

ACOEM

Acoustic Threat Detection ATD- 300 | ATD-301

User Manual

POD FW 1.0.0.4 - SERVER V 1.0.0.0



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1. INTRODUCTION

Acoustic Threat Detection (ATD) sensors are small acoustic detection monitoring devices which continuously analyze noise to detect, identify and localize threats. The pod performs all these analyses on edge, in real time and can move directly a colocalized PTZ camera to the threat direction. An alarm is also pushed by the IP network to a CCTV control room to focus your operator on the incident, giving your responders the situational awareness they need.

This document presents the ATD-300 and ATD-301 sensor. It is the installation and setting guide for the ATD-300 and ATD-301 pods.

Receipt of your equipment

This product was carefully inspected and tested prior to shipping. Nevertheless, you are requested to check when opening the packaging that there is no sign of damage and that all the accessories are included. If this is not the case, please notify ACOEM or its approved representative without further delay. You are advised to keep the packaging in case you need to return your equipment for maintenance at ACOEM's premises.

Warning



Before using the product, read the instructions carefully, especially the safety instructions and the installation section.

The safety instructions (§2) described in this manual should be adhered to and the ATD-300/ATD-301 pod should always be used within the limits specified hereafter. Instrument and operator safety is at risk when the instrument is used in conditions that are not intended by ACOEM.

The Installation (§5) and Safety Instruction (§2) included in this user manual must be read by the operator before installation or starting to operate. Print this document or use a computer or a tablet to keep them available, especially during installation.

2. SAFETY INSTRUCTION

2.1. General Safety Warnings

WARNING! Read all safety warnings and all instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

KEEP ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE.

WARNING! Read all “Lighting protection and Earthing” (§2.4) before installation of the device. Failure to follow the instructions may result in electric shock and serious injury.

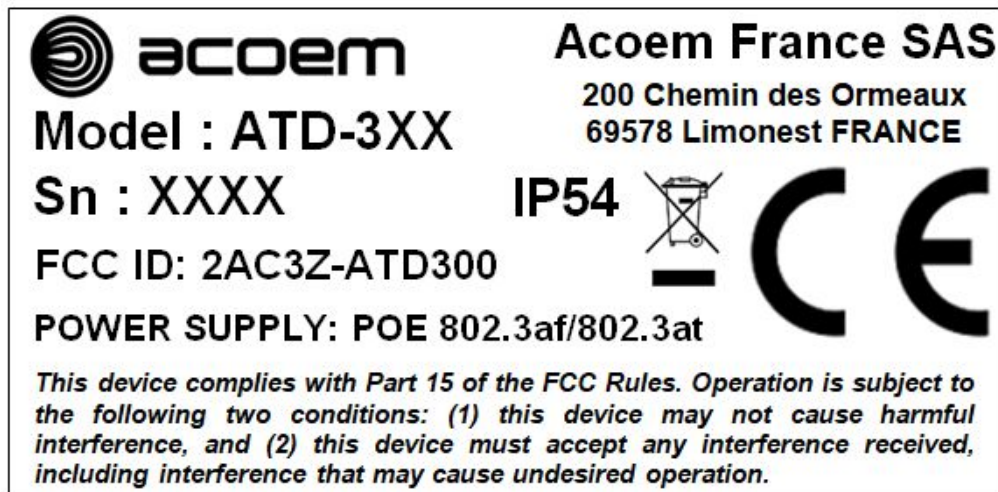
2.2. Definitions: Safety Guidelines

The definitions below describe the level of severity for each signal word. Please read this manual and pay attention to these symbols:

Symbol	Description
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

2.3. Safety Labels and Markings

ID label on the instrument



Symbol	Description
	Discard the instrument with due care for the environment
	CE marking. Indicate that the product meets EU standards

 In no event should this instrument be thrown in trash. It must be disposed of according to the WEEE directive. Waste disposal and recycling procedures compliant with WEEE* shall be adopted.

*WEEE: Waste Electrical and Electronic Equipment

- The instrument and accessories should be recycled as electronic product
- The instrument and its accessories should not be incinerated or thrown into the fire
- The instrument and its accessories must not be landfilled.
- The instrument and its accessories must neither be ground nor crushed.

2.4. Lighting protection and Earthing

To protect people and the equipment from lighting conditions, it is mandatory to observe the following:

- Always install the equipment in a place protected by a lighting rod.
- Always ground the equipment using the dedicated M4 tapped hole.
- Secure the M4 screw with 1.2 Nm maximum torque.
- Ground the equipment with an AWG8 or 10 mm² cable.
- Ground the equipment at the shortest distance.
- Plan periodic reviews of the grounding connection and correct immediately any damages.
- In case of doubt, refer to qualified people before performing any installation or work on the equipment.

Use Panduit P8-8RN-T non isolated ring tongue or equivalent.

The operator need to use a Torx screw driver and the crimping tool for the ring tongue (these tools are not supplied with the equipment).

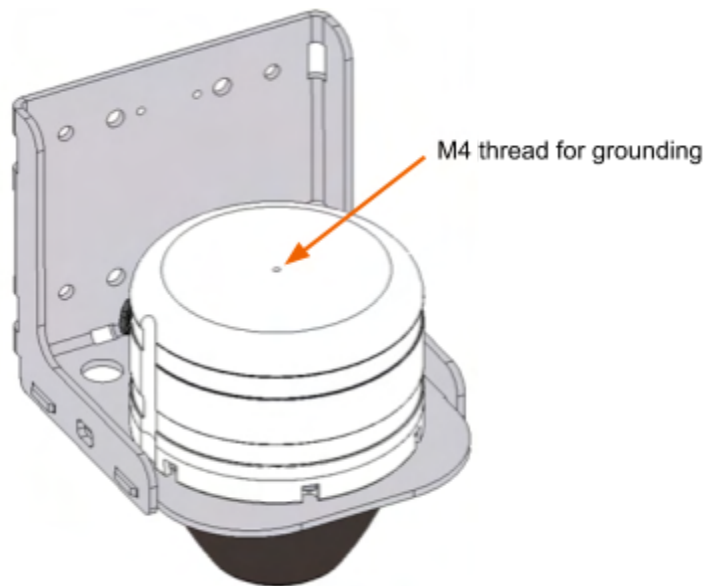


Figure 1: ATD-300/ATD-301 grounding thread

2.5. Operating Environment

Don't use this instrument, and its accessory in an explosive atmosphere, or near flammable products, or near corrosive products.



Warning: Take care to use the instrument in accordance with the environmental constraints

2.6. Installation Caution

The installation must be done only by workers qualified and authorized to work at a high level. The equipment is fixed in height, it is the responsibility of the contractor to ensure the safety of the installation. For a safe installation the requirements below must be followed:

- Keep the work area clean and well lit. Cluttered or dark areas invite accidents.
- Ensure the cables connected to the instrument are secure, protected and fixed to avoid hanging on or falling.
- Before any use, visually inspect the instrument case and its accessories and check there is no visible damage such as crack, broken part or abnormal deformation.
- Do not install nor uninstall all or part of the equipment in stormy weather.
- Use the adapted Personal Protective Equipment and fall protection to work in high level
- Adapt fixation to the weight of the equipment (including external load: wind, snow...) and to the material of the wall
- Control the strength of the attachment point
- Use thread lock on fixation to prevent self-loosening

2.7. Electrical Safety



- **All external circuits connected to the device should be non-hazardous voltage, and energy source limited within the meaning of the IEC61010-1 standard.**
- The PoE power supply (not provided) must follow the IEEE 802.3af / 802.3at standard.
- Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the instrument.
- Ensure the PoE power supply is connected to an outlet protected from shocks or possible damage.
- Keep cord away from heat, oil, sharp edges or moving parts. Damaged or entangled cords increase the risk of electric shock.

2.8. Cleaning

- Disconnect the instrument before attempting to clean.
- Use non aggressive products to clean the instrument, as diluted detergent (dishwashing liquid, or soap)
- Do not insist on labels to avoid erasing them.

2.9. Service

The disassembly for internal repair is prohibited.

The service of the device has to be performed by a qualified person using only the original replacement part. This will ensure that the safety of the instrument is maintained.

Exposition to full sun can raise the temperature of the system.

2.10. Information to user

Caution: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2.11. Information to user

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

3. GENERAL PRESENTATION

3.1. Main Functions

The ATD-300 (white version) and the ATD-301 (black version) are the next generation Acoustic Threat Detection system designed to protect public places. The technology used was proven on the military field for 25 years.

The pod has the ability to detect, identify and localize a gunshot, a sniper or firecracker. All these treatments are performed on edge to have a fast and reliable alarm in case of threat.

The threat detection and identification is not based on simple threshold, but on more than 90 acoustics parameters computed in real time and analyzed with a specific Artificial Intelligence trained on our real gunshot database collected all over the world for more than 25 years. This high performance process limits the number of false alarms and allows you to have the accurate information in a few seconds.

In addition, the pod has a 4 microphones antenna covered by the windscreen, with this antenna and specific algorithm on edge, one pod is able to compute the azimuth and the elevation of the gunshot. In case of a Sniper, if the pod catches the nozzle noise and supersonic bullet noise, one pod is able to compute the azimuth, the elevation and the distance of the Sniper. If only supersonic bullet noise is heard by the pod, in this case the localisation is impossible but the pod will push an alarm to a server or VMS.

As soon as the pod localises a threat, it will move a colocalized PTZ camera directly on the threat root, in the same time alarm will be pushed to a server or a VMS to focus the operator on the threat.

In normal circumstances, the pod pushes the sound level every second, with this simple indicator, it is easy to know if there is activity in a specific area.

3.2. Overall Instrument Presentation

All the electronics of the ATD-300 and ATD-301 pod is protected by a tough aluminum casing. Below the black foam windscreen you can find the 4 microphones antenna used for the threat localisation.

The mains parts of the pod are:

1. Aluminum casing.
2. M12 X-Coded connector for Ethernet connection and power supply (PoE).
3. Windscreen.
4. 3 vertical grooves for the pod orientation reference.
5. 2 horizontal grooves for the metallic strip fixation.
6. Breathing valve with a membrane which allows respiration but stop humidity.
7. Optional bird spykes.

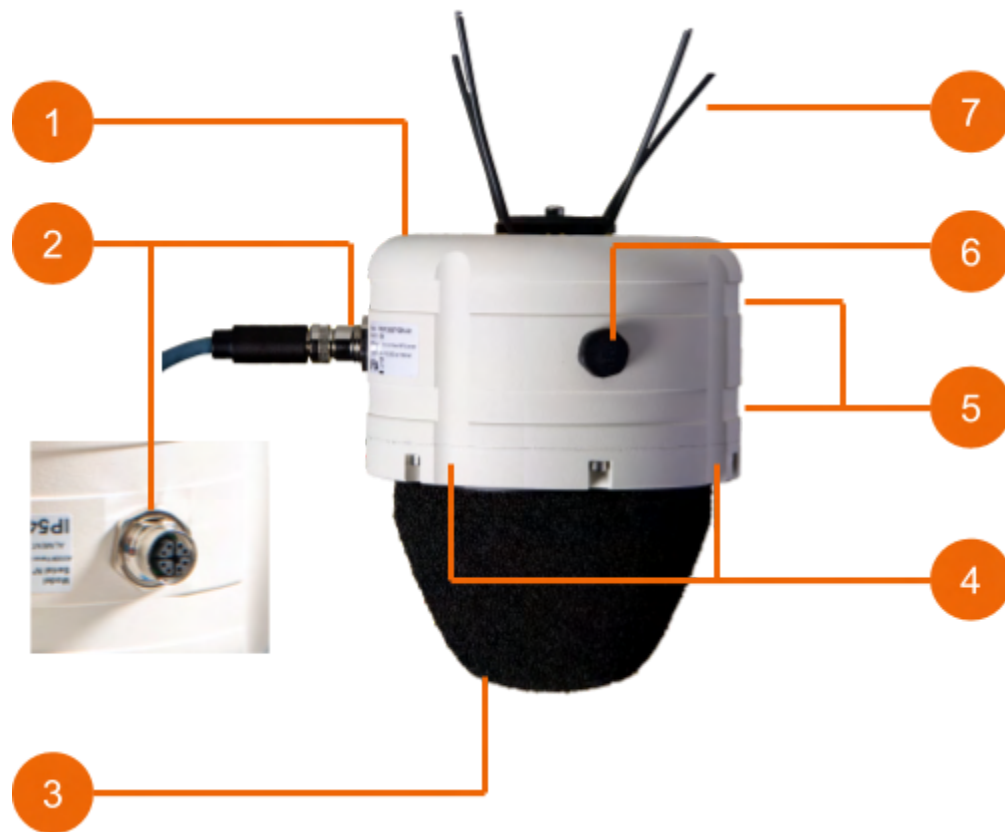


Figure 2: ATD-300/ATD-301 pod main parts

3.3. Network Architecture

The ATD-300/ATD-301 pod is designed to work standalone, therefore the pod controls a colocalised camera with the ONVIF protocol, and pushes a specific HTTP alarm for each type of threat to a VMS system.

For maintenance and AI training purposes, the pod can be associated with the ATD server software solution. In this case the pod will push the following to the server:

- Noise level every 1s
- State of Health every 15min
- Alarm in case of threat with raw signal (optional)

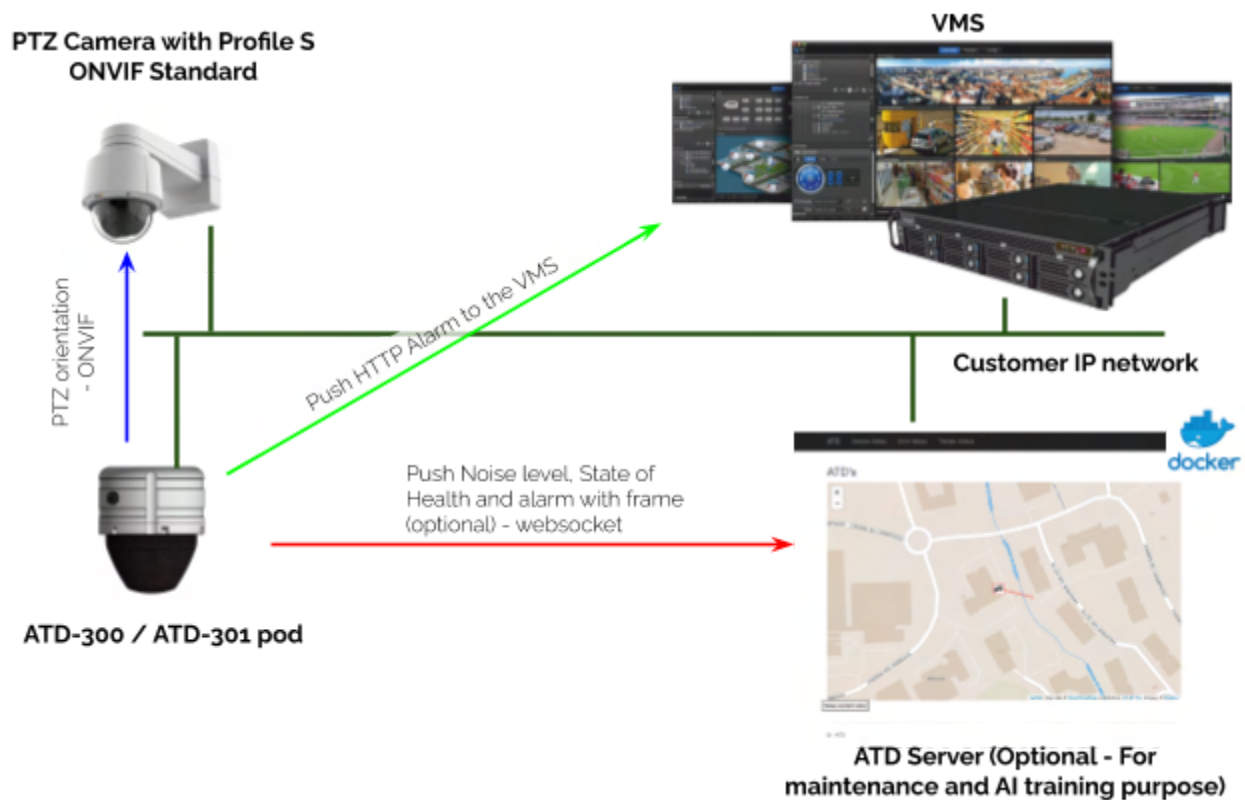


Figure 3: ATD IT architecture

To be functional the following requirements has to be followed:

- The PTZ camera has to be colocalized with the pod
- The PTZ camera has to follow the Profile S ONVIF Standard
- The PTZ camera request absolute move capability
- The pod need to have access to the camera with the ONVIF and PTZ authorization
- The PTZ camera and the pod has to be on the same IP network
- The PTZ camera and the pod need to have the same time and date - It is recommended to use the same NTP server (local or external)
- VMS which accept generic http event

4. SETUP GUIDE

4.1. Power Supply

The ATD-300/ATD-301 is power supplied by PoE (Power over Ethernet), the unique M12 X-coded cable provides power supply and ethernet communication.

The PoE injector or PoE switch has to follow the 802.3at or 802.3af standard.

To power supply the pod, first connect the M12 X-Coded plug on the pod, and on the other end plug the RJ45 cable on a PoE injector (PoE/Data plug) or on a PoE switch.

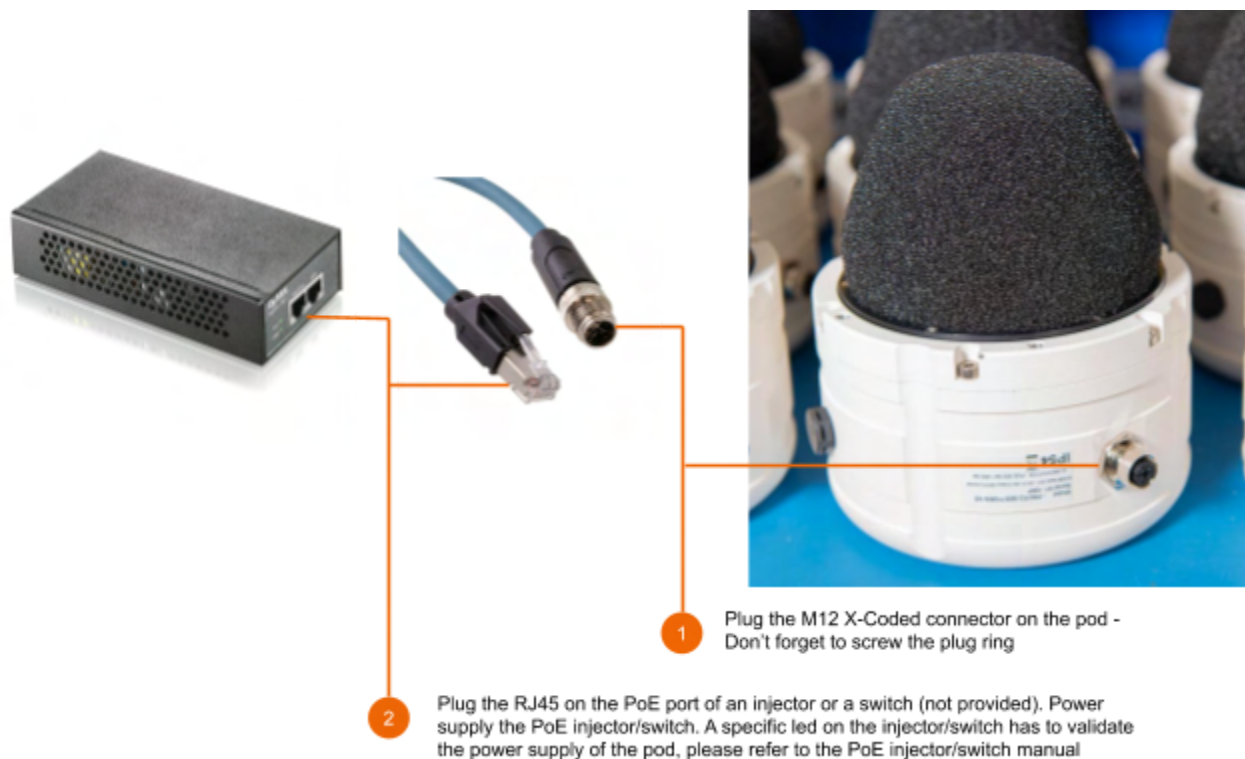


Figure 4: Power supply the ATD-300/ATD-301 pod

4.2. First connection to the pod

All the setting of the ATD-300/ATD-301 is done with a web page generated by the pod itself. By default the pod has no IP assigned, and is waiting for an IP coming from the DHCP server of the network.

The first step is to connect a computer to the same local network than the pod.

With a web browser on your computer(Chrome is recommended), connect to the ATD-300/ATD-301 pod using one of the following options:

- If you are on a network with DHCP server and name resolution service. Enter the following address on your web browser: <http://atdxxxx.local:8080> with xxxx the serial number of you pod. For example, if you have the pod number 1500 then the address to contact the pod is <http://atd1500.local:8080>
- If you are on a network with DHCP server, find the IP address of the pod using IP scanner or request it to your IT department. Then enter the following address on your web browser: http://<atd300_ip>:8080 with **<atd300_ip>** the IP V4 address provided by the DHCP server. For example, if your pod has the IP V4 address **192.168.1.101** then the address to contact the pod is <http://192.168.1.101:8080>
- If you have no DHCP server, or if you can not scan the IP address of your local network, you can connect to the pod using the IP V6 address. The IP V6 address is written on the delivery note provided with the ATD-300/ATD-301 pod. For example, if your pod has the IP V6 address **fa82::ba27:ebff:fed8:63e1** then the address to contact the pod is [http://\[fa82::ba27:ebff:fed8:63e1\]:8080](http://[fa82::ba27:ebff:fed8:63e1]:8080)

Please note that the web page is on the port 8080.

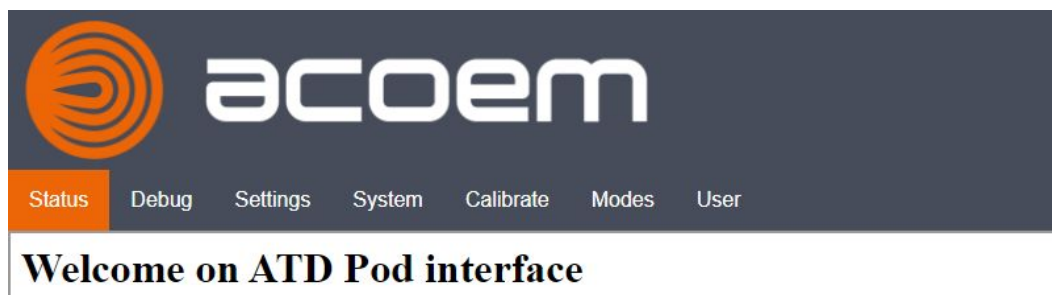


Figure 5: Web page to setup the ATD-300/ATD-301 pod

A second press on the **Status** menu will open the pod status with the Serial number, connection status, Mode of the pod, Camera connection status and firmware version.

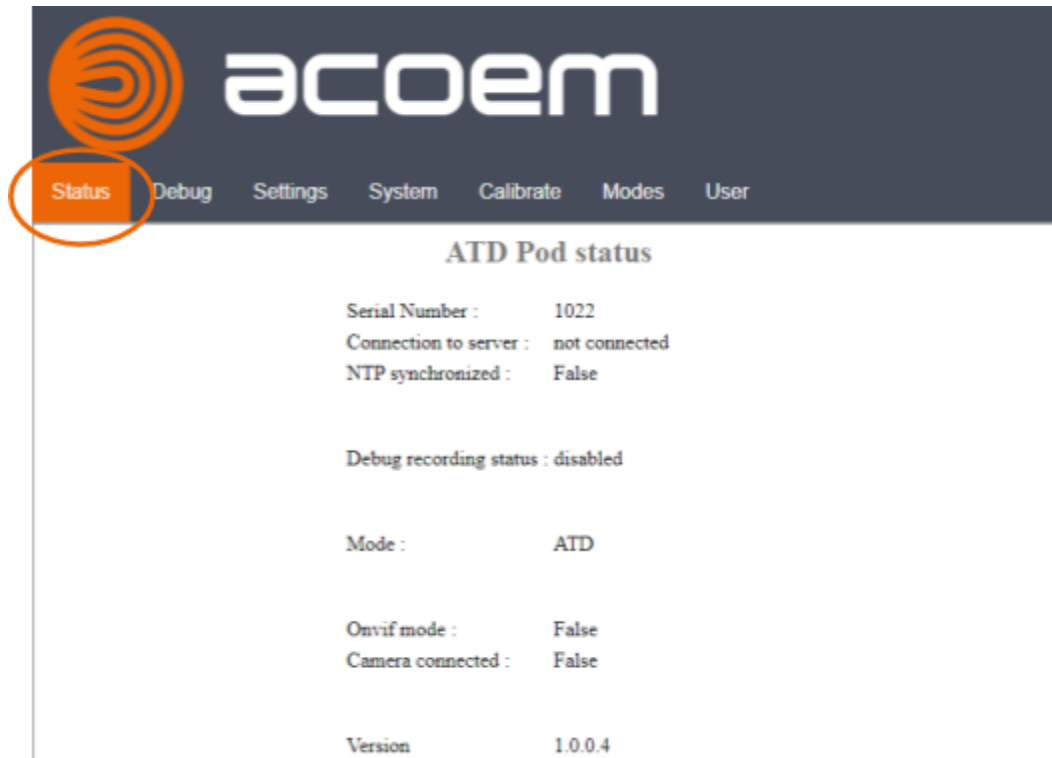


Figure 6: Status web page

To enter on the Setup web page, you need to login on the pod. The default credentials are:

- User name: admin
- Password: atd300



Figure 7: The login web page on ATD-300/ATD-301 pod

For security aspect, it is strongly recommended to modify the default password. Please note that If you lose the new password, you have to contact ACOEM support team to reset the password (support@acoem.com).

To modify the password:

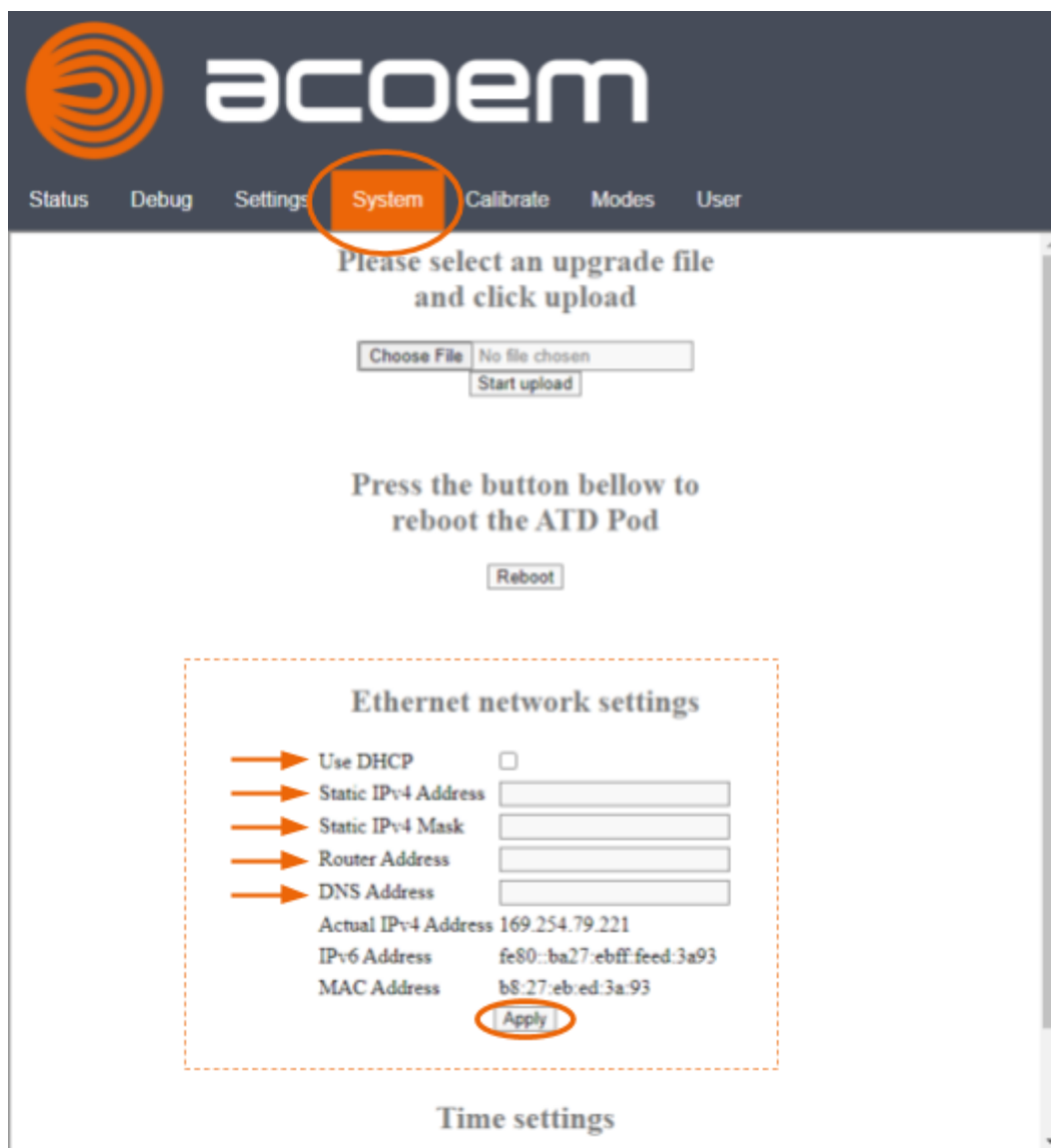
- log in to the pod
- On the User web page, type the new password on the 2 fields
- Press on the Ok button to save the password



Figure 8: The User web page on ATD-300/ATD-301 pod to change the password

4.3. Network setting

The first step is to setup the network parameter of your pod. On the **System** page, you have to edit the **Ethernet network setting**.



The screenshot shows the ACOEM web interface. The top navigation bar includes 'Status', 'Debug', 'Settings', 'System' (highlighted with an orange circle), 'Calibrate', 'Modes', and 'User'. Below the navigation bar, there is a section for file uploads with the text 'Please select an upgrade file and click upload', a 'Choose File' button, a text field showing 'No file chosen', and a 'Start upload' button. Below this is a section for rebooting the pod with the text 'Press the button bellow to reboot the ATD Pod' and a 'Reboot' button. The main section is titled 'Ethernet network settings' and is enclosed in a dashed orange box. It contains the following fields and values:

- Use DHCP: ☐
- Static IPv4 Address:
- Static IPv4 Mask:
- Router Address:
- DNS Address:
- Actual IPv4 Address: 169.254.79.221
- IPv6 Address: fe80::ba27:ebff:feed:3a93
- MAC Address: b8:27:eb:ed:3a:93
- Apply: (highlighted with an orange circle)

Below the Ethernet network settings is a section titled 'Time settings'.

Figure 9: System web page to setup the pod network

By default the IP address of the pod is provided by the DHCP server of the local network.

The DHCP mode is enabled if the Static **IPv4 Address**, the **Static IPv4 Mask**, the **Router Address** and the **DNS Address** field are all empty.

To set the pod to use the IP provided by the DHCP server, tick the **Use DHCP** field and **Apply** the setting. The pod must be reboot to use the new setting.

To set the pod to use static IP address, fill **Static IPv4 Address**, the **Static IPv4 Mask**, the **Router Address** and the **DNS Address** and **Apply** the setting. The pod must be reboot to use the new setting.

Remark:

1. The **Actual IPv4 Address** is the IPV4 address actually used by the pod
2. The **IPv6 Address** is the static IPv6 address of the pod, it is important to store this IPv6 address to find the pod even if the IPv4 setting are incorrect
3. The **MAC Address** is the fixed MAC address of the ethernet interface

On the same **System** page, on the bottom part (use the scrolling bar on the right), you have the **Time settings** section. This part is to setup the NTP server used by the pod.

By default the pod NTP server field is blank, in this case the NTP server used is a public internet NTP server.

You can edit the **NTP server** field to use a local NTP server or an internet one. To apply the new setting, press the **Apply** button and reboot the pod.



Figure 10: System web page to setup the NTP server

Remark:

1. The NTP protocol is the only way to set the time on the pod
2. Have the exact time is a mandatory to use the ONVIF protocol (connection with the camera) and have a correct history of the event
3. The time used on the pod is always UTC
4. You need to refresh the **System** page to update the time of the pod
5. On the **Status** Web page you can check if the pod is synchronized with the NTP server.
The time synchronization can take several minutes after a reboot

4.4. Pod reboot

To apply some of the settings a reboot of the pod is mandatory. On the **System** page, a button is located to reboot the pod



Figure 11: System web page to reboot the pod

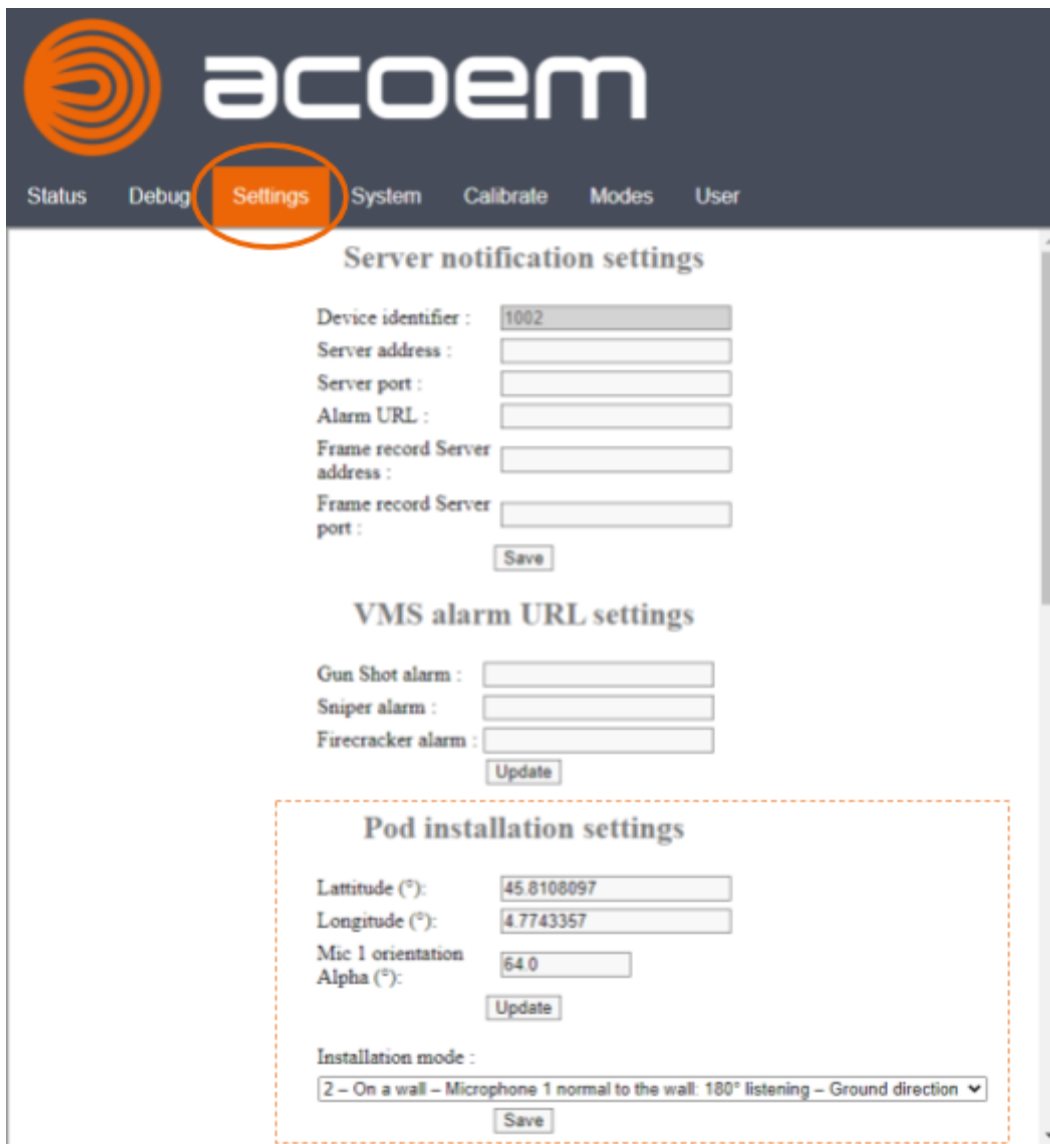
Remark:

1. The reboot of the pod takes several minutes
2. A reboot is mandatory to apply the Server notification settings, the Pod installation mode setting, Network settings and NTP settings (on **Settings** and **System** pages)

4.5. Pod installation Setting

The ATD-300/ATD-301 pod is able to localise (azimuth and elevation) a gunshot. Therefore the pod orientation is a key point to have good results.

All these parameters are located on **Settings** page, **Pod Installation settings** section.



The screenshot displays the ACOEM web interface. The top navigation bar includes 'Status', 'Debug', 'Settings' (highlighted with an orange circle), 'System', 'Calibrate', 'Modes', and 'User'. The main content area is divided into three sections:

- Server notification settings**: Includes input fields for Device identifier (1002), Server address, Server port, Alarm URL, Frame record Server address, and Frame record Server port, with a 'Save' button.
- VMS alarm URL settings**: Includes input fields for Gun Shot alarm, Sniper alarm, and Firecracker alarm, with an 'Update' button.
- Pod installation settings** (highlighted with a dashed orange border): Includes input fields for Latitude (°) (45.8108097), Longitude (°) (4.7743357), and Mic 1 orientation Alpha (°) (64.0), with an 'Update' button. Below these is a dropdown menu for 'Installation mode' set to '2 - On a wall - Microphone 1 normal to the wall: 180° listening - Ground direction', with a 'Save' button.

Figure 12: Settings web page

The **Latitude (°)** and **Longitude (°)** are the GPS coordinate in decimal degrees (DD) of the pod. These datas are not mandatory, but the pod location is used by the ATD server to show the threat on the map.

The **Mic 1 Orientation Alpha (°)**, is the angle in degrees between the North and the Microphone 1 located under the black windscreen.

Two marks are located on the pod to know the Mic 1 location:

- The pod has 3 grooves on the body parts separate by 90°. The microphone 1 is located on the missing groove
- The Mic 1 is located by a small mark on the windscreen basement

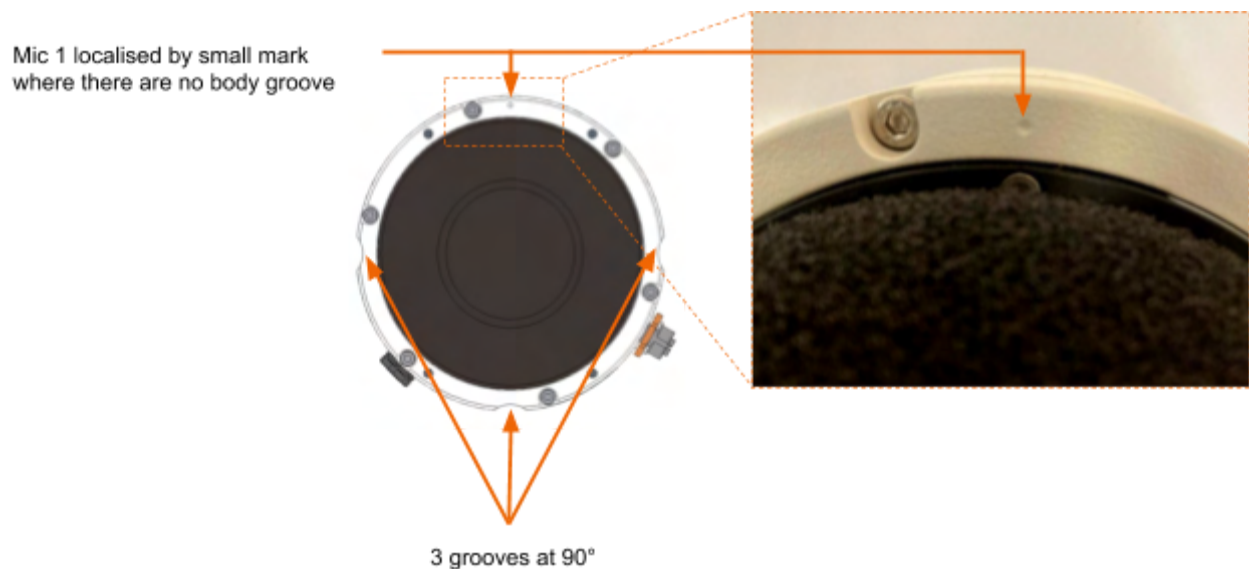


Figure 13: Mic 1 localisation on the pod (bottom view)

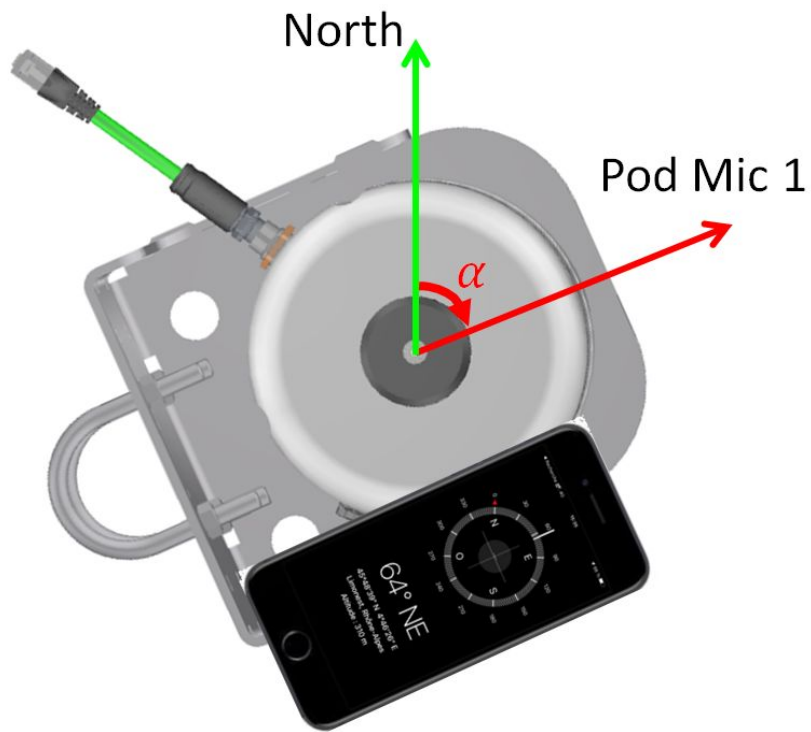


Figure 14: Mic 1 Orientation Alpha (°) (upper view)

To measure **Mic 1 Orientation Alpha (°)** use a compass or a smartphone for indicative measurement. On the following example the Alpha angle is equal to 64°

To apply the new settings, push the **Apply** button on the pod web page.

The ATD-300/ATD-301 pod could be installed on a wall or on a mast. Depending of the installation mode

If the pod is installed on a mast, then the **Installation mode** “1 - On a pole: 360° listening - Ground direction” has to be selected. In this mode, the pod surveys at 360° around him.



Figure 15: Example of a pod installed on a mast

If the pod is installed on a wall, with the Mic 1 normal to the wall, then the **Installation mode** “2 - On a wall - Microphone 1 normal to the wall: 180° listening - Ground direction” has to be selected. In this mode, the pod surveys at 180° in front of him. The installation procedure (§5.2.3) presents this setup.

If the pod is installed on a wall, with the Mic 1 parallel to the wall, then the **Installation mode** “3 - On a wall - Microphone 1 parallel to the wall: 180° listening - Ground direction” has to be selected. In this mode, the pod surveys at 180° in front of him.

For the two last modes the connector has to be located on the wall side and never at the external side.



Figure 16: Example of a pod installed on a wall

To apply the setting, click on the **Save** button and reboot the pod.

4.6. Camera Setting

The ATD-300/ATD-301 is able to move a camera directly on the event in case of detection. To do it, the **Camera settings** section in the **Settings** page has to be completed.

This part is not mandatory. If you have no camera to link to the pod, just keep the default setting with the **Onvif activation** menu at **False**.

The requirement on the camera are:

- Colocalized with the pod
- Compatible with the ONVIF Profile S standard mode
- Have the PTZ absolute move capability
- Have a user credential for the pod with the ONVIF - PTZ permissions
- Be installed on the same private network
- Have the same time than the pod



Figure 17: Settings web page to setup the Camera with the Fixed and Mobile installation mode

The first step is to activate the Onvif mode, Select **True** on the **Onvif activation** menu.

Complete the Camera IP, port and credential for the camera and **Update** the settings.

You can check the configuration on the Status Web page

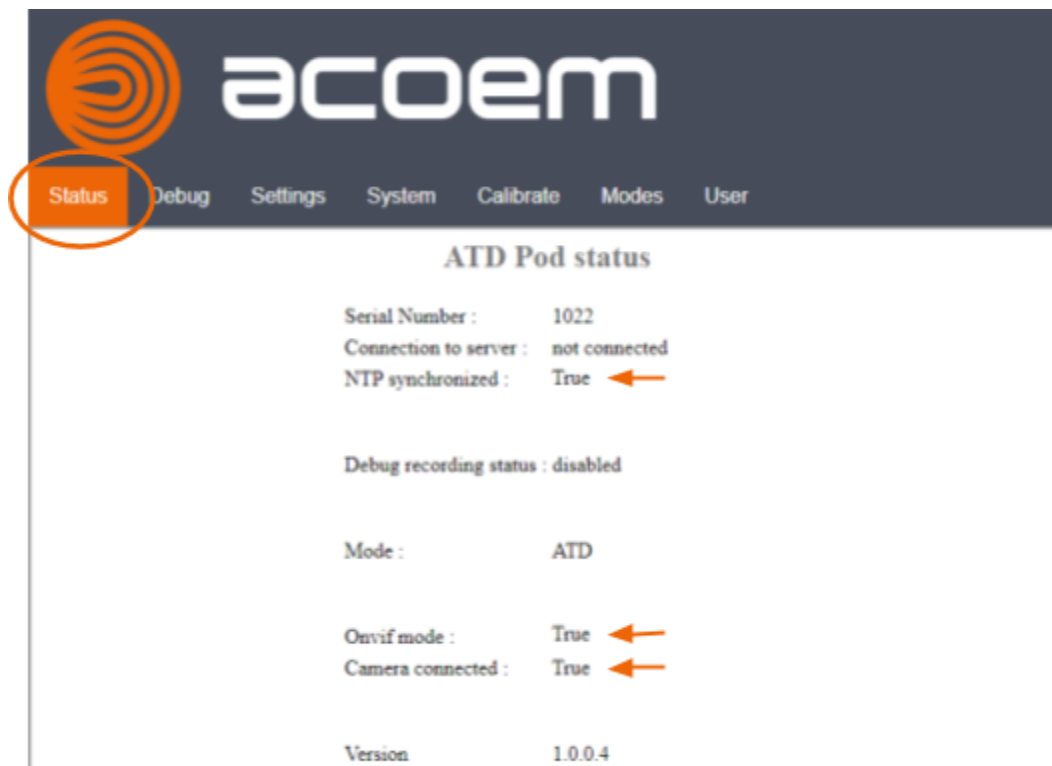


Figure 18: Status web page to check the Camera setting

The pod is connected to the camera if the **Camera connected** is **True**. If the **NTP synchronized** or if the **Onvif mode** is **False** the connection between pod and camera could not happen. In this case check the NTP server setting or activate the Onvif mode.

If the camera is connected, you can finalized the setting on the **Settings** page.

Select the PTZ version of your camera:

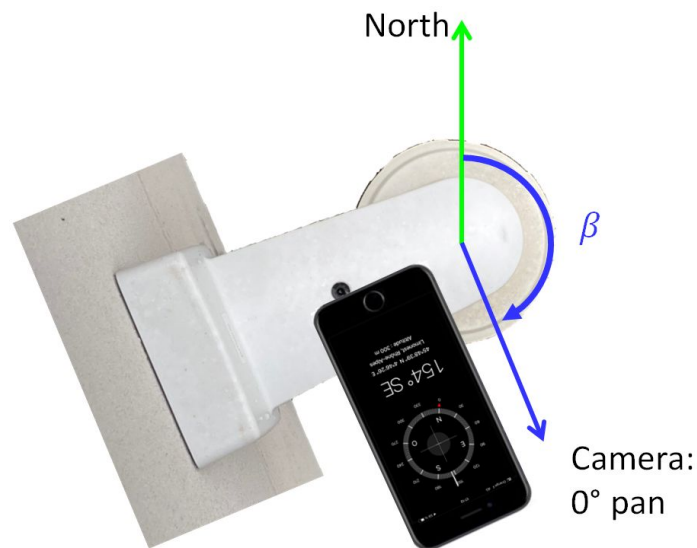
- if your camera is able to have an elevation from the ground to the sky, then select **True** on the **180° Tilt Camera** option.
- If your camera is able to have an elevation from the ground the the horizon, then select **False** on the **180° Tilt Camera** option



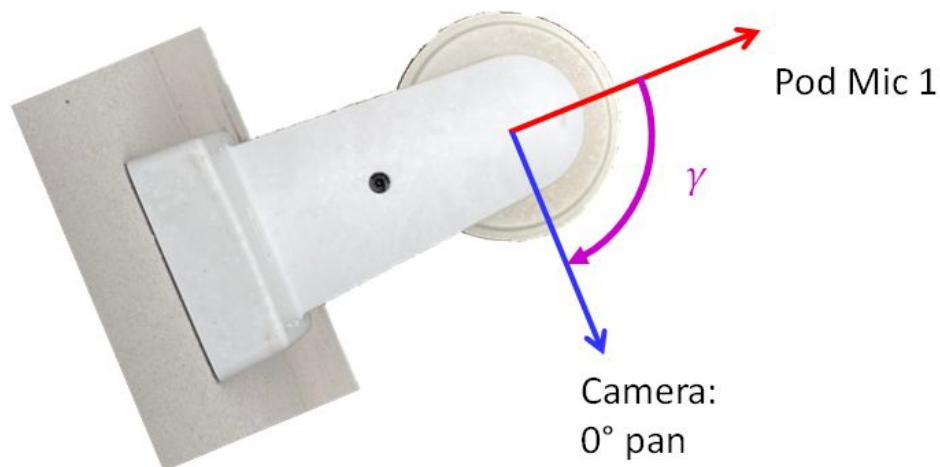
Figure 19: Axis Q6215 - 180° Tilt camera exemple (Left picture) - Axis Q5525-E - 90° Tilt camera exemple (Right picture)

Select the installation mode that you want to use. This option will change the way to enter the angle between the Pod and the camera:

- The **Fixed** mode is more adapted to a fixed installation on a wall or mast. In this mode the **Pan 0° Orientation Beta (°)** angle has to be measured. Beta is the angle in degrees between the North and the Pan 0° of the camera.



- The **Mobile** mode is more adapted to a mobile application. In this mode the Gamma angle in degree between the pod Microphone 1 and the Pan 0° of the camera has to be measured and filled on the **Mic 1/Pan 0° offset Gamma (°)** field. The advantage of this mode is in case if you move the trailer with the pod and the camera, you just have to adjust the **Mic 1 orientation Alpha (°)** on the settings, and never adjust the camera setting.



When all the camera settings are completed you can validate the angle values with the **Test Camera** section.



Figure 20: Test Camera Section to check the Camera angle value

Each button move the camera at a specific position:

- Camera to the North ⇒ Move the camera to the North horizon direction
- Camera to the Mic 1 ⇒ Move the camera to the same direction than the Microphone 1 of the ATD-300/ATD-301 pod and on horizontal tilt level
- Camera to the Pan 0° ⇒ Move the camera to it's 0° pan reference and on horizontal tilt level
- Camera to the Ground ⇒ Move the camera to the ground, at the vertical tilt level.

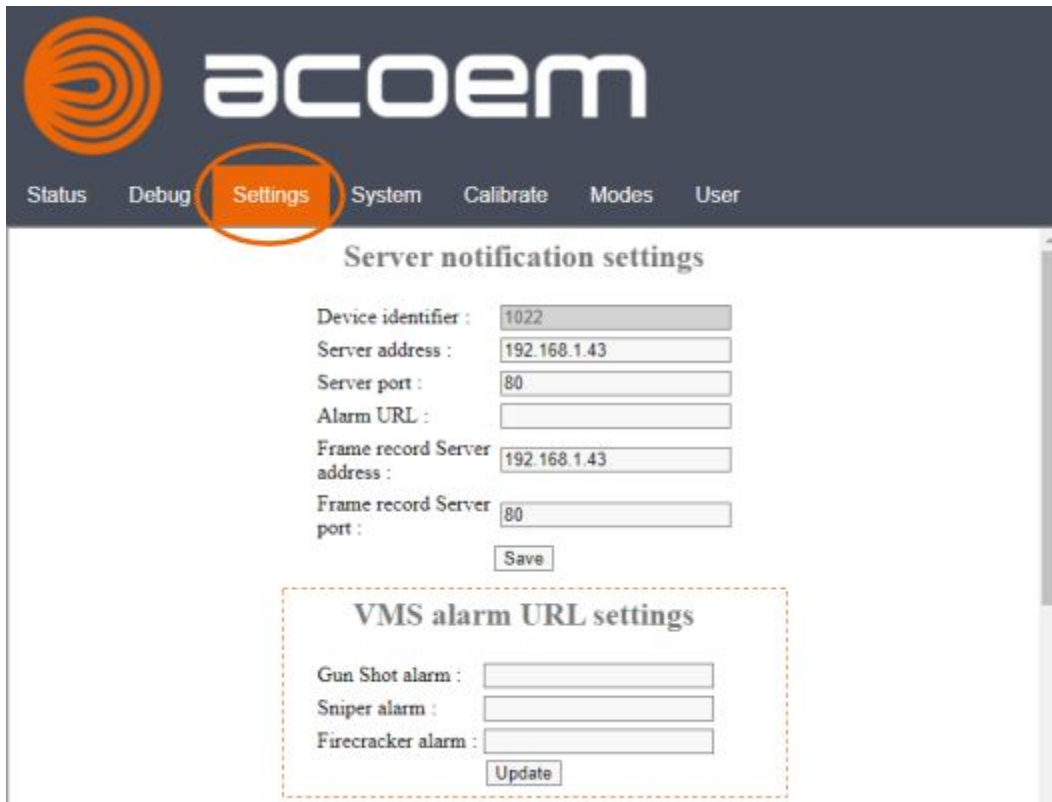
Remark:

- You can use the **Test Camera** function during the setting process to validate the 0° Pan direction or the Tilt mode of your camera

4.7. VMS Setting

For each type of threat detected by the pod (on the actual FW: Gunshot, Firecracker and Sniper), the pod can send a specific alarm to a VMS using a http command.

This setting is not mandatory, and if you don't need this feature, just let the field blank.



The screenshot shows the ACOEM web interface. The top navigation bar includes 'Status', 'Debug', 'Settings' (highlighted with an orange circle), 'System', 'Calibrate', 'Modes', and 'User'. The main content area is titled 'Server notification settings' and contains the following fields:

- Device identifier :
- Server address :
- Server port :
- Alarm URL :
- Frame record Server address :
- Frame record Server port :

A 'Save' button is located below these fields. Below the 'Save' button is a dashed orange box containing the 'VMS alarm URL settings' section:

- Gun Shot alarm :
- Sniper alarm :
- Firecracker alarm :

An 'Update' button is located at the bottom of this section.

Figure 21: Settings web page to setup the VMS alarms

Please refer to the your VMS manual to define the URL and setup on the VMS the requested action for each type of alarm.

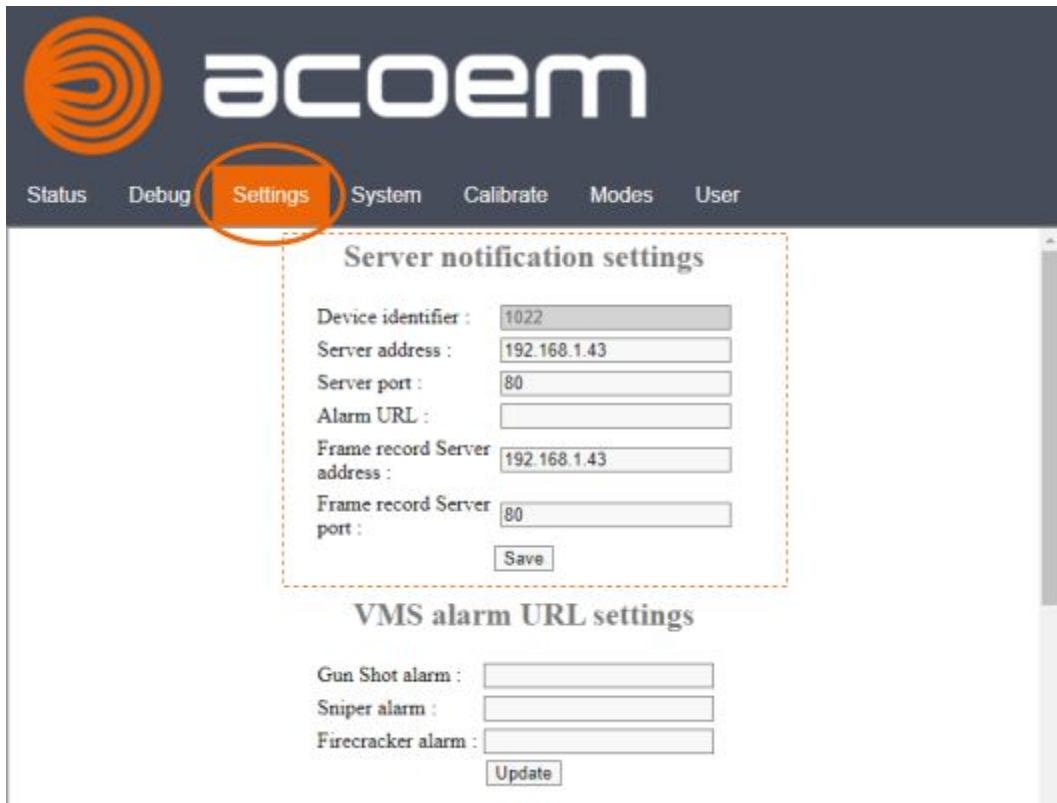
The pod will send the specific alarm if a threat is detected.

4.8. ATD Server Settings

The ATD-300/ATD-301 can be configured to communicate with the ATD server software. The ATD server software will be useful to:

- Log the threat
- Log and check the state of life of each pod
- Have a map with the noise level measured by each pod in real time
- Have a map with the threat detected by each pod in real time
- Store the frame of each event for AI training

This setting is not mandatory, and if you don't need this feature, just let the field blank.



The screenshot displays the ACOEM web interface. At the top, the ACOEM logo is visible. Below the logo is a navigation bar with tabs: Status, Debug, Settings (highlighted with an orange circle), System, Calibrate, Modes, and User. The main content area shows two sections. The first section, 'Server notification settings', is enclosed in a dashed orange box and contains the following fields: Device identifier (1022), Server address (192.168.1.43), Server port (80), Alarm URL (blank), Frame record Server address (192.168.1.43), and Frame record Server port (80). A 'Save' button is located at the bottom of this section. The second section, 'VMS alarm URL settings', is located below the first and contains three fields: Gun Shot alarm, Sniper alarm, and Firecracker alarm, all of which are blank. An 'Update' button is located at the bottom of this section.

Figure 22: Settings web page to setup the ATD server communication

To setup the communication with the ATD server please complete the following field:

- **Server address** ⇒ IP address of the ATD server
- **Server port** ⇒ Port of the ATD server
- **Frame record Server address** ⇒ IP address of the ATD server, usually identical than the **Server address**
- **Frame record Server port** ⇒ Port of the ATD server, usually identical than the **Server port**

To apply the new setting, press the **Save** button and reboot the pod.

Remark:

- The **Device identifier** is the pod Serial Number and can not be modified by user
- The **Alarm URL** is a http command user defined, send in case of threat to an external device (the same command will be send for each type of threat)
- If the **Frame record Server** is blank then no Frame will be sent to the server. In this case no raw data are stored

4.9. Settings Validation

To validate all the settings and the good behavior of the pod, two special functions are implemented on the **Modes** web page.



acoem

Status Debug Settings System Calibrate **Modes** User

Threat simulator :

Threat type : Explosion ▼

Azimut (°) : 0

Elevation (°) : 0

Azimut with reference to the North direction

Alarm

Demo mode

Duration (min) : 5

Apply

High Sensitivity mode :

Sensitivity level (dB) : 100

Figure 23: Modes web page to check the ATD-300/ATD-301 setting

4.9.1. Threat simulator

The **Threat simulator** section will generate an Alarm as if the pod has detected a threat.

Select the Threat that you want to test, Enter the azimuth and elevation (between 0 and -90) in degree and press the **Alarm** button.

The following action has to done:

- The PTZ camera move to the requested location (Gunshot and Firecracker threat only) if the camera setup is ok and the pod connected to camera
- The pod send an alarm to the VMS (if the **VMS alarm URL settings** is fill up for the tested threat)
- The pod send an alarm to the an external equipment (if the **Alarm URL** settings is fill up on the **Server notification setting**)
- The pod send an alarm on the ATD server (if the **Server address** is complet and the pod connected to the server)

Remark:

- The Sniper simulation threat will not move the camera
- Use only the implemented threat capability of your pod in the threat simulator. For this firmware version: Gunshot, Firecracker and Sniper

4.9.2. Demo mode

When the demo mode is enabled, the AI of the pod is not used. All the process to detect and classify the noise is replaced by a simple threshold detector. Therefore it is possible to simulate a fake Gunshot and validate all the settings for the camera and pod angle with impulsive noise.

To simulate a gunshot, use some wood plate or metallic tools to have impulse noise. To have a good localization process it is mandatory to have impulsive noise.

To enter on the **Demo mode** first set a **Duration (min)** in minutes and press the **Apply** button. After this time, the pod will reboot to come back to ATD mode.

You can check that you are on the **Demo mode** on the **Status** page.

On the **Status** page, the pod mode changes to **Demo**. You also have the **Threshold (dB)** of the demo mode, this value define in dB the sensitivity of the system during the demo. You can change it on the **Modes** web page

The **End of the Demo Mode (UTC)** inform about the UTC time when the pod will reboot and restart on the ATD mode.

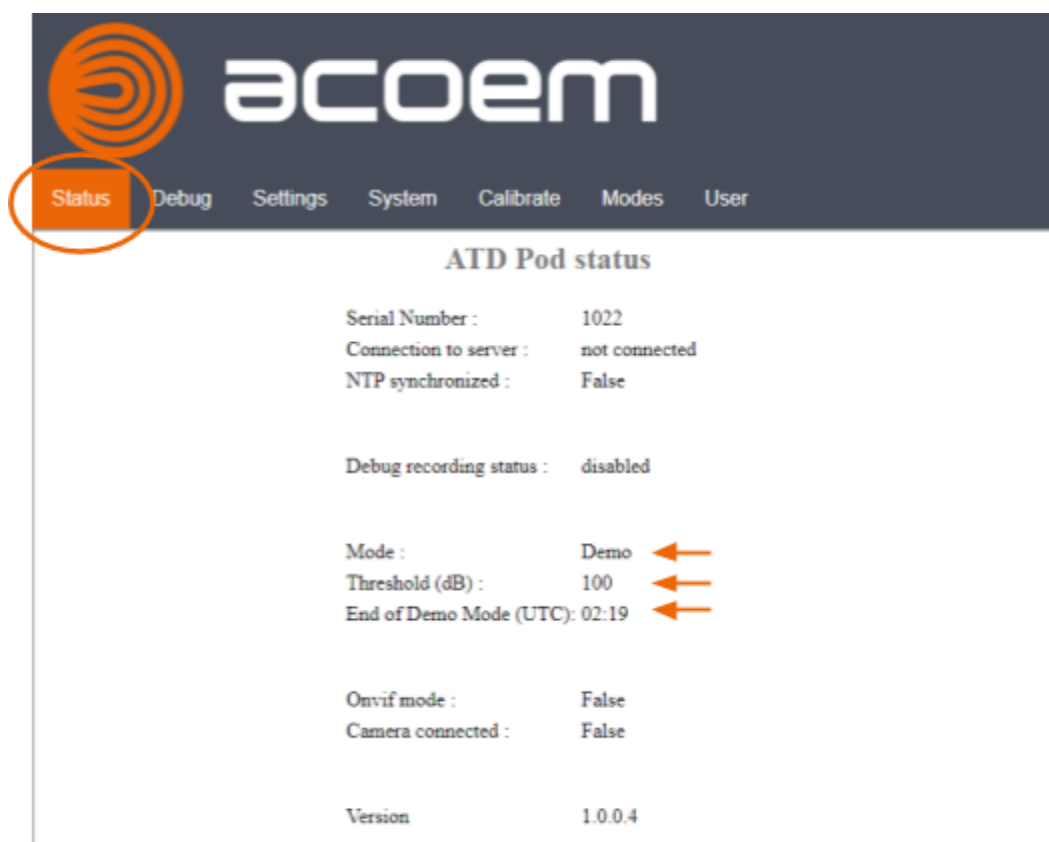


Figure 24: Status web page for the ATD-300/ATD-301 demo mode

4.10. FW update

On the System page, there are the section to update the Firmware.



Figure 25: Firmware update section on the System page

First you have to select the new firmware file on the device, to do that press the **Choose File** button and select the firmware file on the file explorer.

The Firmware file has to be a file with a .deb extension.



Figure 26: Firmware file selected on the System page

When the firmware file is selected you can press the **Start upload** button to upload and update the firmware.

This step can take a couple of minutes, you will have the following message at the end of the update process



Figure 27: Message at the end of a successful update process

To apply the new firmware, you have to reboot the system.

After the reboot, you can check on the Status page the actual Firmware version installed on the pod



Figure 28: Firmware version installed on the ATD-300/ATD-301

4.11. Factory menus

On the ATD-300/ATD-301 web page, there are two last pages for troubleshooting and maintenance.

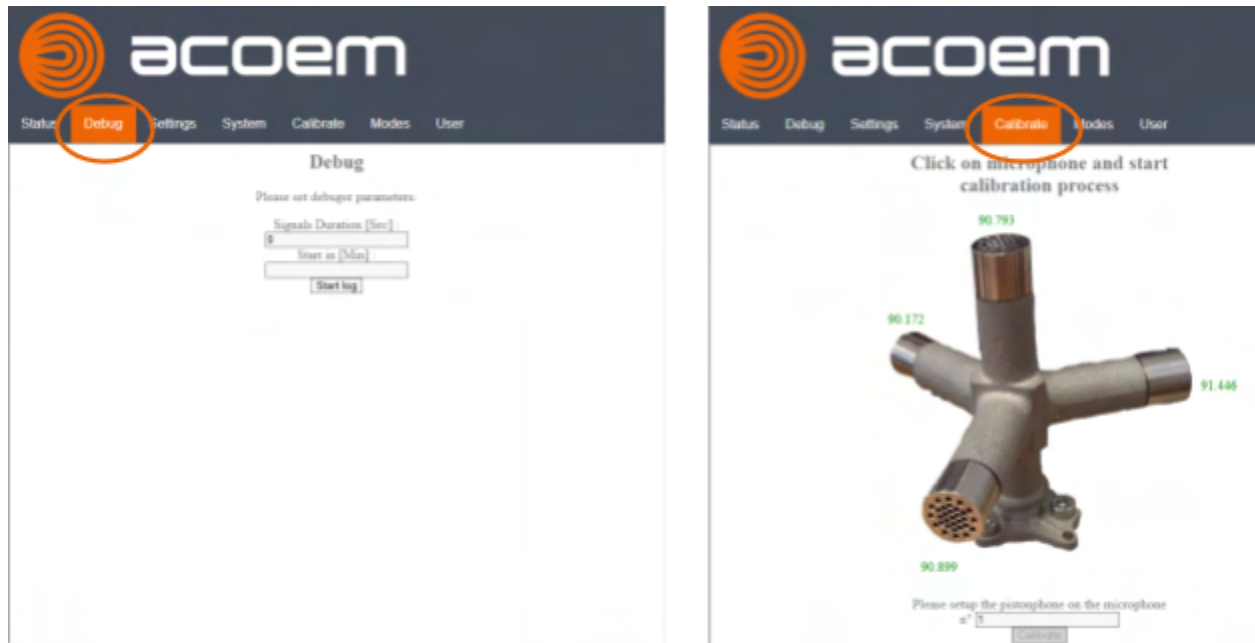


Figure 29: Factory menus

On **Debug** page it will be possible to push specific frames on the ATD server during a specific period. To be able to use this mode, the pod as to be connected to the ATD server and the **Frame record server address** setup on the **Settings** page. When the ATD-300/ATD-301 pod is on debug mode, you will find **Enable** for **Debug recording status** on the **Status** page.

The **Calibration** page is only for maintenance to calibrate the microphone after repair. The ATD-300/ATD-301 no need calibration during its lifetime.

5. POD INSTALLATION

The ATD-300/ATD301 is designed to be installed outside, at a height between 2.5m (8ft) and 10m (32ft).

The windscreen must be installed facing the ground. The ATD-300/ATD-301 is not designed to be installed in any other direction.

The central M4 screw on the upper face is for grounding purpose (ie §2.4). Never fixed the ATD-300/ATD-301 by this screw. It is not designed to support the weight of the pod, and the risk of drop is extremely high.

5.1. Installation without bracket

For short time installation, the pod can be fixed to a mast using two metallic strips.

The ATD-300/ATD301 has 2 horizontal grooves of 1mm deep and 12mm high allowing to maintain the metallic strips, and 3 vertical grooves to maintain the pod at a fixed position on the mast.

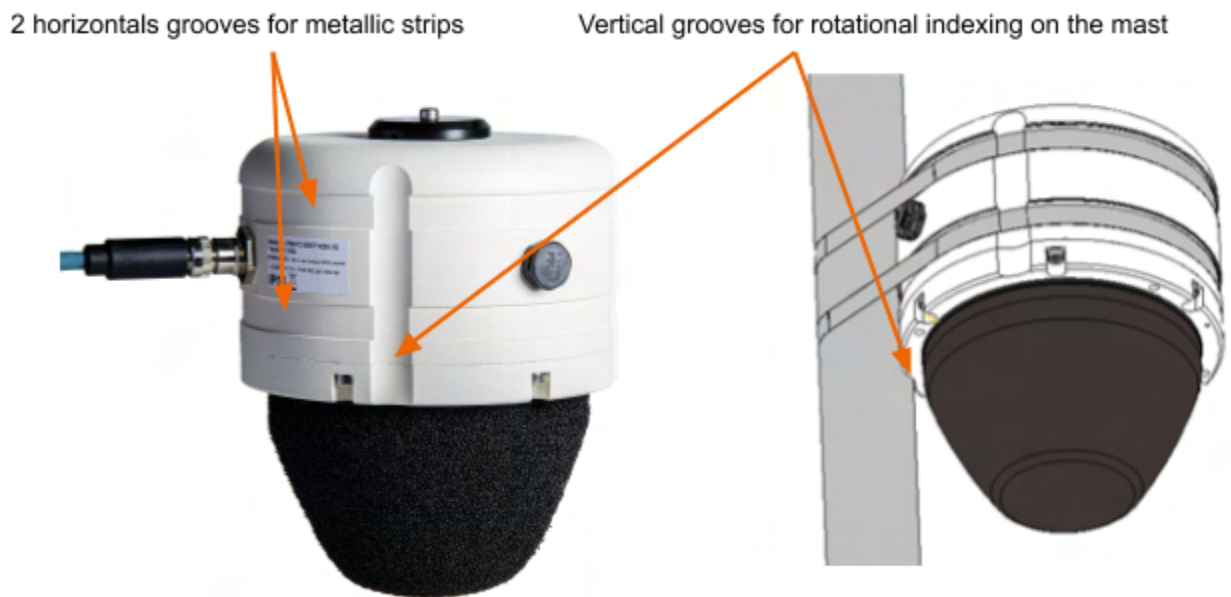


Figure 30: Installation of the ATD-300/ATD-301 on a mast

For a safe installation the requirements below must be followed:

- The mast diameter has to be greater than 35mm
- The mast has to be designed to support the weight of the pod and all the additional load entailed by the pod installation and external factor (wind, snow....)
- The metallic strip has to be selected to support the pod weight
- The metallic strip must be chosen to resist to climatic and environmental constraints
- The metal strip must be tight enough to prevent any movement
- Connect the Ethernet cable on the pod and fix the Ethernet cable on the mast to avoid any mouvement

At the end of the installation please note the angle between the North and the Microphone 1 direction (ie §4.2).

5.2. Installation with bracket

For long terme installation or for a wall installation a bracket has to be used to fix the pod. The bracket is an option and is not delivered in standard. Please contact the ACOEM sale service if you need a bracket.

5.2.1. Installation on a mast

The bracket has 4 openings of 20mm high to fix the bracket and the pod to a mast with 2 metallic strips.

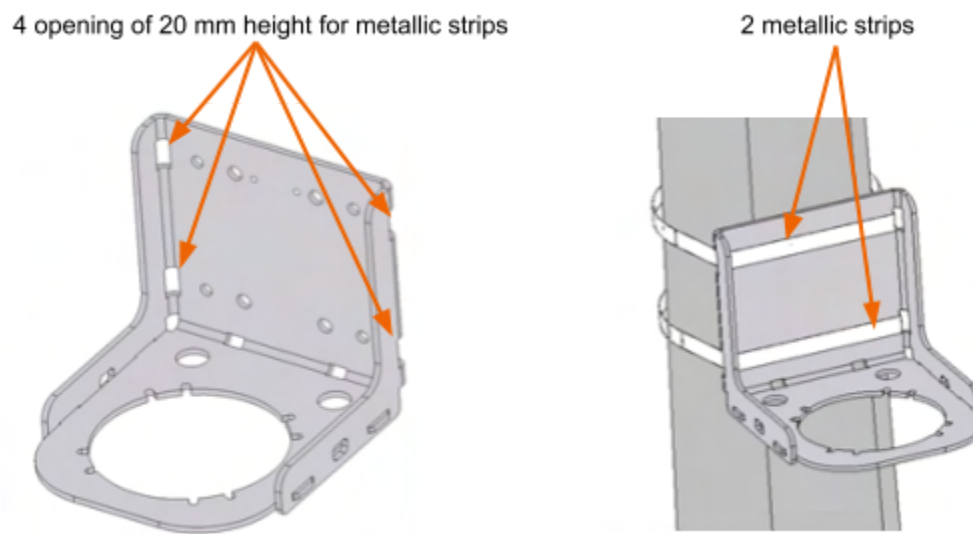


Figure 31: Installation of the ATD-300/ATD-301 braket on a mast

For a safe installation the requirements below must be followed:

- The mast has to be designed to support the weight of the pod/bracket and all the additional load entailed by the pod installation and external factor (wind, snow....)
- The metallic strip has to be selected to support the pod/bracket weight
- The metallic strip must be chosen to resist to climatic and environmental constraints
- The metal strip must be tight enough to prevent any movement
- Connect the Ethernet cable on the pod and fix the Ethernet cable on the mast to avoid any mouvement

5.2.2. Installation on a wall

The bracket has 4 holes of 8mm diameter to fix it on a wall

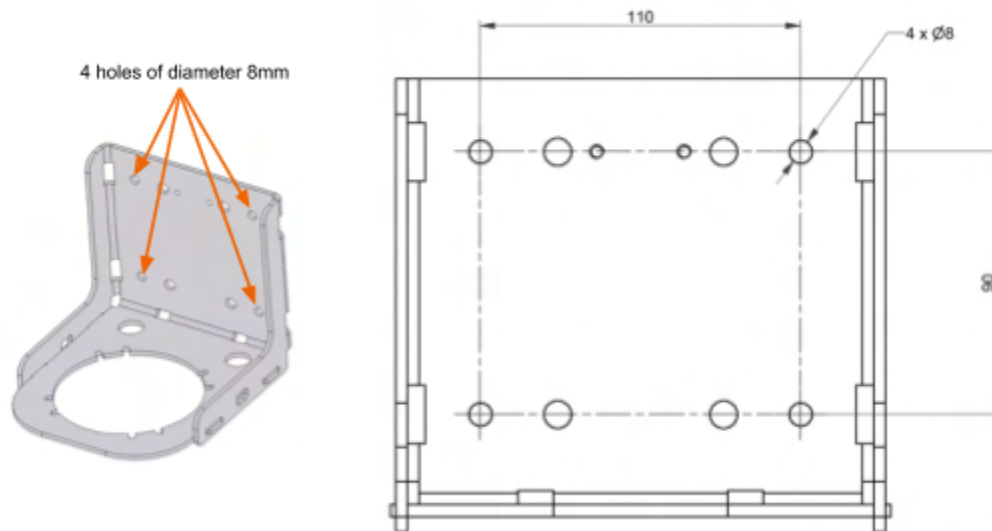


Figure 32: Holes for the wall installation

To fix the bracket on the wall use screw, steel bolt anchor or threaded rod with a diameter at least equal to 6mm and a washer with a external diameter at least equal to 14mm.

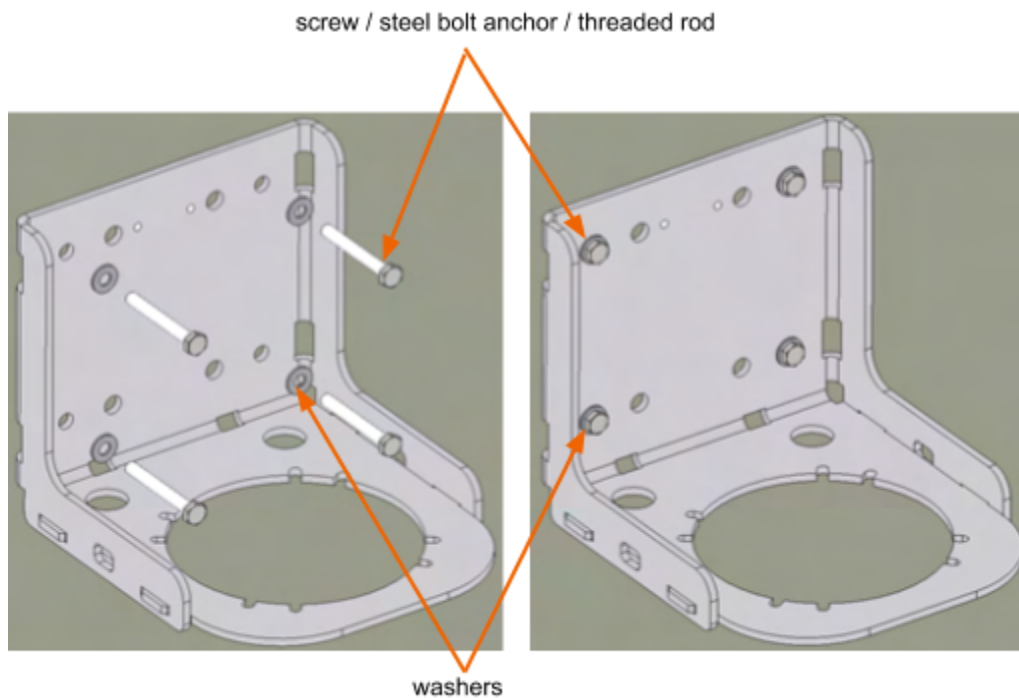


Figure 33: Typical installation on the wall

For a safe installation the requirements below must be followed:

- The wall has to be designed to support the weight of the pod/bracket and all the additional load entailed by the pod installation and external factor (wind, snow....)
- Each fixation point has to be able to support at least 25kg
- The fixation has to be adapted to the support (concrete, wood....)
- The fixation must be chosen to resist to climatic and environmental constraints
- The fixation must be tight enough to prevent any movement
- Connect the Ethernet cable on the pod and fix the Ethernet cable on the mast to avoid any movement

5.2.3. Pod installation on the bracket

The ATD-300/ATD-301 is fixed on the bracket with 4 CHC M5x16 screws. The orientation of the pod on the bracket is important. The Microphone 1 of the pod has to be normal to the wall.

Two marks are located on the pod to know the Mic 1 location:

- The pod has 3 grooves on the body parts separate by 90°. The microphone 1 is located on the missing groove
- The Mic 1 is located by a small mark on the windscreen basement

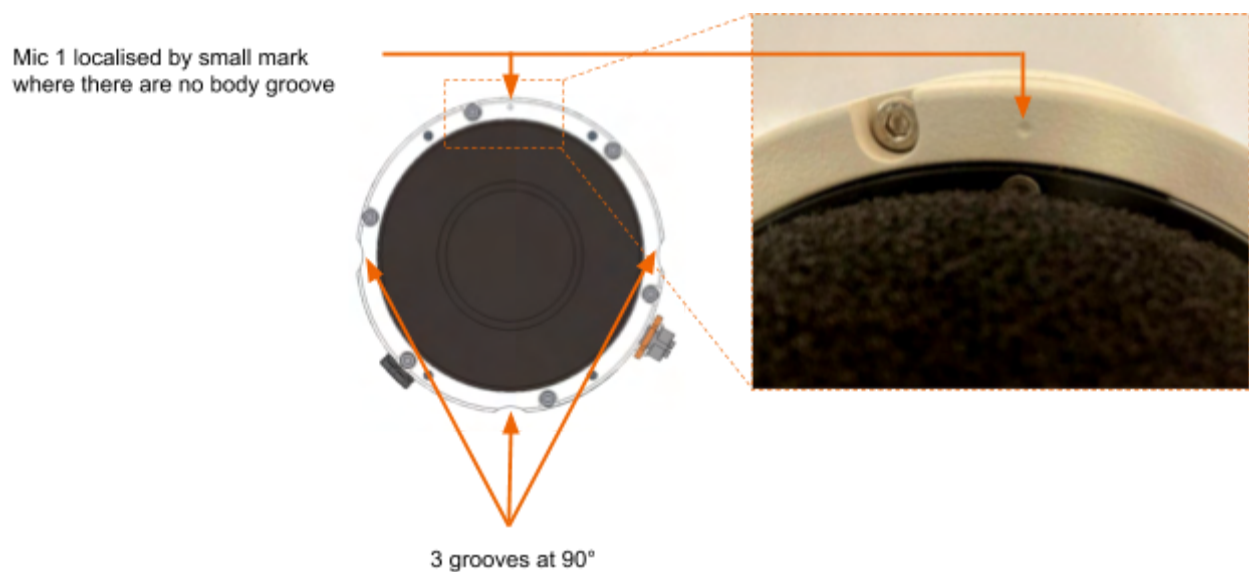


Figure 34: Mic 1 localisation on the pod (bottom view)

The pod has to be located on the bracket with the no vertical groove side at the opposite to the wall or mast.



Figure 35: Orientation of the pod on the Bracket

When the pod is oriented on the bracket, use the 4 CHC M5x16 screws and the washer to fix the pod on the bracket

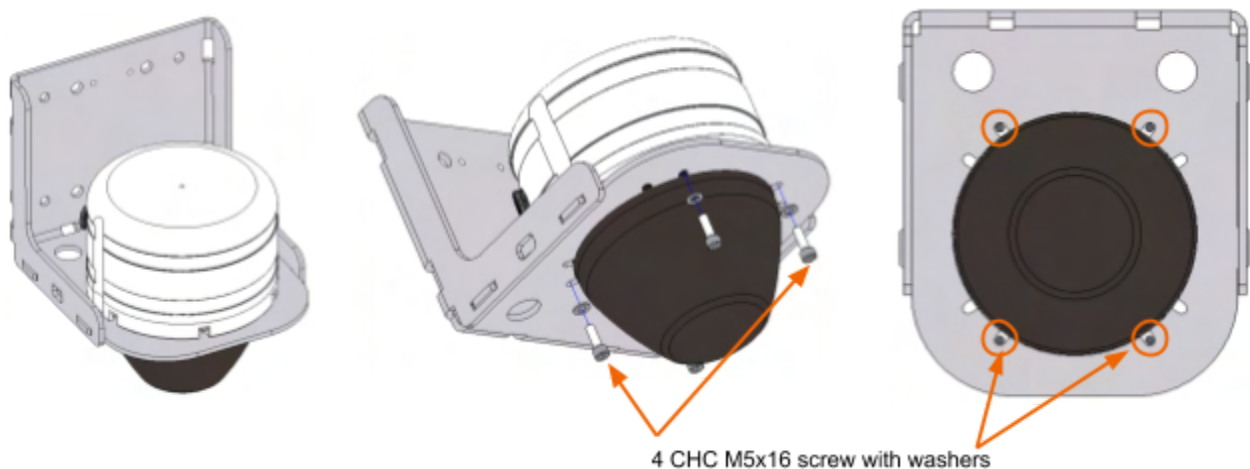


Figure 36: Fixation of the pod on the bracket

At the end of the installation please note the angle between the North and the Microphone 1 direction (ie §4.2).

6. ATD SERVER SOFTWARE INSTALLATION

6.1. Introduction

This procedure explains how to install the ATD server on an Ubuntu Linux server. To simplify the IT architecture, the ATD server software runs on the Docker solution.

The ATD server is not mandatory to have a functional system, if you don't need it you can skip this section. The main function of the ATD server are:

- Log the threat
- Log and check the state of life of each pod
- Have a map with the noise level measured by each pod in real time
- Have a map with the threat detected by each pod in real time
- Store the frame of each event for AI training

The prerequisites to run the ATD server are:

- OS:
 - Ubuntu Focal 20.04 (LTS) – 64-bit version
 - Ubuntu Bionic 18.04 (LTS) – 64-bit version
- Docker Engine with compose installed
- HDD: At least 100Go available to save the frame
- RAM: At least 4Go
- Processor: Minimum 2GHz dual core processor x86/amd64 architecture

Remark:

- This installation has to be done by qualified IT technician with Linux skill

6.2. Prerequisites Software Installation

6.2.1. Install Docker Engine

To install Docker Engine on Ubuntu server you can follow the step describe on the following web site: <https://docs.docker.com/engine/install/ubuntu/>

To summarize the following SSH commands have to be executing on a server terminal:

- **Update the apt package index and install packages to allow apt to use a repository over HTTPS:**

```

$ sudo apt-get update
$ sudo apt-get install \
    ca-certificates curl \
    gnupg lsb-release \
    software-properties-common
$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /usr/share/keyrings/docker.gpg
$ sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
$ sudo apt-get update
$ sudo apt-get install docker-ce docker-ce-cli containerd.io

```

- **Add Docker's official GPG key:**

```

$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /usr/share/keyrings/docker.gpg
$ sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"

```

- **Set up the stable repository:**

```

$ sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
$ sudo apt-get update
$ sudo apt-get install docker-ce docker-ce-cli containerd.io

```

- **Install Docker Engine:**

```

$ sudo apt-get install docker-ce docker-ce-cli containerd.io

```

You can test the installation with the following ssh command on the server:

```

$ sudo docker run hello-world

```


7. DATA SHEET

Threat detected

Gunshot
Firecracker
Sniper

Evolutive

New threat available by upgrade

Gunshot detection

Distance 150m direct view

Firecracker detection

Distance 50m direct view

Identification of threat

Embedded
Acoustic method based on IA

Localisation

Embedded
Azimuth and Elevation of the threat
computed with one sensor for
Gunshot and Firecracker

Microphones

4 electret microphones
Dynamic range: 50-150 dB
1 single range

Noise measurement

Real time Leq measurement (logging
period 1s)

Communication

On Private CCTV IP network

State of health message

Communication status
CPU temperature
CPU usage
Disk usage
FW installed

Ethernet connection

Connector M12 coding-X
Speed: 1 Gbits/s
DHCP mode or fixed IP

Time synchronisation

NTP protocol

Power Supply

PoE : 80.2.3af/802.3at
Power consumption: 6W typical

Operating temperature:

-20°C to +45°C

Humidity

90% HR (non-condensing at 40°C)

Environmental protection

Design for outdoor use
IP54

Casing

Aluminium

Microphone protection

Foam windshield

Dimension

Diameter: 138mm
Height: 165mm
Weight:
1.2kg without bracket
1.8kg with bracket

Mounting

On mast with bracket and metallic strip
On wall with bracket
Microphone oriented to the ground
Fixation height: between 2.5m and 10m

Training mode

Audio recording on production server
No continuous recording
Max 1.5s sample on event
No storage on device

Alarm to VMS

Http message send by pod to the VMS
Specific API could be developed on the
production server

PTZ camera movement

Direct control of the camera by the pod
with ONVIF protocol (need absolute
move ONVIF camera with Profile S)