Sensor Compatibility
INDEX

1. Sensor compatibility .......................................................................................... 3
2. Gases PRO sensor board ................................................................................. 4
3. Smart Cities PRO sensor board ...................................................................... 5
4. Smart Agriculture PRO sensor board ............................................................. 6
5. Smart Water sensor board .............................................................................. 7
6. Smart Water Ions sensor board ..................................................................... 8
7. Events sensor board ...................................................................................... 9
8. 4-20 mA Current Loop sensor board .............................................................. 10
9. Radiation sensor board .................................................................................. 11
10. Prototyping sensor board ............................................................................ 12
11. Certifications................................................................................................. 13
1. Sensor compatibility

This document relates which sensors of the Waspmote platform are connected on each socket of the sensors boards, as long as the special circumstances of each of them. In next sections all the boards are described separately, enumerating the sensors of the board.

- Example of Sensor Compatibility Scheme:
## 2. Gases PRO sensor board

### 1. Temperature, Humidity and Pressure sensor
- Carbon Monoxide – CO
- Molecular Oxygen – O₂
- Ozone – O₃
- Nitric Oxide – NO
- Nitric Dioxide – NO₂
- Sulfur Dioxide – SO₂
- Ammonia – NH₃
- Hydrogen Sulfide – H₂S
- Luminosity (Luxes accuracy)
- Ultrasound (outdoor IP67)

### 2. Gases PRO sensor board

#### 4, 5, 6
- Carbon Monoxide – CO
- Molecular Oxygen – O₂
- Ozone – O₃
- Nitric Oxide – NO
- Nitric Dioxide – NO₂
- Sulfur Dioxide – SO₂
- Ammonia – NH₃
- Hydrogen Sulfide – H₂S
- Luminosity (Luxes accuracy)
- Ultrasound (outdoor IP67)

#### 2, 3
- Carbon Monoxide – CO
- Molecular Oxygen – O₂
- Ozone – O₃
- Nitric Oxide – NO
- Nitric Dioxide – NO₂
- Sulfur Dioxide – SO₂
- Ammonia – NH₃
- Hydrogen Sulfide – H₂S
- Luminosity (Luxes accuracy)
- Ultrasound (outdoor IP67)

### Central socket
- Temperature, Humidity and Pressure sensor

---

Note: Particle Matter (PM1 / PM2.5 / PM10) – Dust sensor probe: only available in the Plug & Sense! Smart Environment PRO line.
3. Smart Cities PRO sensor board

1. Carbon Monoxide – CO
2. Molecular Oxygen – O₂
3. Ozone – O₃
4. Nitric Oxide – NO
5. Nitric Dioxide – NO₂
6. Sulfur Dioxide – SO₂
7. Ammonia – NH₃
8. Hydrogen Sulfide – H₂S
9. Temperature, Humidity and Pressure
10. Luminosity (Luxes accuracy)
11. Ultrasound (outdoor IP67)
12. Carbon Dioxide – CO₂
13. Methane – CH₄ – and other combustible gases

Note: Noise / Sound Level sensor probe and Particle Matter (PM1 / PM2.5 / PM10) – Dust sensor probe: Only available in the Plug & Sense! Smart Cities PRO line.
4. Smart Agriculture PRO sensor board

- In each agriculture board, 3 soil moisture sensors can be connected in order to measure the parameter in different depth levels.

1. Weather station (WS-3000) - Wind vane
2. Weather station (WS-3000) - Anemometer
3. Weather station (WS-3000) - Pluviometer

1. Solar radiation (PAR)
2. Ultraviolet radiation
3. Leaf Wetness

1. Soil/water temperature (Pt-1000)
2. Soil/water temperature (DS18B20)
3. Trunk diameter dendrometer
4. Stem diameter dendrometer
5. Fruit diameter dendrometer

1. Soil moisture sensor (Watermark)* (1.5, 4.5, 8 m)
2. Soil moisture sensor (Watermark)* (1.5, 4.5, 8 m)
3. Soil moisture sensor (Watermark)* (1.5, 4.5, 8 m)

1. Temperature, Humidity and Pressure
2. Luminosity (Luxes accuracy)
3. Ultrasound (outdoor IP67)
5. Smart Water sensor board

* Every Smart Water sensor board is provided with one Soil/Water temperature sensor and 4 BNC pigtails.
6. Smart Water Ions sensor board

*Every Smart Water Ions sensor board is provided with one Soil/Water temperature sensor and 5 BNC pigtails. Ion sensors need a Reference Probe.*

### Reference

1. Single Junction Reference Probe
2. Double Junction Reference Probe
3. Reference Probe [PRO]

### Sensors

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Single-type sensors</th>
<th>Double-type sensors</th>
<th>PRO-type sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fluoride (F⁻)</td>
<td></td>
<td></td>
<td>1. Ammonium (NH₄⁺)</td>
</tr>
<tr>
<td>2. Fluoroborate (BF₄⁻)</td>
<td></td>
<td></td>
<td>2. Bromide (Br⁻) [PRO]</td>
</tr>
<tr>
<td>3. pH</td>
<td></td>
<td></td>
<td>3. Chloride (Cl⁻) [PRO]</td>
</tr>
<tr>
<td>4. Iodide (I⁻)</td>
<td></td>
<td></td>
<td>4. Cupric (Cu²⁺) [PRO]</td>
</tr>
<tr>
<td>5. Silver (Ag⁺)</td>
<td></td>
<td></td>
<td>5. Chloride (Cl⁻) [PRO]</td>
</tr>
<tr>
<td>6. pH</td>
<td></td>
<td></td>
<td>6. Fluoride (F⁻) [PRO]</td>
</tr>
<tr>
<td>7. Iodide (I⁻)</td>
<td></td>
<td></td>
<td>7. Iodide (I⁻) [PRO]</td>
</tr>
<tr>
<td>8. Magnesium (Mg²⁺)</td>
<td></td>
<td></td>
<td>8. Iodide (I⁻) [PRO]</td>
</tr>
<tr>
<td>9. Nitrate (NO₃⁻)</td>
<td></td>
<td></td>
<td>9. Magnesium (Mg²⁺) [PRO]</td>
</tr>
<tr>
<td>10. Nitrite (NO₂⁻)</td>
<td></td>
<td></td>
<td>10. Nitrate (NO₃⁻) [PRO]</td>
</tr>
<tr>
<td>11. Perchlorate (ClO₄⁻)</td>
<td></td>
<td></td>
<td>11. Nitrite (NO₂⁻) [PRO]</td>
</tr>
<tr>
<td>12. Potassium (K⁺)</td>
<td></td>
<td></td>
<td>12. Perchlorate (ClO₄⁻) [PRO]</td>
</tr>
<tr>
<td>13. Silver (Ag⁺)</td>
<td></td>
<td></td>
<td>13. Potassium (K⁺) [PRO]</td>
</tr>
<tr>
<td>14. Sodium (Na⁺)</td>
<td></td>
<td></td>
<td>14. Silver (Ag⁺) [PRO]</td>
</tr>
<tr>
<td>15. pH [PRO]</td>
<td></td>
<td></td>
<td>15. Sodium (Na⁺) [PRO]</td>
</tr>
</tbody>
</table>

**Socket 1, 2, 3, 4**

<table>
<thead>
<tr>
<th>Socket 1, 2, 3, 4</th>
<th>Soil/water temperature (Pt-1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Soil/water temperature (Pt-1000)</td>
<td></td>
</tr>
</tbody>
</table>
## 7. Events sensor board

### 1, 2, 3, 4, 6
1. Presence (PIR)
2. Horizontal liquid level (water)
3. Horizontal liquid level (combustibles)
4. Vertical liquid level (water)
5. Water presence (point)
6. Water presence (line)
7. Hall effect*
8. Relay Input-Output** → ?

### 1
1. Presence (PIR)
2. Horizontal liquid level (water)
3. Horizontal liquid level (combustibles)
4. Vertical liquid level (water)
5. Water presence (point)
6. Water presence (line)
7. Hall effect*
8. Relay Input-Output** → ?

### 5
1. Temperature, Humidity and Pressure
2. Luminosity (Luxes accuracy)

---

**Liqui& Flow**
1. Water flow small
2. Water flow medium

---

See complete connection details in the Events Technical Guide.

* For doors and windows.

** Only available in the Plug & Sense! Smart Security line.
8. 4-20 mA Current Loop sensor board

Note: The user can choose among a wide variety of standard sensors.
9. Radiation sensor board

Note: Every Radiation sensor board is provided with a Geiger sensor.
This board was created to enable customers to develop their own sensor integrations with Waspmote OEM (hardware skills needed).

- Pad Area
- Integrated Circuit Area
- Analog-to-Digital Converter (16 bits)
Certifications

Libelium offers 2 types of IoT sensor platforms, Waspmote OEM and Plug & Sense!:

• **Waspmote OEM** is intended to be used for research purposes or as part of a major product so it needs final certification on the client side. More info at: [www.libelium.com/products/waspmote](http://www.libelium.com/products/waspmote)

• **Plug & Sense!** is the line ready to be used out-of-the-box. It includes market certifications. See below the specific list of regulations passed. More info at: [www.libelium.com/products/plug-sense](http://www.libelium.com/products/plug-sense)

Besides, Meshlium, our multiprotocol router for the IoT, is also certified with the certifications below. Get more info at: [www.libelium.com/products/meshlium](http://www.libelium.com/products/meshlium)

List of certifications for Plug & Sense! and Meshlium:

• CE (Europe)
• FCC (US)
• IC (Canada)
• ANATEL (Brazil)
• RCM (Australia)
• PTCRB (cellular certification for the US)
• AT&T (cellular certification for the US)

You can find all the certification documents at: [www.libelium.com/certifications](http://www.libelium.com/certifications)