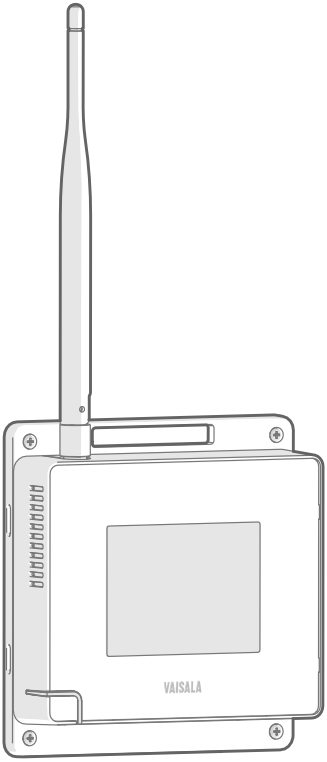
M211860EN-J

User Guide

Vaisala VaiNet Wireless Access Point

AP10



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1. About this document

1.1 Version information

This document provides instructions for installing, using, and maintaining Vaisala VaiNet Wireless Access Point AP10.

Table 1 Document versions (English)

Document code	Date	Description
M211860EN-J	October 2023	Updated for AP10 firmware version 5.0.0 with VaiNet segments feature and support for Transport Layer Security (TLS) protocol version 1.3. Updated sections: • Overview of the web interface (page 31) • Setting up AP10 (page 21) • AP10 installation location and range (page 20) • Problem situations (page 45) • AP10 technical specification (page 50) Added sections: • VaiNet segments explained (page 16) • Copying settings between access points (page 43) If any AP10 access points with firmware version 5.0.0 or higher are used on a site, all AP10 access points on that site must be updated to at least firmware 5.0.0. This is due to a change in the timing offsets of VaiNet radio communication.
M211860EN-H	March 2023	Added model AP10C. Updated sections: • Related manuals (page 8) • Overview of AP10 Access Point (page 10) • Updating AP10 firmware (page 41) • AP10 technical specification (page 50) Added sections: • AP10 models and radio compatibility (page 10)
M211860EN-G	October 2021	Added model AP10T. Updated section AP10 technical specification (page 50).

1.2 Related manuals

Table 2 Related manuals

Document code	Name
M211821EN	Vaisala AP10 VaiNet Wireless Access Point Quick Guide
M211822EN	Vaisala RFL100 VaiNet Wireless Data Logger Quick Guide
M211861EN	Vaisala RFL100 VaiNet Wireless Data Logger User Guide
M212315EN	Vaisala viewLinc Enterprise Server 5.1 User Guide

1.3 Documentation conventions

WARNING! Warning alerts you to a serious hazard. If you do not read and follow instructions carefully at this point, there is a risk of injury or even death.

CAUTION! Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

Highlights important information on using the product.

Gives information for using the product more efficiently.

Lists tools needed to perform the task.

Indicates that you need to take some notes during the task.

1.4 Trademarks

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Chrome™ is a trademark of Google Inc.

Edge® is a trademark of Microsoft Corporation in the United States and other countries.

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2. Product overview

2.1 Overview of AP10 Access Point

Vaisala VaiNet Access Point AP10 is a wireless access point that collects data from VaiNet wireless data loggers and transfers it to the viewLinc Enterprise Server using a wired Ethernet connection. AP10 implements Vaisala's proprietary VaiNet protocol. It can connect up to 32 RFL100 Data Loggers to the Vaisala viewLinc Monitoring System.

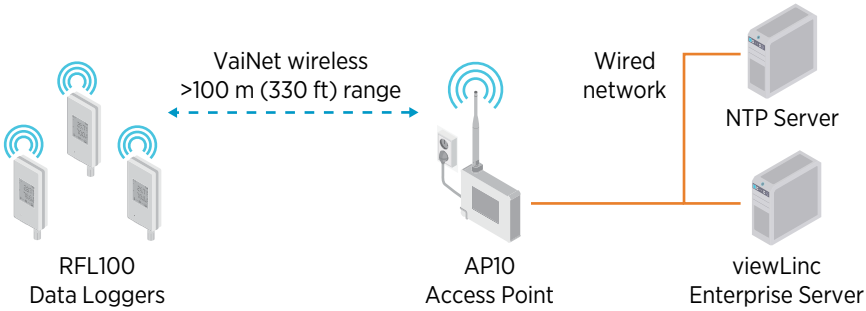


Figure 1 AP10 in the viewLinc Monitoring System

AP10 can be powered from the Ethernet connector using Power over Ethernet (PoE) or from the power supply connector using the included AC/DC adapter. If both power sources are connected, the AC/DC adapter is utilized to power the device.

AP10 has 2 user interfaces:

- Touch interface on the front panel. Use this interface to set up the device during installation and to locally check the connection status.
- Web interface via the Ethernet connection. This interface provides advanced configuration features and can be accessed remotely.

More information

- Overview of touchscreen interface (page 27)
- Overview of the web interface (page 31)
- AP10 technical specification (page 50)

2.2 AP10 models and radio compatibility

There are several models of the AP10 access point. The models differ from each other by the implementation of the wireless connection and its operating frequency band. Only use a model that is approved for use in your country. You can verify the model and operating frequency of the AP10 from its type label.

The AP10 can only connect an RFL100 data logger if its wireless model is compatible. For example, the AP10E model that operates on the 868 MHz frequency band will only connect 868 MHz models of the RFL100 data logger.

Most of the models have identical appearance and dimensions, but the AP10C model uses a different antenna than the others.

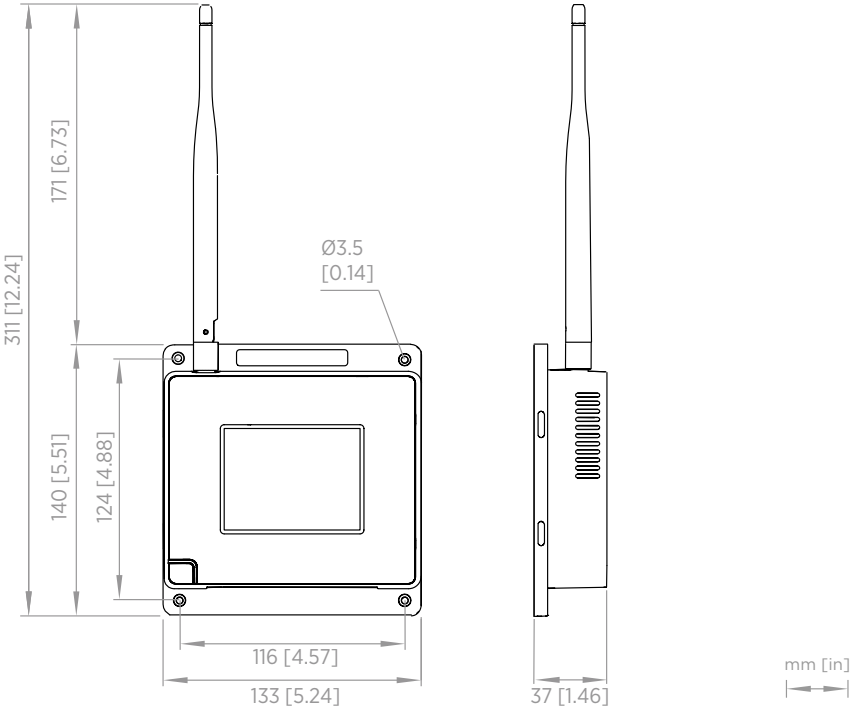


Figure 2 AP10 access point dimensions

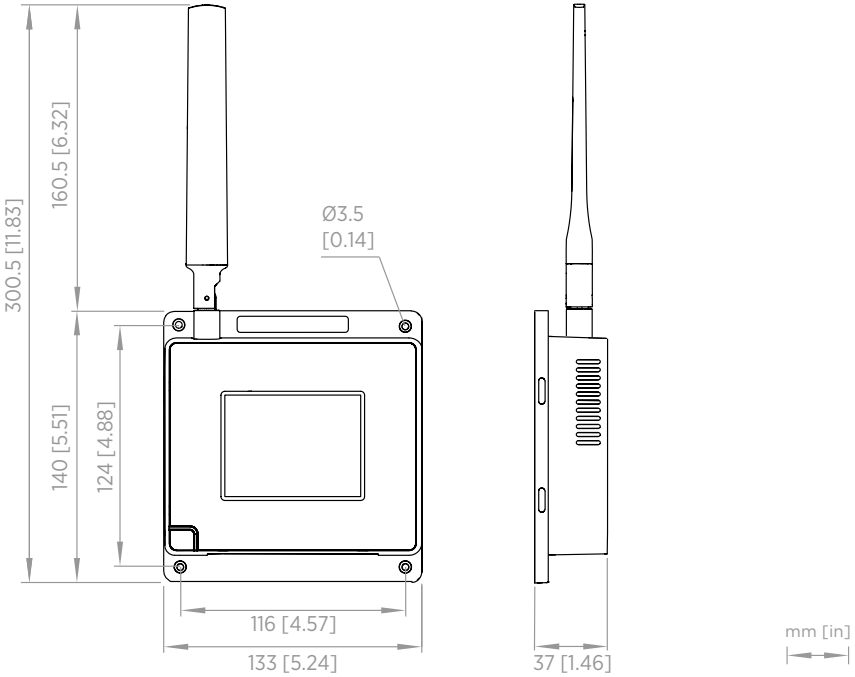


Figure 3 AP10C model dimensions

2.3 AP10 parts

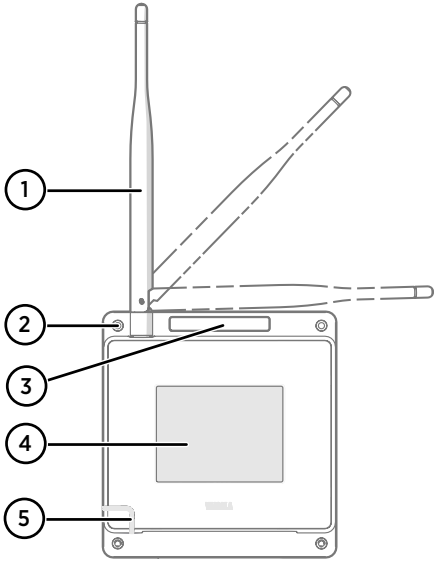


Figure 4 Front

1 Antenna. Can be rotated and tilted. Appearance may vary between models.
2 Screw holes for mounting (4 pcs), Ø 3.2 mm
3 Ventilation hole (do not cover)
4 Touchscreen
5 Status LED:

Green	Normal operation
Blue	Installation mode active
Red	Error - check status

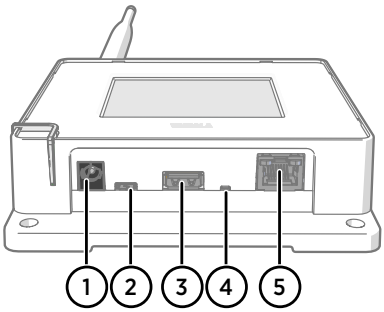


Figure 5 Connector panel

1 Power supply connector (10 ... 30 V DC)
2 Service port (micro-USB)
3 USB port for hardware expansion (USB type A)
4 Reset button. Push to restart, push and hold to revert AP10 to factory settings.
5 RJ-45 Ethernet port. Can be powered by Power over Ethernet (PoE).

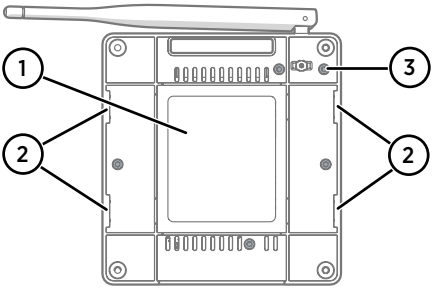


Figure 6 Rear

1 Type label
2 Holes for mounting with tie wraps
3 Housing screws (do not remove)

2.4 VaiNet devices in viewLinc Monitoring System

VaiNet access points create links between Ethernet and Vaisala devices using the VaiNet protocol. Wireless device registration is handled by viewLinc Enterprise Server. Whenever a new data logger is added to the system, it is automatically identified by an access point, which forwards the data logger's information to the server. Once accepted in the system, data loggers will stay synchronized, even in situations where other nearby VaiNet networks overlap. Redundancy is achieved by allowing load distribution between VaiNet access points which share multiple data loggers in range.

VaiNet access points transfer measurement data from the data loggers to viewLinc Enterprise Server. Both access point and viewLinc Enterprise Server verify that the data has been received correctly. Once the data has been verified, it is stored to the secure database where it is protected from tampering and loss.

If data flow is interrupted by a network outage, the data transfer will resume when the outage is resolved. Local memory of the data logger is used to store the data while waiting for a connection to viewLinc Enterprise Server. RFL100 Data Logger has enough local memory for 30 days of measurement.

2.4.1 VaiNet protocol

Vaisala's VaiNet wireless protocol produces a robust and reliable wireless signal for environmental monitoring. The protocol is proprietary, and cannot be used with 802.11 Wi-Fi devices. VaiNet wireless devices always require a VaiNet wireless access point.

VaiNet radio communication uses a modulated, low-power signal at sub-GHz frequencies to provide better signal propagation in environmental monitoring applications. VaiNet provides all the benefits of spread spectrum wireless technology including resistance to interference, interception and multipath fading (reflections). Using the chirp signal to spread the RF energy over a wider band allows for reliable communications even when signal levels are below the background noise floor. It also reduces disruptions from overlapping signals on same frequencies.

VaiNet wireless devices are not limited to using a single access point. If multiple access points are available, VaiNet devices can switch access points to maintain their connection to the viewLinc Monitoring System. The strength of the wireless signal is used to determine the optimum network data path.

Wireless transmissions between VaiNet devices are encrypted to protect against eavesdropping, data tampering, and transfer errors.

2.4.2 Data transfer in a VaiNet network

VaiNet protocol and VaiNet devices are designed for power-efficient operation. To save energy and reduce signal overlap, VaiNet network transfers data at set intervals. This may be apparent to the user as longer data transfer times before the data is available in the viewLinc Enterprise Server.

Intermittent radio connections

Access points take turns communicating in a 2-minute cycle, and connected data loggers send their measurement data to their connected access point every 4 minutes. This introduces the following scenarios:

- Data loggers that are not currently connected (new devices, or devices that have fallen out of radio contact) scan for available access points for a complete cycle before they can decide what is the optimal access point for them. Connection attempts typically take at least a couple of minutes. Additionally, some joining scenarios may take multiple attempts. For example, when filling a single access point up to its full capacity of 32 data loggers, it may take an hour for the last data logger to successfully connect to the access point.
- Access points request missing data and issue management commands to data loggers within their communication window. Transferring a full month's worth of measurement data from 32 data loggers using 1 access point takes several hours.

Data logger scanning interval

Scanning for available access points consumes power. To prevent repeated scanning from draining their batteries, RFL100 data loggers that are not connected to an external power supply shut down their radio temporarily if they cannot connect to an access point. They will resume scanning after a waiting interval that gets progressively longer if they keep failing to find an access point. The maximum interval is 8 hours and 30 minutes.

This means that when access points become available after an outage, it may take several hours for data loggers to discover them. This is why you should always keep your access points powered up, and why you should start your network installation by installing the viewLinc Enterprise Server and access points first.

You can manually wake up the radio of an RFL100 data logger by pressing its **Info** button. The button is located next to the service port under the silicone plug.

2.4.3 VaiNet segments explained

The VaiNet segmentation feature splits the local VaiNet radio network into segments. Each segment can have up to 8 access points, 1 for each VaiNet channel. Up to 4 segments can be created, identified using letters A–D.

Segmentation provides significant benefits for the building of larger VaiNet networks:

- Overlapping radio transmissions have been significantly reduced as each segment has a different timing offset for its VaiNet radio communication.
- The access point switching behavior of data loggers is more controlled. Data loggers only connect to access points of their home segment, and ignore the other segments.

Segment configuration is done on the access point using the web interface or the local touch interface. Starting with AP10 access point firmware version 5.0.0, there is a new **VaiNet segment** configuration parameter. This new setting is part of the VaiNet radio settings. The setting is mandatory, so every VaiNet network has at least one segment. The segment and channel combination of each access point must be unique on the site.

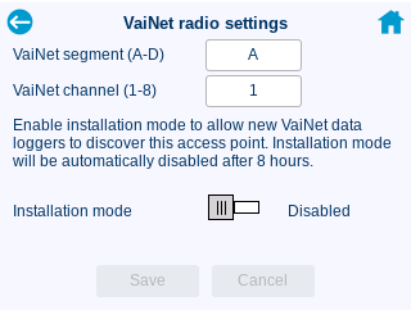


Figure 7 VaiNet segment setting in the AP10 touch interface

Data loggers do not have a configurable segment setting, as their segment is automatically determined by the access point they use to join the system. When a data logger connects to an access point that is in installation mode, the segment of its connecting access point becomes its **home segment**. A data logger will not leave its home segment unless it is remotely released from the network or its physical **Release** button is pressed. For example, if a data logger is connected to access point B1 (VaiNet segment B, channel 1), it will only connect to other access points in the B segment if it loses its current access point connection.

If the segment setting of an access point is changed, all data loggers that are currently connected to it will lose their connection. They will automatically attempt to reconnect to any remaining access point in their home segment. They will not be transferred to the new segment of the access point.

To make sure all data loggers are assigned to the planned segment, the installation of data loggers in a large system should proceed one segment at a time.

For guidance in designing and installing a large system, see Guidelines for Large VaiNet Systems (M212596EN).

2.5 Time synchronization

AP10 requires accurate time to operate its VaiNet wireless connection, and to maintain correct time on the connected data loggers. To achieve the accurate time, AP10 synchronizes with Network Time Protocol (NTP) servers. The hostnames of the default NTP servers are:

`0.pool.ntp.org`

`1.pool.ntp.org`

`2.pool.ntp.org`

`3.pool.ntp.org`

Reaching the default NTP servers requires an internet connection. To allow the AP10 to operate without an internet connection, replace one of the default NTP server addresses with the address of your local NTP server.

AP10 has a supercapacitor as a backup power source for its realtime clock. If AP10 is left without power for more than a day, the realtime clock will lose its time. If this happens AP10 will have to synchronize its clock with the NTP servers before it can operate its radio. This is typically the case when an AP10 is installed - it needs to synchronize its clock before it can start to connect VaiNet data loggers. Synchronization is also needed due to clock drift if the NTP servers cannot be reached for more than three weeks.

With access points that have software version 4.0.0 or higher, the synchronization typically takes a minute or two. It is normal for access points with earlier software versions to synchronize for up to 15 minutes.

2.6 Network security

AP10 Access Point is intended to be connected to a secure internal network, not directly to the internet.

Starting from firmware version 2.0.0, AP10 has a feature that can allow Vaisala to connect remotely to the access point using a secure SSH connection on TCP port 22. This remote connection capability is disabled by default. If needed for installation or support, you can configure the AP10 to allow remote connections using the web interface.

2.7 Power supply

A DC power supply is included with every AP10 Access Point. If a different DC power supply is used, it must fulfill the specifications listed in Table 3 (page 17).

Table 3 AP10 power supply specifications

Property	Specification
Operating voltage	10 ... 30 V DC

Property	Specification
Output power	min. 13 W
Output current	min. 0.8 A
Output connector	Locking type female coaxial connector with positive 2.0 mm center pin
Operating temperature range	-20 ... +60 °C (-4 ... +140 °F)
Operating humidity range	0 ... 95 %RH, non-condensing
Certifications and approvals	• Certified to IEC 60950-1 or IEC 62368-1 • Approved for use in your country

2.8 Remote management

AP10 has a web interface for remote management. Additionally, some settings can be remotely managed using viewLinc Enterprise Server software. Remote management operations can be performed directly from the **Sites Manager > Hosts and Devices** tree.

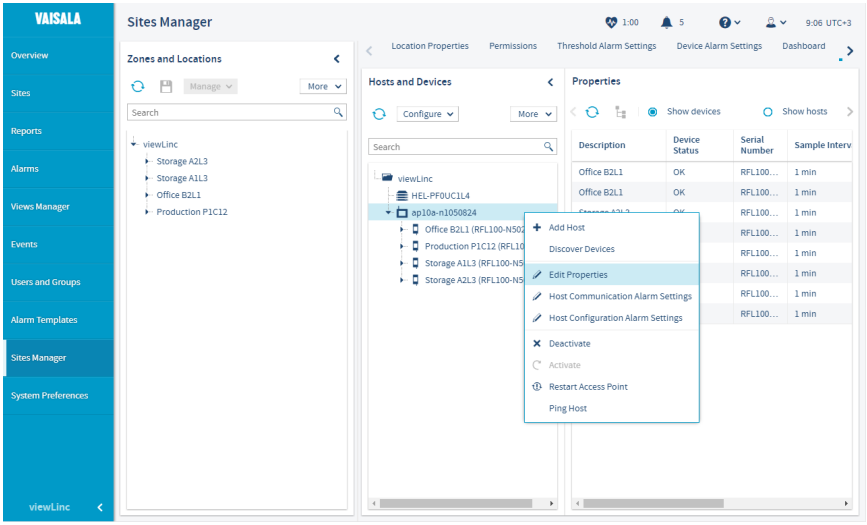


Figure 8 AP10 remote management using viewLinc Enterprise Server

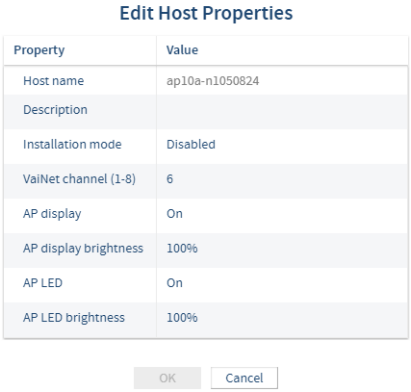


Figure 9 AP10 properties in viewLinc

Select **Sites Manager > Show hosts** to see the IP addresses of all connected hosts. Select the IP address of any AP10 to open its web interface in your browser.

2.9 ESD protection

Electrostatic discharge (ESD) can cause immediate or latent damage to electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering an electrostatic discharge when touching, removing or inserting any objects inside the equipment housing.

Avoid touching component contacts or connectors when working with the device.

3. Installation

3.1 AP10 installation location and range

In a typical indoor space, the wireless range of AP10 is at least 100 m (approx. 330 ft). In an open space with line-of-sight and no interfering structures, the range can be over 500 m (approx. 1600 ft). Placing the AP10 near large metal surfaces and heavy concrete structures will reduce the range of the radio signal.

Walls and ceilings are good locations for AP10. Line of sight is not required. If possible, place AP10 in the same floor as the data loggers. Point the antenna up or down for best wireless performance.

Up to 8 access points can be placed within range of each other, even side-by-side, as long as they each have their own VaiNet channel. For guidance in designing and installing a large system that includes more than 8 access points on a site, see Guidelines for Large VaiNet Systems (M212596EN).

3.1.1 Mounting in plenum space

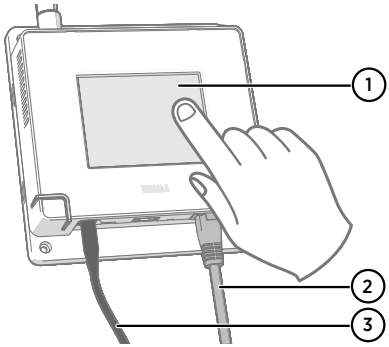
Plenum space is a separate air circulation space that is used by the building's heating and air conditioning systems. For example, the space between the structural floor and the dropped ceiling is typically used as an air-handling space. Due to fire safety considerations, the materials placed in plenum space may be restricted by local legislation.

If you need to mount the access point in a plenum space but its materials do not meet your local requirements, you can mount the access point inside a commercially available enclosure that is meant for this purpose. For example, model 1075CP ceiling enclosure from Oberon Wireless is suitable.

When selecting a plenum mounting enclosure, note the following requirements:

- The inside dimensions of the enclosure must be large enough for the access point. There should be enough space to rotate the antenna if desired, and to easily connect the cabling.
- The enclosure must not completely block the radio transmissions of the access point.

3.2 Setting up AP10

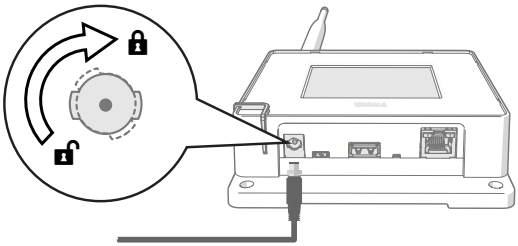


1 Touchscreen.
2 Ethernet cable. Use a shielded cable to meet the rated EMC performance of the device.
3 Cable from DC power supply.

- AP10 requires a **network connection** to your viewLinc Enterprise Server and a Network Time Protocol (NTP) server. AP10 can also use its default NTP servers if **Internet** is accessible from the network.
- It is usually easiest to configure the access point before mounting it.

1. Connect the Ethernet cable to Ethernet port of AP10. If possible, connect to the same network where the viewLinc Enterprise Server is, so that you can verify the connection when doing the setup.
2. If AP10 starts up at this point, the Ethernet cable provides power using Power over Ethernet (PoE) and the separate DC power supply is not needed. If the DC power supply is needed, connect it as follows:

   a. Connect the plug to the power supply connector of AP10. Make sure the plug is oriented correctly and goes in all the way. Rotate the plug to lock it in, otherwise it will not stay reliably connected.



   b. The power supply comes with multiple adapters for wall sockets. Connect the adapter you need, and plug in the power supply to a wall socket.

3. A setup wizard starts when AP10 is first powered up. Use the touch interface to complete the wizard.

   If the setup wizard has been previously completed, the access point will start up to the home screen. Press the symbol to access the **Settings** screen and check the settings using the menu.

4. Select a language for the touchscreen display. The selected language will be used after the setup wizard has been completed.
5. Configure the network settings so that AP10 can join the network:
   - Select **DHCP** if you are connecting the access point to a network that assigns network configuration settings automatically.
   - Select **Static** to configure network settings manually. Using the information supplied by your IT administrator, enter the **AP10 IP address**, **Subnet mask**, and **Default gateway**.

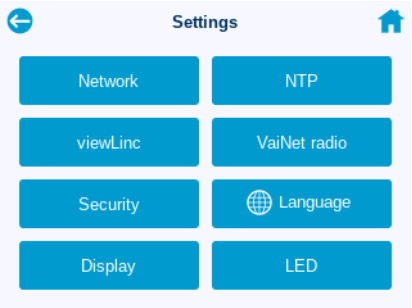
   DHCP is the most common way to assign network settings. Do not use a static address unless your IT administrator has instructed you to do so. Note that many corporate networks require devices to be registered before they can connect. If this is the case with your network, you must provide the MAC address of the access point to your IT administrator. The MAC address is marked on the front of the access point (near the Ethernet connector) and on its type label in the back.

6. Configure the Network Time Protocol (NTP) servers that the access point will use. If you have a local NTP server in the network, replace one of the default servers with its IP address or hostname.
7. Select the **VaiNet segment (A–D)** and **VaiNet channel (1–8)** according to your device installation plan.

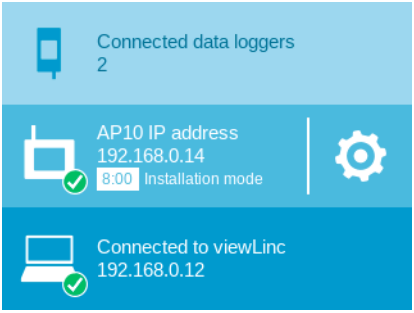
   The VaiNet segmentation feature is used to split the local VaiNet radio network into segments. Data loggers can only switch between access points in the network segment that they have originally joined.
   - In standard installations that have 1–8 access points, it is not necessary to split the network into segments. Keep all access points in the default segment (A) and assign a unique VaiNet channel for each one. This maximizes available access point capacity and communication performance.
   - In large installations of more than 8 access points, assign a unique segment ID and channel ID combination for each access point. For guidance in designing and installing a large system, see Guidelines for Large VaiNet Systems (M212596EN).
8. Enter the IP address or hostname of the viewLinc Enterprise Server. Leave the **TCP port** at default 12600 unless you know it has been changed.
9. Enable **Installation mode** to start connecting new data loggers to your system.

10. Wait for the display to change to the home screen.

    There are some optional settings that are not included in the setup wizard. For example, you can change the brightness of the display and the LED, and prevent the changing of settings if the user does not know the password. The default password is **ap123456**.



11. After configuring all of the settings, verify the status of the access point from the home screen. The access point should be connected to the network and the viewLinc Enterprise Server. **Installation mode** should be enabled if you want to connect new data loggers to your system.



CAUTION! The access point will not turn on its radio if it does not have accurate time. This means that data loggers cannot connect to the access point until it has synchronized its time with a Network Time Protocol (NTP) server. To accomplish this, the access point must have a network connection to one of the configured NTP servers. Connecting to the default NTP servers requires Internet access, and network firewall must allow the access point to connect to UDP port 123.
An NTP connection error continues to be shown while AP10 is synchronizing time with the listed NTP servers. With access points that have software version 4.0.0 or higher, the synchronization typically takes a minute or two.

3.3 Mounting AP10

- AP10 Access Point, set up and configured
- Content of AP10 delivery package
- Crosshead screwdriver (if screw mounting is used)

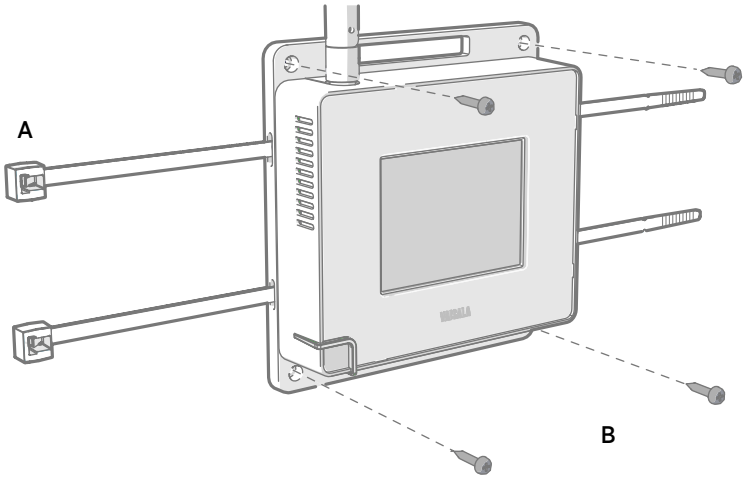


Figure 10 AP10 mounting methods

A Mounting with cable ties (2 pcs)
B Mounting with screws (4 pcs)

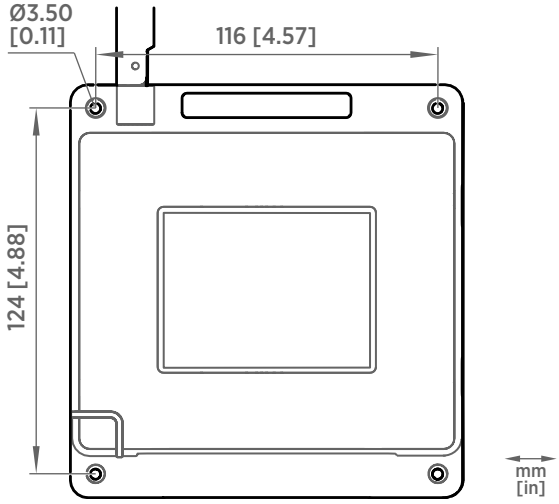


Figure 11 AP10 screw mounting dimensions

1. Attach AP10 to its mounting location using the most suitable mounting option. Ensure the unit is securely fixed if you are mounting it higher than 2 m (approx. 6 ft) or in a location where it would pose a hazard if dropped.
2. Point the antenna up or down for best wireless performance.
3. Peel off the protective film from the display.
4. Connect the Ethernet cable.
5. If the Ethernet cable does not provide power, connect the DC power supply:
   a. Connect the plug to the power supply connector of AP10. Make sure the plug is oriented correctly and goes in all the way.
   b. Rotate the power plug slightly to lock it to the connector.
   c. Connect the power supply to the wall socket.
6. Secure the power supply so it does not fall or hang on its cable.
7. Wait for the access point to start up. Verify from the touchscreen that the access point is fully connected and no errors are shown. Make sure installation mode is still enabled if you want to connect new data loggers.

If the message **Not connected to NTP** is shown on the display, see Troubleshooting NTP connections (page 47) for instructions on how to resolve time server connection problems.

4. Touchscreen interface

4.1 Accessing the touchscreen interface

The display on AP10 is a capacitive touchscreen. The touchscreen interface may be locked by a password.

1. Touch the screen to start using the interface. Do not wear gloves when using the touchscreen.
2. If the password query has been enabled, you will be prompted to enter the password using the on-screen keypad. The default password is **ap123456**.

4.2 Overview of touchscreen interface

Touchscreen interface is the most convenient way to set up the access point, and available for use whenever physical access is available. For remote management, use the web interface or viewLinc Enterprise Server.

Touchscreen interface does not provide measurement results or graphs, and it does not communicate any threshold alarms.

Home screen

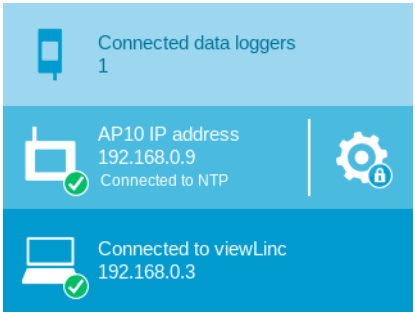


Figure 12 Touch interface home screen

Home screen provides an overview of the connection status of the access point. The screen is split into three parts:

- Top: number of currently connected data loggers. Touch to browse through their information.

- Middle: access point IP address and status. Touch the symbol to open the **Settings** screen. If the symbol is marked with a lock, you must enter the password before you can view and change the settings.
- Bottom: status of viewLinc Enterprise Server connection.

Connected data loggers

Figure 13 Touch interface data logger information screen

Data logger information screen shows connection and battery level status of each data logger that is connected to this access point. **Last connection** is the amount of time since last successful contact with the data logger.

After a data logger has been out of contact for more than 32 minutes, it will be removed from the list of connected data loggers. Since the access point only removes one data logger from the list during one scan cycle, data loggers that are out of contact may remain on the list even longer. It is possible for data loggers to be listed on more than one access point simultaneously when they are changing access points.

Settings

Settings screen provides local access to most of the access point's settings. Some advanced functions, such as firmware update, are only available using the web interface.

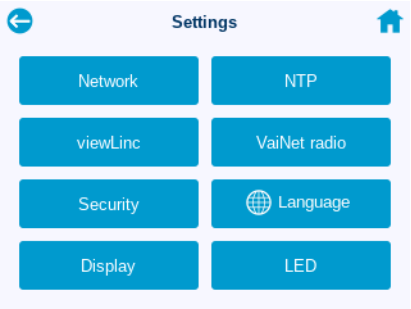


Figure 14 Touch interface settings menu

5. Web interface

5.1 Accessing the web interface

- Computer with a modern web browser (for example, Google Chrome™ or Microsoft Edge®)

Touchscreen interface may be difficult to access after AP10 has been installed. AP10 also has a web interface that you can use to remotely view access point status and configure its settings.

1. Verify the IP address of the access point from the touchscreen interface.
2. Open a web browser.
3. In the address field of the web browser, enter **`https://`** and the IP address of AP10. For example: **`https://192.168.10.47`**
4. The default user interface language is English. If you want to use another language for this session, select it from the drop-down menu.
5. Enter the login information:
   - **Username**: **`apadmin`**
   - **Password**: **`ap123456`** (default)
6. Select **Log in** to access the interface.

5.2 Overview of the web interface

System summary

System summary page lists the identifying information and current operating settings of the access point. Some information, such as the hardware ID of the device, is only available on this page.

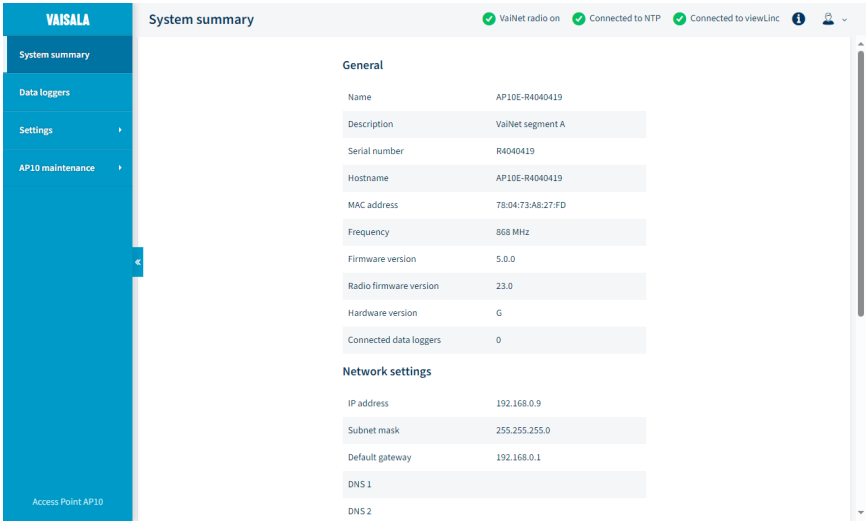


Figure 15 Web interface system summary page

Data loggers

Data loggers page lists each data logger that is connected to this access point. You can see the latest measurement values, battery level, and the signal quality of the VaiNet connection to the data logger. **Last connection** is the amount of time since last successful contact with the data logger.

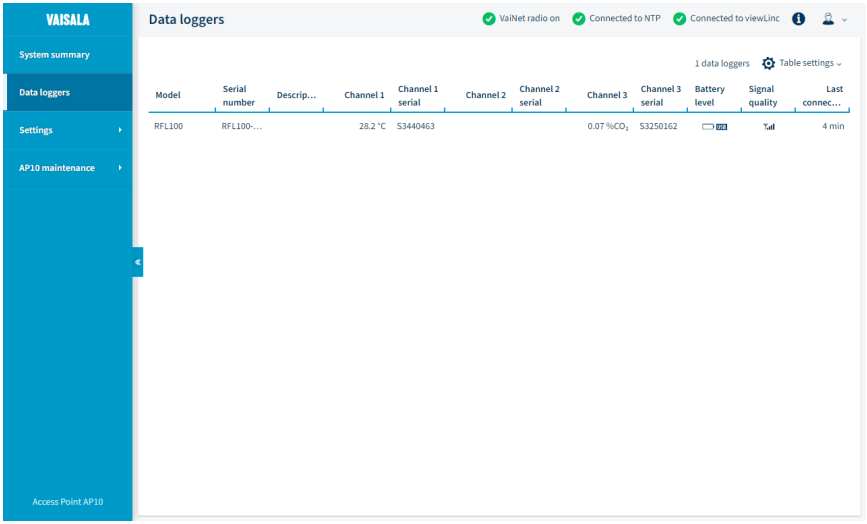


Figure 16 Web interface data loggers page

After a data logger has been out of contact for more than 32 minutes, it will be removed from the list of connected data loggers. Since the access point only removes one data logger from the list during one scan cycle, data loggers that are out of contact may remain on the list even longer. It is possible for data loggers to be listed on more than one access point simultaneously when they are changing access points.

Settings

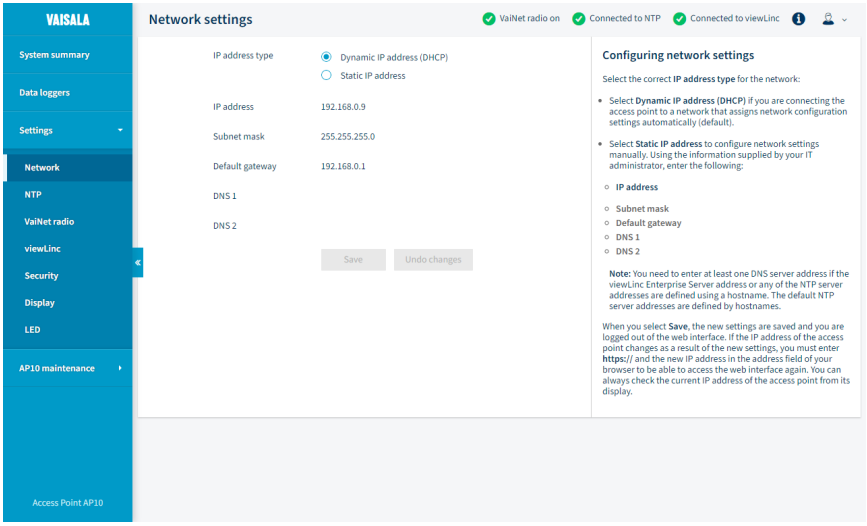


Figure 17 Web interface network settings

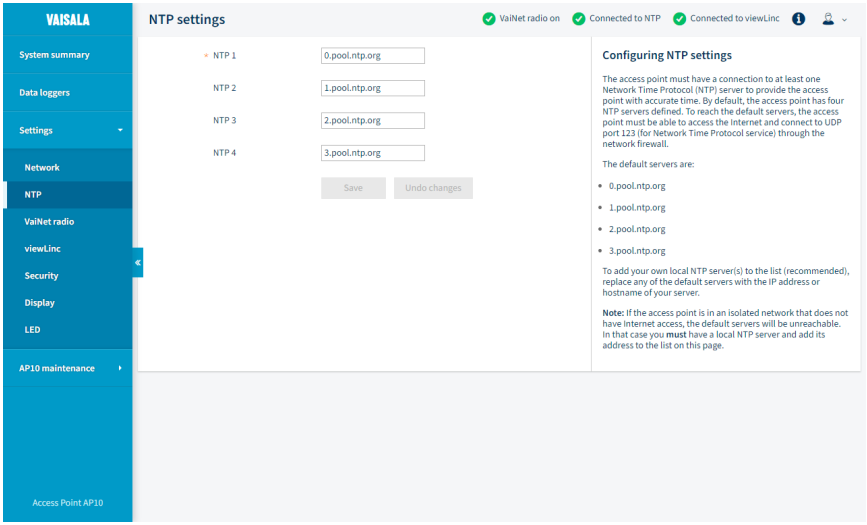


Figure 18 Web interface NTP settings page

VaiNet radio page contains the settings for VaiNet segment and channel, as well as the switch for enabling the installation mode.

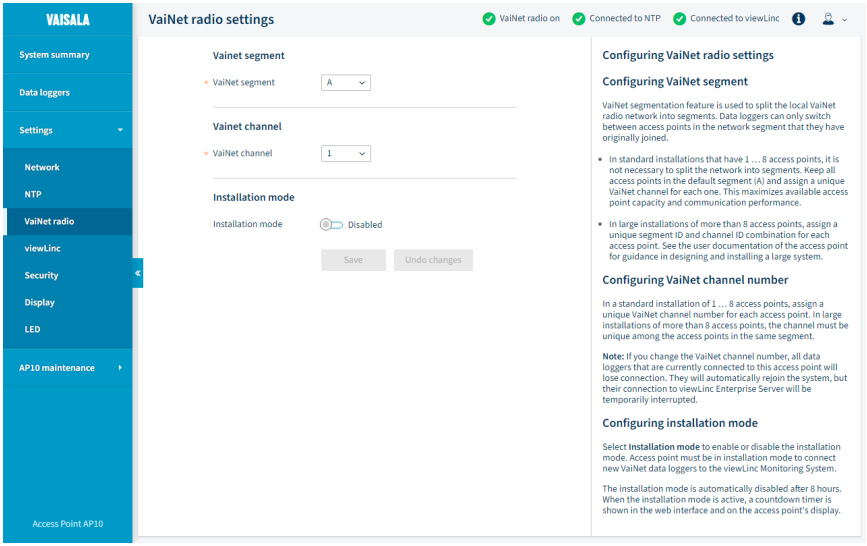


Figure 19 Web interface VaiNet radio settings page

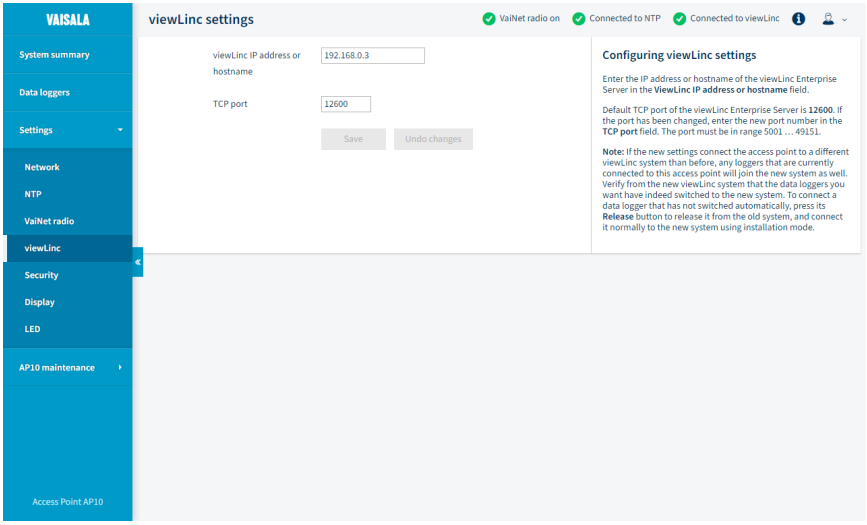


Figure 20 Web interface viewLinc settings page

Vaisala recommends changing the default password. Minimum password length is 8 characters. Allowed characters are **0–9** and **a–z**.

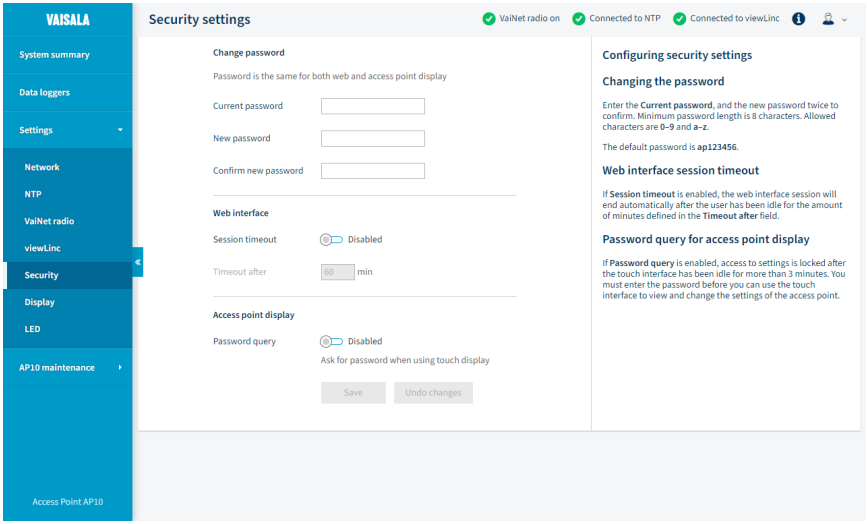


Figure 21 Web interface security settings page

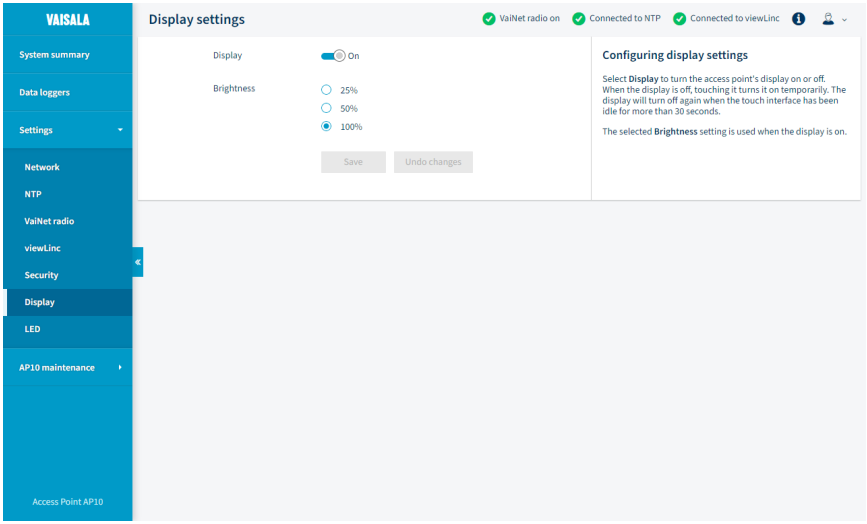


Figure 22 Web interface display settings page

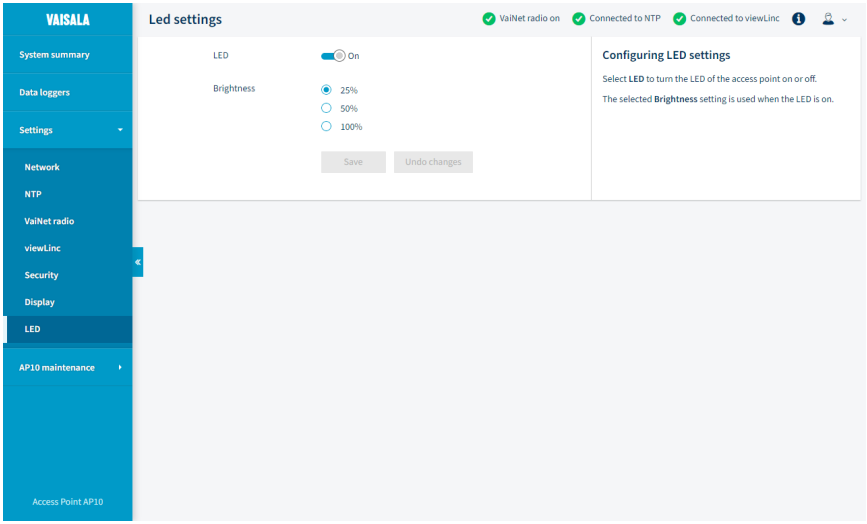


Figure 23 Web interface LED settings page

AP10 maintenance

You can back up and restore your current configuration settings on the **Back up and restore** page. This is convenient for testing settings, and also for copying the same settings to several access points. See Copying settings between access points (page 43).

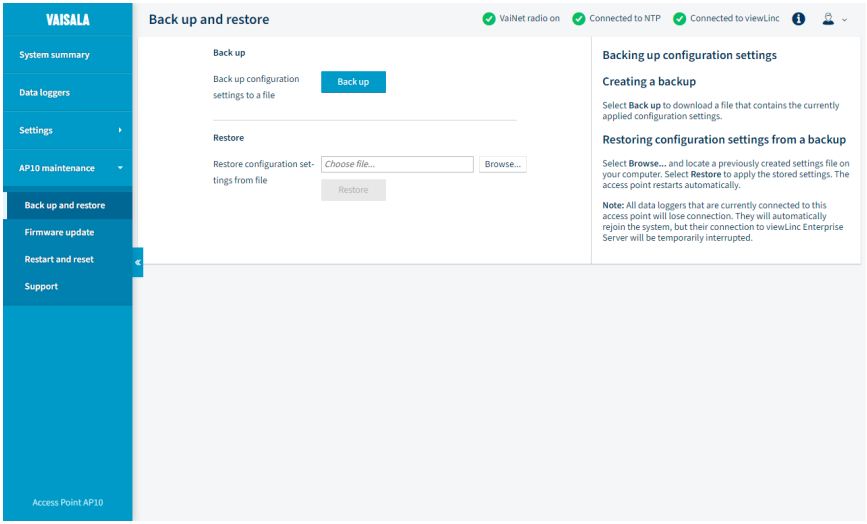


Figure 24 Web interface backup and restore page

For firmware update procedure, see Updating AP10 firmware (page 41).

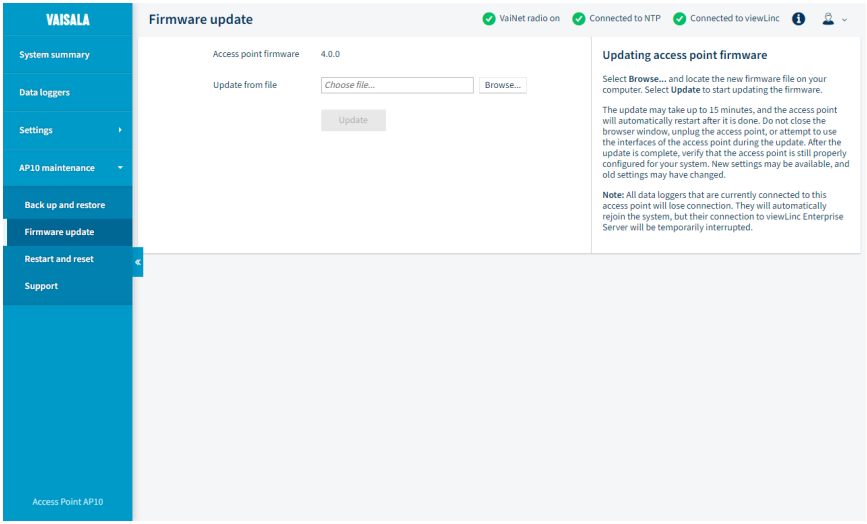


Figure 25 Web interface firmware update page

Restart and reset page can be used to restart the access point, or reset all or some of its settings. If you reset all settings, the installation wizard starts when the access point boots up. Complete the wizard to make the access point operational again. If you select to keep some settings, you must go through the settings manually to check that everything is correctly configured for your system.

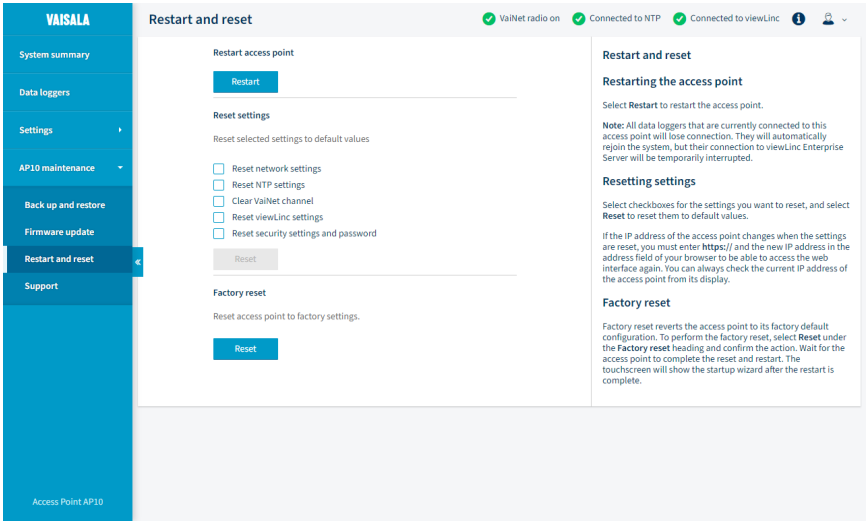


Figure 26 Web interface restart and reset page

If Vaisala support requests a diagnostic data package from your AP10, you can retrieve it from the **Support** page.

Starting from firmware version 2.0.0, this page also has a switch for disabling **Vaisala remote access** connections to this access point. Remote access enables Vaisala to connect to the access point using a secure SSH connection on TCP port 22.

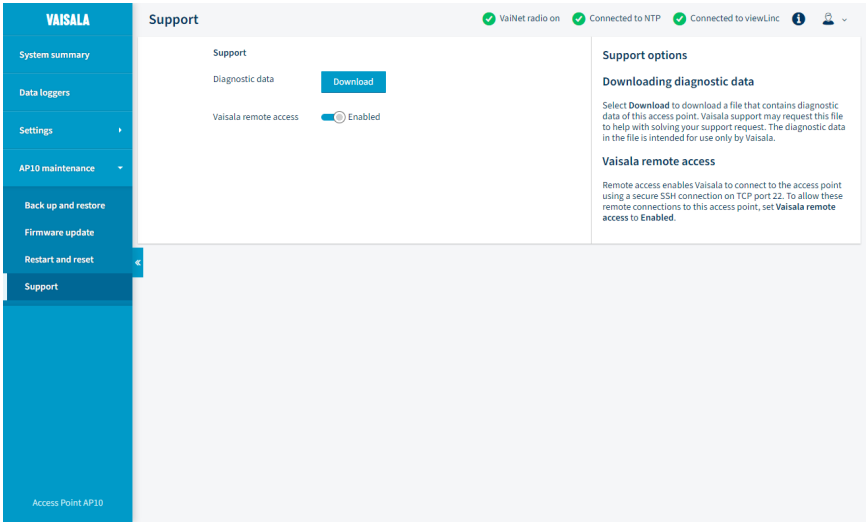


Figure 27 Web interface support page

6. Maintenance

6.1 Cleaning AP10

- Lint-free cloth
- Isopropyl alcohol (70 %)

Do not spray anything directly on the AP10.

1. Moisten some lint-free cloth with isopropyl alcohol (70 %).
2. Wipe the access point and its antenna.

6.2 Updating AP10 firmware

For general principles of VaiNet device firmware updates, firmware compatibility information, and instructions on how to minimize the impact to your viewLinc system, see Updating VaiNet device firmware in a viewLinc system Technical Note (M212867EN) available at docs.vaisala.com.
If a release notes document is included with the firmware update file, read it before starting for information on any important changes and possible compatibility requirements.

- Computer with a modern web browser (for example, Google Chrome™ or Microsoft Edge®)
- AP10 firmware update file from Vaisala

All data loggers that are currently connected to this access point will lose connection. They will automatically rejoin the system, but their connection to viewLinc Enterprise Server will be temporarily interrupted.

If any AP10 access points with firmware version 5.0.0 or higher are used on a site, all AP10 access points on that site must be updated to at least firmware 5.0.0. This is due to a change in the timing offsets of the VaiNet radio communication.

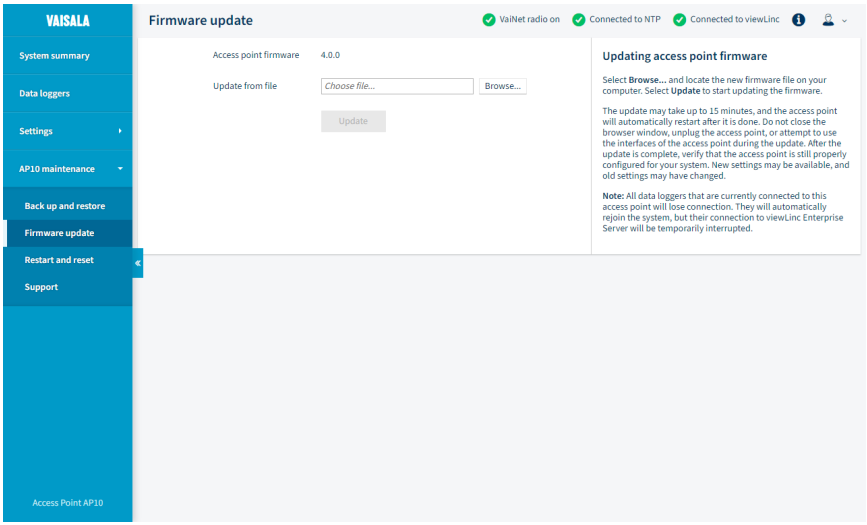


Figure 28 Firmware update page in web interface

1. If the firmware update file is a ZIP package, unzip it into a temporary directory on your computer.
2. Log in to the web interface of the AP10. See Accessing the web interface (page 30).
3. Verify the **Hardware version** of the AP10 from the **System summary** view and verify it is compatible with the firmware update file.
4. Select **AP10 maintenance > Firmware update**.
5. Check the currently installed firmware version. If the version of your update file is higher than the installed version, continue with the update.
6. Select **Browse...** and locate the firmware file on your computer.
7. Select **Update** to start the firmware update process. Confirm the update by selecting **Update** again.

   The update will typically complete within 15 minutes, and the access point will automatically restart after it is done. Do not unplug or attempt to use the access point during the update.
8. After the update is successfully completed:
   a. Log in again to the web interface.
   b. Select **AP10 maintenance > Firmware update** and verify that the firmware version has been updated.
   c. Verify that the access point is still properly configured for your system. New settings may be available, and old settings may have changed.

If the update appears to be stuck and you have already waited for 15 minutes, or if you receive a message indicating the update has failed (this can happen due to network connectivity problems):

1. Restart the AP10 and log in again to the web interface.
2. Check the current firmware version from the **AP10 maintenance > Firmware update** page. If the firmware version has not been updated (update was not successful), try the update again. If you have already tried twice, continue to the next step.
3. Select **AP10 maintenance > Back up and restore > Back up** to back up your settings to a file.
4. Revert the AP10 back to factory settings; see Performing a factory reset (page 48). Note that doing this may change the IP address of the AP10, since network settings will also be reset.
5. Repeat the firmware update one more time. If the update still fails, contact Vaisala support.

6.3 Copying settings between access points

You can use the backup and restore feature of the web interface to copy user-changeable settings between AP10 access points. This may be convenient when installing a large number of access points with similar settings, or when replacing an access point with a new one.

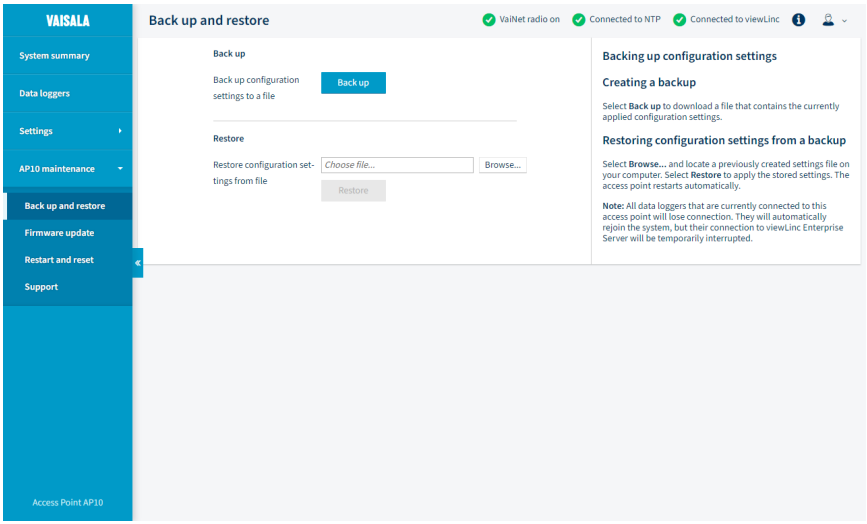


Figure 29 Web interface backup and restore page

Many corporate networks require devices to be registered before they can connect. If this is the case with your network, you must provide the MAC address of each new access point to your IT administrator. The MAC address is marked on the front of the access point (near the Ethernet connector) and on its type label in the back. It cannot be changed or copied between devices.

1. Log in to the web interface on AP10 that has the settings you want to copy. See Accessing the web interface (page 30).
2. Select **AP10 maintenance > Back up and restore**.
3. Select **Back up** to download the settings as a file named *backup.json*.
4. Set up the new AP10 to the point where it is connected to the network. See Setting up AP10 (page 21).
5. Log in to the web interface on the new AP10.
6. Select **AP10 maintenance > Back up and restore**.
7. To apply the copied settings:
   a. Select **Browse...** and locate the downloaded file.
   b. Select **Restore** to apply the settings. The access point restarts automatically.
8. After the access point has restarted, log in to the web interface again, and go through the following settings:
   - **Network** menu: If you are using a static IP address configuration, change the copied IP address to what it should be for this access point, and verify that the DNS settings are correct.
   - **VaiNet radio** menu: Set the VaiNet segment and VaiNet channel according to your device installation plan.

7. Troubleshooting

7.1 Problem situations

Table 4 Troubleshooting table

Problem	Possible cause	Solution
AP10 cannot connect to viewLinc Enterprise Server. The following message is shown on the display and the web interface: **Not connected to viewLinc**	AP10 network settings are incorrect.	Check and correct network settings of AP10. Verify that it can join the network.
	AP10 does not have the address of the viewLinc Enterprise Server.	Check and correct viewLinc settings of AP10.
	Firewall is blocking the viewLinc communication port.	Check that connections between AP10 and viewLinc Enterprise Server are allowed on port 12600 (default).
	Network outage.	Check that the Ethernet connection cable is attached to the AP10, and that the activity LEDs on the Ethernet connector are flashing. Contact your local IT support.
	viewLinc version that is used requires TLS 1.3 encryption and the AP10 has a firmware version that does not support it.	Update firmware of the AP10 to version 4.5.0 or newer. See Updating AP10 firmware (page 41).
The following messages is shown on the display and the web interface: **Not connected to NTP**	AP10 has not yet successfully communicated with an NTP (Network Time Protocol) server.	Wait for AP10 to communicate with the NTP servers.
	AP10 has been unable to synchronize time with any of the NTP servers on its list, or has been unable to communicate with an NTP server for more than three weeks.	Check the NTP settings and take corrective action so that at least one of the listed NTP servers is reachable by the AP10. See Troubleshooting NTP connections (page 47).

Problem	Possible cause	Solution
The following message is shown on the display and the web interface: **VaiNet radio off**	AP10 has not yet successfully synchronized its time with an NTP server.	Wait for AP10 to synchronize its time with the NTP servers.
	VaiNet channel has not been selected.	Select a channel for the VaiNet radio. See Setting up AP10 (page 21).
AP10 is in installation mode but data loggers are not connecting to it.	Data loggers have turned off their radio temporarily to conserve battery.	Wait patiently. Even normal connections take several minutes to complete. If a data logger has been out of contact with an access point for a long time, it may keep its radio off for up to eight hours.
	AP10 cannot start its radio communication because it does not have accurate time from a network time protocol (NTP) server.	Verify that the AP10 is configured to connect to the right NTP server. Make sure the NTP server is accessible from the network. Note that internet access is required to reach the default NTP servers.
	AP10 is configured for VaiNet segment B–D and the data loggers have an old firmware version that can only join segment A.	Update the firmware version of the data loggers. See Updating VaiNet device firmware in a viewLinc system Technical Note (M212867EN).
Cannot log in to the web interface.	Incorrect username and/or password.	Enter the correct credentials. The user name is **apadmin** and the default password is **ap123456**.
AP10 turns off unexpectedly.	AP10 is powered by the DC power supply, and the plug has disconnected since it was not locked into the power supply connector.	Insert and lock the plug as instructed in the setup instruction. See Setting up AP10 (page 21).
AP10 display turns off by itself.	Display has been configured to turn off automatically.	Check the display and LED settings of AP10 and configure as desired.
AP10 does not start up properly. The following message is shown on the display: **Persistent storage failure**	Filesystem of the AP10 has been corrupted.	Perform a factory reset. See Performing a factory reset (page 48).

7.2 Troubleshooting NTP connections

AP10 must maintain accurate time by synchronizing with a Network Time Protocol (NTP) server. If AP10 does not have accurate time, it shows the messages **Not connected to NTP** and **VaiNet radio off** on the home screen. AP10 will not connect any data loggers or transfer any data through VaiNet radio until it is able to synchronize with an NTP server again.

Go through the possible causes of NTP connection problems in the following order. You may need help from your local IT support unless the problem is a simple network connection or configuration issue.

1. Make sure AP10 is connected to the network:
   a. Check that the Ethernet cable is connected to AP10, and the network activity LEDs on the connector are lit (indicating an active connection).
   b. Check the current network settings from **Settings > Network**. If you are unsure, confirm the settings from your local IT support. It may also be necessary to register the MAC address of the AP10 to the network so that it can join. The MAC address is written on the front of the AP10 near the Ethernet connector.
   c. Check that AP10 shows the appropriate IP address on its home screen. The message **Not connected to network** must not be shown.
2. Verify the NTP servers listed in the **Settings > NTP** screen. By default, there are four numbered *`pool.ntp.org`* servers listed (for example, *`0.pool.ntp.org`*).
   If you have replaced a default server with a local NTP server, make sure its address is written correctly. If the address of the local NTP server is a hostname (for example, *`myntpserver`*), make sure it is registered with the DNS server AP10 is using. Instead of the hostname, you can also try to provide a fully qualified domain name (for example *`myntpserver.corporate.net`*) or the actual IP address of the server.
3. A firewall may be blocking UDP port 123 that is needed for the NTP protocol to function. Typically this happens on the edge of the network. Both inbound and outbound connections must be allowed.
   If you have set up a local NTP server, make sure the firewall on the server itself is not blocking the NTP connections.
4. There may be a network routing problem. The most typical case is an isolated network with no access to Internet, which means the default NTP servers are not reachable. In an isolated network, you **must** provide a local NTP server or AP10 cannot be used.

Depending on your geographical location, the default NTP servers may be unreachable even if the access point has Internet access and the firewalls of your local network are not blocking the NTP connections. In that case, you should reconfigure the NTP server list to use country-specific servers. For example, you could use *`0.ch.pool.ntp.org`* if the access point is installed in Switzerland. For lists of available server addresses, see www.ntppool.org.

7.3 Verifying operation of AP10

Perform this procedure to verify the normal operation of an AP10 access point. If you encounter problems or error messages, proceed as instructed in section Problem situations (page 45).

1. Connect the Ethernet cable.
2. If the Ethernet cable does not provide power, connect the DC power supply:
   a. Connect the plug to the power supply connector of AP10. Make sure the plug is oriented correctly and goes in all the way.
   b. Rotate the power plug slightly to lock it to the connector.
   c. Connect the power supply to the wall socket.
3. Monitor the startup from the display. At startup, the access point performs several checks to verify that its hardware, filesystems, and configuration are in order. If the startup completes normally, the home screen is shown.

   If startup encounters errors, it may be able to automatically correct them and continue normally. Filesystem errors are typically recoverable. However, configuration errors may be fatal and prevent normal startup.
4. Wait a minute for the home screen to update, then verify the status.

   Lack of a network connection or incorrect configuration will cause connectivity errows to be displayed. If the access point has been unpowered for more than a day, you will see an NTP connection error. The error continues to be shown while AP10 is synchronizing time with its configured NTP servers. It may take up to 15 minutes for it to disappear even when the NTP servers are reachable.
5. Touch the screen to verify the operation of the touchscreen.

7.4 Performing a factory reset

- Pen or a small flat-head screwdriver

Factory reset clears all user settings and diagnostic data on the AP10. It is also necessary if the access point is unable to start up due to filesystem corruption.

All data loggers that are currently connected to this access point will lose connection. They will automatically rejoin the system, but their connection to viewLinc Enterprise Server will be temporarily interrupted.

1. If the AP10 is not on, connect it to a network and power it up using the DC power supply. Wait for startup to complete.

2. Download the diagnostic data file from the AP10 using the web interface. The data file is useful for Vaisala support to diagnose and solve any problems related to the AP10.
   a. Log in to the web interface of the AP10. See Accessing the web interface (page 30).
   b. Select **AP10 maintenance > Support**.
   c. Select **Download** to download the data package.
3. AP10 has a small button marked **Reset**. Push it using a pen or a small flat-head screwdriver, and hold it down. AP10 will reset. Continue pushing the button.
4. Release the button when the text **Performing factory reset...** appears.
5. Wait for the AP10 to complete the startup and show the installation wizard.
6. Before starting to use the AP10 after the factory reset, complete the installation wizard using the touchscreen interface.

8. Technical data

8.1 AP10 technical specification

Table 5 AP10 wireless

Property	Specification
Networking standards	Vaisala VaiNet
Wireless connection capacity	Up to 32 supported devices
Modulation	Chirp spread spectrum modulation
Output power	13 dBm (20 mW)
Antenna	Non-removable external antenna
Typical range (indoors)	At least 100 m (approx. 330 ft)
Maximum number of access points in an area	
Standard system	8
Large system [1)]	32
Frequency bands	
Model AP10C	500 MHz
Model AP10E	868 MHz
Model AP10A	915 MHz
Model AP10J	920 MHz
Model AP10T	922 MHz

1) *Subject to additional installation requirements. See Guidelines for Large VaiNet Systems (M212596EN).*

Table 6 AP10 general

Property	Specification
Compatible viewLinc versions	5.0 and above
Supported wireless devices	RFL100 data logger
User interfaces	Web browser interface Touchscreen interface
User interface languages	English, German, French, Portuguese, Spanish, Swedish, Chinese, Japanese

Property	Specification
Internal clock	Synchronizes with Network Time Protocol (NTP) server. NTP server connection required for operation.

Table 7 AP10 operating environment

Property	Specification
Operating environment	Indoor use
IP rating	IP30: Protected against solid foreign objects of 2.5 mm Ø and greater.
Operating temperature	–20 … +60 °C (–4 … +140 °F)
Operating humidity	0–90 %RH, non-condensing
Storage temperature	–20 … +60 °C (–4 … +140 °F)

Table 8 AP10 inputs and outputs

Property	Description/value
Supply voltage using dedicated power supply connector	10–30 V DC
PoE power class	Class 0
Power consumption	Max. 13 W
Ethernet interface	
Supported standards	10BASE-T, 100BASE-TX
IPv4 address assignment	DHCP (automatic), static
Connectors	
Power supply connector	2.0 mm center pin locking type DC power jack
Service port	Micro-USB (2.0)
Expansion port	USB type A (2.0)
Ethernet	8P8C (RJ-45)

Table 9 AP10 compliance

Property	Description/Value
Electromagnetic compatibility (EMC)	IEC/EN 61326-1, industrial environment
Electrical safety	IEC/EN 61010-1

Property	Description/Value
AP10E model	
EU directives and regulations	RoHS Directive (2011/65/EU) amended by 2015/863 Radio Equipment Directive, RED (2014/53/EU)
Radio standards and approvals	ETSI EN 300 220-2 ETSI EN 301 489-1 ICASA No: TA 2020-7918 IMDA No: DB105576 TRA No: ER67585/18 Serbia: И005 21
Compliance marks	AAA, CE, ICASA, UKCA
AP10A model	
Radio standards and approvals	Anatel ID: 04763-19-12322 AS/NZS 4268 FCC ID: 2AO39-AP10A IC ID: 23830-AP10A NOM ID: 1901C00393
Compliance marks	ANATEL, NOM, NYCE, RCM
AP10J model	
Radio standards and approvals	MIC ID: 012-200006
Compliance marks	GITEKI
AP10C model	
Radio standards and approvals	China MIIT 工业和信息化部公告 2019 年第 52号
Compliance marks	China RoHS
AP10T model	
Radio standards and approvals	NCC ID: CCAP21LP1250T6
Compliance marks	NCC

Table 10 AP10 mechanical specifications

Property	Specification
Housing color	White
Mounting methods	Screws, tie wrap

Property	Specification
Weight	386 g (13.62 oz)
Dimensions (H × W × D)	
AP10C model	300.5 × 133 × 37 mm (11.83 × 5.24 × 1.46 in)
Other models	311 × 133 × 37 mm (12.24 × 5.24 × 1.46 in)
Materials	
Housing	PC/ABS blend
Display window	Chemically strengthened glass
Antenna	ABS

8.2 AP10 accessories and spare parts

Table 11 Spare parts

Item	Item code
Power supply for AP10	245127SP
Mounting kit	245679SP

8.3 AP10 dimensions

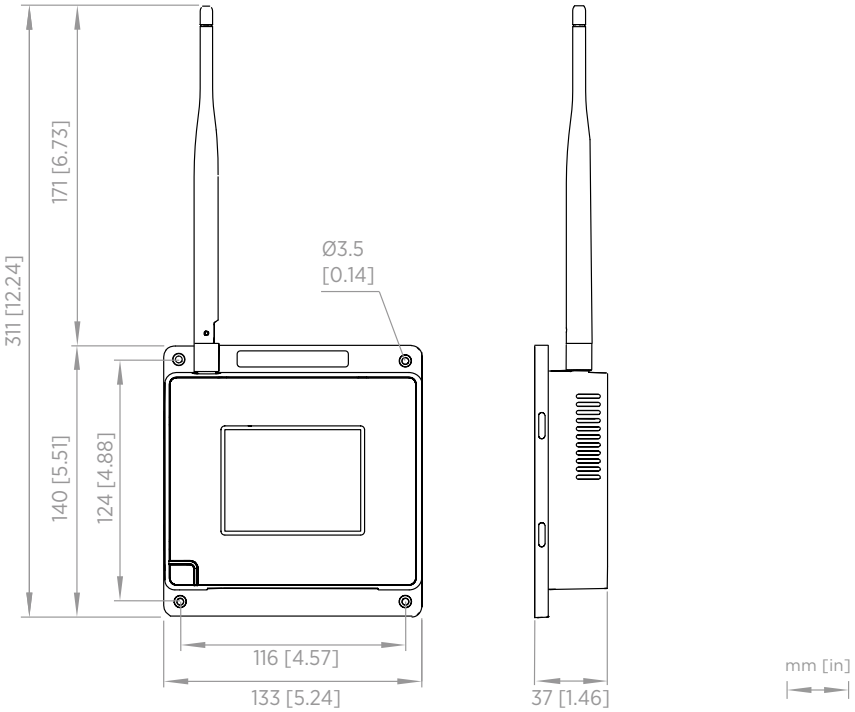


Figure 30 AP10 access point dimensions

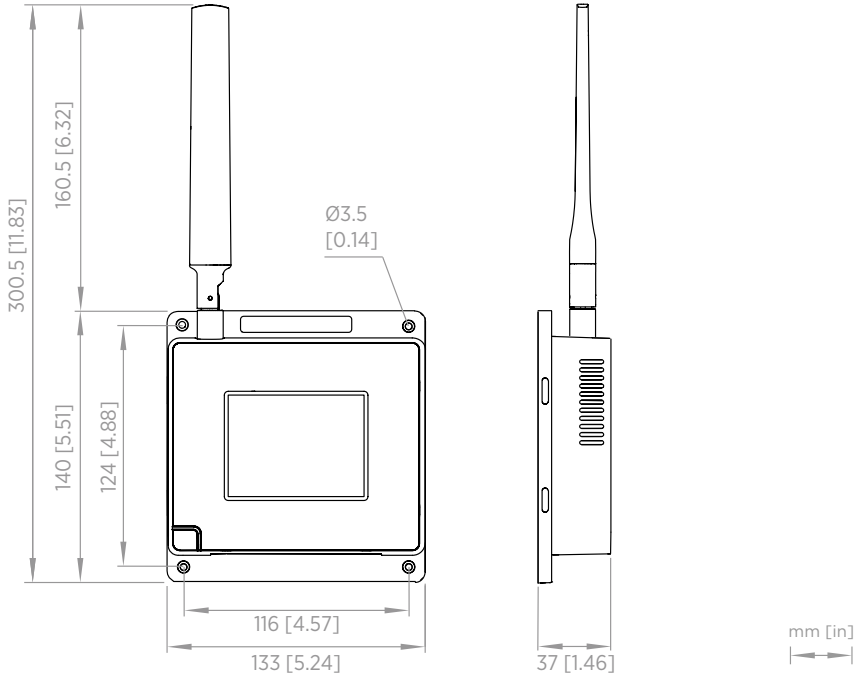


Figure 31 AP10C model dimensions

Maintenance and calibration services

Vaisala offers comprehensive customer care throughout the life cycle of our measurement instruments and systems. Our factory services are provided worldwide with fast deliveries. For more information, see www.vaisala.com/calibration.

- Vaisala Online Store at store.vaisala.com is available for most countries. You can browse the offering by product model and order the right accessories, spare parts, or maintenance and calibration services.
- To contact your local maintenance and calibration expert, see www.vaisala.com/contactus.

Technical support

Contact Vaisala technical support at helpdesk@vaisala.com. Provide at least the following supporting information as applicable:

- Product name, model, and serial number
- Software/Firmware version
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see www.vaisala.com/support.

Warranty

For standard warranty terms and conditions, see www.vaisala.com/warranty.
Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

Recycling

Recycle all applicable material according to local regulations.

VAISALA

Visit docs.vaisala.com for product documentation updates and translations.

www.vaisala.com