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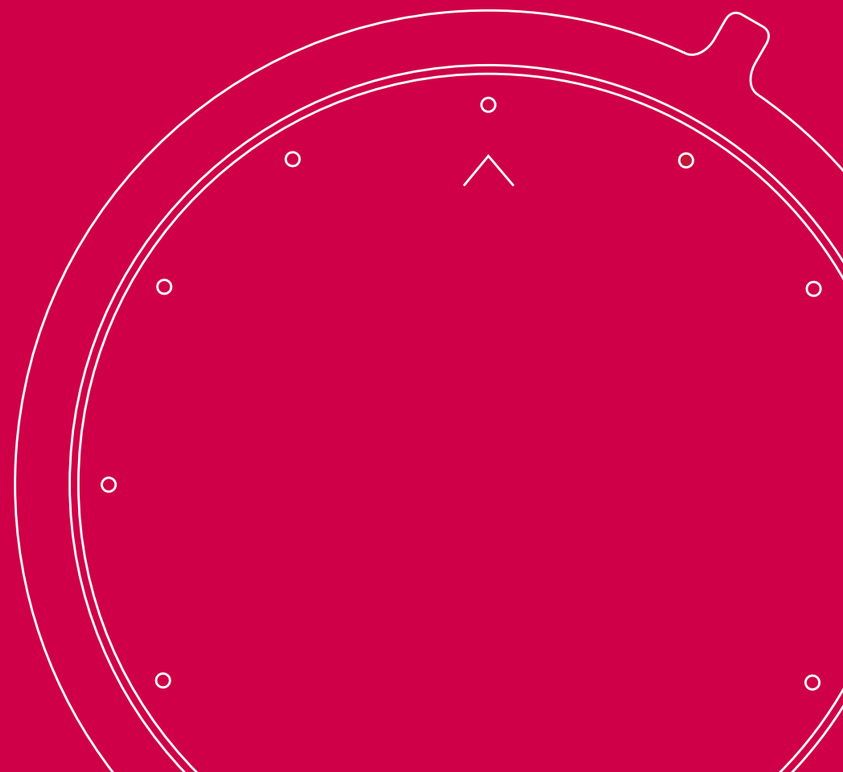
Smart metering



Nero Electronics

Nero Electronics is a Belarusian company that develops and manufactures devices for intelligent resources metering systems.

The skills and experience of our specialists allow us to produce devices that meet European quality standards. They are functional and versatile. Products by Nero can be used separately and as a system, combined with other developments of the company.

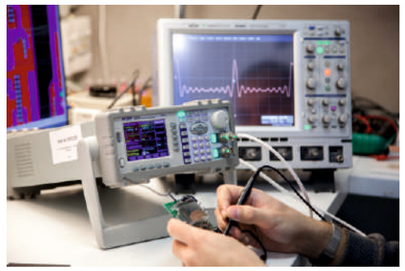
High-tech equipment, components from the world's best manufacturers, ESD control, automated production - all this becomes the key to the company's success. The particular role plays a system of multi-stage quality control, which minimizes the release of defective items.

We adhere to the principles of multitasking and we are always ready to cooperate with partners for new developments.

Our job is to create devices you can trust.

- Full-cycle production in Belarus
- Patents on communication technologies
- Development department is a member of High Technology Park
- Modern manufacturing
- Low level of defects 0,05%
- Factory capacity up to 2 000 000 modules per year

Nero Electronics factory



Own development

Modern manufacturing

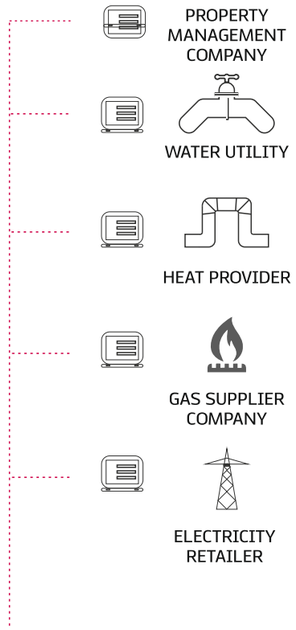
NERO Integrated Smart Metering System

How does the system work?

The link between a smart meter and a utility server is the base station produced by NERO. Stations receive data from water meters, gas meters, and other metering devices via high-tech radio communication, and then transmit data to the server via more traditional channels: Ethernet or LTE connections (which are often too expensive and less convenient if used in individual meters).

One base station can serve an entire district of a large city, providing collection of readings from hundreds of thousands of end devices within a radius of several kilometers. It is the most profitable solution for large projects.

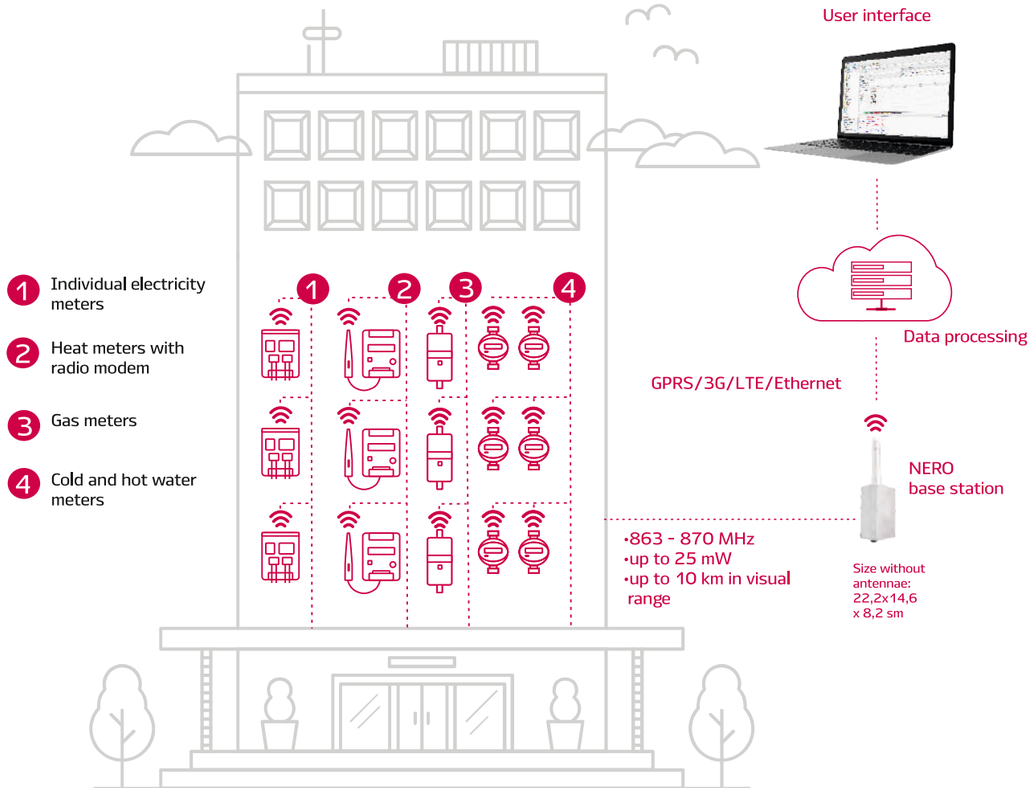
Utilities and ordinary residents can get access to the information on consumed resources online or using special software.



Available LPWAN technologies for transferring data from meters to a base station

LPWAN — (Low-power wide area network) – the dominant IoT technology type with large coverage and low power consumption.

- **UNB LPWAN:** SigFox, Nero UNB, etc.
- **LoRaWAN**
- **GSM,** GPRS, LTE
- **NB-IoT**



Base Station

NERO base station receives readings from individual meters (water, gas, electricity meters) and radio modems using Nero UNB LPWAN technology and transmits them to utility servers via Ethernet or LTE connection.

A single NERO base station is capable of supporting hundreds of thousands of end devices within a radius of several kilometers which reduces the cost of overall network and makes it the most costeffective solution for large projects.

Dimensions without antennae:
22,2 x 14,6 x 8,2 cm

Peculiarities

- Provides a two-way communication and reception of readings from hundreds of thousands of metering devices within a radius of several kilometers;
- Carries out data exchange between subscribers and elements of the upper level of the system;
- Radio communication is carried out in the frequency range 863 - 870 MHz (a specific range is selected based on the legislation of the country);
- The station is based on an anti-jamming panoramic receiver;
- The enclosure provides a high degree of protection against dust and moisture IP65 for outdoor installation.

Favorable cost

Building an automated metering system based on wired solutions can be too unprofitable in terms of connection and maintenance. The use of a base station for projects with a large number of metering points, on the contrary, reduces costs and is economically justified.

Proven reliability and completeness of data collection

The base station is highly reliable due to the use of modern software and hardware solutions. For example, the base station has the ability to automatically recover software after critical failures.

Unified metering system for different resources

The base station is a multipurpose device that will allow organizing the automation of water, gas, and heat metering.

System based on data acqusition and transmission device

Smart meters send readings to a hub, which is a data acquisition and transmission device.

One data acquisition and transmission device is installed for each hub of an apartment house and collects readings via radio and/or PLC communication, and then transmits data to a remote server of the resource sales organization via GSM or Ethernet communication.

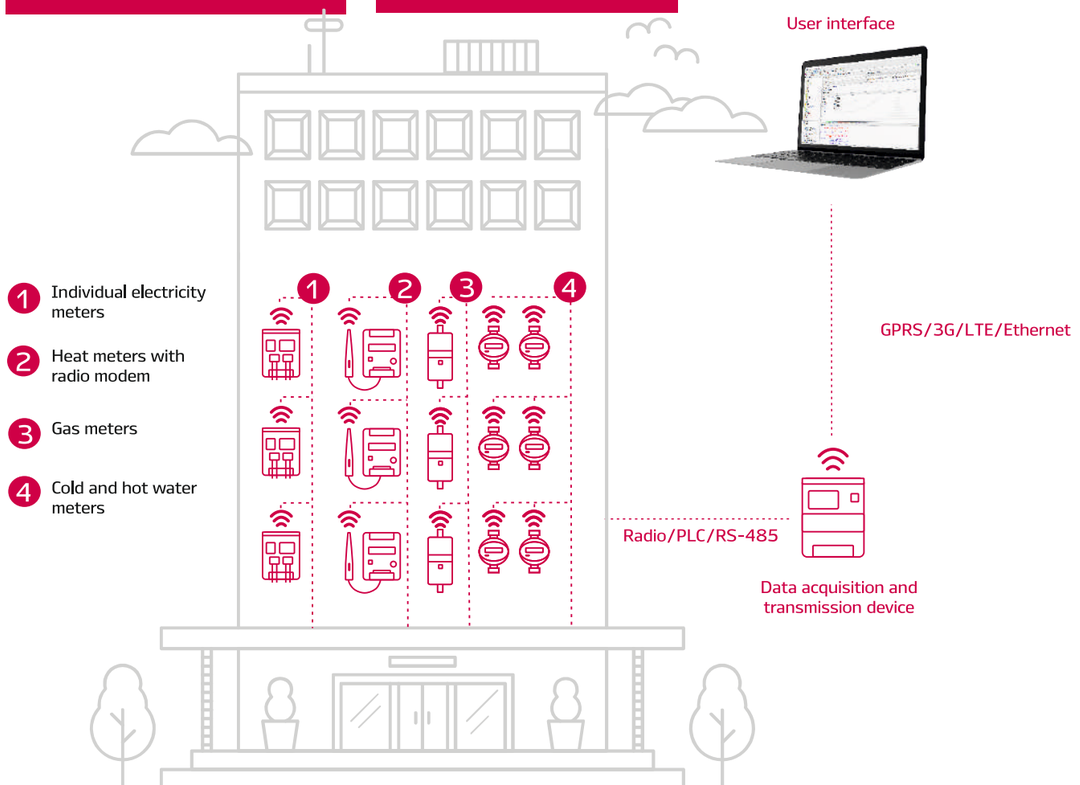
The software installed on the server allows to monitor the consumption of districts and entire cities in real time, process, analyze and store data. Services can be connected to the the server of the energy sales organization, and billing systems of banks can receive information. Owners of apartments and houses can track the indicators of resource consumption in a convenient application.

Data transfer protocols

- NERO-PLC
- DLMS
- SPODES
- Smart Meter Protocol

Communication interfaces

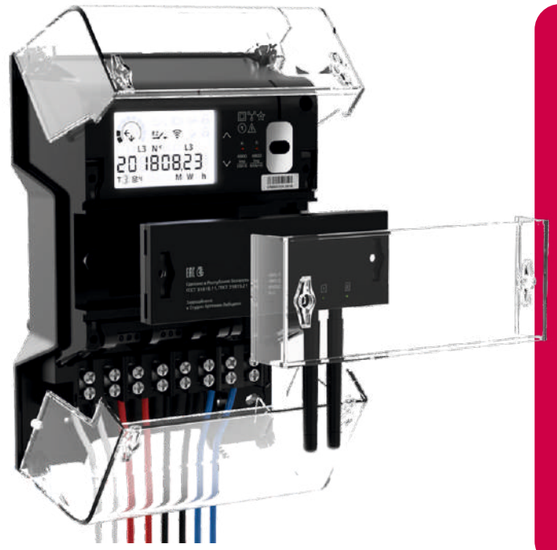
- GPRS/LTE
- Radio
- PLC
- RS-485
- Optical port
- G3-PLC



Data Acquisition and Transmission Device

The device is intended for acquisition, processing, storage of data from meters and transfer of information via information channels to the upper level in automated systems for comprehensive utility metering. It is installed as a part of a three phase smart electronic meter and functions together with it.

An important function of the device is time measuring and clock synchronization on the metering devices in automated systems for comprehensive utility metering.



Features

- 2 GPRS/LTE modules, micro-USB, Wi-Fi module;
- Provides event log storage and information transfer on request;
- Multilevel protection against unauthorized access: mechanical seals, an eight-digit password for access, encryption of information during its transmission through the interfaces of the lower and upper levels of the device.
- Linux based operating system;
- Storage depth: 6144 readings per interval.

Data acquisition:

- active consumed and generated power;
- reactive consumed generated power;
- general power;
- amount of tariff storages (operated/all) for active consumed/generated power;
- tariff accumulations according to each tariff for active consumed/generated
- voltage (average value during the integration period);
- current intensity (average value during the integration period);
- frequency (average value during the integration period);
- event log.

Sends information to the upper level about the following events:

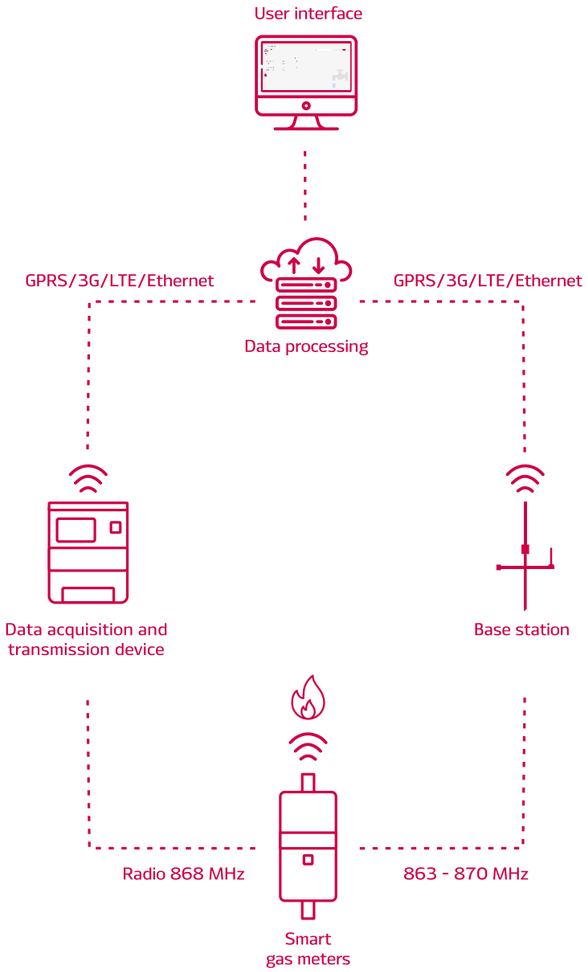
- overlimit of active power;
- current threshold crossing along neutral channel;
- consumer electrical installation deviation;
- network frequency deviation;
- voltage state – overlimit; failure;
- power overlimit 1/2/3;
- critical time deviation or forbidden time unsynchronization;
- low consumption for a long time;
- the device is open – terminal block /housing;
- magnet or reverse magnet interference (for meters including magnetic field sensors);
- radio field interference (for meters including radiofrequency electromagnetic field sensors);
- password blocking;
- low battery;
- data transfer via communication channel during the emergence the event was performed;
- flag of requirement of schedule group change;
- reason for the latest unscheduled automatic start.

Smart Gas Metering

Manual meter readings and estimated calculations are inevitably replaced by cost-effective intellectual automatic remote reading.

For that purpose NERO has developed a very compact and precise smart residential gas meter with a unique patented ultrasonic technology and popular embedded communication protocols which allow to integrate the meter in partners' existing systems.

But at the same time NERO offers a complete and easily expandable system that includes smart meters, concentrators, a platform for data processing and visualization together with technical assistance in launch of the system.



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Smart Ultrasonic Gas Meter

Electronic gas meter is based on an innovative ultrasonic technology. Thanks to it gas meter is compact and extremely precise. It immediately responds to flow changes and provides no pressure loss. The meter ensures stable measurement reliability over time and a long service life.

The readings are saved in a non-volatile meter memory and then the embedded communication module sends all the data to a utility platform using one of the popular LPWAN technologies: SigFox, LoraWAN, NB-IoT, NB-Fi, Nero UNB.

Features

- High precision ultrasonic measurement;
- Compact size;
- Data archive storage;
- Built-in monitoring and diagnostics system;
- Temperature and pressure correction;
- Maintenance-free, which reduces operating costs;
- High IP67 enclosure protection;
- Communication technologies available: SigFox, LoRaWAN, NB-IoT, NB-Fi, Nero UNB.

Automatic data collection

The communication module inside the meter transmits data to the personal account, providing remote collection of readings.

Personal account

Convenient personal account for analysis and statistics. The ability to export data to Excel and other software.

Temperature and pressure correction

Automatic adjustment to standard conditions by temperature and pressure correction function enables the meter's intallation outdoors or in unheated rooms.

Ultrasonic technology

The main advantages of the technology are accurate measurements of low flow rates, as well as resistance to mechanical wear due to the absence of moving parts.

Resistance to magnetic fields

The meter will withstand the influence of magnetic fields and signal about the incident by indication on the screen and in a personal account of a gas supplier.

Specifications

Parameter	G1,6	G2,5	G4	G6
Maximum flow rate Qmax	2,5 m3/hour	4,0 m3/hour	6,0 m3/hour	10,0 m3/hour
Minimum flow rate Qmin	0,016 m3/hour	0,025 m3/hour	0,04 m3/hour	0,06 m3/hour
Transient flow rate Qt	0,16 m3/hour	0,25 m3/hour	0,6 m3/hour	1,0 m3/hour
Relative error, not more than %	±1,5			
Temperature regime	-40 - +55°C			
Sensitivity threshold	0,004 Qmax			
Counting mechanism capacity	99999,999 m3			
Thread on connecting pipes	G1/2 inch G3/4 inch			
Frequency range	863 - 870 MHz			
Data transmission power	25 mW			
Data encryption	+			
Power supply voltage	3,6 V			
Enclosure protection class	IP67			
Weight	from 0,55 to 0,65 kg			
Dimensions	176x80x35 mm			

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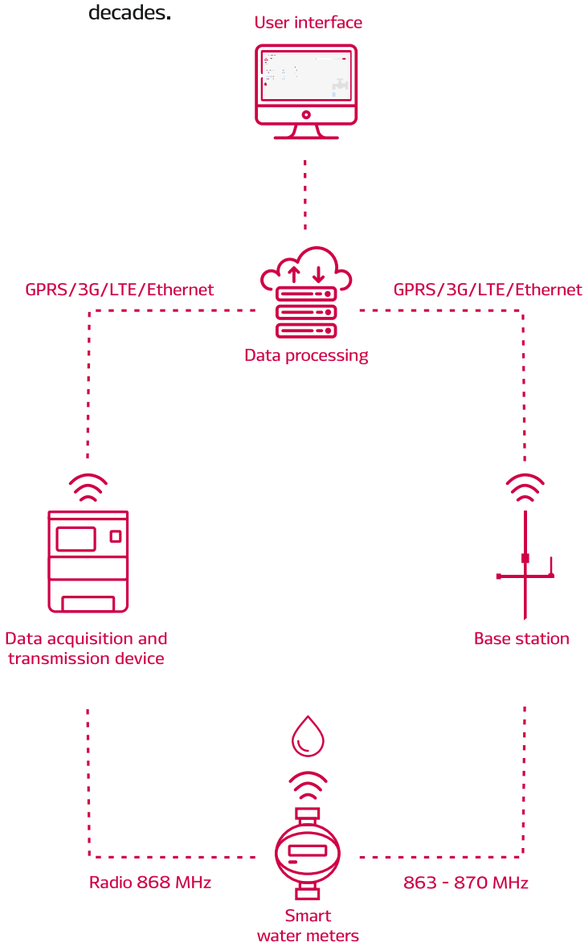
Smart Water Metering

Automation solution for water metering offered by NERO includes not only smart residential meters with communication technologies, but also a complete and easily scalable turnkey system with concentrators, a platform for data processing and visualization, technical assistance in launch of the system.

Advantages:

- Automatic data collection;
- Popular LPWAN communication technologies;
- Precision and stability in a wide dynamic range;
- Reverse flow records;
- Resistance to magnetic fields;
- Alarms and notifications in a personal account;
- Autonomous operation on the built-in battery for decades.



Smart Ultrasonic Water Meters

Water meters with IoT capabilities are based on an innovative ultrasonic technology. Having no mechanical parts, the meters do not suffer from mechanical wear and guarantee high measurement accuracy and reliability during all service life.

The meters readings are saved in a non-volatile meters memory and then the embedded communication module sends them to a utility platform using one of the popular LPWAN technologies: SigFox, LoraWAN, NB-IoT, NB-Fi, Nero UNB.

Features

- Up to R400 – wide measurement range;
- Resistance to mechanical wear, do not require filter installation;
- Automatic error diagnosis;
- Easy installation: horizontal and vertical;
- High IP68 enclosure protection;
- Communication technologies available: SigFox, LoRaWAN, NB-IoT, NB-Fi, Nero UNB.

Ultrasonic technology

Guarantees high measurement accuracy due to its sensitivity to low flow rates. Having no moving parts, the meters are not subject to mechanical wear, are not sensitive to deposits on the flow path and do not require the installation of filters.

Automatic data collection

The communication modules built into the meters tranmits data to the personal account, providing remote collection of readings.

Reverse flow indication

In the event of a reverse flow, the data is not subtracted from the main readings, but is counted in a separate register and displayed on the screen.

Resistance to magnetic fields

The meters will withstand the influence of magnetic field and signal about the incident with indication on the screen and in the personal account of the managing organization.

Specifications

Parameter	Value
Nominal flow	1,6; 2,5 m3/h
Maximum allowable pressure	1,6 MPa
Dynamic class R	up to R400
Connection diameter	DN15
Pressure loss class	Δp63
Sensitivity class to flow disturbances	U0/D0
Data transmission power	up to 25 mW
Frequency range	863 - 870 MHz
Data encryption	+
Battery	battery 3,6 V
Enclosure protection class	IP68

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Smart Cold and Hot Water Meters

Electronic vane water meters with built-in radio LPWAN module and autonomous power supply are designed for automatic wireless metering of cold and hot water in residential buildings, cottage settlements, and at enterprises. The built-in radio module enables data transfer to the personal account of a utility and other users.

Features

- Up to R160 - wide measurement range;
- When a reverse flow occurs, the data is not subtracted from the main readings, but is counted in a separate register and displayed on the screen;
- Equipped with an electronic head with indicator rotating 360 °;
- High IP67 enclosure protection;
- Communication technologies available: SigFox, LoRaWAN, NB-IoT, NB-Fi, Nero UNB.

Automatic data collection

The embedded communication module of the required technology transmits data to the personal account, providing remote collection of readings.

Reverse flow indication

In the event of a reverse flow, the data is not subtracted from the main readings, but is counted in a separate register and displayed on the screen.

Resistance to magnetic fields

The meter will withstand the influence of the magnetic field and will signal an attempt to influence the indication on the screen and in the personal account of the managing organization.

Convenient installation

Both vertical and horizontal installation is possible. Electronic head with indicator, rotating 360 °.

Specifications

Parameter	Modification Q3=1,6 m3/h	Modification Q3=1,6 m3/h	Modification Q3=2,5 m3/h
Dynamic class R	R 40H	R100	R160
Minimum flow rate Q1	0,04 m3/hour	0,016 m3/hour	0,016 m3/hour
Transient flow rate Q2	0,064 m3/hour	0,026 m3/hour	0,025 m3/hour
Constant flow rate Q3	1,6 m3/hour	1,6 m3/hour	2,5 m3/hour
Maximum flow rate Q4	2 m3/hour	2 m3/hour	3,125 m3/hour
Dimensions	110 x 80 x 67 mm	110 x 76 x 80 mm	110 x 76 x 80 mm
Weight	up to 0,45 kg		
Connection diameter	DN15		
Temperature regime	0,1 - +90°C		
Metrological class of accuracy	2		
Frequency range	863 - 870 MHz		
Data transmission power	up to 25 mW		
Data encryption	+		
Frequency of sending data	once a day with standard factory setting		
Battery	battery 3,6 V		
Enclosure protection class	IP67		

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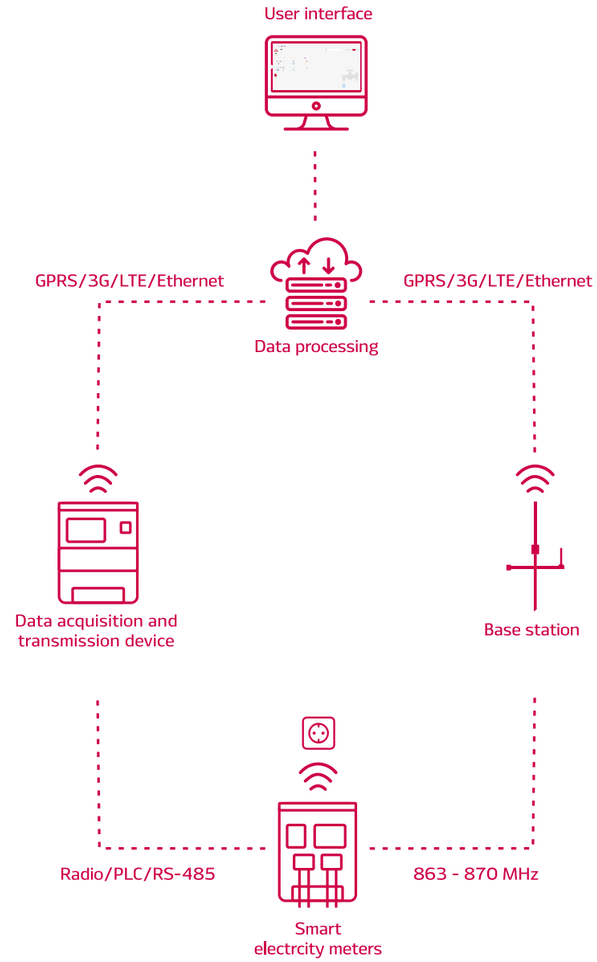
Smart Electricity Metering

Automated systems for smart electricity metering are often based on PLC technologies, e.g. G3-PLC. They are reliable and allow to receive the data without additional wiring when powerlines are correctly designed and implemented. But in some regions of the world powerline architecture is not flawless. NERO suggests two ways of dealing with this challenge.

First solution is the system with combination of radio communication and PLC that allows meters to choose the optimal transmission path depending on the load in each channel and to guarantee collection of all readings.

The second one is to use a completely wireless LPWAN NERO UNB technology for electricity meters. It has become possible thanks to a unique Smart Meter Protocol developed by NERO, that is both: functional enough for all electricity parameters and perfectly light weight to suit LPWAN requirements.



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Radio Modem

Radio modem is used to allow the remote monitoring of the consumed resources in case they are measured by traditional meters without IoT capabilities. The data is transmitted by the modem to the utility servers using one of the popular LPWAN technologies: SigFox, LoraWAN, NB-IoT, NB-Fi, Nero UNB.

Features

- Reads and transmits data from any device with pulse outputs: water, heat, gas, electricity meters;
- Has two pulse inputs for connection to two metering devices;
- Conducts channel-by-channel accumulation and storage of data archives for a period of up to 6 years with saving once a day;
- In a personal account, one can control not only the readings, but also the charge level of the built-in battery, as well as the operating temperature of the radio modem.
- High IP68 enclosure protection;
- Communication technologies available: SigFox, LoRaWAN, NB-IoT, NB-Fi, Nero UNB.

Multipurpose

Reads and transfers to the user's personal account readings from different meters: water, heat, gas, electricity - by any manufacturer.

Economical

One radio modem can be used to transmit readings from two meters, for example, heat meters of two neighboring apartments.

Convenient to install

It can be placed in humid and hard-to-reach rooms due to autonomous battery power supply and the increased enclosure protection against moisture and dust IP68.

Adaptive to national radio standards

The ability to set an arbitrary frequency plan depending on the requirements in the country of use. Sensitivity meets international standards in tenders: up to -138dBm.

Reliable

The data will not be lost: channel-by-channel accumulation (saving once a day) and storage of data archives for a period of up to 6 years is carried out.

Specifications

Parameter	Value
Pulse inputs	2
Sensitivity	up to -138 dBm
Frequency range	863 - 870 MHz
Data transmission power	up to 25 mW
Frequency of sending data	configurable during manufacture: once an hour; every 3 hours; every 6 hours; every 12 hours; every 24 hours
Data encryption	+
Battery	battery 3 V
Antenna type	internal
Enclosure protection	IP68
Fastening	ties to the support or wall
Weight	up to 0,3 kg
Dimensions	195x55x45 mm

Single Phase Smart Electricity Meter

The intelligent multi-tariff single phase electronic meter is designed for use in smart electricity metering systems with remote collection of readings.

The embedded IoT communication module allows utilities to receive information automatically about active and reactive energy, generation and consumption, voltage quality, tampering incidents, magnet exposure and etc. via radio (RF-433 or RF868) LPWAN, GSM or RS-485 technology.

Features

- Accuracy class for active and reactive energy 1;
- Choice of communication interfaces: Radio (RF433 or RF868), LTE/GPRS , RS-485;
- Circuit and network parameters measurement;
- Built-in relay for remote power control;
- Sensors detecting tampering with the housing cover and the terminal block clipses;
- Resistance to magnetic fields up to 500 mIT, date and exposure time recording;
- Alert messages about unauthorized interventions or power failure;
- Multifunctional LCD with backlight;
- Mountable on a DIN-rail.

Resistant to magnetic influence

The meter withstands magnetic fields of 500 mIT, and also records the date and time of exposure.

Notifies the operator

The meter will promptly transmit to the operator information about opening the terminal cover or case, exposure to a magnet, electrical disturbance, attempts to handle an incorrect password, overheating, etc.

Load control relay

Allows you to remotely disconnect bad payers. Relay triggering is configured depending on profile and certain events.

User's personal account

Electricity consumption and other indicators recorded by the meter can be monitored remotely in your personal account in any place where there is Internet.

Phase/zero current accounting

In addition to metering the current in the forward and reverse directions, the meter monitors and displays the network parameters, generation and consumption.

Autonomous functioning

In the event of a power outage, data will not be lost thanks to nonvolatile memory. The operation of the calendar and display is provided by a built-in battery with a long service life.

Specifications

Parameter	Value
Accuracy class	active energy 1 reactive energy 1
Rated voltage	230V
Operating frequency	47,5 - 52,5 Hz
Base (maximum)	5 (80) A 5 (100) A
Starting current	10 mA
Pulse inputs	1
Number of tariffs	8: 24 schedule of daily tariff programs for 7 days of the week
Daily tariff programs	32 programs, 48 half-hour zones
Setting up essential event groups	64 events in one of 3 groups
Storage depth	at least 6144 values per interval
Meter constant	3600, 4800 imp./ (kWh), imp./ (kvarh)
Compliance	GOST 31818.11-2012 GOST 31819.21-2012 GOST 31819.23-2012
Operating temperature range	- 40 - +70 °C
Weight	up to 0,6 kg
Overall dimensions	152x116x51 mm

Functionality

- Recording and storage of measuring data when changing:
  - days - 128;
  - months or billing periods - 40;
  - years - 10.
- Power control zones;
- Ability to set the date of the billing period;
- Automatic winter / summer changeover;
- Registration and storage of load profiles by 6144 values with an interval of power integration of 1, 3, 5, 10, 15, 60 minutes;
- Control and display of voltage quality parameters;
- Low consumption control;
- Current difference control;
- Temperature control inside the meter;
- Registration and indication of the date and time of exposure to magnetic and electromagnetic fields;
- Data presented in the form of OBIS codes (EN 625056-61).

Single Phase Smart Electricity Meter

The intelligent retro-style multi-tariff single phase electronic meter combines from one to several communication interfaces and allows the utilities to receive the readings and other data about active and reactive energy, generation and consumption, voltage quality, tampering incidents, magnet exposure and etc. remotely.

Available communication interfaces include G3-PLC, NERO-PLC, Radio (RF433 or RF868), LTE/GPRS, RS-485, optical port.

Features

- Accuracy class for active and reactive energy 1;
- Communication interfaces: G3-PLC, NERO-PLC, Radio (RF433 or Rf868), LTE/GPRS, RS-485, optical port;
- Data transfer protocols: SPODES, DLMS, Smart Meter Protocol;
- Circuit and network parameters measurement;
- Built-in relay for remote power control;
- Sensors detecting tampering with the housing cover and the terminal block clipses;
- Resistance to magnetic fields up to 500 mIT, date and exposure time recording;
- Alert messages about unauthorized interventions or power failure;
- Multifunctional LCD with backlight;
- Mountable on a DIN-rail.

Resistant to magnetic influence

The meter withstands magnetic fields of 500 mIT, and also records the date and time of exposure.

Notifies the operator

The meter will promptly transmit to the operator information about opening the terminal cover or case, exposure to a magnet, electrical disturbance, attempts to handle an incorrect password, overheating, etc.

Load control relay

Allows you to remotely disconnect bad payers. Relay triggering is configured depending on profile and certain events.

User's personal account

Electricity consumption and other indicators recorded by the meter can be monitored remotely in your personal account in any place where there is Internet.

Phase/zero current accounting

In addition to metering the current in the forward and reverse directions, the meter monitors and displays the network parameters, generation and consumption.

Autonomous functioning

In the event of a power outage, data will not be lost thanks to nonvolatile memory. The operation of the calendar and display is provided by a built-in battery with a long service life.

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Specifications

Parameter	Value
Accuracy class	active energy 1 reactive energy 1
Rated voltage	230V
Operating frequency	47,5 - 52,5 Hz
Base (maximum)	5 (80) A 5 (100) A
Starting current	10 mA
Pulse inputs	1
Number of tariffs	8: 24 schedule of daily tariff programs for 7 days of the week
Daily tariff programs	32 programs, 48 half-hour zones
Setting up essential event groups	64 events in one of 3 groups
Storage depth	at least 6144 values per interval
Meter constant	3600, 4800 imp./ (kWh), imp./ (kvarh)
Compliance	GOST 31818.11-2012 GOST 31819.21-2012 GOST 31819.23-2012
Operating temperature range	- 40 - +70 °C
Weight	up to 2,0 kg
Overall dimensions	200x120x73 mm

Functionality

- Recording and storage of measuring data when changing:
  - days - 128;
  - months or billing periods - 40;
  - years - 10.
- Power control zones;
- Ability to set the date of the billing period;
- Automatic winter / summer changeover;
- Registration and storage of load profiles by 6144 values with an interval of power integration of 1, 3, 5, 10, 15, 60 minutes;
- Control and display of voltage quality parameters;
- Low consumption control;
- Current difference control;
- Temperature control inside the meter;
- Registration and indication of the date and time of exposure to magnetic and electromagnetic fields;
- Data presented in the form of OBIS codes (EN 625056-61).

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Three Phase Smart Electricity Meter

The multi-tariff three-phase electronic meter is designed for metering active and reactive energy in forward and reverse directions in three-phase four-wire AC circuits with a frequency of 50 Hz.

The meter is equipped with communication interfaces for operation in systems with remote sending of readings and possibility of simultaneous data collection using different communication technologies.

Features

- Active energy accuracy class 0.5S / 1; for reactive energy: 0.5 / 1;
- Simultaneous collection of data via PLC and radio interfaces;
- Communication interfaces: Radio (RF433 or RF868), GSM / LTE, RS-485, PLC, G3-PLC;
- Removable GSM/LTE modem or DATD.
- Records the mains frequency, current and voltage in each phase, angles between the vectors of phase voltages and vectors of phase currents of voltages, power factor in each phase;
- Signals about tampering with the housing cover and the terminal block clipses, exceeding the energy and power limits;
- Can be mounted on a DIN rail.

The meter measures and displays:

- Network frequency;
- Current in each phase;
- Voltage in each phase;
- Angle between current and voltage in each phase;
- Angle between phase voltages;
- Power factor in each phase.

The meter controls:

- Accounting for four energy profiles: active and reactive, forward and reverse directions with an interval of power integration of 1, 3, 5, 10, 15, 60 minutes;
- Consumed active power direction with an interval power integration in 1, 3, 5, 10, 15, 60 minutes;
- Instantaneous power consumption;
- Active energy consumption limits;
- Low current consumption;
- Supply voltage;
- Consumed currents;
- Network frequencies;
- Phase sequence;
- Phase loss.

Specifications

Parameter	Value
Accuracy class	active energy 0.5S / 1 reactive energy 0.5 / 1
Rated voltage	3x230/400 V
Working frequency range	47,5 - 52,5 Hz
Base (maximum)	5 (80) A 5 (100) A
Working range of input signals: - current strength - voltage - active power factor - reactive power factor	 0,05·Ib...Imax (0,8...1,15) Unom 0,8(capacity)...1,0...0,5(ind) 0,25(capacity)...1,0...0,25(ind)
Starting current	20 mA
Impulse outputs	2
Number of tariffs	8 by active energy 4 by reactive energy
Storage depth	6144 readings
Meter constant	1600, 8000 imp./ (kWh), imp./ (kvarh)
Basic relative error when measuring rms values of phase voltages	1,0 from184 to 264, 5 V
Basic relative error when measuring rms current values in the phase circuit	1,0 from 0,25 to 100 A
Apparent active power consumed in each voltage circuit at rated voltage, normal temperature and rated frequency	4 V A
Apparent active power consumed in each voltage circuit at rated voltage, normal temperature and rated frequency	10 (2) V A
Optical and RS-485 exchange rate	9600 bit/s
Working temperature	- 40 - +70 °C
Weight	not more than 1,9 kg
Overall dimensions	241x176x77 mm

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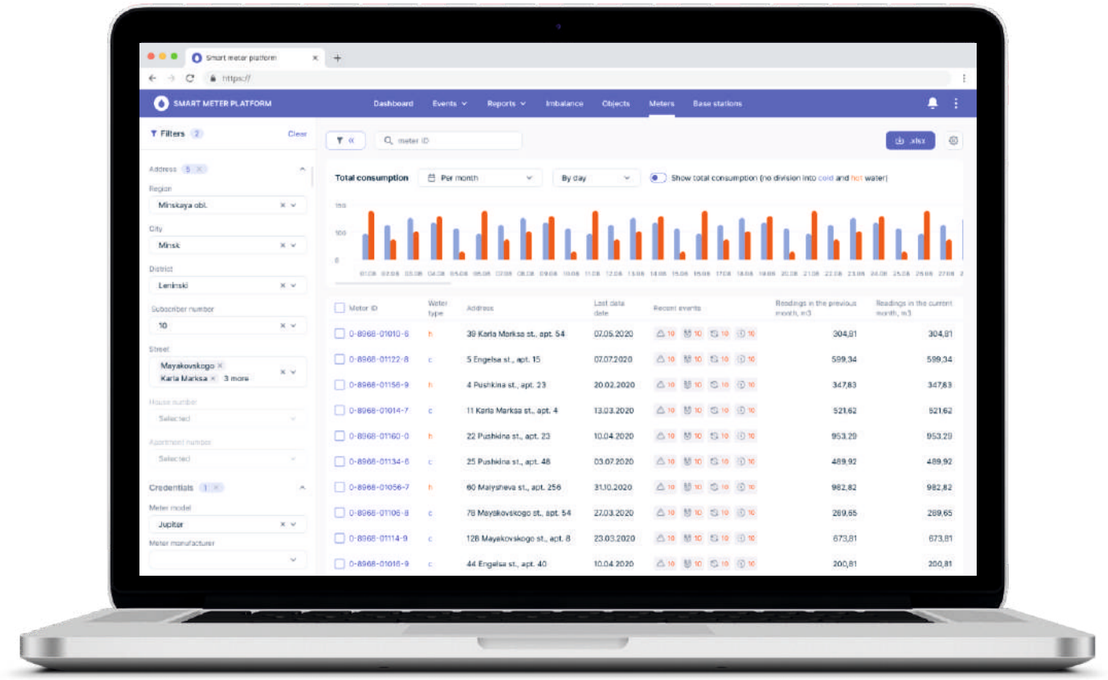
NERO IoT Platform

A universal IoT platform for collecting, processing and displaying data received from smart meters provides convenient monitoring and analysis: failure warning, unauthorised access warning, performance deviation, etc.

It is compatible with NERO smart meters, base stations and radio modems, and is comprised of network layer, IoT cloud and software for effective management of received data. The platform can be integrated with other systems and is easily expandable with additional software interfaces to connect new device types.



Optimization of the staff

Allows to simplify your workflow. The solution has an intuitive user interface and requires no extra training.

Loss Prevention

You will be aware of the event that influenced the loss of data and will be able to prevent it. Track suspicious meter behavior and find scammers.

Persistence of profits

Don't lose money if the meter is out of order in the system. You will receive an immediate notification and the meter will automatically go into “rate-by-rate” mode.

Financial benefit

Use our platform and increase your profits up to 30% by tracking all resource flows.

Integrated manner

Connect any kind of meters to our system: water, heat, gas and electricity. Manage all meters from your personal account.

Responsive design and custom dashboard

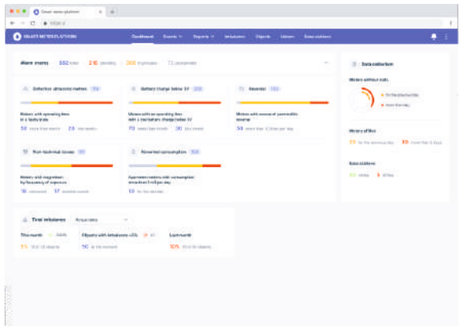
Manage your data wherever you are: from your laptop, tablet or phone. Mark the indicators you need on an individual dashboard.

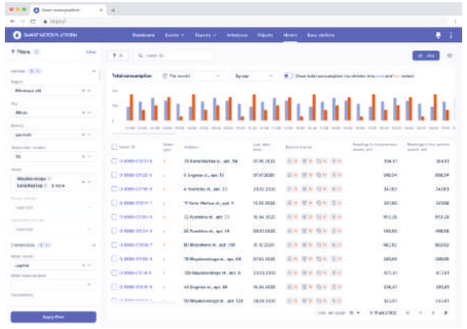
Solution Architecture

- **Data Gateway Service -** raw data acquisition and parsing input layer.
- **Data Aggregator Service -** consumption data aggregation, interpolation, access granting.
- **Device Control Service -** data acquisition relating to devices, their owners and service companies, firmware, manufacturers and compatible protocols.
- **Pii/Auth Service -** access management, user and service settings.
- **Personal account (Account Service) -** data visualisation, device ranking and assignment to houses/apartments, statistics recording and reporting.

Data management

- Customize the display of key indicators on an individual dashboard.
- Track information and receive notifications about accidents and losses.
- Prevent events that contribute to data loss.
- Predict business losses.
- Manage problem status.



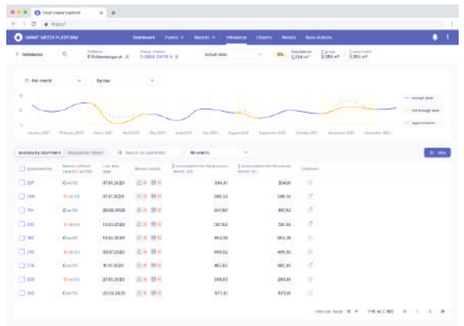


IoT device management

- Add groups of meters to the system and link them to the desired object.
- Configure general parameters of meters in two clicks.
- Manage meter lifecycle (operational status).
- Keep track of meters that are in reserve, repair or operation.
- Save your time! The system eliminates the wrong entry of the meter and remove the duplicate.

Billing and reporting management

- Issue invoices based on real data and reduce business losses.
- Pay on the fact of consumption and don't depend on the subscriber.
- Save your time on payment processes and monthly reporting.
- Get and export exactly the data you need.



Communication protocols and technologies

NERO UNB Communication Standard

Nero UNB is Nero Electronics' wireless communication technology for long-distance remote automated data collection from hundreds of thousands of metering devices. This narrowband technology makes the most efficient use of available radio-frequency spectrum—one channel only takes 50 Hz of air band versus the broadband technology with channel width from 100 KHz and above.

Features

- Operation in the allowed frequency range of 863-870 MHz, meeting the requirements for maximum signal strength of 25 MW.
- Line-of-sight acquisition distance is up to 30 km and up to 5 km under restrained urban conditions.
- High energy potential of communication channels and cost-effective consumption of power supply charge in wireless meters.
- Maintenance of two-way communication with devices to ensure their control—time synchronization, tariff schedule and software updates, etc.
- Scalability and possibility to build a large network comprising millions metering devices.
- Encryption for protected data exchange between meters and cloud server.
- Efficient self-designed SMP data transmission protocol.
- Cost-efficient equipment including water, gas, electricity meters and radio modems; on-site technical implementation.

Patented PLC Technology

Experts of Nero Electronics engineered an efficient PLC solution for electricity metering automation. It is based on an anti-noise coding allowing to minimize data loss. Moreover, a device automatically creates a network and builds efficient routes to each meter to ensure a full reading data collection.

Combination of NERO PLC and radio communication is another unique and efficient company's technology. There are often congestions in home power supply utilities or radio air with a number of electrical and radio interferences changing over time. Integration of two wireless technologies in one device let the meter choose the best transmission route at any specific time and guarantee metering data collection.

Wide-spread standards

Basic requirements of the market participants for communication technology openness leads to occurrence and development of such communication standards and protocols as G3-PLC, DLMS, SPODES, as well as LPWAN-class wireless radio technologies with long coverage range and low energy consumption, including Sigfox, LoRaWAN, NB-IoT, etc. Consequently, one of the company's priorities is to develop and produce metering devices with communication technologies popular and wide-spread on the market.