SENSECOM - OMD

SIGFOX communication unit for meter readings using optical data interface

Purpose

The **SENSECOM-OMD** retrieves data from metering device by optical reading head with seamless installation using just magnetic holder built-in (now screws, no wires).
Device sends meter readings via a nationwide **SIGFOX** IoT network. Sending of readings can last >10years without battery replacement with typically one reading of 4 registers a day.

The device can be configured to provide values from other meters and their registers.

SENSECOM-OMD-E option is preconfigured for electricity meters as a default to retrieve basic four parameters (consumptions – tariff 1&2, supply, S/N of meter).

Typical applications:
Remote readings from utility meters like electricity, water, gas, calorimeters, ... equipped with optical head interface based on IEC 62056-21 standard

Description:

The **SENSECOM-OMD device** is designed for data readings via optical reading head interface specified by **IEC 62056-21** standard with "C" type protocol.
The device is powered by replaceable, but no-rechargeable lithium batteries. SENSECOM-OMD sends readings via **SIGFOX** IoT network, directly or via repeater SENSECOM-WSH (for radio-hard-to-reach locations). It is designed to be easily installed by the end consumer without specific knowledge and skills.

SENSECOM-OMD-E is preconfigured for electricity meters as a default to retrieve few basic data (supply, consumption of 2 tariffs, serial number of meter) - the set is also limited due to power distribution companies' regulations).

Selected 4 reading registers for billing electricity meters:

OBIS	Value
1.8.1	Positive active energy (A+) in tariff T1 [kWh] (consumption)
1.8.2	Positive active energy (A+) in tariff T2 [kWh] (consumption)
2.8.0	Negative active energy (A-) total [kWh] (supply)
C.1.0	Meter serial number

Other medium meters or non-billing electricity meters:
Selection of registers to be read of the connected meter is configurable via downlink (except for billing electricity meters using SENSECOM-OMD-E model type). Selected registers are to be added or removed from the readings set by specifying particular OBIS codes, protocol "C". If more registers are read from the meter, then more than one message is generated at each transmission period (one register per message).

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Wireless communication

SENSECOM-OMD sends reading statuses to the IoT network SIGFOX directly or indirectly via WLAN. To ensure successful sending of messages, you can use different broadcast modes according to the availability of SIGFOX network in particular situation:

1. Seamless SIGFOX network availability
    - Small stick antenna (included)
2. Insufficient network availability in the cabinet, but available outside
    - Connection of external antenna (located outside of the cabinet) using coaxial cable up to 2m
3. Insufficient network availability in the cabinet, basement, shaft, etc., but available in diameter of ~20m from the cabinet
    - Location of the SENSECOM-WSH repeater in the area of the SIGFOX network availability and pairing it with the SENSECOM-OMD device

Message types

Types of messages transmitted from SENSECOM-OMD to Cloud:

- **Interval (periodical) reading –** A message containing readings, by default in the 24-hour interval (the interval is adjustable by 15 min within the range 15min-1440min, minimum is adjusted by number of registers by 15 min, e.g. 1h for 4 registers). If more registers are to be send per reading, than messages are send consecutively (in 10min intervals). Set of read registers can be defined by downlink (except for SENSECOM-OMD-E model) – added or removed by selecting OBIS codes.
- **Alarm Message** – A message generated when data readings fail, in case of physical manipulation (device shaking, tilt, etc.) detected by accelerometer, in case of high-humidity threshold is reached (OMDH device option).
- **Keep-Alive Message** – A periodic system message that the device broadcasts every 24 hours by default.
- **Downlink Message** – a message of 8 Byte length that the device receives from the SIGFOX backend as part of the first message sent after each Keep-Alive message. If there are Downlink data available at the backend, device receives message, changes parameters and accepts the message if the device has sufficient signal from the SIGFOX network.
- **Downlink Acknowledge Message** – System acknowledgment response of received downlink.

Data processing

Data from the device can be accessed in two ways:

- SIGFOX Backend - received readings are stored in the SIGFOX cloud for further processing
- SmartImp NDB - readings are available in the end-values form (normalized)

In both cases, the forwarding of data to a customer is possible by these means:

- Call-back
- REST-API (only SIGFOX Backend)
- Email
- SMS (only SmartImp NDB)
- Download to CSV

Device security

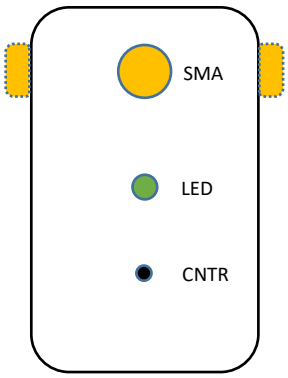
The device sends a minimum 1x a day system Keep-Alive message with the battery voltage and CPU temperature status.
Message transfer has ensured integrity by using the AES-128 algorithm (avoiding the message forgery). The device can be configured to SW encryption (option on request), message decoding is done then at customer side.

Other device parameters

Device includes button for resetting the device and also for the initial activation from a deep-sleep mode (protecting battery during storage and transport or long-term non-use). Reset function ignores permanent press of a button.
SENSECOM-OMD can be configured to power-safe mode, where only changed values are sent in periodical readings (the minimum sent data are one parameter a day, whole set once a 28 days)

SENSECOM-OMD installation schema

The device is supplied in a plastic (ABS) housing, in IP65 enclosure. The device can be simply mounted by magnetic holder with longer part pointing down to the meter possessing IEC 62056 optical head holder. Antenna is fixed to SMA connector pointing upwards, event. downwards if limited by available space in cabinet. Ability to broadcast and receive signal from SIGFOX network is a subject of local radio coverage and location of antenna. Metal cabinets, surrounding metal parts, basements etc. limits penetration of radio signal.
The device must not constraint visual readability of meter display area and meter S/N number, except for antenna stick, which actually does not constraint visibility of meter display area due to its parallax effect.



Legend:
SMA... Output to a small stick or external antenna via SMA connector (can be central, on the left side or right side of the box – see model types)
LED... Two-color indicative LED for initiating and operations
CNTR... Control microswitch (invisible from outside) used to wake-up (and reset) or turning into deep-sleep mode by sensitive pressing of cover in this area.

SF/LC... Switch between transmission to SIGFOX and local WLAN (accessible by opening the case and removing batteries)

Optional related devices

Repeater SENSECOM-WSH

SENSECOM-WSH repeater allows communication with SENSECOM-CMD within local wireless (WLAN) broadcasting with high signal penetration within ~20m diameter (up to 200m in direct visibility) and resending it to the SIGFOX network. Communication SENSECOM-OMD with SENSECOM-WSH is possible after pairing.
Longer distances (e.g. in tunnels) can be overcome by chaining of the SENSECOM-WSH repeaters in cascade.
SENSECOM-WSH is powered by battery for > 5years (for up to 4 messages a day) and has an outdoor design (IP67).

Technical parameters

Parameter	SENSECOM-OMD
Meter Reading interface	Optical head interface with serial data transmission defined by IEC 62056-21 specifications
Meter Reading communication protocol	IEC 620561-21 Protocol "C" (OBIS Codes with C.D.E structure)
Meter Reading limits	Set of read registers is limited to **max 13** registers (OBIS codes) except for billing electricity meters - default 4 registers for billing electricity meters (total supply, tariff1 and tarrif2 consumptions, meter S/N).
Meter Registers selection	Set of source device registers to be read is setup by downlink by adding or removing OBIS codes in a set (except for SENSECOM-OMD-E model)
Transmission network	SIGFOX (ISM 868MHz band)
Data payload	8Bytes / message (or 12Bytes using repeater, where 4 bytes are reserved for source communication device ID). Each message contain value of one register (OBIS code)
Message types	▪ Periodical ▪ Initial with device pre-set values status ▪ Alarm – data reading failure, manipulation with device (detected by accelerometer), humidity >95% (OMDH option) ▪ Keep-Alive (24h)
Message periodical setup	15min-24h (step 15min), default **24h** interval (minimum 15min or longer by 10min per register in multi-registers reading)
Messages interval hold-on period	**10min** between alarm message**s**, the first alarm message is instant (no hold-on), min **15min** between readings, (aprox. 10s interval for messages of first reading after reset or after downlink request)
Data access	SIGFOX back-end, data transmission options: ▪ Call-back (push) ▪ REST-API ▪ Email ▪ CSV download
Secondary sensors	Accelerometer, Temperature/Humidity (OMDH option)
Power supply - Battery	2x size A 3,6V LS17500 lithium replaceable (non-rechargeable) (>10years with 1 reading set of max 4 registers / day)
Antenna	Stick antenna for ISM bandwidth, connected via SMA-M connector at the front panel of the device
Casing	IP65
Weight	200g
Dimensions (without antenna)	45x68x40mm

Device design

The SENSECOM-OMD is in a plastic housing (ABS) with optical head with a magnetic holder. There is SMA connector for a stick antenna, which is a part of packaging. This antenna can be replaced by hat-type antenna with RG-58 cable, or by similar 868MHz antenna. Batteries and SF/LC switch are inside the box accessible by opening the case using screws.

There are 3 options of antenna SMA connector location to prevent visibility of meter display and label :

- Central **SENSECOM-OMD-(E)-(C)**
- Left **SENSECOM-OMD-(E)-L**
- Right **SENSECOM-OMD-(E)-R**

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