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
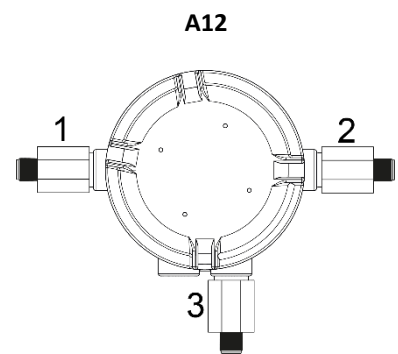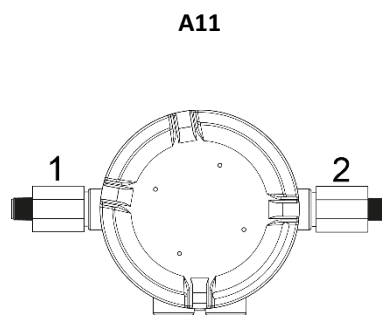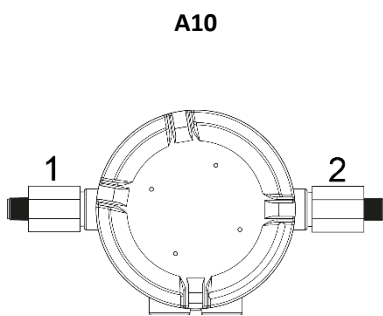
POWER SUPPLY

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

TEMPERATURE RANGE

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

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

**10, rue des Entrepreneurs
78450 Villepreux - France
www.acksys.fr**

WaveNet-EX manual Annex

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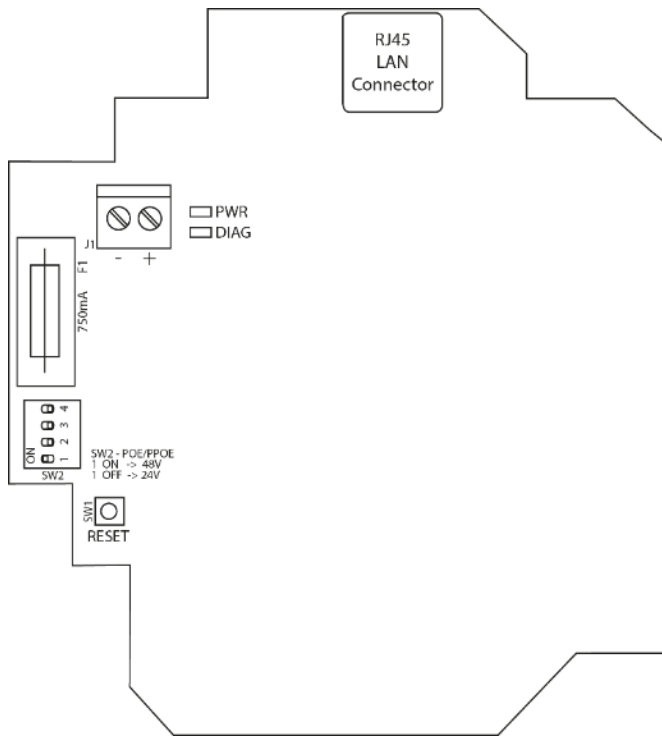
Label	Description
	RJ45 LAN connector (PPoE @24VDC or PoE @ 48VDC)*

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.

ACKSYS
COMMUNICATIONS & SYSTEMS

**10, rue des Entrepreneurs
78450 Villepreux - France
www.acksys.fr**

WaveNet-EX manual Annex

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.

ACKSYS
COMMUNICATIONS & SYSTEMS

**10, rue des Entrepreneurs
78450 Villepreux - France
www.acksys.fr**

WaveNet-EX manual Annex

Step 2

Using your web browser open the WEB interface (IP address: 192.168.1.253) and select the "SETUP" tab:

For setup page is required User name and password 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

![ACKSYS COMMUNICATIONS & SYSTEMS]

10, rue des Entrepreneurs
78450 Villepreux - France
www.acksys.fr

WaveNet-EX manual Annex

SETUP   TOOLS   STATUS

PHYSICAL INTERFACES
VIRTUAL INTERFACES
NETWORK
VPN
BRIDGING
ROUTING / FIREWALL
QOS
SERVICES

WIRELESS INTERFACES OVERVIEW

You can set up to 8 simultaneous roles (wifi interface types) per radio card, among the following combinations:

Combination	Channel selection		Max number of interfaces			
	Multiplicity	Can use DFS	Access point	Infrastructure client	Mesh point	Ad-hoc
802.11ac radio cards						
Multiple access points	single, auto, multiple	yes	8			
Client / bridge	single, auto, multiple, roaming*	yes		1		
SRCC	single	yes	auto	auto		
Other / Ad-hoc	single	no			unsupported	unsupported
802.11n only radio cards						
Multiple access points	single, auto, multiple	yes	8			
Portal	single	no	8		1	
Client / bridge	single, auto, multiple, roaming	yes		1		
Other / repeater	single	no	8	1 (non-roaming)	1	1

When using several roles, they all use the same shared channel; in this case, the client role must not be set to multichannel roaming. Repeater mode is a combination of two roles: access point + client.

* The roaming feature is not yet available for IEEE802.11ac cards.

WI-FI INTERFACE

WiFi 1: Wi-Fi 4 (802.11n) Wireless interface

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
5	802.11g+n	acksys_1_2.4_test	Access Point (infrastructure)	WPA2-PSK (Personal)	

WI-FI INTERFACE

WiFi 2: Wi-Fi 5 (802.11ac) Wireless interface

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
48	802.11ac+n	acksys_2_5_test	Access Point (infrastructure)	WPA2-PSK (Personal)	Interface disabled

GLOBAL PARAMETERS

RADIO REGULATION AREA

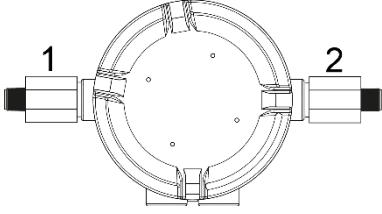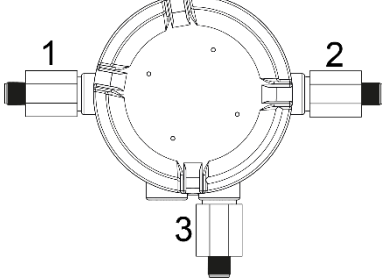| Country	United States ▼

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 Off : power not present
DIAG	Blue : when product is OK and initialized Flashing : when firmware in flash is not valid Off : for more then 2min with PWR led green indicate a Hardware/Software failure

RF INFORMATION

Device version	
A10	ANTENNA 1 AND 2 * Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g and 802.11n Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz 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) 802.11n HT20 2.4GHz band 20.5 dBm @ 7.2 Mbps (MCS 0) 18 dBm @ 72.2 Mbps (MCS 7) 802.11n HT40 2.4GHz band 20.5 dBm @ 15 Mbps (MCS 0)

10, rue des Entrepreneurs
78450 Villepreux - France
www.acksys.fr

WaveNet-EX manual Annex

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

10, rue des Entrepreneurs
78450 Villepreux - France
www.acksys.fr

WaveNet-EX manual Annex

	802.11b 2.4GHz band 20 dBm @ 1 Mbps
	20 dBm @ 11 Mbps
	802.11g 2.4GHz band 21 dBm @ 6 Mbps
	18 dBm @ 54 Mbps
	802.11a 5GHz band 20 dBm @ 6 Mbps
	15 dBm @ 54 Mbps
	802.11n HT20 2.4GHz band 21 dBm @ 7.2 Mbps (MCS 0)
	16 dBm @ 72.2 Mbps (MCS 7)
	802.11n HT40 2.4GHz band 20 dBm @ 15 Mbps (MCS 0)
	16 dBm @ 150 Mbps (MCS 7)
	802.11n/ac VHT20 5GHz band 19 dBm @ 7.2 Mbps (MCS 0)
	14 dBm @ 72.2 Mbps (MCS 7)
	13 dBm @ 86.7 Mbps (VHT MCS 8)
	802.11n/ac VHT40 5GHz band 18 dBm @ 15 Mbps (MCS 0)
	14 dBm @ 150 Mbps (MCS 7)
	13 dBm @ 200 Mbps (VHT MCS 9)
	802.11ac VHT80 5GHz band 18 dBm @ 32.5 Mbps (MCS 0)
	14 dBm @ 325 Mbps (MCS 7)
	13 dBm @ 433.3 Mbps (VHT MCS 9)

* Antenna position

ACKSYS
COMMUNICATIONS & SYSTEMS

**10, rue des Entrepreneurs
78450 Villepreux - France
www.acksys.fr**

WaveNet-EX manual Annex
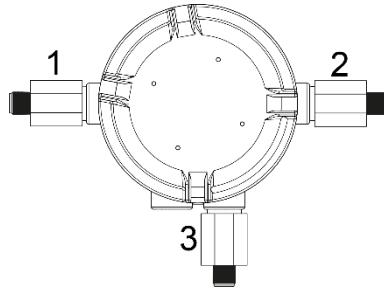
MAXIMUM PERMITTED RF THRESHOLD POWER (Pth)

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 Power (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:

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

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