Larisa

solutions for the transport sector

MIRRORS

Edition: 1/2019

PPHU "LARISA" is a reliable and trustworthy partner, designing and producing modern equipment and accessories based on mechanical, pneumatic, electrical, and electronic systems.

"LARISA" creates and continuously improves its own solutions dedicated mainly to manufacturers of means of transport. One of our specialities is the design and production of rear-view mirrors mounted in rail vehicles. For years we have been supplying these products to European markets, as well as to Asian and African ones.

The innovativeness of our solutions is mainly due to the low weight of the structure and miniaturized mechanical and control systems. Our advantages are also short lead times and competitive prices.

RESEARCH AND DEVELOPMENT:

"LARISA" is a manufacturer of modern high quality products which have gained recognition of Customers and Users.
In order to ensure continuous development of the product range, as well as constantly increasing quality of products, Larisa invests in the development of machinery and systematically trains its employees. We approach each design individually. Our specialists make every effort to ensure that the solutions offered are both durable and safe to use. All products, before being introduced into serial production, are subjected to restrictive tests concerning both durability as well as functionality and ergonomics.

INDIVIDUAL DESIGNS:

In addition to the ready-made solutions presented in this catalogue, we also prepare individual solutions tailored to the needs of the customer or end user. We are able to make a product both on the basis of the entrusted documentation, as well as to design and produce a new one from scratch, taking into account functional and aesthetic requirements. The implementation of design and production processes is supervised by qualified personnel with appropriate equipment at their disposal, which guarantees the optimum quality level of our products.

QUALITY:

The main goal of our activity is to provide products that meet the requirements of our Customers in terms of technical solutions and aesthetics, which are produced in accordance with the guidelines of standards and regulations, which allows obtaining the necessary approvals and certificates to use the products, among others, in rolling stock.
We have been maintaining high quality for years thanks to the system implemented in accordance with ISO 9001

Basing on years of experience, we design mirrors ourselves or according to customer guidelines. We can make a product consistent with your design or develop and manufacture a new product entirely developed by our engineers.

We work in a 3D CAD environment, which significantly shortens the design process thanks to the possibility of quick modelling and smooth corrections, significantly improving data exchange at a distance.
We offer solutions for newly designed vehicles, as well as for modernization purposes. The features of the mirrors are adapted each time
to the individual needs of the customer.
Analyses of visibility, functionality and strength are carried out for each new design process.

PRODUCTION:

The production of most of the elements that are part of the mirror mechanisms, as well as the rest of the components are carried out on numerically controlled machine tools (CNC), which ensures precision and repeatability. Assembly of parts and components is performed by qualified and experienced personnel.

FUNCTIONS:

Closing/Opening – the primary function of the mirror is to allow the observation of the side area of the vehicle from the driver's cab during boarding and alighting of passengers. However, due to the size of the vehicle and limited space in the mirror extremity, they must be opened and closed automatically with the door or when the vehicle starts to move.

Mirror control – in order to adjust the individual position of the mirror and thus achieve optimum visibility for each driver, there is a manipulator inside the cab to change the angle of the mirror.

Heating – in order to limit the influence of weather conditions (e.g. low temperatures, high humidity) on the possibility of observing the mirror, the mirrors are equipped with heating elements activated remotely as needed by the vehicle operator.

Emergency folding – in case of failure, e.g. power failure, mirrors can be folded in emergency mode – manually.

Control – the mirror can be controlled by the vehicle's master controller or an autonomous controller communicating with the vehicle controller. The control functions can be adapted to individual user requirements.

STANDARDS:

The offered mirrors meet reqiurements of standard such as:

- EN 50155
- EN 50121
- EN 61373
- EN 45545
- EN 50153

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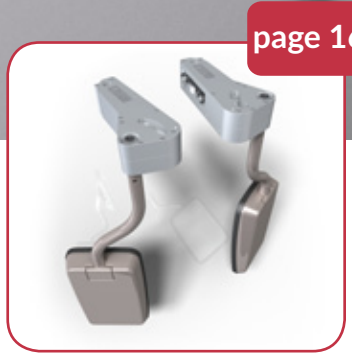
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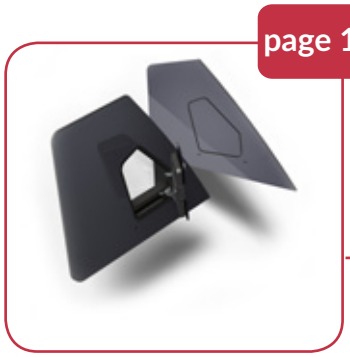

LUS032

MIRRORS FOR TRAINS

Mirror system

Rear-view mirrors, which are used to observe the space from the sides of the vehicle and can be used as an independent equipment or as a complement to the camera system.

The advantages of using rear-view mirrors are:

- Zero response time to changes in light intensity – unlike cameras, mirrors do not need time to adapt to changing lighting conditions, e.g. when entering or leaving a tunnel;
- An analogue form of image transmission is more often preferred by train drivers, tram drivers and vehicle drivers than the camera image seen on a monitor;
- The classic form of image transmission is free from the noise or faults of the camera-monitor system;
- The heating of the mirror automatically removes atmospheric agents (rain drops, steam, frost and ice) from its surface.

Mirrors are designed based on applicable national and international standards and regulations. It is possible to certify our products in accredited research units, e.g. for compliance with the following standards:

- EN 50155 – Technical equipment used on rolling stock;
- EN 61373 – Tests for resistance to mechanical impact and vibration;
- EN 50121 – Electromagnetic compatibility;
- EN 45545 – Fire protection in railway vehicles

For each new mirror design we carry out functional analyses, as well as visibility and strength calculations.

Main functions:

- folding of the mirror arm by means of electric or pneumatic drive;
- electrical mirror positioning by means of a joystick;
- heating of the mirror.

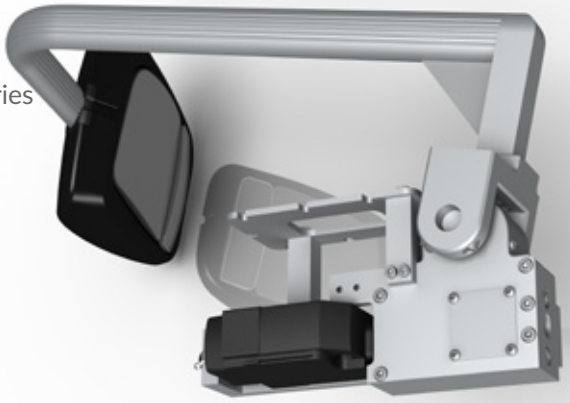
Additional functions:

- control by means of a dedicated LARK1 controller;
- automatic mirror folding after activation of the second cabin (for two-way vehicles);
- possibility of emergency mirror folding in case of loss of voltage or pressure;
- additional mirror for first door observation;
- OPEN CAN diagnostics;
- stylised casing

Our mirrors are characterized by:

- excellent visibility;
- high resistance to voltage fluctuations;
- high durability and strength;
- exceptional resistance to changing weather conditions;
- resistance to vibrations,
- possibility to cooperate with properly configured control systems.

PPHU “LARISA” also implements individual solutions based on entrusted designs or customer guidelines by designing a new product from scratch.
Experienced constructors and stylists are a guarantee of a satisfactory effect of the design process.
Delivered sets of mirrors can be equipped with various types of accessories such as manipulators, controllers, covers, etc.



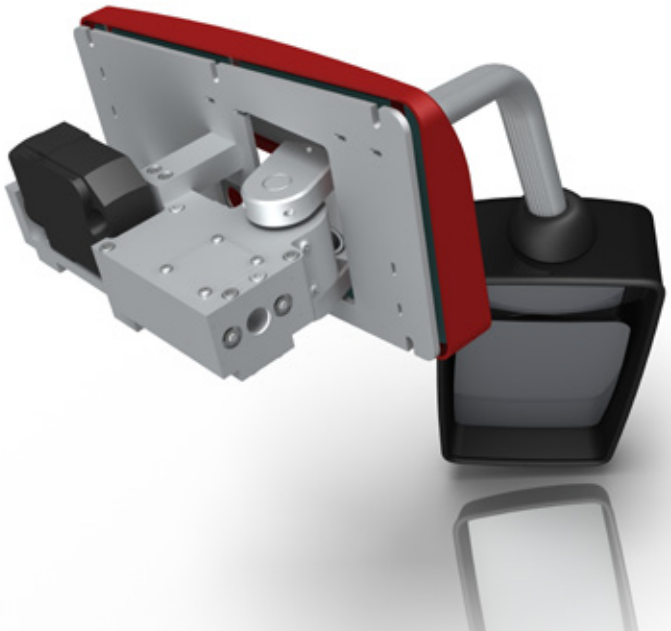
Mirror system for trams

Due to the specific features of trams – including the size and geometry – the structure of mirrors differs significantly from mirrors used in other vehicles. The main distinguishing feature of a tramway mirror is the long arm between the mirror unit and the drive. This is largely due to the position of the driver's seat.

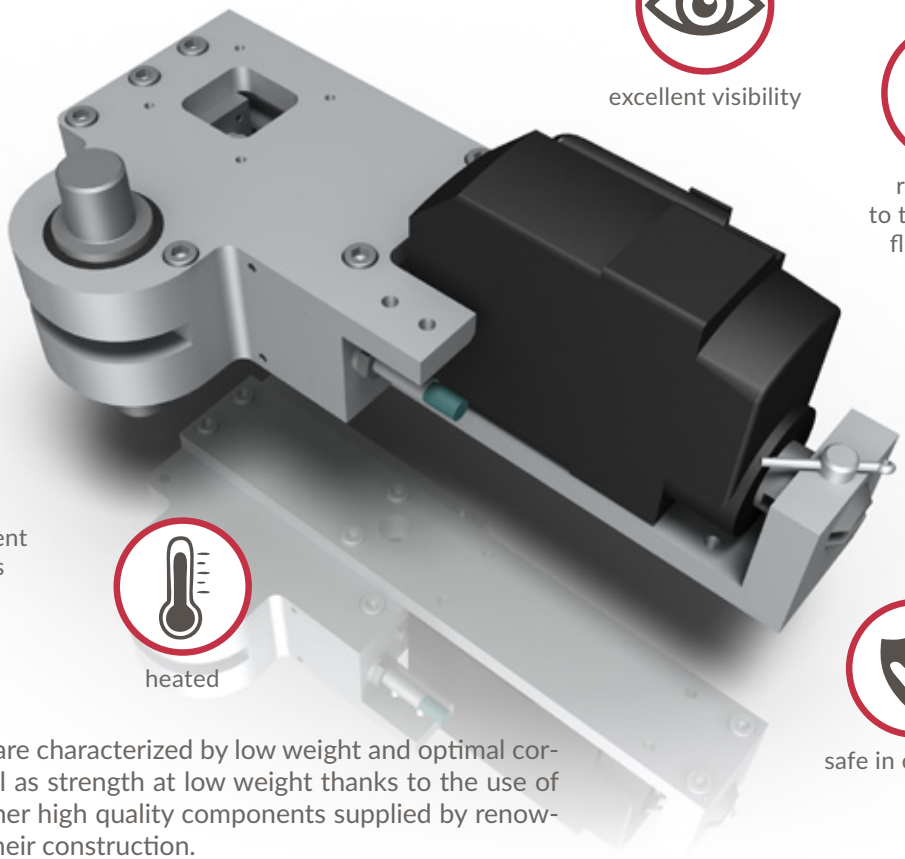
Our tram mirrors are designed on the basis of the UNECE regulations, which ensures optimum visibility and guarantees the safety of vehicle passengers.

To improve the quality of the visible image in the mirror, we have developed many innovative solutions. These include, among others:

- use of dynamic vibration dampers to reduce the influence of vehicle structure vibrations on the mirror
- introduction of a system of couplings fulfilling, among others, the function of clearing the play in mechanical systems, by locking the system in the closed position to protect the mirror against pick-up on the automatic car wash, as well as the function of an overload (emergency) coupling and a coupling combining several functions at once.



It is possible to adjust the configuration of the mirror components according to the user's needs, both in terms of functionality and style and geometry.



vibration-resistance

excellent visibility

resistance to temperature fluctuations

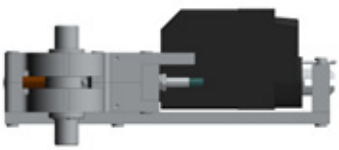
tailored to different supply voltages

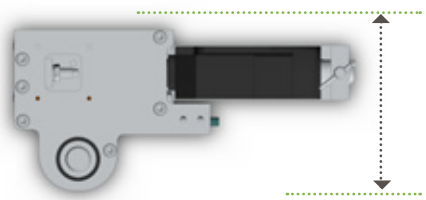
resistant to wind blasts

heated

safe in operation

The mirror mechanisms are characterized by low weight and optimal corrosion resistance, as well as strength at low weight thanks to the use of aluminium alloys and other high quality components supplied by renowned manufacturers for their construction.





custom sizes

Tram Mirror Series LUS05

The mechanism of the electric tram mirror of the LUS05 series is mounted in a recess located in the front of the vehicle under the cover, which guarantees 100% tightness of the cab and the possibility of preserving the original silhouette of the vehicle. This drive operates very quietly and allows precise control of the arm angle of the mirror unit. Long bore in the masking blank allows the arm to move freely when opening and closing the mirror. The “soft” start and stop function extends the life of the mechanism components.
The mirror is equipped with a heating function, which definitely facilitates the work of tram drivers and increases the level of safety of travellers during autumn and winter days.
The LUS05 series is equipped with a mechanical play correction function with integrated spring tensioners.

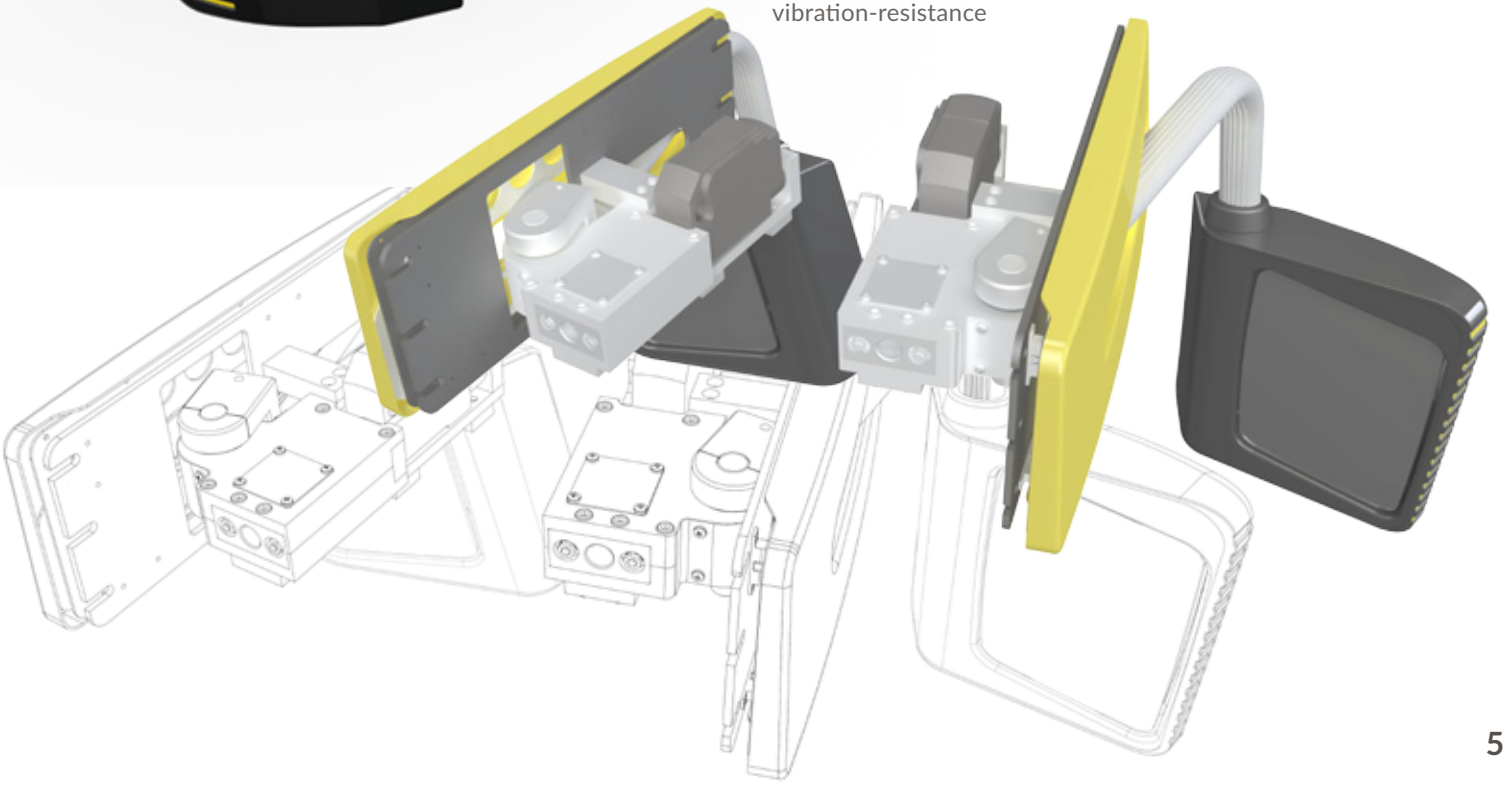
Mirror operating temperature range from -30 to +55°C

resistance to temperature fluctuations

heated

tailored to different supply voltages

vibration-resistance



Tram Mirror Series LUS010

The LUS010 series electric mirrors are mounted similarly to other dedicated mirrors for trams, so that it is possible to hide the mechanism under the vehicle's cover, while the arm and mirror assembly are optimally positioned. The mirror drive equipped with an electric actuator is characterized by precision and repeatability of movements.
Its compact design reduces vibrations during arm movement and allows it to be placed in a small space.
The LUS010 series is equipped with a convenient emergency folding clutch so that in the event of a power outage or other cases where the mirror arm cannot be closed, it can be done manually. An additional mirror enlarging the range of visibility increases the safety level of passengers and animals travelling with them.
The "soft" START and STOP function extends the life of the mechanism components.
The main mirror is equipped with a heating function, which greatly facilitates the work of the tram drivers during autumn and winter days.

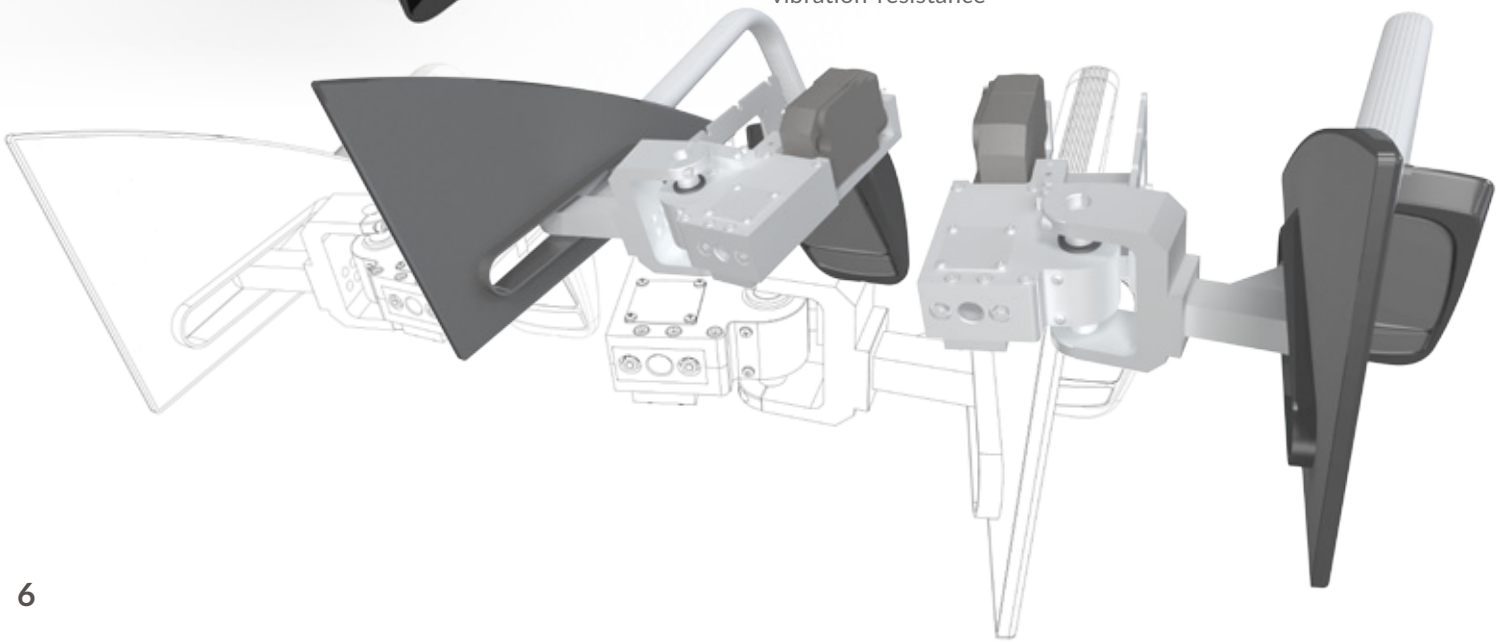
Mirror operating temperature range from -30 to +55°C

resistance to temperature fluctuations

heated

tailored to different supply voltages

vibration-resistance



Tram Mirror Series LUS016

LUS016 mirrors are a structure built mostly of light alloys and polyester laminates.
All elements are resistant to atmospheric corrosion and more aggressive conditions caused by e.g. solutions containing road salt.
The compact design of the electric arm moving mechanism allows for installation outside the body of the vehicle, which makes it possible to use these mirrors also in modernised vehicles where there is no space for the drive unit in the spaces under the sheathing. The applied housing perfectly masks the mechanism and its colouring can be matched to the vehicle colour. As with most of the exterior mirrors produced by PPHU "LARISA," it is possible to adjust the range of arm movements to suit the geometry of the vehicle.

Mirror operating temperature range from -30 to +55°C

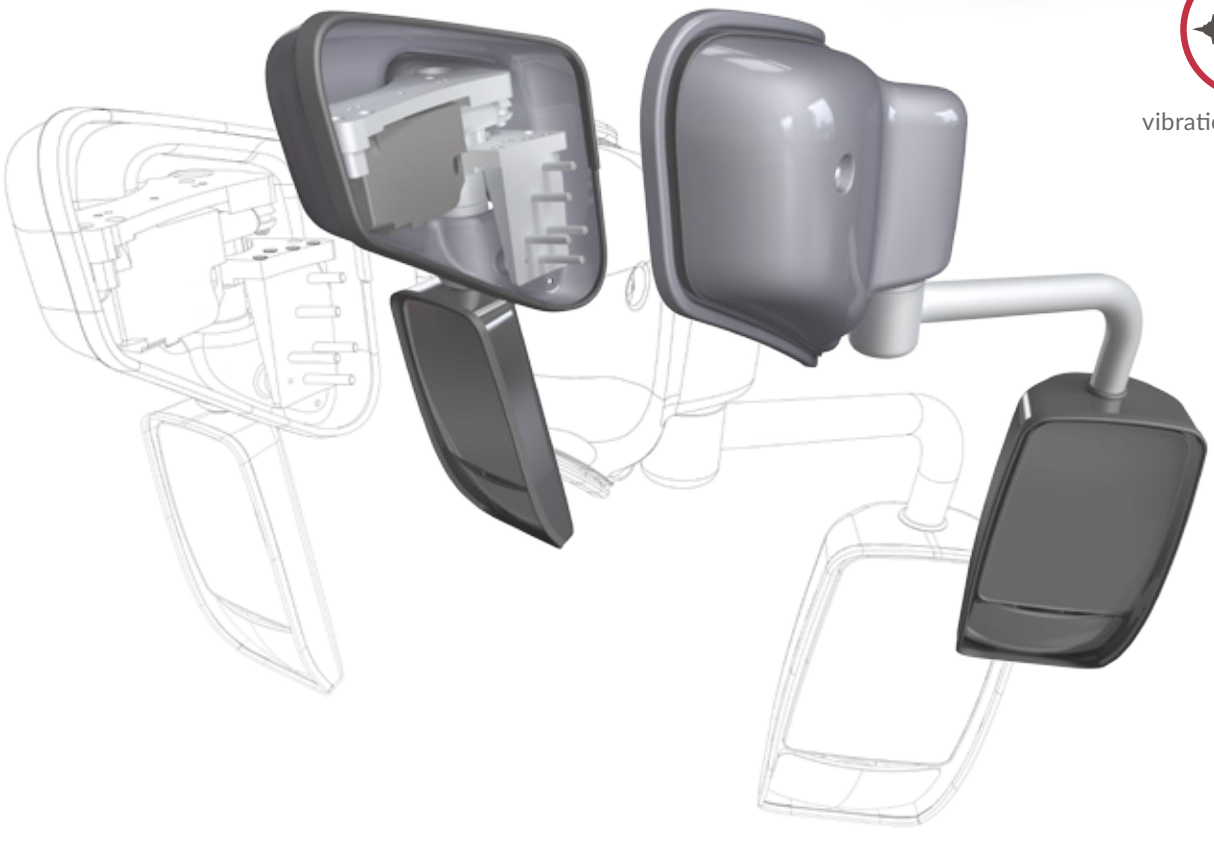
resistance to temperature fluctuations

excellent visibility

tailored to different supply voltages

heated

vibration-resistance



Tram Mirror Series LUS022

The mirror system of the LUS022 series is a solution for use in trams, buses and trolleybuses constructed based on the requirements of UNECE Regulation 46.
The manually folding arm of these mirrors is designed for customers looking for an economical solution for their vehicles. Its design has been optimised for harmonic movements during MES analysis and testing in our laboratory. The large mirror is housed in a slim case and provides very good visibility.
Mirrors of this series are equipped with couplings that tighten the mirror housing to the side of the vehicle. This function is particularly useful during the process of washing the vehicle's sheathing in automatic car washes.

Mirror operating temperature range from -30 to +55°C

Tram Mirror Series LUS028

The automatically controlled mirrors of the LUS028 series are dedicated for trams where the driving position does not allow observation of the reflection in the mirror through side windows, but only through the windscreen. The bipartite arm used for this purpose has been equipped with a clutch unit enabling manual emergency closing of the mirror. The electric drive mechanism is operated by a controller allowing for arm movements as well as for auto calibration of the drive mechanism position. Two remote-controlled and heated mirrors (main and auxiliary panoramic mirrors) provide optimal visibility in accordance with UNECE.

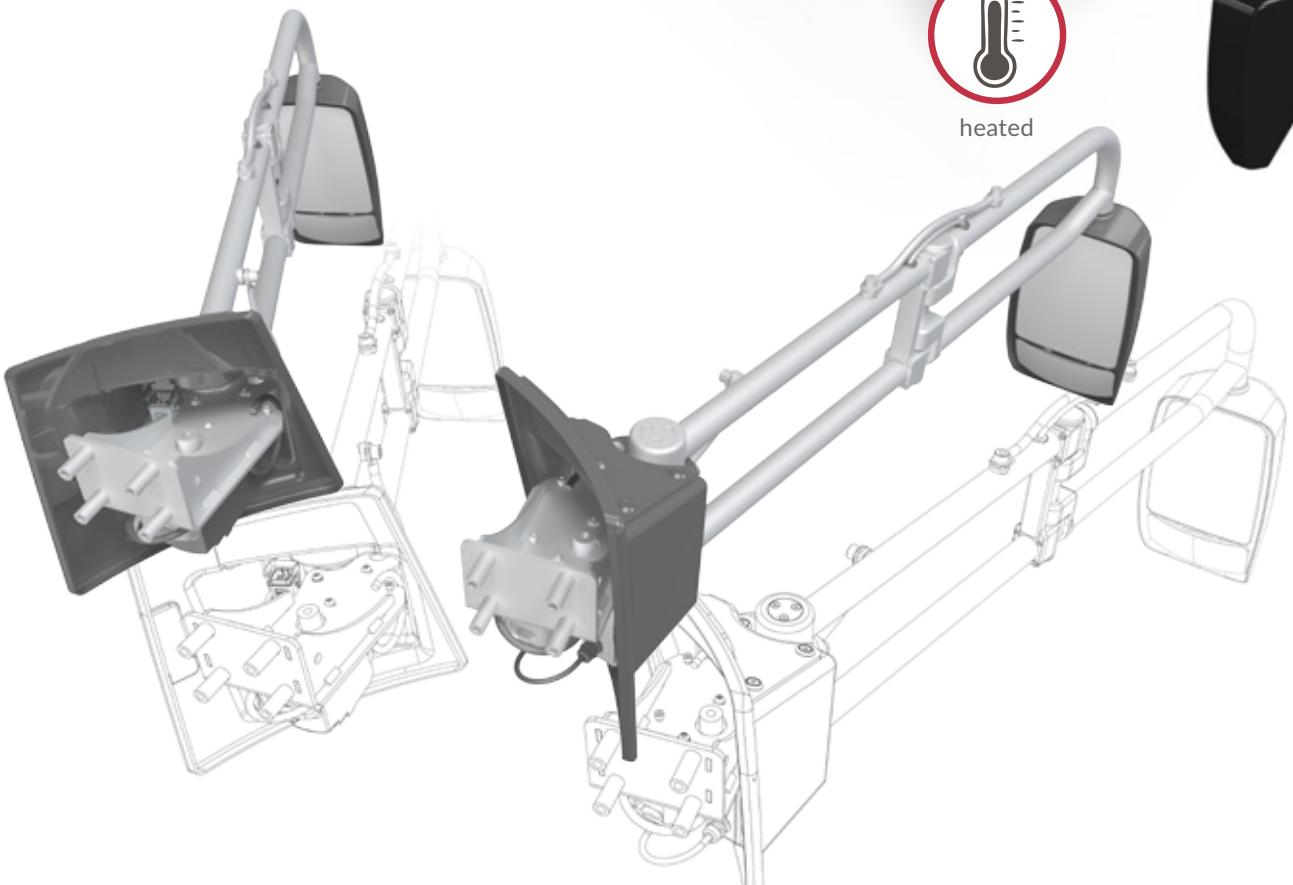
The design of the device enables its operation in the temperature range from -30 to +70°C for vehicles reaching maximum speeds up to 70 km/h.

vibration-resistance

resistance to temperature fluctuations

tailored to different supply voltages

heated



Mirror Series LUS020

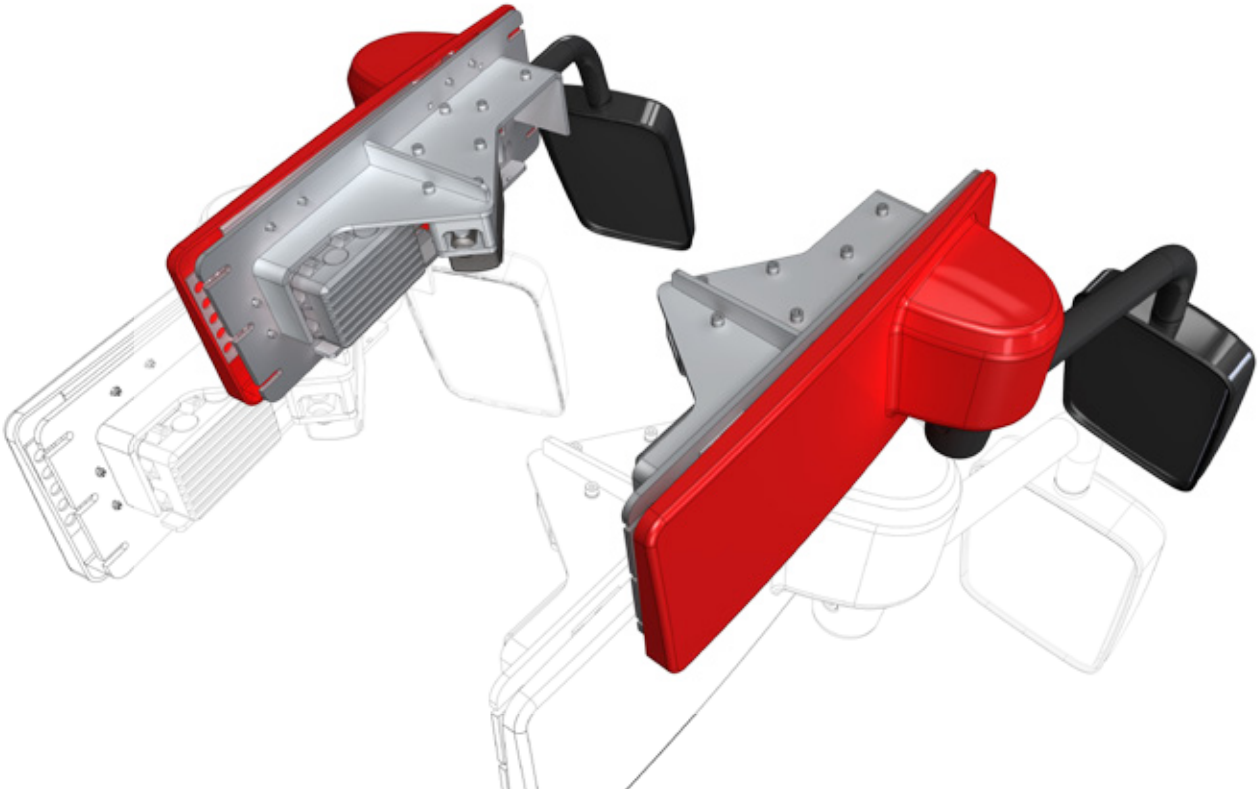
LUS020 mirrors can be used on most trams with mounting spaces located in the front of the vehicle. They are driven by precise electric actuators, which allows for repeatability and a wide range of arm movements. The components used to build individual mirror parts are highly resistant to corrosive factors, including road salt solutions. Optimally designed components guarantee high durability and rigidity of the system while maintaining low weight of the whole structure. Visible elements made of polyester composites and aluminum can be color-matched to the vehicle body. The work of mechanisms is controlled by electronic controllers enabling individual adjustment of each of the mirrors. To facilitate observation during adverse weather conditions, the mirrors have been fitted with heating mats.
The temperature range of the mirror is from -30 to +55 °C

resistance to temperature fluctuations

heated

vibration resistance

tailored to different supply voltages



Mirror system for trains

The train rear-view mirror systems produced by PPHU LARISA include specific conditions of use where they are exposed to high passing speeds, icing or gusts of wind. Our mirrors are used in the most modern rail vehicles manufactured by European and world leaders in this industry. Each new solution is subjected to complex tests and inspections, e.g. in a climatic chamber, as well as to electromagnetic and vibration resistance tests.

custom sizes

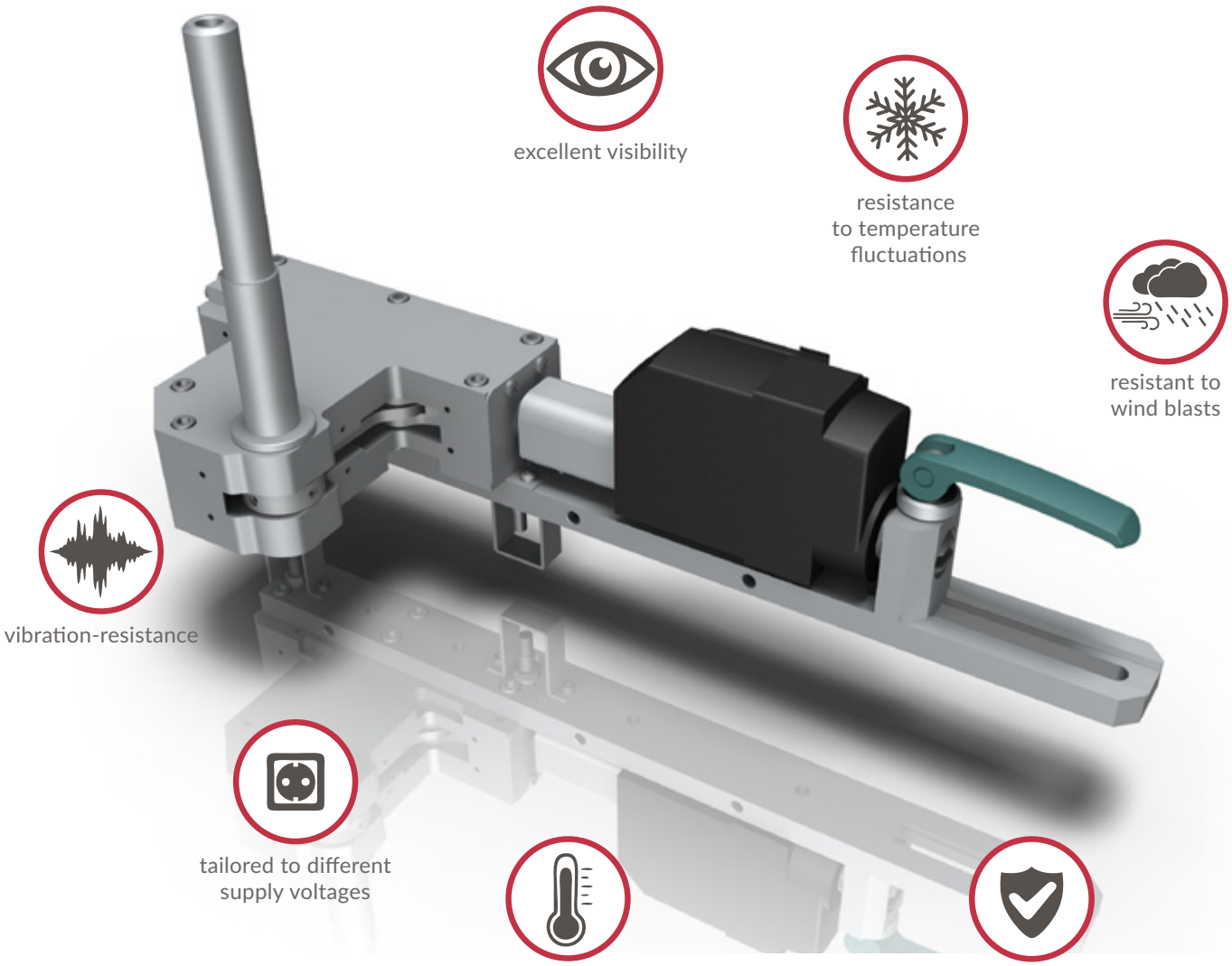
custom designs

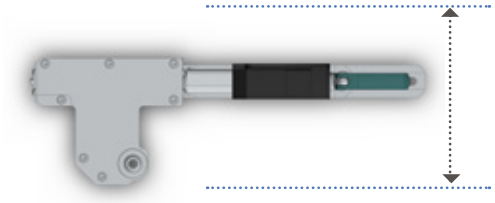
Developed from a design
by PESA Bydgoszcz SA
for DMU LINK trains

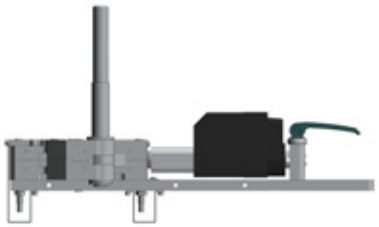
Mirror Series LUS02

The LUS02 series electric mirrors are characterised by a solid structure which guarantees high durability of this solution. The particularly quiet drive is compatible with most control systems in rail vehicles. The materials used to produce these mirrors provide high resistance to mechanical wear and weather conditions.

Mirror operating temperature range from -30 to +55°C





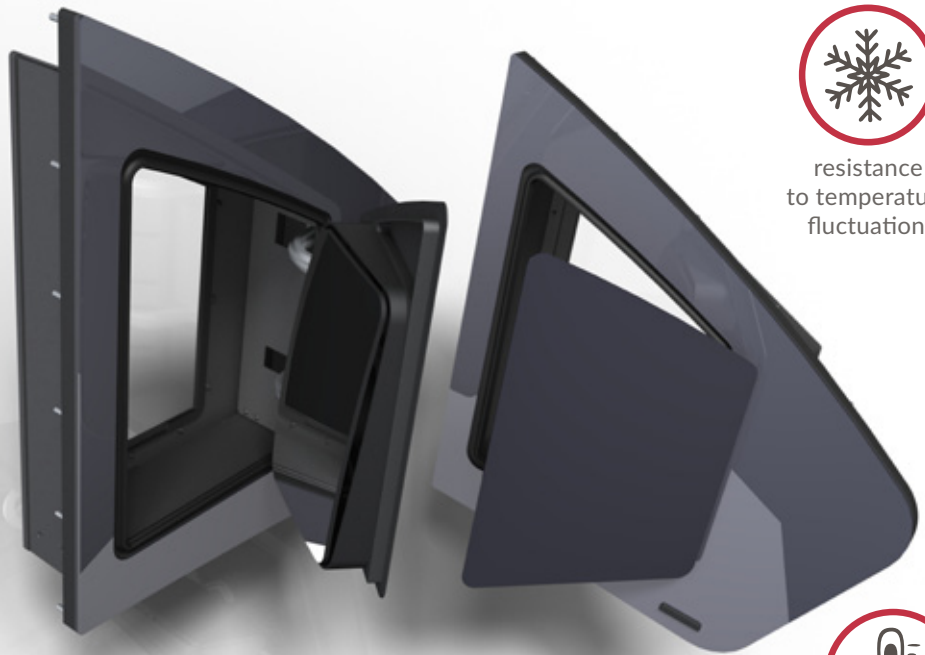


A characteristic feature of this product is the external axis of rotation of the mirror housing, thanks to which the mirror is not a part of the window assembly, but only a supplement, while the mirror housing mechanism is hidden under the vehicle's cover. On the outside there is only a casing with a mirror, which is completely enclosed in the vehicle extremity. The drive is equipped with an emergency mirror folding system to be used in the event of a situation preventing remote folding in automatic mode, allowing the vehicle to continue driving.

Mirror Series LUS013

The LUS013 series mirror with electric drive is dedicated as a traction unit or locomotive equipment. Its casing is entirely made of aluminium and mounted as a side window unit or part of it. The compact design integrates the mechanism into the casing, allowing for quick installation of the entire unit in the cabin.
A characteristic feature of this mirror is the mirror's mechanism of closing and opening, which is invisible from outside and works with high precision and low noise level. Owing to the internal axis of rotation of the mechanism, after the mirror is closed, the mirror's housing faces the vehicle's sheathing. The airtight housing is equipped with an internal heated window through which the driver can comfortably observe the sides of the vehicle, even during frost or precipitation.

Mirror operating temperature range from -30 to +60°C



resistance to temperature fluctuations

tailored to different supply voltages

heated

excellent visibility

vibration resistance

Mirror Series LUS017

The airtight housing of the LUS017 series airtight mirror is made of composites and equipped with a heated inner pane, which provides good visibility even in adverse weather conditions. LUS017 mirrors are designed to be mounted in place of the whole or part of the side window of the traction unit or locomotive cab.
The compact design allows the mirror opening/closing mechanism to be placed inside the housing, which greatly facilitates and accelerates installation in the cabin. Owing to the internal axis of rotation of the mechanism, after closing the mirror housing, the whole mirror faces the vehicle body. A mechanism driven by a pneumatic cylinder is a guarantee that the mirror opens and closes without any play and very quickly.
In order to prevent the mirror housing from breaking up at high speed, caused by vacuum, e.g. when a train enters a tunnel or passes another vehicle in case of lack of compressed air supply, the device is equipped with a clamping mechanism.

Mirror operating temperature range from -30 to +55°C

Mirror Series LUS013-01

The LUS013-01 series are mirrors with an integrated design that encloses both the pneumatic drive element and the mirror unit in one piece. The airtight housing of these devices is made of composites allowing to adjust the visible surfaces to the colour of the rest of the vehicle.
In order to ensure optimum visibility, both the window pane and the mirror are equipped with heating elements. A mechanism driven by a pneumatic actuator allows for an instant mirror opening/closing cycle. Constant contact between the mirror housing and the main housing is provided by a clamping system to prevent the mirror from being raised at high speed due to vacuum when the train enters the tunnel or passes another vehicle.
The single-shape mirror design makes it easy to install in place of all or part of the side window of the traction unit or locomotive cab.
LUS013-01 mirrors are characterized by extremely low weight and the possibility of full service access from inside the cabin.

Mirror operating temperature range from -30 to +55°C

vibration resistance

tailored to different supply voltages

heated

excellent visibility

resistance to temperature fluctuations

Mirror Series LUS015

The construction of pneumatic mirrors LUS015 series is a combination of solutions used in locomotives and trams. The body of the driving mechanism and most of its parts are made of aluminium alloys, which keeps its weight to a minimum. The emergency clutch used in this device allows the arm to move independently of the position of the mechanism, so it is possible to move the arm manually when needed. Mirrors of this series are also equipped with a pressure system which prevents the mirror from opening automatically in case of a lack of compressed air supply.

Mirror operating temperature range from -30 to +55°C

heated

resistance to temperature fluctuations

tailored to different supply voltages

vibration resistance

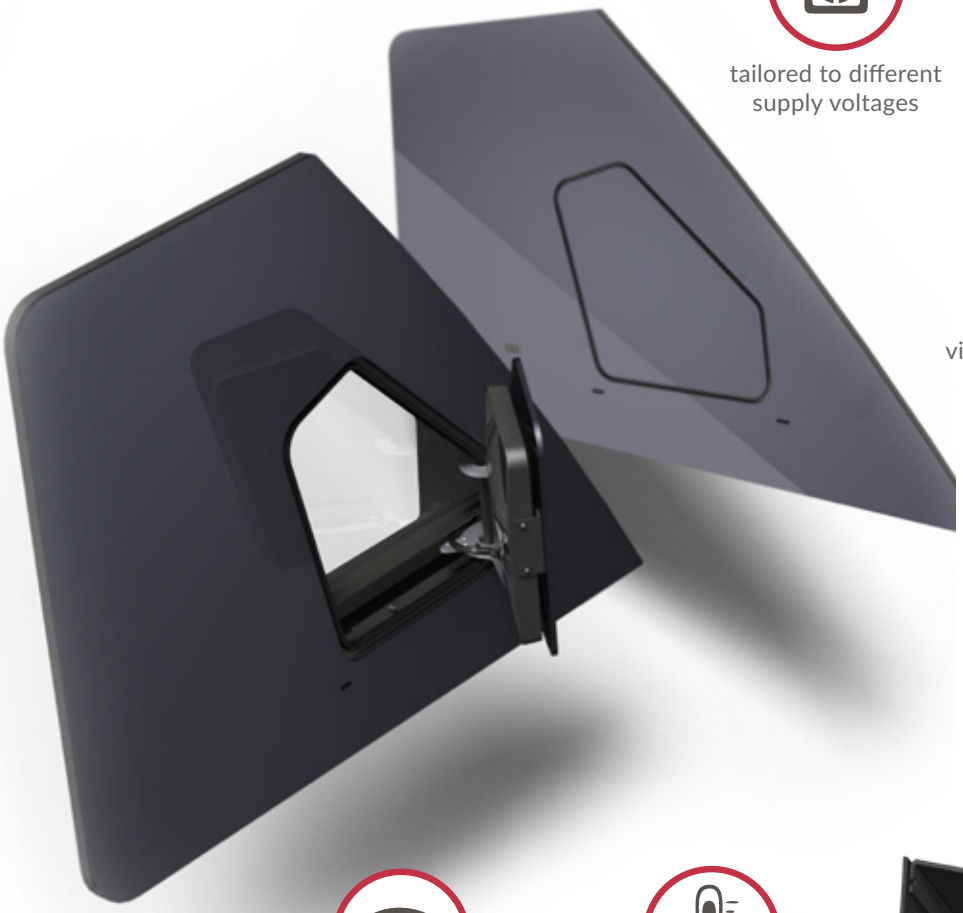
Mirror Series LUS032

LUS032 is another offered integrated rear-view mirror, which in the folded position faces the vehicle's sheathing. A characteristic feature of this model is the glass finish of the external surface which also serves as a window. The single-unit design of the device makes it measurably easier to mount the mirror in a vehicle. The remote-controlled position of the plane of the heated mirror allows an optimal field of view. The pneumatic mechanism used enables very fast opening and closing of the mirror flap. The use of a drive equipped with throttle valves enables simple adjustment of opening/closing speeds. The mirror has been equipped with a safety system that will fold the mirror itself in case of a power failure.

Mirror operating temperature range from -30 to +55°C

tailored to different supply voltages

vibration resistance



excellent visibility

heated

resistance to temperature fluctuations

THE TESTS OF OUR PRODUCTS CERTIFIED BY THE

RAILWAY INSTITUTE:

- Climatic tests;
- Strength and electrical efficiency tests;
- Electromagnetic compatibility tests.

INSTITUTE OF AVIATION

- Impact resistance tests;
- Vibration resistance tests.

In 2013, LARISA implemented an ISO 9001 Quality Management System.

ISO 9001
LL-C (Certification)

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