Single-phase electronic energy meter

AIST A100-H

USER MANUAL

Content

1. Introduction

This operating manual (hereinafter referred to as the OM) contains information about the single-phase electronic electric energy meter “AIST A100-H” (hereinafter referred to as the meter), necessary to ensure full use of its technical capabilities, correct operation and maintenance.

The operating manual is intended for personnel performing installation, operation, repair and maintenance of the meter.

2. General description

2.1 Purpose

The single-phase electric energy meter is designed for multi-tariff measurement and accounting of active and reactive energy in both directions in single-phase AC circuits with a nominal frequency of 50 Hz. It also measures and calculates other electrical network parameters, including individual power quality indicators, while also providing load management capabilities using an internal switching device. Measurement results can be displayed directly on the LCD display and transmitted via external communication interfaces.

The AIST A100-H meter is designed for indoor use and can also be used in areas with additional protection from environmental influences.

2.2 Modifications

The AIST A100-H meter has modifications that differ in nominal voltage, nominal and maximum current, accuracy class, and functionality that do not affect components associated with metrologically important application software.

The AIST A100-H meter does not have modifications equipped with a remote display intended for remote reading of information.

All versions of the AIST A100-H meter are equipped with an optical port. All versions also have a built-in communication module with an RS-485 interface.

The structure of the symbol for the AIST A100-H meter is shown in Figure 1.

The table of modification types of the AIST A100-H meter is presented in Table 1.

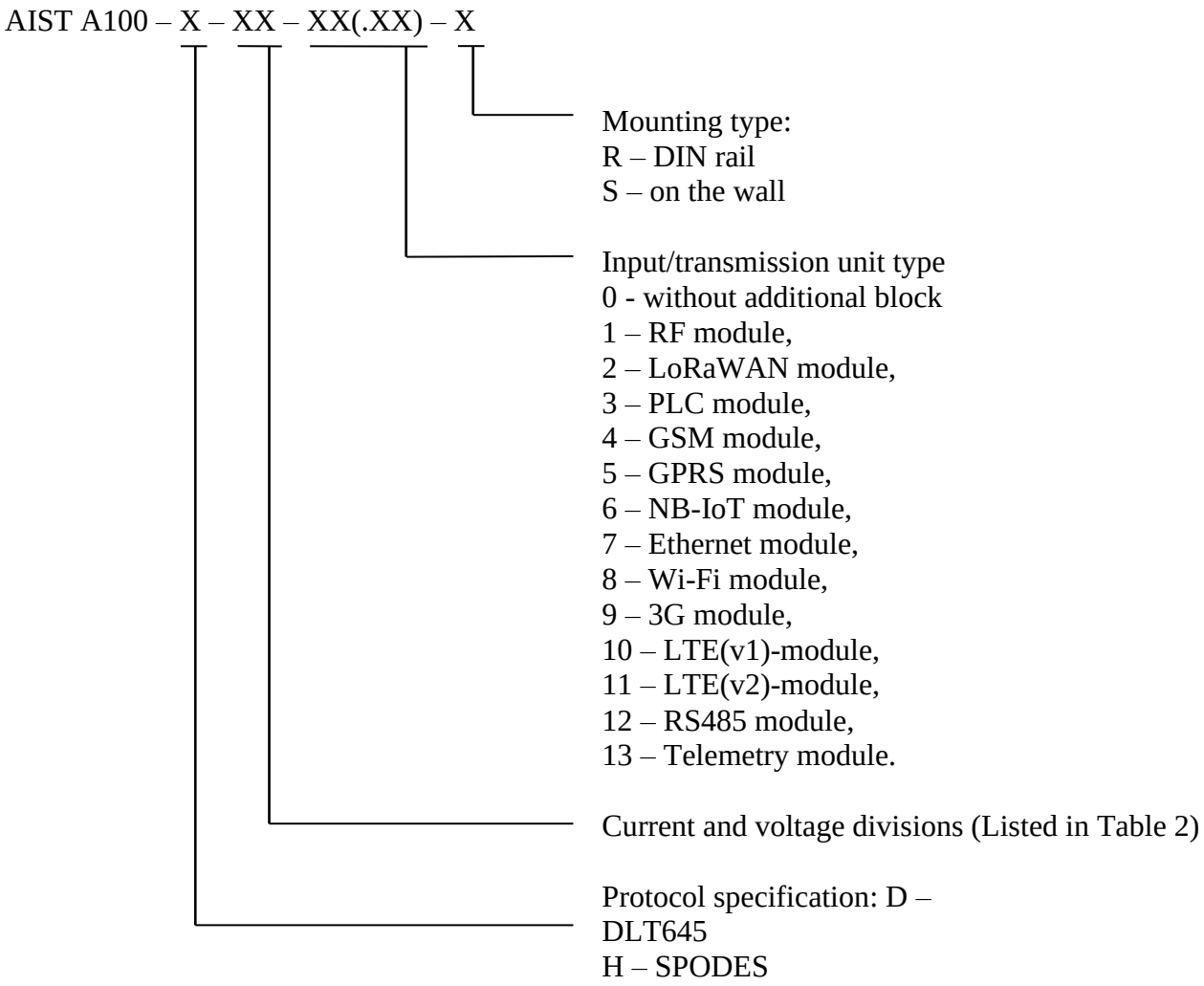


Figure 1. The structure of the symbol for the AIST A100 counter

Table 1. Types of modifications of the AIST A100-H meter by voltage, base and maximum current and accuracy class.

Designation executioncounter (XX)	Nominal voltage, V	Nomin. (max) current, A	Active energy accuracy class	Reactive energy accuracy class
01	57.7	1 (2)	0.5S	1
02	57.7	1(5)	0.5S	1
03	57.7	1(7.5)	0.5S	1
04	57.7	1 (10)	0.5S	1
05	57.7	5 (10)	0.5S	1
06	230	5 (10)	1	2
07	230	5 (60)	1	2
08	230	5 (80)	1	2
09	230	5 (100)	1	2
10	230	10 (60)	1	2
11	230	10 (80)	1	2
12	230	10 (100)	1	2

3. Safety requirements

Before using the meter, please read the operating documentation for the meter.

Only persons who have undergone special training and have a certificate entitling them to perform technical maintenance and repair of meters are allowed to perform installation, maintenance and repair of meters.

All work related to the installation of the meter must be carried out with the network disconnected.

4. Technical specifications

4.1 Metrological characteristics

4.1.1 Main metrological characteristics

The voltage ranges of the meter are given in Table 2.

Table 2.

Voltage range	Voltage value
Set working range	0.9 to 1.1 U_{nom}
Extended operating range	0.8 to 1.15 U_{nom}
Maximum operating range	0.0 to 1.2 U_{nom}

4.1.2 Error limits

The limits of the permissible basic relative error of the meter when measuring the root-mean-square phase voltage in the operating temperature range and in the range of measured voltages from 0.8 to 1.15 Unom ±0.5%.

The limits of the permissible basic relative error of meters when measuring phase currents (for three-phase meters), phase and neutral currents (for single-phase meters) are given in Table 3.

Table 3. Error limits

Accuracy class of the meter	Current range	Margin of error
0.5S	from 0.02Iном to Imax	$\delta i = \pm [0.5 + 0.005 (\underset{Ix}{I}\text{max})\text{-}1]$
1	0.05Iб to Iб	$\delta i = \pm [1 + 0.01 (\underset{Ix}{I}\text{b} - 1)]$
1	from Iб to Imax	$\delta i = \pm [0.6 + 0.005 (\underset{Ix}{I}\text{max})\text{-}1]$

Limits of permissible basic absolute error of meters when measuring the frequency of the power supply network in the range from 45 to 55 Hz: ±0.02 Hz.

4.1.3 Characteristics of power quality measurement

The meter provides measurements of the quality of electricity indicators and their recording in the event log and indication on the liquid crystal display, namely:

- Frequency deviation

- Slow change in voltage
- Voltage fluctuations
- Voltage non-sinusoidality
- Voltage interruption
- Voltage dip and overvoltage
- Impulse voltages

The limits of permissible relative error in measuring residual voltage, voltage dip depth, maximum overvoltage value, and overvoltage coefficient do not exceed ±1%×Unom.

The uncertainty in measuring the duration of dips, interruptions, and overvoltages does not exceed 2 periods of the network frequency.

When measuring voltage dips, overvoltages, and interruptions, the voltage value, date, and time of crossing the voltage threshold are recorded for each event in the event log.

4.1.4 Measured parameters

The meter provides measurement and calculation of the following parameters:

- Accounted active and reactive electric energy of forward and reverse directions, including at 4 tariffs with a cumulative total and at the beginning of reporting periods, including energy losses.
- Instantaneous and average values of phase voltage
- Instantaneous and average values of phase and neutral currents and their difference
- Values of active, reactive and apparent power
- Power factor values
- Maximum power values
- Network frequency values
- Values of phase voltage unbalance coefficients
- Power quality indicators (positive and negative deviations of voltage and frequency, duration and depth of voltage dips, overvoltage duration and overvoltage coefficient, values of symmetrical components)
- Current time and date with the ability to adjust through external communication interfaces, with calendar maintenance and seasonal time transitions
- Total operating time (running time) of the meter

4.1.5 Time management characteristics

The meters are equipped with a non-volatile clock with the ability to set the time, change the time zone, and automatically correct the time and time zone via external communication interfaces.

The accuracy of the non-volatile clock at normal operating temperature of the meter is no worse than ± 5 seconds per day.

The counter provides the ability to synchronize with the unified time system (UTS), with the recording of each fact of time adjustment in the event log indicating the date, time of adjustment and the indication of the date, time before and after the adjustment.

4.2 Main technical characteristics

4.2.1 Design, basic operating principle and appearance

The AIST A100-H meter is made in a plastic case.

The main technical characteristics of the meter are presented in Table 4.

Table 4. Main technical characteristics

Name of the characteristic	Meaning
Accuracy class for active electrical energy	0.5S/1
Accuracy class for reactive electrical energy	1/2
Basic, $I_{b\ (maximum)\ current,\ A}$	1(2), 1 (5); 1 (7.5); 1(10), 5(10), 5(60), 5(80), 5(100), 10(60), 10(80), 10(100);
Nominal voltage value ($U_{nom),\ In}$	57.7; 230
Starting current (sensitivity threshold): ▪ to directly connect the meter: • accuracy class 1	 $0.004 \cdot I_b$
• accuracy class 2 ▪ to turn on the meter via current transformers: • accuracy class 0.5S • accuracy class 1 accuracy class 2	$0.005 \cdot I_b$ $0.001 \cdot I_{nom}$ $0.002 \cdot I_{nom}$ $0.003 \cdot I_{nom}$
Power consumption, VA, no more than: by voltage circuit along the current circuit	 10 0.5
Nominal value of the electrical network frequency, Hz	50
Maximum number of tariffs	4
Minimum tariff duration, min	15
- Speed exchange via RS-485 interface, bit/s	1200~9600
Accuracy of the built-in clock at normal temperature, better, c/day.	± 0.5
▪ The storage period of the profile of received and given active and reactive energy (power) with a programmable integration time interval from 1 minute to 60 minutes (if integration time 30 minutes), not less than a day	90
Storage in a non-volatile memory device of data on received and given active and reactive energy with a cumulative total at the beginning of the current billing period and previous programmed billing periods, not less than	36
Liquid crystal display (LCD): – number of indicated digits the price of one unit of the least significant digit when displaying energy, kW□h	 8 0.01
Meter constant, imp./(kWh):	1000
Mean time between failures, h	at least 160,000
Service life of the power supply of the counter clock, years	at least 10

Additional data input/transmission blocks	RF module, PLC module, GSM module, Ethernet module, Wi-Fi module, LoRaWAN module, NB-IoT module, Ethernet module, 3G module, LTE(v1) module, LTE(v2) module, RS485 module, GPRS module, telemetry module
Temperature range, °C:	from minus 40 to +70
At temperatures from minus 20°C to minus 40°C, partial loss of LCD functionality is allowed.	
- Relative air humidity at 25°C, %	from 5 to 95 (without condensation)
Overall dimensions (L x W x H), mm:	219×125×76
Weight of counters, kg:	no more than 1.0
Degree of protection	IP 56

The meters are resistant to electrostatic discharges. Severity level is 4 with a performance criterion of A when applying test voltage using the contact discharge method and the air discharge method.

The meters are resistant to radio frequency electromagnetic fields. Severity level 3 with performance criterion B when applied to a radio frequency electromagnetic field in the frequency range from 80 to 2000 MHz and a field strength of 10 V/m. Severity level 4 with performance criterion A when applied to a radio frequency electromagnetic field in the frequency range from 80 to 2000 MHz and a field strength of 30 V/m.

The counters are resistant to nanosecond impulse interference (1/50 μs) in voltage and current circuits, the severity level is 4 with the performance criterion B.

The meters are resistant to microsecond impulse interference in voltage and current circuits, severity level is 4 with performance criterion B.

The meters are resistant to conductive interference induced by radio-frequency electromagnetic fields in voltage and current circuits, severity level – 4 with performance criterion A.

The appearance of the counter is shown in Figure 2.

Figure 2. External appearance of the AIST A100-H meter

1) Meter cover screws, 2) Front panel, 3) Terminal box cover, 4) Terminal box screw

The overall dimensions of the meter are shown in Figure 3.

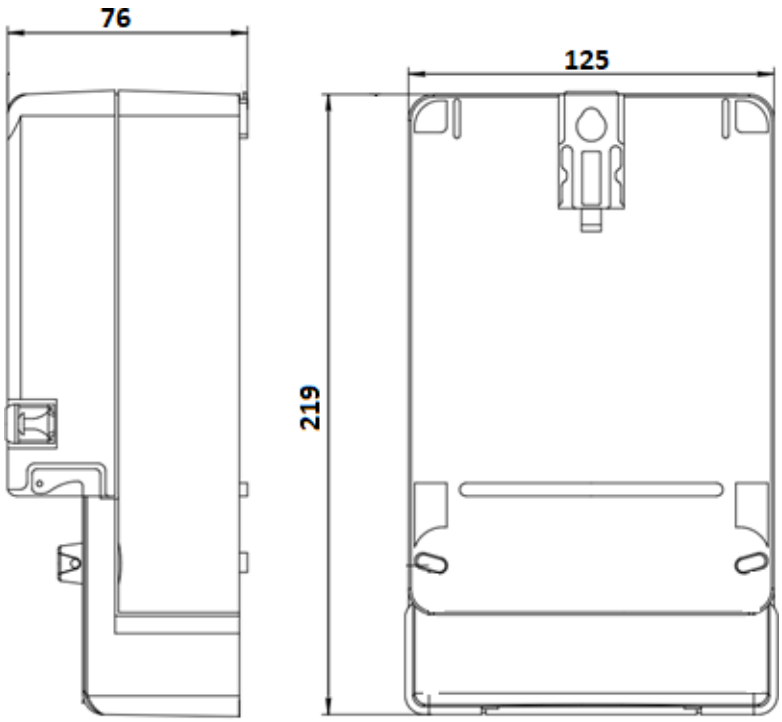


Figure 3. Overall dimensions of AIST A100-H

The appearance of the front panel of the meter is shown in Figures 4 and 5.

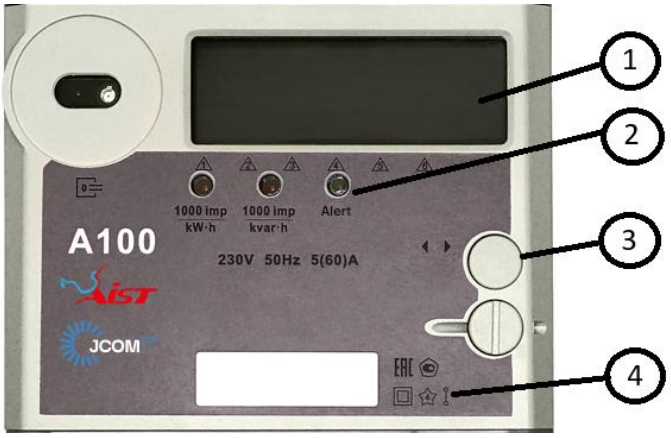


Figure 4. Front panel of the AIST A100-H meter

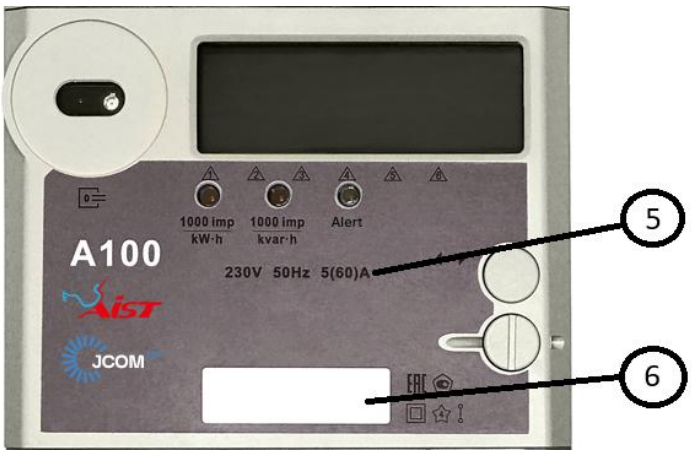


Figure 5. Front panel of the AIST A100-H meter

The following symbols and designations are applied to the front panel (lower part):

Approval mark for measuring instruments

Sign of product circulation on the Eurasian Union market.

(1) ANDliquid crystal display

(2) Signal reception/transmission indicators.

(3) Button for switching counter modes.

(4) Zone of special signs and symbols:

– Active energy accuracy class.

4 – Insulation test voltage.

– Sign for meters in an insulating housing of protection class II.

– Graphic designation of the number of phases and wires of the circuit for which the meter is intended.

(5) The main characteristics of the meter, depending on its modification:

– Nominal voltage;

– Base and maximum current;

– Nominal frequency;

– Counter constant.

(6) Serial number of the meter.

The meter's main terminals, designed for connection to the electrical network, are made of a highly conductive electrical alloy. They are housed in a housing made of impact-resistant, fire-resistant plastic, which ensures high insulation resistance.

The external appearance of the meter terminal block is shown in Figure 5.

Additional contacts of the terminal block are intended for pulse outputs and digital interfaces (Figure 6).

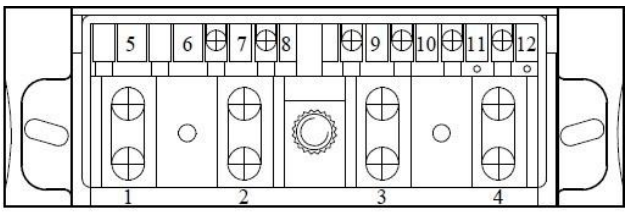


Figure 6. Terminal block of the AIST A100-H meter

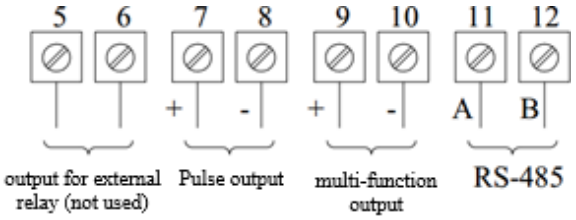


Figure 7. Additional contacts of the terminal block of the AIST A100-H meter

The appearance of the terminal block and the connection diagram of the meter are shown in Figure 8.

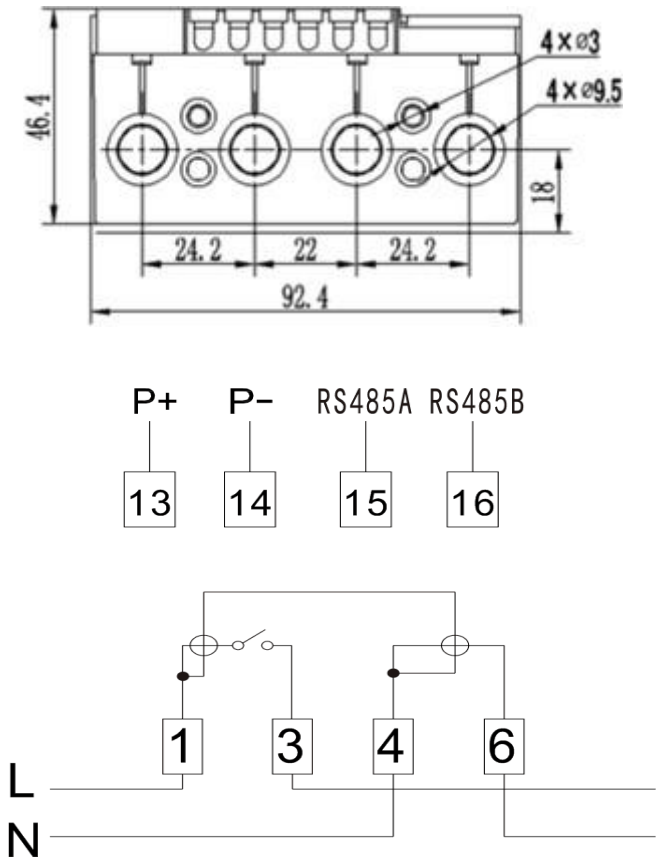


Figure 8. View of the terminal block and connection diagram of the AIST A100-H meter

The calibration outputs can be tested using an open collector transistor; to ensure its operation, it is necessary to apply the supply voltage according to the circuit shown in Figure 9.

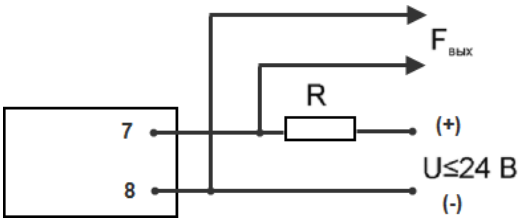


Figure 9. Connection to the test output device

The signal form Fout is rectangular pulses of negative polarity with an amplitude equal to the supplied supply voltage U.

The value of electrical resistance R, in kOhm, in the load circuit of the test output device is determined by the formula:

$$R = \frac{U}{I},$$

where U ≤ 24 V is the supply voltage; I ≤ 30 mA is the current.

The operating principle of the counter is explained by the structural diagram shown in Figure 10.

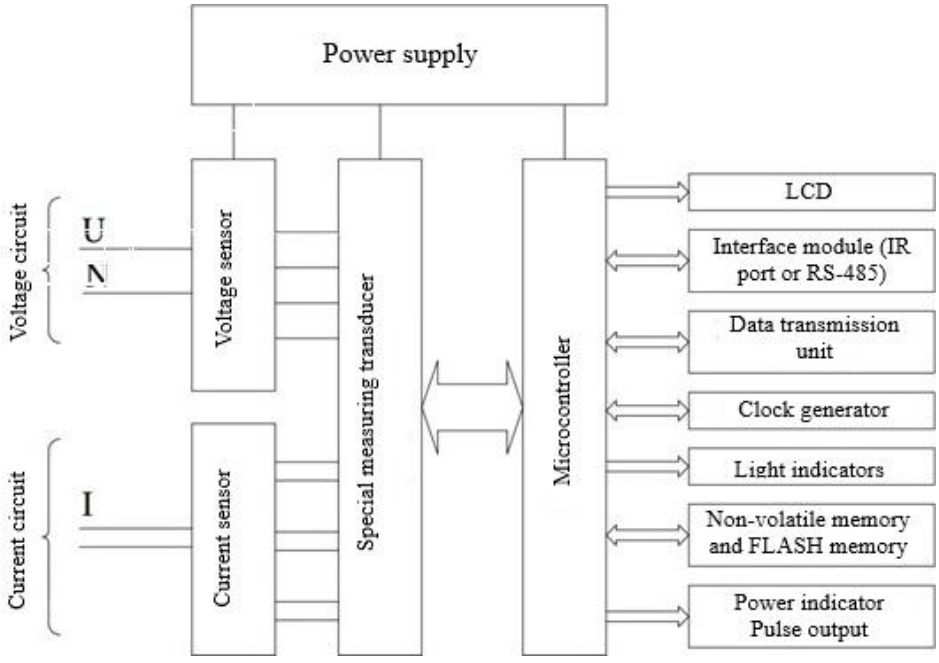


Figure 10. Structural diagram of the counter

Currents and voltages in the measured network are fed through the corresponding terminals and input elements to the corresponding inputs of the analog-to-digital converter (ADC). The measuring converter converts the analog voltage and current signals into digital values and also calculates the energy consumed.

The central processor receives measurement results and stores them in non-volatile memory, maintains communication via interfaces, and displays information on a liquid crystal display.

Measured data, configuration parameters, status and other information are stored in non-volatile memory and can be displayed on the meter's liquid crystal display.

The power supply converts AC mains voltage to DC voltage, which powers the microcontroller and operates the integrated circuits. Using the AIST Meter Configurator software, you can configure meter parameters and read data. The computer can communicate with the meter via either an optical or digital port. To ensure safety and reliability, before configuring the parameters, the meter must undergo an identification procedure.

4.2.2 Characteristics of interfaces and data exchange protocols

The meter is equipped with a built-in optical port and an RS-485 communication module. Depending on the meter version, additional communication modules can be installed: RF module, PLC module, GSM module, Ethernet module, Wi-Fi module, LoRaWAN module, NB-IoT module, Ethernet module, 3G module, LTE(v1) module, LTE(v2) module, RS-485 module, GPRS module, and telemetry module. All meter versions are capable of data transmission.

4.2.3 Load management

The meter is equipped with an internal switching device for load control, including locking it in the "off" and "on" positions directly on the meter, with the option of software or hardware control. The meter can be sealed in its installed position and its status is indicated on the liquid crystal display.

The meter has the ability to trigger the internal switching device to control the load in the following cases:

- Request for an automated information and measuring system for commercial electricity metering;
- Exceeding the limits of the electrical network parameters set in the electric energy meter;
- Exceeding the limit of electrical energy (power) set in the electric energy meter;
- Unauthorized access to the electric energy meter (opening the terminal cover, opening the housing (for detachable housings) and exposure to constant and alternating magnetic fields);

The maximum breaking capacity of the switching device may not exceed the value of the maximum measured current of the meter, declared in the corresponding modification.

4.2.4 Event generation

The counter records and stores the following events in non-volatile memory:

- Date and time of opening the terminal box
- Date and time of opening the meter case
- Date of the last reprogramming (including recording the fact of communication with the meter that led to a change in its parameters)
- Changing the direction of power flow
- Date and time of exposure to a constant or alternating magnetic field with a magnetic induction modulus value exceeding 150 mT
- Deviation of voltage in measuring circuits from specified limits
- Turning the meter off and on (absence and restoration of voltage)
- Absence of voltage in the presence of current in the measuring circuits
- Initialization of the meter, time of the last reset, number of resets with cumulative effect
- Results of the periodic self-diagnostics
- Changing the current time and date values when synchronizing via external communication interfaces

- Date and time of operation of the internal switching device
- Date, time, type and parameters of the command being executed
- Date and time of attempted access in violation of access control rules
- Date and time of the access attempt with unsuccessful identification and authentication
- Date, time attempts unauthorized violations integrity software and parameters
- The fact of communication with the electric energy meter, which led to a change in the configuration parameters, operating modes (including the introduction of a full and (or) partial restriction (resumption) of the electric energy consumption mode (load management)
- Exceeding the specified power limit
- Phase inversions

All recorded and stored events can be stored directly in the counter.

4.2.5 Storage of information

The meter can record and store data in non-volatile memory, indicating the date and time of each recorded event. The meter can store an event log of at least 500 entries.

The meter stores a profile of received and delivered active and reactive energy (power) with a programmable integration time interval from 1 minute to 60 minutes and a storage period of at least 90 days (with a 30-minute integration time). Data on received and delivered active and reactive energy is stored in non-volatile memory, cumulatively as of the beginning of the current billing period, for a period of at least 36 previous programmable billing periods.

4.2.6 Protection from unauthorized access

The meter is equipped with non-volatile electronic seals that record the opening of the cover, terminals, or casing, as well as the operation of the internal switching device. The activation of the electronic seals, caused by opening or closing the cover, terminals, or casing, or by the operation of the internal switching device, is recorded in the event log and displayed on the liquid crystal display. The meter has a one-piece housing; attempts to open the housing result in a visual breach of the protective elements. The meter records the effect of direct and alternating magnetic fields with a magnetic induction vector magnitude greater than 150 mT. The start and end of the exposure are recorded in the event log and stored in non-volatile memory, along with the date and time, and the exposure is displayed on the liquid crystal display. Exposure to a direct or alternating magnetic field can trigger the internal load control switching device, if this parameter is specified during the meter configuration. The meter allows for the control and restriction of access to settings and data storage by implementing an identification and authentication procedure that requires a username and password. All instances of incorrect login and password entry, as well as other violations of the identification and authentication procedure, are recorded in the event log with the date and time and stored in the meter's non-volatile memory.

4.2.7 Reading information from the liquid crystal display

The meter is equipped with a liquid crystal display, which is used to display a programmable set of measured and calculated values.

Every displayed parameter accompanied by symbolic explanation (hint).

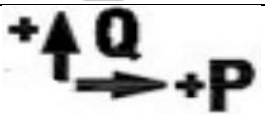
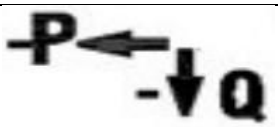
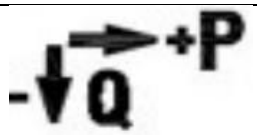
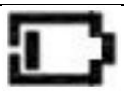
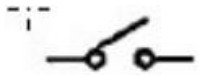
The appearance of the LCD meter AIST A100-H with the designation of its information fields is shown in Figure 18.

Figure 16. General view of the LCD meter AIST A100-H

The main symbols displayed on the display of the AIST A100-H meter are presented in Table 5.

Table 5 Table of symbols for the LCD meter AIST A100-H

Icons in LCD	Description
	Main indication area, indication value, electric power, instantaneous value, etc.
	OBIS. OBIS indication zone
	Sign of communication, currently in progress data exchange
	kWh, kvarh, VA, V, A, W Combined units of measurement zone
	L1 L ; indicates the direction of current L is reverse L2 N ; Indicates the direction of current L is reversed L1: When the phase wire is disconnected, the L1 sign is not shown, and when there is overvoltage and undervoltage, it flashes. L2 : The L2 sign is never shown.
	left to right (default)

	1-triangle (left): opening the module compartment cover (historical indication) 2-oh triangle: opening the terminal block cover (historical indication) 3-th triangle: opening of the meter cover (historical indication) 4-th triangle: magnetic influence (historical indication) 5-triangle: summer time (instantaneous indication) 6-oh triangle: backup
T8	tariff indication
	Q1: The current active energy power is positive, the reactive energy power is positive.
	Q2: The current active energy power is negative, the reactive energy power is positive.
	Q3: The current active energy power is negative, the reactive energy power is negative.
	Q4: The current active energy power is positive, the reactive energy power is negative.
	Low battery
	The sign appears when opening the meter cover, block, compartment cover modules, under magnetic influence.
	remote relay shutdown
	the relay is closed
Credit ALT Total PRE	spare
	spare
$ W G	spare

The indication is carried out according to time and corresponds to the following parameters:

Set normal display time: adjustable 1~100s, default 5s.

Button display time: fixed at 30 sec

Power off indication: Normal when the screen is clear, when the button is activated, the LCD remains on for 30 seconds.

Backlight fixed 30 sec

The normal display mode and the button display mode are divided into two lists. Each list supports up to 48 display items. Press the button, and the display will change to the button display list, and after 30 seconds, it will automatically return to the scrolling display list.

The meter has the ability to display the following values on the LCD:

- Current date and time;
- Current values of consumed electrical energy in total and by tariff zones;
- Current values of active and reactive power, voltage, current and frequency;
- Values of consumed electrical energy at the end of the last programmable billing period in total and by tariff zones;
- Indicator of the mode of receiving and transmitting electrical energy;
- Indicator of the fact of violation of individual parameters of power supply quality;
- Indicator of opening of electronic seals on the body and terminal cover of the electric energy meter;
- An indicator of the fact of an event of impact of magnetic fields with a value of the magnetic induction vector modulus over 150 mT (peak value) on the elements of an electric energy meter;
- Indicator of inoperability of the electric energy meter due to a hardware or software failure;

Table 6. Examples of displaying information about the results of measurements and calculations.

Displaying the OBIS code	Description	Unit
1.8.0 ~ 1.8.8	Total imported active energy T1 ~ T8 (current month)	kWh
2.8.0 ~ 2.8.8	Total export active energy T1 ~ T8 (current month)	kWh
3.8.0 ~ 3.8.8	Total imported reactive energy T1 ~ T8 (current month)	kvarch
4.8.0 ~ 4.8.8	Total export reactive energy T1 ~ T8 (current month)	kvarch
15.8.0 ~ 15.8.8	Total Active Energy T1 ~ T8 (current month)	kWh
9.8.0 ~ 9.8.8	Total imported Total energy T1 ~ T8 (current month)	kVAh
·10.8.0 ~ 10.8.8	Total export Total energy T1 ~ T8 (current month)	kVAh
1.8.0.1 ~ 1.8.8.1	Total import of active energy T1 ~ T8 (last month)	kWh

2.8.0.1 ~ 2.8.8.1	Total export of active energy T1 ~ T8 (last month)	kWh
3.8.0.1 ~ 3.8.8.1	Total import of reactive energy T1 ~ T8 (last month)	kvarch
4.8.0.1 ~ 4.8.8.1	Total export reactive energy T1 ~ T8 (last month)	kvarch
15.8.0.1 ~ 15.8.8.1	Total active energy T1 ~ T8 (last month)	kWh
9.8.0.1 ~ 9.8.8.1	Total Total Imported Energy T1 ~ T8 (last month)	kVAh
·10.8.0.1 ~ 10.8.8.1	Total Total Export Energy T1 ~ T8 (for the last month)	kVAh
1.6.0 ~ 1.6.8	Total active import power T1~T8 and time of occurrence (current month, displayed on 3 screens)	kW
2.6.0 ~ 2.6.8	Total active import power T1~T8 and time of occurrence (current month, displayed on 3 screens)	kW
3.6.0 ~ 3.6.8	Total reactive import power T1~T8 and time of occurrence (current month, display on 3 screens)	kVAr
4.6.0 ~ 4.6.8	Total reactive import power T1~T8 and time of occurrence (current month, display on 3 screens)	kVAr
9.6.0 ~ 9.6.8	Total Imported Total Power T1~T8 and Occurrence Time (Current Month, 3 Screens)	kVA
10.6.0 ~ 10.6.8	Total Export Total Power T1~T8 and Occurrence Time (Current Month, 3 Screens)	kVA
1.6.0.1 ~ 1.6.8.1	Total imported active power T1~T8 and time of occurrence (current month, 3 screens)	kW
2.6.0.1 ~ 2.6.8.1	Total export active power T1 ~ T8 and time of occurrence (current month, 3 screens)	kW
3.6.0.1 ~ 3.6.8.1	Total imported reactive power T1~T8 and time of occurrence (current month, 3 screens)	kVAr

4.6.0.1 ~ 4.6.8.1	Total export reactive power T1 ~ T8 and time of occurrence (current month, 3 screens)	kVAr
9.6.0.1 ~ 9.6.8.1	Total imported total power T1~T8 and time of occurrence (last month, display on 3 screens)	kVA
10.6.0.1 ~ 10.6.8.1	Total export capacity T1~T8 and time of occurrence (last month, display on 3 screens)	kVA
1.2.0 ~ 1.2.8	Total accumulated active import power T1 ~ T8	kW
2.2.0 ~ 2.2.8	Total accumulated active export power T1 ~ T8	kW
3.2.0 ~ 3.2.8	Total accumulated reactive import power T1 ~ T8	kVAr
4.2.0 ~ 4.2.8	Total accumulated reactive import power T1 ~ T8	kVAr
9.2.0 ~ 9.2.8	Total accumulated full import capacity T1 ~ T8	kVA
10.2.0 \ 10.2.8	Total accumulated full export capacity T1 ~ T8	kVA
0.9.2	Counter date	
0.9.1	Counter time	

C.1.0	Serial number of the meter	
0.9.6	Billing time	
0.9.5	Billing time	
0.0.0	Full screen display	
32.7.0	Voltage	IN
31.7.0	Current	A
15.7.0	Total active power	kW
3.7.0	Total reactive power	kVAr
9.7.0	Full power	kVA
13.7.0	Overall power factor	
14.7.0	Frequency	Hz
1.29.0	Net energy for the current month	kWh
1.29.0.1	Net energy for the last month (energy of the active import interval)	kWh
1.29.0.2	Net energy for the last 2nd month	kWh
1.29.0.3	Net energy for the last 3rd month	kWh
1.29.0.4	Net energy for the last 4th month	kWh
1.29.0.5	Net energy for the last 5th month	kWh
1.29.0.6	Net energy for the last 6th month	kWh
1.29.0.7	Net energy for the last 7th month	kWh
1.29.0.8	Net energy for the last 8th month	kWh
1.29.0.9	Net energy for the last 9th month	kWh
1.29.0.10	Clean Energy of the Last 10th Month	kWh
1.29.0.11	Clean energy from the last 11 months	kWh

1.29.0.12	Clean energy from the last 12 months	kWh
C.3.5	The relay switch turns on or off the reason	

The meter is equipped with LED indicators that display: - Indication of operation (operational state) on the housing
- Pulse indication
- Indication of operation of the internal switching device

5. Verification

The verification interval is 16 years.

6. Maintenance

The meters are designed for continuous 24-hour operation without the mandatory presence of maintenance personnel.

Technical service should conduct faces, studied presentoperating manual.

Maintenance of the meter at the installation site consists of systematic monitoring of its operation and eliminating errors and malfunctions in the meter's operation.

Only persons who have completed safety training and have an electrical safety qualification group of at least III for electrical installations up to 1000 V are allowed to carry out maintenance work on the meter.

7. Transportation

Conditions for transporting meters in the manufacturer’s transport packaging:
- Ambient temperature from minus 50 to plus 70 °C;
- Relative air humidity up to 95% at a temperature of 30 °C.

The shipment type is small, low-tonnage. Meters must be transported in covered railway cars, by road with protection from rain and snow, by water, and in sealed, heated compartments of aircraft in accordance with the following documents:
- "Rules for the transportation of goods by road transport";
- "Rules for the transportation of goods";
- "Technical conditions for loading and securing cargo";
- "Air Freight Handbook".

During loading and unloading operations and transportation, the requirements of the handling signs on the meter packaging must be observed.

8. Storage

The meter must be stored in its packaging in the consumer’s (supplier’s) warehouse; storage conditions must comply with:
- Ambient temperature from minus 50 to plus 70 °C;
- Relative air humidity up to 95% at a temperature of 30 °C.

In places where the meter is stored, the air must not contain conductive dust and impurities that cause corrosion of metals and destroy insulation.

9. Disposal

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

When disposed of, the meter body, which is made of plastic, can be recycled.

10. Manufacturer's warranties

The warranty period for the device is set at 36 months, counting from the date of transfer of the device into operation, but not more than 42 months from the date of manufacture of the meter.

During the warranty period, repairs to the meter are carried out at the expense of the manufacturer.

The manufacturer's warranty is void if the meter has mechanical damage that is not the fault of the manufacturer, or if the meter's seals are broken or replaced.