atim cloud wireless™
PRODUCT LINE

# ATIM Cloud Wireless®

# Metering and Dry Contacts DINDxxx

# User Guide


Concerned models:

ACW/LW8-DIND160

ACW/SF8-DIND160

ACW/LW8-DIND80

ACW/SF8-DIND80

ACW/LW8-DIND88

ACW/SF8-DIND88

ACW/LW8-DIND44

ACW/SF8-DIND44

LoRaWAN™

sigfox ready

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# Table of content

This user guide deals with the following references:

| Product reference | Product version |
|---|---|
| ACW/SF8-DIND160 | B.0 |
| ACW/SF8-DIND80 | B.0 |
| ACW/SF8-DIND88 | B.0 |
| ACW/SF8-DIND44 | B.0 |
| ACW/LW8-DIND160 | B.0 |
| ACW/LW8-DIND80 | B.0 |
| ACW/LW8-DIND88 | B.0 |
| ACW/LW8-DIND44 | B.0 |

## Document version history

| Version | Date | Description | Author |
|---|---|---|---|
| 1.8 | 21/09/2020 | Output calendar (downlink and command) + configuration of shock alarm + update configuration manual | AC |
| 1.7 | 24/02/2020 | Add new uplink frames (output status) | AC |
| 1.6 | 21/02/2020 | Clarify Downlink summary table | AC |
| 1.5 | 07/10/2019 | Re-reading and corrections | FR, CR |
| 1.3 | 11/09/2019 | - Renaming<br>- Outputs versions addtions (DIND44 and DIND88).<br>- Electrical features updates. | AM |
| | 05/04/2018 | Inputs decoding precisions | AM |
| 1.2 | 15/03/2018 | SF8/LW version in 8 and 16 inputs<br>Downlink commands addition | AM |
| 1.1 | 27/09/2017 | Complete version in SF8 | AM |
| 1.0 | 26/06/2017 | Corrections | FR |
| 0.9 | 10/06/2017 | 1st version | AM |

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## Trademarks and copyright

# Declaration of compliance

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

CE

1 SAFETY (Article 3.1a of the 1999/5/EC Directive)
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 the 1999/5/EC Directive)
EN 301489-3 v1.4.1, EN 301489-1 V1.9.2

3 Efficient use of the radio frequency spectrum (Art.3.2 of the 1999/5/EC Directive)
ETSI EN300 220-2 v2.4.1 and EN300 220-1 v2.4.1

# Environmental recommendations

## a. Explosive atmosphere

Except for the ACW-ATEX line specifically intended for this purpose, do not use ACW radio modems in the presence of flammable gases or fumes. Using the equipment in such an environment constitutes a safety hazard.

## b. Environment

Respect the temperature ranges for storage and operation of all products. Failing to respect these guidelines could disrupt device operation or damage the equipment. ACW products in IP65 water- and dust-resistant housings may be placed outdoors, but must not, under any circumstances, be submerged.

Follow the instructions and warnings provided below to ensure your own safety and that of the environment and to protect your device from any potential damage.

**General hazard** – Failure to follow the instructions presents a risk of equipment damage.

**Electrical hazard** – Failure to follow the instructions presents a risk of electrocution and physical injury.

Direct-current symbol

**WARNING**: do not install this equipment near any source of heat or any source of humidity.

**WARNING**: for your safety, it is essential that this equipment be switched off and disconnected from mains power before carrying out any technical operation on it.

**WARNING**: the safe operation of this product is ensured only when it is operated in accordance with its intended use. Maintenance may only be performed by qualified personnel.

Waste disposal by users in private households within the European Union. This symbol appears on a product or its packaging to indicate that the product may not be discarded with another household waste. Rather, it is your responsibility to dispose of this product by bringing it to a designated collection point for the recycling of electrical and electronic devices. Collection and recycling waste separately at the time you dispose of it helps to conserve natural resources and ensure a recycling process that respects human health and the environment. For more information on the recycling centre closest to your home, contact your closest local government office, your local waste management service or the business from which you purchased the product.

### c. Radio

Modems in the ACW line are radio-communication modems that use the ISM (industrial, scientific and medical) bands, which may be used freely (at no cost and with no authorisation required) for industrial, scientific and medical applications.

# Prelude

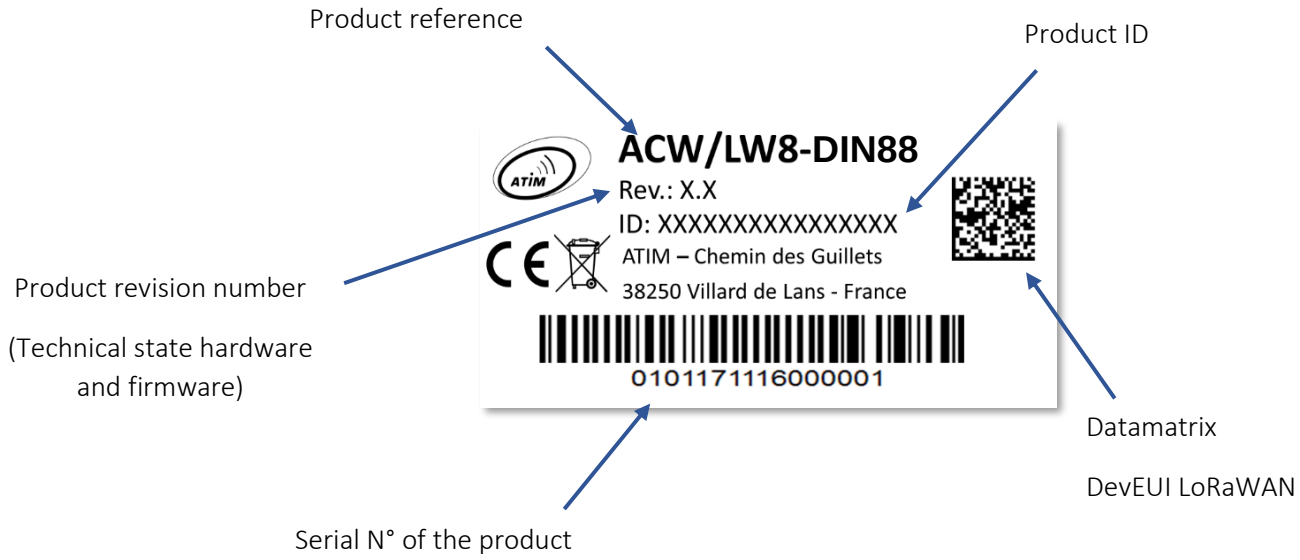
This guide describes the features of the ACW-DINDxxx product. It describes the characteristics of the product, explains its commissioning, its configuration and its operation.

The ACW-DINDxxx is intended to raise the digital input states (ToR) on an IoT network such as Sigfox or LoRaWAN. These inputs are configurable and can be enabled / disabled as single inputs or as counter inputs. Versions with dry contact outputs are also available, allowing the remote control of various equipment.

A temperature sensor can be optionally connected. The product also has a shock sensor for issuing an alert in case of tearing of the limp.

## Product identification

The product identifier is visible on the outer label:




Each product in ATIM's ACW range has a QR Code label visible either on the side or on the front of the product. This QR Code can be easily read with any 2D barcode reader app on your smartphone.

Reading the QR Code indicates the following information:

ATIM|ACW/LW8-DIND88|A.0|190925|1|1.0|1.3.0|70B3D59BA0009030

Interpretation

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ATIM | ACW/LW8-DIN88 | A.0 | 190925 | 1 | 1.0 | 1.3.0 | 70B3D59BA0009030 |
| Manufacturer name | Product reference | Revision version | Date of manufacture (AAMMJJ) | Manufacture site | Hardware version | Application firmware version | DevEUI LoRaWAN |

# 1. Technical features

## a. Products features

| | |
|---|---|
| *Dimensions* | 53 x 67 x 95 mm |
| *Antenna* | External connector SMA |
| *Temperature* | -20°C à +55°C (operating mode)<br>-40°C à +70°C (storage) |
| *Mounting* | Rail-DIN |
| *Power supply* | 1 x power supply 10-30 Vcc |
| *Consumption* | 100 mA |
| *Digital inputs TOR (DIND160)* | -16 configurable inputs<br>-Change of state alerting<br>-8 configurable meters on whatever input (4 meters before version V1.2.0)<br>-Available configuration of 4 group of inputs |
| *Digital inputs TOR (DIND80 et DIND88)* | -8 configurable inputs<br>-Change of state alerting<br>-8 configurable meters on whatever input<br>-Available activation of a group of inputs |
| *Digital inputs TOR (DIND44)* | -4 configurable inputs<br>-Change of state alerting<br>-4 meters configurable on whatever input<br>-Available activation of a group of inputs |
| *Digital outputs TOR* | -DIND88: 8 outputs driven via downlink<br>-DIND44: 4 outputs driven via downlink |
| *Set up* | USB Port or Downlink |
| *Alarm* | Wrenching / Shock |
| *Frequency* | 865 – 870 MHz |
| *Power* | 25 mW (14 dBm) |
| *Rate* | Sigfox: 100 bps<br>LoRaWan: 300 bit/s à 10 Kbit/s |
| *LoRaWAN* | Class C |

## b. Electrical features

| | Min. | Type | Max. |
|---|---|---|---|
| *Power supply (V)* | 10V | | 30V |
| *Emission consumption (mA)* | | Condition:<br>-12V Power supply<br>-Every output is shut down | 60mA – Sigfox<br>60mA – LoRaWAN |
| | | Condition:<br>- 24V Power supply<br>-Every output is shut down | 35 mA – Sigfox<br>30mA – LoRaWAN |
| *Reception consumption (mA)* | | Condition:<br>-12V Power supply<br>-Every output is shut down | 50mA – Sigfox<br>30mA – LoRaWAN |
| | | Condition:<br>- 24V Power supply<br>-Every output is shut down | 30mA – Sigfox<br>20mA – LoRaWAN |
| *Standby consumption (mA)* | | Condition:<br>-12V Power supply<br>-Every output is shut down | 20 mA – Sigfox<br>N/A – LoRaWAN |
| | | Condition:<br>- 24V Power supply<br>-Every output is shut down | 15 mA – Sigfox<br>N/A – LoRaWAN |
| *Higher threshold dry contacts tensions of inputs (V)* | 2.8V | with Pull-Down | |
| | 2.3V | with Pull-Up | |
| *Lower threshold dry contacts tensions of inputs (V)* | | with Pull-Down | 1.3V |
| | | with Pull-Up | 0.15V |
| *Dry contacts tensions of outputs (V)* | 10V | Power supply tension | 30V |
| *Dry contacts outputs current (mA)* | | | 250 mA |

### c. Inputs and counters features

| | Min. | Type | Max. |
|---|---|---|---|
| **Inputs or meters frequency (Hz)** | | Condition:<br>- Cyclic report at 50%<br>- Filtering time 1 ms | 400Hz |
| **Bounces filtering time** | 1 ms | Note: Configurable value. | 255 ms |
| **Bounces filtering time precision** | -1ms | Note: to guarantee a minimum 1ms of filtering time, the filtering time must be configured to 2ms. | 0ms |
| **Meters size** | | 4 bytes | |

### d. Temperature sensor features

Optionally, a temperature sensor can be connected to the ACW-DINDxxx. The following ranges refer to the sensor used. Be careful, the product has a smaller operating range than the sensor (see above).

| | | |
|---|---|---|
| Temperature | Range | -55°C / +125°C |
| | Resolution | 0,1°C |
| | Precision between -10°C and 85°C | +/- 0,5°C |
| | Precision entre -55°C and 125°C | +/- 2°C |

### e. Meters back-up

Since version V1.2.0 the counters are saved in the memory of the ACW during several events:

- When writing counters via the USB configurator
- When writing via a downlink command
- During a power failure

### f. Outputs calendar

From **1.4.0** firmware version, it is possible to program outputs state depending weekday and a time window.

The possible configurable parameters are:

- The start time (1 minute increment)
- The stop time (1 minute increment)
- The weekdays when the program is effective
- Outputs to set
- Outputs to reset

You can configure from 1 to seven programs and several programs can be used the same day.

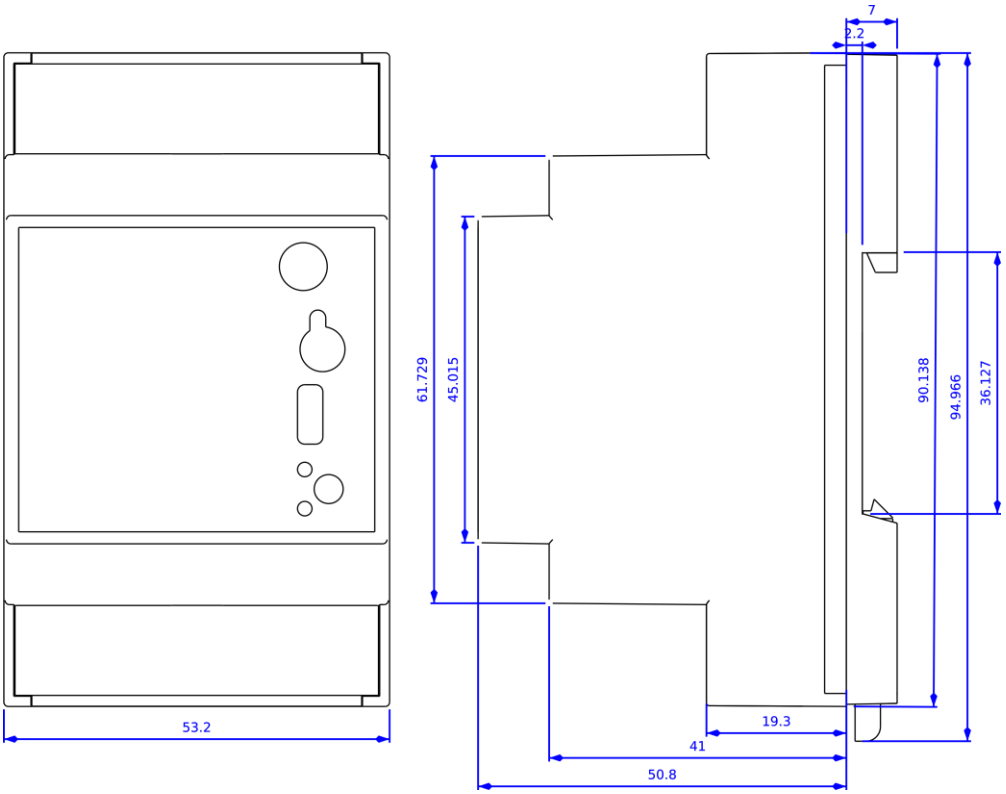
Once a program is configured, it is automatically enabled but a command is provided to disable it later on (several programs can be disabled at once). It will remain disabled while the same command is sent once again.

In addition, this command can disable the program(s) for the next day only. The program(s) will be automatically enabled the day after.

Once a program's time slot is done, the outputs affected by the program will be driven at the opposite state (ex: an output to "1" during the program will be at "0" at the end).

WARNING: It is not a good practice to configure several programs at the same time if these ones drive the same outputs.

## 2. Footprint and mounting




Dimensions given in mm.

ACW modems in 'breaker' format are attached to a DIN-rail.

# 3. Set up

## a. Antenna positioning

This version was designed for installation in a cabinet. If the latter is made of insulating materials (PVC, ABS, fiberglass), it is possible to simply use a small half wave whip antenna (Ref: ANT868-12FSC). This antenna must be correctly screwed on the SMA connector and positioned vertically, preferably upwards.

**In the case of a metal box, it is imperative to deport the antenna to the outside to have good results in radio (avoid the Faraday cage).**

For optimal results, it is advisable to deport the antenna in height, clear of any metallic obstacle in a radius of one meter.

## b. Modem connection


### Antenna (SMA connector)

Before powering the product, a 50 Ω / 868MHz antenna must be connected, either directly to the SMA connector or via a 50 Ω cable in case of antenna offset.

### Power Supply (Lower terminal)

The ACW-DINDxxx module must be powered with a DC power supply between 10V and 30V that can provide a minimum current of 100mA. The POWER pin corresponds to the + terminal and the GND pin to the - (0V) terminal.

Note: All GND terminals of the ACW-DINDxxx are interconnected internally. Only the GND terminal, bottom right, should be used to connect the power cable.

### Jack connector

This connector is used to connect an optional temperature sensor (supplied with a 2m cable).

### Micro USB

This connector is used for product configuration via USB interface on PC.

Note : The configuration via USB can directly power the ACW-DINDxxx and does not require an external power supply (10 / 30V). But an external power supply can also be present.

### c. Terminals' description

Below you will find a table describing the different connection pins:

| Name | Designation | Input / Output |
|---|---|---|
| GND | Ground (-) for IN1, IN2 and IN3 | Ground |
| IN1 | Digital input ALERT 1 | Input |
| IN2 | Digital input ALERT 2 | Input |
| IN3 | Digital input ALERT 3 | Input |
| GND | Ground (-) and IN4, IN5 and IN6 | Ground |
| IN4 | Digital input ALERT 4 | Input |
| IN5[(2)] | Digital input ALERT 5 | Input |
| IN6[(2)] | Digital input ALERT 6 | Input |
| GND | Ground (-) for IN7 and IN8 | Ground |
| IN7[(2)] | Digital input ALERT 7 | Input |
| IN8[(2)] | Digital input ALERT 8 | Input |
| NC | Do not use – Do not connect | |
| IN9[(1)] | Digital input ALERT 9 | Input |
| OUT1 | Digital output 1 | Output |
| IN10[(1)] | Digital input ALERT 10 | Input |
| OUT2 | Digital output 2 | Output |
| IN11[(1)] | Digital input ALERT 11 | Input |
| OUT3 | Digital output 3 | Output |
| IN12[(1)] | Digital input ALERT 12 | Input |
| OUT4 | Digital output 4 | Output |
| GND | Ground (-) for GPIO9, 10, 11 and 12 | Ground |
| IN13[(1)] | Digital input ALERT 13 | Input |
| OUT5[(3)] | Digital output 5 | Output |
| IN14[(1)] | Digital input ALERT 14 | Input |
| OUT6[(3)] | Digital output 6 | Output |
| IN15[(1)] | Digital input ALERT 15 | Input |
| OUT7[(3)] | Digital output 7 | Output |
| IN16[(1)] | Digital input ALERT 16 | Input |
| OUT8[(3)] | Digital output 8 | Output |
| GND | Ground (-) for GPIO13, 14, 15 and 16 | Ground |
| POWER | Power supply between +10V and +30V | Input (Alim +) |
| GND | Ground (-) | Ground (Alim 0V) |

(1) DIND80, DIND88 et DIND44 versions do not include inputs from IN9 to IN16. **Do not connect anything on those pins.**

(2) DIND44 version, does not include inputs from IN5 to IN16. **Do not connect anything on those pins.**

(3) DIND44 version, does not include outputs from OUT5 to OUT8. **Do not connect anything on those pins.**

### d. Pushbutton

The push button located on the front of the box makes it possible to send a test frame to validate the installation on site by checking the arrival of the message on the ATIM Cloud Wireless® platform.

### e. LEDs meaning

The LEDs are used to characterize the proper operation or not of the ACW-DINDxxx. In general, the green LED indicates correct operation and the red LED indicates a critical, non-critical error, alarm or loss of power.

- Failure or success of an operation

Behavior: The red or green light flashes rapidly for about 1/2 second.

A failure is characterized via the red light and a success is characterized via the green light.

Events

- When the device is powered on (after a short time), to notify power supply is good
- After configuring or sending a command (USB or Downlink)
- During Radio transfer.

- Radio activity

When a radio message is transmitted over the network, the green LED flashes every half-second during the sending time. In Sigfox, this can take up to a minute but usually only takes about 10 seconds.

- Alarm

When a shock is detected, the red light blinks rapidly for one second.

- Power cut

As of version V1.2.0, a small energy reserve is embedded in the product. When power is lost, the red light stays on until the power supply is exhausted.

- Non critic error

Behaviour: the red-light flashes briefly every ten seconds.

Error source*:* The previous radio message could not be transmitted.

- Critical error

Behaviour: the red-light flashes briefly every second.
Error source: The product could not start correctly

# 4. Normal behavior at startup

On power-up, after a moment, the **green** LED flashes rapidly for about 1/2 second, to attest to a good start.

1 minute after power up, 3 frames are sent:

- 1 test frame
- 1 keep alive frame
- 1 input frame with the state of every inputs' states

Then, 4 other test frames are successively sent on the network at a rate of 1 frame per minute for 4 minutes. During this transmission, the **green** LED flashes.

# 5. Setup and configuration

## a. Setup

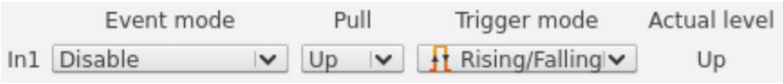
### Inputs setup

All inputs are configurable and can be assigned to different operating modes. Each entry can be deactivated or assigned to one of 14 different events available. For each event, a trigger mode is associated among three different modes available, as well as the type of draw of entries.

*Available event*

- Off (by default)
- Sending an alert frame to the state change if input 1 is open.
- Sending an alert frame to the state change if input 8 is open.
- Send warning frame to status change if input 9 is open (only in ACW-DIN-DIO16 version).
- Send warning frame to status change if input 16 is open (only in ACW-DIN-DIO16 version).
- Sending an alert frame to the state change.
- Incrementation of meter 1
- Incrementation of meter 2
- Incrementation of meter 3
- Incrementation of meter 4
- Incrementation of meter 5 (V1.2.0 and uppers)
- Incrementation of meter 6 (V1.2.0 and uppers)
- Incrementation of meter 7 (V1.2.0 and uppers)
- Incrementation of meter 8 (V1.2.0 and uppers)

*Pulling types (from version V1.2.0)*




- Pull-up: Suitable for dry contacts connecting the input and ground (0V). This default configuration is used in versions below V1.2.0.
- Pull-down: Suitable for dry contacts connecting the input and the 10 / 30V.

*Available trigger modes*

- At the change of state of a contact, from "closed" to "open" (rising edge).
- At the change of state of a contact, from "open" to "closed" (falling edge).
- At state change on rising and falling edge (default).

### Bounce time parameter

All inputs are affected by an anti-rebound time that can be adjusted between 1 and 250 ms depending on the type of dry contacts used.

### Periodic frame parameter

The periodic frames make it possible to regularly go back up the state of the inputs / counters. This frequency is set to 1 hour by default but can be set from 10 minutes to 45 days, 12 hours and 15 minutes.

Depending on the setting you have chosen, it is possible that several frames are sent. In this case and only in the Sigfox version the minimum periodicity can be affected:

- If two frames are to be sent, the minimum period is 20 minutes.
- If three frames are to be sent, the minimum period is 30 minutes.
- If four frames are to be sent, the minimum period is 40 minutes.
- If five frames are to be sent, the minimum period is 50 minutes.

### Keep alive frame parameters

A life frame can be emitted periodically. This frame will remount the supply voltage of the product.

*The available periods are as follows*

- Disabled
- Every hour
- Every two hours
- Every four hours
- Every eight hours
- Everyday
- Every two days
- Every three days
- Every four days (by default)
- Every week.
- Every month (30 days)

### Temperature parameter (offset)

If a temperature sensor is connected, it is possible to assign an offset value for calibration of the sensor. By default, a value of 0 ° C is affected and the possible values are from -10 to +10 ° C in steps of 0.1 ° C.

### Pairing method setup

In the LoRaWAN version it is possible to choose the method of pairing between OTAA (Over The Air Activation) and ABP (Activation By Personalization).

Note: The class of operation LoRaWAN is by default and not configurable, class C. This remains compatible with a network configured for class A.

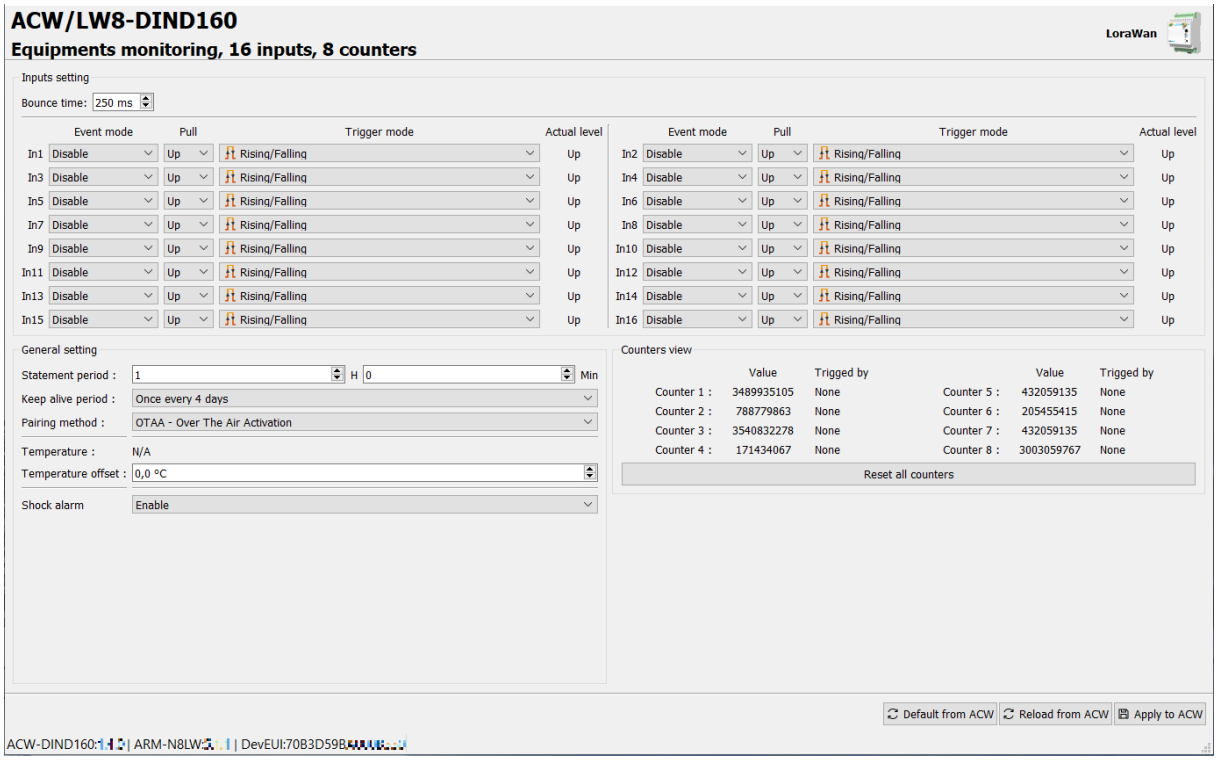
Note: Class C requires a first uplink broadcast before being able to receive downlinks. When starting up, it will take a minute to send downlinks.

## b. Configuration via USB

Download and install the "ACW Configurator" software, which you will find at the following address:

http://www.atim.com/fr/support/telecharger/

Connect the ACW to your computer with a micro-USB cable, then launch the software if you have not already done so. When you connect the ACW-DINDIO8 / 16, the software window changes to allow you to access the ACW configuration. Automatically, the current configuration of the connected ACW is retrieved and displayed. You can then see a window like the one below (eg for an ACW-DIND160, previously ACW-DINDIO16):




In the upper left corner, there is the product reference and a functional description.

In the upper right corner, the radio technology of the product is indicated.

In the “input settings” tab, you will have the choice to configure the inputs mode, pull setting and trigger edge as well as input bounce time.

In the “General settings” tab, you can configure:

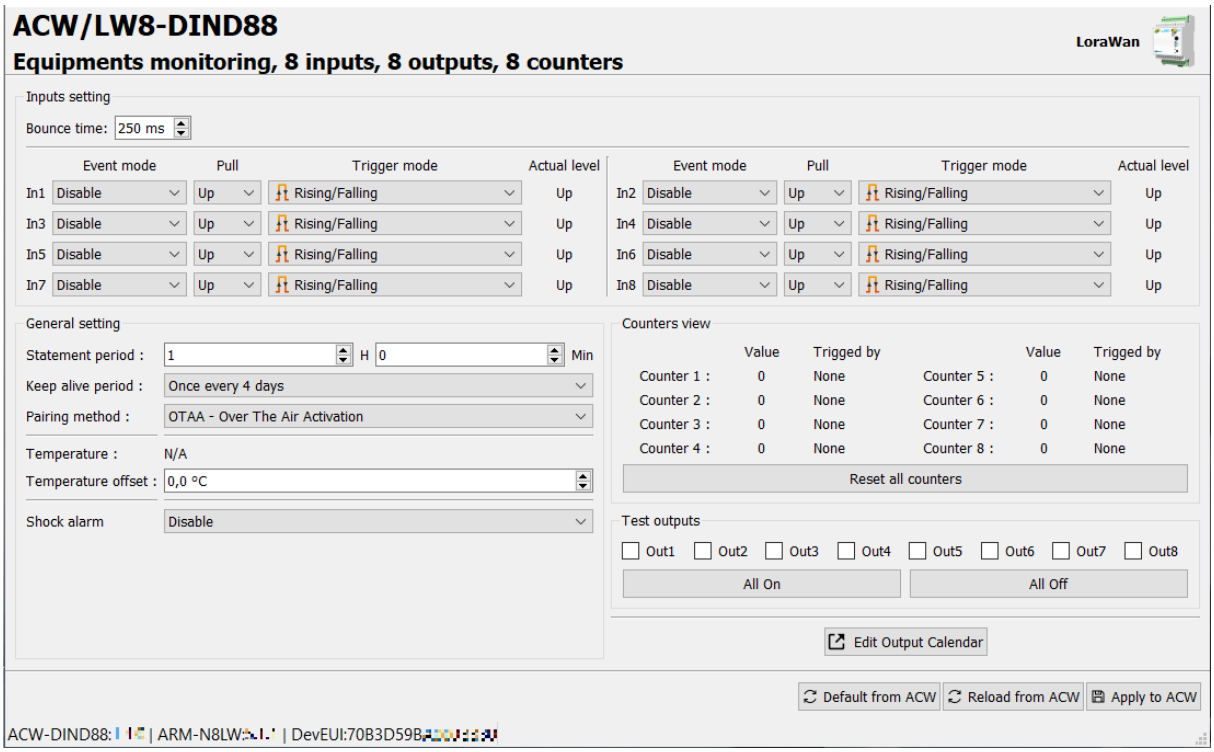
- The statement period (when a periodical radio frame is sent) and the keep alive period.
- Visualize in real time the temperature measured from temperature sensor (if connected) and apply a temperature offset to the measure.
- Enable/disable the shock alarm

In the “Counters view” tab, you can visualize the counters indexes and the associated input. In addition, the “Reset all counters” button set the value of all the counters to “0”.

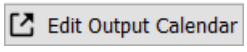
In the lower left corner, the firmware version of the product and radio module plus the radio ID will be listed.

In the lower right corner, there is three buttons to set to default parameter the product configuration, apply the configuration from the application to the device and load the configuration from the device to the application.

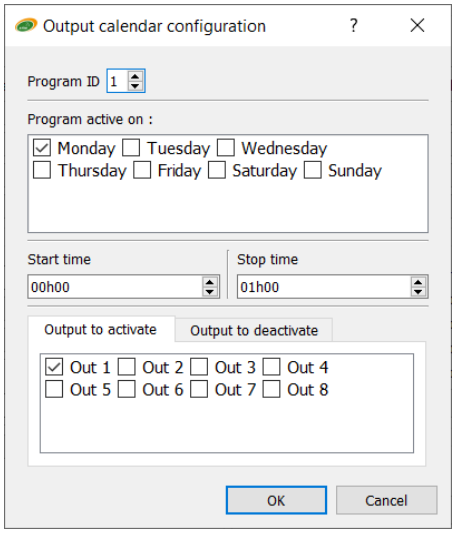
The window below refers to a version with outputs, an ACW-DIND88:




In addition to the previous page element, there is a tab "**Test outputs**" to pilot the outputs separately or all at once.

Finally, the button 

give an access to the output calendar configuration tools.




In addition to having access to all the parameters described in the "Parameterization" section, you have access to a visualization on the state of the inputs, the meters and the temperature (if the sensor is connected). The display of all these parameters is refreshed every 2 to 3 seconds. In versions with outputs (DIND44 and DIND88), there is also the possibility of controlling the outputs.

Note : The configuration must be applied in order to increment and visualize the counters.

Note : It is possible during the first connection that the values of the counters are random. In this case, you will need to click on the "Reset all counters" button to reset all the counters to 0.

# 6. Uplinks on IoT networks (Sigfox/LoRaWAN)

## a. Test frame

This frame is sent to the network every minute for five minutes when the product is started. It can also be triggered via the push button on the front of the ACW-DINDxxx. Each time this frame is sent, a counter is incremented and inserted in the frame.

Frame format

| Byte | 0 | 1 |
|---|---|---|
| Data | 0x05 | Cnt |

***Cnt*** deals with the meter value.

## b. Keep alive frame

This frame is sent to the network periodically (configurable) and after transmission of the first 5 test frames.

Frame format

| Byte | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Data | 0x01 | Power supply tension (millivolt) | | Power supply tension (millivolt) | | 0x64 |

## c. State frame

The state of the inputs and counters, as well as the temperature (if connected) are sent either periodically or on change of state of a previously configured input.

To raise the status of all inputs and counters, it is possible that several frames are sent.

The frames below will be sent depending on the configuration.

Note : Disabled pins ("Disable" in the configurator) are replaced by 1 in bytes going back (byte 2 and byte 3) the state of the inputs.

Note : The **inputs** logical state sent in the data bytes (byte 2 and byte 3) is inverted from the real logical state. For example, for an input configured as a pull-up and a dry contact connected between the input and the GND, the bit of this input will be 1 when the dry contact is closed, and it will be 0 when the dry contact is open. For a pull-down and a dry contact connected between the input and the power supply, it is the opposite, the input will be at 1 when the dry contact is open, and it will be at 0 when the dry contact is closed.

### Digital inputs frame

In case the temperature sensor is disconnected and counter 1 and counter 2 are deactivated.

| Byte | 0 | 1 | 2 |
|---|---|---|---|
| Data (for DIND160 or DIND80 | 0x42 | State of digital inputs | |
| Data (for DIND44 or DIND88 | 0x62 | State of digital inputs | State of digital outputs |

### Frame of digital IN/OUT and temperature

In case the temperature sensor is connected, and all the counters are deactivated.

| Byte | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Data (for DIND160 or DIND80 | 0x41 | State of digital inputs | | Temperature in 1/10 of °C | |
| Data (for DIND44 or DIND88 | 0x61 | State of digital inputs | State of digital outputs | Temperature in 1/10 of °C | |

### Digital IN/OUT frame, temperature and counter 1

In case only counter 1 is activated and the temperature sensor is connected.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Data (for DIND160 or DIND80 | 0x4e | State Digital inputs | | Temperature in 1/10 of °C | | Meter 1 | | | |
| Data (for DIND44 or DIND88 | 0x6e | State of digital inputs | State of digital outputs | Temperature in 1/10 of °C | | Meter 1 | | | |

### Frame of digital IN/OUT, counter 1 and counter 2

In case the counter 1 or / and 2 is / are activated and the temperature sensor is disconnected.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Data (for DIND160 or DIND80 | 0x4f | Digital inputs states | | Meter 1 | | | | Meter 2 | | | |
| Data (for DIND44 or DIND88 | 0x6f | State of digital inputs | State of digital outputs | Meter 1 | | | | Meter 2 | | | |

### Frame of digital IN/OUT and counter 1

In case only counter 1 is activated and the temperature sensor is disconnected.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Data (for DIND160 or DIND80 | 0x52 | Digital inputs states | | Meter 1 | | | |
| Data (for DIND44 or DIND88 | 0x72 | State of digital inputs | State of digital outputs | Meter 1 | | | |

### Counters 1 & 2 frame

In case the meter 2 is activated and the temperature sensor is connected.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Data | 0x50 | Meter 1 | | | | Meter 2 | | | |

### Counters 3 & 4

In the case where the counter 3 and / or the counter 4 are / is activated.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Data | 0x51 | Meter 3 | | | | Meter 4 | | | |

### Counters 5 & 6

the case where the counter 5 and / or the counter 6 are / are activated.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Data | 0x5f | Meter 5 | | | | Meter 6 | | | |

### Counters 7 & 8

In the case where the counter 7 and / or the counter 8 are / is activated (s).

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Data | 0x60 | Meter 7 | | | | Meter 8 | | | |

### Frame of digital IN/OUT, temperature and counters 1 to n (only LoRaWAN)

In the case where counters are activated, and the temperature sensor is connected.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | ... |
|---|---|---|---|---|---|---|---|---|---|---|
| Data (for DIND160 or DIND80 | 0x5d | Digital inputs states | | Temperature in 1/10 of °C | | Meter 1 | | | | Meter 2 to n |
| Data (for DIND44 or DIND88 | 0x7d | State of digital inputs | State of digital outputs | Temperature in 1/10 of °C | | Meter 1 | | | | Meter 2 to n |

Note: If there are 8 counters to send the 0x60 frame will also be sent.

### Frame of digital IN/OUT and counters 1 to n (only LoRaWAN)

In the case where counters are activated, and the temperature sensor is disconnected.

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | … |
|---|---|---|---|---|---|---|---|---|
| Data (for DIND160 or DIND80 | 0x5e | Digital inputs states | | Meter 1 | | | | Meter 2 to n |
| Data (for DIND44 or DIND88 | 0x7e | State of digital inputs | State of digital outputs | Meter 1 | | | | Meter 2 to n |

## d. Alarm of shock frame

This frame is sent to the network during the detection of a shock on the case. This feature is disabled for 10 minutes after this frame is sent.

| Byte | 0 | 1 |
|---|---|---|
| Data | 0x43 | cnt |

***Cnt*** is the value of a counter that increments each time this frame is sent.

## e. Format/decoding of data/frames

### State of digital inputs (for DIND160 and DIND80)

The layout of the digital inputs in bytes 2 and 3 for frames 0x41, 0x42, 0x4e, 0x4f, 0x5d, 0x5e and 0x52 are described in the table below.

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| Byte 2 | Input 8(2) | Input 7(2) | Input 6(2) | Input 5(2) | Input 4 | Input 3 | Input 2 | Input 1 |
| Byte 3 | Input 16(1) | Input 15(1) | Input 14(1) | Input 13(1) | Input 12(1) | Input 11(1) | Input 10(1) | Input 9(1) |

### State of digital inputs/outputs (for DIND88 and DIND44)

The layout of the digital inputs in bytes 2 and 3 for frames 0x61, 0x62, 0x6e, 0x6f, 0x7d, 0x7e and 0x72 are described in the table below.

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| Byte 2 | Input 8(2) | Input 7(2) | Input 6(2) | Input 5(2) | Input 4 | Input 3 | Input 2 | Input 1 |
| Byte 3 | Out 8(3) | Out 7(3) | Out 6(3) | Out 5(3) | Out 4 | Out 3 | Out 2 | Out 1 |

*Metering*

All counters are in 32 bits or 4 bytes, they are sent with the most significant byte (MSB) first. It's up to you to convert your physical value according to the type of impulse counted.

Note (1) : In the DIND80, DIND88 and DIND44 versions these inputs are not used and are replaced by high level.

Note (2) : In the DIND44 version these entries are not used and are replaced by high level.

*Temperature in 1/10 of °C*

The temperature is sent in 10th of degrees Celsius on two bytes coded in complement two. The most significant byte (MSB) is sent first.

*Power supply tension (millivolt)*

The supply voltage is sent in millivolt on two bytes, the most significant byte (MSB) is sent first.

*Metering*

All counters are coded on 4 bytes, the most significant byte (MSB) is sent first.

## f. Frames summary

| Type | Description | Frame format | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | byte 0 (hex) | byte 1 (hex) | byte 2 (hex) | byte 3 (hex) | byte 4 (hex) | byte 5 (hex) | byte 6 (hex) | byte 7 (hex) | byte 8 (hex) | byte 9 (hex) | byte 10 (hex) |
| **Keep Alive** | Keep alive frame | 01 | Power supply tension (mV) | | Power supply tension (mV) | | 64 | | | | | |
| **Test** | Test frame | 05 | Counter | | | | | | | | | |
| **Inputs** | Digital inputs frame | 42 | Digital inputs state | | | | | | | | | |
| **Inputs** | Frame of digital inputs and temperature | 41 | Digital inputs state | | Temperature (1/10 of °C) | | | | | | | |
| **Inputs + Temperature + Counters** | Frame of digital inputs, temperature and counter 1 | 4E | Digital inputs state | | Temperature (1/10 of °C) | | Counter 1 | | | | | |
| **Inputs + Counters** | Frame of digital inputs, counters 1 & 2 | 4F | Digital inputs state | | Counter 1 | | | | Counter 2 | | | |
| **Inputs + Counter** | Frame of digital inputs and counter 1 | 52 | Digital inputs state | | Counter 1 | | | | | | | |
| **Counters** | Frame of counters 1 & 2 | 50 | Counter 1 | | | | Counter 2 | | | | | |
| **Counters** | Frame of counters 3 & 4 | 51 | Counter 3 | | | | Counter 4 | | | | | |
| **Counters** | Frame of counters 5 &t 6 | 5F | Counter 5 | | | | Counter 6 | | | | | |
| **Counters** | Frame of counters 7 e& 8 | 60 | Counter 7 | | | | Counter 8 | | | | | |
| **Inputs + Temperature + Counters** | Frame of digital inputs, temperature and counters | 5D | Digital inputs state | | Temperature (1/10 of °C) | | Counter 1 | | | | Counters... n | |
| **Inputs + Counter** | Frame of digital inputs and counters | 5E | Digital inputs state | | Counter 1 | | | | Counters... n | | | |
| **Shocks** | Alarm and shock frame | 43 | Counter | | | | | | | | | |
| **Inputs/outputs** | Digital inputs/outputs frame | 62 | Digital inputs state | Digital outputs state | | | | | | | | |
| **Inputs/outputs** | Frame of digital inputs/outputs and temperature | 61 | Digital inputs state | Digital outputs state | Temperature (1/10 of °C) | | | | | | | |
| **Inputs/outputs + Temperature + Counters** | Frame of digital inputs/outputs, temperature and counter 1 | 6E | Digital inputs state | Digital outputs state | Temperature (1/10 of °C) | | Counter 1 | | | | | |
| **Inputs/outputs + Counters** | Frame of digital inputs/outputs, counters 1 & 2 | 6F | Digital inputs state | Digital outputs state | Counter 1 | | | | Counter 2 | | | |
| **Inputs + Counter** | Frame of digital inputs and counter 1 | 72 | Digital inputs state | Digital outputs state | Counter 1 | | | | | | | |
| **Inputs/outputs + Temperature + Counters** | Frame of digital inputs/outputs, temperature and counters | 7D | Digital inputs state | Digital outputs state | Temperature (1/10 of °C) | | Counter 1 | | | | Counters... n | |
| **Inputs/outputs + Counter** | Frame of digital inputs/outputs and counters | 7E | Digital inputs state | Digital outputs state | Counter 1 | | | | Counters... n | | | |

# 7. Downlinks from IoT networks (Sigfox ou LoRaWAN)

If your product has a compatible radio version, you can benefit from this feature.

Sigfox radio firmware: Version **5931** or forward

LoRaWAN radio firmware: Version **2.3.3** or forward

The operation of the exchange frames of this function is explained in the document "ATIM_ACW-DLConfig_UG_EN_Vx.x.pdf" This document is available for download at https://www.atim.com/fr/support/telecharger/.

## a. Parameters

Below is a description of all the downlink modifiable parameters:

### Keep alive frame parameters (Code 03)

| Size and Code (Byte 0) | Value (Byte 1) |
|---|---|
| 0x00\|03=0x03 | 0x00 = Disabled.<br>0x05 = Every hour.<br>0x0a = Every two hours.<br>0x0b = Every four hours.<br>0x0c = Every eight hours.<br>0x06 = Every day.<br>0x0d = Every two days.<br>0x0e = Every three days.<br>0x0f = Every four days.<br>0x07 = Every week.<br>0x08 = Every month (30 days). |

Inputs parameters (Code 10 to 25)

| Size and Code (Byte 0) | Value (Byte 1) |
|---|---|
| Input 1: 0x00\|10=0x0a<br>Input 2: 0x00\|11=0x0b<br>Input 3: 0x00\|12=0x0c<br>Input 4: 0x00\|13=0x0d<br>Input 5: 0x00\|14=0x0e<br>Input 6: 0x00\|15=0x0f<br>Input 7: 0x00\|16=0x10<br>Input 8: 0x00\|17=0x11<br>Input 9: 0x00\|18=0x12<br>Input 10: 0x00\|19=0x13<br>Input 11: 0x00\|20=0x14<br>Input 12: 0x00\|21=0x15<br>Input 13: 0x00\|22=0x16<br>Input 14: 0x00\|23=0x17<br>Input 15: 0x00\|24=0x18<br>Input 16: 0x00\|25=0x19 | 0xYY |

The value (0xYY) is composed of an event, a trigger mode and a draw type. The value (0xYY) is thus divided into three concatenated parts.

Note : The 8-input version (ACW-DINDIO8) does not have codes 18 to 25.

Note : The type of print and available only from version V1.2.0.

*Events - bits 0 to 4*

The possible values in the byte for these bits are:

- 0x00 = Disabled.
- 0x01 = Sending an alert frame to the state change if input 1 is high.
- 0x13 = Sending an alert frame to the state change if input 8 is high (Available only in version DIND80, DIND88 and DIND160)
- 0x14 = Sending an alert frame to the state change if input 9 is high. (Available only in version DIND160)
- 0x15 = Sending an alert frame to the state change if the input 16 is in the high state. (Available only in version DIND160)
- 0x02 = Sending an alert frame to the state change
- 0x03 = Counter increment 1
- 0x04 = Counter increment 2
- 0x05 = Counter increment 3
- 0x06 = Counter increment 4
- 0x07 = Counter increment 5 (V1.2.0 and forward; Available only in version DIND80, DIND88 and DIND160)
- 0x08 = Counter increment 6 (V1.2.0 and forward; Available only in version DIND80, DIND88 and DIND160)
- 0x09 = Counter increment 7 (V1.2.0 and forward; Available only in version DIND80, DIND88 and DIND160)
- 0x0A = Counter increment 8 (V1.2.0 and forward; Available only in version DIND80, DIND88 and DIND160)

*Pull types - bits 5 (from V1.2.0)*

The possible values in the byte for these bits are:

- 0x00 = Pull-up (by defaults for lower versions of V1.2.0).
- 0x20 = Pull-down

*Trigger modes - bits 6 to 7*

The possible values in the byte for these bits are:

- 0x40 = At the change of state, from the low state to the high state (rising edge).
- 0x80 = At the change of state, from the high state to the low state (falling edge).
- 0xc0 = At the change of state (rising and falling edge).

Example :

For example, if you want to configure the input 10 (code 19) on the counter 3 (0x05) on the rising edge only (0x40 and a pull up (0x00), the following parameterization must be generated:

| Size and Code (byte 0) | Value (byte 1) |
|---|---|
| 0x00\|19=0x13 | 0x05\|0x40\|0x00 =0x45 |

### Rebound time parameter (Code 30)

| Size and Code (byte 0) | Value (byte 1) |
|---|---|
| 0x00\|30=0x1e | 0xYY |

The value (0xYY) is encoded in milliseconds. From 5 (for 5 milliseconds) to 255 (for 255 milliseconds).

### Parameter of the periodic frame (Code 31)

| Size and Code (byte 0) | Value (byte 1) | Value (byte 2) |
|---|---|---|
| 0x40\|31=0x5f | 0xYY | 0xZZ |

The value (0xZZYY) is coded in minutes. From 10 (for 10 minutes) to 15300 (for 45 days, 12 hours and 15 minutes). The low byte (0xYY) is first in the frame.

Note : In versions less than or equal to V1.2.3, the max value is actually 255min (for 0 days, 4 hours and 15 minutes). This bug has been fixed since version V1.3.0.

### Settings on temperature - Offset (Code 32)

| Size and Code (byte 0) | Value (byte 1) |
|---|---|
| 0x00\|32=0x20 | 0xYY |

The value (0xYY) is coded in addition to two and tenths of ° C. From -100 (for -10 ° C) to 100 (for + 10 ° C).

### Output calendar configuration (code 34 to 40)

| Size and Code (Byte 0) | Frame size (Byte 1) | Start time / stop time (byte 2 -4) | | | Week day (byte 5) | Output to set (byte 6) | Output to reset (byte 7) |
|---|---|---|---|---|---|---|---|
| **Program 1: 0xc0\|0x22 (34) = 0xE2**<br>**Program 2: 0xC0\|0x23 (35) = 0xE3**<br>**Program 3: 0xC0\|0x24 (36) = 0xE4**<br>**Program 4: 0xC0\|0x25 (37) = 0xE5**<br>**Program 5: 0xC0\|0x26 (38) = 0xE6**<br>**Program 6: 0xC0\|0x27 (39) = 0xE7**<br>**Program 7: 0xC0\|0x28 (40) = 0xE8** | 0x06 | 0xAA | 0xAB | 0xBB | 0xCC | - | - |

Bytes 2 to 4 contains the start and stop time. Both times are coded on 12 bits (12 most significant bits for start time and 12 least significant bits for stop time) as the time in minutes from midnight. The formula to calculate this value is:

*(Hour x 60) + minute*

For example, with a start time at 12h30 and a stop time at 13h24, the start time in minutes is 12*60 + 30 = 750, the stop time in minutes is 13*60 + 24 = 804.

So 0xAAA = 2EE and 0xBBB = 324 (byte 2 = 0x2E, byte 3 = 0xE3, byte 4 = 0x24).

Byte 5 represent the weekday during which the program is active. Each bit stands for one day of the week as follows:

| Byte 5 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| - | Sunday | Saturday | Friday | Thursday | Wednesday | Tuesday | Monday |

If the bit is set to “0”, the program is inactive for the corresponding day and vice versa.

**WARNING**: At least, one bit should be set to 1 to enable the program.

The last two bytes contains the output to set or reset during the program.

Each output corresponds to a bit in these bytes as follows:

| Byte 6/7 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Output 8 | Output 7 | Output 6 | Output 5 | Output 4 | Output 3 | Output 2 | Output 1 |

To drive an output, the corresponding bit should be set to “1” in the corresponding byte (whether the output should be set or reset).

For example, if outputs 1,3,5,7 should be reset and outputs 2,4,6,8 should be set, the value of byte 6 will be 0xAA (0b10101010) and byte 7 will be 0x55 (0b01010101).

**Note**: To let output undriven during a program, the corresponding bit in byte 6 and 7 should be set to “0”.

### Shock alarm configuration (code 41)

| Size and Code (Byte 0) | Value (byte 1) |
|---|---|
| 0x00\|0x29 = 0x29 | 0xYY |

Byte 1 possible values are :

- 0x00 => shock alarm radio frame disabled
- 0x01 => shock alarm radio frame enabled

## b. Commands

### Restart (Command 0x01)

To restart the ACW-DINDIO8 / 16 remotely, you will need to send the following command:

| Byte 0 | Byte 1 |
|---|---|
| 0x01 | 0x01 |

The ACW will restart and not send confirmation.

### About (Command 0x02)

To obtain the information about the ACW-DINDIO8 / 16 it will be necessary to send him the following command:

| Byte 0 | Byte 1 |
|---|---|
| 0x01 | 0x02 |

The ACW will return the information in the following format:

| | Description and Value |
|---|---|
| **Byte 0** | Answer to command frames: 0x07 |
| **Byte 1** | About command: 0x02 |
| **Byte 2** | Type de l'ACW :<br>● DIN D160 - 9<br>● DIN D80 - 11<br>● DIN D88 - 15<br>● DIN D44 - 14 |
| **Byte 3** | ACW version (LSB) |
| **Byte 4** | ACW version (MSB) |
| **Byte 5** | Radio type:<br>1. Sigfox only uplink - 0x03<br>2. Sigfox uplink/downlink - 0x04<br>3. LoRaWan - 0x05 |
| **Byte 6** | Radio version (LSB) |
| **Byte 7** | Radio version (MSB) |
| **Byte 8 to n** | Serial number (devEUI\|sfx) (MSB first). |

### Reconfiguration with default settings (Command 0x03)

To reconfigure the parameters to the default values, it will be necessary to send him the following command:

| Byte 0 | Byte 1 |
|---|---|
| 0x01 | 0x03 |

The ACW will return a confirmation in the following format:

| | Description and Value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Configuration command by default: 0x03 |
| Byte 2 | Indicates whether the reconfiguration went well:<br>● Returns 0x00 to indicate that the configuration went smoothly.<br>● Returns a value other than 0x00 to indicate that the configuration failed. |

### Obtain the complete configuration (Command 0x04)

To obtain the complete configuration of the ACW, it will be necessary to send him the following command:

| Byte 0 | Byte 1 |
|---|---|
| 0x01 | 0x04 |

The ACW will return several frames with all its parameters:

| | Description and Value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Configuration command by default: 0x04 |
| Byte 2 to n | The parameters are encapsulated in the configuration frames. |

### Obtain the version of the used protocol (Command 0x07)

To obtain the version of the Downlink ATIM protocol implemented in the ACW, the following command must be sent:

| Byte 0 | Byte 1 |
|---|---|
| 0x01 | 0x07 |

The ACW will return the version in the following format:

| | Description and Value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Command version of the protocol: 0x07 |
| Byte 2 | Protocol version LSB |
| Byte 3 | Protocol version MSB |

### Apply a value to the counters (from version V1.2.0) (Command 0x0A)

To write the value of one or more counters, it will be necessary to send him the following command:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4-7 |
|---|---|---|---|---|
| 0xC1 | Frame size - 0x06 | 0x0A | Meter Index | Meter(s) value |

The value of one or more counters is defined in bytes 5 to 8. The value is on 32 bits with the LSB first (byte 5).

Byte 4 is the index of the counter where the value is to be applied.

For example, 4 for counter 4, 7 for counter 7, etc ... An index of 255 (0xff) will affect all counters. For example, to put all counters at 256, the following frame should be sent:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 |
|---|---|---|---|---|---|---|---|
| 0xC1 | 0x06 | 0x0A | 0xff | 0x00 | 0x01 | 0x00 | 0x00 |

If the counter (s) may have been affected by the value, the ACW will save the value in its memory and return the following confirmation frame:

| | Description and Value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Command, meter: 0x0A |

Note : As of version V1.3.0, if the index is not between 1 and 8 for a DIND80 or a DIND88 an error frame will be returned, and the counters will remain unchanged. If the index is not between 1 and 4 for a DINd44 an error frame will be returned, and the counters will remain unchanged.

## Outputs monitoring

It is possible to control the state of the outputs via downlink in different ways. Either by affecting the state of each output, or by affecting the state of a group of outputs or by generating a positive or negative pulse on a group of outputs.

### *Apply a state to outputs (Command 0x10)*

To assign the status of all outputs to a value, the following command must be sent:

| Byte 0 | Byte 1 | Byte 2 |
|---|---|---|
| **0x41** | 0x10 | States of outputs |

Each output is represented by a bit in byte 3. Byte 0 of byte 3 corresponds to output 1, bit 7 of byte 3 corresponds to output 8.

In the version of the ACW with 4 outputs, the 4 most significant bits must be 0. Or, in other words, the outputs (which do not exist) 5, 6, 7 and 8 must be controlled at 0. In the opposite case (if at least 1 of the 4 most significant bits is at 1) an error will be returned by the ACW and none of the outputs will be driven. See the response frames below.

Following this command, the ACW will return a response in the following format:

| | Description and value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Command 'Apply a state to outputs': 0x10 |
| Byte 2 | Outputs states after command execution |
| Byte 3 | States of outputs to command, but which does not exist. |

Byte 4 attests an error if that if not null. If byte 4 is null, byte 3 should have the same value as the requested state when sending the command (byte 3 in the control frame). If byte 4 is non-zero, it indicates which output cannot be controlled because it does not exist. For example, on a DIND44 if the 0xFF value is sent (byte 3 of the 0x10 control frame) the value 0xF0 will be returned and none of the outputs will be driven by the ACW.

Example 1 (OK)

For example, for controlling all DIND44 outputs to 1, the following command must be sent:

| Byte 0 | Byte 1 | Byte 2 |
|---|---|---|
| **0x41** | 0x10 | 0x0F |

The answer of the ACW will be: The answer of the ACW will therefore be:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 |
|---|---|---|---|
| **0x07** | 0x10 | 0x0F | 0x00 |

Example 2 (KO)

If you want to control at 1 exit 8 of a DIND44 that does not exist, the following command must be sent:

| Byte 0 | Byte 1 | Byte 2 |
|---|---|---|
| **0x41** | 0x10 | 0x80 |

The answer of the ACW will therefore be:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 |
|---|---|---|---|
| **0x07** | 0x10 | State of outputs | 0x80 |

Byte 4 being different from 0, this indicates a pilot error and raises the bit of the invalid output (in this case the output 8). The command is ignored, and no output will be commanded!

*Obtain the state of outputs (Command 0x20)*

In the same way as to affect the state of the outputs it is possible to recover their current state. For this it will be necessary to send the following command:

| Byte 0 | Byte 1 |
|---|---|
| **0x01** | 0x20 |

Following this command, the ACW will return a response in the following format:

| | Description and value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Command 'state of outputs' : 0x20 |
| Byte 2 | Current states of outputs |

*Apply a state to outputs' group (Command 0x11)*

It is possible to assign the state of a group of outputs to a value without affecting the state of the other outputs, it will be necessary to send the following command:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 |
|---|---|---|---|---|
| 0xc1 | 3 | 0x11 | Masque/Groupe | États des sorties |

Each output is represented by a bit in byte 4 and byte 5. Byte 0 of these bytes corresponds to output 1, ..., bit 7 corresponds to output 8.

Byte 5 has the same role as byte 3 of the 0x10 command, the only difference being that the outputs specified in byte 4 will be driven by the ACW.

Following this command, the ACW will return a response in the following format:

| | Description and value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Command 'Apply a state to outputs': 0x11 |
| Byte 2 | Outputs states after command execution |
| Byte 3 | States of outputs to command, but which does not exist. |

The constituted frame has the same behavior as with the 0x10 command. The difference is that the errors are based on byte 4 of the (control) frame 0x11. On DIND44 outputs 5 to 8 can not be controlled, bits 4 to 7 of byte 4 of frame 0x11 must therefore be 0 to avoid errors. In the case of an error, none of the outputs will be controlled.

*Generate a positive pulse to an outputs group (Command 0x12)*

It is possible to generate a positive impulse (0-> 1-> 0), for that, it will be necessary to send the following command:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 |
|---|---|---|---|---|
| 0xc1 | 3 | 0x12 | Mask/Group | Pulse time |

Each output to be controlled is represented by a bit in byte 4. Byte 0 of byte 4 corresponds to output 1, ..., bit 7 corresponds to output 8.

Byte 5 corresponds to the pulse time in milliseconds with a ratio of 4. The minimum value is therefore 4 ms and the maximum value is 1020 ms.

Following this command, the ACW will return a response in the following format:

| | Description and value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Command 'Apply a state to outputs': 0x12 |
| Byte 2 | Current states of outputs |
| Byte 3 | States of outputs to command, but which does not exist. |

The constituted frame has the same behavior as the response of the 0x11 command. In the case of an error, none of the outputs will be controlled.

*Generate a negative pulse to an outputs' group (Command 0x13)*

It is possible to generate a negative impulse (1-> 0-> 1), for this it will be necessary to send him the following command:

| Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 |
|---|---|---|---|---|
| 0xc1 | 3 | 0x13 | Mask/Group | Pulse time |

Each output to be controlled is represented by a bit in byte 4. Byte 0 of byte 4 corresponds to output 1, ..., bit 7 corresponds to output 8.

Byte 5 corresponds to the pulse time in milliseconds with a ratio of 4. The minimum value is 4 ms and the maximum value is 1020 ms.

Following this command, the ACW will return a response in the following format:

| | Description and value |
|---|---|
| Byte 0 | Answer to command frames: 0x07 |
| Byte 1 | Command 'Apply a state to outputs': 0x13 |
| Byte 2 | Current states of outputs |
| Byte 4 | States of outputs to command, but which does not exist. |

The constituted frame has the same behavior as the response of the 0x11 command. In the case of an error, none of the outputs will be controlled.

*Enable/Disable Output calendar (0x0B)*

At any time, it is possible to turn one or more programs at once on/off with the following command:

| Byte 0 | Byte 1 | Byte 2 |
|---|---|---|
| 0x41 | 0x0B | Output calendar state |

Each program is represented in byte 2 as follows:

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| Next day off only | Program 7 state | Program 6 state | Program 5 state | Program 4 state | Program 3 state | Program 2 state | Program 1 state |

If the state bit of a program is at "1," the program will be activated, if the state bit is at "0," the program will be disabled.

In addition, by forcing bit 7 to "1," all activated programs will be inactive the next day and will become active again the following day.

For example, if the 0x410B83 command is sent on a Tuesday, programs 1 and 2 will only be activated from Thursday (programs 3,4,5.6 and 7 will be deactivated on right after the command).

### *Get output calendar state (0x0C)*

The following command allows to get the output calendar state at any time:

| Byte 0 | Byte 1 |
|---|---|
| **0x01** | 0x0C |

Following this command, the ACW will return a response in the following format:

| | Description and value |
|---|---|
| Byte 0 | Response to command frames: 0x07 |
| Byte 1 | “State of output calendars” command: 0x0C |
| Byte 2 | Output calendar states |

The byte 2 in the response frame has the same format as byte 2 In the command frame.

## c. Summary of commands

| Description | Frame format | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Byte 0 (hex) | Byte 1 (hex) | Byte 2 (hex) | Byte 3 (hex) | Byte 4 (hex) | Byte 5 (hex) | Byte 6 (hex) | Byte 7 (hex) |
| **Restart** (cmd 0x01) | 0x01 | 0x01 | | | | | | |
| **About** (cmd 0x02) | 0x01 | 0x02 | | | | | | |
| **Default parameters reconfiguration** (cmd 0x03) | 0x01 | 0x03 | | | | | | |
| **Obtain setup** (cmd 0x04) | 0x01 | 0x04 | | | | | | |
| **Obtain protocol version** (cmd 0x07) | 0x01 | 0x07 | | | | | | |
| **Apply a value to counters** (cmd 0x0A) | 0xC1 | 0x06 | 0x0A | Counter Index | Counter(s) value | | | |
| **Command a state to outputs** (cmd 0x10) | 0x41 | 0x10 | States of outputs | | | | | |
| **Obtain the state of outputs** (cmd 0x20) | 0x01 | 0x20 | | | | | | |
| **Command a state of an outputs' group** (cmd 0x11) | 0xC1 | 0x03 | 0x11 | Mask/Group | States of outputs | | | |
| **Generate a positive pulse to an outputs' group** (cmd 0x12) | 0xC1 | 0x03 | 0x12 | Mask/Group | Pulse time | | | |
| **Generate a negative pulse to an outputs' group** (cmd 0x13) | 0xC1 | 0x03 | 0x13 | Mask/Group | Pulse time | | | |
| **Enable/Disable output calendar** (cmd 0x0B) | 0x41 | 0x0B | Output calendar state | | | | | |
| **Get output calendar state** (cmd 0x0C) | 0x01 | 0x0C | | | | | | |

# 8. Technical support

For any information or technical problems, you can contact our technical support by e-mail and phone:
www.atim.com/fr/technical-support