



Data collection and transmission controllers measuring "PUMA-30"

WITH TRANSMISSION OVER THE NB-IOT NETWORK

Modification: "PUMA-30.05.06"

USER MANUAL

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Introduction

The PUMA-30 data acquisition and transmission controllers (hereinafter referred to as controllers) are available in various versions, depending on the number of inputs, outputs, and interfaces. This operating manual (hereinafter referred to as the OM) applies to the PUMA-30.05.06 version of the controller.

This operating manual is intended for personnel involved in the design of automated information and control systems for commercial metering, installation, commissioning, operation, repair, and maintenance of Jcom-IoT controllers.

Personnel authorized to work independently with the equipment must:

- be certified to carry out installation and commissioning work of automated information and control system for commercial metering;
- have a qualification group in electrical safety of at least III;
- know the operating principle and technical characteristics of the controller;
- Have computer skills. Repair personnel must also:
- be trained in fault detection and troubleshooting techniques for specific devices that are eligible for on-site repair;
- have practical skills in working with soldering equipment and assembly tools;
- have experience in repairing electronic components.

Jcom-IoT is the copyright holder for the PUMA-30 measuring data collection and transmission controllers, as well as the embedded software in the controllers.

1. Purpose

The PUMA-30 measuring data collection and transmission controllers are designed to collect and transmit energy consumption data from primary converters – energy meters – as well as to monitor the status and control the modes of equipment at a remote facility.

The controllers are used to build automated information and measurement systems for commercial metering of electricity (AIMS KUE) and other energy resources, as well as to build systems for monitoring, dispatching, monitoring the condition and controlling the modes of equipment at a remote facility.

The device is intended for use in the following modes:

- NB-IoT modem;
- Ethernet converter.

Use as an NB-IoT modem (NB-IoT Node) for remote polling (via the NB-IoT channel) of parameters of devices connected via RS485, RS232 interfaces:

- gas meter (support for gas meter profile);
- water meter (support for water meter profile);
- Professional weather station (meteo (weather) meter profile). Use as an

Ethernet converter:

- operation as an Ethernet/RS-485/RS-232 interface converter (virtual COM port).
- operation as an Ethernet/RS-485/RS-232 interface converter (TCP/IP and UDP server/client mode).

2. Safety requirements

Before using the controller, please read the operating documentation.

Equipment connected to a third-party controller must comply with safety and EMC requirements.

3. Technical and metrological characteristics

Main technical And metrological characteristics controller "PUMA-30.05.06" are given in Table No. 1.

Table No. 1. Main technical characteristics

Name of the characteristic	Meaning
Power supply of the device	8-60 VDC
Power consumption	no more than 10W
Voltage for powering external devices	12VDC, 8VDC, 5VDC
User interface for customization	Web interface
Ethernet interface	2 ports
Data transfer rate via 10\100 Base T interface	up to 100 Mbit/s
Number of RS485 interfaces with galvanic isolation	1 piece
Number of RS232 interfaces with galvanic isolation	1 piece
Galvanic isolation voltage for RS485, RS232 interfaces	1000 VDC
Data transfer rate via interfaces (RS485, RS232)	1200-115200 bps
Built-in modem type	LTE-Cat-NB1 (NB-IoT)
NB-IoT protocol stack	3GPP Release 13

Modem	LTE- b3, b8, b20 (1800 MHz, 900MHz, 800MHz)
Frequency range Band 8	Uplink 880..915 MHz Downlink 925..960 MHz
Frequency range Band 20	Uplink 832..862 MHz Downlink 791..821 MHz
Frequency range Band 3	Uplink 1710~1785 MHzDownlink 1805~1880 MHz
Model of MCU	RT5350 (MIPS24KE)
RAM	32 MBytes
FLASH	8 MBytes
Language development	C language
Operating system	Linux
Number of SIM cards	1
SIM card type	Mini SIM
Support for temperature sensor with 1-wire digital interface	+
Indication (LEDs)	nutrition, statuses
Operating temperature range	-20 to + 80°C
Built-in hardware watchdog circuit	+

Type of power supply connectors, interfaces, sensors	Terminal screw connectors
Ethernet connector types	RJ45
Antenna connector type on the controller unit	SMA (F)
Antenna	included
Frame	Plastic
Installation	on a 35 mm DIN rail
Overall dimensions	105x51x65
Controller weight, no more than	0.8 kg
Mean time between failures	at least 150,000 hours
Service life	20 years

4. Completeness

The controller complete set is shown in Table 2. Table 2.

Controller complete set

Name	Quantity, pcs.
1. Data collection and transmission controller "PUMA-30.05.06"	1
2. Operation manual	1
3. Form	1
4. Packaging	1

5. Appearance of the device

The controller is a device housed in a durable plastic case. Inside the case is a circuit board with a microcontroller, a memory device, an RS485, RS232, and Ethernet interface unit, and a wireless NB-IoT modem.

On the outside of the case there are connectors for connecting interface cables.

LED indicators for power availability and current controller status.

The following communication interfaces can be used to connect external equipment to the controller and communicate with it remotely: RS485, RS232, 1-wire.

The design of the controller allows placement in V electrical installation cabinets with the possibility of mounting on a DIN rail.

The appearance of the controller is shown in Fig. 1.

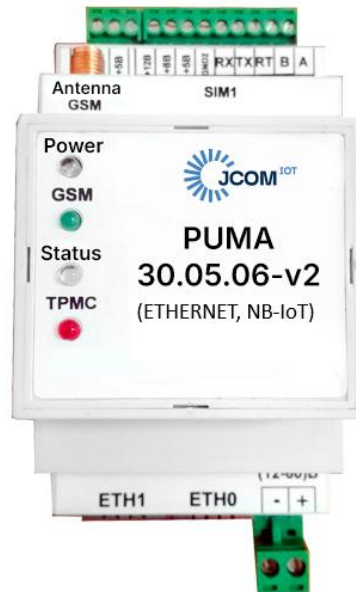


Figure 1 - Controller appearance

6. Preparation for use, connecting external devices.

6.1. Preparing the controller for installation on site

Before installing the controller, perform a visual inspection to detect any mechanical damage to the device's housing. If the controller has been exposed to conditions other than its intended operating conditions, allow it to soak for 2 hours under these conditions before connecting power.

When selecting an installation location, the following criteria should be followed: do not install the controller in places where dust or aggressive gases may be present, place it near powerful sources of electromagnetic and thermal radiation, or in places subject to shaking, vibration, or exposure to water.

The mounting points on the rear of the controller allow it to be mounted on a 35mm DIN rail.

6.2. Getting ready for work

As designed, interface cables are connected to the connectors located on the side of the device's housing (Fig. 1) when the device is turned off. The device is turned on after power is applied through the power connector located on the side of the housing.

After turning on the power, the settings are loaded and the device is prepared for operation.

Note: Connection to the power source should be made using a wire with a cross-section of at least 0.5 mm² through an external 2A fuse or a category A circuit breaker.

7. Indicator lights

The device body contains the following indicator lights that display the status and operating modes:

- "Pit" – constantly on after power is applied. Indicates that the device is powered.
- "Stat" – turns on (red) after data transfer via one of the interfaces. The indicator turns off after receiving a response from the device. If there is no response from the device, the LED turns off 5 seconds after data transfer.
- SIM1/SIM2 – indicates that the SIM card is working.
- GSM – turns on when transmitting data over the GSM network (3G/EDGE/GPRS or NB-IoT).
- TRMS - indicator is active during heating.

Note:

The device is designed to operate at low temperatures.

To ensure normal environmental conditions for the processor, the device has a built-in heating system. When the device heats up, no functions are available. Once the required temperature is reached, the processor inside the device turns on, turning off the heating, and all functions become available.

8. Maintenance

Maintenance must be carried out by persons who have read this operating manual.

Periodic maintenance consists of inspecting the device's appearance, taking measurement data, checking the system time, and checking communication via the RS485 and Ethernet interfaces.

Inspection should be carried out at least once a year, during which the reliability of fastening of devices at the place of operation, the condition of cable lines and the integrity of seals are checked.

The controller's clock must be synchronized at least once per day. Synchronization must be performed from a server connected to an approved time synchronization device.

9. Marking

The controller marking must correspond to the manufacturer's drawings.

One of the screws securing the bottom cover of the controller is sealed by applying an imprint from the quality control department of the manufacturer or the service that verifies the controller.

10. Storage and transportation rules

Climate conditions transportation controller:

- ambient air temperature from minus 40 °C to plus 70 °C;
- the upper value of relative air humidity is up to 95% at plus 45 °C;
- atmospheric pressure from 84.0 to 106.0 kPa (from 630 to 800 mmHg).

Transportation on aircraft must be carried out in accordance with the rules for the carriage of baggage and cargo by air.

The controller must be stored in its packaging in the consumer's (supplier's) warehouse premises under the following conditions:

- ambient air temperature from plus 5 °C to plus 40 °C;
- relative air humidity from 5% to 80%;
- solar radiation, 700 W/m²;
- there is no condensation of moisture, frost formation, or wind-driven precipitation.

A short-term increase in humidity up to 98% at a temperature of no more than +25°C, without moisture condensation, is permitted, but in total, no more than 1 month per year.

11. Disposal

The controller does not contain any hazardous or toxic substances that could harm human health or the environment, so disposal of the controller can be carried out in accordance with the rules for the disposal of general industrial waste.

When disposed of, the controller housing, which is made of plastic, can be recycled.

The remaining components of the controller (electronic boards, connectors, etc.) contain extremely small amounts of precious metals and therefore, their recycling is not practical.

12. Warranty obligations

The controller's warranty period is 12 months from the date of manufacture, including a storage period of 6 months from the date of manufacture of the controller.

During the warranty period, the manufacturer will replace or repair the controller free of charge. The warranty does not cover defects resulting from improper handling, maintenance, storage, or transportation.