

USER GUIDE

- KWadr5000T30
- KWadr5000T60
- KWadr5000T110
- KWadr5000T140
- KWadr5000T250
- KWadr5000T300
- KWadr5000T350



Contents

Introduction	Page 3
1. Critical safety instructions	Page 3
2. Visual appearance	Page 3
3. Installation	Page 4
4. Operating	Page 6
5. Signalization	Page 7
6. Service and storage	Page 7
Enclosure A. Troubleshooting.....	Page 8
Enclosure B. Connection diagram for KWadr5000T to 3 phase mains	Page 9
Enclosure C. MODES «En mode, U», «En mode, I», «En mode, U-I».....	Page 10
Enclosure D. Operating with a program for PC	Page 10
Overview of the control program	Page 11

Introduction

The instructions here after contained in this user guide are applicable for KWadr5000T series power supplies powered by 380 V 50 Hz input mains with 3 phases.

PLEASE SAVE THESE INSTRUCTIONS.

We sincerely thank you for your choosing KWadr5000T power supplies from KW Systems LLC. KWadr5000T will stably provide your equipment with power of a high quality and low ripple voltage. This user guide describes installation and exploitation of KWadr5000T. In order to avoid any problems during further operation of KWadr5000T we draw your attention to the importance of studying of this user guide before operating with KWadr5000T. The user guide includes important safety instructions for operations with KWadr5000T.

Intelligent microprocessor control system

The product KWadr5000T is a microprocessor-controlled power supply. As a consequence the latest technologies allowed to provide a highest performance and wide functionality to the product.

Software for monitoring and control

KWadr5000T together with its special control software allows you to provide the intelligent operation of the power supply system. The supplied version of the software is suitable for most operating systems Windows: XP, 7, Vista, Windows 10. KWadr5000T is controlled by the RS-485 interface using a variety of control devices. In order to operate via a desktop computer, it is required to use a USB-RS485 adapter to connect.

1. Critical safety instructions

⚠ WARNING Danger of electric shock. KWadr5000T is not allowed to be repaired by its users. Danger of electric shock – do not open the cover. Users are not allowed to open or repair the device. Maintenance have to be performed by qualified serviceman. The internal parts of KWadr5000T may be energized and accumulate a high-voltage charge, even if the input AC voltage is off.

(Controlled Environment): Kwadr5000T is intended for installation in controlled environment, i.e. with controlled indoor temperature, humidity and ventilation. Operating temperature range of Kwadr5000T is -20...+55 °C

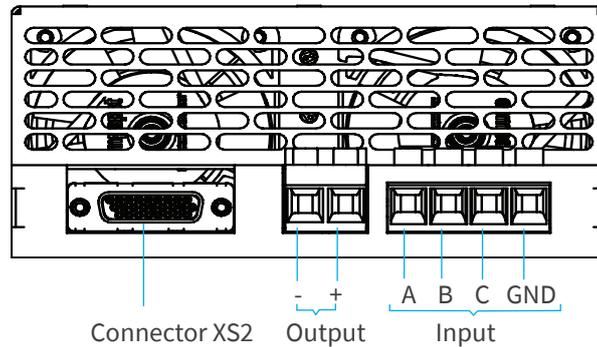
2. Visual appearance

2.1. Front side and LED indicators

There are following elements placed on the front panel of KWadr5000T: air intake grids for cooling fans and 4 LEDs which show the module operation modes and emergency situations. Each LED has the only one color and could operate in 2 modes: lighting and blinking.

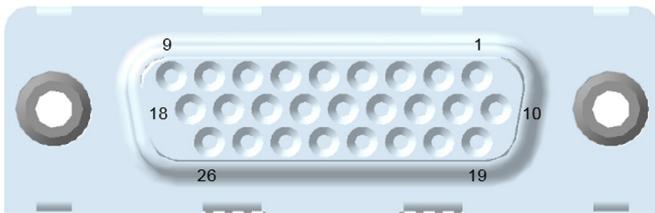
2.2. Rear panel

There are following elements placed on the rear panel of KWadr5000T: 1 connector for control and signal circuits; 2 power screw terminals to connect the 3-phase mains and load.



2.3. Assignment of pins of the signal connector

Attention! Please note: low output voltage models and high output voltage models have different pin assignment of the signal connector.



Type of connector (block side): DHR-26F

Type of connector (response side): DHS-26M

Applicable for models:

KWadr5000T30 and KWadr5000T60

1	VS +	10	VS -	19	Addr.0
2	- DC ok	11	+ DC ok	20	Addr.4
3	Contr	12	NC	21	Addr.2
4	+ Power off	13	Common	22	Addr.2
5	- Power off	14	Common	23	Addr.1
6	Common	15	Common	24	Addr.0
7	CAN-H	16	NC	25	Addr.1
8	CAN-L	17	NC	26	Addr.3
9	DATA-B	18	DATA-B		

KWadr5000T110 and higher

1	+ DC ok	10	+ Power off	19	Addr.0
2	- DC ok	11	- Power off	20	Addr.1
3	NC	12	NC	21	Addr.2
4	Contr	13	Common	22	Addr.3
5	Paral	14	Common	23	Addr.4
6	Common	15	Common	24	K_Addr.0
7	NC	16	NC	25	K_Addr.1
8	DATA-A	17	NC	26	K_Addr.2
9	DATA-B	18	- RS		

3. Installation

Please make the configuration control of KWadr5000T immediately after receipt. The package may be reused; save it for reuse or dispose the package properly.

3.1. Place

Please install the KWadr5000T in a protected and not too dusty place with sufficient ventilation. Do not turn on the KWadr5000T if the temperature and humidity are out of the limits.

3.2. Connection to the power network.

In order to supply KWadr5000T please connect a 3-phase 380 VAC 50 Hz power mains to the screw terminal on the back panel of the module. The phases sequence does not matter. The connection of ground wire is necessary.

If you mount the module on a grounded metal surface then it is possible do not make the ground connection additionally.

⚠ ATTENTION! If you need to connect KWadr5000T to the 3-phase power mains with neutral then it is forbidden to connect the neutral wire to any terminals of the module including the ground terminal! Connecting of such mains (3-phase with neutral) without using of the neutral wire is safe both for the mains and for the module operation. Before the module input terminal, it is recommended to install a 4-pole circuit breaker in order to make possible disconnecting the module. Recommended phase current value for the circuit breaker is 16A, class C either 20A class B. In order to connect input mains use wires with a cross section of 2.5 mm²... 6 mm² maximum.

3.5. Connection to RS-485 interface

Connecting of KWadr5000T to a desktop computer is to be making by means of is using program «KWadr5000_control.exe» provided by KW Systems LLC (Enclosure D). In order to connect KWadr5000T to a desktop computer use isolated USB-RS485 adapter. Connect the RS-485 cable to the XS2 connector placed on the back panel of the module according to the pin assignment described in section 2.3 of these User Guide.

3.6. Connection input and output

Connect the load to the screw terminal on the back side of the module. Please note, if you connect exceeding capacitive load then while charging it switching to the current stabilizing mode is possible, the LED «I stab» will indicate it.

Input connector parameters. Allowed for output connectors for models KWadr5000T140-300

Connection method	Screw connection with tension sleeve
Pluggable	Yes
Conductor cross section solid	0.2 mm ² ... 6 mm ²
Conductor cross section flexible	0.2 mm ² ... 4 mm ²
Conductor cross section AWG / kcmil	24 ... 10
Conductor cross section flexible, with ferrule without plastic sleeve	0.25 mm ² ... 4 mm ²
Conductor cross section, flexible, with ferrule, with plastic sleeve	0.25 mm ² ... 4 mm ²
2 conductors with same cross section, solid	0.2 mm ² ... 1.5 mm ²
2 conductors with same cross section, flexible	0.2 mm ² ... 1.5 mm ²
2 conductors with same cross section, stranded, ferrules without plastic sleeve	0.25 mm ² ... 0.75 mm ²
2 conductors with same cross section, stranded, with TWIN ferrules with plastic sleeve	0.5 mm ² ... 2.5 mm ²
Stripping length	8 mm
Torque	0.5 Nm ... 0.6 Nm

Output screw connector for KWadr5000T30, KWadr5000T60, KWadr5000T110.

Tightening Torque..... 9 Nm

Screw diameter 8 mm

Depth 8 mm

⚠ WARNING: Installation of KWadr5000T have to be carried out by qualified for this purposes personnel properly knowing safety regulations and all locally existing electric standards. In case if the installation is carried out by unqualified for this purpose personnel and the equipment failure occurred as a result of the actions of these personnel, then the manufacturer is not responsible for these failures.

3.8. 19” rack installation

In order to install KWadr5000T in 19” rack it must to be fixed on the mounting shelf. In order to mount the module it is possible to use mounting flanges or to fix the screws on the lower side directly into the threaded bushings located at the bottom of the module. The dimensions of KWadr5000T allow to place it on the shelf in width up to 3 modules. The height of the KWadr5000T is 1.5 U.

M6 screws are used for mounting through the holes at the flanges. M3 screws are used for mounting to the module bottom, the depths of entry into the module body is not more than 6 mm.

⚠ ATTENTION! If the screws are tightened into the module body more than 6 mm, the internal electronic circuit of the module may be damaged and further failure may occur. Such a case will not be recognized as a warranty and may result in replacement of the module.

If you install KWadr5000T as a part of equipment, installation is performed in the same way as installing on a 19” rack on any flat surface. Orientation in space is arbitrary.

It is not allowed to close ventilation grilles by any structural elements and equipment walls, as well as by wires. It is not allowed to place the module close to equipment walls so that the air circulation inside interfered with the cooling of the module.

4. Operating

4.1. Power on

Right after connecting the module KWadr5000T to the input power supply mains, testing of internal systems begins, as indicated by the alternate lighting of the LEDs on the front panel. After that KWadr5000T switches on if the «Contr» pin in the XS2 connector is connected to the common wire. The outputs of the module are supplied by a voltage that level is equal to the software settings. If all parameters are ok, the mains LED lights up on the front panel and it is displayed one of the operating modes — current stabilization or voltage stabilization.

⚠ ATTENTION! The module will only start operating if the «Contr» pin in the XS2 connector is connected to the common wire (section 2, 3).

Cooling fans may change the speed of rotation during operating depending on the temperature and load value. Such operating of the module is normal.

4.2. Switching off

In the absence of emergency conditions KWadr5000T turns off at:

- disconnecting the power supply;
- disconnecting the «Contr» pin in the XS2 connector with the common wire;
- supplying off voltage to the terminals «+Power Off»;

- turning off at the control program by pressing the «Module Off» button.

When the input voltage drops below 100 VAC the module detects the lack of the input and switches off; the cooling fans switch to maximum speed until the internal electrolytic capacitors are discharged. Such operating of the module is normal.

5. Signalization

5.1. LED «MAINS» indicates supply voltage at the input terminals. The LED lights green if the input voltage is within the nominal range and all phases are normal.

5.2. LED «Ustab» lights if KWadr5000T operates in a voltage stabilization mode. Flashing means a disabled state at the program level, with the mains voltage is present at the input terminals.

5.3. LED «Istab» lights green when KWadr5000T is operating in the current source mode. When LED is blinking it means output is switched off by program (software).

5.4. LED “Error” lights red when:

- internal module failure,
- mains voltage out of the rated value;
- overheating;
- exceeding the output voltage.

6. Service and storage

6.1. Service

6.1.1. Keep the module clean and periodically clean the air vents.

6.1.2. Check for loose or unreliable connections.

6.1.3. Place the module at least 5 cm between the back and front panel and the walls of the equipment. Do not close the air vents.

6.1.4. Protect the module from direct contact with liquid, high humidity and condensation.

6.1.5. Install away from fire or highly heated areas.

6.1.6. The module must not be exposed to corrosive substances.

6.2 Storage conditions

Store KWadr5000T closed in a dry place with ambient temperature of -55 to $+70^{\circ}\text{C}$.

Enclosure A. Troubleshooting

Failure	Cause	Solution
No output voltage	<ol style="list-style-type: none"> Mains input voltage is out of rated value. <ol style="list-style-type: none"> One of phases is missing. There is a power off voltage at the terminals «Power Off» The «Control» pin in the XS2 is disconnected with the common wire. Short circuit at the output. Disconnected with the program settings. Switched to the mode of programmable start. Overheating. Too low value of I_{out} is set, which is not meet the load. 	<ol style="list-style-type: none"> Supply proper input voltage, check phases. Stop supplying a power off voltage at the terminals «Power off» Check program settings of module reaction to «remote» pins. Connect the «Control» pin to the common wire. Remove the short circuit. 6. Check the program settings, restart the module. 7. Downgrade the operation temperature. 8. Check the program settings, restart the module.
Measured U _{out} in fact is lower than nominal or preselected U _{out}	<ol style="list-style-type: none"> The module` output is overloaded. Overload value is not reached to a short circuit value. Programmed limits. 	<ol style="list-style-type: none"> Reduce the load to nominal value. Check the program settings of the current and voltage.
U _{out} in fact is higher than nominal U _{out}	<ol style="list-style-type: none"> Program settings. Feedback pins «VS» connected to the load (for low-voltage modules). 	<ol style="list-style-type: none"> Check the program settings. Check the voltage at the load.
Output voltage ripple exceeds the rated value	<ol style="list-style-type: none"> Module starts within ambient temperature lower -20°C. The load is impulse type. 	<ol style="list-style-type: none"> Increase module`s temperature up to operating temperature. Connect additional capacitors at the output.
Module is not detected by the PC or it is not controlled by RS-485	<ol style="list-style-type: none"> Failure of the adapter USB-RS485. Incorrect connection to XS2 connector, connection is broken. Incorrect program settings. 	<ol style="list-style-type: none"> Replace USB-RS485 adapter. Check the connection to XS2. Check program settings.

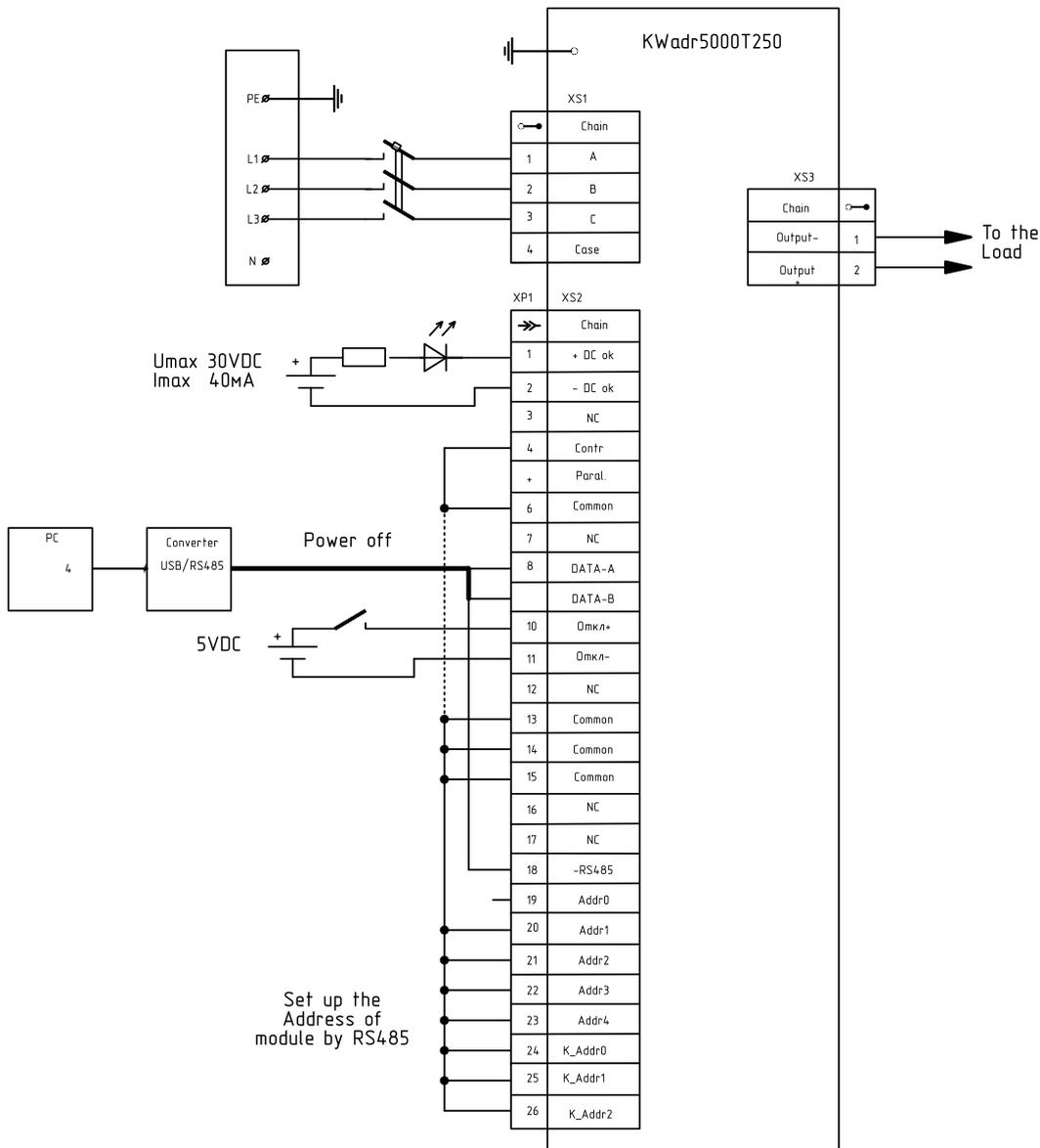
⚠ ATTENTION: If have any questions respecting to installation and service, you can contact our technical support department, KW Systems LLC, Russia, directly by e-mail Techsupport@kwsystems.ru.

Enclosure B. Connection diagram of KWadr5000T250 to the 3-phase mains.

Cross section of wires of input mains – not less then 2 mm².

Cross section of wires of load – not less then 2 mm² for 250&300VDC models.

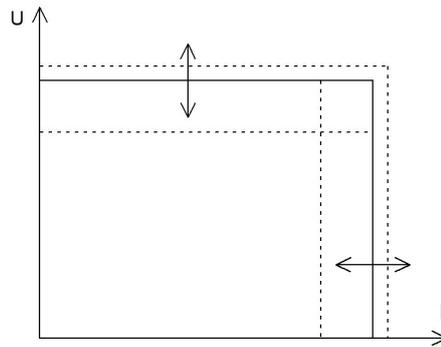
Plug XS2 – type: DHR-26M.



Address of the module for data changing by RS-485 should be set up by means of connecting of Address lines Addr.0...Addr.3 to the «Common». «1» is an opened contact, «0» is a closed contact. The Address is programming in binary 8-bit format, where K_addr.2 is the higher bit and Addr.0 is the lower bit of the address.

Enclosure C. MODES «En mode, U», «En mode, I», «En mode, U-I».

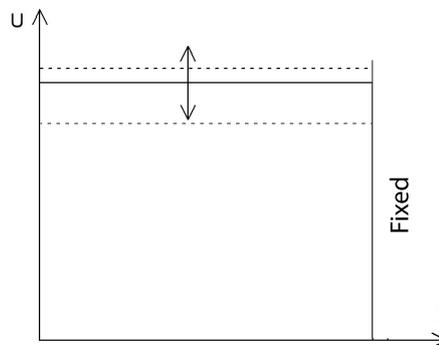
The module is able to operate both in a voltage stabilizing mode as well as in a current stabilizing mode, so it is possible programming of vertical and horizontal characteristics of the output voltage.



The buttons «En mode, U», «En mode, I», «En mode, U-I» correspond enabling and / or switching to the corresponding stabilization mode: «U stabilizing», «I stabilizing», «U-I stabilizing».

It is available to set (to change) U_{out} and I_{out} at the same time operating in the «U-I stabilizing» mode.

The V stabilizing mode allows to change only the set voltage. Setting of the output current is assumed to be at maximum meanwhile:



The I stabilizing mode allows to change only the output current. Setting of the output voltage is assumed to be at maximum in this case.

«U-I stabilizing» is the main mode in common cases. For compatibility with various external control algorithms «U stabilizing» and «I stabilizing» modes were entered as additional.

Enclosure D. Operating with a PC software.

Basic information about the service program.

The service program «KWadr5000_control.exe» is designed to manage, diagnose, and setting the modules of KWadr5000 series. This service program can run on a personal computer with Windows XP/7/8.1/10 operating systems.

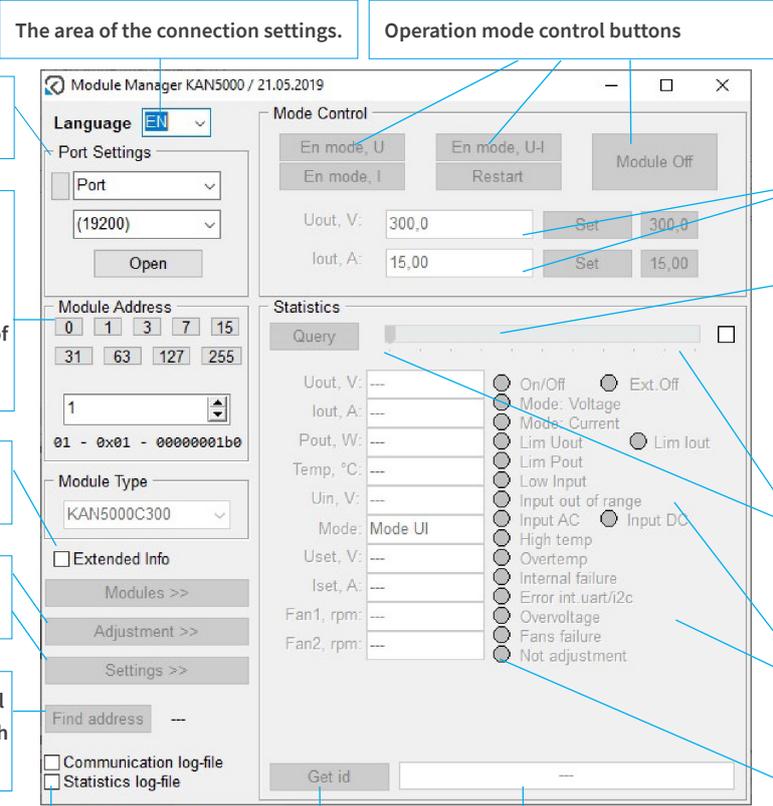
The program allows to:

- request and display basic information about the current status;
- request and display extended information about the current status;

- send control commands of technical status;
- send of set values for output voltage and current;
- send values for calibration;
- read saved values of variable settings;
- change of variable settings;
- perform operations of calibrations and settings with non-volatile memory.

The user can control operation of KWadr5000 modules by a self-developed control program. KW Systems LLC may provide an open program protocol on a request. Please do not hesitate to contact our technical support department by contacts mentioned at our web-site.

Overview of the control program



The area of the connection settings.

Operation mode control buttons

Button for updating the list of available COM ports.

Select the address of the active power Board / module. Top buttons - quick address selection buttons. The line below is the decoding of the decimal address in hex and bin format.

Option to display extended information.

Buttons for displaying calibration areas and settings.

Allows you to find out the actual address in case of problems with its definition.

Quick change of output voltage and current settings.

Status information display area.

Managing the pace of requests. In the leftmost position (by default), only one request is executed.

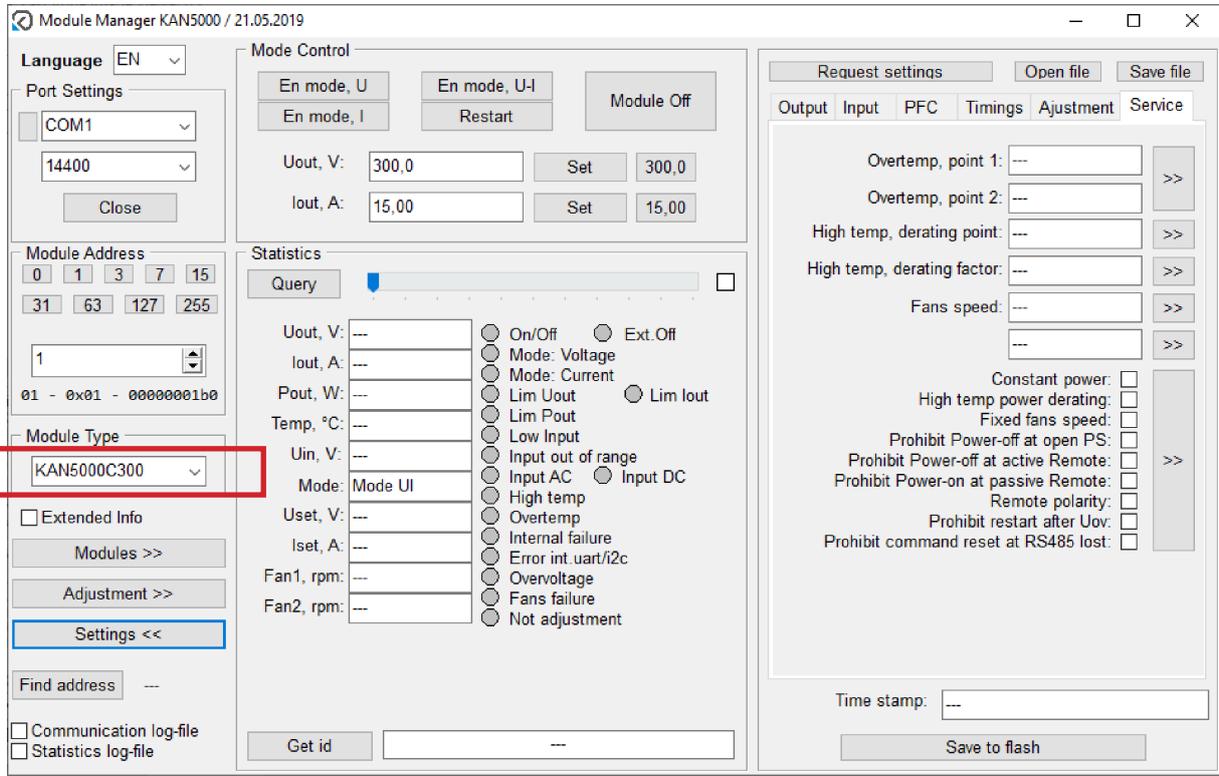
The flags of the RTU registers are displayed as «LEDs».

This flag indicates that there are no saved calibrations and / or settings in memory.

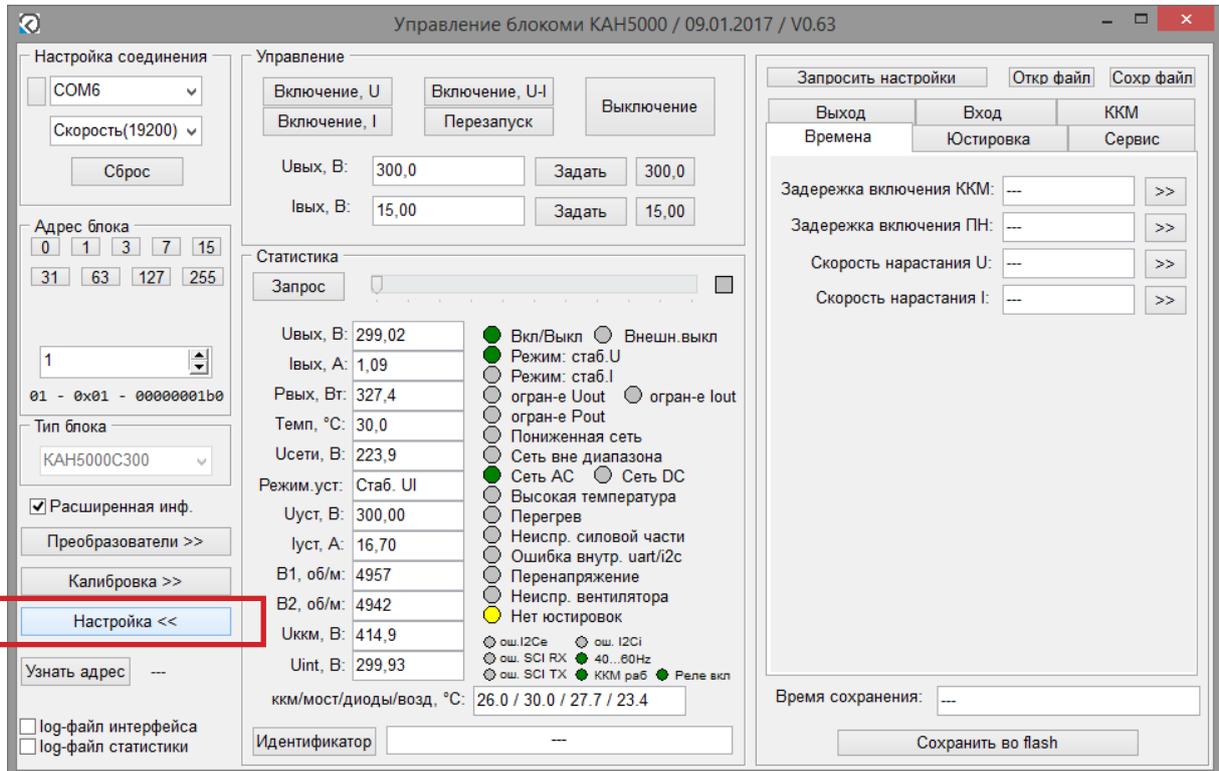
Log file permission.

Request and display an ID card containing information about the program version and about the serial number.

«KWadr5000_control» program in a typical mode with essential comments



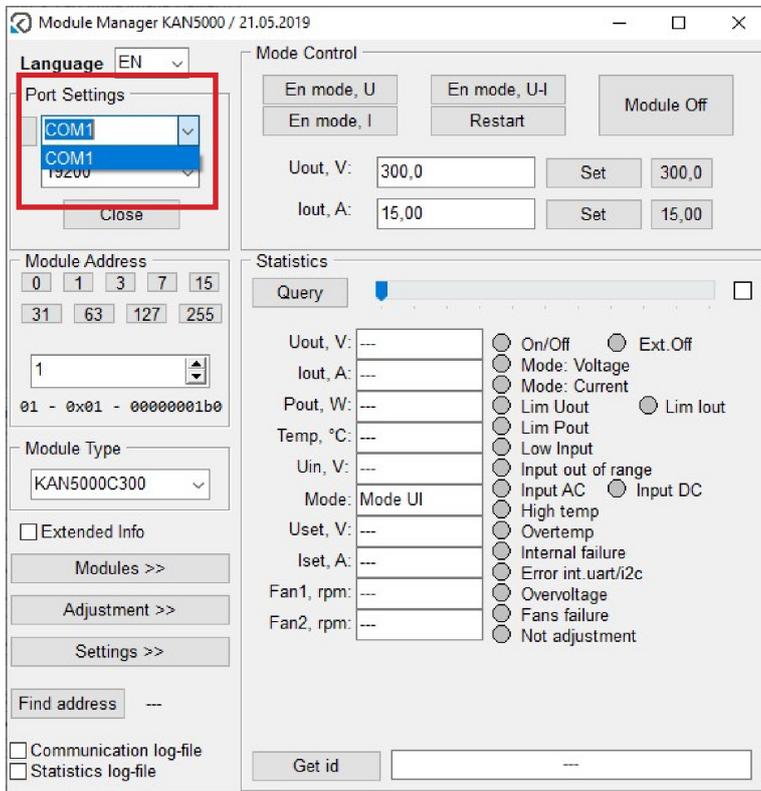
The program «KWadr5000_control» with additional area «Calibration»



The program «KWadr5000_control» with additional area «Settings»

Setting of the service program for operation

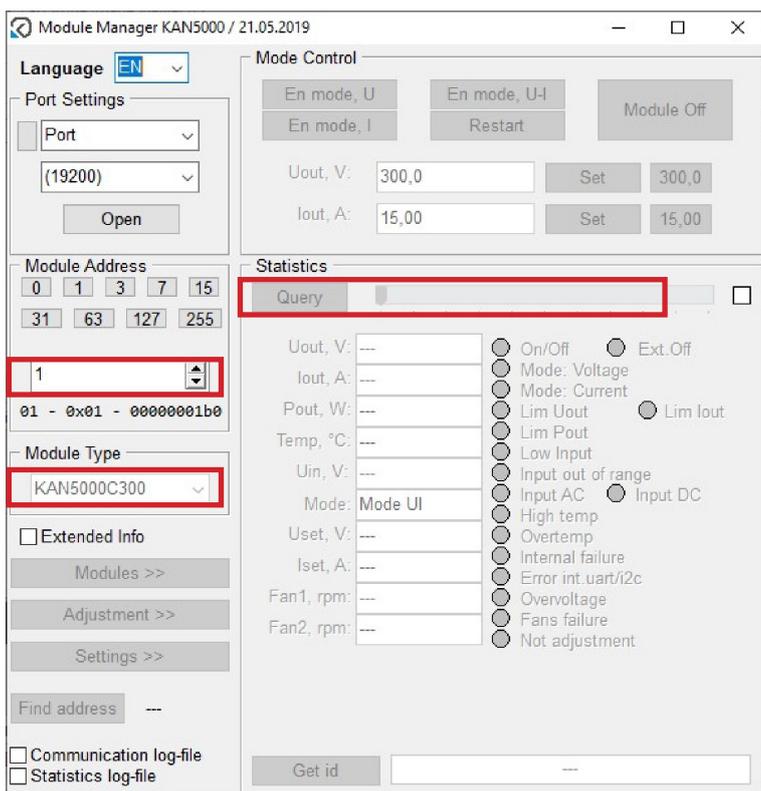
Sequence of actions with the service program to bring it into operation mode:



1.

Appearance of the service program after the start.

- Press the drop-down list Port;
- Choose the number of COM-port corresponding to the converter RS485;
- Leave without any change drop-down list «Rate» (default - 19200);
- Press the button «Close».



2.

Select the desired module type from the drop-down list.

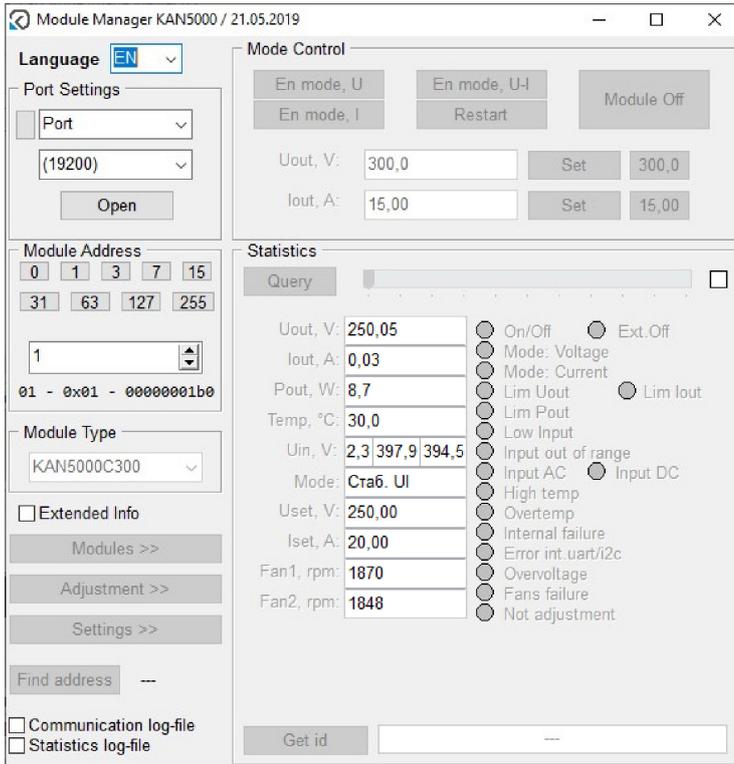
Set the scale at one of right values and press the button «Query».

The scale regulate a frequency of requests.

Make sure that selected address corresponds to the set address of the module.

3.

Make sure that KWadr5000 corresponds: the fields for parameters should be filled automatically after reading the data from the module.

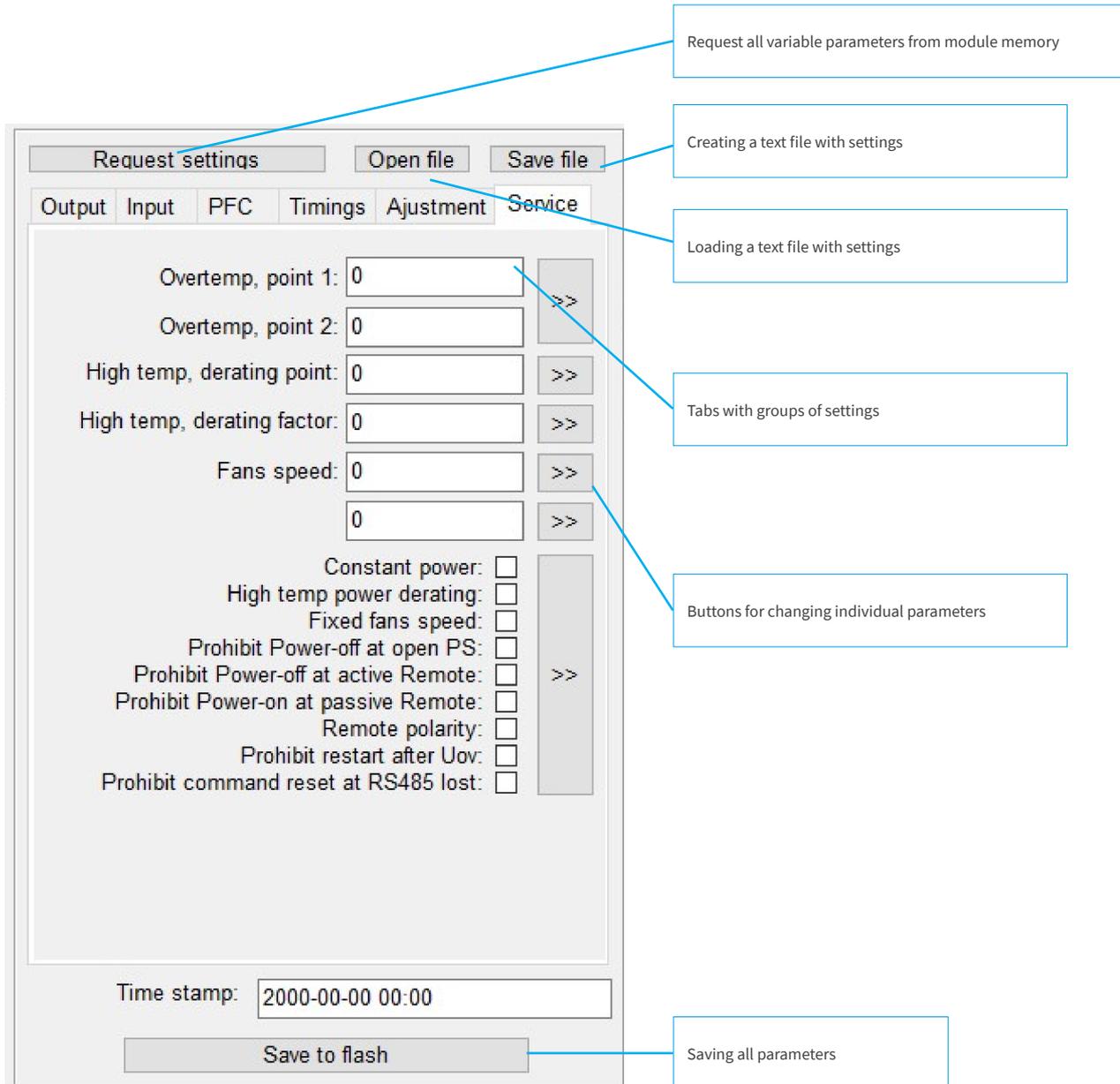


The screenshot shows the 'Module Manager KAN5000 / 21.05.2019' window. It is divided into several sections:

- Language:** Set to EN.
- Port Settings:** Port dropdown set to (19200), with an 'Open' button.
- Module Address:** A grid of address buttons (0, 1, 3, 7, 15, 31, 63, 127, 255) and a dropdown set to 1. Below it is the address '01 - 0x01 - 0000001b0'.
- Module Type:** Dropdown set to 'KAN5000C300'.
- Extended Info:** Three buttons: 'Modules >>', 'Adjustment >>', and 'Settings >>'. Below is a 'Find address' field with '--'.
- Log Files:** Checkboxes for 'Communication log-file' and 'Statistics log-file'.
- Mode Control:** Buttons for 'En mode, U', 'En mode, U-I', 'En mode, I', 'Restart', and 'Module Off'. Below are input fields for 'Uout, V:' (300,0) and 'Iout, A:' (15,00), each with a 'Set' button and a display of the current value.
- Statistics:** A 'Query' input field with a search icon. Below are various parameters:
 - Uout, V: 250,05
 - Iout, A: 0,03
 - Pout, W: 8,7
 - Temp, °C: 30,0
 - Uin, V: 2,3 397,9 394,5
 - Mode: Cra6. UI
 - Uset, V: 250,00
 - Iset, A: 20,00
 - Fan1, rpm: 1870
 - Fan2, rpm: 1848
- Control Indicators:** A list of radio buttons for: On/Off, Mode: Voltage, Mode: Current, Lim Uout, Lim Pout, Low Input, Input out of range, Input AC, Input DC, High temp, Overtemp, Internal failure, Error int. uart/i2c, Overvoltage, Fans failure, and Not adjustment.
- Get id:** A button and a text field with '--'.

Overview of the setting program capabilities

In some cases it is necessary to change the default settings. It is possible to make changes in the additional area of «Settings», or manually, either by changing of certain settings or in a batch way, or by downloading of a corresponding file with settings. A brief overview of the service program for configuring the power supply is showed below.



The screenshot shows a software interface for configuring a power supply. At the top, there are three buttons: "Request settings", "Open file", and "Save file". Below these are five tabs: "Output", "Input", "PFC", "Timings", "Ajustment", and "Service". The "Ajustment" tab is currently selected, showing several numerical input fields with "0" and ">>>" buttons to their right. These fields are labeled: "Overtemp, point 1:", "Overtemp, point 2:", "High temp, derating point:", "High temp, derating factor:", "Fans speed:", and a second "0" field. Below these are several checkboxes for options like "Constant power:", "High temp power derating:", "Fixed fans speed:", "Prohibit Power-off at open PS:", "Prohibit Power-off at active Remote:", "Prohibit Power-on at passive Remote:", "Remote polarity:", "Prohibit restart after Uov:", and "Prohibit command reset at RS485 lost:". At the bottom left, there is a "Time stamp:" field showing "2000-00-00 00:00" and a "Save to flash" button.

Callouts from the right side of the image point to specific features:

- "Request all variable parameters from module memory" points to the "Request settings" button.
- "Creating a text file with settings" points to the "Save file" button.
- "Loading a text file with settings" points to the "Open file" button.
- "Tabs with groups of settings" points to the "Ajustment" tab.
- "Buttons for changing individual parameters" points to the ">>>" buttons next to the numerical input fields.
- "Saving all parameters" points to the "Save to flash" button.

