SE000304A

TG563A Technical Reference Manual

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1. General information

1.1. Description

The TG563A is a LoRaWAN smoke alarm for buildings with a statutory warranty period in accordance with applicable laws. Customers also have the option to extend the warranty to 5 or 10 years for an additional fee.

With a battery life of up to 10 years, an audible alarm with a volume of 85 dB, visual warning and integrated self-monitoring, it offers maximum safety and maintenance-free operation. The detector is suitable for professional use in residential buildings, care facilities and public institutions and communicates wirelessly via LoRaWAN. Data transmission is end-to-end encrypted and meets the highest safety standards, including the European product standard for smoke alarms EN 14604:2005/AC:2008.

In addition to reliable smoke detection, the device detects tampering attempts, reports soiling and adapts to different environmental conditions. Thanks to simple ceiling or wall mounting, support for remote inspection and automatic reconnection in the event of power loss, the TG563A can be efficiently integrated into existing infrastructures and makes a significant contribution to the digitalization of building security.

Figure 1. Picture of the TG563A

Features:

- Smoke detection
- Test Alarm
- Alarm mute
- Manual defect reporting
- Battery checking
- Buzzer checking
- Covering detection
- Obstacle detection
- Smoke chamber fouling monitoring
- Brightness detection
- Temperature measurement
- LoRaWAN 1.0.4 EU868

1.2. Technical specifications

- Detection type: optical smoke detector
- Average area covered: 50 m2
- For indoor use
- Installation: Mount on wall or ceiling
- Max. room height: 6 m
- Max. monitoring area: 60 m2
- Red signal LED:
  - Alarm
  - Errors
- Integrated warning tone when smoke is detected: 85 dB at a distance of 3 m
- Integrated warning tone in test mode or when signalling an error: 75 dB at a distance of 3 m
- Power supply: 3 V lithium battery, sealed, not replaceable, 10-year lifespan
- Dimensions (D x H): 129 mm x 50mm
- Weight (with the mounting plate): 255g
- Protection class: IP30
- Materials: ASA (except grid in polycarbonate)
- Radio:
  - LoRaWAN 1.0.4 class A EU868
  - Frequency: 863-870 MHz
  - Power: 25mW
  - Encryption: AES 128
- Operating temperature: +10°C to +40°C
- Storage temperature: +5°C to +60°C

Temperature profile usages are :

- +10°C to +40°C : Full operating.
- -10°C to +10°C and 40°C to 50°C : All functions except masking and buzzer check.
- +65°C : This is a temperature excursion (camper van profile), only the smoke function is operational. The product should not be exposed to this temperature for more than 6.5 hours.

1.3. Norms and standards

- EN 50130-4 - EMC
- EN 62368-1/A1 (01/2017)
- EN 300 220-2 (RED directive)
- EN 301 489-3 (RED directive)
- EN 63000 (ROHS)
- EN 14604:2013
- LoRaWAN Certified Product
  - LoRaWAN® Specification 1.0.4
  - RP2-1.0.3 LoRaWAN® Regional Parameters
  - Region EU868 (EU863-870).

2. Installation and normal operation

2.1. Choosing a location

The product can be indifferently attached to the ceiling or the wall of the monitored a room.

The smoke detector must be installed as follows:

- the battery in the smoke detector must not be exposed to excessive heat such as sunshine, fire or the like
- the smoke detector must be installed and operated at a temperature between +10 °C and +40 °C,
- in rooms with a risk of fire (in corridors on each floor and in all bedrooms (minimum protection) or additionally in all living rooms and in the basement (optimum protection))
- preferably at the center of the ceiling
- at an adequate distance from ventilation openings that could disperse smoke
- more than 50 cm away from any obstacles
- at both ends of corridors that are over 10 m long
- if the height of the beam is > 20 cm, and if one or more ceiling bays are > 36 m2, a smoke detector must be installed in each ceiling bays > 36 m2, in addition to one smoke detector installed in the center of the ceiling. In those cases where ceiling mounting is either technically not possible or this could trigger more false alarms, wall mounting is permissible. Then mount the detector as follows:
  - at a distance of 30 to 50 cm from its outer edge to the room ceiling
  - at an adequate distance from potential sources of interference (electric meters, metal housings, fluorescent lights, etc.).

The smoke detector must never be installed:

- in the immediate vicinity (< 50 cm) of electronic ballasts, low-voltage transformers, energy-saving light bulbs or fluorescent lights
- in very dusty rooms
- in rooms where the temperature may be permanently below 10 °C or above 40 °C, as this can cause the detector to malfunction
- less than 20 cm from an obstacle
- less than 1 m from heating/cooling vents or ventilation openings, since this could cause smoke to be dispersed
- less than 6 m from fireplaces or wood stoves, as the smoke and gases from the flames could trigger a false alarm
- in rooms where steam or cooking fumes could trigger a false alarm
- in rooms with a risk of moisture condensation (bathroom, laundry room, etc.)
- at the highest point of a vaulted (cathedral) ceiling, as an air pocket in this location could prevent smoke from reaching the detector
- directly on a metal wall. In this case, install a base made of non-magnetic material (wood or plastic) between the wall and the detector.

These recommendations are compliant with standard DIN 14676: 2019-02.

The product is mounted on a mounting plate fixed by screws (provided, as well as the dowels), on the ceiling or on the wall. Fixing using tape is possible but not warranty. The torque to assemble or disassemble the product from the mounting plate is between 2.5Nm and 4Nm

The optical smoke chamber is protected against insect intrusion by using an inlet grid compliant with the standard EN14604_2013, §4.2.21 and Q-label §4.4.

You can refer to the Installation Guide for more details.

2.2. Installation and self-tests

The product is in standby mode after production. In this mode, all the functions including smoke detection are inactive. Pressing the button will light up the red LED for 2 seconds without beeping.

When installed on the mounting plate, the product enters into the installation mode and performs the self-tests. These tests are done sequentially according to the sequence described below. As soon as a test fails, the sequence is stopped.

1. Production test passed: this test should always pass because bad products are removed at production time.
2. Battery test: this test checks the battery level.
3. Temperature test: this test checks if the product temperature is in the rage [0°C, 40°C] If the device temperature is greater than or equal to 0°C and strictly less than 10°C, the product will start in downgraded mode. If the temperature is out of range, wait a few minutes and retry the installation later.
4. Smoke chamber test: this test checks the electronic function around the smoke chamber and performs the complete smoke chamber calibration.
5. Buzzer test: this test performs a complete check of the buzzer and its electronics.
6. Check of the surrounding area: this test verifies that no obstacle is present in the surrounding area. An obstacle could block the smoke. During this phase the smoke detector environment signature is performed. So to avoid embedding the installer in this signature the scan is performed after a 10 seconds of delay. This gives the opportunity to the installer to get out of the perimeter scanning (50cm around the smoke detector). If an obstacle has been detected, try another location.
7. Check of the air inlet: this test verifies that nothing is covering the detector (tape, plastic ...).
8. Ultrasonic and infrared sensors test: these sensors are used to check the area around the detector and the air inlets.

If all the self tests are successful, the product makes 4 sequences of 2 short beeps.

If a test fails, the product makes an infinite sequence of 2 short beeps until the user presses on the product. The button press just mutes the tone for 15 minutes then it will restart. The number of LED blinks corresponds to the failed test. You must unmount the product to stop the beep sequence.

During the installation phase, the smoke detection become active as soon as the smoke chamber test has passed.

Obstacle at less than 50 cm

During installation, it may be impossible to put the detector in an area without any obstacle in the 50cm around. The distance learning function analyzes the smoke detector environment and tries to find a fallback distance of detection if the normal 50cm is not suitable.

During the installation, the product performs a first check with an initial distance of “50cm” as detection distance. If an obstacle is detected at less than 50 cm, the detector will retry the test using the detected distance as a threshold. If the test is successful, the detector informs the user that a

new distance threshold can be used by making 3 short beeps and 6 short led flashes every 3 seconds. The user can accept the new distance by pressing on the detector and the product will report that self-tests are successful. In this case the product will not detect objects at a distance greater than this threshold. Otherwise, the user can reject the new distance by unmounting the product. If the obstacle is still detected when using the new distance, the self-test will fail and the user will have to move the detector to another location.

2.3. Join procedure (OTAA)

After the self-tests are successful, the product sends a join-request. If no join-accept is received, the device makes 4 other attempts during the next minute.

The detector blinks slowly while trying to join a network (1 flash every 2.5 seconds). It blinks quickly for 10 seconds to indicate that a network has been found (2 flashes every second). The installation phase ends after 5 attempts (about 1 minute).

After receiving a join accept, the product sends immediately an uplink message with additional data.

If no network is found during the installation, the product will continue to send a join-request once a day until receiving a join-accept and without LED blinking.

The detector works normally even if it has not joined a LoRaWAN network.

2.4. Normal operation

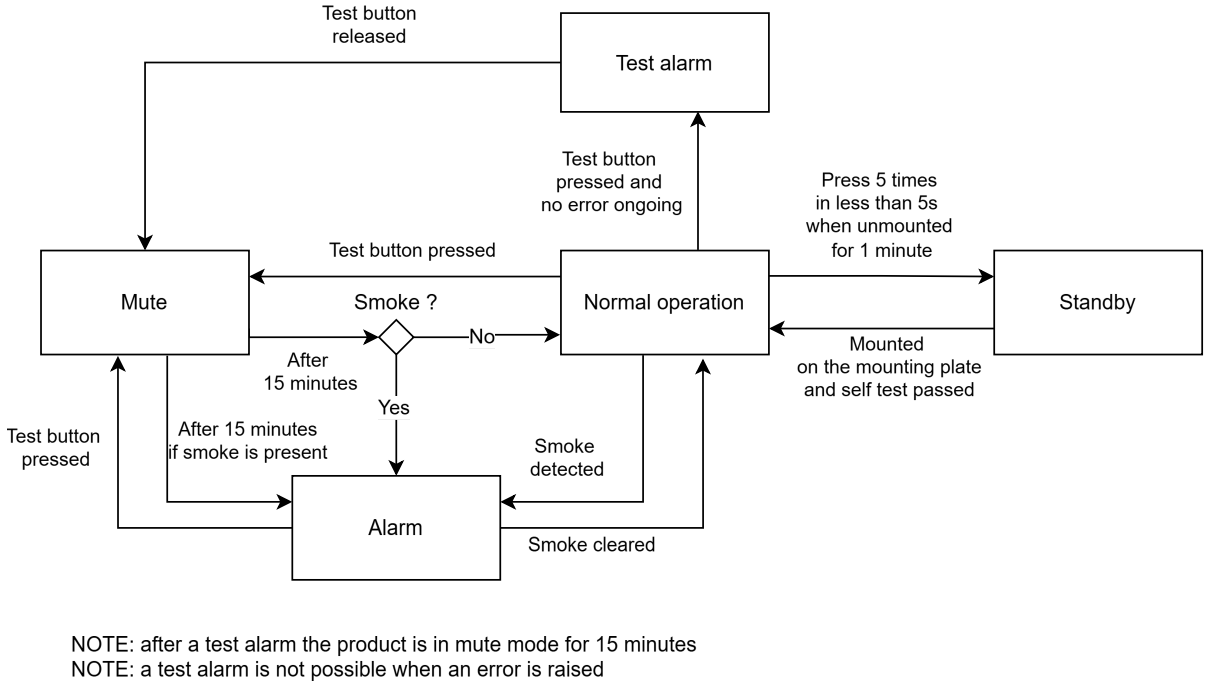

Figure 2. State diagram

Once in normal operation, the product never leaves this mode (even if it is removed from the mounting plate).

In this mode the product is fully operational and so smoke monitoring is active.

The product sends an uplink message every 24 hours. Once a week, a longer telegram with

additional data is sent. Some parameters are configurable by sending a downlink message (transmission period, event sent, new join ...).

After a week without receiving a downlink, the device sends confirmed uplink message. After 40 days without receiving a downlink, it resets the radio with the default parameters. Consequently, the product will retry to join a network once a day.

If the user press the test button while no faults are ongoing, a test alarm starts: for the first 10s, the detector makes a soft buzzer ringing and then it makes a loud buzzer ringing.

When the product is in normal operation and the product goes from un-mounted state or temporary un-mounted state to mounted state, a check for obstacles in the surrounding area is performed again after a 10 seconds of delay. If the test failed, the product must be un-mounted.

It is possible to put the product back into standby mode by using the following sequence:

1. Un-mount the product
2. Wait 1 minute
3. Press the test button 5 times in less than 5s

3. Alarm and Errors

3.1. Sound and visual signals

<table>
<tr><th>Type</th><th>Sound signal</th><th>Visual signal</th></tr>
<tr><td>Alarm</td><td>1s on 1s off, loud</td><td>1s on 1s off</td></tr>
<tr><td>Test alarm</td><td>1s on 1s off, soft tone then loud after 10 seconds</td><td>1 flash each 2 seconds</td></tr>
<tr><td>Production Error</td><td rowspan="6">3 short tones every 5 min</td><td rowspan="6">1 blink every 5 sec.</td></tr>
<tr><td>Low battery</td></tr>
<tr><td>Smoke chamber Failure or pollution</td></tr>
<tr><td>Buzzer Failure</td></tr>
<tr><td>Infrared Sensor Failure</td></tr>
<tr><td>Ultrasonic Sensor Failure</td></tr>
<tr><td>Obstacle Detected</td><td rowspan="4">No</td><td rowspan="4">2 blinks every 30 sec.</td></tr>
<tr><td>Air Inlet Covered</td></tr>
<tr><td>Too Long Inactivity</td></tr>
<tr><td>Too Long Un-mounted.</td></tr>
</table>

3.2. Alarm

During product life if smoke is detected an alarm is raised which activates the loud ringing until the smoke is cleared or the button is pressed.

If the test button is pressed while an alarm condition is ongoing the ringing is postponed for 15 minutes (inhibition period).

When the product is in mute mode, it is still performing the smoke measurements and the LED is flashing if smoke is detected. When the inhibition period is finished the product returns either to normal operation or to alarm if smoke is still present.

A press on the button activates the test of the buzzer, if no fault is ongoing. The detector makes a soft ringing for 10 seconds then a loud ringing. When the button is released the product is muted for 15 minutes.

3.3. Errors

Errors are not as important as alarms so there is no acoustic notification during the night to avoid disturbing the user.

If a fault occurs during night (low brightness) the product will wait one of these events:

- 12h (May to September) or 16h (October to April) has passed
- Day has been detected (high brightness)

If the fault disappears during the waiting time it will never be notified.

If a fault occurs during the day, it is immediately reported.

The fault can be acknowledged by pressing on the product. The signalization is stopped for 3 days. Then the product will start blinking and beeping again. You can postpone for 3 days up to 3 times. Then you will postpone for only 1 day. If the fault disappears before being acknowledged the product stops the signalization.

A short press on the product will replay the sound corresponding to the current fault.

4. Smoke detector functions

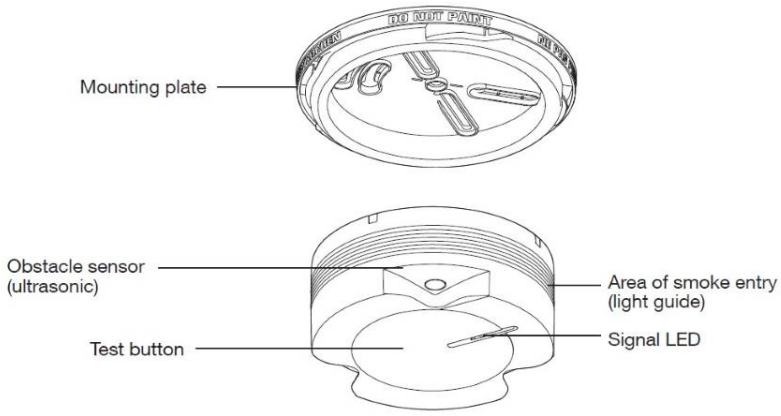

Figure 3. Product description

4.1. Smoke detection

This smoke detector uses a photo-electric sensor to measure the smoke density. The measurement uses a method based on an IR light emitter and a receiver in a dark smoke chamber. When smoke enters, it scatters the light causing it to hit the reception sensor and trigger an alarm. An algorithm uses a differential measurement with smoke chamber fouling and day light compensation.

A smoke measurement is performed every 10 seconds. If the detector starts detecting smoke, it will reduce the period to detect quickly. If smoke is detected, the flag "SmokeAlarm" is raised and the

product sounds loud if it is not in mute mode.

In parallel of the smoke detection there is a smoke chamber fouling detection which is performed every 2 minutes. If pollution is detected, the error “FoulingSmokeChamber" is raised.

The complete smoke electronic function is checked to validate that the smoke chamber is able to detect smoke: emitting diode, receiving diode, amplification chain. If a failure is detected, the error “SmokeChamberFailure" is raised.

4.2. Mounting/unmounting

The detector checks every 5 seconds if it is mounted or unmounted. During transition detection, the periodicity is speed up to 1 second in order to make transition confirmation. An anti-bounce function is implemented to avoid notifying glitches, 4 measurements are needed to detect a state change. Therefore, it may take a few seconds between the assembly and the start of the product.

If the product is in the state “mounted” a transition to un-mounted for more than 1 minute move the product state to un-mounted. This allows the installer to reinstall the product in the right position (to correct the angle for example).

The error "TooLongUnmounted" is raised after 14 days in this state.

4.3. Temperature

The product is fully operational between +10°C to +40°C.

The temperature is measured every 5 minutes (every 1 minute during the first hour after installation). The current temperature, the maximum and minimum temperature are stored in the product and transmitted by radio.

In addition the flag “TemperatureOutOfRange” is raised if the temperature is outside the range [-10°C to 50°C].

The accuracy of the sensor is 1% in the range [+10°C, +40°C], 2,75% in the range [-10°C, +80°C], 3,75% in the range [-20°C, +100°C] and 6% in the range [-40°C, +125°C].

4.4. Brightness

The product detects day or night to avoid “buzzer check” and "error reporting" (battery low, hardware fault ...) during the night.

The brightness is measured every 30 minutes. It can take up to 1 hour to detect a change. The detection threshold is ~40 lux.

4.5. Battery check

The smoke detector tests the battery level every 26 hours.

During this test the product draws a high amount of current to check the health of the battery. This test verifies if the battery can deliver enough energy to ring loudly in case of fire.

The battery low notification is raised when the battery voltage is below 2.52V. Three consecutive measures below this threshold are required to report a "LowBattery".

The smoke detector continues to operate normally for 30 days after the fault has appeared.

4.6. Buzzer check

The smoke detector automatically checks that the buzzer is in good condition to ring using a fail-safe algorithm, eliminating the need for a manual ringing test. However, it is recommended to do a manual test once a month.

By using different analogic measurements and by crossing all this information, the algorithm is able to detect if all the electronic components around the buzzer are operational (they are not destroyed or not in short circuit and the buzzer frequency is between 2.5kHz and 3.5kHz).

This measurement is done every 7 days during the day when the product is mounted and the temperature is in the range [+10°C, 40°C].

The flag “TooLongInactivity" is raised when the buzzer check has not been performed for more than 91 days.

The check of the buzzer generates a slight short sound like a crackle ("crik").

If it is the night, the test is postponed up to 12 hours. It is forced running if the smoke detector is still in night condition after 12 hours (except if the temperature is out of range and/or smoke detector un-mounted).

When a buzzer error is suspected, the period between 2 checks is shorten from 7 days to 6 seconds for the 4 first measurements, then a delay of 12h (at least if no postponement occurs) is waited and then 4 measurements are performed again with an interval of 6s. Totally, 16 (4 sets of 4 buzzer check measurements) measurements are done before reporting the error "BuzzerFailure".

4.7. Check of the surrounding area

This smoke detector verifies the absence of obstacles in the surrounding area which may disturb the smoke detection. The check is based on an ultrasonic transceiver. It detects obstacles (beams, boxes ..) too close from the smoke detector which could prevent smoke spreading. The detection distance is configurable from 10cm to 50cm.

The ultrasonic measurement is performed every 7 days when the product is mounted and the temperature is between [+10°C, 40°C]. If an obstacle is seen in the scanning range, the measurement is performed again 12 hours later. The detection algorithm needs 60 consecutive errors (1 month) before reporting an error "ObstacleDetected".

If the product is unmounted or if the the temperature is out of range for more than 91 days, an error "TooLongInactivity" will be raised informing that the detector is not able to perform the check.

The ultrasonic sensors need some reference information to know the environment of the product. These reference data (including temperature) are evaluated and stored inside the smoke detector memory during the installation phase when the product is installed to the mounting plate.

During the product life if the product is demounted and remounted, the reference information is updated. This gives the possibility to move the location of the smoke detector while it is in running mode. When the product is remounted and after 10s of waiting, the reference is acquired again and rechecked against the detection distance. If an object is detected, the product reports an error. In that case, the smoke detector shall be dismantle to stop this signalization and remount it on a right

location.

In case of hardware failure, the flag "UltrasonicHardwareFailure" is raised. The product shall be replaced.

If an obstacle near the detector is absorbing the acoustic waves and giving no reflection, it will not be detected. Below 10 cm, the smoke detector is blind because of the physical limitation of the ultrasonic technology.

4.8. Check of the air inlet

The check of the air inlet is based on infrared light in combination with a light guide. This function is able to detect an object blocking the smoke. For example if some dust tape or paint have been left on the smoke detector.

The infrared sensors and electronics are calibrated during production.

These measurements are done every 7 days when the product is mounted and the temperature is between [+10°C, 40°C]. When the product detects an obstruction, it checks again 12h later. The detection algorithm needs 60 consecutive errors to notify an error. The flag “AirInletCovered” is raised when the product detects something blocking the grid.

If the product is unmounted or if the the temperature is out of range for more than 91 days, an error "Too Long Inactivity" will be raised informing that the detector is not able to perform the check.

The flag "InfraredSensorFailure" is raised when an electronics error is detected.

The presence of an "InfraredSensorFailure" can also involve a “AirInletCovered”.

If the covering is not touching the light guide, it could not be detected by this function.

For the assessment it is important to consider combination of all functions. E.g. tape which is around the smoke detector might not be detected by the IR function, because it is not enough touching the light guide, but it could be detected by the ultra-sonic sensors. Pollution on the product and the PCB creating a leakage current which possibly influence the smoke detection sensitivity could be detected by the infrared function.

Installation of a cold product

If the temperature of the product is between 0°C and 10°C, the check of the smoke inlet will not be performed during installation but later.

The detector will check every minute if there is an obstacle during 1 hour to adjust its reference according to the temperature evolution. If an object is detected the reference will not be adjusted.

After 1 hour, the smoke detector is acclimatized and delayed self-tests are executed. In case of coverage detection, the product will report an error.

If the product is unmounted during this first hour :

- If it is mounted again during the hour, the checks remain delayed until the end of the hour.
- If it is mounted again after the hour : the checks of obstacles and air inlet are executed. In case of detection the product will report an error.

If the temperature of the room is still below 10°C after 1 hour, we cannot be held responsible for false detection of obstacle or covering occurring afterwards.

5. Payload description

5.1. Uplink message

A short uplink message is sent every 24 hours. It contains the status of the product and the temperature. The periodicity of uplink messages can be modified by sending a command in a downlink message.

Once a week, an additional block of data is added in the telegram. This message can be identified with the MessageType field: 0xF.

This long message can be disabled by downlink message. It possible to request the additional data in the next uplink message by downlink message.

When a major event occurs, the periodic message is sent immediately. The frame type value changes to inform that the telegram has been triggered by an event. See "MessageType".

List of events:

- Smoke Detected
- Low Battery
- Smoke Chamber Failure
- Fouling Smoke Chamber
- Ultrasonic Sensor Failure
- Infrared Sensor Failure
- Buzzer Failure
- Obstacle Detected
- Air Inlet Covered

The event are sent without requesting an acknowledge and there is no retry. There is no guarantee that you will receive these events. If a message is missed, the information will be in the next message.

The product SHALL NOT BE USED in a fire alarm system.

The uplink messages are sent on fport 1.

The size of the payload is 5 bytes or 35 bytes if additional data is present.

Bytes [0:4] are present in every uplinks. Bytes [5:34] are only present in uplink message with additional data (message type: 0xF).

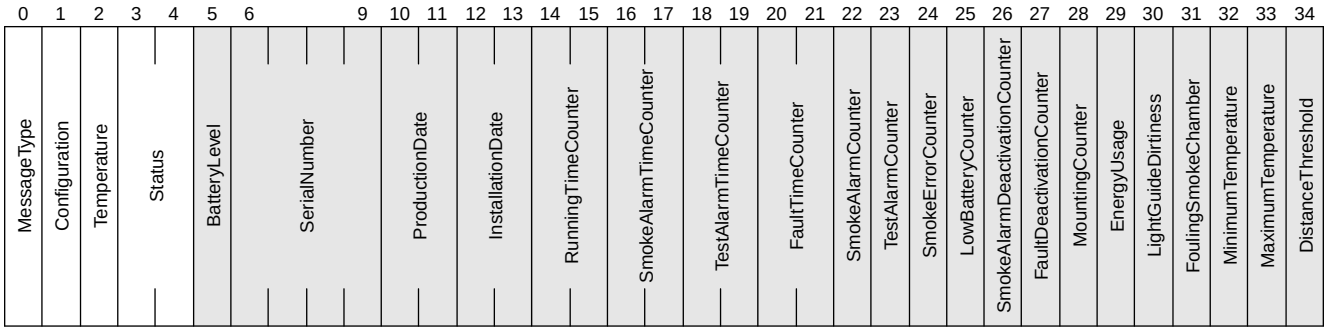

Figure 4. Payload content

- Byte 0 **MessageType**: Type of the message. Use this field to know the size of the payload.
  - 0x0: Periodic uplink message
  - 0x1: Smoke Alarm Event
  - 0x2: Low Battery Event
  - 0x3: Smoke Chamber Failure Event
  - 0x4: Fouling Smoke Chamber Event
  - 0x5: Ultrasonic Sensor Failure Event
  - 0x6: Infrared Sensor Failure Event
  - 0x7: Buzzer Failure
  - 0x8: Obstacle Detected Event
  - 0x9: Air Inlet Covered Event
  - 0xA: Reserved For Future Use
  - 0xB: Reserved For Future Use
  - 0xC: Reserved For Future Use
  - 0xD: Reserved For Future Use
  - 0xE: Reserved For Future Use
  - 0xF: Periodic uplink message containing additional data
- Byte 1: **Configuration**: The configuration of the radio.
  - Bits 2:0: **Uplink Message Transmission Periodicity**: The default value is 24 hours (6). Other values are:
    - 0: 1 hour
    - 1: 2 hours
    - 2: 4 hours
    - 3: 6 hours
    - 4: 8 hours
    - 5: 12 hours
    - 6: 24 hours
    - 7: 48 hours
  - Bit 3: **AdditionalDataEnabled**: If this bit is set, additional data is sent once a week. This bit is set by default.
  - Bit 4: **ObstructionEventEnabled**: If this bit is set, the detector immediately sends an uplink message when an obstacle is detected or the air inlets are covered. When this bit is reset, the information will be sent in the next periodic uplink message. This bit is set by default.
  - Bit 5: **HardwareFailureEventEnabled**: If this bit is set, the detector immediately sends an uplink message when an hardware error occurs. If this bit is reset, the information will be sent in the next periodic uplink message. This bit is set by default.
  - Bit 6: **SmokeEventEnabled**: If this bit is set, the detector immediately sends an uplink message when smoke is detected. This bit is set by default.

  - Bit 7: **RFU**: Reserved For Future Use.
- Byte 2: **Temperature**: The temperature in degree (signed byte). Example: 0x1B = 27°C, 0xE2 = -30°C
- Bytes 4:3 **Status**: Status of the smoke detector.
  - Bit 0: **SmokeAlarm**: This bit is set during alarm.
  - Bit 1: **LowBattery**: This bit is set when the battery is low. The product will continue to work for at least 30 days. It has to be quickly replaced.
  - Bit 2: **SmokeChamberFailure**: This bit is set when the smoke detection function is no longer operational. The product has to be quickly replaced.
  - Bit 3: **FouledSmokeChamber**: This bit is set when the smoke chamber is too fouled and the smoke detection might not be operational. The product has to be quickly replaced.
  - Bit 4: **UltrasonicSensorFailure** : This bit is set when the check of the surrounding area is no longer operational (electronic or mechanic issue). If an object is added in the smoke detector environment, disturbing the smoke detection, it might be not detected. The product has to be quickly replaced.
  - Bit 5: **InfraredSensorFailure**: This bit is set when the check of air inlet is no longer operational (electronic or mechanic issue around). In case something blocks the entrance of the smoke through the grid, the smoke might be not detected. The product has to be quickly replaced.
  - Bit 6: **BuzzerFailure**: This bit is set when the buzzer/horn is no longer operational. In case of smoke detection, no sound alert might be generated by the product. The product has to be quickly replaced.
  - Bit 7: **RFU**: Reserved For Future Use.
  - Bit 8: **Mounted**: This bit is set if the product is mounted.
  - Bit 9: **Brightness**: This bit is set if an high brightness is detected. The product considers it is the day. Else it considers it is night and will postpone error report.
  - Bit 10: **TemperatureOutOfRange**: This bit is set if the temperature is outside the range [-10°C, +50°C].
  - Bit 11: **RFU**: Reserved For Future Use.
  - Bit 12: **ObstacleDetected**: This bit is set when the device has detected an object too close, which could disturb the smoke detection. An intervention is required to remove the object. Once the object is removed, the value is reset after the next measure.
  - Bit 13: **AirInletCovered**: This bit is set when the detector has detected something (tape, painting, ...) on its grid, which could disturb the smoke detection. An intervention from an installer is required to remove the obstruction. Once the obstruction is removed, the fault returns to 0 after the next measure.
  - Bit 14: **TooLongInactivity**: When the detector is removed of its mounting plate or temperature is not is the operating range, the buzzer and surrounding area checks are stopped. After too long time 91 days without executing on this functions , this bit is set. An installer intervention is required. This fault is reset if, when the detector is remounted the buzzer periodic test result is successful.
  - Bit 15: **TooLongUnmounted** This bit is set when the detector is removed from its mounting plate for 14 days. An intervention is required. This bit is reset when the detector is mounted again on its mounting plate.
- Byte 5: **BatteryLevel**: Battery level in hundredth of volt (unsigned byte). Add 1V to this value to get the real voltage (V = value/100 + 1). Example: 176 (0xB0) means 2,76V.
- Bytes 9:6 **SerialNumber**: The product serial number. It is a 8 digits number. The serial number is coded in BCD on 32 bits. This data is sent LSB first. Example: 0x01002093 corresponds to 93200001
- Bytes 11:10 **ProductionDate**: The date of production. Format: Date

- Bytes 13:12 **InstallationDate**: The date of the first successful installation. Format: Date
- Bytes 15:14 **RunningTimeCounter**: Seconds elapsed since the installation. Format: Time counter
- Bytes 17:16 **SmokeAlarmTimeCounter**: Seconds elapsed in smoke alarm mode. Format: Time counter
- Bytes 19:18 **TestAlarmTimeCounter**: Seconds elapsed in alarm test. Format: Time counter
- Bytes 21:20 **FaultTimeCounter**: Seconds elapsed in error. Format: Time counter
- Byte 22 **SmokeAlarmCounter**: Number of smoke alarm occurred.
- Byte 23 **TestAlarmCounter**: Number of test alarm proceed.
- Byte 24 **SmokeErrorCounter**: Number of smoke chamber failure occurred.
- Byte 25 **LowBatteryCounter**: Number of low battery error occurred.
- Byte 26 **SmokeAlarmDeactivationCounter**: Number of times a smoke alarm is muted by pressing the button.
- Byte 27 **FaultDeactivationCounter**: Number of times an error is muted by pressing the button.
- Byte 28 **MountingCounter**: Number of mounting.
- Byte 29 **EnergyUsage**: Percentage of energy consumed by alarms and test alarms based on standard usage reference.
- Byte 30 **LightGuideDirtiness**: Amount of pollution that adheres to the light guide.
- Byte 31 **FoulingSmokeChamber**: Percentage of pollution in the smoke chamber. "FouledSmokeChamber" is set when the value is greater than 90%.
- Byte 32 **MinimumTemperature**: The lowest temperature measured by the product.
- Byte 33 **MaximumTemperature**: The highest temperature measured by the product.
- Byte 34 **DistanceThreshold**: The object detection distance chosen by the smoke detector during the installation.
  - 1: 10 cm
  - 2: 20 cm
  - 3: 30 cm
  - 4: 40 cm
  - 5: 50 cm (default).

Format field

Date

Bits	15:9	8:5	4:0
Content	Year	Month	Day

- Bits 15:9 Year: 0 to 99
- Bits 8:5 Month: 1 to 12
- Bits 4:0 Day: 1 to 31

Dates are sent LSB first

Example: 0xB632 is 22/05/2025

Time counter

Bits	15:2	1:0

Content	Value	Unit

- Bit 15:2 Value
- Bits 1:0 Unit:
  - 0: Second
  - 1: Minute
  - 2: Hour
  - 3: Day

Example: 0x504 = 321 seconds, 0x505 = 321 minutes, 0x506 = 321 hours and 0x507 = 321 days

5.2. Downlink message

Commands can be sent to the product with a downlink message (transmission period, event sent, new join ...).

Downlink messages shall be sent on fport 1.

It is possible to send multiple consecutive commands in a same downlink message. The commands will be processed one after the other and will possibly overwrite a previous command in the same message.

A command is a single byte. There are 10 commands.

Bits	[7:4]	[3:0]
Content	Command	Parameter

Commands:

- 0x00: Change uplink message periodicity
  - Parameter: Periodicity (See Configuration byte)
- 0x01: Enable additional data once a week
  - Parameter: 0 (disable) or 1 (enable)
- 0x02: Set events
  - Parameter: b0: HardwareFailureEvent, b1: ObstructionEvent, b2: SmokeEvent (3 bits)
- 0x03: Set hardware failure event
  - Parameter: 0 (disable) or 1 (enable)
- 0x04: Set obstruction event
  - Parameter: 0 (disable) or 1 (enable)
- 0x05: Set smoke detected event
  - Parameter: 0 (disable) or 1 (enable)
- 0x06: Set configuration LSB
  - Parameter: Configuration byte [3:0]
- 0x07: Set configuration MSB
  - Parameter: Configuration byte [7:4]
- 0x08: Send additional data in the next uplink
  - Parameter: don’t care
- 0x09: Request a new join
  - Parameter: Delay before the rejoin in days (between 0 and 15 days)

Commands like "Requesting a long telegram", "Requesting a rejoin" or changing the transmission periodicity can increase the power consumption. If the product detects an overuse, it will switch to a saving mode and will increase the period between two uplinks.

When an event is disabled, a failure or an object will still be detected, reported locally and transmitted by radio in the status field of each uplink. However, the uplink message will not be sent immediately when the event occurs.

6. Autonomy

The detector is battery powered. The autonomy is 10 years in normal operation. It is not possible to change the battery. After 10 years, the product must be replaced.

The autonomy is 10 years with the following typical use:

- Storage time: max 2 years
- Test alarm: 10 seconds every month for 10 year
- Smoke alarm: 60 seconds every year for 10 years
- One uplink message every 24 hours in SF12
- One uplink message with additional data every 7 days in SF12
- One downlink message every month

When the low battery event is raised up the product can ensure:

- 30 days of normal operation
- 1 alarm for 240 seconds in case of fire

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Version history

Date	Version	Changes
03-10-2024	A01	• First version
19-11-2024	A02	• Fix mounted state
13-03-2025	A03	• Downlink commands
02-07-2025	A04	• Change the brand from Hager to Sept-S • The name changed from Payload description to Technical User Manual • Events and faults have been renamed • Product description added