



**I N F O R M A T I O N  
S Y S T E M S & S T R A T E G I E S**

# **SEM.Next**

**IoT**

**Platform**

**Energy Management  
solution**

**Smart Things**

**Robotization**

**Business  
intelligence**

**Business automation  
and optimisation**

**Big Data collecting  
and analysis tools**



Dear friends, colleagues, partners,  
current and future customers and clients!

Once again, the civilization has reached a point of development that will change the lifestyle known today. We, Information Systems and Strategies, are definitely not a passive observer of this endeavour.

Another industrial revolution, the results of which are to change the world as we know it, is already happening. From our perspective, artificial intelligence, automation and robotization will help humans set free their own intellectual resources and get a clearer view on the issues they haven't been able to concentrate on because of routine.

In this publication we are telling you about our company and its role in the Fourth Industrial Revolution. We will outline how the automation systems and cloud AI, developed and installed by our company to serve humans, businesses and the society, can make a difference for you.

You can find all the details on our website: [www.infsys.ru](http://www.infsys.ru) and join us in a social network: [facebook.com/sem365](https://facebook.com/sem365).



ИНФОРМАЦИОННЫЕ  
СИСТЕМЫ И СТРАТЕГИИ

The company was established in 2003. We specialize in creation and integration of automation systems for corporate clients. At present our numerous solutions are used at the federal level, uniting clients companies' departments and branches all over the Russian Federation and the CIS into unified manageable infrastructure clusters.

### Competences and implemented projects

- Development and installation of monitoring and distance management systems;
- Installation of service and incident management systems;
- Development and installation of centralised systems of data collection;
- Development of unique edges and sensors;
- Development of mobile client applications;
- Development and installation of management and dispatching centres;
- Development and installation of cloud services.

The progress of competences and development in the field of Internet of Things has proved the organic growth of the company. Automation, robotization, eliminating humans from the management of global businesses as well as smaller enterprises enable the client to simplify control and understanding of the processes in their company and provide tools for more convenient monitoring and management.

As a result, client companies reach a higher level of management and optimize a multitude of direct and hidden costs, which they used to take as an inevitable given of business.

ISS has developed an **IoT Platform** software solution and a **Cloud service** for it, a **Controller** interacting with the cloud as a local intelligent agent and has launched the production of controllers and related equipment.

At a certain point in our development, the powers and competences of the company became so broad that a new approach to management and organization was required. We needed precise department specialization, calculations of engagement levels, perfectly set goals. We established subsidiary companies which received the solutions of ISS and which develop them within the general strategy of the holding company.



Resident of innovation centre Skolkovo, Inspark continues the development of the IoT Platform – a software solution, uniting hundreds of thousands of the client devices into unified manageable environments.



Equipment designed and produced in a SmartThings Lab - ISS Lab – serves as a bridge between cloud and «ground».



ISS Plus is the company that follows the direction of ISS in the field of integration of third party software with the IoT Platform. ISS+ has by now worked out several solutions to be integrated with the Platform. They are global data statistics and analytics tools.

Information Systems and Strategies  
is the main holding company.



# IoT Platform

SEM.Next is an up-to-date programming platform of IoT/IIoT for collecting, aggregating, processing and presenting information.

SEM.Next Platform enables communication with various devices, application and data so that users can apply the results without extra integration.

The architecture and solutions of SEM.Next correspond to all the trends of IoT platforms definitions. They are built with the use of open code only. Though at the first level of their development only, according to their functional and technical characteristics answer all the requirements necessary for an IoT solutions platforms.

## Basic opportunities

- [Connectivity management](#) of systems, detectors and devices;
- Data aggregation and storage – [IoT Core](#);
- Applications support – [IoT Analytics and Application](#).

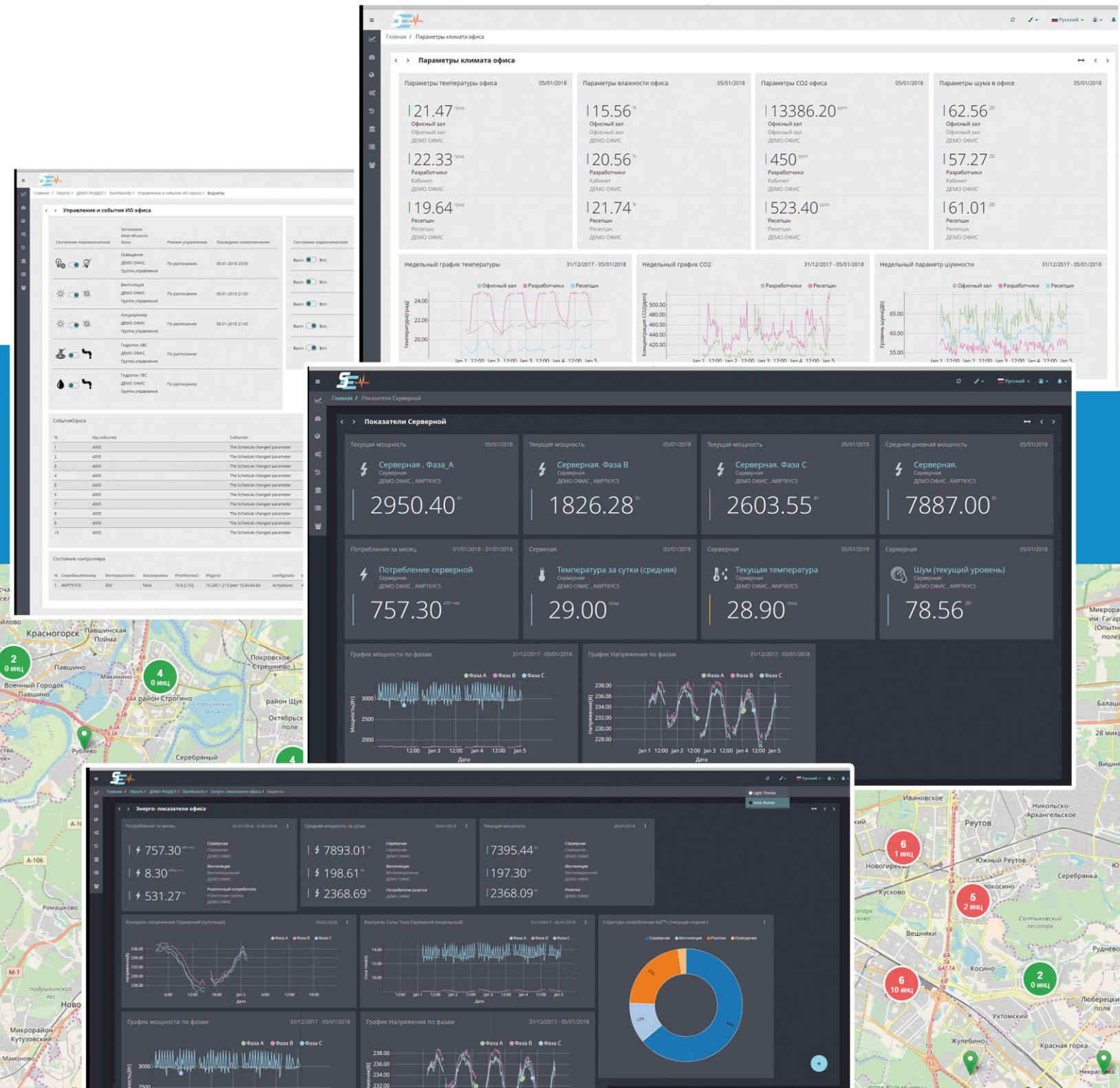
## Web applications

Web applications provide all necessary tools for devices management and configuration, showing results as [dashboards](#), analyzing data behavior with [graphs](#) and tracking device state on [geographical maps](#).

SEM.Next Platform uses the Edge Computing or Fog Computing architecture. The platform has a key important element – controller as Edge which brings architectural elements of the platform closer to the objects of management as Things. In addition, SEM.Next delegates to the Edge-level part of important functions connected to analysis and decision-making for the management of Things. The architecture provides a number of technological advantages over hard-oriented systems.

- Faster reaction to the behaviour of object;
- Independence of the state of connection channel with the server component;
- Selective interaction with the server (by necessity, on occasion, on rules etc.)

The platform does not have points of failure and can be scaled to the configuration allowing to process millions of controllers.



# Controller

Controller is an element of the general architecture of SEM.Next. It provides the functions of monitoring and management for the objects incompatible with IoT protocols. Objects are managed by the controller locally and does not require interaction with server components of the platform.

Software for the controller is an independent element of the platform. It allows to preprocess data, execute actions on devices by schedule or on rules and to interact with the platform for data collection or transmission.

## The software components installed on the controller:

- **Master control program** ensures the collection, processing and transmission of information from the controller to the data collection server of the platform as well as the management of the controller (autonomously or by the order of the platform). MCP consists of the following components:

- **Monitor** collects, converts to the needed format and sends data to the data collection server of the platform.
- **Scheduler** ensures autonomous execution of actions by schedule or at the occurrence of given circumstances.

Both the monitor and the scheduler get all the managing orders with their operation modes as well as the data on parameters from the platform.

- **Queue server** of the controller provides other components with the means of information interaction by MQTT protocol. Apart from that, it interacts with the MQTT queue server at the data collection server for data transmission between the controller and the collection server.
- **Devices drivers** are responsible for the hardware capability of the controller and the function of external connected devices. They occasionally record their state to the MQTT queue in the form of specific messages. In addition, these drivers receive messages from the queue and give orders to the corresponding devices.



SEM controller is a management device based on Linux OS for monitoring automation and engineering systems management. The controller manages equipment by customizable scripts and enables the user to carry out observations and management at a distance. The controller questions counters and detectors and, using the received information, gives orders to the connected devices.



In 2018 we launched a new version of the programmable controller – SEM Pro: Next Generation. This solution came into physical existence in the collaboration with our partners from China. The united R&D has done its best to make the price-quality even more attractive for our partners and clients.

The international descendant of SEM supports most protocols and smart devices currently used in industry and can be integrated and successfully manage any infrastructure: RS-485, RS-282, ZWave, Wi-Fi, CAN, I2C, GSM, USB, Ethernet, 1-Wire, IR-devices, analogue devices.

- |  |  |
|--|--|
| <b>1 15</b> <b>I2C bus gateway</b> supports up to 8 external plug-ins. Slots for internal pug-ins – support of up to 8 plug-ins by each port.                      | <b>8</b> <b>USB-port</b> with interruptible power for working with flash drives, printers and other USB devices.                         |
| <b>2</b> <b>GSM-module and SIM-card slot</b><br>Channel of communication with the distanced server.  | <b>9</b> <b>Power ports</b><br>From 7 to 36 V DC. Backup power input. Separate output for 5 V.   |
| <b>3</b> <b>Wi-Fi module.</b> Controller can serve as access point to its web interface or as a Wi-Fi client.  | <b>10</b> <b>ADC</b> – Analogue-to-digital converter<br>Measuring and managing low voltage of 0-31 V.                                    |
| <b>4</b> <b>RF-module</b><br>Radiomodule 433MHz for work with <b>Z-Wave</b> and <b>Noolite</b> devices   | <b>11</b> <b>1-Wire</b><br>Ensures work with 1-Wire detectors of different use.  |
| <b>5</b> <b>Ethernet</b><br>Ethernet port 10/100 for IP network and Internet connections. TCP/IP, UDP, HTTP(S), Modbus TCP, SNMP, MQTT, KNX IP. Passive PoE Power. | <b>12</b> <b>CAN</b><br>Industrial connection standard port aimed at uniting different executive devices and detectors into one network. |
| <b>6</b> <b>IR-port.</b><br>Reception and transmission of signals to IR-devices.   | <b>13</b> <b>RS-485</b><br>Two RS-485 ports. Modbus RTU, meters and detectors as well as other Modbus devices supported.                 |
| <b>7</b> <b>S/PDIF</b><br>Interface of digital audio transmission between devices without converting to analogue signal.   | <b>14</b> <b>Analogue sensors</b><br>Two inputs for resistive detectors.   |

**Real time clock**  
**Built-in zoomer** — a local alert device.  
The autonomous **battery of backup power** ensures up to 4 hours of independent work.

# Cloud service

# User objects



Platform to controllers  
Data exchange

The opportunity of simultaneous monitoring and control of millions of objects without significant server powers upload.

Data collection and storage

Statistics, analytics

Controller management, massive update

Interaction with the user

## Controller

- Observation and control of environment parameters: temperature, humidity, illumination, CO2, noise
- Observation and control of input electricity parameters
- Observation of correct functioning and management of electrical appliances
- Integration with local security systems
- Custom security system complements: door, object and staff control
- Interaction with any meters, detectors and other devices required by the user

Currently  
**1600+**  
objects on the territory  
of the Russian Federation

Separate object

User





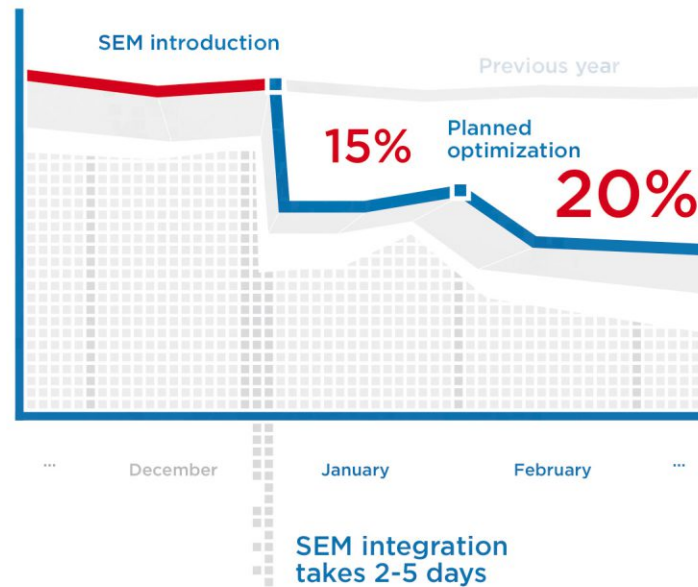
## Results of ISS SEM introduction

500 spread  
offices

3 months after  
introduction

### Energy consumption reduced

All offices, I quarter ■ 2015 ■ 2016

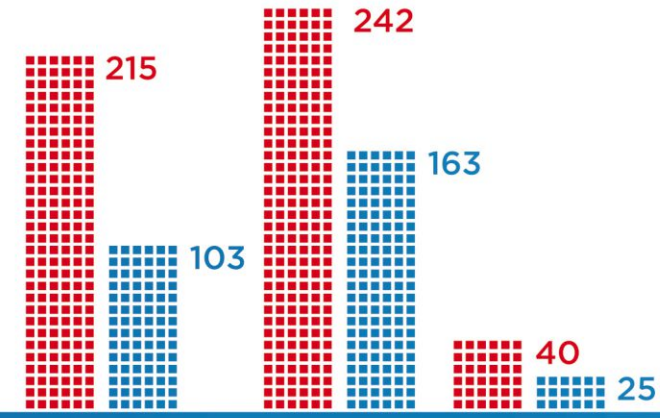


It is installed over the working  
equipment of the object and  
requires no change of equipment.

Energy consumption  
reduced by **€ 134K**

### Accidents reduced

I quarter ■ 2015 ■ 2016



Regulation and repair  
of ventilation and  
air conditioning systems 107 39

Regulation and repair  
of heating systems 31 25

Repair of water supply  
and sanitation systems 85 49

Economy on  
life-support systems repair **€ 23K**

Electrical equipment  
repair 274 181

### Particular cases of economy and accidents

Following the schedule  
of equipment and devices work without  
human participation **€ 50K**

Excessive consumption due to  
malfunction of electronical appliances  
and networks **€ 19K**

Inefficient operation of climate  
systems, simultaneous operation  
of systems with opposite functions  
(heating vs. cooling) **€ 61K**

External illegal connections  
to networks of 3 objects  
were found.

2 floods were prevented.

2 hidden leaks and a hidden basement  
flood were found

In 30 branches' offices excessive  
quantity of CO2 in the atmosphere  
was found.

Other violations of environmental  
parameters (temperature,  
illumination, noise) were found  
in 120 branches' offices.

In 10 branches problems were found  
in the functioning of illuminated  
advertisements.

**€ 130K**

## Results:

Saved expenses on electricity and other  
utility bills

Saved expenses on repair, service and  
replacement of electrical appliances and  
networks

Better climate conditions in offices,  
following the regulations

Fast informing and faster reaction to events

Realtime managed and observed processes

Automation of routine actions of staff,  
eliminating human factor

Security of offices improved

Total  
calculated savings  
after 3 months of SEM work:

**€ 287 000**

Est. payback period of the installation:  
**2 years**



Business analytics tools

The idea of integration with BI is to give managers an opportunity to start working with BI tools quickly without experience in statistics and baseline data analysis. They should also be able to make their own enquiries with corporate data sets without the mediation of IT departments.

Big Data analysis is the field where independent BI is boosting. This is a brand new solution in the sphere of databases which underlies rapid growth and innovation. A descriptor is a more suitable name as Big Data usually works with huge data amounts which ordinary tools cannot process.

We have created a set of tools analyzing big data collected by SEM since the start of operation. The tools help analyse statistics and make various predictions. Business actions can be planned on the basis of statistical data, aimed at optimization of infrastructure and interaction with service departments policies as well as measures targeting increasing client and staff loyalty.

Department comparison as a tool for consumption anomaly detection

System conclusion based on the results of monitoring sales and offices comfort level interdependence

Forecasting future consumption and regulations development by the system

Benchmarking of own departments and rivals



Business intelligence

BigData analysis

# Devices produced by ISS



## Relay output module

The module has 8-, 12- and 16-channel edition. The controller manages power relays via ROM by switching on and off electricity power, groups of appliances and separate appliances.

The nominal current is 1 A, voltage up to 250 V. It has built-in protection from sparking contacts. Connects to the controller to the common [I2C bus](#).



## Module of discrete inputs

The module has 8 inputs ensuring the collection of information from “dry contacts” of detectors (reed switches, impulse meters, IR-, photodetectors, security system outputs). The module channels are protected from overload.

The module connects to the controller to the common [I2C bus](#).



## Solid-state relay module

The module has 8 independent contacts. It can be applied with the upload up to 30 V and 400 mA and with “dry contact” devices

Module channels are protected from power surges when commutating inductive load. Connects to the controller to the common [I2C bus](#).

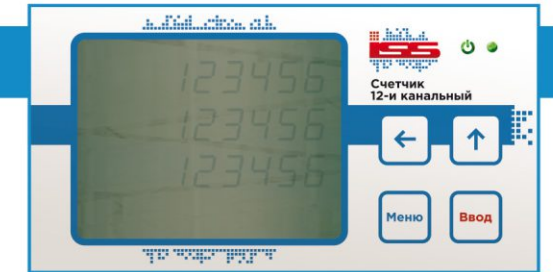
## Multichannel electricity meter

The meter accounts the consumption of 12 power lines. Instant parameters of current, voltage and and power (kWt, kVA, kVAR) are measured.

It can replace 4 three-phase or 12 single-phase meters.

Data exchange with the controller is executed via [RS-485](#) connection interface.

Does not require power line breaking for setup with the use of separable current transformer. External separable transformers for current up to 400 A.



## Voltage control module

The module has 8- and 16-channel edition. Can be used to control the work of contactors and circuit continuity. Can determine the existence of 220 V. The voltage of input response is 50-250 V.

The module connects to the controller to the common [I2C bus](#).



## Detectors and sensors

**Multidetectors** for wall and DIN-rail installation can be installed on walls in frequented places. The meter consists of a basis and optionally integrated detectors: temperature and humidity, illumination, sound pressure, CO<sub>2</sub> amount in the atmosphere. The detector is connected to the controller via [RS-485](#) port. The detector has [1-Wire](#) port and can retranslate data for other detectors, e.g. an output temperature detector.

**The water leak detector** is to register the presence of water and control of floods. It is usually installed together with a water-stopping rebar.

## Examples of third-party devices with ability of integration



### «Milur» electricity meters

Static single- and three- phase electricity meters can account active and reactive energy consumed in the two-wire line of alternating current of 50 Hz frequency.

Meters work via connection interface [RS-485](#), registering electricity consumption. Reflect data on the consumed electricity on an LCD indicator.

Built-in relay enables power disconnection management.



### Water meters, heat meters etc.

Account of hot and cold water with data transmission to the impulse channel. External magnetic field sensor, inductive data collection. **Water meter** transfers the data to the controller via [impulse output](#).

**Heat meters** are used for accounting heating energy per unit of time. A heat meter measures the temperature and volume of the transfer medium in the supplying and reverse pipelines, calculates the used heat. An additional function is the measurement of water volume if its temperature exceeds the given point. Data exchange with the controller via connection [RS-485](#) interface.

### Contactors, smart sockets

**Contactors** are used for managing the power of systems with the voltage exceeding management modules.

[DeKraft](#): 25 A, 40 A, 63 A  
[ELKO](#), with the switch: 25 A, 40 A, 60 A

**The smart socket** transmits the information about the fact of consumption to the controller. Allows the controller or a distance operator switch the power on and off.



### Signal and interface devices

**Message displays** for reflecting current measurements, functional and emergency messages from connected devices on a touch screen. Common access to all devices. Data exchange with the controller via connection interface [RS-485](#).

**Signal lamps** serve for informing about situations that need attention, e.g. gates and barriers, moving mechanisms in manufacturing areas, various alarms.

**Sirens and sound notifiers** give sound signals of various volume, so that they differ from manufacturing and background noises and can be heard well.

Data exchange with the controller via ISS Modules.



### Water-stopping rebar and smart water tap

**The water-stopping rebar** allows the controller or a distance operator to stop water supply. Can be used both independently and together with the leak detector. Water stops immediately, the supply can be renewed manually. Data exchange with the controller via ["dry contact"](#) output.

Manageable **tap** for working in heating regulation systems, hot and cold water supply, distance management and control of liquid media. Two temperature detectors, position sensor, flood detector. Data exchange with the controller via connection [RS-485](#) interface.



### Detectors, sensors

**Bluetooth trackers, GPS tags, radio detectors.** Track location and position of objects and staff. Extremely low energy consumption.

**Motion detectors, smoke detectors etc.**

**Magnetic notifiers (reed switches, contact opening detectors)** for objects of various sizes.

**IR-detectors, solar cells.**

# IoT technologies

Whatever sphere your business specializes in, we provide the opportunity to make it more ergonomic and efficient.

Smart things and cloud technologies that we develop can be integrated with any activity. Wherever the energy is consumed, there is a place for energy management. Wherever people do routine actions, automation can offer help. Wherever humans are, comfort and security without worries need to be implemented.

Our solutions have already been integrated into many companies:

- Banks, business centers, shopping centers, separate offices;
- Schools, kindergartens, hospitals and other municipal institutions;
- Shopping malls, discount retailers, medical centers;
- Industrial enterprises and factories;
- Chains of petrol stations, restaurants, shops, pharmacies.

You can find all the details on our website: [www.infsys.ru](http://www.infsys.ru) and join us in a social network: [facebook.com/sem365](https://facebook.com/sem365).

**Saved expenses**

**In-time alert**

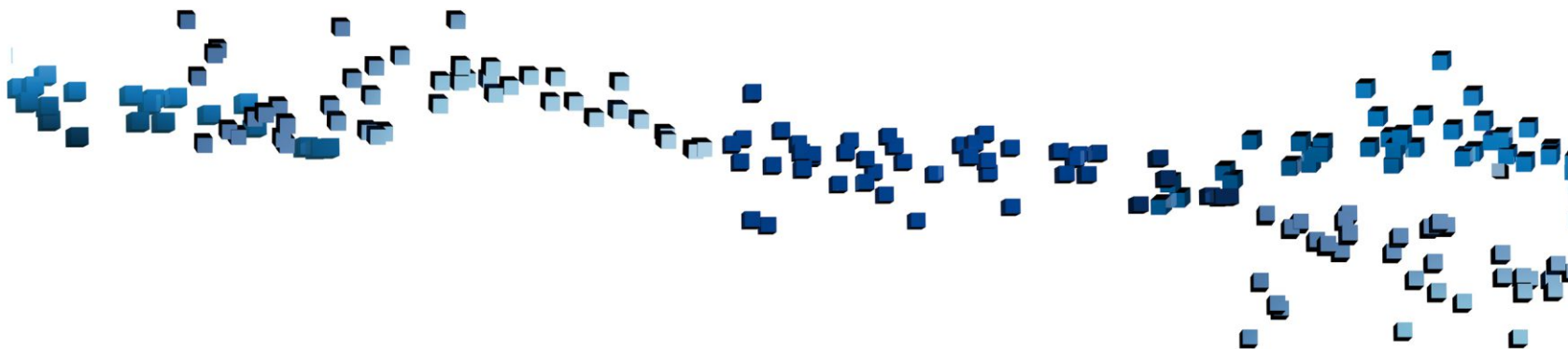
**Automation**

**Real-time control  
and observation**

**Human factor  
elimination**

**Business  
transparency**

**Comparison  
with rivals**



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