

# SENSECOM- IMN

## Communication device for impulse readings

SENSECOM-IMN

## Purpose

The **SENSECOM-IMN** device is designed for pulse readings of 1-2 channels (S0 and voltage-free contact) with 2-tariffs resolution on S0 and for sending readings via the **NB-IOT** IoT network. Sending the power failure message and providing the voltage-free input counter function during power failure is provided by the supercapacitor. The device is manufactured in a DIN rail (3U) version.

**Typical use:** remote readings from billing and secondary meters with high accuracy, e.g. from electricity meters (via galvanically separated S0 input), gas meters, water meters, calorimeters (via switched voltage-free contact or in open collector connection), or other probes with pulse output 30ms-120ms (pulse length) with minimum 30ms delay.



## Description of equipment:

### Pulse inputs and tariff resolution

**SENSECOM-IMN** has the following inputs:

- **S0** - pulse input from S0 (power meters) with galvanic isolation by optocoupler and with separate optocoupler power supply (in connection with resistance min. 4,5kV)
- **CNT** - pulse input from potential-free contact input (gas meters, water meters). Any voltage signal cannot be applied to this input other than in an open-collector connection.
- **HDO** – 2-tariffs input from tariffs controller (in switched to grounding mode).

### Wireless communication

**SENSECOM-IMN** sends the readings to the **NB-IOT** IoT network. To ensure successful sending of messages, variations of sending methods can be used according to the type of NB-IOT network availability:

- Seamless network availability
  - small rod antenna (included with the device)
- Lack of network availability inside the cabinet, but available outside the cabinet
  - connection of external antenna (located outside the switchboard) via coaxial cable

- connection of the equipment to a separate plastic switchboard outside the meter cabinet

### Data processing

Data from the readout unit can be accessed in two ways:

- In own system by routing IP packets from NB-IOT network with public or private APN (can be set remotely on SENSEPARAM)
- SENSEPARAM(.com) portal - values are made available in processed form.

Data transmission to the customer is possible in SENSEPARAM in the following ways:

- Call-back to customer database
- Email/SMS notifications (alarms, status changes)
- Download to CSV file

### Device security

The device sends a Keep-Alive message at least once/day with the battery voltage and CPU temperature status.

Some models are equipped with an accelerometer to detect manipulation.

The device can be configured to E2E SW encryption of the payload message content using the **AES-256** algorithm with individual keys for each device. Message decoding is performed in the SENSEPARAM portal.

The data sent by the callback from SENSEPARAM to the customer database is sent over a secure SSL connection

Data is forwarded from the mobile operator's network using UDP packets over a public or private APN.

## Other device parameters

- The average consumption of the device is <0.5VA.
- Power is backed up by a supercap
  - Ensuring that the device power loss (and pulse status) message is sent
  - Providing power supply for reading pulses from a voltage-free contact for 12-24 hours.

## Types of messages

Types of transmitted messages:

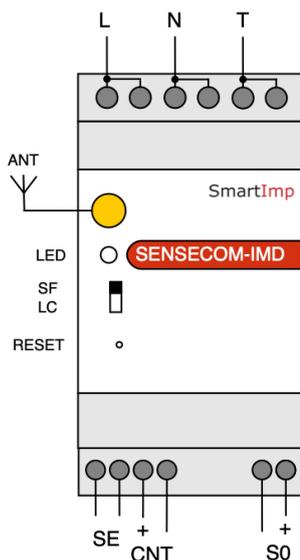
- **Interval reading** - interval value message containing readings from pulse inputs, normally in 24-hour intervals (the interval is adjustable in 10-min intervals from 10min-1440min).
- **Volume Readout** - A readout status message sent when a preset volume of pulses counted from the

previous readout status message is reached. By default, sending this type of message is disabled. The range of configurable pulse volumes is 1, 2, 5, 10, 20, 50, 100, 200, 500, 1k, 2k, 5k, 10k, 20k.

- **Alarm message** - a message generated when the normal consumption thresholds are exceeded in a measured period adjustable in the range of 10-85s, i.e. signalling extreme consumption (accident, media leak). By default, the sending of these alarm messages is disabled. The device is also capable of sending alarms (if enabled) such as mains power failure/restoration, tariff change, tampering (models with accelerometer).
- **Keep-Alive message** - a periodic system message that the device sends by default every 24 hours if it is energized.
- **Downlink message** - a message received by the device from SENSEPARAM as part of the process of sending a Keep-Alive message, if downlink data is available on SENSEPARAM (or the customer back-end) at that time. This message is used to reconfigure the device mode and send messages if the device has sufficient signal to receive messages from the NB-IOT network.

## Connecting the SENSECOM-IMN device

The device is supplied in a plastic **DIN-type** housing, **3U wide** with IP20 protection, which is mounted on a DIN rail. The front panel can be accessed even after sealing the cabinet:



### Legend:

L ... phase supply 220-240V

N ... zero conductor

HDO ... tariffs signalization from the tariffs controller (by connecting to the zero conductor)

S0 ... pulse input S0 (with built-in galvanic isolation for electric meter), powered by built-in power supply

CNT ... pulse input from voltage-free contact (for water meter, gas meter or similar)

+ ... positive side of power supply in open collector input connection

SE ... N/A (not connected)

ANT ... output to small rod or external antenna via SMA connector

LED ... two-colour indicative LED for initiation and operation

SF/LC ... switch (not connected)

RESET ... device reset (does not reset the readings, permanent press is ignored)

### Warning:

The installation must only be carried out by a person authorised to work on the low-voltage network. The connection of the S0 input to the billing meters is carried out by an authorised person of the electricity distributor after the installation is completed.

### Remark:

The device has a built-in galvanic isolation of the 4.5kV S0 input by means of an optocoupler (with built-in power supply), so e.g. distributor CEZ Distribuce does not require the installation of a separate isolation component and its power supply for this device.

## Technical parameters

| Parameter                                | SENSECOM-IMN   |
|--|--|
| Main reading inputs                      | Primary - <b>S0 pulse input</b> (with galvanic isolation by optocoupler, resistance min 4,5kV, built-in optocoupler power supply)<br>Secondary - <b>CNT pulse input</b> (voltage-free contact input, possibly in open-collector connection)  |
| Accuracy of readings                     | >99% of pulses   |
| Network for data transmission            | <b>NB-IoT</b>  |
| Types of messages                        | <ul style="list-style-type: none"> <li>▪ Normal interval or volume with values</li> <li>▪ Initial with values</li> <li>▪ Alarm - excessive consumption/media leakage, seal tampering, change of power supply status, change of tariff (adjustable alarm activation)</li> <li>▪ Keep-Alive (24h) with downlink requirement</li> </ul>   |
| Interval sending of messages with values | 10-1440min(24h) in 10min increments  |
| Pulse volumes for volume messages        | 1,2,5,10,20,50,100,200,500,1k,2k,5k,10k,20k, <b>0-off</b> (default),   |
| Hold between sending messages            | <b>10min</b> , the first alarm message of a given type is without jamming  |
| Mode                                     | <ul style="list-style-type: none"> <li>▪ Standard</li> <li>▪ Operational (OMM) - allows monitoring of consumption peaks at short intervals (10-85s) on the S0 input</li> </ul>   |
| Access to data                           | SENSEPARAM portal with data incorporation: <ul style="list-style-type: none"> <li>▪ Callback (push) for sending processed data to the customer system via a secure SSL connection</li> <li>▪ Email / SMS notifications (alarms, status changes)</li> <li>▪ CSV download</li> </ul> or in its own system with IP packet processing directly from the NB-IOT network (via public or private APN) |
| Data encryption                          | Possible <b>E2E</b> encryption using <b>AES-256</b> with individual keys for each device. Decryption on the SENSEPARAM portal side or in the customer database (with delivery >100pcs of devices).   |
| Manipulation detection (Accelerometer)   | Selected models  |
| Antenna                                  | Bar antenna, connected via a connector (SMA-M) on the front panel of the device  |
| Estimated mains power failure endurance  | 24h  |
| Input and power connections              | Screw clamps   |
| Coverage                                 | IP20   |
| Weight                                   | 120g   |
| Dimensions                               | 3U (DIN rail mounted), 90x53x50mm  |

## Device design

The SENSECOM-IMN is housed in an IP20-rated enclosure in a 3U DIN rail design with a rod antenna attached to an SMA connector on the front panel.

