

Atomsenses LoRaWAN Indoor Ambiance Monitoring Sensor

Configuration Guide V1.04

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1.General

1.1 Applicability

This guide applies to the following sensors, unless otherwise specified:

Model	Description
AS-201 AS202/AS203/AS- 204	 AS-10x : Indoor Ambiance Sensor (3-IN-1 functional series) AS-20x : Indoor Ambiance Sensor (advanced series) ES-10x : Indoor Ambiance Sensor (advanced series)
IAQ Combo Flex	Indoor Ambiance Sensor (Sensors of your choice)

1.2 Declaration of Conformity

Atomsenses sensors comply with the essential requirements and relevant provisions of CE/EMC, and RoHS standards.

1.3 Device EUI and information

Each device is shipped with a sticker with the default device EUI, below is an example of AS-201 :



2. Connect to LoRaWAN network

2.1 How it works

By default, the sensor is configured in LoRaWAN OTAA Class A mode and has OTAA keys for joining the LoRaWAN network. To connect to a local LoRaWAN network, input the OTAA keys in the LoRaWAN IoT server and press the button to activate the sensor. It will then automatically join the network via OTAA and start sending sensor values. The default uplink interval is 20 minutes.

2.2 Connect to LoRaWAN server - ChirpStack

The following is an example of joining the ChirpStack V4. Assuming the LoRaWAN gateway is already connected:

Step 1: Add device profile with the corresponding region:

IAQ_AII	AQ_AII device profile id: d45f6cf0-47b8-422c-b1b4-0493d27ba37b								Delete device profile
General	Join (OTAA / ABP)	Class-B	Class-C	Codec	Relay	Tags	Measurements		Select device-profile template
* Name									
IAQ_AII									
Description	n								
									4
* Region								Region configuration ③	
AS923								A\$923	
* MAC ver	sion ③							• Regional parameters revision ③	
LoRaWA	N 1.0.2							A	
* ADR algo	orithm 💿								
Default #	ADR algorithm (LoRa o	nly)							
Flush queu	e on activate ⊘							* Expected uplink interval (secs) ⑦	
								3600	

And update Payload codec functions, you can find the corresponding codec function in github: <u>https://github.com/atomsenses/atomsenses-decoder</u> Click "And device" under Applications – find the corresponding application, enter Device EUI/DevEUI which can be found from the sticker on the sensor, then input Join EUI, and select the previously created device profile :

IAQ_3in1 device eui: fffff100004b/7d	Delete devi	ce
Dashboard Configuration OTAA keys Activation Queue Events LoRaWAN frames		
Device Tags Variables		
* Name		
IAQ_3in1		
Description		le
Device EUI (EUI64)	Join EUI (EUI64) 🕥	
fffff100004bf7d	00000000000000000000000000000000000000	
Device profile IAQ All		
	Uisable frame-counter validation 🕑	
Submit		

Step 2: Add APP Key

App Key will be sent via email (usually it's included in the shipping

notification email)

Device will be in OTA mode by factory setting.

Navigate to "OTAA Keys" then enter App Key:



Step 3 : Activate the sensor

Press the button to restart the device. It will then attempt to join the LoRaWAN network. Upon successful join, it will start uploading messages. You can view the messages on Events & LoRaWAN Frames screen.

2.3 Connect to LoRaWAN server – The Things Network

The following is an example of joining the. Assuming the LoRaWAN gateway is already connected to TTN network :

Step 1: Create a device in TTN with the sensor OTAA keys.

Register the device – Add DevEUI

Navigate to TTN console and click "Register end device", then input JoinEUI (e.g.: as below), then enter DevEUI which can be found from the sticker on the sensor:

THE THINGS STACK SANDBOX	Applications > Atomsenses-id > End devices > Register end device
	Input method 🗇
Home Applications Gateways	Select the end device in the LoRaWAN Device Repository
Q Search Ctrl K	Enter end device specifics manually
	Frequency plan ⑦*
← Atomsenses-id	Asia 920-923 MHz
	LoRaWAN version 🕲 *
Application overview	LoRaWAN Specification 1.0.2
End devices	Designal Desamptage version (2)
E Live data	REGIONAL Parameters Version O
Payload formatters	
\Lambda Integrations 🗸 🗸	Show advanced activation, LoRaWAN class and cluster settings
Collaborators	
🖉 API keys	
General settings	Provisioning information
Top end devices +	JoinEUI [®] *
atomsenses-as201-3in1	00 00 00 00 00 00 01 Reset
	This end device can be registered on the network
	DevEUI ⑦*
	C Generate 1/50 used
	АррКеу ⁽¹⁾ *
	••••••••••••••••••••••••••••••••••••••
	End device ID ^(*) *
	my-new-device
	After registration
	View registered end device
	Register another end device of this type
() Resources > au1 • v3.32.1.6738267293	Register end device

Add APP Key

App Key will be sent via email (usually it's included in the shipping notification email)

Device will be in OTA mode by factory setting.

Setup Payload decoder

update Payload codec functions, you can find the corresponding codec

function in github : https://github.com/atomsenses/atomsenses-decoder



Step 2: Activate the sensor

Press the button to restart the device. It will then attempt to join the LoRaWAN network. Upon successful join, it will start uploading messages to TTN. You can view the messages on the TTN end device Live Data screen.

3.Data Report

3.1 Payload Definition

Туре	Id	Length	Description
Temperature	01	4	temperature, unit: °C
Humidity	02	4	humidity, unit: %RH
Pressure	03	4	pressure, unit: hPa
PM1.0	04	4	pm1_0, unit: ug/m^3
PM2.5	05	4	pm1_0, unit: ug/m^3
PM10	06	4	pm1_0, unit: ug/m^3
CO2	07	4	co2, unit: ppm
TVOC	08	4	tvoc, unit: mg/m^3
Light	09	4	light, unit: lux
H2S	11	4	h2s, unit: ppm
NH3	12	4	nh3, unit: ppm
СО	13	4	co, unit: ppm
НСНО	14	4	hcho, unit: ppb
03	15	4	o3, unit: ppb
NO2	16	4	no2, unit: ppm
SO2	17	4	so2, unit: ppm
Voltage	20	4	voltage, unit: V

3.2 Example of PayloadData

0141d50d780242771974030000662704000000e05000001306000001307000040808000000009000032911000000012000000013000000014000001815000000116000000217000000820405c55cc

1. { 2. "Temperature": 26.632, "Humidity": 61.775, 3. "Pressure": 1008.6, 4. 5. "PM1 0": 14, 6. "PM2 5": 19, "PM10": 19, 7. 8. "CO2": 1032, "TVOC": 0, 9. 10. "Light": 809, "H2S": 0, 11. "NH3": 0, 12. "CO2": 0, 13. 14. "HCHO": 0, "<mark>03</mark>": 0, 15. "NO2": 0.024, 16. "SO2": 0.008, 17. "Voltage": 3.443 18. 19.}

4.IAQ Command

4.1 CMD A0: Upload interval setting

Header 1	Header 2	CMD	Value [0]	Value [1]	Checksum	Checksum
0xFF	0x00	0xA0	XX	XX	CRC High	CRC Low

Value [0]: Value High

Value [1]: Value Low

Set the upload interval to 600 seconds (10 minutes)

e.g. FF00A0025830AC

4.2 CMD A2: MCU reset

Header 1	Header 2	CMD	Value [0]	Value [1]	Checksum	Checksum
0xFF	0x00	0xA1	Reserved	Reserved	CRC High	CRC Low

Reset MCU and Lora, note the all the parameter remain unchanged

e.g. FF00A2000091F6

4.3 CMD A3: LoRa setting

Header 1	Header 2	CMD	Value [0]	Value [1]	Checksum	Checksum
0xFF	0x00	0xA3	Reserved	XX	CRC High	CRC Low

Value [1]:

00 - Disable

01-Enable

Enable ADR function

e.g. FF00A3000101F6

4.4 CMD A4: Offset

CMD C0: Temperature offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC0	XX	CRC Low	CRC High

Value: Temperature offset * 10 (in signed char format)

e.g. Temperature + 2.0 degree Celsius: 0x14

Command line: FF00C014603F

CMD C1: Humidity offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC1	XX	CRC Low	CRC High

Value: Humidity offset * 10 (in signed char format)

e.g. Humidity -1.0%: 0xF6

Command line: FF00C1F6E1E6

CMD C2: Pressure offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC2	XX	CRC Low	CRC High

Value: Pressure offset (in signed char format)

e.g. Pressure + 15 hPa: 0x0F

Command line: FF00C20F2154

CMD C3: CO2 offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC3	XX	CRC Low	CRC High

Value: CO2 offset / 10 (in signed char format)

e.g. CO2 -350 ppm: 0xDD

Command line: FF00C3DDA099

CMD C4: TVOC offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC4	XX	CRC Low	CRC High

Value: TVOC offset * 100(in signed char format)

e.g. TVOC -0.34 ppb: 0xDE

Command line: FF00C4DEE2A8

CMD C5-C7: PM1/2.5/10 offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC5	XX	CRC Low	CRC High

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC6	XX	CRC Low	CRC High

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC7	XX	CRC Low	CRC High

Value: PM10 offset (in signed char format)

e.g. PM1 +33: 0x21

Command line: FF00C721A218

4.5 Change APPKEY

Header 1	Header 2	CMD	APPKEY [0-15]	Checksum	Checksum
0xFF	0x00	0xB0	XX	CRC High	CRC Low

e.g. FF00B000112233445566778899AABBCCDDEEFFDCE4