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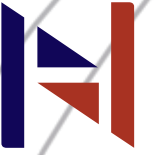
# IIOT-AMS

SOLUTIONS FOR THE AUTOMATION OF OIL AND GAS  
INDUSTRY FACILITIES

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# IIOT-AMS APPLICATION AREAS



**CPCS (computerized process control system) AND MONITORING SYSTEMS OF CRITICAL AND DISTRIBUTED INFRASTRUCTURE**

Monitoring of production facilities operation, building telemetry and automation systems of technological processes, building of automated system of electric power technical metering in facilities with geographically distributed infrastructure.



**ENERGY ACCOUNTING AND CONTROL SYSTEMS IN PUBLIC ENERGY SERVICE**

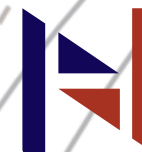
Data collection from electricity metering stations, meters of heat, steam, water and others.



**MONITORING AND CONTROL OF LIFE SUPPORT SYSTEMS**

Security functions of the house, apartment, office, garbage cans filling control with automatic demand for garbage transportation. Control of water and air condition, deviations from set parameters.

# SOLUTION



Universal autonomous wireless measuring and switching device for controllers and sensors with digital and analog outputs ( IIOT-AMS), operates using LPWAN technology (LoRaWAN and NB-IoT standards)

**Functional capabilities of the device when operating with data from sensors and controllers:** RS-485, RS-422, RS-232, MODBUS, 0-5 mA, 0-20 mA, 4-20 mA, 0-0.01 V / 0-1 V / 0-10 V, pulse output., HART.

The device provides long term autonomous operation of sensors and measuring instruments with above-mentioned output interfaces from conventional batteries (lithium-thionyl chloride cell). Storage up to 10 years, self-discharge <1% per year). Designed for long term operation.

**Operating temperature (°C): -55...+85**

**Nominal voltage (V): 3.6**

**Nominal Capacity(mAh): 16500**

**Standard discharge current(mA): 5.0 (max 500)**



IIOT-AMS has a number of certificates and certifications

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# SOLUTION CAPABILITY



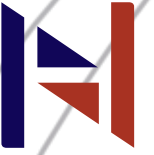
## CAPABILITIES OF THE "UNIVERSAL AUTONOMOUS WIRELESS MEASURING AND SWITCHING DEVICE OF CONTROLLERS AND SENSORS WITH DIGITAL AND ANALOG OUTPUTS"

- In autonomous mode **(if there is no external power supply)** it is possible to take readings from sensors and measuring instruments with digital and analog outputs.
- One standard IIOT-AMS can be connected up to **8 sensors or up to 64 controllers** and transfer up to 64 parameters in one batch in LoRaWan network: pressure, temperature, flow, humidity, light, location, battery power as well as alarm output from security alarms, fire alarms, from flood sensors and access control system.
- **Reading discreteness is adjustable for each parameter individually.**
- Make adjustments of the internal clock to synchronize the timing of the readings.
- **The autonomous operation time of the controller is up to 10 years** depending on the number of parameters, type of sensors and readings frequency.
- If there is no communication with LoRaWan base station, **it is possible to accumulate the taken readings** and transfer them when communication is restored.
- It is possible **to process** on the side of IIOT-AMS **emergency and alarm events** and manage the executive elements of the object to prevent accidents.



IIOT-AMS is based on patents №183764 and №2694789.

# COMPARISON OF LPWAN TECHNOLOGY STANDARDS\*

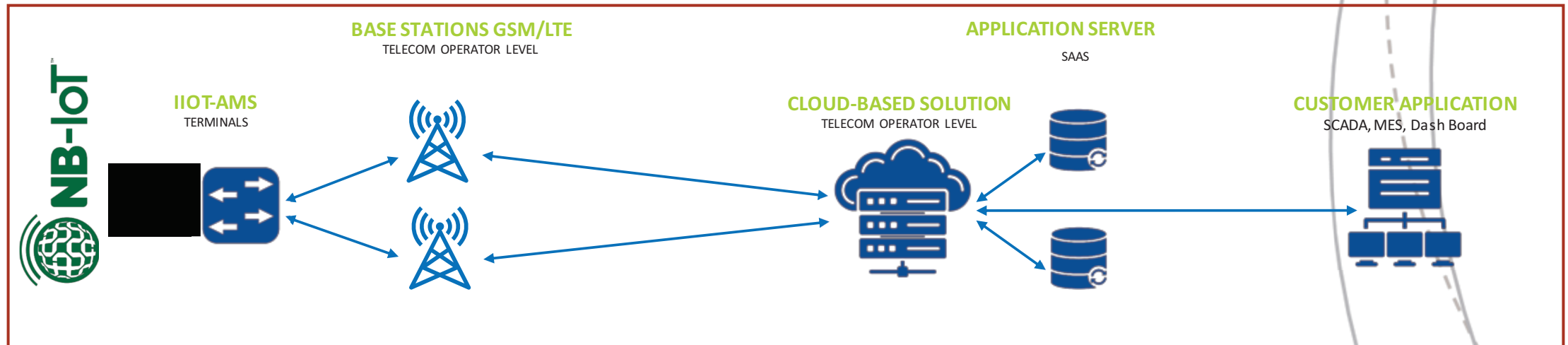
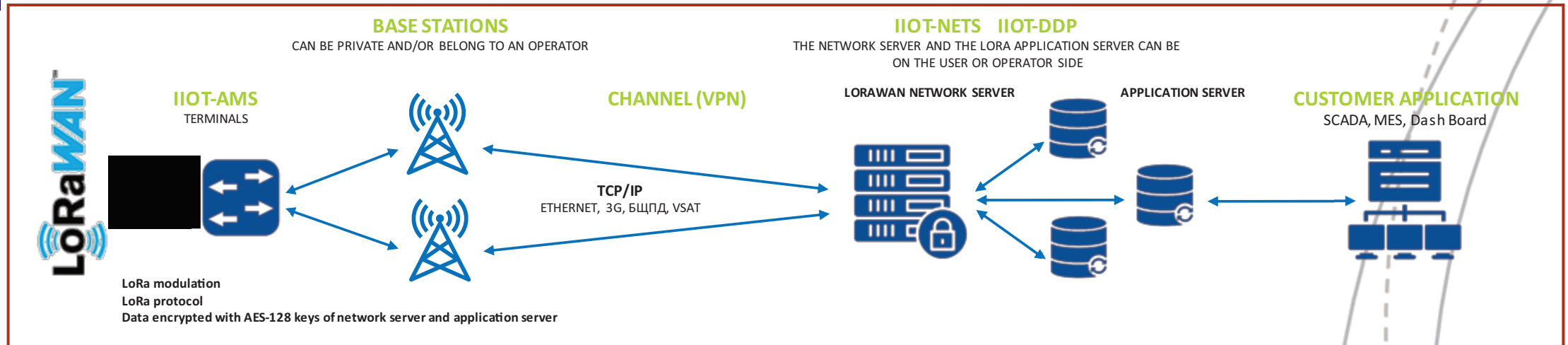
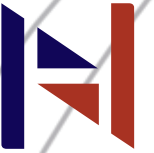


PARAMETERS/STANDARD	LoRaWAN	NB-LTE-M (NB-IOT)	NB-FI	LTE-M
<b>Spectrum/Frequency (MHz)</b>	Unlicensed (ISM)/868	Licensed, on GSM/791-862 and 1710-1880 networks	Unlicensed(ISM)/868	Licensed, on existing LTE/1800 network
<b>Vendor support</b>	LoRa Alliance (IBM, Cisco, Semtech and others.)	Ericsson, Nokia, Intel, Qualcomm, Alcatel...	VAVIOT (Russia) on ON Semiconductor chips (USA)	Ericsson, Nokia, Intel...
<b>Range</b>	15 km	5-15 km	10 km	10 km
<b>Network Speed</b>	Up to 15 Kbps	Up to 150 Kbps	Up to 10 Kbps	1 Mbps
<b>Supporting the construction of private networks</b>	YES	YES (private LTE)	NO	NO
<b>Module autonomy</b>	10 years	10 years	10 years	A few months
<b>Device classes</b>	A,B,C	Analogous to A,B,C	A (limited control)	Always connected
<b>Availability</b>	available	Partially available	Partially available	Partially available
<b>Built-in encryption elements</b>	AES-128 (AES-CMAC) both channel and data	APN/VPN	AES-128 (AES-CMAC)	APN
<b>Cost of the communication module**</b>	20 \$	20\$	40\$	50-70\$
<b>Cost of base station</b>	~ 1000 \$	~ 30 000 \$	~ 2500 \$	~ 30 000\$

According to Tadviser.ru

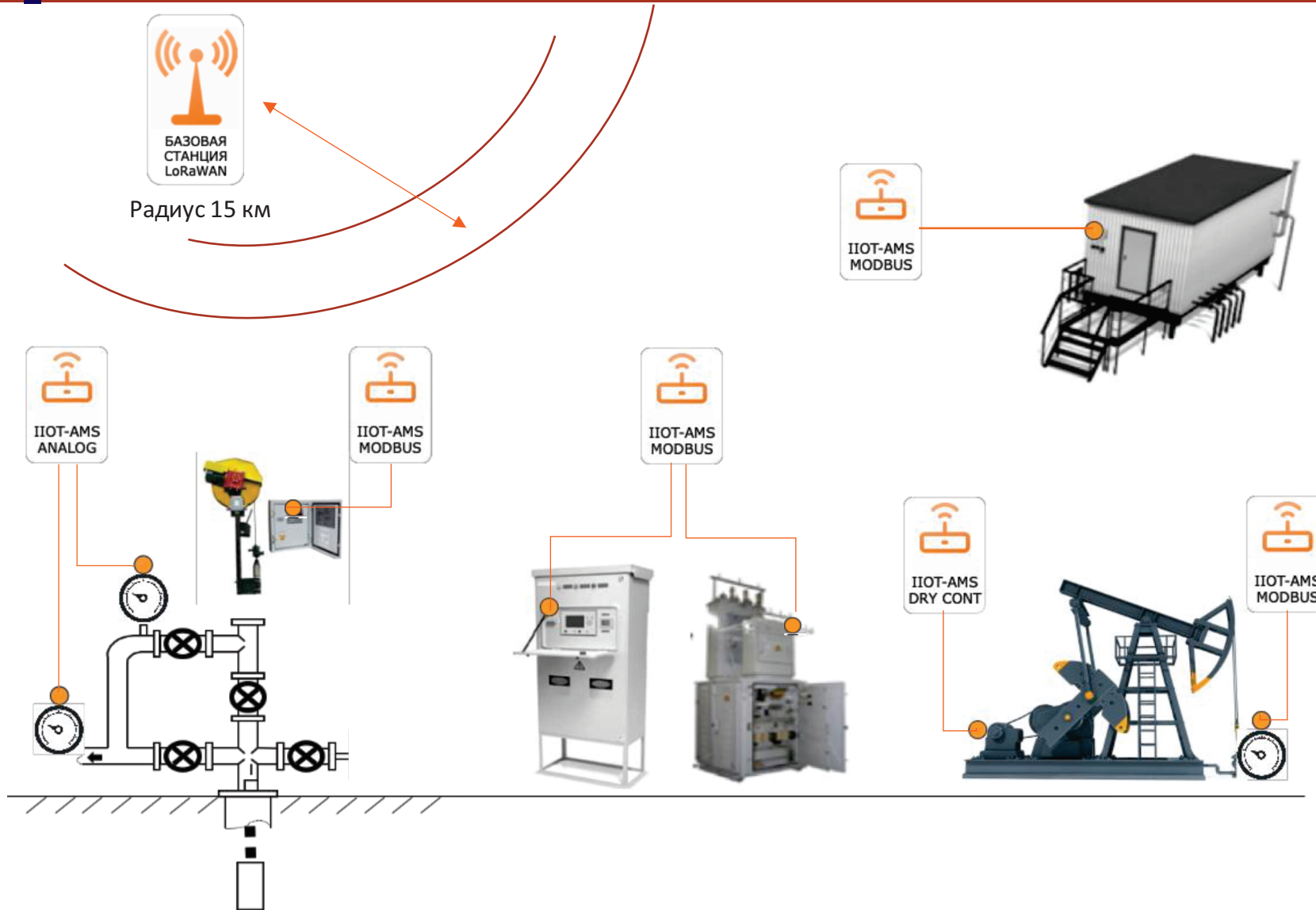
- \* - LPWAN (Low-Power Wide-area Network) is a low-power, long-range wireless technology developed for distributed telemetry, machine-to-machine communication, and Internet of Things networks.
- \*\* - The cost of the communication module is the cost of the communication microchip used in the production of the final devices.

# IOT/IIOT SYSTEM ARCHITECTURE



# DIGITAL WELL

Complete automation solution  
with wireless technology



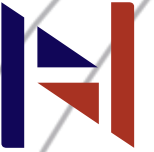
## COMPLETE SOLUTION FOR AUTOMATION OF WELL PADS AND SINGLE WELLS

- Covers all process facilities of oil production (wells with different methods of operation, reagent dosing units, purification devices, metering units, and fluid meter, mass meter .
- Autonomous data collection from measuring instruments (pressure, temperature, dynamic level, dynamograph) .

## ADVANTAGES

- Implementation time is unique (no need to build cable infrastructure for power supply);
- The cost of implementation is 2 times or more lower than existing automation solutions.
- Low operating costs.

# I IOT-AMS EQUIPMENT FOR AUTOMATION OF BEAM-PUMPING UNITS



**SWITCHING DEVICE**  
**I IOT-AMS Modbus**  
Reading dinamogramma



**SWITCHING DEVICE**  
**I IOT-AMS Analog**  
•Control of pressure  
(Buffer, Annular, Linear)



**SWITCHING DEVICE**  
**I IOT-AMS Modbus**  
•Reading echosounder data



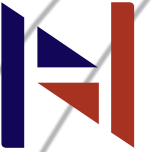
**SWITCHING DEVICE**  
**I IOT-AMS Tilt Counter**  
•Control of bottom-hole pump swing  
•Control of belts break



**SWITCHING DEVICE**  
**I IOT-AMS UNICON**  
•Control of engine operation  
•Phase current measurement  
•Remote activation and deactivation of bottom-hole pump



# IIOT-AMS EQUIPMENT FOR AUTOMATION OF CONTROL STATIONS OF ELECTRIC SUBMERIBLE PUMP/SREW PUMP



## SWITCHING DEVICE IIOT-AMS Modbus

(Operates with ICS/electric-centrifugal pump/electric progressive cavity pump/sucker-rod pumping unit)

- The switching device operates with the ICS in the mode of constant interrogating, parameter monitoring and packet data transfer to the upper layer
- Remote start and stop
- Remote change of parameters and setpoints (ICS remote control)
- Control of current parameters and setpoints (selection of required parameters from registers table and transfer to upper level)
- Alarm system of precautionary settings



All specified equipment can operate according to LoRaWAN or NB- IoT standards. The equipment has Ex versions. The equipment operates at temperatures of -55... 85 °C..

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# USE OF IIOT- SWITCHES AMS FOR AUXILIARY EQUIPMENT AUTOMATION OF OIL PRODUCTION PROCESSES



## IIoT-AMS Unicon

(Operates as part of a reagent dosing unit)

- Calculation of reagent amount
- Remote start and stop of unit
- Remote changing of parameters and setpoints
- Monitoring of current parameters and setpoints
- Signalling of warning setpoints

All of the specified equipment can work according to LoRaWAN or NB-IoT standards. IIoT-AMS Dry contact switching device can operate in autonomous mode. The equipment has Ex versions.

The equipment operates at temperatures of -55....+85 °C



## IIoT-AMS Dry contact

(Operation as part of manual/semi-automatic well dewaxing units)

- Purification winch on/off monitoring

## IIoT-AMS Modbus

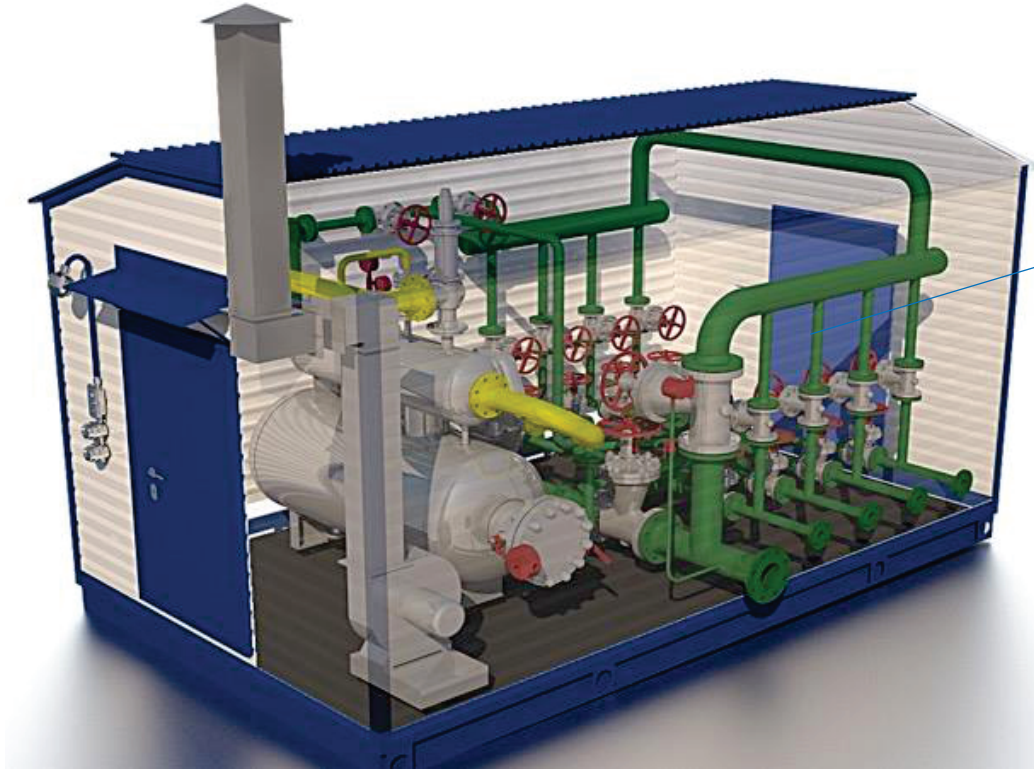
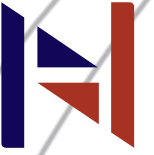
(Operation as part of well dewaxing units)

- Monitoring of oil and gas additional separation plant parameters
- Cleaning monitoring
- Alarm signaling

**USE OF IIOT - SWITCHES  
AMS FOR AUXILIARY EQUIPMENT  
AUTOMATION OF OIL PRODUCTION  
PROCESSES**

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# IIOT-AMS equipment for the automation of automated group measure unit for gas measuring in oil



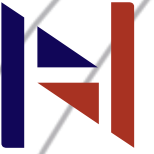
## IIOT-AMS Modbus

(Operates as part of automated group measure unit for gas measuring in oil)

- Remote control of Multi-Way Well Switch
- Remote change of parameters and settings
- Monitoring of current parameters and settings
- Warning setpoint alarm
- Control of automatic fire-alarm system, gas sensor, security alarm

IIOT-AMS equipment for the automation of automated group measure unit for gas measuring in oil

# I IOT-AMS EQUIPMENT FOR TELEMETRY OF FLUID METERS DATA



I IOT-AMS Pulse  
• Fluid counting



I IOT-AMS Pulse  
Operates as part of a mass meter  
Fluid counting



Modbus  
Operates as part of a mass meter  
Fluid counting

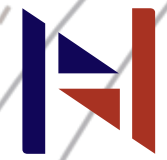


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All specified equipment can operate according to LoRaWAN or NB-IoT standards. The I IOT-AMS Pulse switch can operate in stand-alone mode and also processes input frequencies from industrial mass flow meters (e.g. Micromotion) above 300 Hz. The equipment has Ex versions. The equipment operates at temperatures of -55....+85 °C.

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# WIDESPREAD USE OF IIOT-AMS ANALOG

## IIOT-AMS ANALOG EX

SINGLE-CHANNEL / OR MULTI-CHANNEL VERSION



Provides autonomous operation of instrumentation with 4-20 mA current output, with resistive output, HART.

Compatible with pressure, temperature, level, vibration, gas, etc. sensors.

Installed in places with no power supply.

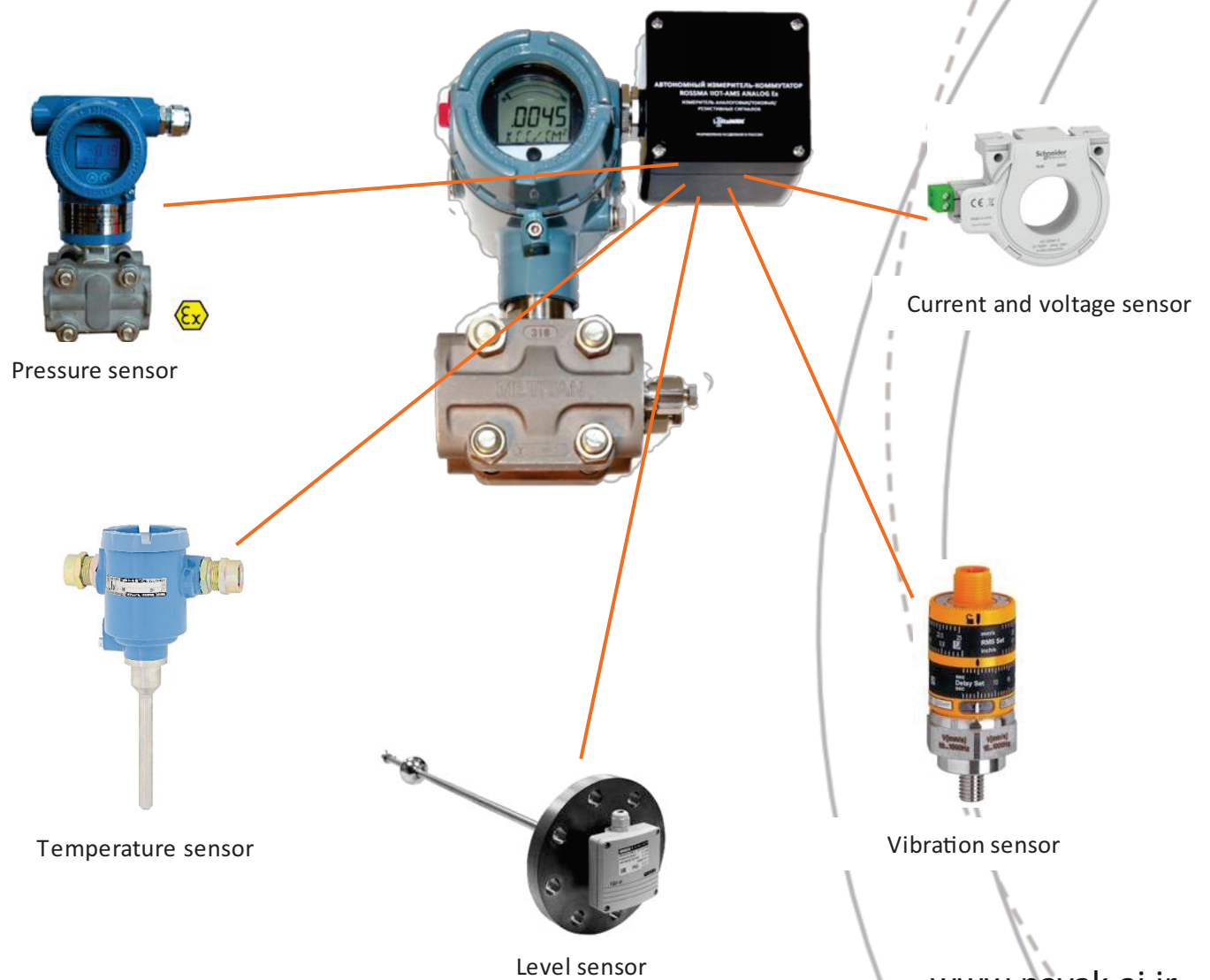
Has nonvolatile memory.

Provides long-term autonomous operation up to 5 years.

Operates at temperatures from -55 °C.

Supports standards: LoRaWAN®, NBiOT™, 6LoWPAN.

Can work with both active and passive instrumentation.

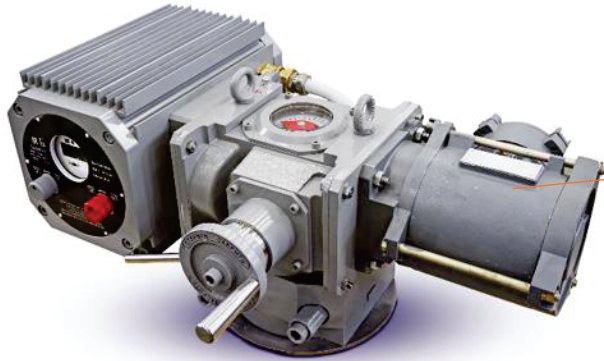
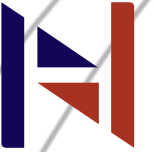


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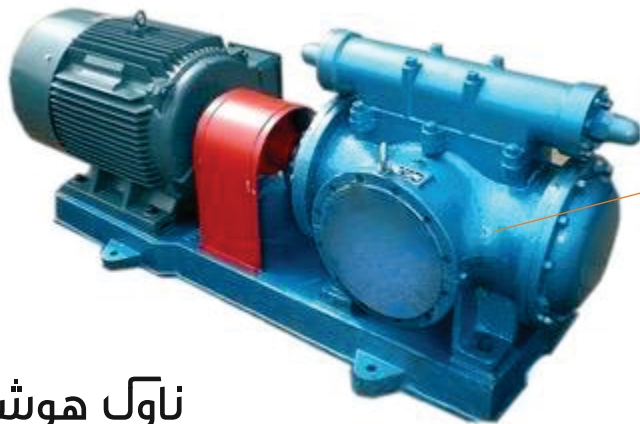
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# I IOT-AMS EQUIPMENT FOR CONTROL OF HIGH-VOLTAGE EQUIPMENT UP TO 30 kW



## SWITCHING DEVICE I IOT-AMS DRY CONTACT RELAY (High-voltage relay)

- Control of power units
- Remote opening / closing
- Monitoring of valve position
- Current and voltage monitoring



## SWITCHING DEVICE I IOT-AMS DRY CONTACT RELAY (High-voltage relay)

- Control of power unit
- Remote start / stop
- Current and voltage monitoring
- Current protection algorithms

# DIGITAL PIPELINE

## Autonomous equipment for wireless data telemetry



### PIPELINE MONITORING

- Pipeline pressure
- Pipeline temperature
- Temperature on pipeline surface
- Control of gassiness in dens (lowlands), places of potential accumulation of gases.

### MONITORING OF CULVERTS

- Pressure in the culvert
- Gassing level in the duct
- Pressure switch actuation on set point
- Float switch actuation

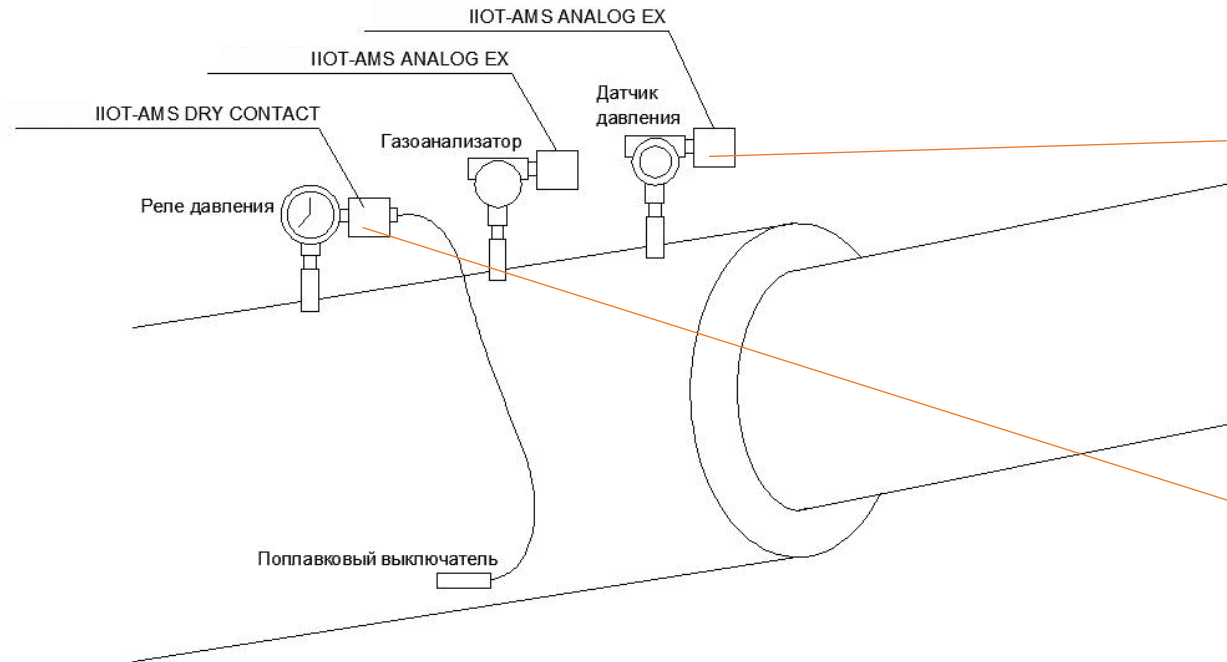
- Low cost of implementation (the cost is 2 times and more lower than the existing analogues)
- The work of control and measuring devices is provided by autonomous switching devices for a long period of time (up to 10 years, depending on the discreteness of parameter acquisition).
- Ability to deploy the system in the field in the absence of existing communication channels and power infrastructure.

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# AUTONOMOUS MONITORING OF CULVERTS



- I/IOT-AMS Analog**
- Pressure monitoring
- Control of gas analyzer readings



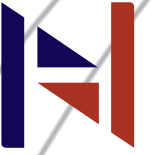
- I/IOT-AMS Dry Contact**
- Pressure switch control
- Float switch control



**ONLINE MONITORING OF CULVERTS**

- Pressure in the culvert
- Culvert gassing level
- Pressure switch actuation on set point
- Float switch actuation

# IIOT-AMS equipment for telemetry of energy metering devices data



## SWITCHING DEVICE

### IIOT-AMS Modbus

(Operation as part of PTS together with electric meter)

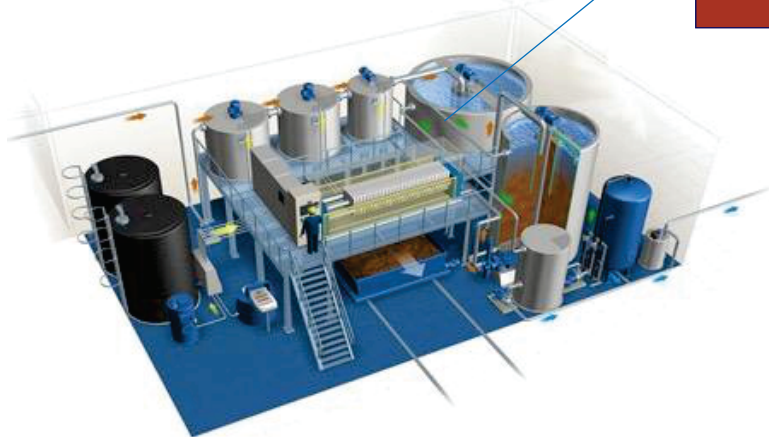
- Control of electric power parameters
- Monitoring of electric power quality
- Electricity metering
- Security functions of PTS access

## SWITCHING DEVICE

### IIOT-AMS Modbus

(Operation as part of water treatment plant)

- Monitoring and accounting of water, steam



All specified equipment can operate according to LoRaWAN or NB- IoT standards. The equipment has Ex versions.

The equipment operates at temperatures of -55.... +85 °C.

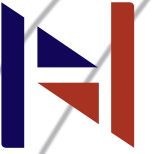
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IIOT-AMS equipment for telemetry of energy metering devices data (ELECTRICITY, HEAT, STEAM, WATER)

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# IOT-AMS equipment for enterprise security systems



## SWITCHING DEVICE

### IOT-AMS Dry contact

Access control (penetration, breaking, motion detection, opening/closing of process rooms and cabinets, hatches, tanks)

## SWITCHING DEVICE AND SENSOR

### IOT-AMS Smoke detector

Control of smoke



## USE OF IOT-AMS SWITCHES FOR CONTROLLING ENTERPRISE SECURITY SYSTEMS

## SWITCHING DEVICE AND SENSOR IOT-AMS

Leak detector Control of water leakages

## SWITCHING DEVICE IOT-AMS Alarm button

Alarm button for sending alarm or service messages

## SWITCHING DEVICE

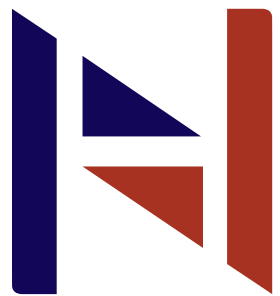
### IOT-AMS Analog

- Air quality monitoring (dust, gas)
- Monitoring of illumination
- Monitoring of noise level

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