

SENSECOM- SE

Communication equipment for monitoring electronic seals

SENSECOM-SE4, -SE8, -SEN4, -SEN8

Purpose



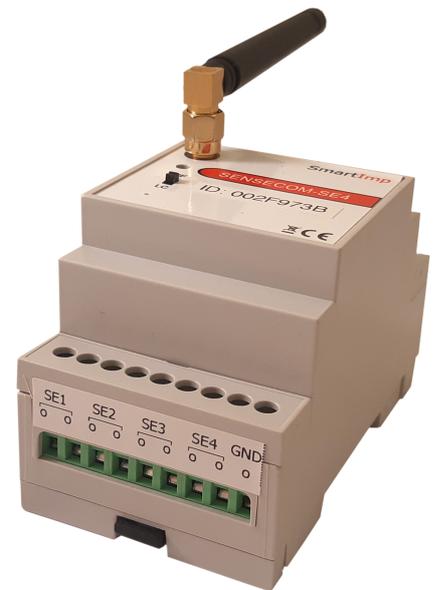
The **SENSECOM-SE** device is designed for monitoring 4 or 8 electronic seals with sending statuses and alarms via a **SIGFOX** or **NB-LoT** nation-wide IoT network. The electronic seal is represented by a sealing wire connected to the respective input terminals of the device.

SENSECOM-SE is also able to communicate indirectly via the SENSECOM-WSH, -WNH repeater in places that are hard-to-reach by radio.

The device is powered by a lithium battery located inside the device, it is manufactured in a DIN rail version, 3U width, with IP20 protection.

Typical use:

monitoring of the sealed area of electricity meters or other billing meters.



Description of the device

SENSECOM-SE device

The **SENSECOM-SE** detects the status of the connected seals. Each seal input (seal loop) is calibrated after initial connection to the spring clamps and resetting of the device. The device actively monitors the status of the seal since calibration. When it is broken (interrupted, shortened, extended), it sends an alarm message and in each subsequent message its alarm status remains unchanged. In order to use a given input for another seal, a recalibration must be performed, which is only possible on the basis of a remote authorization from the server. Each input is independent, a seal can be connected to another input at any time and recalibrated if it has not been calibrated (or has been recalibrated). The device is low power, battery powered, expected battery life is min. 5 years (at 2 messages/day, measuring at 1min intervals).

Design of the **SENSECOM-SE** device according to the number of connectable seals and the type of the full IoT network:

Number of attachable seals	SIGFOX	NB-LoT
4 seals	SE4	SEN4
8 seals	SE8	SEN8

Seals

The electronic seals are in the form of a constantan wire with a cross section of 0.2-0.5mm² in Teflon insulation (type TFCI-010, packing 30m per coil). The sealing wire with a length of 0.2-1.2m is connected directly to the spring clamps of the SENSECOM-SE, or indirectly via a double extension line up to 1m long.

Wireless communication

SENSECOM-SE sends alarms and seal statuses to the **SIGFOX** or **NB-LoT** IoT network

The device has a standard small rod antenna connected via **SMA** connector. In case of poor radio signal availability, alternatives can be chosen:

- Hat antenna (for metal base)
- Dipole antenna (to non-metallic surface)
- Rod antenna (to any surface)
- Repeater **SENSECOM-WSH, WNH** (for forwarding messages to SIGFOX network, up to approx. 20m from SENSECOM-SE)

Data processing

Data can be transmitted to the customer in the following ways:

Method of accessing and transmitting data from the IoT network	SENSEPARAM portal (processed data)	SIGFOX cloud	APN NB-LoT
IoT networks	SIGFOX, NB-LoT	SIGFOX	NB-LoT
Portal	YES, reports, tables, charts,...	Datagrams (hex format)	NO, (see SENSEPARAM)
Call-back	YES	YES, datagrams	NO

REST-API	NO	YES, datagrams	NO
IP communication	NO	NO	UDP
Email notifications	YES	YES, only selected events	NO
SMS notifications	YES	NO	NO
CSV Download	YES	YES	NO

Device security

The device has several types and levels of security:

Tamper - signaling when the device cover is opened

Accelerometer - signaling of manipulation (when the device is shaken and tilted)

Alarm counter - the device increments the counter with each detected alarm

Keep-alive - The device sends a Keep-Alive message at least once/day with the battery voltage and CPU temperature status. If no message is received within 24 hours, a loss of communication can be signaled

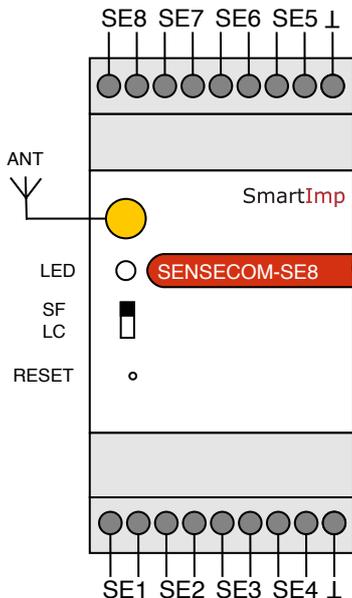
Message Integrity - The integrity of the message transmission is ensured by the AES-128 algorithm (message forgery prevention).

Message encryption - can be applied to a request to encrypt the contents of a payload message using the AES-128CTR algorithm. Message decryption is performed in the Senseparam portal or by the customer up to their database.

IP communication - communication in the SIGFOX wireless network is not IP, unlike NB-IoT. The device on NB-IoT is not fully open to the IP world, after sending a packet it receives only one packet from the same IP address as the destination of the packet sent. It then immediately returns to low-power mode (sleep). Thus, it cannot be crippled by a DoS attack. SENSEPARAM portal protection - The portal has protection against DoS attacks using IP anycast and scrubbing.

Data transfer from SIGFOX cloud or NB-IoT is in SSL mode.

Installation scheme



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

Legend:

SE1-8 ... single wire feed of the electronic seal (SE1-4 for SENSECOM-SE4)

⊥ ... under

ANT ... SMA connector for antenna connection

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

SF/LC ... switch between transmitting to SIGFOX and local WLAN (inactive for NB-IoT models)

RESET ... reset the device (permanent press is ignored), resetting:

- activates the device and device remains active as long as at least one seal is calibrated (otherwise it goes back to deep sleep)
- performs calibration of newly connected seals (on uncalibrated or uncalibrated inputs), or recalibration if remotely enabled

Optional related equipment

Transmission unit SENSECOM-WSH, WSHD, WNH

It is a repeater type device that allows communication with SENSECOM-SE within local wireless WLAN transmission over about 20m with high signal penetration (up to 200m in direct visibility) and sending it to SIGFOX or NB-IoT network.



Technical parameters

SENSECOM	SE4	SE8	SEN4	SEN8
Number of connectable electronic seals	4	8	4	8
Electronic seal	Teflon-insulated constantan wire 0.25mm diameter (type TFCI-010)			
Loop length of electronic seal	20-120cm			
Detection of seal breakage	breakage, shortening or lengthening > 5% of the filling length over 25cm, >15% up to 25cm length			
Extension of seals	up to 100cm (using a double line, cross-section min. 0,75mm ² , need to crimp to the wire of the seal with a crimp larger than the holes for the seals), the length of the seal loop can then be max 110cm			
Connection of electric seals	spring self-locking clamps			
Network for data transmission	SIGFOX		NB-IoT	
Types of messages	<ul style="list-style-type: none"> ▪ Routine periodic with current status of seals ▪ Initialization with configuration ▪ Alarm - in case of seal breakage or tampering with the device ▪ Keep-Alive (24h) - system message 			
Remote configuration	Configuration possible once a day or after reset. Configuration: enable seal recalibration, normal message period (10-1440min), seal measurement interval (10-160s), accelerometer sensitivity			
Hold between sending messages	10min , the first alarm message of a given type and channel is without delay			
Firmware	v2.4			
Variants of data access	SIGFOX back-end (raw data) or SENSEPARAM portal (processed data): <ul style="list-style-type: none"> ▪ Call-back (push) ▪ REST-API (SIGFOX only) ▪ Email / SMS (SENSEPARAM only) ▪ CSV download 		SENSEPARAM portal (processed data): <ul style="list-style-type: none"> ▪ Call-back (push) ▪ REST-API (SIGFOX only) ▪ Email / SMS (SENSEPARAM only) ▪ CSV download NB-IoT APN: UDP packets	
Manipulation detection	Tamper - opening the device cover Accelerometer - tilt, shake of the device			
Antenna	Bar antenna for ISM band, connected via SMA connector on the front panel of the device			
Power and endurance	Lithium non-rechargeable industrial battery SAFT LS 26500 7,7Ah, size "C". Battery life >5 years with 1-day status messages			
Coverage	IP20			
Weight	120g			
Dimensions	3U (DIN rail mounted), 90x53x50mm			

