APATOR

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smart ESOX

Instruction Manual

ISO 9001 **PN-N-18001** **ISO 14001**

1. Basic information on meter

1.1 Information on meter

SmartEsox is four quadrant type electricity meter for the measurement of energy in three phase and four wire and three phase three wire power grids. The meter is designed to apply for commercial, industrial and balancing measurement purposes. The meter is available both in direct version (smartESOX B) or CT or CT / VT (smartESOX P) versions. The Meter is functioning and measuring energy upon disconnection from the neutral wire, if voltage is present in at least two phases.
The meter measures active, reactive and apparent energy and values of selected parameters of power network. Real time clock ensures the time base for the built in calendar to save the measured energy in separate tariff registers, in load profiles and any events to the event log. In case of interruption of the mains, a replaceable AA size battery and built in super capacitor enables the RTC and to display a subset of registered values on the LCD.
The meter is furnished with optical port (EN 62056-21), pulse and relay outputs of local communication ports and dedicated chamber for replaceable communication modules. The meter enclosure is made from inflammable PC thermoplastic of second protection class and IP54 degree protection against dust and water.

1.2 Electrical, mechanical and environmental parameters of meter

Parameter	smartESOX P	
Accuracy class for active energy	B, C (MID); 0,2s (IEC 62053-22)	
Accuracy class reactive energy	2 class EN 62053-23	
Reference voltage Un	3x58 (100)…3x230 (400) V	
Range of voltage	0,8Un – 1,15Un	
Transitional current Itr	0.05 A	0.25 A
Reference current Iref	1 A	5 A
Maximum current Imax	6 A	
Frequency fn	50 Hz	
Pulse constant for active energy	20 000 pulse/kWh	
Temperature of operation	–25 to +55°C , optional: –40 to +70°C	
Temperature of storage	–25 to +55°C , optional: –40 to +70°C	
Mechanical class	M1	
Electromagnetic class	E2	
Case	II protection class	
Protection against dust and water	IP54	
Electrical insulation strength	4 kV, AC 50 Hz, 1 min., 6 kV, 1,2/50 µs/µs 500Ω	

EMC immunity	4 kV, 1,2/50 µs/µs 2Ω
RTC	Accuracy not worse than 0,5s/day (by temperature 23°C) - EN 62054-21
Optical interface	Compliance with 62056-21, DLMS COSEM and IEC1107 compliant, speed up to 19200 bps
Electrical interfaces	2x serial port , replaceable communication module Protocols supported by interfaces IEC 1107(only readout) and DLMS/COSEM (readout and configuration). Configurable initial and final data transfer speed from 300 to 19200 bps
Serial number	On the meter label as number or bar code (according to individual requirements)
Battery	In case of meter connected to power network - battery working cycle not less than 14 years, (standard AA size lithium battery) accessible under the terminal cover, replaceable without need of disconnecting meter from power
Standards	PN-EN 50470-1 PN-EN 50470-3 PN-EN 62053-23 PN-EN 62053-11

2. Mechanical aspects of meter

2.1 Description of the case of meter

Four-part case of the meter consists of the base, front cover, terminal cover and replaceable module. All parts are made of polycarbonate, which is resistant to weather conditions and ensures appropriate mechanical strength to protect the internal parts of the meter against unauthorised access. The meter body has second protection class of insulation and IP 54 protection degree against weather conditions allow to mount and to maintain the meter in different weather conditions. Additionally, terminal box is protected by a cover fixed by sealable screws. The mounting triangle of the meter meets the requirements of DIN 43857. External view of ESOX type meter and places for seals are shown on Fig.1.
Meter enables to set two seal marks, two seals marks for terminal box and sealing mark for button to set parameters and manual closing of billing period.

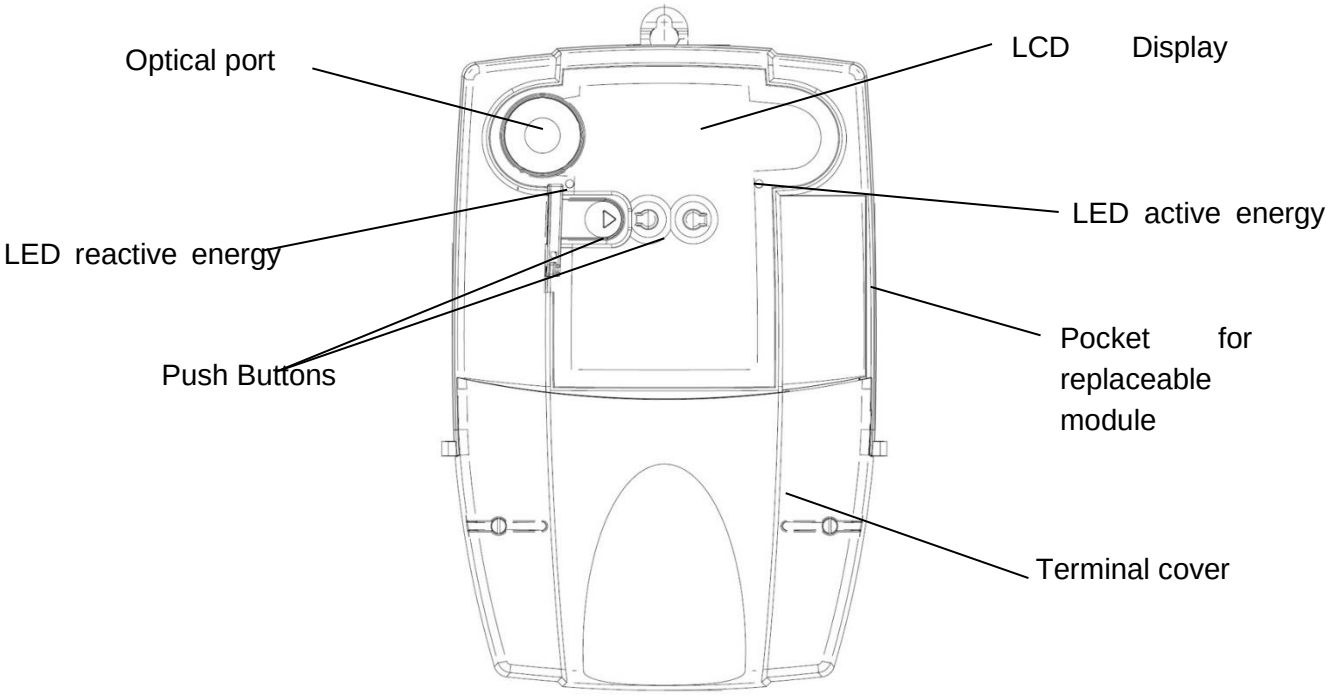


Fig.1 Case of meter

The main and auxiliary terminals are located under the terminal cover in the lower part of meter.
All main current and voltage terminals by using a cage clamp solution are designed to ensure the possibly most secure connection. Auxiliary terminals are spring-clamp type – screw less terminals. In order to take out the wire one should press the pusher located on the upper part of the clamp. Moreover, there is RJ-45 connector to connect with the meter on RS-485 The meter can also have optionally an external power input where the power supply voltage may vary between AC or DC 50-264 V.

2.2 Overall dimensions

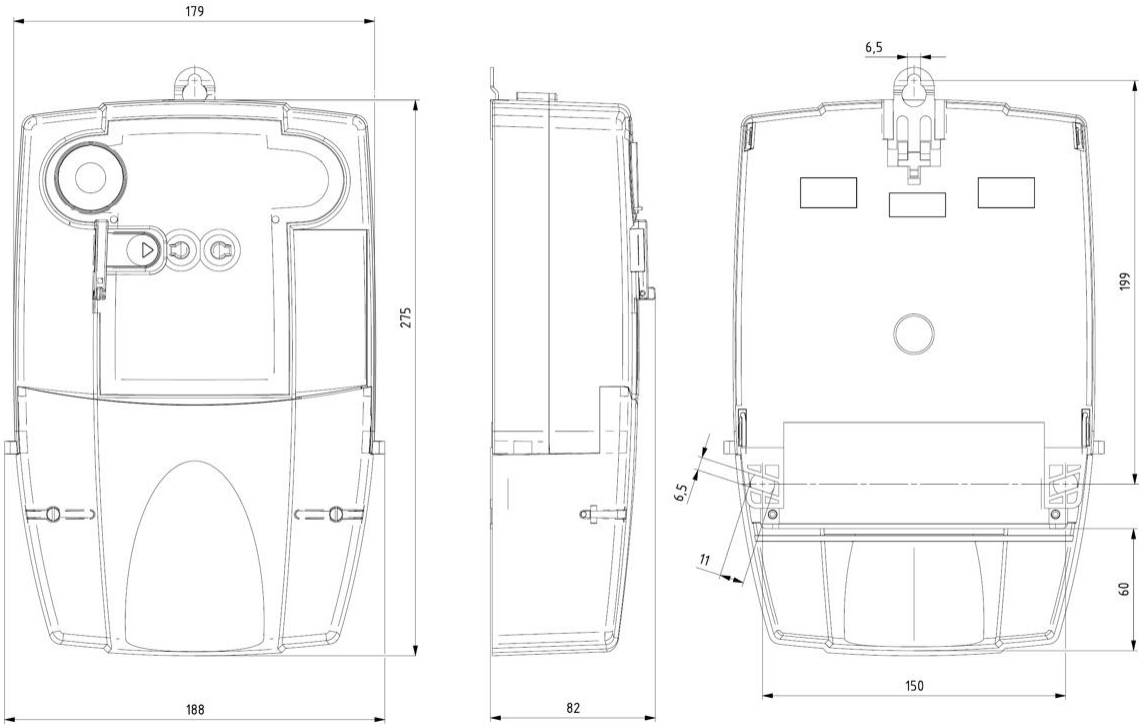


Fig.1 Overall dimensions

Рys. 1.

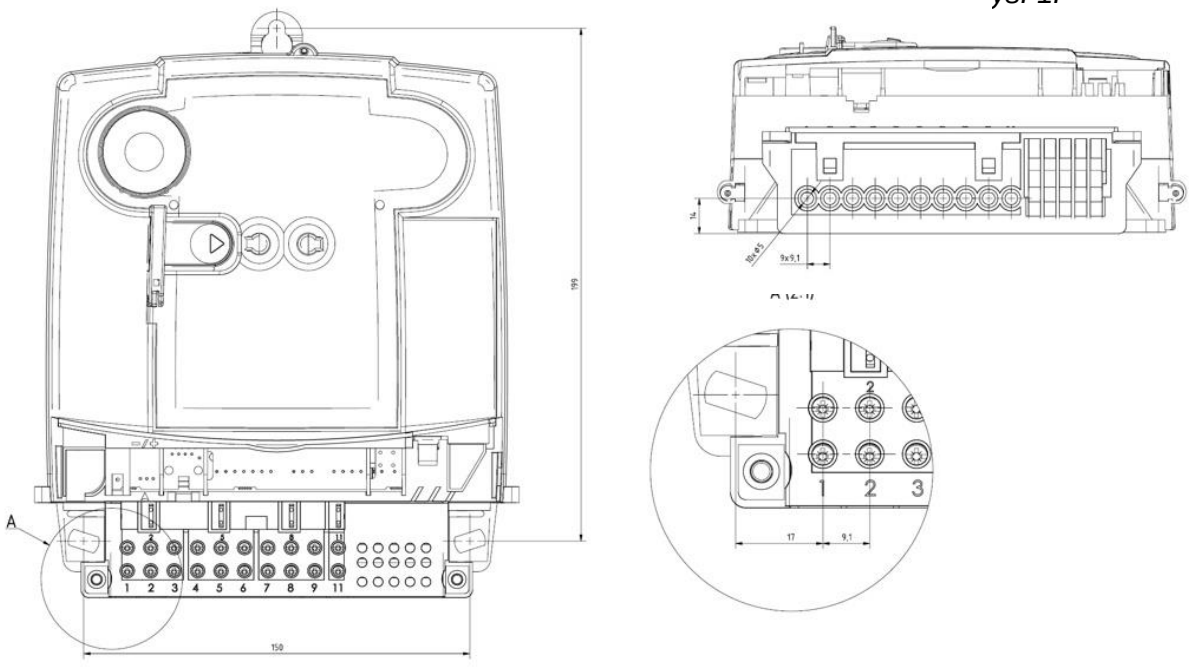


Fig.2 Overall dimensions

3. User interfaces

3.1 LCD elements

The graphic LCD display operating in VDEW mode is integral part of the meter.

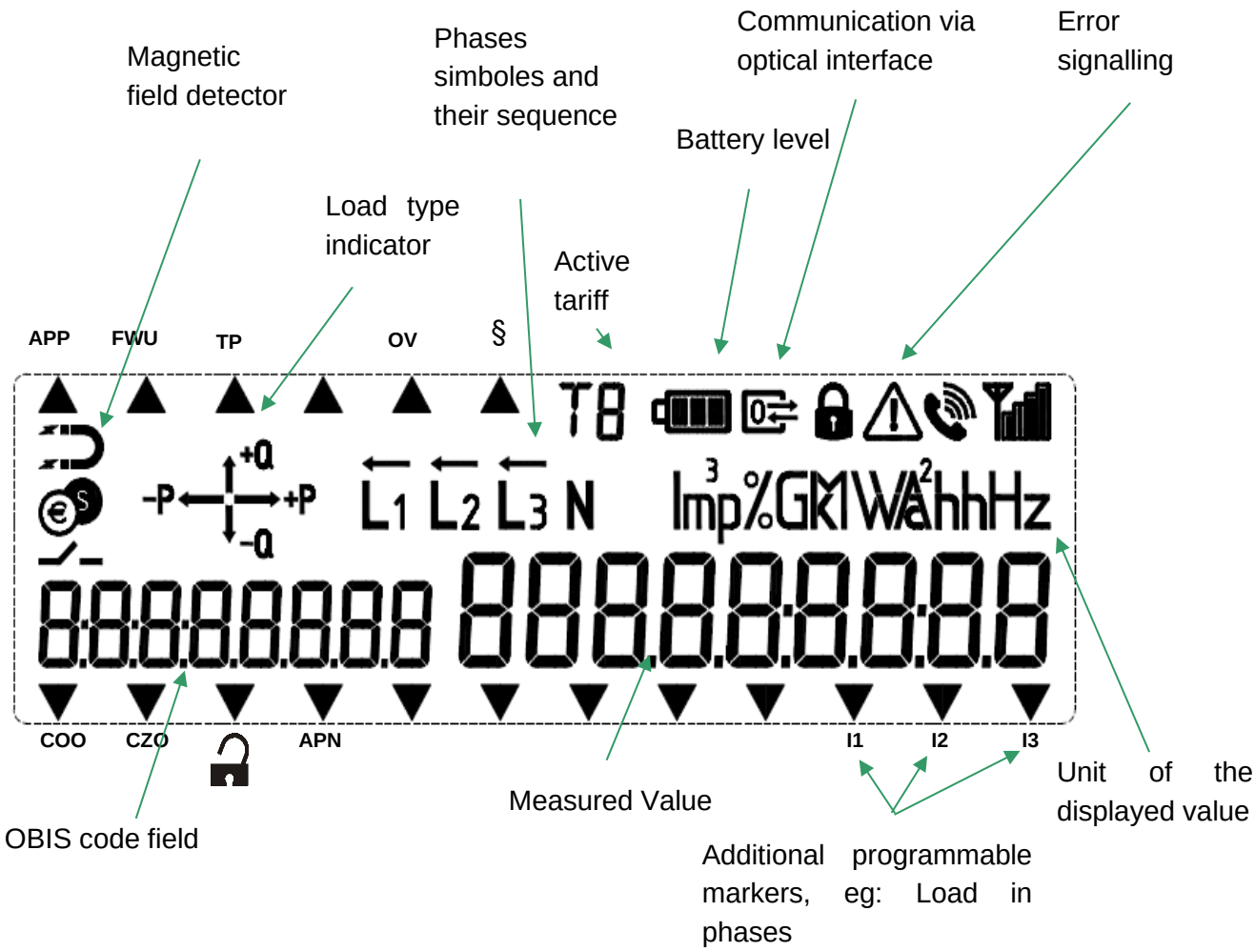


Fig.3 LCD display

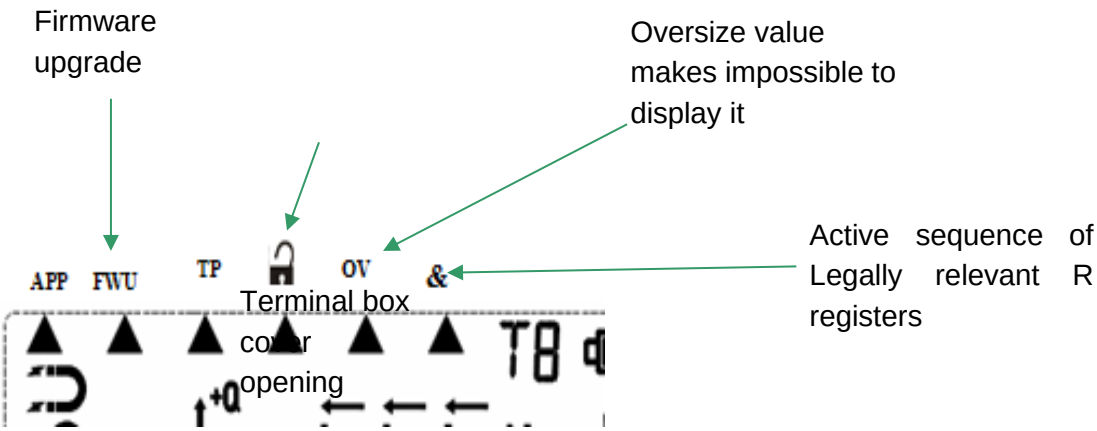


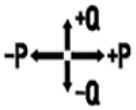
Fig. 4 LCD display upper markers

(1) Magnetic field tamper detection

The meter registers the magnetic field, displaying the symbol  (while the magnetic field is in effect). After the end of exposure to the magnetic field, the meter additionally displays the symbol  (error signaling), which means that the operation with the magnetic field has been registered in the error log.

The tamper detection for magnetic field is getting activated around the level of 200mT.

(2) Load type detection

SmartESOX is a four-quadrant meter - the small vector diagram on the left part of the display 

indicates the direction of active and reactive energy flow at a given moment.

(3) Phase voltage sequence detection

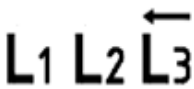
- Labels L1, L2, L3 are active only when the given phase is connected to the mains.

Example:

 only phases L1 and L3 are powered.

- Arrows ← are active only when the meter has registered the reverse direction of current flow on a given phase.

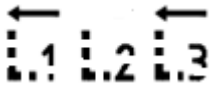
Example:

-  the reverse direction of the current flow on the L3 phase

- Blinking labels  * indicate that the meter has registered a wrong phase sequence.

- Blinking L1, L2, L3 and simultaneously lit arrows over the respective phase markers mean that the meter simultaneously registered the wrong order of phases and the reverse direction of the current flow.

Example:

 - The meter registered the wrong order of phases and the reverse direction of the current flow on the L1 and L3 phases.

*- The dotted line means that the label is blinking.

(4) Load in the phase (optional)

In low-left part of the LCD display, 3 triangles (labeled I1 I2 I3) are indicating load in each phase independently.

(5) Active tariff

The smartESOX meter can register consumption in six tariffs depending on the calendar settings. The tariffs are controlled by the internal clock.

The tariff in which the meter currently calculates is always indicated on the display.

Example:

 - at the moment the meter registers the energy consumption in the Tariff 6.

(6) Battery level

The LCD display shows a 3-level battery indicator. It is updated each time the meter is started and during normal operation in every 8 hours. The indicator update frequency increases while the terminal box cover is removed.

(7) Communication with the meter

The symbol  means, that at any given time communication with the meter takes place via any interface (optical port, RS 485, communication module ...).

(8) Error indication:

The active symbol  means that an error has occurred in the meter.

a) By adding to the display sequence (manual or automatic) "**LR error register**" and reading the value marked as "**F.F.9**" (OBIS code). The codes are presented in decimal form - they should be changed into a binary form and the error should be read according to the given alarm mask:

Bitmask of currently ongoing alarms:

	description
bit_1	Reduced battery voltage (battery must be replaced)
bit_2	At least one of the sensors has been activated: the meter housing, the terminal cover, or the magnetic field
bit_3	Terminal cover tamper detection
bit_4	Meter housing tamper detection
bit_5	Magnetic field tamper detection
bit_11	Measurement system error (there may be a temporary disturbance, if the problem persists, the meter is suitable for repair)

List of error code masks for registered errors**:**

	Register of errors reported by the firmware NLR
bit_2	At least one of the sensors has been activated: the meter housing, the terminal cover, or the magnetic field
bit_0	RTC error (only means the loss of time, must be set the clock in the meter)
bit_1	Reduced battery voltage (battery must be replaced)
bit_10	There was a problem with the meter's memory
bit_11	Measurement system error (there may be a temporary disturbance, if the problem persists, the meter is suitable for repair)
bit_13	communication module error PRIME / GSM / WMBUS
	Register of errors reported by the firmware LR
bit_0	Terminal cover tamper detection
bit_1	Meter housing tamper detection
bit_2	Magnetic field tamper detection
bit_4	Reduced battery voltage (battery must be replaced)
bit_5	Measurement system error (there may be a temporary disturbance, if the problem persists, the meter is suitable for repair)
bit_6	wrong order of connecting phase voltages in a three-phase meter (change the order of phase wires)

bit_8	the counter has a default key for securing the technological protocol, you have to change the key (production error, set a unique security key)
bit_9	meter's memory damage (meter must be replaced)
bit_12	the NLR application is not suitable to run - install the right application
bit_13	the NLR application has been stopped - the counter will be restarted automatically or it should be turned off and on

a) Reading the register of errors through one of the interfaces (locally or remotely) using dedicated software.

(9) OBIS code

Each displayed value is described by an appropriate code compliant with the OBIS standard.

(10) Value

The values are displayed with the accuracy specified by the user using the smartPatronus parameterizing application. Separate instruction manual is dedicated to the application.

(11) Unit of measurement

Description of the units in which the indicated value is given.

(12) Firmware update

Only part of the NLR (not legalized) software in the meter can be updated. The **FWU** tag is active only when uploading software (remotely or locally).

(13) Removable cover of the terminal (**CZO**) and meter main cover (**COO**)

The meter is equipped with a micro switch, which is sensing the removal of the terminal cover. This element provides protection from unauthorized access to the wirings.

(**COO**) – meter housing opening sensor

(14) Value exceeding (**OV**)

When the number of characters representing a given value is exceeded (in relation to the amount that can be display on LCD), an additional "**OV**" marker will appear. In this situation, the full value reading will be possible only through dedicated software (via one of the interfaces) or after changing the number of decimal places (to a lesser accuracy).

(15) Active LR display queue (**APP**)

The LR queue is a set of master data that was defined during the production process. This data set cannot be reconfigured by the user like the NLR (automatic and manual) sequences. The LR queue is available when the meter is not powered up and can be activated by long-pressing and holding any of the scroll buttons.

3.2 DISPLAY SEQUENCE

The meter has two available display sequences - NLR (non legally-relevant) and LR (legally-relevant). The NLR queue is displayed according to the user configuration, while the LR queue is defined in the meterr. When reading on the battery, the meter provides only the LR queue.

The NLR queue is additionally divided into an automatic queue (the meter automatically scrolls the values on the display according to the time interval defined by the user) and manual (the user scrolls the values using the any of the scroll buttons).

After a certain period of inactivity on the user side, the meter returns to the automatic LCD queue.

3.3 Buttons

SmartEsox type meter is furnished with three buttons:

- 2 scroll buttons:

- scrolls NLR sequence

- switches over to LR sequence (by pressing the button for a longer time)

- scrolls LR sequence

- Red, sealable pushbutton:

- closes billing periods (manual closing of **OR**) – option (configurable in smartPatronus)

4. Communication interfaces

4.1 Optical interface

Local communication with meter via optical interface is operated by use of infra-red USB cable. Default parameters of the interface are the baud rate at 19200 bps. Default protocol– DLMS/ Cosem, HDLC profile, possible configuration on IEC 62056- 21 (read out in Mode C, transfer to DLMS via Mode E).

4.2 Communication Modems

The meter can be furnished with GSM/LTE type module connected to dedicated nest in the meter body. The DLMS/COSEM with TCP/IP communication profile is available on serial connector of the replaceable module. Implementation of the protocol is pursuant to PN-EN (IEC) 62056-47 standard. In case of access to internet on the installation site an Ethernet module can be used instead of the GSM modem. Additional instructions please see under chapter 6.2.

4.3 Additional inputs and outputs (optional)

Meter can have maximum to 6 OC type outputs , two relay outputs and two digital inputs. All of these In/Outputs are galvanically isolated from the other internal parts of the device. The number of inputs and outputs depends on the version ordered. Additional inputs/outputs are shown in the figure below:

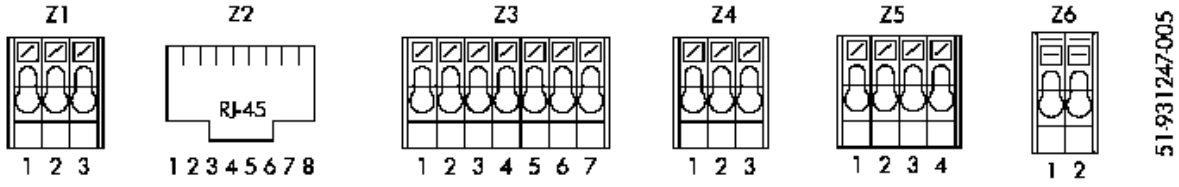


Fig. 5 Additional inputs/outputs which may vary in meters according the request of the Customer. Please make sure the correct wiring according to the drawing in the internal side of the terminal cover.

4.3.1 Serial ports (Z1, Z2)

SmartEsox is furnished with two independent RS 485 ports or optionally one RS485 and optionally with one Current Loop type serial ports. The communication on the ports – connectors Z1 and Z2 is possible over DLMS protocol.

4.3.2 Digital outputs (Z3)

Digital outputs are for retransmission of energy counted in form of pulses and to signal the states of alerts, events. Operation mode is configured by a customer.

In alert signalling mode the following parameter settings are available:

- Type of value being measured and controlled by OC type output
- Character of operation on output
- Thresholds for operation (lower threshold and upper threshold)

In operation mode as the pulse output it is allowed to set parameters:

- Setting the energy direction for pulsing by appropriate output
- Pulse constants

4.3.3 Relay outputs (Z5)

Meter can have up to two relay outputs. The following parameters can be programmed:

– Type of value being measured and governed by relay output
– Operation character of output (pursuant to graphs below)
– Thresholds of operation (lower threshold and upper threshold)

4.3.4 Digital inputs (Z4)

Meter can have to two digital –pulse inputs. They can perform the following functions:

- Tariff control input
- Synchronization of RTC of meter (optional function)
- Alert input (optional function)
- Pulse input – to count pulses from other meters (optional function)

4.3.5 Input for external power supply (optional- Z6)

The meter can also have optionally an external power input where the power supply voltage may vary between AC or DC 50-264 V.

5. *Tariff system and calendar*

Brand new meter is programmed pursuant to a customer's requirements as single tariff rate or multi tariff rate meter with required tariff rate plan. It is possible to reprogram active and passive calendar. The meter is programmed from any communication port after prior correct password is entered.

The meter is furnished with built in annual seasonal calendar compiles with COSEM. The arrangement of calendar allows to define maximum 12 seasons. For each season it is possible to define 7-day schedule of switching pursuant to days of the week including holiday (it regards fixed and floating holidays).

Special days are defined based on established list of fixed holidays during the year and the list of floating holidays with capacity up to 30 dates.

The active and passive calendars have the same parameters. The date of switching from passive to active calendar is additionally programmed in the meter. The meter has got internal RTC. Functions of internal clock are as follows:

- Indication of current time and date,
- Automatic change of daylight saving time (with possibility to switch off the function),
- Performance of brand new programmed or indicated tariff rate by a user,
- Measurement of time of operation of the meter in case of interruption of power supply and the entry of correction to the clock,
- Closing of billing period (in automatic mode)
- Alert marking for the events regarding network and meter
- Time marking for the values being registered
- Automatic activation of passive calendar with the date and time programmed

6. Installation of the meter

Overall dimensions of the meter, terminal box and the method of mounting are pursuant to appropriate PN-74/E-88004 and DIN 43857 standards. It enables the mounting on typical mounting plates.

After mechanical mounting is completed then current leads should be connected according to connection diagram on the label located on the cover. Incorrect connection of current leads is signalled on the display by blinking of the digit of appropriate phase.

Next step is mounting and sealing of terminal cover. After the action is completed it is allowed to reset the register of events from the menu of the meter (if required). Finally, one can seal the programming button (if required).

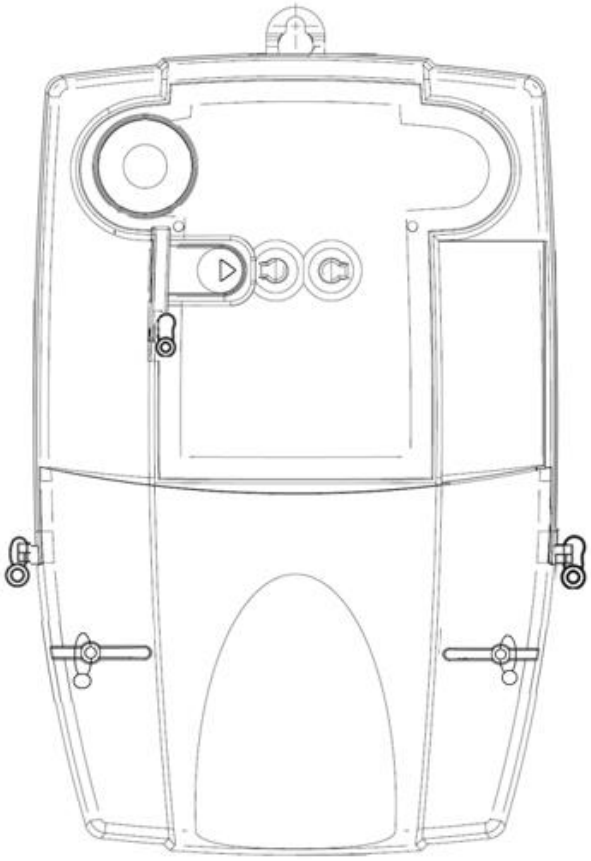


Fig. 6 Exemplary sealed electricity meter

6.1 Procedure of installation

The meter can be installed on mounting plate or directly on the wall.

The case has been specially designed in order to avoid water pouring on the wall to get inside the meter. For the installation of the meter three points were marked on the figure below. The mounting should be commenced to hang the meter first using upper hole and then two lower ones.

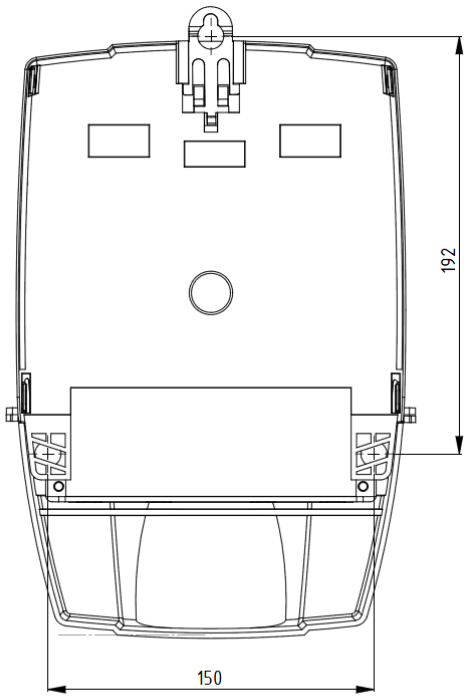


Fig.7 The arrangement of holes for mounting

After the meter is mounted on the mounting plate, the leads should be connected. Connection diagram for external leads to be connected to terminals is presented on a label located on the internal side of the terminal cover.

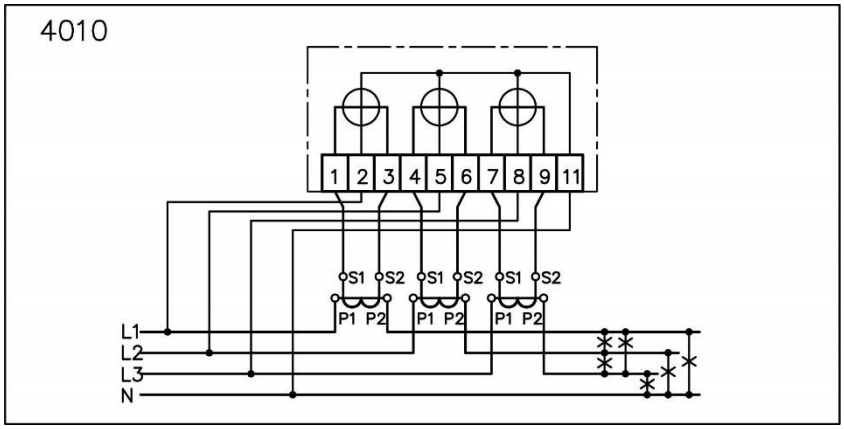


Fig. 8 Connection diagram of basic terminals – ct operated meter

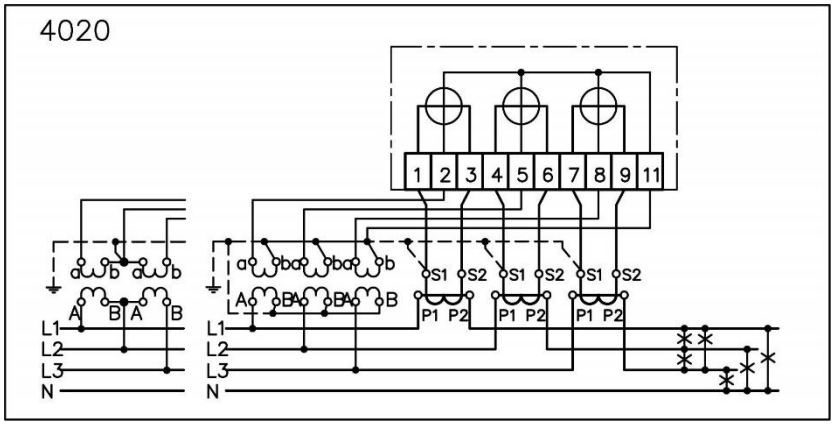


Fig. 9 Connection diagram of basic terminals – ct and vt operate meter

In order to fix the wires correctly one should strip its end on the length of ~ 30 mm. The both screws for clamps should be loosened and make sure that there is enough room between bus bar and stapes to insert the lead. The attention should be paid that the lead is in both clamps (front and back one). Both screws should be tighten after the stripped lead is inserted and the empty room occurred.

For **ESOX P** type meter (ct and ct and vt operated measurement) minimum force 1 Nm and maximum force 3 Nm. This action should be repeated with other leads.

Important Notice: Inaccurate fixing of leads can cause the damage of the meter

If additional inputs and outputs or ones related to alert charger are already being in use then the connection should be made pursuant to the description in the figure below. The connection diagram for terminal box of the meter is also located on the cover.

Diameter of connection leads to connector Z2 = (0,5...1,5) mm^2
Diameter of connection leads to connector Z3 = (0,75...1,5) mm^2

After the wires were fixed then the cover of the terminal box should be mounted. The mounted cover should be fixed by screws and seales.

Meter in Aron connection (3-wires power network):

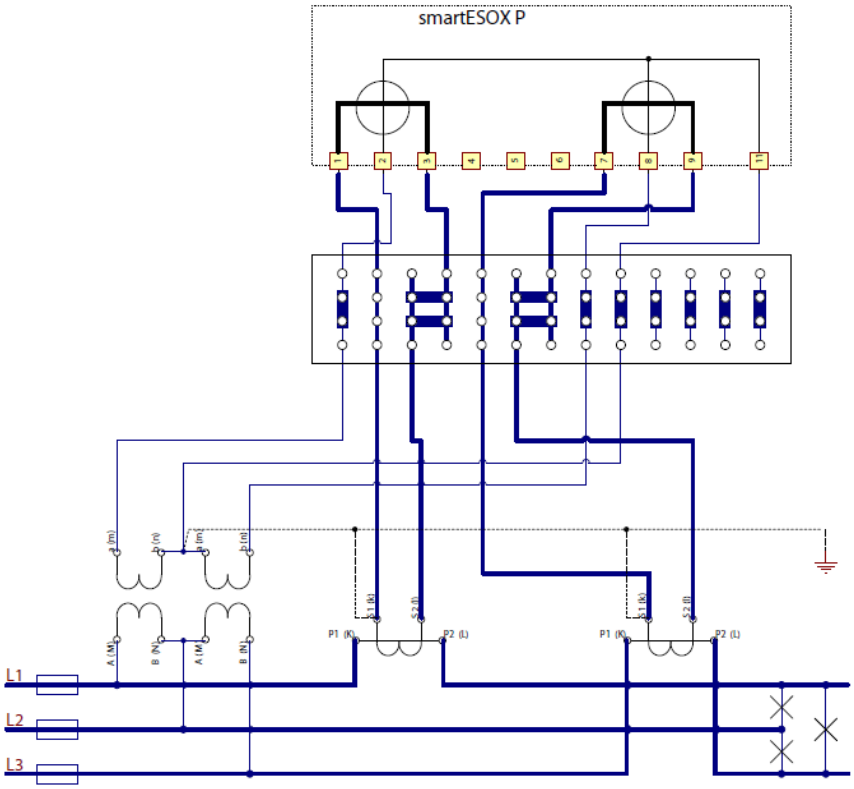


Fig. 10 Connection diagram of CT meter in Aron connection on 3 phase 3 wire network.

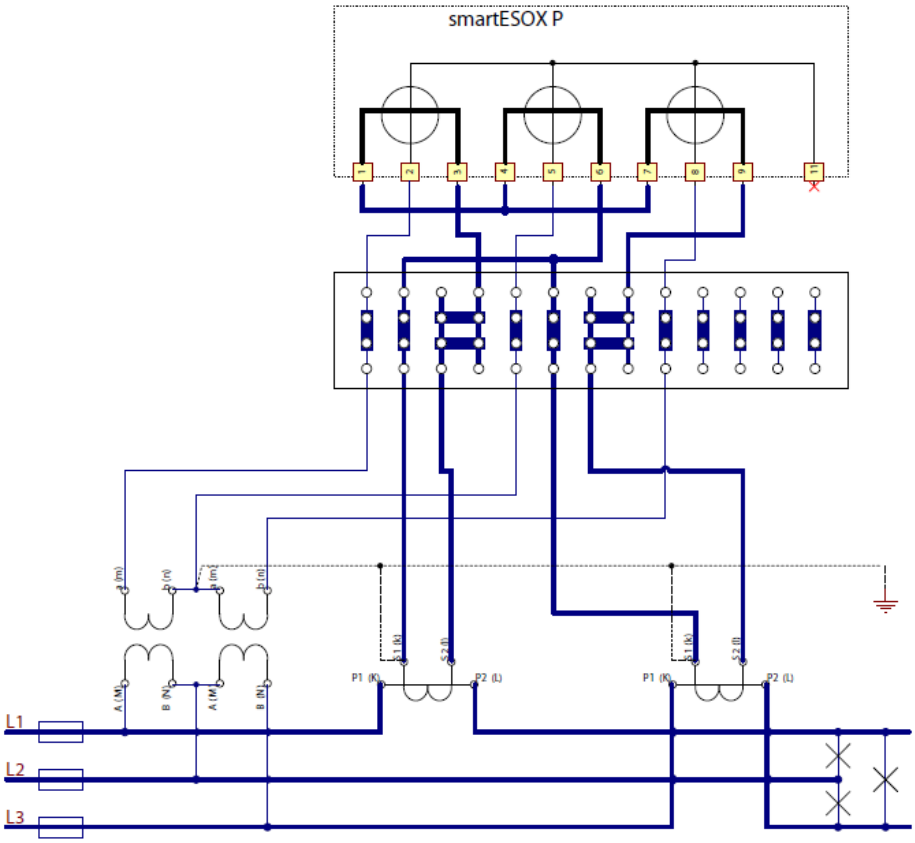


Fig. 11 Connection diagram of CT / VT meter on 3 phase 3 wire network.

7. Software for the service and setting of parameters for ESOX type meters

APATOR SA offers its customers a software to data read out and setting of parameters of smartESOX type meter called smartPatronus. The description of the software is presented in separate document. The software should be ordered separately because it is not integral part of the equipment of the meter.

8. Values being registered by meter

SmartEsox type meter is furnished with registers divided into **Live registers** and **Event and Load profile registers**.

Live Registers are grouped according to the following sub-categories:

- Energy
- Power
- Voltage
- Current
- Counts - quantities
- Others

Registers are presented in the meter as:

- Automatic sequence of display- **NLR** display sequence
- Manual sequence of display - **NLR** display sequence
- Current data / Readout
- Billing period
- Register of standard events
- Register of tamper events
- Register of events concerning contactor (optional)
- Register of firmware events
- Register of events concerning network quality
- Register of events concerning the operation of interfaces
- Register of events concerning the Real Time Clock

- Register of events concerning interruption of power supply
- Load profile no. 1
- Load profile no. 2
- Load profile no. 3
- Additional load profile (optional)

Each of the above mentioned load profiles may use different integration period, and are able to register **up to 20 Cosem Objects** per load profile. It means that altogether (with the optional Additional load profile) 80 different values are possible to register in the profiles.

8.1 Selection of values being registered by the meter:

Active energy registers 1-0:X.8.Y.255 (y: 0 - sum, 1…6 tariffs)		**Reactive energy registers 1-0:X.8.Y.255 (y: 0 - sum, 1…6 tariffs)**	
1-0:1.8.y.255	(A+) [kWh]	1-0:3.8.y.255	imported reactive energy
1-0:2.8.y.255	(A-) [kWh]	1-0:4.8.y.255	exported reactive energy
1-0:15.8.y.255	(IAI) total [kWh]	1-0:5.8.y.255	reactive energy Q1
1-0:17.8.y.255	Active energy QI	1-0:6.8.y.255	reactive energy Q2
1-0:18.8.y.255	Active energy QII	1-0:7.8.y.255	reactive energy Q3
1-0:19.8.y.255	Active energy QIII	1-0:8.8.y.255	reactive energy Q4
1-0:20.8.y.255	Active energy QIV	1-0:23.8.y.255	Reactive energy + L1 QI+QII
1-0:21.8.y.255	Active energy + L1 QI+QIV	1-0:24.8.y.255	Reactive energy - L1 QIII+QIV
1-0:22.8.y.255	Active energy - L1 QII+QIII	1-0:25.8.y.255	Reactive energy L1 QI
1-0:35.8.y.255	Active energy abs. L1	1-0:26.8.y.255	Reactive energy L1 QII
1-0:37.8.y.255	Active energy QI L1	1-0:27.8.y.255	Reactive energy L1 QIII
1-0:38.8.y.255	Active energy QII L1	1-0:28.8.y.255	Reactive energy L1 QIV
1-0:39.8.y.255	Active energy QIII L1	1-0:43.8.y.255	Reactive energy + L2 QI+QII
1-0:40.8.y.255	Active energy QIV L1	1-0:44.8.y.255	Reactive energy - L2 QIII+QIV
1-0:41.8.y.255	Active energy + L2 QI+QIV	1-0:45.8.y.255	Reactive energy L2 QI
1-0:42.8.y.255	Active energy - L2 QII+QIII	1-0:46.8.y.255	Reactive energy L2 QII
1-0:55.8.y.255	Active energy abs. L2	1-0:47.8.y.255	Reactive energy L2 QIII
1-0:57.8.y.255	Active energy QI L2	1-0:48.8.y.255	Reactive energy L2 QIV
1-0:58.8.y.255	Active energy QII L2	1-0:63.8.y.255	Reactive energy + L3 QI+QII
1-0:59.8.y.255	Active energy QIII L2	1-0:64.8.y.255	Reactive energy - L3 QIII+QIV
1-0:60.8.y.255	Active energy QIV L2	1-0:65.8.y.255	Reactive energy L3 QI
1-0:61.8.y.255	Active energy + L3 QI+QIV	1-0:66.8.y.255	Reactive energy L3 QII
1-0:62.8.y.255	Active energy - L3 QII+QIII	1-0:67.8.y.255	Reactive energy L3 QIII
1-0:75.8.y.255	Active energy abs. L3	1-0:68.8.y.255	Reactive energy L3 QIV
1-0:77.8.y.255	Active energy QI L3		
1-0:78.8.y.255	Active energy QII L3		

1-0:79.8.y.255	Active energy QIII L3
1-0:80.8.y.255	Active energy QIV L3

Apparent Energy registers 1-0:X.8.Y.255 (y: 0 - sum, 1…6 tariffs)	
1-0:9.8.y.255	Apparent energy + QI+QIV sum
1-0:10.8.y.255	Apparent energy - QII+QIII sum
1-0:29.8.y.255	Apparent energy + L1 QI+QIV
1-0:30.8.y.255	Apparent energy - L1 QII+QIII
1-0:49.8.y.255	Apparent energy + L2 QI+QIV
1-0:50.8.y.255	Apparent energy - L2 QII+QIII
1-0:69.8.y.255	Apparent energy + L3 QI+QIV
1-0:70.8.y.255	Apparent energy - L3 QII+QIII

Instantaneous Active Powers 1-0:X.7.0.255	
1-0:1.7.0.255	Active power + QI+QIV Inst. Sum.
1-0:2.7.0.255	Active power - QII+QIII Inst. Sum.
1-0:15.7.0.255	Active power abs. L1+L2+L3 Inst Sum.
1-0:16.7.0.255	Active power (abs.(QI+QIV) - (abs(QII+QIII) Inst. Sum.
1-0:21.7.0.255	Active power + L1 QI+QIV
1-0:22.7.0.255	Active power - L1 QII+QIII
1-0:35.7.0.255	Active power L1 (abs.(QI+QIV) - (abs(QII+QIII) Inst. Sum.
1-0:36.7.0.255	Active power L1 (abs.(QI+QIV) - (abs(QII+QIII) Inst. Sum.
1-0:41.7.0.255	Active power + L2 QI+QIV
1-0:42.7.0.255	Active power - L2 QII+QIII
1-0:55.7.0.255	Active power L2 (abs.(QI+QIV) - (abs(QII+QIII) Inst. Sum.
1-0:56.7.0.255	Active power L2 (abs.(QI+QIV) - (abs(QII+QIII) Inst. Sum.
1-0:61.7.0.255	Active power + L3 QI+QIV
1-0:62.7.0.255	Active power - L3 QII+QIII
1-0:75.7.0.255	Active power L3 (abs.(QI+QIV) - (abs(QII+QIII) Inst. Sum.
1-0:76.7.0.255	Active power L3 (abs.(QI+QIV) - (abs(QII+QIII) Inst. Sum.

Instantaneous Reactive Powers 1-0:X.7.0.255	
1-0:3.7.0.255	Reactive power + QI+QII Inst. Sum.
1-0:4.7.0.255	Reactive power - QIII+QIV Inst. Sum.
1-0:5.7.0.255	reactive power QI Inst. Sum.
1-0:6.7.0.255	reactive power QII Inst. Sum.
1-0:7.7.0.255	reactive power QIII Inst. Sum.

1-0:8.7.0.255	reactive power QIV Inst. Sum.
1-0:23.7.0.255	Reactive power+ L1 QI+QII Inst. Sum.
1-0:24.7.0.255	Reactive power- L1 QIII+QIV Inst. Sum.
1-0:25.7.0.255	Reactive power L1 QI Inst. Sum.
1-0:26.7.0.255	Reactive power L1 QII Inst. Sum.
1-0:27.7.0.255	Reactive power L1 QIII Inst. Sum.
1-0:28.7.0.255	Reactive power L1 QIV Inst. Sum.
1-0:43.7.0.255	Reactive power+ L2 QI+QII Inst. Sum.
1-0:44.7.0.255	Reactive power- L2 QIII+QIV Inst. Sum.
1-0:45.7.0.255	Reactive power L2 QI Inst. Sum.
1-0:46.7.0.255	Reactive power L2 QII Inst. Sum.
1-0:47.7.0.255	Reactive power L2 QIII Inst. Sum.
1-0:48.7.0.255	Reactive power L2 QIV Inst. Sum.
1-0:63.7.0.255	Reactive power+ L3 QI+QII Inst. Sum.
1-0:64.7.0.255	Reactive power- L3 QIII+QIV Inst. Sum.
1-0:65.7.0.255	Reactive power L3 QI Inst. Sum.
1-0:66.7.0.255	Reactive power L3 QII Inst. Sum.
1-0:67.7.0.255	Reactive power L3 QIII Inst. Sum.
1-0:68.7.0.255	Reactive power L3 QIV Inst. Sum.

Instantaneous Apparent Powers 1-0:X.7.0.255	
1-0:9.7.0.255	Apparent power + QI+QIV Inst. sum
1-0:10.7.0.255	Apparent power - QII+QIII Inst. Sum
1-0:29.7.0.255	Apparent power + L1 QI+QIV Inst. Sum
1-0:30.7.0.255	Apparent power - L1 QII+QIII Inst. sum
1-0:49.7.0.255	Apparent power + L2 QI+QIV Inst. Sum
1-0:50.7.0.255	Apparent power - L2 QII+QIII Inst. Sum
1-0:69.7.0.255	Apparent power + L3 QI+QIV Inst. Sum
1-0:70.7.0.255	Apparent power - L3 QII+QIII Inst. Sum

Average Active Powers 1-0:X.4.0.255	
1-0:1.4.0.255	Active power + QI+QIV sum. Current average
1-0:2.4.0.255	Active power - QII+QIII sum.Current average
1-0:15.4.0.255	Active power abs. L1+L2+L3 Current average

Average Reactive Powers 1-0:X.4.0.255

1-0:3.4.0.255	Reactive power + QI+QII Current average
1-0:4.4.0.255	Reactive power - QIII+QIV Current average
1-0:5.4.0.255	reactive power QI Current average
1-0:6.4.0.255	reactive power QII Current average
1-0:7.4.0.255	reactive power QIII Current average
1-0:8.4.0.255	reactive power QIV Current average

Maximum Active Powers 1-0:X.6.Y.255 (y: 0 - sum, 1…6 - tariffs)	
1-0:1.6.y.255	Active power + QI+QIV sum. Max
1-0:2.6.y.255	Active power - QII+QIII sum. Max
1-0:15.6.y.255	Active power abs. L1+L2+L3 Max

Maximum Reactive Powers 1-0:X.6.Y.255 (y: 0 - sum, 1…6 - tariffs)	
1-0:3.6.y.255	Reactive power + QI+QII Max
1-0:4.6.y.255	Reactive power - QIII+QIV Max
1-0:5.6.y.255	reactive power QI Max
1-0:6.6.y.255	reactive power QII Max
1-0:7.6.y.255	reactive power QIII Max
1-0:8.6.y.255	reactive power QIV Max

Maximum Hourly Powers TOP10 1-0:1.6.X.255	
1-0:1.6.128.255	Active power + QI+QIV Max 1
1-0:1.6.129.255	Active power + QI+QIV Max 2
1-0:1.6.130.255	Active power + QI+QIV Max 3
1-0:1.6.131.255	Active power + QI+QIV Max 4
1-0:1.6.132.255	Active power + QI+QIV Max 5
1-0:1.6.133.255	Active power + QI+QIV Max 6
1-0:1.6.134.255	Active power + QI+QIV Max 7
1-0:1.6.135.255	Active power + QI+QIV Max 8
1-0:1.6.136.255	Active power + QI+QIV Max 9
1-0:1.6.137.255	Active power + QI+QIV Max 10

Instantaneous Voltages 1-0:X.7.Y.255 (y: 0…31st harmonics)

1-0:32.7.y.255	U L1
1-0:52.7.y.255	U L2
1-0:72.7.y.255	U L3

Instantaneous Currents 1-0:X.7.Y.255 (y: 0…31st harmonics)	
1-0:11.7.128.255	highest of all phase currents
1-0:31.7.y.255	I L1
1-0:51.7.y.255	I L2
1-0:71.7.y.255	I L3
1-0:90.7.y.255	Currents sum in phases L1+L2+L3

Power Threshold		**Power Coefficients 1-0:X.7.0.255**	
1-0:1.35.0.255	Power over limit threshold	1-0:13.7.0.255	Power factor inst sum.
		1-0:33.7.0.255	Power factor L1 inst
Power Threshold Overload Counter		1-0:53.7.0.255	Power factor L2 inst
1-0:1.36.0.255	Active power over limit counter	1-0:73.7.0.255	Power factor L3 inst

Excess Power	
1-0:1.38.0.255	Excess poweer