ELECTRICITY METERS

TYPE NIK 2106

OPERATING MANUAL

CONTENTS

This operating manual (hereinafter referred to as the OM) applies to electricity meters of type NIK 2106 (hereinafter – meters).

It covers the operation, intended use, maintenance, storage, and transportation of the meters.

1 Description of meters and their operating principle

1.1. Compliance with standards

Table 1 lists the standards that meters type NIK 2106 meet.

Table 1. Standards

EN 62052-11	Electricity metering equipment - General requirements, tests and test conditions - Part 11: Metering equipment (IEC 62052-11)
EN 62053-21	Electricity metering equipment - Particular requirements - Part 21: Static meters for AC active energy (classes 0,5, 1 and 2) (IEC 62053-21)
EN 62053-22	Electricity metering equipment - Particular requirements - Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S) (IEC 62053-22)
EN 62053-23	Electricity metering equipment - Particular requirements - Part 23: Static meters for reactive energy (classes 2 and 3) (IEC 62053-23)
EN 50470-1	Electricity metering equipment (a.c.) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)
EN 50470-3	Electricity metering equipment - Part 3: Particular requirements - Static meters for AC active energy (class indexes A, B and C)
EN 62059-32-1	Electricity metering equipment - Dependability - Part 32-1: Durability - Testing of the stability of metrological characteristics by applying elevated temperature
IEC 60721-3-3	Classification of environmental conditions – Part 3-3: Classification of groups of environmental parameters and their severities – Stationary use at weather protected locations
IEC 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols
IEC 62052-31	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 31: Product safety requirements and tests
EN 61140	Protection against electric shock - Common aspects for installation and equipment
EN 60529	Degrees of protection provided by enclosures (IP Code)
EN 62056-53	Electricity metering - Data exchange for meter reading, tariff and load control - Part 53: COSEM application layer
EN 62056-61	Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: Object identification system (OBIS)
EN 62056-62	Electricity metering – Data exchange for meter reading, tariff and load control – Part 62: Interface classes
EN 62056-21	Electricity metering –Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange

1.2. Designation

Electricity meters of the NIK 2106 type (hereinafter referred to as “the meters”) are designated to measure active and reactive electrical energy in both forward and reverse directions in single-phase AC circuits, primarily in communal and other applications. The meters are equipped with two measuring elements.

The meters feature an electronic display utilizing a liquid crystal display (LCD). The sequence of data displayed on the LCD is programmable.

The meters incorporate the DLMS/COSEM standard with data encryption (or connection) and without encryption. The meters comply with the requirements of the IDIS package 2, type D.

The meters meet the requirements of the following standards: EN 50470-1:2006, EN 50470-3:2006, EN 62053-23:2003 (IEC 62053-23:2003), EN 62052-11:2003 (IEC 62052-11:2003), and EN 62053-21:2003 (IEC 62053-21:2003).

The meters comply with the requirements of EN 62059-32-1:2012 based on the results of stability and metrological reliability studies.

The accuracy class for active energy is B (EN 50470-3:2007) and 1(IEC 62053-21:2003). The accuracy class for the reactive energy is 2 (IEC 62053-23:2003).

The meters meet the requirements of Directive 2014/32/EU of the European Parliament and the Council of 26 February 2014.

The meters are available in different versions, which vary in functional capabilities and technical specifications, as shown in Table 2. Descriptions of the meter versions are provided in Table 7.

Each meter is equipped with a cover opening sensor, a terminal cover opening sensor, an “optical port” interface, and optical and electrical pulse test outputs for measuring active energy. Versions of the meters that measure reactive electrical energy are also equipped with optical and electrical pulse test outputs for measuring reactive energy. The contacts for the electrical test outputs are connected to special connectors on the printed circuit board. The optical pulse test outputs are located on the front of the meter housing and also function as LED indicators for measuring active and reactive energy (depending on the meter version). Additionally, each meter is equipped with a backup power battery. Upon the customer’s request, the meters can be equipped with an additional external backup battery.

Depending on the version, the meters can be equipped with magnetic and/or electromagnetic field sensors. The meters are equipped with a “View” button for navigating the menu on the electronic display and a function button, the functionality of which can be customized by the customer. The function button can be locked and sealed by the customer to prevent unauthorized use.

All meter versions allow the customer, if needed, to equip the meter with an additional auxiliary interface module NIK LTE.

1.3. Technical parameters

1.3.1. The main technical parameters of meters

The main technical parameters are given in Table 2.

Table 2. The main technical parameters meters of type NIK 2106

Parameter	Value
Accuracy class for measurement of active energy (according to EN 50470-3)	B
Accuracy class for measurement of active energy (according to IEC 62053-21)	1
Accuracy class for measurement of reactive energy (according to EN 62053-23)	2
Reference voltage U_n, V	220, 230, 240 (subject to version)
Voltage operating range, % of U_n	-20 to +15
Starting current for active energy I_{st}, mA	12,5
Starting current for reactive energy I_{st}, mA	15,6
Minimum current I_{min}, A	0,25
Transitional current I_{tr}, A	0,5
Reference (basic) current I_{ref} (I_b), A	5
Maximum current I_{max}, A	80
Meter constant for active energy, imp/kWh	6400
Meter constant for reactive energy, imp/kvarh	6400
Power consumption of meter in voltage circuit, less than, VA (W) with PLC (PLC G3) without PLC (PLC G3)	 20 (5) 10 (2)
Power consumption of meter current circuit (at I_{ref}), less than, VA	0,05
Reference frequency f_n, Hz	50
The number of LCD digits to display basic information, depend on meter parametrisation	6+3 or 7+2
Register capacity, kWh	999999,999 or 9999999,99
Rate accounting of energy consumption	Up to 4 rates and 12 rate seasons
Storage of data on consumed energy at all rates at the end of the day, days	180
Storage of data on consumed energy at all rates at the end of the month, months	48
Storage of a load profile, notation Load Profile 1 Load Profile 1 Billing Profile	 17280 394 40
Verification interval, years	16
Operating temperature range, °C	-40 to +70
Storage temperature range, °C	-40 to +70
Relative humidity at a temperature +30 °C, less than, %	95
Degree of protection	IP54

Class by external mechanical conditions	M2
Class by external electromagnetic conditions	E2
Weight, less than, kg	1
Average service life before first overhaul, not less, years	24
Mean time to failure, taking into account maintenance, greater than, hours	200 000
The main absolute error of the built-in clock, less than, seconds per day	±0,5

The main technical parameters of LTE module are given in Table 3.

Table 3. Technical parameters of LTE module

Parameter	**Value**
GSM/GPRS cellular radio communication technology	
Transmitter/receiver frequency ranges, MHz - GSM-900 - DSC-1800	 880,1 - 915/925,1 - 960 1710 - 1785/1805 - 1880
Class of GPRS communication	B
The maximum output power of the transmitter, less than, W - GSM-900 - DSC-1800	 2 1
LTE cellular radio technology (E-UTRA)	
Transmitter/receiver frequency ranges, MHz: - Band 1 - Band 3 - Band 7 - Band 8 - Band 20 - Band 28	 1920–1980/2110–2170 1710-1785/1805-1880 2500-2570/2620-2690 880-915/925-960 832-862/791-821 703-748/758-803
Maximum output power of the transmitter, W (dBm)	0,2 (23)
Antenna type	dedicated

1.3.2. **Limits of error in the load current range**

The exact limits of error within the load current range are defined by the relevant standards EN 62053-22, EN 50470-3 and IEC 62053-23.

1.3.3. **Current overload**

The meters can withstand short-term overloads exceeding 30 times Imax for one half-period at the reference frequency.

1.3.4. **Resistance to magnetic fields and electric discharges**

Meters are resistant to the effect of a constant magnetic field generated by a permanent magnet with a cross-section area of at least 5,0 cm^2 and induction not less than 300 mT at the pole.

The meters are resistant to an external magnetic field created by a current with a frequency equal to the mains frequency with induction greater than 100 mT.

The meters are resistant to electrostatic and spark discharges.

The meters are resistant to high-frequency electromagnetic fields.

1.3.5. **Reliability indicators**

The meters have a mean time between failure, considering maintenance, of at least 200 000 hours.

The mean time between failures is specified for the conditions in Table 4.

The average service life before the first major overhaul of the meters is at least 30 years.

Table 4. Reference conditions

Influence quantity	Reference value	Permissible tolerances for meters
Ambient temperature	Reference temperature or, in its absence, 23 °C	± 2 °C
Voltage	Reference voltage	± 1,0 %
Frequency	Reference frequency	± 0,3 %
Wave-form	Sinusoidal voltages and currents	Distortion factor less than: 2 %
Continuous magnetic field of external origin	Equal to zero	–
Power frequency magnetic field of	Equal to zero	Induction value which causes a variation of error not greater than: ± 0,2 %
Electromagnetic RF field, 30 kHz to 2 GHz	Equal to zero	< 1 V/m
Operation of auxiliary devices	No operation of auxiliary devices	–
Conducted disturbances, induced by RF fields, 150 kHz to 80 MHz	Equal to zero	< 1 V

1.4. Nominal designation of meters

All possible versions of meters and the structure of their designations are shown in Table 5.

Table 5. Versions of the meters and the structure of their markings

NIK 2106		X	P6		T	.	3	X	X	X	.	X	.	X	X

	Reference voltage
1	220 V
2	230 V
3	240 V
	Ability to measure energy
1	In the forward direction
2	In the forward and reverse direction
	Sensors
0	Without sensors
M	The magnetic field sensor is installed
C	The electromagnetic field sensor is installed
MC	Magnetic field and electromagnetic field sensors are installed
	Relay availability
0	Without Supply Control Switch
2	The Supply Control Switch is installed
	Additional auxiliary interfaces availability
0	Without interfaces
8	PLC interface is installed
9	PLC G3 interface is installed
	Auxiliary interfaces availability
0	Without interfaces
2	RS-485 interface is installed
3	wM-Bus interface is installed
	Case type
3	Modular design with optical port interface
	Ability to measuring energy at multi-rate meters
T	Indication of multi-rate meters
	Electrical network connection diagram
P6	Direct connected with rated and maximal current 5(80) A
	Type of the measured energy
A	Measurement of the active energy
AR	Measurement of the active and reactive energy

The designation of meters when ordering them, as well as in the documentation of other products in which they may be used, consists of the meter's name, type and specific features. For example:

"Electricity meter NIK 2106 ARP6T.2202.MC.22".

1.5. The composition of the meters

1.5.1. General view of meters

A general view of the meter NIK 2106 is shown in Figure 1 and Figure 2.

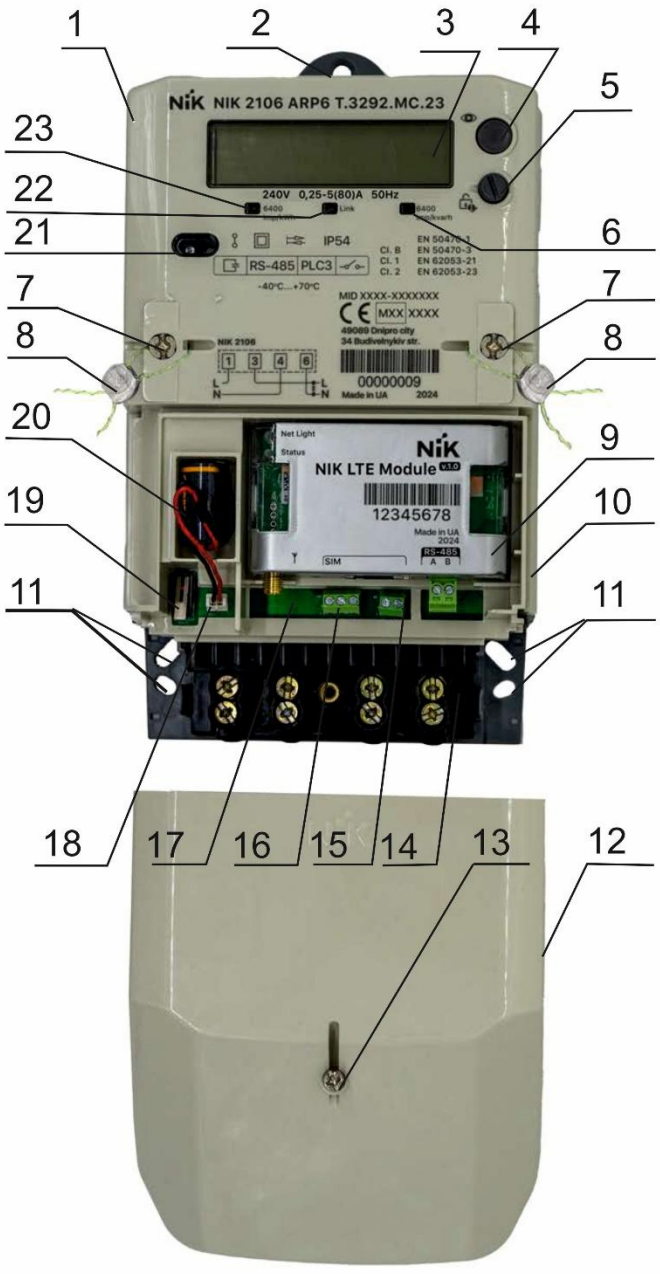


Figure 1. An example of the general view of the meter NIK 2106 with sealing screws and external LTE module

The figure shows the following elements:

1. The cover of the meter with nameplate.
2. Clamp for meter attachment.
3. Liquid crystal indicator.
4. "View" button and its symbolic designation.

5. Functional button and its symbolic designation.
6. Optical pulse test output for measuring reactive energy and its designation (constant of the meter's electric output).
7. Sealing screws of the cover.
8. Seals of the meter casing.
9. External NIK LTE module.
10. Base of the meter.
11. Mounting holes in the base for meter installation.
12. The terminal cover.
13. Sealing screw of the terminal cover.
14. The block of clamps.
15. Connector of the RS-485 interface.
16. Connector of the electrical test output.
17. Printed circuit board with electronic components.
18. Connector of the external backup power battery.
19. Sensor for detection of the terminal cover opening.
20. Backup power battery.
21. Optical port.
22. PLC interface LED indicator (only for versions with PLC or PLC G3).
23. Optical pulse test output for measuring active energy and its designation (constant of the meter's electric output).

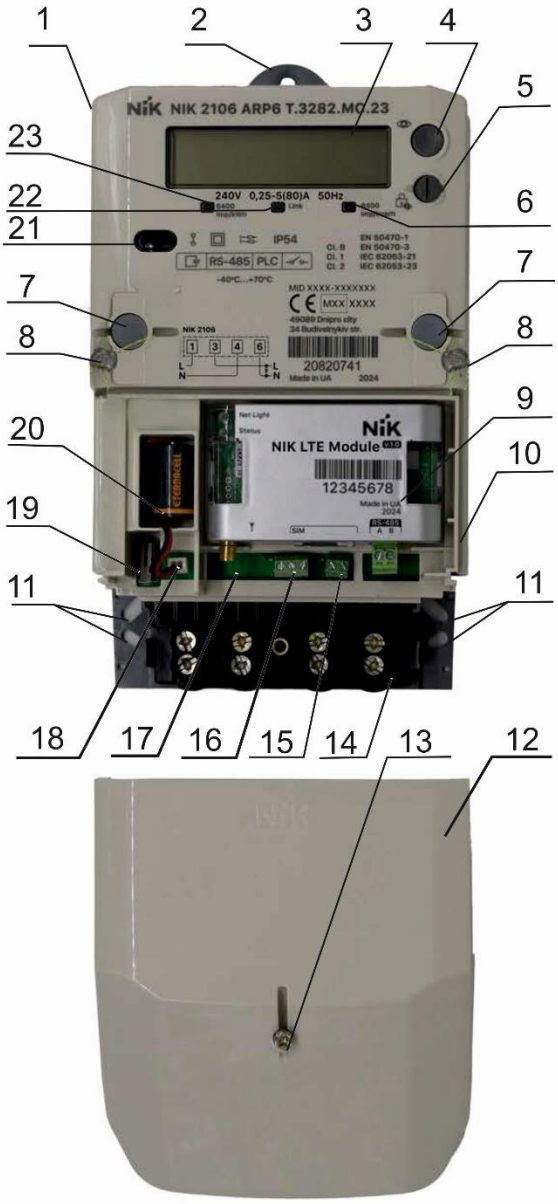


Figure 2. An example of the general view of the meter NIK 2106 with plastic inserts and external LTE module

The figure shows the following elements:

1. The cover of the meter with nameplate.
2. Clamp for meter attachment.
3. Liquid crystal indicator.
4. "View" button and its symbolic designation.
5. Functional button and its symbolic designation.
6. Optical pulse test output for measuring reactive energy and its designation (constant of the meter's electric output).
7. Sealing plastic insert of the cover.
8. Seals of the meter casing.

9. External LTE module.
10. Base of the meter.
11. Mounting holes in the base for meter installation.
12. The terminal cover.
13. Sealing screw of the terminal cover.
14. The block of clamps.
15. Connector of the RS-485 interface.
16. Connector of the electrical test output.
17. Printed circuit board with electronic components.
18. Connector of the external backup power battery.
19. Sensor for detection of the terminal cover opening.
20. Backup power battery.
21. Optical port.
22. PLC interface LED indicator (only for versions with PLC or PLC G3).
23. Optical pulse test output for measuring active energy and its designation (constant of the meter's electric output).

1.5.2. **The design of the meters**

The meters are assembled in a plastic insulating case with protection class II, consisting of a base and a cover with a transparent window for the display, which is a liquid crystal display. Two types of meter cases are avail. The first type is designed to accommodate sealing screws that secure seals with reinforced threads. The second type features a specialized design with single-use plastic inserts, which allow for the attachment of identical seals in the same manner as the first type.

The base of the meter houses a printed circuit board with electronic components, most of which are covered by the cover and screw terminal. The cover design allows access to the connector for the external backup power battery, the connector for the electrical pulse test output, and the RS-485 interface connector installed on the printed circuit board.

A separate compartment in the base is designed to house external interface modules and the external backup power battery. These external modules and backup power battery are installed in this compartment and connected to the printed circuit board via the appropriate connectors. Information about the external interface is provided on the transparent cover of the compartment (see section 2.4.3). The compartment for external interfaces and the screw terminal is closed by a terminal cover, which is secured to the base with a sealing screw. The terminal cover design ensures the correct fixed position of the modules and battery. The base and cover of the meters are also connected with sealing screws.

On the front of the meter’s cover are located a liquid crystal display (see section 2.4.5), an “Alarm” LED indicator, an optical test output that also serves as indicators for active and reactive energy measurement, and the meter’s optical port. The cover of the meter is also marked with a nameplate (see section 2.4.2).

1.5.3. **Meter dimensions**

The overall and installation dimensions of the meters are provided in Annex A.

1.5.4. **Calendar and clock**

The meters have a real-time clock and a calendar. The real-time clock is used for multi-rate metering of electricity, determination of the average power for the period of integration, and registration of events with a time stamp. The real-time clock can switch to summer and winter time in automatic mode or on a date that is set during parameterization.

A temperature sensor is built into the meter to reduce the dependence of the clock error on the ambient temperature. The meter microcontroller switches to battery saving mode in the absence of mains voltage. The external backup power battery ensures the continuous operation of the built-in clock during a power outage. Only the internal clock of the meter works in this mode. The energy of the built-in battery is not used when the mains voltage is switched on. The meter can operate for at least 16 years under extreme conditions, without mains voltage.

1.5.5. **LCD description**

The meters use liquid crystal display (hereinafter – LCD). The appearance and elements of the LCD are described below (see Figure 3).

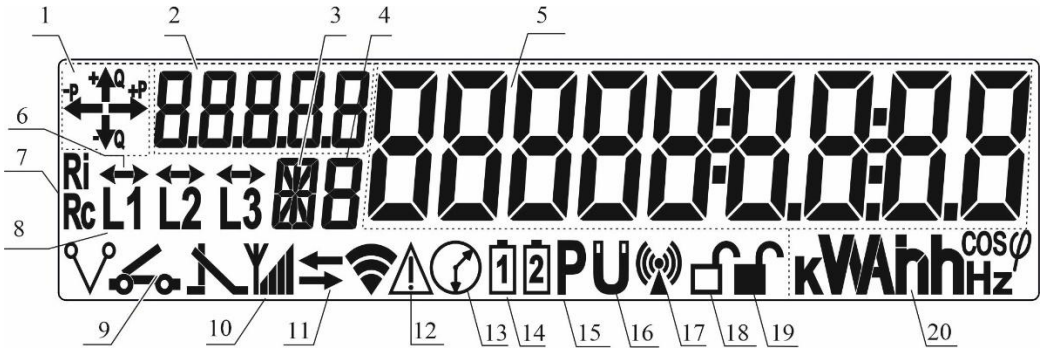


Figure 3. Appearance of LCD

The following elements of the LCD are indicated in this figure:

1. Group of energy angle quadrant indicators:
   - 1.1. «» active power (A+);
   - 1.2. «» active power (A-);
   - 1.3. «» full power vector in the first quadrant (A+R+);
   - 1.4. «» full power vector in the second quadrant (A-R+);
   - 1.5. «» full power vector in the third quadrant (A-R-);
   - 1.6. «» full power vector in the fourth quadrant (A+R-);
2. Group of indication of OBIS-code of the displayed parameter.

3. The indicator of the type of rate, for example T – is designation of the usual rate.
4. Indicator of the rate number currently in effect.
5. Group to display the value of the measured parameter.
6. Indicators of the direction of current flow in phases.
7. Indicator of the nature of the load: Rc– capacitive load, Ri – inductive load.
8. Indicator of presence of phases.
9. Supply Control Switch status indicator: – switch is open, – switch is closed.
10. Communication status indicator GPRS or 4G.
11. Indicator of data exchange through interfaces «⇄».
12. The indicator of internal error «⚠», flashes when an error occurs, or during the emergency rate.
13. Clock failure indicator.
14. A group of battery discharge indicators for backup power. If the symbol is displayed, the corresponding battery needs to be replaced.
15. Indicator of overload.
16. Indicator of the presence of magnetic irradiation in close proximity to the meter. A flashing indicator indicates the presence of magnetic irradiation at the current moment. After the disappearance of the magnetic irradiation, this indicator is active continuously until it is turned off by appropriate software.
17. Indicator of the presence of electromagnetic irradiation in close proximity to the meter. A flashing indicator indicates the presence of electromagnetic irradiation at the current moment. After the disappearance of electromagnetic irradiation, this indicator is active continuously until it is turned off by appropriate software.
18. Indicator of opening the meter terminal cover .
19. Indicator of opening the meter cover .
20. Group of unit of measure indication:
    - 20.1. «A» is current in amperes;
    - 20.2. «V» is voltage in volts;
    - 20.3. «kW» is active power in kilowatts;
    - 20.4. «kVAr» is reactive power in kilovars;
    - 20.5. «kWh» is active energy in kilowatt-hours;
    - 20.6. «kVArh»is reactive power in kilovars-hours;
    - 20.7. «Hz» is network frequency;
    - 20.8. «cosφ» power factor.

LCD symbols not marked in the figure are not used in these meters.

1.5.6. **Supply control switch**

The meters are equipped with a supply control switch – see. Table 4. This allows the load at the consumer's premises to be disconnected or connected via any communication interface. Depending on the parameter settings, the relay can automatically disconnect when the maximum permissible values of voltage, current, or power are exceeding, after the magnetic or electromagnetic field sensors are triggered.

1.5.7. **Sensors**

The meters have sensors for opening the meter cover and the terminal cover. When the meter cover or the terminal cover is being opened the corresponding sensor is triggered. An entry about this event is then made in the event log of the meter. The recorded event has the mark of its date and time. Similarly, the log records about the closure of the meter cover or terminal the cover are made.

1.5.8. **Meter interfaces**

All meters are equipped with an "optical port" interface. Meters can also be equipped with additional internal interfaces and external interface modules. A description of the interfaces and their characteristics is provided in Table 6.

Table 6. Additional interfaces and their characteristics

<table>
<tr><td>Interface</td><td colspan="3">Description</td></tr>
<tr><td>RS-485</td><td colspan="3">An asynchronous interface for a half-duplex multipoint communication line of the "common bus" type, in which data is transmitted using differential signals.
The interface has a galvanic isolation of the communication line.
The interface is compliant with the ANSI TIA/EIA-485-A:1998 standard.
The communication speed is from 9600 to 115200 baud (9600 default).</td></tr>
<tr><td rowspan="2">wM-Bus</td><td>Protocol mode wM-Bus
Frequency, MHz
Frequency deviation, kHz
Chip rate transmit, kcps
Encoding type</td><td>S1-m
868.3
50
32,768
Manchester</td><td>T1
868,95
50
100
3 out of 6</td></tr>
<tr><td colspan="3">The protocol mode is carried out during the meter parameterization</td></tr>
<tr><td>PLC</td><td colspan="3">Interface for data transmission using a modulated signal over power transmission lines.
First-generation PLC interface:
Marking on the nameplate "PLC"
Data rate to 150 Kbps.
Frequency band CENELEC-A (10kHz to 95kHz).
• Modulation DCSK</td></tr>
<tr><td>PLC G3</td><td colspan="3">Interface for data transmission using a modulated signal over power transmission lines.
Third – generation PLC interface:
Marking on the nameplate "PLC G3"
Frequency band PLC-G3 FCC (154kHz to 487kHz).
Data rate PLC-G3 FCC to 208 Kbps.
• Modulation OFDM
The PLC and PLC G3 are not compatible with each other</td></tr>
</table>

The interface and relay designations on the nameplate are described in Table 7.

Table 7. Interface and relay designations on the meter's nameplate

Designation	Explanation
RS-485	Presence of the relevant interface
	Presence of the "optical port" interface
PLC	Presence of the PLC interface
PLC G3	Presence of the PLC G3 interface
	Presence of the supply control switch

M-Bus wireless	Presence of the relevant interface

1.5.9. **Meters unauthorized interference protection**

The meter cover and the terminal cover are attached to the base with sealing screws. The groove on the perimeter of the base provides at least a 4 mm connection overlap. The overlap eliminates unauthorized penetration into the measuring part of the meters without damaging the meter case. In addition to the sealing screws, laser welding can be used to attach the meter cover to the base.

The meters are equipped with a terminal cover opening sensor and a meter cover opening sensor.

Depending on the configuration, information in the meters can be read via the optical port, RS-485 electrical interface, PLC or PLC G3 interface, and wM-Bus interface.

Access to data is possible through specialized software only after authentication.

Authentication with user-level access allows only reading data from meters. Recording data to the meter is not possible at this access level.

Authentication with operator-level access allows both recording and reading data.

1.6. Delivery set

The meter delivery set is given in Table 8.

Table 8. Delivery set

Name	Quantity
Electricity meter (version according to the order)	1 pc.
External NIK LTE module**	1 pc.
Passport*	1 copy
Operations manual *	1 copy
Software **	1 pc.
Packaging	1 pc.
Certificate of conformity	1 copy
* It can be downloaded electronically from the manufacturer's site at https://nik-el.com. Other options of operational documentation are specified in the delivery contract. **According to the supply contract.	

2 Operation principle of the meter

2.1. Measurement of energy parameters, their indication, and data storage

Active and reactive electrical energy is measured by analog-to-digital conversion of electrical signals coming from the primary current and voltage converters to the input of the built-in analog-to-digital converter (ADC) of the microcontroller. The microcontroller converts the signals into a sequence of digital readings. This sequence is transmitted to another microcontroller, which calculates the values of voltage, power and active energy in total and for each rate.

The microcontroller provides the operation of the electronic display, communication interfaces, electrical and optical pulse test output, meter cover opening sensor, and terminal cover opening sensor,

magnetic and electromagnetic field sensors (if available), supply control switch (is available), buttons and indicators.

Non-volatile memory is used to store data in the meters. The accumulated values of the electric power and parameters of the meters are stored in memory. The measured energy values and parameters of the meters are stored for entire life in the absence of voltage at the terminal.

A seven-segment LCD with additional symbols is used to display measured values in the meter. The software implements an automatic menu, which provides an automatic sequential cyclic display of a specific set of data regarding the parameters measured by the meter, as well as a manual menu, which allows displaying the required data using the "View" button. In addition to the automatic and manual menu is separately configured. Navigation through this menu is performed using function button, located on the meter. Each menu item can be set to execute pre-created scenarios. A scenario is a sequence of actions that can be programmed into the meter at the customer's request during production. The menu configuration is performed using the specialized software "UNIK".

The meters are powered by a pulsed power supply, which converts the rectified input voltage into the voltage necessary to power all nodes and modules of the meters. In the absence of mains voltage, the backup battery is used to read data stored in the meter's memory. When there is no mains voltage, the meter operates in battery mode, and pressing the "View" button activates the display mode for a short period. During this time, measured and stored values can also be read by switching the menu. The duration of operation in display mode, as well as the type and list of displayed information window, depends on the meter's parameterization.

2.2. Rate module

The meter software rate module can support up to 4 rates and record the data of energy measured by meters in the registers of active and reactive energy separately for each of the 4 rates.

Each rate's operation throughout the year is scheduled using an annual rate plan. The annual rate plan consists of rate plan of the day, rate plan of the week, and seasonal rate plans. All possible options for annual rate plans constitute the rate grid. A simplified scheme for setting up and operating the meter's rate grid is presented in Annex D.

2.2.1. **Active rate**

All rates are numbered from 1 to 4. Only one of the four possible rates can be valid at any time of the day. This rate is called active, unlike other currently inactive rates.

2.2.2. **Rate plan of the day**

The rate plan of the day is a numbered sequence and time of activation of a rate during the day. The rate allows you to set up to 12 changes in the active rate during the day and supports up to 16 different rate plans per day. The numbering of rate plans for the day is from 1 to 16. Each change of the rate during the day is set by the moment of rate activation (hours, minutes, seconds) and the number of this rate (from 1 to 4).

2.2.3. **Rate plan of the week**

The rate plan of the week allows you to assign each day of week one of the 16 possible rate plans of the day. The meter rate module supports up to 10 different rate plans per week. The numbering of rate plans of the week is from 1 to 10. For each day of the week, the number of the selected rate plan of the day is indicated. The change of daily rate plans during the week occurs when the day changes, at 00:00:00 according to the built-in real-time clock. The current rate plan of the week is called active.

2.2.4. **Rate plan of the season**

The rate module of the meter allows you to divide the calendar year into seasons (up to 12 different rate seasons are supported), and assign a rate plan to each of them. The season rate plan (or season rate) describes the sequence and time of change of weekly rate plans during the season. The numbering of rate seasons is from 1 to 12. The current rate season is considered active. The rate season is set by the moment of activation of the season and the number of its rate plan.

2.2.5. **List of holidays**

The rate module allows to support up to 30 separate rate daily plans for special days (their numbering is from the 1st to the 30th), the moment of activation of which is set for a specific date in month-day format, as opposed to regular daily rate plans, which occurs sequentially when changing the day of the week. Such rate plans allow you to configure the switching of rates for special days, for example, holidays. When the corresponding holiday date arrives on the built-in clock and calendar, the change of rates will be performed according to the holiday daily plan, i.e. the holiday daily plan will be active, and not the usual one, which should be activated on the corresponding day of the week.

2.2.6. **Setting up rate plans**

Set up of daily, weekly, seasonal, and holiday rate plans is performed during meters parameterization with the help of special software. The parameters of each rate plan of the day, week, season, or holiday are set when setting up, and thus, the sequence and time of activation of a rate within a day, week, season, or in case of a set holiday date is set.

2.2.7. **Rate grids**

The set of configured rate plans (days, holidays, weeks, and seasons) that are currently in force is called the active annual rate plan, or active rate grid. It is not possible to edit the active rate grid. The rate module of the meter software allows you to additionally configure another, currently passive, rate grid. You can activate it later. This provides the opportunity to make the necessary changes in rate plans. The scheme of the rate grid is described in Annex D.

2.2.8. **Change of rate plans**

The meter rate module tracks the activation moments of the respective rates, controlling the current time, day of the week, and date according to the built-in clock and real-time calendar. When the moment set

in the rate plans of the day, week, season, or holiday comes, the corresponding rate is activated and it is valid until the next rate is activated.

2.2.9. **Emergency rate**

In case of failure of the built-in real-time clock, the emergency rate is automatically activated in the meter, and all calculated energy values are recorded in the emergency rate registers, while the corresponding symbol (icon ⚠ and rate number) flashes on the electronic display. The emergency rate number is set during parameterization.

2.2.10. **Accumulation of data on rates**

The measured values of energy parameters are accumulated in the corresponding registers in the memory of the meter. The rate module for each rate provides a separate set of registers for the accumulation of values of energy parameters.

2.2.11. **Push-notification**

The meters implement the capability to send push-notifications to the server due to the structural features of the LTE modem and the extended functionality of the device's software. Push-notifications are sent during the following events:

- turning the meter on or off;
- loss of voltage in one, several, or all phases;
- restoration of voltage in any of the three phases.

The sent notification contains the following parameters:

- meter serial number;
- active and reactive energy;
- voltage and current of each phase at the time of sending the notification;
- errors in the meter at the current moment.

These parameters can only be changed during the factory configuration of the meter. The IP address and server port can be modified using the UNIK 3.0 software.

When any of the aforementioned events occur, except for the meter turning on, a single notification is sent. When the meter is turned on, two notifications are sent. The first notification is sent when the meter is powered on, and the second one is sent after voltage appears on all three phases, indicating that the metrology has fully started.

2.3. Load profiles

To collect statistics on energy consumption during the operation of the meter, in advance, at the stage of its parameterization, you can create a load profile – a list of measured values, for which the integration period is specified. The values of the measured values included in the load profile will be periodically (with

the specifies period) recorded and stored in the relevant registers of the meter memory. Accumulated information can be read from the meter using the appropriate software through the available interfaces.

By default, a voltage profile is pre-configured for collecting statistical data on voltage levels, with a maximum storage depth of 10 days. Additionally, the user can configure up to 4 more profiles.

The integration period when parameterizing the load profile is set in minutes from a number of fixed values 1, 2, 5, 10, 15, 20, 30, and 60 minutes.

The storage depth of the load profile of each type of measured energy depends on the integration period.

2.4. Marking

2.4.1. **General requirements**

Marking of meters corresponds to EN 50470-1, IEC 62052-11 and manufacturer blueprints.

Fonts and symbols used for marking correspond to the drawings of the manufacturer.

The quality of inscriptions and markings ensures this clear depiction throughout the meter's service life.

Marking is done in English and/or the language specified in the supply contract.

2.4.2. **Nameplate marking**

The markings are applied to the cover by pad printing or other method preventing quality impairment.

Figure 4 presents the design of the nameplate of the meters.

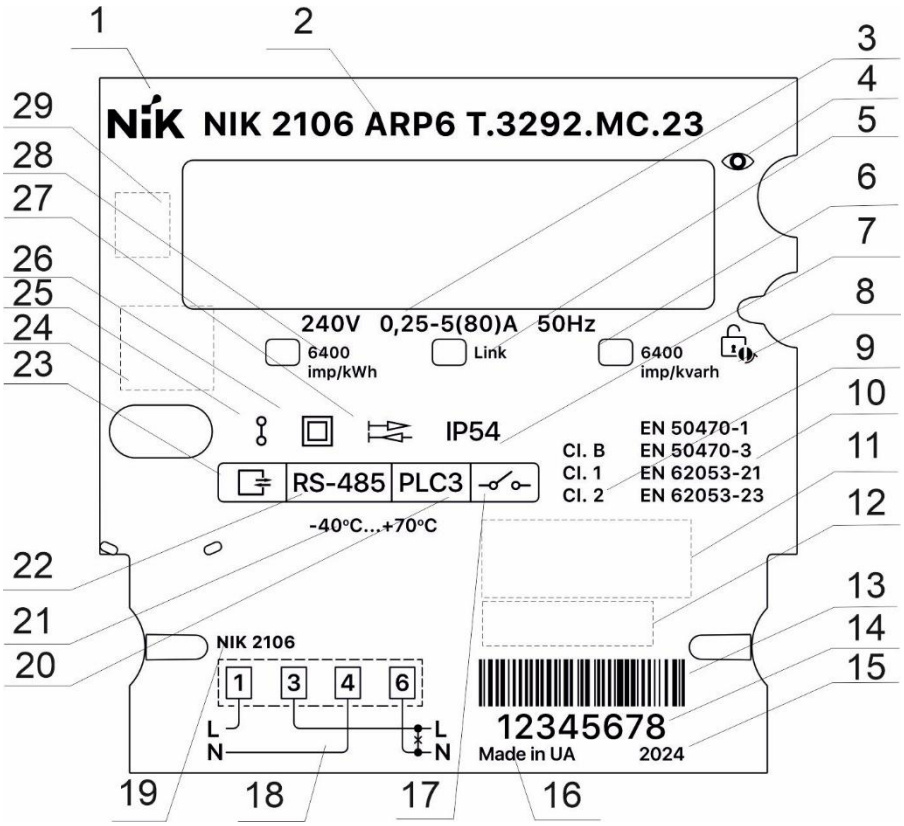


Figure 4. An example of NIK 2106 nameplate design

The figure shows the following elements:

1. Registered trademark.
2. Designation of meter version.
3. Basic technical parameters (nominal/reference voltage, minimum/basic//reference/rated and maximum current, nominal/reference frequency).
4. Marking of the "View" button.
5. Marking of the indicator "Link" (only for modification with PLC or PLC G3).
6. Designation of bidirectional meter
7. Marking of the "Reset" button.
8. Designation of the optical test pulse output when measuring the reactive energy (meter's constant, when measuring reactive energy).
9. Designation of meter accuracy classes when measuring active and reactive energy.
10. Designation of meter standards for accuracy classes when measuring active and reactive energy.
11. Area for the mark of conformity assessment and additional metrological marking.
12. Area for manufacturer's address.
13. Place for meter barcode.
14. Factory number according to the numbering system of the manufacturer.
15. Year of manufacture of the meter.
16. Marking "Made in Ukraine".
17. Marking of the presence of the Supply Control Switch.
18. Connection diagram.
19. Meter type designation.
20. Marking of the presence and type of the second additional interface.
21. Operating temperature range.
22. Marking of the presence and type of the first additional interface.
23. Marking of the presence of an optical port.
24. Area for IDIC icons.
25. Symbol of the number of measuring elements.
26. Symbol of protection class II.
27. Conditional marking of a bidirectional meter.
28. IP rating of the meter.
29. Area for DLMS icons.
30. Designation of the optical test pulse output when measuring the active energy (meter's constant, when measuring active energy).

Notes:
1. Inscriptions on the nameplate may be made in other languages at the request of the customer.
2. Additional elements may be applied to the nameplate at the request of the customer.
3. It is allowed to change the relative position of the elements and their dimensions on the nameplate when changing its geometry or meter casing and for other production reasons.

2.4.3. **Marking of the external modules**

An example of the design of the nameplate of external modules is shown in Figure 5.

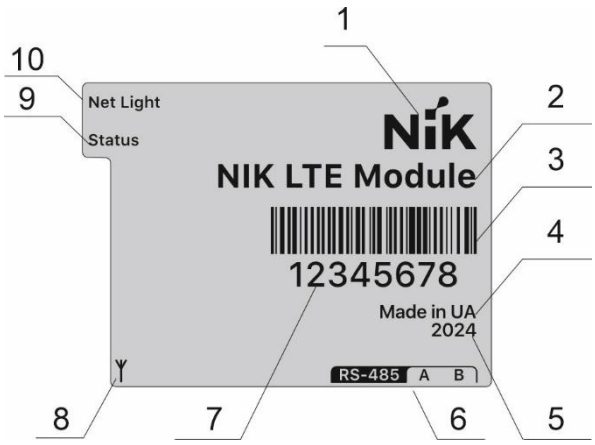


Figure 5. Marking of the nameplate of external NIK LTE module

The figure shows the following elements:

1. Registered trademark.
2. Designation the type of module.
3. Barcode.
4. Marking «Made in Ukraine».
5. Year of manufacture of the module.
6. Connection of the RS-485 interface.
7. Factory number according to the numbering system of the manufacturer.
8. Symbol of the antenna LTE interface.
9. Module power indicator symbol.
10. Indicator of the LTE network indicator.

2.4.4. **Marking of the terminal cover**

The terminal cover of the meter has a connection diagram. The connection diagram for the meters is provided in Annex B.

2.4.5. **Marking of packaging**

The marking of consumer packaging complies with the drawings of the manufacturer and includes the following information:

- company trademark;
- name and type designation of the meter;
- year of packaging;
- technical control department stamp.

Marking of transport containers complies with EN ISO 780.

The marking is applied to the label attached to the consumer packaging or directly on the packaging itself.

The marking of transport packaging complies with the requirements of the contract and the drawings of the manufacturer.

On the transport packaging, there are images of handling signs “Fragile. Handle with care”, “Protect from moisture”, “Top”, and a sign indicating the maximum permissible load on the transport packaging.

An alternative packaging marking is possible at the customer’s request, with details specified in the supply contract.

2.5. Packaging

The packaging of meters, operational, and accompanying documentation is carried out according to the drawings of the manufacturer. The type of shipments is small-tonnage.

Individual packaging for meters is made of cardboard according to the manufacturer’s drawings.

One meter is placed in individual packaging, according to the supply set. The individual packaging

An alternative meter packaging can be done at the customer’s request, as specified in the supply contract. Upon the customer’s request, meters packaged in individual packaging can be additionally placed in group packaging. According to the drawings of the manufacturer, 20 meters are placed in group packaging.

The group packaging also includes accompanying documentation, including a packaging sheet containing the following information:

- name and designation of the meter;
- quantity of meters;
- packing date;
- technical control department stamp.

The overall dimension of packaging does not exceed 390 mm x 252 mm x 310 mm.

The net weight does not exceed 24 kg.

The gross weight does not exceed 48 kg.

3 Intended use

3.1. Operational limitations

According to climatic and mechanical requirements, the meter complies with the requirements of EN 50470-1 when used in premises free from aggressive vapors and gases.

Outdoor installation is allowed in specialized external boxes that comply with the IP54 requirements of IEC 60529

The operational limitations are described in Table 9.

Table 9. Operational limitation

Parameter	Value
Input voltage range, V	For Un=220 B: from 176 to 253 For Un=230 B: from 184 to 264 For Un=240 B: from 192 to 276
Operating current range, A	from 0,0125 to 60
Maximum permissible voltage at test output terminals in open state, V	30
Maximum permissible current of the test output circuit in closed state, mA	30
Working temperature range, °C	-40 to +70
Storage temperature range, °C	-45 to +70
Range of relative humidity variation (at a temperature of +30 °C), %	from 0 to 95
Range of atmospheric pressure variation, kPa	from 70 to 106,7

Note: At temperatures below minus 25 °C, the information in the electronic display of the meter changes every 1 minute.

3.2. Preparation of the meter for use and installation procedure

3.2.1. Parameterization of meters

During parameterization, constants of meter configuration are entered into the non-volatile memory. Parameterization is divided into two types: factory parameterization and consumer parameterization.

During factory parameterization, the meter's memory is loaded with the serial number and constants necessary for the functioning of the meters and additional modules. These constants remain unchanged throughout the meter's operational life. Factory parameterization is only possible in factory conditions.

In consumer parameterization, constants adapting the meter to operating conditions are written into the memory through any existing communication channel. The information recorded in the meter's memory is provided in Table 10.

Consumer parameterization is carried out by the energy supply or authorized organization using special software, which requires authentication for use.

Table 10. Consumer parameterization data

Parameter	Value	
	Default values	Permissible values
Transmission speed: – for the optical port; – for electrical PLC interface*	9600 baud	do not change
Time to disconnect when the interface is inactive	120 s	30 to 300 s
Meter address: – higher «HIGH» – lower «LOW»	Generated based on the meter's serial number	 16 to 16383 16 to 16383
Identification field (1st field) Identification field (2nd field) Identification field (3rd field) Identification field (4th field)	– – – –	0 to 100 characters 0 to 100 characters 0 to 100 characters 0 to 100 characters
Transition to Daylight Saving Time / Standard Time	Automatic transition	– automatic transition; – transition to the specified month, day; – no transition.
Number of rates Number of Weekly Profile Number of rate Seasons Number of Daily Profiles Holidays	On demand	from 1 to 4 from 1 to 10 from 1 to 12 from 1 to 16 from 0 to 30
* – Depended on the version.		

3.2.2. **Installation**

Meter's installation, removal and calibration must be performed only by organizations with appropriate authorization. Installation and removal of meter must be carried out by personnel with a qualification group

in accordance with the safety rules for the operation of electrical installations of consumers – not lower than the third group.

The meter must be installed in environments free from aggressive vapors, dust, and gases, in conditions according to the requirements described in Table 4.

Before installing the meter, a visual inspection must be conducted to ensure there are no mechanical damages and that seal are present.

Secure the meter at the measurement point using three screws or mount it on a DIN rail.

3.2.3. **Backup battery**

At the customer's request, either an external replaceable backup battery or a built-in backup battery can be used to power the meter's clock, which is designed for the entire service life of the meter. Replacement of the battery is possible only in the service center of the manufacturer. If the low battery indicator on the electronic display flashes, this means that the battery is low and you need to contact a service center.

3.2.4. **Replacing the external backup battery**

The replacement of the external backup battery may only be carried out by the energy supply company or an authorized organization If the electronic display shows a blinking low battery indicator, it means the battery is discharged, and you should contact the service center of the energy supply company or the authorized organization.

To ensure safety, before replacing the backup battery, the meter must be disconnected from the electrical network.

Replacement of the external backup battery is performed in the following sequence:

1. Cut the seal thread on the terminal cover of the meter.
2. Open the terminal cover of the meter (see Figure 1 and Figure 2).
3. Disconnect the backup battery connector from the meter's circuit board.
4. Remove the discharged backup battery and, ensuring proper polarity, insert the new one.
5. If, after replacing the backup battery, the symbol continues to blink on the electronic display for more than 60 seconds, it indicates that either a discharged battery was installed or the battery polarity was not correctly observed during replacement.
6. Set the current date and time in the meter via the optical port.
7. Close the meter's cover or terminal cover and seal it.

3.2.5. **Connecting the meter**

The meter must be connected in accordance with the diagram shown on the meter nameplate, the terminal cover, in the meter passport and Annex B.

All screws of the screw terminal must be tightened with a screwdriver (blade thickness 1 mm) to the stop point with a torque of at least 3.5 ± 0.5 Nm.

The aluminum wires must be pressed into special sleeves during the connection of the meters to the mains. The sleeves should prevent corrosion of the connections in the terminal cover.

Apply power to the meter and verify that the electronic display indicates normal operations as described below, otherwise, correct the connections or replace the meter.

After applying a voltage to the meter screw terminal, it is necessary to ensure that the indicators work properly, then the terminal cover should be fixed with a screw and the seal thread should be passed through a special tide in the cover and the hole in the screw head. Finally, the seal is applied.

The screws of the terminal cover should be tightened with a screwdriver (blade thickness 1 mm) to the stop point with a torque of at least 0.5±0.1 Nm.

3.3. Using the meter

In operational mode, the meter measures active and reactive electrical energy with a cumulative total.

Energy consumption, depending on the load, is displayed using optical indicators for «6400 imp/kW·h» and «6400 imp/kvar·h» on the front panel of the meters.

The main pulse test output is implemented via an electronic switch with optical isolation. The maximum allowable voltage of the switch in the open state is 30 V, and the maximum allowable current of the switch in the closed state is 30 mA.

3.4. Data reading

3.4.1. Data stored reading

The measured values stored in the meter's memory or calculated based on measurement results, depending on the meter's configuration, can be read as follows:

- visually on the electronic display;
- through the optical port;
- through the RS-485 interface;
- through the wM-BUS interface.

In the meters, after power is supplied and depending on the configuration, data is sequentially generated and displayed on the screen in the form of information windows, as described in Table 10. At the initial moment after the meter is turned on, all segments of the LCD light up. The duration of each type of data display is 10 seconds. The type of data shown in each window is set during the meter's configuration.

Table 11. Data displayed on the meter's display

№ п/п	Data type	Windows displayed on the electronic display
1	Display of all segments on the electronic display	

№ п/п	Data type	Windows displayed on the electronic display
2	Active energy A + (imported) in total at all rates, kWh	
3	Active energy A + (imported) at rate 1, kWh	
4	Active energy A + (imported) at rate 2, kWh	
5	Active energy A + (imported) at rate 3, kWh	
6	Active energy A + (imported) at rate 4, kWh	
7	Instantaneous power value, kW	
8	Instantaneous voltage value, V	
9	Instantaneous current value, A	
14	Meter serial number	

The manual data review function allows you to display most of the stored data on the electronic display using the “View” button (see Figure 1).

To read data through additional communication interfaces, you need the corresponding converter and software. For data reading via the optical communication interface, an optical head designed according to IEC 62056-21 and software available for download from the official website https://nik-el.com are required.

3.4.2. **Sensor triggering notifications**

The magnetic field sensor, which may be installed in the meters, is triggered by exposure to a constant magnetic field with an induction greater than 100 mT. If the exposure lasts more than 3 seconds, the meter’s display will start flashing an alarm symbol. An entry regarding this event is recorded in the meter’s event log, and corresponding bits are set in the status register, which can be viewed using the menu.

The electromagnetic field sensor, which may be installed in the meters, is triggered by exposure to an electromagnetic field with an intensity greater than 10 V/m in the frequency range from 80 to 2000 MHz. If the exposure lasts more than 3 seconds, the meter’s display will start flashing an alarm symbol. An entry regarding this event is recorded in the meter’s event log, and corresponding bits are set in the status register, which can be viewed using the menu.

If, withing 60 seconds after the first exposure, these sensors detect repeated field exposure of the same level, an entry will be made in the event log 60 seconds after the end of the last exposure, recording the total duration of this field’s effect. If the pause between exposures is longer than 60 seconds, each exposure will be recorded in the log as a separate entry, nothing the duration of each one.

Sensor alert notifications can only be disabled using the “NIK Parameterization” software by sending a special command through any available meter interface.

3.5. Menu navigation

The meter’s software provides several types of possible interactive interactions with the user. This primarily includes viewing accumulated information and executing predefined actions (scenarios).

The reviewed of the accumulated information in the meter is organized by sequentially displaying informational windows (hereinafter referred to as “windows”) on the display, each of which contains information about the current state of the meter and data on one of the parameters stored in the meter’s memory. The user can view the accumulated information in two modes: automatic and manual. For this purpose, two types of menus are provided: the automatic menu (Auto) and the manual menu (Manual).

3.5.1. **Automatic menu**

The window demonstration scheme of the automatic menu is shown in Figure 6.

After the first connection of the meter to the network, the message “Hello” appears on its display, and after 3 seconds, the meter enters the automatic menu demonstration mode. The automatic menu is a pre-configured sequence of informational windows that are displayed on the meter’s screen one after another with a set duration. The list of windows, their sequence, and the duration of the display can be configured by a user with the appropriate permissions to work in specialized software. The maximum number of windows is up to 40. The windows change automatically and cyclically; the keyboard is not used in this mode, and no action is required from the user. If some information cannot fit on the LCD completely, the corresponding windows display it using scrolling.

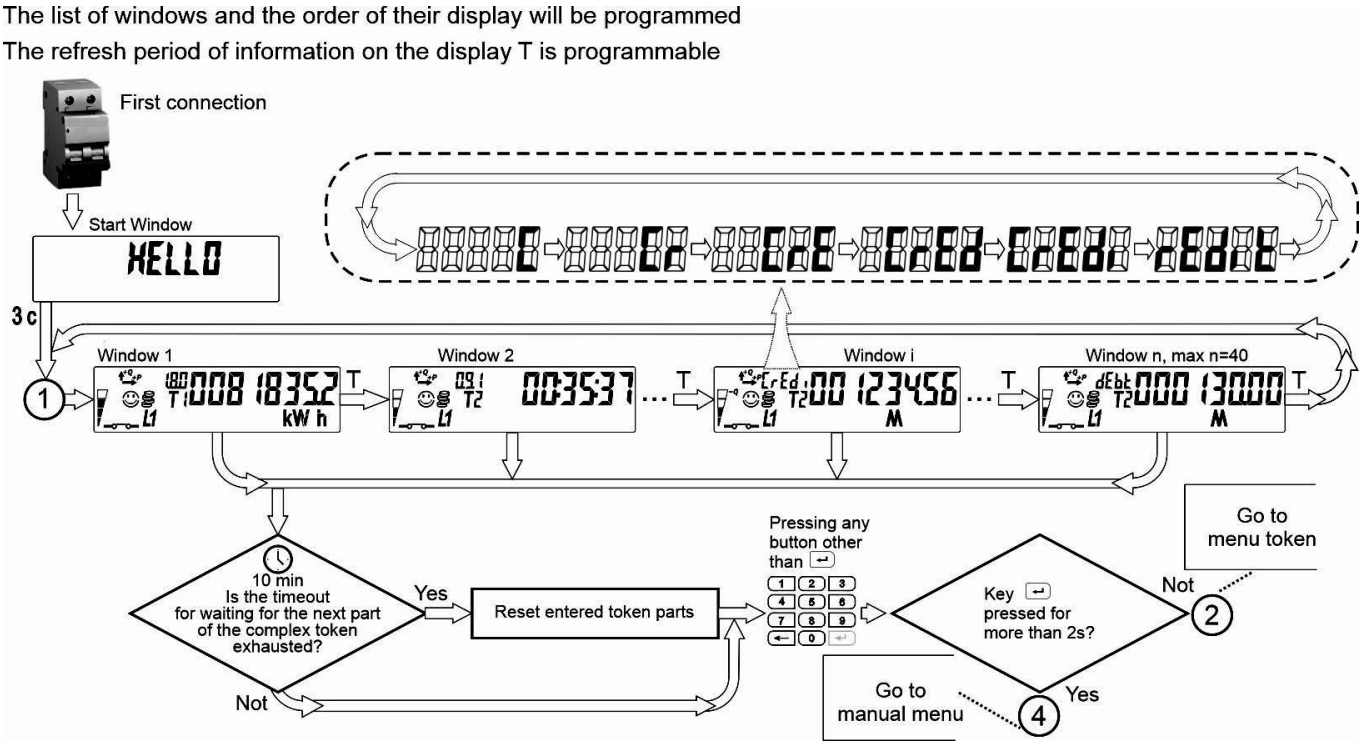


Figure 6. Diagram of the automatic menu

If the voltage in the network to which the meter is connected disappears, the display of menu windows will stop. When the power is restored, the cyclic display of the automatic menu windows will also resume, continuing from the point where it was interrupted.

The meter's display returns to the automatic menu mode from all other operational modes if user activity in those modes is halted and if more time than the return period duration has passed since the user's last action. The return period is the waiting time for a key press and can be configured at the user's discretion by someone with the appropriate permissions.

3.5.2. **Manual menu**

If, in the automatic menu mode, the "View" button 👁 is pressed, the meter will switch to the manual menu navigation mode, and the display will switch to demonstrating this menu.

The manual menu is an organized system consisting of one or more levels. Each level is an ordered linear set of informational windows, typically grouped according to a defined logic. The names of the sets, the number, the list, and the order of informational windows in each set are configured during the parameterization of the meter. AN example of a manual menu is shown in Figure 7.

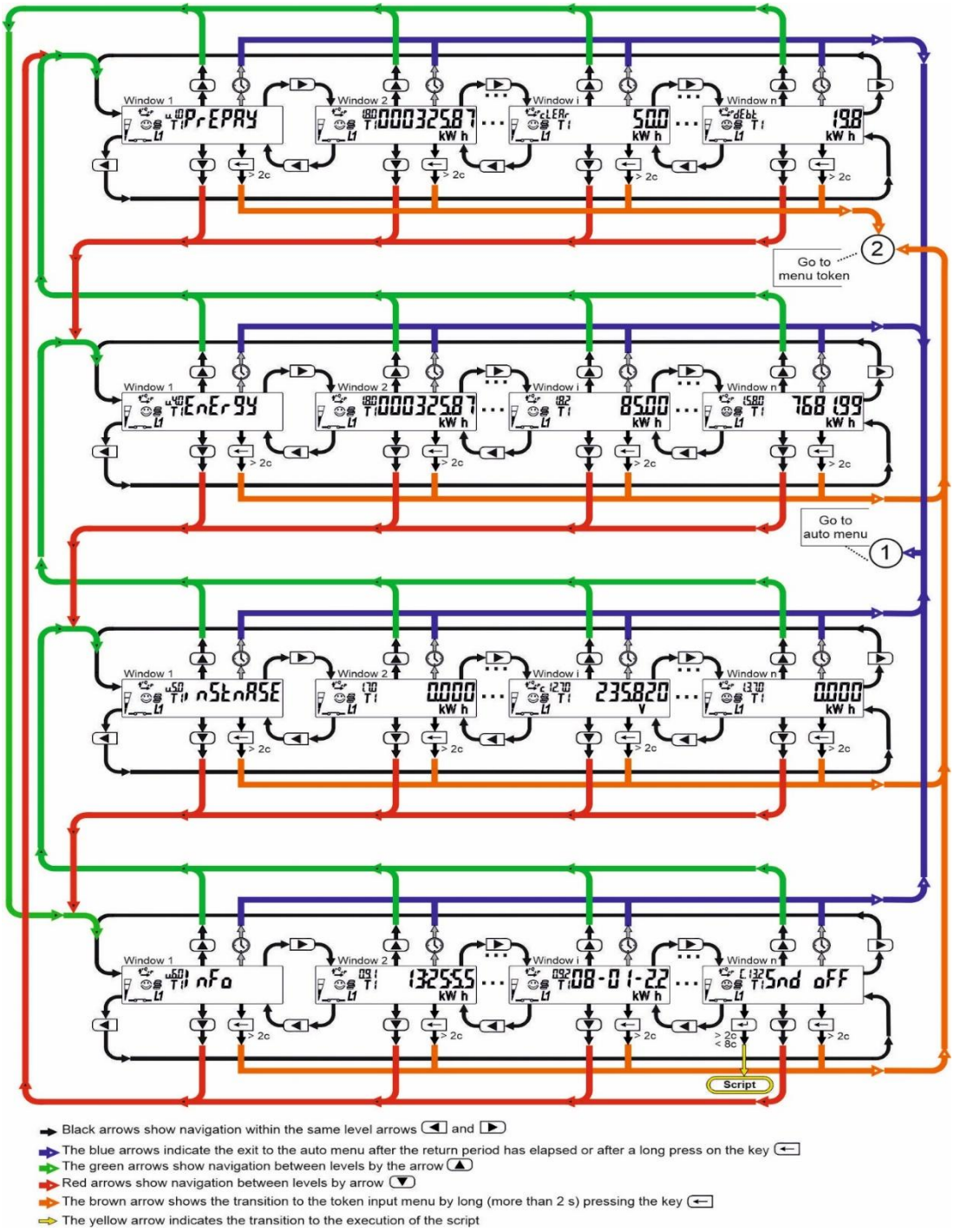


Figure 7. Example of navigation through the manual menu

In the given example, a manual menu system with four levels is shown

1. OBIS – code u.1.0, level name – PrEPAY.
2. OBIS – code u.4.0, level name – EnErGY.
3. OBIS – code u.5.0, level name – inStAnSE.
4. OBIS – code u.6.0, level name – InFo.

Each linear set of information windows has a first window that contains the name of the set, its OBIS-code, and a certain number (up to 40) of information windows, each of which displays various data stored in the meter's memory. The nature of the data displayed in the window is determined by the OBIS-code or another comment in the special LCD section (see. LCD description).

The orderliness of each set of information windows lies in the fact that:

- In the set, there is a first window, a last window, and there may also be intermediate windows.
- At each moment of viewing the manual menu, there is a current window – the one displayed on the LCD at that moment – and it always has a previous and a next information window.
- Navigation within the set is only sequential: from the current to the next window or from the current to the previous window.
- Additionally, such orderliness provides for cyclical navigation within the set: for the last window, the next one is the first information window of this set, and for the first window, the previous one is the last information window of this set.

Within each set, navigation from the current window to the next window is achieved by a short press of the "View" button, while navigation from the current window to the previous window is done by a double press.

At any given moment in the manual menu display, there is a current level, a previous level, and a next level. The order of levels is such that navigation between levels in the manual menu system is only possible sequentially: from the current level to the next level. The current level is the one whose information window is currently displayed on the LCD. Navigation from the current level to the next level is done using the "View" button (by pressing and holding for 2 seconds).

Navigation between levels also follows a cyclical principle: for the last level, the next one is the first level, and for the first level, the previous one is the last level.

Some information windows may display data on the LCD using scrolling if it does not fit entirely on one screen. In this case the display sequentially shows information windows that present fragments of the required information, creating a visual effect of a "moving line" that allows the full information about the current parameter to be read. An example of such scrolling is shown in Figure 8. Pressing any navigation button interrupts the scrolling and transitions to the information window corresponding to the pressed button.

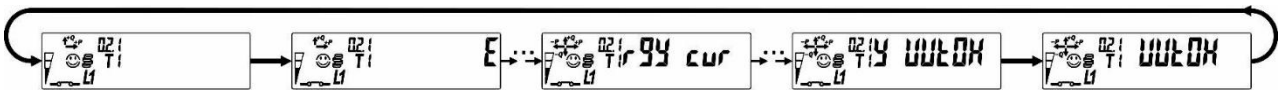


Figure 8. Example of parameter scrolling with OBIS code 0.2.1 – Configuration version

Some information windows may have additional functionality assigned. The list and functions of scripts are defined by the meter's software, which is installed by the manufacturer, and assigning one of them to a specific information window is done during parameterization and can be customized by the user as desired. For example, scripts can be used to activate a supply control switch if user confirmation is required.

In battery mode, the manual menu operates as part of the main system, fully mirroring the actions that occur when the meter is powered on.

If, in the demonstration mode of any manual menu window, the time since the last key press exceeds the return period, the display will revert to the automatic menu demonstration mode.

All available scripts are executed by a long press (from 3 to 5 seconds) of the function button on the corresponding screen.

3.6. Indication of meter operating modes

3.7. Indication of external modules operation

To display operating modes in meters, depending on their configuration, LED indicators are installed: the active energy measurement indicator “6400 imp/kWh” for active energy measurement and the reactive energy measurement indicator “6400 imp/kVarh”. These indicators blink at a frequency proportional to the consumed power and operate synchronously with the main pulse testing electrical output. Additional symbols, as described in section 2.4.5, are also displayed on the electronic screen.

In the event of failure or errors in the operation of the meters, the electronic display will start flashing an error symbol ⚠. The cause of the error can be viewed in the status alarm register using the menu.

The emergency rate is activated in cases of failure of the rate system or the internal clock of the meter.

The emergency rate function in the meters is indicated on the electronic display by flashing the symbol ⚠ and the number of the emergency rate.

For meters, the number of the active rate is displayed in position 7 (see section 2.4.5). For meters that measure active energy in both directions, the displayed rate number, as well as other measured and calculated parameters, are shown in position 2 (see section 2.4.5) in the form of OBIS codes. The list of OBIS codes supported by the meters is provided in the Annex C.

Meters that measure active energy in both directions display the quadrant of the energy angle on the electronic display using symbols in position 1 (see section 2.4.5).

4 Maintenance

4.1. General instructions

Maintenance includes verification (mandatory), calibration and repair of the meter (if necessary).

Repair and calibration operations are carried out at the manufacturer’s factory.

The calibration operation is carried out by an authorized organization or an authorized laboratory.

5 Instructions for safety precautions

According to the method of protection of a person from electric shock, the meter complies with class II in accordance with IEC 62053-21.

Insulation between all circuits of current, voltage, “ground” on the one hand and the terminals of the interfaced and electrical test leads on the other withstands a test voltage of 4 kV (RMS) at a frequency of 50±2,5 Hz for 1 min.

Insulation resistance between the case and electrical circuits is not less than:

- 20 MOhm – under normal conditions;
- 7 MOhm – at ambient temperature (30±2) ℃ and relative humidity of 90%.

The meter is fire-safe and complies with fire safety requirements.

6 Transportation and storage

Requirements for transportation and storage of the product

The meters must be stored and transported in the manufacturer's packaging under conditions corresponding to class 1K22 according to the IEC 60721-3-1 and to class 2K12 according to the IEC 60721-3-2 respectively (except for the possibility of condensation and ice formation in the environment where they are operated). Premises must be free from aggressive vapors and gases.

The meter can be transported in covered railway cars, transported by road with protection from rain and snow, water transport, as well as transported in sealed heating compartments of aircraft.

Transportation must be carried out in accordance with the rules of carriage applicable to each mode of transport.

The meter in a transport container is steady against the influence to ambient temperature from minus 40 to plus 70 ℃, the influence of relative humidity of ambient air to 95% at a temperature of 30 ℃, and atmospheric pressure from 70 to 106,7 kPa (from 537 to 800 mmHg).

The meter in a transport container is steady against the influence of a transport shaking at a number of blows from 80 to 120 per minute with the acceleration of 30 m/s^2.

7 Requirements for environmental protection and disposal of the device

After the end of its service life, the device must not be disposed of with household waste. The disposal must be carried out in compliance with all applicable requirements of the local legislation.

In order to eliminate possible damage to the environment, due to uncontrolled waste disposal, please separate this product from other waste and reuse it or its components.

Production waste is subject to disposal in accordance to national standards.

Users can contact the product manufacturer about handing over a non-reusable appliance.

8 Manufacturer’s warranties

The manufacturer guarantees the compliance of the meters with the requirements of EN 50470-1, EN 50470-3, IEC 62053-23, IEC 62053-21 and IEC 62052-11 if the consumer complies with the conditions of operation, storage, and installation established by this operation manual.

The warranty period of operation of meters is 3 years from the moment of their sale. In the absence of a mark on the date of sale, the warranty period is determined from the date of issue.

When exporting, the manufacturer guarantees the quality of meters and their compliance with the requirements of the operations manual for 3 years from the time of meters crossing the State Border of Ukraine

if the customer complied with the customer operating and storage conditions described in this operations manual and maintaining the seal of the manufacturer.

In the event of failure or non-compliance of meters with the requirements of this operations manual during the warranty period, the meters must be repaired by the organization authorized to carry out warranty repairs ore replaced by the manufacturer.

Meter transported, stored, installed, connected, or used in violation of the requirements specified in the operating manual and meters that have damage to the cover, base, screw terminal or the consequence of their thermal heating, damaged seal of the manufacturer, as well as if the product has pronounced mechanical damage received as a result of any actions of the buyer or third parties, not subject to warranty repair, and repaired at the expense of the consumer.

The manufacturer is not responsible for meters that have failed during operation due ti incorrect connection.

Post-warranty repairs are carried out by an organization authorized to carry out repairs or by the manufacturer under a separate agreement.

The warranty period of storage is 1 year from the moment of shipment of meters.

Annex A. Overall and installation dimensions

The overall and installation dimensions of the NIK 2106 meter are shown in Figure A. 1.

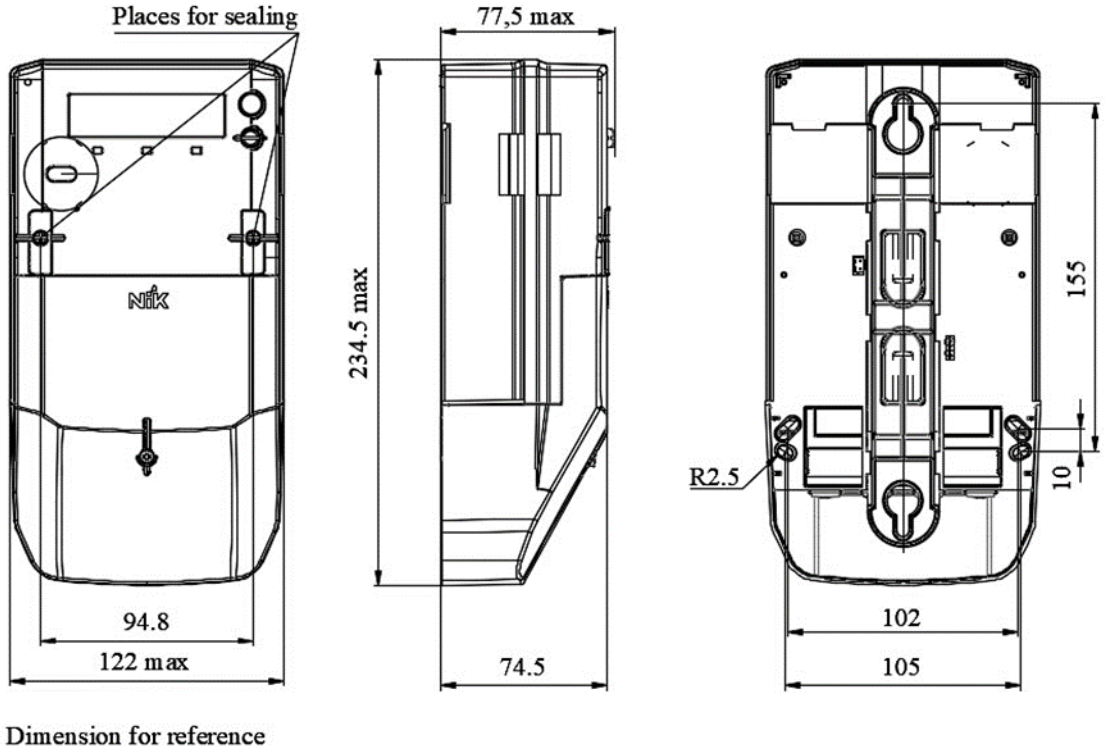
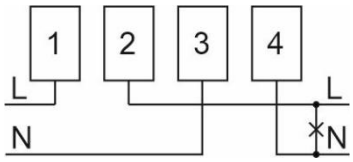


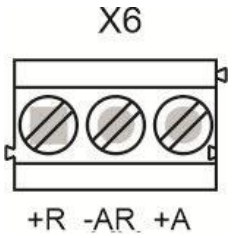
Figure A. 1. Overall and installation dimensions

Annex B. Connection diagram of meters

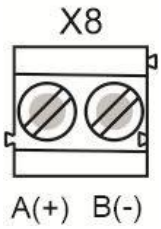
Figure B. 1 illustrates the connection diagram for NIK 2106 meters to the consumer's network, including the contacts of the electrical test outputs and the RS-485 interface.



a) connection diagram of the meter to the consumer's network



b) contacts of the electrical test pulse outputs for active (A+) and reactive (R+) energy



c) contacts of the RS-485 electrical interface

Figure B. 1. Connection diagram of meters

Annex C. Table of OBIS codes

Table C.1 provides a list of some OBIS codes supported by the meters, depending on their configuration. The column designation are as follows: “A” – meter measuring active energy in two directions.

Table C. 1. Meter’s OBIS codes

OBIS code	Name of the parameter	A
1.8.0	Active energy A+ (imported) total for all rates, kWh	+
1.8.1	Active energy A+ (imported) for rate 1, kWh	+
1.8.2	Active energy A+ (imported) for rate 2, kWh	+
1.8.3	Active energy A+ (imported) for rate 3, kWh	+
1.8.4	Active energy A+ (imported) for rate 4, kWh	+
2.8.0	Active energy A- (exported) total for all rates, kWh	+
2.8.1	Active energy A- (exported) for rate 1, kWh	+
2.8.2	Active energy A- (exported) for rate 2, kWh	+
2.8.3	Active energy A- (exported) for rate 3, kWh	+
2.8.4	Active energy A- (exported) for rate 4, kWh	+
15.8.0	Active energy |A+|+|A-| total for all rates, kWh	+
15.8.1	Active energy |A+|+|A-| for rate 1, kWh	+
15.8.2	Active energy |A+|+|A-| for rate 2, kWh	+
15.8.3	Active energy |A+|+|A-| for rate 3, kWh	+
15.8.4	Active energy |A+|+|A-| for rate 4, kWh	+
16.8.0	Active energy |A+|-|A-| total for all rates, kWh	+
16.8.1	Active energy |A+|-|A-| for rate 1, kWh	+
16.8.2	Active energy |A+|-|A-| for rate 2, kWh	+
16.8.3	Active energy |A+|-|A-| for rate 3, kWh	+
16.8.4	Active energy |A+|-|A-| for rate 4, kWh	+
0.9.1	Current time	+
0.9.2	Current date	+
96.1.0	Meter serial number	+
96.1.10	Software version	+
96.1.11	Checksum of the software	+
1.7.0	Instantaneous active power values A+ (imported), kW	+
2.7.0	Instantaneous active power values A- (exported), kW	+
15.7.0	Instantaneous active power values |A+|+|A-|, kW	+
16.7.0	Instantaneous active power values |A+|-|A-|, kW	+
12.7.0	Instantaneous voltage values, V	+
11.7.0	Instantaneous current values, A	+
13.7.0	Power factor	+
14.7.0	Network frequency, Hz	+
0.2.0	Metrological software version	+
0.2.8	Checksum of the metrological software version	+

Annex D. Scheme of calendar rate grid

Figure D 1 illustrates a simplified scheme of the setup and operation of the meter's rate grid.

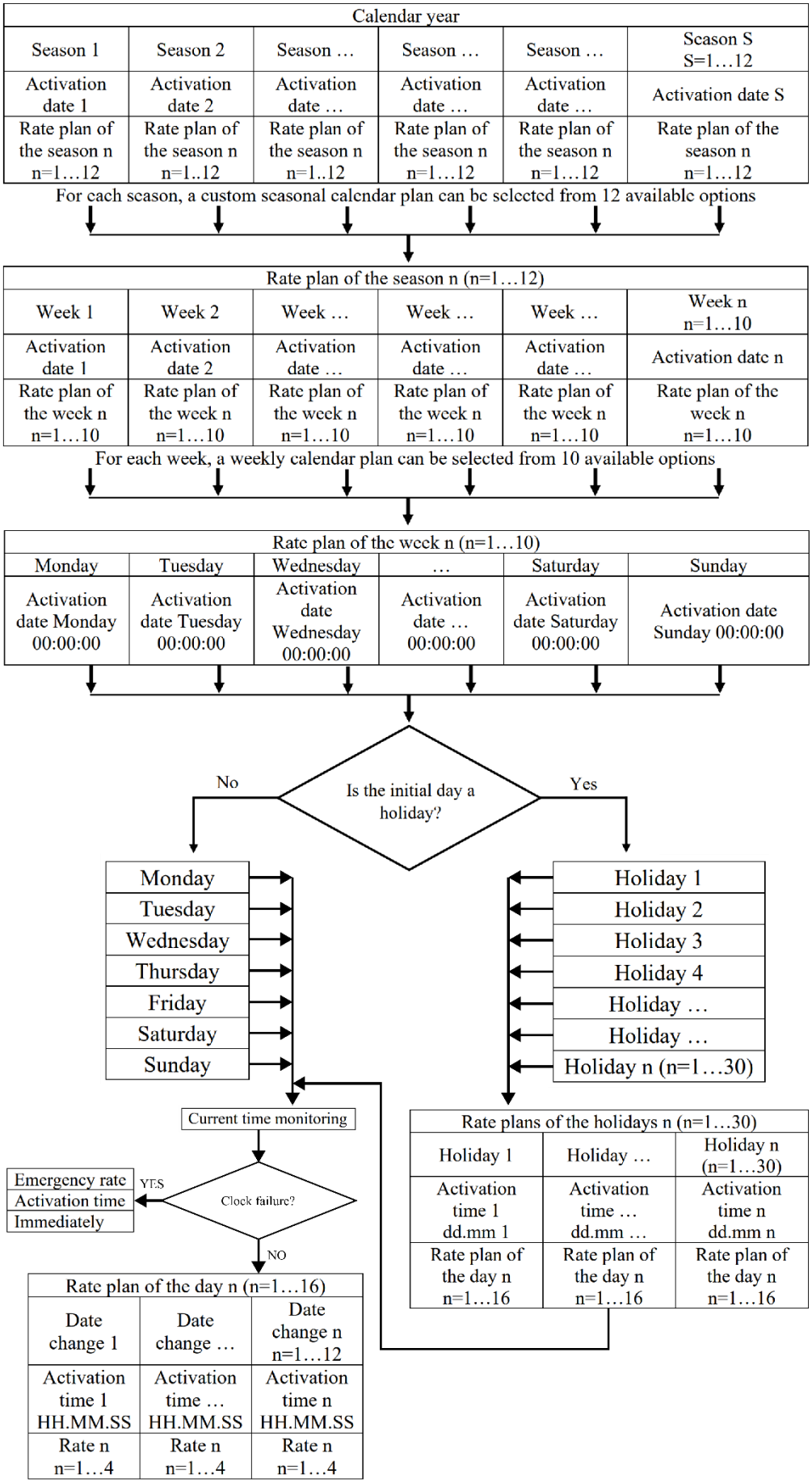


Figure D 1. Scheme of the calendar rate grid