www.elhos.pl

INSTRUCTION MANUAL

MEASURING DEVICE FOR LIGHT PERMEABILITY IN VEHICLE WINDOWS

type EGM-1
„Elhos Glass Meter“

Manufacturer:
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This manual has been prepared with care, nevertheless we do not guarantee it is faultless. If you have any doubts or anything is unclear, please contact product manufacturer or the sole distributor.

Manufacturer reserves the right to make modifications of the device, that do not influence its metrological properties without prior notification.

Current software can be downloaded from www.elhos.pl

	software	V2.2	05.02.04
	hardware	V1.3	15.01.04
	instruction	V1.36	10.02.04

Contents

1. Introduction. General information

Thank you for purchasing EGM-1 *Elhos Glass Meter* - measuring device for light permeability in vehicle windows. Please read the instruction manual prior to the first activation of the device and follow the instructions it contains. Instruction manual shall always be kept in place that is easily accessible.
If you have any questions regarding operation of the device or if there are any irregularities in its operation, please contact product manufacturer or its sole distributor.

1.1. Intended use. Range of application

Elhos Glass Meter of EGM-1 type is a measuring device for light permeability in vehicle windows. It enables measurement of light permeability coefficient of glazed surfaces in a vehicle, both inside diagnostic station and in the open field, at night and during a day, even if the measured vehicle is placed within the reach of sun rays.

1.2. Definitions

Light transmittance coefficient – ratio of value of light stream passing through vehicle window to the value of the stream incident to the window

vehicle windows – windows mounted in automotive vehicles, tempered or laminated, made of mineral glass (inorganic) and also of plastics (organic); colourless, coloured or covered with darkening foil, also windows covered with refining coat, e.g. anti-dazzle.

Measuring device (meter) for light permeability – device for light permeability coefficient measurement in vehicle windows.

1.3. Proper usage. Safety of operation.

In order to ensure proper operation of the device the following points must be observed:

Device must be used in accordance with its intended use.

Device must be kept clean, and once measurement is finished it must be kept in its special case.

Device must be protected from wet environment and any liquids. It should only be cleaned with a soft, dry cloth.

Device should not be used or stored in dirty and dusty places.

Illuminator and measuring head units are not shock-resistant. You should not throw, drop or hit the device.

Device should not be placed near strong magnetic field.

Device should not be left near heating equipment and in places with hight sun exposure.

Device should not be kept in cold places. If the device heats during operation (to normal temperature), moisture accumulates inside, which can damage electronic units and lead to distortion of measurement results by condensed steam.

Device should not be opened. Once it has been opened, illuminator – measuring head unit must be calibrated again, and improper calibration may cause its further damage.

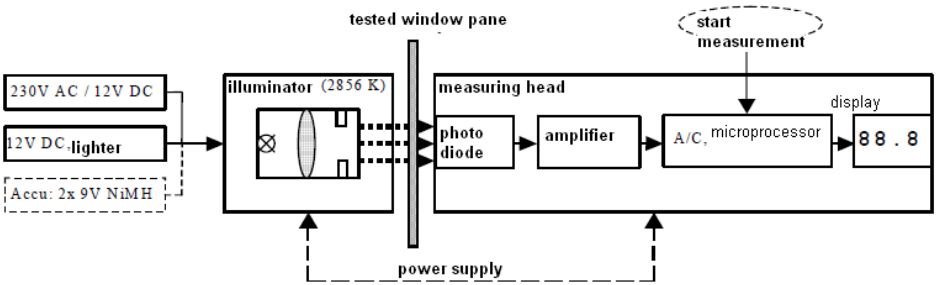
Guarantee does not cover damage resulting from non-observance of the forementioned instructions.

2. Technical characteristics

2.1. General information

Light permeability meter EGM-1 *Elhos Glass Meter* is a modern measuring device, made with the use of microprocessor technologies. It features several unique functions that improve comfort and precision of its usage. Prior to

measurement the device automatically checks the batteries (option), light bulb voltage and correct line connection, and any errors or faults are displayed on the monitor in the form of error codes. Upon finishing the measurement, the device automatically switches off, which substantially increases battery life. In order to improve stability of light emitting element power supply, a system of voltage change thermal compensation has been used. Measurement optics path makes use of the solution that reduces the influence of external light penetrating into the window on measurement result. Robust construction of the casing, completely digital calibration and lack of mechanical adjustment elements make the device shock-proof and suitable for use both at the Vehicle Control Stations and on the road, e.g. during control operations carried out by authorised road services.



Block diagram of the device

2.2. Equipment

The set includes:

- Illuminator
- Measuring head
- Spiral line connecting the iluminator with measuring head
- Power line from vehicle cigarette lighter socket
- Feeder 230V AC / 12V DC with supply line
- Battery set (additional equipment)
- Instruction manual, work-post instruction and warranty card
- Calibration foil (glass)

2.3. Construction

Both, iluminator and measuring head, are cylindrical. The iluminator is equipped with light source, optical system and power supply system with built-in voltage stabilisation system. The source of light is a special low-power halogen bulb with colour temperature of 2856K ± 50K, and parameters that enable stable working conditions. Light emitted by the bulb passes through optical system that is responsible for creation of parallel and uniform light beam. System voltage is 12V, supplied from the socket of vehicle cigarette lighter, power pack or built-in batteries. In order to improve stability of light emitting element power supply, a system of voltage change thermal compensation has been used.

Measuring head is made of radiation detector characteristics of which is similar to human eye sensitiveness V_λ for day vision and measuring system made by means of microprocessor technology. Measurement result readout is shown on display located at the base of measuring head cylinder. In the side wall of measuring head there is *MEASUREMENT* pushbutton which when pushed initiates each measurement.

Illuminator and measuring head are connected by means of a flexible, spiral line that can be disassembled in order to facilitate storage of the device or replacement of batteries. Plugs of this line must be plugged in sockets located in the iluminator and measuring head until you hear clicking sound. When disassembling the line you must push plastic element on the plug and take it out of the socket.

The device is as a standard powered from power pack 230V / 12V, or from vehicle cigarette lighter socket. Power lines must be connected (plugged in) to the socket placed in the back bottom of the iluminator.
Measuring elements are stored in a smart case.

2.4. Technical-operation data

Light source (iluminator):

Halogen bulb

Colour temperature 2856 [K] ± 50 [K]

Thermally compensated bulb supply voltage with accuracy of 0.1 [%]

Detector (measuring head):

Spectral-response characteristics corresponding to relative spectral response curve in CIE1931 standard for day vision.

Measuring path:

Measured value – light permeability coefficient

Measuring range: 0[%]÷100 [%] of measured value

Indication resolution: 0,1 [%]

Standard absolute error: ±2 [%]

Thickness of measured window: to 10 [mm]

Calibration: once a year and after each bulb replacement.

Power supply:

- Supply line from the socket of vehicle cigarette lighter
- Power pack 230V AC / 12V DC with connecting line
- Set of batteries (additional equipment)

Dimensions and weight:

Dimensions:

- Illuminator: ϕ 66 x 155 [mm]
- Measuring head: ϕ 66 x 135 [mm]

Weight of the device (measuring head and iluminator): 800 [g]

Working conditions:

Ambient temperature: +5 to +40 [°C]

Relative humidity: below 90 [%] with temp. + 30 [°C]

Atmospheric pressure: 860 to 1060 [hPa]

Operation :

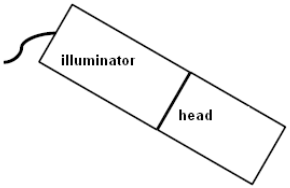
In most cases the devices enables individual operation. In some buses, when measuring windshield assistance of another person is necessary.

3. Measurement

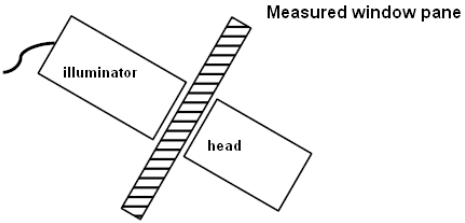
3.1. Conditions of proper measurement

- Measurement must be made on flat surface of the window.
- Measured window must be clean and dry.
- The device measuring head is equipped with photo-element and light source in the illuminator. These elements are placed coaxially. When carrying out measurement, the iluminator and measuring head must be placed in such a way that they remain coaxial.
- During measurement these elements cannot be moved or detached from tested pane.
- **Mutual location of the illuminator and measuring head shall be similar during calibration.**

1) Calibration



2) Measurement



- Meter is adapted for operation in lighting conditions of a vehicle control station.
- **ATTENTION**: In case of strong external light (spotlight, in the extreme situations strong sunlight) falling on the window pane, measurement is not made and display shows respective message! (bL3)
- Tested window pane shall be up to 10 [mm] thick.

3.2. Measurement procedure

In order to carry out measurement you must take the following steps:
Connect the device to the socket of vehicle cigarette lighter or power pack – for versions without batteries.
Choose the flattest area of the surface for measurement.
Clean the pane in the measurement spot from both sides (clean, dry cloth, window cleaning agents) and then dry it.

Switch on the device by pressing MEASUREMENT pushbutton *(*all elements of the display will light up for a moment, and then only one spot will remain lit). Now you have 30 seconds to start calibration.
Press the illuminator to measuring head and press MEASUREMENT pushbutton. Display shows „CAL”**(all the time, for ca. 7 seconds, keep the position of the system similar to measurement position).** Once calibration has been finished the display shows two spots for 30 seconds, and then the device enters stand-by mode, which is signalled by means of „Got” sign. The device is ready for measurement for about 1 minute.
When in stand-by mode, place the iluminator and measuring head on the opposite sides of the window pane, maintaining their coaxiality. Adjoin the iluminator to external, and measuring head to internal surface of the window.
Slightly push the elements to the pane and press MEASUREMENT pushbutton. Display shows „P”.
Without any change to the position of measuring elements wait ca. 7 seconds until the end of the measurement.– which is indicated by acoustic signal, and on the display you will see measurement result or message.
When the measurement is finished, its result remains on the display for ca. 1 minute, and then the device is automatically switched off. The result is given in percentage of window pane permeability.
ATTENTION Next measurement (e.g. of side window) requires repeating the whole measurement procedure, including calibration.
In most cases the devices enables individual operation. In some buses, when measuring windshield assistance of another person is necessary.

3.3. Result recording and printout

In the situation when the device is equipped with infrared communication port, there is a possibility of recording and wireless data transmission to the computer.
In order to record the result after finished measurement (when display shows measurement results), you must press MEASUREMENT pushbutton. Display will show two digits separated by horizontal line, the first of which, the flashing one, is the number of tested vehicle, and the other one is the type of tested window pane.
By quick keystrokes you must enter the number with which the tested vehicle will be saved, and then press and hold for 2 sec. MEASUREMENT pushbutton – then the right digit starts flashing, which means you must determine the type of tested window pane. Next, pushing MEASUREMENT pushbutton, you must select the type of tested window pane: 1 is for windshield, 2 – for left side and 3 for right side window.

Next time you press and hold MEASUREMENT pushbutton for 7 sec. , the device records measurement results, which is signalled by flashing of the horizontal line between digits.
In order to send recorded data to the computer, the device must be moved near infrared port of the computer with the distance not bigger than 1.5 m. You must activate respective application on the computer and establish communication with the device. Measurement data will be automatically entered in the table. There is an option archiving and editing of data from numerous measurements, and then printout of measurement report of the selected measurement series. Data of Vehicle Control Station and vehicle included in the report must be entered in the respective windows of the application prior to the printout.

3.4. Self-test

Before measurement the device carries out self-test. If it detects a failure that could substantially reduce measurement accuracy or make it impossible, measurement is not carried out and the display shows respective message (see – troubleshooting).

NOTE
When the device is moved from lower to higher temperature, you must wait for about 10 minutes before you start measurement procedure. It will prevent distortion of the results caused by condensed steam.

4. Evaluation of measurement results

After the measurement, its results should be compared with limit values for the respective kind of window pane. Light permeability coefficient shall not be smaller than:

- 75% for windshield
- 70% for front side window panes (left and right)

Legal ground for those values has been included in the ordinance of the minister of infrastructure from 31 December 2002 *concerning vehicle technical specification and the scope of their necessary equipment*, published in Gazette from 2003 No 32, item 262 (section III, chapter 1, § 8, p. 5.4).

If, after comparing obtained results with limit values for respective kind of window pane, measurement result of at least one pane is negative, final result for the vehicle shall be found negative.

5. Exemplary measurement report

Measurement report of light permeability of vehicle window panes shall include:

Fixed heading including:

- note: „Measurement report of light permeability of vehicle window panes”,
- data of the unit (station) carrying out measurement.

Variable heading including:

- date and time of measurement,
- vehicle identification data (registration number, kind, make, type/model and counter readout).

Table including the following positions for each tested window pane (i.e. windshield and front side panes)

- minimum permissible value of light permeability coefficient in [%],
- measured value,
- measurement result.

End-foot including:

- final measurement result,
- data of diagnostic technician

-

Record of light permeability measurement in vehicle windows

SKP-SGE04/1
Zakład usługowo-handlowy
Labusek Jan, Labusek Urszula
Pyskowice, ul. Powstańców Śląskich 15a
tel. 233 33 66

Date:	*28.01.2004*	Registration No:	
Time:	*13:34*	Kind of car:	
		Make:	*SG 98765*
		Type/ model:	*Audi A4 19.TDI*
		Odometer reading:	

Kind of window	Light permeability coefficient [%]		Measurement result *
	Min. permissible value	measured value	
windshield	75	*80,3*	positive / ~~*negative*~~
Front right window	70	*80,8*	positive / ~~*negative*~~
Front left window	70	*78,1*	positive / ~~*negative*~~

Final measurement result * positive / ~~*negative*~~

Notes: *none* .....

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Diagnostic technician: *Jan Kowalski* .....

* cross out if does not apply

6. Troubleshooting

PROBLEM	*CAUSE– SOLUTION*
Meter does not switch on	• Totally discharged batteries – recharge them. • No power supply – check for proper connections: meter – cigarette lighter line – cigarette lighter socket (turn the key in the ignition). • No power supply – check for proper connections: meter – power pack line – socket 230V AC.
Display shows bL1	Too low supply for electronic part – recharge the batteries.
Display shows bL2	• Incorrect light bulb supply – recharge the batteries. • Line for activation of iluminator is broken – check it and its connection to the socket.
Display shows bL3	Measurement cannot be made due to excessive light beam coming from the background – carry out measurement in a place with sun exposure or do away with external spotlight onto the window pane.
Display shows bL4	Numerical calculation error – repeat measurement. If such error appears again, contact service station.
Display shows bL5	Measuring system out of calibration – have the device serviced in order to get it calibrated.
Display shows bL6	Calibration error • Repeat calibration according to instruction • Check if light bulb in the illuminator lights up.
Display shows bL7	Measurement error. • Repeat calibration according to the instruction and repat measurement (check illuminator and measuring head for cleanliness). If such error appears again, contact service station.
Meter indicates 0% irrespective of the kind of window pane	Light bulb damaged – send the device for servicing.

Measurement is extremely faulty	• **Measurement was carried out in a position (illuminator – measuring head system) different to calibration – see fig. in p. 3.1.** • Dirty iluminator or measuring head – clean emission field (protecting panes). • Too big external illumination – carry out the measurement in a shade. • Lack of concentricity – place the meter concentric to the iluminator. • Measured window is too thick • Meter is out of calibration – contact service centre in order to have the device calibrated

If you encounter any problems that have not been described in the table above, please contact the device manufacturer – ELHOS company, or its sole distributor – WSOP Sp. z o.o.

7. Maintenance

The device has been designed and constructed in such a way that when observing instructions from this manual it does not need any special maintenance. Its maintenance is limited to taking care it is properly clean (it especially pertains to protecting panes through which light beam passes) and periodic check of correct indications.

Checking correct indications:

In order to check whether meter indications are correct, you must measure permeability of calibration foil (glass) included in the set. Measurement procedure is described in p.3. If meter indication differs by over ±2 from the value of test foil permeability, the device must be sent to service station in order to have it calibrated.

Installation and replacement of batteries

Flat batteries are indicated by displayed „bL1" or „bL2". You must always remember to replace set of batteries at the same time and remove them from the device when it is put out of operation for longer periods of time. It will help to prevent electrolyte leakage and damage to the meter.

Used batteries must be obligatorily left at the recycling centre or disposed of in accordance with regulations in force. They cannot be left in litter bins nor can they be thrown into fire!

Periodic service inspection

Apart from the mentioned above steps, in order to ensure correct operation of the device, periodic operating inspection is required, which can be carried out only by a qualified service technician. This inspection should be carried out every 6 months and it constitutes a condition of warranty validity.

8. Warranty and service

The product goes with manufacturer warranty for the purchaser, as a part of general commercial terms, and the manufacturer commits to repair or replace every faulty element during warranty period if the device is sent to its distributor.

When warranty claim for the product is made, the user shall enclose completely filled in warranty card and warranty notification together with original signed receipt including date of purchase and serial number of the meter. Warranty claim can be accepted only if the device was used in accordance with instruction manual and the user maintained it at regular intervals.

Detailed warranty terms and conditions are specified in warranty card supplied with every device.

Service

In case of any repair works, the users should address the sole distributor of the device in Poland, i.e.
W.S.O.P. Sp. z o.o.
44-100 Gliwice, ul. Pszczyńska 306
tel./fax. +48 32 232 18 10
tel. +48 32 332 49 30 ; fax +48 32 332 48 48

9. Measurement record (sample to be used)

Record of light permeability measurement in vehicle windows

SKP data:

Date:

Time:

Registration No:

Kind of vehicle:

Make:

Typ/e model:

odometer reading:

Kind of window	Light permeability coefficient [%]		Measurement result*
	Min. permissible value	Measured value	
windshield	75		positive / negative
Front right window	70		positive / negative
Front left window	70		positive / negative

Final measurement result * positive / negative

Notes: .....

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Diagnostic technician: .....

* cross out if does not apply