Scientific Industrial Enterprise LLC «AVEK»



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- □ Field of activity: Digitalization of Resource Consumption on the Basis of Innovative Devices of Demand Side Management in Smart Grids, Smart Cities and Smart Homes.
- Number of years on the market, date of the company establishment: 10 years on the market, November 9, 2009
- Company turnover: **11 million**
- □ Location of the head office: 630049, the Russian Federation, Novosibirsk Red Avenue, 220, building 53
- □ Locations of the production facilities: 630049, the Russian Federation, Novosibirsk, Red Avenue, 220, building 53
- Export share, export country: 50-80%, European Union countries, United States of America, Community of Independent States (CIS) countries, Ukraine, etc
- Company ownership: **100%**

## **PRODUCTS**The patented devices of Demand Side Management<br/>– the Normalizers of AC Voltage **NORMEL**

Normalizers of AC Voltage are switched to electrical input of buildings, constructions, industrial equipment, street lights,i. e. to all energy consumers anywhere around the world



DEVICES WITH THE SIMILAR EFFECT IN THE WORLD DO NOT EXIST.



- 1. The mass use of the method and devices in electric energy systems of many countries allows to maintain in practice International standards on the norms of electric energy quality, identical in different countries of the world, for example:
- GOST 32144-2013 inter-state standard of Armenia, Belarus, Kyrgyzstan, the Russian Federation, Tajikistan, Uzbekistan "Electric energy. Electromagnetic compatibility of technical means. Norms of quality of electric energy in the systems of electric supply of public grids";
- Standard EN 50160: 2010 (NEQ) the standard of the countries of the European Union «VOLTAGE CHARACTERISTICS in PUBLIC DISTRIBUTION SYSTEMS»;
- corresponding standards in any regions of the world.





**2.** The consumption of electric energy according to the meter reduces from 7% to 24%, depending on the character of electric load with the preservation of conditions for normal work of the equipment.

**3.** The working time of technological equipment, household and light appliances increases significantly.





#### 4. The losses in the electric grid reduce not less than by 10%, which increases the possibility of switching additional equivalent capacities to the electric energy system, that is to increase in transfer capacity of electric grids takes place..







**5.** The mass use of technology in electric energy systems reduces the consumed power and allows to increase the stability of work of synchronous generators at power stations due to the increase in their stability to short circuits, voltage fluctuations, other transition modes, **on the whole the stability and the reliability of energy system increase.** 







**6.** The period between the reconstruction works in electric grids increases significantly.

7. The devices NORMEL<sup>™</sup> can be integrated into the automated system of managing the electric energy system , as they possess all information channels, necessary for this.







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- 8. The essence of new innovative decision is in the following: to provide the operation of the normalizer with new functions preserving at the same time all its positive features:...
- 1. collecting, recording, managing and transferring the information to a channel, preferable for the supplying organization, for further dispatching on a higher level.
- 2. providing feedback with dispatching systems of resource-supplying organizations with a possibility of distant managing supplying organizations (managing valves, dampers (air ventilating flaps), frequency converters of electric engines), i.e. automation of managing systems by operating devices;.
- 3. providing systems of video observation, safety and fire alarm with similar possibilities, etc.



Resource Consumption Monitoring on the Basis of Devices normalizers NORMELTM®© CONSUMPTION OF A STREAM OF A STREAM

gas

Ration of the contraction of the °° Amount & Amount & Annual Distance heat power energy water energy

# Image: Notal Economic EffectFROM THE SYSTEMIC APPLICATION OFINNOVATIVE TECHNOLOGY NORMEL

With the system mass application of innovative technology NORMEL<sup>™®©</sup> in electric power systems of the world the total economic effect due to reduction of consumption of the electric power and improvement of its quality makes MORE THAN **50% SAVINGS OF FINANCIAL AND OTHER RESOURCES**, ASSOCIATED WITH

1. ELECTRICITY PRODUCTION;

2. ELECTRICITY TRANSMISSION;

3. CONSUMPTION OF ELECTRIC AND THERMAL ENERGY, GAS, WATER AND OIL, AS WELL AS ALL RELEVANT ENVIRONMENTAL AND SOCIAL EFFECTS.





#### **NORMALIZERS APPLICATION AREA**



**Smart Power grid** 

House



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**S**\_\_\_

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Power

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#### **Geography of usage is** the whole world

**Smart House** 

#### **Smart City**





#### **LOGISTICS FEATURES**





## **NORMEL<sup>TM</sup>®© TECHNOLOGY PATENTS**

Scientific Industrial Enterprise LLC "AVEC" was set up in 2009 in Novosibirsk, RF, at present it is the only enterprise in the world that produces and improves the innovative patented device for the management of electric power consumption called

#### Normalizer of AC Voltage NORMEL $^{\text{TM} \textcircled{RC}}$

#### The technical essence of the technology is set out in patents

- **1. 2003 ---** Patent for invention RF RU Nº 2237270
- 2. 2006 --- United States Patent Nº 7.816.894
  - «Method and Apparatus for Regulating Voltage»
- 3. 2008 --- Patent for invention RF RU Nº 2377630
- **4. 2011 --- Utility model patent RF RU Nº 120499** «Voltage regulation device for electrical installations of consumers»
- 5. 2013 --- Eurasian patent for invention Nº 018813
- 6. 2013 --- Patent on invention Ukraine Nº 103498
- 7. 2016 --- European Patent Nº 2343620 «Alternating voltage stabilizer with protection elements (embodiments)»
- **8. 2016 --- Patent for invention RF RU Nº 2618115** «The Normalizer of AC voltage»



## Scientific Industriel Enterprise LLC «AVEK» - the world's only official owner of intellectual property on manufactured devices







**CERTIFICATES** 

 Trademark certificate NORMEL<sup>™</sup>®© № 436079. (annex to the patent № 2377630)

**2.** Certificate of conformity of the Customs Union TC RU C-RU. AЛ32.B.00069. Series RU № 0050178

**3.** Certificate of conformity of the quality management system № ST.RU.0001.P3977926

**4.** Certificate of compliance with technical regulations on fire safety requirements Nº 000051

**5. EC/EU CONFORMITY CERTIFICATE Nº171299284**. Reg. Nº009/P-018. ISSUE DATE: 19.12.2017 EXPIRY DATE: 18.12.2020





#### CERTIFICATES





#### Comparison of characteristics of normalizers **NORMEL**<sup>™®©</sup> and standard stabilizers with the capacity 55 kVA

| Characteristic                                 | Standard Stabilizers  | Energy Saving Normalizers NORMEL <sup>™®©</sup>                                     |
|--|---|---|
| Capacity                                       | 55 kVA  | 55 kVA  |
| Reduction of expenses<br>on electrical energy  | do not reduce expenses, as they themselves are users of electrical energy | up to 25 %  |
| Joint economic effect                          |   | up to 60 %  |
| The quality of the received energy             | sometimes<br>they are sources<br>of higher harmonics                      | according to interstate standards<br>EN 50160:2010<br>"Removal of higher harmonics" |
| Efficiency coefficient                         | 95.0 %  | 99.7 %  |
| Dimensions                                     |   | 3-6 times less than<br>standard stabilizers   |
| Weight   | 250 kg  | 70 kg   |
| Service  | monthly examination<br>and tuning of the equipment                        | only one prophylactic<br>examination per year                                       |
| Increase of service life of attached equipment | 1.5 times more  | 2–4 times more  |
| Price  | average 4 570 €   | 2 210 €   |
| The time of payback                            | is not paid back, as they themselves are users of<br>electrical energy    | 6 -18 months due to energy saving   |

PRICE



pcs per month

## 100-125

## **Planned Deliveries**

**Time frames** 

60 days





## **N** Long-term practical experience and results of scientific research

Scientific Industrial Enterprise LLC «AVEK» together with Novosibirsk State Technical University conducts research and development work and research and development work aimed at the widespread introduction of alternating voltage normalizers NORMEL<sup>™</sup> in power systems of Russia, CIS, European Union and other countries of the world at departments and in scientific and educational centers:

- 1. Theoretical and Applied Informatics;
- 2. Automated Electric Power Systems;
- 3. Center «Testing of Control Devices and Control Modes of Electric Power Systems»;
- 4. Scientific and Educational Center «Intellectual Information Technologies in Business».





Scientific articles about technology  $NORMEL^{TM} \mathbb{R}^{\mathbb{C}}$ 

since 2011, published by the world professional organization of scientists and researchers

«The Institute of Electrical and Electronics Engineers» -

indexed in international scientometric databases of scientific and analytical articles IEEE Xplore Digital Library:

IEEE, Web of Science и Scopus





- [1] Feigin L.Z., Levinson S.V., Klavsuts D.A. et al "Method and Apparatus for Regulating Voltage", U.S. Patent Nº 7 816 894 B2, filing date 06.20.2007 date of publication October 19.2010.
- [2] Feigin L. Z., Levinson S.V., Klavsuts I. L. et al "AC voltage regulator with elements of protection and backup", RU patent Nº 2377630 C1 Russian Federation from 16.09.2008
- [3] Feigin L.Z., Levinson S.V., Klavsuts I.L. "Alternating voltage stabilizer with protection elements" The international application for the invention № PCT/RU2009/000441 (PCT) of 16.09.2008 заменить на патент EC.
- [4] Feigin L.Z., "The device of voltage control of electricity-generating equipment" RU patent Nº 120499 Russian Federation from 23.09.2011
- [5] Feigin L.Z., Feigin I.L., Klavsuts A.B., Klavsuts I.L. "The device (utility model) of modes control of the work of asynchronous motor" The application for the invention Nº 2014116596/07(026157) of 25.04.2014.
- [6] Feigin L.Z., Feigin I.L., Klavsuts A.B., Klavsuts I.L. "The device (utility model) of modes control of the work of asynchronous motor" The international application for the invention Nº PCT/RU2014/000669 of 09.09.2014.





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- [9] Fishov A.G., Denisov V.V., Kobets B.B., The method of voltage control of the node of electric grid, Patent of SU Nº 1372465, valid from 8.07.1993
- [10] Certificate on the trademark «NORMEL» Nº 43 6079, trademark owner LLC "AVEC"/ Russian Federation from 7.05.2010
- [11] Feigin L.Z., Levinson S.V., Klavsuts I.L. et al "Stabilizer of ac voltage" Eurasian invention patent Nº 018813 Date of issuance: October 30, 2013.
- [12] Feigin L.Z., Levinson S.V., Klavsuts I.L. et al "Stabilizer of ac voltage" Invention patent of Ukraine Nº 103498 Date of issuance: October 25, 2013.
- [13] [14] Klavsuts A.B., Trubin V.G. "Normalizer of AC voltage" RU patent Nº 2618115 Priority of invention 18.11.2015, filing date 05.05.2017.





- [1] Klavsuts D.A., Klavsuts I.L., Levinzon S.V. "Innovative method of demand side management" / 46-th International Universities' Power Engineering Conference UPEC2011, hosted **by South Westphalia University of applied Sciences**, Soest, **Germany** \ Section- Innovation and Future Power System\\ **5th 8th September 2011.**
- [2] Klavsuts D.A., Klavsuts I.L., Levinzon S.V. "New Method for Regulating Voltage an Ac Current" / 46-th International Universities' Power Engineering Conference UPEC2011, hosted by **South Westphalia University of applied Sciences**, Soest, **Germany** \ Section- Section- Power Conversion\\ 5th 8th September 2011.
- [3] Klavsuts I.L., Levinzon S.V., Klavsuts D.A. "Integration Innovative Method Of Demand Side Management In Smart Grid" 47th International Universities' Power Engineering Conference UPEC 2012, hosted by **Brunel University Institute of Power Systems in the School of Engineering and Design at Brunel University, London, UK** \\ 4th 7th September 2012.
- [4] Klavsuts D.A., Klavsuts I.L., Rusin G.L. "Aspects Of Evaluating The Efficiency Of Introducing Innovative Method And Technology Demand Side Management In Smart Grid System" \ 48 th International Universities' Power Engineering Conference UPEC 2013, hosted by **Dublin Institute of Technology, Ireland** \\ Section- Smart Drids \\ **2th 5th September 2013.**





- [5] Klavsuts I. L., Klavsuts D. L., Rusin G. L., Mezhov I. S / Perfecting business processes in electricity grids by the use of innovative technology of demand side management in the framework of the general conception of smart grids /. // 49 International Universities power engineering conference (UPEC), **Romania**, Cluj-Napoca, 2–5 **Sept. 2014**. IEEE, 2014. 4 p. ISBN 978-1-4799-6556-4. (UPEC).
- [6] Fishov A. G., Klavsuts D. A., Klavsuts I. L. / Multi-Agent Regulation of Voltage in Smart Grid System with the Use of Distributed Generation and Customers [Electronic resource] // Electrical Engineering, Energy, Mechanical Engineering – EEM 2014, pp - 761-767 - Mode of access: http://www.scientific.net/AMM.698.761.
- [7] Fishov A.G. Smart electric grid revolution in relations of subjects and mode regulation of electric energy/Collection of reports of the 3-d international scientific-technical conference. Yekaterinburg October 22-26, 2012. V.1. P. 91-97.





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