# WaveNet-EX Series

## Quick installation guide

## WiFi MIMO access point & Mesh router for hazardous areas

- ✓ WiFi Access Point, WiFi client, repeater, router & Mesh point (A10 and A12 only)
- ✓ ATEX / IECEX certification :
  - Zone 1, 2, 21 & 22
  - II 2G Ex db IIC T5-T4 Gb
  - II 2D Ex tb IIIC T110°C/T140°C Db
  - I M2 Ex db I Mb (SWS only)
- ✓ USA & CANADA CERTIFICATION
  - Class I, Division 1, Groups B, C and D
  - Class II, Division 1, Groups E, F and G
  - Class I, Zone 1, Groups IIB+H2 [For U.S. only]
  - Zone 21, Groups IIIC [For U.S. only]
- ✓ Heavy duty aluminum (SWA series) or stainless steel (SWS series) IP66/IP68 enclosure
- ✓ 2 or 3 intrinsically safe RF outputs
- ✓ Gigabit Ethernet network interface
- ✓ DC power supply input (+18VDC to +60VDC), PoE or PPoE (Passive Power over Ethernet)

Before starting, please check the product kit part listing below. Contact immediately your dealer if any item is missing or damaged:

- One **WaveNet-EX**
- This quick installation guide printed

Before continuing, check thanks to the ACKSYS website: www.acksys.fr/en

- If a latest update of this quick start is available
- Download and read the full manual **« WaveOS user guide ».**

**You will need:**

- **a PC equipped with Ethernet access to install the « WaveManager » software,**
- **a web browser, IE compatible,**
- **an android smartphone if you want to install the optional « ACKSYS WaveViewer » App.**



ACKSYS COMMUNICATIONS & SYSTEMS
10, rue des Entrepreneurs
Z.A Val Joyeux
78450 VILLEPREUX - France

Phone +33 (0)1 30 56 46 46
Fax : +33 (0)1 30 56 12 95
Web : www.acksys.fr
Hotline : support@acksys.fr
Sales : sales@acksys.fr

## READ THIS INSTRUCTION FIRST

To avoid serious or fatal personal injury or major property damage, read and follow all safety instruction in this manual. If you require additional assistance, please contact ACKSYS.

This product must be installed and maintenance according to suitable standards for electrical application in potentially explosive atmospheres (example: IEC/EN 60079-14, IEC/EN60079-17 or other national standards). Read this first and keep this instruction manual always available.

This instruction refers to certified equipment covered by the EXA 14 ATEX 0042, IECEx EXA 14.0001 and by LR1504 certificate.

**NOTE**

1. Suitably trained personnel shall carry out installation according with applicable code practice.
2. Cover must be tightening with a torque of at list 15 Nm.
3. To avoid the thread cover blocking the thread joint can be protect with grease like Nyogel 760G, Uniflor 8512R, Uniflor 8911 or equivalent compatible with silicon gasket
4. The user should not repair this equipment.
5. The user should not modify the enclosure and related components inside.
6. For ambient temperature below -10°C and above 70°C use field wiring suitable for both minimum and maximum ambient temperature.
7. The electrical devices must be grounded using their grounding connections.
8. The user should guarantee the keeping of the safety characteristic of the device after maintenance.
9. If the equipment is likely to come in to contact with aggressive substances, it is responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised. Aggressive substances: example Acids, liquids, gases with can affected metals.
10. The metallic alloy used for the enclosure, in the event of a rare accident, could cause ignition sources due to impact or friction (sparks may occur). This shall be considered when the box is installed in group Ex area.
11. Remove plastic plugs or plastic stickers supplied with enclosure before installation, these components aren't certified. All cables entry devices and blanking elements shall be certified in the type of explosion protection flameproof type "d" and "tb" suitable of use in Ex area and correctly installed.
12. For functionality of device installed inside the enclosure refer to device instruction

**WARNING!**

Warns of hazard that MAY cause serious personal injury, death or major property damage.
HAZARDOUS VOLTAGE
Disconnect all power before servicing equipment.
DO NOT REMOVE COVER WHEN ENERGISED.
DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.

**CAUTION!**

The conduit plug supplied with the switch boxes are for transit purposes only.
IP66/68 protection depends on cable gland and cabling methods used.
Before the installation verify into the Annex to Installation & Operation manual the limitation to use and the accessories allowed.

**NOMENCLATURE**

| SWA | A10 | 33 | - | 42 | 0 | X0 |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | | 4 | 5 | 6 |

1 – Enclosure
SWA Aluminium polyester powder coated
SWS Stainless steel AISI 316 (CF8M) electropolish

2 – Device code
A10 802.11n, MIMO 2x2
A11 802.11ac, MIMO 2x2
A12 802.11n, MIMO 2x2 plus 802.11ac (1 stream)

3 – Antenna connection
30 n° 3 RXN antenna coupler (N Female)
33 n° 2 RXN antenna coupler (N Female)

4 – Cable entries
42 n° 4 3/4" npt-f (two used for antenna connection)
44 n° 4 M25x1.5 (two used for antenna connection)

5 – Colour
0 black polyester powder coating (SWA series only)
E electropolished (SWS housings only)

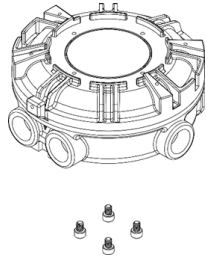
6 – Approvals
X0 Atex/IECEx Gas and Dust certified, Zone 1, 2, 21 & 22
M0 Atex/IECEx Gas, Dust and mining certified, Zone 1, 2, 21 & 22
N0 QPS CL1 DIV1 and North American Zones listed

**PRODUCT'S STORAGE**
Keep the boxes away from atmospheric agents in an environment with temperature between 0°C and 40°C.

**INSTALLATION**
Attach the enclosure to a fix surface using four M6 bolts
The unit can be installed in all position.

**ELECTRICAL WIRING**
Remove screw cover, remove protection plugs from cable entries and substitute them with cable glands or conduits or plugs suitable for type of protection required.
Connect terminal strip according to the wiring diagram present into the Annex to Installation & Operation Manual.
Reassemble screw cover and lock it by means of the screw or anti rotation kit.
WARNING: Before closing the enclosure check that thread joint were free of foreign matters and deformations check seal is properly fitted in slot.
The cover must be screwed and securely locked to the body.

**MAINTENANCE**
The verification and maintenance of the electrical equipment must be performed according to IEC/EN 60079-17.
The cover must be securely locked to the body.
After every opening must to check before closing that he thread joint is free of foreign matters and deformations and if necessary lubricate the thread joint in order to avoid cover blocking with grease like Nyogel 760G, Uniflor 8512R, Uniflor 8911 compatible with silicon gasket or equivalent according to enclosure temperature range.
In order to guarantee the protection degree IP66-68 it's necessary that the gasket is maintained in good conditions and must be verified after every opening that the same does not show breakage or cuttings. In case of damage replace with ACKSYS spare part.



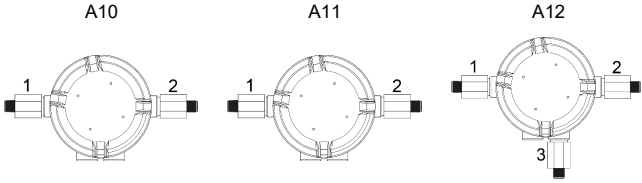
The maintenance related the components used for wiring must be performed according to manufacturer instruction.

**DISPOSAL / RECYCLING**
Disposal and recycling of the product according to national regulation for waste disposal and recycling.
WARNING: Do not dispose the product and the components in the environment.

## DESCRIPTION

The SWA & SWS A series is a WiFi access point equipped with 1 Ethernet port and up to 3 WiFi ports as follows:

| Device version | Model | WiFi Port |
|---|---|---|
| **A10** | WiFi Access point 802.11n MIMO 2x2 | n° 2 |
| **A11** | WiFi Access point 802.11ac MIMO 2x2 | n° 2 |
| **A12** | WiFi Access point 802.11n MIMO 2x2 plus 802.11ac (1 stream) | n° 3 |




## POWER SUPPLY

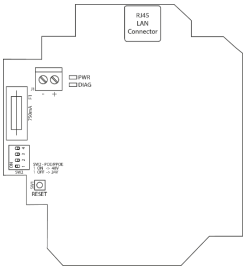
Screw terminals = Supply voltage: 18 ~ 60 VDC
RJ45 connector = PPoE @ 24 VDC or PoE @ 48 VDC *
Max Power Consumption 8W for A10 / 14W for A11 and A12
** PPoE = Passive Power over Ethernet (operating voltage 24VDC), PoE = Power over Ethernet (operating voltage 48VDC)*

## TEMPERATURE RANGE

| Device version | Model | Ambient temperature range |
|---|---|---|
| **SWA** | Aluminum enclosure | min -40°C – max +60°C |
| **SWS** | Stainless steel enclosure | min -40°C – max +50°C |

**WARNING :** The unit can reach a surface temperature of 70°C, use cable and cable glands / conduit Ex certified suitable for this temperature.

# WIRING




| ***Label*** | ***Description*** |
|---|---|
| | RJ45 LAN connector (PPoE @24VDC or PoE @ 48VDC)* |

**J1**

| ***Label*** | ***Description*** |
|---|---|
| - | Power supply - (18 ~ 60 VDC) |
| + | Power supply + (18 ~ 60 VDC) |

**F1**

| ***Label*** | ***Description*** |
|---|---|
| 750mA | 5x20 mm power line fuse (750mA fast-blow type) |

| ***Label*** | ***Description*** |
|---|---|
| **PWR** | Power led indication |
| **DIAG** | Diagnostic led indication |

**SW1**

| ***Label*** | ***Description*** |
|---|---|
| RESET | Reset button |

**SW2**

| ***Label*** | ***Description*** |
|---|---|
| POE/PPOE | DIP switch for PoE / PPoE selection * |

1 ON = 48V = PoE
1 OFF = 24V = PPoE

*DIP switch operate only in case of PoE/PPoE power supply*

** PoE = Power over Ethernet*
*(operating voltage 48VDC)*
*PPoE = Passive Power over Ethernet*
*(operating voltage 24VDC)*

***Step 1 – ANTENNA CONNECTION***
Connect the antenna before to turn on the device.

**WARNING :** use antenna only with 50Ω impedance and with operating frequency in according to technical data listed into the above paragraph "RF information".
The device must be set according to limitation listed at paragraph MAXIMUM PERMITTED RF THRESHOLD POWER (Pth) for installation in Hazardous Location and the national regulation rules.

***Step 2 – POWER SUPPLY CONNECTION***

**WARNING : DO NOT WIRED POWER SUPPLY WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.**
**FOR SAFETY REASONS WIRING MUST BE MADE ACCORDING TO WA & WS INSTALLATION AND OPERATION MANUAL**

The device can be powered by terminal strip (J1 18 ~ 60 VDC) or through PoE/PPoE.
In case of PoE (Power over Ethernet, 48VDC) set the DIP Switch SW2 nr. 1 to ON,
In case of PPoE (Passive Power over Ethernet, 24 VDC) set the DIP Switch SW2 nr. 1 to OFF
*The DIP switch position has no influence in case of power supply through terminal strip J1*

The device has no ON/OFF switch. It turns on automatically when power is applied. Check that the PWR led turn on.

The DIAG led stay off for around 40 seconds, until the device is fully ready to use. Then the DIAG led turns blue.

***Step 3 – ETHERNET CONNECTION***
Connect the Ethernet cable (if it not connected in case of PoE or PPoE).

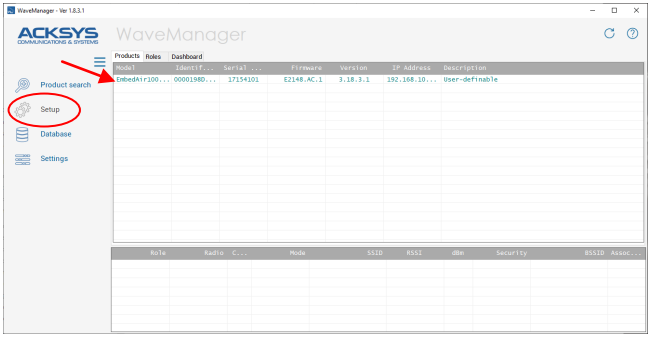
## DEVICE CONFIGURATION

**FACTORY SETTINGS:**

- IP address: 192.168.1.253
- Radio Interface disable, preset for access point mode
- SSID: acksys (broadcast)
- No security (no WEP, no WAP, no WAP2, no MAC filter)
- 802.11n or ac mode, 5GHz band, auto-channel
- WEB interface for device configuration:

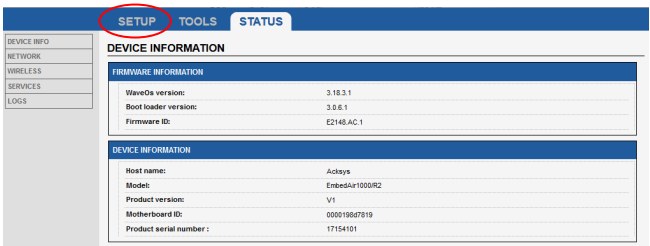
IP address: 192.168.1.253
User name: root
Password: no password set as factory setting

***Step 1***
Verify that the IP address factory setting is compatible with your network, if the IP address is not suitable for your network use Windows application **WaveManager** (available on web site www.acksys.fr).

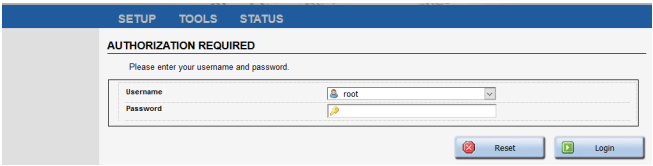



After the WaveManager installation run the application, select the EmbedAir1000 device then click to “Setup”: now you can configure the IP address or you can activate the DHCP client.

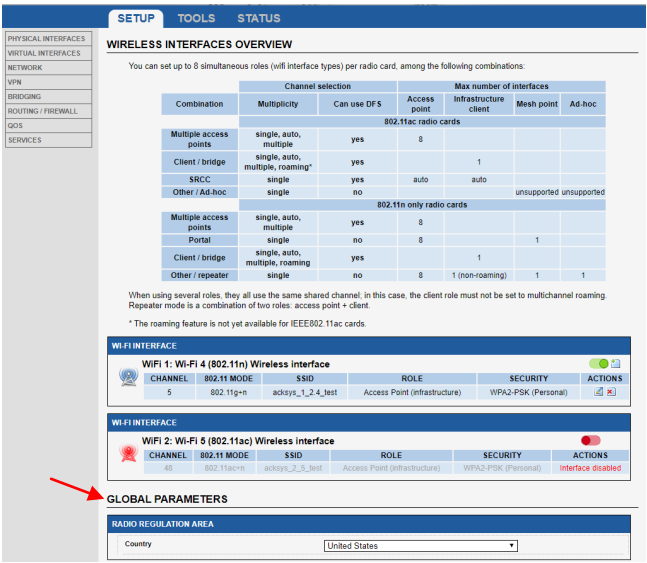
***Step 2***
Using your web browser open the WEB interface (IP address: 192.168.1.253) and select the “SETUP” tab:



For setup page, user name and password are required and for factory setup the user name is **root** and no password is required (these data can be changed under “TOOLS” tab, PASSWORD SETTINGS section)

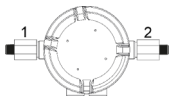
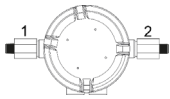
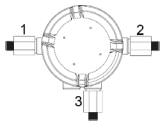



On the “WIRELESS INTERFACES OVERVIEW” page you should first select your **country** in order to enforce applicable **regulation rules**. The country selector is located in the global parameters, near the bottom of the page.

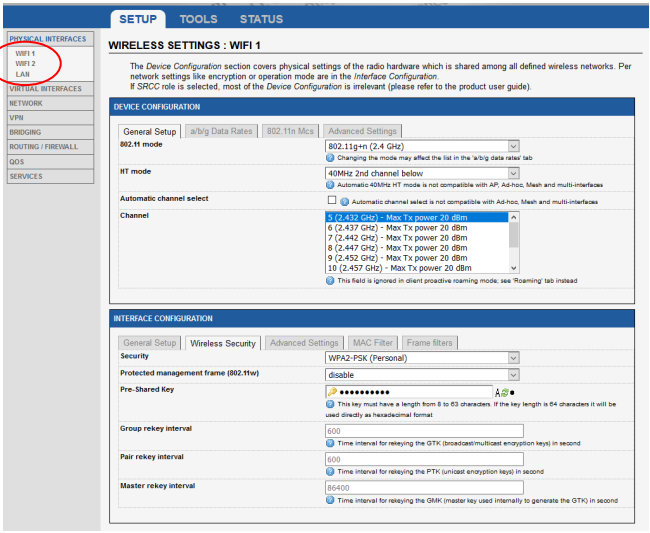



You can select radio interface to set up its WiFi parameters (you can also change IP configuration and services).

In function of device version the WiFi Interface available are:

| Device version | Model | | WiFi Interface used |
|---|---|---|---|
| A10 | WiFi Access point 802.11n MIMO 2x2 |   | WiFi Interface 1 only (antenna 1 and 2) |
| A11 | WiFi Access point 802.11ac MIMO 2x2 |   | WiFi Interface 2 only (antenna 1 and 2) |
| A12 | WiFi Access point 802.11n MIMO 2x2 plus 802.11ac (1 stream) |   | WiFi Interface 1 (antenna 1 & 2) and WiFi Interface 2 (antenna 3) |

For WiFi and LAN interface setup click on relative menu on “PHYSICAL INTERFACES” menu:




Set for each WiFi interface the following essential parameters:

- The operating mode: 802.11 mode, radio channel (take care about local legislation), SSID
- WiFi security parameters (WEP, WPA, WPA-PSK, WPA2, WPA2-PSK, SSID broadcast or not)

For more details consult Acksys WaveOS User Guide.

## TROUBLESHOOTING AND LED DEFINITION

**None of the LED indicators turn ON**

- Verify the power supply (voltage, cabling)
- Verify the fuse F1

**The WiFi link does not come up**

- Make sure that the Wireless parameters of the Client (case sensitive SSID, 802.11 mode, radio channel and security) match those of the AP
- Check the radio conditions: distance between devices, placement of antennas, interferences and obstacles to radio waves propagation
- Try with all securities and encryption settings temporarily disabled
- Try another radio channel

**How to restore factory settings?**

- If the built-in web-based interface is reachable, you can use a browser to restore factory settings.
- Else, power up the unit, wait for the DIAG led to turn blue, then hold down the reset button (for at least 2 seconds) until DIAG goes off. Then release it and wait for the DIAG led to turn blue again, meaning that the product rebooted with its factory settings.

**LED Definition**

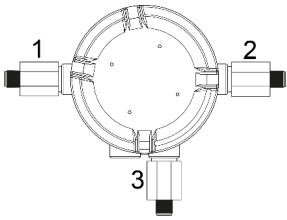
| LED | Function |
|---|---|
| PWR | Green : power on<br>Off : power not present |
| DIAG | Blue : when product is OK and initialized<br>Flashing : when firmware in flash is not valid<br>Off : for more then 2min with PWR led green indicate a Hardware/Software failure |

## RF INFORMATION

| Device version | |
|---|---|
| **A10** | ANTENNA 1 AND 2 *<br><br>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g and 802.11n<br><br>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz<br><br>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz<br><br>Tx output power (Radio card output per chain, antenna excluded)<br>802.11n HT20 2.4GHz band 20.5 dBm @ 7.2 Mbps (MCS 0)<br>18 dBm @ 72.2 Mbps (MCS 7)<br>802.11n HT40 2.4GHz band 20.5 dBm @ 15 Mbps (MCS 0)<br>18 dBm @ 150 Mbps (MCS 7)<br>802.11n HT20 5GHz band 18 dBm @ 7.2 Mbps (MCS 0)<br>15 dBm @ 72.2 Mbps (MCS 7)<br>802.11n HT40 5GHz band 18 dBm @ 15 Mbps (MCS 0)<br>15 dBm @ 150 Mbps (MCS 7)<br>*Value for 1 stream, add 3 dBm for 2 streams* |
| **A11** | ANTENNA 1 AND 2 *<br><br>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g, 802.11n and 802.11ac<br><br>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz<br><br>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz<br><br>Tx output power (Radio card output per chain, antenna excluded)<br>802.11b 2.4GHz band 20 dBm @ 1 Mbps<br>20 dBm @ 11 Mbps<br>802.11g 2.4GHz band 21 dBm @ 6 Mbps<br>18 dBm @ 54 Mbps<br>802.11a 5GHz band 20 dBm @ 6 Mbps<br>15 dBm @ 54 Mbps<br>802.11n HT20 2.4GHz band 21 dBm @ 7.2 Mbps (MCS 0)<br>16 dBm @ 72.2 Mbps (MCS 7)<br>802.11n HT40 2.4GHz band 20 dBm @ 15 Mbps (MCS 0)<br>16 dBm @ 150 Mbps (MCS 7)<br>802.11n/ac VHT20 5GHz band 19 dBm @ 7.2 Mbps (MCS 0)<br>14 dBm @ 72.2 Mbps (MCS 7)<br>13 dBm @ 86.7 Mbps (VHT MCS 8)<br>802.11n/ac VHT40 5GHz band 18 dBm @ 15 Mbps (MCS 0)<br>14 dBm @ 150 Mbps (MCS 7)<br>13 dBm @ 200 Mbps (VHT MCS 9)<br>802.11ac VHT80 5GHz band 18 dBm @ 32.5 Mbps (MCS 0)<br>14 dBm @ 325 Mbps (MCS 7)<br>13 dBm @ 433.3 Mbps (VHT MCS 9)<br>*Value for 1 chain, add 3 dBm for 2 chains (Tolerance ± 2 dB)* |
| **A12** | ANTENNA 1 AND 2 *<br><br>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g and 802.11n<br><br>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz<br><br>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz |

| | |
|---|---|
| | Tx output power (Radio card output per chain, antenna excluded)<br>802.11n HT20 2.4GHz band 20.5 dBm @ 7.2 Mbps (MCS 0)<br>18 dBm @ 72.2 Mbps (MCS 7)<br>802.11n HT40 2.4GHz band 20.5 dBm @ 15 Mbps (MCS 0)<br>18 dBm @ 150 Mbps (MCS 7)<br>802.11n HT20 5GHz band 18 dBm @ 7.2 Mbps (MCS 0)<br>15 dBm @ 72.2 Mbps (MCS 7)<br>802.11n HT40 5GHz band 18 dBm @ 15 Mbps (MCS 0)<br>15 dBm @ 150 Mbps (MCS 7)<br>*Value for 1 stream, add 3 dBm for 2 streams*<br><br>ANTENNA 3 *<br><br>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g, 802.11n and 802.11ac<br><br>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz<br><br>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz<br><br>Tx output power (Radio card output per chain, antenna excluded)<br>802.11b 2.4GHz band 20 dBm @ 1 Mbps<br>20 dBm @ 11 Mbps<br>802.11g 2.4GHz band 21 dBm @ 6 Mbps<br>18 dBm @ 54 Mbps<br>802.11a 5GHz band 20 dBm @ 6 Mbps<br>15 dBm @ 54 Mbps<br>802.11n HT20 2.4GHz band 21 dBm @ 7.2 Mbps (MCS 0)<br>16 dBm @ 72.2 Mbps (MCS 7)<br>802.11n HT40 2.4GHz band 20 dBm @ 15 Mbps (MCS 0)<br>16 dBm @ 150 Mbps (MCS 7)<br>802.11n/ac VHT20 5GHz band 19 dBm @ 7.2 Mbps (MCS 0)<br>14 dBm @ 72.2 Mbps (MCS 7)<br>13 dBm @ 86.7 Mbps (VHT MCS 8)<br>802.11n/ac VHT40 5GHz band 18 dBm @ 15 Mbps (MCS 0)<br>14 dBm @ 150 Mbps (MCS 7)<br>13 dBm @ 200 Mbps (VHT MCS 9)<br>802.11ac VHT80 5GHz band 18 dBm @ 32.5 Mbps (MCS 0)<br>14 dBm @ 325 Mbps (MCS 7)<br>13 dBm @ 433.3 Mbps (VHT MCS 9) |

* Antenna position



## MAXIMUM PERMITTED RF THRESHOLD POWER (Pth)

The RF threshold power (Pth), sometimes called the effective isotropic radiated power (EIRP), as defined in IEC /EN 60079-0, is the product of the effective output power of the transmitter multiplied by the antenna gain. The maximum threshold powers for each equipment group as defined by Table 4 in IEC/EN 60079-0 are provided below.

Because most antennas list the gain relative to an isotropic radiator (dBi) instead of the raw power gain, it is often easier to simply add the antenna gain in dBi to the radio output power in decibel-milliwatts (dBm). Any added cable loss between the RF output and the antenna may also be factored in.

Pth $_{(dBm)}$ = RF output power $_{(dBm)}$ + Antenna gain $_{(dBi)}$ – Coax cable loss between RF output and Antenna $_{(dB)}$

The resulting threshold power calculated by the above formula MUST be below the threshold power for the operating area group rating below.

| Equipment for | Threshold Power (W) | Threshold Pwr (dBm) |
|---|---|---|
| Group I | 6 | 37.7 |
| Group IIA | 6 | 37.7 |
| Group IIB | 3.5 | 35.4 |
| Group IIC | 2 | 33.0 |
| Group III | 6 | 37.7 |

The above threshold level refer to installation in classified area Ex according to IEC/EN 60079-0 standard.
The use of device differs from one region and/or country to another. The user of the device must take care that the device is operated only according to local rules and standard or without the permission of the local authorities on frequencies other than those specifically reserved and intended for use without a specific permit. More detailed information is available at the local frequency management authority.

## MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION

In case of use of a coax cable installation for antenna installation the adding cable need to be evaluating to ensure that the maximum energy stored on cable not exceeded the value allowable per IEC/EN 60079-11:

| **Max energy (Joules) allowed per IEC/EN 60079-11** | |
|---|---|
| Group I | 1500 µJ |
| Group IIA | 950 µJ |
| Group IIB | 250 µJ |
| Group IIC | 50 µJ |

The calculation can be done according to following equation:

$$E = \frac{1}{2} * \left\{ (C_1 + C_2) * \left[ \left( 1.5 * \left( \sqrt{R * P} \right) \right] \right]^2 \right\}$$

*Where:*
*E = Energy*
*$C_1$ = Antenna Barrier Capacitance (18 pF)*
*$C_2$ = Coax cable capacitance*
*R = Impedance (50Ω)*
*P = RF power output (18 dBm, 63 mW)*
*1.5 = Safety Factor*

*Example:*
*Antenna cable capacitance = 1195 pF*

$$E = \frac{1}{2} * \{(18pF + 1195pF) * 7.08\} = 0{,}00858\mu J$$

*Answer = 0,00858 µJ acceptable for any Group*

## ATEX / IECEx CERTIFICATION INFORMATION

**Atex identification:** 

**II 2G Ex db IIC T5-T4 Gb**
**II 2D Ex tb IIIC T110°C/T140°C Db**
**I M2 Ex db I Mb** (SWS series only)
**IP66-68**
Atex certificate number **EXA 14 ATEX 0042**

**IECEx identification:**

**Ex db IIC T5-T4 Gb**
**Ex tb IIIC T110°C/T140°C Db**
**Ex db I Mb** (SWS series only)
**IP66-68**
IECEx certificate number **IECEx EXA 14.0001**

**USA & CANADA:**

**Class I, Division 1, Groups B, C and D**
**Class II, Division 1, Groups E, F and G**
**Class I, Zone 1, Groups IIB+H2** [For U.S. only]
**Zone 21, Groups IIIC** [For U.S. only]