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.

Option **SENSECOM-OMD-E** is preconfigured for electricity meters as a default to retrieve basic four parameters (consumption in 2 tariffs, supply, meter S/N).

Typical applications:
Remote readings from utility meters like electricity, water, gas, calorimeters, ... equipped with optical head interface.

Device 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. If metering device is protected by sealed shield, then cooperation with utility distributor is needed. Some utility distributors require approval of using the optical head readers on their meters.

Model **SENSECOM-OMD-E** is preconfigured for electricity meters as a default to retrieve few basic data.

SENSECOM-OMD-E with pre-selected four reading registers for billing electricity meters (the set is also limited due to particular power distribution companies' regulations):

OBIS	Value
1.8.1 (1.8.0, 1.8.2)*	Positive active energy (A+) in tariff T1 [kWh] (consumption)
1.8.2 (1.8.3)*	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

*Preconfigured alternatives for different power distributors in SENSECOM-OMD-E model

Other utility meters or non-billing electricity meters:
Selection of registers to be read of the connected meter is configurable via downlink (except for SENSECOM-OMD-E model type, where registers are preconfigured). Selected registers are to be added or removed from the readings set by specifying particular OBIS codes, using 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).

Wireless communication options

SENSECOM-OMD sends reading statuses to the IoT network SIGFOX **directly or indirectly via WLAN**. To ensure successful reception 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 of it
   - 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 up to ~20m from the cabinet
   - Location of the SENSECOM-WSH repeater in the area of the SIGFOX network availability

Data processing

Measured values are typically available for processing within 7 seconds (max 15s) in the SIGFOX cloud. Data can be obtained using a call-back mechanism (push method), REST-API, or download to a CSV file (manually) from SIGFOX Back-end. Alternatively, data can be accessible via SENSEPARAM portal with already normalized data. Callback, download to CSV file, alarm notifications by Email or SMS can be configured there, too.

Device security

The device is able to indicate tampering due to the built-in accelerometer. In case of violation, it sends immediately the alarm message.

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The device also sends 1x / day system Keep-Alive message with information about battery voltage and processor temperature. Missing Keep-Alive detects device disconnection or failure. There is also optional a temperature and humidity sensor inside the device which can indicate environmental change inner the device if the sensors are enabled (OMDH model).

Message transmission has assured integrity through the AES-128 algorithm (message spoofing avoidance).

Message types

Types of transmitted messages from the device to the cloud:

- **Interval (periodical) reading messages –** messages containing readings, by default in the 24-hour interval. Messages are sent consecutively in 10min intervals with each register from readout.
- **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** – 24h system periodical message sent by the device.
- **Downlink acknowledge message** - System response to received downlink.
- **Configuration message** - comes after successful receipt and processing of downlink.
- **Downlink message** - message received by the device from SIGFOX back-end as a part of sending the first message after each Keep-Alive message. It is used for eventual adjustment of the device.

Remote setup and FW upgrade

Period of value messages, inner sensors sensitivity or their de/activation can be set remotely once a day (via downlink). In places with poor coverage of the SIGFOX network, the device may not be able to receive a downlink message even though the uplink message has been received regularly by the network. Remote FW upgrade is not possible.

Other device options

Device includes button for the initial activation from a deep-sleep mode (protecting battery during storage and transport or long-term non-use), resetting and switching back to deep-sleep.
SENSECOM-OMD can be configured to power-safe mode, where only changed values are sent in periodical readings.

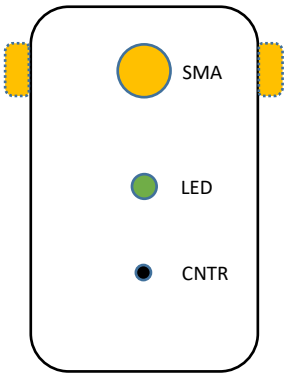
Device casing:

The device is supplied in a plastic housing, in IP52 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.
There are 3 options with antenna placement to ensure visual readability of display area and meter S/N number of the particular meter.

Device design description

There are 3 design models with different antennas placement:

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



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 (1mm) in this area.

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

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Technical parameters

Parameter	SENSECOM-OMD	SENSECOM-OMD-E
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)	Default set of **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	Default set of 4 registers, **no selection possible**
Transmission network	SIGFOX (ISM 868MHz band)	
Connectable to repeater	SENSECOM-WSH, SENSECOM-WSHD	
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, e.g. 1h for 4 registers)	
Messages interval hold-on period	**10min** between alarm messages, 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, type: LS17500 lithium replaceable (non-rechargeable)	
Battery endurance	Aprox. 10years with 1 reading set of max 4 registers a day	
Antenna	Stick antenna for ISM bandwidth, connected via SMA-M connector at the front panel of the device	
Casing	IP52	
Weight	200g	
Dimensions	45x68x40mm (without antenna)	

Optional related devices

Repeater SENSECOM-WSH, SENSECOM-WSHD

SENSECOM-WSH repeater allows communication with SENSECOM-OMD(-E) 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.
SENSECOM-WSH is powered by battery for > 10years (for up to 4 messages a day) and has an outdoor design (IP65, with silicon up to IP67).
SENSECOM-WSHD is an option in bigger case, uses larger battery for doubling the time of use.

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