ATIM Cloud Wireless
Digital Input and Output
DINDIO
User Guide

Concerned model:
ACW/868 – DINDIO

M2M

Modbus

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Document version history

Version document	Date	Description	Author	Concerned soft version
0.1	13/11/2015	Creation	YL	
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Declaration of compliance

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

$$C\,E$$

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

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.

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.

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.

Technical specifications

Dimensions	90 x 57 x 67 mm	
Antenna	External (SMA connector)	
Temperature	-20°C to +55°C (operating) -40°C to +70°C (storage)	
Mounts to	DIN-Rail	
Battery	1 x alimentation 10-30Vcc	
Frequency	865 – 870 MHz	
Power	25 mW (14 dBm)	
Rate	Local: 1.2 to 115 Kbit/s LoRa: 300 bit/s to 10 Kbit/s	
Consumption	Local	LoRa
Mode Tx	60 mA	50 mA
Mode Rx	35 mA	10 mA
Standby mode	10 mA	10 mA

Footprint and installation
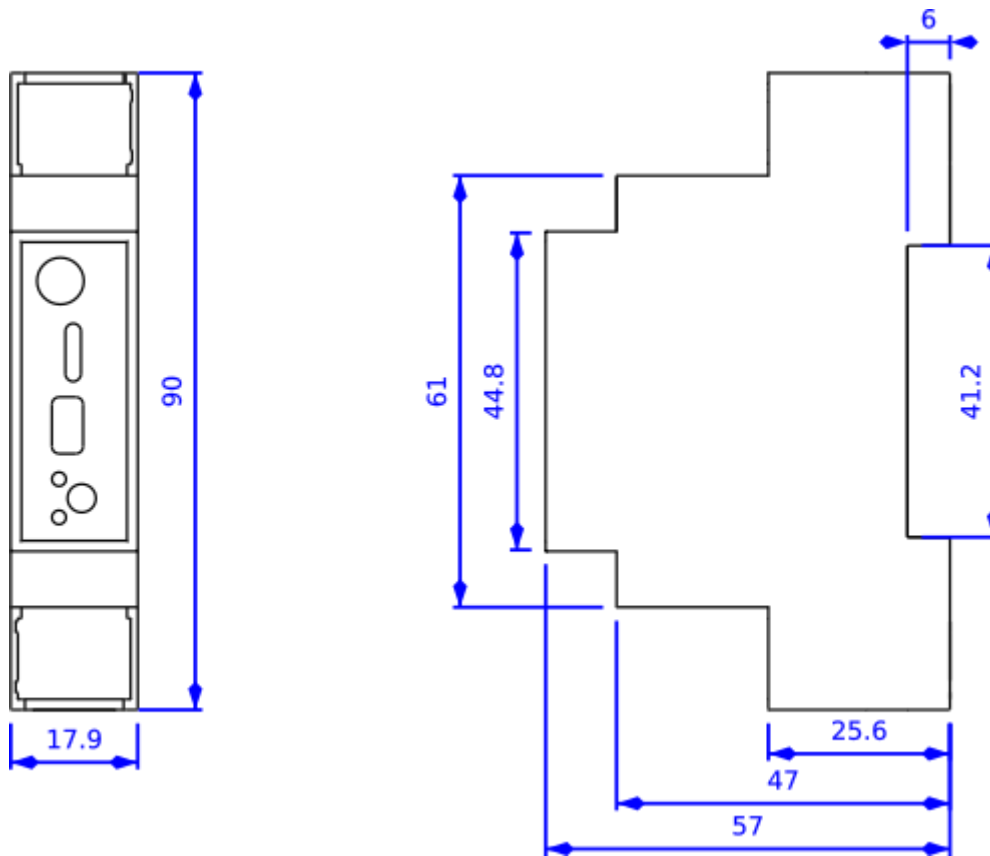
Dimensions give in mm.

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

Set up

a. Positioning

This version was designed for installation in an electrical box made of PVC or metal. If the cabinet is made of insulating material (PVC, ABS, fiberglass), it is possible to simply use a small whip-wave antenna: Ref ATIM ANT868-12FSC. This antenna must be firmly 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 best results, it is advisable to move the antenna up and clear of any metal obstacle within a radius of 1 meter if possible.

b. Modem connection

Terminals:

Name	Designations	Input / Output
GND	Ground	Input
10/30V	Alimentation between 10V and 30V	Input
OUT	Digital output 10-30Vdc	Output
NC	Not connected	/
IN1	Digital input 1	Input
IN2	Digital input 2	Input

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

Alimentation (Lower terminal):
The ACW-DIO module must be powered with a continuous power supply between 10V and 30V.

OUT (Lower terminal):
The logic output is MOSFET current source (N channel), 10-30Vdc. The maximum charging current is 0.2A.

IN1/IN2 (Upper terminal):
You can connect up to two inputs in 10-30Vdc positive logic. The filter of the input is 250 ms. The maximum recommended cable length and 1 meter.

USB:
The USB connector is used to configure the ACW via a PC and a USB cable.

➔ The configuration must be done with the device powered by 10 / 30Vdc.

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Configuration du modem

Download and install the configuration software '' setupACW.exe '' at:
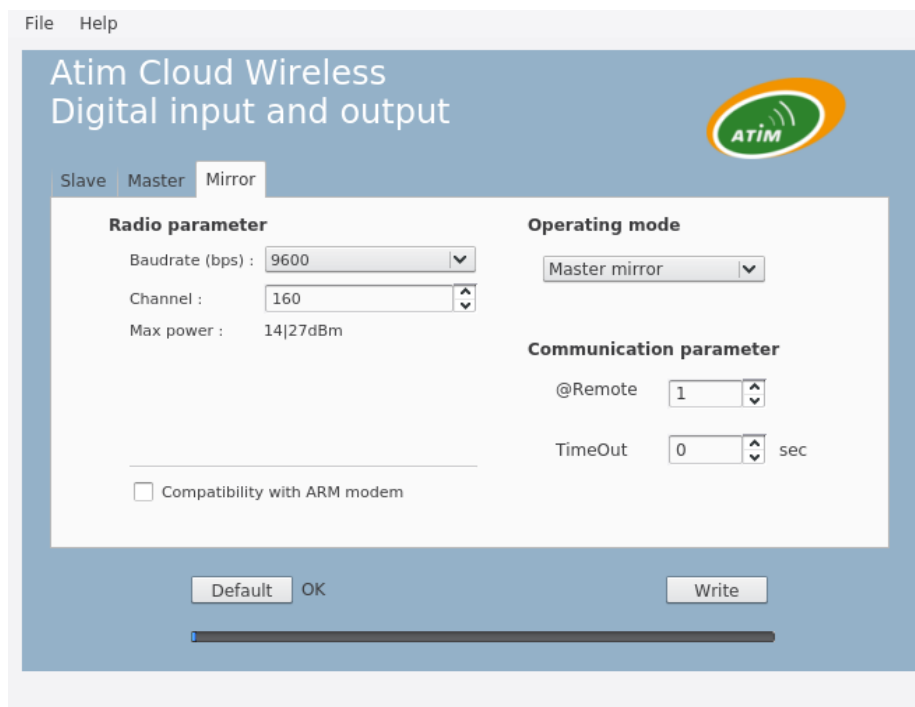http://www.atim.com/produit/atim-cloud-wireless-acw/
Connect the module to your computer with a USB cable and then launch the software.
When you connect the module, the software window changes to allow you to access the main features.
Automatically, the current configuration of the connected module is retrieved and displayed.

a. Local mode configuration 868MHz

✓ Operating mode
Three operating modes are available: slave, master or mirror.

- o Slave mode it is your remote device that will interrogate the ACW-DIO.
- o In Master mode, the ACW-DINDIO will periodically send (from 10min to 24h) or on a change of state the values of the recorded entries.
- o In Mirror mode, communication is done between two ACW-DIOs every 500ms. A copy of the input and output is performed between two remote modems. One of the two modems must be identified as master and the other as a slave, which can be defined in the "Operating mode" window of the "Mirror" tab.

✓ Inputs configuration
The ACW-DINDIO module has 2 configurable inputs. Each entry can be activated or not. The signal must be made by a 10-30V contact.

✓ Radio parameters
- o The radio channel must be the same between your different devices wanting to communicate together.
- o The baudrate must be the same between your different equipment wanting to communicate together.

- o The modem address is the address of your ACW-DINDIO, each modem must have a different address.
- o The remote address is the address of the device with which you want to communicate.
- o TimeOut acts as a watchdog. It is configurable from 0 (disabled) to 10 seconds. If no frame has arrived at the product within this time, then the modem output goes to 0.

If you do not set one of the statement periods fields. When you click the **Write** key, an **Invalid** message will appear next to it and a window will indicate which field is in default.

✓ Setup
Once you have completed the configuration, click on the **Write** button to validate it. After a few seconds of waiting, a message appears next to it to inform you if the module update succeeded or failed.

Note
This is when the module synchronizes with the time of your PC.

✓ Default
Resets the original values. After clearing the saved values, you can configure the ACW-DIO again.

Once the configuration is complete, do not leave the module connected to USB. This mode of operation is very energy intensive. When you remove the USB link without disconnecting the power, the modem automatically returns to normal operation. On power up, a first radio transmission is made in the 60s.

Lights meaning

In USB configuration mode, the green LED flashes slowly until the configuration is completed and the USB cable is removed.

a. Local 868MHz

The green status indicator illuminates when the product is powered. After a few seconds, a data transmission is performed. If the request is successful, the green LED illuminates briefly, in case of a failure the red LED lights up.

Frames format

In point-to-point or point-to-multipoint local communication mode, the Modbus RTU protocol is used.

Modbus mode is commonly used with a Modbus master controller or with a supervisor connected to an ACW-RS or an ARM-SE. Download the configuration software from: http://www.atim.com/product/atim-cloud-wireless-acw/la-new-gamera-atim-cloud-wireless

The main functions are:
- Digital inputs lecture
- Lecture and writing of the digital output
- Analogical input lecture (ACW-DA version)
- Metering lecture and writing

Modbus Slave configuration

Modbus Master configuration

Modbus table

Modbus Adress	Data
0x00 (0)	Digital inputs lecture b0: Input 1 state b1: Input 2 state
0x40 (64)	Meter input 1 lecture and writing (b31 to b16)
0x41 (65)	Meter input 1 lecture and writing (b15 to b0)
0x42 (66)	Meter input 2 lecture and writing (b31 to b16)
0x43 (67)	Meter input 2 lecture and writing (b15 to b0)

Supported Modbus Functions

Function	Type
0x03 (3)	Various registers lecture
0x10 (16)	Various registers writing

Data decoding

SLAVE ID	FUNC	START ADDR	REG QTY	BYTES COUNT	COUNTER 1 MSB	COUNTER 1 LSB	COUNTER 2 MSB	COUNTER 2 LSB	CRC

|			
Slave Id	1 octet	Slave Modbus ID	14
Code Function	1 octet	0x10 (Write multiple registers)	10
Start Address	2 octets	MSB = 0x40, LSB=Slave Id	40001
Quantity of registers	2 octets	Number of registers to write	0004
Bytes count	1 octet	Number of octets to write	08
Counter 1 MSB-LSB	4 octets	Metering input 1	00000012
Counter 2 MSB-LSB	4 octets	Metering input 2	00000008
CRC	2 octets	Errors control code	XXXX

Use case

Mirror mode allows copying of digital inputs to one or more remote radio modems. In simple mirror mode, the copy is made from one module to another (and vice versa). In multiple mirror mode, it is possible to have a master module to several slave modules. The transmission is cyclic or triggered (change of state).

Download the configuration software from: http://www.atim.com/product/atim-cloud-wireless-acw/la-new-gamera-atim-cloud-wireless
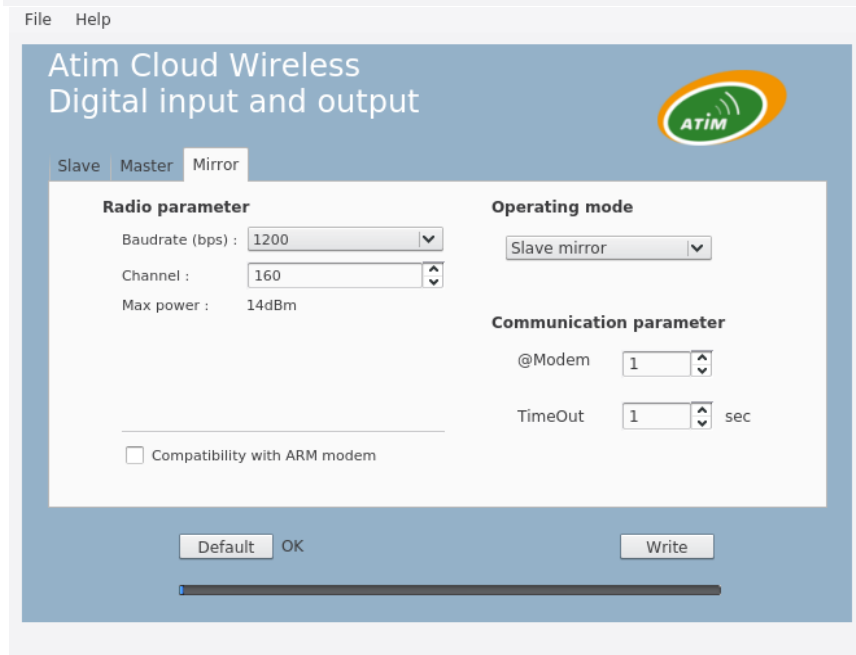
Simple mirror mode between two ACW-DINDIO

ACW-DIO
Master Modem
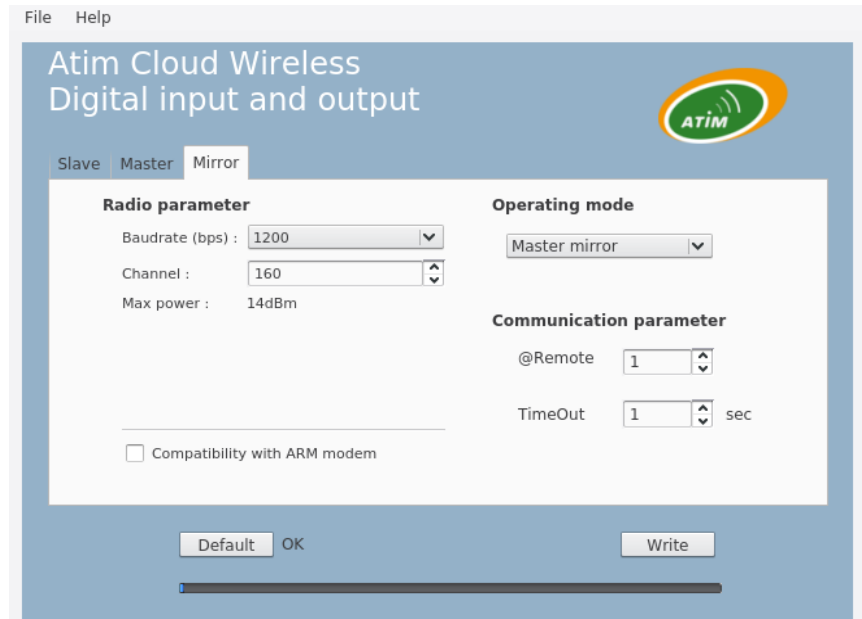
ACW-DIO
Slave Modem

In this configuration, the master modem and the slave modem have identical configuration of the inputs and outputs, the master modem sends a radio frame representing the state of its inputs to the slave modem which copies the state of the received inputs to its outputs and which immediately returns the status of its entries to the master modem.

Click on the 3rd tab of the configuration tool called "Mirror". One of the two modems must be declared as master and the other as a slave using the "Operating mode" drop-down list.

The "@Modem" modem address of the slave product must match the "@Remote" address of the master product. The radio channel and the baudrate must also be identical on both products. Please refer to the ARM-Nano User Guide for the frequency corresponding to the channel. TimeOut acts as a watchdog. It is configurable from 0 (disabled) to 10 seconds. If no frame has arrived at the product within this time then the modem output goes to 0.

The master modem instantiates communication with the slave modem to send the state of its input 1 and retrieve the state of input 1 of the slave modem. In order to enable you to validate the installation, the green leds on both modems must illuminate when the communication is effective.

Simple mirror mode between a ACW-DI and a ACW-DINDIO

In this configuration, the master modem sends the frame on a change of state of its digital inputs to the slave modem.

The ACW-DI with battery must be configured in master mode, it is him who will instantiate the communication during a change of state of its entry. The ACW-DINDIO will be configured as a slave to assign the value sent from the master to its output.

The "@Remote" address of the ACW-DI master must match the "@Modem" slave address of the ACW-DINDIO, so that communication is valid between the two products.

In order to allow you to validate the installation, the green leds must light up on both modems when the communication is effective.

ACW-DI
Master Modem
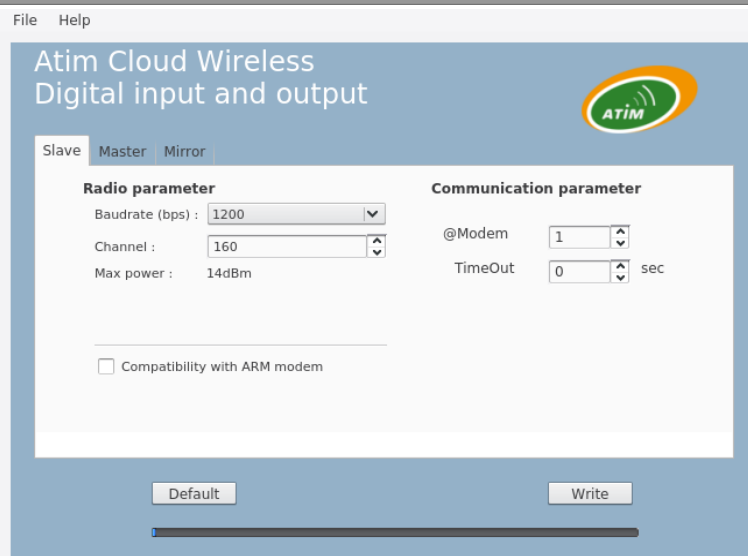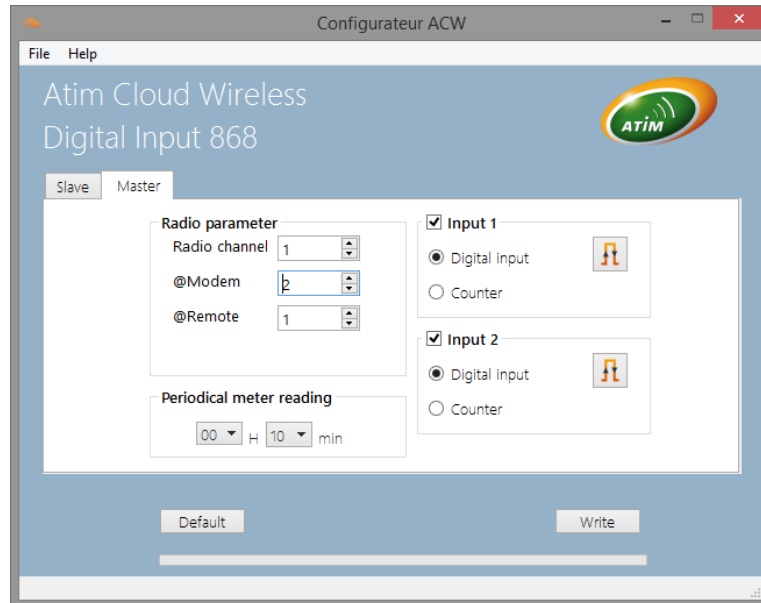
ACW-DIO
Slave Modem

The "Remote" address on the ACW-DI master product must match the "Modem" address on the ACW-DIO slave product.

ATIM_ACW-DINDIO_868_UG_EN_V1.3

Multiple mirror mode

In this configuration, there is a master modem and several slave modems. The master modem cyclically sends the state of its input to the slave modems. In this mode, slave modems do not respond to the master. The "@Remote" address of the master modem must be set to 0 in order to broadcast (broadcast to all slaves without distinction of address). Slave modems must be set to "Slave".

ACW-DIO
Master Modem

ATIM_ACW-DINDIO_868_UG_EN_V1.3
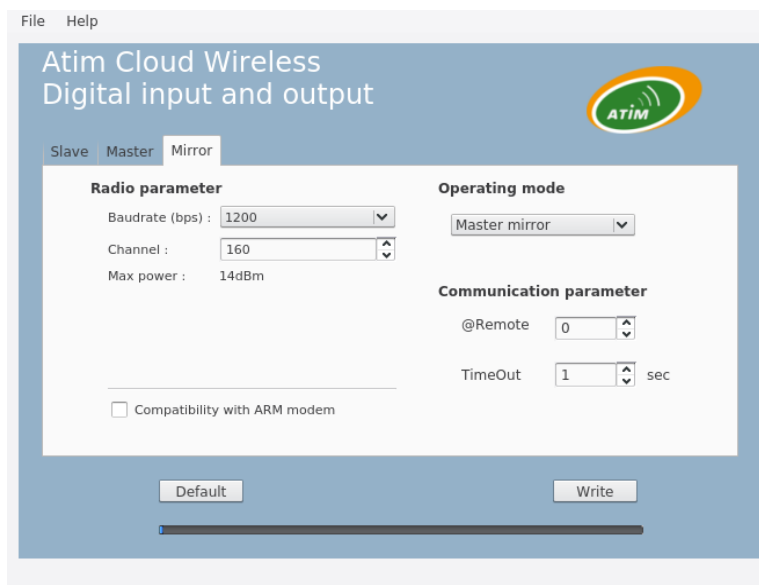
Help

The modem is not configured via USB or the configurator page does not update

- Check if the power supply is properly connected to the modem
- Check if the green light is flashing
- Check that "Windows Update" is enabled, that the PC is connected to the Internet and that the driver installation is complete. Also check that your version of the configurator is up to date (Menu File -> Update).
- Replace the USB cable
- In case of Failed to write the configuration, unplug and reconnect the USB cable

Radio data is not received

- Check if the power supply is properly connected to the modem
- Check if the modem has been registered on the network
- Check if radio network coverage is available
- Check if the green lights flash during a broadcast

Counter index does not increment

- Check if the counter wires are not reversed and plugged into the terminal block
- Check if your reading head is well sized for your use (liters, m3)
- Check that the output of your meter does not exceed 5V in the case of a push-pull output

LED does not flash

- Check if the power supply is properly connected to the modem
- USB Configure the modem using the USB configurator

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