

MICROART

Presentation of the company MicroART and its production

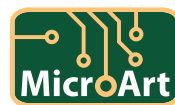
ABOUT THE COMPANY

The company "MicroART" was created as a scientific production and innovation enterprise in Russia, Moscow in April 1992. The achievements of the company were numerous developments in the field of microelectronics. The devices made by the company have certificates of conformity. All the components for their production are bought from the approved producers only and have a high quality.

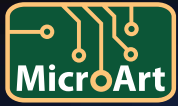
The main assembly production, the adjustment and the system of devices quality control is realized directly in the company. The soldering of printed-circuit board components is made on the modern equipment at the biggest Russian enterprises specialized on microelectronics to assure the better quality.

Since 2000 the "MicroART" LLC has produced and realized a number of developments in the field of electrical engineering and power electronics including those graded as invention and patented ones. These are uninterruptible power supplies, solar controllers, stabilizers, devices of 230 V power supply automatic control.

Inverters, solar controllers and other devices developed by our company are widely known in the Russian market. They have a high level of reliability, and are successfully used both by private individuals and organizations such as Ministry of Emergency Situations, military departments, Russian Railways, ambulance stations and hydrometeostations of the all Russia (for different climatic zones and conditions).



— Since 1992 —



WE BELIEVE

RENEWABLE ENERGY SOURCES MAKE THE FUTURE DIFFERENT





WE BELIEVE

RENEWABLE ENERGY SYSTEMS – FREEDOM AND INDEPENDENCE

AUTONOMOUS AND UNINTERRUPTIBLE POWER SUPPLY





CATEGORIES OF OUR PRODUCTS FOR RENEWABLE ENERGY SYSTEMS



MAC

Multifunctional
Autonomous Converter



SEC

Solar Energy
Controller



PZS

Accumulators
With Tubular



BMS

Battery
Management System



WEC

Wind Energy
Controller



ASS

Automatic Starting
System



VS

Voltage
Stabilizer



MWS

Mobile
Water Source



MSE

Mobile
Source of Energy

AUTONOMOUS AND UNINTERRUPTIBLE POWER SUPPLY



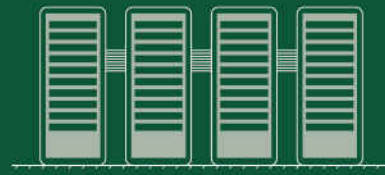
APPLYING OF RENEWABLE ENERGY SYSTEMS WITH OUR PRODUCTS

MILITARY
INSTALLATIONS

MEDICAL
INSTITUTIONS



SERVER
INSTALLATION



IN TRAVEL



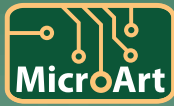
PRIVATE
HOUSES



AUTONOMOUS AND UNINTERRUPTIBLE POWER SUPPLY

MAIN PRODUCTION

Inverters



MAIN PRODUCTION | MAC INVERTERS

COMPONENTS, POTENTIAL AND QUALITY ARE AT THE EUROPEAN MANUFACTURERS LEVEL

DEVELOPED
AND MADE
IN RUSSIA



- Efficiency – 96%
- Record power – up to 20 kW
- Remote control/monitoring
- Ultralow consumption in the idle mode
- Low-frequency toroidal transformer
- Sendust chokes

**MAC INVERTER –
THE HEART OF RENEWABLE ENERGY SYSTEMS**



MAIN PRODUCTION | MAC INVERTERS

The MAC inverter is a multi-functional converter (voltage inverter) of the 12/24/48V direct voltage accumulator battery (AB) to the alternating 230 V 50 Hz voltage performing the function of the AB powerful charging and serves to supply different electric power users (electric tool, household appliances, radio equipment, etc.).

Jointly with a gasoline/diesel/gas generator the device with several AB may serve as an autonomous power source with a very high efficiency. The generator will be turned on only occasionally, once a several twenty-four hours (to recharge the AB) and the power will be available constantly.

Jointly with solar panels and/or a wind generator it may form an autonomous off-grid power plant.

Two modifications of inverters are proposed MAC – MAC HYBRID and MAC DOMINATOR. The model family of MAC inverters is produced with the maximum inverters power – 3 kW to 20 kW.

TECHNICAL DETAILS



Inverters



MAIN PRODUCTION | MAC INVERTERS: MAC HYBRID AND MAC DOMINATOR

MAIN TECHNICAL SPECIFICATIONS OF MAC INVERTER WITH MAXIMAL POWER 20 KW

Name	20kW MAC HYBRID	20kW MAC DOMINATOR
AB voltage	48V	48V
Efficiency, %	96	96
U, V	48.0	48.0
Uout, V	230.00	230.00
~Frequency, Hz	50	50
Peak power, kW*	25.00	25.00
Maximal power, kW	20.00	20.00
Rated power, kW**	13.50	13.50
Self-consumption in idle mode, W	14.4 - 24	14.4 - 24
Built-in microcomputer	-	+
Built-in LAN card	-	+
Relays for generator or other control	-	+
USB port	+	+
Recommended AB total power, Ah	1600	1600
Min total power, Ah	400	400
Max recommended acid AB capacity, Ah	2400	2400
Operating temperature range, °C****	-25...50	-25...50
Dimensions [HxDxW], cm	21×41×56	21×41×56
Net weight, kg	55.30	55.30



MAC HYBRID



MAC DOMINATOR

*Operating time with peak power in MAC autonomous mode – no more 5 sec.

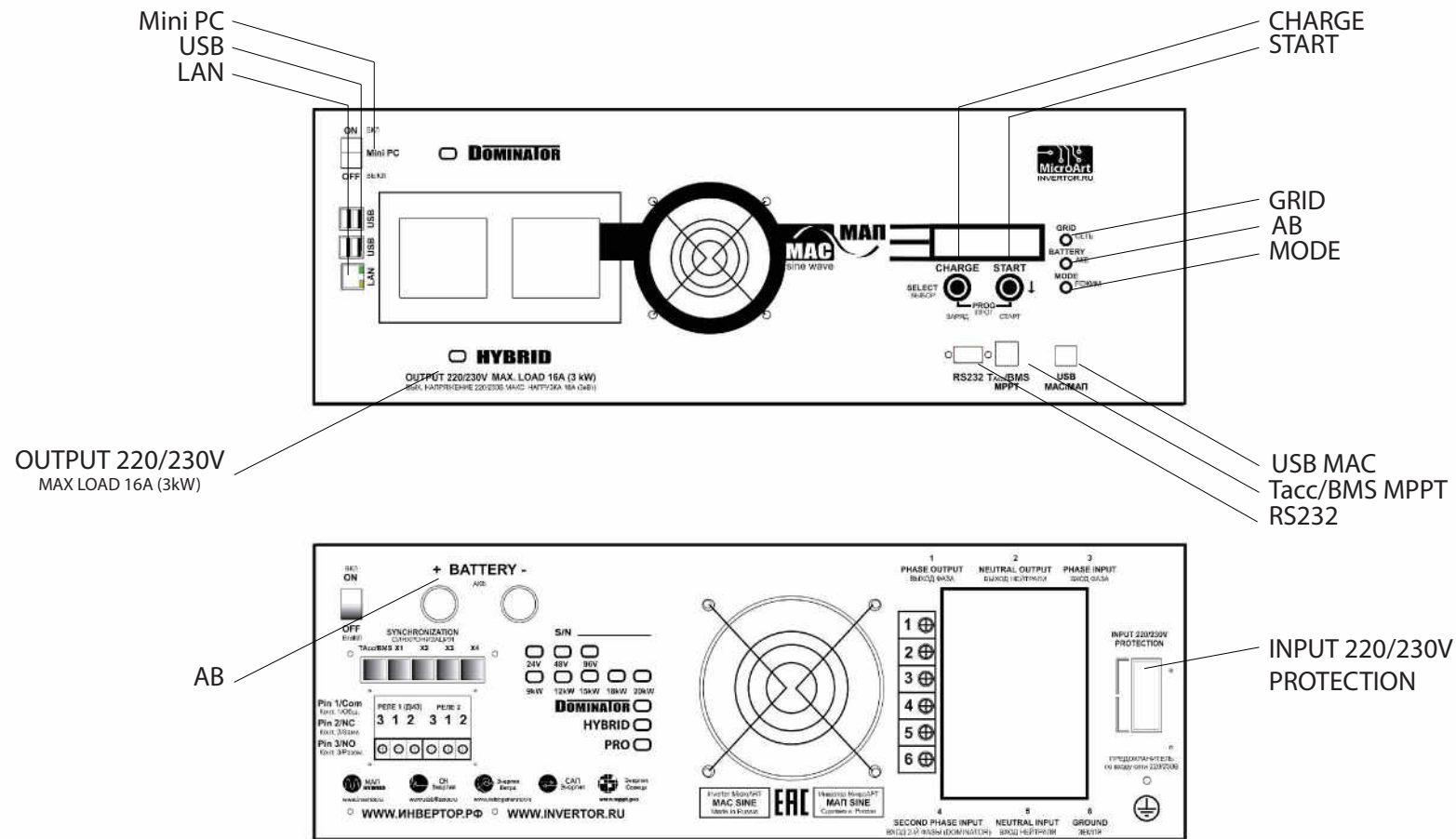
**Operating time with over rated power in MAC autonomous mode – no more than 20 min.

***AB capacity may be very large, but in this case charging time also will be very long

****With the ambient temperature over 25°C the inverter



MAIN PRODUCTION | MAC INVERTERS: MAC DOMINATOR (FACE AND BACK PANEL)





DIFFERENCES OF THE INVERTER OF MODIFICATION MAC DOMINATOR FROM MAC HYBRID

1

MAC DOMINATOR is able to synchronize not only with the 230V network (or with a generator) but to do it in parallel with other inverters MAC DOMINATOR (up to 9 in parallel). It could be useful for gradual rising of power and for system fail-safety growth.

2

MAC DOMINATOR is also able to synchronize with/in a three-phase system. Thus every of three phases can be connected with 1 up to 9 MAC DOMINATOR. Thereby the ultimate power of one three-phase system connected with MAC DOMINATOR 48 V 20 kW (9 MAC x 3 phases), can go up to 540 kW.

3

MAC DOMINATOR has a built-in microcomputer with special software forming the complex called MALINA Appliance. The microcomputer is an autonomous WEB-server on the base of microcomputer with the operational system Linux. The microcomputer collects necessary data from MAC and solar MPPT controller SEC (only one MAC or one solar controller should suffice, though) and outputs them in the format supported by any WEB-browser in any platform. After connecting to a local area network (LAN) the user can monitor/control the devices from any appliance connected to the given network, be it PC, phone or tablet with any OS. With the appropriate connection of the appliance to the Internet monitoring/control may be realized from any appliance connected to it.

Microcomputer with the software (MALINA Appliance) has the Monitor AB function to measure AB real current capacity as well as supplementary feature to switch off the generation 230 V by the MAC inverter at certain % of discharge depth. The connection to a LAN is provided via 10/100 Ethernet port.

Microcomputer also can be connected to USB GSM modem and be able to perform MAC monitoring and control through SMS.

4

MAC DOMINATOR has supplementary relays for generators control with the input for dry contacts or for other devices control, including remote control through the built-in micro-PC or/and USB GSM modem. In addition to RS232, MAC DOMINATOR, also has an USB input.



THE MAIN DIFFERENCES OF MAC HYBRID INVERTER FROM A CONVENTIONAL INVERTER

- 1 MAC HYBRID is able to synchronize with the 230V network (or with an electric generator) and, if necessary, (for example when exceeding power consumption from the network/generator), not to switch over to the 230V generation from AB but add AB energy to network energy. It is much better because the process is running gradually; the addition is quiet equal to the needs. Eventually, in whole, the charge going to the AB is many times lower what allows using this addition much longer that when all the charge would switch to the generation from the AB.
- 2 It is able to add power from alternative energy sources (solar panels, wind generators) in the home network both with using of AB (entirely or partially) and without. AB are still needed so far as a MAC cannot function without them. In case of disconnection from the 220V network they will be needed too. So far as they are not used their life time doesn't become shorter.
- 3 It is able to transfer produced power from the alternative sources to the grid (if there is a supply meter able to subtract registrations by reversal direction of current).
- 4 It is possible to connect it with other devices using I2C bus for their correct joint action (solar controllers SEC™, BMS for LFP AB, etc.)
- 5 MAC HYBRID calculates voltage drop across wires to AB according to the current and carries out the appropriate voltage correction.

FEATURES AND ADVANTAGES



Inverters

1 2 YEAR GARRANTY

The special feature of the company MicroART inverters (MAC) is their high reliability– 2 year garranty, even with unassisted installation of the inverter.

2 LOW ENERGY CONSUMPTION AT 230 V GENERATION

Low energy consumption at 230 V generation during the idle running (Idle mode current 0,3 – 0,7 A due to an expensive toroidal transformer). The possibility of *the sleep mode* activation (automatic switching on/off of 230 V generation only by appearance/disappearance of the load).

3 HIGH PEAK POWER

2 – 2,5 times more than rated one (5 sec)

4 THE AUTOMATIC STARTING

The automatic starting of the emergency/backup gasoline/diesel/gas generator (power station) and its further control (the modification MAC DOMINATOR has a special output – dry contacts for generator starting).

5 WORK IN THE THREE-PHASE SYSTEM

Work in the three-phase system is possible (both with the power network and off-line) – joint action of 3 inverters (synchronization by phases, modification MAC DOMINATOR). The realization of their joint action allows to the system to select “the master” (leading MAC) automatically – *the latter feature is what the best world brands cannot offer.*



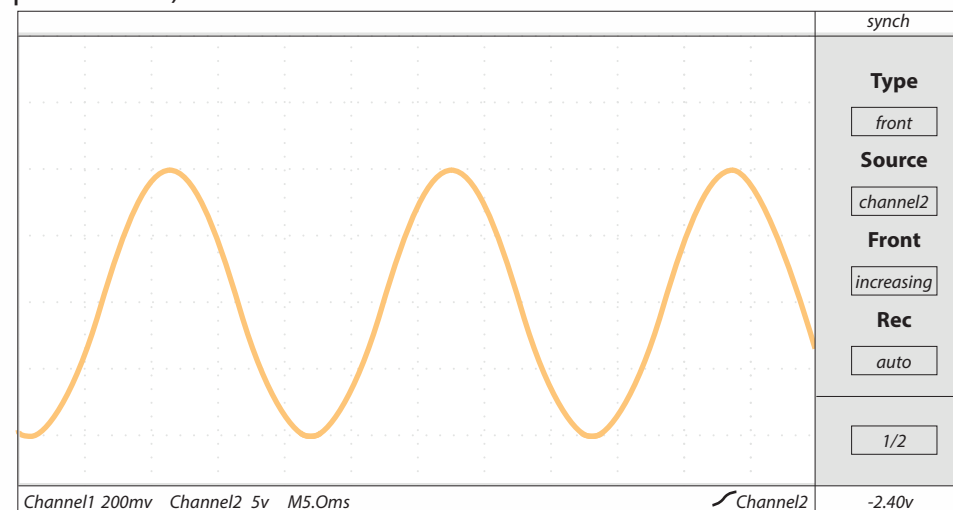
6 WORK IN PARALLEL UP TO 9 INVERTERS

Work in parallel up to 9 inverters (*modification MAC DOMINATOR*) including up to 9 for every phase in three-phase system is possible. The realization of the possibility of their joint work allows the system scaling by increasing the power if it is wanted after some time. It also allows to improve the overall fail-safety so long as in case of the failure of one inverter the rest will go on with working.



7 PURE SINE

The waveform of output signal – pure sine (the accuracy on the rated power is 3%)



8 POWER NETWORK MAINTENANCE MODE

Power network (or generator) maintenance mode: automatic "addition" of the inverter power to network one (or to generator one) with peak loads (modification MAC HYBRID и MAC DOMINATOR).

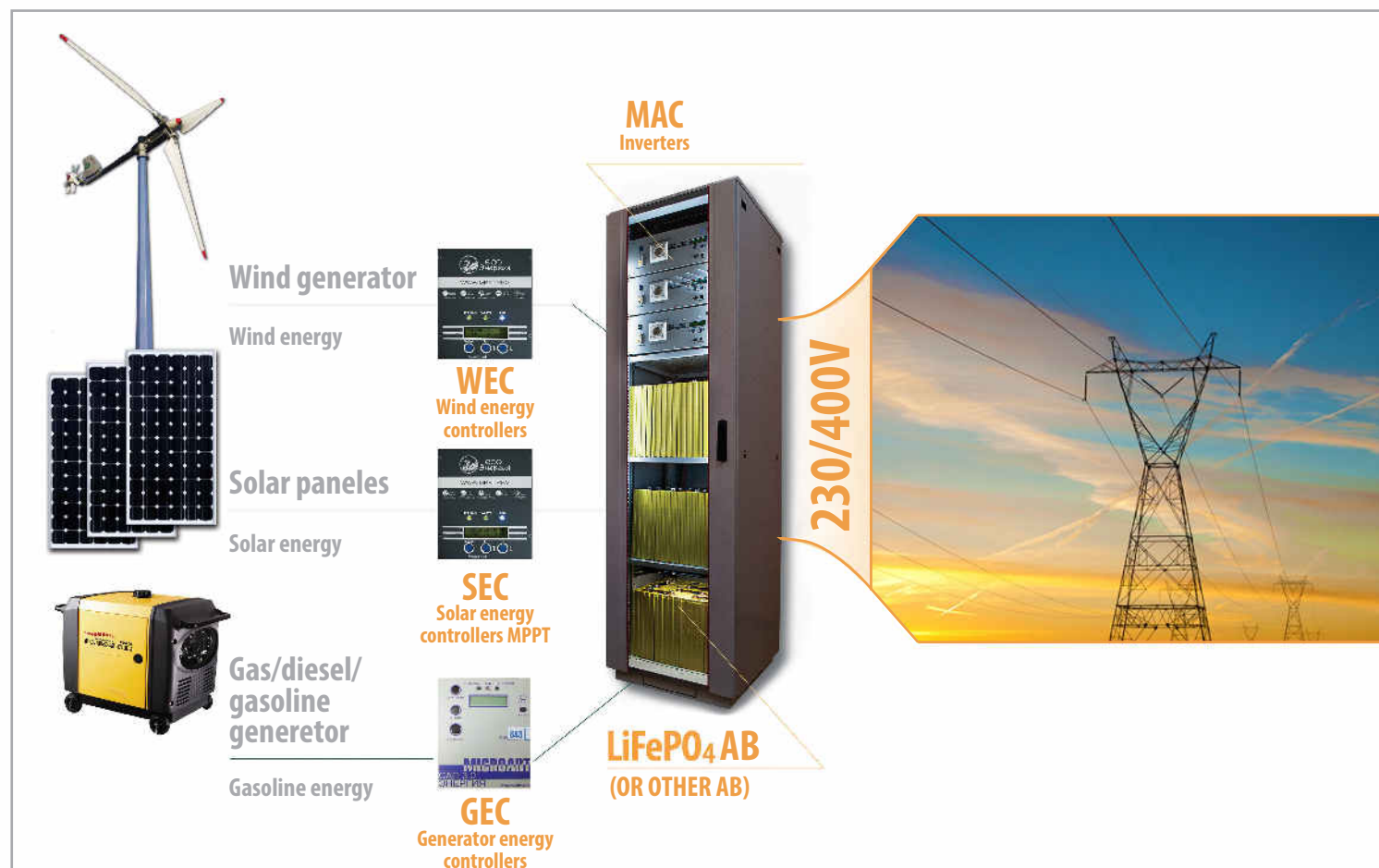
For example, if the house is provided only with 5 kW power one can increase it up to 13 kW when using the MAC 12,0 kW with AB (5 kW from the network + 8 kW rated power from the MAC 12,0 kW = 13 kW), and in case of need the device will automatically pass to AB and add from it the required power to available network power.

9 SETTING OF NETWORK MAINTENANCE TIME PERIODS

Setting of network maintenance time periods, AB charge and generator work AB priority (ECO conditions). The possibility of using the double-rate mode (priority charging of the AB in the nighttime and priority generation from the AB in the daytime).

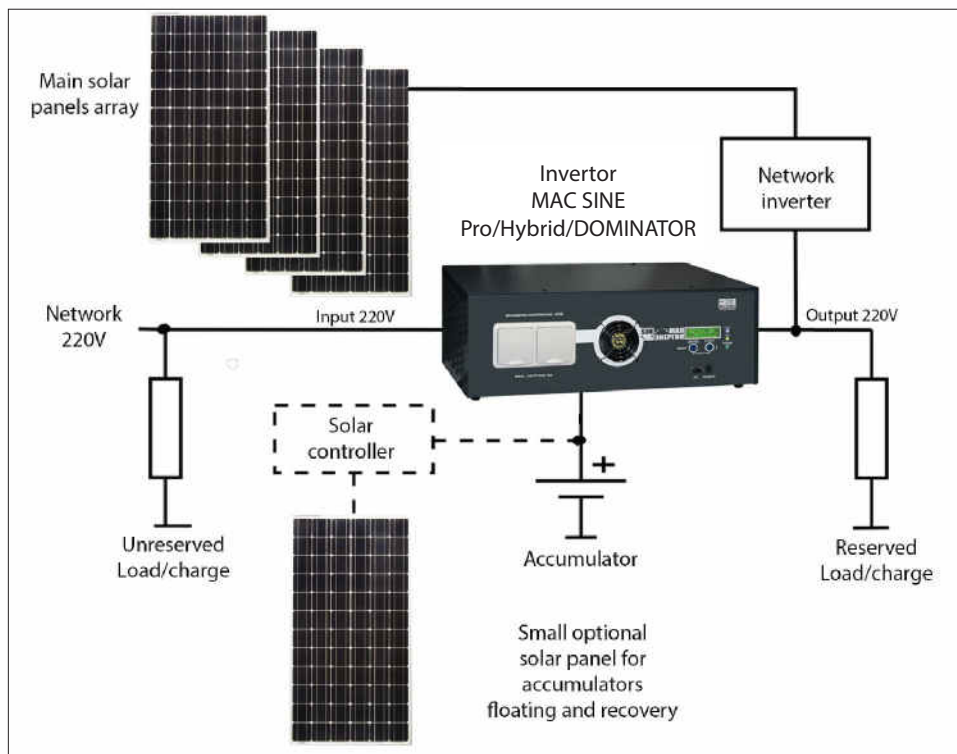
10 POWER "ADDITION" (MIXING) MODE

Power "addition" (mixing) mode from the alternative energy source to save or to sell energy in the network (modifications MAC HYBRID and MAC DOMINATOR), at the same time AB can be idle (a minimal capacity of AB must be present, though).



11 POSSIBILITY OF WORK WITH GRID-TIE INVERTERS

Possibility of work with grid-tie inverters (their frequency-shift automatic power control, the possibility of charging from one's output).



12 POSSIBILITY OF WORK WITH ACCUMULATORS OF ANY TYPE

Possibility of work with accumulators of any type (all acid, gel, AGM, alkaline and lithium iron phosphate (LFP), and it is possible to program without assistance any other to appear in the future). An automatically switched off output to BMS for its control and supply) is provided to work with the LiFePO₄ AB.

13 THE LARGEST SET OF SETTINGS FOR CHARGING AND MAINTAINING ACCUMULATORS

The largest set of settings for charging and maintaining accumulators in work. Intelligent four-stage charge of high quality with temperature compensation and availability of any adjustments.

14 EFFICIENCY UP TO 96%



15 NOISELESS WORK

Noiseless work – the micro-processor controls ventilators with variable rotary speed according to the load for the silent work.

16 PROVIDES THE EQUIPMENT SUPPLEMENTARY PROTECTION

Switching to the accumulators when the input network voltage value goes beyond the specified limits in greater or smaller side. The input voltage range (without the switching to accumulator batteries, as a rule 175V – 250V) is regulated by the user and provides the equipment supplementary protection.

17 THE MOST POWERFUL MODIFICATION IN THE WORLD

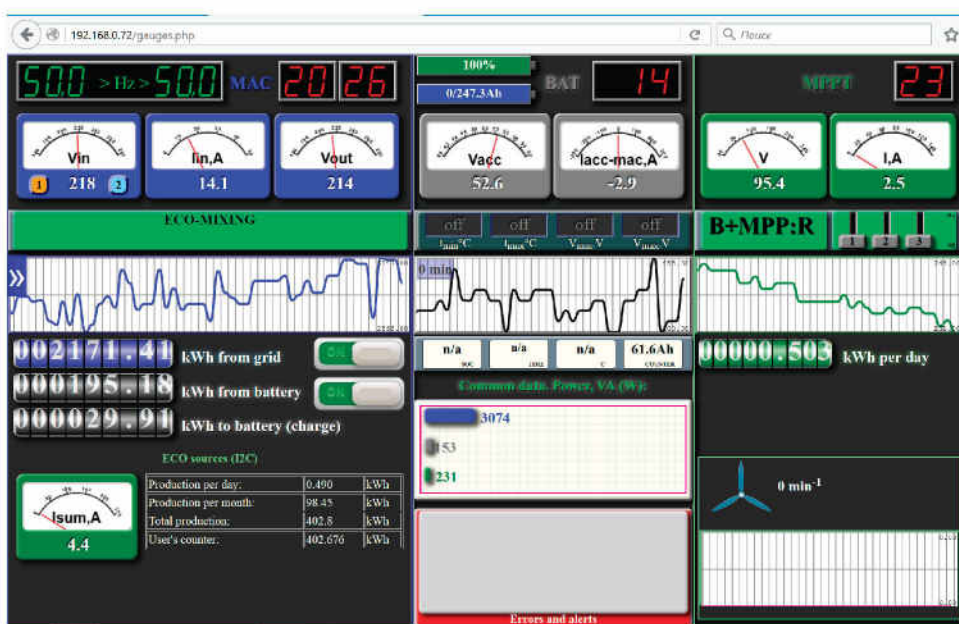
The MAC model 48 20 kW is the most powerful modification in the world of the inverter with secure voltage – *this power is the record as compared with those of the best world brands analogous products.*

18 THE BUILT-IN BYPASS

The built-in bypass (bypass passes network or generator 230V voltage from MAC input to output even if the MAC fails).

19 POSSIBILITY OF DIRECT CONNECTION TO THE COMPUTER

Possibility of direct connection to the computer for monitoring and programming. Free software for the power networks monitoring and MAC control (including remote one) is developed. *For these purposes the inverter MAC DOMINATOR is equipped with its own built-in microcomputer.*



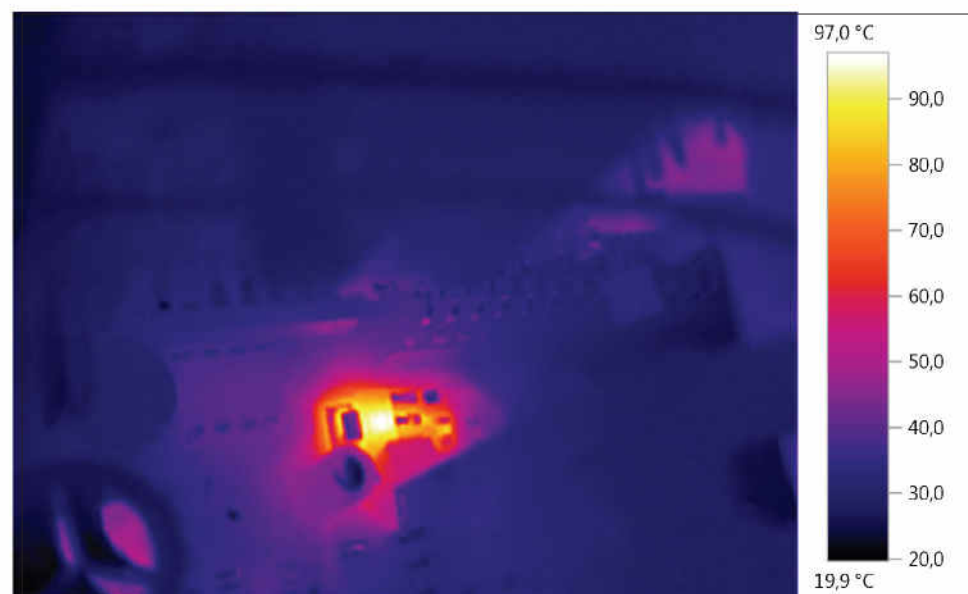
Interface of a programm for the power networks monitoring and MAC control (including remote one)

20 CERTIFIED TEMPERATURE RANGE -25°C TO +35°C

Certified temperature range -25°C to +35°C. The real temperature range can come up to -40°C to +55°C. Outdoor operation is allowed. Testing with ultralow temperatures proved the MAC inverter reliability up to -50°C.

21 QUALITY OF MANUFACTURE AND CONTROL

Quality of manufacture and control. Double checkout and quality department.



22 LIMIT OF POWER CONSUMPTION

Limit of power consumption from 230V source by the way of automatic accumulator batteries charging current reduction. To prevent the overload of the 230V source, in the first place MAC supplies the electric power users and use only surplus current to charge accumulator batteries (in the MAC menu one can set up the maximum power of the 230V source which exceed will not be allowed by MAC).

23 AUTOMATIC SHUTOFF

Automatic shutoff in case of overload, overheating, AB deep discharge and overcharge.

24 ALPHANUMERIC DISPLAY

Alphanumeric display with all parameters and English menu.

25 UPGRADE IS AVAILABLE

Hardware and/or firmware upgrade is available.

26 PROFESSIONAL FABRICATION

Professional fabrication: a high-strength steels plash proof and fire safe body, a high reliability and anti-interference ability.

27 THE BEST PRICE

The price is appreciably lower than that of the best world brands with the same or better features.

28 POSSIBILITY OF MANUFACTURE IN THE 19 INCH BODY

Possibility of manufacture in the 19 inch body designed for standard telecommunication racks.



CIRCUITRY ENGINEERING

Circuitry engineering is based on the using of low-frequency toroidal transformers what although being more expensive ensures vast powers and reliability – *torus are used by the best world brands only.*



A little more about a relatively expensive but qualitative and positive-acting solution applied in MAC: its power part is made on basis of a low-frequency toroidal transformer.

Only the most expensive models of foreign inverters also involve a toroidal transformer but their price is 3 times higher than that of MAC with similar power.

Advantages of a torus over a conventional transformer:

- *Smaller size. Saving more than 50% of the volume.*
- *Smaller weight. Saving more than 50%.*
- *The biggest efficiency. To 50%.*
- *Very low noise level.*
- *Very low electromagnetic interference level.*

Inconveniences:

Higher Price.

MAIN PRODUCTION

Solar energy controllers



SEC SOLAR CONTROLLER – EFFECTIVE CONTROL OF SOLAR POWER

- Efficiency – 98%
- Record current – up to 100 A
- Charge control allowing AB capacity be lower
- Power addition without AB using
- Solar panels voltage at the input – up to 200/250 V
- Fast MPPT algorithm



COMPONENTS, POTENTIAL AND QUALITY ARE AT THE EUROPEAN MANUFACTURERS LEVEL



MAIN PRODUCTION | SOLAR ENERGY CONTROLLERS (SEC). MPPT



SEC PRO



SEC DOMINATOR
(200/100 or 250/60)

Solar charging controller is the important component of solar power station. It provides the correct operating of the rest of equipment, particularly the correct AB charging.

SEC uses MPPT technology. It allows the considerable increasing of produced energy, by 25–30% in comparison with charging controllers with PDM.

SEC controllers work with any solar panels.

The use of current sensors CS 325 A (optionally) allows the controller “to know” complementary external charging/discharging currents from inverter and/or wind generator. It allows automatic decrease of charging current, if it passes simultaneously from wind generator and solar panels and exceeds AB maximum allowable current. The use of this sensor for charging/discharging currents from inverter also allows, as appropriate, instantly adding the required current to the inverter (for charging) from solar panels. It is possible even when AB are charged and the controller has come to low charging current (high current in the end of charging is inadmissible).

It can be also achieved by connecting the controller SEC and the inverter MAC using I2C bus and a special cable.

Two modifications of solar controllers are produced – SEC PRO and SEC DOMINATOR.

TECHNICAL DETAILS



Solar energy controllers



MAIN PRODUCTION | SOLAR ENERGY CONTROLLERS (SEC). MPPT

TECHNICAL DETAILS OF SOLAR CONTROLLERS SEC PRO AND SEC DOMINATOR

Name	SEC Pro 200/60	SEC DOMINATOR 200/100	SEC DOMINATOR 250/60
Technique	MPPT	MPPT	MPPT
Maximal voltage from solar panels, V	200	200	250
Maximal operating voltage from solar panels, V	185	185	230
Max. current to AB (40°C)	60	100	60
Accumulators voltage, V	12 / 24 / 36 / 48 / 96V automatic detection	12 / 24 / 36 / 48 / 96V automatic detection	12 / 24 / 36 / 48 / 96V automatic detection
Type of accumulators	AB: GEL, AGM, closed, open, alkaline, LiFePO₄	AB: GEL, AGM, closed, open, alkaline, LiFePO₄	AB: GEL, AGM, closed, open, alkaline, LiFePO₄
Temperature sensor	External	External	External
Temperature compensation (by default)	-3mV / °C per 2V battery cell	-3mV / °C per 2V battery cell	-3mV / °C per 2V battery cell
Efficiency with full load	12 V: 95% / 24V: 96,5% / 36V: 97% / 48V: 98%	12 V: 95% / 24V: 96,5% / 36V: 97% / 48V: 98%	12 V: 95% / 24V: 96,5% / 36V: 97% / 48V: 98%
Energy consumption in the idle mode	1,9 W	1,9 W	1,9 W
Programmable relay	3 pieces DPST AC: 240V / 16A	3 pieces DPST AC: 240V / 16A	3 pieces DPST AC: 240V / 16A
Inputs for current sensors (sensors are not included)	2 pieces	2 pieces	2 pieces
Presence of I2C bus	+	+	+
Switching ports RS-232 and USB	+	+	+
Body material, colour	Aluminum/steel	Aluminum/steel	Aluminum/steel



TECHNICAL DETAILS OF SOLAR CONTROLLERS SEC PRO AND SEC DOMINATOR

Name	SEC Pro 200/60	SEC DOMINATOR 200/100	SEC DOMINATOR 250/60
Protection class	IP40	IP40	IP40
Installation	Vertical wall mounting	Vertical wall mounting	Vertical wall mounting
Terminals size	35mm ² / AWG2	35mm ² / AWG2	35mm ² / AWG2
Humidity (without condensate)	95%	95%	95%
Cooling	Passive	Passive	Passive
Dimensions [HxDxW], cm	22x12x19	35x12x21	35x12x21
Mass, kg	3.7	5.0	5.0
Protection	Protections from overheating and power loss with high temperature. PV panels short circuit and PVP protection from reversed polarity. In addition, protection from AB reversed polarity.		
Operating temperature	From -40 °C up to 60 °C. With the inside temperature above 65 °C the output current is gradually reducing.		

FEATURES AND ADVANTAGES



Solar energy controllers



MAIN PRODUCTION | SOLAR ENERGY CONTROLLERS (SEC). MPPT: KEY ADVANTAGES

1 ALLOWABLE VOLTAGE IS UP TO 200/250 V

Allowable voltage at the controller input is up to 200 V (or up to 250 V according to a model). It allows to form a solar panels array with parallel chains of up to 3 (or up to 4) solar panels in series with 24 V rating each one.

It is very important to create special conditions to ensure solar panels work on a cloudy weather. For this purpose they must be appropriately connected to make their total voltage high. Then, even with the absence of a direct sunlight their power will be sufficiently high to charge the accumulators.

The further increase of solar panels array voltage (300 V and more) is as usual unreasonable because it cause the considerable drop of controller efficiency and the installation of panels becomes dangerous for life.

2 INPUT AH/WH METER

3 HIGH SPEED

High speed of SEC controllers, and as a result, the efficiency is higher – up to 10% (in comparison with other MPPT controllers) and up to 40% (in comparison with PDM controllers).

4 TWO CURRENT SENSORS BASED ON HALL SENSOR

Two current sensors based on Hall sensor (what is better than an instrument shunt) for the charging/discharging monitoring from the other device (for example, wind generator and/or inverter) – optionally.

5 THE RECORD CURRENT

The record current (up to 100 A or up to 60 A according to modification) and the possibility of working with the 96 V systems allow to receive the record power from one controller: up to 11 kW (100 A current is multiplied by AB buffer voltage – 110 V).

6 BMS CONTROL/TRANSFERS BMS CONTROL TO MAC

The possibility of connection of lithium iron phosphate (LiFePO₄) accumulator batteries with BMS. The controller controls BMS itself or, in case of need, automatically transfers their control to MAC inverter. The controller is connected with MAC by a supplementary cable. MAC also has the possibility of BMS control.

7 THE POSSIBILITY TO WORK IN PAIR WITH A HYBRID INVERTER FOR 220 V NETWORK

Due to currents sensors there is the possibility to work in pair with a hybrid inverter for 220 V network (instant on-demand addition of current, including more than it is allowed for AB charge, without AB – but minimal accumulators must be installed, though). It concerns also any conventional inverters – addition of power from PV panels to the load is performing without AB using.

8 ALLOWS MANUAL SETTING OF ANY VOLTAGES

Besides AB standard voltages 12/24/48/96 V the controller allows manual setting of any user-defined voltages for working with AB. Recommended for operating with unconventional alkaline AB or unconventional number of cells.

9 OWN TRANSFORMER POWER SOURCE

The own transformer power source from solar panels allows controller supplying independently of AB state (work is possible even with completely discharged AB).

10 FIRMWARE UPDATE

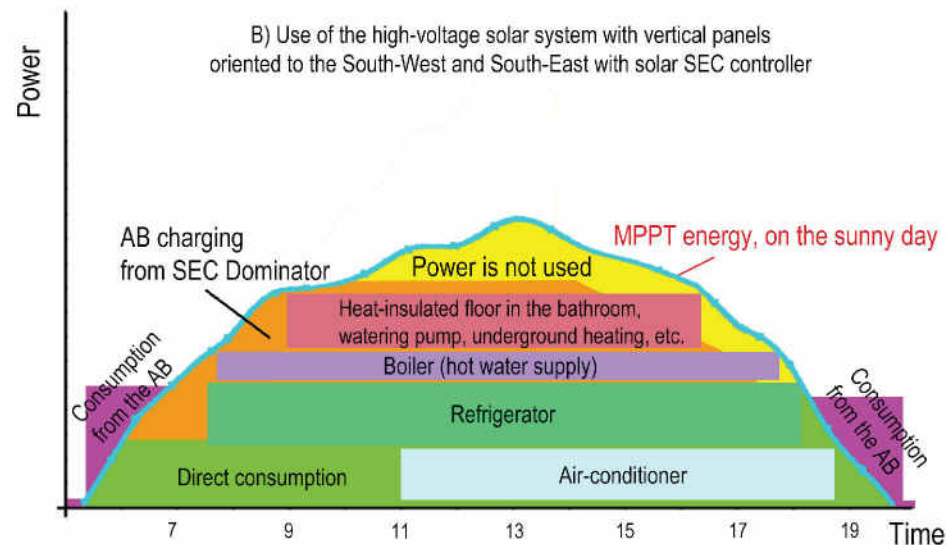
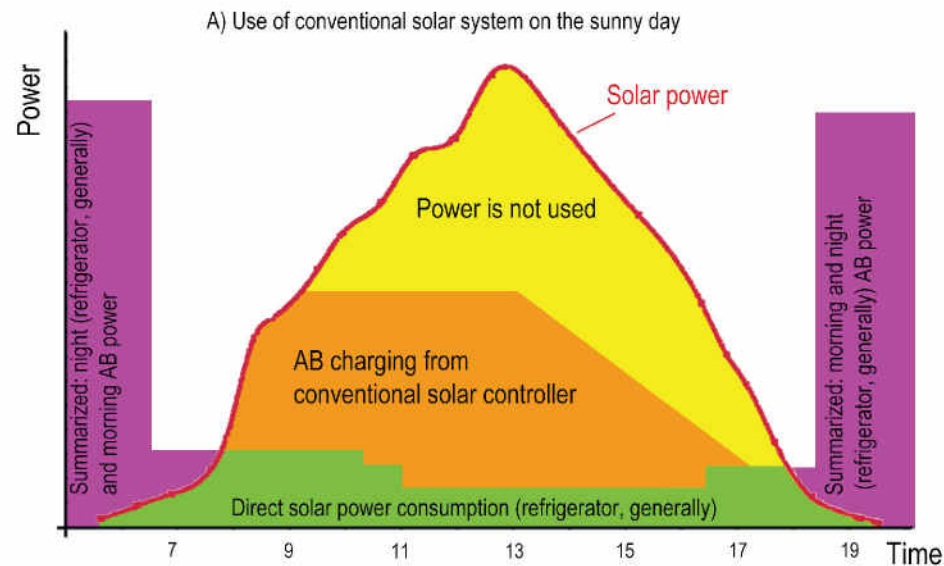
The possibility of firmware update.

11 THREE PROGRAMMABLE POWERFUL OUTPUT DEVICES CONTROL RELAYS

Three programmable powerful output devices control relays (for example, for energy saving in the conditions of full autonomy from power networks – one can switch off a refrigerator with frost accumulators inside for all the night).

As opposed to competitors, SEC have powerful 3,5 kW – 240 V 16 A relays (it is possible, for example, to switch on a refrigerator directly through a controller without any supplementary powerful relay).

Commonly these relays are used to generate an alarm signal and/or to switch on a generator. However, the last tendencies, especially for the autonomy, are the increase of solar panels arrays (but not accumulators) and the commutation of different 220 V appliances (refrigerators, boilers, conditioners, heaters, etc.) for their automatic switching to feed in the daytime. It is due to the fact that the damage of solar panels is almost impossible and they serve ten times more than accumulators.





CONCLUSIONS

The newest fast-acting solar MPPT controllers are a bit more effective as compared with conventional MPPT controllers.

The difference of MPPT controllers' efficiency is not so great. It may be covered by the very small increasing of solar panels power. But the "covering" of missing potential is not always possible. That is why the comparison makes sense only with regard to the price and other features of the controller.

Premium class Solar MPPT controllers (including SEC) differ from cheaper MPPT controllers by:

- *Higher power.*
- *High quality and reliability.*
- *Availability of a display indicating all the parameters and installation-specific settings.*
- *High admissible voltage range (usually up to 150 – 200 V).*
- *Automatic AB voltage detection (usually 12 – 48 V).*
- *Availability of other AB consumers control.*
- *Statistics recording*

High-quality solar systems are usually made with AB connected for 48 V and cheap controllers with MPPT practically don't have this voltage.

MAIN PRODUCTION

Accumulators
with tubular plates (PzS)



MAIN PRODUCTION | ACCUMULATORS WITH TUBULAR PLATES (PzS)



MICROART accumulators
with tubular plates (PzS)

The company "MicroART" offers for sale the following most durable AB: MicroART's lead-acid open type traction AB with tubular plates (with the possibility of water refilling).

Recommended to provide full autonomy and/or for backup systems. AB MicroART lifetime is not less than 10 years under autonomic operating with correct operation (or 80% depth of 1500 discharge (DOD) cycles) or 15 – 17 years with backup supply. Delivered in dry-charged state.

Buying of liquid electrolyte is required (they are filled up on-site). They become practically hermetically sealed after installing of recombination plugs what maintains the best durability parameters.

TECHNICAL DETAILS

A decorative graphic on the right side of the slide consisting of several nested, stylized chevrons or arrow shapes pointing to the right. The lines are thin and dark green, creating a sense of depth and movement.

Accumulators
with tubular plates (PzS)



MAIN PRODUCTION | ACCUMULATORS WITH TUBULAR PLATES (PzS)

Tubular plate AB represent the wide class of high-quality lead-acid accumulators built on the lattice structure plates with tubular electrodes. The so-called tubular positive plates, every component of which is encased in an acid-permeable polymeric bar, are made of chemically pure plumb alloy (metal purity is not less than 99,9%) and 2 – 6% of antimony.

This technology is used for all durable industrial types of AB (tractive, stationary, solar, both low-maintenance and sealed) with a long lifetime.

It should be noted that the durability and reliability of all 12 V AB is lower than that of the same type of accumulators but of 2 V.

This is related to the manufacturing technology. Both 12 V and volt AB are formed by the same cell jars of 2 V low-capacity accumulators assembled in common body with concealed connections. Therefore, every single 12 V accumulator consists of six built-in small 2 V accumulators. That is why it is advised, to improve the reliability and the durability, to compose the required capacity from 2 cell jars of high-capacity accumulators.

Preliminary conclusion: traction tubular plate AB (AB with a very-high-purity free electrolyte and recombination plugs are advisable) are the most suitable for the features price/durability for the autonomous and backup energy supply.

Traction AB may be used in electric hoists and other kinds of electrical machinery. Usually, a battery pack for required voltage is made of 2 V high-capacity batteries (1200 A·h).

The mentioned traction AB are made by tubular plate technology and refer to tractive, but they can be successfully used for autonomous and uninterruptible energy supply. Their standard labeling – Low-Maintenance PzS (is the German abbreviation of “Panzerplatten Standard”).

A similar modification of MicroART AB is offered.



MAIN PRODUCTION | ACCUMULATORS WITH TUBULAR PLATES (PzS)



MICROART accumulators
with tubular plates (PzS)

These are low-maintenance lead-acid 2 V AB with positive tubular plates.

An accumulator is composed of the block of positive tubular plates and the negatives lattice plates. That construction of the positive plates prevents their faster destruction and provides long accumulators lifetime in general. Tubular plate accumulators stand at least 1500 charge-discharge cycles before the AB capacity drops by 20-25%.

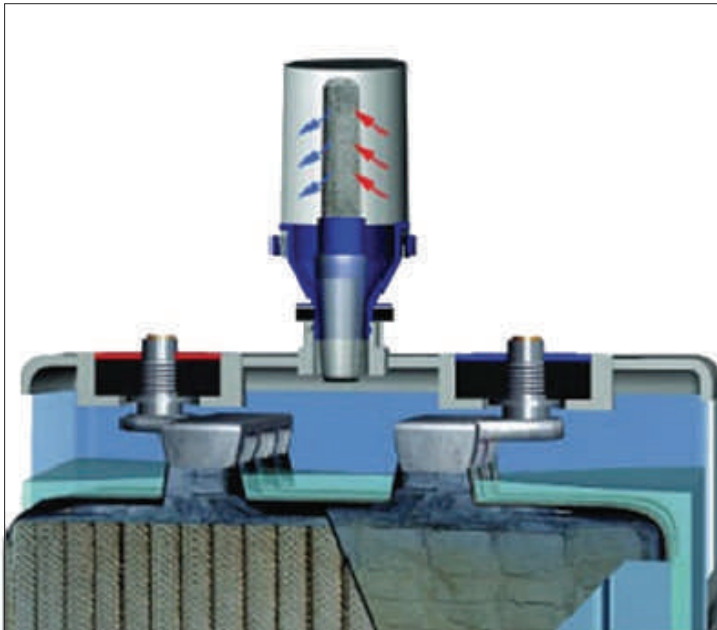
The standard family (2 V accumulators are connected in series to provide 12, 24, 48 or 96 V required voltage) is the following:

- 210 A·h 2 V
- 400 A·h 2 V
- 720 A·h 2 V
- 960 A·h 2 V

2 V accumulators have a capacity up 960 A·h that allows to reduce their total number.

Also, special plugs with catalysts for hydrogen recuperation are offered. It allows to reduce the requirements for room ventilation and the likelihood to miss out electrolyte level checkup, what may cause the premature AB damage. There are two types of catalysts operating with the AB up 500 A·h to 1000 A·h).

As a result, the requirements to the necessity of room ventilation are reduced in many times! It is advised to check up electrolyte level (for water refilling, if necessary) only 1 time every 3 – 6 years (it depends on the use intensity).



PRINCIPLE OF RECOMBINATION PLUGS OPERATION

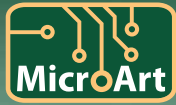
Escaping from the AB hydrogen combines with oxygen and transforms into water, which, condensing by drops, flows back into the battery. Therefore, the electrolyte level may be checked up not once a year but every 6 years.

In addition, the PzS AB are usually made with the content of antimony in the lead alloy up to 6%, and in the OPzS it is up to 3%. It contributes to less water evaporation and allows checking up the electrolyte level every 3 years without any recombination plugs.

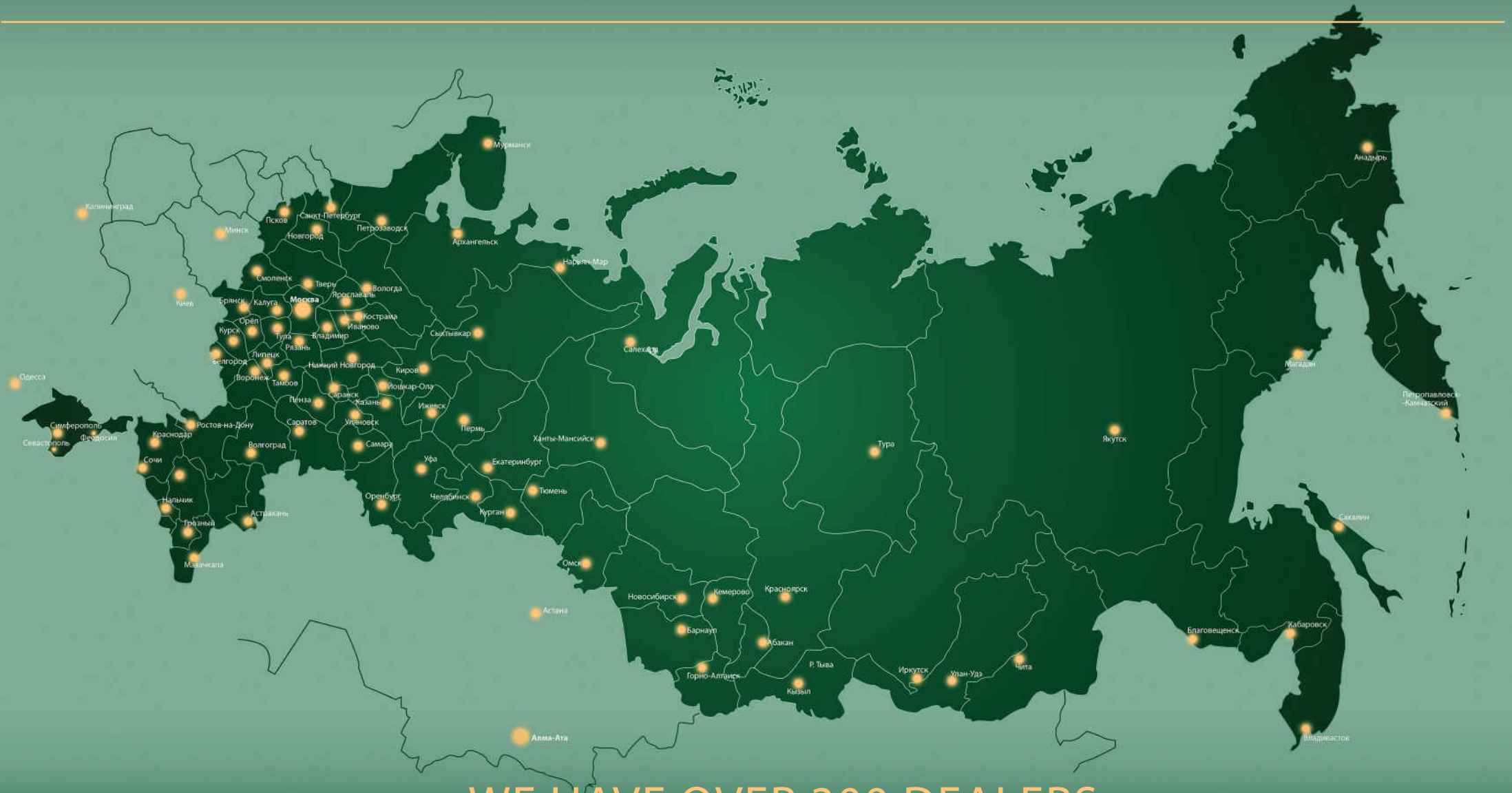
However, with recombination plugs greater evaporation will be of no importance and higher antimony content makes the AB more resistant to deep discharges. And this is especially important for the purposes of the autonomous or backup power supply.

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