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INSTRUCTION MANUAL

EGM-1L Elhos Glass Meter
EGM-3 Elhos Glass Meter

Measuring device for light permeability in vehicle windows

Pilchowice 04.05.2022

Manufacturer:
ELHOS
Firma Projektowo - Usługowo – Handlowa
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44-145 Pilchowice
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1. Introduction

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 devices sold by ELHOS, please contact the manufacturer of the product or its seller.

The manufacturer reserves the right to make changes to the device that do not affect the metrological properties without prior notice.

1.1. Safety of operation

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

- Device may only be operated by trained personnel;
- 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 should be protected against moisture, sunlight, liquids of any kind;
- Do not leave the device near heating devices;
- It should only be cleaned with a soft, dry cloth;
- Device should not be placed near strong magnetic field;
- Device should not be used or stored in dirty and dusty places.;
- Illuminator and detector units are not shock-resistant. You should not throw, drop or hit the device;
- Protect the device from falling;
- 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 – detector 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.

1.2. Intended use

Elhos Glass Meter typ EGM-3, EGM-1L 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.

1.3 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.

2. Technical characteristics

2.1. General information

Light permeability meter **EGM-3, EGM-1L 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 authorized road services.

EGM-1L is a device created as a result of modernization of an older version of the device **EGM-1.**

2.2. Equipment

The set includes:

- Illuminator
- Detector
- Spiral line connecting the illuminator with detector
- Power line from vehicle cigarette lighter socket
- Power pack 230V AC / 12V DC with supply line
- Battery set (additional equipment)
- Instruction manual, work-post instruction and warranty card

2.3. Construction

Both, illuminator and detector, are cylindrical. The illuminator is equipped with light source, optical system and power supply system with built-in voltage stabilization system. The light source is a LED diode with a color temperature of 2856K ± 50K and parameters ensuring stable working conditions. Light emitted by the LED diode passes through optical system that is responsible for creation of parallel and homogeneous beam of light. 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. Detector 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.

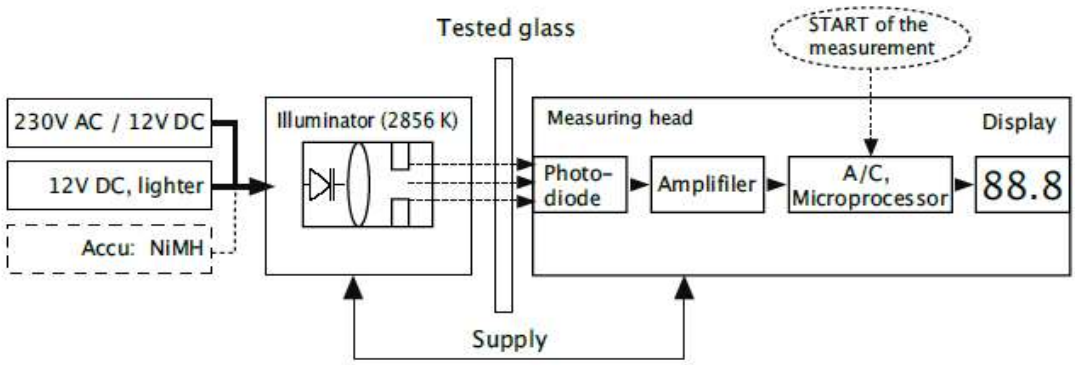


Fig. 1 Block diagram of the device

Measurement result readout is shown on display located at the base of detector cylinder. In the side wall of detector there is "***MEASUREMENT***" pushbutton which when pushed initiates each measurement. Illuminator and detector 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 illuminator 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 illuminator. Measuring elements are stored in an elegant case.

2.4. Technical – operation data

Light source (iluminator)

Led	
Colour temperature	2856 [K] ± 50 [K]

Detektor (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

In the whole measuring range for quasi-colourless glass	±2 [%]
In the whole measuring range for glass in four basic colors	±5 [%]

Thickness of measured window	do 10 [mm]

Calibration: once a year and after each light source 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

Illuminator	ϕ 66 x 140 [mm]
Detector	ϕ 66 x 116 [mm]
Weight of the device (detector and illuminator)	720 [g]

Working conditions

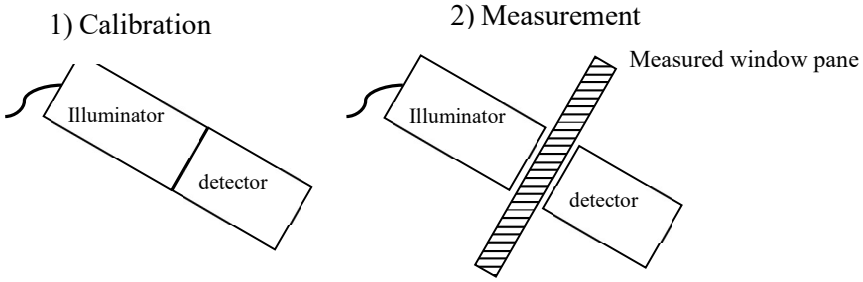
Ambient temperature	+5 to +40 [°C]
Relative humidity	below 90 [%] with temp. + 30 [°C]
Atmospheric pressure	860 to 1060 [hPa]

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 detector is equipped with photo-element and light source in the illuminator. These elements are placed coaxially. When carrying out measurement, the illuminator 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.**



Rys. 2

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. 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).

ATTENTION: 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.

3.3. 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).
- Press the illuminator to measuring head and press **"MEASUREMENT"** pushbutton. Display shows **"CAL" (all the time, for ca. 2 seconds, keep the position of the system similar to measurement position).** After the calibration is completed, the device will enter the measurement readiness state, signalled by the inscription "Got". The device maintains measurement readiness for ca. 2 minutes.
- When in stand-by mode, place the illuminator and measuring head on the opposite sides of the window pane, maintaining their coaxiality. Adjoin the iluminator to external, and detector 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. 1 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 **" % "** of window pane permeability.
- After the measurement is completed, you can:
  - go to a new measurement by pressing the **"MEASUREMENT"** button (without saving measurement results)

  or

  - save the measurement results by holding down the **"MEASUREMENT"** button for about 5 seconds. see point **3.4 Saving the results.**

ATTENTION: Each shutdown of the instrument requires a calibration procedure. In most cases the devices enables individual operation. In some buses, when measuring windshield assistance of another person is necessary.

3.4. Save the results

The EGM-3 device can be connected to a computer via a WiFi module, as a result of which it is possible to save and wirelessly transfer data to a computer and perform full archiving of measurement results.

- In order to save the result, after the test (while the result is displayed on the display), you must press and hold **"MEASUREMENT"** pushbutton for about 5 seconds. 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 signaled by flashing of the horizontal line between digits.

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:

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

The legal regulation of these values is contained in the Journal of Laws item 2022 of October 27, 2016 on the technical conditions of vehicles and the scope of their necessary equipment, as amended. If, as a result of comparing the results obtained with the limit values for a given type of glass, the measurement result of at least one of the glass panes is negative, the final result of the measurement of a given vehicle should be considered negative

5. Exemplary measurement report (manual entry)

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

1. Fixed heading including:
   - note: „Measurement report of light permeability of vehicle window panes",
   - data of the unit (station) carrying out measurement.
2. Variable heading including:
   - date and time of measurement,
   - vehicle identification data (registration number, kind, make, type/model and mileage).
3. 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.
4. End-foot including:
   - final measurement result,
   - comments entered by the inspector,
   - data of inspector

Record of light permeability measurement in vehicle windows

SKP-SGE004/5
ELHOS s.c.
Firma Projektowo - Usługowo - Handlowa
44-145 Pilchowice, ul. Stanicka 9

Date:	*28.01.2021*	Registration No:	*SG 1234*
Time:	*13:34*	Kind of car:	*Samochód osobowy*
		Make:	*Ford*
		Type/ model:	*Mondeo*
		Mileage:	*123456*

Kind of window	**Light permeability coefficient [%]**		**Measurement result ***
	Min. permissible value	**Measured value**	
Windshield	70	*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 .....

.....

Inspector: *Jan Kowalski* .....

* cross out if does not apply

6. Software installation on the PC for wireless WiFi communication with the device.

Download the compressed ElhosDevMenager.zip file from the website **https://www.elhos.pl/oferta/elhos-glass-meter**, and then run the **"Setup.exe"** file located in the **"ElhosDevMenager"** directory.

Connection with the EGM-3 device in order to read/print saved measurement results can be made in two ways:

- The first one consists in direct connection of the computer (laptop) to the WiFi network created by the EGM-3 device. The name of this network is as follows: **"ELHOS_EGM3_xxyyzz"**, where "xxyyzz" are the last digits of the AccessPoint's MAC address created by EGM-3. Thanks to this, each EGM-3 device creates a unique WiFi network (AccessPoint). No password is required as the network is open. The EGM-3 device always has the address 192.168.4.1 in the network it creates.
  After connecting your computer to this network and launching the software, select the **"Direct connection"** option. After pressing the "**Search for devices**" button, the EGM-3 device should be detected and appear on the list of devices as shown in the screen in Fig. 3.

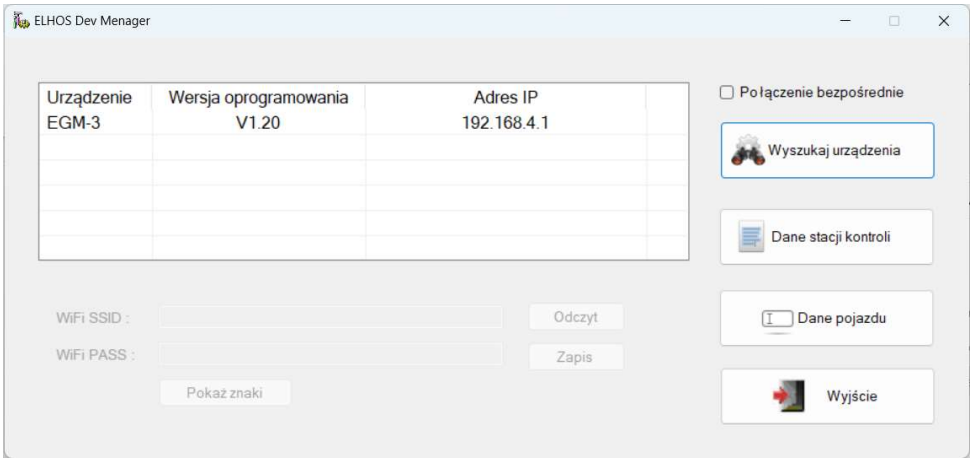


Fig. 3

- The second way is to connect the EGM-3 device and the computer to the local network. The computer can then be connected by wire, while the EGM-3 device can be connected via an access point of the local network. In order to establish this connection, set the name of the WiFi network (WiFi SSID) and password (WiFi PASS) to which you want to connect in the EGM-3 device. The local network should dynamically assign IP addresses, i.e. have a DHCP server. After configuring the network and unchecking the **"Direct connection"** option, pressing the "Search for devices" button, the device should be detected and appear on the list of devices as shown in the screen in Fig.4.

ATTENTION: Before the first connection to the local network, it can be done only by **"Direct Connection"** with the device (see description above). After connecting to the device using the first or second method and selecting the device as shown on the screen in Fig. 4, we can proceed to modify (read or write) the parameters of the local WiFi network to which the EGM-3 device is to be connected.

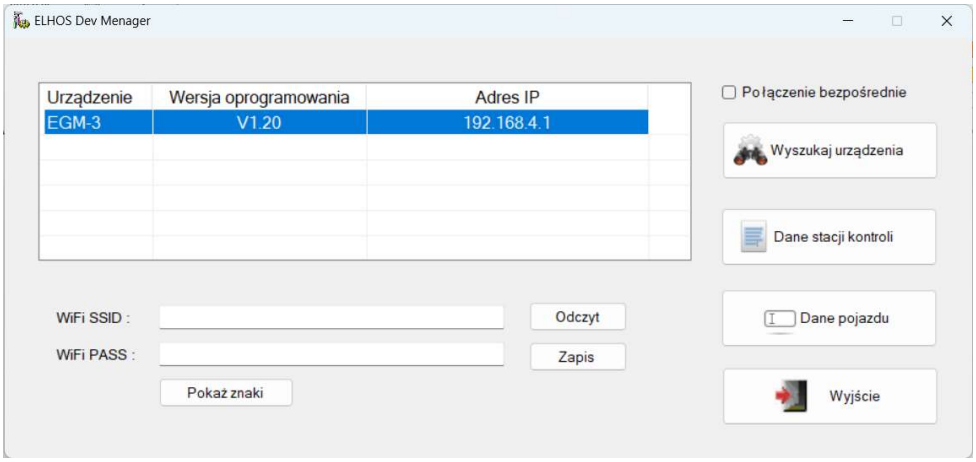


Fig. 4

7. Application support on a PC

The software enables archiving, editing data from many measurements and printing a protocol from a selected series of measurements. In order to transfer the saved data to the computer, connect the device with the computer via the WiFi module, and run the application on the computer and establish communication with the device. The data of the Vehicle Inspection Station and the car contained in the report should be entered in the appropriate application windows before printing.

In the main window of the program you can select and enter:

a) Data of the control station
b) Vehicle data

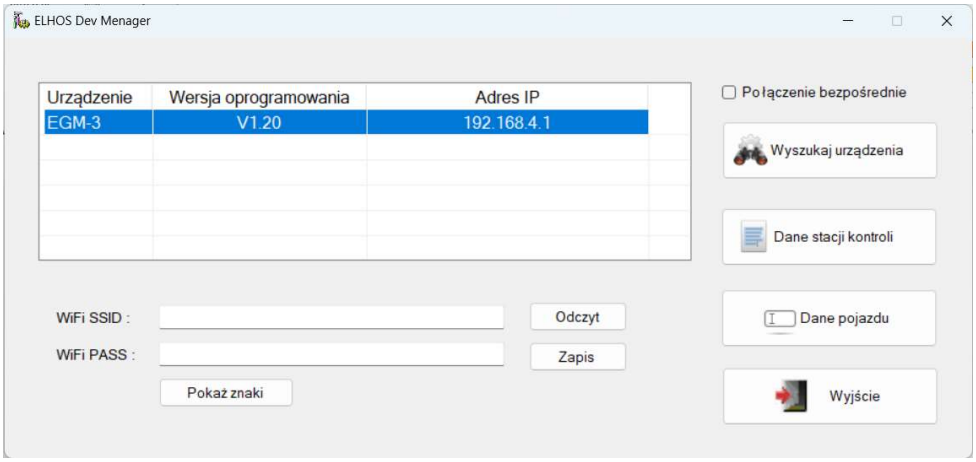


Fig. 5

a. Data of the control station

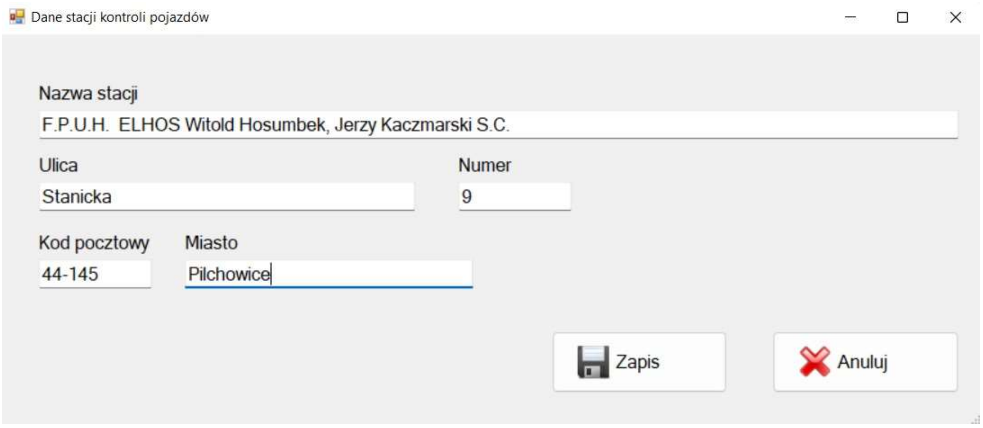


Fig. 6

b. Vehicle data

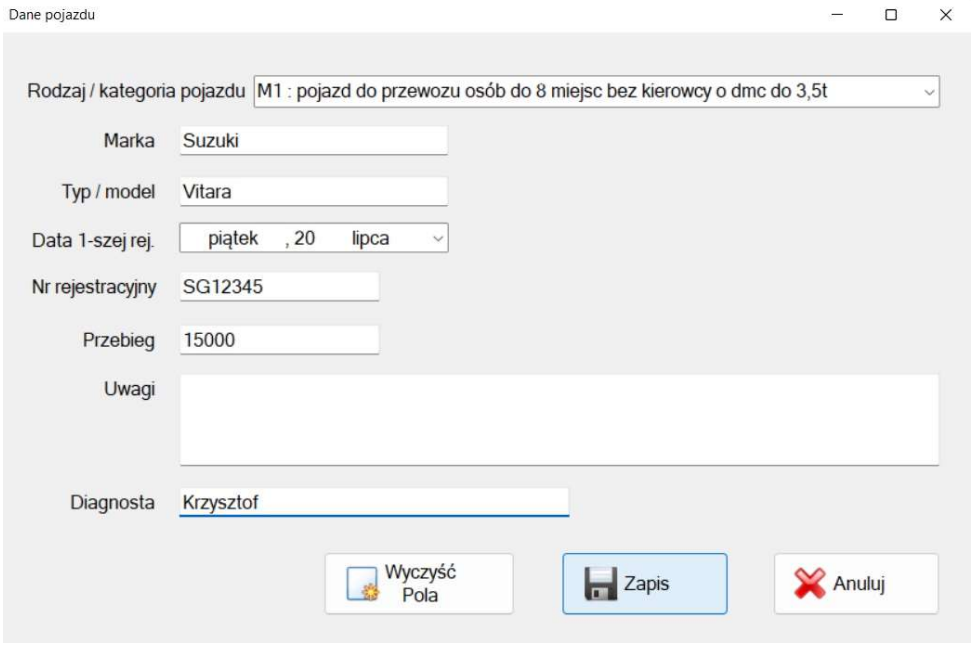
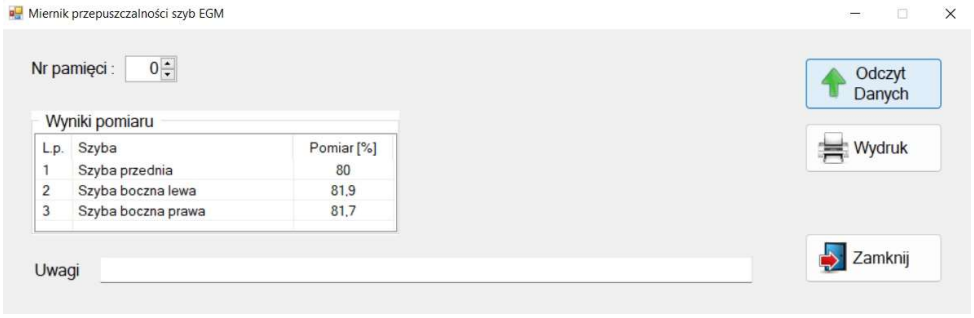


Fig. 7

Double clicking on the device in the device window Fig. 4 causes the application to go to the window where it is possible to read and print the measurement results stored in the device. The application allows you to read 10 memory, numbered from 0 to 9, where each memory contains a measurement of max. 3 windows By pressing the up/down arrows next to the memory number, the saved measurement number in the device that we want to read/print changes. In order to read the measurement results, press the **"Data Reading"** button, where the table with the measurement results is automatically filled in Fig. 8. In order to print the measurement report, press the button **"Printout"**.



Rys. 8

Sample printout:

F.P.U.H ELHOS Miernik przepuszczalności szyb EGM
15.09.2021 11:32:14

DANE SKP/WARSZTATU

Nazwa : **F.P.U.H. ELHOS Witold Hosumbek, Jerzy Kaczmarski S.C.**
Adres : **ul. Stanicka 9**
44-145 Pilchowice

DANE POJAZDU

Typ : **M1: pojazd do przewozu osób do 8 miejsc bez kierowcy o dmc do 3,5t**
Marka : **Suzuki**
Model : **Vitara**
Data 1-szej rejestracji : **20.07.2018**
Rejestracja : **SG12345**
Przebieg : **15000 km**

WYNIKI POMIARÓW

L.p.	Szyba	Pomiar [%]
1	Szyba przednia	**80**
2	Szyba boczna lewa	**81,9**
3	Szyba boczna prawa	**81,7**

Uwagi :

Diagnosta : **Krzysztof**

8. Troubleshooting

PROBLEM	CAUSE– SOLUTION
Device 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 led supply – recharge the batteries. • Line for activation of illuminator 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 LED 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	LED 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 detector – 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 • Device 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.

9. 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.

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.

10. 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..

11. Measurement record (sample to be used)

Record of light permeability measurement in vehicle windows			
SKP data:			
Date: Time:		Registration No: Kind of vehicle: Make: Type/ model: Mileage:	
Kind of window	**Light permeability coefficient [%]**		**Measurement result ***
	Min. permissible value	**Measured value**	
windshield	70		positive / negative
Front right window	70		positive / negative
Front left window	70		positive / negative
Final measurement result *			positive / negative
Notes:			
.....			
Inspector:			
* cross out if does not apply			