SENSECOM- IMT

Communication device for impulse readings

Battery design with 2 pulse inputs (without galvanic isolation)

Purpose

The SENSECOM-IMT device is designed for pulse readings of 1-2 channels (CNT0, CNT1) with input for flow direction resolution for CNT0 channel. The device includes an additional separate digital input. The **SENSECOM-IMT** sends the readings via a **SIGFOX-type** wide area IoT network, either directly or via a **SENSECOM-WSH** repeater (in radio-hard to reach locations).
The SENSECOM-IMT is battery powered and with one day of messaging has a battery life of about 10 years without battery replacement. It is manufactured in an IP67-rated housing.

Typical applications: remote readings from billing and secondary meters with high accuracy, e.g. water meters, gas meters, or other probes with pulse output. In addition, the device can be connected, for example, to a float for detection of manhole flooding.

Description of equipment:

Pulse inputs and tariff resolution

SENSECOM-IMT has the following inputs:

- **CNT0, CNT1** - two separate pulse inputs from the voltage-free contact input (gas meters, water meters) *.
- **DIR** - input for determining the direction of flow on CNT0* (independent direction counters)
- **DI** - digital voltage-free input*

*Alternatively, it is possible to connect an output with an open collector with a maximum voltage in the switched state of 0.5V at a current up to 0.5mA, in this case it is necessary to observe the polarity (+ input, - ground).

Wireless communication

SENSECOM-IMT sends the readings to the SIGFOX IoT network directly or indirectly via WLAN. Multiple transmission methods can be used to ensure successful messaging depending on the type of SIGFOX network availability:

- Dipole antenna with 1m cable (included in the equipment delivery) - for sticking to non-metallic surface
- Hat antenna with 3m cable (can be ordered) - for attachment to metal surface (e.g. switchboard plate)
- Wireless communication unit of the SENSECOM-WSH repeater type (can be ordered) in the availability of the SIGFOX network and its pairing with the SENSECOM-IMT device at up to 20m

Data processing

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

- SIGFOX Back-end - received readings are stored in the SIGFOX cloud for further processing
- SmartImp SENSEPARAM portal - values are made available in processed form.

In both cases, data transmission to the customer is possible in the following ways:

- Call-back
- REST-API (SIGFOX Back-end only)
- Notification Email / SMS (SMS only SENSEPARAM)
- Download to CSV

Device security

The device sends a Keep-Alive message at least once/day with the battery voltage and CPU temperature status.
The message transmission is integrity assured using the AES-128 algorithm (message spoofing prevention). The device can be configured for SW encryption of transmitted data using the AES-128 CTR algorithm.

In this case, message decoding is performed in the SENSEPARAM portal.

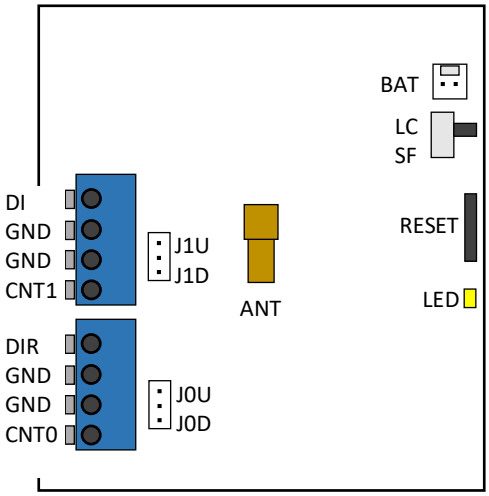
Types of messages

Types of messages transmitted to (from) the cloud:

- **Interval reading** - interval 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 message is reached. The range of configurable pulse volumes is 1-20.000.
- **Alarm message** - a message generated when the threshold values of the normal consumption pulses are exceeded in a measured period of 10s (adjustable 10-85s), i.e. signaling extreme consumption (crash, media leak) if it is switched on. The device is also capable of sending alarms such as: change of flow direction in CNT0, change on digital input.
- **Keep-Alive message** - a periodic system message that the device sends by default every 24 hours if it is powered.
- **Downlink Acknowledge message** - system response to a received downlink.
- **Downlink message** - an 8B message received by the device from the SIGFOX back-end as part of the process of sending the first message following each Keep-Alive message, if downlink data is available on the back-end at that time. It is used to reconfigure the device.

Connecting the SENSECOM-IMT device

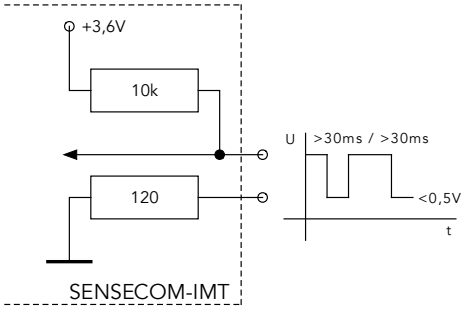
Legend:
CNT0, CNT1... pulse inputs from a voltage-free contact* (from water meter, gas meter, etc.), min. pulse length 30ms and min. delay between pulses 30ms
DIR ... input for media flow direction for CNT0 * (by voltage-free contact, i.e. by switching DIR to GND)
DI ... digital input from a voltage-free contact* (e.g. from a float)
GND ... ground
ANT ... output to external antenna via SMA connector
LED ... two-colour indicative LED for initiation and operation
SF/LC ... switch between transmitting to SIGFOX and to local WLAN (including pairing with repeater)
RESET ... reed switch for resetting the device with an attached magnet (does not reset the readings, permanent attachment is ignored)
BAT ... battery inlet connector (has a lock for polarity and attachment)



Jxx ... jumpers (jumpers) for distinguishing the edge of the signal with which the pulse is loaded on the given CNT input, JxU for the rising edge and JxD for the falling edge (default jumper wiring). The appropriate choice between JxU and JxD is important for pulse sources that do not automatically have a limited pulse duration, thus limiting excess battery power consumption during a long pulse. The jumper must always be in at least one position, otherwise the pulses cannot be read.

When connecting multiple inputs (CNT0, CNT1, DIR, DI), it is necessary to maintain a common ground (GND) if the connected devices on the inputs also share a common ground on their side.

*Alternatively, it is possible to connect an **open-collector** output with a maximum on-state voltage of 0.5V at a current up to 0.5mA, but the polarity of the connected wires must be observed: + to the input and - to GND. For this type of connection, it is necessary to check the documentation of the manufacturer of the device providing the pulses. For possible higher voltages in the switched state, functionality cannot be guaranteed.



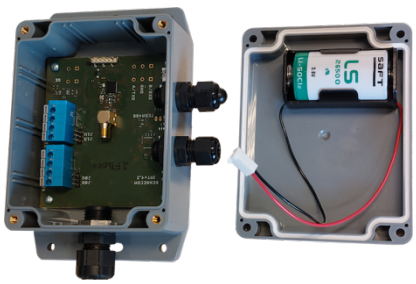
Technical parameters

Parameter	SENSECOM-IMT
Main impulse inputs	Primary - **CNT0 pulse input** (voltage-free contact input*), 2 pulse counters according to the signal at DIR input Secondary - **CNT1 pulse input** (voltage-free contact input*).
Nature of the impulse	Min. pulse length 30ms and minimum delay between pulses 30ms. It is possible to select the pulse edge type for counting by jumper selection (to limit power consumption for pulses of unlimited length)
Digital inputs	**DIR input** - input for differentiation of flow direction, tariff, etc. (voltage-free contact input*) on CNT0 pulse input from which it divides pulses into 2 counters **DI input** - digital input (voltage-free contact input*), e.g. for signaling from a float sensor about shaft flooding
Accuracy of readings	> 99% of pulses
Network for data transmission	SIGFOX (ISM band 868MHz)
Types of messages	▪ Normal interval or volume with read pulse values ▪ Initialization with configuration values ▪ Alarm - excessive consumption/media leakage, seal tampering, change of power supply status, change of tariff (adjustable alarm activation) ▪ Keep-Alive (24h) system message
Interval sending of messages with values	10-1440min (**default 1440min=24h**), adjustable in 10min increments
Pulse volumes for volume messages	1,2,5,10,20,50,100,200,500,1k,2k,5k,10k,20k, **0-off** (default),
Hold between sending messages	**10min**, the first alarm message of a given type is without jamming
Fashion	▪ Standard ▪ Operational (OMM) - identification of CNT0 consumption peaks in short intervals (10-85s)
Access to data	SIGFOX back-end (12 Bytes message payload) or SENSEPARAM portal and middleware (with data normalization), data transfer variants: ▪ Call-back (push) ▪ REST-API (SIGFOX only) ▪ Email / SMS (SMS only SENSEPARAM) ▪ CSV download
Manipulation detection	No (can be added for batches from 100 pcs upwards)
Antenna	External ISM antenna, connected via connector (SMA-M), dipole antenna with 1m cable included
Connecting inputs	Spring self-locking clamps
Power	Lithium non-rechargeable battery **3.6 V**, type LS 26500 7,7Ah size "C", connecting to the connector on the board starts the power supply of the device
Coverage	IP67
Weight	150g
Dimensions	115x90x55mm (without grommets and handles)
Optional accessories	Repeater SENSECOM-WSH for difficult to reach locations (up to 20m)

* Alternatively, it is possible to connect an **open-collector** output with a maximum voltage in the switched state of 0.5V at a current up to 0.5mA, in this connection it is necessary to observe the polarity + CNT and - GND.

Device design

The SENSECOM-IMT is supplied in an IP67 ABS housing with 1-2 M12 pins for pulse input and 1 M16 pin for external antenna (SMA connector can be threaded through). A dipole ISM antenna (with self-adhesive tape) with 1m coaxial cable terminated with SMA connector is included as standard.



SENSECOM-IMT2

Dipole antenna with SMA

SENSECOM model	Number of signal pins
IMT1	1
IMT2	2