

SENSECOM - IMD

Communication unit for pulse readings

SENSECOM-IMD, IMDS, IMDB, IMDSB (with FW 2.0, 2.1)

Purpose

The **SENSECOM-IMD device** is designed for pulse readings of 1-2 channels (S0 and voltage-free/dry contact) with high/low tariffs resolution in S0 readings if applied. The device sends readings via a nationwide **SIGFOX** IoT network, directly or via repeater **SENSECOM-WSH** (for radio-hard-to-reach locations). Power outage limited functioning is ensured by the supercap. SENSECOM-IMD is manufactured in a DIN rail casing, 3U width, IP20.

SENSECOM-IMDS also includes an electronic seal input.

SENSECOM-IMDB subtype contains supercap with higher capacity (5F for 24h back-up).

Typical applications: remote readings from billing or secondary meters with high accuracy, e.g. electricity meters (contains galvanically separated S0 input for them), gas meters, water meters, calorimeters (voltage-free/dry contact), or other sensors with pulse output 30ms-120ms pulse duration and minimal 30ms delay between pulses.



Description:

Pulse input with tariffs resolution

SENSECOM-IMD has the following inputs:

1. **S0** – Pulse input from S0 (electricity meters) with galvanic isolation by optron (breakdown voltage resistance min. 4, 5kV) and with separate power supply for optron.
2. **CNT** – Pulse input from a voltage-free contact input (gas-meters, water meters). No voltage signal can be put into this input, open-collector input is also acceptable (correct polarity is required)
3. **HDO** – Input High/Low tariff from the tariff switching receiver (in the mode of switching open - grounding to neutral conductor).
4. **EP** – Electronic seal input (**SENSECOM-IMDS**).

A sealing wire with a length of 0.1-1m can be connected to the electronical seal (constantan wire with an insulation, 0.2-0.7mm in diameter) directly or indirectly via an extension cable (max 1m).

Wireless communication

SENSECOM-IMD 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:

1. Seamless network Availability
 - Small stick antenna (included)
2. Insufficient network availability in the switchboard, but available outside of the switchboard
 - Connection of external antenna (located outside of the switchboard) using coaxial cable
 - Casing the device to a separate plastic cover outside the electricity switchboard
3. Insufficient network availability in the switchboard, basement, shaft, etc., but available in diameter of max 20m from the switchboard
 - Location of the SENSECOM-WSH repeater in the area of the SIGFOX network availability and pairing it with the device

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 (SENSEPARAM.COM portal) - readings are available in the target 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 (or SMS)
- Download do CSV

Device data security

The device sends a minimum 1x/day system Keep-Alive message with the battery voltage and CPU temperature status. The device and meter can be secured by an electronic seal, which is part of the **SENSECOM-IMDS** device option. Message transfer has ensured integrity by using the AES-128 algorithm (avoiding the message forgery). The device FW can be reconfigured to SW encryption of payload messages using the algorithm AES-128CTR. Message decoding is done then at customers side.

Other device parameters

The consumption of the device is < 0.5 VA (the device can be powered even from a non-measured side of meter if approved by Electrical Energy Distributor).

The power is backed up by a supercap – to send a message about the loss of power from mains and to provide power for counting of pulses from the voltage-free contact for minimum 2hr with SENSECOM-IMD or extended 24 hours with SENSECOM-IMDB (an outage status message is sent including counters status)

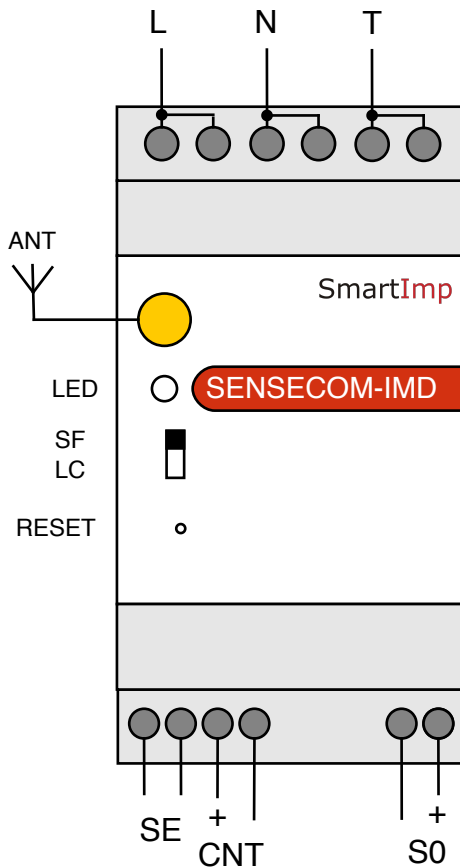
Message types

Types of messages transmitted from SENSECOM-IMD to Cloud:

- **Interval reading** – An interval message containing readings from pulse inputs, by default in the 12-hour interval (the interval is adjustable for 10 min in the range 10min-1440min).
- **Volumetric Reading** – The reading status message sent when a preset volume of pulses is reached, calculated from the previous reading status message. The set of adjustable pulse volumes is 1, 2, 5, 10, 20, 50, 100, 200, 500, 1k, 2k, 5k, 10k, 20k. By default, sending messages of this type is off.
- **Alarm Message** – A message generated when the threshold values for normal consumption are exceeded in the measured period, i.e. indicating extreme consumption (crash, media leak). Sending these alarm messages is turned off in regular mode. The set of adjustable volumes for generating alarms is the same as the volume readings listed above. The measured interval for evaluating the alarm message is adjustable 10s-85s. In addition, the device is able to send alarms (if enabled) for power failure/recovery from the network (lasting min. 30s), for change of tariff, for violation of electronic seals (SENSECOM-IMDS).
- **Keep-Alive Message** – A periodic system message that the device broadcasts every 24 hours by default.
- **Downlink Acknowledge Message** – System response to the received downlink.
- **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 on the backend, device receives message, reset parameters and accepts the message if the device has sufficient signal for receiving messages from the SIGFOX network.

SENSECOM-IMD wiring scheme

The device is supplied in a DIN-type plastic housing, **3U wide**, in IP20 enclosure, which is designed to be place on a DIN rail. The device can be mount the way allowing to access front panel after closing and sealing the switchboard without interfering measurements and meters.



The legend:

L... Phase input (220-240V)

N... Neutral input

HDO... Tariff signal input (open/close to the neutral conductor)

S0... S0 pulse input (for power meter)

CNT... Voltage-free/dry contact pulsed input (for water meter, gas meter, etc.), open-collector connection possible (polarity is required)

EP... Electronic seal wire input (SENSECOM-IMDS option)

ANT... Output to a small stick or external antenna via SMA connector

LED... Two-color indicative LED for initiating and operations

SF/LC... Switch between transmission to SIGFOX and to the local WLAN

RESET... Device reset (without resetting counters, permanent push is ignored)

Optional related devices

Repeater SENSECOM-WSH

SENSECOM-WSH repeater allows communication with SENSECOM-IMD 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-IMD with SENSECOM-WSH is possible after pairing. Longer distances (e.g. in tunnels) can be overcome by chain 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-IMD	IMDS	IMDB	IMDSB
Main reading parameters	Primary S0 pulse Input Secondary CNT pulse input (voltage-free/dry contact, eventually open collector connection)			
Readings inaccuracy	<1% pulses			
Transmission network	SIGFOX (ISM 868MHz bandwidth)			
Message types	<ul style="list-style-type: none"> ▪ Periodical or Volume-based with counters status, optionally with S0 consumption peak status ▪ Initial with device pre-set values ▪ Alarm – media leakage (excessive consumption), manipulation with sealing, change of power state, change of tariff (configurable activation and configurations of alarms) ▪ Keep-Alive (24h) 			
Message period setup	10min-1440min in 10min intervals, 24h (default), 0-off			
Leakage/peak monitoring interval	10-85s in 5s intervals			
Pre-set counter volume for volume or leakage type of messages	1,2,5,10,20,50,100,200,500,1k,2k,5k,10k,20k,50k, 0-off (default),			
Messages interval hold-on period	10min between messages, the first alarm message is instant (no hold-on)			
Data access	SIGFOX back-end (12 Bytes payload messages) or SmartImp NDB (SENSEPARAM.COM portal) (with data normalization), data transmission options: <ul style="list-style-type: none"> ▪ Call-back (push) ▪ REST-API (only SIGFOX B/E) ▪ Email ▪ CSV download 			
Secondary sensors – Accelerometer	Yes			
Secondary sensors - Electronical seal detector	No	Yes	No	Yes
Antenna	Stick antenna for ISM bandwidth, connected via SMA-M connector at the front panel of the device			
Expected backup power life during power failure	2h		24h	
Inputs and power connection	Screw terminals			
Casing	IP20			
Weight	120g			
Dimensions	3U (for DIN rail), 90x53x50mm			

Device design and installation

The SENSECOM-IMD is in a DIN rail housing of 3U width, IP20, with a stick antenna attached to the SMA connector on the front panel.

Installation of the device can be performed only by authorized electrician and according to the working instructions specified in the written manual. Connection to billing meters is subject to particular distributor conditions and restrictions. No warranty or remedy is provided if installation does not comply with these conditions and local regulations.

