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## **Users Manual**

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# ***MULTIVOIES WIRELESS system***

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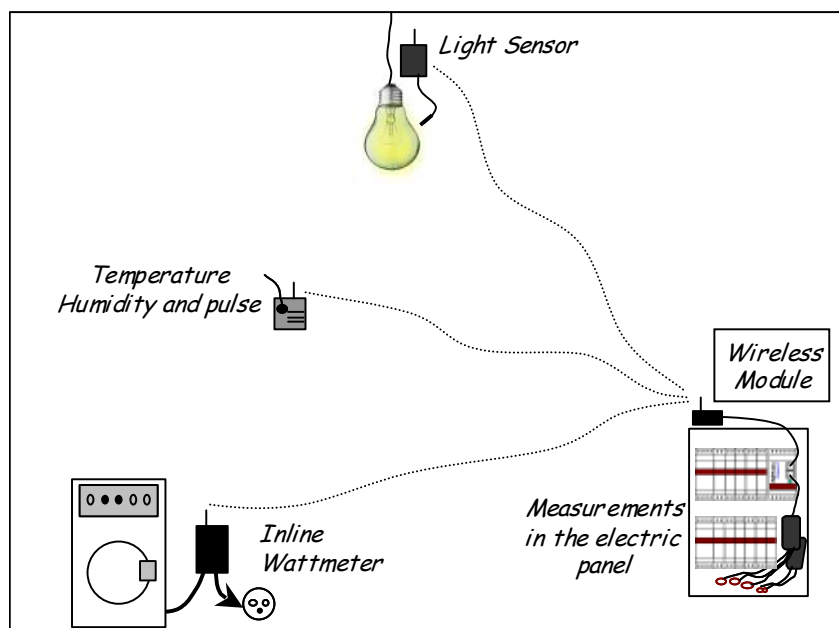
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## 1 OVERVIEW

This manual describes mains features and how to use the Multivoies Wireless Sensors and Module. The user is supposed to be familiar with the configuration use of the Multivoies system. Otherwise, please refer to the corresponding user manual.

The Wireless system is designed to collect the measurements from wireless remote sensors together with the measurements made by the Multivoies system in the electric panel.



### 1.1 Safety remarks :

- The Wireless Module is designed to work with the Multivoies system. Do not connect to any other system.
- The Inline Wattmeters is to be connected to mains (230Vac – 16 amps max). Do not use in the vicinity of water or in humid conditions. Handle with care and inspect the enclosure for cracks or defects before each use. Install and secure so that no exaggerated forces can be applied on the power cords.
- Keep the Wireless Module antenna away from people (> 1 meter). The emitted power is higher than that of the Wireless sensors.

## 2 MAIN FEATURES

The Wireless Sensors periodically communicate with the Wireless module to send their data and synchronize clocks.

The Wireless module has a large non volatile memory to store the measurements of the Sensors. The system clock and period of recording are determined by the Multivoies system concentrator.

The configuration of the Wireless module is necessary to tell which Sensor measurements are to be recorded. This is done like the Multivoies system configuration, using a Palm PDA.


The Wireless module can record up to 48 different measurements and has the same memory autonomy as other Multivoies modules (near to 5 months of data at 10 minutes interval)

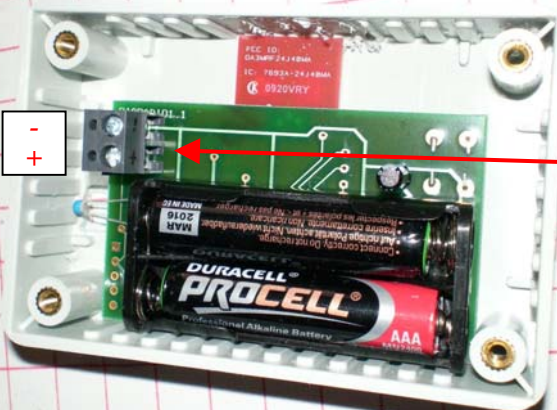
If less channels are needed, it is advisable to configure the wireless module accordingly. This can be done from 6 to 48 channel by multiples of 6.

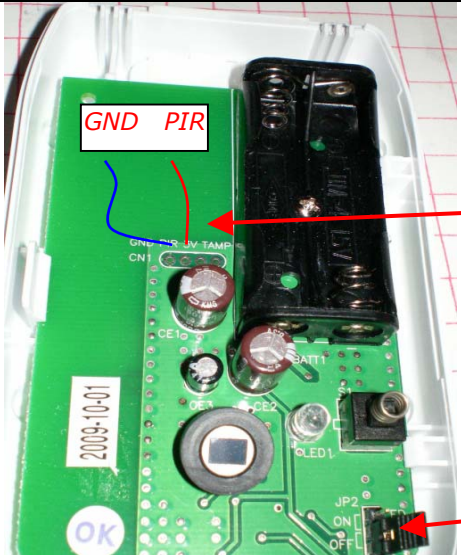
## 3 WIRELESS SENSORS


Several wireless sensors are available :

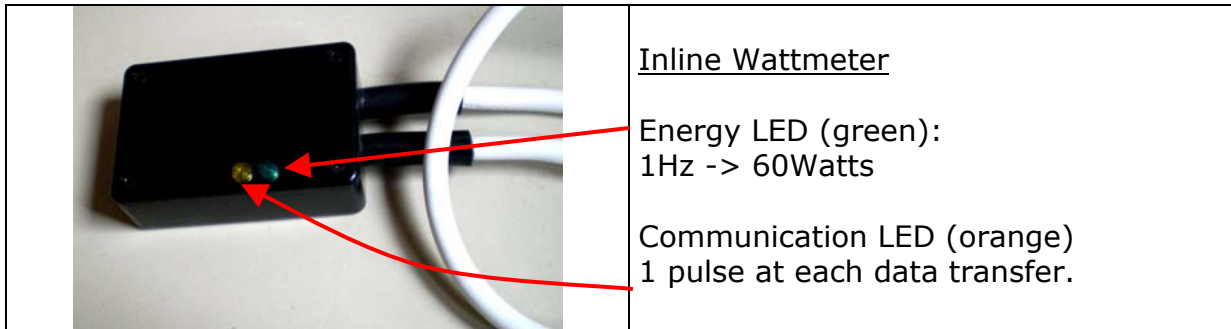
Name	Measurements	Remarks
Temp/Humidity/Pulse	Temperature Humidity Impulse ON Time	Battery Powered (2 x AAA) The digital input measures impulse count or ON-Time
Temp/Pulse	Temperature Average Temperature Impulse ON Time	Battery Powered (2 x AAA) The digital input measures impulse count or ON-Time
Lamp	Light Lamp ON Time Switch count	Battery Powered (2 x AAA)
Inline Energy	Active Power Apparent Power Voltage Current Active Energy Apparent Energy	Mains Powered (110-230V)

	<p><u>Wireless Temp/Hygro/Pulse</u></p> <p>Start button (requires a small tip)</p> <p>Internal Sensor.</p> <p>LED (1 very light pulse every second)</p>
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	<p><u>Wireless Temp/Pulse (inside)</u> <u>Wireless Temp/Hygro/Pulse (inside)</u></p> <p>It is possible to connect a switch or other contact to record impulses or ON time. 2 screw terminals are used. If the contact has a polarity, then it should be connected according to the signs on the left of the picture</p>
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	<p>For instance, when connecting to a PIR IR Tech 250LP, connect :</p> <ul style="list-style-type: none"><li>-GND to (-)</li><li>-PIR to (+)</li></ul> <p>Also do not fail to set JP2 to OFF to save battery. (turns LED off)</p>
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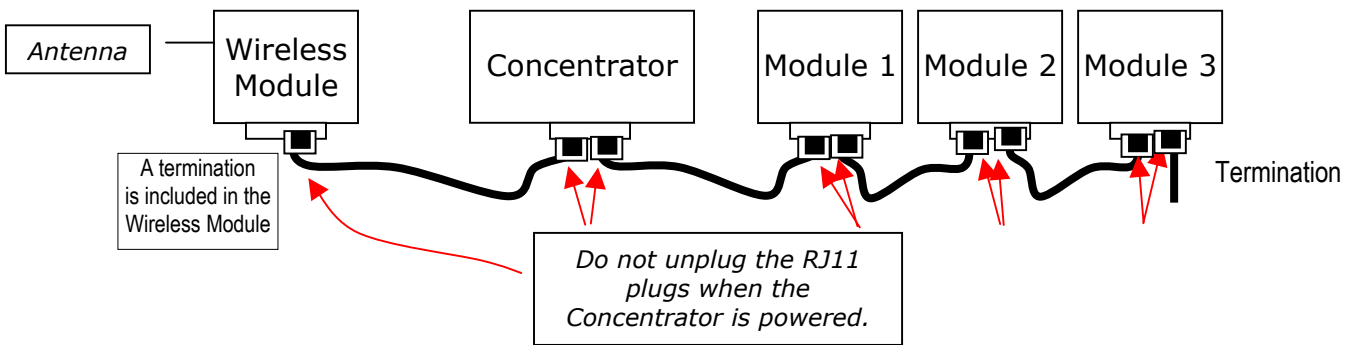
	<p><u>Wireless Light Sensor</u></p> <p>Must be directed at the light source (and not receive direct Sunlight)</p>
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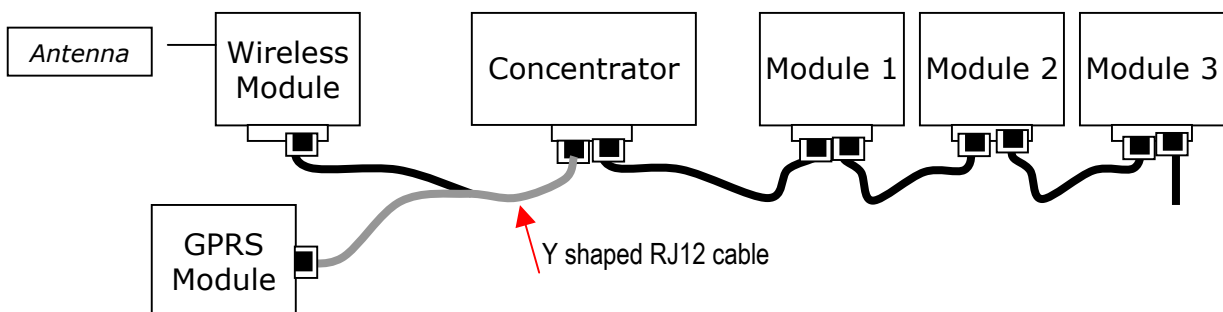
#### 4 INSTALLATION

The Wireless module is connected to the Multivoies Concentrator using a RJ11 6/4 straight cable. Depending on site configuration, the Wireless module can be connected at either end of the bus.

Example of bus cabling :



When a GPRS module is used, the Wireless Module and GPRS modules should be connected using a Y shape cable :

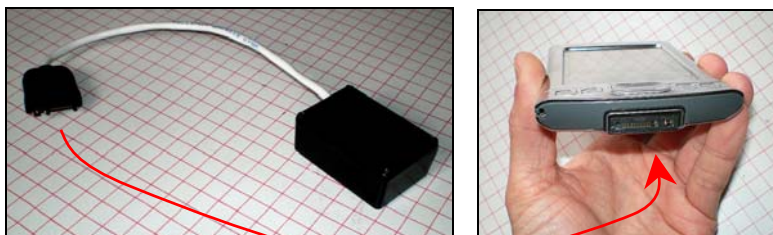


#### 5 CONFIGURING THE WIRELESS MODULE

The configuration of the Wireless Module is made just like other elements of the Multivoies system – using a Palm PDA.

You may either communicate with the system directly with the Concentrator by infrared or using the PDA zigbee interface.

Using the PDA zigbee interface :



							COM
Module	1	2	3	4	5	6	
							Make sure the Multivoies system is powered :
							-Concentrator green LED blinks slowly
							-Wireless Module green LED ON
							-other Module green LED blinks fast
							Launch the MV1Z software
							Tap "Option" to set the Wireless module you want to communicate with.
<div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>Option</span> <span>Start Config</span> <span>Data</span> </div>							
<div style="border: 2px solid purple; padding: 10px;"> <p style="text-align: center; margin: 0;"><b>Radio Options</b></p> <p>Wireless address to call: 8020</p> <p>Module autodetection <span>Restart</span></p> <p>Wireless Module Lines: 8</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <span>GPRS module</span> <span>OK</span> </div> </div>							<p>Input the Wireless module serial number in this field.</p> <p>Then tap 'OK' to validate and return to main menu.</p>

Using the PDA infrared communication to the Concentrator will bring you directly to the following menu :

SN: 01000459 Multivoies1 **COM**

Module	1	2	3	4	5	6
001024	0	0	0	0	0	0
001106	0	0	0	0	0	0
1*8020	250	250	250	250	18.3	18.3
2*8020	18.3	3.2	3.2	28.6	28.6	28.6
3*8020	18.5	18.5	18.5	3.2	3.2	3.2
4*8020	0.0	0.0	0.0	0.0	0.0	0.0
5*8020	3.7	3.7	3.7	3.7	3.7	3.7
6*8020	0.0	0.0	~	~	~	~
7*8020	3.7	3.7	~	~	~	~

Option Start Config Data

Now you should see the list of modules on the system.

The Wireless Module (here SN:8020) appears like a series of modules, depending on how many Sensor Channels have been allowed.

To change the number of channels, tap 'Option'.

**Radio**

Wireless address to call: 8020

Module autodetection **Restart**

Wireless Module Lines: 8

GPRS module OK

*Will appear as N/A when using infrared*

Change this field according to how many wireless sensor channels will be required.

- 1-> 6 channels
- n-> 6\*n channels
- 8-> 48 channels

Tap 'OK' to validate.

SN: 01000459 Multivoies1
COM

Module	1	2	3	4	5	6
001024	0	0	0	0	0	0
001106	0	0	0	0	0	0
1*8020	250	250	250	250	18.3	18.3
2*8020	18.3	3.2	3.2	28.6	28.6	28.6
3*8020	18.5	18.5	18.5	3.2	3.2	3.2
4*8020	0.0	0.0	0.0	0.0	0.0	0.0
5*8020	3.7	3.7	3.7	3.7	3.7	3.7
6*8020	0.0	0.0	~	~	~	~
7*8020	3.7	3.7	~	~	~	~

Option
Start Config
Data

At first, you should set the recording period for the system. It is preferable during configuration and tests to have the period set to 1 minute. The sensors will be interrogated more frequently so you can more easily detect mistakes.

Concentrator
COM

Name : Multivoies1

Serial number : 01000277

Period: 23/11/2006 16:33:22

▼ 10 min Set Time

Number of data : 81108

Free memory : 66%

Clear
Read Data
OK

Set the Multivoies system Clock. (Make sure the PDA clock is correct)

Then set the period to 1 minute. And clear the memory.

Tap 'OK' to return to main menu



SN: 01000459 Multivoies1
COM

Module	1	2	3	4	5	6
001024	0	0	0	0	0	0
001106	0	0	0	0	0	0
1*8020	250	250	250	250	18.3	18.3
2*8020	18.3	3.2	3.2	28.6	28.6	28.6
3*8020	18.5	18.5	18.5	3.2	3.2	3.2
4*8020	0.0	0.0	0.0	0.0	0.0	0.0
5*8020	3.7	3.7	3.7	3.7	3.7	3.7
6*8020	0.0	0.0	~	~	~	~
7*8020	3.7	3.7	~	~	~	~

Option
Start Config
Data

Now you need to configure which Wireless module channel corresponds to which Sensor and measurement.

Tap on the channel you want to configure (here channel 1)

This would be channel 14

Sensor: 0700
COM

▼ Light Sensor

Reading: 97 %

Latest data received: 23 seconds ago

Signal strength from sensor: -61dBm

Link quality to sensor: 81%

Sensor Battery: 3.1 Volts

Name: OfficeA123 Light

Channel

<<< 01 >>>

Input here the Wireless Sensor Serial Number.

Check the Wireless module channel here; You may jump to other channels using the arrows.

Select here the measurement to be recorded in this channel.

Input a name (16 characters). This name will appear in the data files to identify the measurements.

OK

<p>Sensor: 0700 <span style="float: right; color: green; font-weight: bold;">COM</span></p> <p style="text-align: center;">Channel</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; width: 150px;"> <p style="background-color: #4b0082; color: white; padding: 2px;">Light Sensor</p> <p>ON Time</p> <p>Switch Count</p> </div> <div style="margin-left: 10px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&lt;&lt;</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&lt;</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">01</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&gt;</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&gt;&gt;</div> </div> </div> <p>Latest data received: 26 seconds ago</p> <p>Signal strength from sensor: -61dBm</p> <p>Link quality to sensor: 81%</p> <p>Sensor Battery: 3.1 Volts</p> <p>Name: OfficeA123 Light <span style="float: right; border: 1px solid black; border-radius: 50%; padding: 2px 10px;">OK</span></p>	<p>When selecting the measurement channel, a list choice is displayed according to the type of Sensor.</p> <p>Select the measurement that you want to record.</p> <p>For instance, Light Sensor refers to the instantaneous value of light seen by the sensor.</p> <p>The ON Time is the cumulated time when the Light sensor was seen above a certain threshold.</p>
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<p>Sensor: 0700 <span style="float: right; color: green; font-weight: bold;">COM</span></p> <p style="text-align: center;">Channel</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>▼ ON Time</p> <p>Reading: 000017.3 h</p> <p>Latest data received: 32 seconds ago</p> <p>Signal strength from sensor: -61dBm</p> <p>Link quality to sensor: 81%</p> <p>Sensor Battery: 3.1 Volts</p> <p>Name: OfficeA123 Time <span style="float: right; border: 1px solid black; border-radius: 50%; padding: 2px 10px;">OK</span></p> </div> <div style="margin-left: 10px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&lt;&lt;</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&lt;</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">02</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&gt;</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">&gt;&gt;</div> </div> </div>	<p>Once done, go to next channel to be configured.</p> <p>Configuration data are automatically stored in non-volatile memory.</p>
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The configuration process is the same for all types of Wireless Sensors.

But for battery powered Sensors, you will then need to push the start button on each Sensor to force a first communication. Use a small tip to carefully push the internal button.

When the button is released, the orange LED will blink 1 to 4 times depending upon the signal quality (the more pulses, the better signal).

If the LED does not blink at all, this means that either the Sensor is not properly configured in any Wireless Module, or that the Wireless module is beyond reach (no radio answer received).

Starting the Sensor has to be done once only to attach the Sensor to the corresponding Wireless Module.

<p>Sensor: 0700</p> <p>▼ ON Time</p> <p>Reading: 000017.3 h</p> <p>Latest data received: 32 seconds ago</p> <p>Signal strength from sensor: -61dBm</p> <p>Link quality to sensor: 81%</p> <p>Sensor Battery: 3.1 Volts</p> <p>Name: OfficeA123 Time</p> <p style="text-align: right;">OK</p>	<p style="text-align: center;"><b>COM</b></p> <p style="text-align: center;">Channel</p> <p style="text-align: center;">&lt;&lt;&lt; 02 &gt;&gt;&gt;</p> <p>When pressing the Start Button of the Wireless Sensor, a communication is forced and the 'Last data received' should be set to 0 second and then increment.</p> <p>You can check the measurement value (Reading) and also the radio link quality to and from sensor.</p>
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The battery powered Wireless sensor is now configured to call the Wireless Module just before the end of each recording period.

The mains powered Wireless sensor work differently. They do not have a start button and are directly interrogated by the Wireless Module upon each new recording period.

<p>Sensor: 9002</p> <p>▼ Voltage</p> <p>Current</p> <p>Active Power</p> <p>Apparent power</p> <p>Active Energy</p> <p>Reactive Energy</p> <p>Latest data received: 5 seconds ago</p> <p>Signal strength from sensor: -86dBm</p> <p>Link quality to sensor: 46%</p> <p>Sensor Battery: ???</p> <p>Name: 9002Wh</p> <p style="text-align: right;">OK</p>	<p style="text-align: center;"><b>COM</b></p> <p style="text-align: center;">Channel</p> <p style="text-align: center;">&lt;&lt;&lt; 21 &gt;&gt;&gt;</p> <p>Mains powered wireless sensor data appear the same way as battery powered sensors.</p> <p>Since they do not have battery, the 'Sensor Battery' field is not filled.</p>
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SN: 01000459 Multivoies1							COM
Module	1	2	3	4	5	6	
001024	0	0	0	0	0	0	
001106	0	0	0	0	0	0	
1*8020	250	250	250	250	18.3	18.3	
2*8020	18.3	3.2	3.2	28.6	28.6	28.6	
3*8020	18.5	18.5	18.5	3.2	3.2	3.2	
4*8020	0.0	0.0	0.0	0.0	0.0	0.0	
5*8020	3.7	3.7	3.7	3.7	3.7	3	
6*8020	0.0	0.0	~	~	~	~	
7*8020	3.7	3.7	~	~	~	~	

In the main menu, the measurement data are displayed in 'real time'. The display is refreshed upon reception of new measurement from the wireless sensor.

This symbol means that no communication occurred with the corresponding sensor. Or that this channel was not properly configured.

Option Start Config Data

The data displayed in the main menu does **not** depend on which value is selected for recording. It only depends on the type of sensor :

- Wireless Temp/Hygro/Pulse -> Temperature in °C
- Wireless Temp/Pulse -> Temperature in °C
- Wireless Light -> Light in %
- Wireless Inline Wattmeter -> Power in W

## 6 RECOMMANDATIONS

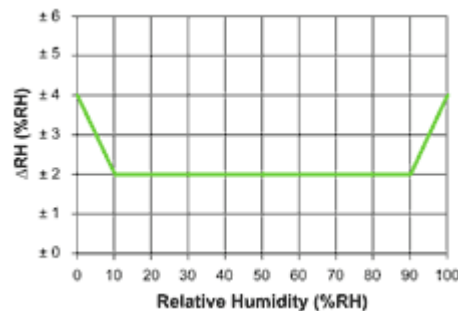
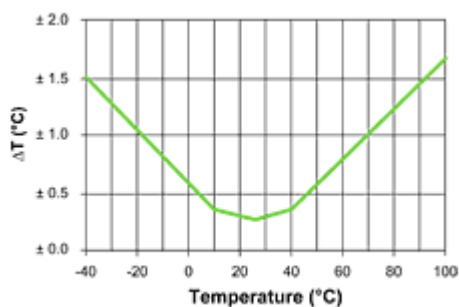
- ✓ Make yourself familiar with the system in the lab before installing on site.
- ✓ When changing configuration, download the data at first, and clear the memory after new configuration is set.
- ✓ Preferably configure the battery powered sensors in the first channels of the Wireless Module.
- ✓ If several measurements of a single wireless sensor are to be recorded, configure them in adjacent channels of the Wireless Module.
- ✓ Avoid leaving unused battery powered wireless sensors ON. They will continuously try to attach to the last Wireless module they were attached to. You may stop them : Push and hold the start button and release it about 12 seconds later when the LED turns ON. The usual every second weak pulse of the LED should then stop. You may restart the Sensor by just pushing the start button.
- ✓ Keep the wireless sensors away from heat sources and radio interferences.
- ✓ Metallic shielding (or reinforced concrete) will sharply reduce wireless communication range.
- ✓ Use flat panel (patch) antennas designed for 2.4Ghz attached to the Wireless module to increased the range. (for example TP-LINK TL-ANT2409A). The antenna connects using a RPSMA plug.
- ✓ Avoid recording periods below 60 seconds. The Wireless sensor battery autonomy will be reduced. When configured, the wireless sensor will keep trying to communicate with the Wireless Module once per period.
- ✓ When changing recording period of the Multivoies system, the update will take effect on the battery powered sensor only at the end of the previously configured period.

✓

## 7 CHARACTERISTICS

Name	Measurements	Range	Accuracy *
Temp/Humidity/Pulse	Temperature Humidity Impulse ON Time	-40..+100°C 0..100%RH 0..65535 par period 10Hz max.	+/-0.5°C +/-2%RH 1 count 1 second
Temp/Pulse	Temperature Average Temperature Impulse ON Time	-20..+80°C -20..+80°C 0..65535 par period 10Hz max.	+/-1°C +/-1°C 1 count 1 second
Lamp	Light ON Time Switch count	0..100%	+/-5% 1 second 1 count
Inline Wattmeter	Active Power Apparent Power Voltage Current Active Energy Apparent Energy	0.2-3600W 0.2-3600VA 110-255V 0-16A 0.1Wh resolution 0.1VA resolution	1W +/-2% 2VA +/-3% 1% 2% 2% 3%

\*Accuracy around 20°C.



### Electrical safety (Inline Wattmeter) :

CATI 250 V. Max overvoltage : 2 kVca

Electromagnetic compatibility : CE (CEI 61236-1, CEI 61236/A1)

### Battery (Autonomous Sensors) :

- 2x AAA

- Autonomy : 4 years with 60 seconds recording period. The autonomy is reduced when the ON Time measurement contact is ON during extended periods.

### Environmental conditions :

Service temperature 0°C to +40°C

Storage temperature -10°C to +60°C

Relative humidity 80 % maximum, not condensing

Altitude 2000 m maximum

Mechanical : IP 20

Power Consumption : <0.4W

## 8 INSTALLATION SHEET

It is advised to keep a paper record of the devices being attached to a Wireless Module :

Module Channel	Sensor SN	Sensor Measurement	Remarks / Where the sensor is
1	700	ON Time	
2	700	Light	
3	406	Temperature	
4	9003	Active Power	
5	9003	Apparent Power	
6	9003	Voltage	
..			
48			