

SD-29-AC-ZW Smoke Detector Series

Draft Version

SD-29 series is a mini-sized wireless smoke detector with built-in PIR motion sensor, temperature sensor and emergency light (optional). Designed to protect your family against potential fire hazards, the Smoke detector is also capable of detecting movements and reporting temperature to users. The Z-Wave™ Smoke Detector allows access to the "S2 Unauthenticated" class.

The SD-29 is a wirelessly operated photo-electronic Smoke Detector designed to operate with any Z-Wave enabled controller devices; it also features smoke detecting, temperature sensing and IR detection. The Smoke Detector's alarm situations, battery condition, operating conditions, supervisory data and general fault information are sent to the Z-Wave Gateway/Control Panel wirelessly. The device is also serially connected with other sensors in the Z-Wave gateway to serve as an extra siren. When any other sensor in the Z-Wave network is activated and sends an alarm signal, the Smoke Detector will also raise alarm with its built-in buzzer as a siren to help sound warning.

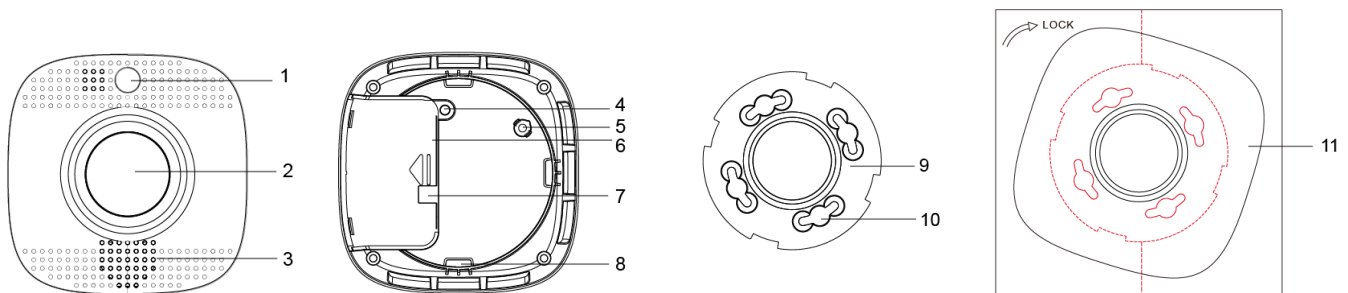
The SD-29 is a Z-Wave enabled device and is fully compatible with any Z-Wave enabled network. Z-Wave is a wireless communication protocol that uses a low-power RF radio.

The Smoke Detector calibrates for the air contents after warming up to determine a standard condition for the environment. It can also be manually instructed to calibrate for air content. It is also pre-programmed to automatically calibrate once a month.

The Smoke Detector includes the following models:

Model Name	Heat Detection	Temperature Sensor	PIR Sensor	Emergency Light	Serial Connection
SD-29-TH-SC	○	○			○
SD-29-THM	○	○	○		○
SD-29-THME	○	○	○	○	○

Parts Identification



1. LED Indicator /Function Button / Emergency Light

Red LED

- Turns ON briefly: Transmitting signal.
- Quick flash: Alarming.
- Flashes every 1 second: Smoke Detector under Sleep Mode
- Flashes every 2 seconds: Smoke Detector under warmup and calibration process.
- Flashes every 4 seconds: battery exhausted.

Orange LED

- Flash every second: Device power on/Calibration failed.
- Flashes every 5 seconds: Detecting smoke failed or device malfunctioning.
- Flashes every 4 seconds: battery exhausted.
- Flashes every 45 seconds: Low battery condition

Function Button

- Press the button once to send temperature signal to the gateway.
- Press the button once during alarm to silence the alarm.
- Press the button twice to discharge before inserting new batteries.
- Press the button 3 times within 1.5 seconds to send a learn code.
- Press and hold the button for 10 seconds to enter calibration process.
- Press and hold the button for 20 seconds to perform factory reset.

White LED (Emergency Light)

- The emergency light will begin to flash slowly to alert uses that the system is alarming. (SD-29-THME only)

2. IR Lens

3. Buzzer

4. Battery Compartment Fixing Screw

5. Tamper Switch

6. Battery Switch

Use a pair of tweezers to slide the Battery Switch to ON Position (left).



7. Pre-punched Hole for Wiring

8. Hooks

9. Mounting Bracket

10. Mounting Holes (for Hooks)

The Hooks of the Mounting Bracket can hook into this Mounting Hole.

11. Mounting Sheet

Features

● **Battery**

- The SD-29 uses AC 110-220V as its power source and has three 200mAh AAA Ni-MH rechargeable batteries as its backup battery in case of power failure.
- When AC power is applied, the rechargeable battery will be charging at the same time, and the SD-29 will report its battery percentage to the Gateway/Control Panel respectively at 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, and 100%. If the battery voltage is low (20%), a Low Battery signal will be sent to the Control Panel to notify the user.
- When the Smoke Detector is low on battery, a low battery signal will be transmitted along with regular signal transmissions. The Orange LED will flash with accompanying low-volume beep once every 45 seconds.
- The Red and Orange LED will flash once every 4 seconds when the batteries are exhausted.

<NOTE>

When changing batteries, after removing the old batteries, press the Function button twice to fully discharge before inserting new batteries.

● **Testing the Smoke Detector**

By pressing the Function button on the Smoke Detector, you can test if the Smoke Detector is functioning normally.

- If the Smoke Detector functions normally, the Red LED will be on for 2 seconds followed by a 2-tone beep.
- If the buzzer sounds 2-tone beeps 3 times, the "Optical Chamber" on the Smoke Detector is either dirty or out-of-order.

● **Tamper Switch**

- The SD-29 is protected by a tamper switch which is compressed when the SD-29 is hooked onto the mounting bracket. When the SD-29 is removed from the mounting bracket, the tamper switch will be activated and the SD-29 will send a tamper open signal to the system control panel to remind the user of this condition.
- The SD-29 will send a tamper close signal to the Control Panel after the device is hooked onto the mounting bracket. Please note that the SD-29 has to be included in the Z-Wave network first.

● **Temperature & Smoke Detection**

Temperature detection:

- Once the temperature rises by 8.25 °C per minute (rise rate) or exceeds the threshold temperature of 57.25 °C, the Smoke Detector lights up its LED to indicate it is sending an alarm report. The Smoke Detector then activates its buzzer with LED flashing rapidly for 10 seconds for local warning.
- After this 10-second local warning period, the Smoke Detector performs a follow-up temperature check. If the temperature is found to be alarming still, the Smoke Detector will repeat another 10 seconds of local warning with buzzer and rapid flashing LED.
- The Smoke Detector will repeatedly perform follow-up checks until the temperature is lower than the set value of 49°C. The alarm will stop automatically if the temperature drops below 49°C. The alarm can also be stopped manually by using the "Alarm Silence" function.
- The Smoke Detector can also report temperature signal to the Control Panel in every 30 to 33 minutes with Smoke Detector normal operating or when temperature changes by +/- 2°C.

Smoke Detection:

- Once the concentration of the smoke exceeds the set threshold value, the Smoke Detector lights up its Red LED to indicate it is sending the Smoke Alarm signal to the Z-Wave Gateway/Control Panel. After the transmission is completed, the Smoke Detector then activates its buzzer with the Red LED flashing rapidly for 10 seconds for local warning.
- After this 10-second local warning period, the Smoke Detector proceeds to perform a follow-up smoke check. If the smoke concentration is found to be alarming still, the Smoke Detector will repeat another 10 seconds of local warning with buzzer and rapid flashing Red LED.
- The Smoke Detector will repeatedly perform follow-up checks until the smoke concentration is lower than the set value, then the alarm will be stopped automatically or the alarm can be stopped manually by using the “**Alarm Silence**” function.

IR Detection: (SD-29-THM/SD-29-THME only)

- The Smoke Detector will transmit signal to the Control Panel if any movement is picked up within the IR detection coverage. The buzzer will not sound and the LED will not flash. Please refer to your Control Panel for details.

● **Emergency Light (SD-29-THME only)**

- The Smoke Detector has a built-in emergency light that can provide visual alerts in case of emergency. When the Smoke Detector is activated, the emergency light will begin to flash slowly to indicate the system is alarming.

● **Alarm Silence**

- When the Smoke Detector is alarming, pressing the Function Button will put the Smoke Detector into Alarm Silence mode to silence the alarm for 9 minutes. The buzzer will only stop sounding after the alarm has been activated for at least 1-minute. If the button is pressed before alarm time reaches 1 minute, the Smoke Detector will wait until alarm time has reach 1 minute before silencing the alarm.
- During the 9-minute Alarm Silence period, the Red LED will flash once per second. The Smoke Detector will continue to monitor smoke concentration during the alarm silence period:
- After the 9-minute Alarm Silence period has expired, if the smoke concentration has dropped below alarm threshold, the Smoke Detector will emit a 2-tone beep and return to normal operation without sounding alarm.
- If smoke concentration still exceeds alarm threshold, the Smoke Detector will start alarming again.
- If smoke concentration continues to rise during Alarm Silence period and exceeds a second alarm threshold, the Smoke Detector will start alarming again. An alarm activated by exceeding the second alarm threshold could not be silenced by pressing the Function Button.

● **Recalibration**

As the operation condition of the Smoke Detector may vary after being installed for some time, you may wish to recalibrate the Smoke Detector to take a new smoke detection threshold value and ensure optimal performance of the Smoke Detector. To do this:

- Press 10 seconds on the Function button and hold until the Red LED starts to flash. The Smoke Detector will sound 2 short beeps then follow the calibration process described in step 4 of **Installation Procedure** to take the new reference value.
- Every time the battery is removed and reinserted, the Smoke Detector will also take the new threshold value following the warming and calibration process.

● **Auto-Calibration**

- After first installation, Smoke Detector will perform auto-calibration after 4 hours. Afterwards it will perform auto-calibration once every month. During the auto-calibration process, Smoke Detector will not emit any sound.
- If auto calibration fails, the Orange LED will start to flash every second and the Smoke Detector will send calibration failure code to the Z-Wave Gateway/control panel. The Orange LED flashing can be cancelled by removing and reloading the battery, or by manually starting the calibration process.
- If the manual calibration fails again, Smoke Detector will emit continuous beeps and the Red LED will also flash continuously. In this case you need to remove the batteries, wait for 30 seconds then reload the batteries to restart Smoke Detector.

<NOTE>

☞ When Smoke Detector auto calibration fails, the smoke alarm function will still work normally using the threshold value taken from last successful calibration

● **Add Device (Inclusion)**

The Smoke Detector can be included and operated in any Z-Wave network with other Z-Wave certified devices from other manufactures and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network. To include the SD-29 into the gateway or control panel, you have to connect it to AC (mains) power first. Please follow steps below to proceed:

Step 1. Before you start, find the circuit breaker or fuse box.

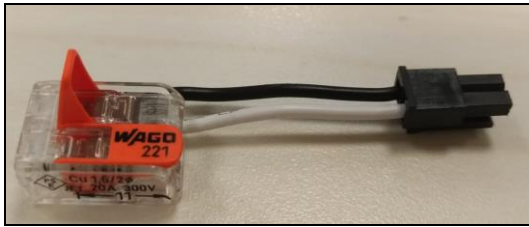
Step 2. Once you have found it, open the door and turn off the main power switch.

Step 3. Two Wago 221 Splicing Connectors are provided. Take out one connector. Pull the lever up and insert the white wire.

Step 4. Push the lever back down. The transparent housing allows you to check if the wire is connected properly. **Make sure the wire is tightly held in place before you proceed.**

Figure 1

Figure 2



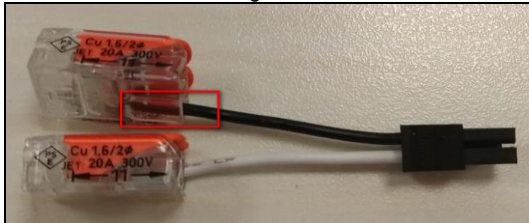
Step 5. Repeat Step 3 and Step 4 to insert the black wire. Inserting the two wires to the same side (right), as shown below, of the two connectors provides an easier installation in the following steps.

Step 6. Insert the AC wires to the two connectors respectively, as shown below. Use a pair of tweezers to turn the Battery Switch to ON position (left side), the rechargeable battery will begin to charge.

Figure 3



Figure 4



Step 7. Put the Z-Wave gateway or control panel into **Inclusion** or **Learning** mode (please refer to the Z-Wave gateway or control panel manual).

Step 8. Within 1.5 seconds, press the Function button 3 times. The Smoke Detector will emit a 2-tone beep and the LED will turn on for ~2 seconds. Refer to the operation manual of the Z-Wave gateway or control panel to complete the learn-in process.

- If the sensor has already been **included** (learnt) into another Z-Wave Gateway/Control Panel, or if the sensor is unable to be learnt into the current Z-Wave Gateway/Control Panel, please exclude it first (see **Exclusion**) before attempting to **include** it into the current Z-Wave Gateway/Control Panel.

● Removing Device (Exclusion)

The Smoke Detector must be removed from existing Z-Wave network before being included into another. There are two methods available to exclude a device.

Exclusion Mode

- Put the Z-Wave gateway or control panel into **Exclusion mode** (please refer to the Z-Wave gateway or control panel manual).
- Within 1.5 seconds, press the Function button 3 times and the Smoke Detector will be removed from the Z-Wave network.

Factory Reset

(Only use factory reset when network Control Panel/Gateway is missing or inoperable).

- Remove the batteries of the Smoke Detector first.
- Press and hold the Function button. While holding the Function button, power on the Smoke Detector by re-inserting the batteries, wait for 20 seconds to factory reset.

<NOTE>

- ☞ Before you remove or factory reset the Smoke Detector, please ensure that the device DSK information has been removed or does not exist in the gateway. If you remove or factory reset the device, but its DSK still exists in the gateway, the gateway will automatically include the device again.
- ☞ Factory resetting the Smoke Detector will restore it to factory default settings (excluded from the Z-Wave network). The Z-Wave gateway or control panel will still keep its Z-Wave settings. Please refer to the gateway or control panel manual on how to remove the Smoke Detector's Z-Wave settings.

● Range Test

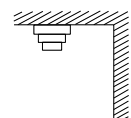
To test whether the device is able to communicate with the Z-Wave gateway or control panel:

- Put the gateway / panel into range test mode (Walk Test).
- Press the Function button on the device.
- The gateway / panel should display if the device is within the operation range (please refer to the operation manual of the gateway / panel).

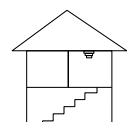
Installation

● Installation Guideline

- It is recommended that the installation site be in the center area of the ceiling.
- Do not locate the detector in the following locations:
 - The Kitchen – Smoke from cooking might cause an unwanted alarm.
 - Near a ventilating fan, florescent lamp or air-conditioning equipment – air drafts from them may affect the sensitivity of the detector.
 - Near ceiling beams or over a cabinet – stagnant air in these areas may affect the sensitivity of the detector.
 - In the peak of an “A” frame type of ceiling.



At least 60 cm from the wall



At the top of a stairway

● Installation Recommendation

- It is recommended to install the Smoke Detector in the following locations.
 - In a ceiling area with full view of its detection coverage unobstructed by appliances and furniture.
 - Near the entrance of a room or house to monitor entry activity.
- Limitations
 - Do not install the Smoke Detector exposed to direct sunlight.
 - Avoid installing the Smoke Detector in areas where devices may cause rapid change of temperature in the detection area, i.e. air conditioner, heaters, etc.
 - Avoid large obstacles in the detection area.
 - Do not point directly at sources of heat e.g. Fires or boilers, and not above radiators.
 - Avoid moving objects in the detection area i.e. curtain, wall hanging etc.

● Mounting the Smoke Detector

- The Smoke Detector is designed to be mounted on the ceiling. The ideal mounting height for the Smoke Detector is 2.7 meters to 3 meters. Mounting above 3 meters can affect detection performance.

Step 1. Before you start, find the circuit breaker or fuse box.

Step 2. Once you have found it, open the door and turn off the mains power switch.

Step 3. Place the Smoke Detector at desired mounting location and use the Range Test function to make sure the Smoke Detector can be received by the Control Panel at mounting location.

Step 4. Two Wago 221 Splicing Connectors are provided. Take out one connector. Pull the lever up and insert the white wire.

Step 5. Push the lever back down. The transparent housing allows you to check if the wire is connected properly. **Make sure the wire is tightly held in place before you proceed.**

Figure 1



Figure 2



Step 6. Repeat Step 4 and Step 5 to insert the black wire. Inserting the two wires to the same side (right), as shown below, of the two connectors provides an easier installation in the following steps.

Step 7. Insert the AC wires to the two connectors respectively, as shown below. Use a pair of tweezers to turn the Battery Switch to ON position (left side), the rechargeable battery will begin to charge.

Figure 3

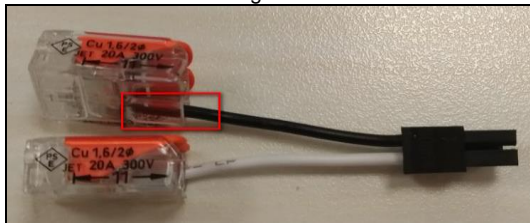


Figure 4



Step 8. Take out the mounting sheet included in the package. The picture's size equals the Smoke Detector's actual size and the perforated design allows for easy tear-off after installation.

Step 9. Position the sheet tight against the ceiling and use the four holes as template to drill holes and insert wall plugs if required.

Step 10. Place the mounting bracket on top of the mounting sheet and screw it onto the wall.

Step 11. Wipe away dust thoroughly, or it can make the sensor dirty and prevent it from operating properly in case of an emergency.

Step 12. Use a Phillips screwdriver to remove the battery compartment fixing screw. Remove the battery compartment cover and attach the cable to the PCB board of SD-29.

Step 13. Put the two Splicing Connectors in the space, as example shown below.

Figure 5



Step 14. Replace the battery compartment cover in its proper place and tighten the fixing screw. The pre-punched hole on the cover enhances its flexibility.

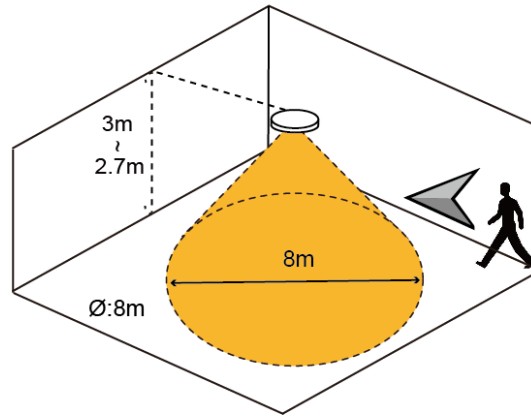
Step 15. The Smoke Detector has three notches on its back cover for easy identification.

Step 16. Hold the Smoke Detector with extra care and align the three notches with the hooks on the mounting bracket.

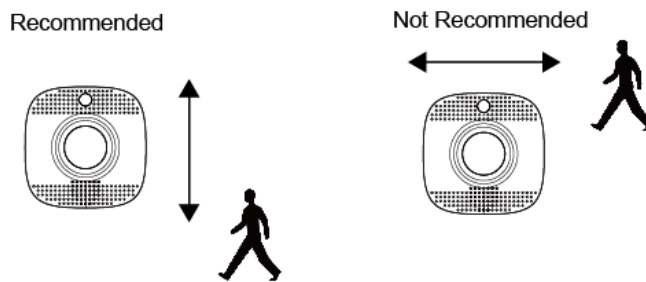
Step 17. Rotate clockwise to lock the hook.

Step 18. Installation is now complete. You can now tear off the mounting sheet.

- The Smoke Detector can support detection coverage within a radius of 4 meters. Please refer to below figures for the installation details. (SD-29-THM/SD-29-THME only)



- When mounted on the ceiling, the PIR has better detection performance against horizontal movement.



● Z-Wave Information

Device Type: Sensor – Notification Smoke Alarm

Role Type: Always on Slave (AOS)

Max Association Group: 2

Command Class Support/Control

Mandatory CC Support:

Command Class	Version	Required Security Class
Z-Wave Plus Info	1	None
Association	2	S2 Unauthenticated x
Multi Channel Association	3	S2 Unauthenticated x
Association Group Information	1	S2 Unauthenticated x
Transport Service	2	none
Version	3	S2 Unauthenticated x
Manufacturer Specific	2	S2 Unauthenticated x
Device Reset Locally	1	S2 Unauthenticated x
Power Level	1	S2 Unauthenticated x
Battery	1	S2 Unauthenticated x
Security 2	1	none
Notification	8	S2 Unauthenticated x
Sensor Multilevel	11	S2 Unauthenticated x
Supervision	1	none
Firmware Update Meta Data	4	S2 Unauthenticated x

● Z-Wave's Groups (Association Command Class Version 2)

The smoke Detector can be set to send reports to associated Z-Wave devices. It supports 2 association group.

Group 1 for "LifeLine": (maximum node: one)

Battery CC (COMMAND_CLASS_BATTERY)

Notification CC, V4 (COMMAND_CLASS_NOTIFICATION)

SensorMultilevel CC, V4 (COMMAND_CLASS_SENSOR_MULTILEVEL)

Device Reset Locally CC (COMMAND_CLASS_DEVICE_RESET_LOCALLY)

Group 2 for "Basic set": (maximum node: one)

Basic CC (COMMAND_CLASS_BASIC)

- When the Smoke Detector is active, it will send Basic Set (0xFF) in Group 2.
- When the Smoke Detector is restored, it will send Basic Set (0x00) in Group 2.

● **Command Class Data Format**

● **AC Failure/Restore: [COMMAND_CLASS_NOTIFICATION] [NOTIFICATION_REPORT]**

- When an AC power failure is detected, the SD-29 will send an AC failure signal to the Control Panel. When AC power is restored, the SD-29 will send a restore signal to the Control Panel.
- AC Failure: 00 00 00 FF 08 02 00
- AC Restore: 00 00 00 FF 08 03 00

● **Battery: [COMMAND_CLASS_BATTERY] [BATTERY_REPORT]**

- 0x64 --- 100% Battery Full
- 0x5A --- 90% Battery
- 0x50 --- 80% Battery
- 0x46 --- 70% Battery
- 0x3C --- 60% Battery
- 0x32 --- 50% Battery
- 0x28 --- 40% Battery
- 0x1E --- 30% Battery
- 0x14 --- 20% Low Battery
- 0x00 --- Battery Power not Detected
- 0xFF --- Battery Dead (Cut Off)
- Cut Off --- The device will stop working and both Red and Amber LEDs will flash every 4 seconds.
- If the battery power is not detected, the SD-29 will send 0x00 to notify the user. Please note when set as OFF, the battery will not be charged when AC power is connected and nor will it serve as a backup power source when AC power is missing.
- When AC power is applied, the rechargeable battery will be charging at the same time, and the SD-29 will report its battery percentage to the Gateway/Control Panel respectively.
- When AC power is removed or power failure takes place, the SD-29 will use its built-in rechargeable battery and report its battery percentage. After AC power is reapplied, the SD-29 will report its battery percentage detected.

● **Smoke Detection Triggered/Smoke Detection Restored: [COMMAND_CLASS_NOTIFICATION] [NOTIFICATION_REPORT]**

- Smoke Alarm Triggered: 00 00 00 FF 01 02 00 00
- Smoke Alarm Restored: 00 00 00 FF 01 00 01 02
- Smoke Alarm Silenced: 00 00 00 FF 01 06 00

● **Heat Detection Triggered/Heat Detection Restored: [COMMAND_CLASS_NOTIFICATION] [NOTIFICATION_REPORT]**

- Heat Alarm Triggered: 00 00 00 FF 04 02 00 00
- Heat Alarm Restored: 00 00 00 FF 04 00 01 02
- Heat Alarm Silenced: 00 00 00 FF 04 09 00

● **Movement Detection Triggered/Movement Detection Restored: [COMMAND_CLASS_NOTIFICATION] [NOTIFICATION_REPORT]**

- Movement Detection Triggered: 00 00 00 FF 07 08 00
- Movement Detection Restored: 00 00 00 FF 07 00 01 08

● **Tamper Open/Close report [COMMAND_CLASS_NOTIFICATION] [NOTIFICATION_REPORT]**

- The SD-29 is protected by a tamper switch which is compressed when the SD-29 is hooked onto the mounting bracket. When the SD-29 is removed from the mounting bracket, the tamper switch will be activated and the SD-29 will send a tamper open signal to the system control panel to remind the user of this condition.
- Tamper Open : 00 00 00 07 03 00
- Tamper Close: 00 00 00 07 00 01 03

● **Temperature Report: [COMMAND_CLASS_SENSOR_MULTILEVEL] [SENSOR_MULTILEVEL_REPORT]**

- The Smoke Detector can report temperature signal to the Control Panel every 30 to 33 minutes with Smoke Detector normal operating or when temperature changes by +/- 2°C.
- Temperature: 01 22 00 FA
- If temperature signal 01 22 00 FA is transmitted, 00 FA can be viewed as 0x00FA in Hexadecimal number. You can convert hexadecimal to decimal and divide by 10 to check the temperature data (in Celsius).
0x00FA=250=25.0°C.

● **Siren On/Off Control: [COMMAND_CLASS_BASIC] [BASIC_SET] [COMMAND_CLASS_SWITCH_BINARY] [BINARY_SET]**

- The siren of SD-29 can be controlled by using Basic Set On/Off commands.
- To turn on the siren by using this command, set Basic Set: 0xFF.
- To turn off the siren by using this command, set Basic Set: 0x00. **Please note this command CANNOT be used to stop the siren of a real alarm.**