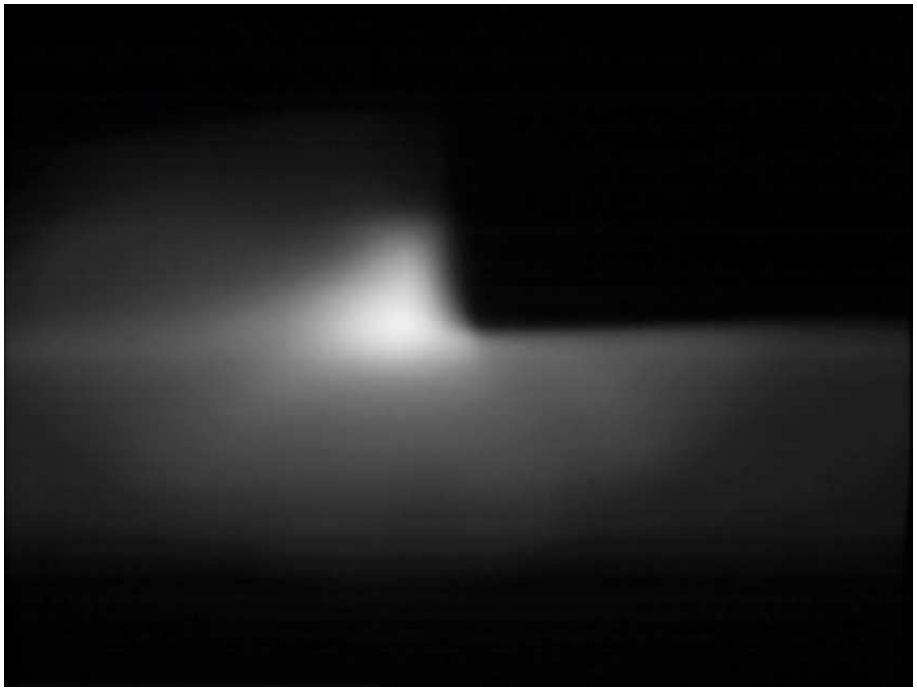


Figure 19: Left glare free high beam

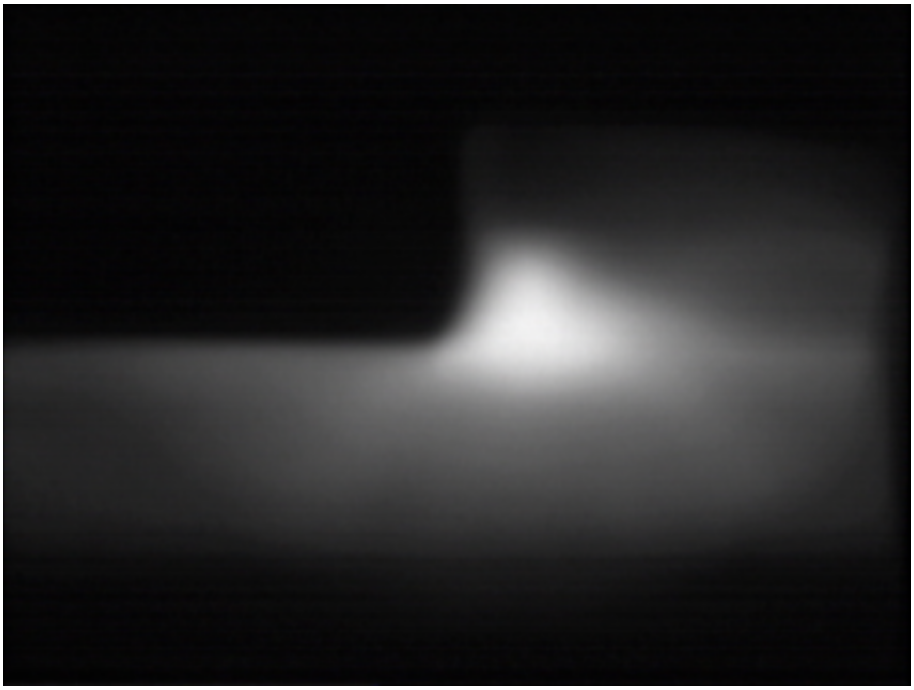


Figure 20: Right glare free high beam

An example of this headlamp principle is the *MDF (Maskiertes Dauerfernlicht)* high beam.

3.6.2 Glare free high beam with multiple static LED sources

An intelligent camera, fitted behind the windscreen, detects both vehicles in front of the vehicle and oncoming vehicles. The high beam zones that might cause glare are darkened by dimming or switching off one or more *LED* sources. So the overall high beam image is electronically controlled in order to avoid glare at multiple zones on the road.

Figure 21: Matrix high beam simulation scene

Calibrating a *Matrix* high beam with a headlight tester requires in most cases a calibration set-up of the vehicle (through vehicle specific diagnosis link) to switch on one of the *LED* sources as a reference.

The horizontal position of the reference spot should be mechanically adjusted or in other cases its position should be measured. The position is stored afterwards in the electronic control unit (*ECU*) of the vehicle.

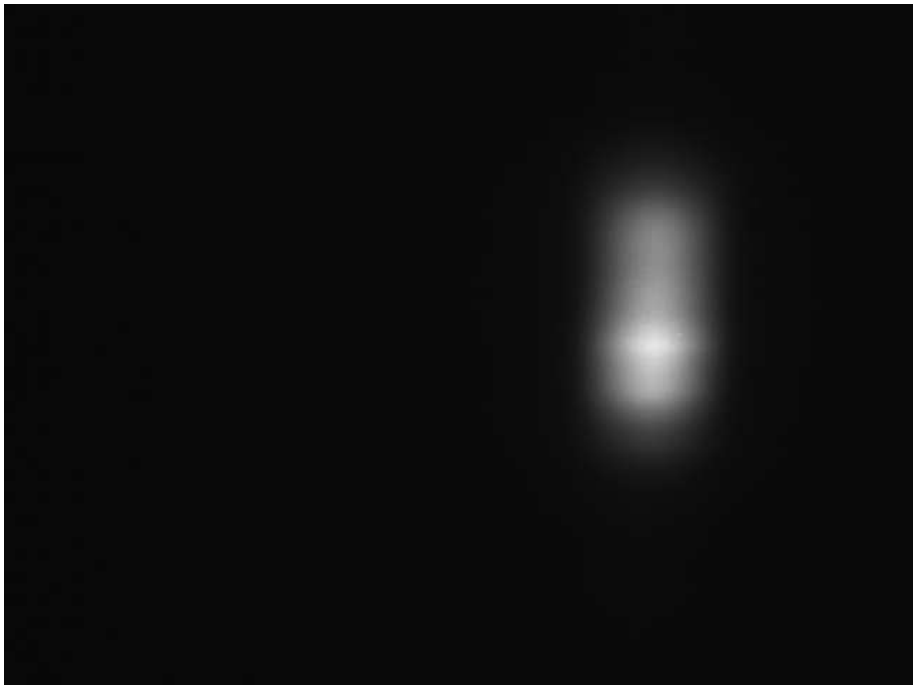


Figure 22: Reference spot of matrix high beam

An example of this headlamp principle is the *Matrix* high beam.

3.6.3 Dynamic low beam

Note: The terms *low beam* and *dipped beam* also refer to the same type of headlamp and are used interchangeably.

With a dynamic low beam, the horizontal position of the beam can be controlled by the steering angle, to achieve the most optimal light distribution on the road in all conditions (e.g. when the vehicle takes a turn). There are different technologies available for this purpose.

By means of a servo motor the horizontal *cut-off* line position could be automatically adapted during driving. In addition, there are also systems available with multiple *LED* sources as in the image underneath. It shows an *LHD* low beam *cut-off* line with a step of 90°. The upper part of the *cut-off* line (horizontal bar with the highest intensity at the right side of the image) can be made wider or smaller, depending on the steering angle of the vehicle. This is done by controlling the *LED* sources in order to have the most optimal road illumination for all steering angles when driving in low beam mode.

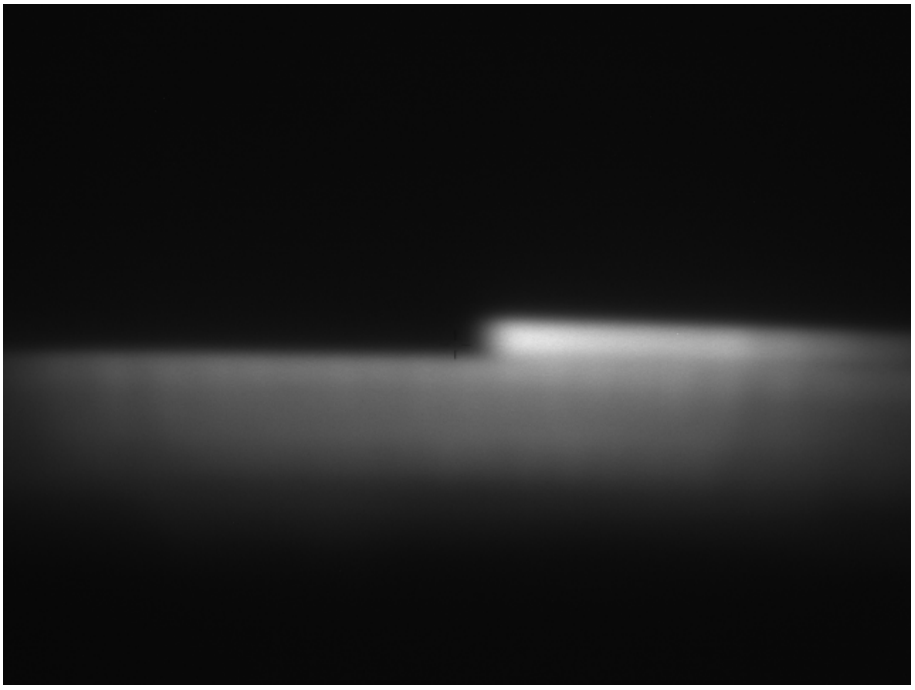


Figure 23: Dynamic low beam projection

4 Prerequisites for checking or adjusting

In order to achieve an accurate and stable headlamp measurement or adjustment, a number of prerequisites must be taken care of.

4.1 Prerequisites for the vehicle

- The front wheels must be in the straight-line travel position.
- The tires should be inflated to manufacturer specified pressures.
- The vehicle should be empty, with the hand-brake released.
- The springs and the shock-absorbers should be in their equilibrium positions. For vehicles with hydro-pneumatic suspension, the motor should be running.
- Where the vehicle is equipped with a manual control to adjust the low beam, it should be checked that it is in its rest position.

4.2 Prerequisites for the headlamps

- Check that the headlamps are rigidly connected to the vehicle.
- Check whether the two lamp glasses are identical, whether they are in their correct angular position and that they are not cracked.
- Check that the lamp glasses are clean and whether the reflectors are in a satisfactory state.
- Check that the headlamp units neither contain any water, or are misted up.

4.3 Positioning the system

- Locate the vehicle approximately 30-60 cm from the lens of the headlamp tester.
- Check regularly that the air bubble in the spirit level is centered at the lamps' test place.

5 Technical characteristics

5.1 PLA 35 models

Depending on the provided guiding system, there are different Luminoscope® models available.

Model	Height range of the Luminoscope optical axis	Description
Luminoscope® PLA 35 DR	Between 240 mm and 1355mm. Range might extend slightly further.	The two V-shaped front weels of the trolley base are guided on a hexagonal rail. The simple flat wheel runs on the square rail. The uniform levelling of the rails can be easily adjusted to obtain a perfect horizontal movement over the whole lenght of the rails.
Luminoscope® PLA 35 SR	Between 255mm and 1370mm. Range might extend slightly further.	The two rubber front wheels of the trolley are guided on a simple M-shaped steel rail, fixated to the floor. The rubber rear wheel runs on the floor. There is no adjustment mechanism provided to adjust the uniform levelling of the rail. The inclination of the optical unit will subtle vary without any doubt while displacing the Luminoscope® and this has a direct consequence on the headlamp measurement. To solve this problem, the Luminoscope® PLA 35 SR is equipped with the *ESL* (electronic spirit level module).
Luminoscope® PLA 35 NR	Between 255 mm and 1370mm. Range might extend slightly further.	The three rubber wheels of the trolley base run on the floor. The Luminoscope® can be used on different locations which have identical floor slope for the vehicle standing area. The inclination of the optical unit will subtle vary without any doubt while displacing the Luminoscope® and this has a direct consequence on the headlamp measurement. To solve this problem, the Luminoscope® PLA 35 NR is equipped with the *ESL* (electronic spirit level module).

Luminoscope® PLA 35 DR

Figure 24: General view of Double Rail model (PLA 35 DR)

Luminoscope® PLA 35 SR

Figure 25: General view of Single Rail model (PLA 35 SR)

Luminoscope® PLA 35 NR

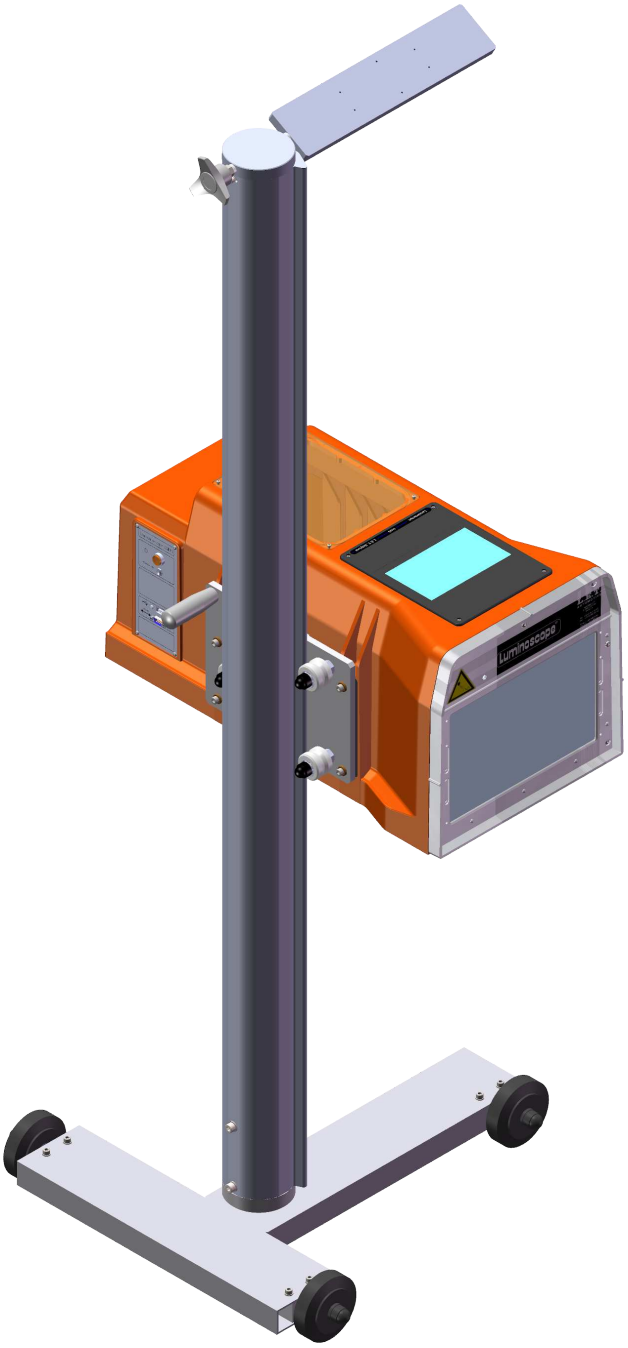


Figure 26: General view of No Rail model (PLA 35 NR)

5.2 Guiding systems

The two front wheels of the trolley base of the Luminoscope® PLA 35 can be guided on one non-adjustable rail profile that is fixed to the floor. Other systems are guided on two robust adjustable rails which are fixed to the floor or recessed in the floor.

Guiding the Luminoscope® PLA 35 on rails ensures an easier alignment of the Luminoscope® system with the vehicle. In case the rails are adjustable, the Luminoscope® remains horizontally along the whole range of the rails.

Luminoscope® PLA 35 systems without guiding rails are also available. In this case, the rubber wheels of the trolley base are just running on the floor. The equipment can be used on different locations which have the same floor slope for the vehicle standing area.

On systems with non-adjustable rails or without any rails, the inclination of the optical block will subtle vary without any doubt while displacing the system. This has a direct consequence on the measurement results of the Luminoscope® system. To solve this problem, the Luminoscope® PLA 35 could be equipped with an *ESL* (electronic spirit level module).

The purpose of the *ESL* (electronic spirit level module) is to automatically take into account a possible inclination of the optical block (caused for instance by the slope of non-adjustable rails or the absence of any guiding rail) to ensure an accurate measurement.

There are three different guiding systems available, depending on the use or type of rail:

- DR – Double Rail
- SR – Single Rail
- NR – No Rail

5.2.1 PLA 35 DR: double rail

The two V-shaped front wheels 1 of the trolley base are guided on a hexagonal rail 2. The simple flat rear wheel 3 runs on the square rail 4. The uniform levelling of the rails can be easily adjusted to obtain a perfect horizontal movement over the whole length of the rails.

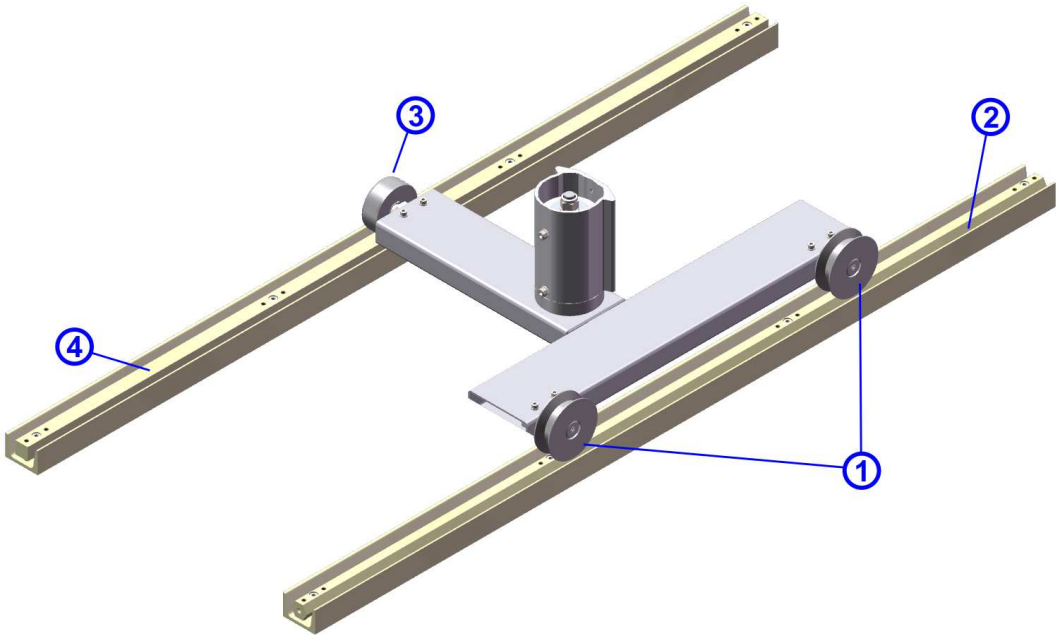


Figure 27: Double rail (DR)

5.2.2 PLA 35 SR: single rail

The two front rubber wheels 1 of the trolley base are guided on a simple M-shaped steel rail 2, fixated to the floor. The rear rubber wheel 3 runs on the floor.

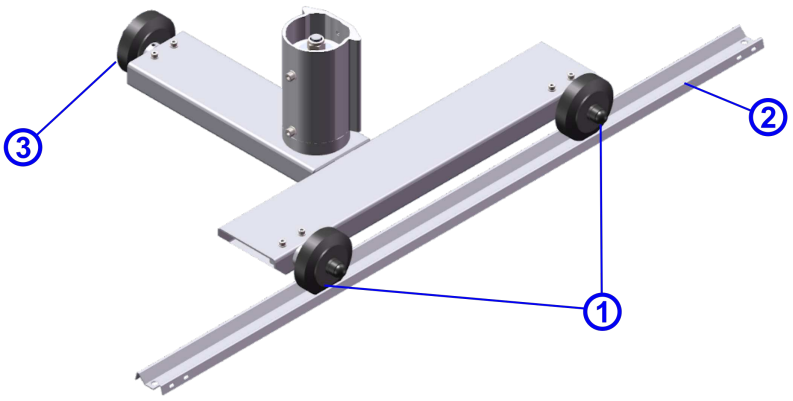


Figure 28: Single rail (SR)

There is no adjusting mechanism provided to adjust the uniform levelling of the rail.

5.2.3 PLA 35 NR: no rail

The three rubber wheels of the trolley base run on the floor.

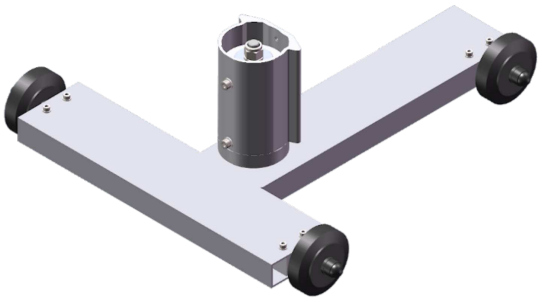


Figure 29: No rail (NR)

The equipment can be used on different locations which have an identical floor slope for the vehicle standing area.

The shape of the NR base differs from that for DR and SR models. The reason behind this is achieving an easier movement of the system between locations.

5.3 Layout

The following sections include detailed graphics and callouts of the Luminoscope® which lead to an easier identification of the different parts and models.

Remember: Depending on the ordered options, the supplied unit may look slightly different from the following drawings.

5.3.1 Front view

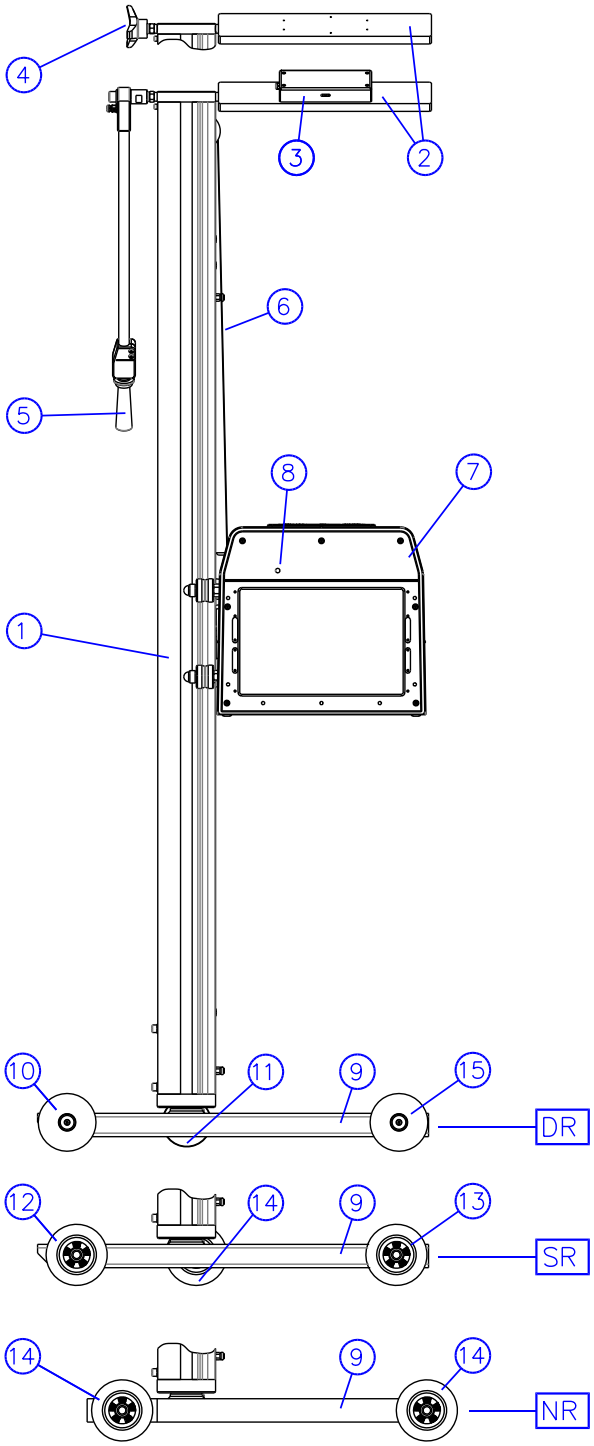


Figure 30: Front view of the Luminoscope®

1	Stand	The optical block is attached to the vertical sliding table of the stand.
2	Alignment mirror	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
3	Green alignment laser (optional)	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
4	Mirror / laser handle (standard type)	Used to tilt the alignment mirror / laser assembly.

5	Mirror / laser lever (optional)	Used to tilt the alignment mirror / laser assembly. The button on the lever extends the power-on button on the alignment laser.
6	Counterweight cable	Connects the vertical sliding table of the optical block with the counterweight inside the stand.
7	Optical block	The optical block includes a lens, a white projection screen, a digital camera, a control panel and a connector plate. Captures, processes and analyzes the headlight beam projection.
8	Red laser pointer (optional)	Its purpose is to point at the lowest rim of the reflector of the headlamp to determine the mounting height of the headlamp. Only applicable in certain countries.
9	Trolley base	The trolley base on wheels ensures the stability and the perpendicularity of the system.
10	V-wheel with eccentric axle	Front wheel guides the system on the hexagonal rail. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
11	Flat wheel with eccentric axle	Flat wheel running on the square rail. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
12	Rubber wheel with eccentric axle	The rubber wheel runs on a non-adjustable rail profile. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
13	Rubber wheel	The rubber wheel runs on a non-adjustable rail profile.
14	Rubber wheel with eccentric axle	The rubber wheel runs on the floor. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
15	V-wheel	Front wheel running on the hexagonal rail.

5.3.2 Top view

PLA 35 DR

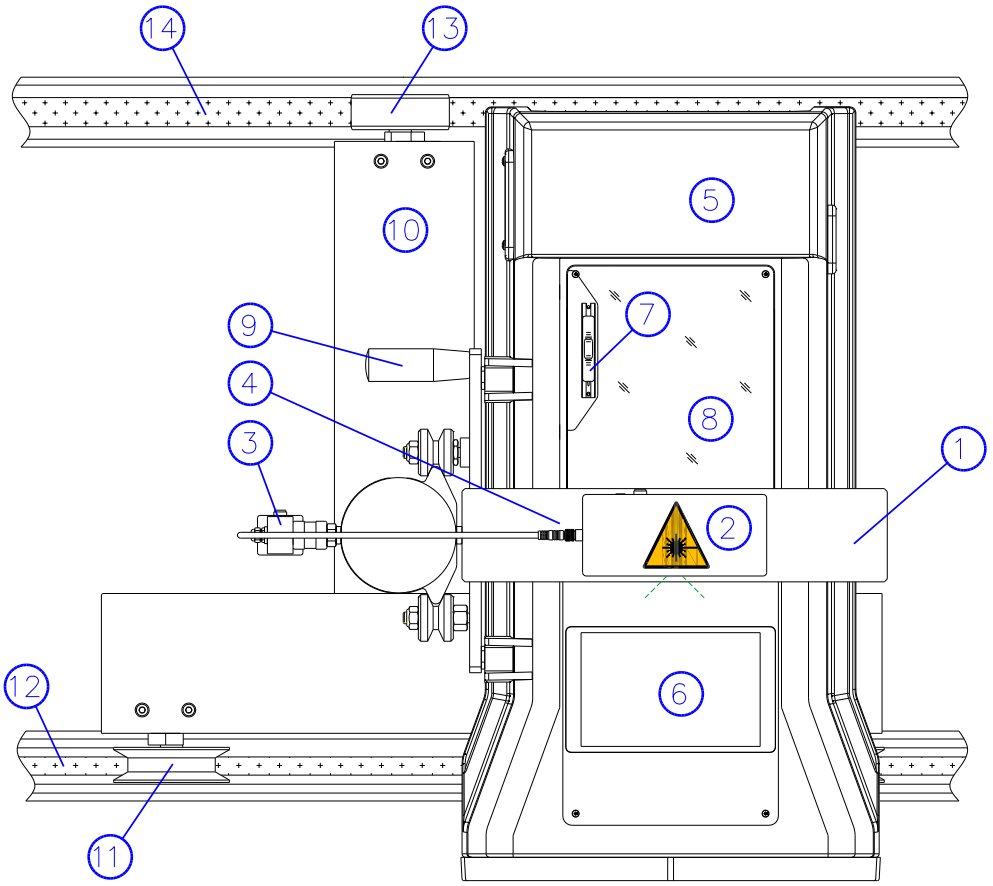


Figure 31: Top view Luminoscope® *PLA 35 DR*

1	Alignment mirror	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
2	Green alignment laser (optional)	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
3	Mirror / laser lever (optional)	Used to tilt the alignment mirror / laser assembly. The button on the lever extends the power-on button on the alignment laser.
4	Connector for external power-on button of alignment laser	Connected to the button of the optional lever, when this is supplied.
5	Optical block	The optical block includes a lens, a white projection screen, a digital camera, a control panel and a connector plate. Captures, processes and analyzes the headlight beam projection.
6	Control panel	Control panel with 7" colour touch screen to operate the system and to visualize the headlight image.
7	Reference spirit level	The reference spirit level is used as a tool to verify the calibration status of the optical block. The Luminoscope® PLA 35 is initially calibrated at the factory to a point on which the optical axis of the optical block is horizontal.

8	Perspex window	The headlight image on the projection screen inside the optical block is visible through this window.
9	Handle	Handle on the vertical sliding table to move the system and vertically displace the optical block.
10	Trolley base	The trolley base on wheels ensures the stability and the perpendicularity of the system.
11	V-wheel with eccentric axle	Front wheel guides the system on the hexagonal rail. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
12	Adjustable hexagonal rail profile	Adjustable rail profile embedded in the floor, which guides the two front V-wheels of the trolley base.
13	Flat wheel with eccentric axle	Flat wheel running on the square rail. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
14	Adjustable square rail profile	Adjustable square rail profile embedded in the floor, over which the rear flat wheels of the trolley base runs.

PLA 35 SR

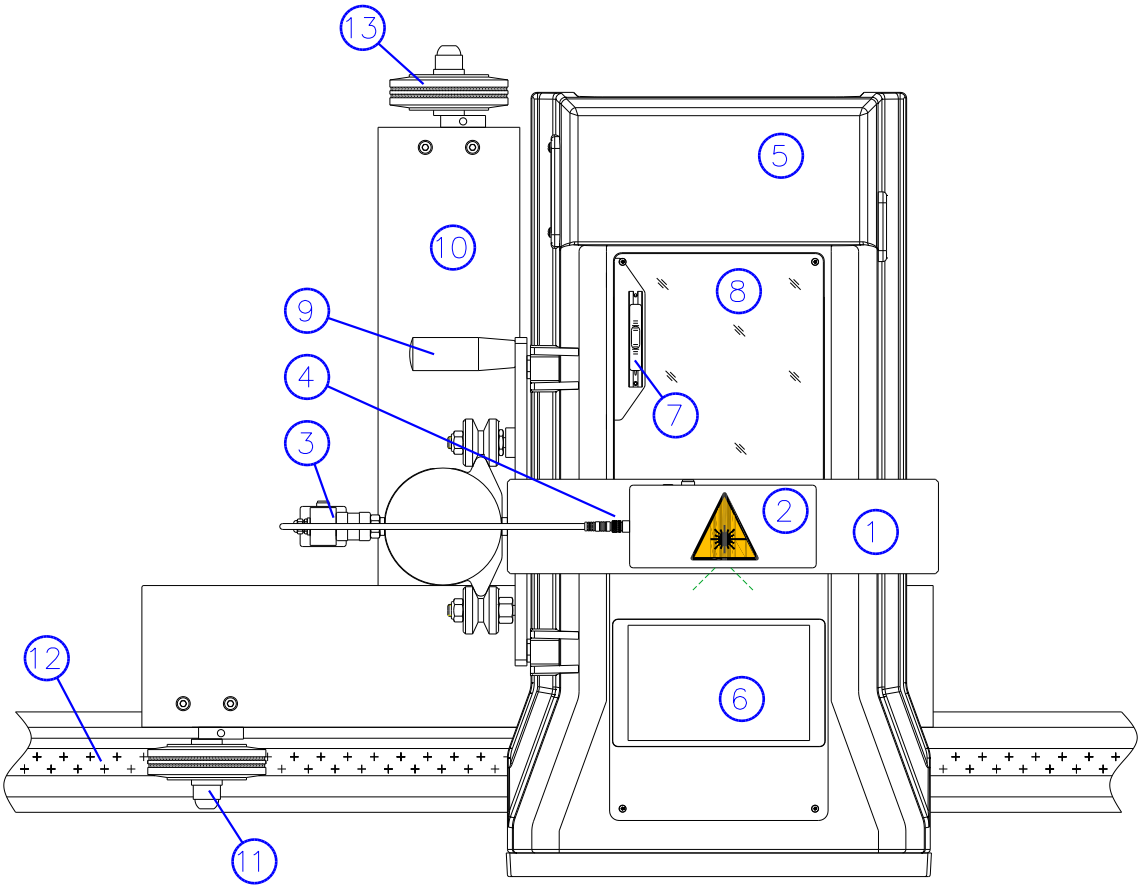


Figure 32: Top view Luminoscope® *PLA 35 SR*

1	Alignment mirror	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
2	Green alignment laser (optional)	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.

3	Mirror / laser lever (optional)	Used to tilt the alignment mirror / laser assembly. The button on the lever extends the power-on button on the alignment laser.
4	Connector for external power-on button of alignment laser	Connected to the button of the optional lever, when this is supplied.
5	Optical block	The optical block includes a lens, a white projection screen, a digital camera, a control panel and a connector plate. Captures, processes and analyzes the headlight beam projection.
6	Control panel	Control panel with 7" colour touch screen to operate the system and to visualize the headlight image.
7	Reference spirit level	The reference spirit level is used as a tool to verify the calibration status of the optical block. The Luminoscope® PLA 35 is initially calibrated at the factory to a point on which the optical axis of the optical block is horizontal.
8	Perspex window	The headlight image on the projection screen inside the optical block is visible through this window.
9	Handle	Handle on the vertical sliding table to move the system and vertically displace the optical block.
10	Trolley base	The trolley base on wheels ensures the stability and the perpendicularity of the system.
11	Rubber wheel with eccentric axle	The rubber wheel runs on a non-adjustable rail profile. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
12	Non-adjustable rail profile	Non-adjustable rail profile mounted on the floor. The two front rubber wheels of the trolley base are guided on the rail.
13	Rubber wheel with eccentric axle	The rubber wheel runs on the floor. Provided with an eccentrical axis which allows for the vertical adjustment of the column.

PLA 35 NR

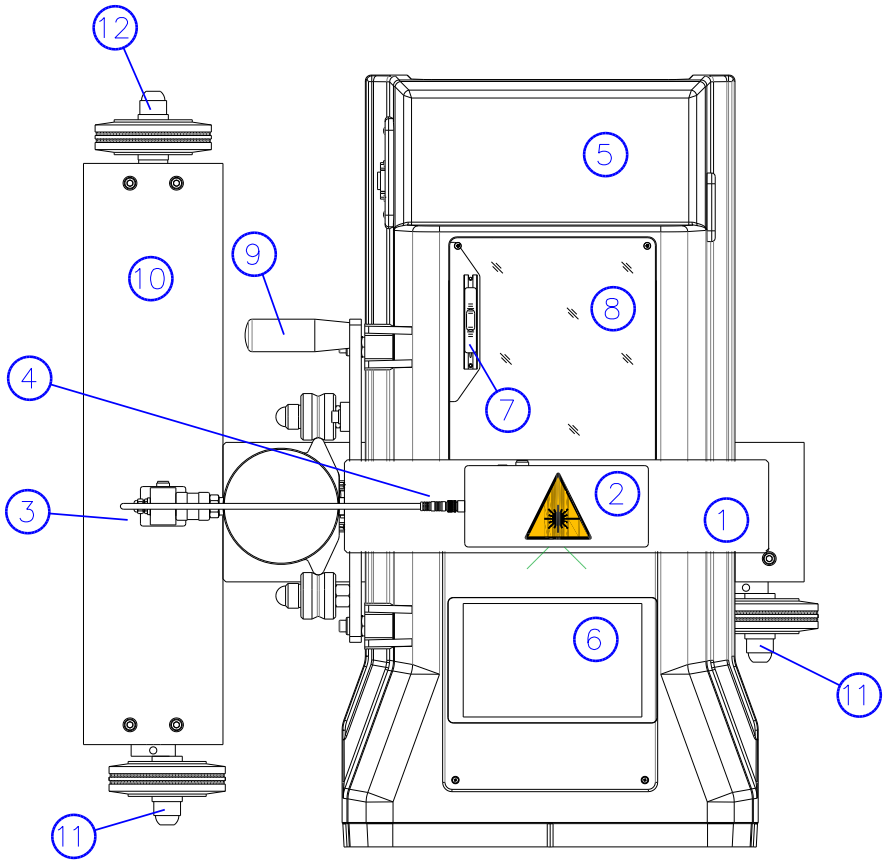


Figure 33: Top view Luminoscope® *PLA 35 NR*

1	Alignment mirror	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
2	Green alignment laser (optional)	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
3	Mirror / laser lever (optional)	Used to tilt the alignment mirror / laser assembly. The button on the lever extends the power-on button on the alignment laser.
4	Connector for external power-on button of alignment laser	Connected to the button of the optional lever, when this is supplied.
5	Optical block	The optical block includes a lens, a white projection screen, a digital camera, a control panel and a connector plate. Captures, processes and analyzes the headlight beam projection.
6	Control panel	Control panel with 7" colour touch screen to operate the system and to visualize the headlight image.
7	Reference spirit level	The reference spirit level is used as a tool to verify the calibration status of the optical block. The Luminoscope® PLA 35 is initially calibrated at the factory to a point on which the optical axis of the optical block is horizontal.
8	Perspex window	The headlight image on the projection screen inside the optical block is visible through this window.

9	Handle	Handle on the vertical sliding table to move the system and vertically displace the optical block.
10	Trolley base	The trolley base on wheels ensures the stability and the perpendicularity of the system.
11	Rubber wheel with eccentric axle	The rubber wheel runs on the floor. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
12	Rubber wheel	The rubber wheel runs on the floor.

5.3.3 Left side view

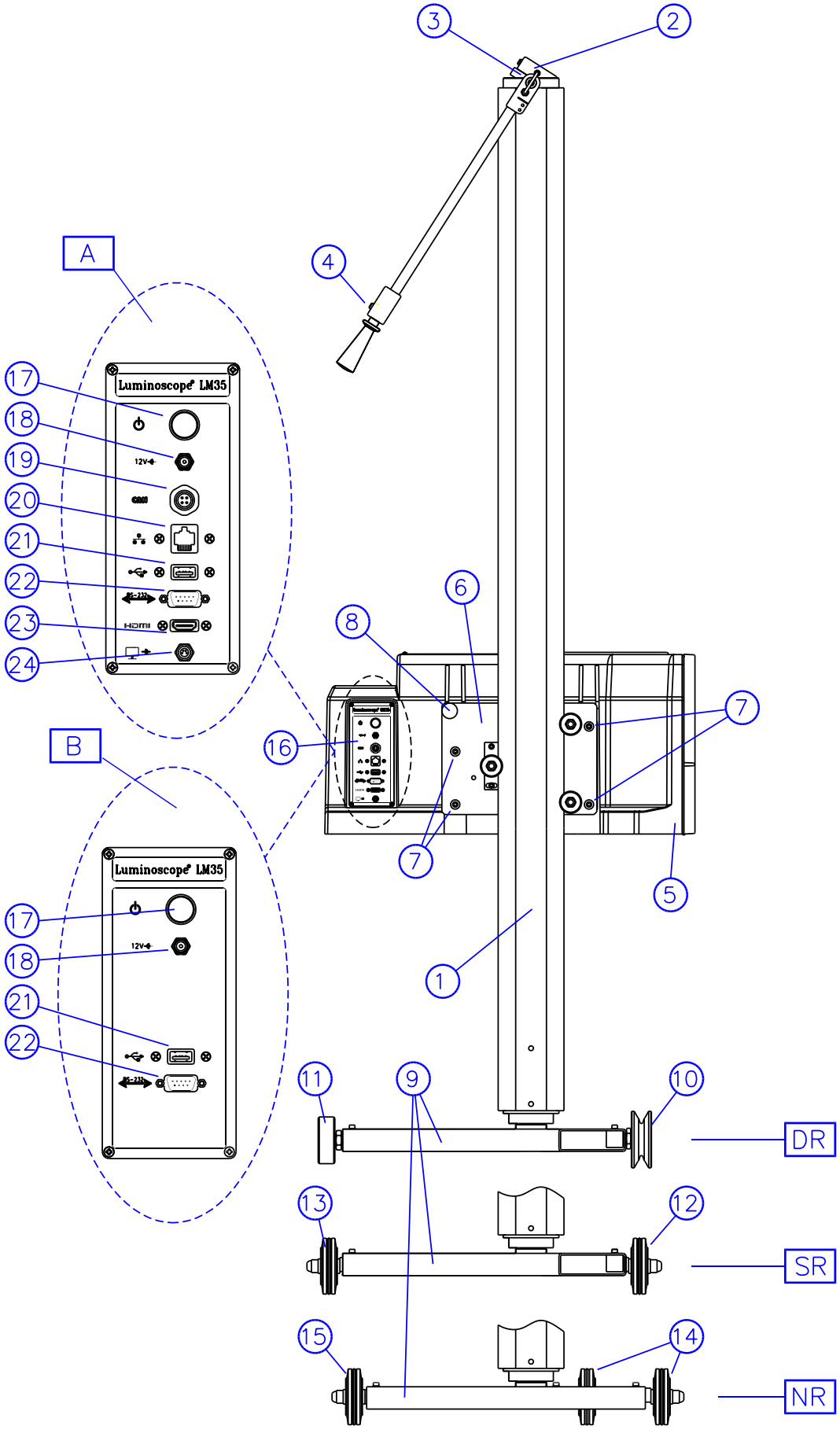


Figure 34: Left side view Luminoscope® *PLA 35*

1	Stand	The optical block is attached to the vertical sliding table of the stand.
2	Green alignment laser (optional)	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
3	Alignment mirror	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
4	Mirror / laser lever (optional)	Used to tilt the alignment mirror / laser assembly. The button on the lever extends the power-on button on the alignment laser.
5	Optical block	The optical block includes a lens, a white projection screen, a digital camera, a control panel and a connector plate. Captures, processes and analyzes the headlight beam projection.
6	Vertical sliding table	The sliding table carries the optical block and can be displaced vertically by means of 3 small guiding wheels on the stand.
7	Fixation screws for optical block	The optical block is attached to the vertical sliding table by means of 4 screws DIN912 M6x20mm and 4 copper washers.
8	Handle	Handle on the vertical sliding table to move the system and vertically displace the optical block.
9	Trolley base	The trolley base on wheels ensures the stability and the perpendicularity of the system.
10	V-wheel with eccentric axle	Front wheel guides the system on the hexagonal rail. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
11	Flat wheel with eccentric axle	Flat wheel running on the square rail. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
12	Rubber wheel with eccentric axle	The rubber wheel runs on a non-adjustable rail profile. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
13	Rubber wheel with eccentric axle	The rubber wheel runs on the floor. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
14	Rubber wheel with eccentric axle	The rubber wheel runs on the floor. Provided with an eccentrical axis which allows for the vertical adjustment of the column.
15	Rubber wheel	The rubber wheel runs on the floor.
16	Connectors plate	Provides all the power and signal connectors of the optical block. There are different available configurations. Shown are *Full option* (A) and *Standard model* (B).
17	Power button with control light	Switches the optical block ON and OFF. Press the button 1 second to switch on the system or to recover from stand-by mode. Press the button 4 seconds to reset the system (cold start). The control light blinks to indicate the charging status of the battery.
18	12VDC charging connector	The internal battery pack of the optical block can be charged with the supplied 12VDC/60W adaptor.

19	CAN port (optional)	For communication with optional CAN (Controller Area Network) modules.
20	Ethernet port (optional)	Connector for LAN communication.
21	USB connector	Multipurpose USB port: system backup and upgrade, USB keyboard or USB barcode scanner.
22	RS232 connector	Serial line for communication purposes.
23	HDMI connector (optional)	Signal output connector for optional HDMI monitor attached to the stand.
24	12VDC power connector for HDMI monitor (optional)	Power for optional HDMI monitor attached to the stand.

5.3.4 Right side view

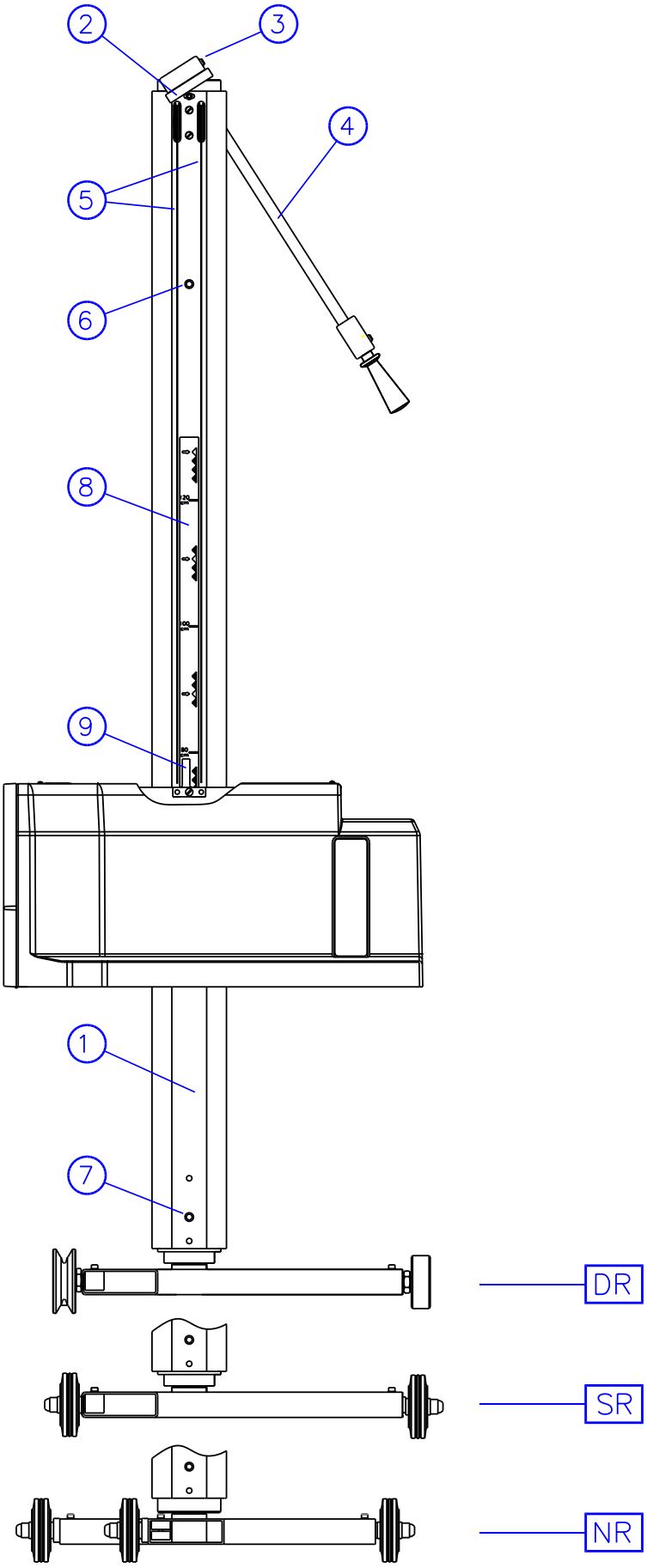


Figure 35: Right view Luminoscope® *PLA 35*

1	Stand	The optical block is attached to the vertical sliding table of the stand.
2	Alignment mirror	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
3	Green alignment laser (optional)	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
4	Mirror / laser lever (optional)	Used to tilt the alignment mirror / laser assembly. The button on the lever extends the power-on button on the alignment laser.
5	Counterweight cable	Connects the vertical sliding table of the optical block with the counterweight inside the stand.
6	Upper mechanical stop	Stops the vertical displacement of the sliding table in the highest position.
7	Lower mechanical stop	Stops the vertical displacement of the sliding table in the lowest position.
8	Headlamp mounting height indication sticker	Sticker with the different height zones. The specific sticker model, and even its requirement, depends on local authorities and norms. Please read the specific chapter on this topic.
9	Headlamp mounting height indicator	Shows the height zone in which the optical block is located after a correct light positioning with the help of the *Position Check* arrows.

5.3.5 Alignment laser

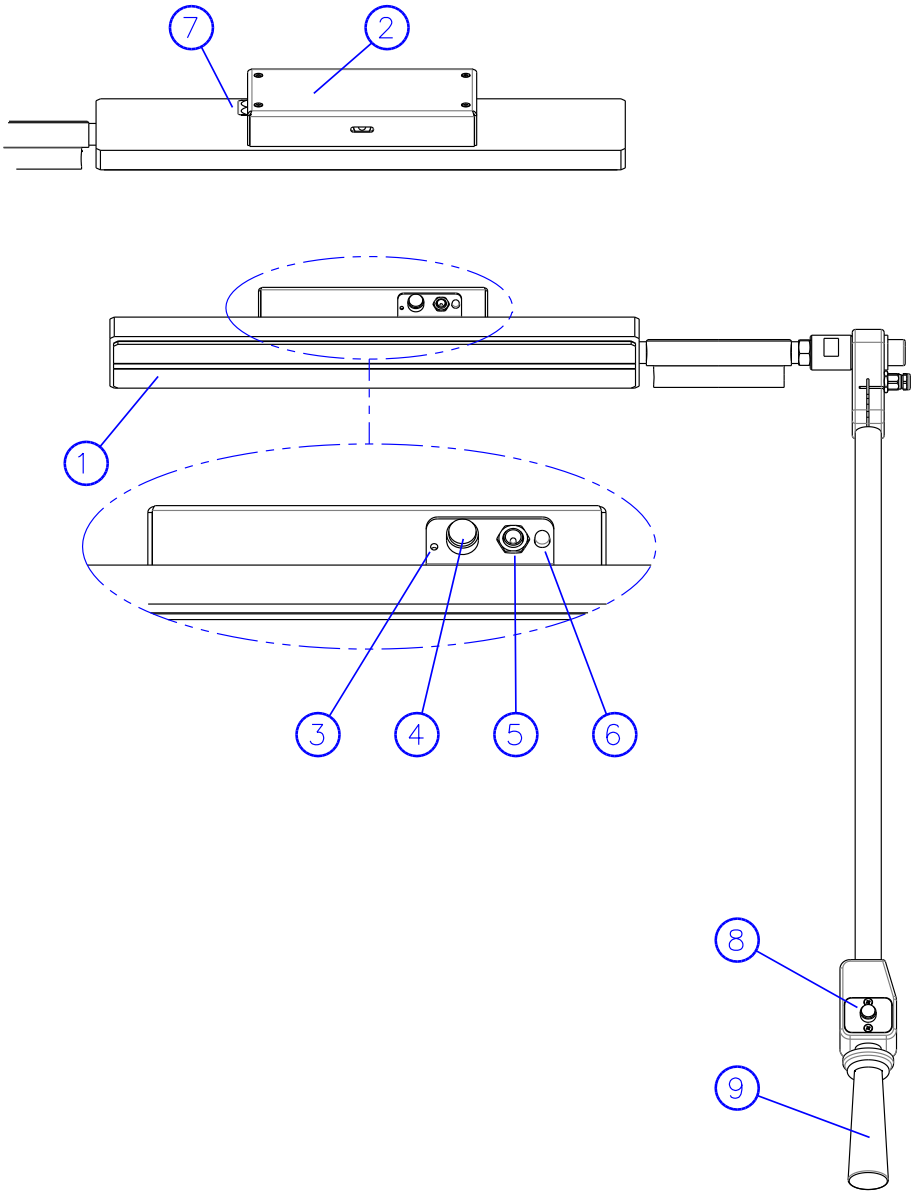


Figure 36: Alignment laser and mirror assembly

1	Alignment mirror	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
2	Green alignment laser (optional)	Used to align the optical axis of the optical block with the longitudinal axis of the vehicle.
3	Auto power-off time adjustment	Trimmer for adjusting the activation time for the alignment laser auto power-off function, between 6 sec and 2 minutes.
4	Power-on button	Push the button to turn on the alignment laser. The laser turns off automatically after a pre-set time.
5	12VDC charging connector	Battery charging connector. The internal battery pack provides power to the alignment laser. Use only the supplied 12VDC/60W adaptor.

6	Status LED	This bicolor LED is connected to a voltage monitor that measures the battery voltage during charging and normal use. The color of the LED indicates the current status. Refer to the table below for a complete explanation.
7	Connector for external power-on button of alignment laser	Connected to the button of the optional lever, when this is supplied.
8	Power-on button on lever	Push the button to turn on the alignment laser. The laser turns off automatically after a pre-set time.
9	Mirror / laser lever (optional)	Used to tilt the alignment mirror / laser assembly. The button on the lever extends the power-on button on the alignment laser.

The color of the status LED 6 varies with the battery charge or usage cycle as follows:

While charging	RED	Charging voltage too low.
	ORANGE	Battery is being charged.
	GREEN	Battery fully charged.
While in use	RED	Battery voltage too low.
	ORANGE	Battery voltage is still enough.
	GREEN	Battery voltage OK.

5.4 Dimensions

5.4.1 PLA 35 DR

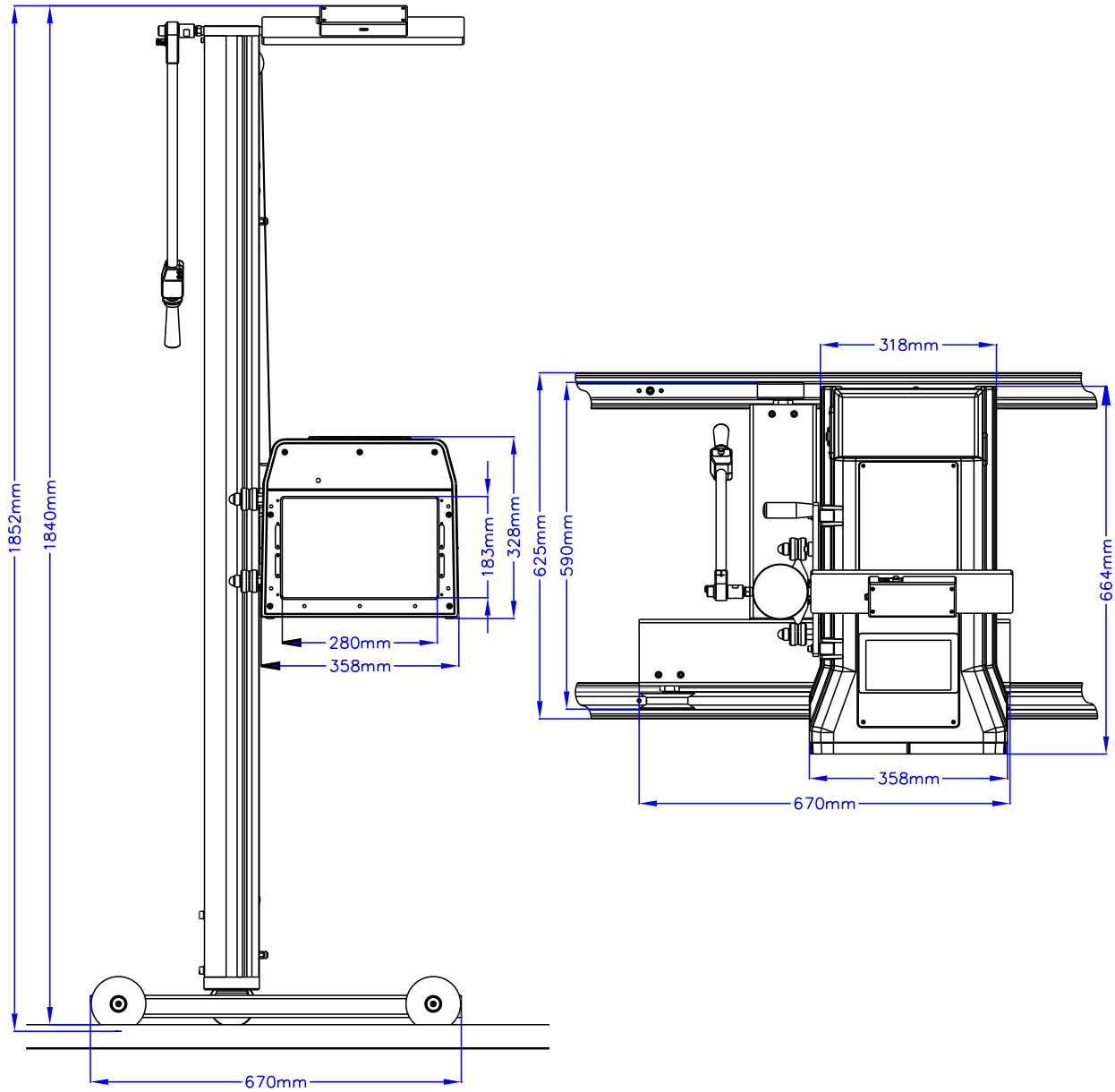


Figure 37: PLA 35 DR: front and top views

5.4.2 PLA 35 SR

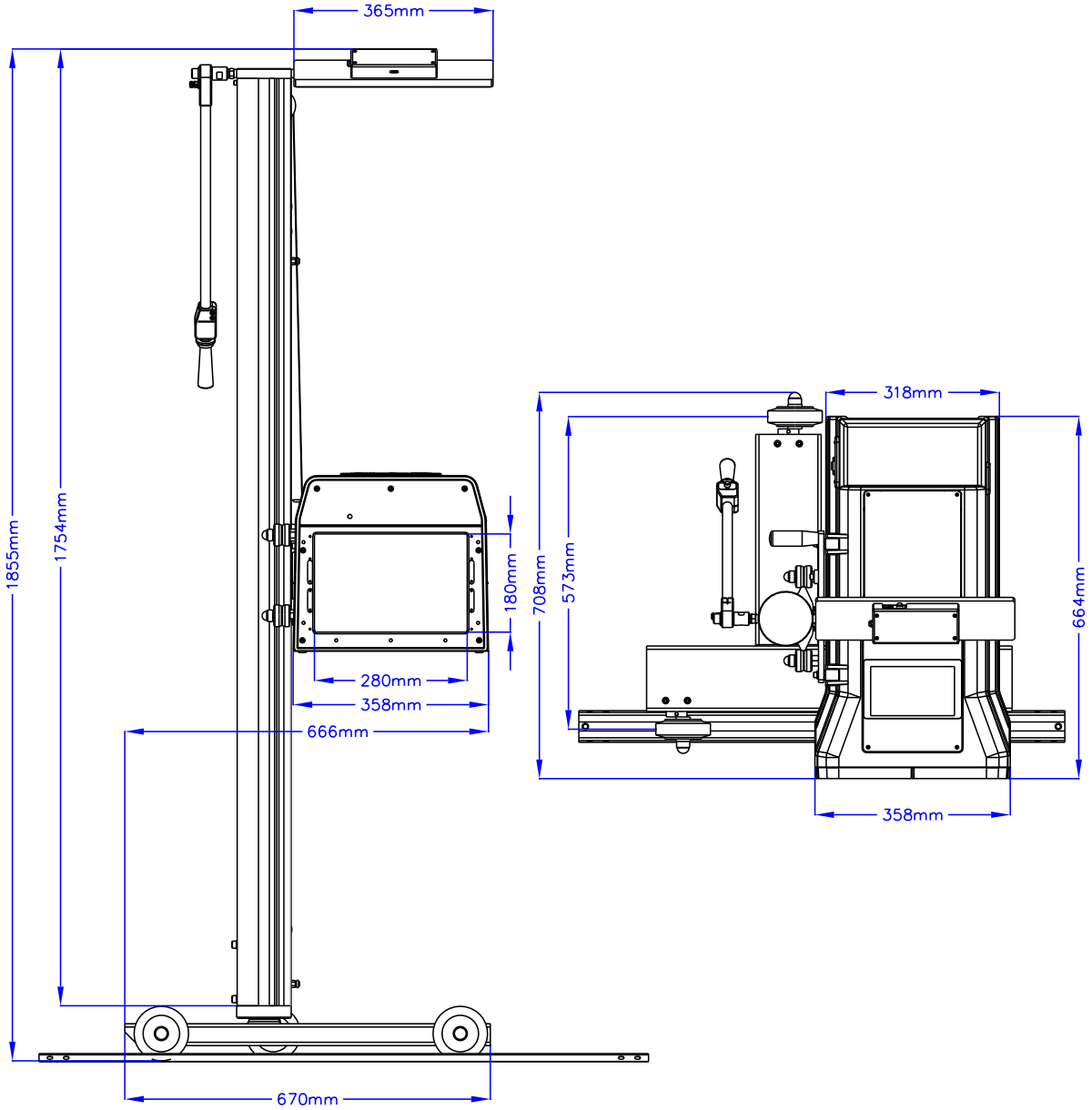


Figure 38: PLA 35 SR: front and top views

5.4.3 PLA 35 NR

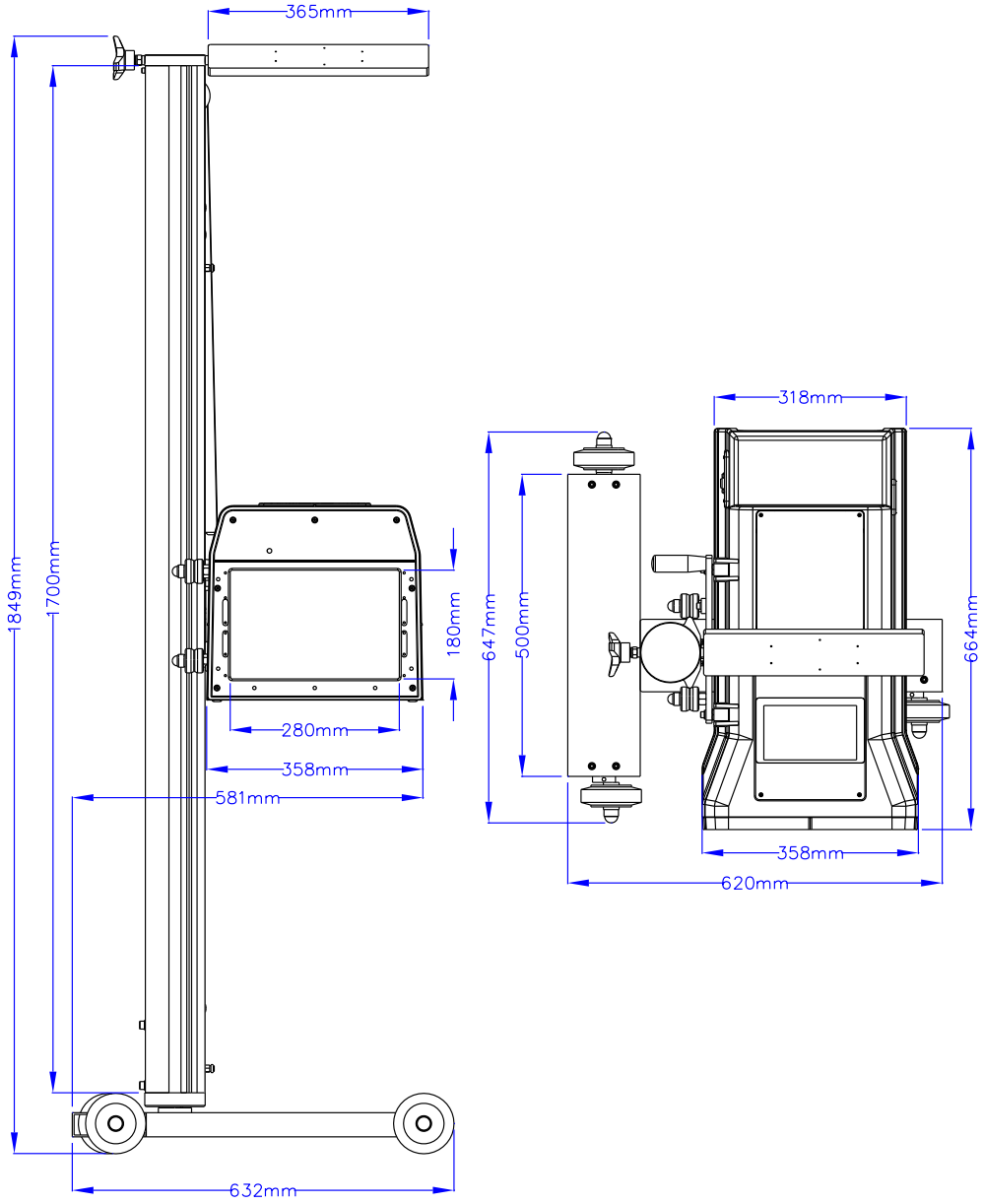


Figure 39: PLA 35 NR: front and top views

5.5 Datasheet

Testing area	Up	0-10	%
	Down	0-10	%
	Left	0-10	%
	Right	0-10	%
	Luminous intensity	0-125	kCd
Measurement tolerance		±1	cm/10m
		±0,1	%
Measurement resolution		1	mm/10m

		0,01	%
Measuring range for *ESL* (electronic spirit level module)	Pitch and roll angle	±0,2	%
Vertical positioning range, measured from lens center to ground	PLA 35 DR	240-1355	mm
	PLA 35 SR	255-1370	mm
	PLA 35 NR	255-1370	mm
Dimensions	Length	670	mm
	Width	675	mm
	Height	1.805	mm
Weight		≈ 50	kg
Operating temperature range	Minimum	-10	°C
	Maximum	+35	°C
Optical block internal battery	Technology	NiMH	
	Voltage	7,2	VDC
	Capacity	9	Ah
	Continuous operating time	8	h
	Charger voltage	12	VDC
	Charger power	60	W
	Charging cycle	12	h
Optional Alignment laser battery	Technology	NiMH	
	Voltage	4,8	VDC
	Capacity	1,9	Ah
	Continuous operating time	6	h
	Charger voltage	12	VDC
	Charger power	60	W
	Charging cycle	10	h
Color LCD touch screen	Size	7	Inch
	Resolution	1024x600	px
Interfaces	LAN	1	Gbps
	WLAN	WPA2 / 802.11bgn	
	Bluetooth	v4.0	
	Serial	RS232	
	HDMI (optional)	1280x720	px
	USB	v2	

6 Power management

This chapter explains the details on the power-on and off cycle, showing how to switch the system on for normal use and how to switch it off when required.

It also explains the *standby mode* and how to wake the system up after inactivity.

Finally the *auto power-off* feature and the *system reset* are explained.

6.1 Switching the Luminoscope® ON and OFF

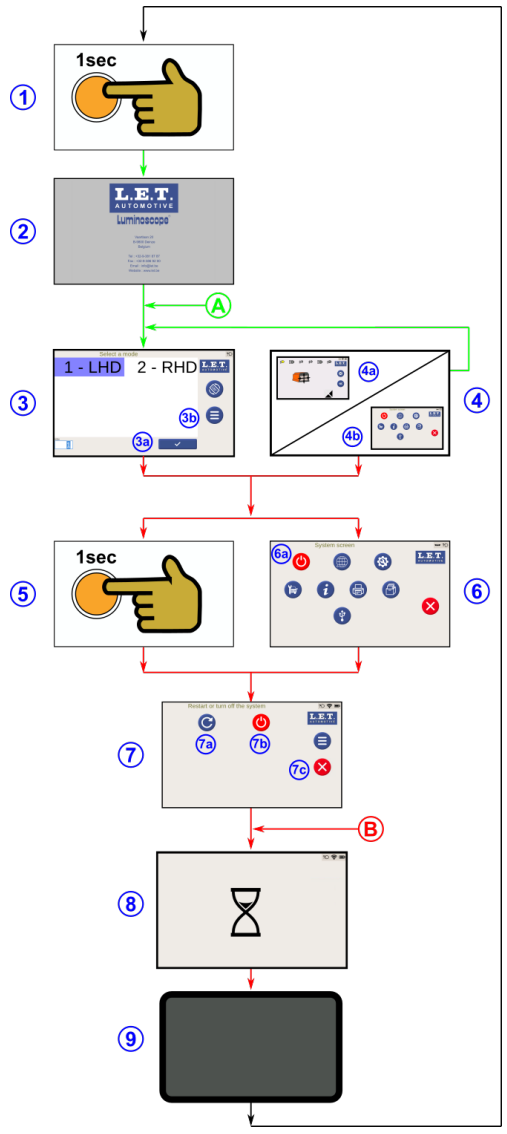
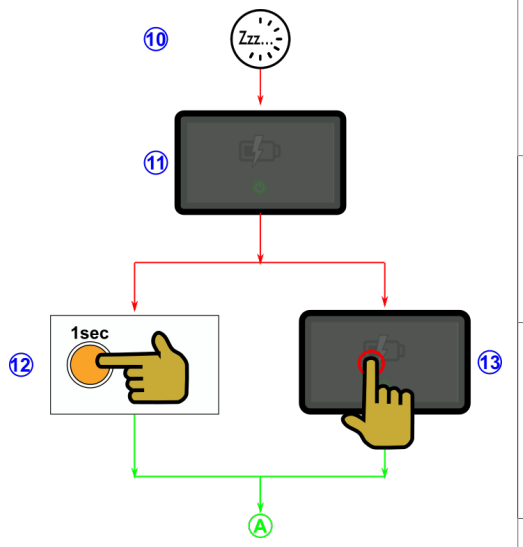


Figure 40: Switching the Luminoscope® ON and OFF

1	**Power** button on the *Optical block*	Turn the Luminoscope® on by pushing the **Power** button on the *Optical block* for 1 second.
2	Start screen	Info *L.E.T. Automotive NV*. The unit starts up and is initializing.
3	Program selection screen	Screen with choice to confirm a selected program 3a or to open the system screen 3b.
4	Operational mode	Cycle screens 4a, system screens 4b, configuration screens, etc.
5	**Power** button on the *Optical block*	Push the **Power** button on the *Optical block* for 1 second to switch the Luminoscope® off.
6	**Power** button on the touch screen	Tap on step 3 on the **System** button 3b and the **Power** button 6a appears on the **System** screen 6. This button has the same function as the **Power** button on the *Optical block* 5.
7	Restart or switch-off	This screen contains three options: 7a - Restart the Luminoscope®. 7b - Switch the Luminoscope® off completely. 7c - Leave this screen. The Luminoscope® stays on.
8	Hour glass screen	Displayed during some seconds while the Luminoscope® turns off completely.
9	Luminoscope® switched off	The unit is turned off.

6.2 Power standby



10	Standby timer	When the Luminoscope® is turned on but not used for a while (no button pressed, no lamp measured, etc), it will switch to *standby* mode after a configurable time.
11	Standby mode	When the Luminoscope® enters the *standby* mode, the LCD screen turns dark instantaneously, but the unit is not switched off.
12	**Power** button on the *Optical block*	Wake the Luminoscope® up by pushing the **Power** button on the *Optical block* for 1 second. The **Program selection** screen 3 pops up immediately.
13	Touch the screen	Wake the Luminoscope® up by pushing a random place on the LCD screen. The **Program selection** screen screen 3 pops up immediately.

6.3 Inactivity timer

In addition to the *standby mode* discussed in previous chapter, there is also an integrated timer feature that fully turns the unit off after a configurable longer inactivity period (*auto switch off* function).

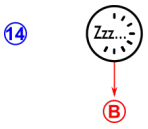
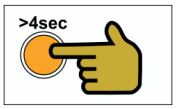


Figure 41: Automatically switching the Luminoscope® *OFF*

14	Inactivity timer	If the Luminoscope® is turned on but not used for a while (no button pressed, no lamp measured, etc.), it automatically switches to *standby mode*, darkening the LCD screen. If the inactivity period extends for a longer time, the Luminoscope® will be switched off completely. The Luminoscope® can be switched on again by pushing the **power button** 1 on the connector panel of the optical block.

6.4 Forced shut down of the Luminoscope®

This function provides a hardware power-off to be used only in cases of an unexpected operation.

	15	Forced shutdown	Pressing the power button for a time longer than 4 seconds will switch off the system immediately. This should only be used in case the system is blocked as a result of an unexpected operation.

7 Operation

The main purpose of the Luminoscope® is to measure specific headlamp beam characteristics such as horizontal beam position, vertical beam position, beam intensity, etc. There are different headlamp algorithms available for measuring the headlamp characteristics of different headlamp types. Based on the chosen algorithm, a number of the headlamp beam characteristics will be measured.

Most of the headlamp algorithms can be used either for adjusting the headlamp beam position or for checking the headlamp beam position. This means there are two different approaches for a test cycle:

- Headlamp aiming cycle: The position of the headlamp beam should be aimed (adjusted) to a pre-defined target position. An *aiming tolerance zone* around the target position allows the operator to adjust the headlamp correctly,
- Headlamp audit cycle: The position of the headlamp beam should be evaluated to check whether it is within the pre-defined *audit tolerance zone*.

The audit tolerance zone is in most cases determined by the government regulations. The *aiming tolerance zone* should always be smaller than the *audit tolerance zone*. This to ensure that a correctly aimed headlamp in a workshop (using the smaller *aiming tolerance zone*) will pass the test in a government inspection station (using the larger *audit tolerance zone*).

7.1 Test cycle references

There is a number of topics related with the test sequence which apply to many of its steps. They are collected below and will be used as a reference along the explanation of the test cycle.

7.1.1 Beam icons

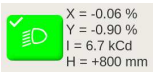
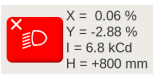
Each low beam, high beam and fog beam has its specific beam icon on the cycle screens. Next table explains the meaning of the icons and the different statuses.

Icon	Beam	Status description
	Low beam	Headlamp under test (test not yet started).
	High beam	
	Fog beam	
	Low beam	Headlamp position inside tolerance. The tolerance overlay on the headlamp image is green-colored.
	High beam	
	Fog beam	
	Low beam	Headlamp position outside tolerance. The tolerance overlay on the headlamp image is red-colored.
	High beam	
	Fog beam	

Similarly, each low beam, high beam and fog beam has its specific beam icon on the **Beam selection** screen. Next table explains the meaning of the icons and the different statuses.

Icon	Beam	Status description
	Low beam	Headlamp not yet tested.
	High beam	
	Fog beam	
	Low beam	Headlamp position inside tolerance.
	High beam	
	Fog beam	
	Low beam	Headlamp position outside tolerance.
	High beam	
	Fog beam	

After the test, the system displays a datablock including the test results next to the corresponding beam icon on the beam selection screen, regardless of the positive or negative test results.

Icon	Status description
	Approved headlamp with measurement results
	Rejected headlamp with measurement results

The datablocks for the results of each tested beam include the following information:

Value	Description
X	Horizontal beam measurement position (Left/Right)
Y	Vertical beam measurement position (Up/Down)
I	Intensity
H	Mounting height of the headlamp

Depending on the chosen algorithm and configuration of the system, the number of results so as the units may vary.

7.1.2 Left / right vehicle side definition

The left and right sides of the vehicle are always defined from the driver’s point of view.

Headlamps which are located at the left side (as seen from the driver’s point of view) are called the *left headlamps*, and those at the right side are called the *right headlamps*.

The touch screen of the Luminoscope® PLA 35 can be rotated 180° by pressing the **Rotate screen** button.

Consequently there are two possible screen orientations. One is better suited for checking headlamps and the other is preferred for adjusting headlamps.

Screen orientation mode	Description
Checking headlamps	The operator is standing behind the Luminoscope® system, looking towards the front of the vehicle and the touch screen.
Adjusting headlamps	The operator is standing nearby the zone between the Luminoscope® system and the front of the vehicle and is looking towards the lens of the Luminoscope® and the touch screen.

Rotating the screen position affects to the position of the beam icons and the beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps at the left side. Those closer to the right side of the vehicle are applicable for the headlamps at the right side.

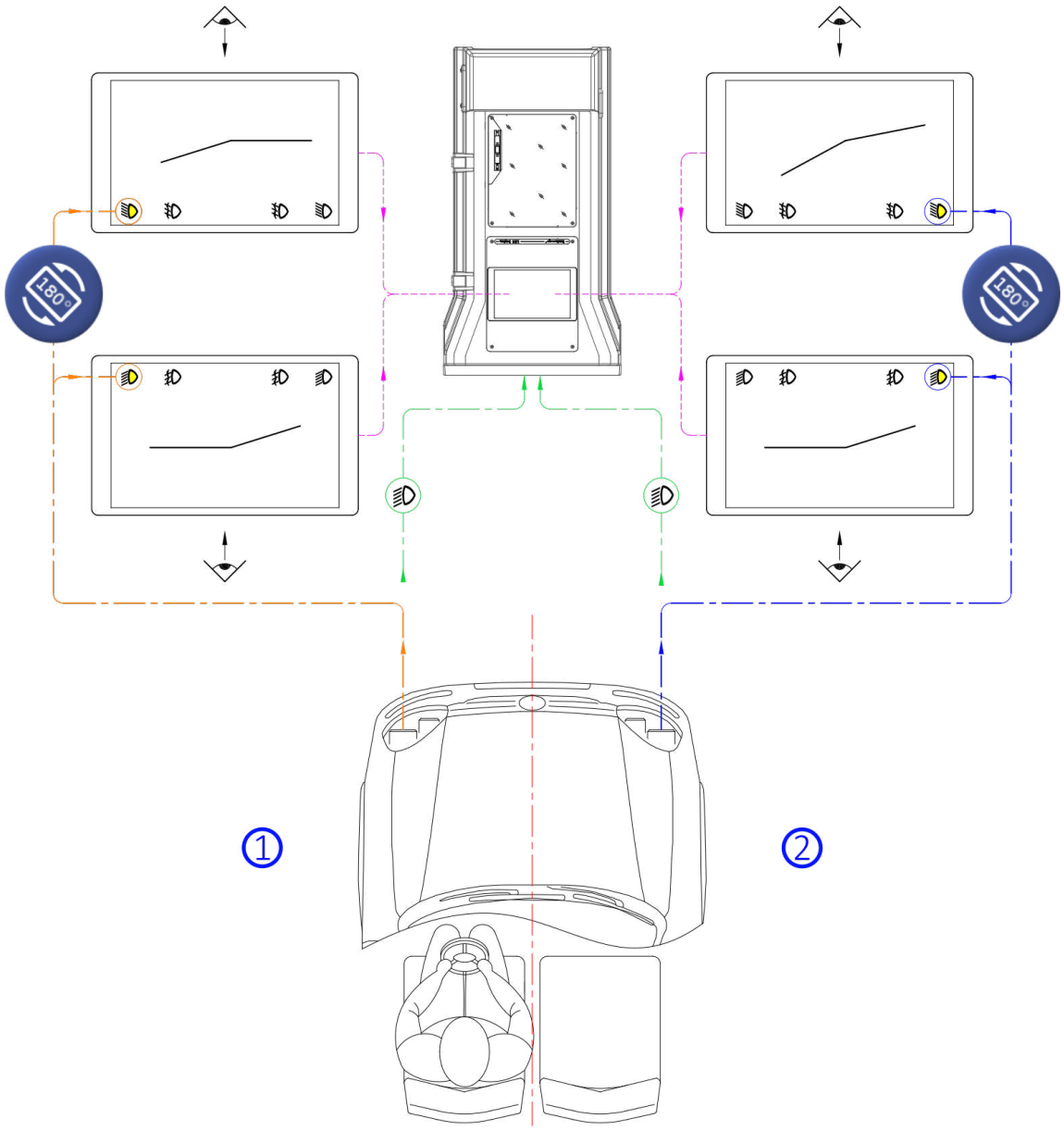


Figure 42: Left / right vehicle side definition

1	Left side of the vehicle	2	Right side of the vehicle

7.1.3 Alignment with the vehicle

Before each test cycle starts, it is necessary to align the optical axis of the headlamp tester with the longitudinal axis or driving direction of the vehicle, in order to minimize the measurement result error in the horizontal direction.

7.1.3.1 Alignment mirror

Use the alignment mirror on top of the stand to align the Luminoscope® with the longitudinal axis of the vehicle.

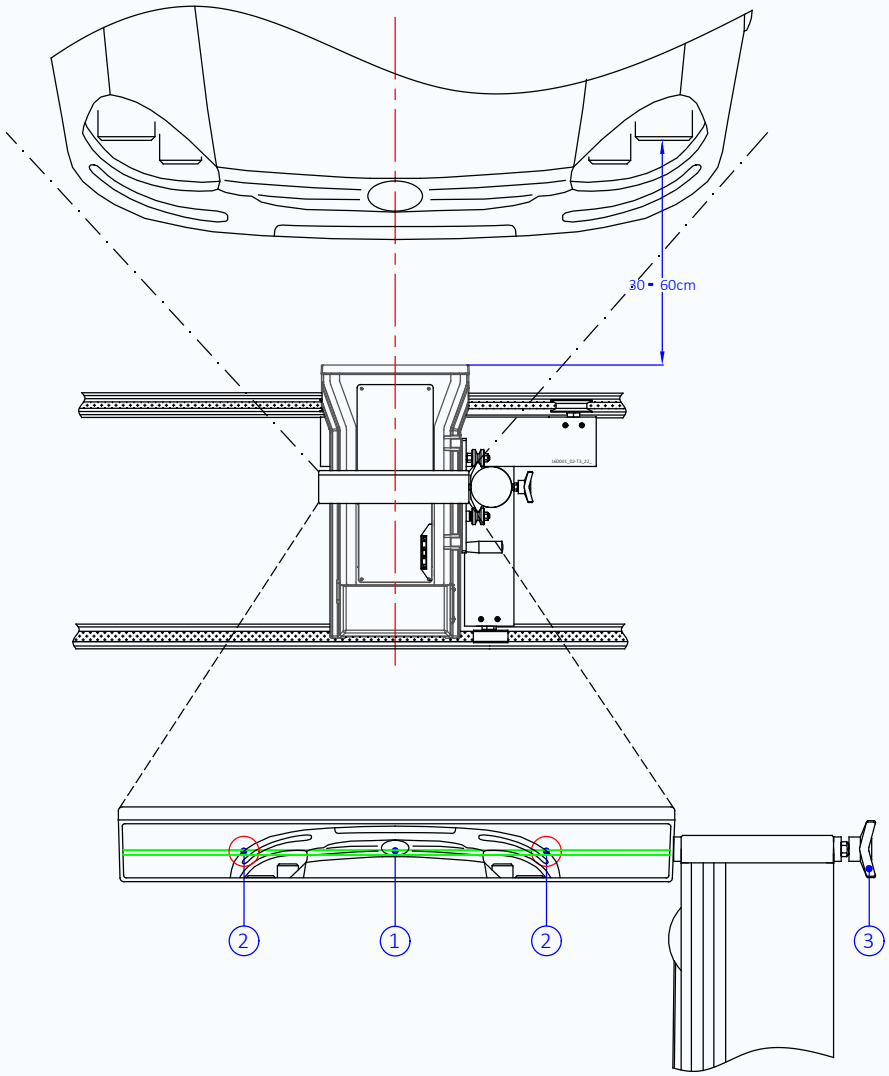


Figure 43: Use of alignment mirror to align the Luminoscope® *with vehicle longitudinal axis*

1. Move the Luminoscope® to the middle of the vehicle. Skip this step for the PLA 35 NR model.

Remember: In case of the PLA 35 NR model, the alignment should be performed for each vehicle side separately, i.e. once for the left headlamps and once for the right headlamps.

2. Rotate the mirror handle 3 until the green lines 1 of the alignment mirror are visible at the front of the vehicle reflection.

3. Rotate the stand slowly until one of the mirror lines 1 intersects two symmetrical points 2 of the vehicle.

   The two symmetrical points should be as far apart as possible, close to the vehicle sides, in order to maximize the precision of the alignment.

7.1.3.2 Alignment laser

Use the optional green alignment laser on top of the stand to align the Luminoscope® with the longitudinal axis of the vehicle.

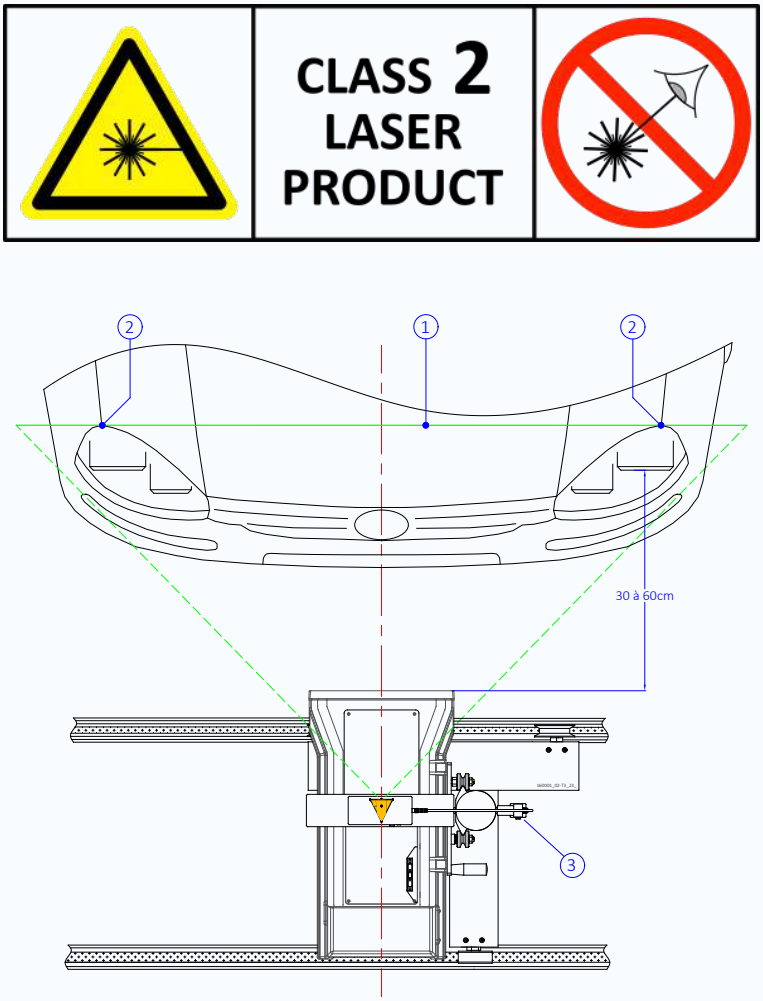


Figure 44: Use of alignment laser to align the Luminoscope® *with vehicle longitudinal axis*

1. Move the Luminoscope® to the middle of the vehicle. Skip this step for the PLA 35 NR model.

   Remember: In case of the PLA 35 NR model, the alignment should be performed for each vehicle side separately, i.e. once for the left headlamps and once for the right headlamps.

2. Turn on the laser by pushing the **ON** button. The laser remains powered on for a preset timespan.

3. Rotate the laser handle 3 until the laser beam 1 is projected at the front of the vehicle.

4. Rotate the stand slowly until the laser beam 1 intersects two symmetrical points 2 of the vehicle.

   The two symmetrical points should be as far apart as possible, close to the vehicle sides, in order to maximize the precision of the alignment.

Some bodywork colours may cause too much color absorption. In this case, either use the alignment mirror or open the front hood and project the laser beam on two symmetrical points at the inside.

7.1.4 Positioning in front of the headlamp

It is of great importance that the lens of the Luminoscope® is correctly positioned in front of the headlamp to ensure that as many light rays as possible are entering the lens.

This guarantees that the beam image is displayed realistically on the white projection screen inside the Luminoscope® to be able to perform a correct headlamp measurement.

With this purpose, the Luminoscope® system is provided with the electronic *Position Check* system that uses twelve photocells around the lens 1.

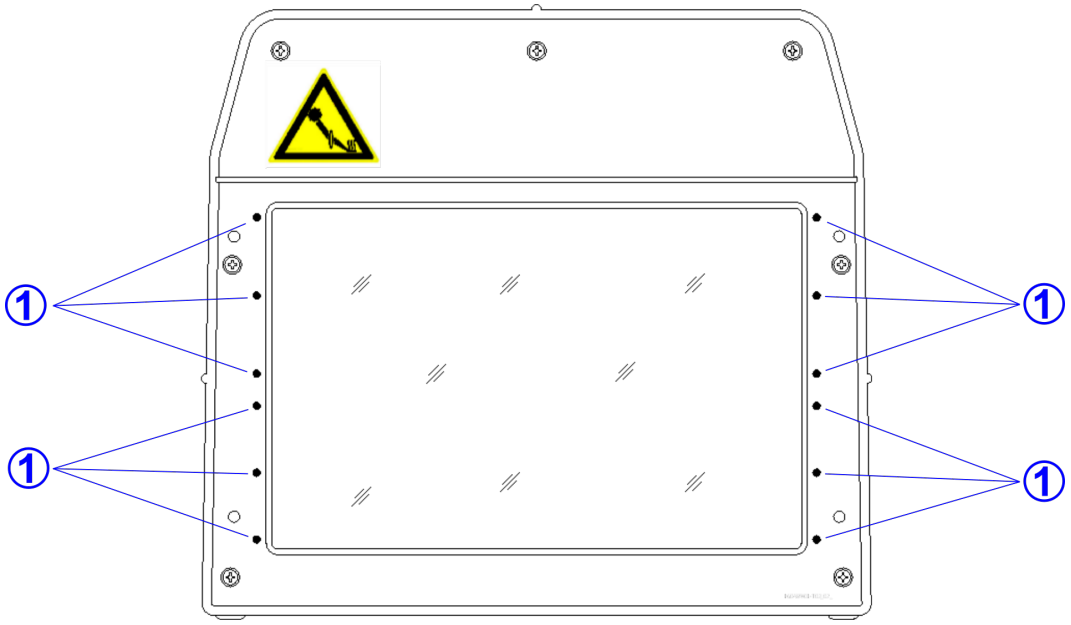


Figure 45: Position Check cells around the lens

The electronic *Position Check* system guides the operator to the optimal position for measuring the headlamp beam by means of four *Position Check* arrows 2. Once the optimal position is reached, all *Position Check* arrows 2 disappear and the headlamp measurement starts automatically.

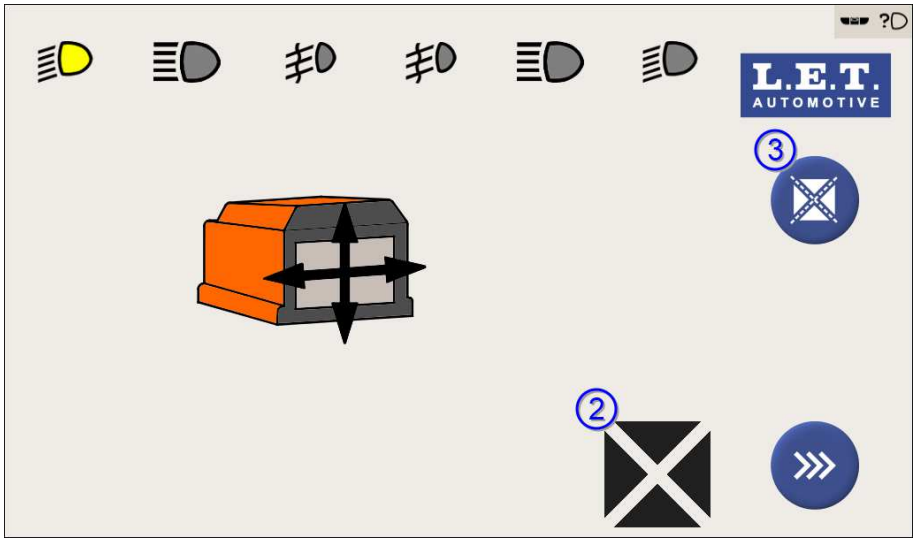


Figure 46: Position Check Arrows on control panel screen

In some situations, it is not possible to reach an optimal position in front of the headlamp using the *Position Check*. This could be caused, for example, because of a very wide headlamp beam. In such a case, the alignment operation can be done manually.

The operator positions the Luminoscope® in front of the headlamp by moving the optical block vertically and horizontally (without rotating the stand) and by simultaneously looking at the beam projection on the white projection screen inside the optical block. When the beam projection looks as expected, tap on the **Skip *Position Check*** button 3 to start the headlamp measurement.

7.1.5 Mounted height of the headlamp

The vertical target values and the vertical aiming and audit tolerances for European LHD and RHD low beams depend on the mounted height of the low beam. The targets and tolerances are defined in the *ECE R48* standard (part of *ECE 324* standard).

The *ECE R48* standard doesn't provide any information about the horizontal aiming or audit tolerances.

Remember: Target and tolerances are defined by local regulations and may vary from those explained below.

The standard defines four height ranges or zones for low beams:

Zone	Height range	Application
0,8m > height	Lower than 0,8m	These zones are typically used for workshop and inspection station equipment.
1,0m ≥ height ≥ 0,8m	Between 0,8m and 1,0m	
1,2m ≥ height > 1,0m	Higher than 1,0m and not over 1,2m	
Height > 1,2m	Higher than 1,2m	Reserved for some special vehicles such as off-road or military vehicles.

The specific vertical audit tolerance values for the different height zones are explained in the diagram below. The colored hatched areas are the initial vertical aiming tolerances as defined by the *ECE R48* regulation.

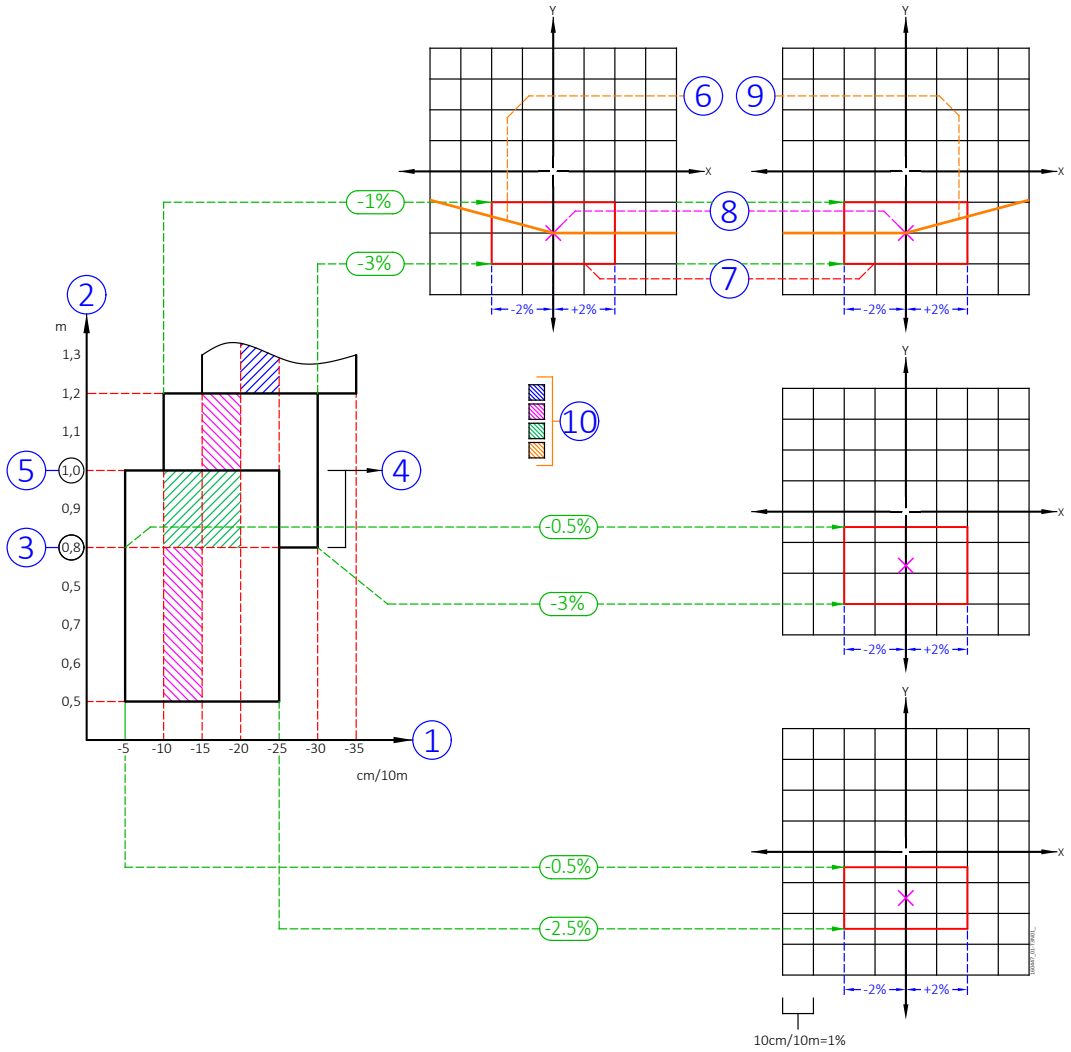


Figure 47: Vertical audit and aiming tolerance window depending on the mounting height of the low beam

1	Horizontal axis. Vertical inclination value for an European LHD or RHD low beam in cm/10m.
2	Vertical axis. Mounted height of the low beam in meter.
3	Low beam mounting height of 0,8m.
4	Low beam mounting height between 0,8m and 1,0m.
5	Low beam mounting height of 1,0m.
6	RHD low beam cut-off line simulation.
7	Audit tolerance window.
8	Measurement reference of the low beam cut-off line (V-point).
9	LHD low beam cut-off line simulation.
10	Vertical tolerance window for initial low beam aiming.

The higher the mounted height of the low beam, the lower the low beam inclination should be.

The next table shows an overview of the four *height zones* with the corresponding vertical aiming and audit tolerance window:

Low beam mounting height	Vertical audit tolerance window for low beam	Vertical aiming tolerance window for low beam
< 0,8m	-5cm/10m till -25cm/10m	-10cm/10m till -15cm/10m
0,8 - 1,0m	-5cm/10m till -30cm/10m	-10cm/10m till -20cm/10m
> 1,0 - ≤1.2m	-10cm/10m till -30cm/10m	-15cm/10m till -20cm/10m
> 1,2m	-15cm/10m till -35cm/10m	-20cm/10m till -25cm/10m

At the start of each headlamp measurement, it is necessary to determine the mounting height of the headlamp in order to select the corresponding vertical tolerance zone. For this purpose, the optical block has to be properly aligned in front of the headlamp, with the assistance of the *Position Check* system.

The cursor upper side 2 of the height indicator 1 on the sliding table, shows the exact mounting height of the headlamp, according with the reading on the sticker 3 on the PLA stand.

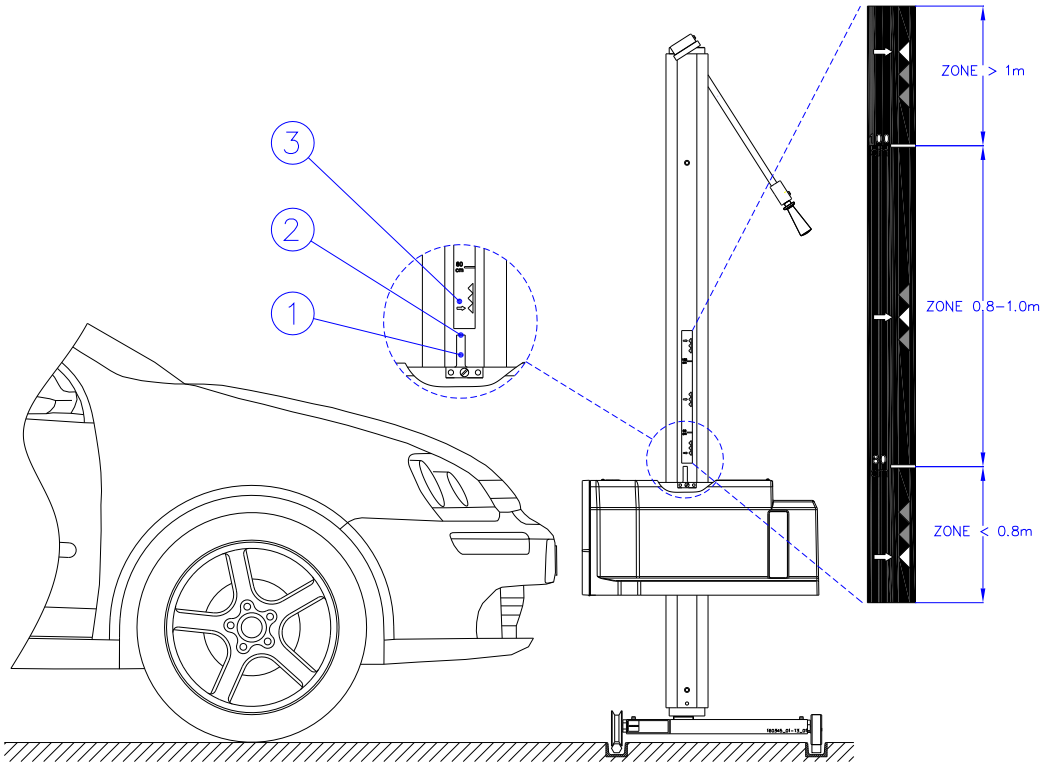


Figure 48: Height selection

After correctly positioning the Luminoscope® in front of the headlamp by using the *Position Check* system, the *Position Check Arrows* 4 should all disappear as on the image underneath.

At this point, one of the three height area buttons 5 should be tapped and the correct aiming or audit tolerance window will be automatically applied.

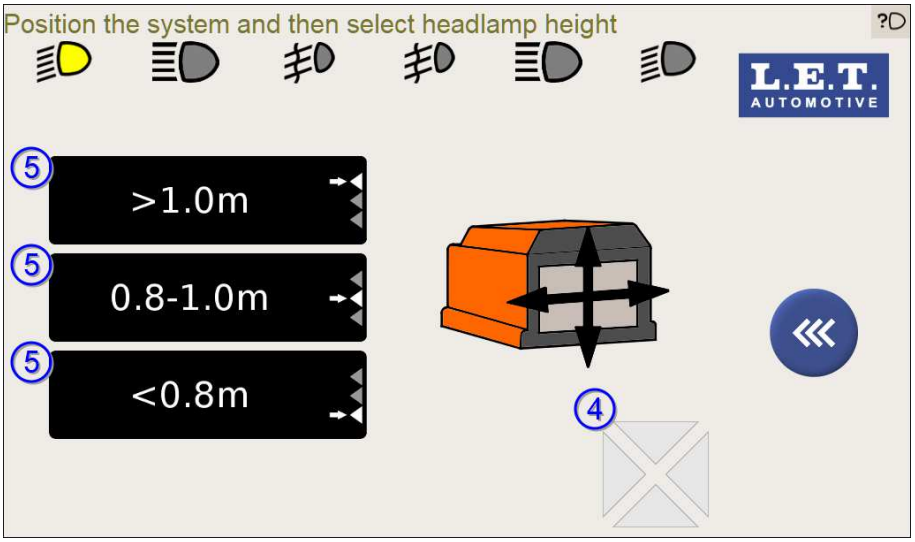


Figure 49: Lamp height area selection

Note: The height selection step should only be done before the first low beam measurement in the cycle. The second low beam in the cycle automatically uses the same defined height zone.

This principle is also valid for the high and fog beams.

Related information

Mounted height of the headlamp (pg. 66)

7.1.6 *ESL* - Electronic Spirit Level module

The Luminoscope® may be provided with an optional on-board electronic level or *ESL* (electronic spirit level module).

Luminoscope® systems with a trolley base not running on adjustable guiding rails are equipped with the *ESL*. The *ESL* is mounted underneath the mechanical spirit level of the optical block.

It's unavoidable that the pitch angle and roll angle of the optical block of systems with non-adjustable rails or without any rails will vary while displacing the system. This has a direct consequence on the headlamp measurement results. As a solution, the Luminoscope® PLA 35 is equipped with an *ESL*.

The purpose of the *ESL* is to automatically take into account the pitch and roll angle of the optical block to ensure an accurate headlamp measurement. The headlamp measurement result is automatically compensated with the real time angular measurement of the *ESL*.

Before each headlamp measurement starts, the pitch (inclination) and roll angle of the optical block is measured by the *ESL*. As the Luminoscope® PLA 35 was moved, the *ESL* needs a short period to stabilize its angular measurement. The image underneath is shown as long as the *ESL* is stabilising. The icon of the *ESL* shows some "shivering" by means of two lines above and below the icon 1. At the same time the measured pitch and roll angle of the *ESL* are displayed 2.

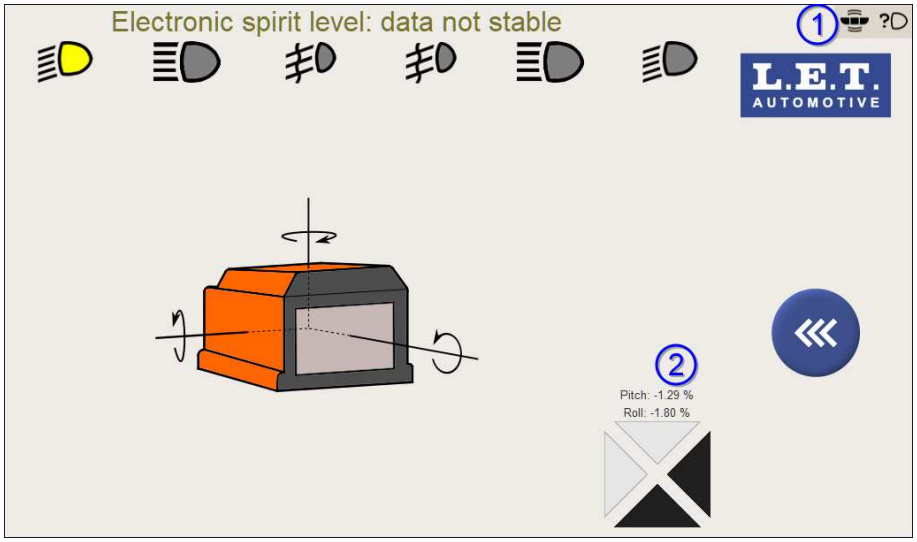


Figure 50: ESL: data not stable

As soon as the *ESL* is stabilised, the screen disappears and the actual headlamp measurement starts automatically. The angular measurement values of the *ESL* are taken automatically into account. In case the Luminoscope® is (slightly) moved or shaken during the headlamp measurement, the *ESL* performs a new angular measurement and the above screen is displayed again. As soon as the *ESL* has been stabilised, the headlamp measurement resumes.

If however the pitch or roll angle exceed ±2,00%, a warning message appears indicating that the spirit level is out of range. In this case the headlamp measurement cannot start.

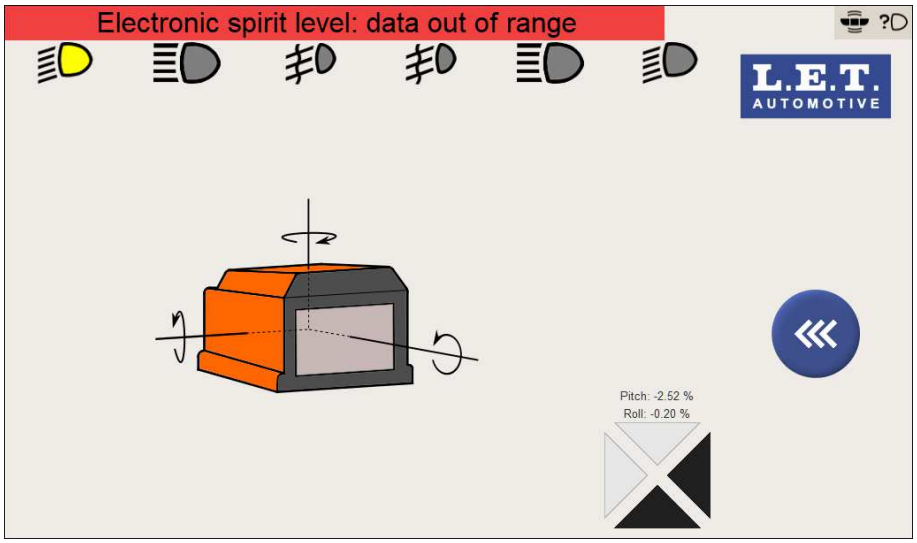


Figure 51: ESL: data out of range

7.2 Test cycle sequence

This chapter explains the different steps that should be followed in a test cycle. Based on the Luminoscope® configuration or the selected program, a test cycle could be a headlamp aiming cycle or a headlamp audit cycle.

Remember: The test cycle could look slightly different depending on the Luminoscope® configuration or selected program which could be based on different regulations.

Step number	Step description	Comments
1	Switching on the Luminoscope®	The Luminoscope® should be properly charged and switched on.
2	Alignment with the vehicle	The Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle.
3	Program selection	The **Program selection** screen displays different selectable test modes, which allow the operator to select among a number of pre-configured test cycles.
4	Beam selection	The **Beam selection** screen provides buttons for the selection of the required beam and vehicle side.
5	Selection of mounted headlamp height	The **Height selection** screen shows the different headlamp mounting height zones for each beam type (low, high and fog beam) separately. At the start of each headlamp measurement, it is necessary to determine the mounting height of the headlamp in order to select the corresponding vertical tolerance zone.
6	Positioning in front of the headlamp	Before the headlamp measurement can start, it is required to position the Luminoscope® correctly in front of the headlamp by means of the electronic *Position Check* system.
7	*ESL* (electronic spirit level module) compensation	The *ESL* (electronic spirit level module) automatically takes into account the pitch and roll angles of the optical block to ensure an accurate headlamp measurement.
8	Beam measurement	The digital camera inside the Luminoscope® captures, processes and analyzes the headlamp beam projection.
9	Overview beam measurement results	When all tests have been finished, the **Beam selection** screen shows all beam measurement results.
10	Test cycle reports and data transmission	Depending on the configuration of the Luminoscope®, the measurement results can be stored on the system (*PDF* format), printed on a paper ticket or transmitted to an external device using one of the communication protocols.

7.2.1 Switching on the Luminoscope®

The Luminoscope® should be properly charged and switched on.

1. Switch on the Luminoscope®.
2. Make sure the Luminoscope® is properly charged.

   Look at the battery status icon at the top right corner of the screen.

Charger		Battery status description
Connected	Disconnected	
		Fully charged.
		Charge level between 100% and 75%.

Charger		Battery status description
Connected	Disconnected	
		Charge level between 75% and 50%.
		Charge level between 50% and 25%.
		Charge level below 25%.
		Very low charge level.
		Battery disconnected.
		Charge too low for operation.

CAUTION: Do not connect the charger in case the rechargeable battery is not connected or broken.

Related tasks

System restarting and power-off (pg. 140)

7.2.2 Alignment with the vehicle

The Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle.

1. Use the alignment mirror on top of the stand to align the Luminoscope® with the longitudinal axis of the vehicle, or
2. use the optional green alignment laser on top of the stand to align the Luminoscope® with the longitudinal axis of the vehicle.

Remember: In case the Luminoscope® is used on a rail guiding system (e.g. PLA 35 SR – Single Rail or PLA 35 DR – Double Rail), the stand should not be rotated during the cycle, specially when moving the Luminoscope® from one side of the vehicle to the other side.

Remember: In case the Luminoscope® is NOT used on a rail guiding system (e.g. PLA 35 NR – No rail), the alignment procedure should be performed separately for each headlamp at the left and right sides of the vehicle.

Related information

Alignment with the vehicle (pg. 62)

7.2.3 Program selection

The **Program selection** screen displays different selectable test modes, which allow the operator to select among a number of pre-configured test cycles.

Remember: The screen may have a different appearance depending on the customer's specific implementation.

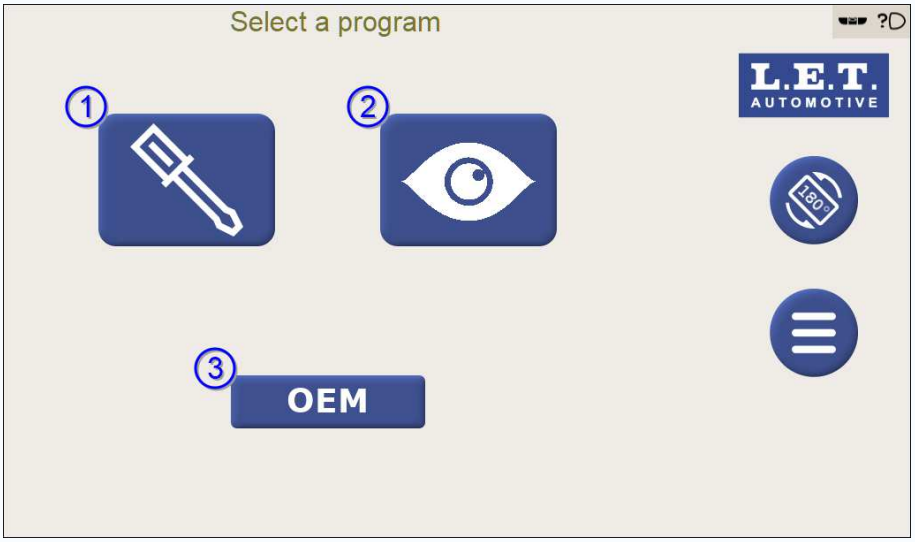


*Figure 52: **Program selection** screen*

#	Button	Description
1	**Aiming** button	The *screwdriver button* refers to a headlamp aiming cycle. In a headlamp aiming cycle, the position of the headlamp beam should be aimed (adjusted) to a pre-defined target position. An aiming tolerance zone around the target position allows the operator to adjust the headlamp correctly.
2	**Audit** button	The *eye button* refers to a headlamp audit cycle. In a headlamp audit cycle, the position of the headlamp beam should be evaluated to check whether it is within the pre-defined audit tolerance zone. The audit tolerance zone is determined by the government regulations. The aiming tolerance zone should always be smaller than the audit tolerance zone. This to ensure that a correctly aimed headlamp in a workshop (using the smaller aiming tolerance zone) will pass the test in a government inspection station (using the larger audit tolerance zone).
3	**OEM** button	The **OEM** button refers to special Original Equipment Manufactures sequences for various beam types.

Tap on one of the buttons for accessing the desired functionality:

- Tap on the **Aiming** button 1 to start a test in aiming mode.
- Tap on the **Audit** button 2 to start a test in audit mode.
- Tap on the **OEM** button 3 to enter the **OEM program selection** screen.

Related tasks

OEM test cycle sequences (pg. 97)

7.2.4 Beam selection

The **Beam selection** screen provides buttons for the selection of the required beam and vehicle side.

Select the desired beam by tapping on the corresponding button and vehicle side.

Remember: The screen may have a different appearance depending on the customer's specific implementation.

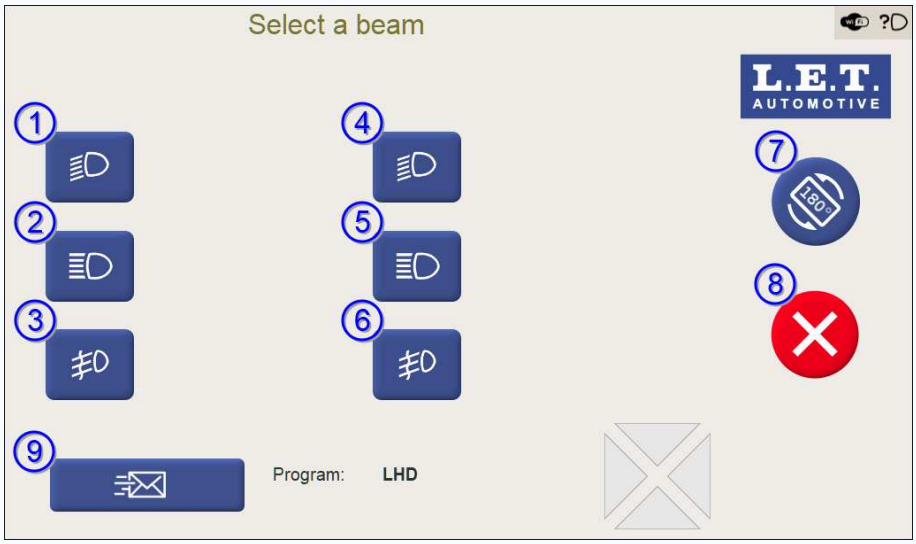


*Figure 53: **Beam selection** screen*

#	Button	Description
1	First low beam	Enable the test of the first low beam.
2	First high beam	Enable the test of the first high beam.
3	First fog beam	Enable the test of the first fog beam.
4	Second low beam	Enable the test of the second low beam.
5	Second high beam	Enable the test of the second high beam.
6	Second fog beam	Enable the test of the second fog beam.
7	Screen rotation	Change the screen orientation.

#	Button	Description
8	Abort	Abort the test cycle and return to the **Program selection** screen.
9	Send results	Store the measurement results of the test cycle. Depending on the configuration of the Luminoscope®, the measurement results can be stored on the system (*PDF* format), printed on a paper ticket or transmitted to an external device using one of the communication protocols.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related information

Left / right vehicle side definition (pg. 60)

7.2.5 Selection of mounted headlamp height

The **Height selection** screen shows the different headlamp mounting height zones for each beam type (low, high and fog beam) separately. At the start of each headlamp measurement, it is necessary to determine the mounting height of the headlamp in order to select the corresponding vertical tolerance zone.

Remember: The screen may have a different appearance, depending on the customer's specific implementation and on the local specific height zones regulations.

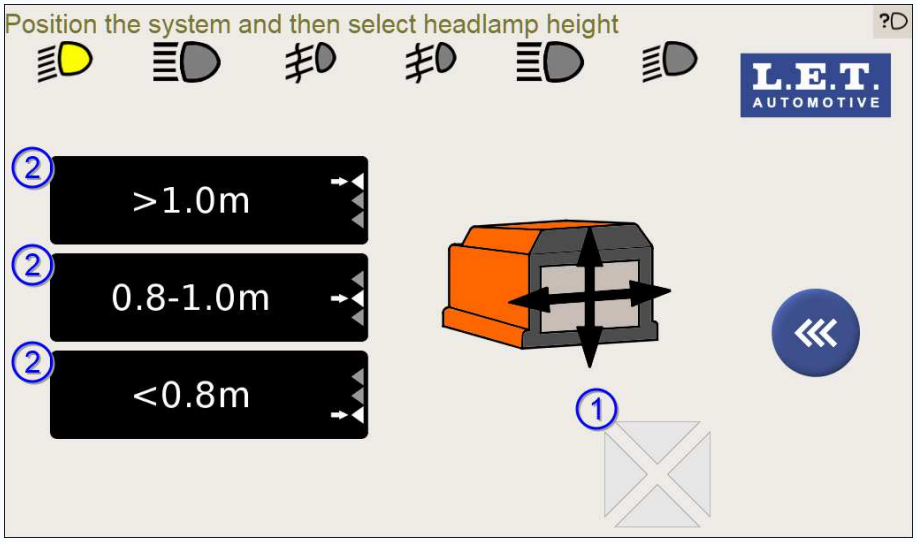


Figure 54: ***Height selection*** *screen*

1. Position the Luminoscope® in front of the headlamp by means of the electronic *Position Check* system 1. Once the optimal position is reached, all *Position Check Arrows* disappear (as shown on the image above).

2. Read the exact mounting height of the headlamp on the height sticker on the PLA stand by using the height indicator on the sliding table of the *Optical block*.

3. Tap on the corresponding **Height zone** buttons 2.

Related tasks

Positioning in front of the headlamp (pg. 76)

Related information

Mounted height of the headlamp (pg. 66)

7.2.6 Positioning in front of the headlamp

Before the headlamp measurement can start, it is required to position the Luminoscope® correctly in front of the headlamp by means of the electronic *Position Check* system.

CAUTION: A correct positioning of the Luminoscope® in front of the headlamp is necessary for an accurate headlamp measurement.

Remember: As a result of the previous *Selection of mounted headlamp height* step, the optical block should already be correctly positioned in front of the headlamp.

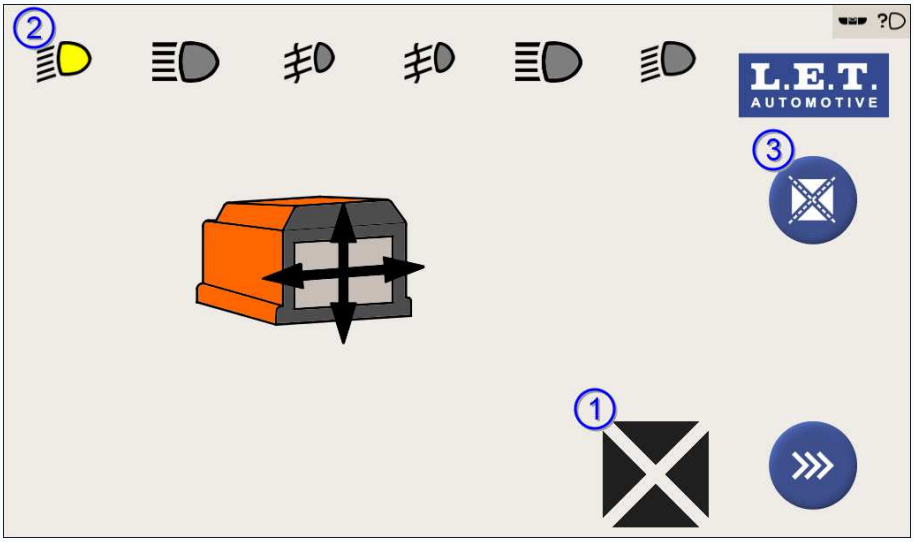


Figure 55: ***Position Check*** *screen*

1. Position the Luminoscope® in front of the headlamp under test 2 (the beam icon is displayed in yellow) by means of the black *Position Check Arrows* 1.

2. Move the optical block vertically and / or horizontally (without rotating the stand) towards the direction of the arrows.

   If the optimal position in front of the headlamp is achieved, the Luminoscope® automatically proceeds to the next phase in the test cycle.

   Remember: In some situations it is not possible to reach an optimal position in front of the headlamp using the *Position Check*. This could be caused, for example, because of a very wide headlamp beam. In such a case, the alignment operation can be done manually.

3. Only in case of manual alignment operation: the operator positions the Luminoscope® in front of the headlamp by moving the optical block vertically and horizontally (without rotating the stand) and by simultaneously looking at the beam projection on the white projection screen inside the optical block.

4. Once the beam projection looks as expected, tap on the **Skip *Position Check*** button 3.

Related tasks

Positioning in front of the headlamp (pg. 76)

7.2.7 *ESL* (electronic spirit level module) compensation

The *ESL* (electronic spirit level module) automatically takes into account the pitch and roll angles of the optical block to ensure an accurate headlamp measurement.

Remember: Depending on the Luminoscope® configuration, it may be provided with an on-board *ESL*. Consequently, the screen underneath will not appear on the Luminoscope® screen if there is no *ESL*.

When not stable conditions are detected, the following screen is displayed.

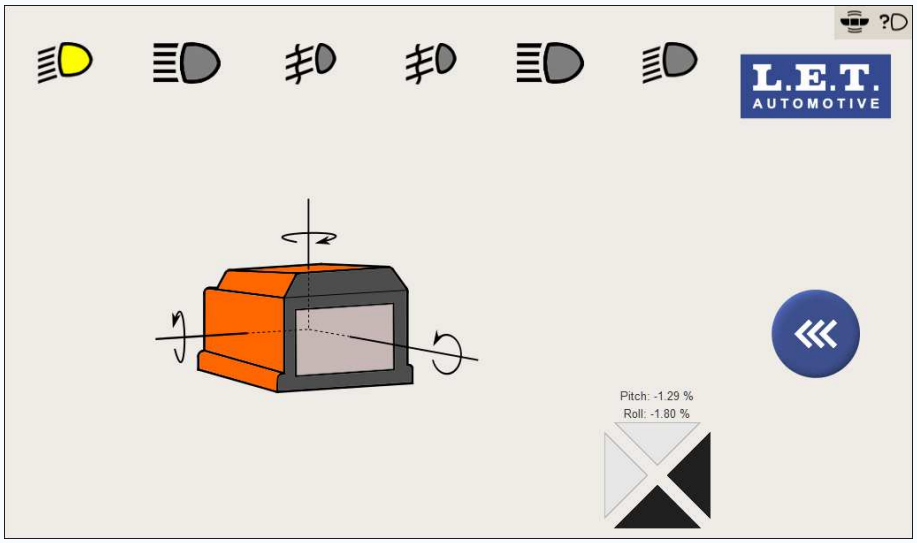


Figure 56: ESL (electronic spirit level module) screen

Wait until the *ESL* stabilizes.

As soon as the *ESL* is stabilised, the screen disappears and the actual headlamp measurement starts automatically. The angular measurement values of the *ESL* are taken automatically into account for the headlamp measurement.

Remember: In case the Luminoscope® is (slightly) moved or shaked during the headlamp measurement, the *ESL* performs a new angular measurement and the above screen is displayed again. As soon as the *ESL* has been stabilized, the headlamp measurement resumes.

Related information

ESL (electronic spirit level module) (pg. 69)

7.2.8 Beam measurement

The digital camera inside the Luminoscope® captures, processes and analyzes the headlamp beam projection.

The following sections explain the headlamp test procedure for a common and complete set of headlamps including:

- two ECE low beams,
- two high beams and
- two fog beams.

Remember: The test sequence could look slightly different depending on the Luminoscope® configuration or selected program, which could be based on different regulations.

Related information

Headlamps (pg. 19)
Headlamp icons (pg. 59)

7.2.8.1 Low beam test

7.2.8.1.1 Aiming mode

This chapter explains the low beam test in case the **Aiming** button (screwdriver button) has been tapped in the **Program selection** screen.

The next screen is displayed as soon as the first ECE low beam test starts.

Remember: The screen is identical for the second low beam (with the exception of the indication of the beam icons on top of the screen).

In case of an ECE LHD (Left Hand Drive) low beam:

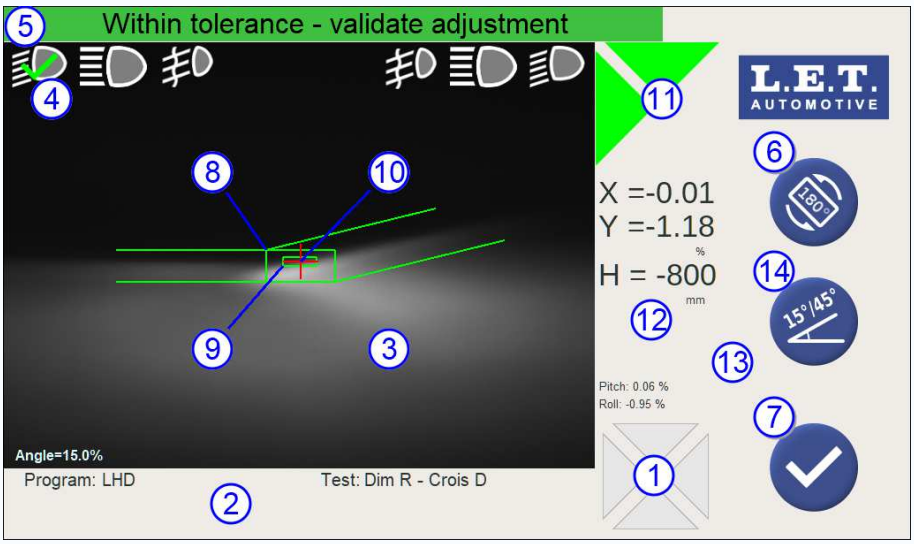


Figure 57: Example of an LHD low beam

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.

4	First low beam icon	First low beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means *Test in progress*. • **Green** V-sign means *Within tolerance*. • **Red** cross means *Out of tolerance*.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Audit tolerance zone	The *audit tolerance zone* allows the operator to check if the headlamp is within the audit tolerances that are applicable in a government inspection station.
9	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
10	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
11	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
12	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
13	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.
14	**Cut-off angle** button	Each time the **Cut-off angle** button is tapped, the selected angle of the low beam tolerance overlay changes between 15º and 45º. In most common cases the default selection of 15° can be used. Use the 45º selection only for *ECE* low beam *cut-off* lines with a 45º step. It is important to correctly set the angle because it has a direct consequence on the horizontal algorithm measurement position (determination of the *V-point*) of the *cut-off* line.

Cycle description

1. Adjust the beam position until the algorithm measurement position (red cross) is inside the aiming tolerance zone.

2. Tap on the **Validation** button 1 to store the beam measurement result.

   The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.

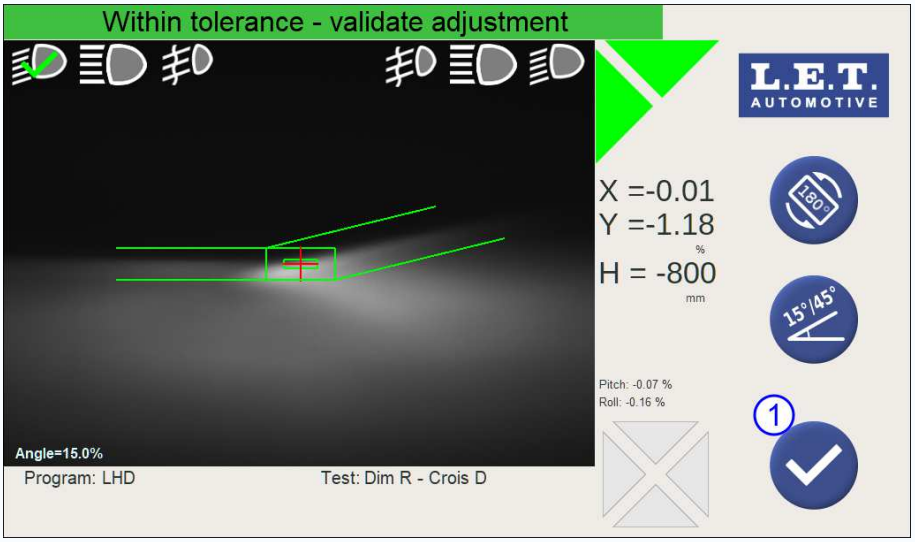


Figure 58: LHD low beam test screen

The **Beam selection** screen appears and the headlamp measurement results are displayed next to the corresponding beam selection button 2.

Note: Depending on some Luminoscope® configuration parameters, the *headlamp intensity* may be automatically measured after tapping on the **Validation** button 1.

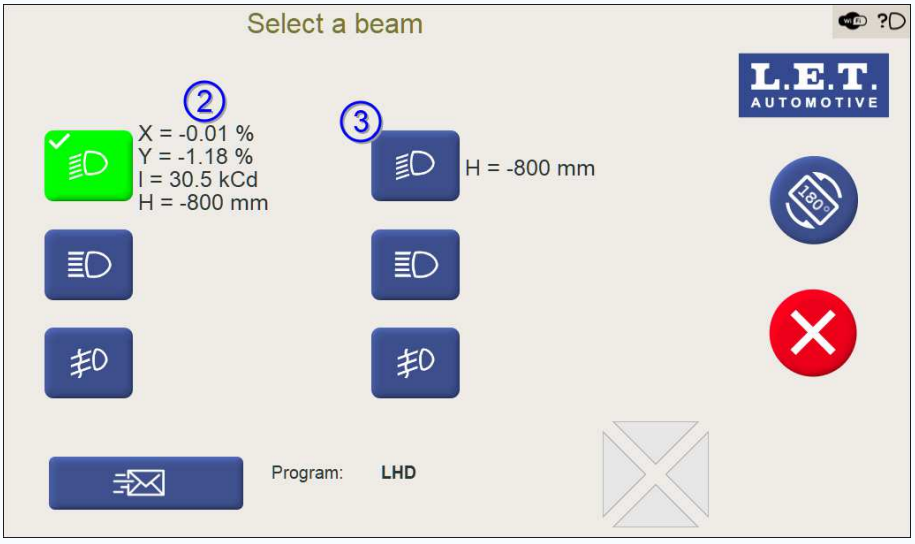


*Figure 59: Low beam test results on **Beam selection** screen*

Test Repetition

If required, repeat the test. Proceed as follows.

Tap again on the corresponding beam selection button.

Testing the second low beam

Once the first low beam test is completed, it is usually required to test the second low beam.

1. Move the Luminoscope® in front of the second low beam.
2. Tap on the **Second low beam** button on the **Beam selection** screen 3.

   Remember: The height selection should only be done before the first low beam measurement in the cycle. The selected height zone is copied automatically for the second low beam.

3. Repeat the step *Positioning in front of the headlamp*.
   Make sure the optical block is correctly positioned in front of the second low beam.

Related tasks

Positioning in front of the headlamp (pg. 76)

7.2.8.1.2 Audit mode

This chapter explains the low beam test in case the **Audit** button (eye button) has been tapped in the **Program selection** screen.

When tapping the **Audit** button (eye button), the same low beam audit tolerances that are of application in the official Belgian *GOCA* (*Groupement des entreprises agréées de contrôle automobile et du permis de conduire*) inspection stations are used. The low beam audit tolerances meet the specification sheet of *GOCA* of 2016. Note that only the vertical position of the low beams is measured and this on the horizontal part of the low beam cut-off line (between -3,5% and -5,5% on the horizontal axis). The aiming tolerance zone is not shown.

The next screen is displayed as soon as the first ECE low beam test starts.

Remember: The screen is identical for the second low beam (with the exception of the indication of the beam icons on top of the screen).

In case of an ECE LHD (Left Hand Drive) low beam:

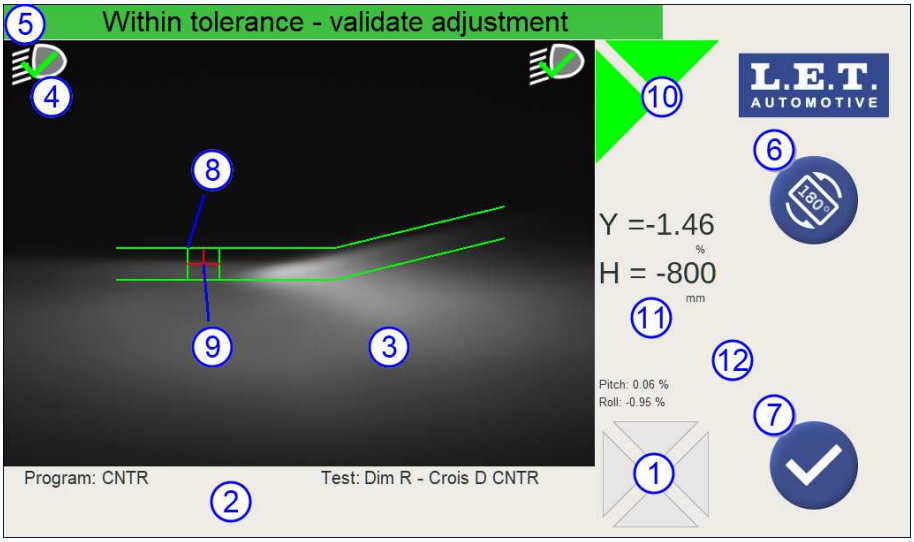


Figure 60: Example of an LHD low beam

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	First low beam icon	First low beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means *Test in progress*. • **Green** V-sign means *Within tolerance*. • **Red** cross means *Out of tolerance*.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Audit tolerance zone	The *audit tolerance zone* allows the operator to check if the headlamp is within the audit tolerances that are applicable in a government inspection station.
9	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.

10	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
11	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
12	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.

Cycle description

1. Check if the beam position is inside the *audit tolerance zone*.

2. If not, and if it is allowed to aim the headlamp on the spot, adjust the beam position towards applicable vertical target value.

3. Tap on the **Validation** button 1 to store the beam measurement result.

   The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.

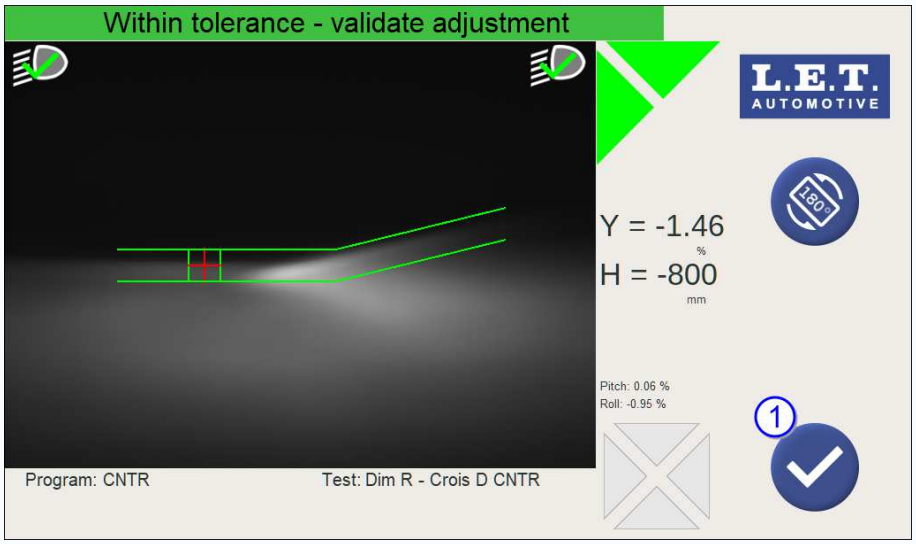


Figure 61: LHD low beam test screen

The **Beam selection** screen appears and the headlamp measurement results are displayed next to the corresponding beam selection button 2.

Note: Depending on some Luminoscope® configuration parameters, the *headlamp intensity* may be automatically measured after tapping on the **Validation** button 1.

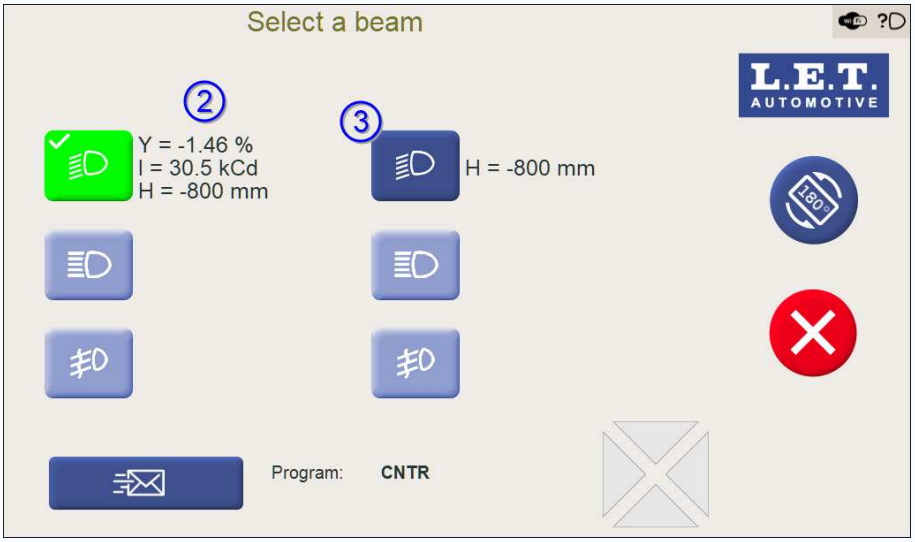


*Figure 62: Low beam test results on **Beam selection** screen*

Test Repetition

If required, repeat the test. Proceed as follows.

Tap again on the corresponding beam selection button.

Testing the second low beam

Once the first low beam test is completed, it is usually required to test the second low beam.

1. Move the Luminoscope® in front of the second low beam.
2. Tap on the **Second low beam** button on the **Beam selection** screen 3.

   Remember: The height selection should only be done before the first low beam measurement in the cycle. The selected height zone is copied automatically for the second low beam.

3. Repeat the step *Positioning in front of the headlamp*.
   Make sure the optical block is correctly positioned in front of the second low beam.

Related tasks

Positioning in front of the headlamp (pg. 76)

7.2.8.2 High beam test

The next screen is displayed as soon as the first high beam test starts.

Remember: The screen is identical for the second high beam (with the exception of the indication of the beam icons on top of the screen).

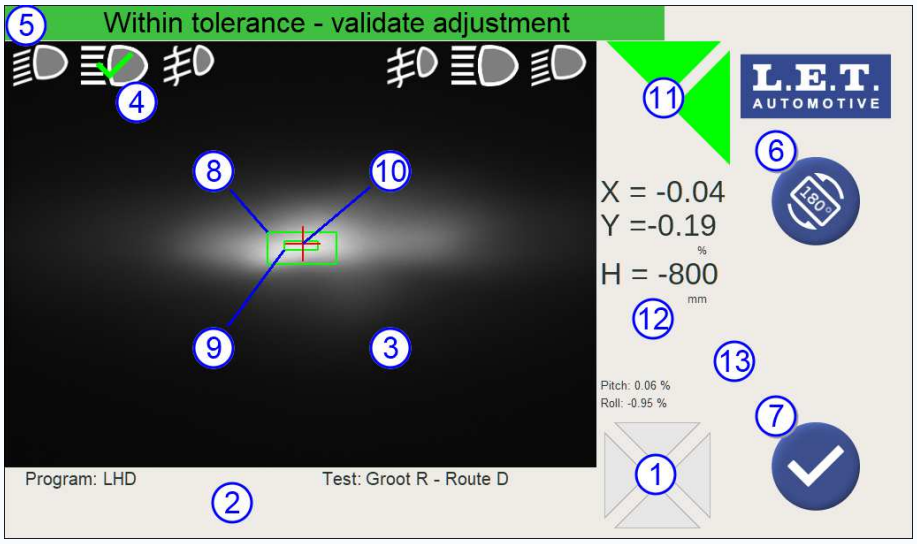


Figure 63: Example of a high beam

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	First high beam icon	First high beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means *Test in progress*. • **Green** V-sign means *Within tolerance*. • **Red** cross means *Out of tolerance*.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.

8	Audit tolerance zone	The *audit tolerance zone* allows the operator to check if the headlamp is within the audit tolerances that are applicable in a government inspection station.
9	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
10	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
11	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
12	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
13	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.

In case of an *aiming cycle*:

1. Adjust the beam position until the algorithm measurement position (red cross) is inside the aiming tolerance zone.

In case of an *audit cycle*:

2. Check if the beam position is inside the *audit tolerance zone*.

3. If not, and if it is allowed to aim the headlamp on the spot, adjust the beam position inside the *aiming tolerance zone*.

For both aiming and audit cycles:

4. Tap on the **Validation** button 1 to store the beam measurement result.

   The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.

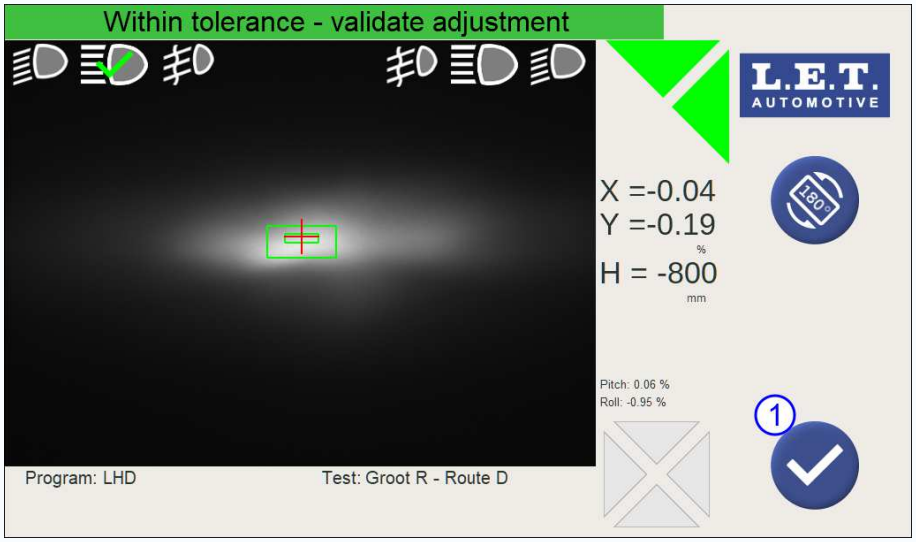


Figure 64: High beam test screen

The **Beam selection** screen appears and the headlamp measurement results are displayed next to the corresponding beam selection button 2.

Note: Depending on some Luminoscope® configuration parameters, the *headlamp intensity* may be automatically measured after tapping on the **Validation** button 1.

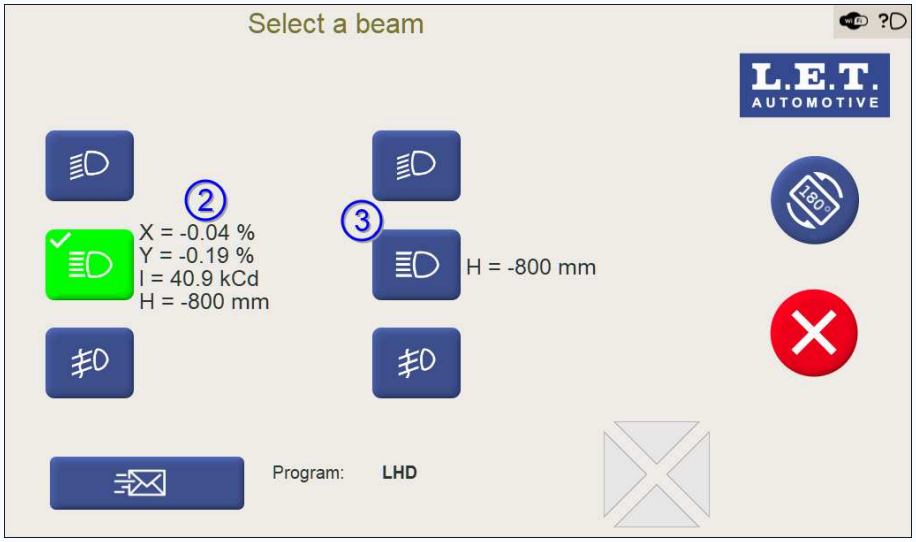


*Figure 65: High beam test results on **Beam selection** screen*

Eventually repeating the test on the same high beam:

5. If required, repeat the test by tapping again on the corresponding beam selection button.

Testing the second high beam:

6. Move the Luminoscope® in front of the second high beam.

7. Tap on the **Second high beam** button on the **Beam selection** screen 3.

Remember: The height selection should only be done before the first high beam measurement in the cycle. The selected height zone is copied automatically for the second high beam.

8. Repeat the step *Positioning in front of the headlamp*.

Make sure the optical block is correctly positioned in front of the second high beam.

Related tasks

Positioning in front of the headlamp (pg. 76)

7.2.8.3 Fog beam test

The next screen is displayed as soon as the first fog beam test starts.

Remember: The screen is identical for the second fog beam (with the exception of the indication of the beam icons on top of the screen).

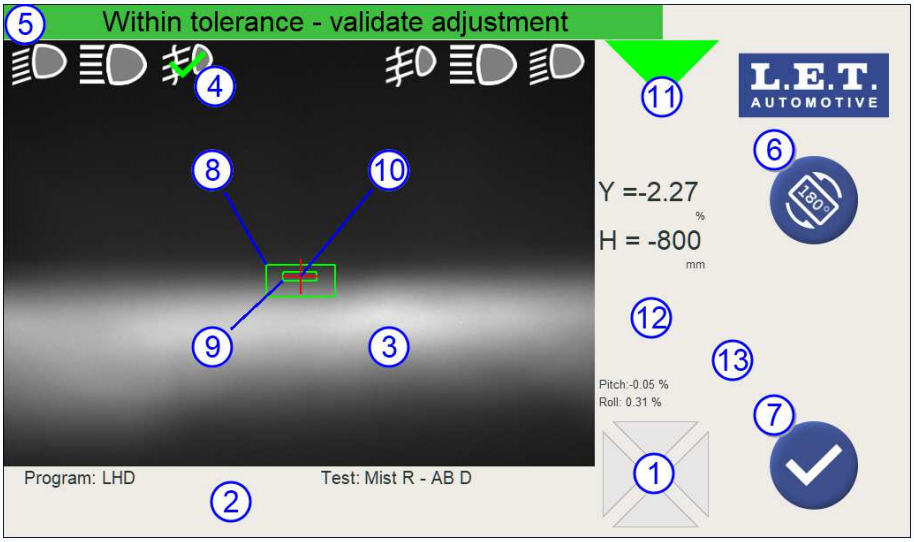


Figure 66: Example of a fog beam

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.

4	First fog beam icon	First fog beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means *Test in progress*. • **Green** V-sign means *Within tolerance*. • **Red** cross means *Out of tolerance*.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Audit tolerance zone	The *audit tolerance zone* allows the operator to check if the headlamp is within the audit tolerances that are applicable in a government inspection station.
9	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
10	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
11	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
12	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
13	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.

In case of an *aiming cycle*:

1. Adjust the beam position until the algorithm measurement position (red cross) is inside the aiming tolerance zone.

In case of an *audit cycle*:

2. Check if the beam position is inside the *audit tolerance zone*.

3. If not, and if it is allowed to aim the headlamp on the spot, adjust the beam position inside the *aiming tolerance zone*.

For both aiming and audit cycles:

4. Tap on the **Validation** button 1 to store the beam measurement result.

   The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.

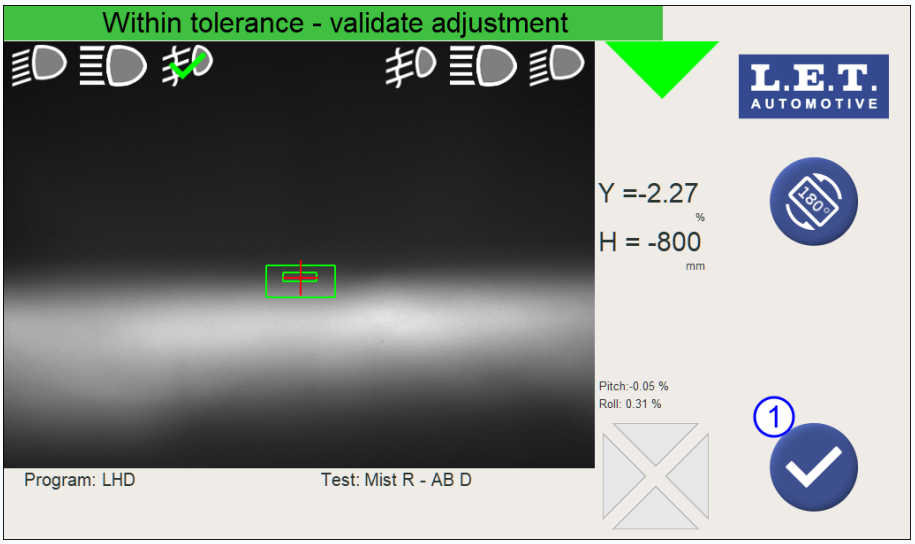


Figure 67: Fog beam test screen

The **Beam selection** screen appears and the headlamp measurement results are displayed next to the corresponding beam selection button 2.

Note: Depending on some Luminoscope® configuration parameters, the *headlamp intensity* may be automatically measured after tapping on the **Validation** button 1.

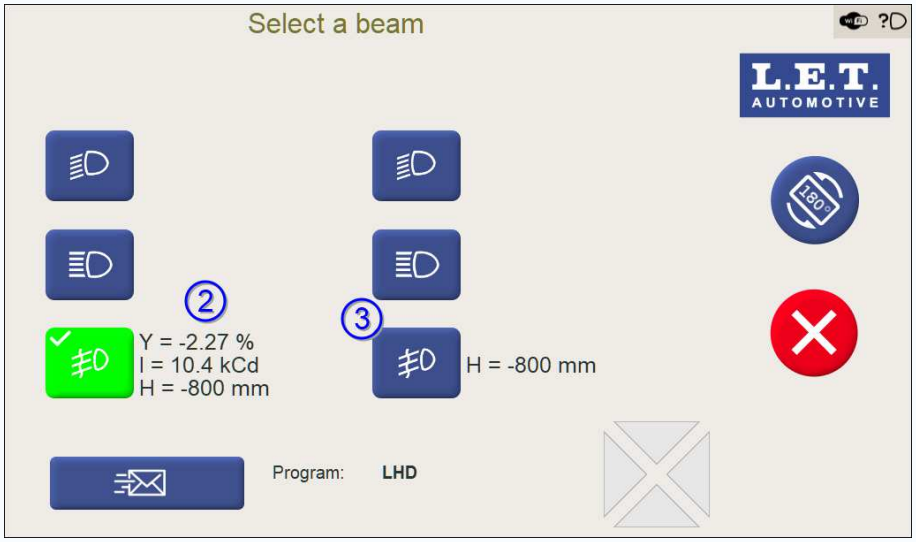


*Figure 68: Fog beam test results on **Beam selection** screen*

Eventually repeating the test on the same fog beam:

5. If required, repeat the test by tapping again on the corresponding beam selection button.

Testing the second fog beam:

6. Move the Luminoscope® in front of the second fog beam.

7. Tap on the **Second fog beam** button on the **Beam selection** screen 3.

Remember: The height selection should only be done before the first fog beam measurement in the cycle. The selected height zone is copied automatically for the second fog beam.

8. Repeat the step *Positioning in front of the headlamp*.
Make sure the optical block is correctly positioned in front of the second fog beam.

Related tasks

Positioning in front of the headlamp (pg. 76)

7.2.9 Beam measurement results

When all tests are completed, the **Beam selection** screen displays all beam measurement results.

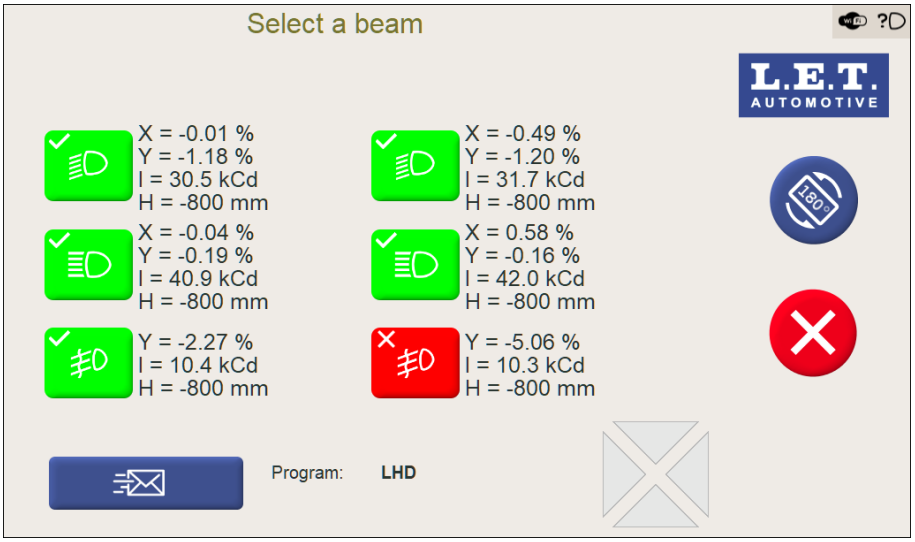


Figure 69: Overview of beam measurement results

Remember: If required, each test can be repeated by tapping on the corresponding beam selection button again.

7.2.10 Test cycle reports

Depending on the configuration of the Luminoscope®, the measurement results can be stored on the system (*PDF* format), printed on a paper ticket or transmitted to an external device using one of the communication protocols.

1. Tap on the **Send results** button 1.

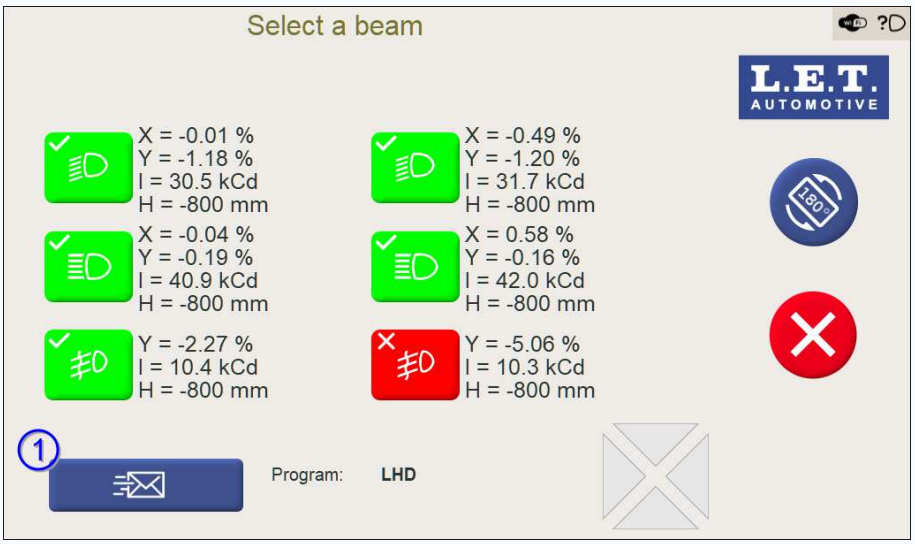


*Figure 70: **Send results** button on **Beam selection** screen*

2. Enter the *license plate number* of the vehicle (or leave it empty if not required) and tap on the **Validation** button 2. The license plate entered becomes part of the file name of the produced file.

   Alternatively, tap on the **Abort** button 3 to cancel the operation.

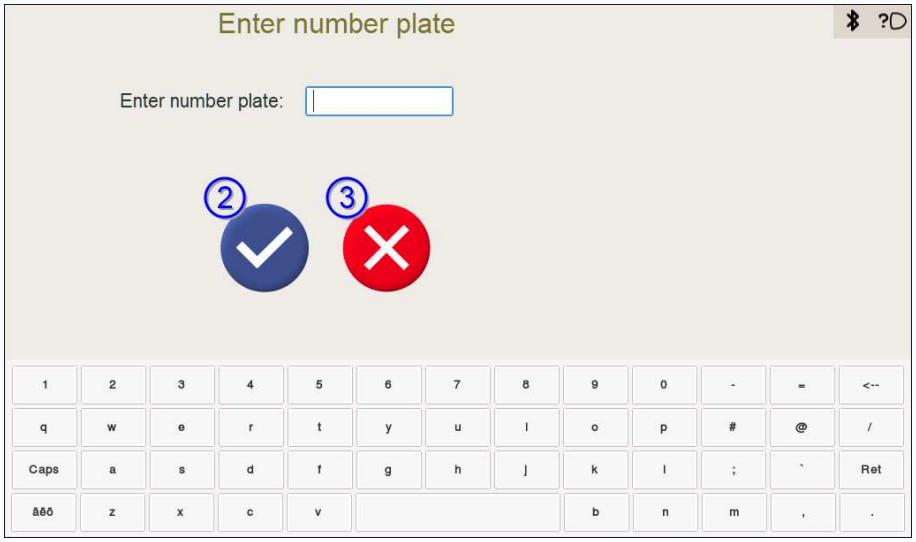


*Figure 71: **License plate input** screen*

In case the Luminoscope® is configured to store the results on the system (PDF format), the file is now created.

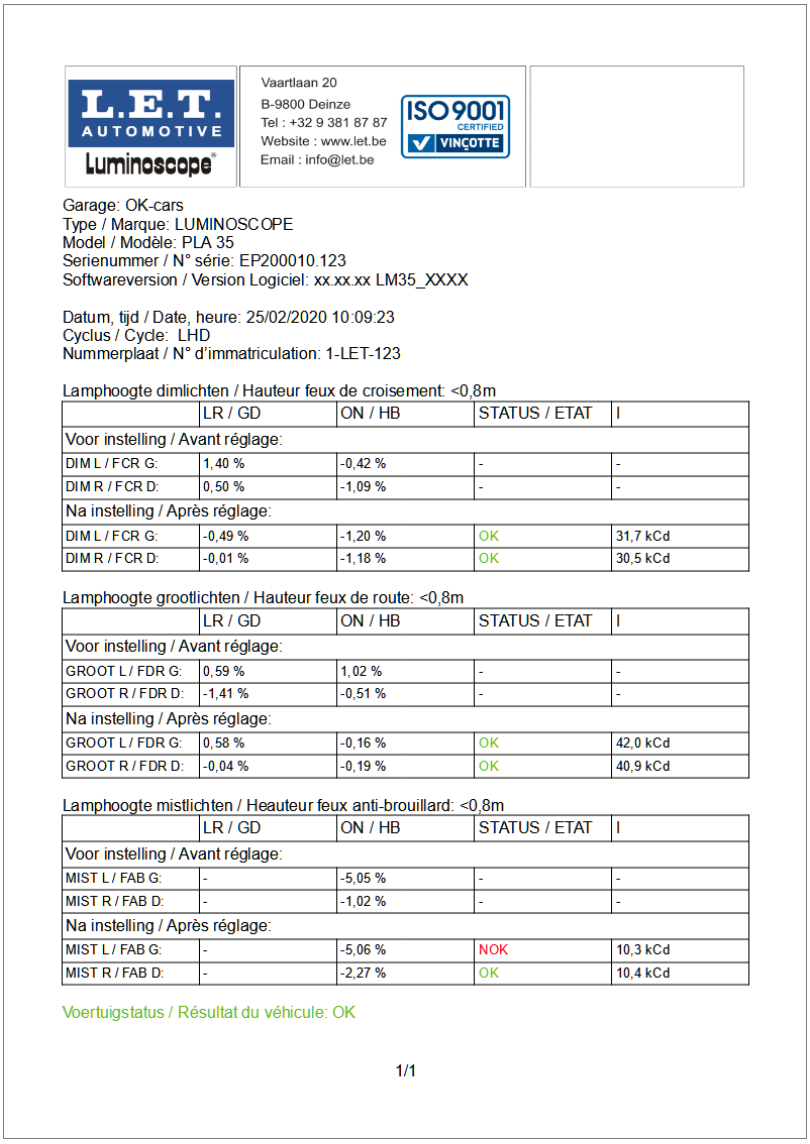
In case the Luminoscope® is configured to use a ticket printer, the ticket is now printed.

The **Program selection** screen will be displayed again. The Luminoscope® is ready to start a new test cycle.

7.2.10.1 Test report as a PDF file

In the case the Luminoscope® is configured to store the measurement results on the system (PDF format), the generated reports can be exported afterwards to an USB stick via the Export functionality.

Remember: The report layout depends on the Luminoscope® configuration and on the selected program, and consequently the format of the report below may differ.



L.E.T. AUTOMOTIVE
Luminoscope®

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ISO9001 CERTIFIED VINÇOTTE

Garage: OK-cars
Type / Marque: LUMINOSCOPE
Model / Modèle: PLA 35
Serienummer / N° série: EP200010.123
Softwareversion / Version Logiciel: xx.xx.xx LM35_XXXX

Datum, tijd / Date, heure: 25/02/2020 10:09:23
Cyclus / Cycle: LHD
Nummerplaat / N° d'immatriculation: 1-LET-123

Lamphoogte dimlichten / Hauteur feux de croisement: <0,8m

	LR / GD	ON / HB	STATUS / ETAT	I
Voor instelling / Avant réglage:				
DIM L / FCR G:	1,40 %	-0,42 %	-	-
DIM R / FCR D:	0,50 %	-1,09 %	-	-
Na instelling / Après réglage:				
DIM L / FCR G:	-0,49 %	-1,20 %	OK	31,7 kCd
DIM R / FCR D:	-0,01 %	-1,18 %	OK	30,5 kCd

Lamphoogte grootlichten / Hauteur feux de route: <0,8m

	LR / GD	ON / HB	STATUS / ETAT	I
Voor instelling / Avant réglage:				
GROOT L / FDR G:	0,59 %	1,02 %	-	-
GROOT R / FDR D:	-1,41 %	-0,51 %	-	-
Na instelling / Après réglage:				
GROOT L / FDR G:	0,58 %	-0,16 %	OK	42,0 kCd
GROOT R / FDR D:	-0,04 %	-0,19 %	OK	40,9 kCd

Lamphoogte mistlichten / Heauteur feux anti-brouillard: <0,8m

	LR / GD	ON / HB	STATUS / ETAT	I
Voor instelling / Avant réglage:				
MIST L / FAB G:	-	-5,05 %	-	-
MIST R / FAB D:	-	-1,02 %	-	-
Na instelling / Après réglage:				
MIST L / FAB G:	-	-5,06 %	NOK	10,3 kCd
MIST R / FAB D:	-	-2,27 %	OK	10,4 kCd

Voertuigstatus / Résultat du véhicule: OK

1/1

Figure 72: Example of a test report

Parameter	Description
Garage	Customer name.
Type	Luminoscope®.
Model	Model of Luminoscope®.
Serienummer	Serial number of the Luminoscope® optical block.
Softwareversie	Software version of the Luminoscope®.
Datum/tijd	Date and time of the test.
Cyclus	Selected program.
Nummerplaat	License plate number of the vehicle
Lamphoogte dimlichten	Selected mounting height zone of the low beams.
Dim links	Measurement results of the left low beam in the specified units: Horizontal beam position (L/R), vertical beam position (U/D), Status (OK or NOK) and intensity (I).

Parameter	Description
Dim rechts	Measurement results of the right low beam in the specified units: Horizontal beam position (L/R), vertical beam position (U/D), Status (OK or NOK) and intensity (I).
Lamphoogte grootlichten	Selected mounting height zone of the high beams.
Groot links	Measurement results of the left high beam in the specified units: Horizontal beam position (L/R), vertical beam position (U/D), Status (OK or NOK) and intensity (I).
Groot rechts	Measurement results of the right high beam in the specified units: Horizontal beam position (L/R), vertical beam position (U/D), Status (OK or NOK) and intensity (I).
Lamphoogte mistlichten	Selected mounting height zone of the fog beams.
Mist links	Measurement results of the left fog beam in the specified units: Horizontal beam position (L/R), vertical beam position (U/D), Status (OK or NOK) and intensity (I).
Mist rechts	Measurement results of the right fog beam in the specified units: Horizontal beam position (L/R), vertical beam position (U/D), Status (OK or NOK) and intensity (I).

Related tasks

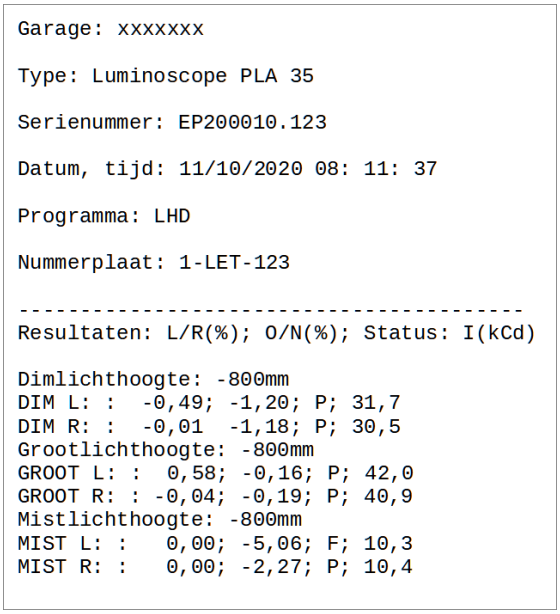
Exporting test results to a *USB* stick (pg. 149)

7.2.10.2 Test report as printed ticket

Depending on the configuration of the Luminoscope®, the measurement results can be printed on a ticket printer.

This ticket printer may be connected to the Luminoscope® either via a serial line or over a *Bluetooth* link.

Remember: The ticket layout depends on the Luminoscope® configuration and on the selected program, and consequently the format of the ticket below may differ.



```
Garage: xxxxxxx

Type: Luminoscope PLA 35

Serienummer: EP200010.123

Datum, tijd: 11/10/2020 08: 11: 37

Programma: LHD

Nummerplaat: 1-LET-123

----------------------------------------
Resultaten: L/R(%); O/N(%); Status: I(kCd)

Dimlichthoogte: -800mm
DIM L: :  -0,49; -1,20; P; 31,7
DIM R: :  -0,01  -1,18; P; 30,5
Grootlichthoogte: -800mm
GROOT L: :  0,58; -0,16; P; 42,0
GROOT R: : -0,04; -0,19; P; 40,9
Mistlichthoogte: -800mm
MIST L: :   0,00; -5,06; F; 10,3
MIST R: :   0,00; -2,27; P; 10,4
```

Figure 73: Example of measurement results on ticket

Parameter	Description
Garage	Customer name.
Type	Model of Luminoscope®.
Serienummer	Serial number of the Luminoscope® optical block.
Datum, tijd	Date and time of the test.
Programma	Selected program.
Nummerplaat	License plate number of the vehicle.
Resultaten	Arranged in columns with the following structure: • **L/R**: (Left/Right) horizontal beam position, expressed in the specified units. • **U/D**: (Up/Down) vertical beam position, expressed in the specified units. • **Status**, can be either **P** (Passed), or **F** (Failed). • **I**: (Intensity), expressed in kCd.
Dimlichthoogte	Specified mounting height zone of the low beams.
Dim L	Measurement results of the left low beam in the specified units.
Dim R	Measurement results of the right low beam in the specified units.
Grootlichthoogte	Specified mounting height zone of the high beams.
Groot L	Measurement results of the left high beam in the specified units.
Groot R	Measurement results of the right high beam in the specified units.
Mistlichthoogte	Specified mounting height zone of the fog beams.
Mist L	Measurement results of the left fog beam in the specified units.
Mist R	Measurement results of the right fog beam in the specified units.

7.3 OEM test cycle sequences

The **OEM** button on the **Program selection** screen provides access to some special *Original Equipment Manufacturer* sequences for various beam types.

1. Tap on the **OEM** button 1 on the **Program selection** screen.

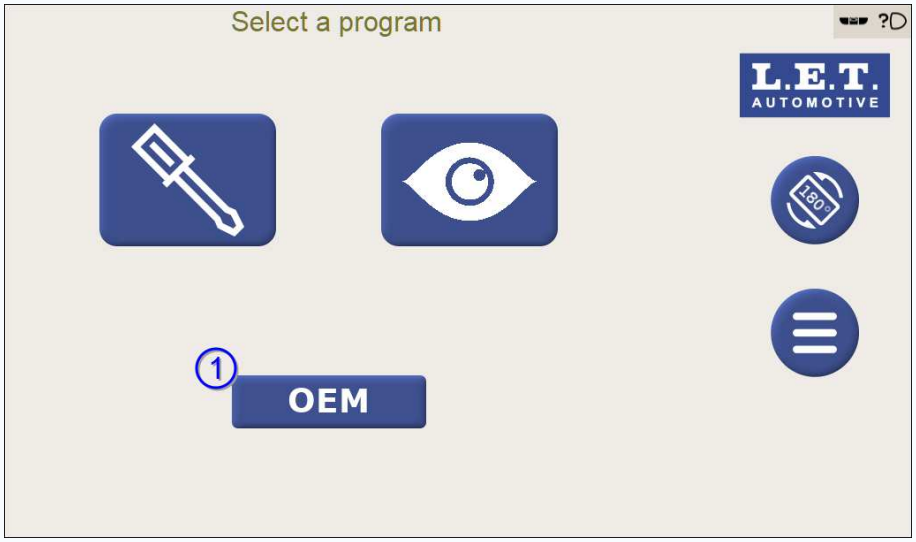


*Figure 74: **Program selection** screen with **OEM** button*

The **OEM program selection** screen is now displayed.

2. Select one of the options on the **OEM program selection** screen by tapping on the corresponding button.

Remember: The screen may have a different appearance depending on the customer's specific implementation.

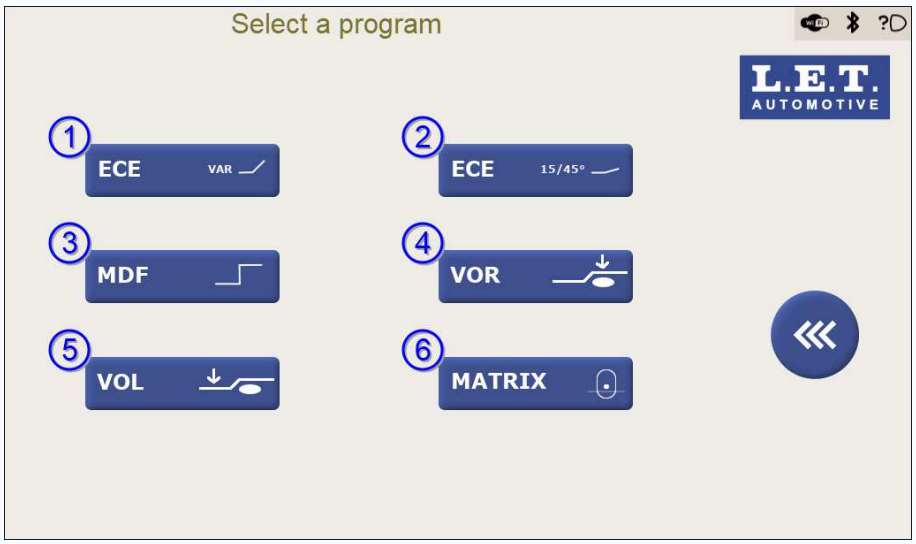


*Figure 75: **OEM program selection** screen*

#	Button	Description
1	**ECE-VAR** button	Program selection for *ECE* low beam adjustment with *automatic calculation of the slope angle* of the cut-off line (**ECE – var**iable slope angle).

#	Button	Description
2	**ECE-15/45** button	Program selection for *ECE* low beam adjustment with *manual determination of the slope angle* of the cut-off line (**ECE – 15° or 45°** slope angle).
3	**MDF** button	Program selection for *MDF* (*Maskiertes Dauerfernlicht*) high beam adjustment. An *MDF* high beam, is a glare free high beam with beam motorisation
4	**VOR** button	Program selection for *SAE VOR* low beam adjustment. This selection could be used to adjust *American VOR* low beams to be used in the Belgian traffic.
5	**VOL** button	Program selection for *SAE VOL* low beam adjustment. This selection could be used to adjust *American VOL* low beams to be used in the Belgian traffic.
6	**Renault Matrix** button	Program selection for *Matrix* high beam calibration. A *Matrix* high beam, is a glare free high beam with multiple *LED* sources. **Note:** This specific *Matrix* selection is only applicable to vehicles of the *Renault* group which feature *Matrix* beams.

Related tasks

ECE – VAR low beam sequence (pg. 99)
ECE – 15°/45° low beam sequence (pg. 104)
MDF high beam sequence (pg. 110)
Renault Matrix high beam sequence (pg. 117)
VOL american low beam sequence (pg. 123)
VOR american low beam sequence (pg. 128)

7.3.1 *ECE-VAR* low beam sequence

This chapter explains the use of the OEM program selection for the adjustment of *ECE* low beams with *automatic calculation* of the slope angle of the *cut-off* line (**ECE – var**iable slope angle).

Note: The *ECE-VAR* program could be used for low beams with a slope angle in a range of 10° till 50°. However, in most common cases the *ECE–15/45* program should be used instead of the *ECE-VAR* program.

Tap on the **ECE-VAR** button 1 on the **OEM program selection** screen.

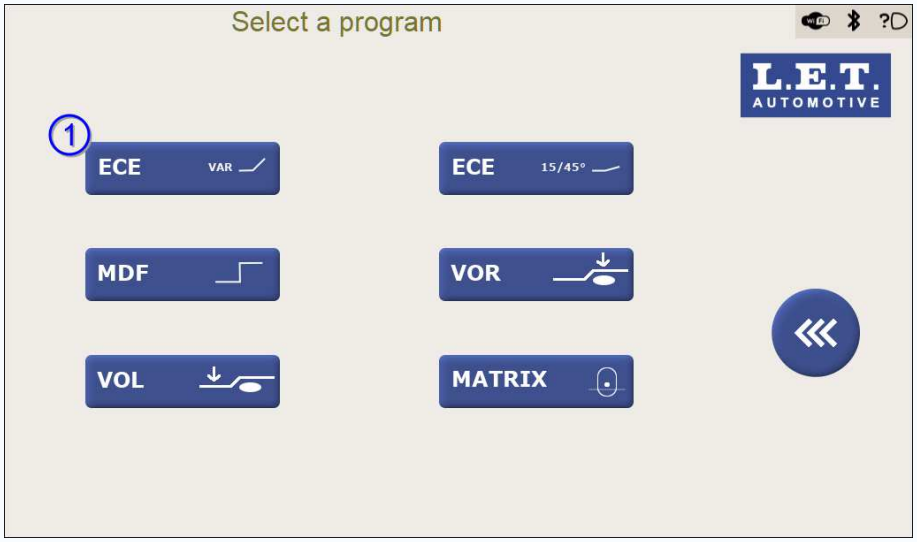


*Figure 76: **OEM program selection** screen with **ECE-VAR** button*

The **Beam selection** screen for the *ECE-VAR* program is now displayed.

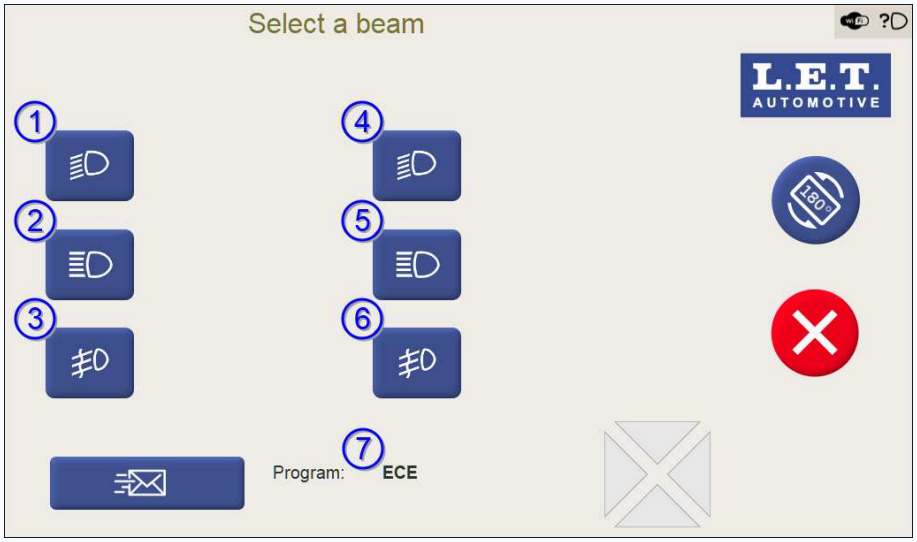


*Figure 77: **Beam selection** screen for ECE-VAR program*

#	Button	Description
1	First ECE low beam	Starts the test of the first ECE low beam.
2	First high beam	Starts the test of the first high beam.
3	First fog beam	Starts the test of the first fog beam.
4	Second ECE low beam	Starts the test of the second ECE low beam.
5	Second high beam	Starts the test of the second high beam.
6	Second fog beam	Starts the test of the second fog beam.
7	Program name	*ECE* program.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection

buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related information

ECE or European low beam (pg. 19)
Left / right vehicle side definition (pg. 60)

7.3.1.1 Summary of the test sequence

What follows is a summarized listing of the steps for the test sequence. Refer to the next chapter for a detailed explanation of each step.

1. Align the Luminoscope® with the vehicle.
2. Tap on the **beam selection** button corresponding with the left or right *ECE* low beam.
3. Position the Luminoscope® sequentially in front of both *ECE* low beams.
4. Adjust both *ECE* low beams sequentially.

7.3.1.2 Test sequence

1. Align the Luminoscope® with the vehicle.

   Before the start of the actual test, the Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle. This is crucial in order to minimize the measurement result error in the horizontal direction. At the end of the chapter there is a link with related information on how to align the Luminoscope®.

The next three steps are to be applied to both *ECE* low beams sequentially.

2. Tap on the **beam selection** button corresponding with the left or right *ECE* low beam on the **Beam selection** screen to start its calibration.

   Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

3. Position the Luminoscope® in front of the selected *ECE* low beam.

Make use of the electronic *Position Check* system.

Once the optimal position in front of the headlamp is achieved, the Luminoscope® proceeds automatically to the next phase in the test.

4. Adjust the selected *ECE* low beam.

Both *ECE* low beams should be adjusted with exactly the same procedure.

Note: The *ECE* low beam algorithm is capable to determine the horizontal and vertical position of the *V-point* (also called *elbow* point or *kink* point) of the *cut-off* line. With this *ECE-VAR* program, the *ECE* low beam algorithm is also capable to determine the angle of the *ECE* low beam *cut-off* line.

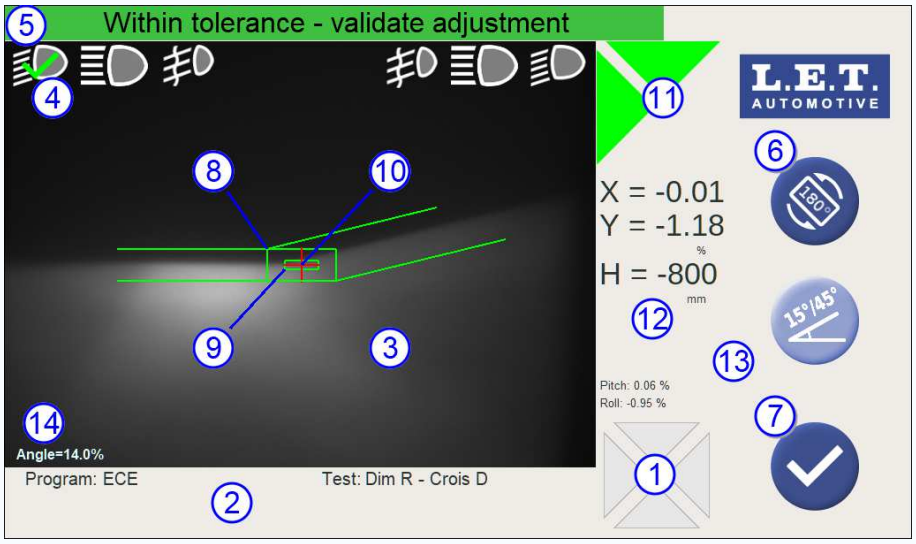


Figure 78: Right ECE low beam adjustment

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	*ECE* low beam icon	*ECE* low beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means **Test in progress**. • **Green** V-sign means **In tolerance**. • **Red** cross means **Out of tolerance**.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.

7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Audit tolerance zone	The *audit tolerance zone* allows the operator to check if the headlamp is within the audit tolerances that are applicable in a government inspection station.
9	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
10	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
11	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
12	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
13	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.
14	*Cut-off* angle field	The angle of the *ECE* low beam cut-off line is displayed here.

The following **Beam selection** screen is shown when both *ECE* low beams are properly adjusted.

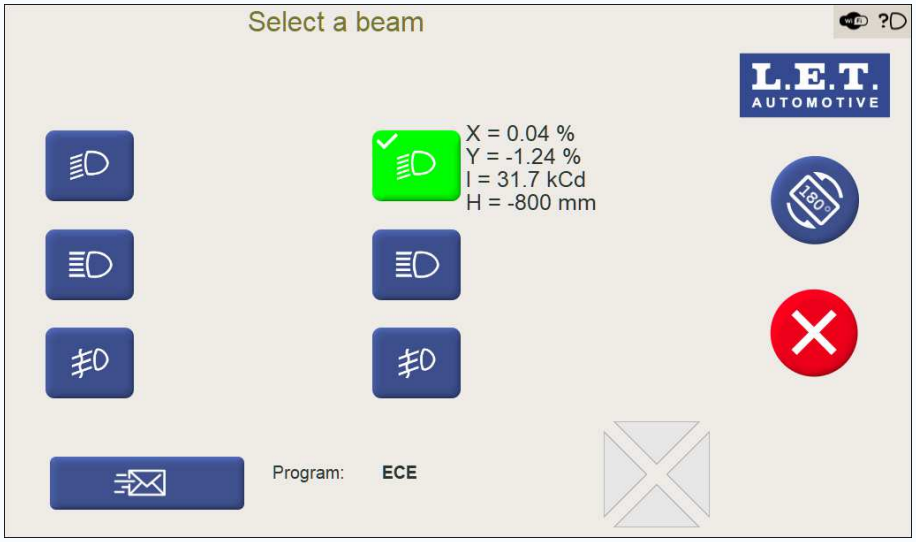


Figure 79: ***Beam selection*** *screen with ECE low beam test results*

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related tasks

Positioning in front of the headlamp (pg. 76)

Related information

Alignment with the vehicle (pg. 62)
Low beam test (pg. 79)

7.3.2 *ECE - 15°/45°* low beam sequence

This chapter explains the use of the OEM program selection for adjustment of *ECE* low beams with *manual determination* of the slope angle of the *cut-off* line (**ECE – 15° or 45°** slope angle).

Note: The **ECE-15/45** button has exactly the same functionality as the **Aiming** button (the *screwdriver* button) on the **Program selection** screen which was previously explained.

Tap on the **ECE-15/45** button 1 on the **OEM program selection** screen.

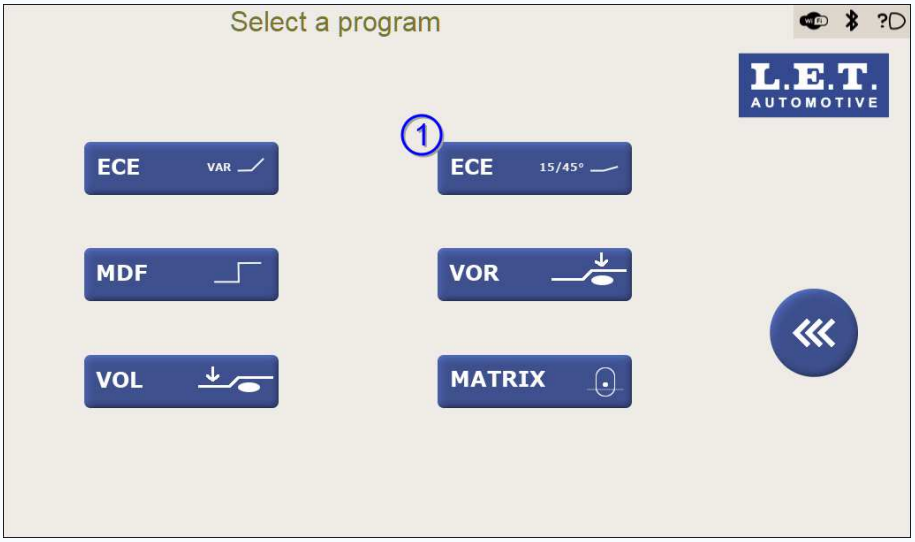


*Figure 80: **OEM program selection** screen with **ECE-15/45** button*

The **Beam selection** screen for the *ECE-15/45* program is now displayed.

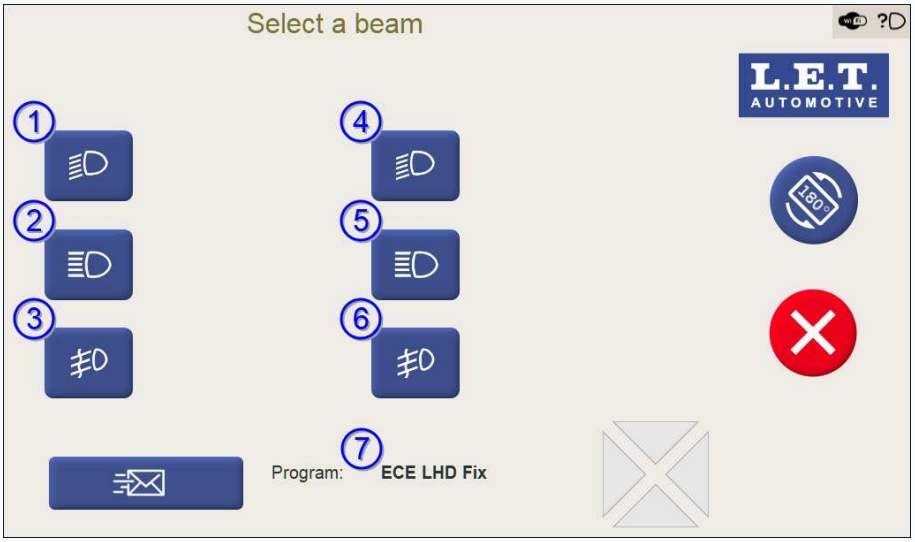


*Figure 81: **Beam selection** screen for ECE-15/45 program*

#	Button	Description
1	First ECE low beam	Starts the test of the first ECE low beam.
2	First high beam	Starts the test of the first high beam.
3	First fog beam	Starts the test of the first fog beam.
4	Second ECE low beam	Starts the test of the second ECE low beam.
5	Second high beam	Starts the test of the second high beam.
6	Second fog beam	Starts the test of the second fog beam.
7	Program name	*ECE LHD Fix* program.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection

buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related information

ECE or European low beam (pg. 19)
Left / right vehicle side definition (pg. 60)

7.3.2.1 Summary of the test sequence

What follows is a summarized listing of the steps for the test sequence. Refer to the next chapter for a detailed explanation of each step.

1. Align the Luminoscope® with the vehicle.
2. Tap on the **beam selection** button corresponding with the left or right *ECE* low beam.
3. Position the Luminoscope® sequentially in front of both *ECE* low beams.
4. Adjust both *ECE* low beams sequentially.

7.3.2.2 Test sequence

1. Align the Luminoscope® with the vehicle.

   Before the start of the actual test, the Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle. This is crucial in order to minimize the measurement result error in the horizontal direction. At the end of the chapter there is a link with related information on how to align the Luminoscope®.

The next three steps are to be applied to both *ECE* low beams sequentially.

2. Tap on the **beam selection** button corresponding with the left or right *ECE* low beam on the **Beam selection** screen to start its calibration.

   Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

3. Position the Luminoscope® in front of the selected *ECE* low beam.

Make use of the electronic *Position Check* system.

Once the optimal position in front of the headlamp is achieved, the Luminoscope® proceeds automatically to the next phase in the test.

4. Adjust the selected *ECE* low beam.

Both *ECE* low beams should be adjusted with exactly the same procedure.

Note: The *ECE* low beam algorithm is capable to determine the horizontal and vertical position of the *V-point* (also called *elbow* point or *kink* point) of the *cut-off* line. Each time the **Cut-off angle** button is tapped, the selected angle of the low beam tolerance overlay changes between 15º and 45º. In most common cases the default selection of 15° can be used. Use the 45º selection only for *ECE* low beam *cut-off* lines with a 45º step. It is important to correctly set the angle because it has a direct consequence on the horizontal algorithm measurement position (determination of the *V-point*) of the *cut-off* line.

In case of an *ECE LHD* (Left Hand Drive) low beam with a 15º angle:

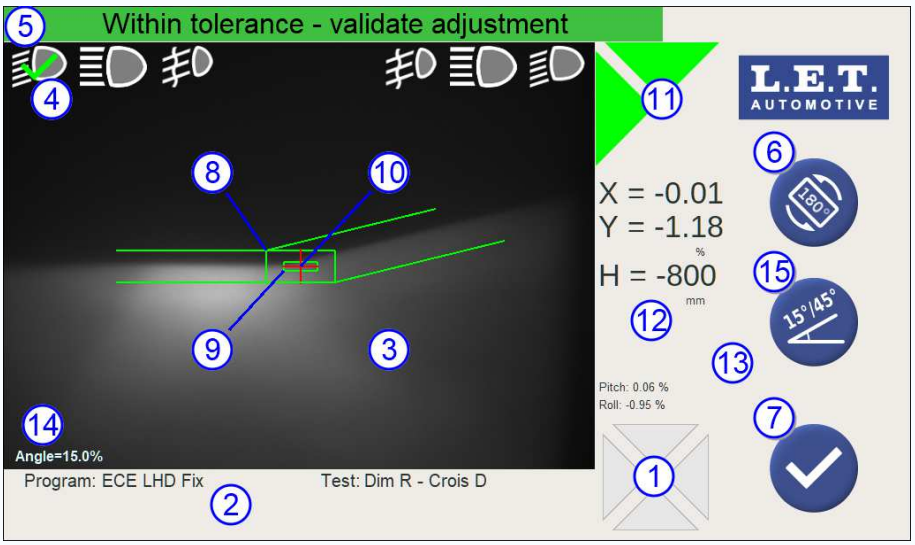


Figure 82: Right ECE low beam with 15º angle adjustment

In case of an *ECE LHD* (Left Hand Drive) low beam with a 45º angle:

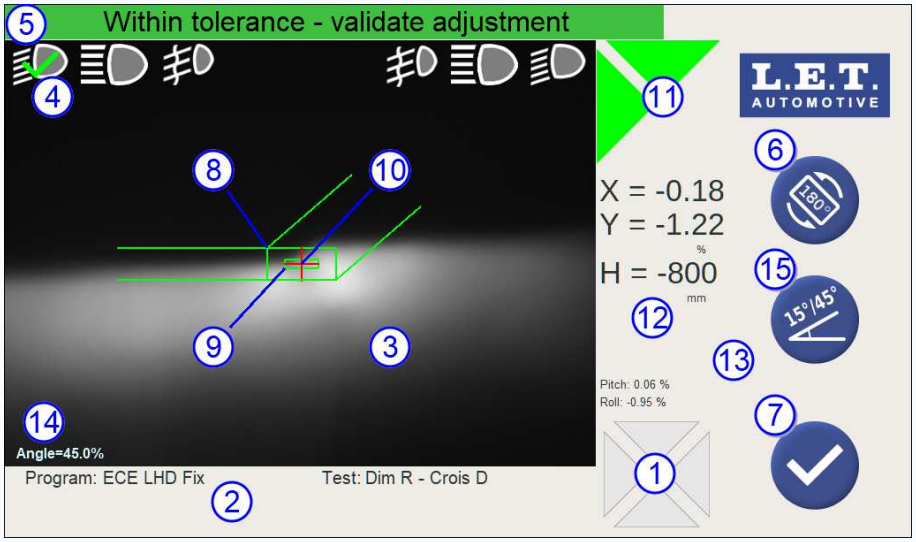


Figure 83: Right ECE low beam with 45º angle adjustment

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	*ECE* low beam icon	*ECE* low beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means **Test in progress**. • **Green** V-sign means **In tolerance**. • **Red** cross means **Out of tolerance**.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Audit tolerance zone	The *audit tolerance zone* allows the operator to check if the headlamp is within the audit tolerances that are applicable in a government inspection station.

9	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
10	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
11	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
12	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
13	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.
14	*Cut-off* angle field	The angle of the *ECE* low beam cut-off line is displayed here.
15	**Cut-off angle** button	Each time the **Cut-off angle** button is tapped, the selected angle of the low beam tolerance overlay changes between 15º and 45º. In most common cases the default selection of 15° can be used. Use the 45º selection only for *ECE* low beam *cut-off* lines with a 45º step. It is important to correctly set the angle because it has a direct consequence on the horizontal algorithm measurement position (determination of the *V-point*) of the *cut-off* line.

The following **Beam selection** screen is shown when both *ECE* low beams are properly adjusted.

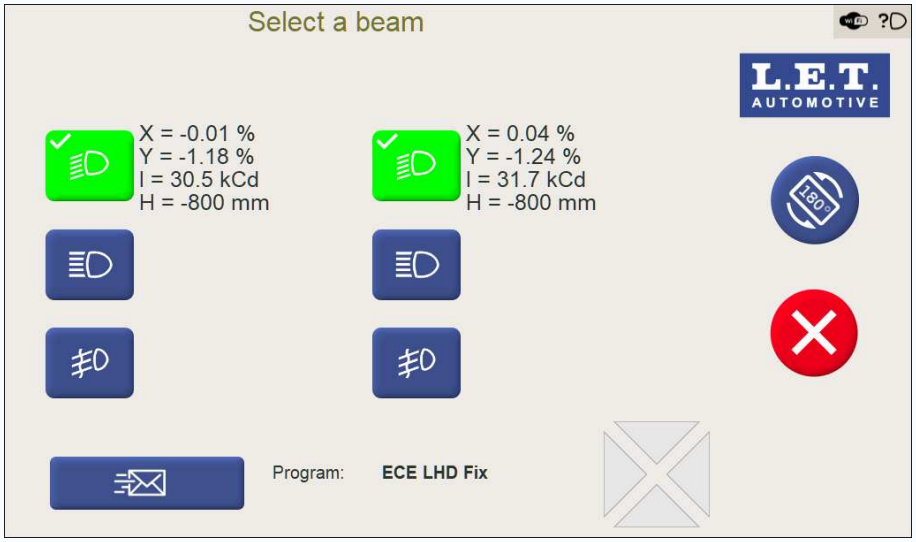


Figure 84: ***Beam selection*** *screen with ECE low beam test results*

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related tasks

Positioning in front of the headlamp (pg. 76)

Related information

Alignment with the vehicle (pg. 62)
Low beam test (pg. 79)

7.3.3 *MDF* high beam sequence

This chapter explains the use of the OEM program selection for *MDF* high beam adjustment. An *MDF* high beam, is a glare free high beam with motorization.

Note: This specific *MDF* selection is only applicable to vehicles which have this function available.

Remember: To perform the *MDF* high beam calibration, most of the vehicles need to be set in a special calibration mode to reveal the *MDF* pattern. A *vehicle diagnostic tester* must be connected to the *On Board Diagnostic* (*OBD*) port of the vehicle to switch the *MDF* high beams in a special calibration mode.

Refer to the specific instructions from the vehicle manufacturer in the vehicle manual.

Note: The *MDF* high beam has to be physically adjusted with the headlamp adjustment screws.

Tap on the **MDF** button 1 on the **OEM program selection** screen.

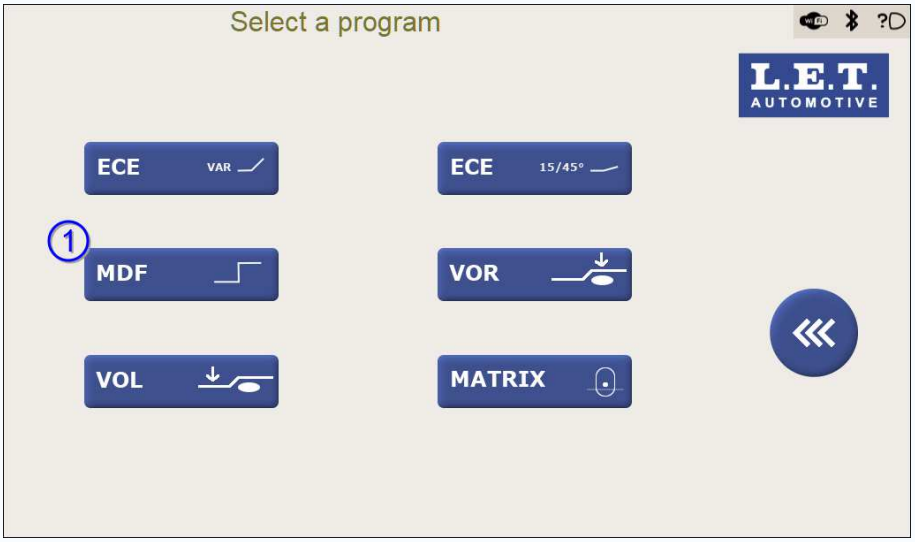


*Figure 85: **OEM program selection** screen with **MDF** button*

The **Beam selection** screen for the *MDF* program is now displayed.

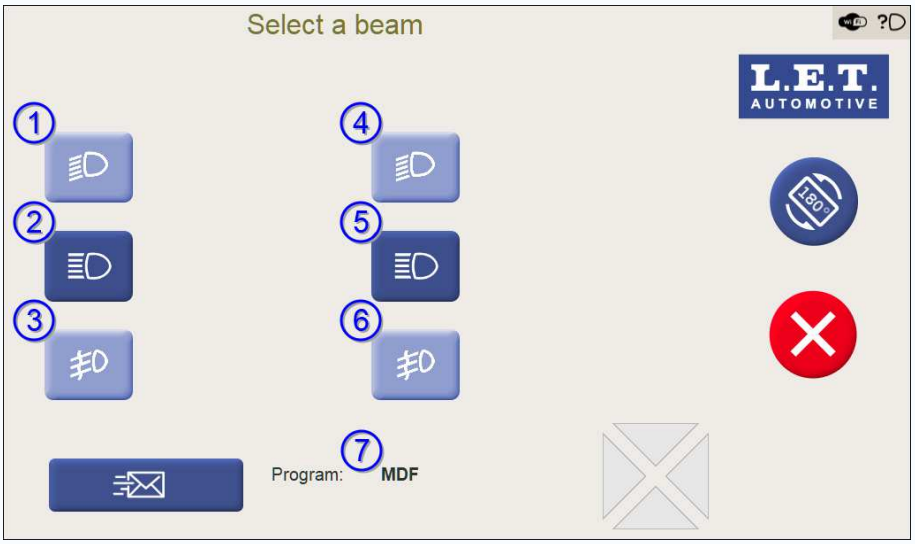


*Figure 86: **Beam selection** screen for MDF program*

#	Button	Description
1	First low beam	Starts the test of the first low beam.
2	First *MDF* high beam	Starts the test of the first *MDF* high beam.
3	First fog beam	Starts the test of the first fog beam.
4	Second low beam	Starts the test of the second low beam.
5	Second *MDF* high beam	Starts the test of the second *MDF* high beam.
6	Second fog beam	Starts the test of the second fog beam.
7	Program name	*MDF* program.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Note: The low and fog beam buttons on the **Beam selection** screen remain disabled until both *MDF* high beams are properly adjusted.

Related information

Glare free high beam with beam motorisation (pg. 24)
Left / right vehicle side definition (pg. 60)

7.3.3.1 Summary of the test sequence

What follows is a summarized listing of the steps for the test sequence. Refer to the next chapter for a detailed explanation of each step.

1. Align the Luminoscope® with the vehicle.
2. Switch the high beams to *MDF* mode.
3. Tap on the **beam selection** button corresponding with the left or right *MDF* high beam.
4. Position the Luminoscope® sequentially in front of both *MDF* high beams.
5. Adjust both *MDF* high beams sequentially.
6. Switch on the low beams.
7. Tap on the **beam selection** button corresponding with the left or right low beam.
8. Position the Luminoscope® sequentially in front of both low beams.
9. Adjust both low beams sequentially in vertical direction only.

7.3.3.2 Test sequence

1. Align the Luminoscope® with the vehicle.

   Before the start of the actual test, the Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle. This is crucial in order to minimize the measurement result error in the horizontal direction. At the end of the chapter there is a link with related information on how to align the Luminoscope®.

2. Switch the high beams to *MDF* mode.

To perform the *MDF* high beam calibration, most of the vehicles need to be set in a special calibration mode to reveal the *MDF* high beam pattern.

Refer to the specific instructions from the vehicle manufacturer in the vehicle manual.

The next three steps are to be applied to both *MDF* high beams sequentially.

3. Tap on the **beam selection** button corresponding with the left or right *MDF* high beam on the **Beam selection** screen to start its calibration.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

4. Position the Luminoscope® in front of the selected *MDF* high beam.

   Make use of the electronic *Position Check* system.

   Once the optimal position in front of the headlamp is achieved, the Luminoscope® proceeds automatically to the next phase in the test.

5. Adjust the selected *MDF* high beam.

   Both *MDF* high beams should be adjusted towards the tolerance zone in horizontal direction (X direction) and vertical direction (Y direction).

   The projection of the left and right *MDF* high beams differ from each other.

   Note: The *MDF* high beam algorithm is capable to determine the *kink* point on the lower horizontal line of the *MDF* high beam *cut-off* line. The *MDF* high beam *cut-off* line has a 90° step.

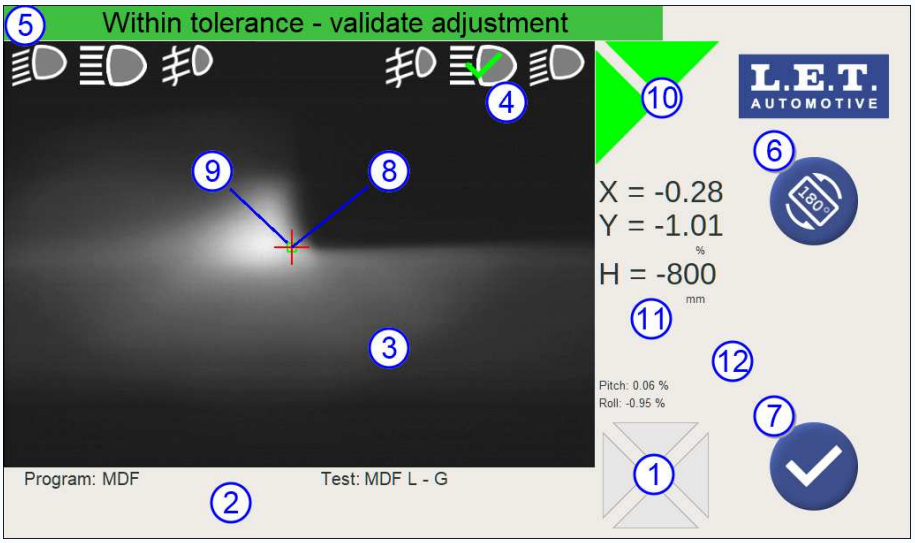


Figure 87: Left MDF high beam adjustment

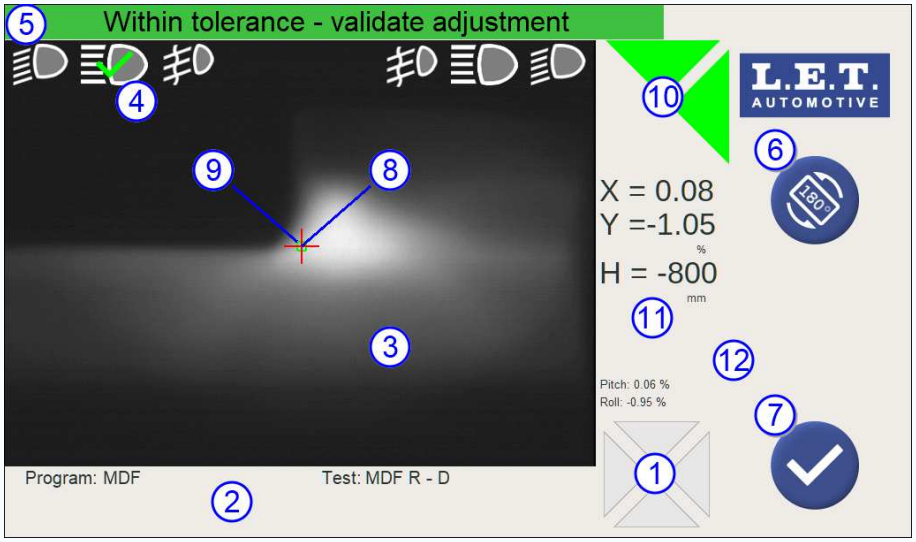


Figure 88: Right MDF high beam adjustment

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	*MDF* high beam icon	*MDF* high beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means **Test in progress**. • **Green** V-sign means **In tolerance**. • **Red** cross means **Out of tolerance**.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.

9	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
10	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
11	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
12	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.

The following **Beam selection** screen is shown when both *MDF* high beams are properly adjusted.

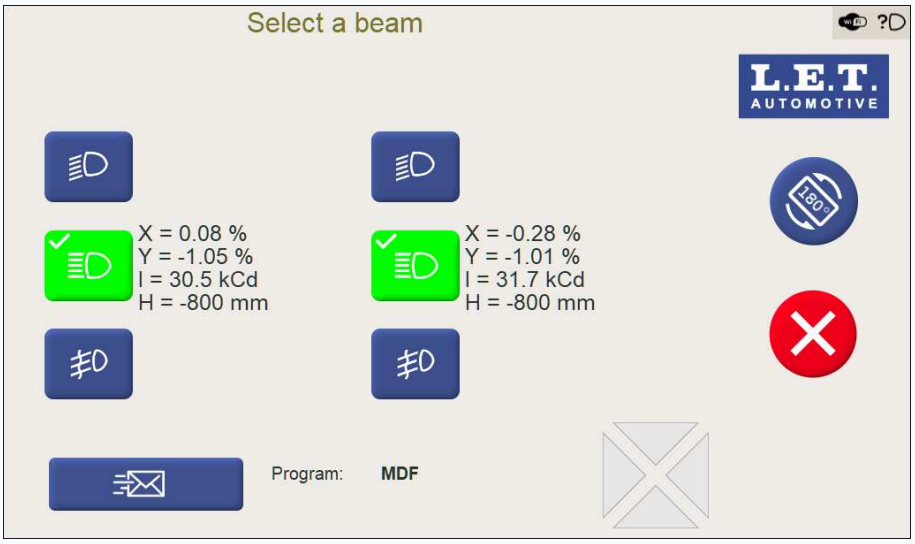


Figure 89: ***Beam selection*** *screen with MDF high beam test results*

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the

headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

6. Switch on the low beams.

   Refer to the specific instructions from the vehicle manufacturer in the vehicle manual.

The next three steps are to be applied to both low beams sequentially.

7. Tap on the **beam selection** button corresponding with the left or right low beam on the **Beam selection** screen to start its calibration.

   Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

8. Position the Luminoscope® in front of the selected low beam.

   Make use of the electronic *Position Check* system.

   Once the optimal position in front of the headlamp is achieved, the Luminoscope® proceeds automatically to the next phase in the test.

9. Adjust the selected low beam in vertical direction only.

   Both low beams should be adjusted towards the tolerance zone in vertical direction (Y direction) only.

   CAUTION: It is not allowed to adjust the horizontal direction (X direction) of the low beams as this has a direct influence on the previously performed calibration of the *MDF* high beams.

   Note: The *ECE* low beam algorithm is capable to determine the horizontal and vertical position of the *V-point* (also called *elbow* point or *kink* point) of the *cut-off* line.

Related tasks

Positioning in front of the headlamp (pg. 76)

Related information

Alignment with the vehicle (pg. 62)
Low beam test (pg. 79)

7.3.4 Renault *Matrix* high beam sequence

This chapter explains the use of the OEM program selection for *Matrix* high beam calibration. A *Matrix* high beam is a glare free high beam with multiple *LED* sources.

Note: This specific *Matrix* selection is only applicable to vehicles of the *Renault* group which feature *Matrix* beams.

Remember: To perform this calibration, a *vehicle diagnostic tester* must be connected to the *On Board Diagnostic* (*OBD*) port of the vehicle to switch the *Matrix* high beams in a special calibration mode.

Follow the specific instructions from the vehicle manufacturer on the dialog screen of the *vehicle diagnostic tester*.

Note: The low and *Matrix* high beams have to be physically adjusted with their corresponding headlamp adjustment screws.

Tap on the **Renault Matrix** button 1 on the **OEM program selection** screen.

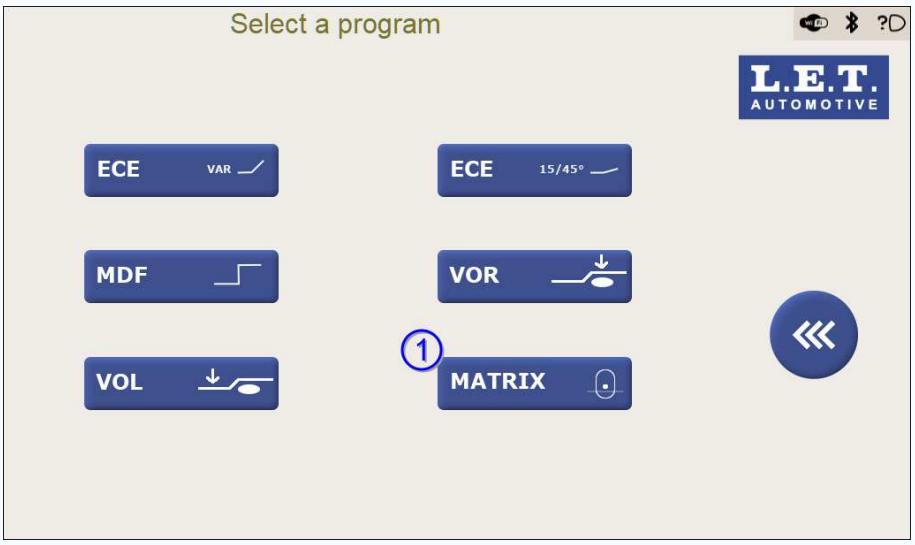


Figure 90: ***OEM program selection*** *screen with* ***Renault Matrix*** *button*

The **Beam selection** screen for the *Renault Matrix* program is now displayed.

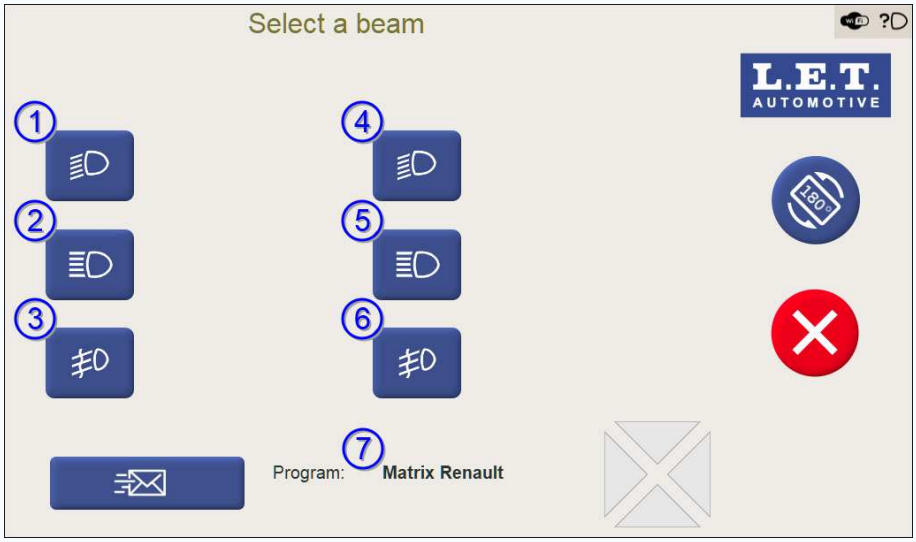


Figure 91: ***Beam selection*** *screen for Renault Matrix program*

#	Button	Description
1	First low beam	Starts the test of the first low beam.
2	First *Matrix* high beam	Starts the test of the first *Matrix* high beam.
3	First fog beam	Starts the test of the first fog beam.
4	Second low beam	Starts the test of the second low beam.
5	Second *Matrix* high beam	Starts the test of the second *Matrix* high beam.
6	Second fog beam	Starts the test of the second fog beam.
7	Program name	*Renault Matrix* program.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related information

Glare free high beam with multiple static LED sources (pg. 25)
Left / right vehicle side definition (pg. 60)

7.3.4.1 Summary of the test sequence

What follows is a summarized listing of the steps for the test sequence. Refer to the next chapter for a detailed explanation of each step.

1. Align the Luminoscope® with the vehicle.

2. Establish an *OBD* connection with the *vehicle diagnostic tester*.
3. Adjust the low beams.
4. Switch the *Matrix* high beams in a special calibration mode.
5. Tap on the **beam selection** button corresponding with the left or right *Matrix* high beam.
6. Position the Luminoscope® sequentially in front of both *Matrix* high beams.
7. Adjust both *Matrix* high beams sequentially.
8. Exit the calibration mode.

7.3.4.2 Test sequence

1. Align the Luminoscope® with the vehicle.

   Before the start of the actual test, the Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle. This is crucial in order to minimize the measurement result error in the horizontal direction. At the end of the chapter there is a link with related information on how to align the Luminoscope®.

2. Establish an *OBD* connection with the *vehicle diagnostic tester*.

   The *vehicle diagnostic tester* must be connected to the *On Board Diagnostic* (*OBD*) port of the vehicle to switch the *Matrix* high beam in a special calibration mode.

   Follow the specific instructions from the vehicle manufacturer on the dialog screen of the *vehicle diagnostic tester*.

3. Adjust the low beams.

   Both low beams should be adjusted properly before the *Matrix* high beam calibration can be performed.

   The following **Beam selection** screen is shown once both low beams are properly adjusted.

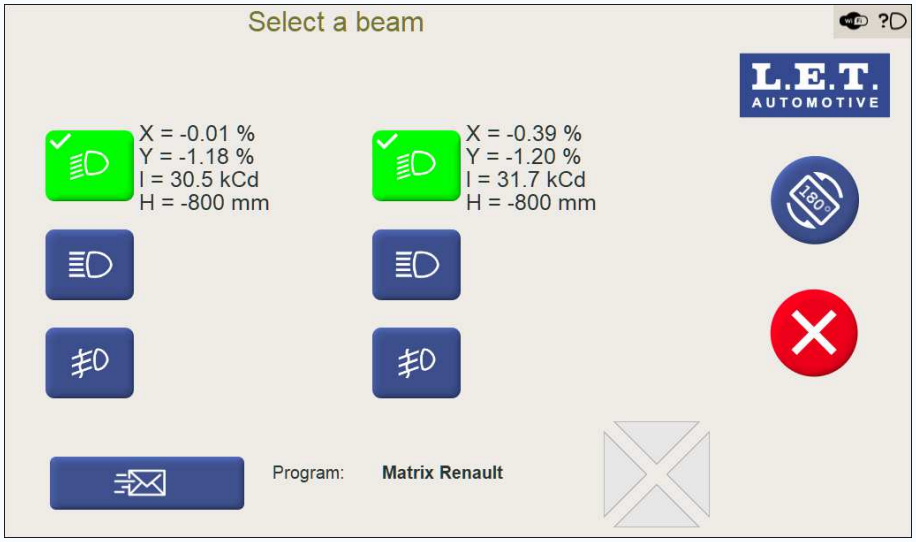


*Figure 92: **Beam selection** screen with low beam test results*

4. Switch the *Matrix* high beams in a special calibration mode.

   Follow the specific instructions from the vehicle manufacturer on the dialog screen of the *vehicle diagnostic tester*.

The next three steps are to be applied to both *Matrix* high beams sequentially.

5. Tap on the **beam selection** button corresponding with the left or right *Matrix* high beam on the **Beam selection** screen to start its calibration.

   Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

6. Position the Luminoscope® in front of the selected *Matrix* high beam.

   Position the Luminoscope® in front of the *Matrix* high beam projection, in such a way the light beam shines through the centre of the lens of the Luminoscope® while observing the beam projection on the lens of the Luminoscope®.

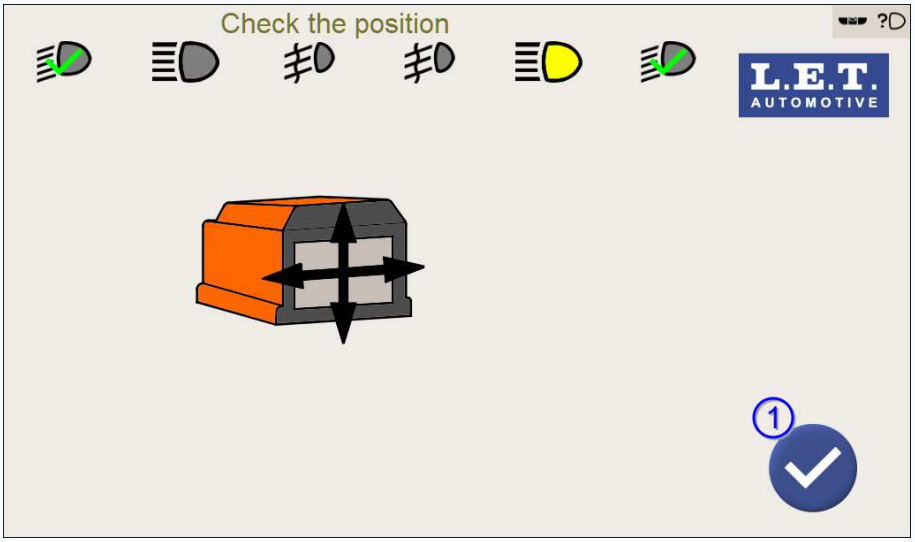


*Figure 93: **Positioning** screen*

Once the correct position is reached, tap on the **Validation** button 1 to proceed.

7. Adjust the selected *Matrix* high beam.

Both *Matrix* high beams should be adjusted towards the tolerance zone in horizontal direction (X-direction) with exactly the same procedure.

Note: The *Matrix* high beam algorithm is capable to determine a central position in the reference *LED* source, based on the position of the left and right flank of the reference *LED* source.

Refer to the specific instructions from the vehicle manufacturer in order to physically adjust the horizontal setting of the headlamp (X-direction) with the corresponding adjustment screw.

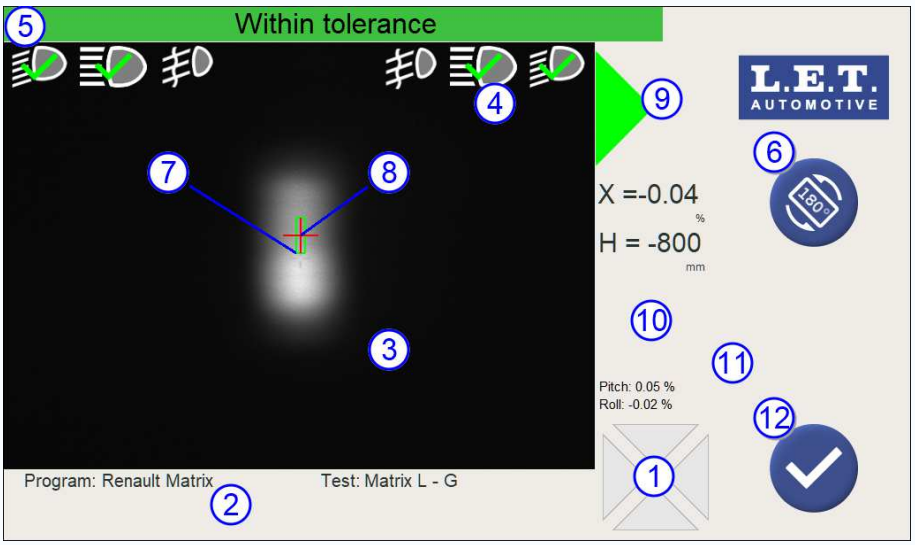


Figure 94: Left Matrix high beam calibration

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.

2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	First *Matrix* high beam icon	First *Matrix* high beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means **Test in progress**. • **Green** V-sign means **In tolerance**. • **Red** cross means **Out of tolerance**.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.
6	**Rotate screen** button	Rotate the screen position.
7	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
8	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
9	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
10	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
11	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.

12	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.

The following **Beam selection** screen is shown once both *Matrix* high beams are properly adjusted.

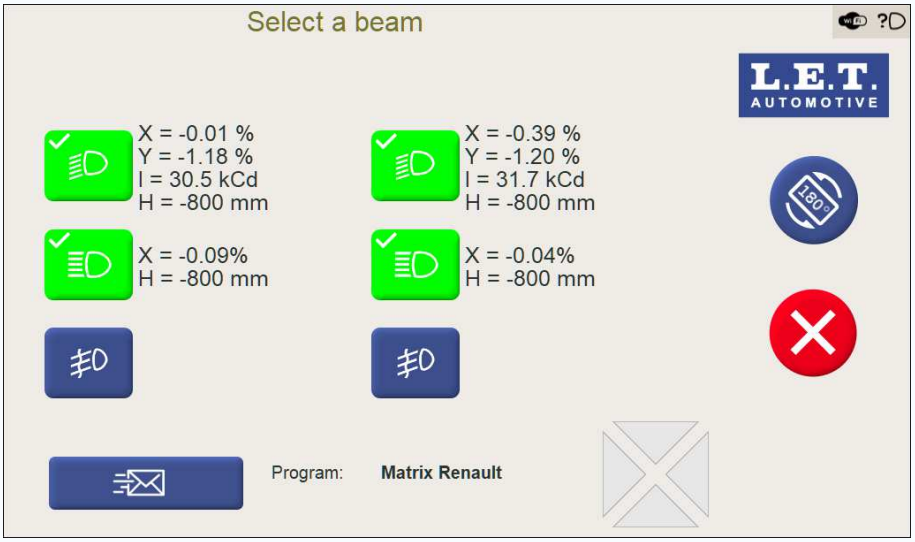


*Figure 95: **Beam selection** screen with test results of both low beams and Matrix high beams*

8. Exit the calibration mode.

Follow the specific instructions from the vehicle manufacturer on the dialog screen of the *vehicle diagnostic tester*.

Related information

Alignment with the vehicle (pg. 62)
Low beam test (pg. 79)

7.3.5 *VOL American* low beam sequence

This chapter explains the use of the OEM program selection for adjustment of American *VOL* low beams to be used in the Belgian traffic.

Note: This specific *SAE VOL* selection is only applicable to vehicles which are equipped with American *VOL* low beams.

Tap on the **VOL** button 1 on the **OEM program selection** screen.

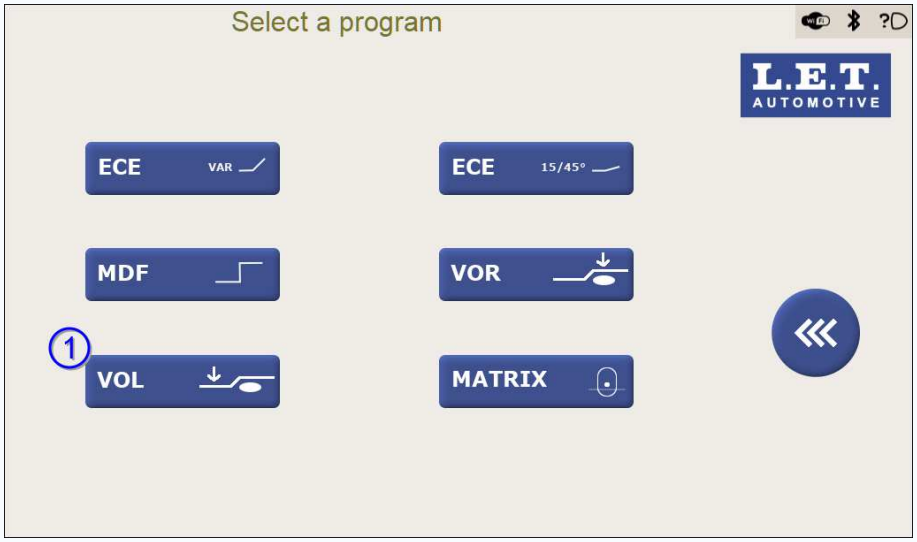


*Figure 96: **OEM program selection** screen with **VOL** button*

The **Beam selection** screen for the *VOL* program is now displayed.

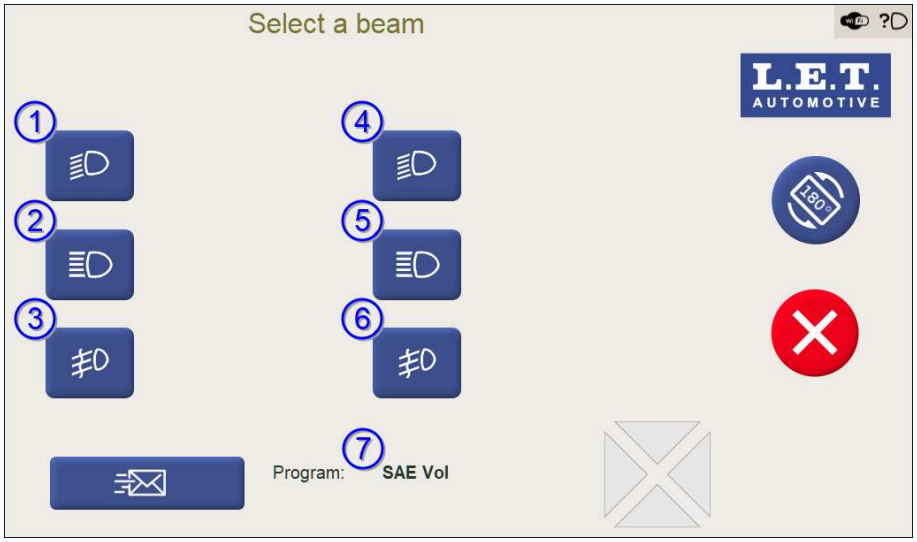


*Figure 97: **Beam selection** screen for VOL program*

#	Button	Description
1	First *VOL* low beam	Starts the test of the first *VOL* low beam.
2	First high beam	Starts the test of the first high beam.
3	First fog beam	Starts the test of the first fog beam.
4	Second *VOL* low beam	Starts the test of the second *VOL* low beam.
5	Second high beam	Starts the test of the second high beam.
6	Second fog beam	Starts the test of the second fog beam.
7	Program name	*VOL* program.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection

buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related information

SAE or American low beam (pg. 22)
Left / right vehicle side definition (pg. 60)

7.3.5.1 Summary of the test sequence

What follows is a summarized listing of the steps for the test sequence. Refer to the next chapter for a detailed explanation of each step.

1. Align the Luminoscope® with the vehicle.
2. Tap on the **beam selection** button corresponding with the left or right *VOL* low beam.
3. Position the Luminoscope® sequentially in front of both *VOL* low beams.
4. Adjust both *VOL* low beams sequentially.

7.3.5.2 Test sequence

1. Align the Luminoscope® with the vehicle.

   Before the start of the actual test, the Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle. This is crucial in order to minimize the measurement result error in the horizontal direction. At the end of the chapter there is a link with related information on how to align the Luminoscope®.

The next three steps are to be applied to both *VOL* low beams sequentially.

2. Tap on the **beam selection** button corresponding with the left or right *VOL* low beam on the **Beam selection** screen to start its calibration.

   Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

3. Position the Luminoscope® in front of the selected *VOL* low beam.

Make use of the electronic *Position Check* system.

Once the optimal position in front of the headlamp is achieved, the Luminoscope® proceeds automatically to the next phase in the test.

4. Adjust the selected *VOL* low beam.

Both *VOL* low beams should be adjusted with exactly the same procedure.

Note: The *VOL* low beam algorithm is capable to determine the required vertical position of the *VOL* low beam *cut-off* line.

The vertical position of the *cut-off* line is measured at 4,35% (2,5°) to the left of the absolute zero reference point of the Luminoscope®.

Note: The headlamp should only be adjusted in vertical direction (Y direction). The vertical *cut-off* position should be set to -1,25% to be used in Belgian traffic.

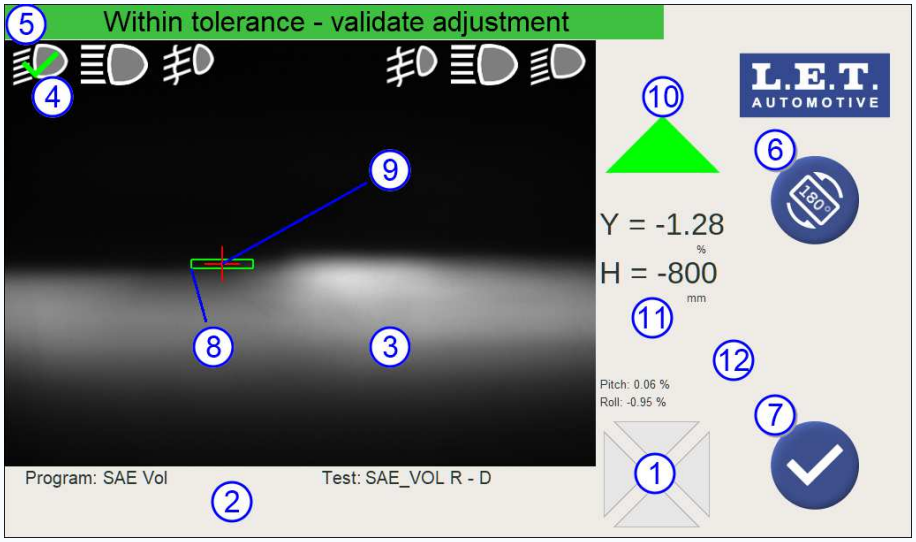


Figure 98: Right VOL low beam adjustment

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	*VOL* low beam icon	*VOL* low beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means **Test in progress**. • **Green** V-sign means **In tolerance**. • **Red** cross means **Out of tolerance**.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.

6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
9	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
10	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
11	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
12	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.

The following **Beam selection** screen is shown when both *VOL* low beams are properly adjusted.

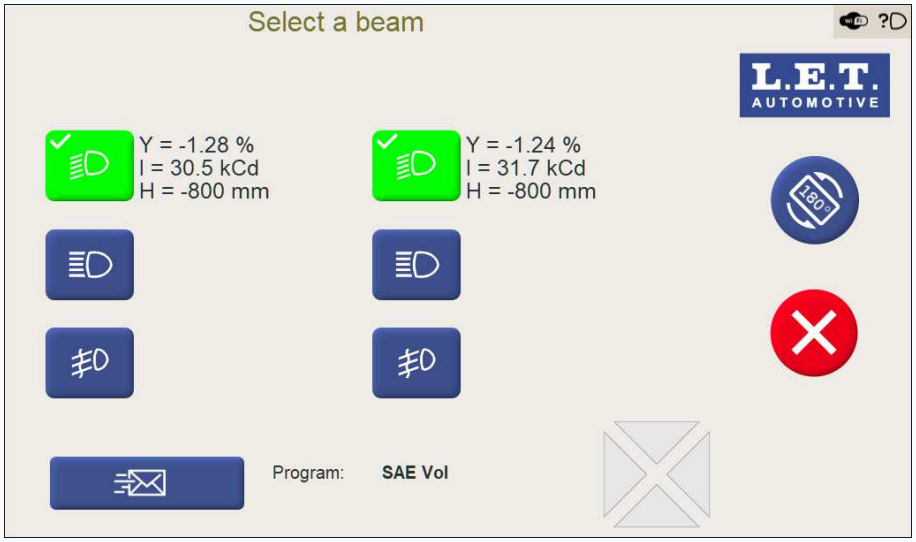


*Figure 99: **Beam selection** screen with SAE VOL low beam test results*

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related tasks

Positioning in front of the headlamp (pg. 76)

Related information

Alignment with the vehicle (pg. 62)

7.3.6 *VOR American* low beam sequence

This chapter explains the use of the OEM program selection for adjustment of American *VOR* low beams to be used in the Belgian traffic.

Note: This specific *SAE VOR* selection is only applicable to vehicles which are equipped with American *VOR* low beams.

Tap on the **VOR** button 1 on the **OEM program selection** screen.

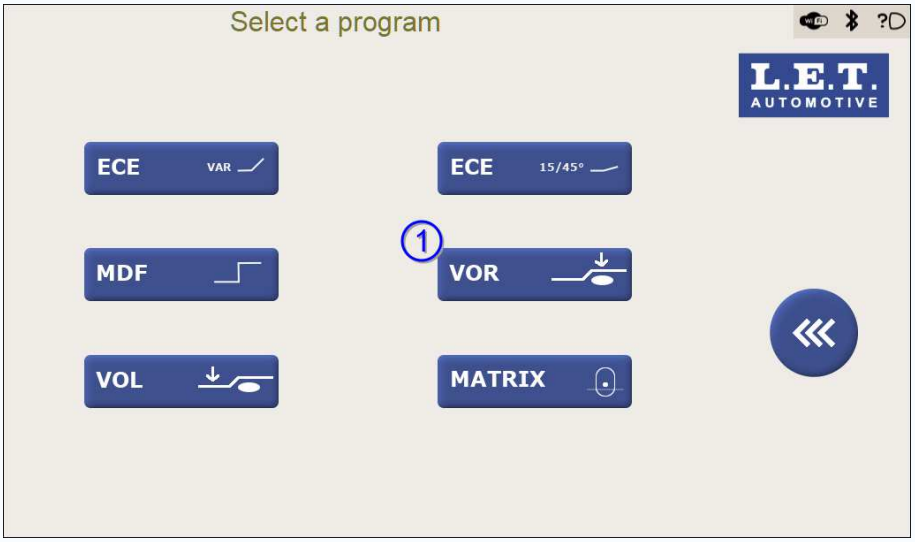


*Figure 100: **OEM program selection** screen with **VOR** button*

The **Beam selection** screen for the *VOR* program is now displayed.

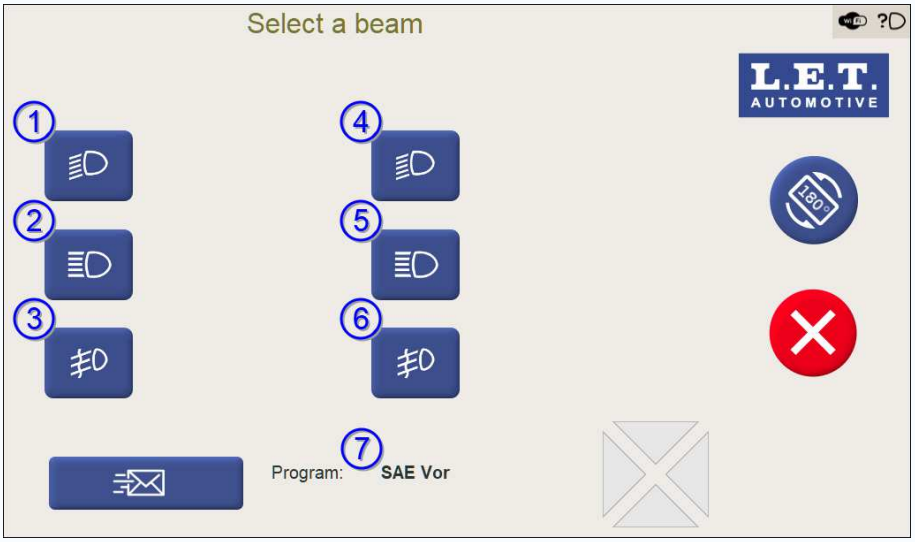


*Figure 101: **Beam selection** screen for VOR program*

#	Button	Description
1	First *VOR* low beam	Starts the test of the first *VOR* low beam.
2	First high beam	Starts the test of the first high beam.
3	First fog beam	Starts the test of the first fog beam.
4	Second *VOR* low beam	Starts the test of the second *VOR* low beam.
5	Second high beam	Starts the test of the second high beam.
6	Second fog beam	Starts the test of the second fog beam.
7	Program name	*VOR* program.

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection

buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related information

SAE or American low beam (pg. 22)
Left / right vehicle side definition (pg. 60)

7.3.6.1 Summary of the test sequence

What follows is a summarized listing of the steps for the test sequence. Refer to the next chapter for a detailed explanation of each step.

1. Align the Luminoscope® with the vehicle.
2. Tap on the **beam selection** button corresponding with the left or right *VOR* low beam.
3. Position the Luminoscope® sequentially in front of both *VOR* low beams.
4. Adjust both *VOR* low beams sequentially.

7.3.6.2 Test sequence

1. Align the Luminoscope® with the vehicle.

   Before the start of the actual test, the Luminoscope® should be properly aligned with the longitudinal axis (driving direction) of the vehicle. This is crucial in order to minimize the measurement result error in the horizontal direction. At the end of the chapter there is a link with related information on how to align the Luminoscope®.

The next three steps are to be applied to both *VOR* low beams sequentially.

2. Tap on the **beam selection** button corresponding with the left or right *VOR* low beam on the **Beam selection** screen to start its calibration.

   Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

3. Position the Luminoscope® in front of the selected *VOR* low beam.

Make use of the electronic *Position Check* system.

Once the optimal position in front of the headlamp is achieved, the Luminoscope® proceeds automatically to the next phase in the test.

4. Adjust the selected *VOR* low beam.

Both *VOR* low beams should be adjusted with exactly the same procedure.

Note: The *VOR* low beam algorithm is capable to determine the required vertical position of the *VOR* low beam *cut-off* line.

The vertical position of the *cut-off* line is measured at 3,50% (2,0°) to the right of the absolute zero reference point of the Luminoscope®.

Note: The headlamp should only be adjusted in vertical direction (Y direction). The vertical *cut-off* position should be set to -0,5% to be used in Belgian traffic.

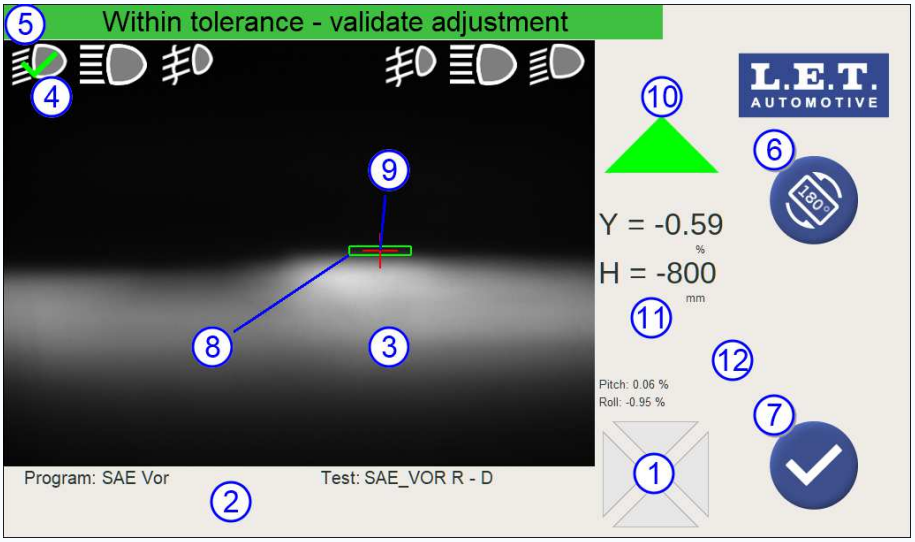


Figure 102: Right VOR low beam adjustment

1	*Position Check Arrows*	Indicates the direction(s) on which the optical block should be moved to achieve the optimal position in front of the headlamp. This position can change when adjusting the headlamp.
2	Information field	Depending on the Luminoscope® configuration, some related information such as the name of the selected program (Vehicle), the name of the test (Beam), license plate, etc. will be displayed.
3	Live headlamp beam image	Real time image of the headlamp beam including overlays for tolerance zone(s), algorithm measurement position, etc.
4	*VOR* low beam icon	*VOR* low beam icon indicating the status of the beam. The meaning of the icon depends on its shape and color: • **Yellow** mark means **Test in progress**. • **Green** V-sign means **In tolerance**. • **Red** cross means **Out of tolerance**.
5	Information banner	The information banner shows different status messages such as: **Test in progress**, **Within tolerance**, **Out of tolerance**, etc. Status, error or warning messages can also be displayed over there.

6	**Rotate screen** button	Rotate the screen position.
7	**Validation** button	If the *live validation* function is activated, tapping on this button will store the beam measurement result. The result is unconditionally stored whether the algorithm measurement position is *Within tolerance* or *Out of tolerance*.
8	Aiming tolerance zone	The aiming tolerance zone allows the operator to adjust the headlamp correctly. Note that the aiming tolerance zone should always be smaller than the audit tolerance zone. This is to ensure that a correctly aimed headlamp at a workshop (*using the smaller aiming tolerance zone*) will pass the test in a government inspection station (*using the larger audit tolerance zone*).
9	Algorithm measurement position	The algorithm overlay (red cross) represents the algorithm measurement position on the headlamp beam image. In case of an aiming cycle, the red cross position should be aimed towards the center of the aiming tolerance zone. In case of an audit cycle, the red cross position is evaluated. The actual position is displayed at the headlamp measurement result field.
10	Beam direction arrows	The beam direction arrows indicate the direction(s) in which the headlamp should be moved to reach the target position inside the tolerance zone. The color of the arrows indicates the live status of the aiming: • **Green** means the result is *inside* the tolerance zone. • **Yellow** means the result is *close* to the tolerance zone. • **Red** means the result is *far away* from the tolerance zone.
11	Headlamp measurement results field	Depending on the chosen algorithm and Luminoscope® configuration, headlamp measurement results such as horizontal beam position (X), vertical beam position (Y), headlamp mounting height (H), etc are displayed here.
12	*ESL* (electronic spirit level module) angles	Measured Pitch and Roll angle of the *ESL* (electronic spirit level module), if applicable.

The following **Beam selection** screen is shown when both *VOR* low beams are properly adjusted.

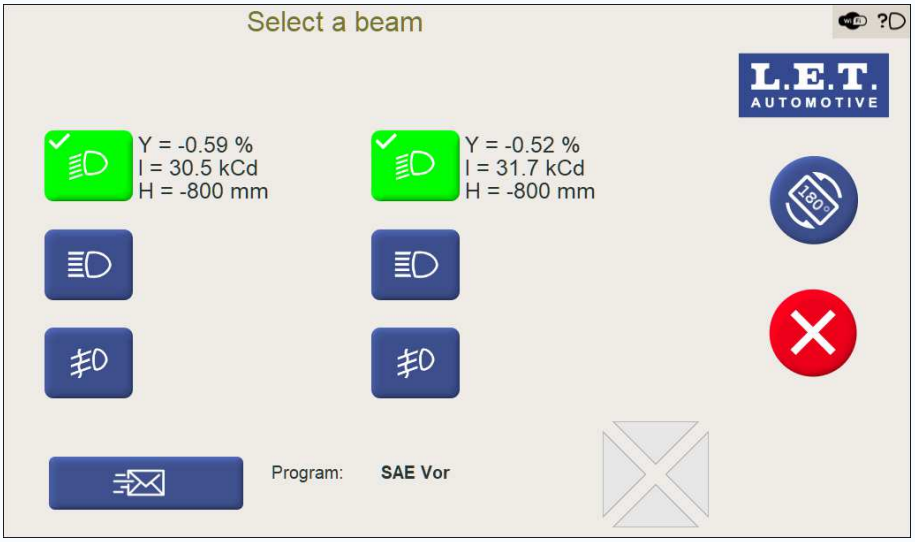


Figure 103: ***Beam selection*** *screen with SAE VOR low beam test results*

Remember: Rotating the screen position affects to the position of the beam icons and beam selection buttons on the screen. The intelligence of the Luminoscope® automatically places the beam icons and beam selection buttons at the correct side of the vehicle. For both screen orientation modes, the beam icons and beam selection buttons which are closer to the left side of the vehicle are applicable for the headlamps on the left side. Those closer to the right side of the vehicle are applicable for the headlamps on the right side.

Related tasks

Positioning in front of the headlamp (pg. 76)

Related information

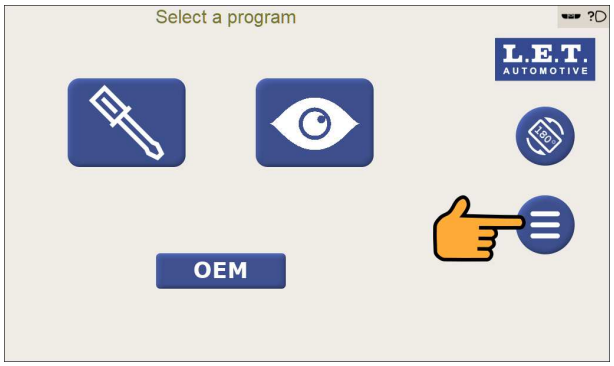
Alignment with the vehicle (pg. 62)

8 Navigation map

This navigation map shows the most important screens on the Luminoscope® system and how to get there, including a reference to the corresponding chapter in the manual.

Program selection screen

Remember: The screen may have a different appearance depending on the customer's specific implementation.



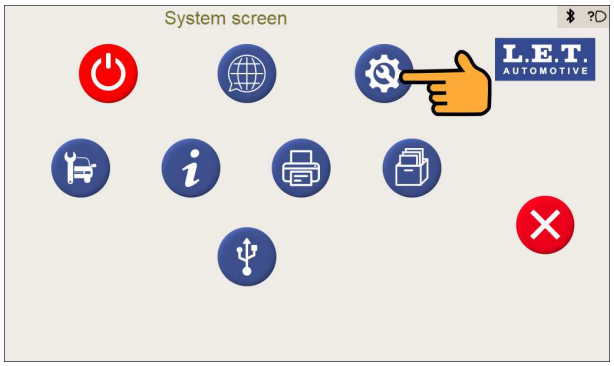
The **Program selection** screen is displayed after starting up the system and offers different programs. This allows the operator to select a preconfigured test cycle sequence. There's also a **System** button to access the **System** screen.

Tap on the button above to enter the **System** screen.

Related tasks

Program selection screen (pg. 73)

System screen



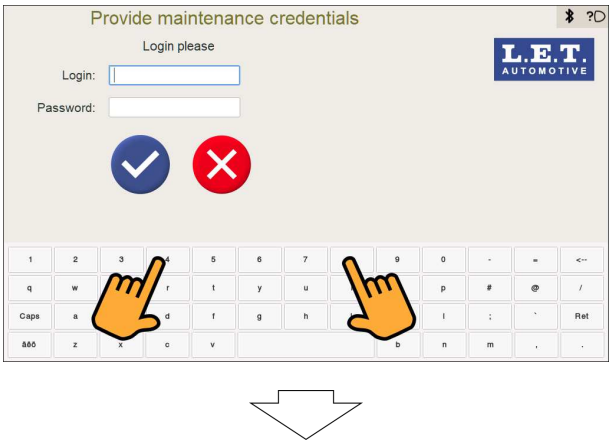
The **System** screen displays different system items.

Tap on the button above to enter the **Setup login** screen.

Related tasks

System screen (pg. 139)

Setup login screen

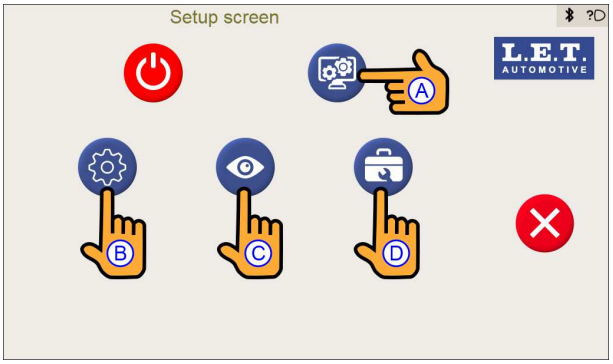


The **Setup login** screen allows the operator to enter the **Setup** screen.

Enter your credentials and tap on the **Validation** button.

Setup screen

Remember: The access rights to the different menus on the screen are hierarchical and depend on the applied login level, which is password protected.



The **Setup** screen allows the operator to enter the **Computer configuration** screen Ⓐ, **Settings program** screen Ⓑ, **Verification** screen Ⓒ, **Calibration** screen Ⓓ and the **Power** screen.

Tap on the Ⓐ button above to enter the **Computer configuration** screen.

Tap on the Ⓑ button above to enter the **Settings program** screen.

Tap on the Ⓒ button above to enter the **Verification** screen.

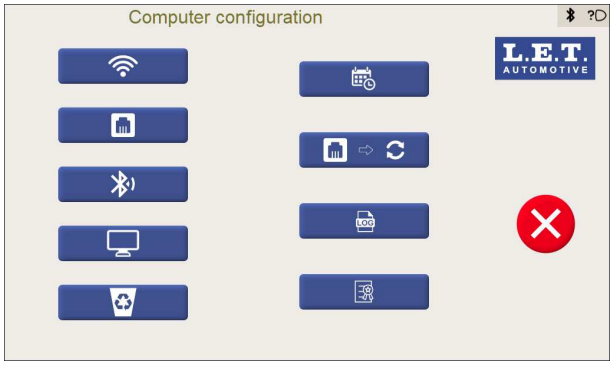
Tap on the Ⓓ button above to enter the **Calibration** screen.

Related tasks

Setup screen (pg. 161)

Computer configuration screen

Remember: The screen may have a different appearance depending on the customer's specific implementation. The access rights to the different menus on the screen are hierarchical and depend on the applied login level, which is password protected.



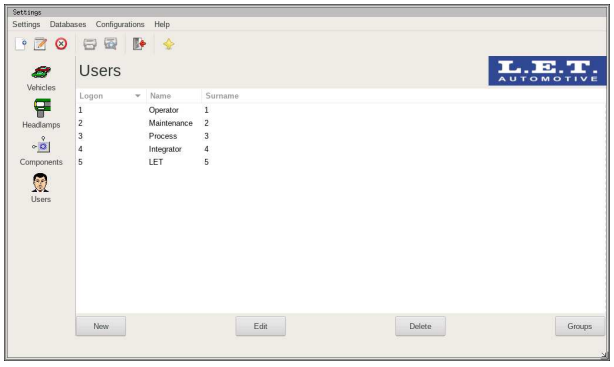
The **Computer configuration** screen allows the operator to access date/time settings, licensing information and communication related parameters.

Related tasks

Computer configuration screen (pg. 167)

Settings program screen

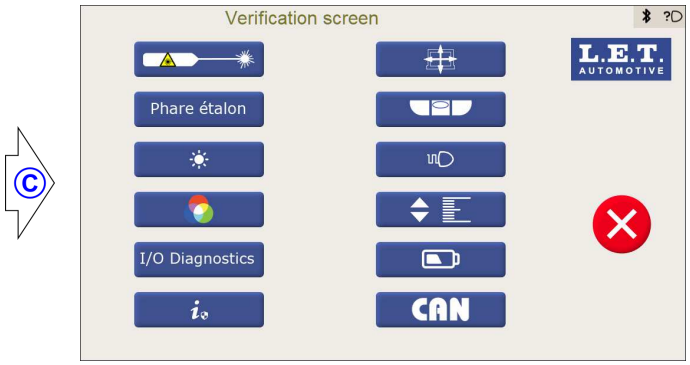
Remember: The screen may have a different appearance depending on the customer's specific implementation. The access rights to the different menus on the screen are hierarchical and depend on the applied login level, which is password protected.



The **Settings program** screen allows the operator to edit the Luminoscope® databases. The settings program contains a collection of parameters used in the Luminoscope®. These parameters define the vehicles (also called programs), headlamps (also called tests), components and users.

Verification screen

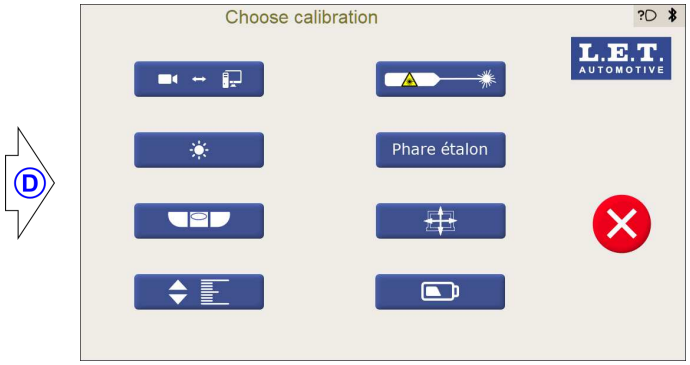
Remember: The screen may have a different appearance depending on the customer's specific implementation. The access rights to the different menus on the screen are hierarchical and depend on the applied login level, which is password protected.



The **Verification** screen allows the operator to access tools for verification of the calibration and operations of the Luminoscope®.

Calibration screen

Remember: The screen may have a different appearance depending on the customer's specific implementation. The access rights to the different menus on the screen are hierarchical and depend on the applied login level, which is password protected.



The **Calibration** screen allows the operator to access tools for calibration of different components of the Luminoscope®.

9 System screen

The **System** screen acts as a hub for a number of functions. Among others, it gives access to the following functions which are thoroughly explained in the upcoming chapters:

- Turn off or restart the Luminoscope®.
- Language selection.
- Setup menu.
- Overview of technical data of the Luminoscope®.
- Reprint the last test result.
- Recall the recent test results.
- Data import and export using a *USB* stick.

When powered-up, the Luminoscope® displays the **Program selection** screen. Follow the navigation sequence below to reach the **System** screen.

1. Tap on the **System** button 1 on the **Program selection** screen.

   Remember: The screen may have a different appearance depending on the customer's specific implementation.

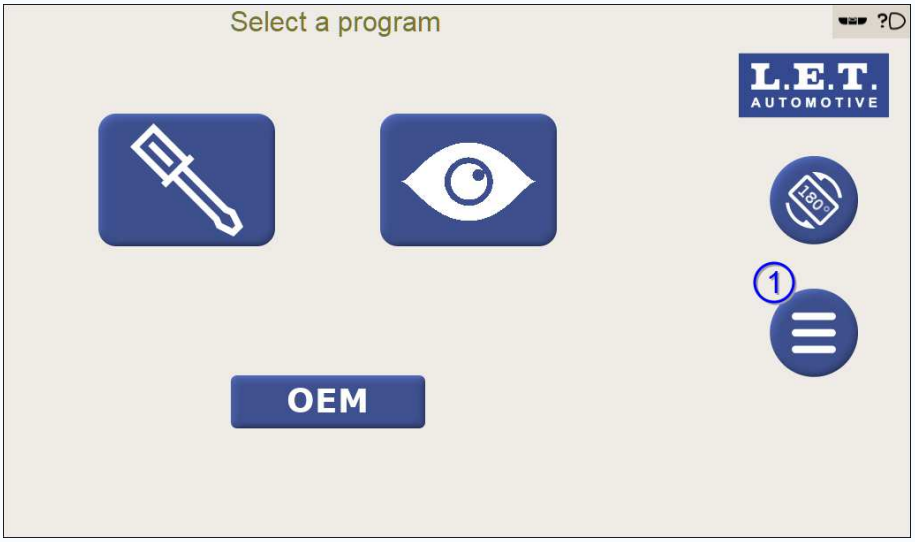


*Figure 104: **Program selection** screen with **System** button*

   The **System** screen is now displayed.

2. Choose one of the options on the **System** screen and tap on the corresponding button.

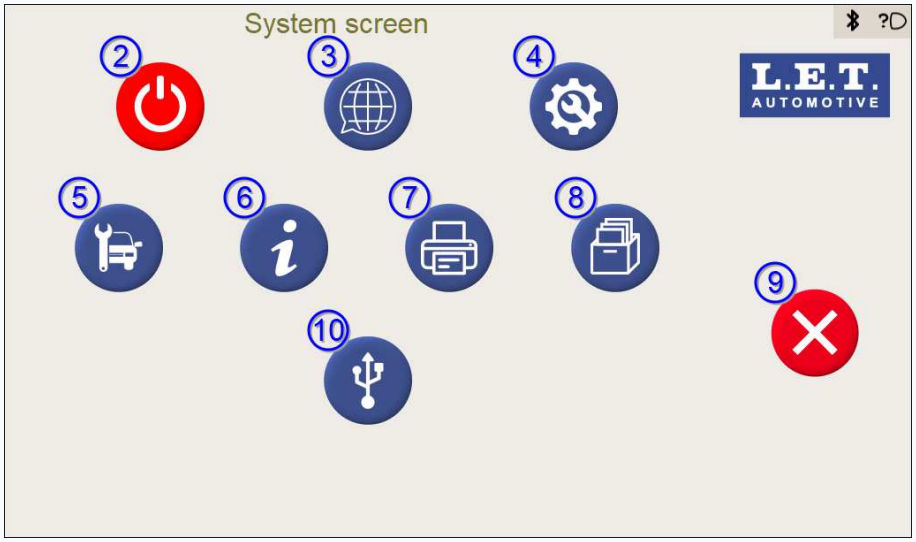


*Figure 105: **System** screen*

#	Button	Description
2	**Power** button	Turn off or restart the Luminoscope®
3	**Language** button	Select the language for the user interface.
4	**Setup** button	Enter the **Setup login** screen.
5	**Test program** button	Enter the **Beam selection** screen to execute a test cycle without communication (if applicable).
6	**System information** button	Overview of technical data of the Luminoscope®.
7	**Print last result** button	Reprint the last test result.
8	**Recall recent results** button	Query the most recent test results and reprint if needed.
9	**Abort** button	Return to the **Program selection** screen.
10	***USB*** button	Import/export data using a USB stick.

Tip: Button 7 is only functional when a ticket printer is connected to the Luminoscope®.

Tip: The ***USB*** button 10 appears when an *USB* stick is inserted in the connector plate of the Luminoscope®.

9.1 Luminoscope® turn off or restart

The **Power** button on the **System** screen gives access to the menu to turn off or restart the Luminoscope®.

1. Tap on the **Power** button 1 on the **System** screen.

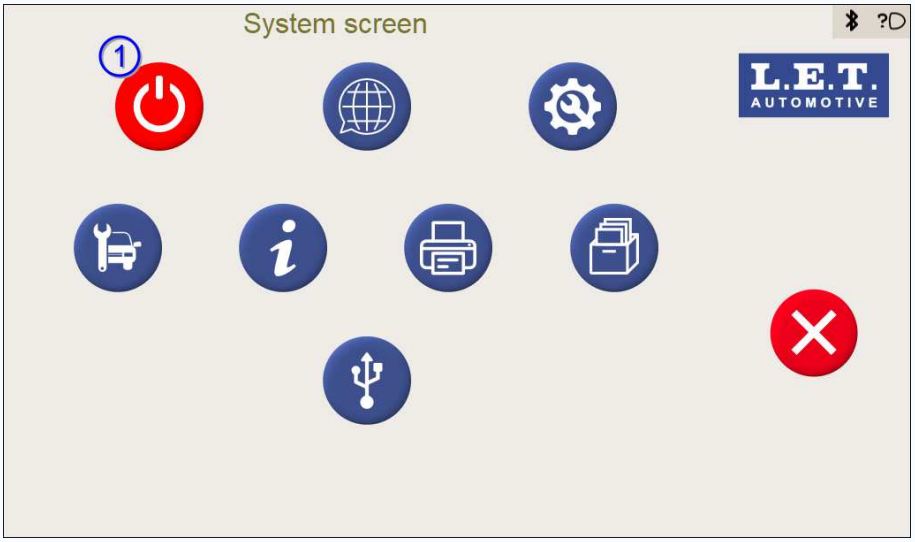


*Figure 106: **System** screen with **Power** button*

The **Power** screen is now displayed.

2. Choose one of the options on the **Power** screen and tap on the corresponding button.

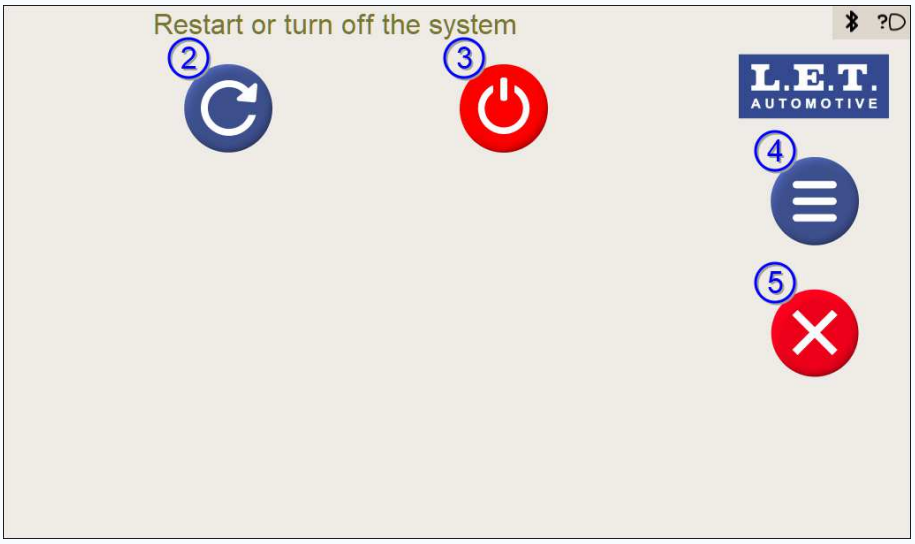


*Figure 107: **Power** screen*

#	Button	Description
2	**Restart** button	Restart the Luminoscope®.
3	**Turn Off** button	Turn off the Luminoscope®.
4	**System** button	Access the **System** screen.
5	**Abort** button	Return to the **Program selection** screen.

Related information

Power management (pg. 55)

9.2 Language selection

The **Language** button on the **System** screen gives access to the menu to choose the language of the user interface of the Luminoscope®.

1. Tap on the **Language** button 1 on the **System** screen.

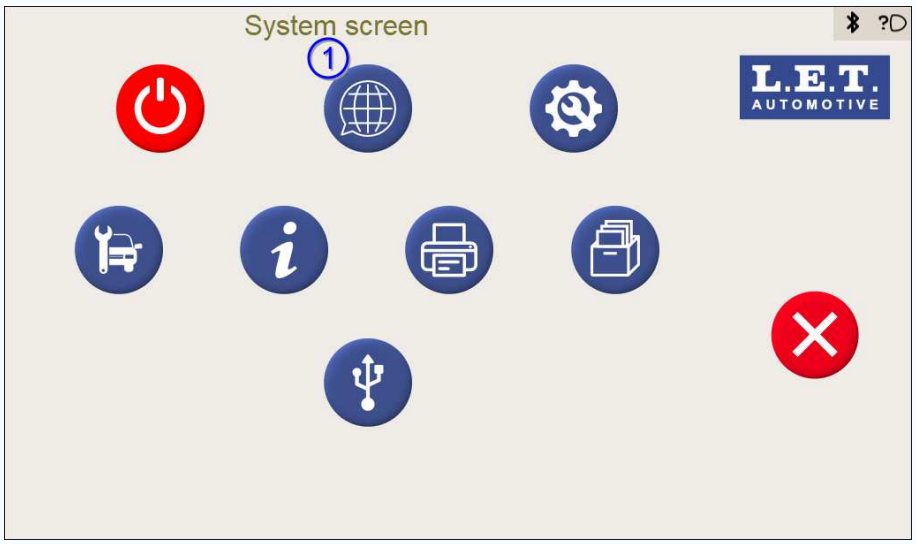


*Figure 108: **System** screen with **Language** button*

The **Language selection** screen is now displayed.

2. Choose one of the options on the **Language selection** screen and tap on the corresponding button.

Remember: The screen may have a different appearance depending on the customer's specific implementation.

*Figure 109: **Language selection** screen*

#	Button	Description
2	**Language selection** button	Select a language for the user interface.
3	**Abort** button	Return to the **System** screen.

3. Reboot the Luminoscope® to ensure that all the system components display the newly selected language.

Related tasks

Luminoscope® turn off or restart (pg. 140)

9.3 Technical data of the Luminoscope®

The **System information** button on the **System** screen provides access to technical data of the current setup of the Luminoscope® and can be useful for consult details about the configuration and status of the Luminoscope®.

1. Tap on the **System information** button 1 on the **System** screen.

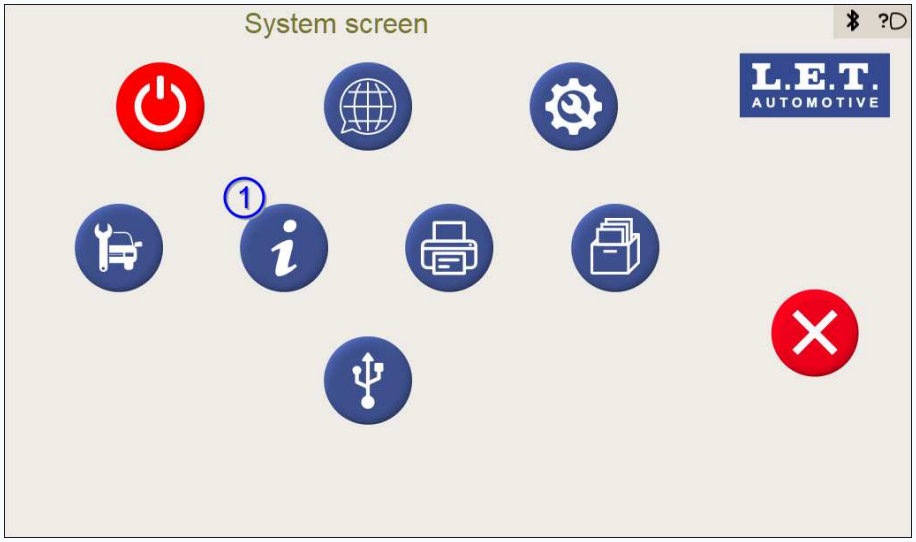


*Figure 110: **System** screen with **System information** button*

The **System information** screen is now displayed.

2. Consult the information on the **System information** screen or tap the **Abort** button.

Remember: The screen may have a different appearance depending on the customer's specific implementation.

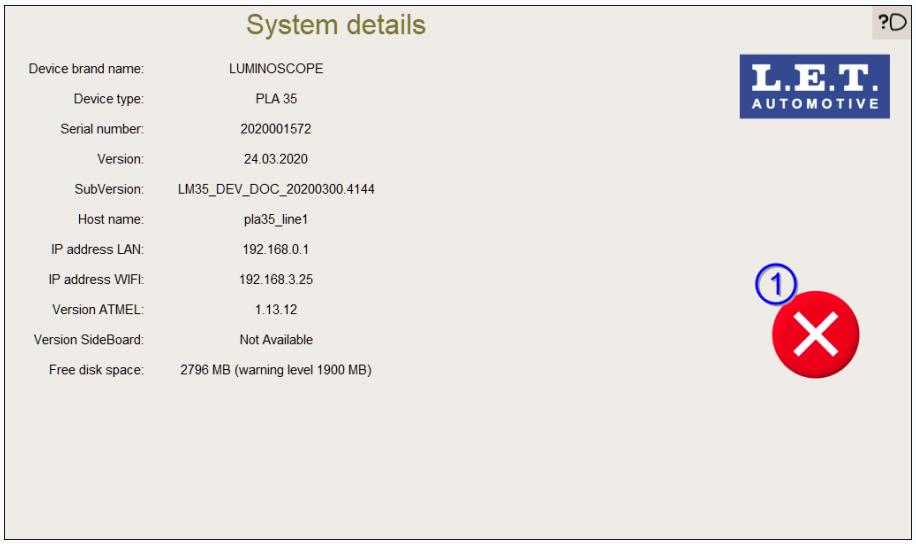


*Figure 111: **System information** screen*

#	Button	Description
1	**Abort** button	Return to the **System** screen.

9.4 Reprint last test result

The **Print last result** button on the **System** screen enables the user to reprint the last test result of the Luminoscope®.

Remember: The **Print last result** button only has an associated function when a ticket printer is connected to the Luminoscope®.

Tap on the **Print last result** button 1 on the **System** screen.

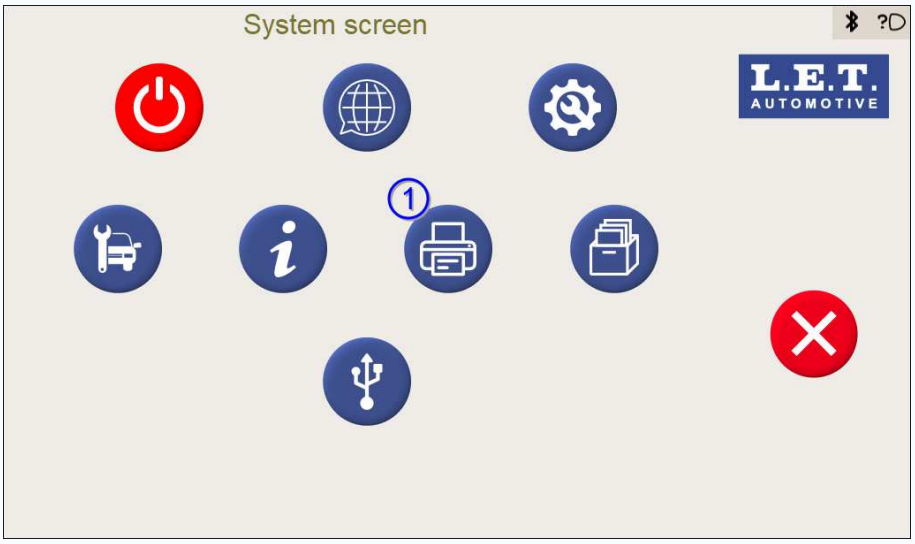


*Figure 112: **System** screen with **Print last result** button*

A duplicate of the last test result is printed on the ticket printer.

Related information

Test report as printed ticket (pg. 96)

9.5 Recall recent test results

The **Recall recent results** button on the **System** screen enables the user to scroll through the recent test results of the Luminoscope® and to reprint the ticket of the selected test result.

1. Tap on the **Recall recent results** button 1 on the **System** screen.

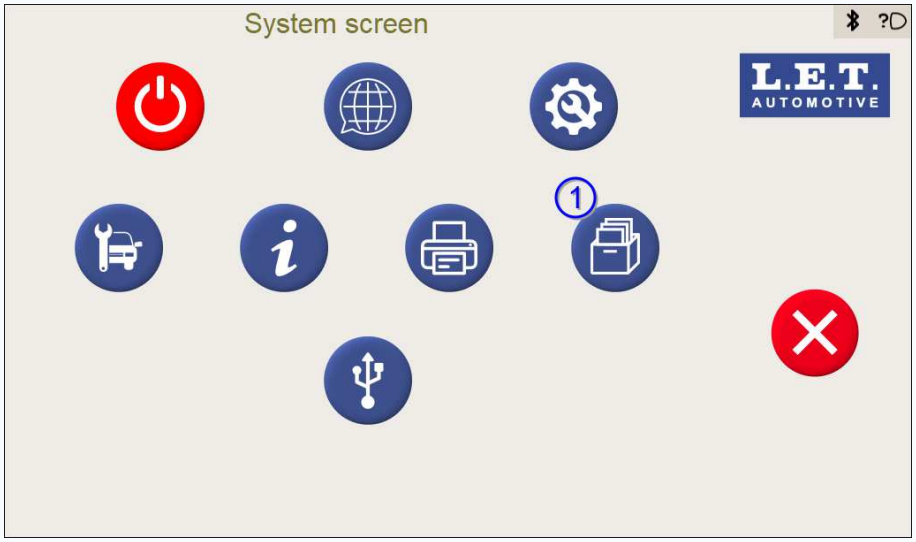


*Figure 113: **System** screen with **Recall recent results** button*

The **Recent results** screen is now displayed.

2. Choose one of the options on the **Recent results** screen and tap on the corresponding button.

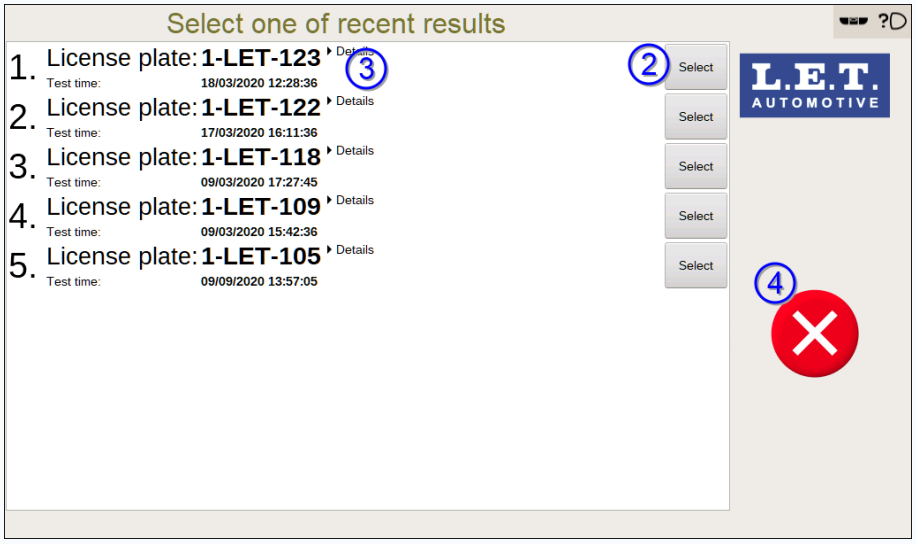


*Figure 114: **Recent results** screen*

#	Button	Description
2	**Select** button	Select one of the results to be reprinted. A duplicate of the selected test result is printed on the ticket printer.
3	**Details** button	Show or hide the measured values of the selected result.
4	**Abort** button	Return to the **System** screen.

Tip: Button 2 is only functional when a ticket printer is connected to the Luminoscope®.

Related information

Test report as printed ticket (pg. 96)

9.6 Import / export of data via *USB* stick

The ***USB*** button on the **System** screen gives access to the **USB** screen.

Remember:

- The ***USB*** button on the **System** screen appears when an *USB* stick is inserted in the connector plate of the Luminoscope®.
- Only *FAT-32*-formatted *USB* sticks are recognized. Specifically, *NTFS* format is not supported.

The **USB** screen acts as a hub for a number of functions. Among others, it gives access to the following functions which are thoroughly explained in the upcoming chapters:

- Export of a configuration file from the Luminoscope® to an *USB* stick.
- Export of test result files from the Luminoscope® to an *USB* stick.
- Export of log files from the Luminoscope® to an *USB* stick.
- Export of the configuration of vehicles (programs) and headlamps (tests) to an *USB* stick.
- Import of configuration files from an *USB* stick to the Luminoscope®.
- Import of a software update from an *USB* stick to the Luminoscope®.
- Import of a new license token configuration from an *USB* stick to the Luminoscope®.
- Import of the configuration of vehicles (programs) and headlamps (tests) from an *USB* stick to the Luminoscope®.

1. Insert a *USB* stick in the connector plate of the Luminoscope®.

   Note: If a *USB* stick is inserted but is not accepted, the screen becomes blank with a single **Abort** button available. In such a case, remove the *USB* stick and press the **Abort** button.

2. Tap on the ***USB*** button 1 on the **System** screen.

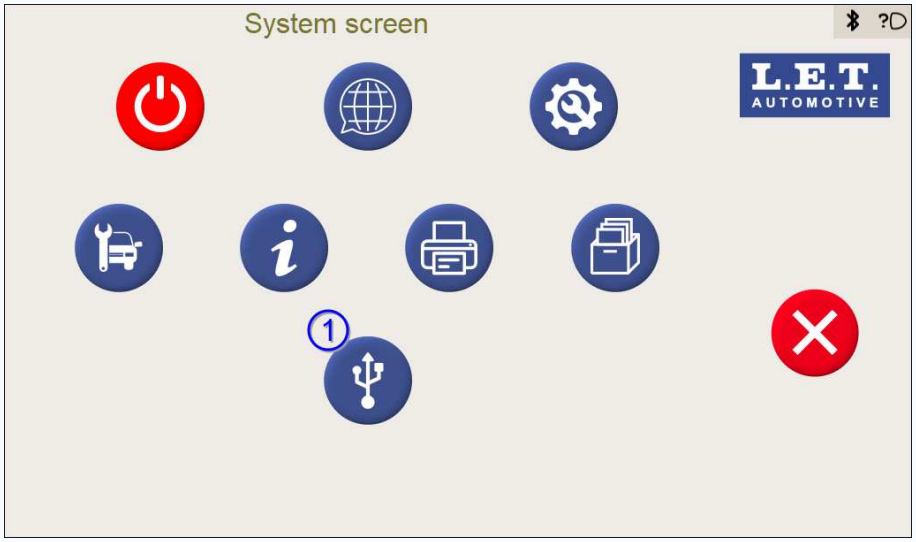


*Figure 115: **System** screen with **USB** button*

The **USB** screen is now displayed.

Remember: The screen may have a different appearance depending on the customer's specific implementation.

3. Choose one of the options on the **USB** screen and tap the corresponding button.

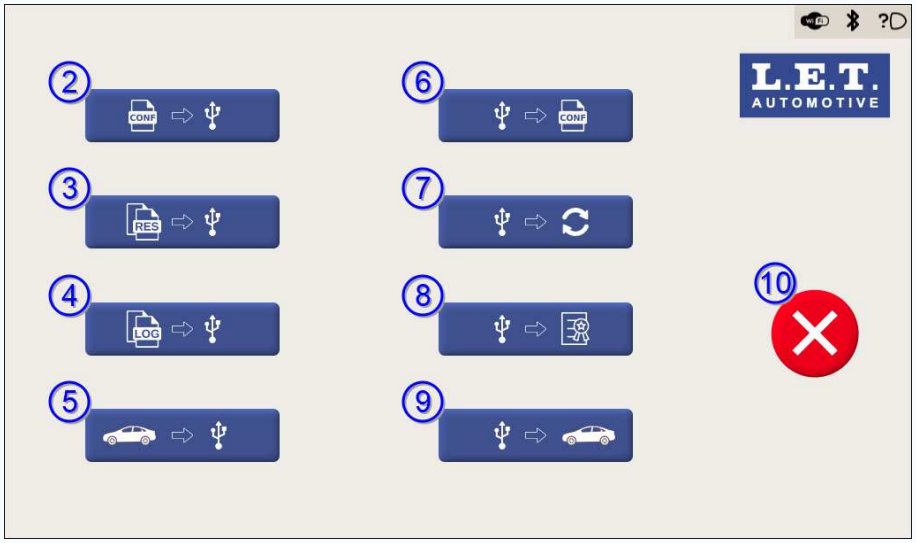


*Figure 116: **USB** screen*

#	Button	Description
2	**Export configuration** button	Export of a configuration file from the Luminoscope® to an *USB* stick.
3	**Export results** button	Export of test result files from the Luminoscope® to an *USB* stick.
4	**Export logs** button	Export of log files from the Luminoscope® to an *USB* stick.

#	Button	Description
5	**Export vehicles and headlamps** button	Export of the configuration of vehicles (programs) and headlamps (tests) to an *USB* stick.
6	**Import configuration** button	Import of the configuration files from an *USB* stick to the Luminoscope®.
7	**Import update** button	Import of a software update from an *USB* stick to the Luminoscope®.
8	**Import license token** button	Import of a new licence token configuration from an *USB* stick to the Luminoscope®.
9	**Import vehicles and headlamps** button	Import of the configuration of vehicles (programs) and headlamps (tests) from an *USB* stick to the Luminoscope®.
10	**Abort** button	Return to the **System** screen.

9.6.1 Export operations: Luminoscope® to *USB* stick

All the following operations export different data from the Luminoscope® and write them to an *USB* stick.

9.6.1.1 Export of a configuration file

The **Export configuration** button on the **USB** screen can be used to export the Luminoscope® configuration to an *USB* stick.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

9.6.1.2 Export of test result files

The **Export results** button on the **USB** screen can be used to export the Luminoscope® test result files to an *USB* stick.

After the Luminoscope® has stored the test result files on the *USB* stick, the user is offered with the option of completely deleting the exported test results from the Luminoscope® memory. This means they are no longer available for any other use in the Luminoscope®.

Alternatively the user may answer negatively, after which is given the chance for deleting these test results also for **recent results** functionality.

Starting from the **USB** screen.

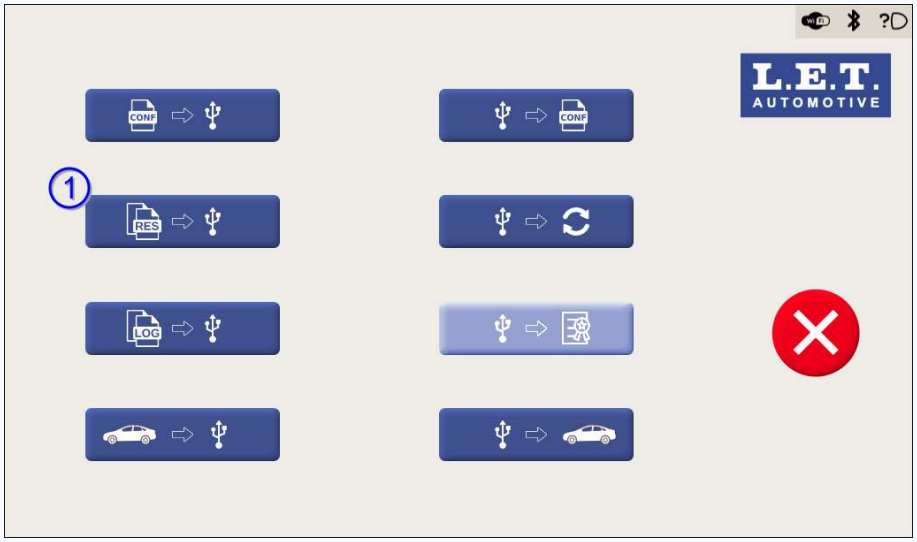


*Figure 117: **USB** screen with **Export results** button*

1. Tap on the **Export results** button 1 on the **USB** screen.

   The test result files are immediately exported to the *USB* stick. During the operation the following screen is displayed:

*Figure 118: **Export results** operation progress*

   Once the **Export results** operation has finished, the *USB* stick can be safely removed and the following screen appears:

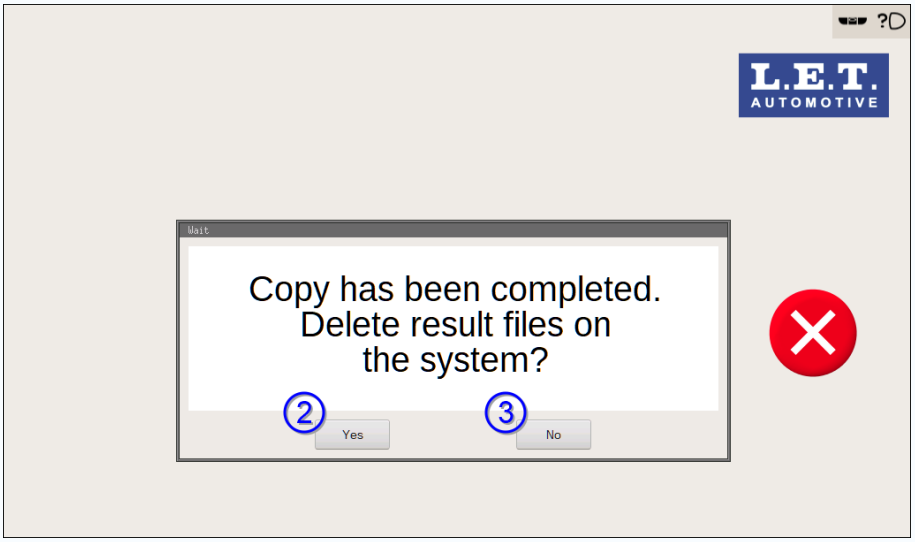


Figure 119: Removing test result file

After the Luminoscope® has stored the test result files on the *USB* stick, the user is offered with the option of completely deleting the exported test results from the Luminoscope® memory. This means they are no longer available for any other use in the Luminoscope®.

Notice: If there were no remaining test result files to export in the Luminoscope® memory, an informative screen is displayed. After pressing the **Abort** button, the screen displays the **USB** screen again.

2. Tap on the **Yes** button 2 to remove the test result files from the Luminoscope® memory or tap on the **No** button 3 in case the result files should be kept.

   When removed, the result files will not be available anymore and the Luminoscope® displays the **USB** screen.

   Otherwise, the next screen is displayed:

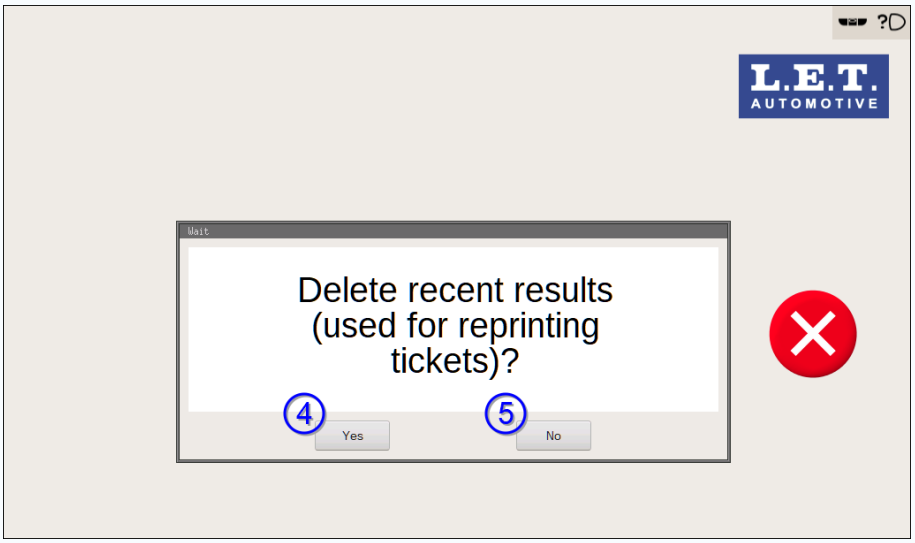


Figure 120: Deleting recent test result files

The results are still available for any required use, which includes exporting them again. The question above refers to the availability of the results for being included in the list of recent results.

3. Tap on the **Yes** button 4 to delete the test results from the list of recent results or tap on the **No** button 5 in case the test result files should be kept in the Luminoscope® memory for being displayed in the list of recent results.

4. Remove the *USB* stick from the socket of the Luminoscope® connector panel and connect it to a PC.

5. Browse the *USB* stick and open its root folder.

   The **Export results** operation has created a main Luminoscope® folder on the *USB* stick, if it didn't exist yet.

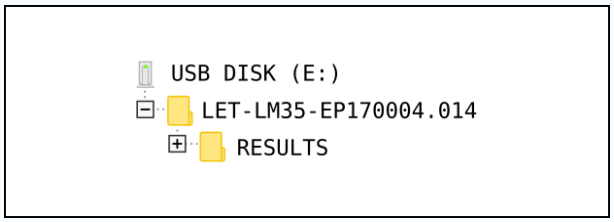


Figure 121: Main Luminoscope® *folder on the USB stick*

The syntax of the main Luminoscope® folder name follows the format `LET-LM35-EPxxxxxx.xxx` where the section `EPxxxxxx.xxx` represents the unique serial number of the optical block.

The **Export results** operation has also created a `RESULTS` folder under the main Luminoscope® folder, if it didn't exist yet. Each **Export results** operation creates a *ZIP* file in the `RESULTS` folder including the exported result files.

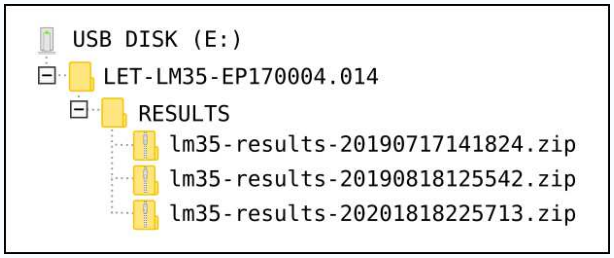


Figure 122: Folder structure on the USB stick

The naming of the exported test result file follows the format `lm35-results-yyyymmddhhmmss.zip` where the section `yyyymmddhhmmss` is calculated upon the file creation timestamp as explained below.

Field content	Format	Example	Explanation
Year	*yyyy*	2020	4-digit format.
Month	*mm*	03	2-digit format, left zero-padded.
Day	*dd*	17	2-digit format, left zero-padded.
Hour	*hh*	09	2-digit format, left zero-padded.
Minutes	*mm*	52	2-digit format, left zero-padded.
Seconds	*ss*	04	2-digit format, left zero-padded.

Field content	Format	Example	Explanation
Extension	.zip	.zip	Compressed archive file extension.

The exported test result file has an internal structure which includes a `pdf` folder with a number of PDF test cycle report files. Each of them is the product of a single test cycle.

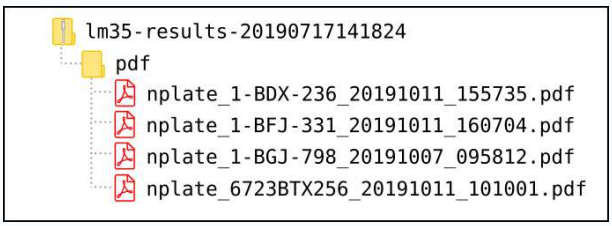


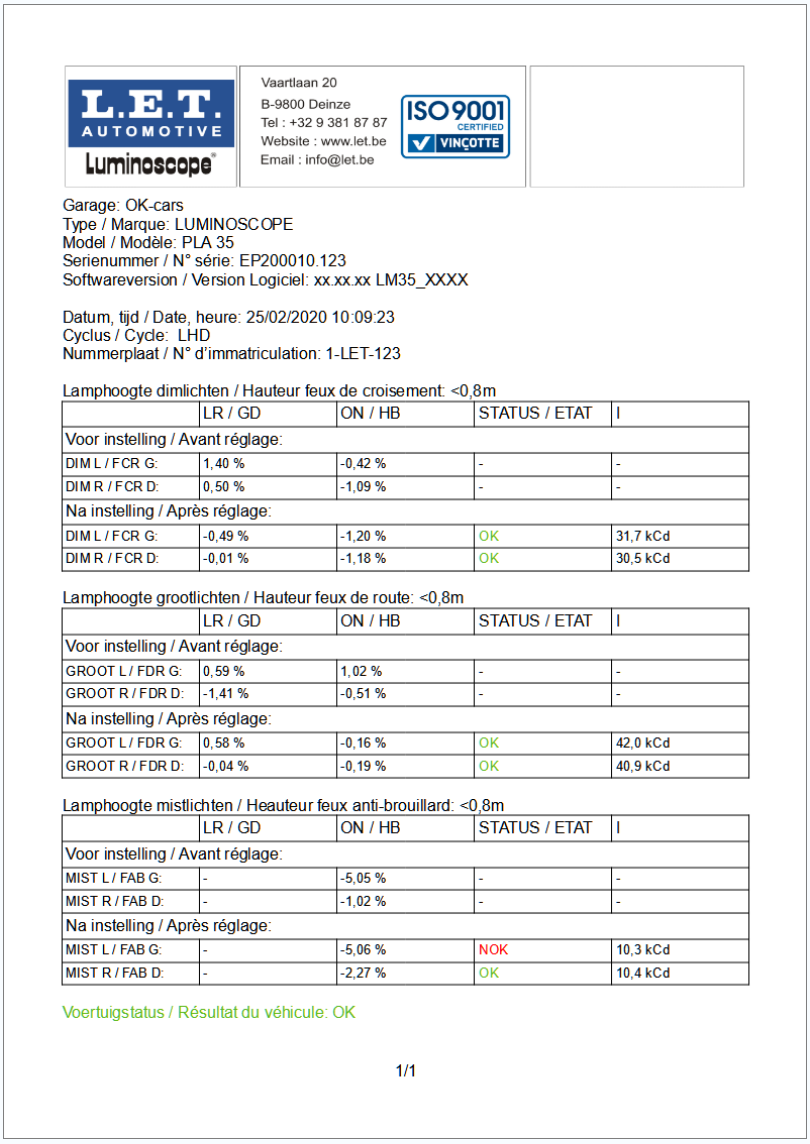
Figure 123: Exported test result file structure including PDF test cycle report files

The naming of each *PDF* test cycle report file follows the format `nplate_licenseplate_yyyymmdd_hhmmss.pdf` including the file creation timestamp among other fields as described below.

Field content	Format	Example	Explanation
File identifier	*nplate*	nplate	Constant string for identification of the file contents.
License plate	*licenseplate*	1-BDX-236	Registration plate of the corresponding vehicle. If the number was not defined during the test, it is substituted by *unknown*.
Year	*yyyy*	2020	4-digit format.
Month	*mm*	03	2-digit format, left zero-padded.
Day	*dd*	17	2-digit format, left zero-padded.
Hour	*hh*	09	2-digit format, left zero-padded.
Minutes	*mm*	52	2-digit format, left zero-padded.
Seconds	*ss*	04	2-digit format, left zero-padded.
Extension	*.pdf*	.pdf	File extension.

6. Open the desired test cycle report file.

Remember: The test cycle report file may have a different appearance depending on the customer's specific implementation. Consequently, the example underneath may differ from your Luminoscope® configuration.



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Luminoscope

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ISO9001 CERTIFIED VINÇOTTE

Garage: OK-cars
Type / Marque: LUMINOSCOPE
Model / Modèle: PLA 35
Serienummer / N° série: EP200010.123
Softwareversion / Version Logiciel: xx.xx.xx LM35_XXXX

Datum, tijd / Date, heure: 25/02/2020 10:09:23
Cyclus / Cycle: LHD
Nummerplaat / N° d'immatriculation: 1-LET-123

Lamphoogte dimlichten / Hauteur feux de croisement: <0,8m

	LR / GD	ON / HB	STATUS / ETAT	I
Voor instelling / Avant réglage:				
DIM L / FCR G:	1,40 %	-0,42 %	-	-
DIM R / FCR D:	0,50 %	-1,09 %	-	-
Na instelling / Après réglage:				
DIM L / FCR G:	-0,49 %	-1,20 %	OK	31,7 kCd
DIM R / FCR D:	-0,01 %	-1,18 %	OK	30,5 kCd

Lamphoogte grootlichten / Hauteur feux de route: <0,8m

	LR / GD	ON / HB	STATUS / ETAT	I
Voor instelling / Avant réglage:				
GROOT L / FDR G:	0,59 %	1,02 %	-	-
GROOT R / FDR D:	-1,41 %	-0,51 %	-	-
Na instelling / Après réglage:				
GROOT L / FDR G:	0,58 %	-0,16 %	OK	42,0 kCd
GROOT R / FDR D:	-0,04 %	-0,19 %	OK	40,9 kCd

Lamphoogte mistlichten / Heauteur feux anti-brouillard: <0,8m

	LR / GD	ON / HB	STATUS / ETAT	I
Voor instelling / Avant réglage:				
MIST L / FAB G:	-	-5,05 %	-	-
MIST R / FAB D:	-	-1,02 %	-	-
Na instelling / Après réglage:				
MIST L / FAB G:	-	-5,06 %	NOK	10,3 kCd
MIST R / FAB D:	-	-2,27 %	OK	10,4 kCd

Voertuigstatus / Résultat du véhicule: OK

1/1

Figure 124: Example of test cycle report

9.6.1.3 Export of log files

The **Export logs** button on the **USB** screen can be used to export the Luminoscope® log files to an *USB* stick.

There are two categories of files which are grouped into log files:

- Log files in text format containing a number of timestamped lines describing events, related to the activity of the Luminoscope®. The information in these log files can be useful for tracking or diagnostic tasks. It may be interesting to store or archive them for future reference. The content of these log files is not intended to be used by regular users and is continuously generated.
- Headlamp images as obtained from the camera of the Luminoscope®, so as screenshots of its user interface. They are captured simultaneously along with some diagnostic files each time the user taps on the *LET Automotive logo* on the touch screen and may be useful for future reference.

Starting from the **USB** screen.

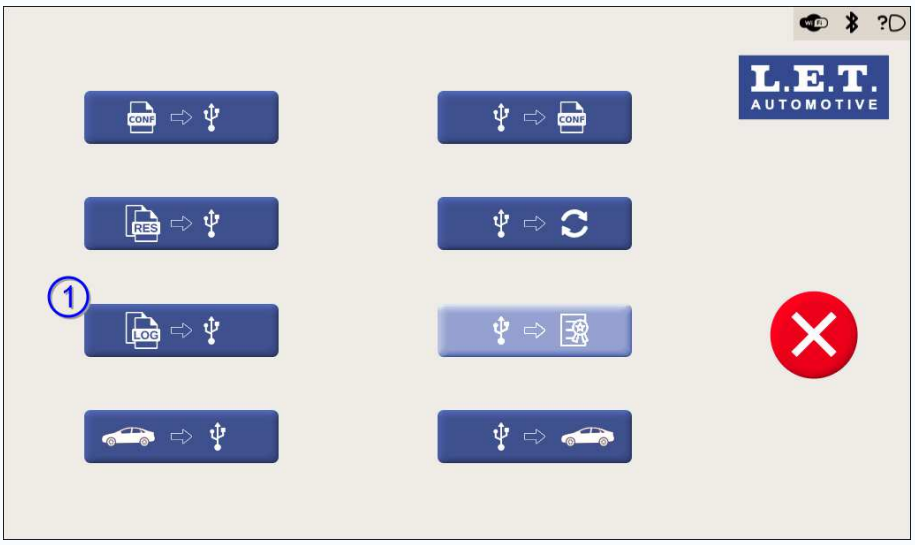

*Figure 125: **USB** screen with **Export logs** button*

1. Tap on the **Export logs** button 1 on the **USB** screen.

   All the different log files are immediately exported to the *USB* stick. During the operation the following screen is displayed:

*Figure 126: **Export logs** operation progress*

   Once the **Export logs** operation has finished, the *USB* stick can be safely removed and the following screen is displayed:

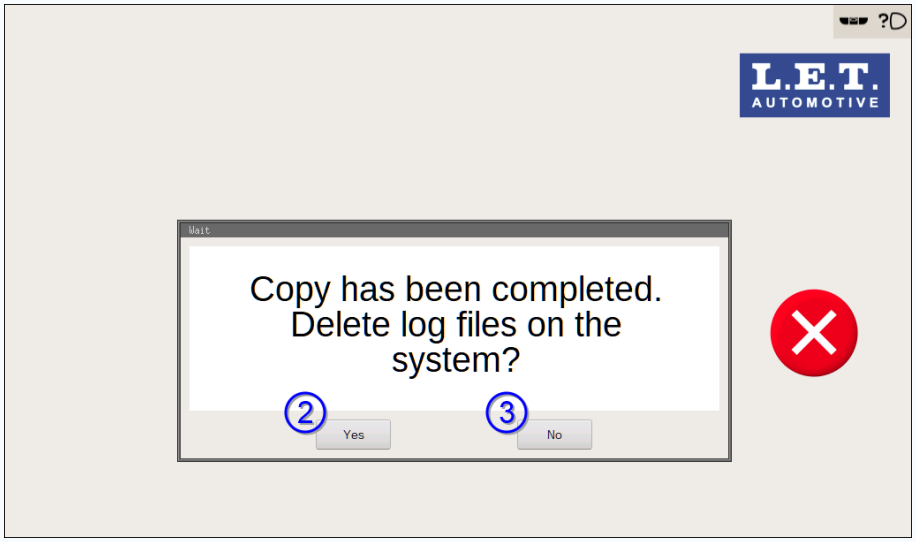

Figure 127: Delete log files from the Luminoscope®

After the Luminoscope® has stored the log files on the *USB* stick, the user is offered with the option of completely deleting the exported log files from the Luminoscope®.

2. Tap on the **Yes** button 2 to remove the log files from the Luminoscope® or tap on the **No** button 3 in case the log files should be kept.

3. Remove the *USB* stick from the socket of the Luminoscope® connector panel and connect it to a PC.

4. Browse the *USB* stick and open its root folder.

   The **Export logs** operation has created a main Luminoscope® folder on the *USB* stick if it didn't previously exist.

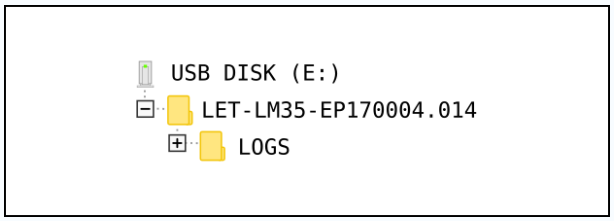

Figure 128: Main Luminoscope® *folder on the USB stick*

The syntax of the main Luminoscope® folder name follows the format `LET-LM35-EPxxxxxx.xxx` where the section `EPxxxxxx.xxx` represents the unique serial number of the optical block.

The **Export logs** operation has also created a `LOGS` folder under the main Luminoscope® folder, if it didn't exist yet. The **Export logs** operation creates a number of files and folders under the `LOGS` folder, depending on their availability.

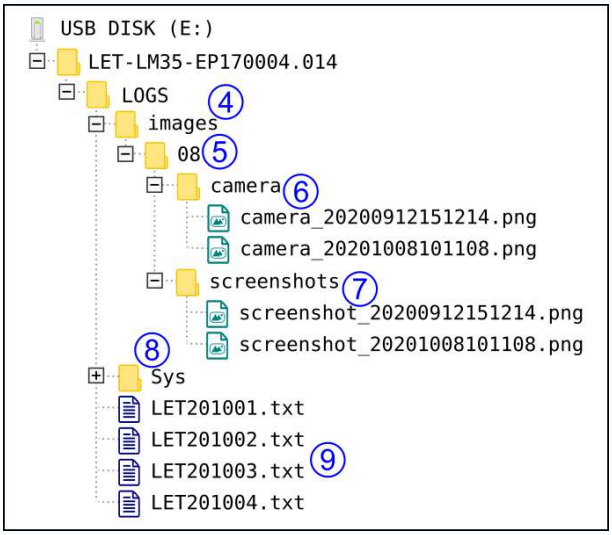

Figure 129: Folder structure on the USB stick

#	Name	Explanation
4	`images`	This folder has been created (if it didn't exist yet) if there were camera images and screenshots of the user interface in the Luminoscope® memory.
5	`08`	This subfolder has been created (if it didn't exist yet), labeled with the (zero-padded) current day of the month of the **Export logs** operation. Successive **Export logs** operations may create similar folders.
6	`camera`	This subfolder has been created (if it didn't exist yet), if there were any pictures to be exported. It contains a variable number of *PNG* files, each of them generated by the tapping on the *LET Automotive logo* of the Luminoscope® screen and containing a screenshot of the status of the device camera. Successive **Export logs** operations may add more pictures to this folder. The name of the picture includes the file creation timestamp.
7	`screenshots`	This subfolder has been created (if it didn't exist yet), if there were any pictures to be exported. It contains a variable number of *PNG* files, each of them generated by the tapping on the *LET Automotive logo* of the Luminoscope® screen and containing a screenshot of the status of the user interface of the device. Successive **Export logs** operations may add more pictures to this folder. The name of the picture includes the file creation timestamp.
8	`Sys`	This subfolder has been created (if it didn't exist yet), if there were either pictures or screenshots be exported. It contains useful diagnosing information and it is not intended for regular users but may be eventually requested by LET service technicians. Successive **Export logs** operations update the content of this folder.

#	Name	Explanation
9	log files	Text files containing a number of timestamped lines describing events related to the activity of the Luminoscope®. Each file is named with a timestamp and contains the events happening on that date. Successive **Export logs** operations may then either append to existing files or add new files to the list.

9.6.1.4 Export of a configuration file of vehicles and headlamps

The **Export vehicles and headlamps** button on the **USB** screen can be used to export a specific part of the Luminoscope® configuration to an *USB* stick. This operation specifically exports the vehicles (*programs*) and headlamps (*tests*) with all their related parameters from the database, while excluding any other configuration parameter.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

9.6.2 Import operations: *USB* to Luminoscope®

All the following operations read different data from an *USB* stick and write them to the Luminoscope®.

9.6.2.1 Import of a configuration file

The **Import configuration** button on the **USB** screen can be used to import a configuration file (that was previously stored on an *USB* stick) to the Luminoscope®. The **Import configuration** operation allows restoring the Luminoscope® to a previous status for which an **Export configuration** operation was done.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

9.6.2.2 Software update from a *USB* stick

The **Import update** button on the **USB** screen can be used to update the system software from a properly crafted *USB* stick. This functionality allows the user to apply, under remote supervision by LET technicians, specific small patches for particular parts of the system in order to modify its behavior or configuration details.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

9.6.2.3 Import of a *license token file*

The **Import license token** button on the **USB** screen can be used to import a new *license token file* from an *USB* stick to the *USB License Dongle* in the Luminoscope®.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

9.6.2.4 Import of a configuration file of vehicles and headlamps

The **Import vehicles and headlamps** button on the **USB** screen can be used to import a specific part of the Luminoscope® configuration that was previously stored on an *USB* stick to the Luminoscope® memory. This operation specifically imports the vehicles (*programs*) and headlamps (*tests*) with all their related parameters from the database, while excluding any other configuration parameter.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

10 Setup screen

The **Setup** screen acts as a hub for a number of functions. Among others, it gives access to the following functions which are thoroughly explained in the upcoming chapters:

- Turn off or restart the Luminoscope®.
- Computer configuration of the Luminoscope®.
- Settings program menu.
- Verification menu.
- Calibration menu.

When powered up, the Luminoscope® displays the **Program selection** screen. Follow the navigation sequence below for reaching the **Setup** screen.

1. Tap on the **System** button 1 on the **Program selection** screen.

   Remember: The screen may have a different appearance depending on the customer's specific implementation.

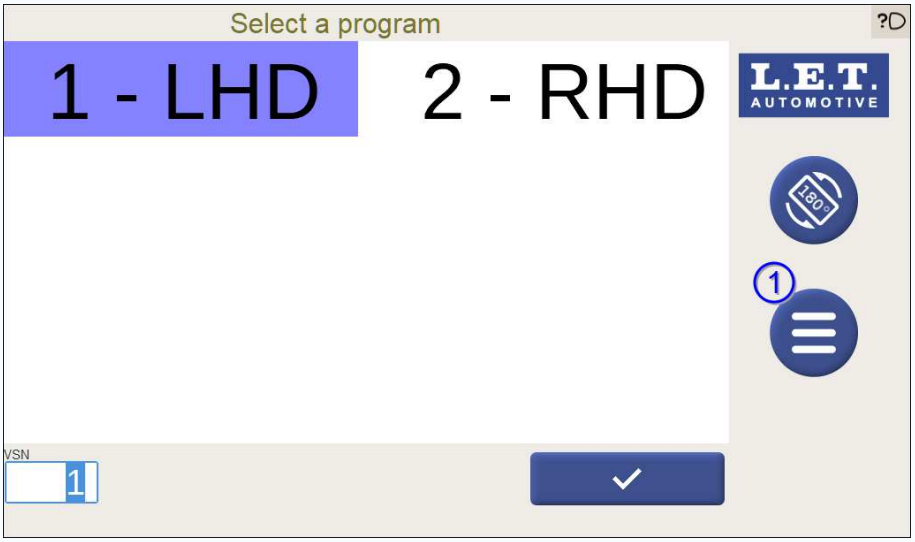

*Figure 130: **Program selection** screen with **System** button*

   The **System** screen is now displayed.

2. Tap on the **Setup** button 2 on the **System** screen.

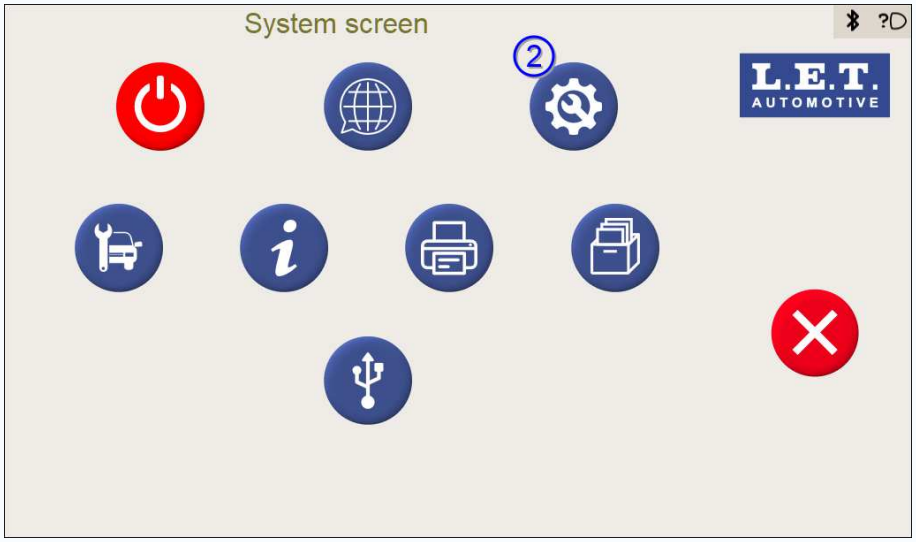

*Figure 131: **System** screen with **Setup** button*

The **Setup login** screen is now displayed.

3. Enter your credentials 3 and tap on the **Validation** button 4. Alternatively tap on the **Abort** button 5 to return to the **System** screen.

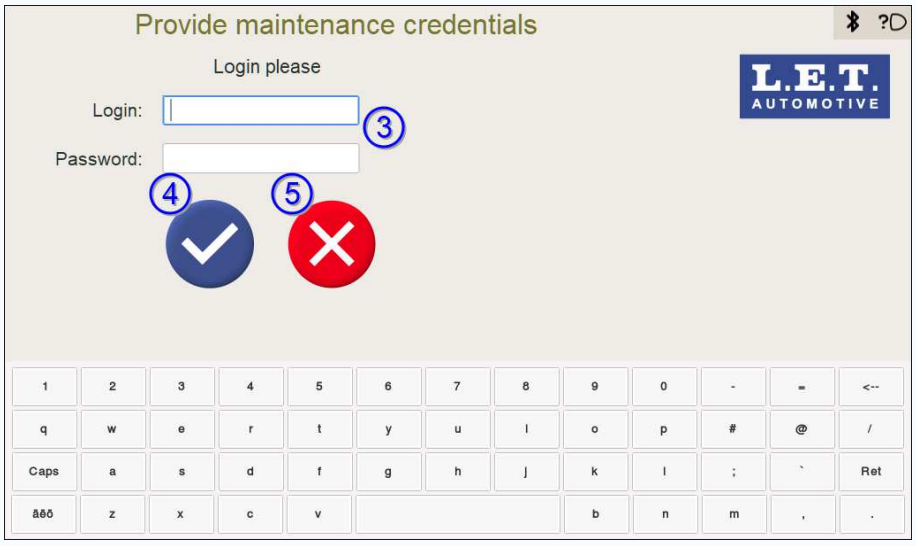

*Figure 132: **Setup login** screen*

The access to the different menus and their options is hierarchical and depends on the access rights of each login, which is identified with a password as follows:

Level	Login	Password	Description
Operator	1	1234	*Operator staff* working with the equipment.
Maintenance	2	Confidential	*Maintenance staff* and *production leaders* have access to most common functions except data related with vehicles and headlamps.
Process	3	Confidential	*Process staff* have additional access to data related to vehicles and headlamps.

Level	Login	Password	Description
Integrator	4	Confidential	*Third-party company* responsible for the integration of the Luminoscope® in a production or audit line.
L.E.T. Service Engineer	5	Confidential	L.E.T. Service Engineer.

Important: These passwords are hard-coded and cannot be changed.

The following screen appears when either wrong or no credentials at all are introduced. In this case the **Setup** screen will be automatically displayed with very limited access rights.

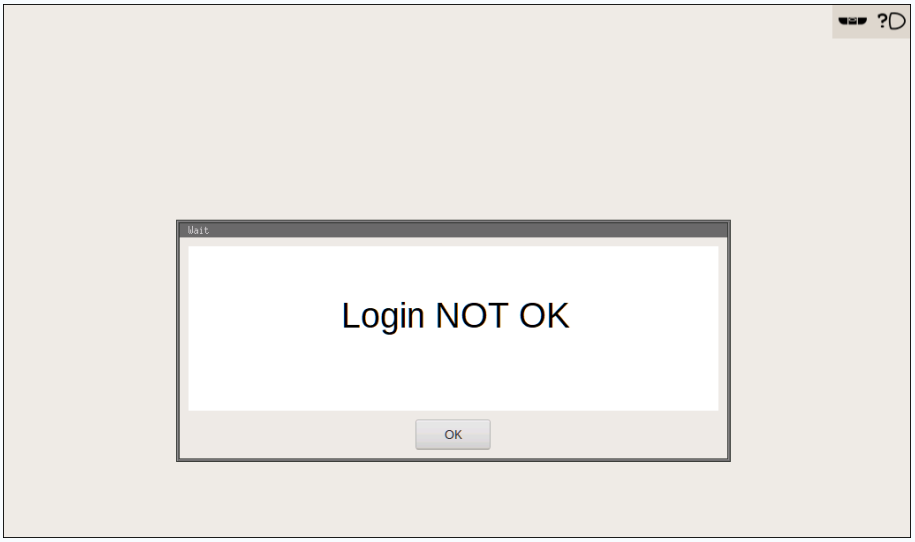

*Figure 133: **Login not OK** screen*

4. Choose one of the options on the **Setup** screen and tap on the corresponding button.

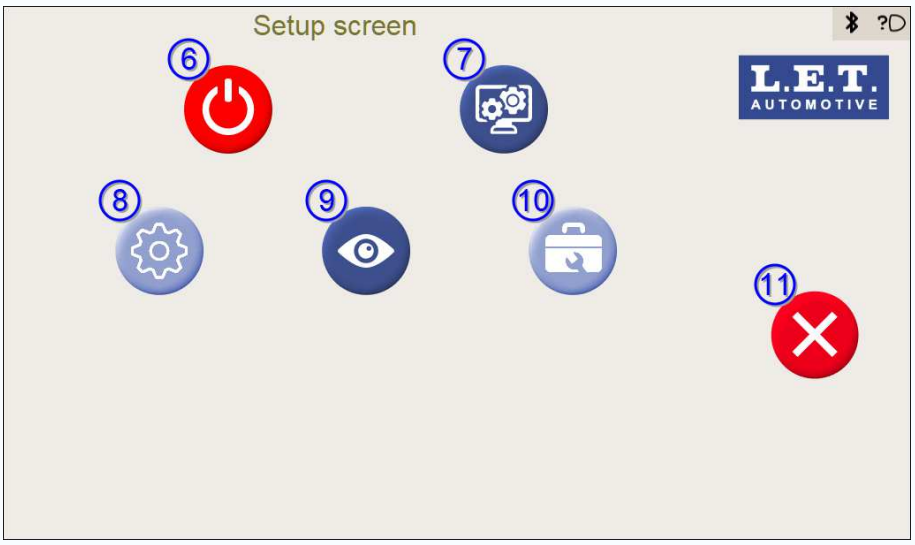

*Figure 134: **Setup** screen*

Remember: The **Setup** screen, **Computer configuration** screen, **Settings program** screen, **Verification** screen and **Calibration** screen may have different appearances depending on the customer's specific implementation and the applied login level.

Consequently, probably not all functions listed in the table below are accessible.

#	Button	Description
6	**Power** button	Turn off or restart the Luminoscope®.
7	**Computer configuration** button	Amongst others, the **Computer configuration** screen gives access to the following functions: • Date and time setup • *Wi-Fi* setup • *Ethernet* setup • *Bluetooth* setup • *HDMI* monitor setup • Check for and apply available firmware updates • Log file information • Licensing information
8	**Settings program** button	The settings program (system database) provides access to the following items: • Vehicle parameters (programs) • Headlamp parameters (tests) • Component parameters • User parameters
9	**Verification** button	Among others, the **Verification** screen gives access to the following functions: • *Zero reference* verification • *Phare Étalon* verification • *Intensity* verification • *I/O* diagnostics: parallel, serial and Bluetooth • *System information* • *Position Check* verification • *ESL* (electronic spirit level module) verification • *Light modulation* verification • *Electronic height measurement* verification • Battery verification • *CAN bus* modules verification
10	**Calibration** button	Among others, the **Calibration** screen gives access to the following functions: • Direct camera connection • *Zero reference* calibration • *Phare Étalon* calibration • *Position Check* calibration • *ESL* (electronic spirit level module) calibration • *Electronic height measurement* calibration • Battery calibration

#	Button	Description
11	**Abort** button	Return to the **Program selection** screen.

Related tasks

Computer configuration screen (pg. 167)

Related information

Power management (pg. 55)

11 Computer configuration screen

The **Computer configuration** screen acts as a hub for a number of functions. Among others, it gives access to the following functions, which are thorougly described in the upcoming chapters:

- Date and time setup.
- *Wi-Fi* setup.
- *Ethernet* setup.
- *Bluetooth* setup.
- External *HDMI* monitor setup.
- Check for and apply available firmware updates.
- Log file information.
- Delete log and result files.
- Licensing information.

The **Computer configuration** screen is reached via a button on the **Setup** screen. If needed, please check relevant link at the end of this chapter.

Starting from the **Setup** screen.

1. Tap on the **Computer configuration** button 1 of the **Setup** screen.

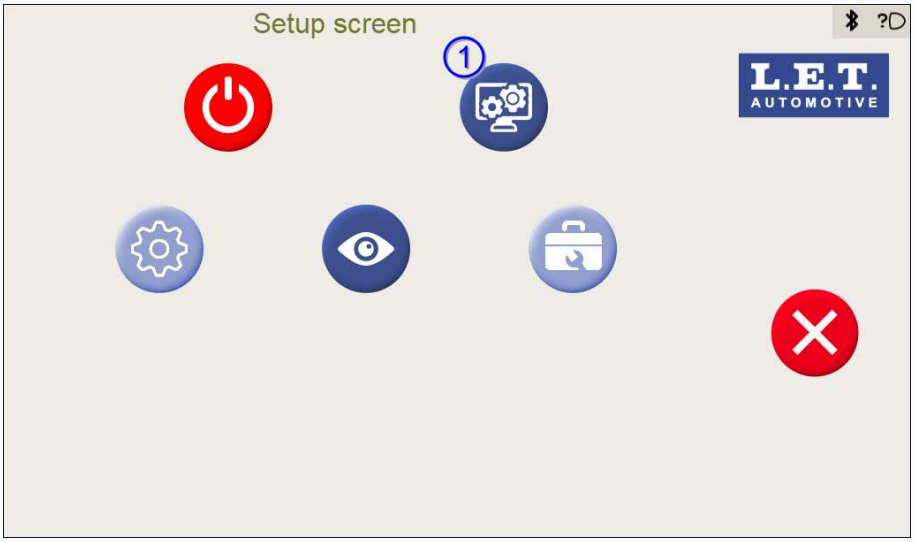

*Figure 135: **Setup** screen with **Computer configuration** button*

   The **Computer configuration** screen is now displayed.

2. Choose one of the options of the **Computer configuration** screen and tap on the corresponding button.

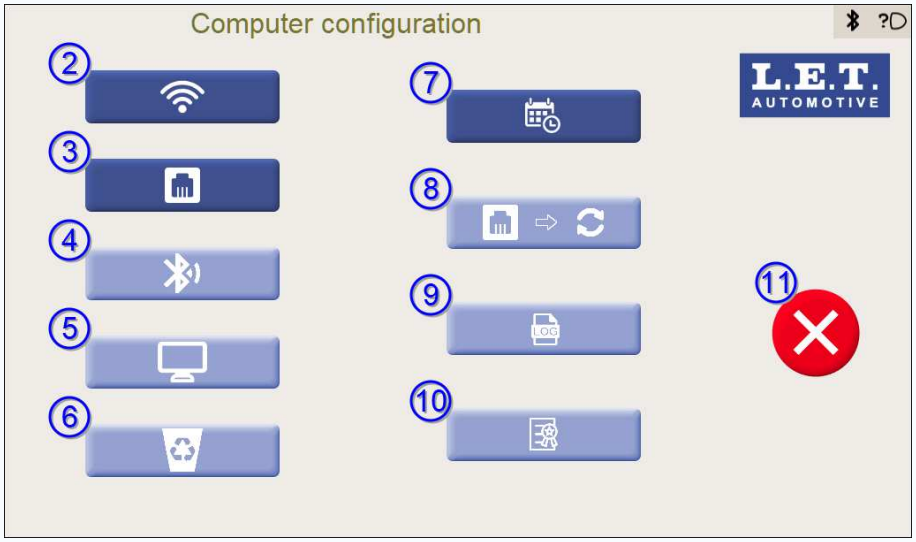

*Figure 136: **Computer configuration** screen*

Remember: The screen may have a different appearance depending on the customer's specific implementation and the applied access level.

#	Button	Description
2	***Wi-Fi*** button	*Wi-Fi* connection setup.
3	***Ethernet*** button	Ethernet connection setup.
4	***Bluetooth*** button[1]	Bluetooth connection setup.
5	**External *HDMI* monitor** button[1]	External *HDMI* monitor setup.
6	**Delete logs and results** button[1]	Delete log and result files from the Luminoscope®.
7	**Date and time** button	Date and time setup.
8	**Online firmware update** button[1]	Check for and apply available firmware updates.
9	**View log** button[1]	Check log files.
10	**Licensing information** button[1]	Check software licensing info.
11	**Abort** button	Return to the **Setup** screen.

[1] Function not available for the current access level.

Related tasks

Setup screen (pg. 161)

11.1 Date and time setup

The **Date and time** button on the **Computer configuration** screen gives access to the menu to configure the date and time settings of the Luminoscope®.

Date and time settings can be achieved either manually or via an automatic synchronization over the network.

Starting from the **Computer configuration** screen.

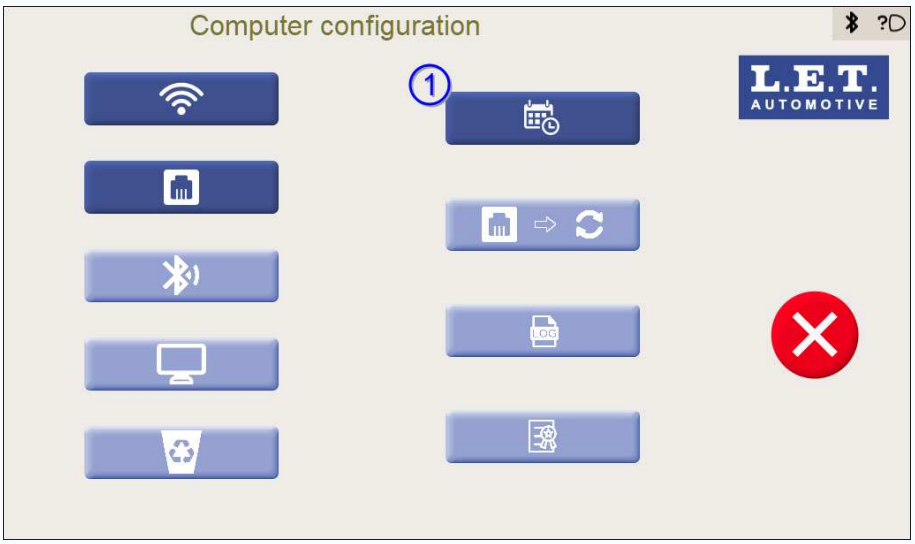

*Figure 137: **Computer configuration** screen with **Date and time** button*

1. Tap on the **Date and time** button 1 on the **Computer configuration** screen.

   The **Time zone settings** screen is now displayed.

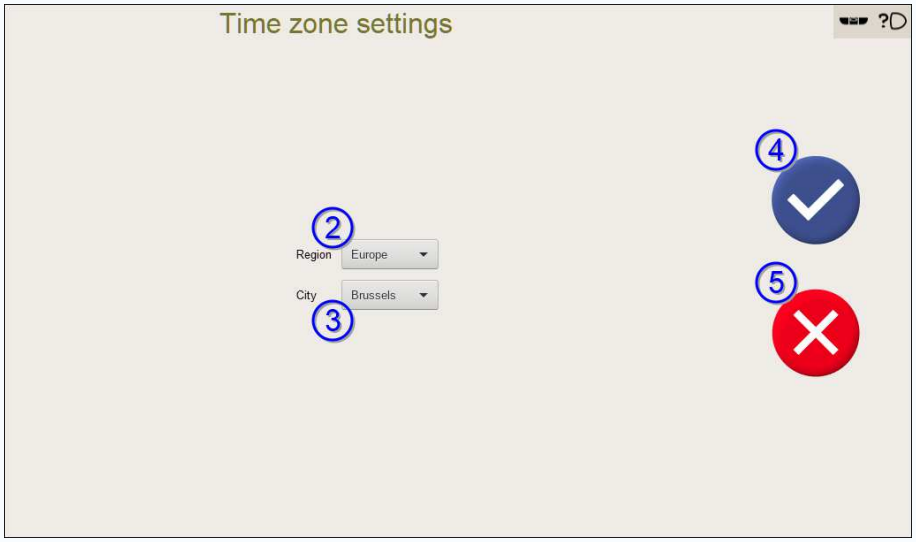

Figure 138: Time zone settings

2. Select the correct time zone region 2 and the nearest city 3 out from the list.

3. Tap on the **Save** button 4 to save the settings. Alternatively tap on the **Abort** button 5 to return to the **Computer configuration** screen.

11.1.1 Manual date and time setting

The Luminoscope® date and time can be set manually.

Start from the **Date and time setup** screen.

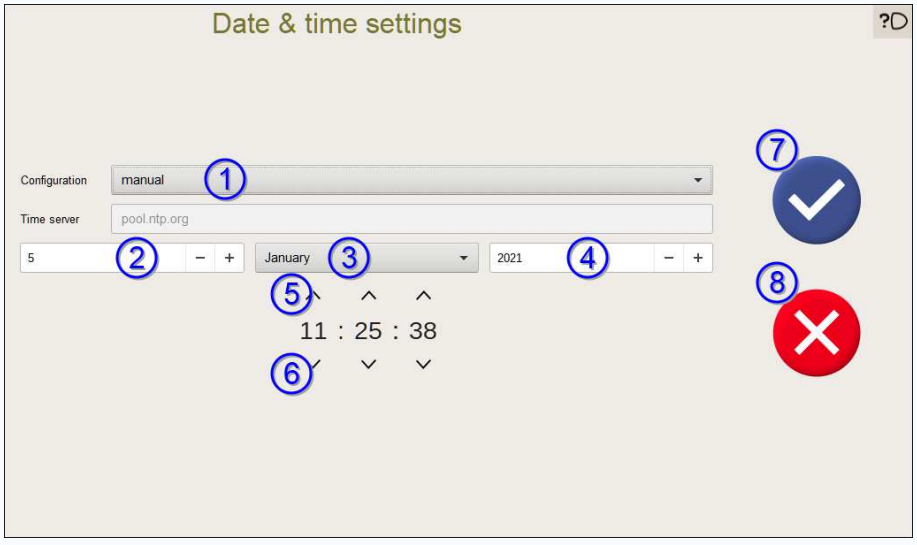

Figure 139: Manual date and time setup

1. Select **Manual** option from the **Configuration** menu 1.

2. Set the correct day 2, month 3 and year 4.

3. Set hour, minutes and seconds by using the corresponding up 5 and down 6 arrows.

4. Tap on the **Save** button 7 to save the settings. Alternatively tap on the **Abort** button 8 to return to the **Computer configuration** screen.

11.1.2 Automatic date and time setup

The Luminoscope® date and time can be set to automatically synchronize over the network.

Remember: The Luminoscope® must be connected to a network providing access to the *NTP* server which is to be used. Additionally it also needs connectivity for a *DNS* server. Make sure the following ports of the selected servers are reachable:

- *NTP* server, port *UDP*/123.
- *DNS* server, port *UDP*/53 and port *TCP*/53.

Start from the **Date and time setup** screen.

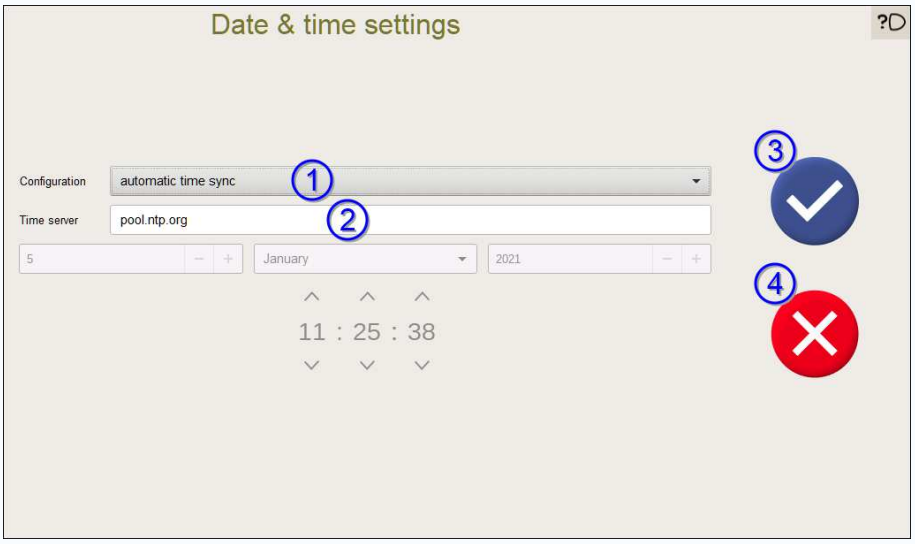

Figure 140: Automatic date and time setup

1. Select **Automatic time sync** from the **Configuration** menu 1.

   Note: The **Date and time settings** controls can no longer be changed manually.

2. Enter the name or address of the time server 2 (e.g. *pool.ntp.org*).

3. Tap on the **Save** button 3 to save the settings. Alternatively tap on the **Abort** button 4 to return to the **Computer configuration** screen.

11.2 *Wi-Fi* networking

The ***Wi-Fi*** button on the **Computer configuration** screen gives access to the configuration of the different *Wi-Fi* network operations and settings of the Luminoscope®.

The Luminoscope® *Wi-Fi* networking can operate in two different modes:

- **AP mode**, on which the Luminoscope® acts as a *Wi-Fi* local access point (*AP*). This mode doesn't provide any additional routing to other networks and is limited to the access to the Luminoscope® provided services. It is very convenient when there is no available *Wi-Fi* infrastructure on the site.
- **Regular mode**, connecting the Luminoscope® to an available *Wi-Fi* network via either *Dynamic Host Configuration Protocol* (*DHCP*) or specifying a static connection networking set of parameters.

Start from the **Computer configuration** screen.

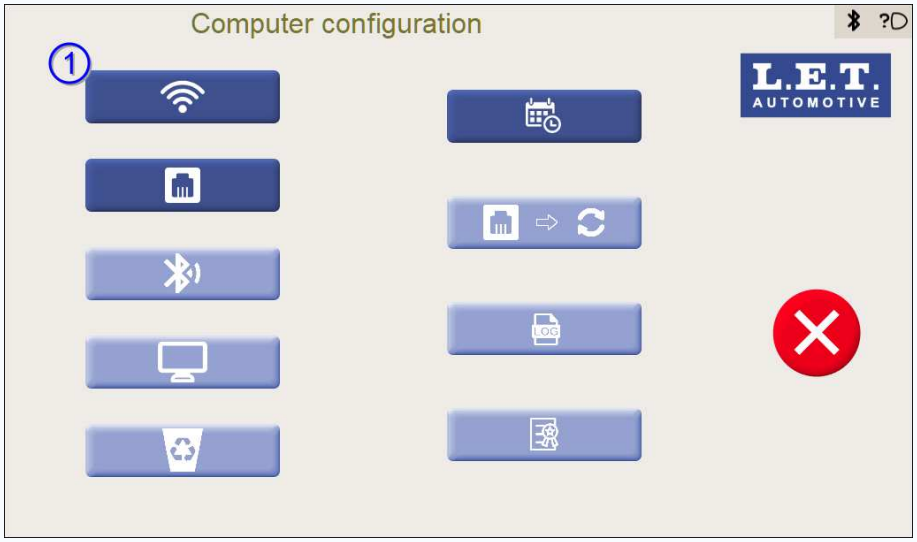

*Figure 141: **Computer configuration** screen with **Wi-Fi** button*

Tap on the ***Wi-Fi*** button 1 on the **Computer configuration** screen.

The **Wi-Fi settings** screen is now displayed and the **General info** tab is active.

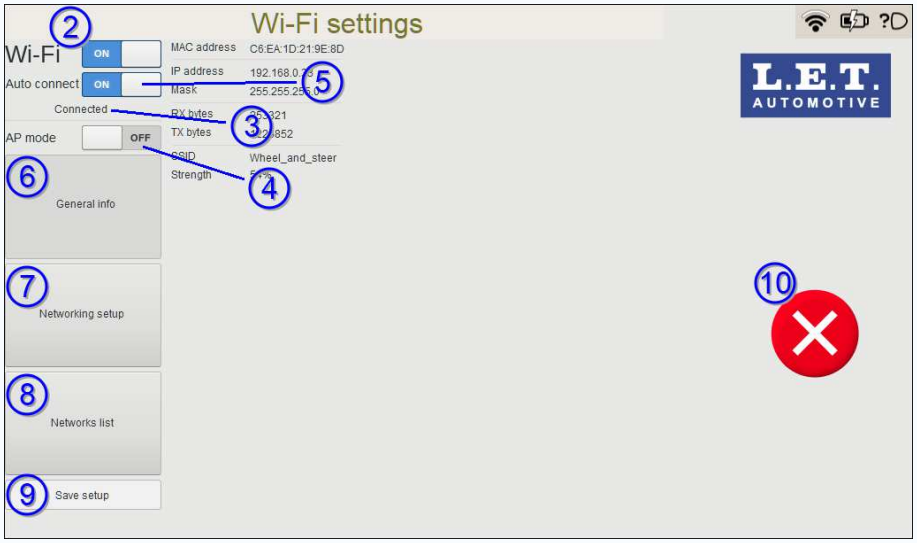

*Figure 142: **Wi-Fi settings** screen with general info*

Tip: The screen may have a different appearance depending on the earlier applied *Wi-Fi* settings.

#	Name	Description
2	*Wi-Fi* **ON / OFF** switch	Enables or disables *Wi-Fi* communication.
3	**Connection status** indication	Shows if the wireless connection is currently stablished and usable.
4	**AP mode** switch	Controls the *Wi-Fi* networking working mode of the Luminoscope®, switching between *AP mode* and *Regular mode*.
5	***Wi-Fi* autoconnect** switch	Enables or disables automatic connection to the last *Wi-Fi* network.
6	**General info** tab	Provides access to the General information on the *Wi-Fi* communication: • MAC address of the physical interface • IP address of the Luminoscope® • Network Mask • RX bytes (number of received bytes) • TX bytes (number of transmitted bytes) • SSID (Service Set Identifier) • Signal strength
7	**Networking setup** tab	Provides access to the Network setup for the *Wi-Fi* configuration. • DHCP (Dynamic Host Configuration Protocol) ON/ OFF switch. In case DHCP is not selected: • IP address • Netmask • Gateway • DNS server
8	**Network list** tab	Provides access to a list of available *Wi-Fi* networks including the signal strength and the *Wi-Fi* protection type. It allows the operator to select the network to connect to.
9	**Save setup** button	Saves the current setup for being used upon a restart.
10	**Abort** button	Returns to the **Computer configuration** screen.

11.2.1 *Wi-Fi* applications

The applications of the *Wi-Fi* connection are among others:

- Remotely operating the Luminoscope®. This is achieved via the VNC-protocol access to the Luminoscope®. Both **AP mode** and **Regular mode** provide support for this application.
- Remotely accessing the configuration of the Luminoscope®, providing the eventual maintenance or technical staff with the possibility of completing their task from a suitable or adequate workplace. This is achieved via the VNC-protocol access to the Luminoscope®. Both **AP mode** and **Regular mode** provide support for this application.

However, operations such *Remote Upload* or *Check for Updates* over network, for which the Luminoscope® needs internet access, cannot be completed unless the **Regular mode** is active.

- Integration of the Luminoscope® into an upper level network for sharing the inspection reports outcome data with a higher level system as technical registers, factories' SCADAs (*Supervisory Control and Data Acquisition*), databases and so on. The nature of these networking applications is better achieved with the **Regular mode** which purpose is more focused on a permanent connection.
- Remotely accessing the Web Interface of the Luminoscope®.

In all cases, any multimedia device (desktop, laptop, tablet, smartphone, etc.) can be used as the client for these activities.

Requirements are:

- Proper *Wi-Fi* connectivity
- VNC protocol client available

The upcoming chapters explain how the Luminoscope® can be switched between the described modes and how to manage the connection of the Luminoscope® to an available *Wi-Fi* network.

Related information

Remote control via multimedia device (pg. 187)

11.2.2 Local Access Point setup

The Luminoscope® can be configured to act as a *Wi-Fi* local access point (*AP mode* for short).

Starting from the **Wi-Fi settings** screen.

1. Enable the *AP* mode by setting the **AP mode** switch 4 to its **ON** position.
   The Luminoscope® creates a *Wi-Fi* hotspot with the name `LuminoscopeAP`.
2. Tap on the **Save setup** button 9 to save the current settings and use them upon restart.
3. Connect your *Wi-Fi* equipped laptop to the hotspot `LuminoscopeAP`.
   Use the password `Luminoscope00` (with two trailing zeros) for that purpose.
4. Check the relevant link at the end of this chapter for a clear explanation on how to remotely control the Luminoscope® via a *VNC* client installed on a laptop.
5. Configure the Luminoscope® as required.
   Remotely complete the configuration of the different settings with the convenience and flexibility of the *Wi-Fi* network range.
6. Once finished, disable the *AP* mode by setting the **AP mode** switch 4 to its **OFF** position.
7. Tap on the **Save setup** button 9 to save the current settings and use them upon restart.

Related information

Remote control via multimedia device (pg. 187)

11.2.3 Regular mode setup

The Luminoscope® can be connected to an available *Wi-Fi* network via either *Dynamic Host Configuration Protocol* (*DHCP*) or specifying a static connection networking parameter set.

Starting from the **Wi-Fi settings** screen.

Enable/disable the *Wi-Fi* communications:

1. Set the *Wi-Fi* **ON / OFF** switch 2 to the **ON** position to enable the *Wi-Fi* communications. Alternatively, set the switch to **OFF** to disable them.

2. Tap on the **Network list** tab 8.
   The **Wi-Fi networks List** screen is now displayed.

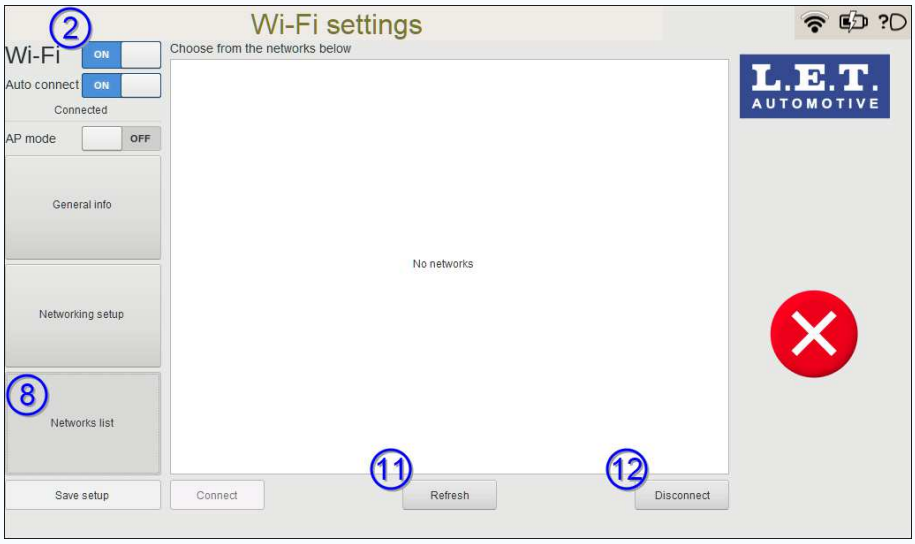

*Figure 143: **Wi-Fi networks List** screen without available networks*

3. Tap on the **Refresh** button 11 to show all available *Wi-Fi SSID*s (wireless network names) or to refresh the network list.
   The following screen is displayed:

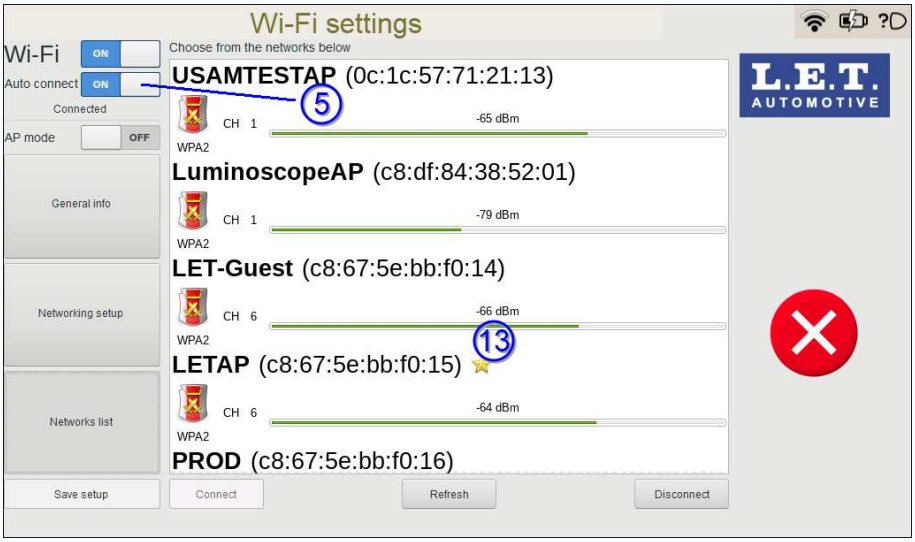

Figure 144: ***Wi-Fi networks List*** *screen with available Wi-Fi networks*

Tip: The network list may have a different appearance and content depending on the available *Wi-Fi* networks and the customer's specific implementation.

A yellow star icon 13 signals the *Wi-Fi* network *SSID* to which the Luminoscope® is connected if so. Otherwise, there is no star icon associated to any network.

4. Activate the ***Wi-Fi*** **autoconnect** switch 5 in order to automatically connect to the last *Wi-Fi* network.

If it is needed to connect to another *SSID*:

5. Delete the current *Wi-Fi* connection setup initially by tapping on the **Disconnect** button 12 if already established.

6. Select the preferred *SSID* by tapping on it.

The selected network is highlighted.

Note:

- Use the SSID with the strongest signal for which you have proper credentials.
- *WPA2* protection is mandatory.

7. Tap on the **Refresh** button 11 to connect to the selected *SSID*.
The following screen is displayed:

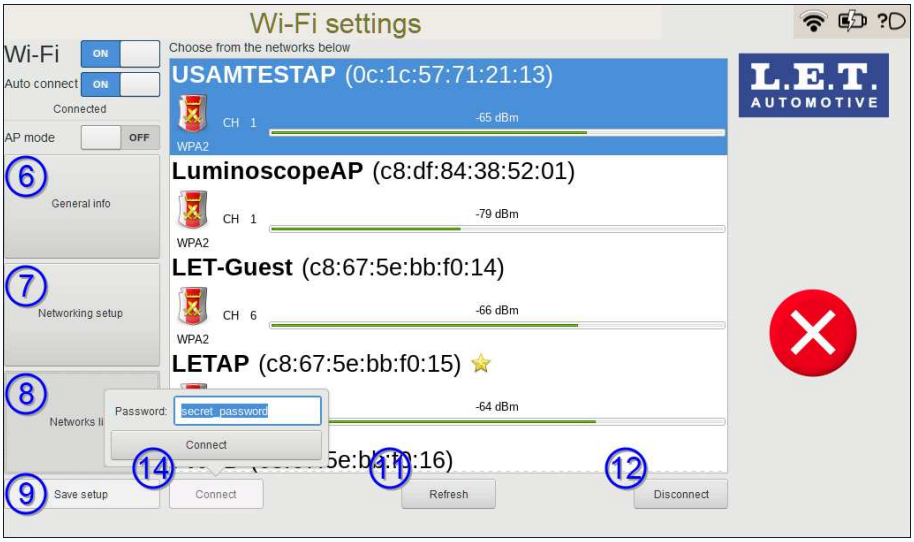

*Figure 145: **Wi-Fi networks List** screen with password entry*

8. Enter the *Wi-Fi* network password and tap on the **Connect** button 14 on the pop-up screen.

9. Tap on the **Save setup** button 9 to save the current settings and use them upon restart.

10. Tap on the **Refresh** button 11 to update the network list.
The chosen network *SSID* is marked with a yellow star icon.

Recalling the data corresponding with the current connection:

11. Tap on the **General info** tab 6 to consult the info about the *Wi-Fi* communication.

- **MAC address**
- **IP address**
- **Netmask**
- **RX bytes** (Received bytes)
- **TX bytes** (Transmitted bytes)
- ***SSID*** (Service Set IDentifier i.e. wireless network name)
- Signal **Strength**

The following screen is displayed:

*Figure 146: **Wi-Fi networks List** screen with General info*

Accessing for modifying or querying the network details of the *Wi-Fi* connection:

12. Tap on the **Networking setup** tab 7 to modify the *Wi-Fi* info.
The following screen is displayed:

*Figure 147: **Wi-Fi networks List** screen with network configuration*

The networking parameters can be set manually or automatically via *DHCP*.

Obtaining network parameters automatically via *DHCP*:

13. Set the ***DHCP*** switch 15 to **ON** to let the Luminoscope® adjust the network parameters without manual intervention.
The Luminoscope® dialogs with the *DHCP* server to obtain the applicable set of networking parameters and they are updated on the display fields.

14. Tap on the **Apply** button 16 to apply the new values to the current connection.

15. Tap on the **Save setup** button 9 to save the current settings and use them upon restart.

Setting the network parameters manually:

16. Set the ***DHCP*** switch 15 to **OFF** to manually enter the networking parameters.

Depending on the specific network setup, it may be interesting to set manually the network parameters.

17. Set the correct network values.

Carefully enter the proper valid values for:

- **IP address**
- **Netmask**
- **Gateway**
- **DNS**

18. Tap on the **Apply** button 16 to apply the new values to the current connection.

19. Tap on the **Save setup** button 9 to save the current settings and use them upon restart.

11.3 Ethernet networking

The ***Ethernet*** button on the **Computer configuration** screen gives access to the configuration of the *Ethernet* network operations and settings of the Luminoscope®.

Remember: Some Luminoscope® optical blocks are provided with the optional *Ethernet* port on their connector plate. The settings underneath may not be of application for your specific Luminoscope®.

Starting from the **Computer configuration** screen.

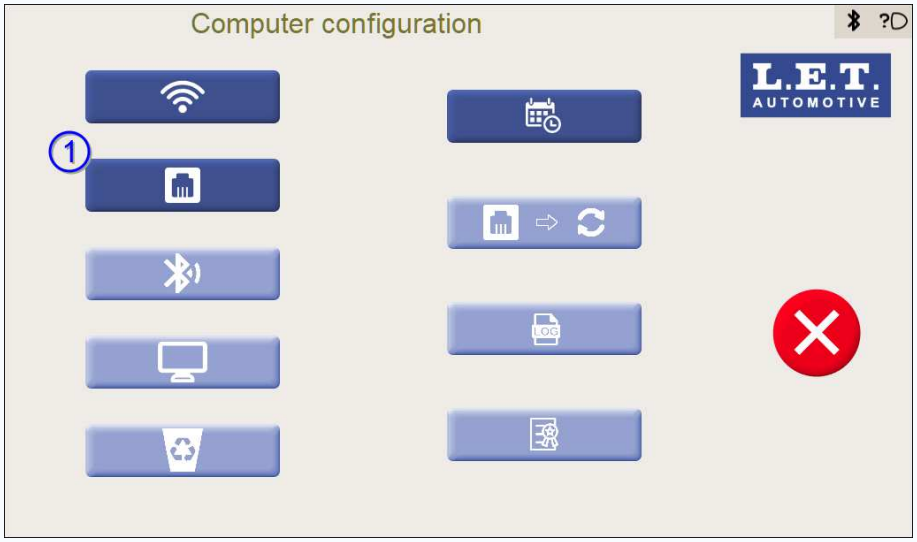

*Figure 148: **Computer configuration** screen with **Ethernet** button*

Tap on the ***Ethernet*** button 1 on the **Computer configuration** screen.

The **Ethernet settings** screen is now displayed and the **General info** tab is active.

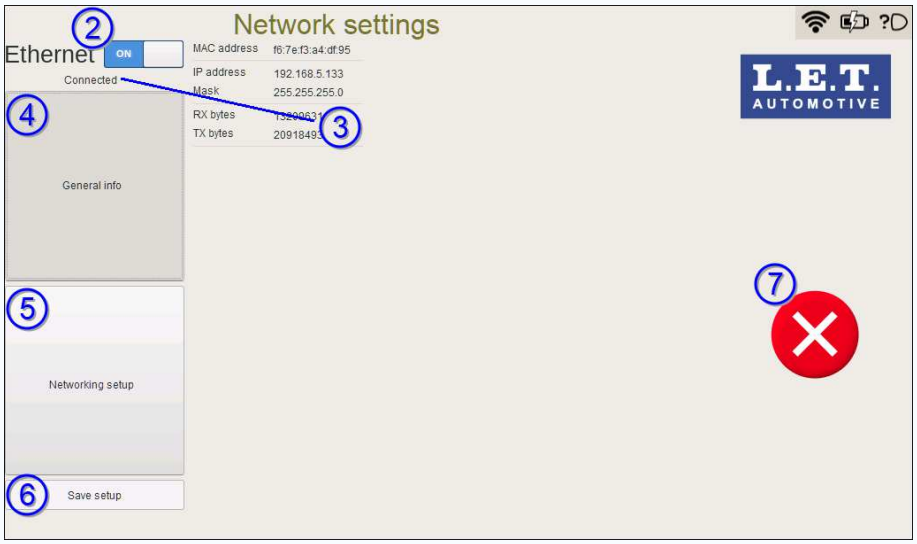

*Figure 149: **Ethernet settings** screen with general info*

Tip: The screen may have a different appearance depending on the earlier applied *Ethernet* settings.

#	Name	Description
2	*Ethernet* **ON / OFF** switch	Enables or disables the *Ethernet* communication.
3	**Connection** status indicator	Shows if the *Ethernet* wired connection is currently established and usable.

#	Name	Description
4	**General info** tab	Provides access to the General information on the *Ethernet* communication configuration: • MAC address of the physical interface • IP address of the Luminoscope® • Network Mask • RX bytes (number of received bytes) • TX bytes (number of transmitted bytes)
5	**Networking setup** tab	Provides access to the Network setup for the *Ethernet* configuration. • DHCP (Dynamic Host Configuration Protocol) ON/OFF switch. In case DHCP is not selected: • IP address • Netmask • Gateway • DNS server
6	**Save setup** button	Saves the current setup for being used upon restart.
7	**Abort** button	Returns to the **Computer configuration** screen.

11.3.1 *Ethernet* applications

The applications of the *Ethernet* connection are among others:

- Remotely operating the Luminoscope®. This is achieved via the VNC-protocol access to the Luminoscope®.
- Integration of the Luminoscope® into an upper level network for sharing the inspection reports outcome data with a higher level system as technical registers, factories' SCADAs (*Supervisory Control and Data Acquisition*), databases and so on.
- Remotely accessing the Web Interface of the Luminoscope®.

In all cases, a desktop or a laptop computer can be used as the client for these activities.

Requirements are:

- Proper *Ethernet* connectivity
- VNC protocol client available

The upcoming chapter explains how to manage the connection of the Luminoscope® to an available *Ethernet* network.

Related information

Remote control via multimedia device (pg. 187)

11.3.2 Ethernet setup

The Luminoscope® can be connected to an available *Ethernet* network via either *Dynamic Host Configuration Protocol* (*DHCP*) or specifying a static connection networking parameter set.

Starting from the **Ethernet settings** screen.

Enable/disable the *Ethernet* communications:

1. Set the *Ethernet* **ON / OFF** switch 2 to the **ON** position to enable the *Ethernet* communications. Alternatively set the switch to **OFF** to disable them.

   The **Connection** status indicator 3 reflects the changes on the network connection availability.

Recalling the data corresponding with the current connection:

2. Tap on the **General info** tab 4.

   The following screen is displayed:

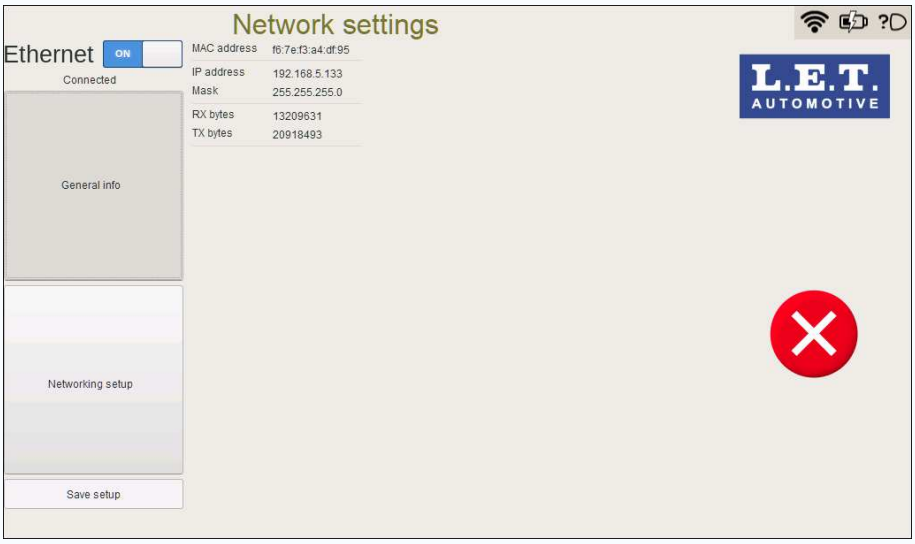

*Figure 150: **Ethernet settings** screen with **General info** tab*

The currently applied network parameters can be reviewed:

- **MAC address** of the physical interface
- **IP address** of the Luminoscope®
- **Network mask**
- **RX bytes** (Received bytes)
- **TX bytes** (Transmitted bytes)

Obtaining network parameters automatically via *DHCP*:

3. Tap on the **Networking setup** tab 5.

   The following screen is displayed:

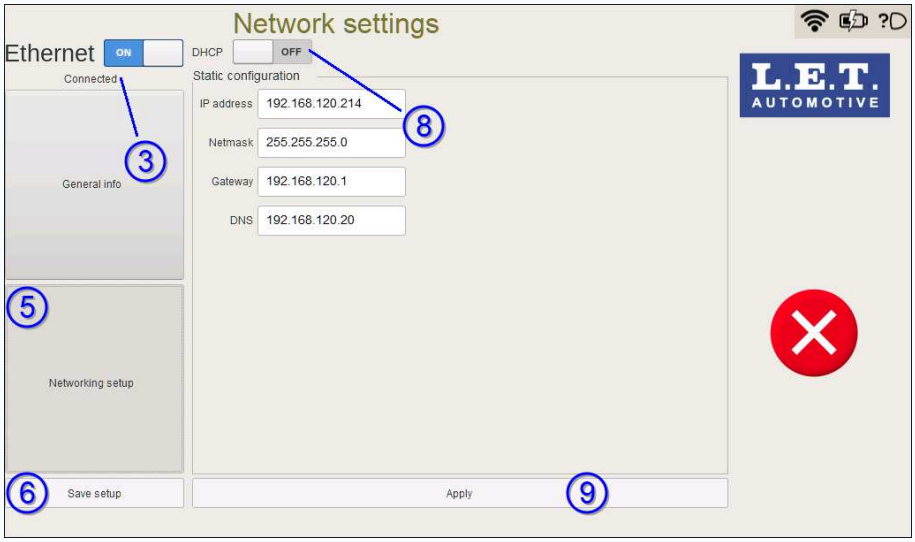

*Figure 151: **Ethernet settings** screen with **Networking setup** tab activated changing DHCP status*

4. Set the ***DHCP*** switch 8 to **ON** to let the Luminoscope® adjust the network parameters without manual intervention.

The Luminoscope® dialogs with the *DHCP* server to obtain the applicable set of network parameters so it can communicate efficiently with other network connected devices. *DHCP* also assigns the subnet mask, default gateway address, domain name server (*DNS*) address and other pertinent configuration parameters.

Of course, the network to which the Luminoscope® is connected must count with an appropriately configured *DHCP* server.

Once the IP address is assigned, the rest of inputs (IP address, Netmask, Gateway and DNS) are updated with the obtained values and disabled.

5. Tap on the **Apply** button 9 to apply the new values to the current connection.

Once the values are correct and the network connection is established, the **Connection** status indicator 3 is updated.

6. Tap on the **Save setup** button 6 to save the current settings and use them upon restart.

Setting the network parameters manually:

7. Set the ***DHCP*** switch 8 to **OFF** to manually enter the network parameters.

The Luminoscope® requires a set of network parameters so it can communicate efficiently with other network connected devices.

8. Set the correct network values.

Carefully enter the proper valid values for:

- **IP address**
- **Netmask**
- **Gateway**
- **DNS**

9. Tap on the **Apply** button 9 to apply the new values to the current connection.

Once the values are correct and the network connection is established, the **Connection** status indicator 3 is updated.

10. Tap on the **Save setup** button 6 to save the current settings and use them upon restart.

11.4 Bluetooth settings screen

The ***Bluetooth*** button on the **Computer configuration** screen gives access to the **Bluetooth settings** screen which enables the connection of the Luminoscope® to external devices that feature the *Bluetooth* protocol.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

11.5 External HDMI monitor setup

The **External *HDMI* monitor** button on the **Computer configuration** screen gives access to the configuration for an optional *HDMI* monitor that could be connected to the Luminoscope®. The *HDMI* monitor shows basically the same information as on the 7” colour touch screen of the Luminoscope®.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

11.6 Firmware update

For a number of reasons, any member of the LET technical staff may recommend you to update the firmware of the Luminoscope®.

Firmware updates can be applied online, while the Luminoscope® is connected to the internet.

Alternatively, when the Luminoscope® doesn´t have full access to the internet, a firmware update can also be applied offline, by connecting a properly crafted *USB* stick including the firmware update package to the corresponding socket on the Luminoscope® connector panel.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

11.7 Log files

The **Log files** button on the **Computer configuration** screen gives access to the log files generated by the Luminoscope®.

Log files (in text format) contain a number of timestamped lines describing events related to the activity of the Luminoscope®. The information in these log files can be useful for tracking or diagnostic topics. The content of these log files is clearly not intended to be used by regular users.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

11.8 Delete log files and result files

The **Delete logs and results** button on the **Computer configuration** screen allows the deletion of all the log files and result files generated by the Luminoscope® on the normal use.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

11.9 Licensing information

The **Licensing information** button on the **Computer configuration** screen gives access to the licensing information of the Luminoscope® on the normal use.

Attention: This feature is not available for the current access level. Please refer to a user who has the necessary permissions if the feature is required.

12 Remote control via multimedia device

This chapter explains how to connect a multimedia device (tablet, smartphone, laptop, desktop, ...) to the Luminoscope® over *Wi-Fi* in order to remotely control the Luminoscope®.

The instructions below require that a *VNC* client is installed on the remote platform, and that both the Luminoscope® and the remote platform are properly connected to the corresponding *Wi-Fi* access points on the network, allowing mutual IP access.

Note:

- The following instructions can be applied to any platform which has a *VNC* client installed.
- The present explanation refers to an *Android* tablet using the freely available *bVNC* client, but neither of the *VNC* client or the platform are exclusively supported by the Luminoscope®.

Remember: The screen displayed on the tablet may have a different appearance depending on customer's specific implementation.

Figure 152: Luminoscope® *screen displayed on a tablet*

12.1 VNC client setup

Remember: These instructions refer to the *bVNC* client and will be similar but not identical for any other client. Take also into account that your *bVNC* client appearance may differ to the one depicted below.

1. Locate the *IP* address 1 of the Luminoscope® on the **System information** screen that is accesible via the **System** screen.

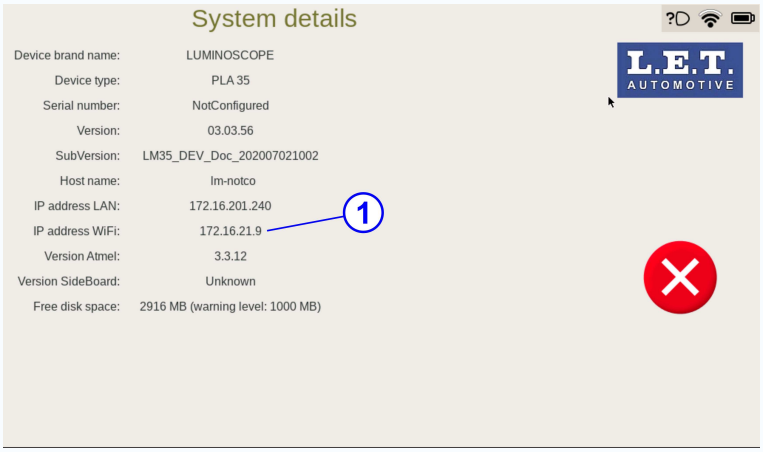

*Figure 153: **System information** screen displaying the Wi-Fi IP address*

2. Write down the *IP* address.
It will be used on an upcoming step.

3. Open the *bVNC* application 2 on the tablet.

Figure 154: bVNC icon on tablet screen

Eventually, the next message or similar is displayed:

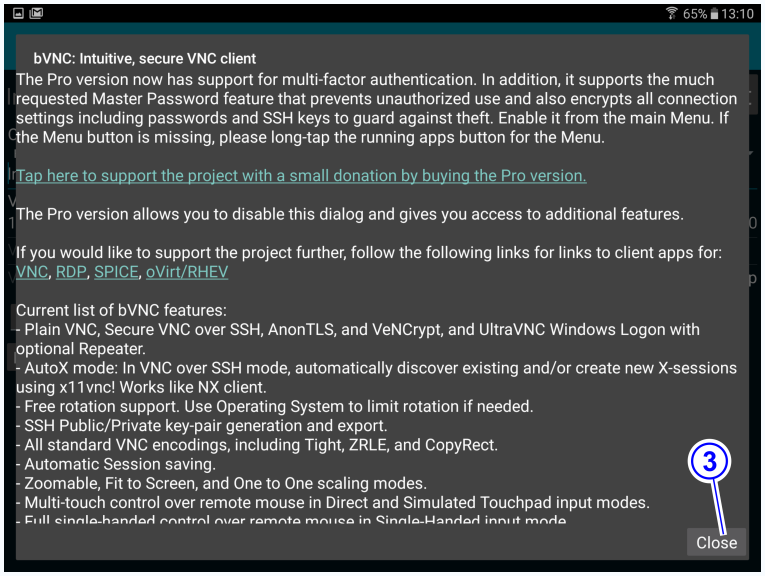

Figure 155: bVNC message

4. Tap on the **Close** button 3.

5. Enter a name for identifying the connection 4 (e.g. **lm35**).

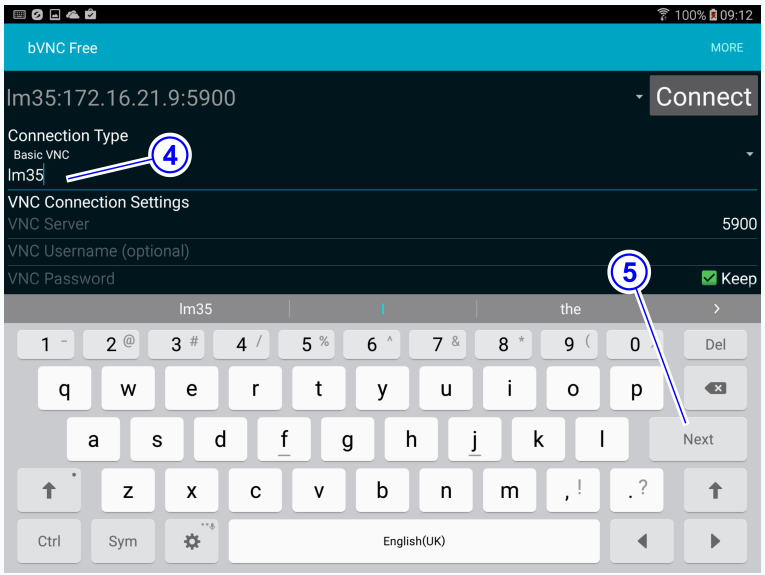

Figure 156: bVNC connection name

6. Tap on the **Next** button 5.

7. Enter the IP address of the *Wi-Fi* connection of the Luminoscope® 6 (e.g. **172.16.21.9**).

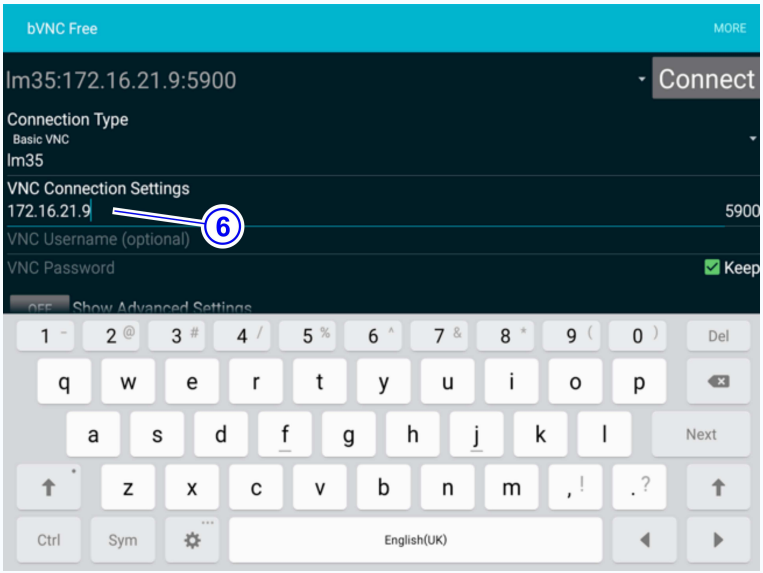

Figure 157: Luminoscope® *IP address in bVNC*

8. Enter the hardcoded password 7 to complete the configuration.

Use ***Luminoscope*** as the *VNC* password.

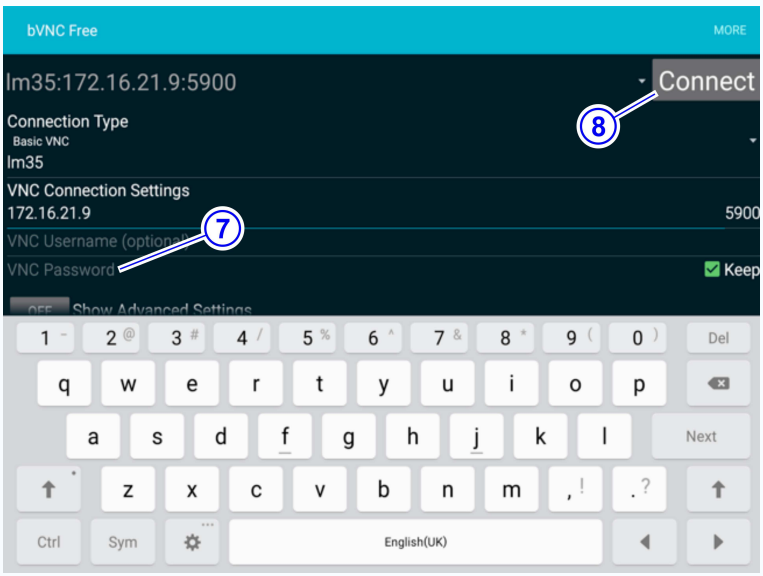

Figure 158: VNC connection password in bVNC

Tip: No *VNC* username is required.

9. Tap on the **Connect** button 8.

A copy of the Luminoscope® screen appears on the tablet screen and the system can now be remotely controlled.

Related tasks

Technical data of the Luminoscope® (pg. 143)

12.2 Disconnection

Once the interaction with the Luminoscope® is no longer needed, it is advisable to properly terminate the session.

Remember: The following instructions are specific for the *bVNC* client on an *Android* tablet, but the same functionality is available for any other platform and *VNC* client.

1. In the remote display, tap anywhere out from the Luminoscope® screen image 1 to invoke the overlay auxiliar buttons of *bVNC*.

Figure 159: Invoke bVNC auxiliar buttons

2. Tap on the dotted icon button 2 to invoke the configuration menu of *bVNC*.

*Figure 160: **Dotted** icon button*

3. Tap on the **Disconnect** button 3 of the *bVNC* pop-up configuration menu.

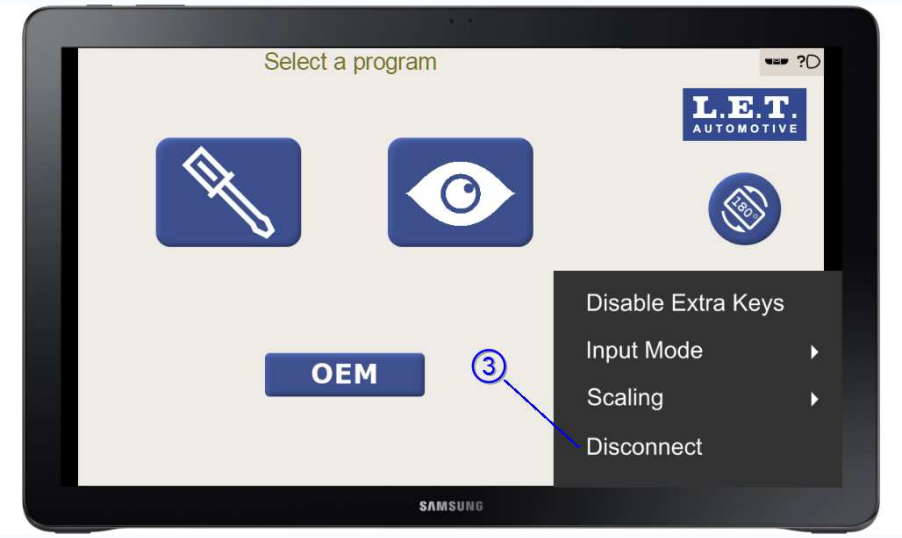

Figure 161: bVNC configuration menu

Note: The shape and layout of the pop-up configuration menu may differ from yours. The link between both device's displays is cancelled.

13 Personal notes