Fire extinguisher Sensor Application layer Protocol

V1.8

Document information

Info	Content
Keywords	*LoRaWAN, Fire Extinguisher sensor, Application Layer, Protocol*
Abstract	This document describes LoRaWAN frame definition

Content

1 introduce

1.1 overview

This article describes in detail the application layer protocol of fire extinguishers sensor RHF1SFE2, which is compatible with the data frame structure of the application layer of RisingHF LoRaWAN products.

1.2 acronym

abbreviation	meaning
RHF1SFE2	RisingHF Fire Extinguisher Sensor
LoRa	Semtech's long-range wireless modulation technology
LoRaWAN	Long Range Wide Area Network
LAP	LoRaWAN Application Protocol
CMD	Command, command code
VAL	Value: specifies the message carried by the command code, which can be divided into multiple fields.
PWM	Pulse Width Modulation
Uplink	Uplink, the direction of transmission from end node to gateway
Downlink	Downlink, the direction of transmission from gateway to end node
equipment	Abbreviation of the node device

1.3 Refer to the documentation

a) [RHF-PS11699] RisingHF LoRaWAN Application Protocol v0.9.pdf

2 Agreement

- In order to achieve low power consumption, the data frame should be as short as possible and easy to parse
- Multi-byte domains are transmitted in little-endian mode
- The data frame infrastructure is in the form of "CMD+ VAL_0 + … + VAL_n"
  - CMD：Command
  - VALx: data carried by the command code
- There are three combinations of data frames:
  - Contains one or more fixed-length CMDs
  - Contains only one variable-length CMD
  - Contains one or more fixed-length CMDs, with the option of attaching a variable-length CMD at the end of the frame

2.1 A list of commands

CMD: Defines a type of data that can contain 0-n VAL fields, which are fixed in length for the specified CMD[1]

VAL: The data carried by the command code[2]

Command code	direction	name of command	length of the data	description
00	Uplink	CFRM	1～242	Compressed Frame
	Downlink	-	-	-
02	Uplink	PPAT	1～242	Post CMD Pattern related CMD list when report CFRM command
	Downlink	-	-	-
04	Uplink	QACK	1~242	Query ACK shake hands
	Downlink	QUERY	1～242	The CMD specified by the Query query is used to trigger a specific upstream message
05	Downlink	SMODE	1	Set Mode Set the sleeping mode
07	Uplink	DEVPARAM	3~242	Device Parameter Basic parameters of the device
	Downlink	-	-	-
0D	Uplink	ACKERR	1	ACK Error Error code of downlink command, VAL is code
0E	Uplink	ACKOK	1	The ACK OK command is successfully processed

[1] Exceptions are made for special command codes

[2] VAL 长度仅为 VAL0 ~VALn 不含 CMD

Command code	direction	name of command	length of the data	description
0F	Uplink	ALERT	2	Alert , VAL is the command code
	Downlink	-	-	-
10	Uplink	TEMP	2	Temperature Unit and resolution：0.01° C
	Downlink	STEMP	3	Set temperature parameter
12	Uplink	AP	2	Atmospheric Pressure
	Downlink	SAP	3	Set Pressure parameter
14	Uplink	ACC	1	Device Tilt Angle
	Downlink	SACC	2	Set Device Tilt Angle
90	Uplink	VER	3	Version: Device version information
	Downlink	-	-	-
95	Uplink	BAT	1	Battery Capicity Indicator
	Downlink	-	-	-
98	Uplink	TOF	2	TOF Distance TOF sensor data
	Downlink	STOF	3	Set distance parameter
9D	Uplink	ULPRD	2	Uplink Period
	Downlink	SULPRD	2	Uplink Period Configuration

3 Commands defined in details

3.1 CFRM （00）

Command code	direction	name of command	Length of data	description
00	Uplink	CFRM	1～242	Compressed Frame
	Downlink	-	-	-

Compressed Frame / Compressed data frame. The CFRM data frame can carry all the VAL fields of one or more fixed-length CMDs , removing the CMD to compress the data frames, reducing the data transfer time and thus reducing power consumption. CFRM can be used to compress data that is reported periodically.

Example: A compressed data frame containing TEMP, AP, and BAT information in order.

The name of the field	CFRM	TEMP	AP	BAT	TOF	ACC
Number of bytes	1	2	2	1	2	1
Sample content	00	2F F8	E8 03	80	E8 03	14
Example parsing		-20℃	1000kPa	50%	1000mm	20°

3.2 QUERY （04）

Command code	direction	name of command	length of data	description
04	Uplink	QACK	1~242	Query ACK shake hands
	Downlink	QUERY	1～242	The CMD specified by the Query query is used to trigger a specific upstream message

3.2.1 QUERY

Query. It is used for the server to actively query and trigger the corresponding upstream command.
Format:

name of the field	CMD	VAL0	VAL1	……	VALn
Number of bytes	1	1	1	……	1
Field definitions	QUERY	CMD	CMD	……	CMD
Value range	04	00 - FF	00 - FF		00 - FF

Queryable Instructions:

directives	Instruction type	TEMP	AP	BAT	TOF	ACC	DPARAM	VER	ULPRD	PPAT
	Command code	0x10	0x12	0x95	0x98	0x14	0x07	0x90	0x9D	0x02

Example:

name of the field	QUERY	TEMP	AP	BAT
Number of bytes	1	1	1	1
Sample content	04	0x10	0x12	0x95

The module automatically removes erroneous, duplicate, or unqueryable commands.If the resulting query list is empty after processing, it returns ACKERR (see the ACKERR section for details).If the inquiry command is valid, it returns QACK (see the QACK example for this response).

3.2.2 QACK

Query ACK / Query Handshake. This command is used to respond to a Query instruction. The QACK response must include the queried content within the same data packet. The order of returned data corresponds to the order of the CMD fields in the original QUERY instruction, and parsing must follow that CMD sequence.

Format:

name of the field	CMD
Number of bytes	1
Field definitions	QACK
Value range	04

Example:

name of the field	QUERY	TEMP	AP	BAT
Number of bytes	1	2	2	1

Sample content	04	2F F8	E8 03	80
Example parsing		-20℃	1000Kpa	50%

3.3 PPAT / GPAT (02)

Command code	direction	name of command	length of data	description
02	Uplink	PPAT	1 ~ 242	Post CMD Pattern related CMD list when report CFRM command
	Downlink	-	-	-

Post CMD Pattern / Reports a list of CMDs associated with the CFRM directive. PPAT is used for node devices to report the CMD combination associated with their CFRM commands, and the CMD sequence is related to the VAL order of the compression commands. PPAT can carry variable-length VAL information, and each byte of the VAL field is CMD.

Format:

name of the field	CMD	VAL0	VAL1	……	VALn
Number of bytes	1	1	1	……	1
Field definitions	PPAT	CMD	CMD	……	CMD
Value range	02	00 - FF	00 - FF		00 - FF

VALn can be taken up to 242.

Example: A list of CMDs associated with compressed data frames containing TEMP, AP, BAT,TOF,ACCinformation in order.

name of the field	PPAT	TEMP	AP	BAT	TOF	ACC
Number of bytes	1	1	1	1	1	1
Sample Content (Command Code)	02	10	12	95	98	14

3.4 DPARAM（07）

Command code	direction	name of command	length of data	description
07	Uplink	DPARAM	3~242	Device Parameter
	Downlink	-	-	-

DPARAM/Device Basic Parameters. Includes VER (0x90) software version and hardware version, ULPRD (0x9D) device reporting interval, and PPAT (0x02) the CMD group associated with periodic device upload information. Used by the server to update device parameters.
The server may use the following commands to query:

Format:

The name of the field	CMD	VAL0
Number of bytes	1	1
Field definitions	DPARAM	CMD
Value range	04	07

Receive:

Number of bytes	1	1	3	1	2	1	4
Field definitions	DPARAM	SEE	DATA	ULPRD	DATA	PPAT	DATA
Value range	04	90	*	9D	*	02	*

3.5 ACKERR （0D） & ACKOK （0E）

Command code	direction	name of command	length of data	description
0D	Uplink/Downlink	ACKERR	1	The ACK Error command is used to handle the error, and VAL is the instruction code

0E	Uplink/Downlink	ACKOK	1	The ACK OK command is successfully processed

3.5.1 ACKERR

ACKERR / Error Response. Setup or control instructions are handling errors.

Format:

name of the field	CMD	VAL0
Number of bytes	1	1
Field definitions	ACKERR	CMD
Value range	0D	00 - FF

Example:

name of the field	ACKERR	CMD
Number of bytes	1	1
Sample content	0D	FF

ACKERR INSTRUCTIONS DO NOT REQUIRE ADDITIONAL REPLIES FROM THE RECEIVER AND ARE NOTIFICATION INSTRUCTIONS.

3.5.2 ACKOK

ACKOK / Successful Reply. Setup or control instructions are handling errors.

Format:

name of the field	CMD	VAL0
Number of bytes	1	1
Field definitions	ACKOK	CMD
Value range	0E	00 - FF

Example:

name of the field	ACKOK	CMD
Number of bytes	1	1
Sample	0E	20

content		

ACKOK commands do not require additional replies from the receiver and are notification commands.

3.6 ALERT / SALERT（0F）

Command code	direction	name of command	length of data	description
0F	Uplink	ALERT	2	Alert, VAL is the command code
	Downlink	-	-	-

Alert. Alerts are generated for certain messages, such as threshold exceeded, intrusion alarms, and so on.

Format:

name of the field	CMD	VAL0	VAL1
Number of bytes	1	1	1
Field definitions	ALERT	KIND	TYPE
Value range	0F	00 - FF	00-FF

Field definitions	Conditions of Use	usage
KIND	The type of alarm	Bit 7 - 0：alarm type Command words that can generate alarms;
TYPE	The type of alarm	Bit 7 - 0： 0: The upper limit threshold is exceeded 1: The set lower threshold is exceeded 2: Rapid threshold-exceedance alarm 3: Slow threshold-exceedance alarm 4: Sensor-interrupt–triggered alarm 5- FF: Reserved

Example:

Rapid Temperature Rise Alarm.

name of the field	ALERT	KIND	TYPE
Number of	1	1	1

bytes			
Sample content	0F	10	02

Slow Leak Alarm.

name of the field	ALERT	KIND	TYPE
Number of bytes	1	1	1
Sample content	0F	12	03

3.7 SMODE (05)

Set Mode / Sets the working mode.

Format:

The name of the field	CMD	VAL0
Number of bytes	1	1
Field definitions	SMODE	mode
Value range	05	00

Example:Send Sleep Command While Device Is Active.

The name of the field	SMODE	Mode
Number of bytes	1	1
Sample content	05	00

If the SMODE is processed correctly, reply to ACKOK. OTHERWISE, REPLY TO THE ACKERR.

3.8 TEMP / STEMP （10）

Command code	direction	name of command	length of data	description
10	Uplink	TEMP	2	Temperature reported temp，with 0.01°C resolution
	Downlink	STEMP	3	Set temperature parameter, with 0.01°C resolution

Temperature. The node device uploads temperature information.

Format:

name of field	CMD	VAL0
Number of bytes	1	2
Field definitions	TEMP	t
Value range	10	0000 - FFFF

t: temperature value. 0000-FFFF, signed 16-bit integer, unit 0.01 ℃. $T = t * 0.01$ ℃

Examples:

name of field	TEMP	VAL
Number of bytes	1	2
Sample content	10	C4 09
Data parsing		25 degrees Celsius

Set temperature parameter. Instructions sent by the gateway to set temperature parameters.

Format:

name of field	CMD	VAL0	VAL1
Number of bytes	1	1	2
Field definitions	STEMP	Function Code	t
Value range	10	0x01/0x04	0000 - FFFF

t: Temperature value. Range 0000－FFFF, signed 16- bit integer, unit 0.01 ° C.

Function Code: Use 0x01 when the gateway needs to send the device’s maximum temperature limit.Use 0x04 when sending the temperature step size (the device will trigger a rapid temperature-rise alarm if the ambient temperature increases by more than the configured step size within 5 s).

Examples: Gateway → Device: Command to set the temperature step size to 5 ° C

name of field	STEMP	VAL0	VAL1
Number of bytes	1	1	2
Sample content	10	04	F4 01
Data parsing		Function Code for Step Size Setting	5℃

Examples： Gateway → Device: Command to set the maximum temperature to 55 ° C

name of field	STEMP	VAL0	VAL1
Number of bytes	1	1	2

Sample content	10	01	7C 15
Data parsing		Function Code for Upper Limit Setting	55℃

3.9 TOF/STOF (98)

Command code	direction	name of command	length of data	description
98	Uplink	TOF	2	TOF sensor distance Distance
	Downlink	STOF	3	Set distance parameter

TOF sensor distance :Upload Obstacle Distance Information

Format:

name of the field	CMD	VAL0
Number of bytes	1	2
Field definitions	GREAT	n
Value range	98	0000 - 07D0

t: distance value. 0000-07D0 (1mm~2000mm), unsigned 16-digit integer, unit 1mm.

Example: Set the lower limit of the distance to 1000mm

name of the field	GREAT	VAL0	VAL1
Number of bytes	1	1	2
Sample content	98	02	E8 03
Data parsing		Function Code for Lower Limit Setting	1000mm

3.10 AP / SAP （12）

Command code	direction	name of command	length of data	description

12	Uplink	AP	2	Atmospheric Pressure Pressure
	Downlink	SAP	3	Set Pressure

Atmospheric Pressure / Pressure.The node device uploads barometric pressure information.

Format:

name of the field	CMD	VAL0
Number of bytes	1	2
Field definitions	AP	n
Value range	12	0000 - FFFF

t: barometric pressure value. 0000-FFFF, unsigned 16-bit integer in 1kPa**.**

Examples:

name of the field	AP	VAL
Number of bytes	1	2
Sample content	12	14 05
Data parsing		1300kPa

Set Pressure. Gateway → Device: Command to Set Barometric Pressure Parameters.

Format:

name of field	CMD	VAL0	VAL1
Number of bytes	1	1	2
Field definitions	SAP	Function Code	Pressure
Value range	12	0x02/0x04	0000 - FFFF

t: Temperature value. Range 0000 - FFFF, signed 16- bit integer, unit 0.01 ° C.

Function Code: Use 0x02 when the gateway needs to send the lower pressure limit to the device.Use 0x04 when sending the barometric pressure step size.(Pressure Step Size: A slow leak alarm will be triggered if the pressure drops by more than the configured step size within 24 hours.)

Examples: Gateway → Device: Command to Set Barometric Pressure Step Size to 60 kPa

name of field	STEMP	VAL0	VAL1
Number of bytes	1	1	2
Sample content	12	04	3C 00

Data parsing		Function Code for Step Size Setting	60Kpa

Examples： Gateway → Device — Command to Set Barometric Pressure Lower Limit to 1000 kPa

name of field	STEMP	VAL0	VAL1
Number of bytes	1	1	2
Sample content	12	02	E8 03
Data parsing		Function Code for Lower Limit Setting	1000Kpa

3.11 ACC / SACC （14）

Command code	direction	name of command	length of data	description
14	Uplink	ACC	1	Device Tilt Angle
	Downlink	SACC	2	Set tilt angle threshold

Device Tilt Angle. The node device uploads the device’s tilt angle.

Format:

name of the field	CMD	VAL0
Number of bytes	1	1
Field definitions	ACC	Angle
Value range	14	00- B6

Device Tilt Angle, 00- B6,number-16 shaped

Examples:

name of the field	AP	VAL0
Number of bytes	1	1
Sample content	14	0F
Data parsing		15°

Set tilt angle threshold : The gateway sends the tilt angle threshold to the device. When the device’s tilt angle exceeds the configured threshold, it is considered to have tipped over, and a tilt alarm will be reported.

Format:

name of the field	CMD	VAL0	VAL1
Number of bytes	1	1	1
Field definitions	SACC	Function Code for Upper Limit Setting	Angle
Value range	14	01	00-B6

Angle:Tilt Angle Value: 00－B6, signed 16-bit integer

Examples: Gateway → Device: Command to Set Maximum Tilt Angle to 35°

name of the field	CMD	VAL0	VAL1
Number of bytes	1	1	1
Sample content	14	01	23
Data parsing		Function Code for Upper Limit Setting	35°

3.12 VER (90)

Command code	direction	name of command	length of data	description
90	Uplink	VER	3	Version Device version information
	Downlink	-	-	-

Version inforation。

Format:

name of the field	CMD	VAL0
Number of bytes	1	3
Field definitions	VER	DATA
Value range	90	000000 - FFFFFF

Field definitions	Conditions of Use	usage
DATA	All cases	Bit 20 - 18：HW major version 0 - 7 Bit 17 - 16：HW minor version 0 - 3 Bit 15 - 12: Software major version number 0 - 15 Bit 11 - 8: Software minor version number 0 - 15 Bit 7 - 0: Patch version number 0 - 255

3.13 BAT / SBAT (95)

Command code	direction	name of command	length of data	description
95	Uplink	BEATS	1	Battery Capacity Indicator
	Downlink	SBAT	-	-

Battery capacity。

Format:

name of the field	CMD	VAL0
Number of bytes	1	1
Field definitions	BEATS	DATA
Value range	95	00 - FF

Field definitions	value	usage
DATA[7:0]	00	mains supply
	01 - FE	01 -> 0% … FE -> 100% (The ratio of the HEX value converted to DEC and 254 represents the current battery percentage.)
	FF	The battery level is unknown

3.14 ULPRD / SULPRD （9D）

Command code	direction	name of command	length of data	description
9D	Uplink	ULPRD	2	Uplink Period

	Downlink	SULPRD	2	Uplink Period Set the escalation period

3.14.1 ULPRD

Uplink Period

Format:

name of the field	CMD	VAL0
Number of bytes	1	2
Field definitions	ULPRD	DATA
Value range	9D	0000 - FFFF

Field definitions	value	usage
DATA[16:0]	0000 - FFFF	Escalation cycle time. Algorithm: <= 28800：unit: 1s i.e. (DATA * 1)s <= (28800 + 36735 = 65535)：unit: 5s 即((DATA - 28800) * 5)s

3.14.1 SULPRD

Set Uplink Period

Format:

name of the field	CMD	VAL0
Number of bytes	1	2
Field definitions	SULPRD	DATA
Value range	9D	0000 - FFFF

Field definitions	value	usage
DATA[16:0]	0000 - FFFF	Escalation cycle time. Algorithm: <= 28800：Unit: 1 s i.e. DATA*1)s <= (28800 + 36735 = 65535)：Unit: 5 s => ((DATA - 28800) * 5)s

If the SULPRD is processed correctly, reply to ACKOK. OTHERWISE, REPLY TO THE ACKERR.

4 Workflows and Protocol Usage

4.1 The terminal triggers an alarm

When the terminal triggers an alarm, the terminal sends the ALERT command upstream.

Rapid Leak Warning(Warning occurred: 0F; Warning Command: Pressure 0x12; Warning Type: Rapid Threshold Exceedance 0x02):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	2F F8	E8 03	80	E8 03	14	0F	12	02
Data parsing		-20℃	1000kPa	50%	1000mm	20°			

Slow Leak Warning(Warning occurred: 0F; Warning Command: Pressure 0x12; Warning Type: Slow Threshold Exceedance 0x03):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	2F F8	E8 03	80	E8 03	14	0F	12	03
Data parsing		-20℃	1000kPa	50%	1000mm	20°			

Low Pressure Warning(Warning occurred: 0F; Warning Command: Pressure 0x12; Warning Type: Below Lower Threshold 0x01):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	2F F8	84 03	80	E8 03	14	0F	12	01
Data parsing		-20℃	900kPa	50%	1000mm	20°			

Obstruction Warning(Warning occurred: 0F; Warning Command: Distance 0x98; Warning Type: Below Lower Threshold Alarm 0x01):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	2F F8	E8 03	80	84 03	14	0F	98	01

Data parsing		-20℃	1000kPa	50%	900mm	20°			

High Temperature Warning(Warning occurred: 0F; Warning Command: Temperature 0x10; Warning Type: Exceeds Upper Threshold 0x00):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	70 17	E8 03	80	E8 03	14	0F	10	00
Data parsing		60℃	1000kPa	50%	1000mm	20°			

Rapid Temperature Rise Warning(Warning occurred: 0F; Warning Command: Temperature 0x10; Warning Type: Rapid Step Threshold Exceedance 0x02):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	88 13	E8 03	80	E8 03	14	0F	10	02
Data parsing		50℃	1000kPa	50%	1000mm	20°			

Displacement Warning(Warning occurred: 0F; Warning Command: ACC 0x14; Warning Type: Sensor-Interrupt–Triggered Alarm 0x04):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	2F F8	E8 03	80	E8 03	14	0F	14	04
Data parsing		-20℃	1000kPa	50%	1000mm	20°			

Device Tilt Warning(Warning occurred: 0F; Warning Command: ACC 0x14; Warning Type: Exceeds Upper Threshold 0x00):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	2F F8	E8 03	80	E8 03	2D	0F	14	00
Data parsing		-20℃	1000kPa	50%	1000mm	45°			

Low Battery Warning(Warning occurred: 0F; Warning Command: 0x95; Warning Type: Below Lower Threshold 0x01):

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1
Sample content	00	2F F8	E8 03	3F	E8 03	14	0F	95	01
Data parsing		-20℃	1000kPa	25%	1000mm	20°			

Example: Multiple alarms uploaded simultaneously — Rapid Temperature Rise Warning + Displacement Warning:

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC	ALERT	KIND	TYPE	ALERT	KIND	TYPE
Number of bytes	1	2	2	1	2	1	1	1	1	1	1	1
Sample content	00	88 13	E8 03	80	E8 03	14	0F	10	02	0F	14	04
Data parsing		50℃	1000 kPa	50%	1000 mm	20°						

5 Deployment mode, process, and protocol usage

5.1 Terminal data reporting

After the reporting cycle is configured, the terminal enters the normal working state and reports the heartbeat data of CFRM commands on a periodic basis.

Example: A compressed data frame containing TEMP, AP, BAT,TOF information in order.

name of the field	CFRM	TEMP	AP	BAT	TOF	ACC
Number of bytes	1	2	2	1	2	1
Sample content	00	2F F8	E8 03	80	E803	14
Example parsing		-20℃	1000kPa	50%	1000mm	20°

5.2 Modify the escalation period

The app runs the SULPRD command to modify the reporting cycle of the terminal

Example: Set the reporting cycle to once every 30 seconds, and send content 9D 1E 00

name of the field	SULPRD	VAL0
Number of bytes	1	2
Sample content	9D	1E 00
Example parsing		30 seconds

5.3 Request data reporting

The app uses the QUERY command to request the device to report data

Example: Querying device information

name of the field	QUERY	TEMP	AP	BAT	TOF	ACC
Number of bytes	1	1	1	1	1	1
Sample content	04	0x10	0x12	0x95	0x98	0x14

Example: The device returns data

name of the field	QACK	TEMP	AP	BAT	TOF	ACC
Number of bytes	1	2	2	1	2	1
Sample content	04	2F F8	E8 03	80	E803	0F
Example parsing		-20℃	1000kPa	50%	1000mm	15°

5.4 Modify the status of the work

The app modifies the working status of the terminal through the SMODE command running down the protocol

Example: Configure a device to go to sleep

name of the field	SMODE	VAL0
Number of bytes	1	1
Sample content	05	00
Example parsing		Hibernate mode

Revision

V1.8 2025-05-07
- Modified protocols for temperature, pressure, and distance parameter settings
- Unified alarm codes
- Standardized function codes for parameter downlink
- Added device tilt angle reporting

V1.7 2025-04-21
- Update the accelerometer sensor’s uploaded data to report the device’s tilt angle
- Add an example for the new device tilt warning
- Remove commands for features that are not enabled

V1.6 2025-03-13
- Updated TOF sensor function commands

V1.5 2020-06-22
- Updated the description of some commands and deployment modes

V1.4 2020-01-10
- Added Barometric Pressure Warning 03 type to distinguish between fast and slow air leaks

V1.3 2019-12-17
- Disable the reporting of device information after network access
- Modify the content of the CFRM dataframe
- Modify the content of the data report triggered by the warning

V1.2 2019-12-3
- Added detailed definitions of some commands
- Added BAT command for the second stage of power reporting and backup

V1.1 2019-11-15
- Updated the content of the triggered alarm and the frame of the heartbeat data

V1.0 2019-11-12
- first draft

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