Air Ion Technology

has created a new leader among the cooling systems of the data centers

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In modern data centers, air cooling systems occupy a dominant position. This situation is explained by the fact that this technical solution has a unique complex of constructive and operational advantages: universality, scalability, simplicity and cheapness of technical implementation and operation, etc.

However, the current generation of air cooling systems has inherent unavoidable flaws, since all manufacturers of conditioning systems for data centers develop their facilities based on a single thermodynamic model of heat transfer, in which the efficiency of heat removal is limited by the permissible frequency of occurrence of electrostatic discharges. This restriction is a kind of "thermodynamic limit" for the improvement of cooling systems for IT equipment, as it introduces a strict and complex setting of the cooling flow rate, its temperature and relative humidity.

ADVANTAGES OF AIR ION TECHNOLOGY OF IT-EQUIPMENT COOLING

In the development of Air Ion Technology, we succeded to replace the limited effective mechanism of indirect control of electrostatic charges of triboelectric nature for the process of direct controlled deionization. The appearance in the thermodynamic cooling model of a new component, the forced controlled ionization of the cooling air (by the polarity and concentration of aeroions), made it possible to modify the requirements for three basic thermodynamic parameters of the cooling air: the cooling flow rate, its relative humidity and temperature. Within the framework of the new model, these parameters became mutually independent, which made it possible to modify (expand) substantially the requirements for their admissible values.

Expansion of operating ranges and independent control of the cooling flow rate and temperature ensured **an increase in the efficiency of the heat excess removal to 600%.**

The mechanism of direct controlled deionization provides **complete protection of IT equipment from electrostatic discharges of triboelectric nature.**

Cooling air dehumidification, the use of bipolar ionization and ozonation **minimizes the damage from atmospheric and biological corrosion.**

NEW INDUSTRY LEADER IS A YEAR-ROUND DIRECT FREECOOLING ON THE BASIS OF AEROION TECHNOLOGY

As it was shown above, Air Ion Technology allows to surpass all existing solutions for cooling data centers in terms of efficiency level. As an illustration, it is proposed below to compare the engineering infrastructure of a data center based on Aeroion Technology with today's technological leaders in this market segment: **facebook** and **Microsoft**.

1. The **facebook** data center in Luleå, Sweden. A year-round direct freecooling with additional adiabatic cooling and humidification with distilled water is applied. Power Usage Effectiveness of engineering infrastructure PUE = 1.04 (excluding water treatment costs).

2. **Microsoft** Data Center in Dublin, Ireland. A year-round direct freecooling without additional adiabatic cooling and humidification. PUE = 1.17.

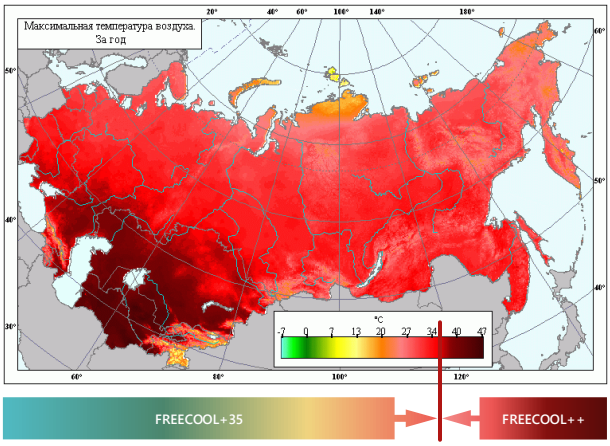
3**. IONOTRON-DC** is a data center with an engineering infrastructure on the basis of Air Ion Cooling Technology. To fully implement the advantages of a new approach to cooling IT equipment, two versions of the air conditioning system are developed:

FREECOOL+35 - implementation of the **IONOTRON-DC** data center conditioning system for a moderate climate. The air temperature is T ≤ + 35 ° C. The air flow discharge is 1 m³ / s for 12 KW of heat output (standard, without additional back-up).

FREECOOL++ - the performance of the **IONOTRON-DC** system for a hot climate. The air temperature is T> + 35 ° C. The air flow discharge is 1 m³ / s for 6 KW of heat output (increased, with additional back-up).

The executive device for the Aeroion Technology is the ion ion generator - **IONOTRON**. Own consumption of IONOTRON - no more than **0.5 W per 1000 W** of server equipment heat release.

To assess the energy efficiency of the engineering infrastructure of **IONOTRON-DC** in the limit conditions, the climatic zone for the data center site was maximally expanded - the entire territory of the Russian Federation.



The result is the calculated value of the parameter "Power Usage Effectiveness (PUE):

FREECOOL+35 : PUE = 1.03

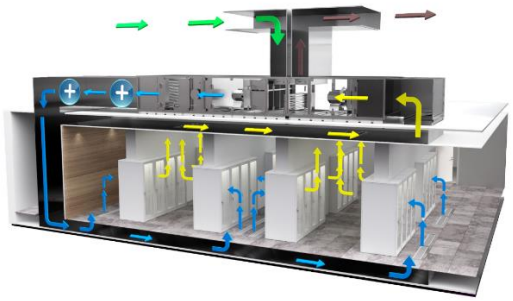
FREECOOL++ : PUE ≤ 1.05

Therefore, the average annual PUE for an IONOTRON-DC data center in any region of Russia will be less than 1.04.

Summarizing the given data, we can make an unambiguous conclusion that the introduction of Aeroion Technology in the data center conditioning systems with the year-round Direct Freecooling mode ensures the **highest level of energy efficiency in the industry and minimizes the restrictions on geographical (climatic) binding of such data centers .**

Hardware implementation of **IONOTRON** for installation in a server cabinet

IONOTRON is integrated with the ventilation grid of the raised floor (zonal emission of cations)



Implementation of the year-round Direct Free Cooling by introducing Air Ion Technology into the system of technological air-conditioning of the data-center

INTELLECTUAL PROPERTY PROTECTION

"Electronic equipment cooling method and system for its implementation"

Patent Russian Federation 2498427
Priority 05/16/2012

Declaration of conformity
ТС № RU Д-RU.AT15.B.00114
ТР ТС 004/2011
"On the safety of low-voltage equipment"
ТР ТС 020/2011
"Electromagnetic compatibility of technical means "