



atim cloud wireless™
PRODUCT LINE

Atim Cloud Wireless®

Temperature and hygrometry sensor

User guide



Models concerned :

ACW/LW8-THX

ACW/SF8-THX



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This user guide is applicable to the following references

	Product reference	Product Version (Visible on the product label)
LoRaWAN	ACW/LW8-THX	B.2
Sigfox	ACW/SF8-THX	B.2

Version history of this document

Version	Date	Description	Author	Software version concerned /Revision
1.0	17/01/2022	Creation of the document	YL	V1.0.2 / B1

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Declaration of conformity

All ACW (Atim Cloud Wireless®) products comply with the regulatory requirements of the R&TTE Directive 1999/5/EC Article 3 :



1 Safety (Article 3.1a of Directive 1999/5/EC)

NF EN60950-1 Ed. 2006/A1:2010/A11:2009/A12:2011 (health)

EN62479: 2010 (power <20mW) or EN62311:2008 (power > 20mW)

2 Electromagnetic compatibility (Article 3.1b of Directive 1999/5/EC)

EN 301489-3 v1.4.1, EN 301489-1 V1.9.2

3 Efficient use of the radio frequency spectrum (Article 3.2 of Directive 1999/5/EC)

ETSI EN300 220-2 v2.4.1 and EN300 220-1 v2.4.1

Environmental recommendations

a. Environment

Observe the storage and operating temperature ranges of the products. Failure to do so may result in operational disruption and even damage to the equipment. This equipment is not designed for an outdoor environment !

Follow the precautions and instructions listed below to ensure your safety and that of your environment and to prevent damage to your equipment.



General Danger - *If instructions are not followed, there is a risk of damage to equipment.*



WARNING : *Do not install near any heat source or near any moisture source.*



This symbol on the product or its packaging indicates that this product should not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste by taking it to a designated collection point for the recycling of electrical and electronic equipment. Separate collection and recycling of your waste at the time of disposal will help conserve natural resources and ensure environmentally and human health friendly recycling. For more information on the nearest recycling center to your home, contact the nearest city hall, the household waste disposal service or the store where you purchased the product.

b. Radio

The modems of the ACW series are part of the radiocommunication modems using the ISM (Industrial Scientific Medical) bands which can be used freely (free of charge and without authorization) for industrial, scientific and medical applications.

Technical specifications

a. Product

Dimensions	80 x 80 x 35 mm	
Antenna	Integrated (¼ wave)	
Temperature	-20°C to +55°C (operating)	
	-40°C to +70°C (storage)	
Fastening	Mural	
Box	Home automation	
Power supply	1 pack of Lithium batteries 3,6V / 7,2 Ah	
Weight	100 g	
Frequency	863 – 870 MHz	
Power	25 mW (14 dBm)	
Radio version	Sigfox : v2.8.1	
	LoRaWan : v1.0.2 revB	
Flow rate	Sigfox : 100 bits/s	
	LoRaWAN : 250 bit/s to 5.5 Kbit/s	
Consumption	Sigfox	LoRaWAN
Tx mode	60mA	30 mA
Storage mode	15 µA	15 µA
Rx mode	50mA	5 mA

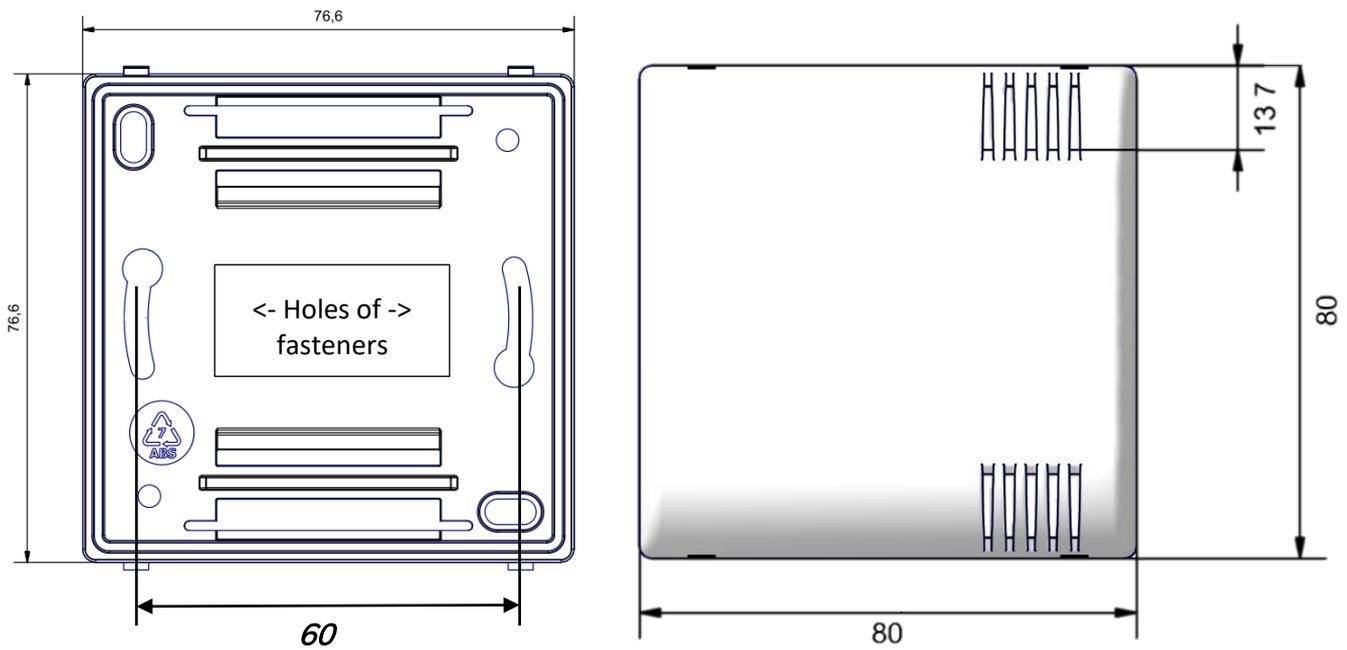
b. Functions of the integrated sensors

Temperature sensor	
Track	-40°C to +125 °C
Resolution	0,01°C
Accuracy between -40°C and +80°C	+/- 0.2°C

Capteur d'humidité	
Track	0 to 100 %RH
Resolution	0,01 %RH
Accuracy between 0 %RHC and 100 %RH (Operating range)	+/- 2 %RH

Box

a. Footprint



b. Fastening

The ACW-THX is fixed to a wall with two screws that fit into the two fixing holes at the back of the case.

The holes of the cover must be on the right, in the same direction as the picture below.

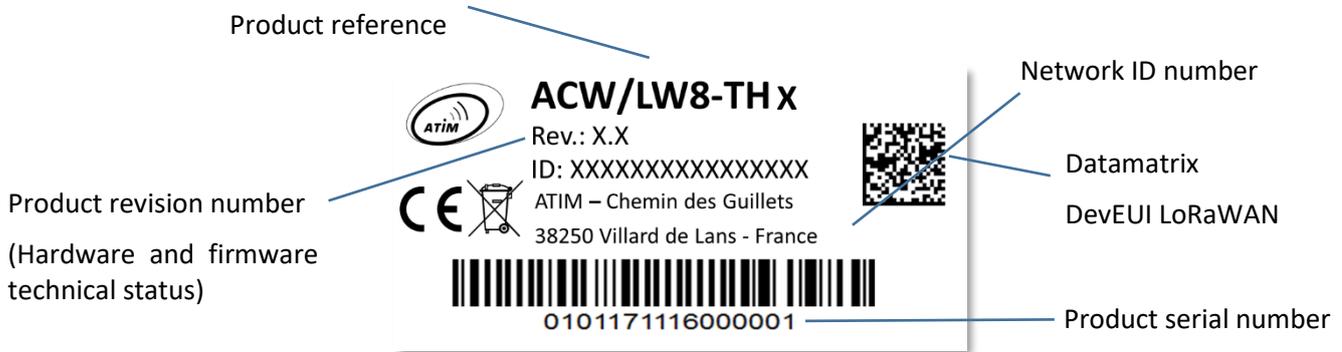


c. Installation

For best results, it is recommended to install the box without environmental obstruction and to place it at a height of about 1.5m. For information, the antenna is integrated in the box. It should be mounted on a vertical support, or fixed to a wall.

d. Identification

The Sigfox or LoRaWAN identifier of the product is visible on the external label on the back of the product, inside on the electronic board, and in the status bar of the ACW configurator. For LoRaWAN modems, the communication keys are automatically given by the network (pairing by "Over The Air Activation", or OTAA).



ACW/LW8-THX label

Operation

a. Mode of operation

To find out the status of the product, you just need to pass a magnet briefly (<2 sec) against the QR CODE label, which causes the LED to light up. The color of the LED indicates the operating mode of the product as described:

 **Storage mode** : When you take the product out of its packaging, it is by default in this storage mode, which optimizes the life of the batteries by avoiding their oxidation. The product does not emit and waits patiently for you to wake it up.

 **Network pairing mode** : This mode is active as soon as the product leaves the storage mode and allows the pairing to a network (automatic in case of battery change).

 **Configuration mode** : This mode is active 5 minutes after the exit of the storage mode and authorizes the configuration of the product in Bluetooth thanks to the PC configurator or to the mobile application ATIM. During these 5 minutes messages are sent by radio every minute (5 "radio frames"), that allows you to check that the product works well, for example after having placed it under a cast iron manhole. After this period, the product goes into operation mode and the Bluetooth is deactivated (possibility to reactivate it via Downlink).

 **Operating mode** : This is the default mode after the product start-up phase. In this mode, the module periodically sends measurements according to the configuration applied (if the product has never been configured, the factory configuration applies, see Factory Configuration).

 **Internal fault mode** : This mode allows the normal operation of the module to be interrupted when a critical event occurs. The nature of the event can be multiple:

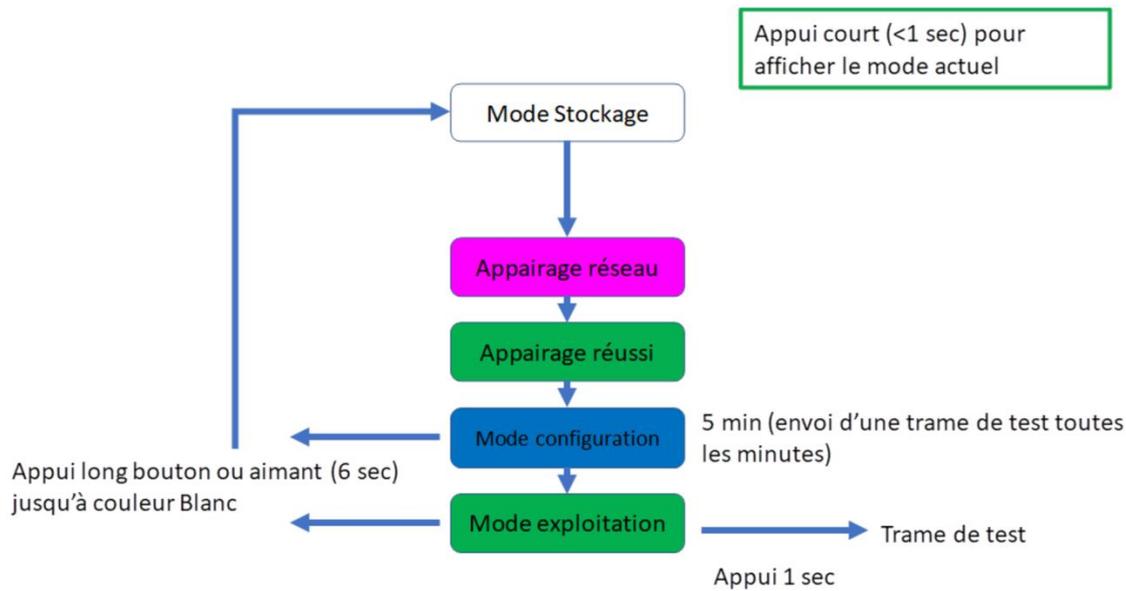
- Battery empty (Battery voltage < 2.2V)
- Internal error of the radio module
- System error

The entry in this "Internal Fault" mode is signaled by a **RED** flashing of the product LED

If the error does not come from the radio module, the product will send a radio frame every 24 hours containing the or the error codes (see chapter Frame format for error codes). In addition, the product will emit a warning light depending on the nature of the event.

Once in this mode, the module must be restarted (by disconnecting and reconnecting the battery, by Downlink command or with the magnet) to regain normal operation.

b. Putting the product into service



○ Unless otherwise requested, ACW products are delivered with batteries connected and set to "storage" mode.

● To place the product in its operating mode, hold a magnet against the QR CODE label for 6 seconds. During these six seconds, the product's LED should blink **WHITE** and then **GREEN** at the end of the six seconds to indicate that the product has been successfully switched on. L'ACW rentre alors en phase d'appairage au réseau. Durant cette phase, un signal lumineux **FUSCHIA** avec un effet de fondu indique que la phase de recherche est en cours.

If the connection is successful, the product will emit a light signal indicating the quality of the network :

- **GREEN** light signal: good network quality
- **YELLOW** light : average network quality
- **ORANGE** light signal: low network quality
- **WHITE** : no information on the network quality

● The module will then enter its operating mode and start sending information to the network according to the configuration.

NOTE

The LoRaWAN version, if it fails to connect, will go into simple sleep mode and make the next pairing attempt the next day and every day until it successfully joins the network.

Special case

For a Sigfox product

To have the information on the quality of the Sigfox network (**GREEN**, **YELLOW** or **ORANGE** light signal), it is necessary to provide a Sigfox Downlink. It is this one which will allow to rule on the quality of the network. The product emits at startup a test Uplink described in the chapter Classic frame (frame type 0x02). If a Sigfox Downlink is provided, the information on the network quality will be sent back by the ACW (light signal). If no Downlink is provided, the ACW will always display the **WHITE** light signal at the end. If a **WHITE** light signal is emitted by the product at the end of the 5 minute pairing phase and a Downlink has been provisioned, this means that the Network is not accessible.

- If a **WHITE** light signal at the end of the 5min pairing phase is emitted by the product without a downlink being provided, this has no meaning as to the network quality. The network quality can be good or bad (or non-existent).

For a LoRAWAN product

- In the default LoRAWAN Class A operating mode, (see chapter Radio module configuration), if at the end of the 5 minutes pairing phase, no network has been reached, then the product goes into standby and will restart a 5 minutes pairing phase 24 hours later. So if the product is placed in an area not yet covered by a network, the product will join it when connectivity is possible. There is no need to intervene on the product for it to join the network.

c. Sending a test frame

- When the product is in its operating mode (and only in this mode), it is possible to send a test frame (which avoids waiting for the next measurement frame) including a measurement sample.

To do this, simply move the magnet against the QR CODE label, which turns the LED **GREEN**, and wait until it goes out before removing the magnet. The successful sending of the test frame will be indicated by a **CYAN** light signal.

d. Putting into storage mode

During transport or storage of the ACW-THX, it is preferable to place it in its storage mode to limit unnecessary power consumption.

From any operating mode (except fault mode), move a magnet against the QR CODE on the case for 6 seconds.

- During these six seconds, the product's LED will flash the color corresponding to the operating mode and then the end of the sequence will be indicated by a **WHITE** fade acknowledging that the product has been put to sleep. The magnet can then be removed.

e. Radio module activity

Any transmission of a radio frame is normally indicated by three short flashes of **GREEN** color of the LED.

f. Exceeding the threshold

When thresholds have been configured using the configurator and the measurement values exceed these thresholds, the product LED emits a periodic **ORANGE** flash to notify this.

g. Substitution to the magnet

It is possible to use the push button on the ACW-THX board to perform the same actions as the magnet (switch the product on or off, view the product status, send a test frame).

→ Pressing the button has the same effect as approaching the QRCode magnet.



h. De-passivation of batteries

All new generation ACW products include a battery de-passivation feature to prevent battery oxidation during extended storage. This feature is automatically activated as soon as the product enters its storage mode. The product will be woken up once a day to start the battery de-passivation sequence, then the product will return to storage mode by itself.

ACW Configurator

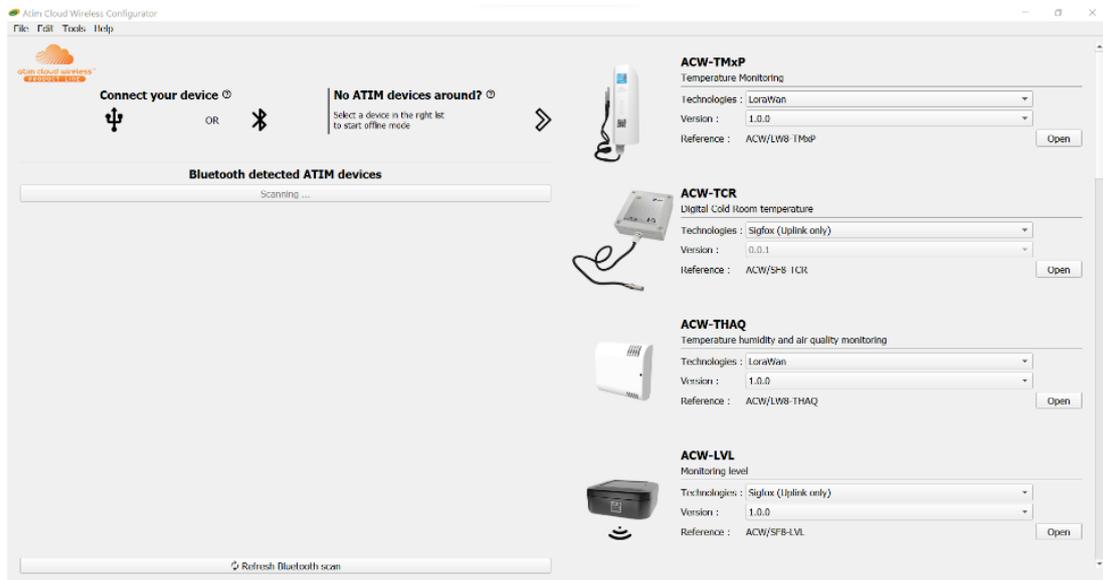
a. Compatible configurator versions

For a THX with the following application software version	Using the ACW Configurator version
Sigfox : V1.0.3 (revision B2)	V5.3.2 or higher
LoRaWan: V1.0.3 (revision B2)	V5.3.2 or higher

Download and install the configuration software "setupACW.exe" at : <https://www.atim.com/wp-content/uploads/documentation/CONFIGURATEUR/ACW/configurateur-acw.exe>

NOTE

The product must be in its configuration mode to be detected by the configurator. For safety reasons, configuration is only possible for 5 minutes after the product has been started. First of all, the product must be put into deep sleep mode (magnet close for 6 seconds), wait about 20 seconds for the entry into deep sleep to be effective, then wake up the product (magnet 6 seconds again). The product can then be configured.



When the ACW Configurator is launched, the waiting window appears on the screen.

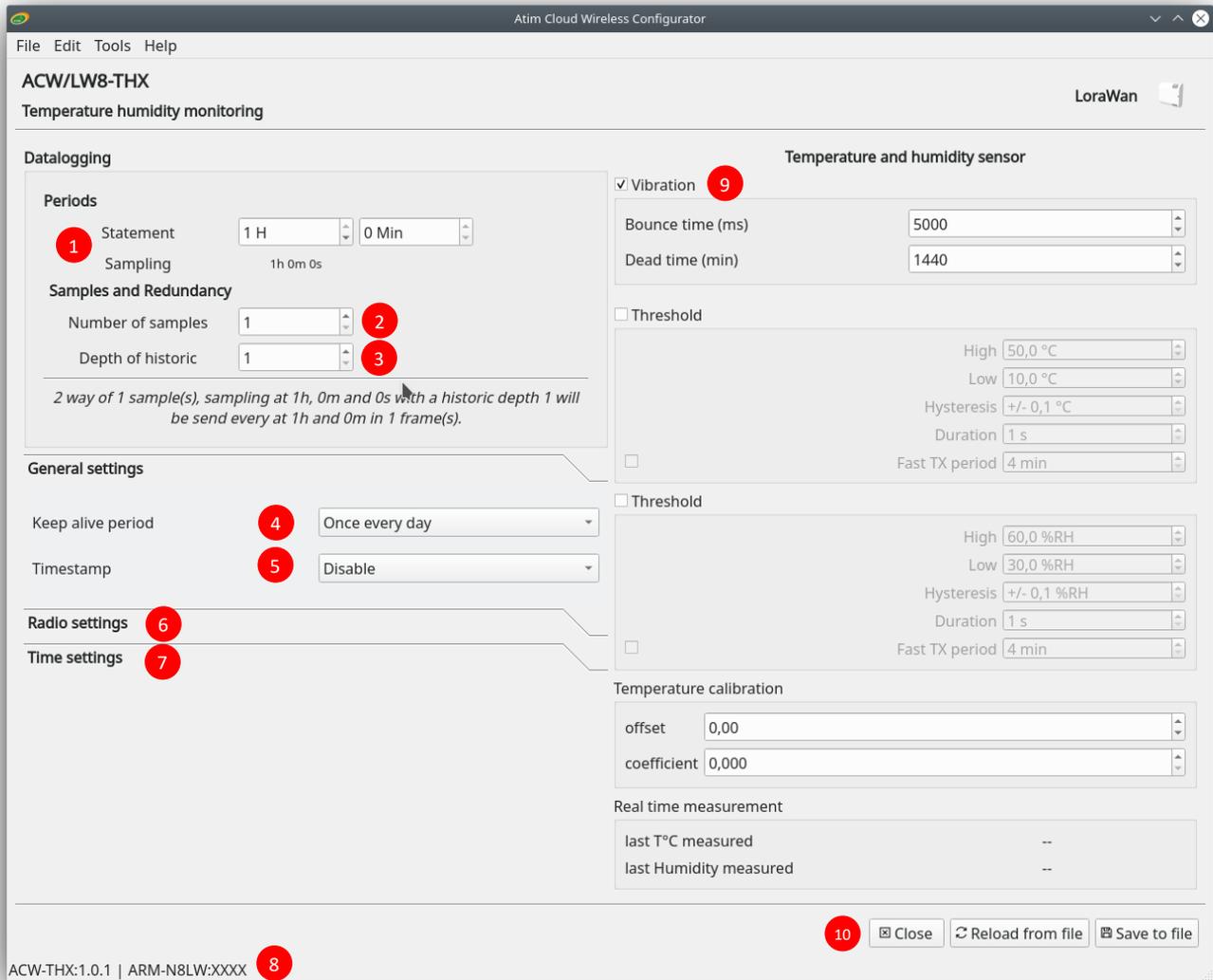
The pairing of the ACW-THX to the configurator can be done in two ways:

- **By USB:** open the ACW-THX case and connect it to a computer with a micro-USB cable.
- **By Bluetooth:** make sure that Bluetooth is activated

WARNING

Do not leave the product connected to the configurator (via USB or Bluetooth) unnecessarily, otherwise the product's autonomy will be significantly reduced.

b. Configuration of the ACW-THX



Transmission period and samples in the frame

The transmission period **1** corresponds to the time interval between each transmission of a measurement frame. This period can be configured from :

- 1 min to 255h for a LoRaWan product
- 10min to 255h for a Sigfox product

The transmission period is set to 1 hour by default

WARNING

If the transmission period is less than 4 min on a LoRaWan product, an alert message will be displayed to warn the user that the ADR (Adaptive Data Rate) will be disabled, and that the product will freeze its Data Rate at SF9

It is possible to configure the number of samples in a frame ² . Thus, several measurements will be made before sending the frame that will contain all these measurements.

For example, with a period of 60 minutes and a number of samples of 4, a measurement will be made every 15 minutes and the 4 samples will be sent in 4 frames every hour. (4 frames because Sigfox product. 2 frames are needed in LoRaWAN)

Finally, it is possible to apply data ³ redundancy, which means that samples that were sent in frame n-1, n-2 or n-3 can be sent again in frame n following the new measurement samples (the most recent sample first in the frame and the least recent last).

For example, for a history depth of 3, the data from the last 2 frames will be sent, in addition to the new data, in the next frame.

By default, there is only one sample per frame and no redundancy enabled.

TIP: HOW TO INCREASE BATTERY LIFE?

- Using the Threshold functionality, it is possible to configure 2 different cycle times, a "slow" one in standard operation, for example 1 measurement and emission every 2 hours and a "fast" one, for example 1 measurement and emission every 10 minutes. The "fast" operation being defined by "Fast Tx Period" should in this case be taken into account only in cases where the temperature is outside the comfort thresholds.

With this trick, the autonomy can easily be multiplied by 2!

Period of the life frame

A life frame can be issued periodically. ⁴ This frame will contain the supply voltage of the product.

The value of this period can be configured from 1 hour to 1 month.

By default, the value is set to 1 day.

Timestamp of the frame

is possible to disable/enable time stamping of all radio frames. ⁵

WARNING

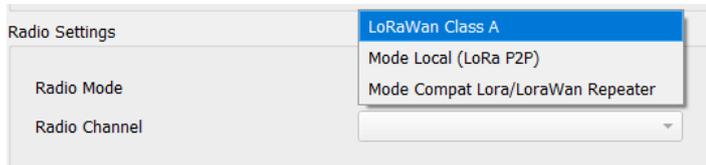
This option, when activated, monopolizes 4 bytes in the frame that cannot be used for useful data. These 4 bytes will then represent the timestamp of the sensor data acquisition.

By default the timestamp is disabled.

Radio module configuration

It is possible for the product to work in three different 6 ways both in **LoRaWAN** and in **Sigfox** :

For a **LoRaWAN** product



1. **LoRAWAN Class A** : The product modulation is done in LoRa and uses the LoRAWAN Class A protocol. This is the default mode of the product. This mode requires a private LoRAWAN network (private gateway), or an operated network to view the data sent by the product.
2. **Local mode** : The modulation of the product remains the LoRa modulation. However there is no LoRAWAN overlay. In this mode, you have to choose the radio channel on which the product will transmit. To be able to receive the frames of the product, you need a radio modem with the same parameters. This mode does not have for the moment a real concrete use case, but future developments of this mode will allow to have interesting point to point functionalities.

WARNING

This radio mode is NOT AVAILABLE on THX revision B1 (detailed in this user guide)

3. **Compatibility mode with the ATIM LoRa/LoRAWAN Repeater** : This mode is to be selected when you want to operate in classic LoRAWAN, but no network (private or operated) is accessible. This mode, associated with the ATIM LoRa/LoRAWAN Repeater, allows then to join the LoRAWAN network with the intermediary of this repeater. In this mode, if the network is not joined (no JOIN_ACCEPT), then the product will transmit its frames locally. The LoRa/LoRAWAN repeater will then relay these frames on the network that it has joined (It is necessary that the repeater is placed at a location with connectivity to the desired network).

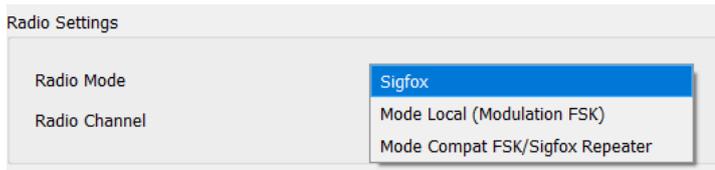
IMPORTANT NOTE

If the product has access to the LoRAWAN network, the default operating mode (LoRAWAN Class A) should be chosen. If this mode is chosen, while the network is accessible, the product will still send a frame on the LoRAWAN network and this same frame in Local mode to the Repeater, which will consume battery unnecessarily.

WARNING

This radio mode is NOT AVAILABLE on THX revision B1 (detailed in this user guide)

For a Sigfox type product



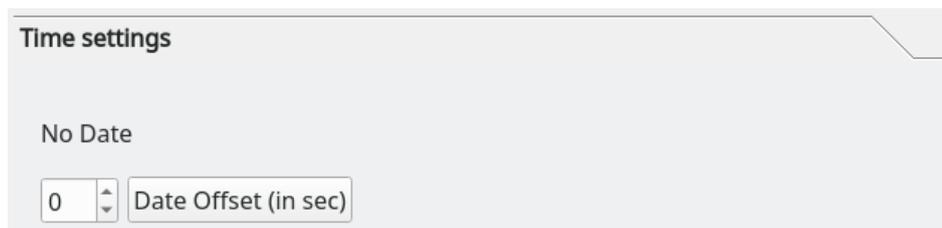
1. **Sigfox** : Modulation and Sigfox protocol used. This is the default mode of the product. This mode requires an access to the Sigfox network to work.
2. **Local mode** : The modulation of the frames is done in FSK. In this mode, you have to choose the radio channel on which the product will transmit. To be able to receive the frames of the product, it is then necessary a radio modem with the same parameters. This mode does not have for the moment a real concrete use case, but future developments of this mode will allow to have interesting point to point functionalities.
3. **Compatibility mode with the ATIM FSK/Sigfox Repeater** : This mode is to be selected when you want to work in Sigfox, but the network is not accessible. This mode, associated with the ATIM FSK/Sigfox Repeater, allows then to join the Sigfox network with the intermediary of this repeater. In this mode, the product transmits these frames both on the Sigfox network and also in Local (FSK modulation). The FSK/Sigfox repeater then relays these frames on the Sigfox network: it is indeed necessary that the repeater is placed at a location where the Sigfox network is accessible.

4. IMPORTANT NOTE

If the product has an access to the Sigfox network, it is necessary to prefer the default mode (Sigfox). If this mode is chosen, the product will always send a frame on the Sigfox network and this same frame in Local mode to the Repeater, which will consume battery unnecessarily.

Product clock

At each connection to the configurator, the product clock is updated (based on the computer clock) and displayed. 7
In addition, an offset in seconds can be applied if needed.



Product versions

When connecting to the product, the configurator retrieves all the product software versions (product software and radio module software) as well as the network 8 identifier

Sensor configuration

Here are the configuration parameters available for this sensor : 

Vibration detection

The ACW-THX is equipped with a vibration sensor that allows to send a radio alarm in case of movement detection on the product. (see chapter Alert frame for all available alerts).

This vibration sensor has two settings:

- Bounce time which corresponds to the duration of the vibration needed for the alert to be sent. This parameter is set to 5s by default
- Dead time, which is the time the vibration sensor is disabled after the alert is sent by radio. This means that two alerts cannot be sent with a period shorter than the inhibition time. This parameter is set to 24h by default.

Temperature and humidity

The ACW-THX has a built-in temperature and humidity sensor.

The sensor can be configured by applying :

- Temperature and humidity thresholds
- A temperature compensation on two points

The thresholds can be set by a high and low threshold according to a configurable hysteresis and duration. When a measurement reaches a threshold, a radio frame will be sent (see the chapter Alert frame for details on the format of the frame).

Moreover, the temperature and humidity values of the sensor are visible in real time when the product is connected to the configurator (these values are refreshed every 2 seconds).

Validation of the configuration

After filling in all the configuration parameters, it is imperative to click on the "Apply to ACW" button to send the configuration to the product. 

It is also possible at any time to read the current configuration of the product which will update the settings on the configurator or to reset the product to its default configuration.

c. Factory configuration

Radio frame parameters

- Transmission period of a radio frame : 1 hour
- Number of samples : 1
- Depth of history : 1

General parameters

- Lifetime frame sending period : 1 time per day
- Timestamp : disabled
- Radio parameters : LoRaWAN Class A (for LoRAWAN product) / Sigfox (for Sigfox product)

Sensor parameters

Vibration sensor

- Status : activated
- Anti-bounce time: 5s
- Inhibition time: 24h

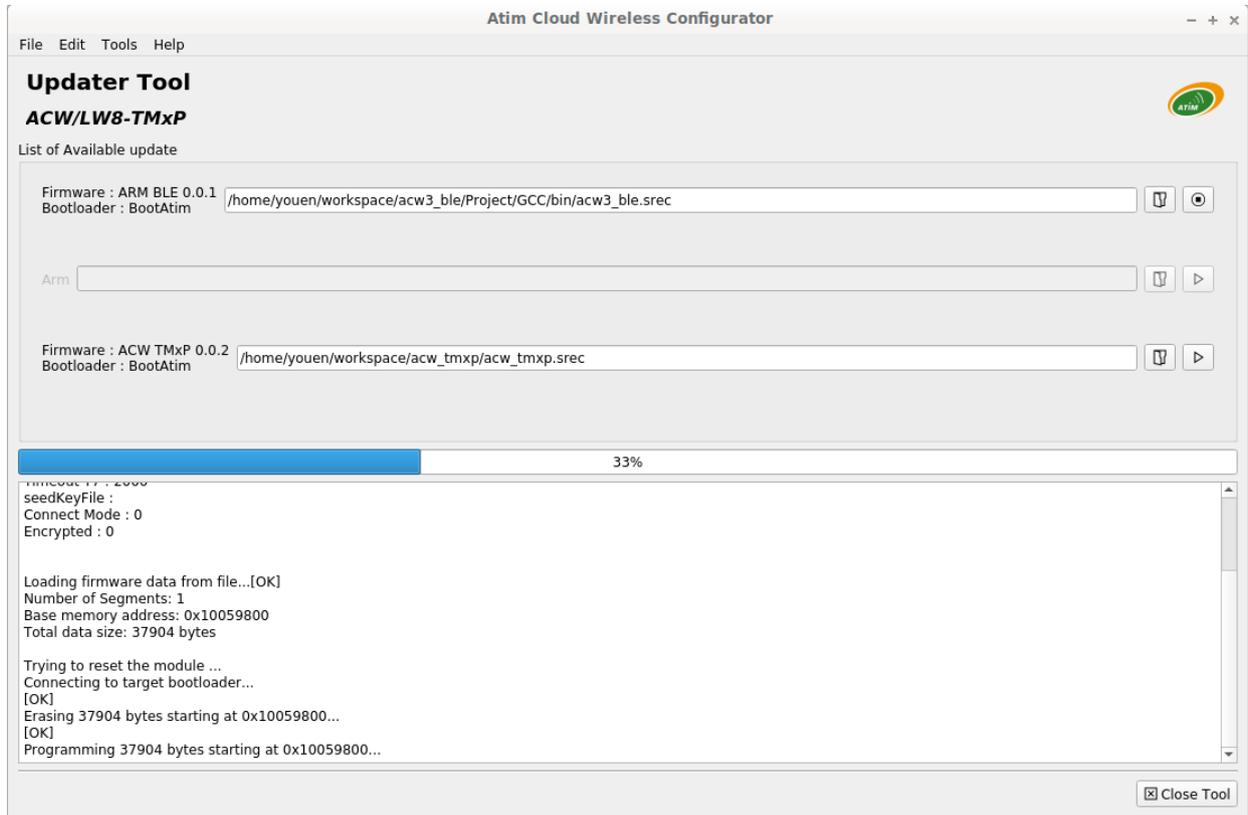
Temperature and humidity sensor

- Status: On
- Temperature threshold: inactive
- Humidity threshold: inactive

d. Updating ACWs

When connected to the product via Bluetooth Low Energy, it is possible to update the different internal software (Firmwares).

To do this, go to the menu *Tools->Updater (CTRL+U)*



UPLINK frame format

a. Description

Trame Uplink			
Byte 1	Byte 2	...	Byte n
Frame header	Data specific to the frame		

Three types of frames can be differentiated :

- **Classic frame ; New generation** : Very close to the old frames, the difference is that you can activate the timestamp. These are for example the life frame, the error frame, the response to configuration frames, ... These last frames are common to all ACWs but it is also possible to have other independent frames for each ACW.
- **Measurement frame ; New generation** : These frames are made up of samples of the different values of each of the channels that an ACW can read. The number of samples and the depth of the history will be inserted in the header beforehand.

NOTE

The number of samples and the depth of the history are common for all the channels of the frame.

- **Alert frame (threshold exceeded); New generation** : These frames combine a classic frame and a measurement frame. They consist of a header warning that a threshold has been exceeded, followed by the samples of each channel for which a threshold has been exceeded.

Classic frame

Byte 1 - header							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
New generation = 1	Timestamp = 1 - enabled 0 - disabled	Measurement frame = 0	Reserved = 0	Frame type (see below)			

If the Timestamp is enabled, 4 bytes with the Timestamp value will be preceded by the header (byte 1).

The different types of frames

Type of frame	Size of the data	Description of the frame
0x00	--	Reserved
0x01	4 bytes	Frame of life.
0x02	0 bytes	Downlink request for network test.
0x03	--	Reserved
0x04	--	Reserved
0x05	1 byte	Test frame with counter.
0x06	Variable	(Cfg box) Response to a configuration frame.
0x07	Variable	(Cfg box) Response to a command frame.
0x08	Variable	(Cfg box) Response to an erroneous frame.
0x09	--	Reserved
0x0a	--	Reserved
0x0b	--	Reserved
0x0c	--	Reserved
0x0d	Variable	Alerts frames follow-up of the samples of the measurements of the channels in alert
0x0e	TBD	General error - TBD (memory, ...)
0x0f	Variable ...	Subframe for ACW. Depending on the ACW

Measurement frame

Byte 1 - Header							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
New generation = 1	Timestamp (Disabled = 0, Enabled = 1)	Measurement frame = 1	Depth of history (-1) Max : 4		Number of samples (-1) Max : 8		

If the Timestamp is enabled, 4 bytes with the Timestamp value will be preceded by the header (byte 1).

WARNING

If the History Depth or Number of Samples field is greater than 1, the transmission period of a frame (in minutes) will be added after the header and will occupy 2 bytes (Big Endian encoding, MSB first)

For each of the channels, a header is inserted afterwards and is constituted in the following way :

Byte 2 Channel header							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved = 0		Lane number		Type of measurement			

Type of measure possible

Type of measure	Units	Size of the data	Type of data	Descriptions
0x08	T°C	2 bytes (Big Endian - MSB)	Integral signed	Temperature in hundredth of degree Celsius <ul style="list-style-type: none"> • Resolution : 0.01°C • Max value : 125°C • - Min value : -40°C
0x09	%RH	2 bytes (Big Endian - MSB)	Integral signed	Hygrometry in hundredth of relative humidity percentage (%RH) <ul style="list-style-type: none"> • Resolution : 0.01 %RH • Max value : 100 %RH • Min value : 0 %RH

This is followed by the data of the measurement sample(s) (depending on the product configuration).

NOTE

When a frame has more than one sample per channel (number of samples > 1 or history depth > 1), the samples are organized from newest to oldest.

The number of bytes sent can be determined as follows:

(Size in bytes of the measurement) * (number of samples) * (history depth)

EXAMPLE

For the measurement type 0x08 (the size of a value is two bytes) with a history depth of 2 and a number of samples of 3, the size of the data to be read would be 12 bytes (2x2x3).

Measurement alert frame

Byte 1 - Header							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
New generation = 1	Timestamp (Disabled = 0, Enabled = 1)	Measurement frame = 0	Reserved = 0	Alert frame (= 0x0d)			

If the timestamp is enabled, 4 bytes with the timestamp value are preceded by the header (byte 1).

A header is inserted for each of the channels being alerted and is made up as follows :

The **alert type** field allows you to identify whether it is an exceedance of the high threshold, the low threshold or a return between the thresholds.

Byte 2 Channel header							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Type of alert		Lane number		Type of measurement			

These values are defined as follows :

Value	Description
0x00	Return between thresholds
0x01	Exceeding the high threshold
0x02	Exceeding the low threshold
0x03	Reserved

The measurement type field is identical to that of the measurement frame (i.e. 0x08, 0x09 in hexadecimal for the ACW-THX).

The sample which caused the alert is then inserted afterwards (with an encoding in **Big Endian** - MSB first)

Frame of life

The life frame is sent at regular intervals according to the applied configuration (by default 1 day) and contains the battery levels of the product at no load (the product is doing nothing) and at load (the product is transmitting a radio frame).

Byte 1 - Header							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
New generation = 1	Timestamp = 0	Trame mesure = 0	Réservé = 0	Trame de vie = 0x01			

Following this header, there are 4 bytes, 2 for the empty battery level and 2 for the charged battery level.

The frame is thus divided as follows: 0xAABBBBCCCC

0xAA being the header of the frame (always equal to 0x81), 0xBBB the empty battery level (value in millivolts, MSB coding) and 0CCCC the battery level in charge (value in millivolts, MSB coding).

EXAMPLE

0x81 0d24 0c68

0d24 : battery level at no load = 3364 mV or 3.364 V

0c68 : battery level under load = 3176 mV or 3.176 V

Error and general alarm frame

Byte 1 - Header							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
New generation= 1	Timestamp = 0	Measurement frame = 0	Reserved = 0	Error frame = 0x0e			

If the timestamp is enabled, 4 bytes with the timestamp value will be preceded by the header (byte 1).

For each of the error messages, a header is inserted and is made up as follows :

Byte 2 - Header Error message							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Message index				Error message length			

The **message index** field is used to prioritize messages when several errors occur.

The **error message** length field indicates the size in bytes of the error message.

The next byte identifies the nature of the error or alarm that occurred :

Byte 3 - Header Error message		
Error code	Type of error	Description
0x81	ERR_UNKNOWN	
0x82	ERR_BUF_SMALLER	The data table is full, impossible to write additional data
0x83	ERR_DEPTH_HISTORIC_OUT_OF_RANGE	The history depth is too large or too small for the frame
0x84	ERR_NB_SAMPLE_OUT_OF_RANGE	The number of samples is too large or too small for the frame
0x85	ERR_NWAY_OUT_OF_RANGE	The number of channels in the frame header is too large or too small
0x86	ERR_TPEWAY_OUT_OF_RANGE	The type of measurement in the frame header is too large or too small
0x87	ERR_SAMPLING_PERIOD	Wrong sample period structure
0x88	ERR_SUBTASK_END	End of a subtask after exiting an infinite loop
0x89	ERR_NULL_POINTER	Pointer with "NULL" value
0x8A	ERR_BATTERY_LEVEL_DEAD	Critical battery level
0x8B	ERR_EEPROM	EEPROM is corrupted
0x8C	ERR_ROM	ROM is corrupted

0x8D	ERR_RAM	RAM is corrupted
0x8E	ERR_ARM_INIT_FAIL	Initialization of the radio module has failed
0x8F	ERR_ARM_BUSY	The module is already busy (possibly not initialized)
0x90	ERR_ARM_BRIDGE_ENABLE	The module is in bridge mode, impossible to send data by radio
0x91	ERR_RADIO_QUEUE_FULL	Radio buffer is full
0x92	ERR_CFG_BOX_INIT_FAIL	Error during initialization of the black box
0x93	ERR_KEEP_ALIVE_PERIOD	Wrong structure of life frame period
0x94	ERR_ENTER_DEEP_SLEEP	The product has gone into deep sleep mode
0x95	ERR_BATTERY_LEVEL_LOW	Low battery level
0x96	ERR_ARM_TRANSMISSION	A transmission has been initialized but an error has occurred
0x97	ERR_ARM_PAYLOAD_BIGGER	Message size is too large for the network capacity
0x98	ERR_RADIO_PAIRING_TIMEOUT	Unable to pair to a network before timeout
0x99	ERR_SENSORS_TIMEOUT	A timeout has been reached on the sensor
0x9A	ERR_SENSOR_STOP	The sensor did not return a value during a reading
0x9B	ERR_SENSORS_INIT_FAIL	Humidity sensor is not detected at startup.
0x9E	ERR_SENSORS_MOVE	Unable to read a temperature/humidity on the sensor.
0x9F	ERR_SENSOR_CRC_KO	RAM is corrupted
0xA0	ERR_SENSOR_NO_DATA	Initialization of the radio module has failed

Only codes 0x8A and 0x95 are followed by additional data corresponding to the battery level in millivolts. This value is coded on two bytes, the high byte first (MSB).

WARNING

For codes from 0x81 to 0x92, the product will enter its FAULT mode and will no longer perform its measurement function. For codes from 0x93 to 0xA0, these correspond only to alarms, so the product continues to operate normally.

b. Examples of frames

Measurement frame

With time stamp disabled, no history and a sample count of 1 (Temperature and humidity only) :

Bytes						
1	2	3	4	5	6	7
0xA0 (new generation measurement frame, no history, 1 sample)	0x08 (channel 0, measurement type: temperature)	0x08	0x85	0x09 (channel 0, measurement type: hygrometry)	0x17	0xDE

The product returns values of 0x0885 (21.81°C) for temperature and 0x17DE (61.10 %RH)

Now with a number of samples of 2 :

Bytes											
1	2 et 3	4	5	6	7	8	9	10	11	12	13
0xA1 (new generation measurement frame, no history, 2 samples)	0x003C (issue period)	0x08 (channel 0, measurement type: temperature)	0x01	0x2C	0x08	0xA4	0x09 (channel 0, type of measurement: hygrometry)	0x22	0x13	0x17	0xDE

Bytes 2 and 3 indicate the emission period, here 60 minutes (so a sample is measured every 30 minutes).

- The first sample is 0x012C (3°C) / 0x2213 (8723 %RH)
- The second sample is 0x08A4 (22.12°C) / 0x17DE (61.10 %RH)

NOTE

This example is valid for the product with a LoRaWAN module. In the case of Sigfox, the size of an Uplink is 12 bytes and therefore this frame is divided into two.

Measurement alert frame

For a high threshold violation on channel 1 (virtual probe), the frame will be :

Byte			
1	2	3	4
0x8D (New generation alert frame)	0x58 (High threshold exceeded on channel 1, temperature measurement)	0x02	0xC9

The sample that triggered the threshold is 0x02C9 (7.13 °C)

Downlink

This feature is available on ACW-THXs meeting the following conditions:

	Software applicatif	Firmware radio
Sigfox version	V1.0.2	V5.9.3.1
LoRaWAN version	V1.0.2	V5.1.1

Downlinks do two things for the product:

- Modification of product parameters
- Send commands to products

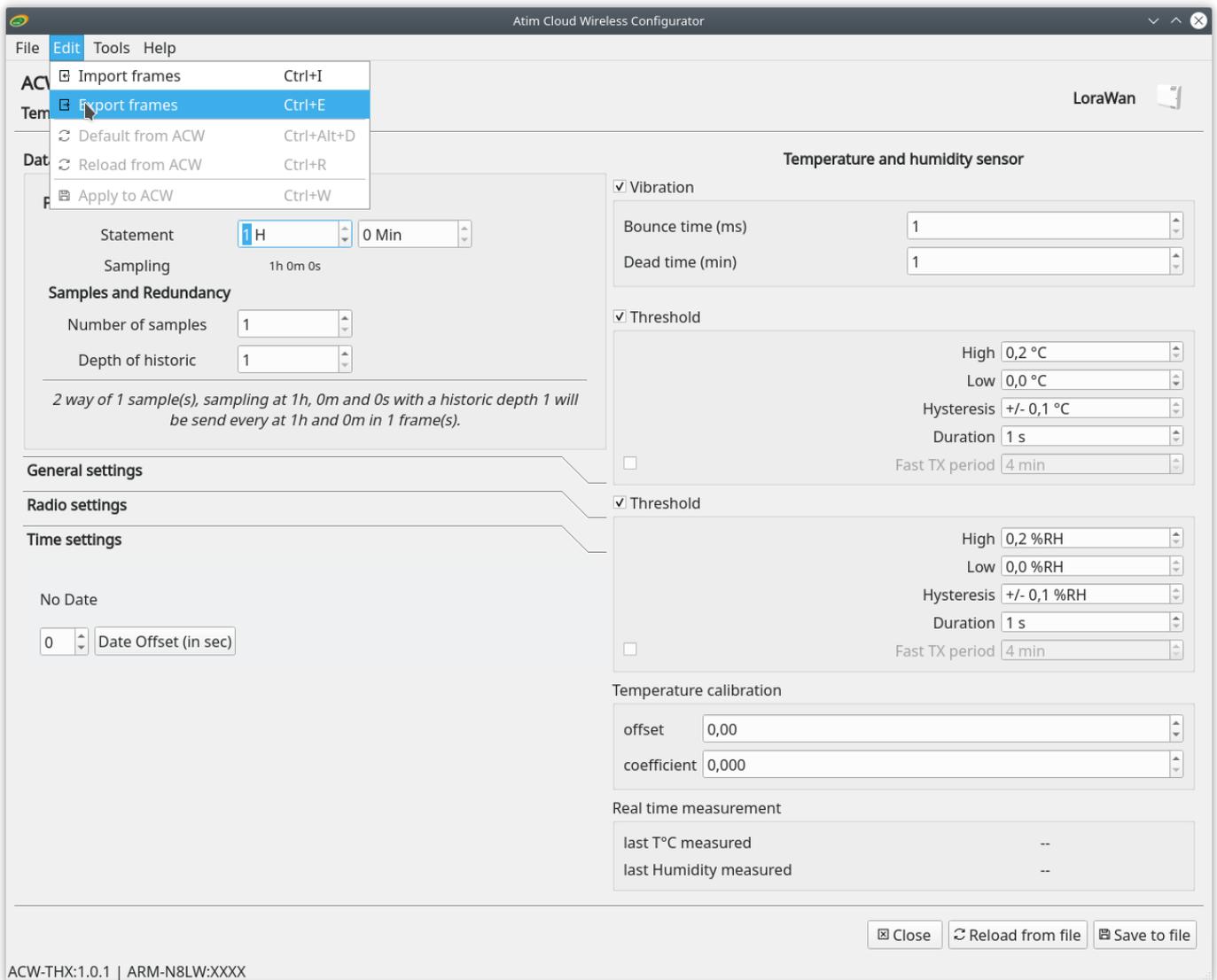
Downlink operation is explained in document ATIM_ACW-DLConfig_UG_EN_v1.4, relating to version V1.2.0 of the ATIM Downlink Protocol (see this document for all parameters and commands common to all products).

a. Parameter modification

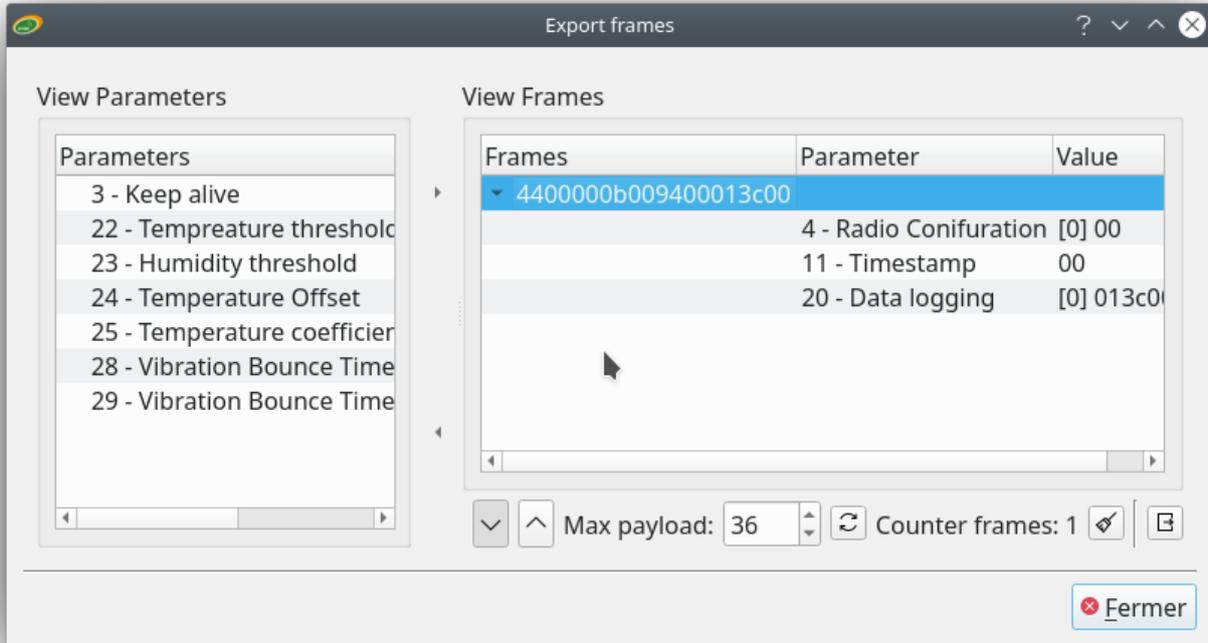
The configurator can be used to generate downlinks for remote parameterization of a product. These downlinks can then be sent via the Sigfox or LoRaWan network.

To do this :

- Open the product configuration page (a virtual page can be opened if the product is not physically in range)
- Build your desired configuration
- Parameters can then be exported using the menu (Edit->Export frames):



- Simply select the parameter(s) you wish to apply via downlink and build the associated downlink. Here, for example, we want to modify the radio configuration, timestamp and datalogging parameters. The downlink to be sent will then be 4400000b009400013c00



WARNING

For Sigfox products, downlinks are limited to 8 bytes. The maximum downlink size can be adjusted via the "Max payload" parameter.

b. Send downlink command

Downlink commands are explained in document ATIM_ACW-DLConfig_UG_EN_v1.4, relating to version V1.2.0 of the ATIM Downlink Protocol.

Technical support

For any information or technical question, please open a ticket on our dedicated support web page:
<https://www.atim.com/support-technique/>

