



ROSSMATM

UNIVERSAL AUTONOMOUS WIRELESS MEASURING
AND SWITCHING DEVICE

ROSSMA IIOT-AMS ESD
(Equipment Security Device)

OPERATON MANUAL

DATA ON THE DOCUMENT

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THIS DOCUMENT IS VALID FOR THE FOLLOWING DEVICES

LINE NAME	DEVICE NAME
ROSSMA IIOT-AMS ESD	ROSSMA IIOT-AMS ESD ROSSMA IIOT-AMS ESD Ex

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INTRODUCTION

This manual applies to ROSSMA IIOT-AMS ESD measuring and switching device (hereinafter switching device) and defines installation and connection procedure, as well as control commands and functional description.



To ensure proper functioning, the switching device must be installed and adjusted by qualified personnel.

1. DESCRIPTION AND OPERATION PRINCIPLE

SWITCHING DEVICE DESCRIPTION

The ROSSMA IIOT-AMS ESD measuring and switching device registers the tilt of the device housing by an angle of more than 15 degrees along the horizontal axis and records vibration and impacts on the device housing, transmitting the received data from sensors in a wireless network.

The device has a sensor for detecting inclinations and sensors for detecting vibration and impacts on the housing.



ATTENTION: Repair and maintenance (except for replacement of power supply element) of the switching device by the consumer is not allowed!

The switching device can be used in industrial enterprises, infrastructure of housing and communal facilities, in hard-to-reach places (wells, basements). The switching device provides the possibility to install control and measuring devices in places with no power supply, operates in difficult climatic and weather conditions.

Measuring and switching device is designed for operation in explosion-proof and explosive conditions. Explosion-proof devices have the form of explosion protection "increased protection of type" e. ""

Explosion-proof measuring and switching device is designed for installation and operation in hazardous areas of rooms and outdoor installations according to Chapter 7.3 "Electrical installations in explosive areas" of Regulations for Electrical Installation, and other regulatory documents regulating the use of electrical equipment in explosive conditions.

Measuring and switching device with type of explosion protection "increased protection of type" e. "" comply with the requirements of GOST 31610.0-2014 "Explosive conditions. Part 0. Equipment. General requirements, "GOST 31610.7-2012" Electrical equipment for explosive gas conditions. Part 7. Equipment. Increased protection of type "e" "and performed with explosion protection level" explosion-proof "with explosion protection marking 1Ex e IIC T4 Gb X.

The "X" sign in the explosion protection marking indicates the special operating conditions of the measuring and switching device, namely the operating temperature range from -55 ° C to + 80 ° C.



ROSSMA IIOT-AMS ESD switching device provides instrument functionality from the built-in power supply, allowing to install sensors with the switching device in hard-to-reach locations where no power supply is available..

The measuring and switching device is supplied with a 3.6V battery.

ROSSMA IIOT-AMS ESD device uses the built-in ER34615M battery with a capacity of 13000-20000 mAh calculated for service life up to 10 years.



WARNING: The switching device is equipped with a built-in power cell - a non-rechargeable lithium-thionyl chloride (LiSOCL₂) battery. **Attempts to charge the battery can cause fire!**

ENSURING EXPLOSION PROTECTION

Explosion protection of the switching device with the type of explosion protection "increased protection of type" e "" is achieved as follows:

- Ensuring the degree of protection against external influences IP66 according to GOST 14254-2015 "Degrees of protection provided by shells (IP code)"
- Selection of leakage paths and electrical gaps between terminals of terminal blocks, as well as electrical insulation materials that meet GOST 31610.7-2012 "Electrical equipment for explosive gas environment. Part 7. Equipment. Enhanced protection of type "e" "
- There is no danger of ignition from electrical discharges under normal conditions of operation, maintenance and cleaning as per GOST 31610.0-2014 "Explosive environment. Part 0. Equipment. General requirements "
- The maximum permissible temperature of the external surface of the switching device (135 ° C) corresponds to the temperature class T4 as per GOST 31610.0-2014 "Explosive environment. Part 0. Equipment. General requirements "
- Ensuring high mechanical strength of the housing as per GOST 31610.0-2014 "Explosive environment. Part 0. Equipment. General requirements "
- Protection against self-screwing of all bolts and fasteners
- Design preventing wire slippage at the point of their connection as per GOST 31610.7-2012 "Electrical equipment for explosive gas environment. Part 7. Equipment. Enhanced protection of type "e" "
- Laying of cable in the hazardous area in accordance with the requirements of Regulations for Electrical Installation Chapter 7.3 and applicable standards.

DATA COLLECTION AND TRANSMISSION ALGORITHM

Registration of the housing inclination sensor along the horizontal axis and recording of vibration and impact sensors is performed constantly.

The data transmission period configured by special commands in the wireless network, by default, the data transmission period is set to 1 time per 15 min in standby mode. Data transmission also occurs when any of the sensors are triggered. The data is transmitted by a set timer, which is set in the internal memory of the device.

Control of switching device communication time is performed by the network server and can be adjusted by command.

FUNCTIONALITY

The device is a class A device (according to classification LoRaWAN) and provides the following functionality:

- Adaptive Data Rate (ADR) support
- Wireless configurable LoRaWAN type of activation in LoRaWAN network - OTAA, ATS. Default: ATS
- Configurable communication time: from 1 minute or higher (configured remotely using wireless network). Default value is 1 time every 15 minutes
- Support for sending confirmation packages (configurable)
- Number of sensitive sensors for swing (tilt) recording: 1
- Number of sensitive sensors to detect vibration (impact): 2




The device operates from the built-in 3.6V battery. The capacity of the 14000 mAh power cell is designed to send 40,000 data packages $\pm 10\%$.

If Prompt for Confirmation is enabled, the switching device will send the next package only after receiving the previous delivery confirmation. If no such acknowledgement is received after three replays, the switching device terminates the session before the next scheduled session. In this case, the switching device records the non-transmitted data into memory. The non-transmitted packages remain in the switching device memory and are transmitted during the next communication session.

When Prompt for Confirmation is disabled, the switching device sends the current data to the network with the specified discreteness. There is no check for package delivery in this mode. The non-transmitted packages do not remain in the memory of the switching device.

MARKING

The following information is shown on the stainless-steel nameplate on the switching device cover:

- Product name
- Manufacturer's trademark
- Manufacturer site
- "Made in Russia" mark
- Conformity marks,   

The following information is indicated on a metallized label glued to the side of the switching device:

- Product name
- Data transfer technology
- Switching device serial number
- Switching device IDa

The explosion-proof equipment shall be equipped with an additional metallized label with the following information:

- Product name
- Manufacturer's trademark
- Explosion protection marking
- Name of the authority for explosion-proof equipment certification
- Compliance Certificate Number
- Signs of conformity **ERC, Ex**, according to Appendix 2 of TR TS "On safety of equipment for operation in explosive environments" 012/2011

Inside the housing, device ID number is applied to the printed board. This ID also serves as an identifier with the passport data of a particular switching device.

The switching device certificate contains the following information:

- Product name
- Product Version Information
- Keys required to register the switching device in the network
- QC department Information
- Month and year of production

The label with the device number is located in three places - on the switching device housing, on the electronic board inside the housing and on the packing box (the first digits before the separator: the device number - XXXXXXXXXXXX).

It is possible to identify the device certificate by the device number in the column "identifier" - the last digits in the number after the separator.

The ID is XXXXXXXXXXXXXXXXXXXXXXXXXXXX - XXXXXX. The first part of the identifier is the part number and the second part is the serial number of the switching device. Interpretation of part number:



LPWAN standard: LW – LoRaWAN, NB – NbiOT, 6LP-6LoWPAN, LWNB - both standards.
Switching device model ROSSMA IIOT-AMS: AN-Analog, MB-Modbus, MU-Modbus Utility, Pulse-P0, DC-Dry Contact, LD-Leak Detector, SD-Smoke Detector, AB-Alarm Button, CN-Can, UC-Universal Controller.
Degree of enclosure protection: IP56-0056, EX IP66-EX66, EX IP68- EX68,etc
Number of inputs: X1-single channel, X4-four inputs, etc.
Switching device version: specifies the hardware platform and firmware version.
Manufacturer OUI: Unique identifier of ROSSMA in IEEE.
Region of delivery: RU-Russian Federation, EU-European Union.

DATA ON CERTIFICATION

Manufactured according to УАБИ.001.83301259.2017 TY specification.

Certificate of compliance No. ПОСС RU.HB32.H04125/20

Declaration EAЭC N RU Д-РУ.АБ93.В.08697 on Compliance with the Technical Regulation Requirements of the Customs Union TP TC 020/2011 "Electromagnetic Compatibility of Technical Means" meets industrial safety requirements.

Certificate of conformity No C-RU.MTЭ.OC.001.H.0003

The design of explosion-proof switching device complies with the requirements of the Technical Regulation of Customs Union TR TS 012/2011 "On equipment safety for operation in explosive environments." Certificate of Compliance No. EAЭC RU C-RU.АД84.В.00191/20..

2. TECHNICAL SPECIFICATIONS

THE MAIN

Number of sensitive sensors	up to 6 - request (default 3)
Operation temperature range	-55...+85°C
Built-in temperature sensor	Yes (sends data every time you connect)
Built-in power supply charge measuring	Yes (sends data every time you connect)
Explosion Protection Marking for Explosion Proof Switching device	1Ex e IIC T4 Gb X, where the mark X in the marking notes special conditions, namely the range of working t ° C of the device -55 ° C.. + 80 ° C

LoRaWAN

Class of LoRaWAN device	A
Frequency plan	RU868, EU868, IN865, AS923, AU915, KR920, US915, KZ865, any (on the basis of EU868)
Activation method in LoRaWAN network	ABP или OTAA (adjustable)
Communication Period	every 15 minutes in standby mode/status change at logon
LoRa antenna type	internal
Sensitivity	-138 dBm
Radio communication range in dense development	Up to 5 km
Radio communication range in non-urban area	Up to 15 km
Default transmitter power	25 milliwatt (adjustable)
Maximum transmitter power	100 milliwatt

HOUSING

Housing dimensions, mm	For general industrial design: 82*80*55 For explosion-proof design: 80*75*55
Degree of housing protection according to GOST 14254-2015	For general industrial design: IP 65 For explosion-proof design: IP66
Mounting	Additional set is specified when ordering

3. WORKING WITH THE SWITCHING DEVICE

CONTACTS DESCRIPTION

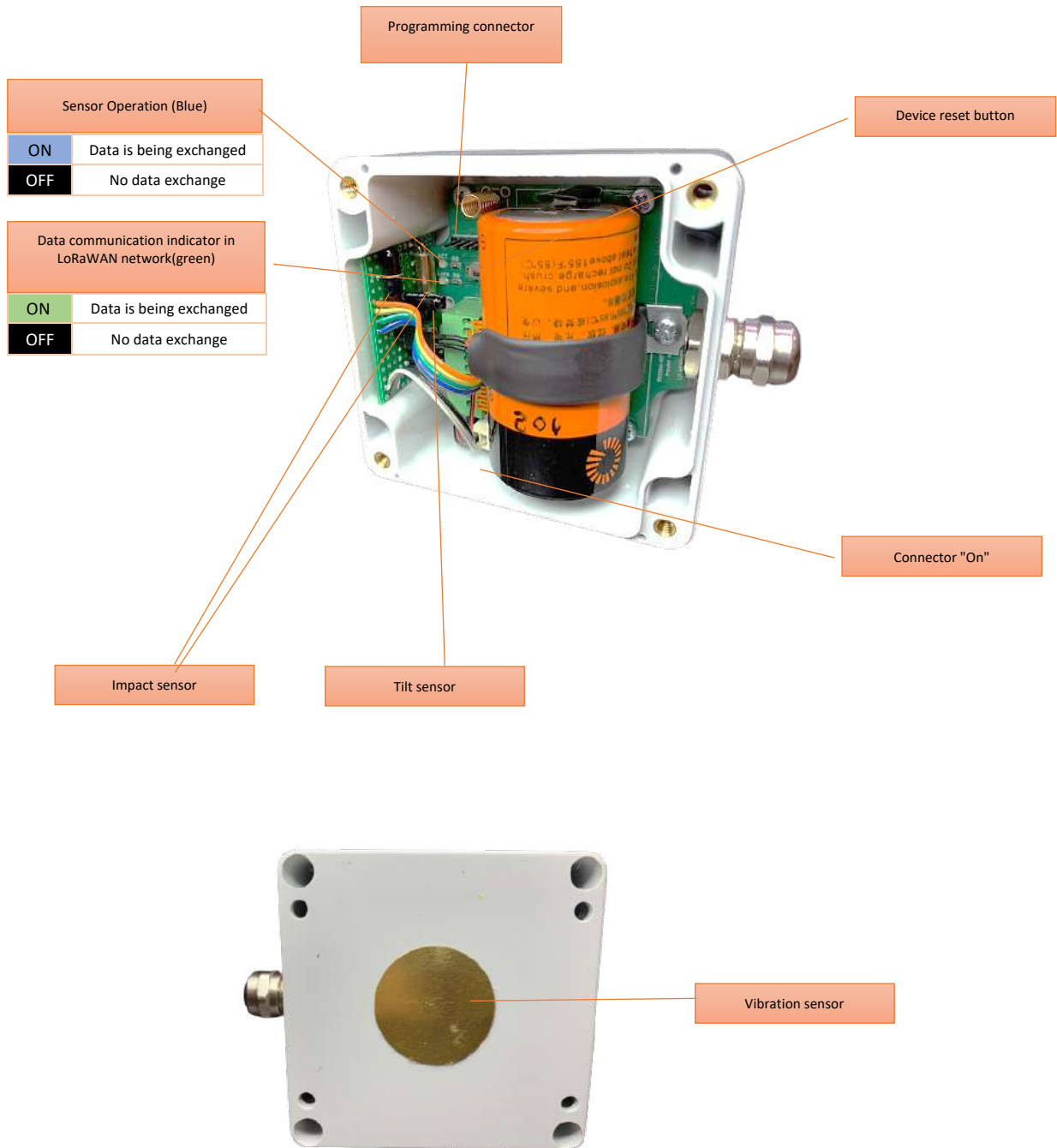


Fig.1 Description of ROSSMA IIOT-AMS ESD device

STRUCTURE DESCRIPTION

The device consists of a plastic housing in which a printed circuit board with a lithium 3,6V power element is installed.

The PCB is attached using stainless steel screws. Silicone seal is installed between body base and cover. The base of the housing and the cover are connected by means of captive screws made of stainless steel.

The device can be additionally equipped with a fastening element to tilting mechanism (specified when ordering).

The manufacturer has the right to change the products design without deterioration of design and functional characteristics and without prior notice and to make changes to this manual.

INDICATORS AND BUTTONS

The switching device has a few indicators: ACT (receiving data from the sensor), LORA (sending/receiving data in the wireless network).

The device has RESET button - resetting the device, when tpressed - the switching device begins to measure and sends data in LoRaWAN network.

EXPLOSION PROTECTION OF THE SWITCHING DEVICE DURING INSTALLATION

Explosion-proof switching devices can be installed in hazardous areas of rooms and outdoor installations, according to Chapter 7.3 "Electrical installations in explosive areas" of Regulations for Electrical Installation and other regulatory documents regulating the use of electrical equipment in explosive conditions.

When installing the sensor, refer to the following documents:

- RTOEIC rules (chap. 3.4 "Electrical installations in hazardous areas")
- Regulations for Electrical Installation rules (chap. 7.3)
- GOST 31610.0-2014 "Explosive enviroment. Part 0. Equipment. General requirements "
- GOST 31610.7-2012 "Electrical equipment for explosive gas enviroment. Part 7. Equipment. Enhanced protection of type "e" "
- This OM and other regulatory documents which are in force at the enterprise.

The installation and operation of the switching device shall be allowed to persons who have studied this operating manual and got the appropriate instruction.

The switching device must be inspected before installation. At the same time it is necessary to pay attention to marking of explosion protection, warning inscriptions, absence of housing damages.

INITIAL START-UP

The following conditions must be taken into account when selecting the switching device installation location:

- The design shall correspond to the area to be installed
- The housing and internal components of the PCB are not subject to aggressive environment

The connection of the switching device must be made in the following way:

- Install switching deice according to fastening type
- Remove screws (4 pcs) fixing the cover on the housing base
- Remove the cover
 - Connect the switching device using a cable (with a recommended core section no more than 1 mm) to the end device via terminals (Fig. 1, Fig. 2, Fig. 3)
 - Install the jumper on the activating pins (Fig.2, Fig. 3). The switching device ROSSMA IIOT-AMS ANALOG X4 PWR is connected to the power supply 220V (Fig.1)
 - Check LED indication
 - Fix the cover on the base of the housing with screws.
 -

The switching device supports two activation methods in the LoRaWAN network - ABP and OTAA. By default, the manufacturer has set the activation method to ABP.



If the switching device is not functioning, check the battery voltage. In case of failure of the switching device, it is necessary to send it to the Manufacturer with warranty ticket for troubleshooting.

REPLACEMENT OF POWER SUPPLY

To replace the power supply, perform the following steps:

- Turn off the device (disconnect the connector of the power element from the connector on the board).



- Unscrew the screw fixing the bracket inside the housing.



- Remove the power element and bracket from the housing.



- Install a new power element into the housing. Install the bracket on the power element and fix it with a screw.



- Connect the power element to the power connector on the board. Check indication of LEDs.



CAUTION: It is recommended to use a non-rechargeable lithium-thionyl chloride (LiSOCL₂) power cell ER34615M with a type connector HU-2.

4. COMMUNICATION PROTOCOL

КОНФИГУРИРОВАНИЕ И ПРОГРАММИРОВАНИЕ ИЗМЕРИТЕЛЯ-КОММУТАТОРА

The switching device is supplied with built-in firmware that enables the switching device to operate with the characteristics specified in this document. The switching device is programmed using a special input for the programmer.

The switching device is configured using special control commands that are sent to the switching device in wireless network.

DATA PACKAGE FORMAT

Data package format for ROSSMA IIOT-AMS ESD switching device:

Decoding:

dd0e000000150010001400ccc14

dd - package type (dd - data, aa - alert, 21 - response)

0e - presence of security inputs actuation (reset when sending of two alerts). The low 4 bits are the status of the security inputs actuation (0x0E = b00001110). There is an actuation on 2,3,4 inputs. 1 input (0 bit) - tilt sensor, 2 input (1 bit) - impact sensor 1, 3 input (2 bit) - impact sensor 2, 4 input (3 bit) - sound impact sensor.

0000 - number of actuations on the first input between data packages (0)

0015 - number of actuations on the second input between data packages (21)

0010 - number of actuations on the third input between data packages (16)

0014 - number of actuations on the fourth input between data packages (20)

00000000 - number of pulses on channel 5 between data packages (0)

0000000000000000 - total number of pulses on channel 5 (0)

00000000 - number of pulses on channel 6 between data packages (0)

0000000000000000 - total number of pulses on channel 6 (0)

0ccc - battery voltage (3.276V)

14 - temperature (20 degrees)

CONTROLLING THE SWITCHING DEVICE

Port 1 (Device Management):

0x02 - Confirmed Message Mode (LoraWAN Confirmed messages on/off)

0x03 - Full frequency range for ABP (device restart required)

0xBB - version request

Response: bb040400010001

Where:

bb - package type

0104 - device type

0200 - Software Version (v2.0)

0301 - Board Version (v3.1)

0xCE – restart

0xF0 - Тестирование связи

Ответ: 2101f0ffa317

Где:

21 - тип пакета (0x21 - ответ)

01 - порт, по которому был сделан запрос

F0 - команда

ffa3 - rssi (-92) 17 - snr (2.3)

Port 3 (Current Data Management):

0x01 - Change the polling interval for current data before restart

Request, option 1: 01003C

01 - command

003C - time in seconds (60 seconds)

Request, option 2: 010000003C

01 - command

0000003C - time in seconds (60 seconds)

Reponse is not provided.

0x02 - Change Next Communication Time Only

Request, option 1: 01003C

01 - command

003C - time in seconds (60 seconds)

Request, option 2: 010000003C

01 - command

0000003C - time in seconds (60 seconds)

Reponse is not provided.

0x03 - Change polling interval permanently (saved after restart)

Request, option 1: 01003C

01 - command
003C - time in seconds (60 seconds)

Request, option 2: 010000003C
01 - command
0000003C - time in seconds (60 seconds)

Response: 21030300
Where:
21 - package type (0x21 - response)
03 - Request Port
03 - command
00 - result (0 - success, 1 - error)

5. STORAGE AND TRANSPORTATION RULES

The switching device should be stored according to GOST 15150-69 "Machines, devices and other technical products. Performances for different climatic areas. Categories, operating conditions, storage and transportation in terms of environmental climatic factors. "

ROSSMA IIOT-AMS switching device should be stored in the factory package in heated rooms at temperature from + 5 ° C to + 40 ° C and relative humidity not more than 85%.

Transportation of the switching device is allowed in covered cargo compartments of all types for any distance at temperature from -40 ° C to + 65 ° C. The method of cargo placing on the vehicle should exclude the possibility of their movement.

6. DISPOSAL

A failed switching device does not pose a danger to human health and the environment.

Disposed according to the procedure established by Federal Law No. 89 "On Waste of Production and Consumption."

7. КОМПЛЕКТ ПОСТАВКИ

The standard delivery set of ROSSMA IIOT-AMS ESD switching device includes:

- Switching device ROSSMA IIOT-AMS ESD – 1 шт.
- Certificate – 1 шт.
- Operation manual – 1 шт.
- Packing – 1 шт.

8. WARRANTY

The warranty period for the switching device is 12 months after the start of operation or 18 months from the date of delivery, whichever of these periods expires earlier (the "Warranty Period").

The Manufacturer will correct (by repair or supply of replacement parts) any defect which will appear in the Goods and which will be reported to the Manufacturer within the Warranty Period.

The manufacturer is obliged to provide repair services or replace the failed switching device within the entire warranty period.

The consumer is obliged to observe the conditions and rules of transportation, storage and operation specified in this user manual.

The Manufacturer shall not be liable for defects caused by normal wear, non-compliance with the Manufacturer 's requirements in terms of storage, installation, operation or operating conditions; inadequate usage; any changes or repairs not previously authorized by the Manufacturer in writing.

Warranty is not subject to:

- Switching device power cells that have sent more than 80,000 packages
- Switching devices with the mechanical, electric and/or other damages and defects which arose at violation of transportations, storage and operation condition;
- Switching devices with repair traces outside the manufacturer 's service center;
- Switching devices with traces of oxidation or other signs of liquids ingress into the device housing.

If a warranty case occurs, contact the service center of the ROSSMA manufacturer at:

614064, Perm, Chkalova Str., 9 Lit. "И".

Phone: 7 (342) 233-93-99.

Or fill out the form on the support page: <https://rossma.ru/support/>



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Operation manual