

SENSECOM-OMN

NB-IoT communication device with optical head for meter reading

Purpose

The **SENSECOM-OMN** acquires **data from the power meter** (or other meters) by means of an optical readout head that is simply attached to the meter by a built-in magnet. It then sends the readings wirelessly over the **NB-IoT** network, normally at **hourly** intervals (depending on the settings).



Typical use:

Remote continuous or daily readings of electricity consumption and production from electricity meters at consumption points of the distribution network.

Description of equipment:

The **SENSECOM-OMN** series of devices is in the form of an optical readout head, defined by **IEC(CSN) 62056-21** standard with a communication protocol type "C". The device is designed to be easily deployable by the end user, i.e. without the need for specific knowledge or competence.

SENSECOM-OMN-E models (i.e. in preset energy mode) are designed to send 4 selected basic data related to consumption (1-2 tariffs), energy production (supply) and meter number. These data are identical to the data visible on the meter display and label. Some distribution companies require notification or approval of the placement of this device on the selected meter. Some meters may not be equipped with this interface or the communication is password protected.

The **SENSECOM-OMN** has rechargeable (LiPOL) batteries with recharging via USB-C (using common mobile phone adapter). The mode with more frequent readings and messages, e.g. 15min intervals, requires recharging at approximately 3-6 months intervals. The device can be set to power saving modes, e.g. sending several readings in aggregate, or filtering the values without change from the last status, the recharge time is then close to 12 months. For fully maintenance-free operation (no recharging), it is advisable to connect the device to power via USB-C permanently (USB-C adapter, DIN power supply with USB-C cable, etc.) and the battery serves as a backup.

Data processing and security

Data transmission can be secured by E2E encryption with an individual key for each device. The data is made available in the **SENSEPARAM** information system portal (with content decryption). From this system, the data can be sent via callback to the customer database via a secure SSL connection or downloaded to a csv file. The message transmission is secured against spoofing by the NB-IoT operator's network, or the customer can use their own APN for connection. The device with encryption fulfils comparable technical and security requirements for communication as those imposed on AMM meters (type C1-C3). The mode of sending messages and their period can be remotely configured on the device. The device sends once a day a keep-alive system message with information about the battery voltage status. Once a day, the device can be remotely reconfigured, or the FW upgraded.

Device design and use

The **SENSECOM-OMN** is manufactured as a compact device with built-in antenna, with IP20 protection. It includes a USB-C connector and a two-color indicative LED. It is delivered in sleep mode. By disconnecting the device from the charger (after previous charging), the device automatically switches on to the operational state and takes the first reading within 1-2 min. Tariffs are determined over a period of several successive readings. If the power meter is not being used or is not readable, the device should be put back to sleep by holding the reset button for 3 seconds, otherwise the battery will discharge within 2-3 weeks. The device may not be in range of the NB-IoT network signal, especially if it were placed in an all-metal enclosure that prevents radio signal passage.

Technical parameters

SENSECOM	OMN-U	OMN-E										
Readout interface	Optical head interface with serial data transmission according to IEC (CSN) 62056-21											
Communication protocol	IEC 620561-21 Protocol "C" (OBIS codes with C.D.E structure)											
Number of readout registers	Up to 13 configurable registers (OBIS codes) for readings (downlink configurable)	Up to 4 registers within range: <table border="1"> <thead> <tr> <th>Value</th> <th>OBIS</th> </tr> </thead> <tbody> <tr> <td>Positive active energy (A+) in tariff T1 [kWh] (consumption)</td> <td>1.8.1 (1.8.0, 1.8.2)</td> </tr> <tr> <td>Positive active energy (A+) in tariff T2 [kWh] (consumption)</td> <td>1.8.2 (1.8.3, 1.8.4)</td> </tr> <tr> <td>Negative active energy (A-) total [kWh] (supply)</td> <td>2.8.0 (2.8.1)</td> </tr> <tr> <td>Gauge serial number</td> <td>C.1.0 (or 0.0.0)</td> </tr> </tbody> </table> <p>The OBIS settings of the meters differ from one energy distributor to another, the device automatically detects the active ones.</p>	Value	OBIS	Positive active energy (A+) in tariff T1 [kWh] (consumption)	1.8.1 (1.8.0, 1.8.2)	Positive active energy (A+) in tariff T2 [kWh] (consumption)	1.8.2 (1.8.3, 1.8.4)	Negative active energy (A-) total [kWh] (supply)	2.8.0 (2.8.1)	Gauge serial number	C.1.0 (or 0.0.0)
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Transmission network	NB-IoT (LTE sub-band)											
Data transfer and datagram	The message is transmitted using a UDP packet within an APN (public or private), 20-1280 Bytes/packet. One packet contains a set of values from one reading, or an aggregation of readings for several hours.											
Time synchronisation	Daily correction, accuracy 10s, readings synchronized to the beginning of 15min intervals, or synchronization of reading time with meter time											
Types of messages	<ul style="list-style-type: none"> Interval (periodic) Initial with setting status Alarm - reading error, missing OBIS code, battery voltage drop, or tampering with the device Keep-Alive (24h) 											
Setting the readout interval	15min, 30min, 60min, 90min, 3h, 6h, 12h, 24h											
Setting the aggregation for transmission	Multiple of 1, 2, 4, 6, 12, 24, 48, 96											
Jam interval	10min interval between alarm messages of the same origin or until the alarm goes off, the first alarm is immediate (no delay)											
Access to data	SENSEPARAM portal (with normalized values) with the possibility of data transfer: <ul style="list-style-type: none"> Call-back (push) Email or SMS alarm notifications CSV download 											
Data encryption	E2E encryption of data content can be remotely activated, encryption use AES-256 with individual keys for each device. Decryption on the SENSEPARAM portal side											
Internet transmission security	UDP with SSL operator -> SENSEPARAM (SSL) -> customer database											
Data backup	Flash memory for re-sending data during short-term NB-IoT network outages											
Auxiliary sensors	Thermometer (processor temperature) or accelerometer (on request for deliveries >100pcs)											
Power	Built-in rechargeable battery (accumulator), occasional charging via USB-C connector, or permanent power supply via USB-C.											
Estimated battery life per charge	<ul style="list-style-type: none"> 24h period of readings and data transmission: 12-15 months 1h reading period: 6-9 months or 9-12 months with transmission aggregation and filtering out the same values 15min reading period: 3-6 months or 6-9 months with transmission aggregation and filtering out the same values <p>Unlimited option: permanent power supply via USB-C (USB-C charger, DIN power supply with USB-C), battery serves as backup power supply</p> <p>Device outside the meter or the meter does not have an active interface: the device should be set to sleep mode, otherwise the battery will run out within 2-3 weeks.</p>											
Antenna	Built-in											
Coverage	IP20											
Weight	200g											
Dimensions	45x78x36mm											

Side view:

