

TKA SCIENTIFIC INSTRUMENTS



**UV-Radiometer
-UV**

Operation Manual

**St. Petersburg
2008**

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Introduction

This operation manual is designed for familiarization with the basic operation of the device, particulars of its design, storage rules, and operational procedure.

Intended purpose and application

The device **UV-Radiometer “ – UV»** (hereinafter referred to as the device) is designed for measuring irradiance (in mW/m^2) created:

in the spectral range **UV** - (315 ... 400) nm by UV sources,

in the spectral range **UV** - (280 ... 315) nm by UV sources,

in the spectral range **UV** - (220 ... 280) nm by UV sources.

The sphere of application of the device: sanitary and technical surveillance in residential and industrial rooms, certification of workplaces, and other spheres of activity.

Basic technical characteristics

Irradiance measurement

• Measurement range, mW/m^2	1 ... 60 000
• Limit of the permitted basic relative error of irradiance measurements, %	±10,0
Continuous operation from battery, hours (not below)	2,0
from the mains, hours (not below)	8,0
Overall dimensions, mm (not over):	
— photometer head	185 70 55
— laptop ASUS Eee PC 701 (closed)	225x165x35

Wight, kg (not above) with power module

2.0

Operation parameters

Ambient temperature, °C :	
– normal operation conditions	20±5
– operation temperature range	0...40
Relative air humidity at ambient temperature 25° , %, not above	95
Atmospheric pressure, kPa	80...110
Mean time between failures with confidence probability $\lambda = 0.8$, h, not below	2000



It is prohibited to measure high irradiance over a long time!

It is recommended to use a heat-resistance lens cover supplied with the device.

Installation and maintenance

UV-Radiometer of the -UV model is a grating-based polychromator with registration of decomposed radiation by a microprocessor-controlled linear photodiode array, sending digital data to a laptop computer compatible with OS Windows® PC — ASUS® Eee PC 701, where the signal is digitally processed with subsequent displaying of data on the irradiation levels.

Eee PC 701 is a 7-inch laptop which is a classic notebook, with a lockless cover. The laptop has no hard disk, its function is performed by a 4 Gb flash memory. The laptop is supplied with a compact power unit resembling more a charger for a mobile phone than the one for a laptop.

Important! It is recommended before the beginning of operation to familiarize yourself with the Brief operation manual of the laptop ASUS Eee PC 701.





The scope of supply includes separate calibrating servicing programs (utilities) for operation system Windows. All you require is start the calibrating utility **GradUV.exe**, enter reference values into the specified fields. In the operation mode start the utility **VDUV.exe**, the main window of which contains the signal spectrum and energy characteristics.

The contents of the scope of supply

The scope of supply (package) of your system -UV should contain all elements listed and illustrated below. When any element is missing, contact an employee of TKA SCIENTIFIC INSTRUMENTS.

- Photometer head
- Laptop ASUS Eee PC 701 with power unit
- Cable USB2.0, connecting **USB A-B**
- Documentation and registration materials

Installation of the device

To capture (register) a digital signal with the photometer head, it must be connected directly to one of the serial ports of the laptop.

To install the device:

1. Remove the device from the package and unfold the cable ends.
2. Connect the main connecting plug (1) to the serial port on the side wall of the laptop.
3. Connect the second plug (2) to the photometer head.
4. Connect the battery or power unit to the laptop.
5. Switch up the laptop.



Maintenance of the device

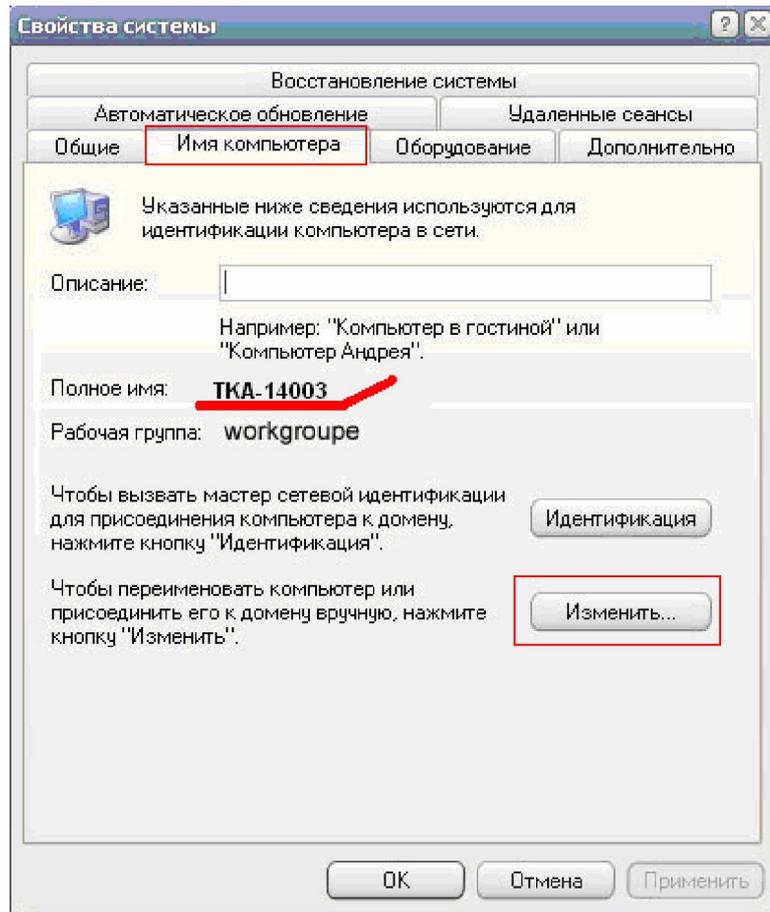
The following maintenance procedure will insure the reliable operation of your device.

Checking the serial numbers

The first thing to do after the unpacking of your system is get assured that the five digits of the factory number on the photometer head match the last five digits in the full name of the computer. For instance, for the device's factory number **14003** the computer's name must be **TKA-14003**.

Note: To learn the name of the computer at which you are working, you should perform the following:

1. At the icon **My computer** press the right button of the mouse and select the menu item Features.
2. In the opened window of the features select the **Computer name**, and in the field **Full name** you will see your computer's name.



Your photometer head must be calibrated exceptionally with the help of the laptop attached to it. If the number of the photometer head and the name of the computer does not match, immediately return the device to R&DC for complete exchange or apply for technical support to make good the incompatibility.

Cleaning the device

If the device is not in use, store it in a dry and clean place. Clean the device once a week or when necessary:

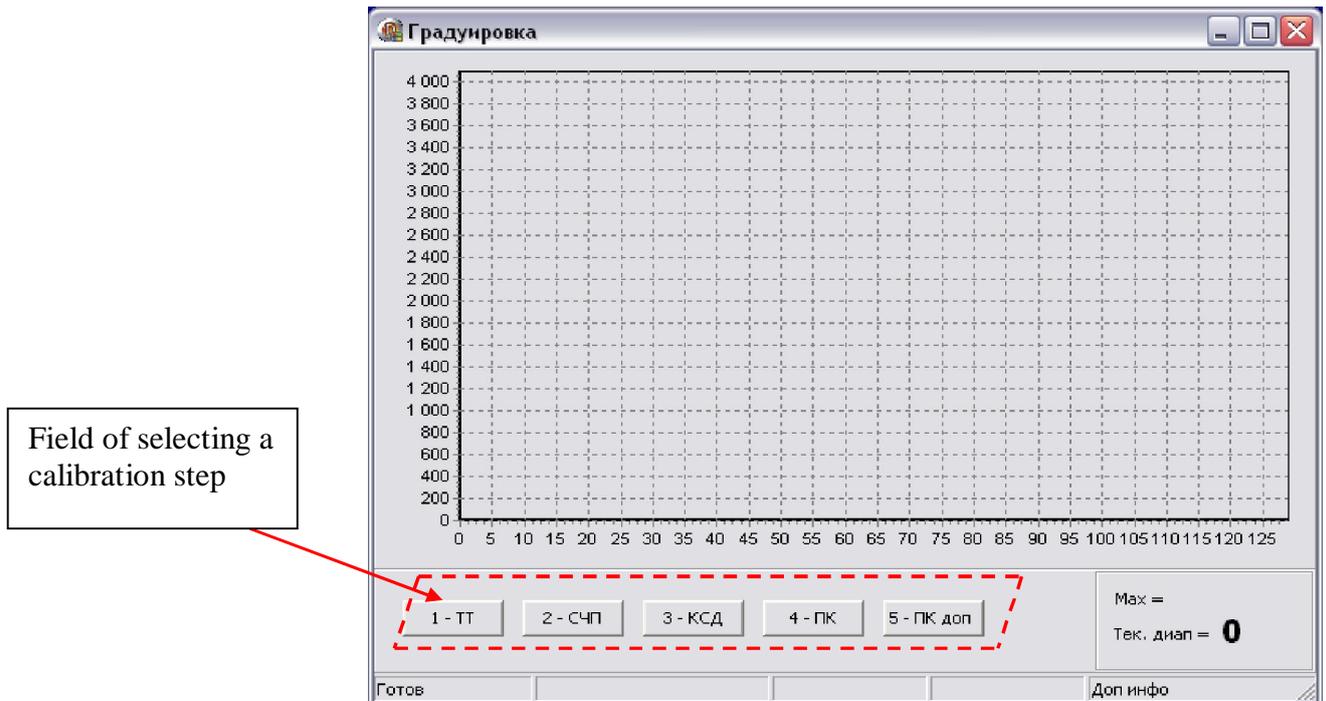
- Carefully wipe with a cloth (without lint) the eye on the photometer head.

Do not use any solvents or cleansers.

- Safe storage insures proper maintenance of the optical part of the device.

Do not let splashes of cleansers or a jet of compressed air to contact the optical part.

Calibration of the device



Buttons to select a calibration step:

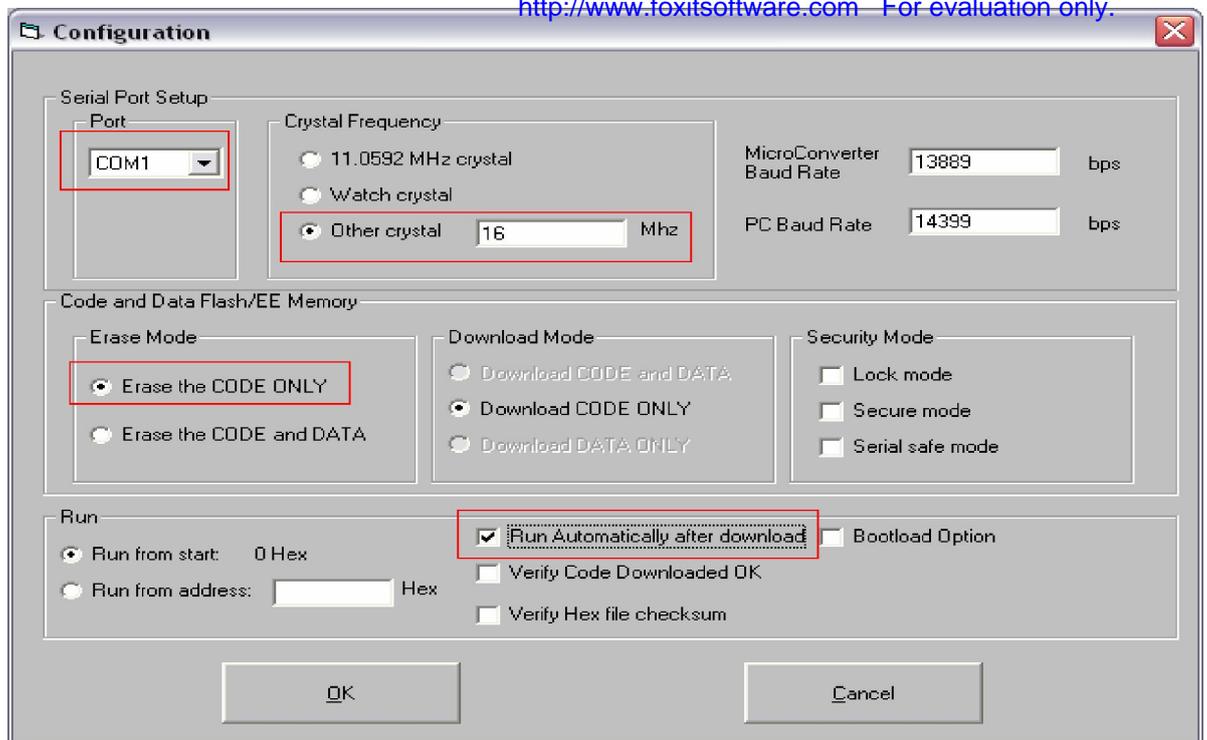
- «1 – - Step 1. Removal of dark current
- «2 - - Step 2. Determining the spectral sensitivity of the device
- «3 - - Step 3. Determining the range lacing ratios
- «4 – - Step 4. Calculating the total irradiance ratio
- «5 – addit - Step 5. Additional adjustment by zones

The buttons are not available, if the device is not switched up or not found through any reason.

Program operation.

Important! For the calibration, it is necessary to braid into the device a program of manual switching of ranges (with the help of **WSD**-application file **grad.hex**).

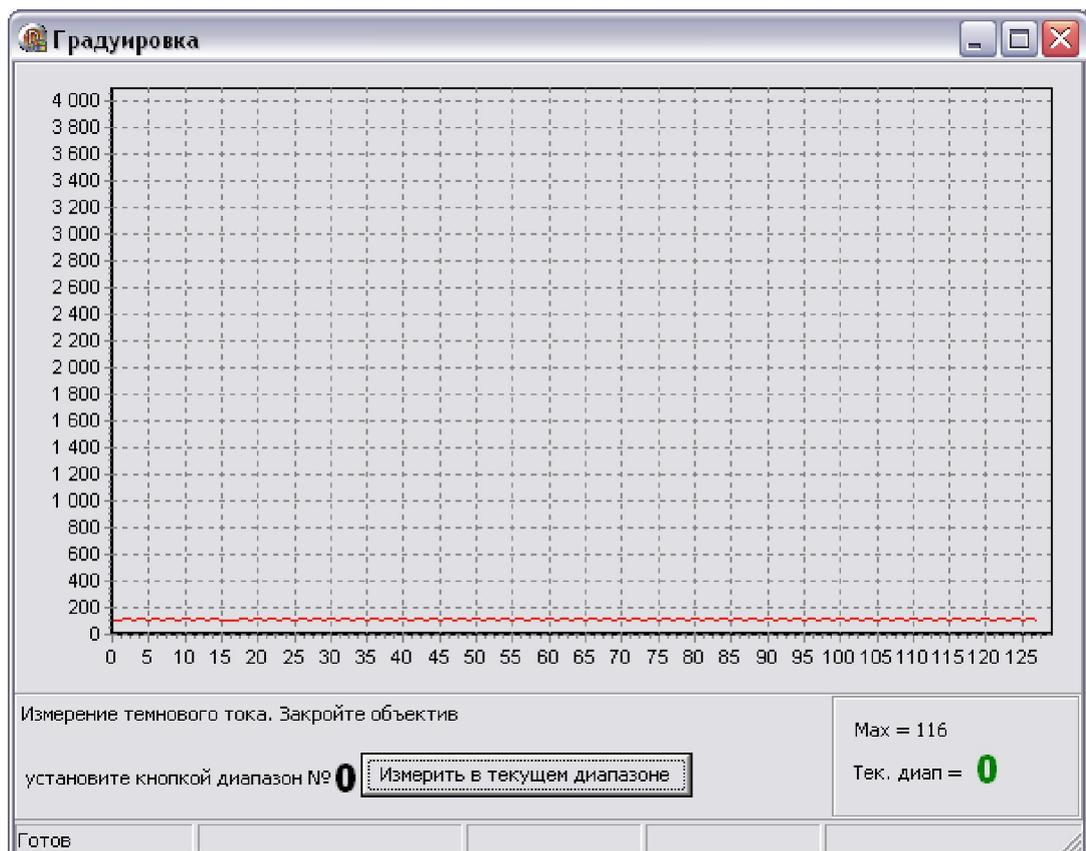
Configuration of WSD-application:



The device should be calibrated in the specified order. The program does not control the operator's actions on the selection of the step, therefore when the order is infringed, failures in operation are possible.

The selection of the calibration step is effected through pressing the respective button.

Dark current measurement



When fulfilling the requirements of the program, it is necessary to close the lens of the device and install with the range selection button (the button on the photometer head increases the value successively) with the recommended program (**a black digit**).

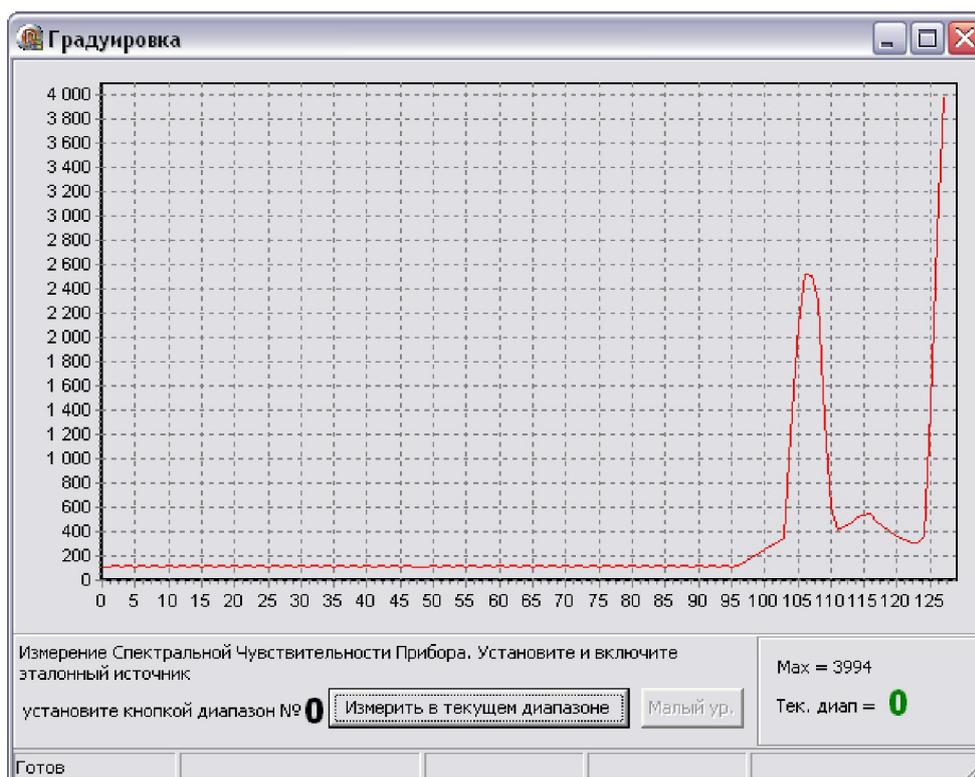
On the panel on the right the current measurement range is displayed (**a green digit**) and the highest value. If the current range does not match the required one, then the digit of the current range will be displayed **in the red color** and the button of starting the measurement in the current window of the program will be unavailable. Specifying the required range with the button on the photometer head, start the measurement by pressing the button **Measure in current range** in the current window of the program.

When the measurement is completed, the program will offer to make a measurement on the next range.

There are 9 ranges altogether, the integral action time is from 4 seconds (range 0) to 16 msec (range 8).

When the measurement is completed in all ranges the program will preserve the matrix of dark currents and return to the selection of a calibration step.

Determining spectral sensitivity of the device



Place the photometer head in parallel to the plane of the item which is being measured. See to it that the shadow of the operator who conducts the measurement does not cast itself onto the photohead window, as well as the shadow of any irrelevant objects that are temporarily present.

To operate on this step, install the photohead on the photometer bench and switch up the reference source DNK-90.

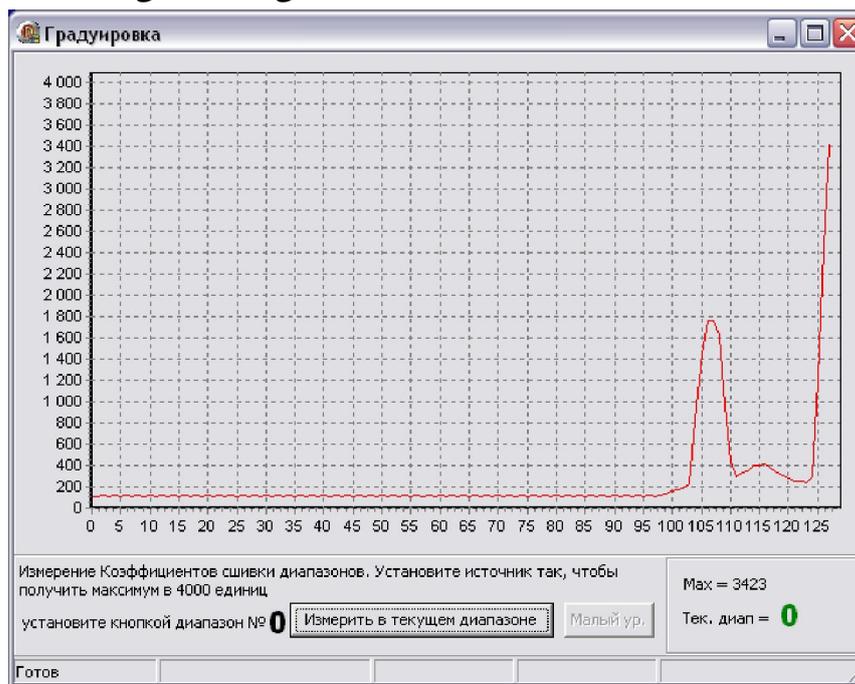
The basic operation is the same as in step 1.

Measurement in each range should be conducted with the steady-state value of the maximum close to **4,000** units.

Do not allow overfilling (4095)!

If it is impossible to reach the normal level of the spectral sensitivity on the last ranges, the button **Low Level** should be pressed in the current window of the program; the remaining ranges will be filled with the values of the last one which was successfully measured.

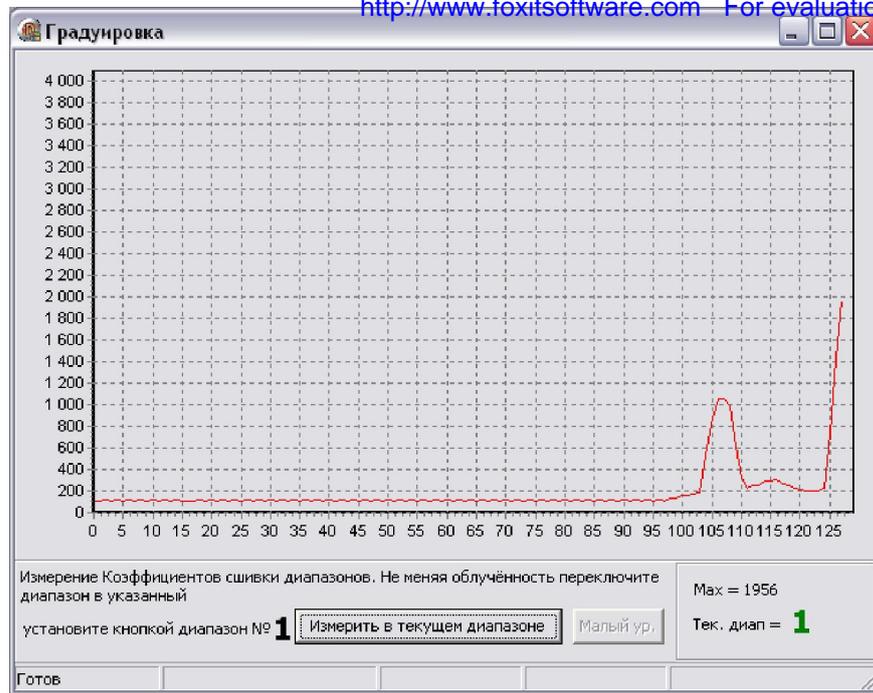
Determining the range lacing ratios



The ratios are calculated following the same scheme as in steps 1 and 2.

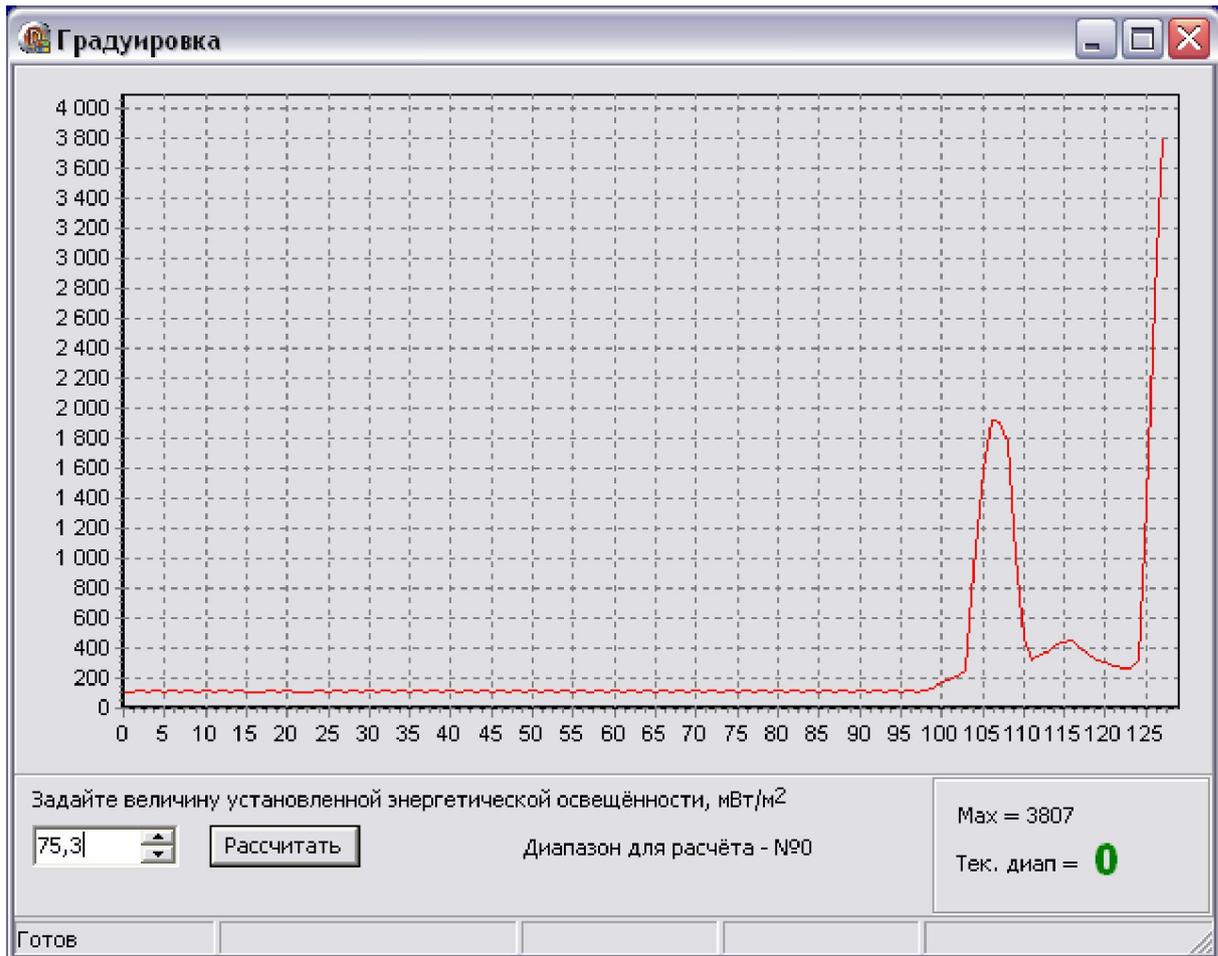
Place the photometer head in parallel to the plane of the item which is being measured. See to it that the shadow of the operator who conducts the measurement does not cast itself onto the photohead window, as well as the shadow of any irrelevant objects that are temporarily present.

To begin the measurements, place the photohead on the bench so that the maximum signal **3,800 ... 4,000** units might be obtained. After the measurement in the selected range, not changing the position of the photohead, increase with the button on the head the range to the next one and repeat the measurement.



The quotient of the measured signals for each will be preserved. Then it is necessary to reach again the maximum level of the signal **3,800 ... 4,000** units, shifting the photohead on the bench, and to make two measurements on adjoining ranges. In case it is impossible to increase the signal to the acceptable value, press the button **Low Level**, and the remaining ratios will be calculated on the basis of the available measurements which were successfully made.

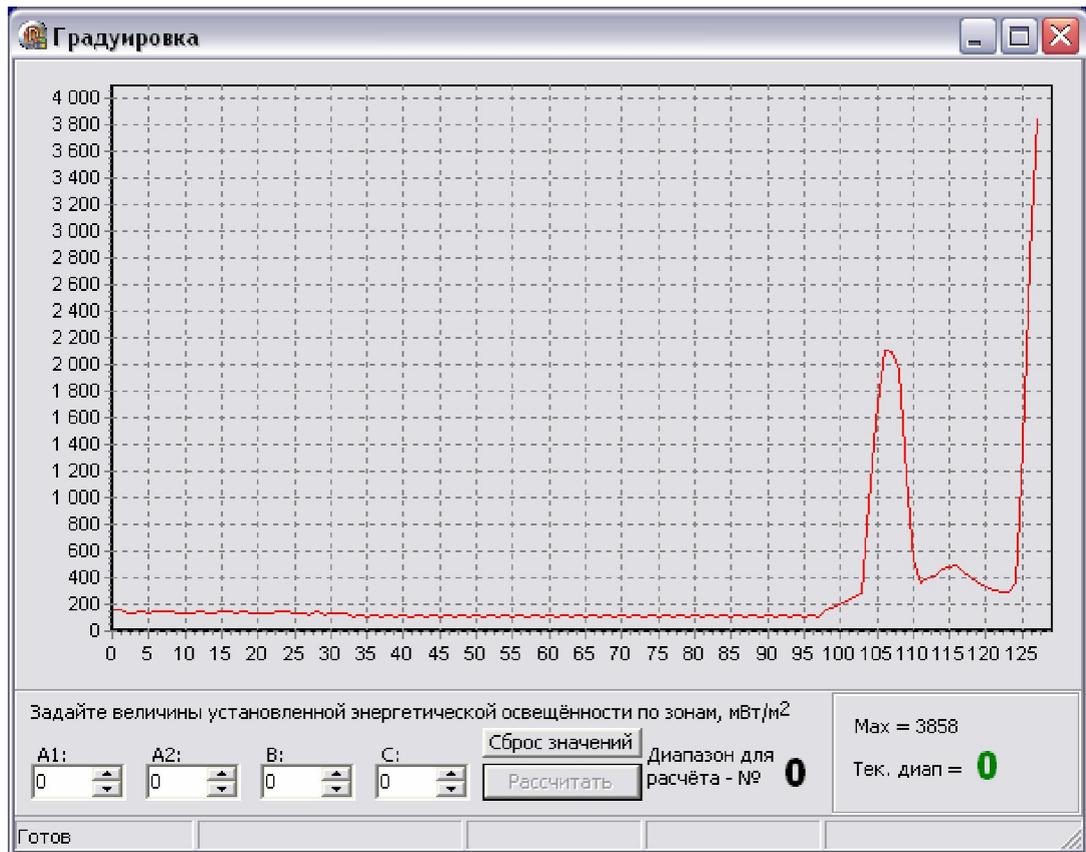
Calculating the total irradiance ratio



Place the photometer head in parallel to the plane of the item which is being measured. See to it that the shadow of the operator who conducts the measurement does not cast itself onto the photohead window, as well as the shadow of any irrelevant objects that are temporarily present.

In this mode the device is installed on the bench so that on the zero range the maximum signal might be obtained in the area of **3,900 ... 4,000** units. The position on the bench is fixed, the photohead removed. Then, in the fixed point reference receivers determine irradiance in the wavelength range 220 ... 400 nm (zones , ,). After that, the photohead returns to the reference point, and the irradiance value is entered into the entry field, and the total irradiance ratio calculated.

Additional energy adjustment by zones



Place the photometer head in parallel to the plane of the item which is being measured. See to it that the shadow of the operator who conducts the measurement does not cast itself onto the photohead window, as well as the shadow of any irrelevant objects that are temporarily present.

By the method stated at the previous step, irradiance is determined separately by zones 1, 2, and

Measurement can be made in any range. It is recommended for calibration to select the level of irradiance at which the maximum value is at the level of **3,000 ... 3,900** units.

Into the field of the respective UV zone the measured value is entered and calculation made. Above the entry field **it is necessary to place a flag** for confirming the entry of changes. When the flag is removed, the changes for a given field will not be rewritten.

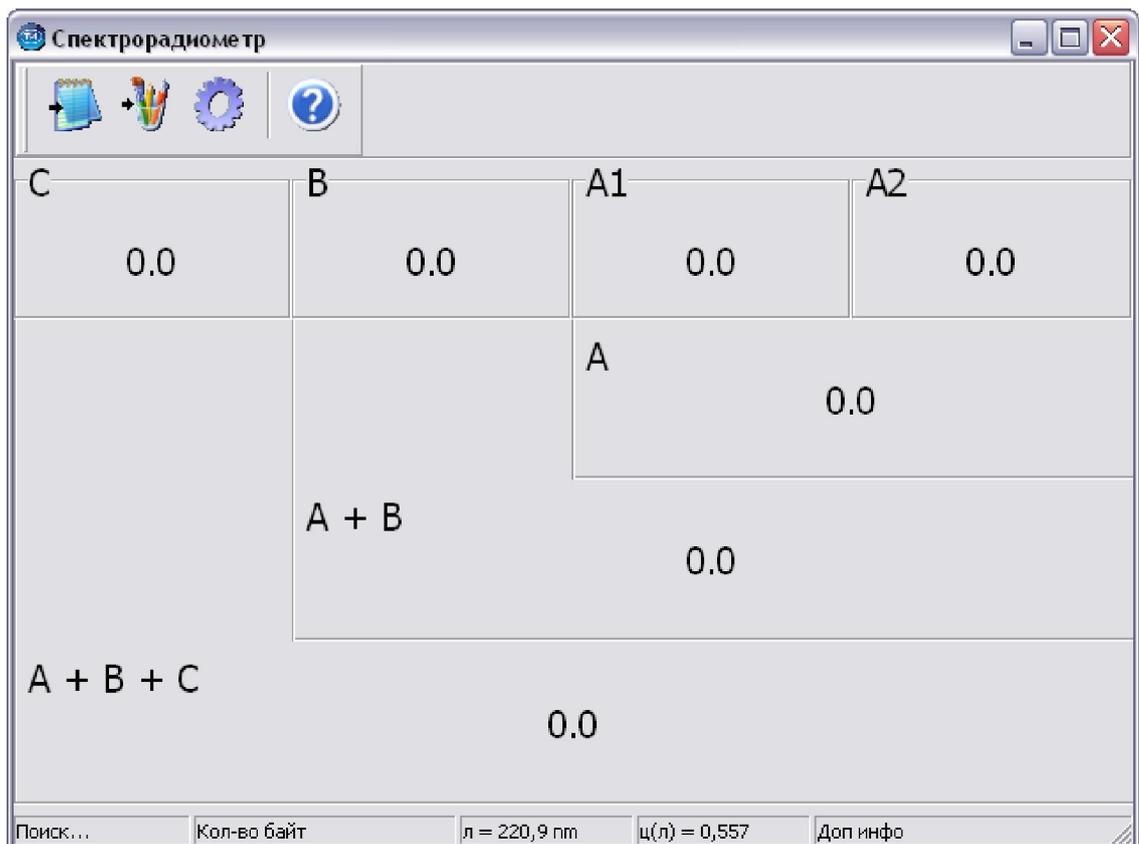
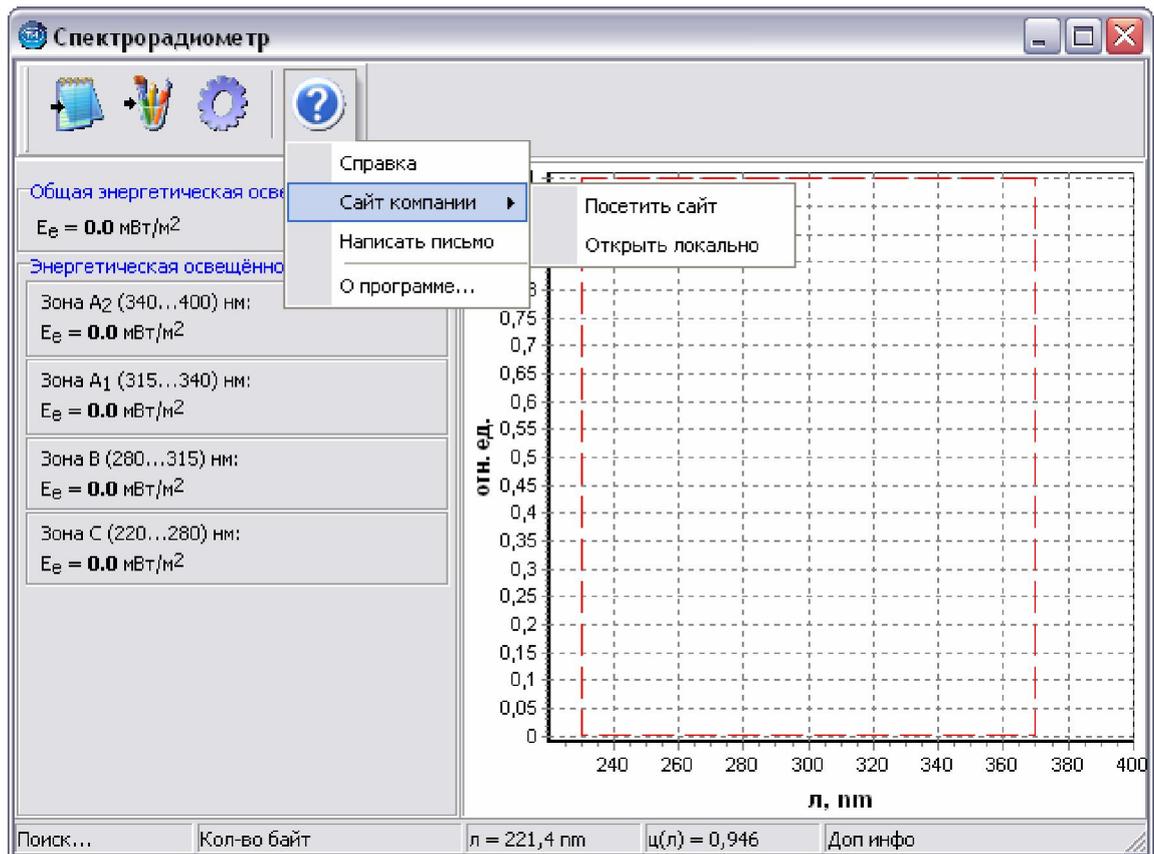
The values of the obtained ratios are used thereafter as supplements to the ratio of total energy adjustment. The button **Value Reset** serves for zeroing the calculated ratios. In this case irradiance is calculated only with taking the total ratio into account.

Output data

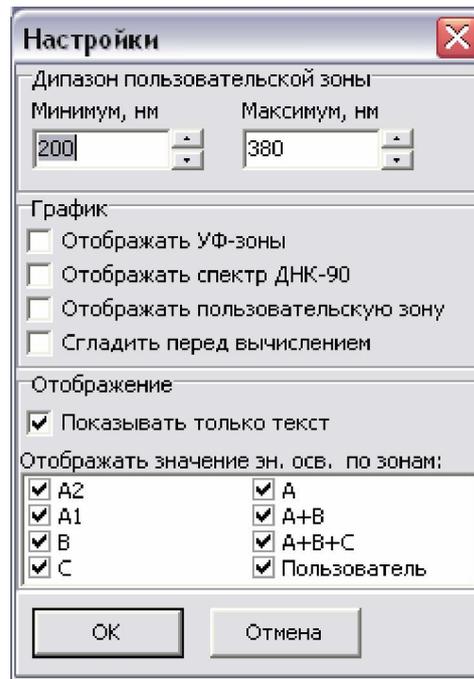
After the fulfillment of the necessary operations the calibration program retains all the calibration data in the Windows register into the branch «**HKEY_CURRENT_USER\Software\TKA\VDUV\1.0**».

Basic operating program

By default the main window of the program contains the signal spectrum and energy characteristics. Output of energy characteristics only can be adjusted (see item **Setup**).



Program setup



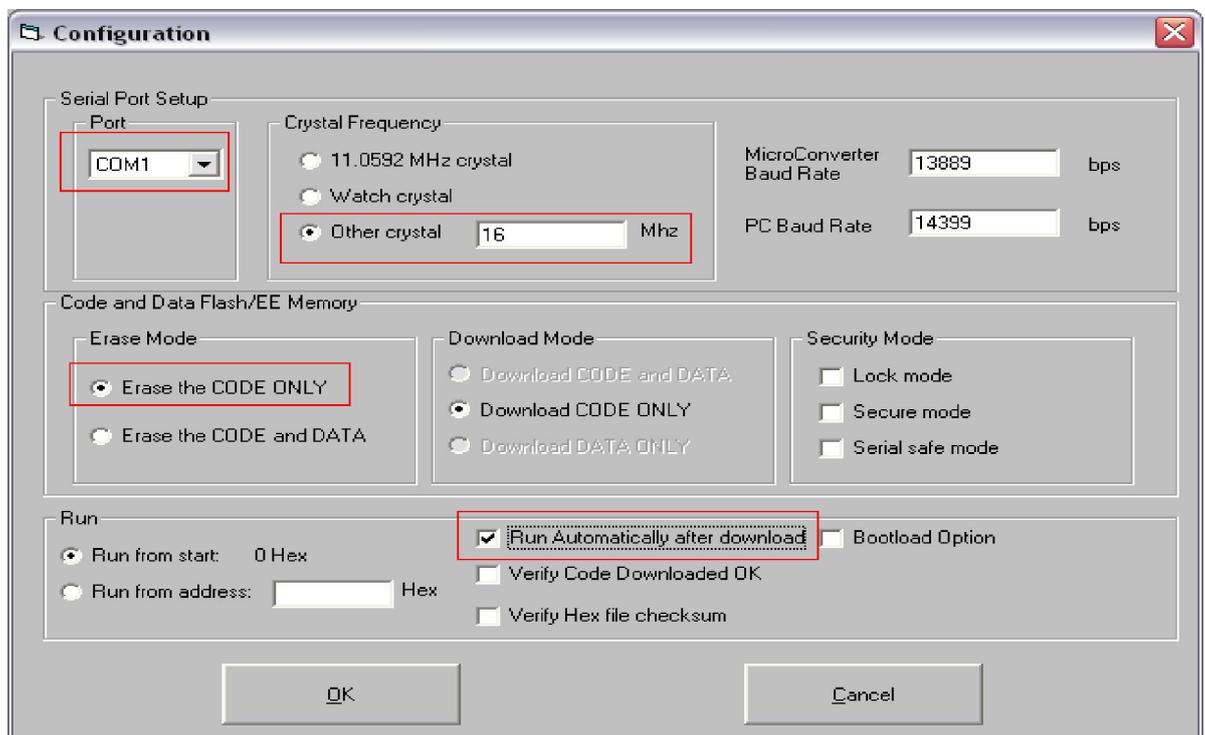
The user zone range specifies the irradiance measurement range within the user-assigned boundaries. Options of **Graph** group control the spectrum display.

Display group allows the format of the main window to be set up. The switch **Show text only** switches the main window of the program to the mode of either display of irradiance only (turned on), or the mode of simultaneous display of irradiance and signal spectrum (turned off).

In the mode of simultaneous display the irradiance output can be controlled for each zone.

Important! For the operation mode it is necessary to braid into the device a program of manual switching of ranges (with the help of **WSD**-application file **work.hex**).

Configuration of WSD-application:



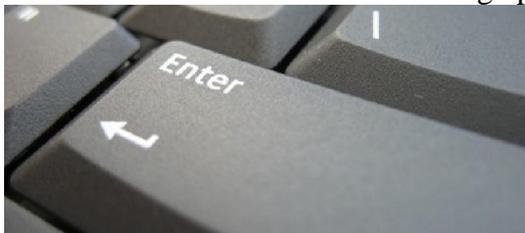
Program operation

Place the photometer head in parallel to the plane of the item which is being measured. See to it that the shadow of the operator who conducts the measurement does not cast itself onto the photohead window, as well as the shadow of any irrelevant objects that are temporarily present.

Upon being started, the program scans the USB bus and in case the device is detected displays **Ready** in the status line and starts automatically to display the data received from the photohead. When there is no connection, the program displays **Searching...** in the status line.

The four buttons of the control panel are designed for storing data being received into a text file, the spectrum graph into a file, setting up the program, and outputting additional information correspondingly. The spectrum graph is stored in BMP format.

For the user's convenience data are stored into a text file also through pressing the button **ENTER**.



The name of the file in this case is formed automatically in the format **tk_data_YYYYMMDD_HHMMSS**. The obtained file can be downloaded into any word processor or electronic table for further processing.

Storage and transportation rules

The device must be stored in a dry heated room under the conditions corresponding to the group 1 GOST15150-69 at the temperature $+5$ to $+40^{\circ}$ and relative humidity not above 85% at 25° .

The air in the room should not contain admixtures of aggressive vapors or gases.

The transportation of the devices in the manufacturer's packing can be made by any closed transport without speed limitations GOST 15150-69 at the ambient temperature from 10 below zero to 60° above zero and relative humidity up to 98% at the temperature 35° . After transportation at temperature below 0° it should be unpacked should only be effected after holding it in the packed condition at the temperature $(20\pm 5)^{\circ}$ for at least 12 hours.

Air transportation is not allowed.

An acceptance certificate

The device UV-Radiometer _____ -UV, factory No.

is acknowledged ready for operation.

Date of release: "____" _____ 200__

Stamp QCD: _____

Date of sale: "____" _____ 200__

Enclosure A

Technical support

UV-Radiometer -UV is used with the special software.

If you have any problems concerning directly the device or means of calibration, contact the Service Department of LLC TKA SCIENTIFIC INSTRUMENTS.

E-mail of Technical Support: akopyan_igor@mail.ru, aduc812@list.ru

Phone/fax of the Service Department: +7(812) 274-06-42, +7(812) 274-49-01

The center LLC TKA SCIENTIFIC INSTRUMENTS can render services in technical support of software. The technical support is performed under the conditions specified by the manufacturer, or stated on the web-site www.tka.spb.ru, or described in the user's manual or other documentation. In the process of rendering technical support services the manufacturer has the right to require from you the information relating to the technical parameters of your equipment. The manufacturer has the right to use the above information for the purposes of business development, including rendering of services in technical support.

The service department of technical support of users of the device UV-Radiometer -UV is fully comprised of qualified technicians for rendering assistance to you by phone or fax. For such case please have the following information at hand:

- Serial No. of your device and serial No. of the laptop
- Software version No.
- Name of the company and your name
- Your phone No.
- Record any error messages and what led to them
- Is the computer or software able to operate within the range of the telephone

Enclosure B

Agreement to use licensed software of UV-Radiometer -UV

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6. Miscellaneous.

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b. RUSSIA Government License. Any Software provided to RUSSIA Government is provided with the commercial license rights and restrictions described elsewhere herein. TKA SCIENTIFIC INSTRUMENTS reserves all unpublished rights under RUSSIA copyright laws.

c. Complete Agreement. This Agreement constitutes the complete Agreement between the parties and supersedes all previous communications and representations or agreements, either oral or written, with respect to the subject matter hereof.

d. Amendments, Waiver. This Agreement may be modified or changed in whole or in part in any manner in writing duly signed by both parties hereto or by a further electronic agreement presented by TKA SCIENTIFIC INSTRUMENTS and accepted by you. TKA SCIENTIFIC INSTRUMENTS' failure to insist upon or enforce strict performance of any provision of this Agreement shall not be construed as a waiver of any provision or right.

e. Severability. The parties desire and intend that all of the provisions of this Agreement be enforceable to the fullest extent permitted by law. If any provision of this Agreement or the application thereof to any person or circumstances is, to any extent, construed to be illegal, invalid or unenforceable, in whole or in part, then such provision will be construed in a manner to permit its enforceability under applicable law to the fullest extent permitted by law. In any case, the remaining terms of this Agreement or the application thereof to any person or circumstance, other than those that have been held illegal, invalid or unenforceable, will remain in full force and effect.

f. Export Controls. You acknowledge that portions of the Software may be of RUSSIA origin. You agree to comply with all applicable RUSSIA and international laws governing export and reexport of the Software, including RUSSIA Export Administration Regulations, as well as end-user, end-use and destination restrictions issued by RUSSIA and other governments.

g. Language. This Agreement was originally prepared in the Russian language. Although TKA SCIENTIFIC INSTRUMENTS may provide one or more translations for your convenience, the Russian version will control in the case of any conflict or discrepancy.

Enclosure C

Warranty

LLC TKA SCIENTIFIC INSTRUMENTS guarantees no defects of workmanship or material in any released device within eighteen months. In case of damage resulting from improper use or wrong operating conditions, the repairs are billed at a nominal price. In this case, before performing the works upon request the evaluation is submitted for approval.

THIS WARRANTY DOES NOT EXTEND TO THE MERCHANTABILITY AND SUITABILITY OF THE DEVICE.

THIS WARRANTY OBLIGATION EXTENDS TO THE SERVICING OF THE UNIT RETURNED TO LLC TKA SCIENTIFIC INSTRUMENTS OR TO ANOTHER REGISTERED SERVICING DEALER FOR THIS PURPOSE.

For more information, contact the Service Department of LLC TKA SCIENTIFIC INSTRUMENTS. For additional information and instructions concerning the warranty for the device, refer to the documentation for the third-party software.

In any correspondence related to the device, specify its serial number. The serial number is on the upper side of the device.

The manufacturer guarantees the operability of the device and conformity with the basic technical and metrological characteristics, provided the consumer complies with the operation and storage conditions.

The warranty is invalid when the serial number on the device is modified, erased, removed, or damaged. The warranty gives no right for recovery of indirect damage resulted from the failure of the devices under warranty.

When the device fails during the warranty period a Certificate should be drawn up specifying the nature of failure and the time when the device failed, and the device should be returned to the manufacturer with enclosed Operation Manual and Certificate. The device is replaced within the pre-agreed times only when it is impossible to repair it.

The manufacturer has no warranty obligations in the following cases:

during the maintenance and repair of the device, related to the replacement of the accessories after their natural wear and tear; after any reworks and improvements effected with a view to expanding the application of the device specified in the user manual; when the user repairs the device.

The warranty does not extend to any failed devices damaged as a result of improper operation, including but not limited to the following:

accidents, lightning strokes, flooding, fire, or other causes beyond the manufacturer's control; use of the device not for its intended purpose or not in compliance with the user's manual.

The warranty obligations do not infringe upon the consumer's legal rights afforded him/her by the current law.

MANUFACTURER:

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