



AKTAKOM Power Manager

User's manual

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Part



1 Introduction

1.1 License contract

1. The present license contract is made between You and the Rightholder of the exclusive right on the present program, specified in the Operations manual to the device to which, or with which, the program was purchased (hereinafter referred to as “rightholder”). The conclusion of contract does not result in the lapse of exclusive right on the program to you.

2. While installing, making a copy, uploading, carrying out an access or somehow using the program, you understand and agree with the conditions of the present license contract. If you do not agree with the conditions of the present license contract, delete all program files from your information storage devices and stop using the program.

3. You have the right to install, use, display and run only one copy of the program for only one device to which, or with which, the program was purchased, the quantity of PCs at which the program can be installed is not limited. It is restricted to use the program for several devices. The access key to the program is indicated at the self-adhesive label with indication of device type and number, which is pasted up on the package, containing CD-disk with the program.

4. You do not have the right to decompile, disassemble, create new versions, make alterations in all parts of the program.

5. You do not have the right to sell, rent, on loan or somehow pass the copy of the program, as well as to gain from the distribution of the program. You are not allowed to distribute this program together with any commercial programs and printing.

6. You are allowed to make one backup copy, and you have the right to use it only for archival purposes and for replacement of the legally acceptable purchased copy in cases, when this copy is lost, destroyed or get unsuitable to use. Herewith the copy of the program can not be used for other purposes and must be destroyed if the possession of the copy of such program is not lawful any more.

7. Lawful purchased copy of the program is a copy, which is obtained by one of the following ways:

a. With a set together with the device, on CD-disk.

The cost of the copy of the program is included in this case in the cost of the device. In case of loss of such a copy of the program it is not subject to free replacement. On the issue of the new version of the program the rightholder can provide you on your demand with the access to copy the new version of the program from the web site in Internet, additionally indicated by the rightholder. After getting the updates it is restricted to use

the program, which is the base for getting updating.

Attention! Not all previously released devices and new versions of the program are compatible.

b. Separate from the device, on CD.

Here you meet the cost of such copy of the program in accordance with prices, actual at the moment of its purchasing. Programs, which copies are being distributed in the following way could have a demo version, which is being distributed in the same way as it is described in the subparagraph "c" of the present paragraph.

c. Separate from the device, by distributing on mailing or getting a copy of the program from the web site in Internet.

The obligatory condition for getting a copy of the program by means of coping the program from the web site in Internet is preliminary filling in of questionnaire. Having filled in a questionnaire you give your consent to using by the rightholder the data about your activity, which the rightholder gets as a result of the filling in of questionnaire.

The rightholder chooses the way of distributing of the program copies.

8. The copy of the program is distributed "AS IS".

a. THERE ARE NO GUARANTIES ENCLOSED AND PROVIDED.

b. YOU USE THE PROGRAM ON YOUR OWN ACCOUNT. THE COPY OF THE PROGRAM IS PROVIDED " IN THE WAY LIKE IT IS" WITHOUT ANY GUARANTEES, EVIDENT OR IMPLIED, INCLUDING, BUT NOT BEING LIMITED, BY IMPLIED WARRANTIES OF THE CONSUMER PROPERTIES OR OF FITNESS FOR CERTAIN PURPOSES.

c. THE Rightholder DOES NOT GUARANTEE, THAT THE FUNCTIONS OF THE PROGRAM WOULD MEET ALL YOUR REQUIREMENTS, THAT THE PROGRAM WOULD WORK FAIL-SAFE OR THAT ERRORS WOULD BE DEBUGED. IF THE ERRORS IN THE PROGRAM WOULD CAUSE YOU DAMAGE, ALL REPAIR COSTS, MAINTENANCE AND SYSTEMS RECOVERY COSTS ARE BORNE BY YOU (BUT NOT THE Rightholder.)

d. UNDER NO CIRCUMSTANCES THE Rightholder IS RESPONSIBLE FOR ACCIDENTAL, DIRECT OR INDIRECT, MATERIAL OR ANY OTHER KIND OF DAMAGE (INCLUDING THE LOSS OF PROFIT, LOSS OF THE BUSINESS INFORMATION AND OTHER FINANCIAL LOSSES, REGARDLESS OF THEIR SIZE).

9. The present license contract is in effect on the whole territory of the Russian

Federation.

10. The present license contract is gratuitous.

11. The present license contract is concluded for the term equal to the validity term of the exclusive right on the program.

12. The rightholder has the right to terminate the license contract in case of non-compliance with the terms and conditions of the contract. On termination of the contract you are obliged to destroy all copies of the program which you have.

13. The present license contract regulates the use of updates, addenda, which could be offered to you by the rightholder after your purchasing the initial copy of the program, if these updates and addenda are not accompanied by special conditions. The conditions of the present contract could be modified for other version of the program.

14. The present license contract does not give any rights in respect of any trademarks, belonging to the rightholder or third party.

1.2 Assignment



AKTAKOM ATH-XXXX series controlled power supplies are designed to supply wireless devices with stabilized voltage or current during the debug processes, repair and laboratory examination in terms of temperate climate.

AKTAKOM Power Manager program is designed for the work with one of the following controlled power supply models: ATH-1533, ATH-1535, ATH-7333, ATH-7335 or ATH-7338, with APS730X and APS7331 series. The program work is possible in compatibility

mode.

1.3 Technical specifications

APS-7303 Power supply DC 90W 30V/3A 1 Channel Programmable



Specifications:

- Channels: Single Channel
- Rated Output Voltage: 0~30V
- Rated Output: Current: 0~3A
- Resolution Voltage: 10mV
- Resolution Current: 1mA (=3A) / 2mA (>3A)
- Power Effect: Voltage: 0.01%+3mV
- Power Effect: Current: 0.01%+3mA
- Load Effect Voltage: 0.01%+3mV (=3A) / 0.02%+5mV (>3A)
- Load Effect Current: 0.2%+3mA (=3A) / 0.2%+5mA

(>3A)

- Set Accuracy Voltage: 0.1%+20mV
- Set Accuracy Current: =0.5%+5mA (=3A) / =0.5%+10mA (>3A)
- Ripple (20Hz~20MHz) Voltage: =1mVrms (=3A) / =2mVrms (>3A)
- Ripple (20Hz~20MHz) Current: =3mA Arms (=3A) / =6mA Arms (>3A)

APS-7305 Power supply DC 150W 30V/5A 1 Channel Programmable



Specifications:

- Channels: Single Channel
- Rated Output Voltage: 0~30V
- Rated Output: Current: 0~5A
- Resolution Voltage: 10mV
- Resolution Current: 1mA (=3A) / 2mA (>3A)
- Power Effect: Voltage: 0.01%+3mV
- Power Effect: Current: 0.01%+3mA
- Load Effect Voltage: 0.01%+3mV (=3A) / 0.02%+5mV (>3A)
- Load Effect Current: 0.2%+3mA (=3A) / 0.2%+5mA

(>3A)

- Set Accuracy Voltage: =0.1%+20mV
- Set Accuracy Current: =0.5%+5mA (=3A) / =0.5%+10mA (>3A)
- Ripple (20Hz~20MHz) Voltage: =1mVrms (3A) / =2mVrms (>3A)
- Ripple (20Hz~20MHz) Current: =3mA Arms (3A) / =6mA Arms (>3A)

1.4 Computer requirements

The computer used for the device work should meet the following minimal requirements:

- 1 free USB port;
- installed Windows 2000, Windows XP or the latest OS versions;
- VGA video system (640*480 resolution, 256 colours), recommended 800*600 resolution, 24-bit colour;

1.5 Preparation for use

1.5.1 Hardware setup

To setup the device first switch it off, connect the PC USB port to the appropriate connector of the controllable power supply with the help of A-B type USB cable.

1.5.2 Software installation

Insert the software distribution disk into the drive, find "setup.exe" program, run it and then follow the further installation program instruction.

When the installation process is finished there will be program group created with the shortcuts for the device program and its Help. You can run them with the help of "Start" menu. Before the device use you should install the USB interface driver. During the software installation all necessary files will be placed into the program working folder, into the Driver subfolder. If you connected the device to the PC during the program installation the driver will be also installed into the system automatically. If, due to some reasons, the driver hasn't been installed you may install it manually at any time later. You may find the description of the driver manual installation procedure in the present Help section below.

Do not forget to specify the device type you would prefer to use and its network location if necessary. Therefore you may use the program [Options panel](#)^[28].

When you start running the program it tries to connect to the device in accordance with the saved settings (see Sockets and Technics tabs description of the [Options panel](#)^[28]). It's possible to use the program without the device connection. Therefore choose "emulator" as the device type.

AKTAKOM USB Lab driver installation for MS Windows XP, Vista, 7

All necessary files are located in the program working directory, for example:

C:\Program Files\AKTAKOM\AKTAKOM Power Manager\Driver

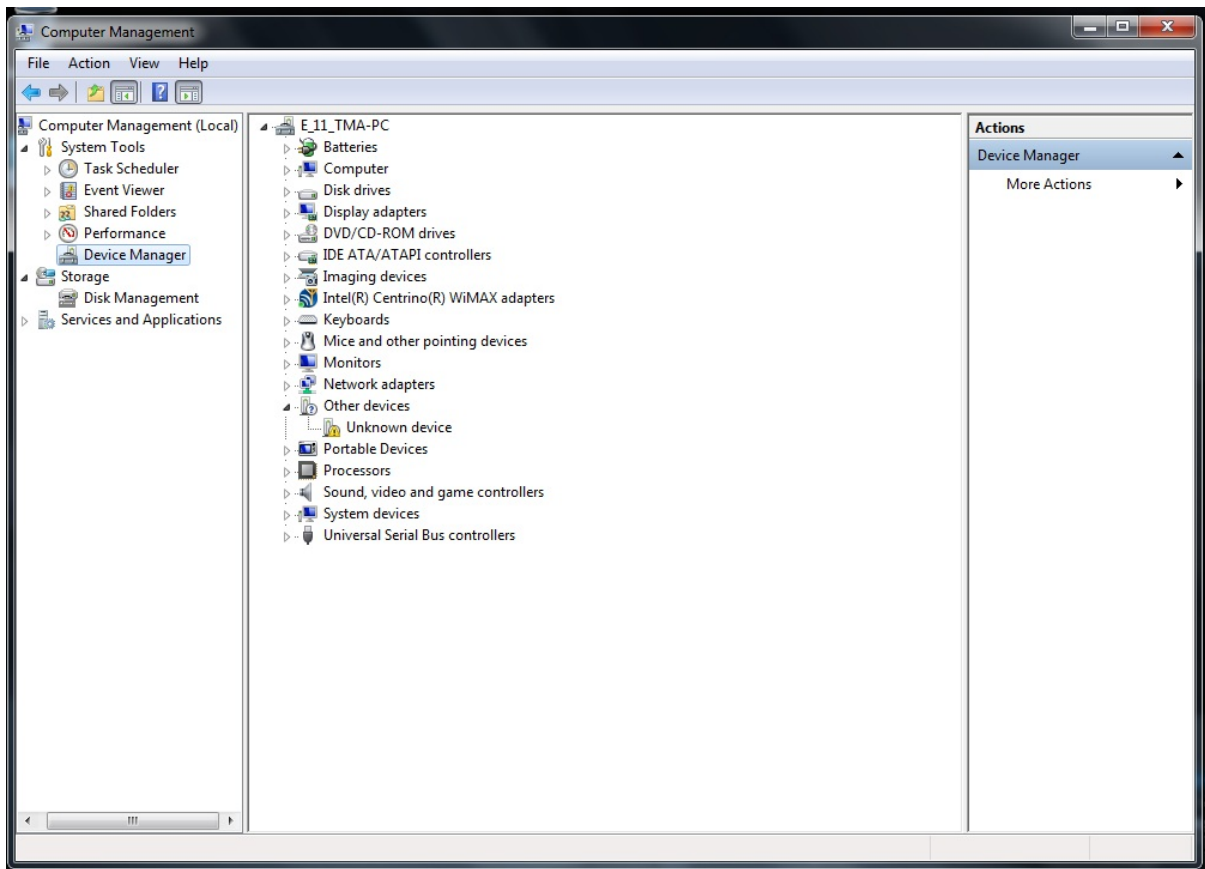
INSTALLATION:

Driver installation for Windows 7 OS.

1. Switch on the PC, connect AKTAKOM device to the PC via USB-port. Switch on the unit supply.

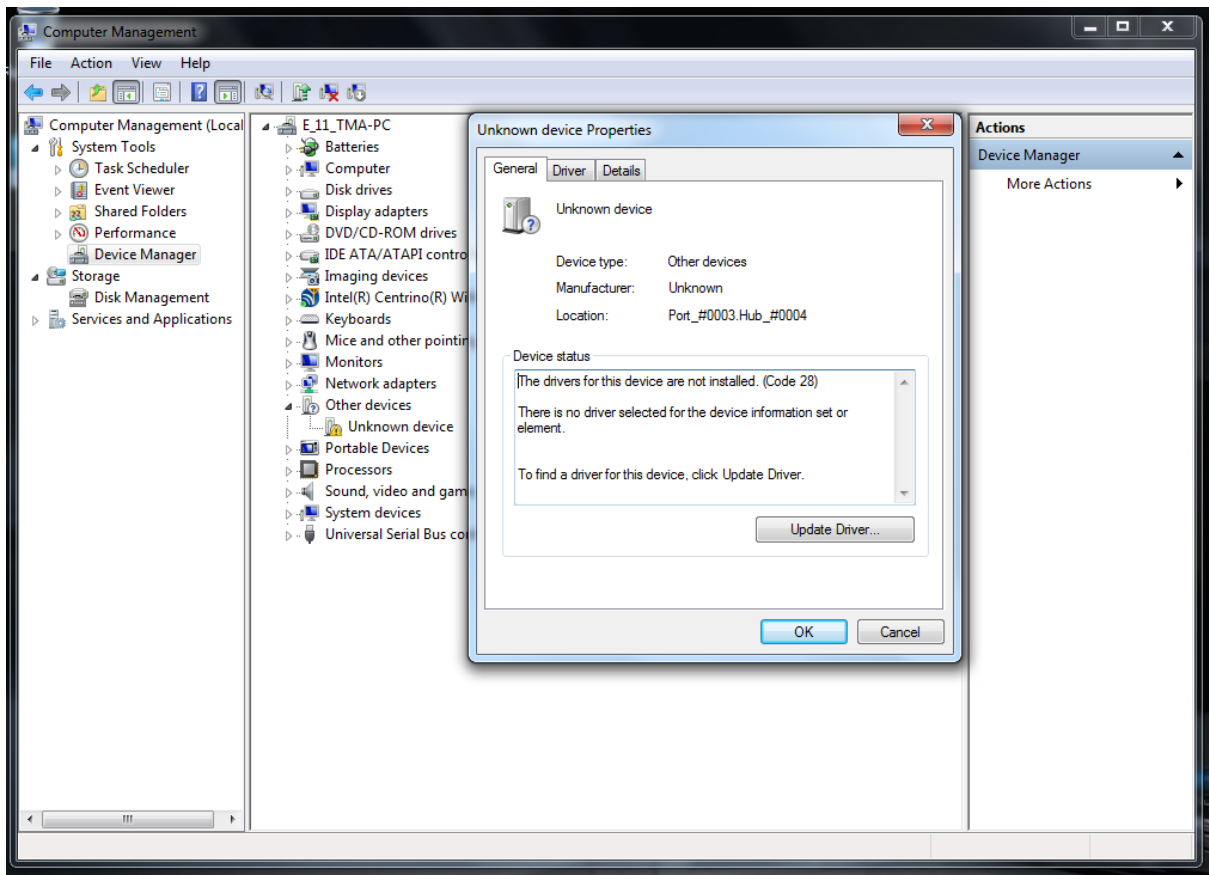
NOTE! The driver can be updated only when the device is on!

2. Open «Device manager» (pressing Windows + Pause keys)

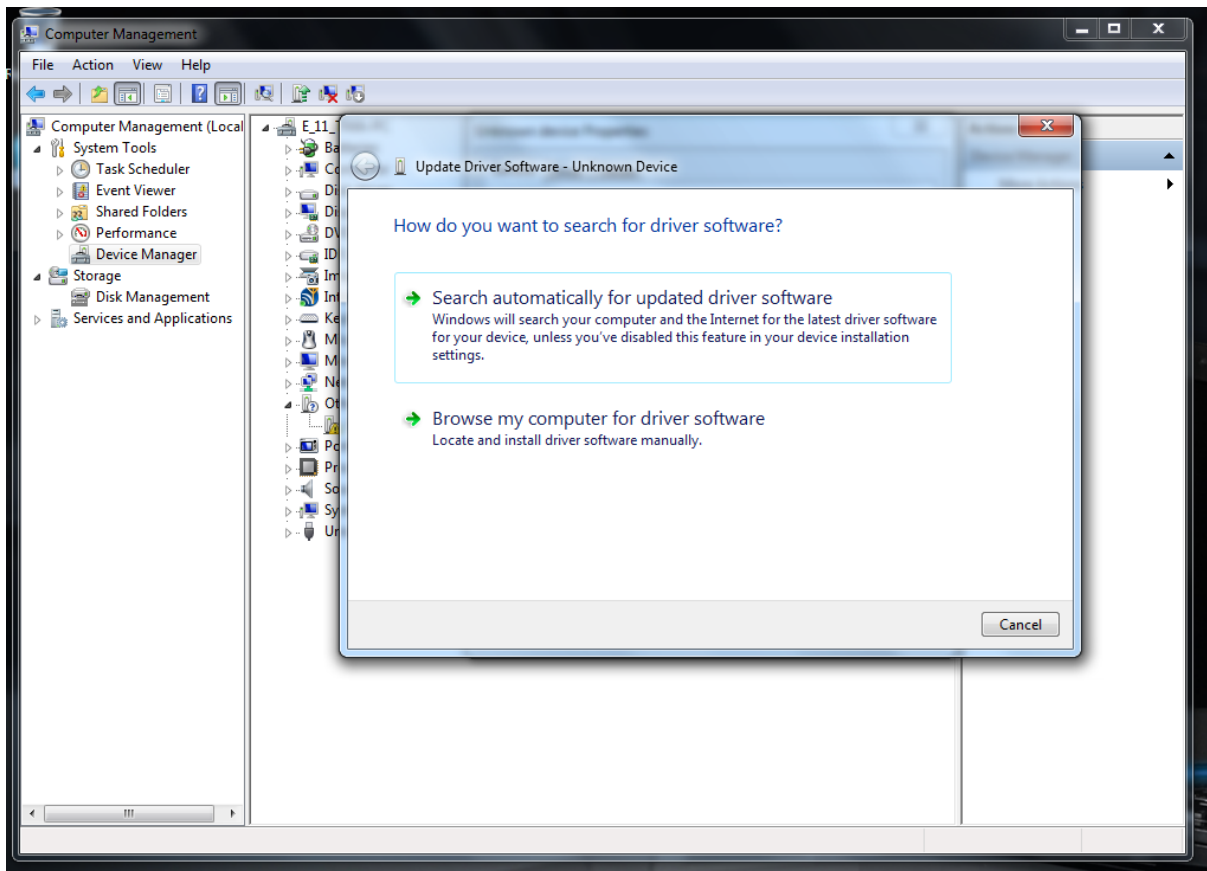


Pic. 1 The device display, software is uninstalled

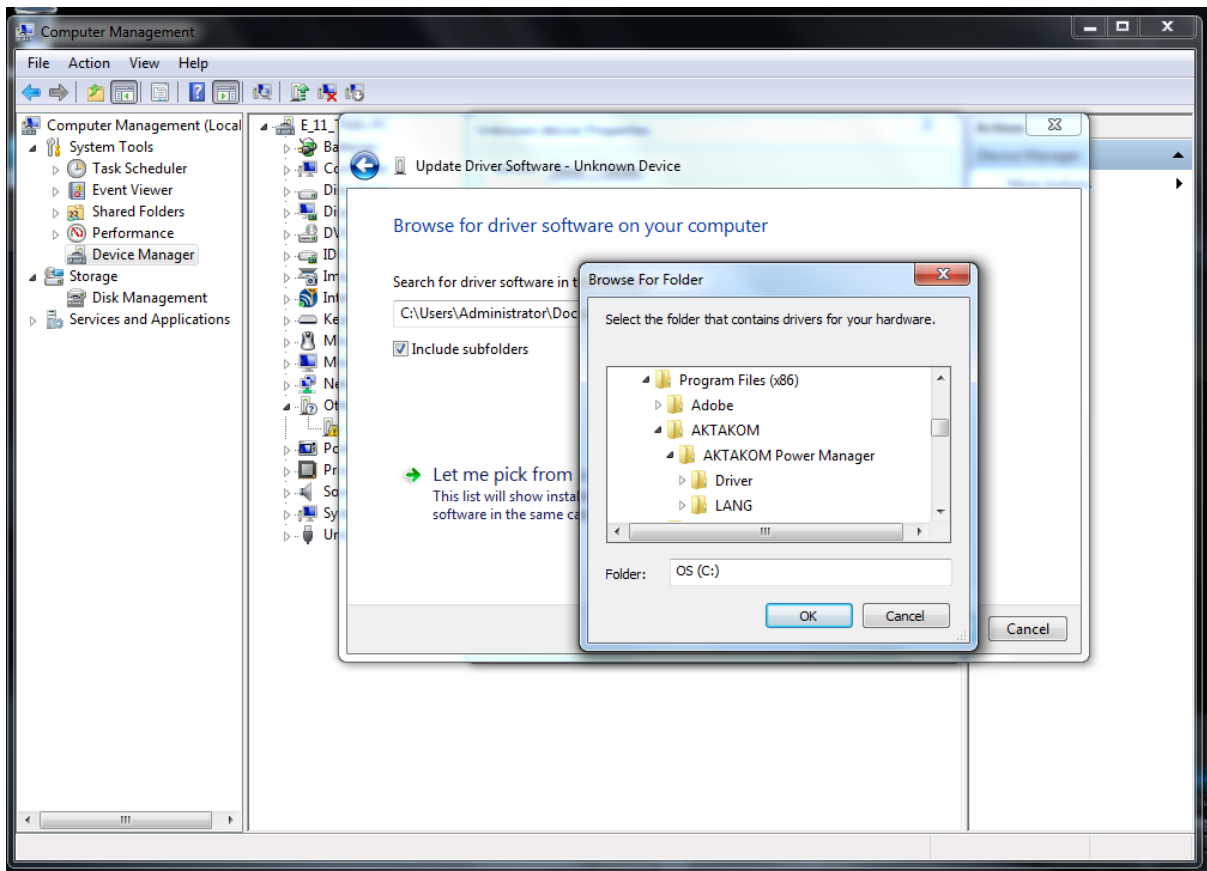
3. Find the right device in the list (AKTAKOM USB-LAB or Unknown device)
4. Open it with a double click. You will see a window. Press "Update Driver..."



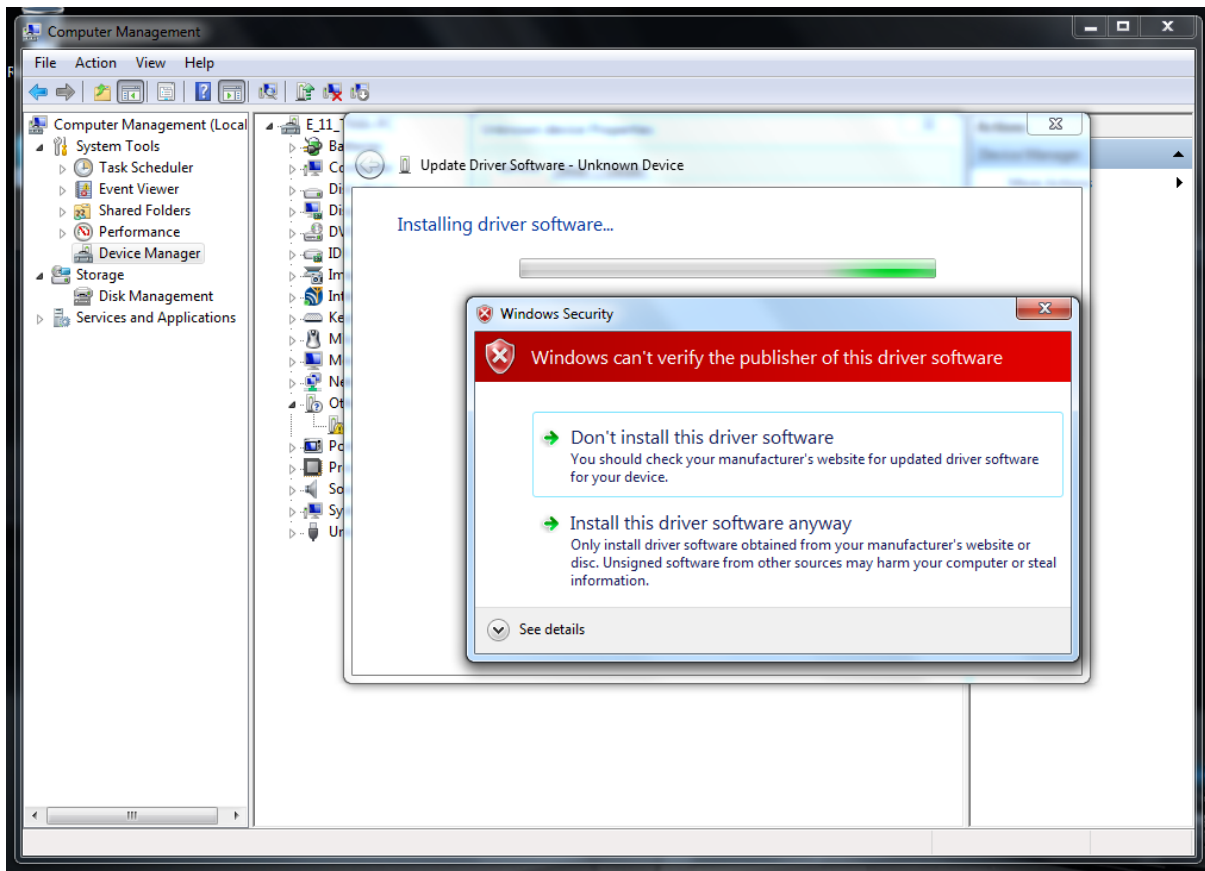
5. Select "Browse my computer for driver software"



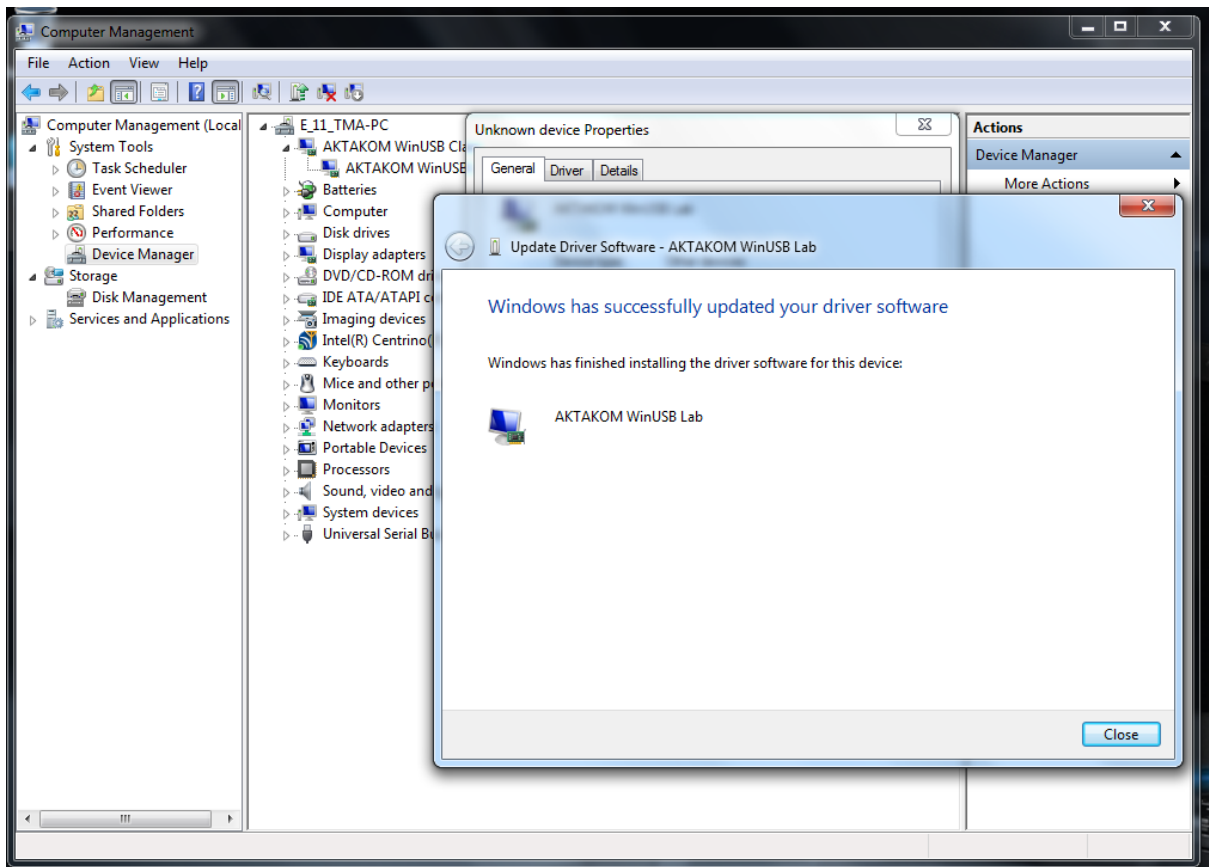
6. Select the direction where the driver is (in a new installed program the driver location is "C:/Program Files (x86)/Driver". If you update the driver specify the direction with a new driver)



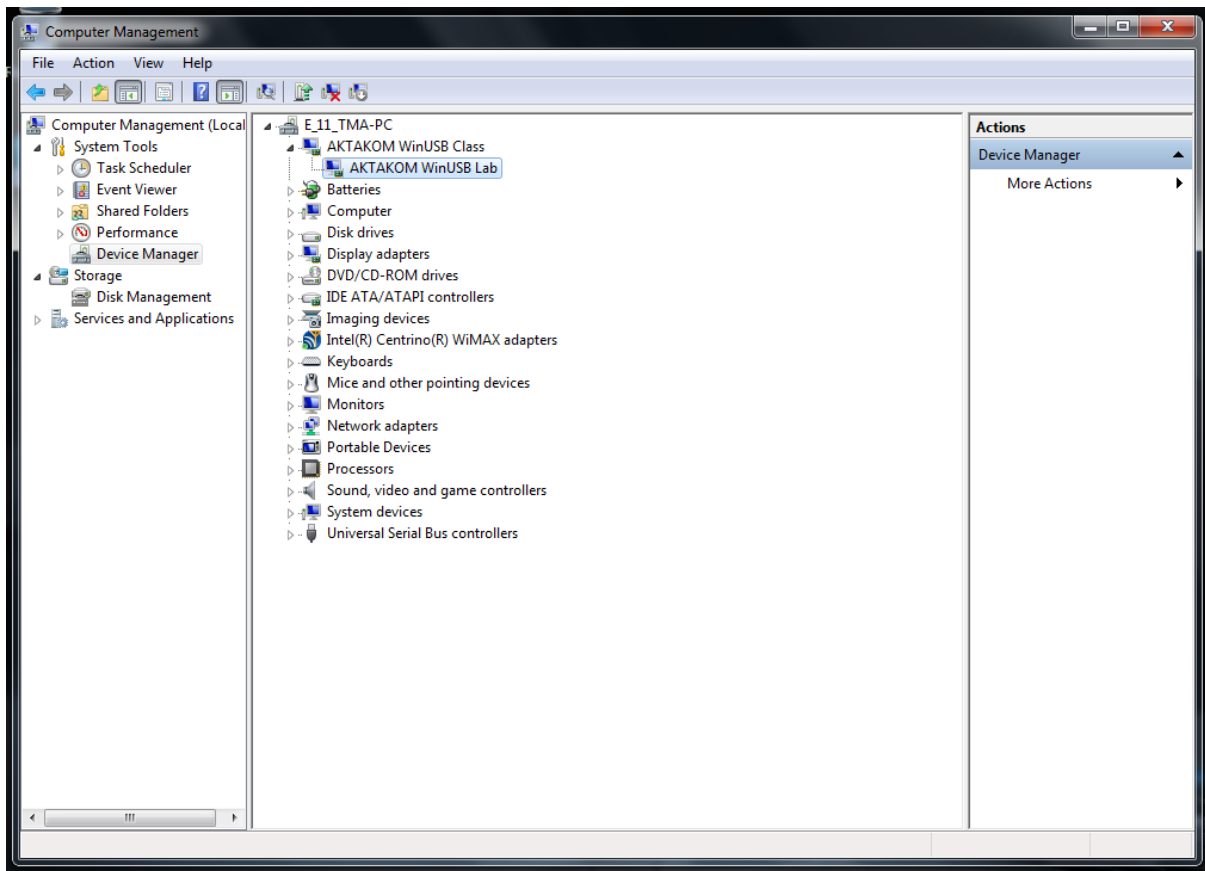
7. Select "Install this driver software anyway"



8. You will see the following window



9. Close the driver updating window
10. Repeat the procedure described above for all problem drivers if you have a combined device (the number of modules should coincide with the number of drivers updated).
11. After all the drivers are updated AKTAKOM instruments should look the following way in «Device manager».



1.5.3 Network configuration

When you connect the device to Ethernet for the first time use the factory defaults until it's necessary to change them. In that case you need to connect the device to the PC via USB interface and change the settings with the help of AVNC program (Aktakom Virtual Network Configuration).

Factory default parameters of the device:

IP-address: 192.168.0.1

Subnet mask: 255.255.255.0

Gateway: 0.0.0.0 (i.e. not specified)

Port number: 1024

Username: AULNetPass

Part



2 Application description

2.1 General program description

AKTAKOM Power Manager program allows the remote control of one of the following controllable power supply models: ATH-1533, ATH-1535, ATH-7333, ATH-7335, ATH-7338 of APS730X and APS7331 series. The program operation is possible in emulation mode.

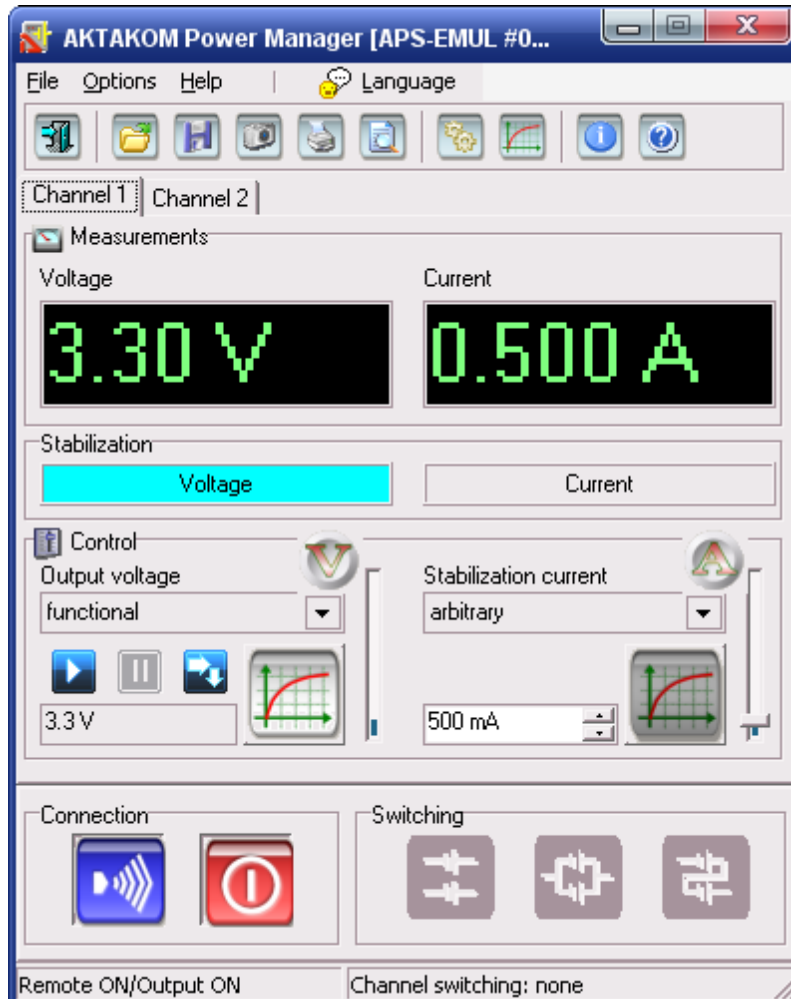
Before you start working it's necessary to select the connected device model by Device model command in the [Options panel](#)^[28], in [Technics](#)^[31] tab, then to select the right device instance and to connect to it.

Stabilization voltage and current manual control is available through the program [main window](#)^[18]. To use the automated control opportunities in accordance with the predetermined law use [Functional control](#)^[21] window.

Program user interface consists of operating panels (windows). Every panel contains control elements (CE) which allow the user to influence on the program work as well as on the indicators which reflect all necessary information. In contrast to the CE the user cannot make a direct influence on the indicators. The majority of these elements are the part of Windows standard interface and don't require special use explanation.

2.2 Main window






The general view is shown in the picture below.



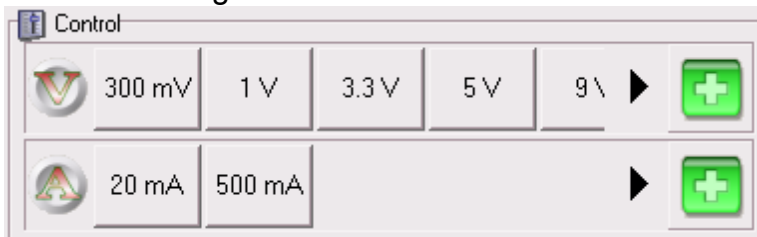
Controls and indicators description

Control pane at the top of the window is used for quick opening of some program [main menu](#)^[18] commands. Channels tabs introduce indicators and CE to control the power supply channels. **Note:** the channels can be shown as grouped into tabs or as extended wide window (see "Group channels in tabs" option in the [settings panel](#)^[28]). Measurements box contains numerical indicators issued on the following channel of stabilization voltage and current. **Please note** that for the devices equipped with control ADC these values are measured on the device output hardwarily, at the same time the figures are displayed **in green**. For those devices without ADC the value under measurement is determined by the specified value (not "what is" but "what should be") and all the figures are displayed **in red**.

In Stabilization box there is a stabilization mode: of the voltage or current CE to control channel output parameters **in the extended (in "expert") mode** consist of:

- sliding and numerical control elements which manually give the regulated parameter value;
- indicator buttons to open [Functional control](#)^[21];
- drop-down list of control modes ("arbitrary" - manual parameter control, "functional" - automated control according to the determined law), see [Functional control](#)^[21], and the standard values kit which can be edited by the user with the help of [Technics settings](#)^[31]);
- automated mode control buttons ( - control start,  - stop,  - switch off after the finish,  - maintain the level after the finish,  - repeat in cycles).

CE to control the channel output parameters **in a simple mode** consist of two horizontal button scrolling bands with the fixed values of voltage and current. There are buttons to the right of each of these bands for the addition of new [standard value](#)^[31].



It's possible to switch between the simple and expert control modes at any time with the help of the program [main menu](#)^[18] (Options - Control mode) or by double clicking the control box title or any of V or A signs.

- Connect buttons:



- remote control, off/on. Puts the device into remote control mode, operating controls on the device are turned off.



- output switch, off/on. When it's switched off there is 0 voltage on the device output regardless the value specified above.

For the device to provide the supply both connect buttons should be on.

Channel commutation buttons are available and effective working with multichannel power sources only.



- channels switching is off;



- channels are switched simultaneously;

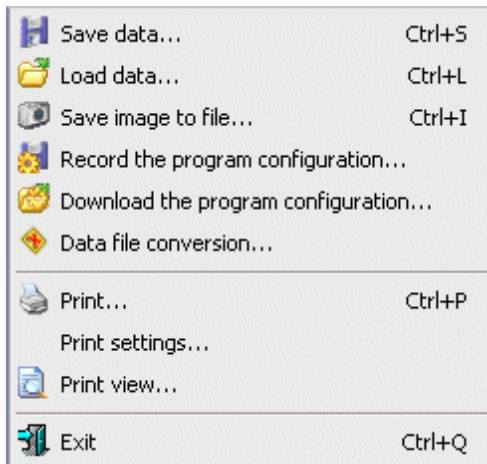


- channels are switched sequentially.

Status line at the bottom of the window shows the current condition of the device.

2.3 Main menu

File Menu



Save data... - to open the file for data saving, duplicates the appropriate command of [Datagrams](#) ²² tab.

Load data... - to open the file for data reading, duplicates the appropriate command of [Datagrams](#) ²² tab.

Save image to file... - to select the file and save the current datagram image to it.

Record the program configuration... - to save the program settings (connection, device, design settings etc.) to the file.

Download the program configuration ... - to reconstruct the program settings from the file

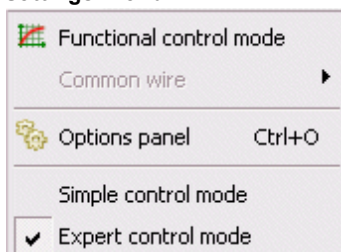
Print... - to send the datagram image to print.

Print settings... - to call the printer setting dialog

Print view... - print data preview.

Exit - exit from the program closing all of its data files.

Settings menu

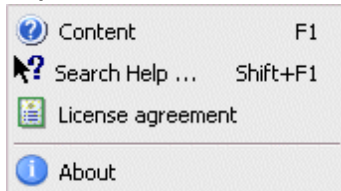


Functional control mode - to open [Functional control](#)^[21] window.

Options panel - to open [Program](#)^[28] settings window.

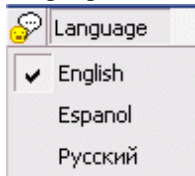
Simple/expert control mode - switches the control modes in the program [main window](#)^[18]. The simple mode allows quick and convenient setting of standard voltage and current on the device, the expert mode allows using all of the application control capabilities.

Help menu



Contains the commands to open help file and the program brief information window.

Language menu



Contains the commands to download the user interface texts in the language available within this installation. It's duplicated by the appropriate element in the Program [settings](#)^[28].

2.4 Functional control

This window shows the specified and measured voltage curves in [Diagrams](#)^[22] tab and allows automatically controlling the output voltage in accordance with the predetermined law with the help of [Graphic editor](#)^[24] and [Tabular editor](#)^[26].

General-purpose buttons:

- Switch to the main program window;

- Start saving into the data file;

- Open a data file for reading;

- Save datagrams to the image file;

- Print preview;

- Print datagrams;

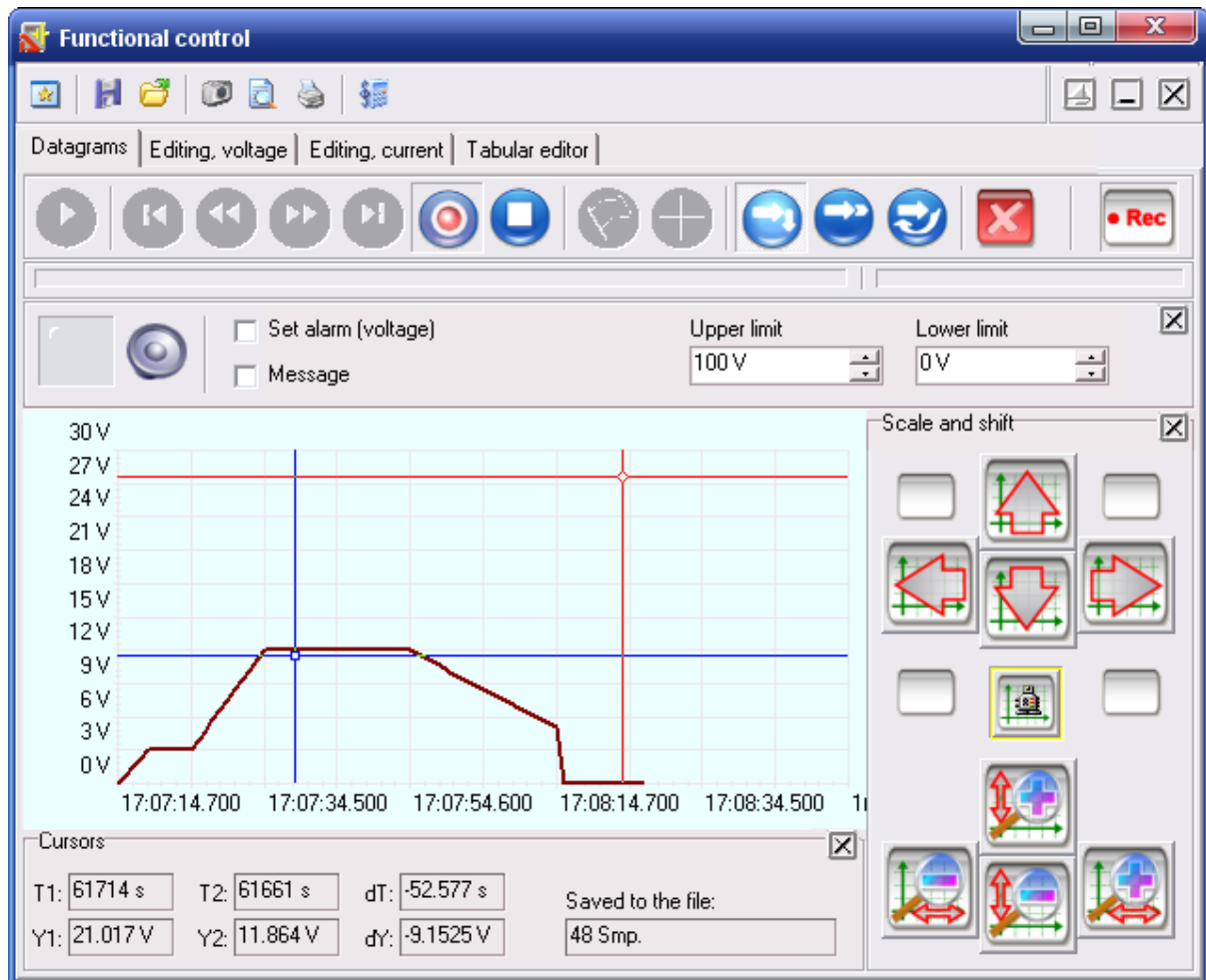
- open [Formula calculator](#)^[34];

- switch on/off “floating panel” mode. Floating panel is always located above the other non-floating panels even if it's inactive. Also this mode includes panel transparency.

- minimize/maximize the panel. Minimizing leaves the window at the same place, only its height reduces to let the window headline and the toolbar stay visible.

- Close the panel.

2.4.1 Datagrams





Controls and indicators description

Control pane at the top of the tab is used to control the records and read data files, to display additional CE groups and indicators, to switch automatic control mode. The keys description from left to right:




- start/stop reading the data file;
- move the reading position to the beginning of the file;
- move the reading position one step back;
- move the reading position one step forward;
- move the reading position to the end of the file;

- start the file record;
- open the file for reading/stop the file reading or record;
- show the alarm box (in case you have closed it with  button);
- show the cursors and graph zoom boxes (in case you have closed them with  button);
- switch on the power off mode after the end of autocontrol;
- switch on the supply voltage level holding mode after the end of autocontrol;
- switch on the autocontrol cyclical repeat mode;
- graph reset button;
- record indicator (**Rec**)/data file reading indicator (**Rep**).

Under the control pane there are two cursors: the left cursor shows data file reading position, the right one regulates the reading rate.

Set alarm - when you set this option the program will control the current voltage to be within the specified limits. If it goes beyond the limits the program will switch on the audible alarm (the indicator will start burning, and the audible alarm will be emitted in

case the user hasn't disabled the alarm with  button). Also if "Message" option is on, system message called "AKTAKOM Power Manager Alarm Message" will be sent to the operating system, the current emergency situation code will be passed by this message parameter.

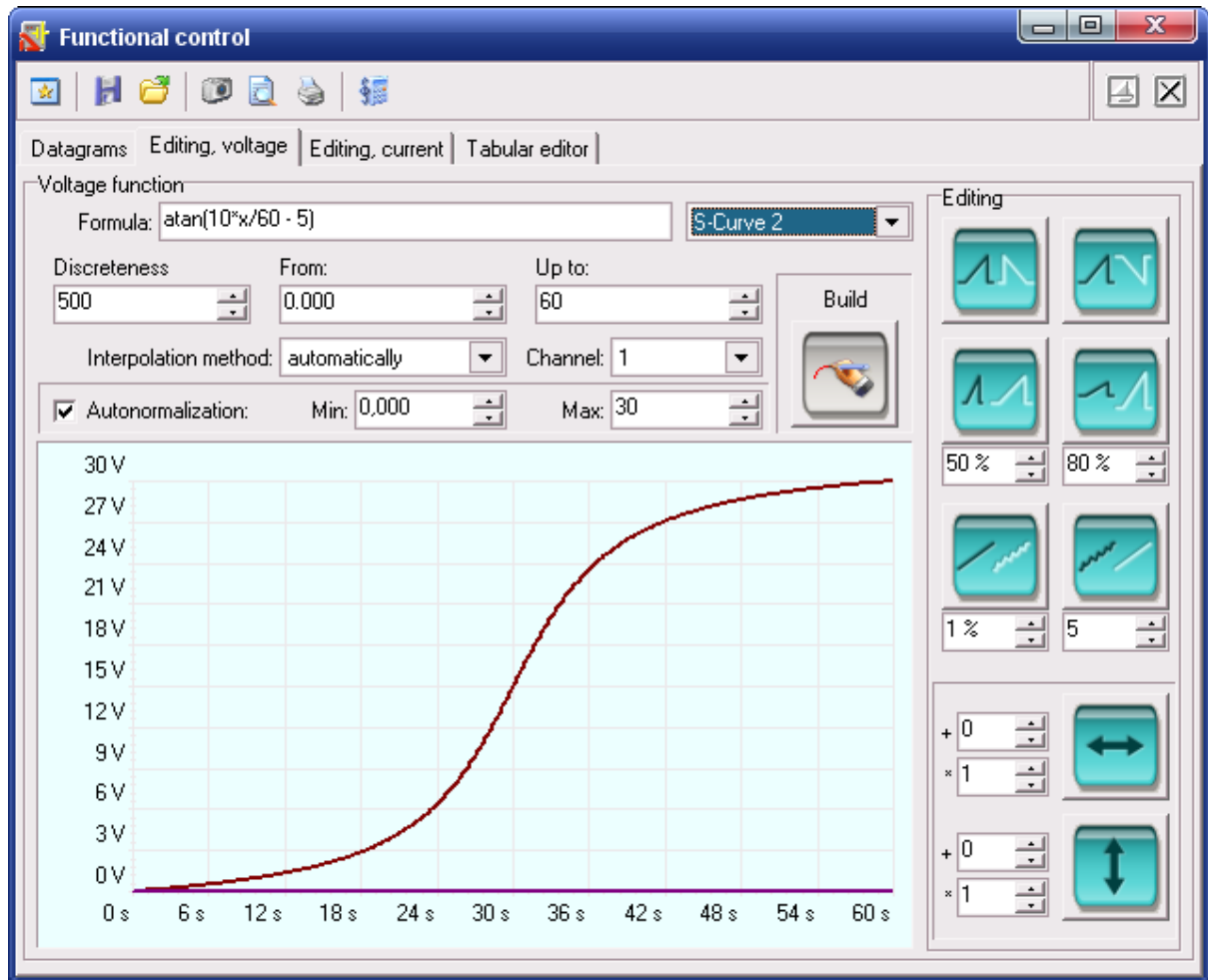
Either the current voltage or the data of the file opened for reading is displayed on the graph in the record mode. In addition to the measured values curve there is a set values curve as well displayed with the same colour that is used for the channel measurements curve but the tint is less bright. For those units not equipped with control ADC these curves will be identical.

In Cursors box there are measurement values from both graph cursors. Also when saving the data to the file the number of the samples recorded is displayed in this box. Scale and shift allow the user to set the graph scales manually or automatically using



button. Here there are indicators of the current data output beyond the alarm signaling (they are on even when the alarm is off) and beyond the graph.

2.4.2 Graphics editor



Controls and indicators description

Formula - waveform mathematical formulation

From - lower calculation limit.

Up to - upper calculation limit.

Discreteness – The number of points to represent the waveform.

Interpolation method – method selection for the signal interpolation at its scaling.

Channel - select a channel for the editing signal.

Build - calculate and draw a waveform.

Form - standard waveforms.

Graph shows an emulated signals template and allows manually setting their forms.

Autonormalization - select this option to make the program automatically scale the editing function on the vertical scale in accordance with the specified minimum and maximum.

Editing



- Horizontal inversion;



- Vertical inversion;



- Horizontal scale;



- Vertical scale;



- Add random noise;



- Smooth;

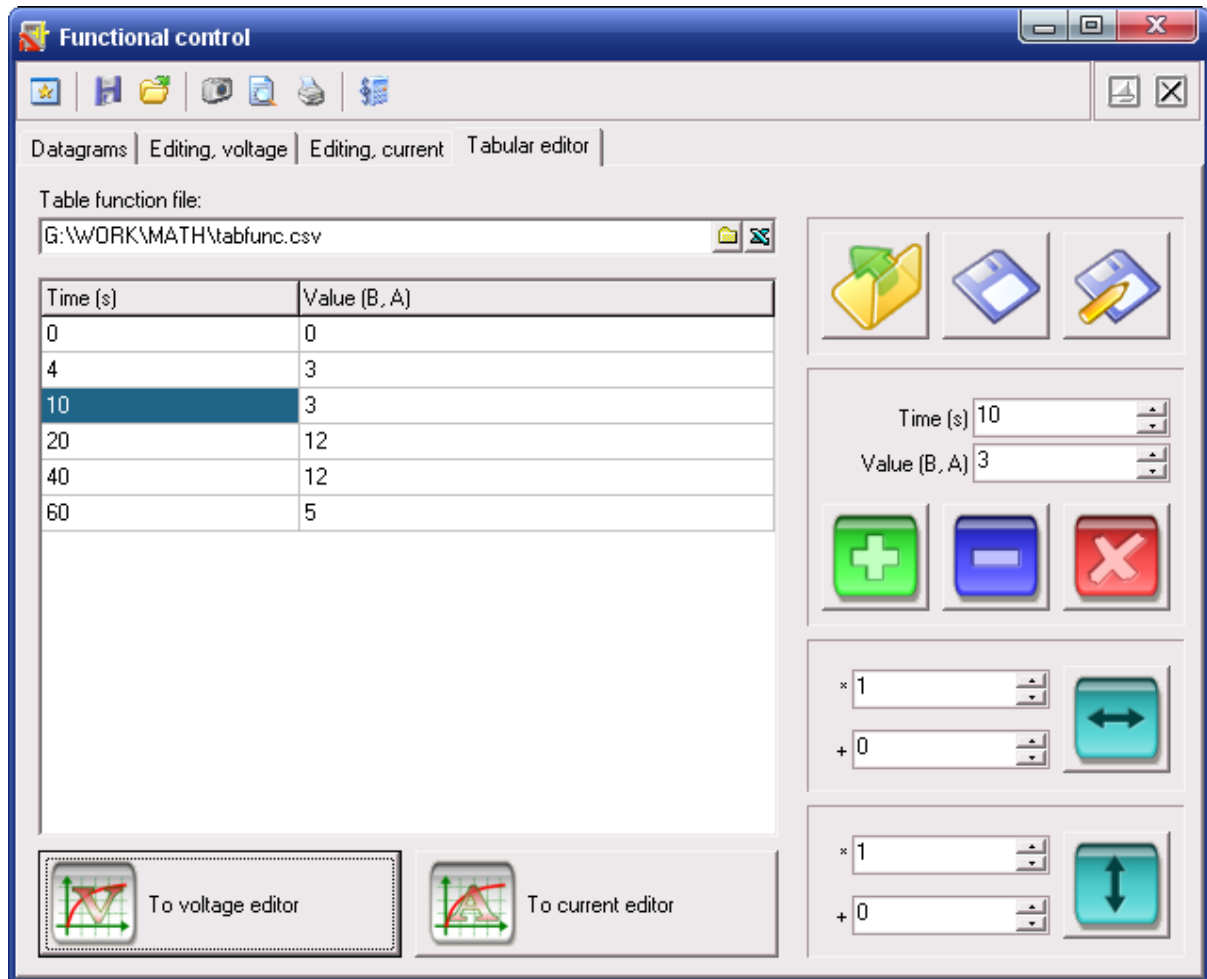


- Change the time scale;



- Change the values scale.

2.4.3 Tabular editor



The tab is intended for convenient edition of table function file used by **filetab** function in the graphic editor or in [formula calculator](#)^[34].

Controls and indicators description

Table function file - the name line of the editing function file.

The following buttons embedded at the end of the line allow: - loading a file into the table in the current tab, - opening the file with an external application registered in the system for files .csv, e.g. MS Excel.

"Time-Value" table - shows the editing function nodes.



- select and open the table function file.



- save all changes to the selected file.



- save the table to the file under a different name.



- add a new line into the table with the specified time and value. The lines will be automatically sorted out into "Time" column.



- delete a selected line from the table.



- clean the table.



- Change the time scale;

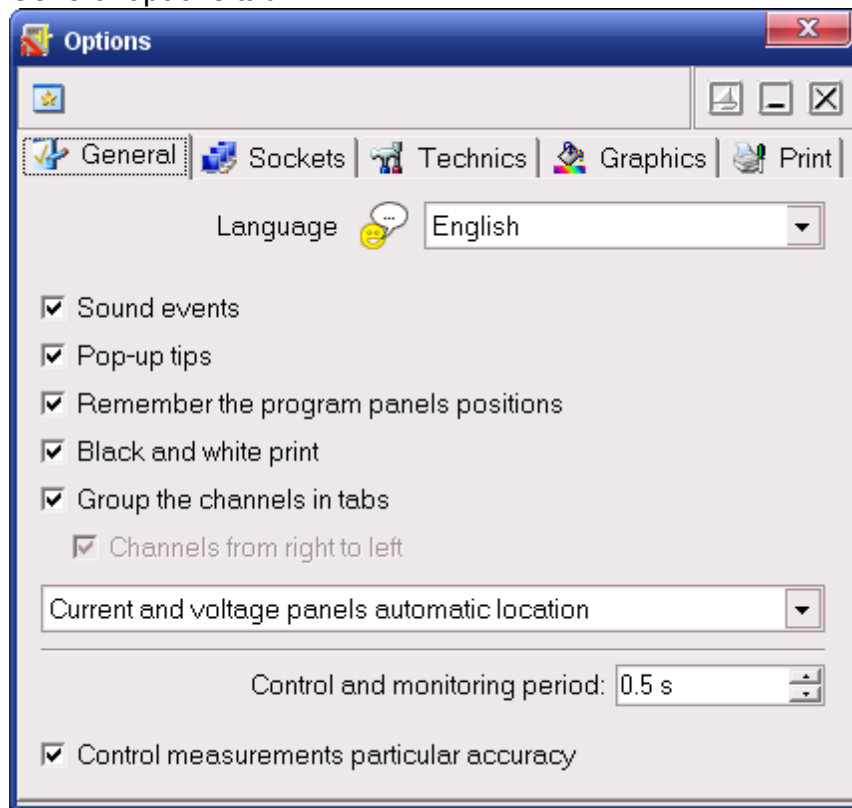


- Change the values scale.

To the editor... - Send the table function to the [graphics editor](#)²⁴.

2.5 Options

General options tab



Language - select the user interface language of the program. It duplicates the appropriate menu items of the program [main menu](#)^[20].

Enable sounds - enables to use the program sound notifications (the computer should be equipped with a sound system). It doesn't affect the sound for standard Windows messages.

Pop-up tips - enables to use the program pop-up tips for the user interface. If you are good at the program work we recommend you to switch off this option to hasten the program work and eliminate visual noises.

Remember the program panels positions - remember the program panels positions after the exit and restore them at the start.

Black and white print - optimize when printing the main graph image for the black and white printing. If you use a color print remove this tag.

Group the channels in tabs - display control and indication elements by each channel in a separate tab. If this option is off there is a detailed display of the control elements by channels used, see the picture below. The option is not available if you select to work with a single-channel power supply model.



Channels from right to left - the first channels (master channel) should be located on the right. The option is available only at the full-scale display of the channels.

Control elements location mode, current and voltage indication - drop-down list. In different instruments models the current and voltage indicators are located in different ways. To escape any confusion when comparing the indicators of application and hardware you may select an appropriate location of these elements in the program. There are following modes available:

Current and voltage panels automatic location - voltage and current location is chosen depending on the device type;

Voltage panel is always on the left - regardless the device type voltage is displayed on the left;

Current panel is always on the left - regardless the device type current is displayed on the left.

Control and monitoring period - with the help of this CE set the time for control cycle and the device status poll. The program will poll the device status and send commands to it in the automatic control mode with a specified periodicity. The valid range - from 0.1 s up to 60 s.

Control measurements particular accuracy - set this option in order to increase the program main panel indicators capacity. The option is unavailable for devices without control ADC.

Additional settings

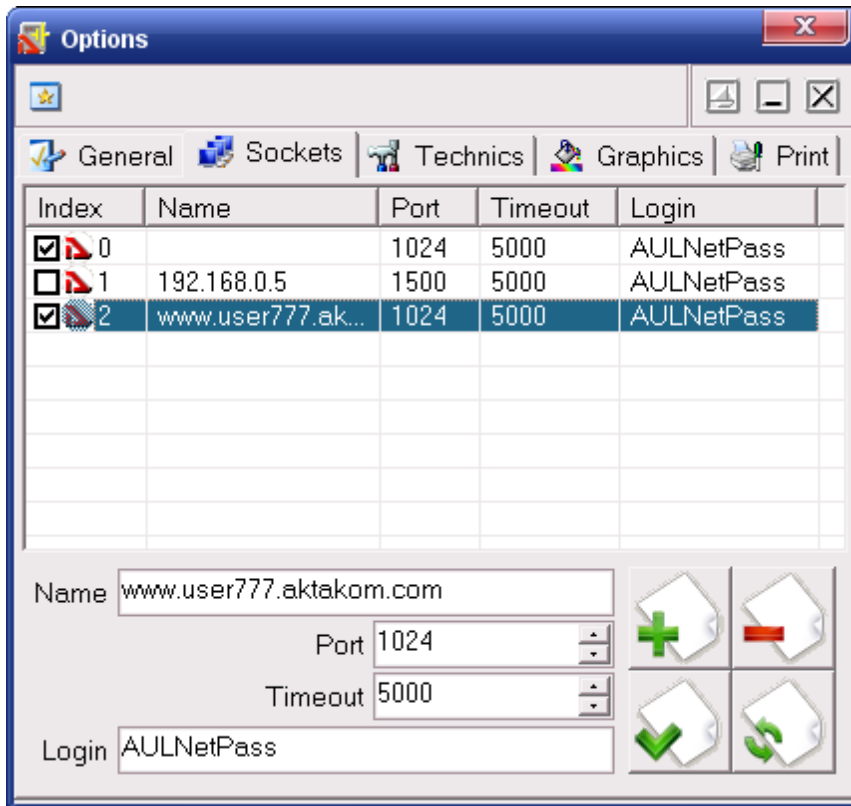
To set the devices network addresses use the [Sockets](#)^[30] tab.

With the help of [Technics](#)^[31] tab you may select a device model and sample for your work and set the standard values for stabilization voltage and current.

[Graphics](#)^[32] tab contains program colour scheme setting elements and other imaging parameters.

[Print](#)^[33] tab contains the print setting elements of work protocol with the device.

2.5.1 Sockets



Allows setting the sockets to work with the devices via TCP/IP computer network (including the Internet). Socket factory settings are shown in [Network parameters settings](#) section.

The table offers AULNet sockets list. Tick off those sockets on which the program should search available instruments. To edit the table content use the control elements at the bottom of the tab.

Name – socket name, domain name (DNS, not more than 256 symbols) or the IP-address of the server which the device is physically connected to.

Port – socket port number (decimal).

Timeout – timeout value for the connection with a socket (in milliseconds, the value on default - 5000).

Login – login-line for the connection to the server (not more than 248 symbols, AULNetPass line is used on default)



- buttons: «Add a socket» (entered parameters are added into the table as a new socket), «Remove a socket» (the dedicated socket is

deleted from the table), «Change a socket» (entered parameters replace the dedicated socket in the table), «Refresh the socket list» (the table content is synchronized with the sockets list kept in the device driver).

Find more details about the sockets use in [Work in computer network](#)^[37] section.

2.5.2 Technics



Controls and indicators description

Standard values - this box allows editing standard values lists for stabilization voltage and current. These values are available when controlling the output parameters from the program [main window](#)^[18].



- buttons: add a value, remove a value, clean the list.

Connection

Device model – the list to select the model needed.

The list of available instruments – the names of appropriate devices. Select the right one and manually enter the name in AULNet format (to find more about names format follow [Work in Computer network](#)^[37] section).

Protocol – text field where a message about the results of connection attempts and test is entered (see below).

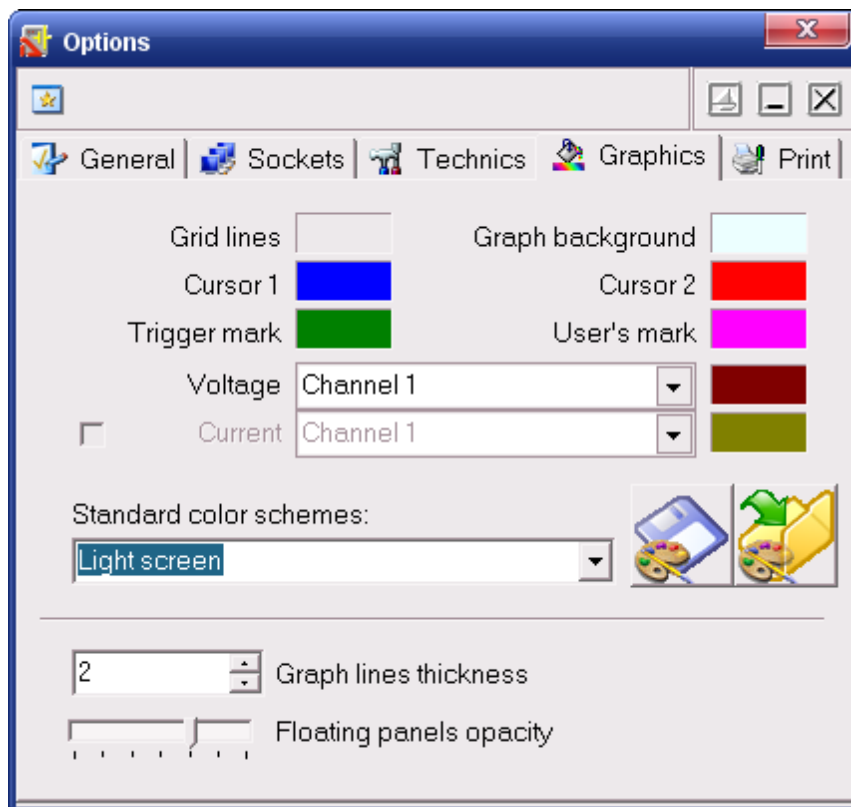


– searching for all devices available for connection, scanning process is made on all specified sockets (see above).



– specified device connection and its test.

2.5.3 Graphics



Allows a user to choose a color of different graphics elements. Clicking the left mouse button allows choosing a color, clicking the right button sets the color on default.

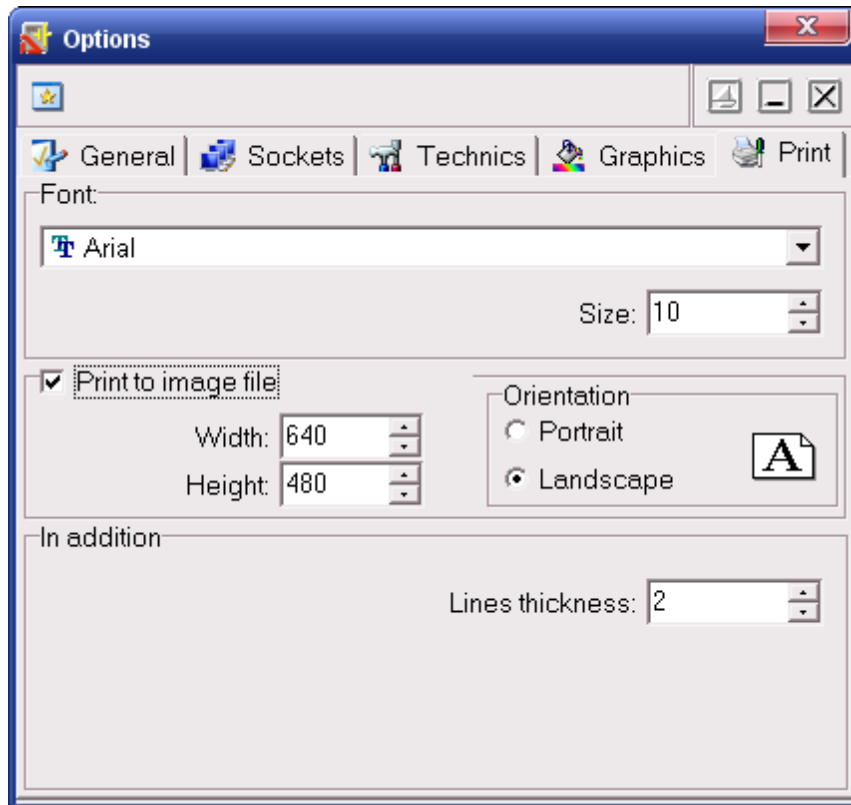
The drop-down list below allows choosing some standard color schemes. The button on the right of the list allows saving user color schemes to files and loading them from files.

Graph lines thickness – sets line thickness of waveforms in pixels in the main window. On default graph line thickness is 1 pixel for maximally clear waveform display. However at high resolution printing or when watching waveforms on a big screen (for example when a projector is used) some very narrow lines become hardly visible. This parameter

use can help you to solve the problem. Note: the parameter increase may slow down the graph redraw, therefore use it with reasonable care.

Floating panels opacity - opacity regulator for floating panels. Regulator leftmost position - maximum transparency, rightmost - complete opacity.

2.5.4 Print



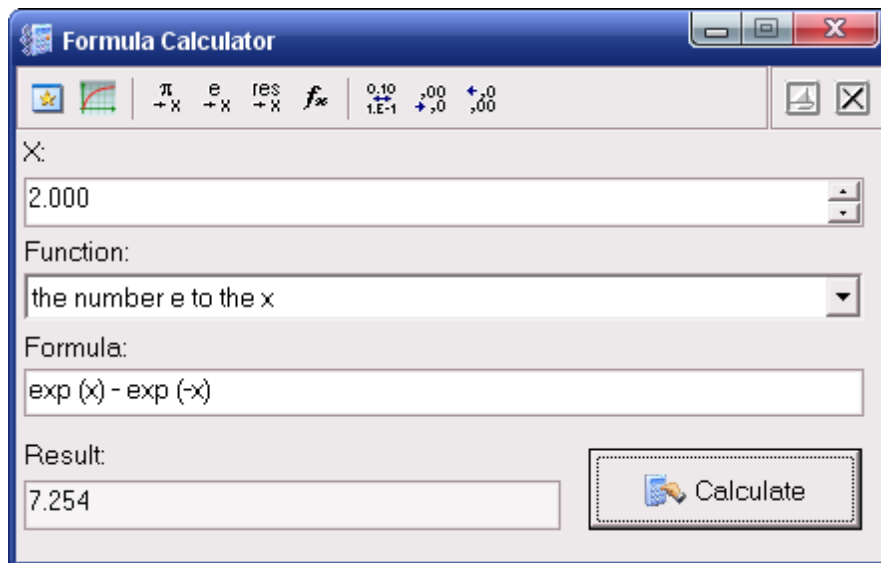
Allows a user to set the print view specifying which data should be printed as well as placing it on the printout the way you need.

Font, size - elements to set the print font.

Print to image file - allows setting and sending protocol print not to paper but into picture file.

In addition the graph line thickness can be specified before printing.

2.6 Formula calculator



Controls and indicators description

π e res - Put Pi value into the variable field: (3.1415...), e (2.7183...) or the result of the previous calculation. f_x - to insert a chosen function into the expression. 0.10 $1.E-1$ - Numbers display format switcher: with a floating point or exponential. $+0.00$ $+0.00$ - decrease or increase the numbers display accuracy (bit). It works only when the exponential format is chosen.

X: - variable field. A number specified here will be displayed instead of "x" parameter in the expression.

Function - choose a standard function from the list.

Formula - mathematical expression for calculation. Read about the rules of writing expressions below.

Result - the latest calculations results.

Calculate - to calculate the expression result.

Rules of writing mathematical expressions

Permitted operation signs: +(addition), -(subtraction), /(division), *(multiplication), ^ (exponentiation). To change the calculation priority use round brackets (). There are

following standard functions:

$\sin(x)$	sine x ;
$\cos(x)$	cosine x ;
$\tan(x)$	tangent x ;
$\text{asin}(x)$	arcsine x ;
$\text{acos}(x)$	arccosine x ;
$\text{atan}(x)$	arctangent x ;
$\sinh(x)$	hyperbolic sine x ;
$\cosh(x)$	hyperbolic cosine x ;
$\tanh(x)$	hyperbolic tangent x ;
$\exp(x)$	number e to x power;
$\ln(x)$	natural logarithm x ;
$\lg(x)$	decimal logarithm x ;
$\text{sqrt}(x)$	square root of x ;
$\text{floor}(x)$	the biggest integer not exceeding x ;
$\text{ceil}(x)$	the smallest integer not less than x ;
$\text{round}(x)$	x rounding to nearest integer
$\text{abs}(x)$	absolute value (module) x ;
$\text{deg}(x)$	converts radians to degrees;
$\text{rad}(x)$	converts degrees to radians;
$\text{sgn}(x)$	x sign, if x - negative number, returns (-1), otherwise (1);
$\text{sgz}(x)$	the same as $\text{sgn}(x)$, but for $x=0$ returns 0
$\text{rand}(x)$	random number from 0 up to the given value x ;
$\text{filetab}(\text{file}, x)$	calculate the interpolated value of $f(x)$ function specified by the table in text file (see the note below).
$\text{binfile}(\text{file}, x)$	x member of the bit sequence specified by the file

Function argument should be placed in round brackets.

Note:

to determine the interpolation nodes **filetab** function uses the text file which name should be indicated as the first argument, without quotes, a coma in the file name is not admitted. If there is only short file name specified without a path to it, this file should be searched for in the program working directory. Interpolation nodes are set line-by-line in the file, in x,y format. For example, a file with the following content:

20.0,0.241

21.0,0.253

22.0,0.266

23.0,0.278

24.0,0.291

25.0,0.303

30.0,0.367

40.0,0.497

50.0,0.630

60.0,0.766

70.0,0.905

75.0,0.975

80.0,1.047

90.0,1.191

100.,1.337

120.,1.637

150.,2.100

170.,2.417

200.,2.901

220.,3.229

250.,3.728

gives voltage dependence function (in millivolts) on BP(A)-2 thermocouple tips from the temperature gradient in the range from 20°C up to 250°C with varied pitch.

To visually edit the table functions use [Tabular editor](#) embedded into the program.

binfile function returns logical value (0 or 1) corresponded to the x bit value in the specified bit file. The file is read byte-by-byte, bits in a byte are calculated from low to high. For example, binfile (func.bin, 15) returns the high bit value of the second byte in func.bin file. If there is only short file name specified without a path to it, this file should be searched for in the program working directory.

You can use also use constants identification in formulas:

$\pi = 3.1415926535897932384626433832795$

$e = 2.7182818284590452353602874713527$

To separate the formula elements you may use spaces (but not in the names of functions).

2.7 The work in the computer network

This software version allows working in "server-client" mode even for the devices without embedded LAN-interface: at the same time the device itself is connected to the computer-server and the data reading is available from any computer of the network. Therefore you need to run a separate application "AKTAKOM AULNet server" on the server. This application is included into the delivery set of the present software which serves as a transmitter between the locally connected device and the connected client application. It's possible to run the client application on the same computer like the server application. Devices equipped with embedded LAN-interface can be connected directly to the network without using a computer-server.

For the connection between with a remote device and the control program use AULNet technology which uses TCP/IP socket subset, familiar both to UNIX and Windows users, as network communication endpoints.

To a user's point of view, accessing to the instrument with AULNet at any point of the network doesn't practically differ from a local access. The "full" name used during the device initialization (in this program - at the connection to the device) is the only difference.

The device full name contains its unique ID (device type and model + serial number), physical connection method (local operating system driver type) and server name. Name parts are separated with a double colon.

Ready for operation AKTAKOM applications usually automate both socket list processing and full names creating. However it is possible to specify connected device name manually. For more info read the rules below.

Syntax:

Angle brackets (<>) are used for names and parameters input; square brackets ([]) - optional fields. The remaining characters must be used without modification. A vertical bar (|) separates alternative methods of parameter input: "either | or."

[AULNET[<interface_type>]::[<socket>::]<device_name>

where:

<interface_type> - one of the symbolic AUL interface designation, e.g.: **AUN** (AUNUsb.sys standard driver), **AUXPR** (USB Xpress driver), **AVCOM** (virtual COM-port), **AEPP** (parallel EPP-port driver).

<socket> = **<socket_number>**|**<socket_parameters>**

<socket>≡**<socket_number >**|**<socket_parameters >**

Shows the socket used for the connection with the device. Either socket number is used entered earlier by the work functions with the servers list or the socket parameters are described (see further).

<socket_parameters>= **@N<server>**[**@P<port>**][**@T<timeout>**][**@L<username>**]

@N<server> - domain name (DNS, 256 characters at most) or physically connected to the tool server IP-address. **@P<port>** - socket port number (decimal number, by default - 1024). **@T<timeout>** - socket connection timeout value (in milliseconds, default value - 5000). **@L<username>** - login to connect to the server (248 characters at most, default name - AULNetPass).

For example: **Nwww.user123.aktakom.com@P1080@ Llogin123**

or: **@ N127.0.0.1@ P1024**

<device_name>=**<model_name>**[**#<serial_number>**]

AUL-device name, composed of the model name (8 symbols) and an optional serial number (16 symbols at most), separated with a space with a "hash" sign - #. For example: **AHP-3121#2310768**.

Substitutional signs and defaults

Some parts of the full device name can be omitted or replaced with an asterisk - *.

If either an AULNET part is completely omitted, i.e. only *device_name* is given, or socket line is omitted or empty, the device is considered to be local and AULNET technology is not used to communicate with it.

If *<interface_type>* field is omitted, the default interface is selected depending on the device model.

If *<device_name>* field does not contain serial number, the attempt is made to the first suitable device ready for use instead of the initial one.

If there is an asterisk symbol *<*>* instead of the *<socket>* field, the search of the specified device is made on all of the servers from the list (set by special functions).

If there is an asterisk symbol *<*>* instead of the *<serial_number>* field, the resort

attempt is made to the first ready for use one-to-one corresponding device.

Specific device drivers can additionally support defaults for supported models.

Examples:

ACK-3106

Attempting to the first ready device which can be used as ACK-3106 (including oscillographic modules ACK-4106, ACK-4166 and ACK-3107 with USB-hub module) and connected to the local machine. A direct connection is used without AULNET use.

AULNET::@N127.0.0.1@P1024::ACK-3106#*

Attempting to the first free ACK-3106 model (oscillographic modules ACK-4106, ACK-4166, ACK-3107 with USB-hub module are ignored), connected to a local machine (IP-address to access the network "itself to itself" - 127.0.0.1) on 1024 port . If there is no socket server with such settings, then it will be added to the list. Added socket list number can be obtained from the open device handler interface. AULNET connection is used.

AULNETAUN:: 2:: AME-1204 # 123456789

Attempting specific AME-1204 model with exact serial number 123456789 and connected through the AUNUsb interface to the socket determined by record number 2 from the previously entered server list. If such entry is not listed, the error will be returned EAULNET_SOCKET_INDEF(-25) - «The socket is not defined».

AULNET::*::AHP-3121#123456789

Search of AHP-3121 model with 123456789 serial number on all servers from the previous list (direct local connections are checked first).

Part



3 Service

3.1 Operation conditions

- Supply and input voltages, storage and operation temperature should be in accordance with the general technical specifications section.
- Relative humidity is not more than 90% at 25° C.
- Atmospheric pressure is from 495 to 795 mm of mercury.
- There should be no dust, acid fume, alkali and gases capable of causing corrosion in the storage and operation areas.
- Fall and vibration are not admitted.
- After being in limiting conditions (storage, transportation) the device cure time in normal (operation) conditions is not less than 2 hours.

3.2 Manufacturer's (provider's) warranty

1.The warranty provides for a free repair or parts and components replacement within the whole warranty period indicated in the warranty service coupon.

2.The manufacturer guarantees the product features compliance with the requirements specified in the "Technical specifications" section within the warranty period following all of the operation conditions specified in the present instruction.

3.Warranty service is provided at the presence of the fulfilled warranty coupon. The warranty coupon is the only document which confirms the right for warranty service. Warranty service is made on the territory of enterprise-manufacturer because after repair or replacement the product should be tested on an engineering test bed. Defected product delivery is made by and at the expense of the consumer unless a special supply contract contains other terms.

4.Warranty obligations for the standard and optional accessories listed in "Configuration" section are valid following the operation conditions within 3 months.

5.Warranty obligations don't cover consumables, diskettes, software unless it has been paid for separately.

6.Replaced (broken) spare parts and components are considered the manufacturer's property. The manufacturer's decisions concerning the warranty should be final.

7.Warranty repair is not made in the following cases:

7.1.the warranty period has expired;

7.2. there is no correctly fulfilled warranty coupon;

7.3. the factory seal or special paper marker have been violated;


7.4. the operation conditions have been violated by the consumer including: supply and input voltages or frequency excess that caused the breakdown of protective power circuit or the defect of highly sensitive input stages; the use of input and network cords, probes etc. not included into the present instruction;


7.5. there are mechanical damages including cracks, chips, breakage of the case or the circuit etc.; heat damage including soldering track, reflow, solder spatter etc.; chemical damages, moisture inside of the device including: oxidation, corrosion, condensate or sea salt spray etc.;

7.6. there are signs of tampering, factory installation violation.

3.3 Update and technical support



 For the software update and AKTAKOM technical support visit our website: <http://www.aktakom.com>

 Also you may ask your questions, send requirements and offers via e-mail: [e-mail: aktakom@gmail.com](mailto:aktakom@gmail.com)



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