

SENSO8 Water Leak Probe Sensor API Document

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The API document describes the format of downlink and uplink JSON data for the following models:

- SEN20310-0000
- SEN21310-0000
- SEN21310-W2xx



Payload templates use unquoted placeholder names to describe field values. Replace each placeholder with a value of the type specified in the field table before sending JSON.

1. Uplink Data

1.1. Data Reporting

1.1.1. MQTT Topic Format

SENSO8/nbiot/data/<IMEI>

1.1.2. MQTT Message Payload Format

```
{
  "ver":protocol_version,
  "msg":msg_seq_no,
  "time":epoch_time,
  "sn":sensor_imei,
  "type":sensor_type,
  "leak":water_leak_alert,
  "analog":analog_reading,
  "pct":wet_pct,
  "bat":battery,
```

```

"RAT":radio_type,
"rssi":radio_rssi,
"rsrp":radio_rsrp,
"rsrq": radio_rsrq,
"sinr":radio_sinr,
"ci":radio_ci,
"tac": radio_tac,
"low_batt":low_batt,
"batt_pow":batt_pow,
"event":event_type,
"debug":debug_info
}

```

Field	Description
protocol_version	Protocol version (int)
msg_seq_no	Message sequence number (uint32)
epoch_time	Unix epoch time in ms
sensor_imei	IMEI of the sensor (string)
sensor_type^a, f^	Sensor type - 12
water_leak_alert	0 – no leakage 1 – leakage detected 2 – cable broken (on probe/water rope supports break detection only)
analog_reading	Analog reading on water rope (0-300) (higher reading => lower resistance)
wet_pct ^g	Wetness (0 –100)
battery	Battery voltage (mV) (invalid when using AC adaptor)
radio_type	Radio Type, e.g. LTE, 3G, ...
radio_rssi	Radio RSSI (int)
radio_rsrp	Radio RSRP (int)
radio_rsrq	Radio RSRQ (int)
radio_sinr^e, f^	Radio SINR (Signal to Interference & Noise Ratio) (int)
radio_ci	Radio cell information (8-digit hex string)
radio_tac	Radio tracking area code (4-digit hex string)

<i>Field</i>	<i>Description</i>
low_batt	0 – battery normal; 1- battery low
batt_pow	0 – running on adaptor; 1- running on battery
event_type^b, f^	Data event type 0 – data update/trigger 1 – user-initiated (by button press) 2 – heartbeat
debug_info	Reserved

1.2. Device Configuration Reporting

1.2.1. MQTT Topic Format

SENSO8/nbiot/sys/<IMEI>

1.2.2. MQTT Message Payload Format

```
{
  "ver": protocol_version,
  "sn": sensor_imei,
  "iccid": sim_iccid,
  "sampling": [sampling_batt, sampling_ac],
  "ain_threshold": ain_threshold,
  "ain_hysteresis": ain_hysteresis,
  "thres_pct": wet_threshold,
  "hyst_pct": wet_hysteresis,
  "heartbeat": heartbeat_interval,
  "low_batt": low_batt_alert_lvl,
  "batt_pwr_alert": batt_alert_en,
  "reg_timeout": registration_timeout,
  "band": [band_1, band_2, ..., band_n],
  "lfreq": lock_cell,
  "report": sys_report_interval,
  "overwrite": overwrite,
  "psm": [psm_en, psm_active_period, psm_tau_period],
  "repeat": [repeat_no, repeat_interval],
  "local_port": 0,
  "en_shutdown": 0,
  "firmware": fw_version,
  "client_prefix": client_id_prefix,
```

```

"topic_prefix": topic_prefix,
"model": model_no,
"stat": stat_info
}

```

The **local_port** field is removed on SEN21310 firmware version 1.00.000 or above (note h).

Field	Description
protocol_version	Protocol version (int)
sensor_imei	IMEI of the sensor (string)
sim_iccid	ICCID of the SIM card (string)
sampling_batt	Data sampling period when running on battery (sec)
sampling_ac	Data sampling period when running on AC adaptor (sec)
heartbeat_interval	Sensor heartbeat period (sec)
low_batt_alert_lvl	Battery low alert level (mV)
ain_threshold	Water leakage analog input threshold (0-300)
ain_hysteresis	Water leakage analog input threshold hysteresis (0-300)
wet_threshold ^g	Water leakage threshold in 0 – 100 scale (0-100)
wet_hysteresis ^g	Water leakage threshold hysteresis in 0 – 100 scale (0-100)
low_batt_alert_lvl	Battery low alert level
batt_alert_en	Reserved
registration_timeout	Mobile network registration timeout (sec)
band_x	NB-IoT frequency band supported (int) 0 – Auto 1 – B1 3 – B3 5 – B5 8 – B8 20 - B20
lock_cell ^d , f ^a	Reserved

Field	Description
sys_report_interval^a, f^	Device configuration report (SYS report) interval (hour)
overwrite^c, f^	Reserved
psm_en ^c, f^	Reserved
psm_active_period ^c, f^	Reserved
psm_tau_period ^c, f^	Reserved
repeat_no	Number of addition data uploads when an alert is triggered (int)
repeat_interval	Time between addition data uploads when an alert is triggered (sec)
fw_version	Firmware version
client_id_prefix	MQTT client prefix (string)
topic_prefix	MQTT topic prefix (string) (apply to data, sys, ctrl topics)
model_no^e, f^	Model number SEN21310: NBIoT water leak sensor SEN21310+: NBIoT water leak sensor with cable break detection
stat_info	Reserved

2. Downlink Data

2.1. MQTT Client Setting

The following setting is required for MQTT client posting downlink data to SENSO8 sensor.

- Publish QoS = 1
- Retain Flag = False

2.2. Download Data Format

2.2.1. Water Leakage Threshold Configuration

2.2.1.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.1.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "ain_threshold": ain_threshold
}
```

2.2.2. Water Leakage Threshold Hysteresis Configuration

2.2.2.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.2.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "ain_hysteresis": ain_hysteresis
}
```

2.2.3. Data Sampling Period Configuration

2.2.3.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.3.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "sampling": [sampling_batt, sampling_ac]
}
```

2.2.4. Heartbeat Period Configuration

2.2.4.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.4.2. MQTT Message Payload Format

```
{
```

```
{
  "sn": sensor_imei,
  "heartbeat": heartbeat_interval
}
```

2.2.5. Addition Data Upload Configuration

2.2.5.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.5.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "repeat": [repeat_no, repeat_interval]
}
```

2.2.6. Frequency Band Configuration

2.2.6.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.6.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "band": [band_1, band_2, ..., band_n]
}
```

2.2.7. Battery Low Alert Level Configuration

2.2.7.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.7.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "low_batt": low_batt_alert_lvl
}
```

2.2.8. Device Configuration Report Interval Configuration

2.2.8.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.8.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "report": sys_report_interval
}
```

2.2.9. Water Leakage Threshold in 0-100 Scale Configuration

2.2.9.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.9.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "thres_pct": wet_threshold
}
```

2.2.10. Water Leakage Threshold Hysteresis in 0-100 Scale Configuration

2.2.10.1. MQTT Topic Format

SENSO8/nbiot/ctrl/<IMEI>

2.2.10.2. MQTT Message Payload Format

```
{
  "sn": sensor_imei,
  "hyst_pct": wet_hysteresis
}
```

<i>Field</i>	<i>Description</i>	<i>Type</i>	<i>Default</i>
sensor_imei	IMEI of the sensor	string	

Field	Description	Type	Default
sampling_batt	Data sampling period when running on battery (sec) (min: 5 sec)	number	60 sec
sampling_ac	Data sampling period when running on AC adaptor (sec) (min: 5 sec)	number	60 sec
heartbeat_interval	Sensor heartbeat period (sec) (min: 180, max: 43200) ¹	number	3600 sec
low_batt_alert_lvl	Battery low alert level (mV)	number	3400 mV
ain_threshold	Water leakage analog threshold (0-300)	number	91 ⁴ 122 ⁵ (SEN21310+)
ain_hysteresis	Water leakage analog threshold hysteresis (0-100)	number	10
wet_threshold ^g	Water leakage threshold in 0-100 scale	number	12 ⁴ 7 ⁵ (SEN21310+)
wet_hysteresis ^g	Water leakage threshold hysteresis in 0-100 scale (0-10)	number	4
repeat_no	Number of addition data uploads when an alert is triggered or cleared ²	number	3
repeat_interval	Time between addition data uploads when an alert is triggered or cleared (sec) ²	number	60
band_x	NBIoT frequency band supported (int) ³ 0 – Auto 1 – B1 3 – B3 5 – B5 8 – B8 20 - B20	number	0
sys_report_interval ^{a,f}	Device configuration report (SYS report) interval (hour) (min: 1)	number	24

Note:

1. Heartbeat period must be longer than data sampling period.
2. When a water leak alert is triggered or cleared, the repeat_no and report_interval parameters can be used to configure the sensors to send additional data reports after the trigger. On the addition data uploads, the analog reading and water leak status are real-time data.
3. For automatic frequency selection, set “band”: [0] on the command. Otherwise, put the desired frequency bands in the JSON array. For example, to support B3 and B8, set “band”: [3 , 8] on the command.
4. Default value for SEN20310 and SEN21310 (without cable break detection).
5. Default value for SEN21310+ (with cable break detection).

Note: After issuing a download configuration command, the device will publish a Device Configuration Report showing the latest device configuration.

Note on JSON keys:

- a. Added on SEN20310 firmware version 2.01.000 or above
- b. Added on SEN20310 firmware version 3.00.000 or above
- c. Added on SEN20310 firmware version 3.01.000 or above
- d. Added on SEN20310 firmware version 4.01.000 or above
- e. Added on SEN20310 firmware version 4.03.000 or above
- f. Added on SEN21310 firmware version 1.00.000 or above
- g. Added on SEN21310 firmware version 1.00.001 or above
- h. Removed on SEN21310 firmware version 1.00.000 or above

3. Revision History

<i>Revision</i>	<i>Date</i>	<i>Description</i>
1.0	Nov 2019	Initial release.
1.1	Mar 2020	Added to the device configuration report: SIM ICCID, network registration timeout, frequency bands, additional data uploads, firmware version, MQTT client ID and topic prefixes. Added configuration commands: additional data upload, frequency band.
1.11	Mar 2024	Added water leak alert value 2 – cable broken (probes and water ropes with break detection only).

<i>Revision</i>	<i>Date</i>	<i>Description</i>
1.12	May 2024	Added the list of supported models (SEN20310-0000, SEN21310-0000).
1.13	Feb 2025	<p>Added SEN21310 fields: sensor type, wetness (0-100 scale), radio SINR, event type, model number (SEN21310+ with cable break detection), lock cell, SYS report interval.</p> <p>Added configuration commands: lock cell, battery low alert level, device configuration report interval, water leakage threshold and hysteresis in 0-100 scale.</p>
1.14	Aug 2025	Lock cell feature changed to reserved; lock cell configuration command removed.
2.0	Oct 2026	First release on docs.senso8.com