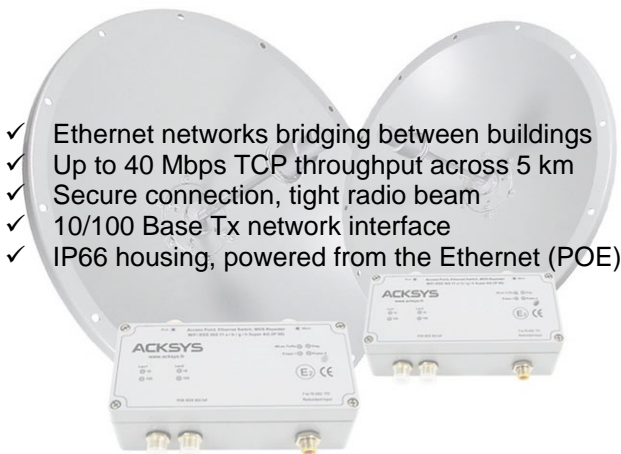


# Hyperlan-Pack

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## Quick installation guide

High throughput, outdoor, point-to-point  
Ethernet bridge



- ✓ Ethernet networks bridging between buildings
- ✓ Up to 40 Mbps TCP throughput across 5 km
- ✓ Secure connection, tight radio beam
- ✓ 10/100 Base Tx network interface
- ✓ IP66 housing, powered from the Ethernet (POE)

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Please check the product kit parts against the following list:

- 2 x identical Hyperlan-Pack modules
- 1 x this documentation, printed
- 2 x M12 to RJ45, male, POE, Ethernet cat. 5 cable, 25 m long
- 2 x directional antennas, 28 dBi (/L version)
- 4 x waterproof plastic caps for M12 connectors
- 2 x lightning arrestors
- 2 x male-to-male N-type coaxial extenders, 60 cm long
- 2 x 50 ohms N-type terminator caps
- 1 x CD ROM with drivers and documentations for all ACKSYS products

and contact immediately your dealer if any item listed above is missing or damaged.

A detailed reference manual about the software complement this quick installation guide.

Before continuing, check for the latest documentation on the [www.acksys.fr](http://www.acksys.fr) web site and read if necessary the software user's manuals.

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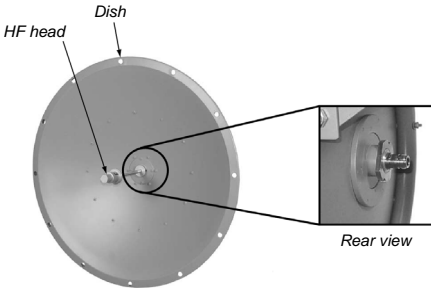
# HARDWARE INSTALLATION

The Hyperlan-Pack is made up of two identical and interchangeable subsets, containing an antenna and a Hyperlan-Pack module fixed to it. The following instructions are to be carried out for both subsets.

## 1. Fix the HF head to the center of the antenna

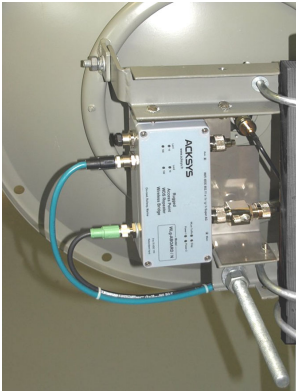
A parabolic antenna is used. While installing the HF head it must be oriented for horizontal or vertical polarization using the small arrow drawn on the tip of the head. To ensure optimal performance, it is important that both antennas are polarized the same way.

The HF head is fixed to the back of the antenna with a screw (see picture).



## 2. Connect the lightning arrester to the Hyperlan-Pack module

To protect from lightning, a lightning arrester must be connected to the 'Main' port on the Hyperlan-Pack system. The 'Aux' port must be connected to a 50-ohms, N-type terminator.



To ensure maximum protection, and to limit loss in cables and connectors, it is strongly recommended to connect the lightning arrester to the 'Main' port of the Hyperlan-Pack without using intermediary cables.

Should the system be struck by lightning, a gas capsule inside the lightning arrester will explode and protect the system. In this event, do remember to change the gas capsule so that the system is once again protected.

**WARNING:** it is important that the lightning arrester is grounded using the provided lug.

## 3. Connect the coaxial cable from the lightning arrester to the antenna

The lightning arrester is connected to the antenna by a 60 cm, coaxial cable (N-type male towards N-type male).

#### 4. Connect the power supply

The product can take its power supply from one or two power sources (called "Power1" and "Power2") of 9 to 75 V DC, 7W min. Both sources come from the same 5-ways M12 plug.

The product can also be powered from a POE injector (48 V DC) connected to the "Lan2" plug.

**Warning:** If you provide a POE power supply source, **do not** connect the 5-way M12 power supply plug and cover it with the provided waterproof cap.

The device has no ON/OFF switch. It turns on automatically when power is applied. Check the two Power1 and Power2 LEDs:

- "Power1" is lit if POWER1 power supply or POE source is detected.
- "Power2" is lit if POWER 2 power supply is detected.

The Diag led stays ON until the device is ready to use, usually in less than 10s.

#### 5. Connect the Ethernet cable

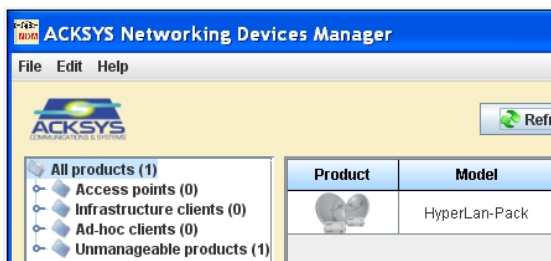
Plug the provided Ethernet cable to one of the Lan1 or Lan2 M12 connectors of the device. Connect the RJ45 side to any RJ45 plug of the network, and then check that either the "Lan1" or "Lan2" LED is ON (according to the Ethernet port which is plugged in).

## SOFTWARE CONFIGURATION

#### 6. Modifying the default IP address 192.168.1.253

The default configuration settings of the two Hyperlan-Pack systems have the same IP address: **192.168.1.253**. To access the web configuration pages of the Hyperlan-Pack, the IP address of one of the two systems should be changed the following way:

From any P.C. of the network, run the **ACKSYS NDM** multi-platform application (found on the CD ROM).

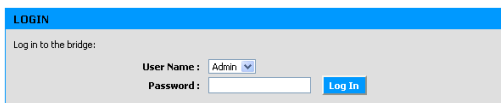


Select the device and click on the « **Configure IP** » button. You can configure the IP address or activate DHCP.

## 7. Device configuration

Click on the « **Web** » button to access from your web browser to the built-in web-based interface.

Select the **Admin** user. No password is required by default.



## 8. Verification of the Bridge/Access point

Before the final installation, the Hyperlan-Pack must be tested at a short distance (30 m) to make sure that it is working correctly.

The products should associate together shortly after switching them on. This can be verified using the ACKSYS NDM software.

The RSSI level returned by the two products **must be** 100% as soon as the two antennas are correctly aligned. If you do not obtain a maximum RSSI, double-check all the connections described in the previous section.

The default parameters are as follows (for both modules):

- No Security
- Mode 802.11a
- Fixed radio channel
- Default distance 40 km

These parameters are the product's default settings in order to help with the antenna alignment.

## 9. Allowing for the communication distance

A long distance between the two antennas could cause communication problems mainly due to radio wave propagation time.

To stabilize this problem, the Basic Wireless option in the Hyperlan-Pack web interface allows the specification and the configuration of the distance between the two antennas. Should the distance between the two antennas not be known exactly, it should always be overestimated.

# FINAL INSTALLATION

## Preparation and recommendations:

Installation of wireless links over a long distance implies human intervention as well as specific materials.

It is necessary to have tools which allow the desired azimuth (GPS, compass) as well as instant ways of communication (cell phone/satellite). An inclinometer is also recommended to measure the tilt of the antenna.

In order to minimize adjustment time spent onsite, it will be necessary to carry out preparatory work.

It is strongly recommended to perform a link simulation using the 'Radio Mobile' software. Using GPS coordinates, this software provides all the information necessary (azimuth, fading, Fresnel zone, height of antennas, tilt...) to ensure a good link between both antennas.

This is an essential phase in the installation, which assesses the feasibility of the link based on the selected site.

The software is free of charge and available at this address:

<http://www.cplus.org/rmw/>.

A tutorial (in English) is available here:

<http://www.pizon.org/radio-mobile-tutorial/index.html>.

The Hyperlan-Pack antenna models for 'Radio Mobile' can be downloaded from the ACKSYS website, under 'Downloads':

<http://www.acksys.fr>



### Mast Installation:

The Hyperlan-Pack comes with a mounting kit made up of two clamping U-bolt and a stopping U-bolt.

It is advisable to fix the antenna with the stopping U-bolt when adjustments are being made.



For a 'tilt up' installation (dish pointing upwards) the tilt-adjusting threaded rod must go at the bottom (see image). For the opposite case, a 'tilt down' installation, the tilt-adjusting threaded rod must go at the top.

The antenna's tilt can be adjusted using the threaded rod. The maximum setting range is from 0° to 30°. A one degree tilt of the antenna corresponds to 0.42cm on the threaded rod.

The azimuth should be adjusted using a GPS or a compass, depending on the data collected during the 'Radio Mobile' simulation, or with a map and a protractor.

### Connecting to power lines

The products may now be connected to power lines using an M12 connector or an Ethernet POE cable. The 'DIAG' diode of each product must light up as soon as it is connected to the power line then turn off a maximum of 10 seconds later.

### Adjusting the antenna alignment

The default settings of the two modules are configured to Ad Hoc mode. This mode is used during the alignment phase of the two antennas as it allows frames to be emitted without them being associated to other equipment.

There are two possible solutions for aligning the antennas:

- with a spectrum analyzer (recommended)
- without a spectrum analyzer (with ACKSYS NDM)

#### Using a spectrum analyzer

Connect the spectrum analyzer to one of the antenna using a coaxial cable then adjust it to the lower-end of the frequency band allocated to 802.11a (roughly 5.3Ghz).

On the computer connected to the other antenna, run the 'ACKSYS RF Quality Tester' program. If the antennas are pointing in the right direction a line should appear on the spectrum analyzer at the frequency corresponding to the chosen channel. Should the line not appear, check the azimuth settings and the tilt of both antennas, and that the 'ACKSYS RF Quality Tester' is running correctly.

A more precise adjustment of both the azimuth and the tilt of the antennas should now be performed. To do this, choose one of the antennas and slowly vary its azimuth until the spectrum analyzer displays the largest power.

Once the maximum has been reached, the antenna should be properly attached. The same alignment procedure should then be carried out for the second antenna.

Once the azimuths of both antennas have been set, the same procedure should be performed for the tilt of the antennas.

Antenna alignment is a repetitive process, which needs several tests to find the best azimuth and tilt settings for the antennas.

#### Without a spectrum analyzer

Should you not have a spectrum analyzer, connect each of the Hyperlan-Pack systems to a computer. Choose one antenna and run the 'ACKSYS NDM' program on the corresponding computer. Configure the detection frequency to 1 second (Menu Edit/Preferences).

Should the antennas be pointing in the correct direction, you should be able to obtain some RSSI for your Hyperlan-Pack system. If the NDM displays no RSSI, check the azimuth and tilt of both antennas.

A more precise adjustment of both the azimuth and the tilt of the antennas should now be performed. To do this, choose one of the antennas and slowly vary its azimuth until 'ACKSYS NDM' detects the best RSSI.

Once the maximum has been reached, the antenna should be properly attached. The same alignment procedure should then be carried out for the second antenna.

Once the azimuths of both antennas have been set, the same procedure should be performed for the tilt of the antennas.

Antenna alignment is a repetitive process, which needs several tests to find the best azimuth and tilt setting for the antennas.

Note: The antenna alignment process without a spectrum analyzer may also be carried out using a tool such as 'iperf', and aiming to maximize bandwidth.

## Choice of operating mode

Tests have shown that performances obtained in Infrastructure mode are the same as those obtained in Ad Hoc mode. The same is true for encryption: as the radio card carries this out independently, any main link debit will not be affected.

Once the antenna alignment is completed, it is recommended to switch to Infrastructure mode (one Hyperlan-Pack system configured in access point, the other in bridge infrastructure) in order to allow for higher security settings (access to WPA encryption and MAC address filtering).

To maximize performance we recommend the following configuration:

- Infrastructure mode
- Super A mode without turbo

Selection of either Infrastructure mode or Super A mode can be found in the 'Basic Wireless' option of the Web administration tool, accessible by NDM or by using an Internet browser (Firefox, internet explorer...).

WARNING: when switching from Ad Hoc mode to Access Point mode, the distance parameter between the two antennas is lost. It must therefore be reconfigured.

# USE

## 10. Modifying device's parameters

Via the integrated web management interface, set the following main parameters:

- The operating mode: Ad hoc or Infrastructure
- Wi-Fi security parameters (WEP, WPA...)
- The IP addresses of the Hyperlan-Pack modules
- The 'distance' parameter (distance between the antennas)
- Integrated SNMP agent setup
- Radio channel to use (in the 802.11a range)

## 11. SNMP Administration

The two Hyperlan-Pack modules can be configured and monitored using the SNMP protocol (V1 or V2c). The ACKSYS enterprise MIB is available at: <http://www.acksys.fr/Logiciels%20&%20Drivers/ACKSYS-WLG-MIB.zip>

# TROUBLESHOOTING

## All 8 LEDs indicators are OFF

- Verify the power supply (Voltage, cabling).

## The relevant LAN1 or LAN2 led indicator stays OFF

- Verify the Ethernet plug of your network; try to connect another device.
- Connect the device with the ACKSYS M12/RJ45 cable.

## The wireless link does not connect:

- Check the radio connections: position and orientation of the antennas, radio wave obstacles, radio channel interference
- Run a second antenna alignment check.
- Try another radio channel.
- Check the state of the lightning arrestor capsule.

## "ACKSYS NDM" doesn't find your device

- ACKSYS NDM only scans the local network. Devices located behind a gateway are not seen.
- If you use a firewall on your P.C, check if the application is not blocked.

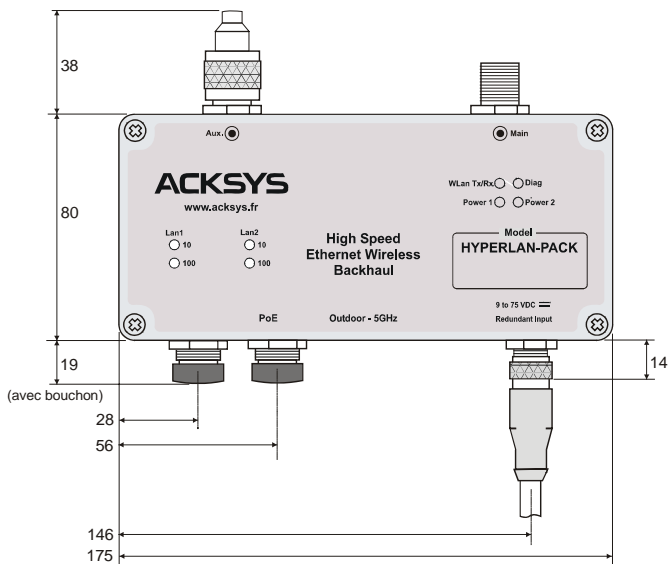


## How to restore factory settings

- If the built-in web-based interface is reachable, you can use your browser to restore factory settings.
- Open the case of the unit, and reset unit back to factory default by holding down the reset button for at least 2 seconds while the unit is powered on.

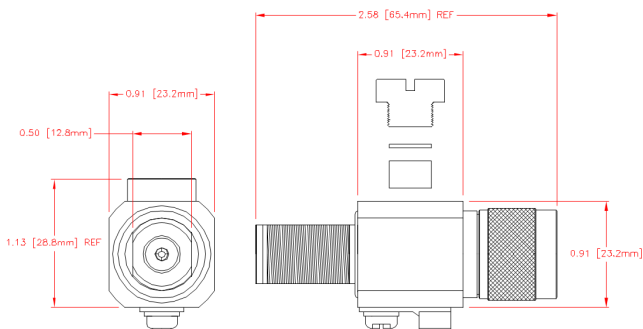
## SPECIFICATIONS

Hyperlan-Pack specifications:



All dimensions are given in mm.

Lightning arrestor specifications:



Power supply	
Number of external power inputs	2
Type	Wide DC power range, from 9V to 75V, 7W max, polarity protection.
Connector	A single 5-pins M12 connector
POE source	From LAN2 connector

Ethernet interface	
Number of ports	2
Type of ports	10 BASE T or 100 BASE Tx Automatic negotiation (HDX/FDX, 10/100 Mbps), auto MDI/MDI-X
Connectors	Two M12-8 female connectors and M12-to-RJ45 cat.5 Ethernet cables

Antennas	
Frequency	5150-5350MHz
Gain	28 dBi
Horizontal beam width	6°
Polarization	Vertical or horizontal
Front to Back ratio (F/B)	25 dB
Impedance	50 Ohms
Standing waves ratio (SWR)	< 1.5 :1 mean
Connector	Type-N female
Dish diameter	600 mm
Mast diameter	Up to 50 mm
ROHS Compatible	Yes

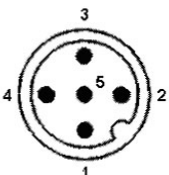
Wi-Fi interface	
Radio mode	IEEE 802.11a/h
Chipset	ATHEROS AR5414
Data rates	802.11a/h: 6 to 54 Mbps ATHEROS Super AG mode: up to 108 Mbps.
Frequency band for 802.11a	5 GHz; 4.900 to 5.850 GHz
	802.11a
Tx output power (Radio card output)	20 dBm @6-24Mbps 17 dBm @36Mbps 16 dBm @48Mbps 13 dBm @54Mbps
Rx sensitivity (Radio card input)	-90 dBm @6Mbps -70 dBm @54Mbps
Mechanical characteristics	
Weight	9 kg
Module enclosure	IP 66, cast aluminum housing
Operating temperatures	-25°C to + 70°C
Status indicators	8 LEDs: Power1, Power2, WLAN Tx/Rx, LAN1 10 Tx/Rx, LAN1 100 Tx/Rx, LAN2 10 Tx/Rx, LAN2 100 Tx/Rx, DIAG
Push button	Short push: Reset Long push (>2s): Restore factory settings

Software	
Device configuration	Automatic device discovery Built in web based utility for easy configuration from any web browser (username/password protection)
Firmware upgrade	Yes (via web browser or NDM)
SNMP	SNMP V1, V2C
Operating mode	AP (Access Point)/ Repeater or Bridge/Client
AP mode only	
Network topology	infrastructure mode with or without WDS
Security	WEP, WPA-PSK/WPA2-PSK, WPA/WPA2 with 802.1x authenticator, MAC address filter, SSID visibility status. Only WEP is available if WDS enabled
Client/Bridge mode only	
Network topology	infrastructure mode ad-hoc mode
Security	WEP, WPA-PSK, WPA2-PSK 802.1x supplicant only available for device V2. AES/TKIP/WEP by hardware encryption

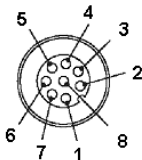
# CONNECTORS

The module contains 5 connectors:

- One male M12 connector for the two power supply sources, DC 9-75V, 7 W min


<u>5-point M12 Male connector</u> 	Pin	Signal Name
	<b>Power 1</b>	3
4		GND
<b>Power 2</b>	1	Vdc
	2	GND
	5	NC

- Two M12 connectors for LAN1 and LAN2 interfaces.

<u>Ethernet connector</u>	
<u>8-point M12 male Connector</u> 	<u>Signal Name</u> Pin 1: PoE+ Pin 2: PoE- Pin 3: PoE- Pin 4: TD- Pin 5: RD+ Pin 6: TD+ Pin 7: PoE+ Pin 8: RD-

The two Ethernet ports LAN1 and LAN2 are auto-sensing (10 Base-T or 100 Base-Tx Half/Full Duplex) and self-configuring to allow connection via either a cross-over or straight-through cable.

- Two Female N-type antenna connectors.

<u>Female N-type connector</u>	
	<p>Main connector: Main antenna used for Tx/Rx Wlan activity.</p> <p>Aux connector: Unused, you must plug a 50 Ohms N-type antenna terminator.</p>

## HYPERLAN PACK MOUNTING

The Hyperlan-Pack comes with a mounting kit made up of two clamping U-bolt and a stopping U-bolt.

The antenna can be easily fixed to the mast using the provided clamping U-bolts (see picture below). The diameter can be set up to 50 mm.

Note: It is advisable to fix the antenna with the stopping U-bolt when adjustments are being made.

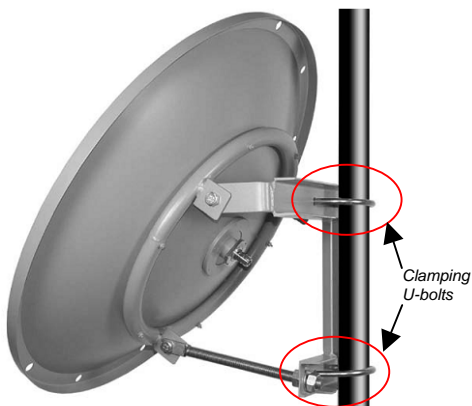
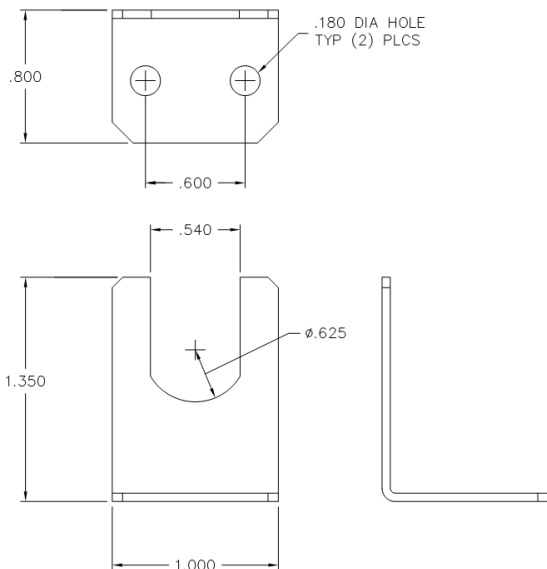


Diagram of angle bracket for lightning arrestor:



All dimensions are given in mm.

## LEDs definition

Each module has 8 status LED indicating:

LED	Color	Description
Power 1	Green	This led is ON when a power supply is connected to pin 3/pin 4 of the power connector.
Power 2	Green	This led is ON when a power supply is connected to pin 1/pin 2 of the power connector.
Diag	Red	This led indicates the unit operational state. ON: Failed, OFF : OK. It stays ON for less than 10s after power is applied then it goes OFF.
WLan Tx/Rx	Blue	Flashing for WLAN Tx/Rx activity.
Lan 1 10	Green	Status for LAN1 network interface: ON for LINK in 10 BASE T and flashing for Tx/Rx activity.
Lan 1 100	Green	Status for LAN1 network interface: ON for LINK in 100 BASE Tx and flashing for Tx/Rx activity.
Lan 2 10	Green	Status for LAN2 network interface: ON for LINK in 10 BASE T and flashing for activity.
Lan 2 100	Green	Status for LAN2 network interface: ON for LINK in 100 BASE Tx and flashing for activity.

The 10 BASE-T or 100 BASE-Tx Half/Full duplex mode is negotiated according to 802.3u recommendations.

## Regulatory compliance

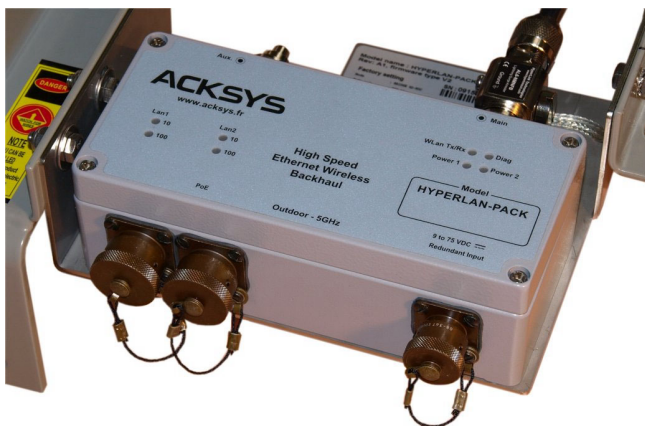
The unit conforms to the following council directives:

N°	Title
1999/5/CE	Radio and Telecommunications Terminal Equipment Directive (R&TTE)
73/23/CE	Low voltage directive

The device has been certified to comply with the European directives and is appropriately CE marked.

N°	Title
EN61000-6-2	EMC emission, industrial grade
EN61000-6-4	EMC Immunity, industrial grade
EN301-489-17	EMC for radio equipment 2.4Ghz & 5GHz
EN 301 893	Broadband Radio Access Networks (BRAN) ; 5 GHz high performance WLAN

# ADDENDUM HYPERLAN-PACK/LR

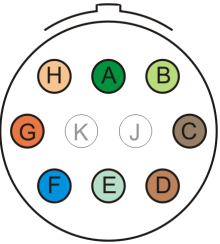


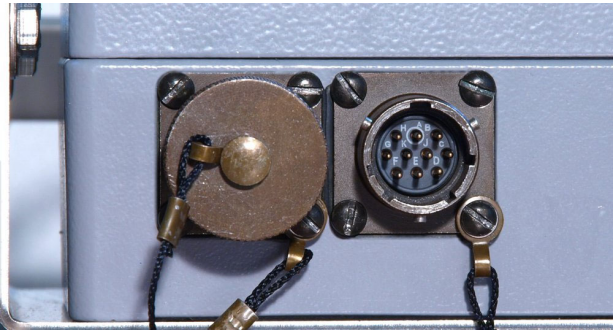
## Power supply connector pin-out

6-pins connector, size 10	Pin	Signal
	B	VDC POWER1
	F	GND POWER1
	C	VDC POWER2
	E	GND POWER2
	A	Earth
	D	NC



**Ethernet Lan1 and Lan2 interface connectors pin-out.**

10 pins connector, size 12	Pin	Signal	Color (T568B)
	A	RD-	Green
	B	RD+	White/Green
	C	POE-	Brown
	D	POE-	White/Brown
	E	POE+	White/Blue
	F	POE+	Blue
	G	TD-	Orange
	H	TD+	White/Orange



RJ45 connector as T568B  
(front view)

