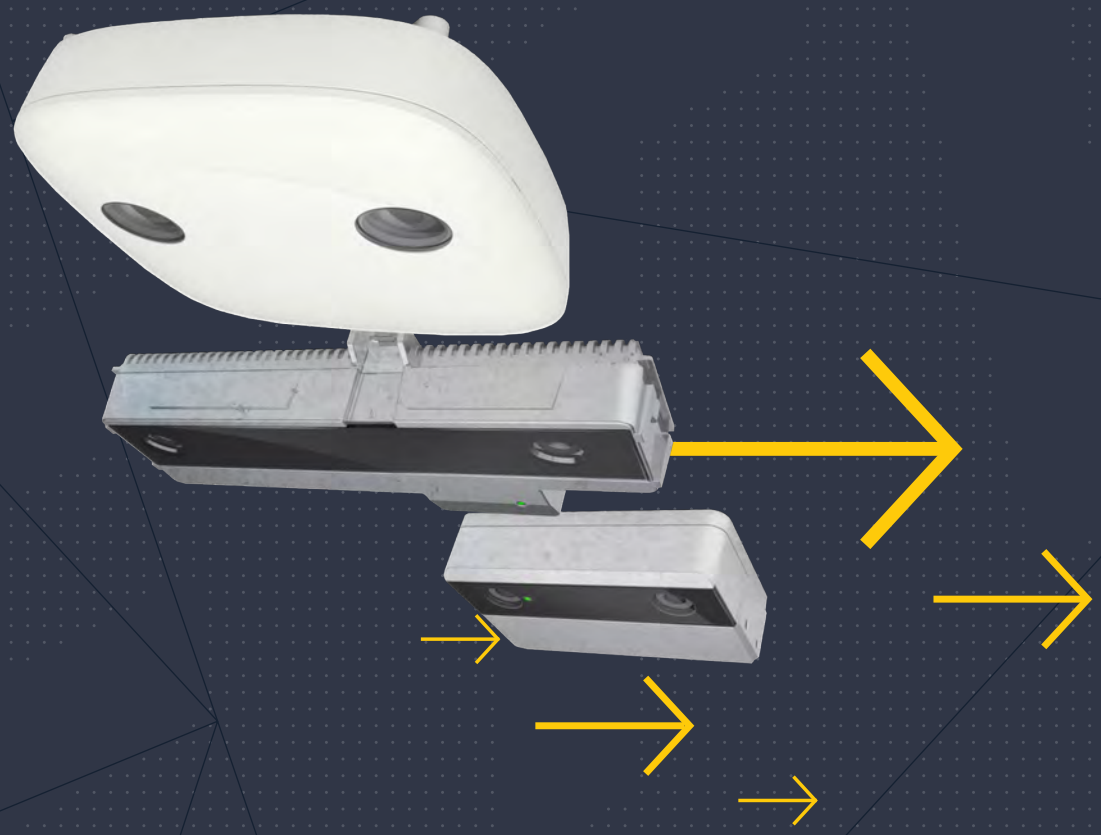
Version 1.18.0

ADVANCED PEOPLE SENSOR

APS-90, APS-180 and APS-90-Outdoor-PoE

Installation and configuration manual



Installation and configuration manual (original)
HAGL-120-00077

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Supplemental directives

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1 Overview

The Advanced People Sensor (APS) counts persons within the configured area/monitored area based on stereoscopic imaging and image processing. The counting data is stored internally and can be transferred via different interfaces for external processing.

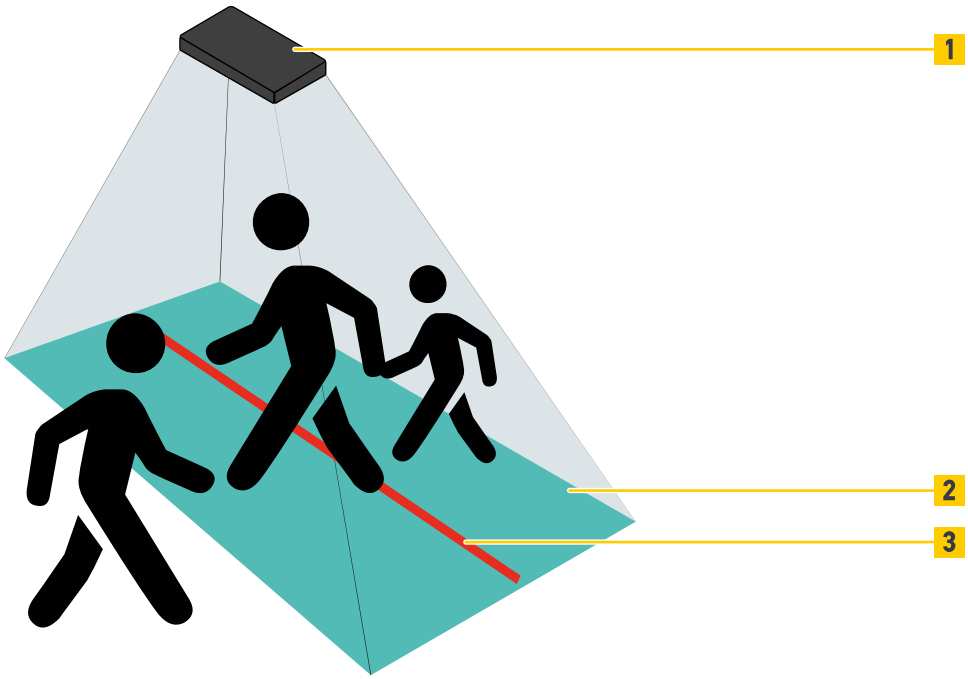


Fig. 1: People sensing

1	Advanced People Sensor (APS)	2	Configured area/monitored area
3	Counting line		

The results can be verified using video recording (optional). This enables a precise validation of the counting accuracy.

2 General information

2.1 About this document

This manual provides information for optimal configuration and efficient operation of the device.

Personnel must carefully read and fully understand this manual before performing any installation or configuration tasks.

The figures in this manual are for information only. Actual design may differ from illustrations.

Target group

This document is addressed to system integrators.

Software and hardware version

All information in this manual refers to firmware version 1.18.0 and hardware APS-90, APS-180 and APS-90-Outdoor-PoE.

Modifications to the functionality which will be implemented through future software updates will be described in separate release notes or in an updated version of the manual.

Notes

Notes and safety instructions are marked by symbols in this manual.

For safety instructions the relevant symbol and words indicate the severity of the danger.

NOTICE

This combination of symbol and signal word indicates a potentially dangerous situation, which can lead to property damage, data loss or misuse of the device if not avoided.

This symbol highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

Symbols

+ A superscript plus-sign after a word indicates a glossary entry for this word. To view the glossary entry click on the plus-sign.

2.2 About the manufacturer

Service requests

Service requests regarding the device can be sent to the following e-mail address:

support@people-sensing.com

The general contact information is shown on page 2.

Warranty information

The warranty information is included in the general terms and conditions of HELLA Aglaia.

2.3 Limitation of liability

All the data and notes in this manual were compiled considering the applicable standards and regulations as well as the state of the art.

In the following cases HELLA Aglaia assumes no liability for damages:

- Non-compliance with this manual.
- Deviation from the intended use.
- Assignment of untrained personnel.
- Unauthorized technical changes.
- Use of unauthorized accessories.
- Opening the device.
- Damage or removal of the "DO NOT OPEN DEVICE" label.

For special models, use of additional order options, or current technical changes, the actual scope of delivery can deviate from the explanations and illustrations in this manual.

The obligations agreed upon in the delivery contract, General terms and conditions and delivery conditions of HELLA Aglaia as well as any legal regulations applicable at the time of the contract conclusion apply.

2.4 Scope of delivery

The standard scope of delivery for the Advanced People Sensor includes:

- The Advanced People Sensor.
- This operating manual as a digital version by download.

2.5 Use of the Advanced People Sensor

Intended use

The Advanced People Sensor is a sensor assembly, which must be integrated into other systems.

The Advanced People Sensor is intended for automatically counting persons in the configured monitored area.

The Advanced People Sensor is intended for detecting and monitoring persons in the configured monitored zone or detecting wireless devices in combination with a wireless USB adapter.

Proper and safe operation of the product requires appropriate transport, storage and installation as well as attentive operation and care.

The information in this manual must also fully comply with use to be deemed 'intended'.

Any use which deviates or exceeds the intended use is considered as 'misuse'.

Non intended use

The following list contains, but is not limited to, the following examples of non intended use:

- Use with unauthorized modified firmware.
- Opening the device or use without housing.
- Use in unsuitable environments (e.g. use outdoors if the Advanced People Sensor is not specified for outdoor operations).

2.6 Privacy of data statement

It should be noted that the APS can be used as a camera, and that it is possible to record and store video data. Under certain conditions it may also be possible to identify a person.

The standard scope of delivery is no live view, therefore people are usually not visible.

The user must establish in advance whether there are legal requirements or privacy regulations applicable when using the people sensor. Appropriate measures should be taken to prevent unauthorized access to the unit.

To prevent unauthorized access to the unit, change the password for full access (↗ Chapter 6.12.4 HMI Login on page 134). Also change the password for service access via linux ssh.

Changing linux passwords

```
APS9029B6 login: root
Password: counter
~ # passwd customer
Changing password for customer
New password: new123password
Retype password: new123password
passwd: password for customer changed by root
~ # passwd hagl
Changing password for hagl
New password: new987password
Retype password: new987password
passwd: password for hagl changed by root
~ # passwd root
Changing password for root
New password: new678password
Retype password: new678password
passwd: password for root changed by root
~ # reboot
~ #
```

3 Structure and function

3.1 Hardware

3.1.1 APS-90

Housing

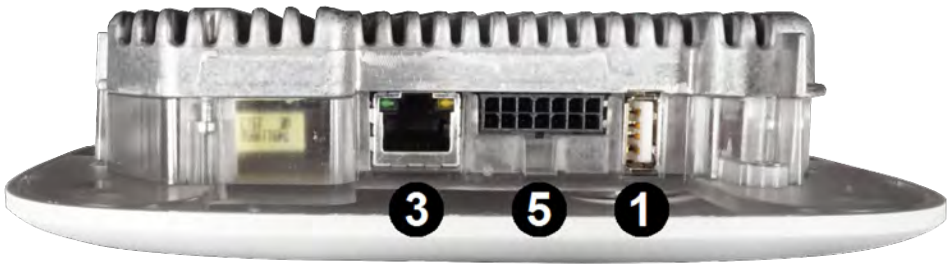


Fig. 2: Housing view: connection side APS-90E-IO (interfaces)

1	USB 2.0 interface	2	Factory reset button
3	Ethernet interface RJ45	4	Status LED
5	Power and I/O interface (only APS-90E-IO)		

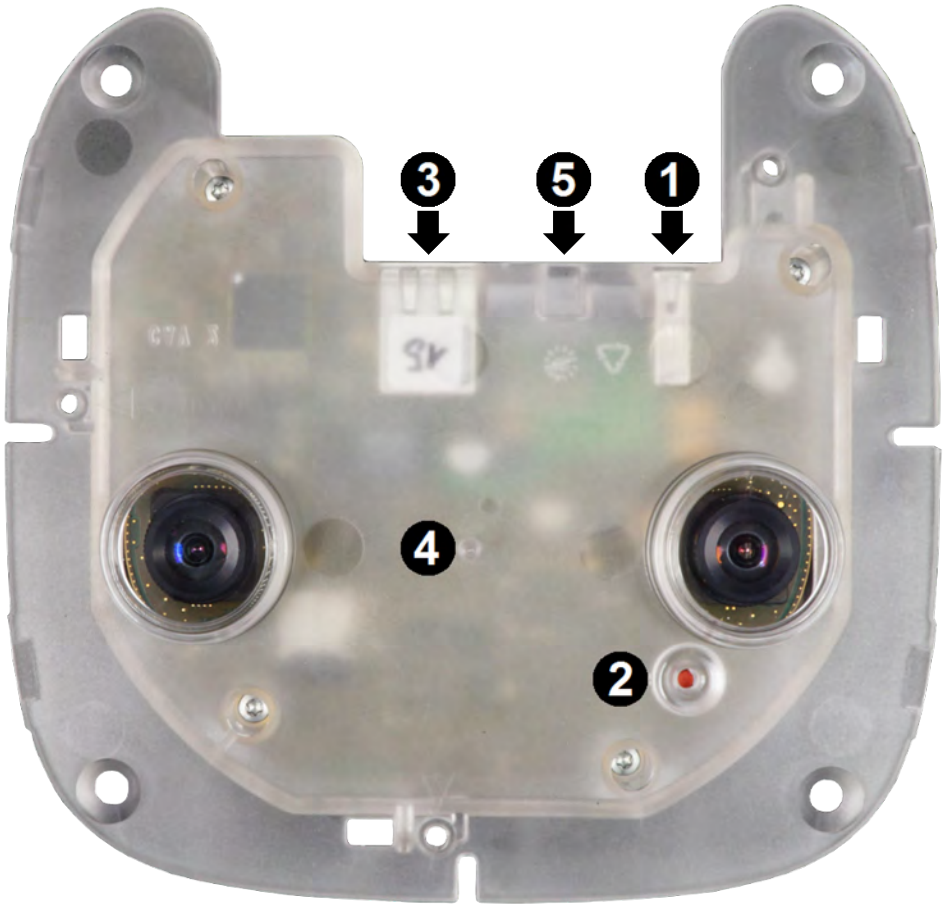


Fig. 3: Housing view: optics side

Ethernet port on device

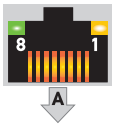


Fig. 4: RJ45 ethernet interface ("A": optics orientation)

Pin no.	Name	Description
1	TxRx A +	Transmit/Receive A (positive polarity)
2	TxRx A –	Transmit/Receive A (negative polarity)
3	TxRx B +	Transmit/Receive B (positive polarity)
4	TxRx C +	Transmit/Receive C (positive polarity)
5	TxRx C –	Transmit/Receive C (negative polarity)
6	TxRx B –	Transmit/Receive B (negative polarity)
7	TxRx D +	Transmit/Receive D (positive polarity)
8	TxRx D –	Transmit/Receive D (negative polarity)

I/O port on device

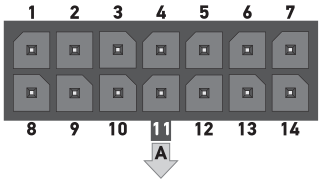


Fig. 5: I/O interface ("A": optics orientation)

Pin no.	Name	Description
1	PWRIN+	DC voltage supply + (alternative to PoE, 18 ... 29 V)
2	IN1+	Programmable input +
3	IN2+	Programmable input +
4	IN3+	Programmable input +
5	OUT1+	Programmable output +
6	OUT2+	Programmable output +
7	OUT3+	Programmable output +
8	PWRIN-	DC voltage supply - (alternative to PoE, 18 ... 29 V)
9	IN1-	Programmable input -
10	IN2-	Programmable input -
11	IN3-	Programmable input -
12	OUT1-	Programmable output -
13	OUT2-	Programmable output -
14	OUT3-	Programmable output -

USB port on device

Fig. 6: USB 2.0 interface ("A": optics orientation)

Pin no.	Name	Description
1	VCC	5 V, max. 500 mA
2	D-	Data -
3	D+	Data +
4	GND	Ground

3.1.2 APS-180

Housing

Fig. 7: Housing view: connection side APS-180E-IO (interfaces)

1	USB 2.0 interface	2	Factory reset button
3	Ethernet interface RJ45	4	Status LED
5	Power and I/O interface (only APS-180E-IO)		

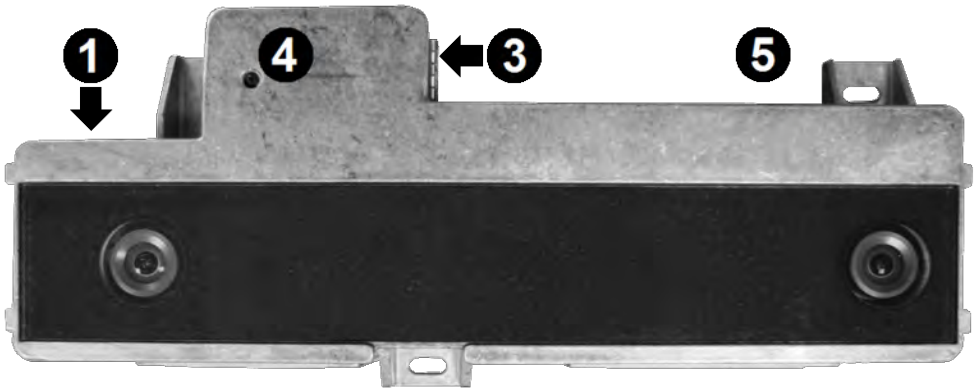


Fig. 8: Housing view: optics side

USB port on device

Fig. 9: USB 2.0 interface ("A": optics orientation)

Pin no.	Name	Description
1	VCC	5 V, max. 500 mA
2	D-	Data -
3	D+	Data +
4	GND	Ground

Ethernet port on device

Fig. 10: RJ45 ethernet interface ("A": optics orientation)

Pin no.	Name	Description
1	TxRx A +	Transmit/Receive A (positive polarity)
2	TxRx A –	Transmit/Receive A (negative polarity)
3	TxRx B +	Transmit/Receive B (positive polarity)
4	TxRx C +	Transmit/Receive C (positive polarity)
5	TxRx C –	Transmit/Receive C (negative polarity)
6	TxRx B –	Transmit/Receive B (negative polarity)
7	TxRx D +	Transmit/Receive D (positive polarity)
8	TxRx D –	Transmit/Receive D (negative polarity)

I/O port on device

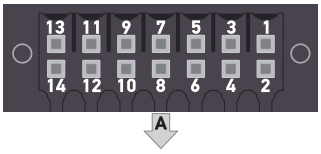


Fig. 11: I/O interface ("A": optics orientation)

Pin no.	Name	Description
1	OUT3-	Programmable output -
2	OUT3+	Programmable output +
3	OUT2-	Programmable output -
4	OUT2+	Programmable output +
5	OUT1-	Programmable output -
6	OUT1+	Programmable output +
7	IN3-	Programmable input -
8	IN3+	Programmable input +
9	IN2-	Programmable input -
10	IN2+	Programmable input +
11	IN1-	Programmable input -
12	IN1+	Programmable input +
13	PWRIN-	DC voltage supply - (alternative to PoE, 18 ... 29 V)
14	PWRIN+	DC voltage supply + (alternative to PoE, 18 ... 29 V)

3.1.3 APS-90-Outdoor-PoE

Housing

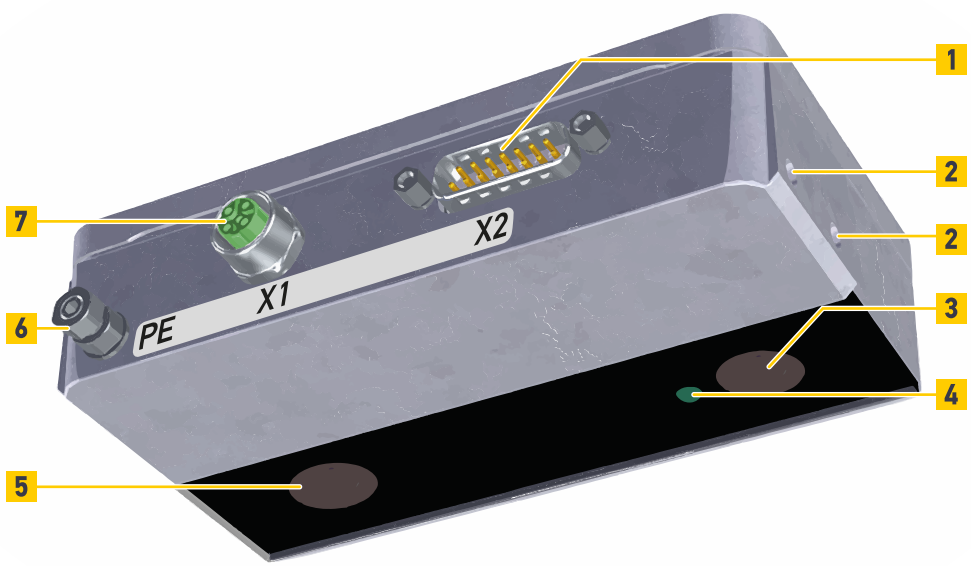


Fig. 12: Housing

1	I/O interface (D-SUB), X2	2	Fixing points (2 x 2 M5)
3	Right HDR camera	4	Status LED
5	Left HDR camera	6	Ethernet interface (M12), X1
7	Ground stud (metric thread M5), PE		

Ethernet port on device

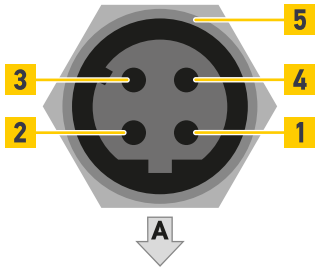


Fig. 13: M12 Ethernet Interface ("A": optics orientation)

Pin no.	Name	Description
1	TD+	Transmit data +
2	RD+	Receive data +
3	TD-	Transmit data -
4	RD-	Receive data -
5	SHD	Shield

I/O port on device

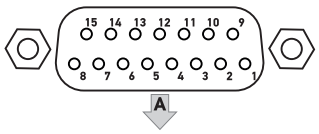


Fig. 14: I/O interface ("A": optics orientation)

Pin no.	Name	Description
1	Reset	Reset Pin (leave open, only required for corrective maintenance)
2	OUT1 +	Programmable output +, potential-free
3	IN1 +	Programmable input +, potential-free
4	IN2 +	Programmable input +, potential-free
5	DID4 A	Code jumper 4 (leave open)
6	DID3 A	Code jumper 3 (leave open)
7	DID2 A	Code jumper 2 (leave open)
8	DID1 A	Code jumper 1 (leave open)
9	OUT1 -	Programmable output -, potential-free
10	IN1 -	Programmable input -, potential-free
11	IN2 -	Programmable input -, potential-free
12	DID4 B	Code jumper 4 (leave open)
13	DID3 B	Code jumper 3 (leave open)
14	DID2 B	Code jumper 2 (leave open)
15	DID1 B	Code jumper 1 (leave open)

3.1.4 Status LED

Starting the device takes about 40 seconds. During this time the status LED is as follows:

- When the device starts the LED is illuminated in red for approximately 10 sec.
- During the rest of the startup process the LED flashes green.
- While waiting for DHCP the LED is blinking in yellow. This overlays the green blinking of startup process.
- At end of startup the LED is illuminated in green for approximately 6 sec. Then off.

User interface is accessible approximately 10 sec later.

The status LED use different colors for signaling.

Color	Period	Description
red	10 s after power on	Start system
red	permanently	Error during boot process
green	blinking	Base system is starting
green	6 s during power on	IP address is assigned, sensor is ready to detect and count people. About 10 s later sensor is ready to be accessed by web interface.
green	permanently	LED is configured for system running
off	permanently	System is running.
blue	5 s while pushing reset button	Change to fallback mode when disengaging the reset button.
blue	1 s	LED is configured for signaling count events
yellow	blinking	Waiting for DHCP
yellow	after 5 s pushing reset button	Factory reset
yellow	permanently	LED is configured for Fill Level

3.1.5 Factory reset button/pin

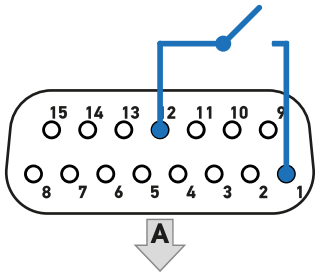


Fig. 15: Connecting the reset pin on an APS-90-Outdoor-PoE

The device must be powered for using the button/pin.

On an APS-90 or APS-180 press the button gently with a pencil.

On an APS-90-Outdoor-PoE connect the reset pin 1 of the I/O port with pin 12.

The device will change the LED illumination as feedback.

There are two options, depending how long the button is pressed or the pin is connected:

- Factory Reset pressing the button/connecting the pin more then 5 second if LED illuminated in yellow.
- Fallback System pressing the button/connecting the pin less then 5 second while LED illuminated in blue.

By the 'Factory Reset' all settings (including network settings) restored to the factory defaults. The device reboot. This reboot takes more time as a normal startup.

At the 'Fallback System' the APS is started only with a basic emergency system in DHCP mode. The LED illuminated in red during the whole time. You could connect to a simple user interface, that allow you to:

- Update the firmware.
- Set the IP setting to use DHCP.
- Set the device to the factory default settings (factory reset).
- Display diagnosis data.
- Reboot the device.

3.2 Functionality

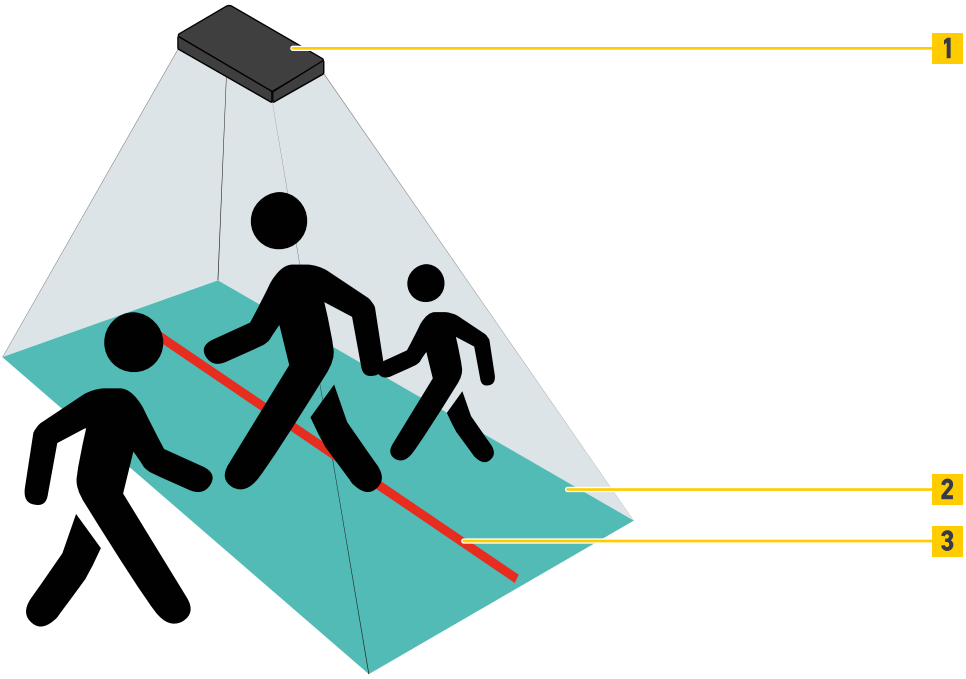


Fig. 16: People sensing

1	Advanced People Sensor (APS)	2	Configured area/monitored area
3	Counting line		

The device continually acquires stereoscopic video images in its visual range.

The integrated software evaluates the stereoscopic images. Persons within the monitored area are recognized automatically and their movements are tracked across the subsequent images.

The software provides the following functions:

3.2.1 Counting

3.2.1.1 Counting lines

A counting line is represented by a colored polyline with lettered points at floor level.

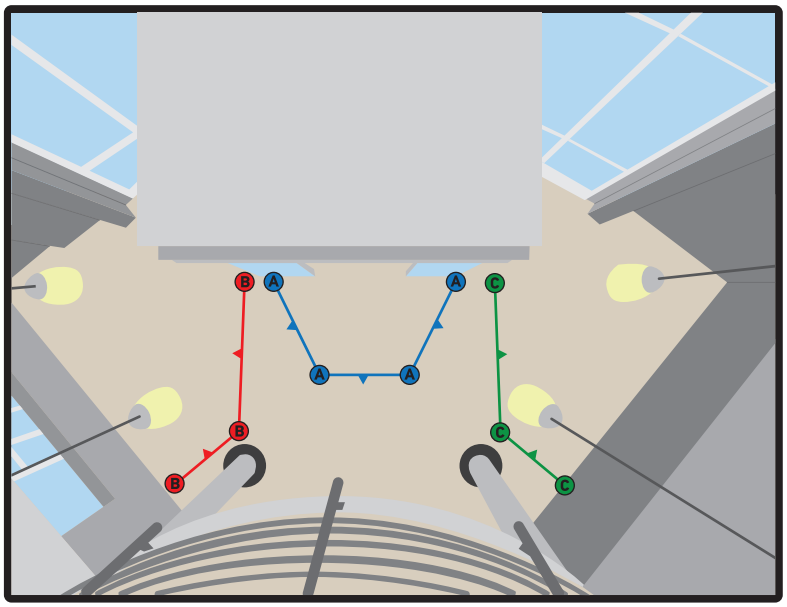


Fig. 17: Counting lines

Counting is bidirectional and achieved by drawing polylines with triangular markers pointing inwards, indicating counting direction.

Higher counting accuracy can only be gained if people are already being tracked approximately 30 to 50 cm before reaching the counting line.

It is also possible to count people using a digital input, e. g. with an infrared detector. In this mode the device counts the input signals from an external sensor. No counting line is displayed in the camera view.

3.2.1.2 Re-entry and re-exit detection

In many cases you do not want to count persons crossing a counting line if they turn around within the monitored area and cross the counting line again.

An example for such a situation would be a floor which can be accessed by two escalators. People who come from an escalator and go to the next one should not be counted (Fig. 18 /A), but people who leave the escalator on that floor (Fig. 18 /B) should be.

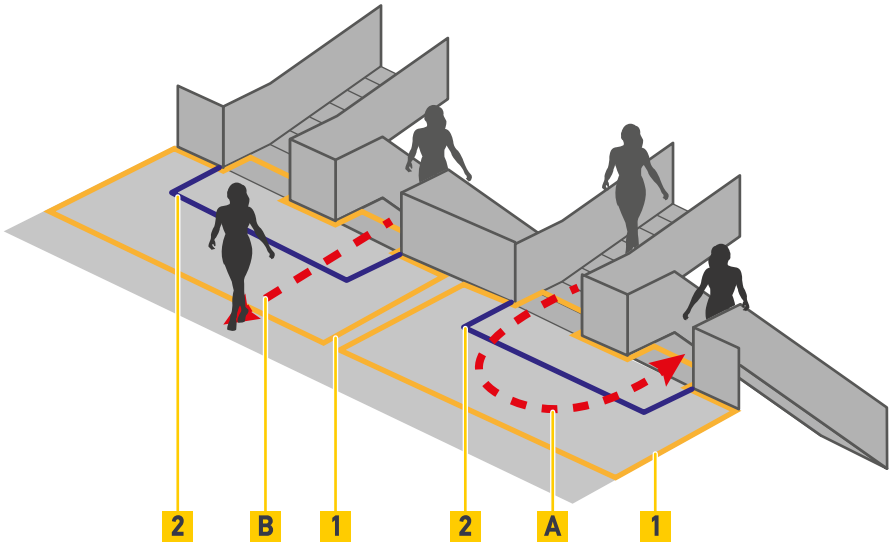


Fig. 18: Example

1	Floor area	2	Counting line

There are three modes for counting persons who turn around in the monitored floor area:

- No delay

  Counts every time a person crosses the counting line, without suppressing U-turns (immediate result after crossing the counting line).

- Infinity

  Count only if no U-turn is made (result delayed until person leaves the floor area).

- Time period (e.g. 10 sec)

  Count if the person stays longer than the time period and without a U-turn in this time (result delayed until time period is over or until person leaves floor area before end of time period).

These modes can be defined separately for each counting line and direction.

3.2.1.3 Counting groups

> *Optional function*
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

This functionality is included in the Object Classification license (↗ Software Options on page 156). With this functionality the device counts groups (shopping units). Each counting line can be configured individually to count groups. A group is up to 4 people who cross the counting line close together.

In the area 2 m in front and behind the counting line, the position and movement of persons are analyzed to form groups. If a group has been detected, the group count takes place when this area is left. Group counting is carried out in addition to the counting of individual persons. Depending on the configuration of the counting line the group counting may be delayed.

The group count information is transmitted on the data interfaces when the group count is activated. Groups cannot be visualized in the camera view of the user interface.

3.2.2 Zone monitoring

> *Optional function*
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

A monitored zone is represented by a colored polygon on floor level.

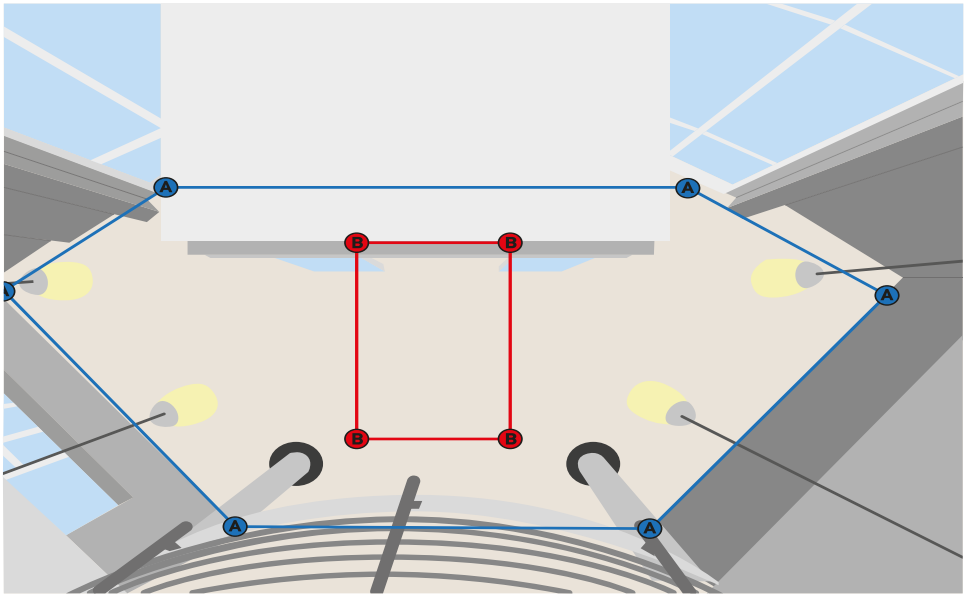


Fig. 19: Monitored zones

It is used to detect the number of people in that zone, e.g. how many people are currently in a lock gate, elevator or in front of a cash point. Based on this information maximum and average dwell times are calculated and displayed in the user interface. A digital output can be used to give a zone alert based on an amount of people or a maximum dwell time.

For these zones the following types of data are available:

- current data as amount of people and their maximum and average dwell time
- statistical data of amounts and dwell times for an adjustable time interval
- detailed list of data of every single persons left a zone for an adjustable time interval
- alarming in case of a threshold of dwell or amount of people

While the data output in the user interface determines only the current data values of zone monitoring, some interfaces (Push Services) deploy all of these data and some interfaces only a subset of statistical or list data.

3.2.3 Object classification

> *Optional function*
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

The device detects objects larger than 50 cm (19.69 in). It suppresses static objects but not moving objects.

Internally it classifies objects as:

- adults (marked red),
- persons up to 130 cm (51.18 in) as children (marked yellow) and
- shopping carts (marked blue)
- groups (shopping units) only for counting lines (not marked or visible)
- other objects by shape (marked white)

These are visible in the *"→ Home → Start Page - Live View"*. Every object will have a dot at floor level and another at it's top (linked by a line).

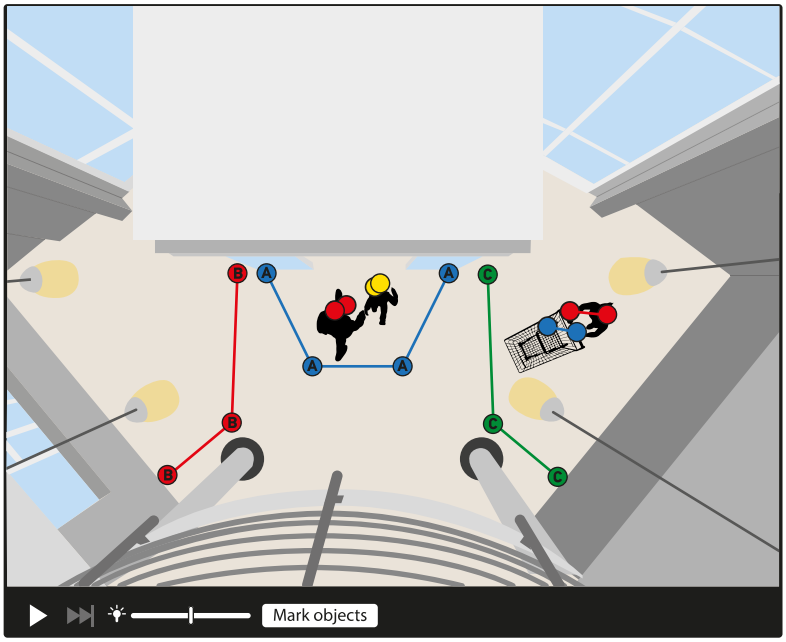


Fig. 20: Example of classification with adults (red), child (yellow) and cart (blue)

3.2.4 Object list

> *Optional function*
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

This function creates a list of current objects (persons). For every object it contains the current position, height, entry position, dwell time and motion vector. Additionally a list of historic objects - those that have left the floor area - is available.

This Object List function could be used for your own applications based on tracking people.

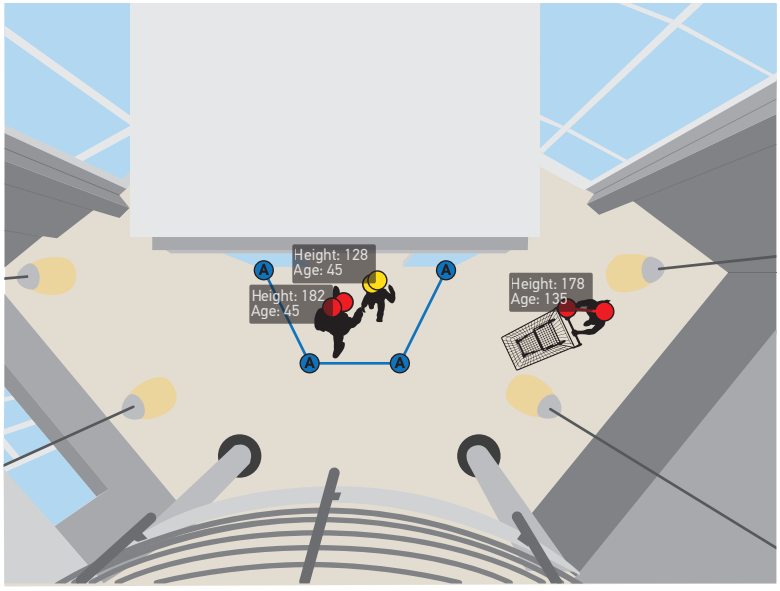


Fig. 21: Example of object list

3.2.5 Multi Sensor Fusion

With the Multi Sensor Fusion it is possible to combine up to 10 sensors. With this fusion a wide entrance could be covered with multiple sensors and used by fusion to a master sensor with only one wide counting line.

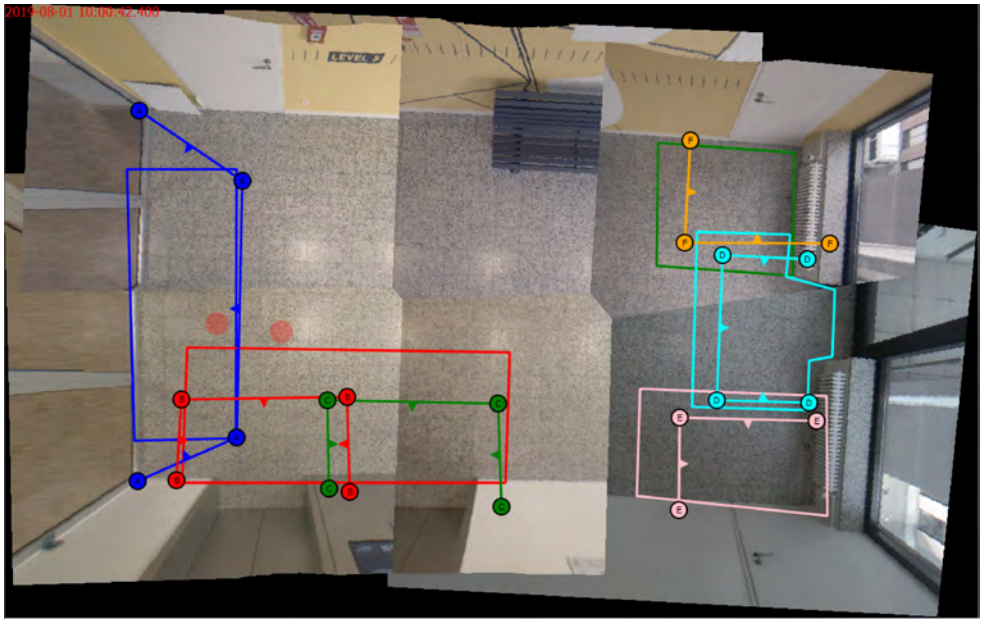


Fig. 22: Live View for a Multi Sensor Fusion of 2x3 devices

The master gets all the tracking information of the other sensors to count and to hide U-Turns. Beside counting this fusion works also for Zone Monitoring or Object List to cover bigger areas. At the interfaces as Data Recording, Push Services or REST the master interacts as one master interface.

The maximum monitored area can be extended from 8 m x 8 m (26.2 ft x 26. ft) with 1 device up to 8 m x 22.8 m (26.2 ft x 74.7 ft) with 2 devices and so on.

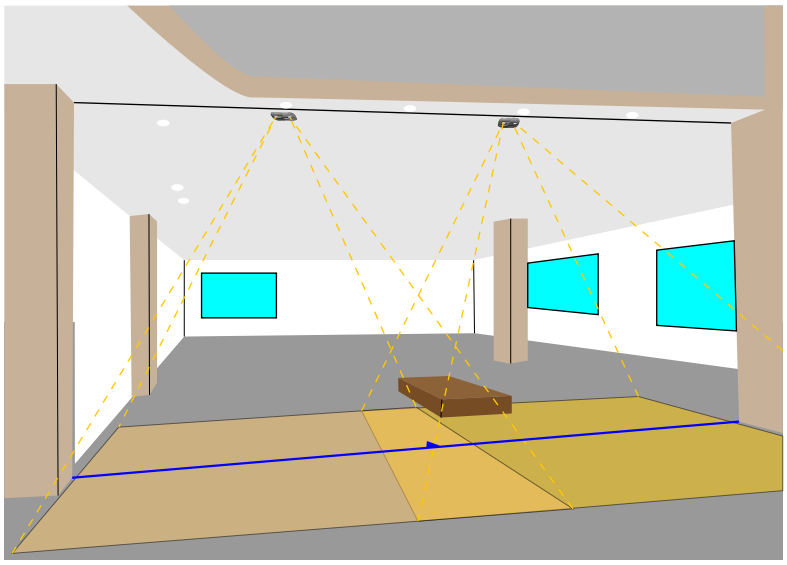


Fig. 23: Fusion of 2 sensors

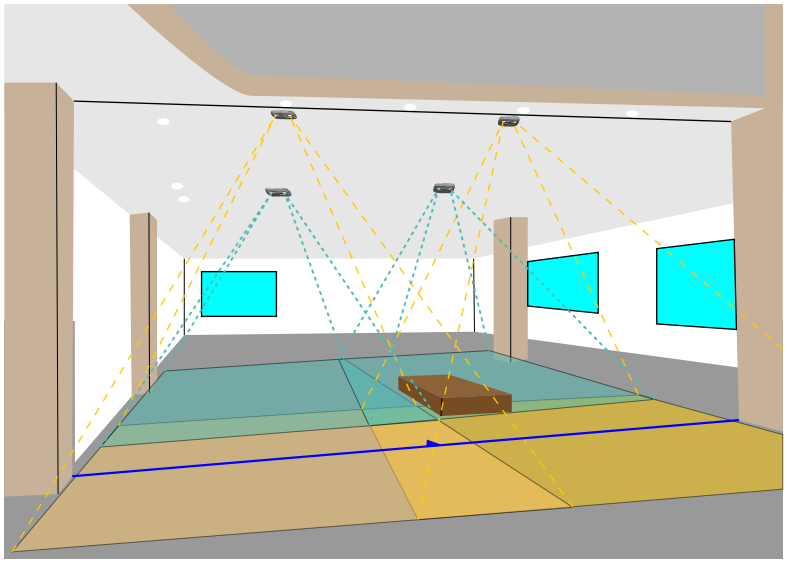


Fig. 24: Fusion of 4 sensors

3.2.6 Optical Self Diagnosis

The device checks its visible range permanently. The status of this optical self diagnosis (OSD) is shown in the user interface.

OK	Normal state.
Covered	One or both cameras covered, e.g. by a sticker.
Too dark	Illumination is too low for proper function or both cameras are completely covered and show a black image.
Too bright	This is more hypothetical, because direct sunlight and reflections from sunlight would not cause a 'too bright' error.

The device does not stop counting in case of an error. The OSD status could help in troubleshooting issues and is also available in data protocols to validate data.

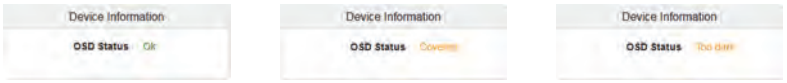


Fig. 25: Example of optical self diagnosis status

3.2.7 Video recording

Optional function

This function can only be enabled if a corresponding license file is installed on the device.

Customers are recommended to record videos including data (e.g. count data) to validate the accuracy of the sensor. It is an easier solution than validating live on site, due to the large amount of statistically relevant information produced in real time.

The APS models with additional memory (↗ table below) can store this video data locally. After being recorded, the data can be automatically sent to a server, or manually downloaded from the user interface.

Model	Video recording possible	license preinstalled
APS-90E	yes	no
APS-90	no	no
APS-90-8GB	yes	yes
APS-180E	yes	no
APS-180	no	no
APS-180-8GB	yes	yes
APS-90-Outdoor-PoE	yes	yes

In addition to the camera image, this video recording also includes the relevant setup, counting, zone monitoring and tracking data.

The license can be deleted in case of privacy protection issues.

The "APS Video Player" (Windows version only) can be used to view these recordings. It can export plain video files with selected overlays (to be played with standard video tools) for the end customer.

> *Use the latest "APS Video Player" version (at least version 1.12.0) in combination with firmware 1.18.0.*
>
> *The new player is compatible with older firmware video recordings.*

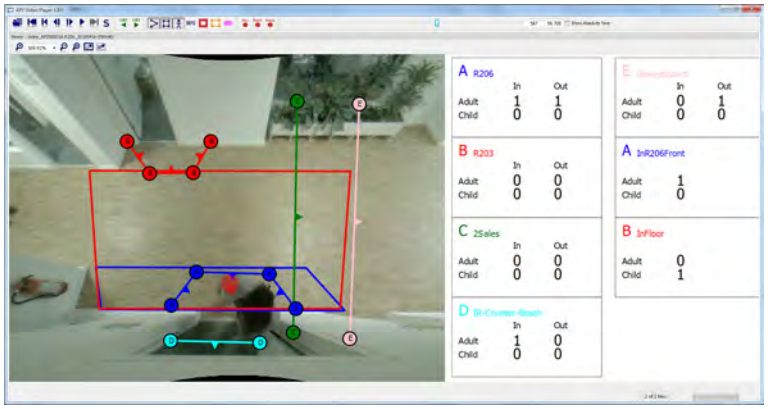


Fig. 26: Example of displaying a recorded video within the PC Software "APS Video Player"

3.2.8 Video streaming

> *Optional function*
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

Video streaming allows live camera images to be streamed over the network and viewed live on a client using software like VLC media player or recorded in a video recorder. The streaming functionality is based on the Real Time Streaming Protocol (RTSP). The video data is encoded with H.264.

The streaming functionality can be activated, deactivated and parameterized via the user interface.

Video streaming is enabled in the video recording license (↗ Software Options on page 156). It is not possible to use video recording and video streaming at the same time. Some devices can not store video recordings. But you can install a video recording license for video streaming.

Model	Video streaming possible	license preinstalled
APS-90E	yes	no
APS-90	yes	no
APS-90-8GB	yes	yes
APS-180E	yes	no
APS-180	yes	no
APS-180-8GB	yes	yes
APS-90-Outdoor-PoE	yes	yes

To receive the videostream connect to the URL

```
rtsp://[ip-address or fqdn]:[port]/video
```

3.2.9 Wireless services

Optional function

This function can only be enabled if a corresponding license file is installed on the device.

The device can be used in combination with a wireless USB adapter. There are two options for now. One for WiFi only and one for WiFi and Bluetooth. These are preselected by HELLA Aglaia to use the correct driver software inside the firmware.

Using these wireless USB adapters, 3 modes for WiFi are available:

WiFi tracking	tracking of wireless devices (such as mobile phones)
WiFi HMI Access	access the user interface by WiFi
WiFi Data Interface	transmitting counting data and others wireless

Beside this with the WiFi and Bluetooth adapter detailed Bluetooth tracking is available in parallel (such as BLE tokens).

The APS-90-Outdoor-POE has no USB connector, so there is no wireless USB adapter and no wireless services useable with this device.

3.2.10 Digital I/O

The device can use digital inputs for counting and digital outputs to signal count events or zone alerts.

Digital inputs and outputs are available on the following devices:

Device	Inputs	Outputs
APS-90E-IO	3	3
APS-180E-IO	3	3
APS-90-Outdoor-PoE	2	1
APS-90-IO-8GB	3	3
APS-180-IO-8GB	3	3

3.2.11 Remote access

Usually the generated data is sent to a central server in a remote location by protocols. This server will then perform data analytics. But these data protocols did not include a remote access e.g. for first setup or maintenance. The sensor itself in a shop behind a router and behind IPv4 NAT and firewalls is not accessible for a service and maintenance PC.

To solve this, we recommend a **Virtual Private Network** (VPN) that is shared by the sensor and the PC and a VPN service server. This VPN connections are like an additional virtual network with additional IP addresses in this network. The VPN connections are built up as secured encrypted tunnel thru standard networks as Ethernet including the Internet.

To start with this, we have a small demo server package, that could be used e.g. on a virtual machine (VM) with Ubuntu 18.04 to handle your list of sensors and service PCs.

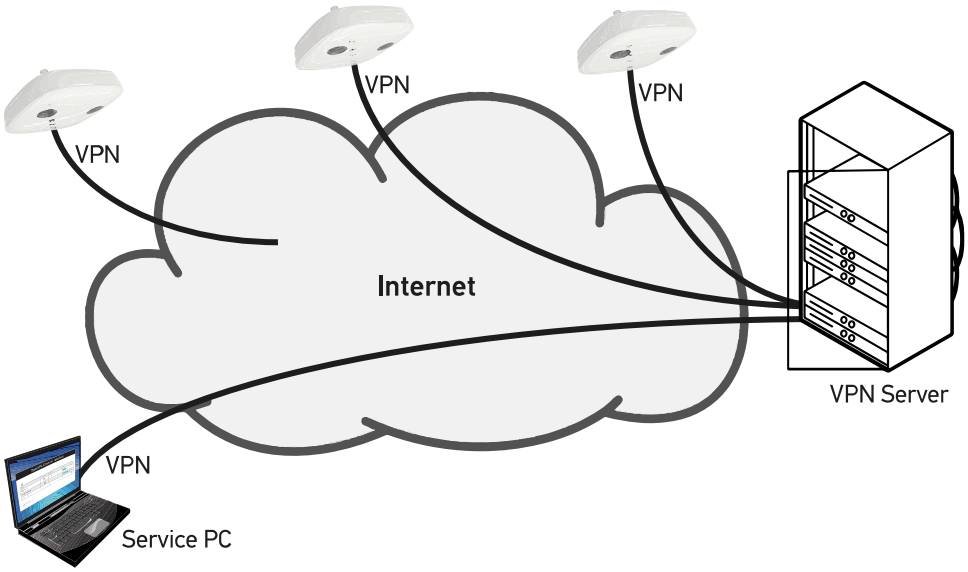


Fig.:

As software inside the sensor, at the VPN server and at your service PC **OpenVPN** is been used. See ➚ https://openvpn.net/.

3.3 Application areas

Indoor

The Advanced People Sensor APS-90 and APS-180 can be used in buildings for counting people in front of doors and passageways or in corridors and stairwells. Typical application areas are retail shops, showrooms, train stations and airports.

Another use is the acquisition and evaluation of the movement of persons in a certain area e.g in order to determine their length of stay.

Data is transferred via Ethernet or optional by WiFi.

Outdoor

For outdoor application such as theme parks, please use the APS-90-Outdoor-PoE or APS-180E with additional outdoor housing.

Data is transferred via Ethernet.

3.4 Interfaces

Interface / available data	User interface (HMI)	Digital Output	Data Recording (CSV)	Video Recording	REST poll	REST push	Push Service SOAP / XML	MQTT IBM Watson	Google Pub / Sub
counting line sum	X	X	X	X	X	X	X	X	X
count event	X	X		X			X		
zone fill & dwell	X			X	X		X		X
zone statistics			X		X	X	X	X	X
zone object list			X		X	X	X	X	X
zone alert	X	X				X	X	X	
object list	X			X			X		
wireless tracking			X		X	X	X	X	X
camera snapshots	X			X			X		
OSD	X		X			X	X	X	X
firmware update	X				X		X		

3.4.1 User interface

Upon delivery the device is set up to use DHCP to find a free IP address in the attached network.

At startup it sends requests for an IP address to a DHCP server (e.g. a router or a DHCP software such as OpenDHCP on your connected PC). The device startup is blocked until it gets an answer by the DHCP server with a usable IP address.

The used IP address can be found in the DHCP server (e.g. the web interface of your router or OpenDHCP).

Configuration

The device is configured by using the user interface, which is implemented as a web interface and can be accessed from a PC connected to the device through Ethernet. The connection is established using a browser with the IP address of the device entered in the address bar.

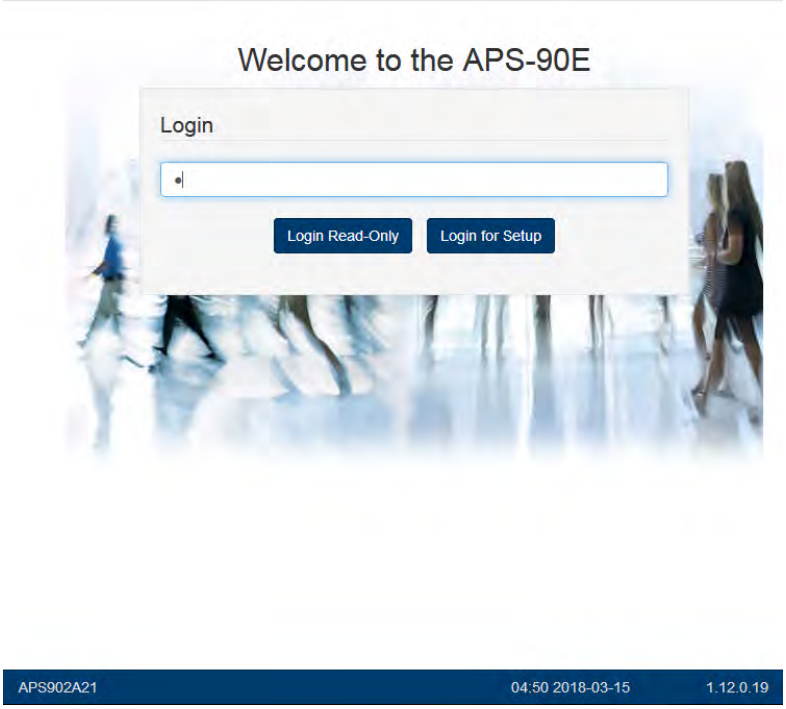


Fig. 27: User interface ('Login')

The device is password protected. There are two modes:

Login Read-Only	To read count values etc without the ability to change anything like the setup.
	The password by default is `user`
Login for Setup	for full access and to configure the setup.
	The password by default is `admin`

Operation

As soon as the installation, initial operation and configuration are completed, the Advanced People Sensor starts counting and tracking automatically without a PC.

The counting data is transferred via the corresponding configured interfaces.

3.4.2 Digital inputs / outputs

Digital Input

Digital inputs are available on the following devices:

Device	Digital inputs
APS-90E-IO	3
APS-180E-IO	3
APS-90-Outdoor-PoE	2
APS-90-IO-8GB	3
APS-180-IO-8GB	3

The digital input can be used instead of a counting line.

In this use case an external device sends an impulse as counting information. There is no distinction between incoming and outgoing counting or between adult and children.

Digital output

Digital outputs are available on the following devices:

Device	Digital inputs
APS-90E-IO	3
APS-180E-IO	3
APS-90-Outdoor-PoE	1
APS-90-IO-8GB	3
APS-180-IO-8GB	3

The digital output can be used to give a signal, if persons stay for some time in the monitored zone or if a defined number of persons are in the zone.

The digital output can be used to signal a count event.

3.4.3 Data File Recording

The counting results of the device can be logged periodically. The results are stored internally as text files in CSV format, and these counts are accumulated between each log. The results (with time stamp and other data) are written to the file with separate columns for each counting line.

Wireless tracking data can also be logged. This includes time stamps and the MAC address and signal strength of the scanned wireless devices (e.g. mobile phones).

Statistic Values for zone monitoring can be logged. This includes the number of objects, the maximum number of objects, the maximum length of stay of objects and the average length of stay of objects. The values (with time stamp and other data) are written to the file with separate rows for each monitored zone.

The files can be automatically uploaded by the file upload service to a ftp or sftp server. The device takes care of correctly uploading to the server. In situations of a network shortage or reboot (e.g. by power-off/-on), the device tries to resend all the files which were previously unsuccessfully sent.

The data recording function can be enabled or disabled using the user interface.

External systems can access the results that are stored internally on the device (via sftp) if required.

The format for the internal filenames are:

- **counting data**

  `[id]_[hostname]_data.csv`
- **countevent data**

  `[id]_[hostname]_countevent_data.csv`
- **wireless tracking data**

  `[id]_[hostname]_wirelesstracking_data.csv`
- **zone statistics data**

  `[id]_[hostname]_zonestatistics_data.csv`
- **zoneevent data**

  `[id]_[hostname]_zoneevent_data.csv`
- **zone objectlist data**

  `[id]_[hostname]_zoneobjlist_data.csv`

The files are found in the directory:

- /media/sdcard/HAGL/DFR/data
- /customdata/HAGL/DFR/data on discontinued devices without additional 8GB memory

It uses an id prefix - restarting at 999999 to 000000 - and contains the hostname which is by default "APS" and the last 6 letters of the MAC address.

Up to 8000 files and up to 100 MB can be stored.

Up to 4000 files and up to 2 MB of data can be stored on discontinued devices without additional 8GB memory.

Counting data

Example

Data file recording settings:

Counting line	"countA"
Completion interval	3 hours
Sample rate	15 min
License	without Object Classification license

record_id	timestamp	period	status	countA_SUM_IN	countA_SUM_OUT
13089	2020-04-01 18:15:00	900	"0"	42	7
13090	2020-04-01 18:30:00	900	"0"	0	2
13091	2020-04-01 18:45:00	900	"0"	3	5
13092	2020-04-01 19:00:00	900	"0"	8	0
13093	2020-04-01 19:15:00	900	"0"	13	21
13094	2020-04-01 19:30:00	900	"0"	34	0
13095	2020-04-01 19:45:00	900	"0"	0	55
13096	2020-04-01 20:00:00	900	"0"	0	0
13097	2020-04-01 20:15:00	900	"0"	0	89
13098	2020-04-01 20:30:00	900	"1"	0	0
13099	2020-04-01 20:45:00	900	"0"	144	0
13100	2020-04-01 21:00:00	900	"0"	0	233

record_id:	Unique ID for the data line (after ID 4294967295 it restarts with 0)
timestamp:	Timestamp of device is adjusted to local time when writing the data line
period:	Sample rate in seconds for the summation
status:	OSD status - see values below **0** OK **1** Error: covered (e.g. one sensor covered) **3** Error: illumination is too dark **5** Error: illumination is too bright
[count line name] _SUM_IN:	Summation of the incoming counts for "period" seconds at the time shown by the "timestamp"
[count line name] _SUM_OUT:	Summation of the outgoing counts for "period" seconds at the time shown by the "timestamp"

If the optional function "Object Classification" is available (by installing the license) the summations are separated into known classes and columns, so instead of the simple columns above (**[count line name]_SUM_IN** and **[count line name]_SUM_OUT**) they will be categorized instead as below:

[count line name] _Adult_IN:	Summation of the incoming adult counts
[count line name] _Adult_OUT:	Summation of the outgoing adult counts
[count line name] _Child_IN:	Summation of the incoming child counts
[count line name] _Child_OUT:	Summation of the outgoing child counts

When group counting or shopping cart counting is enabled, the following columns are added.

[count line name] _Group_IN:	Summation of the incoming group counts
[count line name] _Group_OUT:	Summation of the outgoing group counts
[count line name] _Cart_IN:	Summation of the incoming cart counts
[count line name] _Cart_OUT:	Summation of the outgoing cart counts

Countevent data

Example Data file recording settings:

Completion interval 15 min

record_id	timestamp	period	status	line	event_type	id	class
0	2020-04-01 14:30:15	216	"0"	Polyline0	Out	1740	Adult
1	2020-04-01 14:30:18	219	"0"	Polyline0	Out	0	Group
2	2020-04-01 14:35:19	455	"0"	Polyline0	In	1850	Adult
3	2020-04-01 14:35:11	507	"0"	Polyline0	In	0	Group

record_id: Unique ID for sample interval scanning cycle (after ID 4294967295 it restarts with 0)

timestamp: Timestamp of device is adjusted to the local time of the scanning cycle

period: Time since last record

status: OSD status - see values below
0 OK
1 Error: covered (e.g. one sensor covered)
3 Error: illumination is too dark
5 Error: illumination is too bright

line: Name of the counting line

event_type: Type of the counting event "In" or "Out"

id: Unique ID for the object

class: Classification Adult/Child/Group/Cart of the object

Wireless tracking data

Example

Data file recording settings:

Completion interval 15 min

Sample rate 30 sec

scan_id	timestamp	period	mac_addr	wireless_type_IN	signal_strength
5971	2020-04-01 14:30:15	30	84:8E:DF:01:23:45	WIFI	-43
5971	2020-04-01 14:30:15	30	94:65:9C:98:76:54	WIFI	-23
5971	2020-04-01 14:30:15	30	E0:C7:67:AB:CD:EF	WIFI	-78
5972	2020-04-01 14:30:45	30	64:CC:2E:AB:CD:EF	WIFI	-17
5972	2020-04-01 14:30:45	30	84:8E:DF:01:23:45	WIFI	-49
5972	2020-04-01 14:30:45	30	E0:C7:67:AB:CD:EF	WIFI	-47
some further lines of data...					
6000	2020-04-01 14:44:45	30	E0:C7:67:AB:CD:EF	WIFI	-64

scan_id: Unique ID for sample interval scanning cycle (after ID 4294967295 it restarts with 0)

timestamp: Timestamp of device is adjusted to the local time of the scanning cycle

period: Wireless tracking sample rate in seconds

mac_addr: MAC address of the detected wireless device as identification

wireless_type_IN: Type of wireless detection "WIFI" or "BLUETOOTH"

signal_strength: Signal strength between 0 and -100. A higher value indicates better signal strength (0 is good, -100 is bad).

Zone statistics data

Example

Data file recording settings:

Zone statistics completion interval	5 min
Monitored zones	EntranceZone
	ExitZone
Data recording completion interval	15 min

record_id	timestamp	period	status	zone	SUM_ count	SUM_m ax_fill_ level	SUM_m axDwell	SUM_m eanD- well
13089	2020-04-01 14:30:15	300	"0"	EntranceZone	17	4	22	4
13089	2020-04-01 14:30:15	300	"0"	ExitZone	10	7	1000	40
13090	2020-04-01 14:35:15	300	"0"	EntranceZone	150	5	5	5
13090	2020-04-01 14:35:15	300	"0"	ExitZone	160	7	30	45

record_id:	Unique ID for the data line
timestamp:	Timestamp of device is adjusted to the local time when writing the data line
period:	Zone statistics completion interval in seconds
status:	OSD status - see values below **0** OK **1** Error: covered (e.g. one sensor covered) **3** Error: illumination is too dark **5** Error: illumination is too bright
zone:	Name of the monitored zone
SUM_count:	Number of objects that were in the zone during the interval
SUM_max_fill_level:	Maximum number of objects that were simultaneously in the zone during the interval
SUM_maxDwell:	Maximum length of stay of objects in the zone that were in the zone during the interval
SUM_meanDwell:	Average length of stay of objects in the zone that were in the zone during the interval

If the optional function "Object Classification" is available (by installing the license) the summations are separated into known classes and columns, so instead of the simple columns above (**SUM_count**, **SUM_max_fill_level**, **SUM_maxDwell** and **SUM_meanDwell**) they will be categorized instead as below:

Adult_count:	Number of adults
Adult_max_fill_level:	Maximum number of adults that were simultaneously in the zone
Adult_maxDwell:	Maximum length of stay of adults in the zone
Adult_meanDwell:	Average length of stay of adults in the zone
Child_count:	Number of children
Child_max_fill_level:	Maximum number of children that were simultaneously in the zone
Child_maxDwell:	Maximum length of stay of children in the zone
Child_meanDwell:	Average length of stay of children in the zone

When cart counting is enabled, the following columns are added.

Cart_count:	Number of carts
Cart_max_fill_level:	Maximum number of carts that were simultaneously in the zone
Cart_maxDwell:	Maximum length of stay of carts in the zone
Cart_meanDwell:	Average length of stay of carts in the zone

Zone objectlist data

Example

A	B	C	D	E	F	G	H	I	J	K	L	M	N
0	2020-04-11 10:35:00	240	"0"	"inFloor"	4313	"Adult"	43	231	45	296	2020-04-11 10:32:46	2	139
0	2020-04-11 10:32:46	240	"0"	"inFloor"	5067	"Adult"	129	220	379	107	2020-04-11 10:33:52	2	182
0	2020-04-11 10:33:52	240	"0"	"inFloor"	5237	"Adult"	28	91	359	82	2020-04-11 10:34:05	3	155
0	2020-04-11 10:34:05	240	"0"	"InR206Front"	5278	"Adult"	235	40	185	18	2020-04-11 10:34:09	2	176
0	2020-04-11 10:34:09	240	"0"	"inFloor"	5278	"Adult"	335	143	185	18	2020-04-11 10:34:09	4	176
0	2020-04-11 10:34:09	240	"0"	"inFloor"	5298	"Adult"	16	134	354	85	2020-04-11 10:34:11	4	177

record_id:	(A) Unique ID for the data line
timestamp:	(B) Timestamp of device is adjusted to the local time when writing the data line
period:	(C) Zone objectlist completion interval in seconds
status:	(D) OSD status - see values below **0** OK **1** Error: covered (e.g. one sensor covered) **3** Error: illumination is too dark **5** Error: illumination is too bright
zone:	(E) Name of the monitored zone
id:	(F) Unique ID for the object
class:	(G) Classification adult/children/group/cart of the object
entry_position_x:	(H) X-coordinate when entering the zone
entry_position_y:	(I) Y-coordinate when entering the zone
exit_position_x:	(J) X-coordinate when leaving the zone
exit_position_y	(K) Y-coordinate when leaving the zone
exit_time:	(L) Timestamp when leaving the zone

dwell_time:	(M) Length of stay in the zone during the interval
height:	(N) Height of the object

Zoneevent data

Example

Data file recording settings:

Completion interval 15 min

record_id	timestamp	period	status	zone	event_type	id	class
0	2020-04-01 14:30:15	23	"0"	Zone0	Entry	2633	Adult
1	2020-04-01 14:30:15	23	"0"	Zone1	Entry	2633	Adult
2	2020-04-01 14:35:19	30	"0"	Zone0	Exit	2633	Adult
3	2020-04-01 14:35:19	30	"0"	Zone1	Exit	2633	Adult
4	2020-04-01 14:36:00	456	"0"	Zone0	Exit	2634	Unknown

record_id:	Unique ID for sample interval scanning cycle (after ID 4294967295 it restarts with 0)
timestamp:	Timestamp of device is adjusted to the local time of the scanning cycle
period:	Time since last record
status:	OSD status - see values below **0** OK **1** Error: covered (e.g. one sensor covered) **3** Error: illumination is too dark **5** Error: illumination is too bright
zone:	Name of the monitored zone
event_type:	Type of the zone event "Entry" or "Exit"
id:	Unique ID for the object
class:	Classification Adult/Child/Cart/Unknown of the object

3.4.4 REST API (poll)

Representational state transfer (REST) is a stateless software architecture that reads webpages containing XML. The integrated REST API answers to requests from a server.

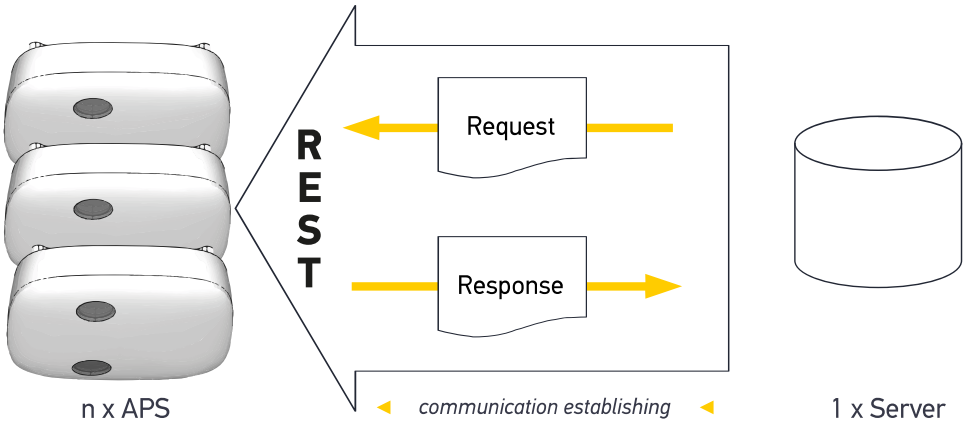


Fig. 28: APS server communication via REST

> ***No Part***
>
> *The server is not part of the HELLA Aglaia offer.*

> ***Detailed Information***
>
> *For detailed protocol information see the APS-RS-Manual-REST-API.*

3.4.5 REST Push

For intranets we have a polling interface named REST API. As it is usually not possible for a server to pull the data from a device in an in-store network, we established a push interface using REST with JSON containers called "REST Push".

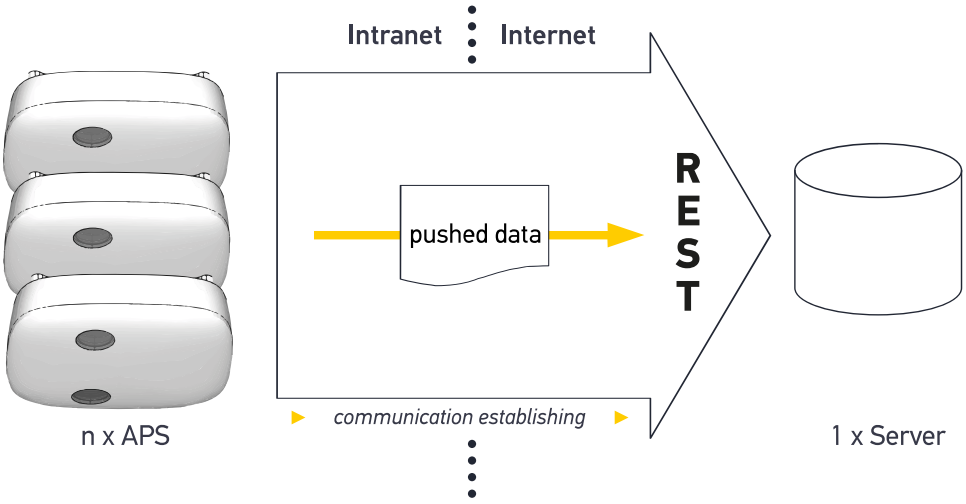


Fig. 29: APS server communication via REST Push

> ***No Part***
>
> *The server is not part of the HELLA Aglaia offer.*

> ***Detailed Information***
>
> *For detailed protocol information see the APS-RS-Manual-REST-Push.*

3.4.6 Push service via SOAP/XML

The device may be out of reach for the server through the Internet, e.g. inside a shop's Intranet due to firewalls and NATs. It is easier to establish one single server contactable for a fleet of devices through the Internet than the other way around. So the device fleet can build up the connection to a server themselves. The server response to the connection established by the device can contain newly invoked tasks. This method is commonly referred to as "inversion of control" similar to the "don't call us, we'll call you" concept.

The integrated Push Service communicates via Ethernet (TCP/IP protocol) with a server. The data is exchanged via the XML-based SOAP protocol encapsulated in http or https requests and responses.

If push services are enabled in the user interface, the device sends a request to the server to confirm the connection upon every device start-up. As a response to device messages the server can pass new tasks to the device e.g. to send counting messages every ten minutes.

> ***No Part***
>
> *The server is not part of the HELLA Aglaia offer.*

> ***Detailed Information***
>
> *For detailed protocol information see the APS-RS-Manual-Push-Service-via-SOAP.*

3.4.7 MQTT

The APS is a high precision people sensing device which generates people counts as well occupancy, dwell time and wireless logging information. This data on its own gives retailers already valuable insights into their customers behavior. However, it becomes even more useful, if it is combined with more data from other sources like POS, weather or traffic information.

For fusion and analytics of data from various sources a common platform is required. This platform shall provide easy access as well as tools to rapidly compose analytics applications. These requirements are met by the Watson IoT platform from IBM.

For integration of the device data into the Watson IoT platform the MQTT protocol has been implemented in the device.

> ***Detailed Information***
>
> *For more information and detailed protocol information see the "APS-RS Manual MQTT".*

3.4.8 Google Pub/Sub

A simple interface to push the data to the Google Cloud.

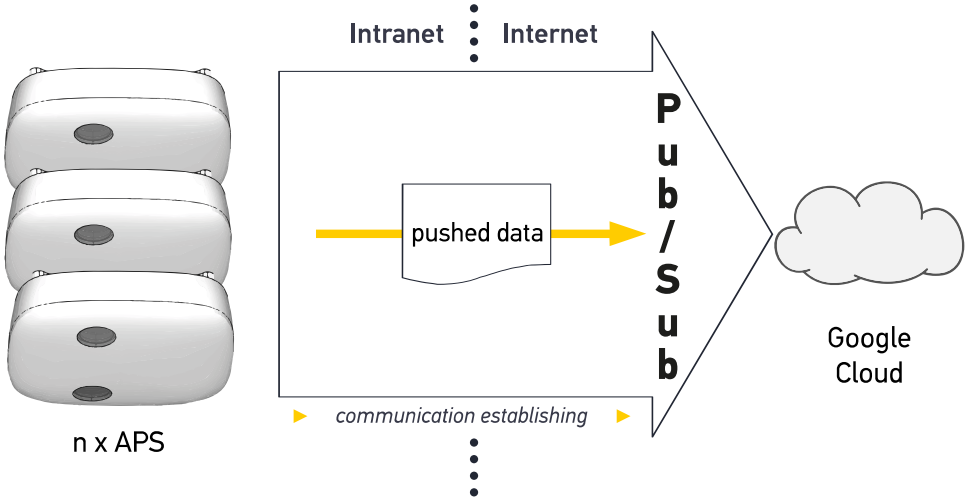


Fig. 30: Push Service to Google Cloud Platform

> ***Detailed Information***
>
> *For detailed protocol information see the APS-RS-Manual-Google-Pub_Sub.*

3.4.9 PS Platform

A simple interface to push the data to the PS Platform (PS.P).

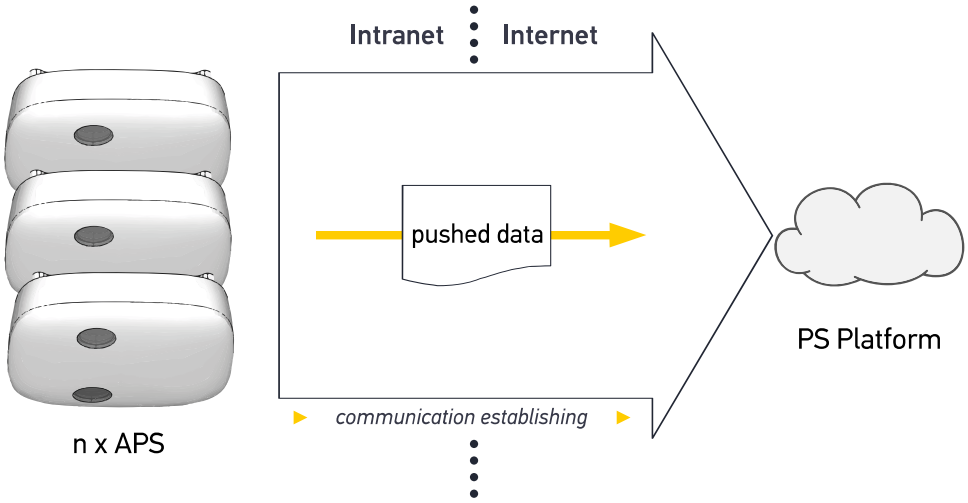


Fig. 31: Push Service to PS Platform

PS.P is an IoT platform for the collection and visualization of customer data. In addition, it is possible to configure the device in its basic functions.

4 Technical data

4.1 Mechanical data

4.1.1 APS-90

Category	Description
Dimensions	159.5 mm x 159.5 mm x 41.4 mm (6.3 in x 6.3 in x 1.7 in)
Weight	430 g (14 oz)
Material	Plastic & Aluminum (ADC12)

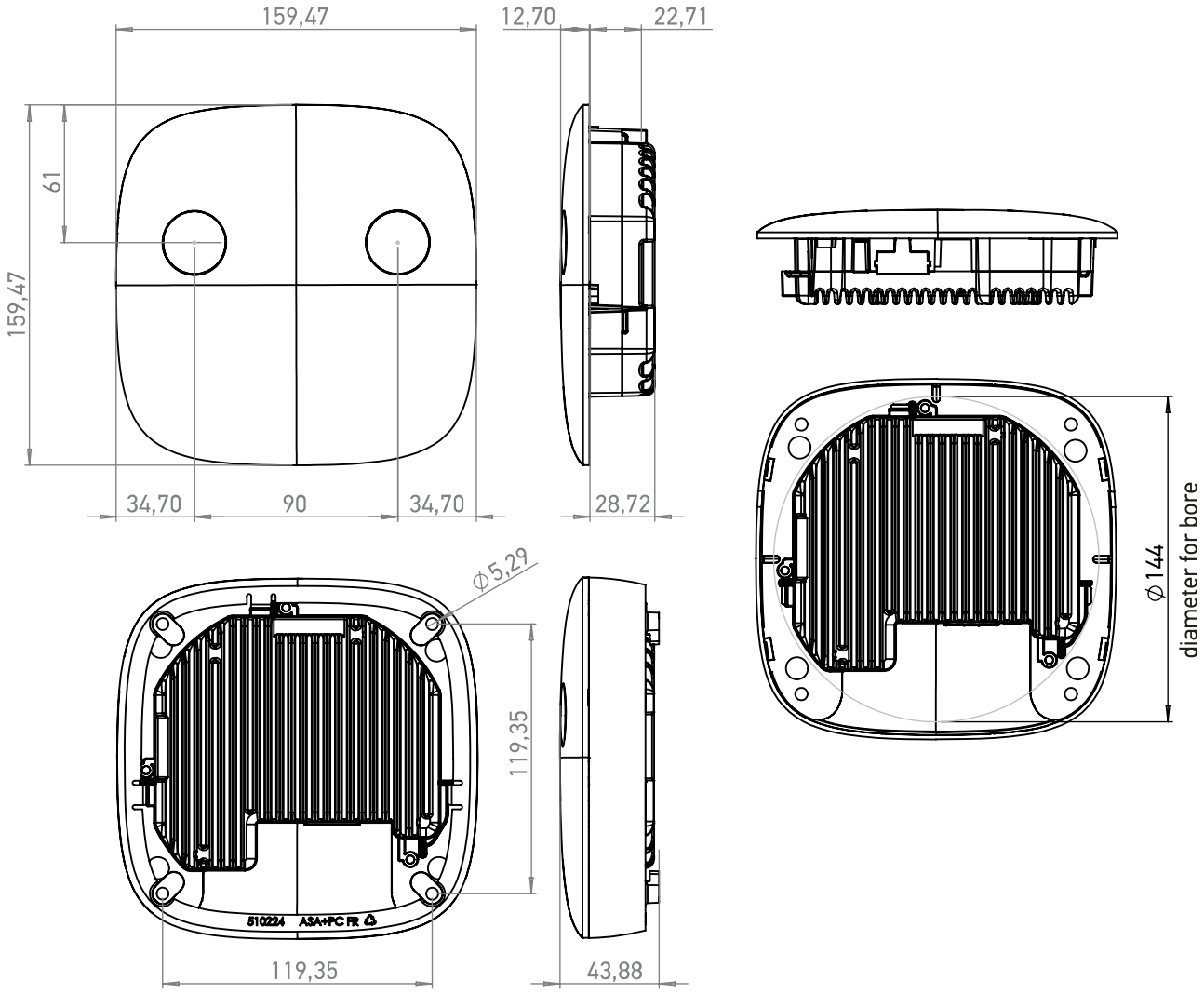


Fig. 32: APS-90 dimensions

4.1.2 APS-180

Category	Description
Dimensions	237.5 mm x 99.2 mm x 36.7 mm (9.3 in x 3.9 in x 1.5 in)
Weight	600 g (21 oz)
Material	Aluminum (ADC12)

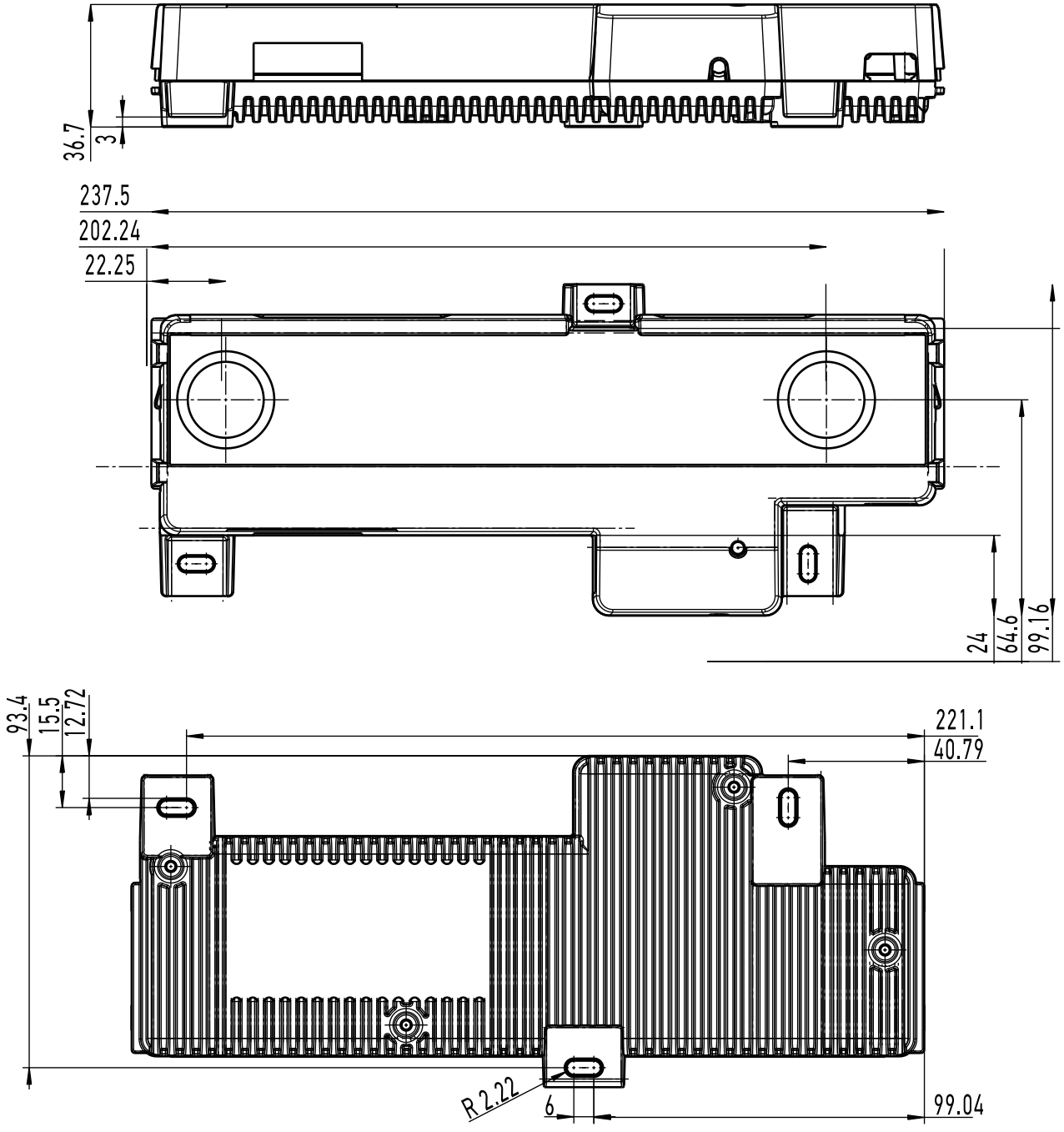


Fig. 33: APS-180 dimensions

4.1.3 APS-90-Outdoor-PoE

Category	Description
Dimensions	140.8 mm x 98.2 mm x 35.0 mm (5.54 in x 3.87 in x 1.38 in)
Weight	440 g (15.17 oz)
Material	Aluminum (ADC12)

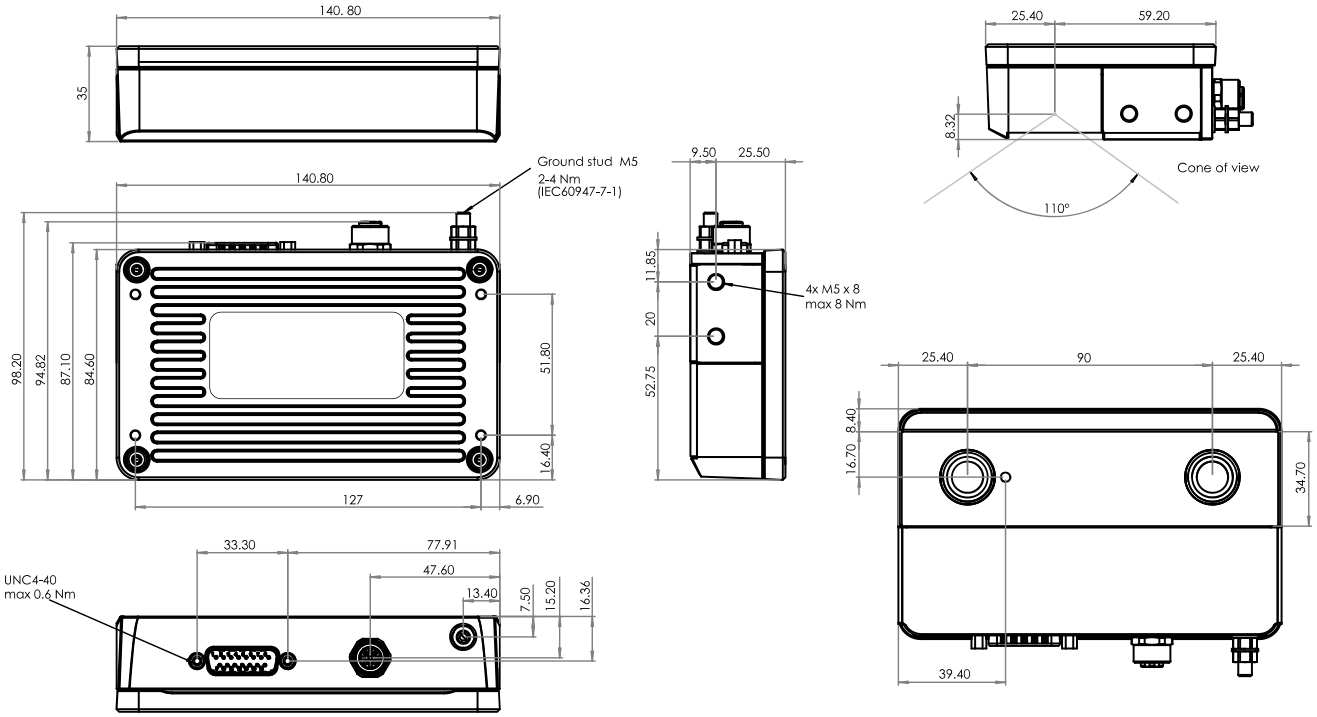


Fig. 34: APS-90-Outdoor-PoE dimensions

4.2 Hardware interface specifications

4.2.1 Ethernet

4.2.1.1 APS-90 and APS-180

Characteristics

Gigabit Ethernet with twisted pair cables, known as 1000BASE-T, IEEE 802.3 Clause 40 (earlier known as IEEE 802.3ab).

This is used in combination with Power over Ethernet (PoE) known as IEEE 802.3af (802.3at Type 1). The used power level class is 0 (0 - 4 mA, 0.44 - 12.96 W). This will also fit in the case of an optional connected USB device. The APS itself take only 6 W (power level class 2).

This Gigabit Ethernet interface serves for the communication of the APS with other devices within an Ethernet network. The interface is also used for connecting a PC in order to configure the device.

Pin allocation on device

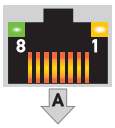


Fig. 35: RJ-45 Ethernet interface (arrow "A": optics orientation)

Pin no.	Name	Ethernet	PoE mode A	PoE mode B
1	TxRx A +	Transmit/Receive A (positive polarity)	DC +	
2	TxRx A –	Transmit/Receive A (negative polarity)	DC +	
3	TxRx B +	Transmit/Receive B (positive polarity)	DC –	
4	TxRx C +	Transmit/Receive C (positive polarity)		DC +
5	TxRx C –	Transmit/Receive C (negative polarity)		DC +
6	TxRx B –	Transmit/Receive B (negative polarity)	DC –	
7	TxRx D +	Transmit/Receive D (positive polarity)		DC –
8	TxRx D –	Transmit/Receive D (negative polarity)		DC –

Compatibility of APS-90, APS-180 and PoE switches

		APS-90, APS-180
		Port RJ45
PoE Switch	Port M12 D-coded (4pins)	✓
	Port M12 X-coded (8pins)	✓
	Port RJ45 "Mode A", "Midspan", "Phantom Feed"	✓
	Port RJ45 "Mode B", "Endspan", "Spare wire feed"	✓

4.2.1.2 APS-90-Outdoor-PoE

Characteristics

This interface serves for the communication of the device with other devices within an Ethernet network. The interface is also used for connecting a PC in order to configure the device.

Pin allocation on device

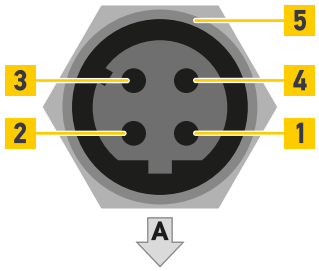


Fig. 36: M12 Ethernet interface ("A": optics orientation)

Pin no.	Name	Description
1	TD+	Transmit data +
2	RD+	Receive data +
3	TD-	Transmit data -
4	RD-	Receive data -
5	SHD	Shield

Compatibility of APS-90-Outdoor-PoE and PoE switches

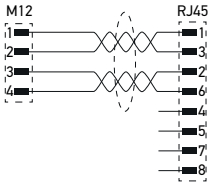


Fig. 37: Ethernet Cable M12 to RJ45

		APS-90-Outdoor-PoE
		Port M12 D-coded (4 pins)
PoE Switch	Port M12 D-coded (4pins)	✓
	Port M12 X-coded (8pins)	✗
	Port RJ45 "Mode A", "Midspan", "Phantom Feed"	✓
	Port RJ45 "Mode B", "Endspan", "Spare wire feed"	✗

4.2.2 I/O Port

4.2.2.1 APS-90E-IO and APS-90-IO

Pin allocation on device

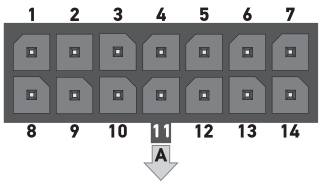


Fig. 38: 14pin I/O interface (arrow "A": optics orientation)

Pin no.	Name	Description
1	PWRIN+	DC voltage supply + (alternative to PoE, 18 ... 29 V)
2	IN1+	Programmable input +
3	IN2+	Programmable input +
4	IN3+	Programmable input +
5	OUT1+	Programmable output +
6	OUT2+	Programmable output +

Pin no.	Name	Description
7	OUT3+	Programmable output +
8	PWRIN-	DC voltage supply - (alternative to PoE, 18 ... 29 V)
9	IN1-	Programmable input -
10	IN2-	Programmable input -
11	IN3-	Programmable input -
12	OUT1-	Programmable output -
13	OUT2-	Programmable output -
14	OUT3-	Programmable output -

	Description	Example
Connector	Micro-Fit 3.0 Receptacle Housing, Dual Row, 14 Circuits, UL 94V-0, Black	Molex: 430251400
Crimp terminal	Micro-Fit 3.0 Crimp Terminal, Female, with Tin (Sn) Plated Phosphor Bronze Contact, 20-24 AWG, Reel	Molex: 430300001
Crimp tool	Hand Crimp Tool	Molex: 638190000

4.2.2.2 APS-180E-IO and APS-180-IO

Pin allocation on device

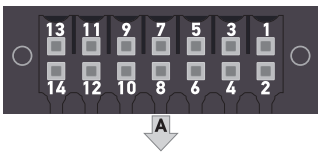


Fig. 39: 14pin I/O interface (arrow "A": optics orientation)

Pin no.	Name	Description
1	OUT3-	Programmable output -
2	OUT3+	Programmable output +
3	OUT2-	Programmable output -
4	OUT2+	Programmable output +
5	OUT1-	Programmable output -
6	OUT1+	Programmable output +
7	IN3-	Programmable input -
8	IN3+	Programmable input +

Pin no.	Name	Description
9	IN2-	Programmable input -
10	IN2+	Programmable input +
11	IN1-	Programmable input -
12	IN1+	Programmable input +
13	PWRIN-	DC voltage supply - (alternative to PoE, 18 ... 29 V)
14	PWRIN+	DC voltage supply + (alternative to PoE, 18 ... 29 V)

	Description	Example
Connector	PCB plug-in connector, female plug, 3.50 mm, No. of poles: 14, 180°, PUSH IN, Tension-clamp connection, Clamping range, max. : 1.5 mm^2, Box	Weidmüller: 1277520000 B2CF 3.50/14/180 SN BK BX

4.2.2.3 APS-90-Outdoor-PoE

Pin allocation on device

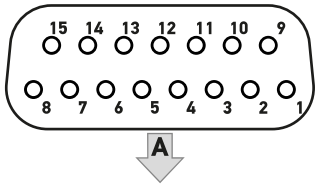


Fig. 40: D-SUB I/O Interface ("A": optics orientation)

Pin no.	Name	Description
1	Reset	Reset Pin (leave open, only required for corrective maintenance)
2	OUT1 +	Programmable output +, potential-free
3	IN1 +	Programmable input +, potential-free
4	IN2 +	Programmable input +, potential-free
5	DID4 A	Code jumper 4 (DID = "Door Identification")
6	DID3 A	Code jumper 3
7	DID2 A	Code jumper 2
8	DID1 A	Code jumper 1
9	OUT1 -	Programmable output -, potential-free
10	IN1 -	Programmable input -, potential-free
11	IN2 -	Programmable input -, potential-free
12	DID4 B	Code jumper 4
13	DID3 B	Code jumper 3
14	DID2 B	Code jumper 2
15	DID1 B	Code jumper 1

4.2.3 USB

Characteristics

This USB 2.0 interface (Hi-Speed, max. 480 MBit/s) is intended for connecting storage media and other devices.

Pin allocation on device

Fig. 41: USB interface (arrow "A": optics orientation for APS-180)

Pin no.	Name	Description
1	VCC	5 V, max. 500 mA
2	D-	Data -
3	D+	Data +
4	GND	Ground

4.3 Electrical data

Supply voltage

Category	Description
Input voltage U_{PoE} (PD class 0) via Ethernet	36 .. 57 V DC
Power consumption P_{IN} (without USB load)	6 W (125 mA at 48 V DC)

Ethernet

	APS-90 APS-180	APS-90-Outdoor-PoE
Transfer rate	100 / 1000 MBit/s	10 / 100 MBit/s
Cable length, maximum	100 m (328 ft)	
Connector type (APS/PC)	RJ-45	M12 D-coded, 4-pin, female

USB

	APS-90 APS-180	APS-90-Outdoor-PoE
USB type	USB 2.0 type host	-
Connector type (APS/PC)	Type-A	-

4.4 Optical data

Category	Description
Image resolution	640 x 480 px, color
Aperture	1.8
Focal length	2.6 mm (0.10 in)
Angle of view	110° diagonal 100° horizontal
Light sensitivity, minimum	3 lx, HDR

4.5 Environmental conditions

Category	APS-180E	APS-90 APS-180	APS-90-Outdoor-PoE
Operating temperature (ambient temperature housing)	-25 to 70 °C (-13 to 158 °F)	0 to 55 °C (32 to 131 °F)	-25 to 70 °C (-13 to 158 °F)
Storage temperature (when device is switched off)	-40 to 85 °C (-40 to 185 °F)		
Relative humidity (non-condensing)	0 .. 90%		95% .. 100% short-time maximum (relative)
Ingress protection (DIN IEC 60529)	IP40		IP65 in conjunction with appropriate mating connectors
Illuminance, minimum	3 lx		

4.6 Product labels

Identification Label

Fig. 42: Identification label

The identification plate contains the following information:

1	Manufacturer name	2	Production country
3	Production date	4	Serial number / MAC address
5	Certification markings (e.g. CE)	6	Preinstalled licenses
7	Software / Firmware version	8	Hardware model
9	Part number	10	Product name (e.g. APS-180-IO-8GB)
11	Manufacturer logo		

Do Not Open Label

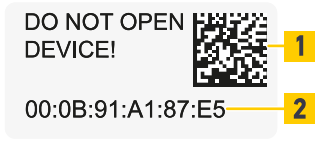


Fig. 43: Do Not Open Label

The small label with the warning "DO NOT OPEN DEVICE!" at the side of the device with data matrix code (Fig. 43 /1) provides the serial number/MAC address (Fig. 43 /2) and some production information in encoded form.

> ***Do not open***
>
> *Opening the device will void the warranty.*

After assembly, all devices are calibrated. Opening the device changes the assembly conditions so that the calibration is invalid.

During production it is possible that the lenses are positioned slightly off the center of the housing cutouts. This is intentional and does not influence the function or quality of the unit.

5 Installation

5.1 Requirements

Mounting position

Consider the following requirements when selecting the mounting position:

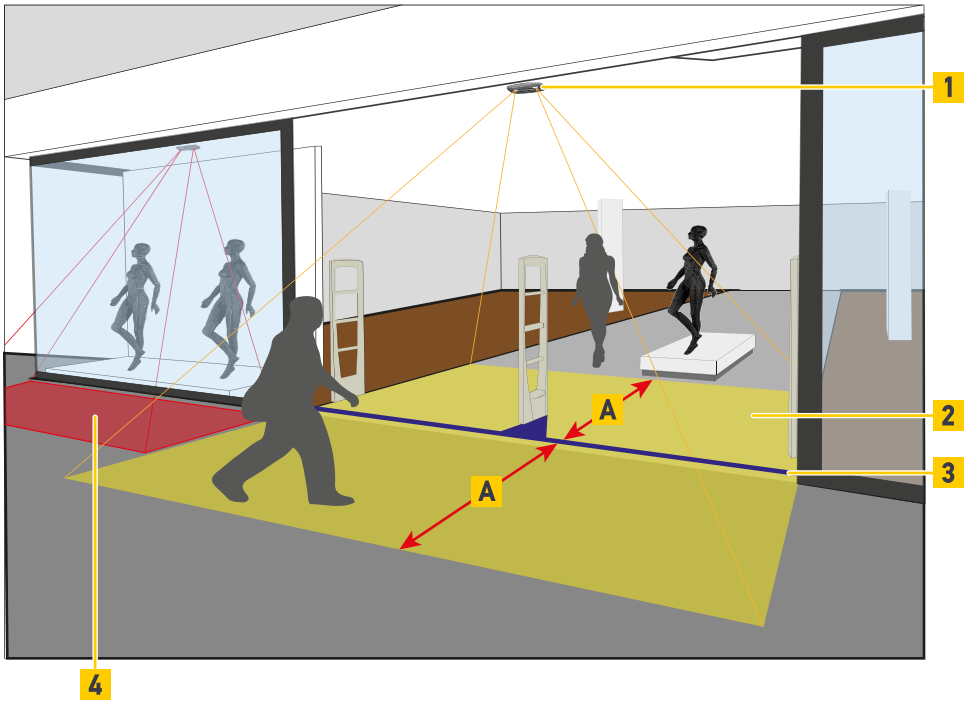


Fig. 44: Mounting position

- Ensure that the mounting position and the holder / protective housing provide sufficient stability.
- Ensure that the mounting position is in the right place:
  - As much as possible, the view between the device and people's heads should be unobstructed.
  - As much as possible, the monitored area (Fig. 44 /2) must be free of interfering objects.
  - The flow of persons in a monitored area should be through the center.
  - Place the device (Fig. 44 /1) above the end of the door swing area, because the counting lines must be set around that door swing area.
  - Place the device at least 30 to 50 cm (11.8 to 19.7 in) away from a wall with sliding doors, because a minimum clearance of 30 to 50 cm (11.8 to 19.7 in) (Fig. 44 /A) must be observed between the counting lines (Fig. 44 /3) and the entrance for tracking people.
  - For counting line applications there must not be any point of interest (Fig. 44 /4) in the counting area, i.e. no place where people are encouraged to linger (sales counter, coat stands, info stands, etc.), because tracking may be lost e.g. due to persons bending down or interacting with objects
- Ensure that there are no sight restrictions.

If the view in the visual range is impaired, the obstructed area can be defined.

- Ensure that the area is sufficiently illuminated.

Mounting parameters

	APS-90	APS-180	APS-90-Outdoor-PoE
Mounting height	2.0 .. 6.0 m (6.6 ... 19.7 ft)	3.0 .. 9.0 m (9.8 ... 29.5 ft)	2.0 .. 6.0 m (6.6 ... 19.7 ft)
Mounting pitch angle α	-45° .. 0 .. 45°		
Mounting yaw angle β	-45° .. 0 .. 45°		
Distance from the door, optimal	30 .. 50 cm (11.8 to 19.7 in)		
Lateral alignment	centered in the passage area		

Consider the following parameters when positioning the device:

The device has an integrated tilt measurement, therefore there is no need to use an extra angle measuring device. The pitch (Fig. 45 /α) and yaw (Fig. 45 /β) angles allow values up to 45°. Keep in mind that this maximum angle value is not very useful, because at the camera edges you will see up to the horizon and small people may be obstructed by bigger people. 30° is a more realistic suggestion as a useful maximum.

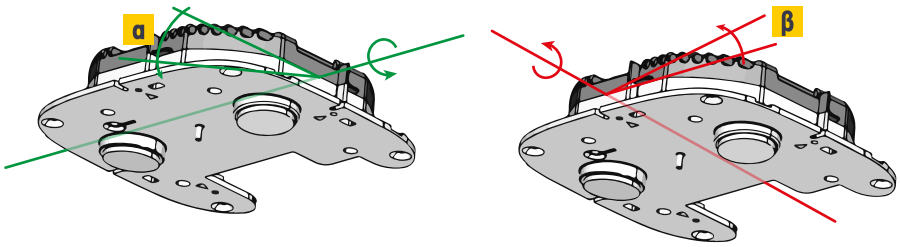


Fig. 45: Mounting position (angles)

The reference plane for the mounting height is the floor directly beneath the device. The device can approximate measure it's own mounting height, if there is a big enough visible floor area . Be prepared to use a distance measuring device as backup. Measure the mounting height from the base to the optics.

Table 1: Monitored area (detailed information ➚ Chapter 9.1 Detection area on page 151)

Installation height		Width (X)		Depth (Z)	
[m]	[ft]	[m]	[ft]	[m]	[ft]
2.00	6.56	1.85	6.07	1.60	5.25
3.00	9.84	3.90	12.80	3.30	10.83
4.00	13.12	6.00	19.69	5.05	16.57
5.00	16.40	8.00	26.25	6.80	22.31
6.00	19.69	8.00	26.25	8.00	26.25

5.2 Mounting the APS-90

5.2.1 Surface mounting

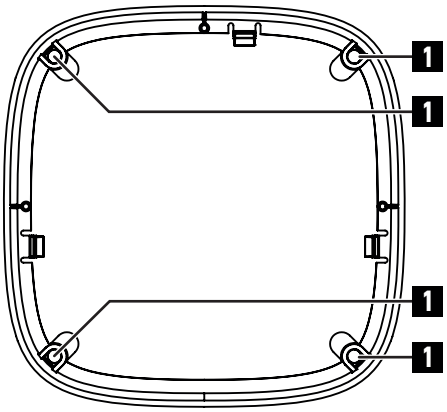


Fig. 46: Fixing Points

1. Fix the APS-90 surface mount box to the ceiling.
2. Attach the ethernet cable to the APS-90

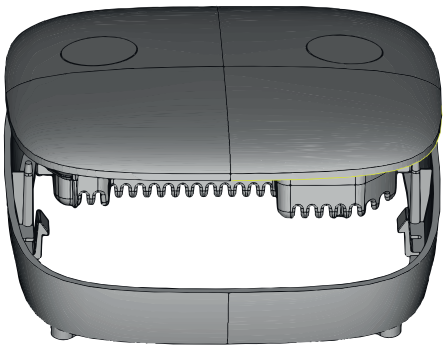


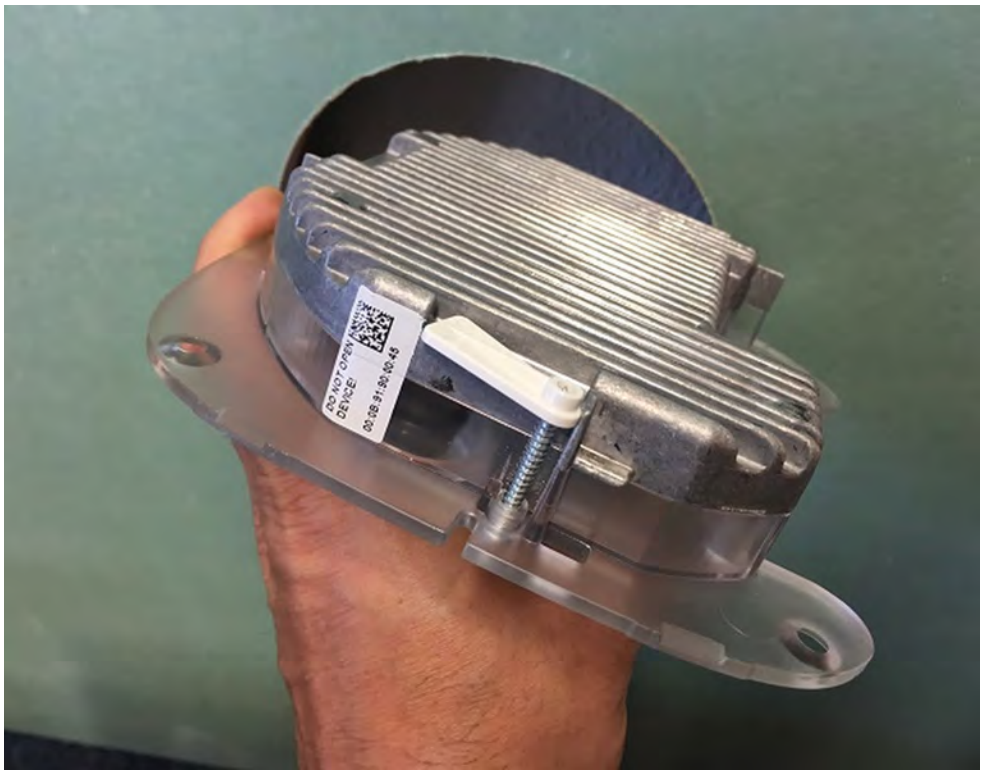
Fig. 47: Mount the device into the mount box

3. Click the APS-90 with faceplate into place in the surface mount box.

> ***Observe sequence***
>
> *To unmount it, first remove the faceplate and then open the three clips of the surface mount box.*

5.2.2 Recessed mounting

1. Drill a hole of 144 - 150 mm (5.6 - 5.9 in).



2. Mount the three screws and flaps, and rotate the flaps so they are tucked in close to the counter body.

3. Fix it with the three screws and flaps - or the 4 screw holes depending to the ceiling material.

4. Attach the ethernet cable.

5. Mount the faceplate.

5.3 Mounting the APS-180

5.3.1 Surface mounting

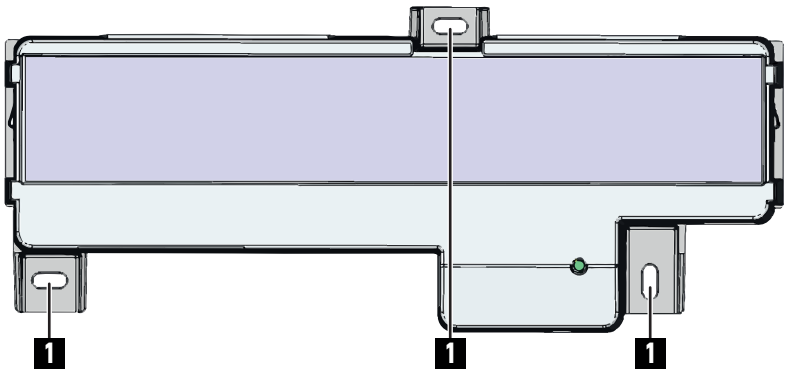
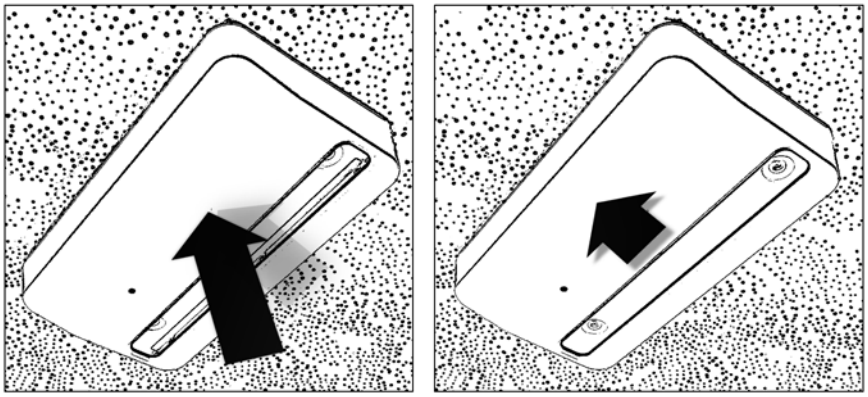


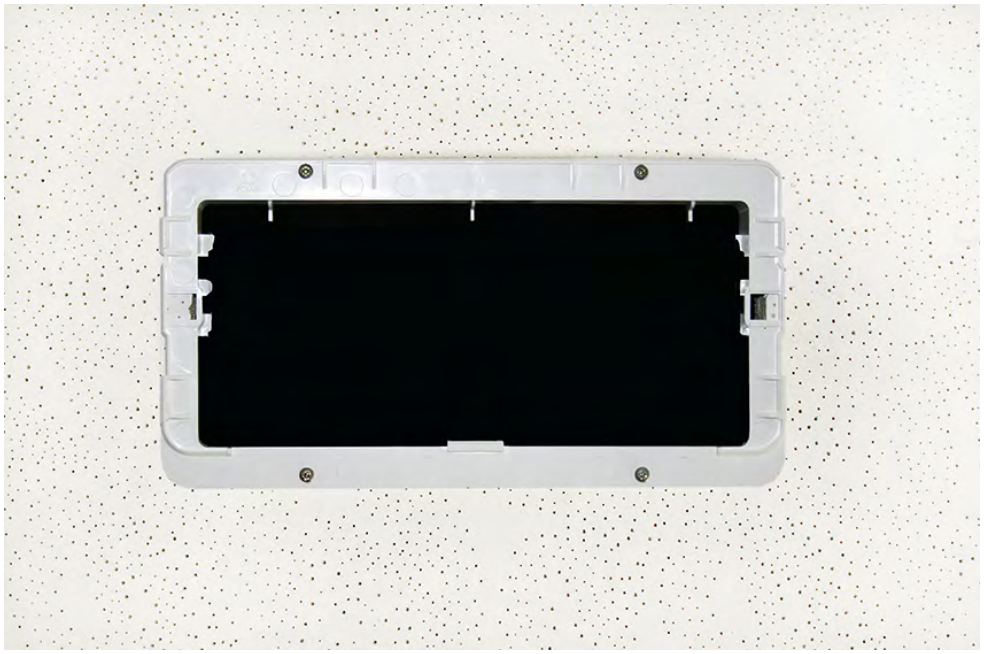
Fig. 48: Fixing points

1. Fix the APS-180 to the ceiling.
2. Attach the ethernet cable to the APS-180.

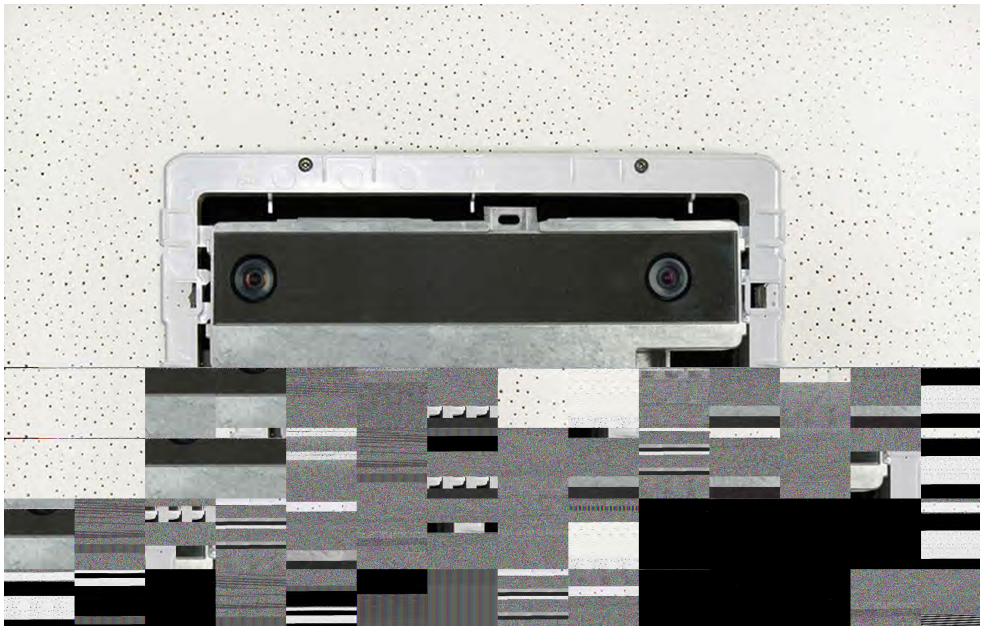


3. To mount the cover of the APS-180 put the hood on and slide it in.

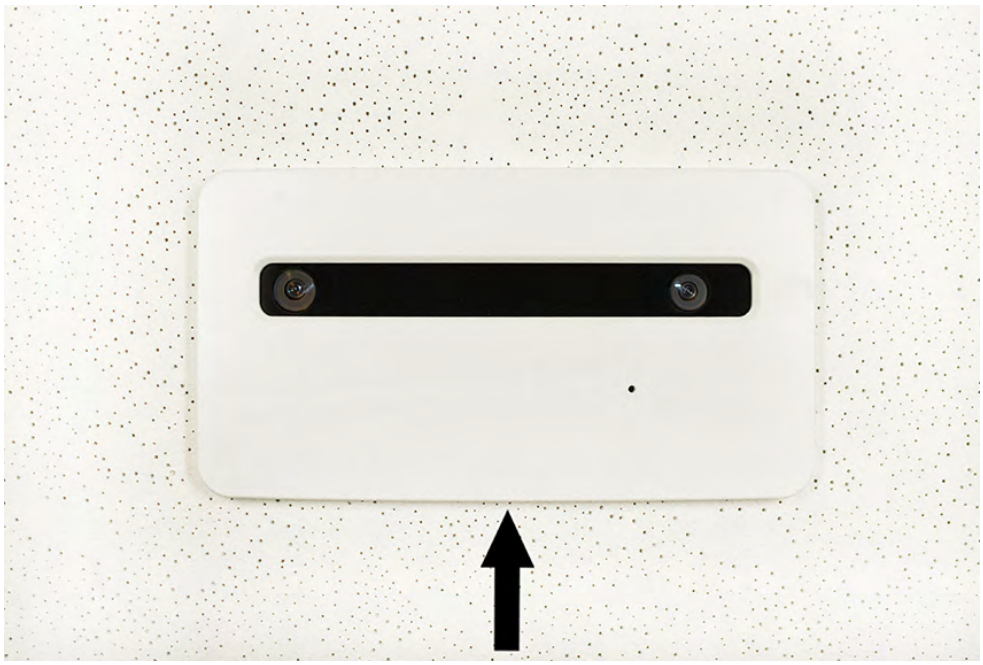
5.3.2 Recessed mounting



1. Mount the bracket inside the ceiling.



2. Click the APS-180 into place and attach the ethernet cable.



3. To install the cover of the APS-180 put the hood on and slide it in by hand.

5.4 Wiring examples

5.4.1 APS-90E-IO and APS-90-IO

Digital input with an IR-sensor

The following example shows a wiring diagram with an infrared sensor as digital input.

Observe the following electrical limit values:

I_{max} = *100 mA*

U_{max} = *30 VDC*

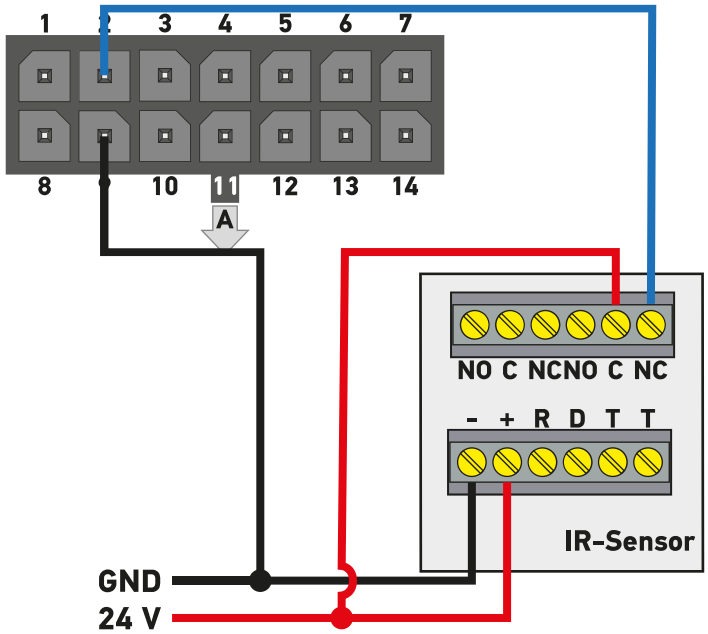


Fig. 49: APS-90 Digital input with an IR-sensor

Digital output with potential-free contacts

The following examples shows wiring diagrams for the potential-free digital output contacts.

Observe the following electrical limit values:

I_{max} = *100 mA*

U_{max} = *30 VDC*

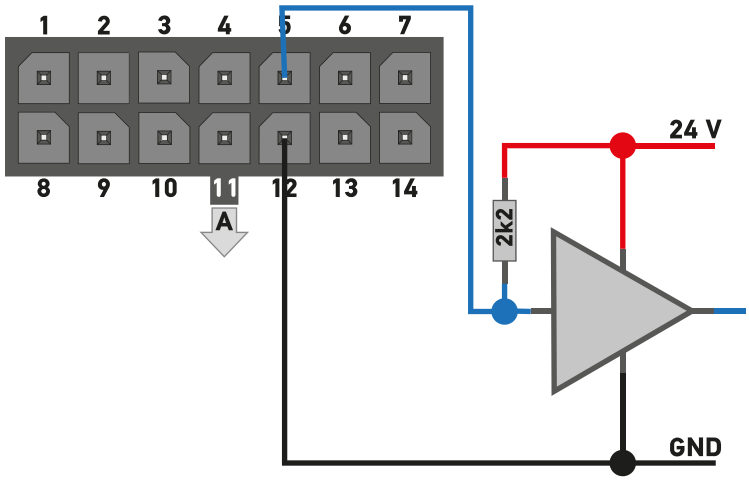


Fig. 50: APS-90 Digital output with potential-free contacts

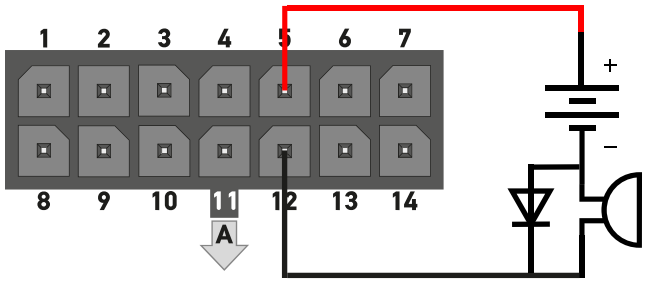


Fig. 51: APS-90 Digital output with buzzer

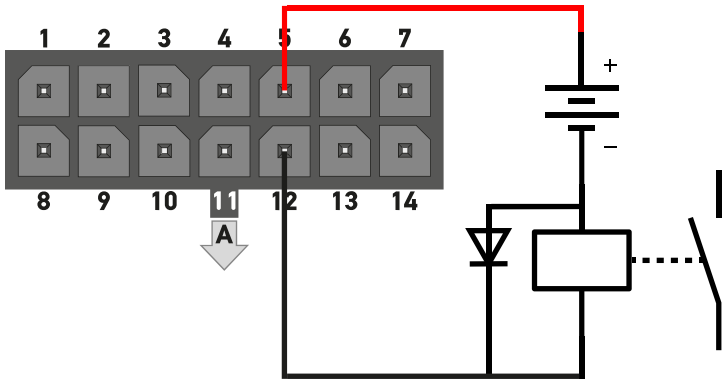


Fig. 52: APS-90 Digital output with relay

5.4.2 APS-180E-IO and APS-180-IO

Digital input with an IR-sensor

The following example shows a wiring diagram with an infrared sensor as digital input.

Observe the following electrical limit values:

I_{max} = *100 mA*

U_{max} = *30 VDC*

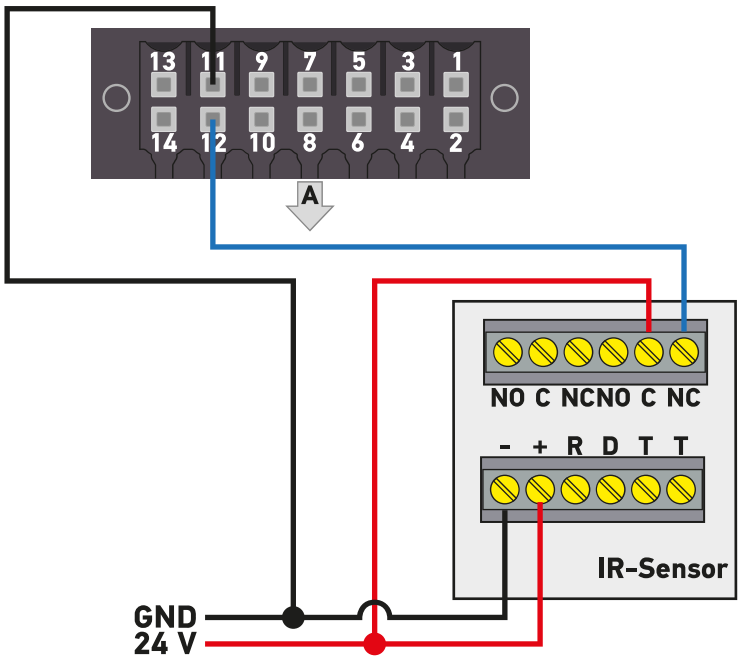


Fig. 53: Digital input with an IR-sensor

Digital output with potential-free contacts

The following examples shows wiring diagrams for the potential-free digital output contacts.

Observe the following electrical limit values:

I_{max} = 100 mA

U_{max} = 30 VDC

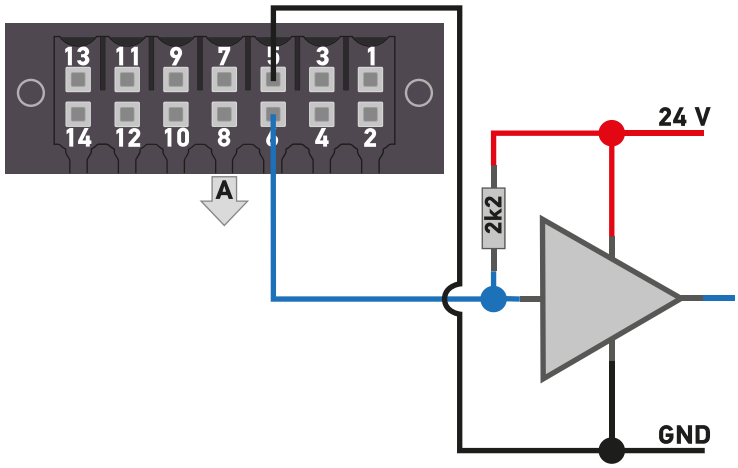


Fig. 54: APS-180 Digital output with potential-free contacts

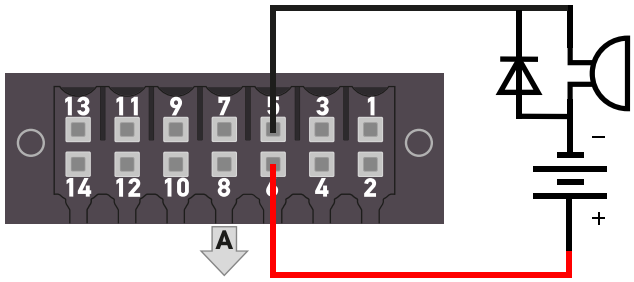


Fig. 55: APS-180 Digital output with buzzer

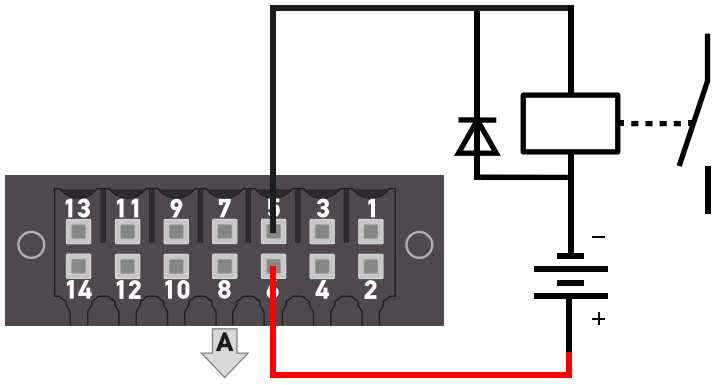


Fig. 56: APS-180 Digital output with relay

5.4.3 APS-90-Outdoor-PoE

Digital input with an IR-sensor

The following example shows a wiring diagram with an infrared sensor as digital input.

Observe the following electrical limit values:

I_{max} = 100 mA

U_{max} = 30 VDC

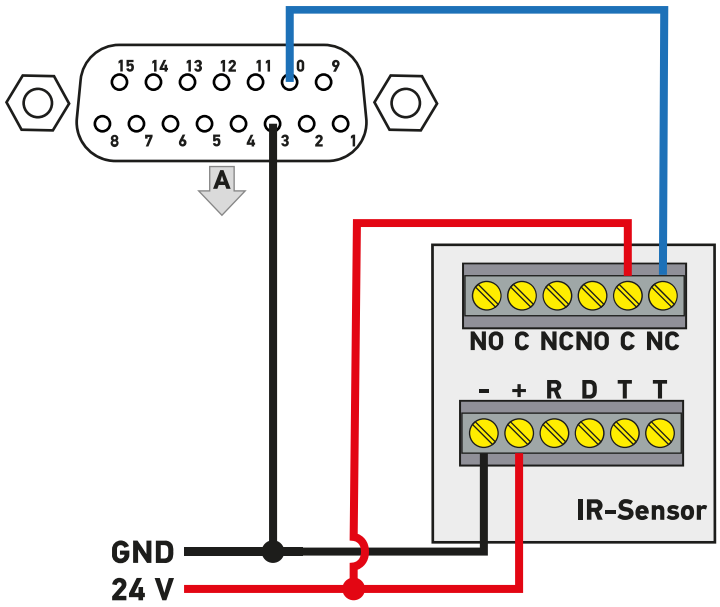


Fig. 57: Digital input with an IR-sensor

Digital output with potential-free contacts

The following examples shows wiring diagrams for the potential-free digital output contacts.

Observe the following electrical limit values:

I_{max} = 100 mA

U_{max} = 30 VDC

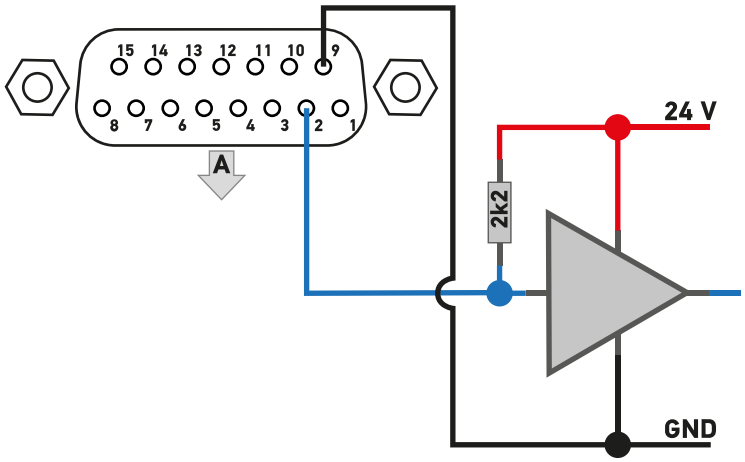


Fig. 58: APS-Outdoor Digital output with potential-free contacts

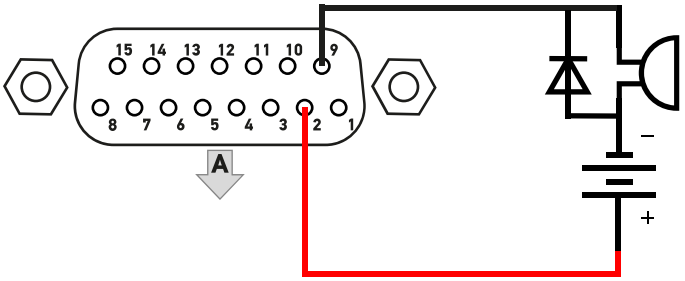


Fig. 59: APS-Outdoor Digital output with buzzer

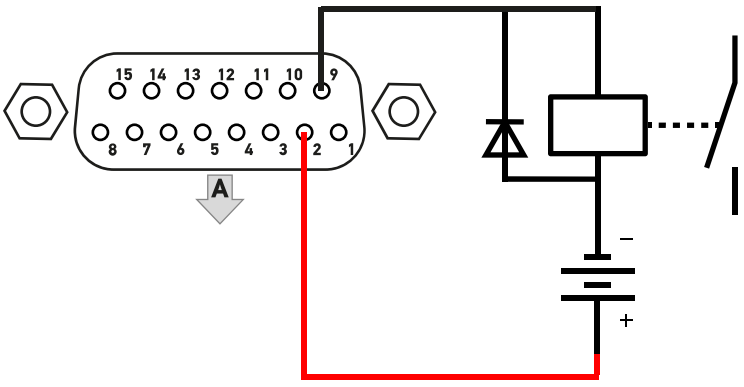


Fig. 60: APS-Outdoor Digital output with relay

5.5 Multi Sensor Fusion

Up to 10 sensors can be merged to monitor large areas.

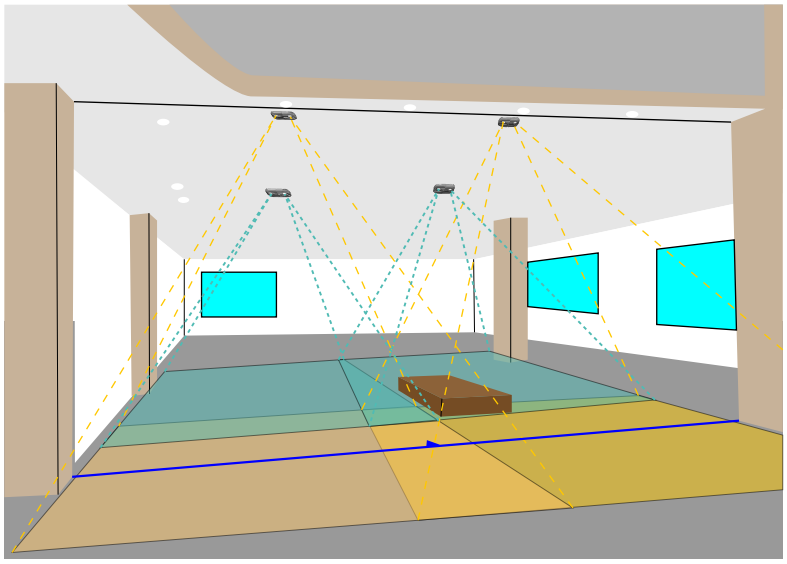


Fig. 61: Fusion of 4 sensors

In this sensor array it is possible to define up to 10 counting lines and up to 8 monitored zones.

Fusing sensors means one device is defined as Master (Fig. 62 /M). The other devices are defined as slaves (Fig. 62 /S).

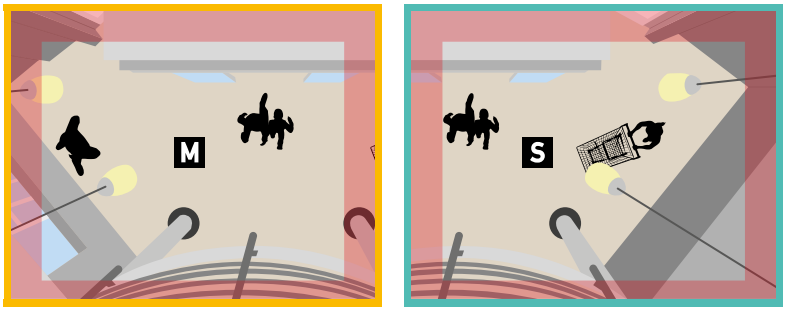


Fig. 62: View of master device and slave device

Requirements

- For the selection of the installation site it is important that the monitored areas of the individual devices overlap by at least 100 cm or 3.3 ft (Fig. 63 /1).
- DNS Service Discovery is available in the network.
- All devices have activated DNS-SD.

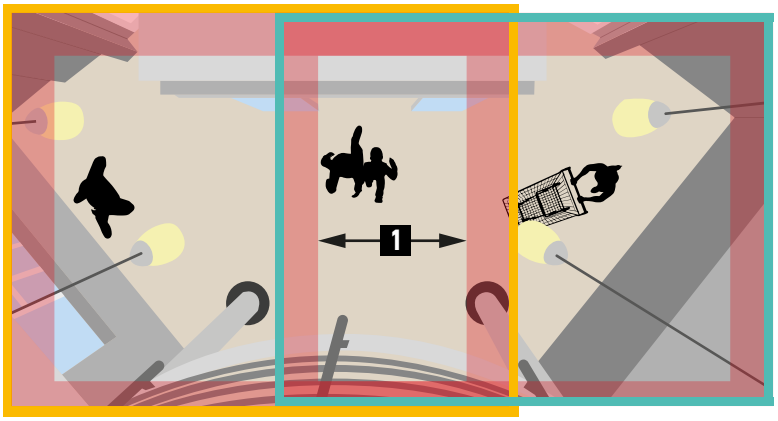


Fig. 63: Overlapping of areas

Installation

To perform a Multi Sensor Fusion proceed as follows:

Installation of all devices

1. Calculate the position of the devices.
2. Install the devices.
3. Configure the devices with the installation height and the pitch and yaw angle.
4. Configure the floor area of the devices.
5. Activate DNS-SD for all devices.

Basic configuration master

Configuring the master

1. Configure one device as master.
2. Scan for slave devices.

   ➡ List of all devices in the network are shown.
3. Select all slave devices.

Basic configuration slaves

Configuring the slaves

1. Configure a slave device as slaves.
2. Scan for Master device.
   ➡ List of all master devices is shown.
3. Select the master device.
   ➡ The status of the connection changes to working.
4. Repeat for all other slaves

Automatic configuration

The automatic configuration determines the positions and arrangement of the devices in relation to each other.

The automatic configuration has 2 modes:

Random Motion	Preferred mode. A great number of people are walking through the area. This variant can take place during normal operation, but it takes longer. The time depends on the number of people.
Controlled Path	A few people walk on defined paths through the area. This variant is faster, but it needs an empty area. The walking people have to stay 2 s or more in the overlapping areas of the devices. The path depends on the array (↗ Examples for controlled path on page 82).

1. Select the master device.
   ➡ The status of the slave devices has changed to unconfigured.
2. Start Automatic Configuration.
   ➡ When the configuration is finished the status of the slaves changes to configured.
3. Configure the counting lines and monitored zones.

Examples for controlled path

Start in one direction, turn around and repeat till the status of the slave devices is configured. Stay 2 s or longer in the overlapping areas (0).

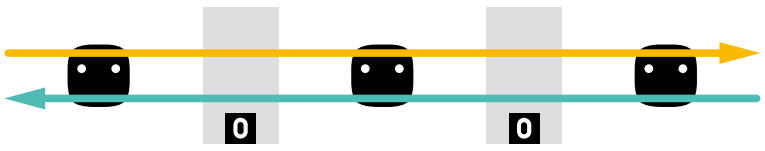


Fig. 64: Straight line

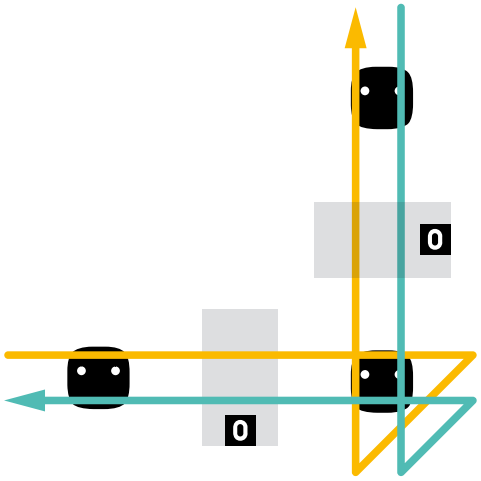


Fig. 65: Around a corner

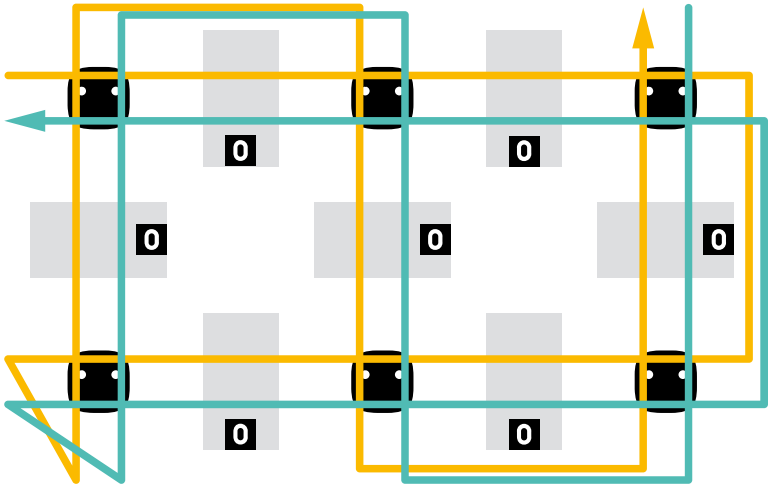


Fig. 66: Multiple overlaps parallel lines

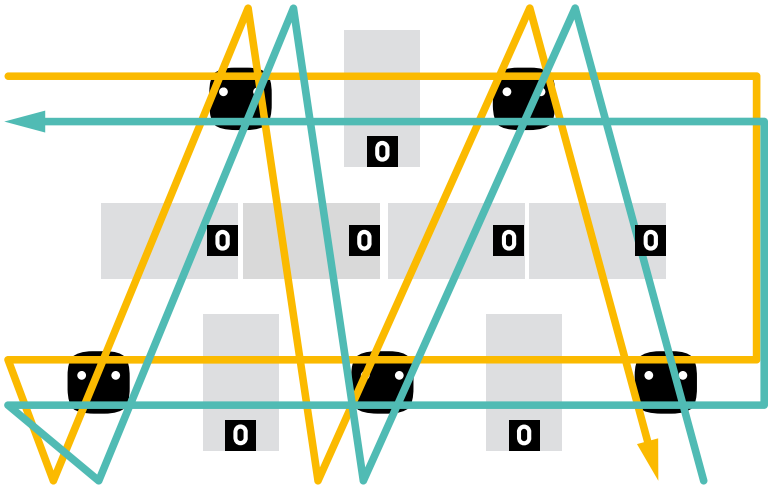


Fig. 67: Multiple overlaps staggered lines

6 Configuration

6.1 Preparation

The equipment needed for configuration corresponds to the installation.

- Ethernet switch with PoE or only a PoE injector
- Ethernet cables (min. spec cat 5) with standard RJ45 connectors or M12 connector
- Router with DHCP in the network or otherwise a PC or tablet running a DHCP server (e.g. OpenDHCP).
- PC or tablet with latest web browser supporting HTML5 and WebSockets.

The device has a web based user interface for configuration.

Upon delivery the device is set up to use DHCP to find a free IP address in the attached network.

Initially, a request for an IP address is sent from the device to the DHCP server. Startup is blocked until the device gets an answer from the DHCP server with a usable IP address.

1. Connect the device with Ethernet cable via the PoE switch or injector to the PC or tablet.
2. Switch on the power supply for the device.

   ➡ The device will indicate the startup process with the LED. LED red on starting up for approx. 10 sec, LED is blinking in green during the complete startup process, LED is blinking in yellow while waiting for DHCP, at the end of startup LED green for approx. 6 sec and then normally off.

6.1.1 Determine the IP address in the DHCP server

1. Access your router or DHCP Software to find the IP address used by the device.
2. Search for the unique MAC address of the device.

   ➡ The MAC address starts with 00:0b:91 for HELLA Aglaia devices.

Open DHCP Server Version 1.64 Windows Build 1041

http://dhcpserver.sourceforge.net

Active Leases

Mac Address	IP	Lease Expiry	Hostname (first 20 chars)
00:0b:91:80:02:27	192.168.100.32	01-Sep-19 08:00:03	APS800227

Free Dynamic Leases

DHCP Range	Available Leases	Free Leases
192.168.100.32 - 192.168.100.39	8	6

Fig. 68: Fetching the used IP address (example)

6.1.2 Determine the IP address without the DHCP server

If there is no access to the DHCP server, you can find out the IP address via Bonjour SDK. This tool is often available through printer drivers on the PC. It can also be installed via ➚ http://www.dns-sd.org/ClientSetup.html.

Find out the hostname

1. Open the Windows command shell.
2. Type: `dns-sd -Z _aps`

   ➡ All APS are listed.
3. Type: <CTRL>+<c>

Example

```
C:\Users\myself>dns-sd -Z _aps
Browsing for _aps._tcp

_aps._tcp            PTR  olf901948._aps._tcp
olf901948._aps._tcp  SRV  0 0 0
                          APS901948.local.
olf901948._aps._tcp  TXT  "Version=1.18.0.1"
                          "Mode=Standalone"
                          "Hostname=APS901948"
^C
```

Find out the IP address for a hostname

1. Open the Windows command shell.
2. Type: `dns-sd -G v4 APS901948.local`

   ➡ The IP address of the APS is listed.
3. Type: <CTRL>+<c>

Example

```
C:\Users\myself>dns-sd -G v4  APS901948.local
Timestamp     A/R Flags if Hostname
       Address                                TTL
11:11:45.744  Add     2 17 APS901948.local.
       192.168.100.32                         120
^C
```

6.1.3 Connect the APS

1. Start a web browser and enter the IP address (e.g. 192.168.100.32).

   ➡ The welcome screen of the device appears.

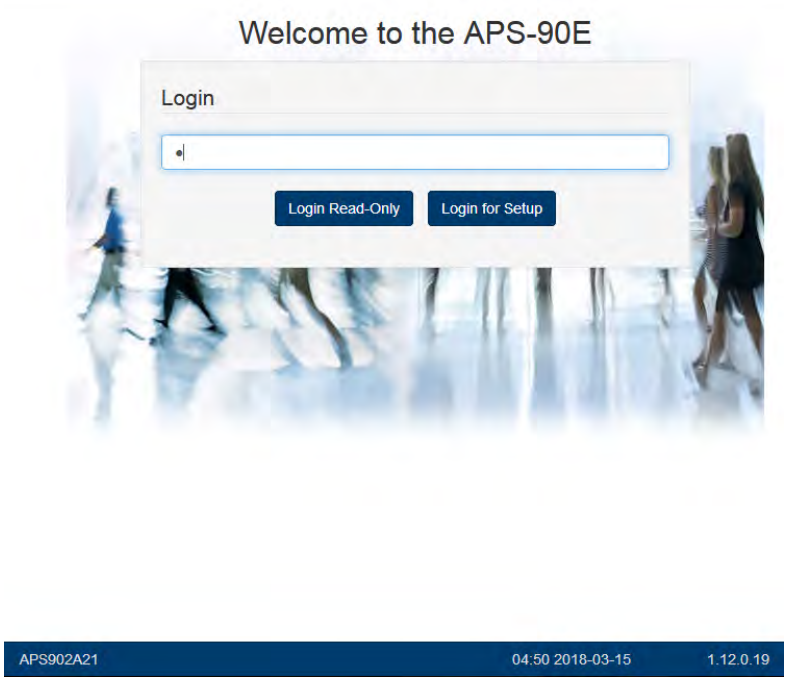


Fig. 69: Welcome screen and login

2. Enter login password depending on whether Login Read- Only or Login for Setup access is needed. Click the corresponding login button.

> ***Changing password***
>
> *The password can be changed in the configuration. The default passwords are:*
>
> - ***user*** *for Login Read-Only.*
> - ***admin*** *for Login for Setup.*

   ➡ The device home page with live view appears.

6.2 Basic Operations

The device has a web based user interface for configuration. During configuration, a browser window refresh can cause the loss of unsaved settings from the current view.

The design of the user interface is responsive. The appearance of the user interface depends on the used configuration device. All user interface figures shown in this manual are given only as an example.

After Login the Start Page appears.

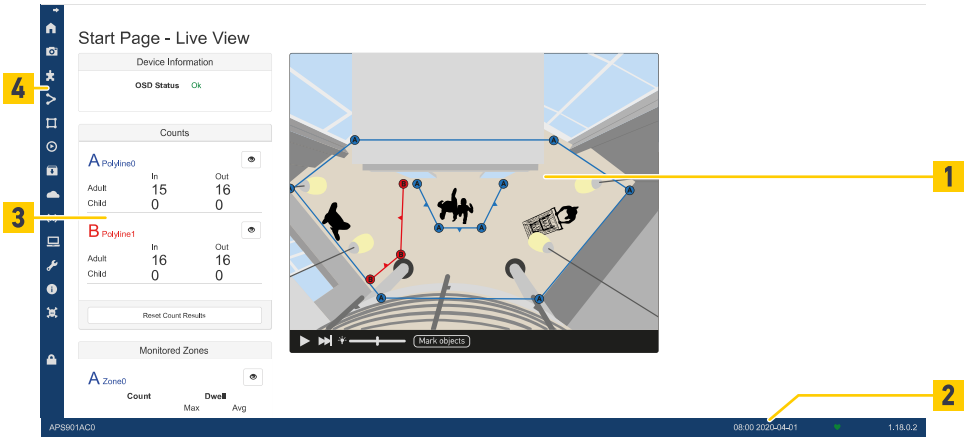


Fig. 70: Start Page

1	Camera View	2	Status Bar
3	Topic block	4	Navigation Bar

6.2.1 Camera view

Some of the menu categories use a camera view to configure areas or lines. This view can be a live view or a still image.

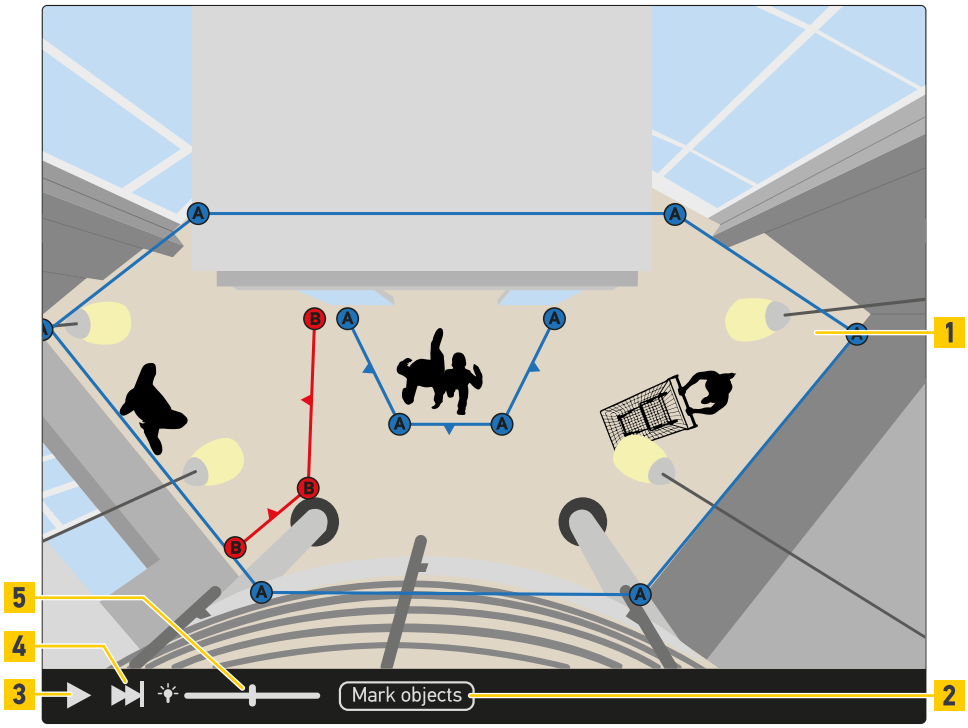


Fig. 71: Camera view

1	Camera View	2	Show/Hide button for overlay information
3	Play button to show live view	4	Forward button to refresh still image
5	Slider control for brightness		

6.2.2 Status bar

The user interface has a status bar below.

Fig. 72: Status bar

1	Hostname of the device	2	Date and time on the device
3	Web interface to sensor connection status indicated by a heart Connection OK: heart flashing green-grey Connection stopped: heart in red	4	Firmware version

6.2.3 Topic block

After selecting a menu category the related configuration page opens. In each menu category several topics are summarized as topic blocks. These topic blocks will automatically reposition and resize based on the zoom level. If the user is zoomed in very close, all other topic blocks can be viewed using the scroll bar.

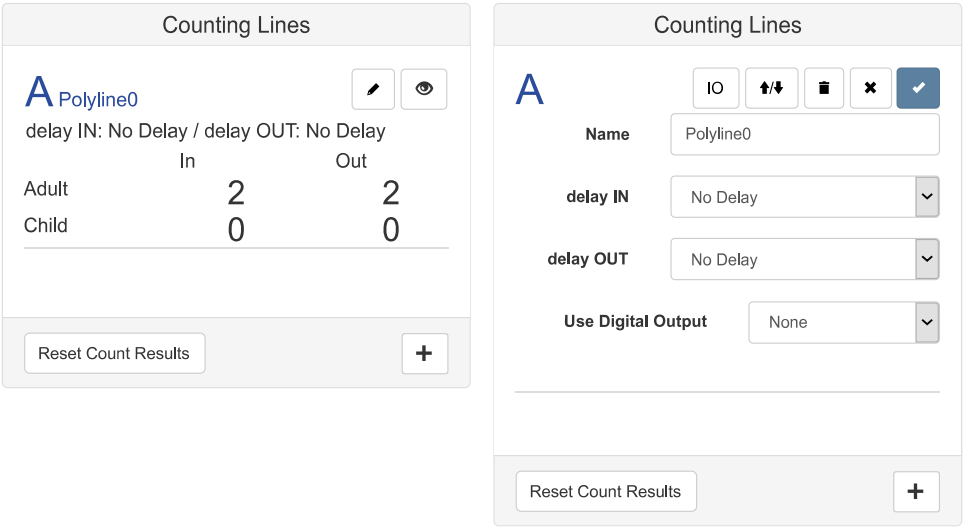


Fig. 73: Topic block Counting Line before and after activation Edit

The information shown in a topic block correspond to the activation of options. Topic blocks contains input fields, activation buttons and buttons for saving data or to revert to previous settings.

6.2.4 Navigation bar

The user interface has a navigation bar on the left. Use the arrow icon to expand or collapse the navigation bar.

Some of the icons only appear if a corresponding license file is installed.

Select an icon to go to a certain configuration category. Select the Home icon to go to the Start Page (see Fig. 70).

 	Switches between the navigation bar with icons and the complete navigation bar with icons and texts.
 	Select the Start Page - Live View page (↗ Further information on page 92).
 	Select the Camera Position Setup page (↗ Further information on page 96).
 	Select the Multi Sensor Fusion Setup page (↗ Chapter 6.5 Multi Sensor Fusion on page 101).
 	Select the People Counting Setup page (↗ Chapter 6.6 Counting on page 105).
 	Select the Zone Monitoring Setup page (↗ Chapter 6.7 Zone Monitoring on page 108).
 	Select the Video Service Settings page (↗ Chapter 6.8 Video on page 111).
 	Select the Data Interface Settings page (↗ Chapter 6.9 Data Interface on page 114).
 	Select the Network Communication Settings page (↗ Chapter 6.10 Network on page 120).
 	Select the Wireless Services Settings page (↗ Chapter 6.11 Wireless Services on page 126).
 	Select the Other Settings page (↗ Chapter 6.12 Other Settings on page 132).
 	Select the Service Tools page (↗ Chapter 6.13 Service Tools on page 135).
 	Select the General Information page (↗ Chapter 6.14 About on page 139).
 	Select the Diagnostics and Test Images page (↗ Chapter 6.15 Diagnostics on page 143).
 	Log out from the device.

6.2.5 Changing Values, Areas and Lines

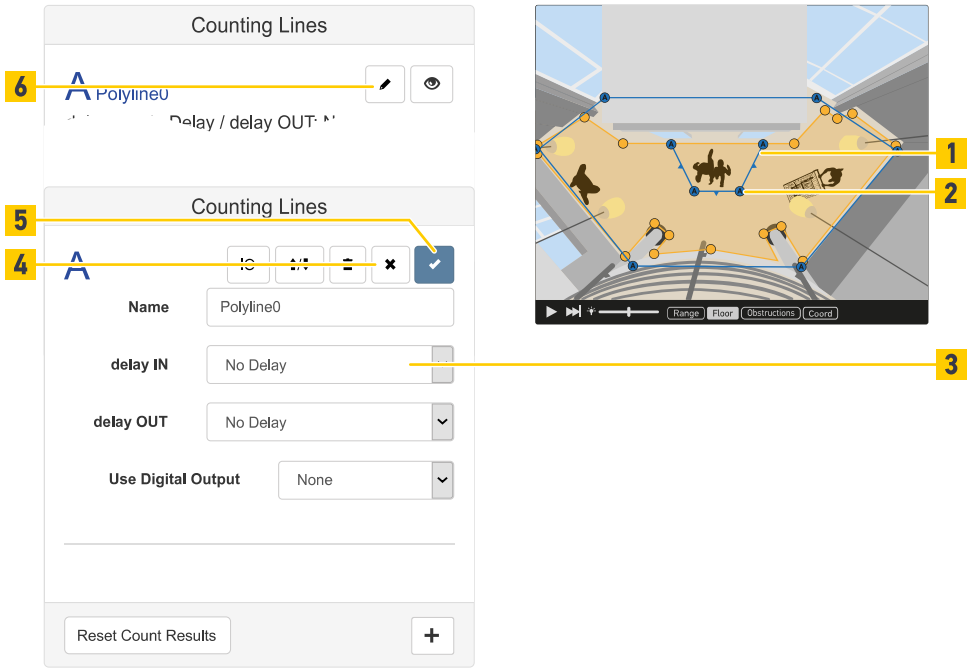


Fig. 74: Configuration options

Changing Values

1. To go to the next input field (Fig. 74 /3) or button click in an input field or use the *<tab>* key.
2. Edit the entry or choose from a list of values.
   - ➡ If the entered value is outside the permissible value range, the input field is outlined in red and in some cases a corresponding error message will appear.
3. To apply the new settings click the ✓ button (Fig. 74 /5). To revert to previous settings click the × button (Fig. 74 /4).

Changing Areas and Lines

1. Click the ✎ button (Fig. 74 /6).
   - ➡ Editing is possible in the corresponding overlay view showing in the camera view.
2. To move a polygon point (Fig. 74 /2) click and hold it.
3. To remove a polygon point double click it.
4. To add a new polygon point double click a polygon line (Fig. 74 /1).
5. To apply the new settings click the ✓ button (Fig. 74 /5). To revert to previous settings click the × button (Fig. 74 /4).

6.3 Start Page - live view

To go to the Start Page - Live View page click the home icon (Fig. 75 /1). This page appears after Login and shows a camera view, the status of the device and counting information.

If a license is installed the counting information is distinguished between adult and child.

If a license is installed it shows information about monitored zones.

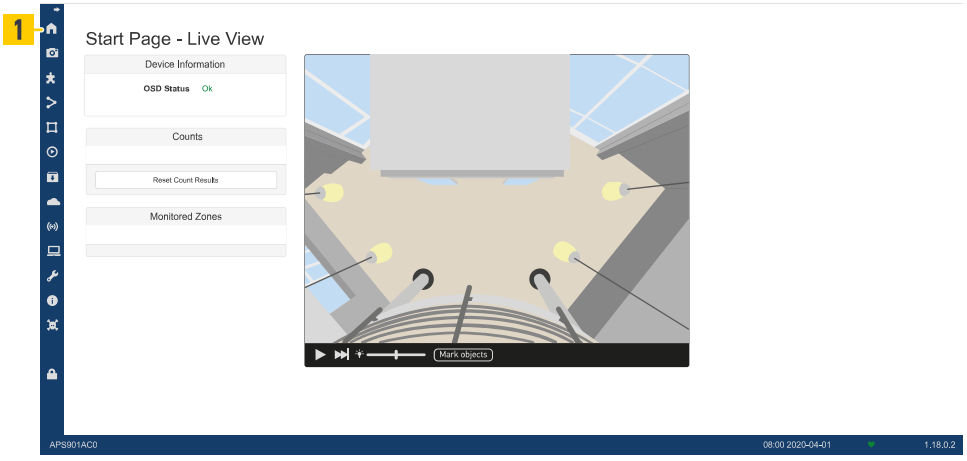


Fig. 75: Start Page - Live View

6.3.1 Camera view

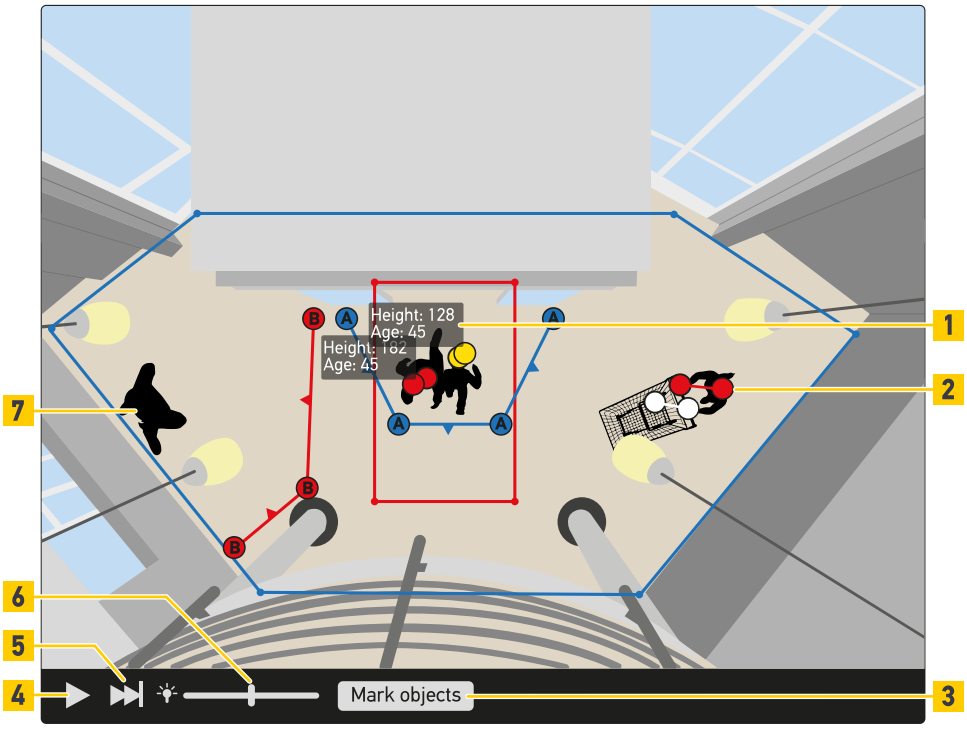


Fig. 76: Camera View

- For a live view click the ▶ button (Fig. 76 /4). The ▶ button changes to a ❚❚ button during live view.
- To refresh view if live view is paused click the ⏭ button (Fig. 76 /5). The ⏭ button is deactivated during live view.
- To change the brightness of the live view use the slider control (Fig. 76 /6). Slide to the right for a brighter view. Slide to the left for a darker view.
- To toggle between different indicators for objects use the Mark objects button (Fig. 76 /3):
  - off (Fig. 76 /7)
  - with points for detected people only (Fig. 76 /2)
  - off
  - with points and info text as id and height (Fig. 76 /1)

6.3.2 Device information

The device displays a diagnostic status.

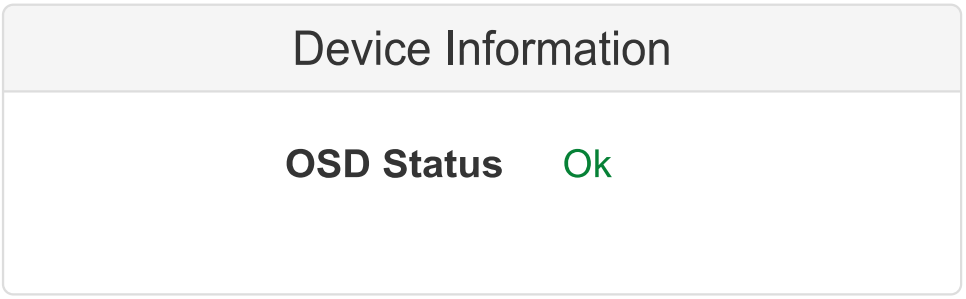


Fig. 77: Device information

Optical Self Diagnosis (OSD) Status

OK	Normal state.
Covered	One or both cameras covered, e.g. by a sticker.
Too dark	Illumination is too low for proper function or both cameras are completely covered and show a black image.
Too bright	Illumination is too bright for proper function.

6.3.3 Counts

Counting Information for up to 10 counting lines can be shown.

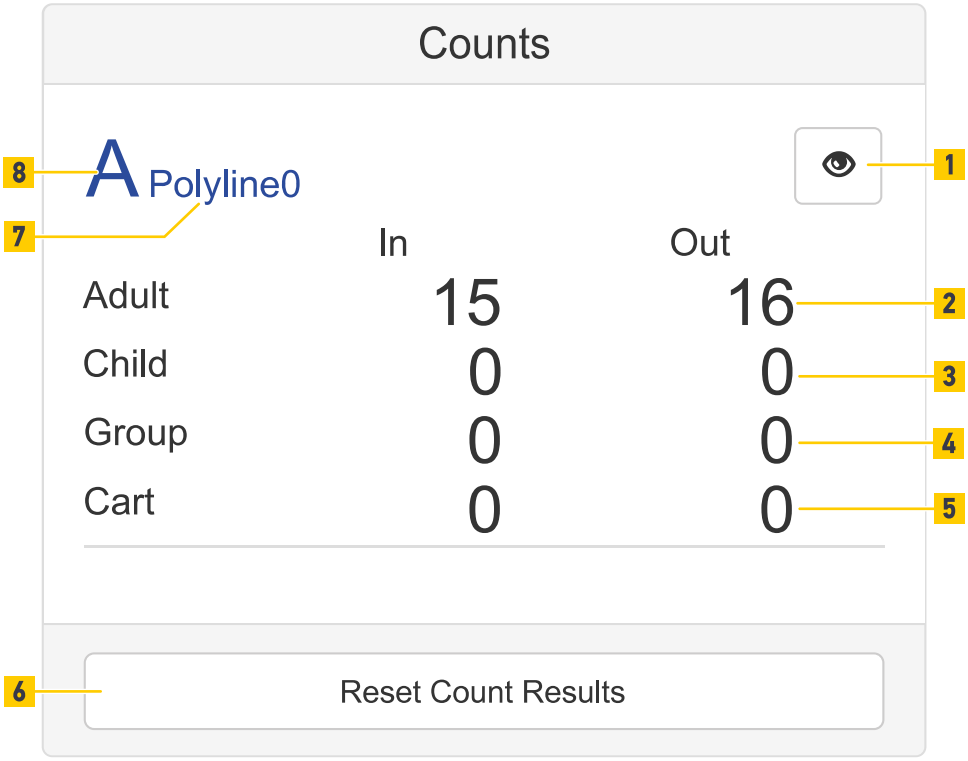


Fig. 78: Counts with 1 counting line

- To show or hide the counting line in the live view use the button (Fig. 78 /1).
- Displays the number of counts for incoming and outgoing adults (Fig. 78 /2).
- Displays the number of counts for incoming and outgoing children (Fig. 78 /3).
- Displays the number of counts for incoming and outgoing groups (Fig. 78 /4).
- Displays the number of counts for incoming and outgoing shopping carts(Fig. 78 /5).
- To reset the count information to 0 use the Reset Count Results button (Fig. 78 /6).
- Configured name of the counting line (Fig. 78 /7). The name is use in the user interface as well as in data interfaces.
- Counting line identifier (Fig. 78 /8) used in the live view.

6.3.4 Monitored Zones

Counts how many persons are inside a zone for up to 8 monitored zones can be shown.

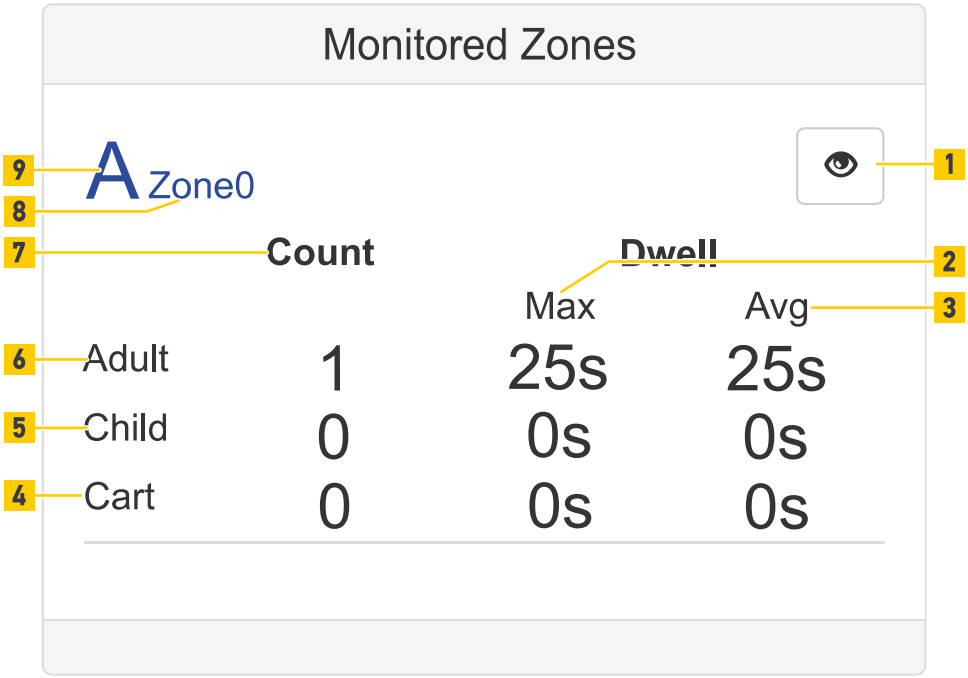


Fig. 79: Counts with 1 monitored zone

- To show or hide the monitored zones in the live view use the button (Fig. 79 /1).
- Displays the maximum dwell time for adults and children (Fig. 79 /2) in the zone.
- Displays the average dwell time for adults and children (Fig. 79 /3) in the zone.
- Information of counts and dwell times for carts (Fig. 79 /5).
- Information of counts and dwell times for children (Fig. 79 /5).
- Information of counts and dwell times for adults (Fig. 79 /6).
- Displays the number of adults and children (Fig. 79 /7) in the zone.
- Configured name of the monitored zone (Fig. 79 /8). The name is used in the user interface as well as in data interfaces.
- Monitored zone identifier (Fig. 79 /9) used in the live view.

6.4 Camera Position Setup

To go to the Camera Position Setup page click the Camera Position icon (Fig. 80 /1).

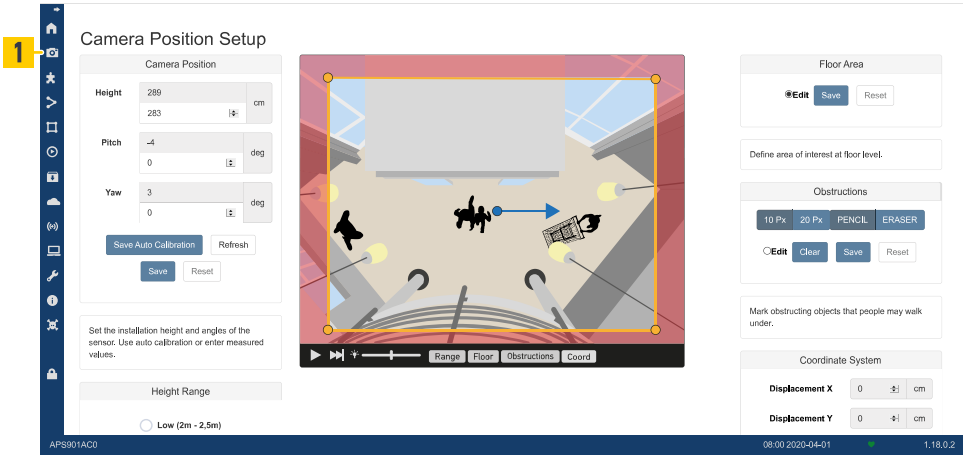


Fig. 80: Camera Position Setup

In order to obtain correct counting results, the position and alignment of the device at the installation site must be set.

6.4.1 Camera Position

The device has an inbuilt tilt measurement and can approximately measure its own mounting height with an accuracy ~5%. These values are visible on top of the input fields. But they are not automatically used - to be human verified.

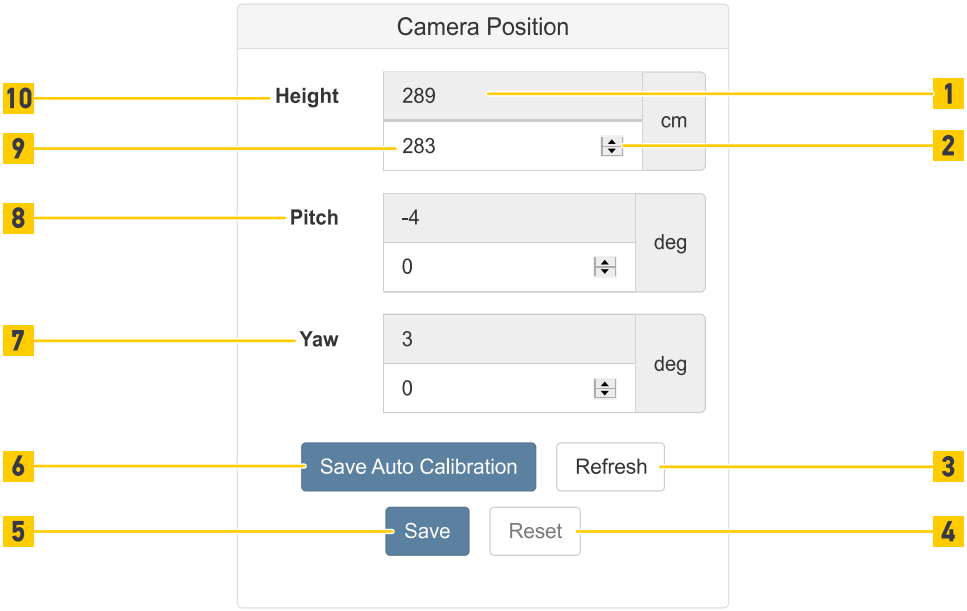


Fig. 81: Camera position

> *If measurement is not possible - e.g. a consistently level floor area is not big enough - the device presents a 'not available' hint (Fig. 81 /1). In this case use a separate measuring device and set up the values manually.*

The height is the distance between the device level and the floor level.

- To perform a new measurement click the Refresh button (Fig. 81 /3).
- To apply the measured values click the Save Auto Calibration button (Fig. 81 /6).
- Set up the values manually for the pitch (Fig. 81 /8) and yaw (Fig. 81 /7) angle or the height (Fig. 81 /10) by inputting a value directly into the input field (Fig. 81 /9) or using the spin control (Fig. 81 /2).
- To go back to the last saved settings click the Reset button (Fig. 81 /4).
- To save all the settings in the device click the Save button (Fig. 81 /5).

6.4.2 Height Range

Define the height range for the APS. The displayed ranges depends to the used device.

Low range

- 2 m to 2,5 m for APS-90 and APS-90-Outdoor-PoE
- not available for APS-180

Standard range

- 2,3 m to 4 m for APS-90 and APS-90-Outdoor-PoE
- 3 m to 6 m for APS-180

Extended range

- 3,5 m to 6 m for APS-90 and APS-90-Outdoor-PoE
- 5 m to 9 m for APS-180

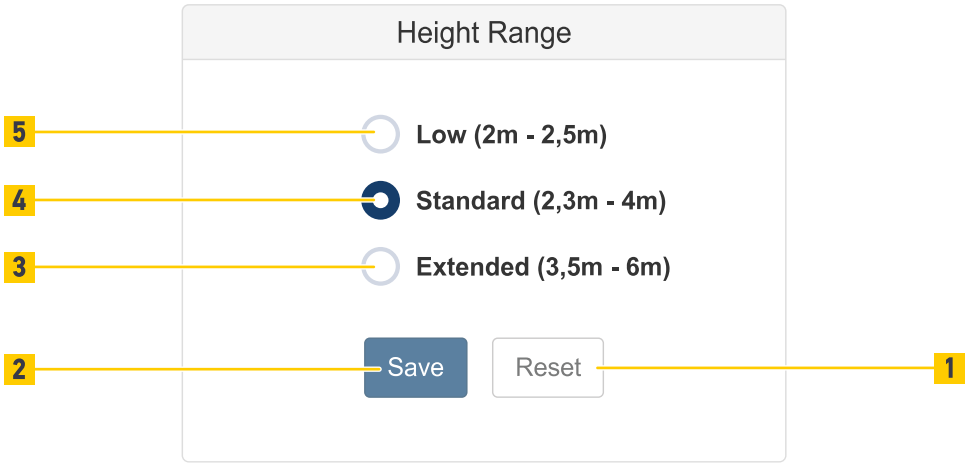


Fig. 82: Height Range

- To set the device for low height select Low (Fig. 82 /5).
- To set the device for standard height select Standard (Fig. 82 /4).
- To set the device for extended height select Extended (Fig. 82 /3).
- To go back to the last saved settings click the Reset button (Fig. 82 /1).
- To save all the settings in the device click the Save button (Fig. 82 /2).

6.4.3 Floor Area

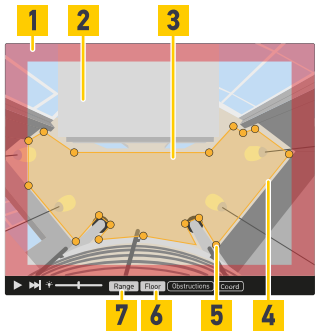


Fig. 83: Live view with range and floor area

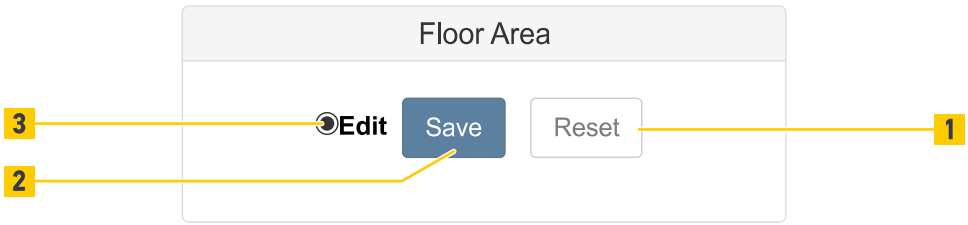


Fig. 84: Floor Area

- To define the floor area (Fig. 83 /3) in the live view activate the Edit button (Fig. 84 /3).
- To see the unusable area (Fig. 83 /1) and usable area (Fig. 83 /2) click the Range button (Fig. 83 /7). The usable area is the range where people can be tracked and counted.
- To see the floor area (Fig. 83 /3) defined by the yellow floor area polygon line (Fig. 83 /4) click the Floor button (Fig. 83 /6).
- Define the floor area by moving/adding/deleting points (Fig. 83 /5). The floor area is defined by a minimum of 3 points and a maximum of 20 points.
- To go back to the last saved settings click the Reset button (Fig. 84 /1).
- To save all the settings in the device click the Save button (Fig. 84 /2).

6.4.4 Obstructions

Ceiling panels, door compartments, exit signs or hanging objects that intrude into the monitored area of the device from the top can affect the counting accuracy. If People can stand below these objects, the objects must be masked to disregard them in count calculations.

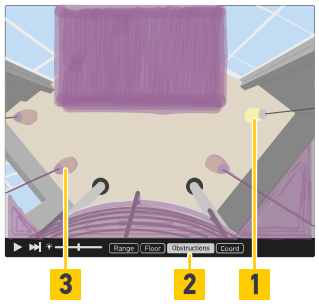


Fig. 85: Live view with partial marked obstructed object

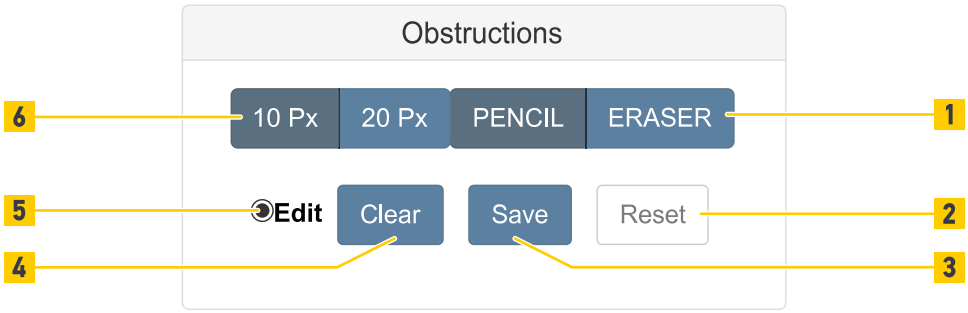


Fig. 86: Obstructions

- To mark obstructed objects in the live view activate the Edit button (Fig. 86 /5).
- To see marked objects click the Obstructions button (Fig. 85 /2).
- To draw or erase marks in the live view click Pencil or Eraser button (Fig. 86 /1).
- To define the line width for drawing/erasing click 10 Px or 20 Px button (Fig. 86 /6).
- To draw lines (Fig. 85 /3) for marking objects (Fig. 85 /1) click and hold mouse button in the live view.
- To go back to the last saved settings click the Reset button (Fig. 86 /2).
- To save all the settings in the device click the Save button (Fig. 86 /3).
- To erase all marks click the Clear button (Fig. 86 /4).

6.4.5 Coordinate System

The feature "Object List" reports the position of people and objects.

By default the coordinate system axis is right below the sensor, with the positive x-axis to the right and positive y-axis to the top of the camera view respectively.

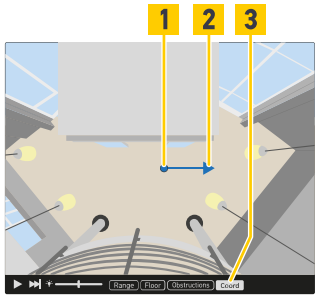


Fig. 87: Live view with coordinate system

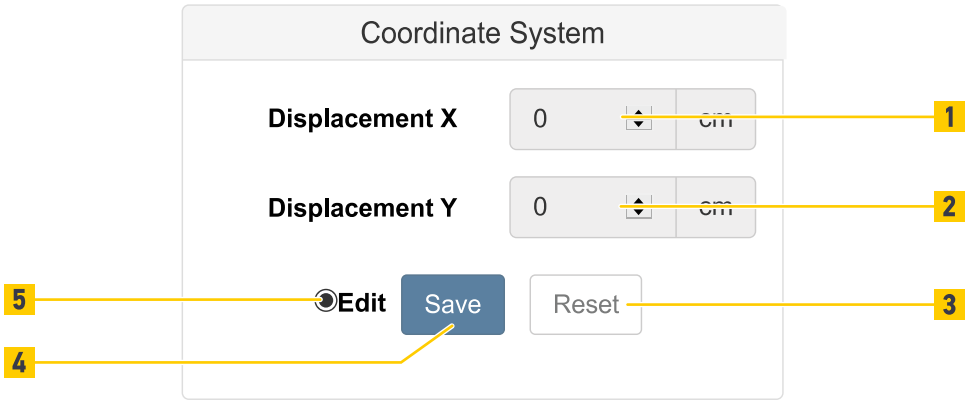


Fig. 88: Coordinate System

- To define the coordinate system activate the Edit button (Fig. 88 /5).
- To see the position and direction of the x-axis click the Coord button (Fig. 87 /3).
- Place the blue dot (Fig. 87 /1) at floor level (drag and drop) to a known position of your coordinate system - or to the center of the default coordinate system.
- Specify the displacement (offset) (Fig. 88 /1 and 2) of the blue dot to your coordinate system - or if this is the center of the coordinate system specify it as 0 (zero) point.
- Rotate (drag and drop) the shown positiv x-axis arrow (Fig. 87 /2).
- To go back to the last saved settings click the Reset button (Fig. 88 /3).
- To save all the settings in the device click the Save button (Fig. 88 /4).

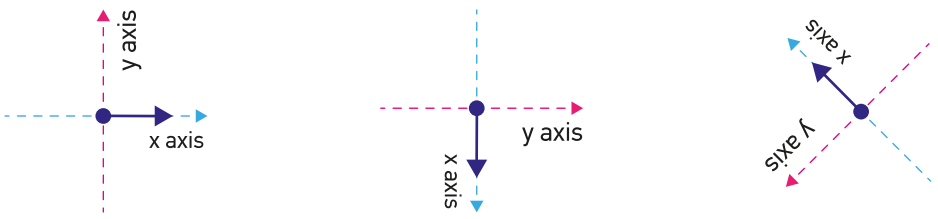


Fig. 89: Examples of coordinate system rotations

> *Only one axis rotation needs to be specified, because we use a Cartesian coordinate system, where x- and y-axis are at floor level and the z-axis is used as height information. Rotating the x-axis at the floor also rotates the orthogonal y-axis (Fig. 89).*

6.5 Multi Sensor Fusion

To go to the Multi Sensor Fusion Setup page click the Multi Sensor Fusion icon (Fig. 90 /1).

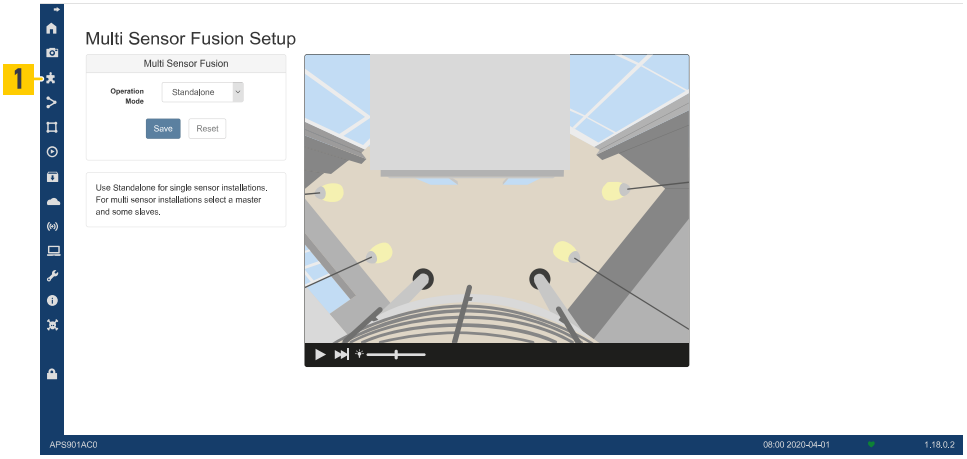


Fig. 90: Multi Sensor Fusion Setup

Define the device as a part of a multi sensor fusion.

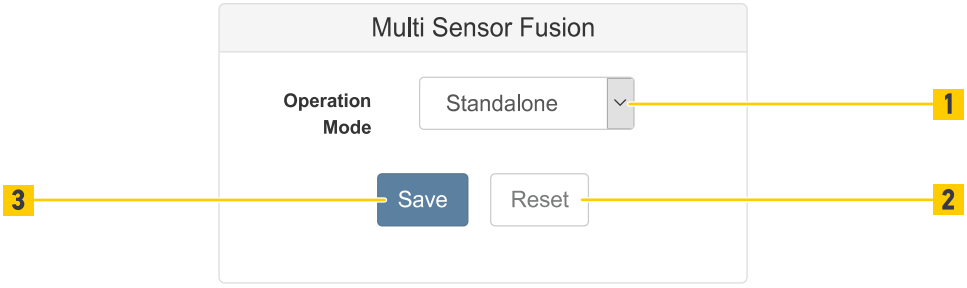


Fig. 91: Multi Sensor Fusion

- To define the kind of device select the operation mode (Fig. 91 /1) from the drop-down list.
- To go back to the last saved settings click the Reset button (Fig. 91 /2).
- To save all the settings in the device click the Save button (Fig. 91 /3).

6.5.1 Configure the master device

When configuring the device as a master determine the slave devices.

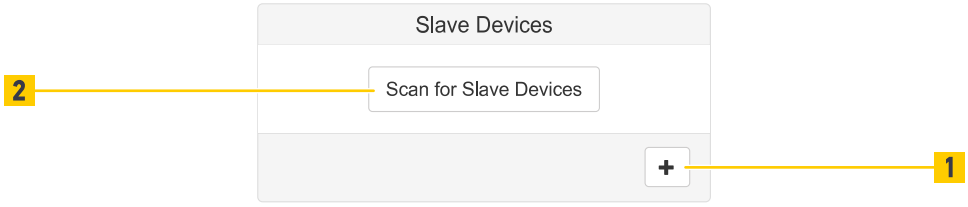


Fig. 92: Slave devices

- To manually add a slave device click the plus button (Fig. 92 /1).
- To find slave devices automatically scan for slave devices by clicking the Scan for Slave Devices button (Fig. 92 /2).
- A popup-window opens and shows the devices found in the network.

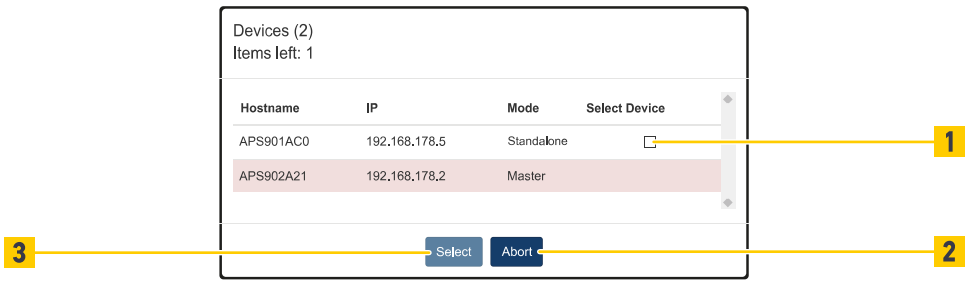


Fig. 93: Select slave devices

- To select a slave device mark a device (Fig. 93 /1). Select the slave devices you need and click the Select button (Fig. 93 /3).
- To leave the window without selecting a device click the Abort button (Fig. 93 /2).

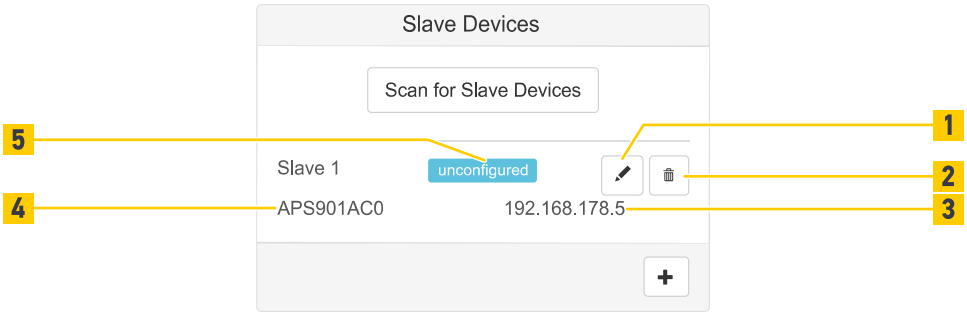


Fig. 94: Connected slave device

- When the connection between a slave and master is established the status (Fig. 94 /5) changes to unconfigured.
- The hostname (Fig. 94 /4) and the IP address (Fig. 94 /3) of a connected slave are shown.
- To delete a slave click the delete button (Fig. 94 /2).
- To edit a slave click the edit button (Fig. 94 /1).

6.5.2 Configure the slave devices

When configuring the device as a slave determine the master device.

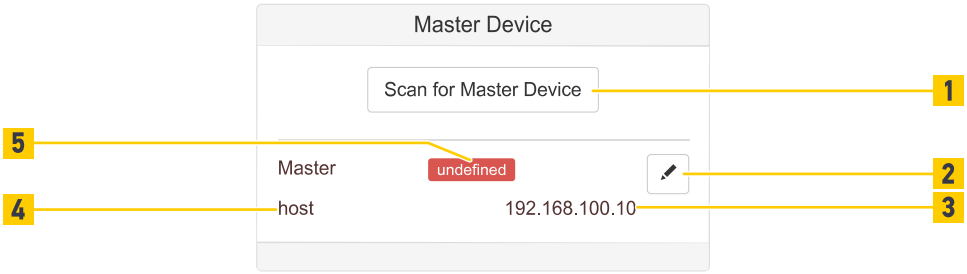


Fig. 95: Master Device

- To find a master device automatically scan for master devices by clicking the Scan for Master Device button (Fig. 95 /1).
- A popup-window opens and shows the master devices and other devices found in the network.

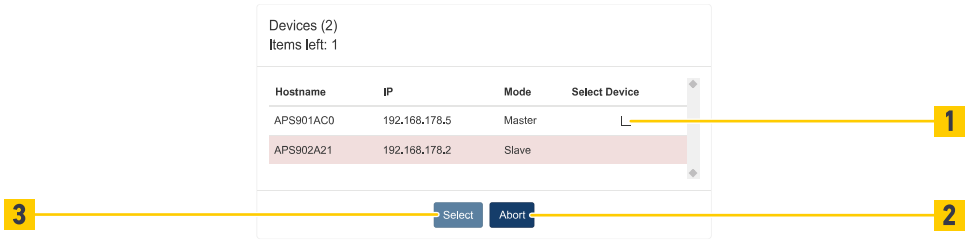


Fig. 96: Select master device

- To select the master device mark a device (Fig. 96 /1) and click the Select button (Fig. 96 /3).
- To leave the window without selecting a device click the Abort button (Fig. 96 /2).
- To set the IP address of the master device manually click the edit button (Fig. 95 /2) and set the IP address.
- When the slave connects to the master the status (Fig. 95 /5) changes to working.
- The hostname (Fig. 95 /4) and the IP address (Fig. 95 /3) of the connected master are shown.

6.5.3 Complete the setup

When the slaves are connected to the master, finish the setup with the automatic configuration. Choose a configuration mode (↗ Automatic configuration on page 82).

Fig. 97: Automatic Configuration

- To start the configuration click the related Start button (Fig. 97 /1). The button changes to abort.
- To abort the configuration click the Abort button (Fig. 97 /2).
- See the State of the configuration (Fig. 97 /3). During the configuration the state changes from Running to Working when finished.
- See the Progress (Fig. 97 /4) as an indication for the remaining time.
- The configuration is finished when the status of the slaves in the Slave Devices topic changes to configured.

6.6 Counting

To go to the People Counting Setup page click the Counting icon (Fig. 98 /1).

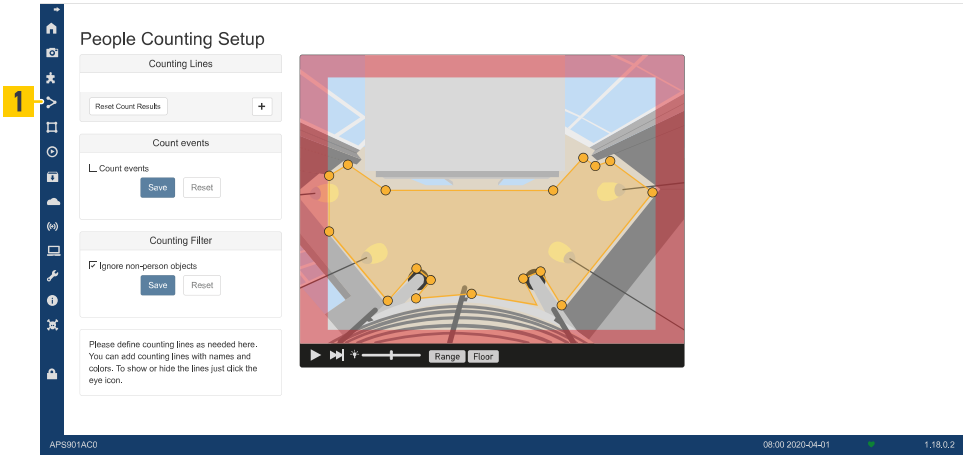


Fig. 98: People Counting Setup

The device can use up to 10 individual bi-directional counting lines.

A counting line is represented by a colored polyline with lettered points at floor level. The line has a triangular marker which indicates the direction of incoming persons, and this can be switched.

6.6.1 Counting lines

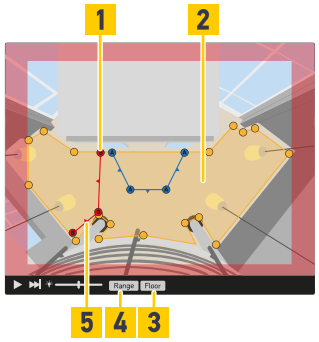


Fig. 99: Editing Counting Lines

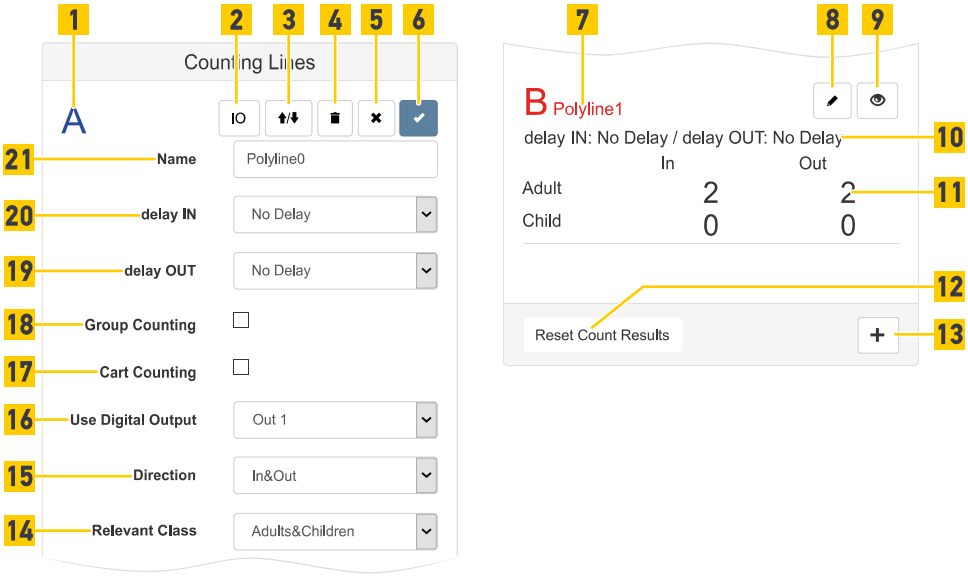


Fig. 100: Counting Lines

- Each configured counting line is listed with its configuration and counting data information (Fig. 100 /11).
- The counting line is specified with its identifier (Fig. 100 /1) and its name (Fig. 100 /7).

- If the counting line is not edited see the configuration (Fig. 100 /10).
- To show or hide the counting line in the live view click the button (Fig. 100 /9).
- To edit the line in the live view click the button (Fig. 100 /8).
- To see the floor area (Fig. 99 /2) in the live view click the Floor button (Fig. 99 /3).
- Define the counting line (Fig. 99 /5) by moving/adding/deleting points (Fig. 99 /1).
  - Counting lines should be in the central third of the monitored area so that persons can be recorded before they cross the counting lines.
  - There should be at least 40 cm distance from both sides of a counting line (in the direction that people are crossing it) to the edges of the floor area - this allows the most effective tracking of persons.
  - Avoid gaps so that people cannot bypass the counting lines and not be counted.
- Enter a unique Name (Fig. 100 /21) for the counting line. This is used in the user interface as well as in data files.
- To handle re-passing and U-turns specify the delay in both directions (Fig. 100 /20 and Fig. 100 /19). Choose a time from the drop down list.
  - No delay

    Counts every time a person crosses the counting line, without suppressing U-turns (immediate result after crossing the counting line).
  - Time Period (e.g. 10 sec)

    Count if the person stays longer than the time period within the floor area and without a U-turn in this time. (result delayed until person leaves floor area before end of time period or until time period is over).
  - Infinity

    Count only once if no U-turn is made (count result delayed until person leaves the floor area).
- To swap the 'in' and 'out' directions click the button (Fig. 100 /3). The triangular marker indicates the direction of incoming persons.
- To activate group counting, tick the Group Counting checkbox (Fig. 100 /18).
- To activate cart counting, tick the Cart Counting checkbox (Fig. 100 /17).
- Specify a digital output for signalling count events (Fig. 100 /16). Choose a digital output from the drop down list.
- Specify the direction of count events (Fig. 100 /15). Choose a direction from the drop down list.
- Specify the relevant class for count events (Fig. 100 /14). Choose a class from the drop down list.
- To use a digital input for counting click the button (Fig. 100 /2). Select a possible input from the list. Pulses from the digital input are counted as incoming adult
- To remove the counting line click the button (Fig. 100 /4).
- To go back to the last saved settings click the button (Fig. 100 /5).
- To save all the settings in the device click the button (Fig. 100 /6).
- To add a counting line click the button (Fig. 100 /13).
- To set the counting information to 0 in the user interface click Reset Count Results (Fig. 100 /12). Reset has no effect on internal counts or data protocols.

6.6.2 Count events

The device can log every single count events for the counting lines.

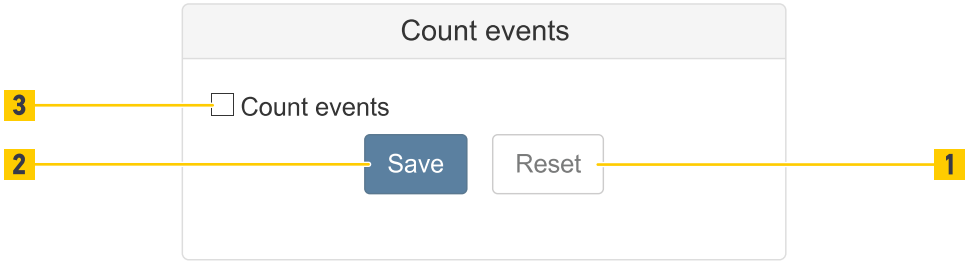


Fig. 101: Count events

- To activate logging count events tick the Count events checkbox (Fig. 101 /3).
- To go back to the last saved settings click the Reset button (Fig. 101 /1).
- To save all the settings in the device click the Save button (Fig. 101 /2).

6.6.3 Counting Filter

The device classifies objects as adults persons, persons up to 130 cm (children) and non-person objects (such as shopping carts). These non-person objects can be either ignored or counted (as adult persons).

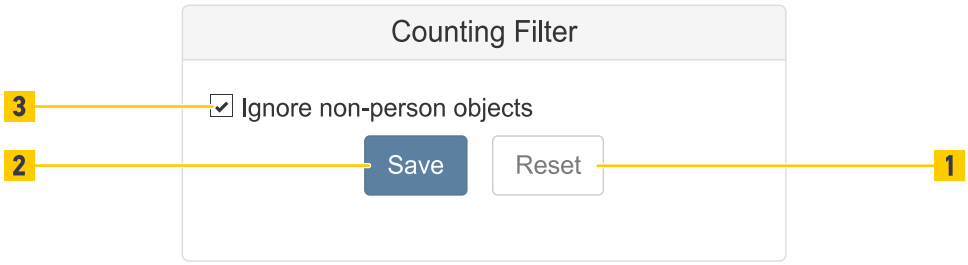


Fig. 102: Counting Filter

- To suppress counting of shopping carts and other objects tick the Ignore non-persons objects checkbox (Fig. 102 /3).
- To go back to the last saved settings click the Reset button (Fig. 102 /1).
- To save all the settings in the device click the Save button (Fig. 102 /2).

6.7 Zone Monitoring

> ***Optional function***
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

To go to the Zone Monitoring Setup page click the Zone Monitoring icon (Fig. 103 /1).

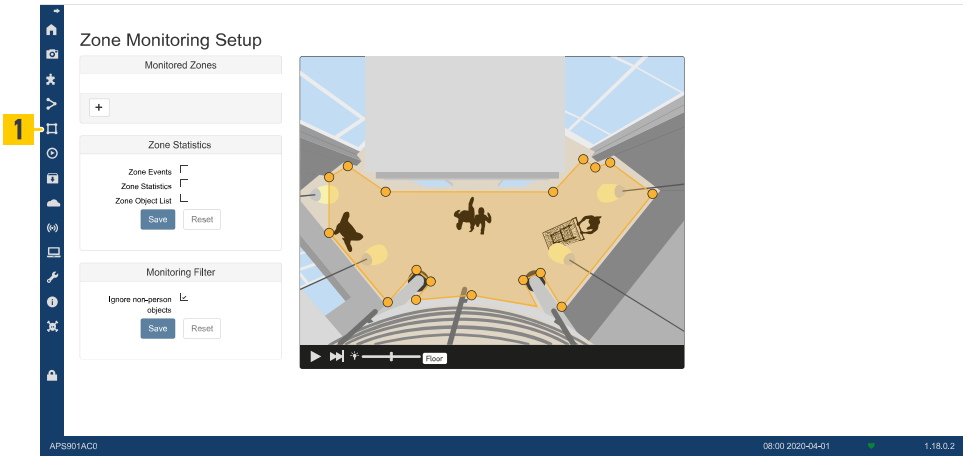


Fig. 103: Zone Monitoring Setup

6.7.1 Monitored Zones

The device can use up to 8 separated zones. A monitored zone is represented by a colored polygon with lettered points on floor level.

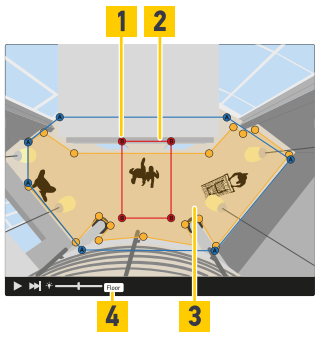


Fig. 104: Editing monitored zones

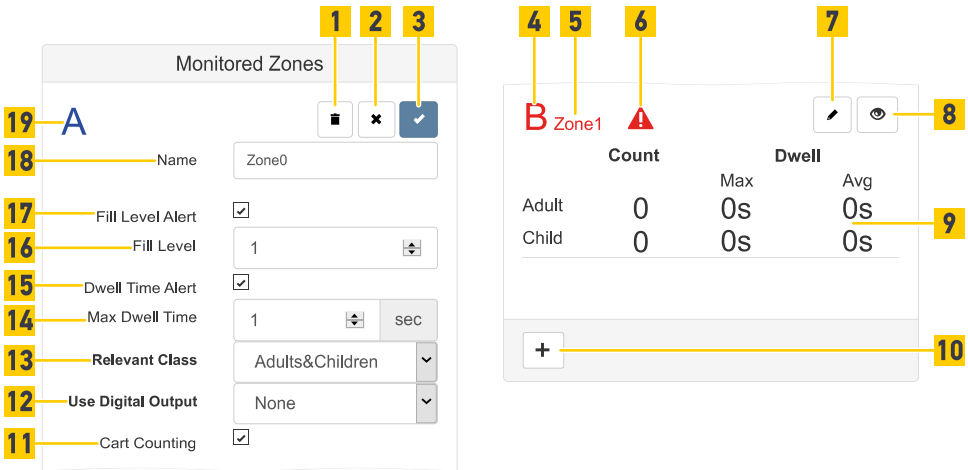


Fig. 105: Monitored zones

- Each configured monitored zone is listed with its configuration and monitoring data information.
- The monitored zone is specified with an identifier (Fig. 105 /4 or /19) and a name (Fig. 105 /5).
- It is possible to see the counting information of the monitored zone for Adults and children (Fig. 105 /9) if object classification is licensed. The number of objects and the maximum and average dwell time are also displayed.
- If an alert for the monitored zone is defined see the status (Fig. 105 /6).
- To show or hide the monitored zone in the live view click the button (Fig. 105 /8).
- To edit the monitored zone in the live view click the button (Fig. 105 /7).
- To see the floor area (Fig. 104 /3) in the live view click the Floor button (Fig. 104 /4).
- Define the monitored zone (Fig. 104 /2) by moving/adding/deleting points (Fig. 104 /1).
- Enter a unique Name (Fig. 105 /18) for the monitored zone. This is used in the user interface as well as in data files.
- To define an alert for a number of objects (Fig. 105 /16) in the monitored zone tick the Fill Level Alert checkbox (Fig. 105 /17). E.g. 5 to alert if 5 Persons or more are in the zone.
- To define an alert for a maximum dwell time of an object (Fig. 105 /14) in the monitored zone tick the Dwell Time Alert checkbox (Fig. 105 /15).
- Select a Relevant Class (Fig. 105 /13) from the list for the alerts.
- To signal the alert select a digital output (Fig. 105 /12) from the list.
- To activate cart counting tick the Cart Counting checkbox (Fig. 105 /11).
- To remove the monitored zone click the button (Fig. 105 /1).
- To go back to the last saved settings click the button (Fig. 105 /2).
- To save all the settings in the device click the button (Fig. 105 /3).
- To add a monitored zone click the button (Fig. 105 /10).

6.7.2 Additional Zone Data

The device can log events, statistical values and object lists for each monitored zone.

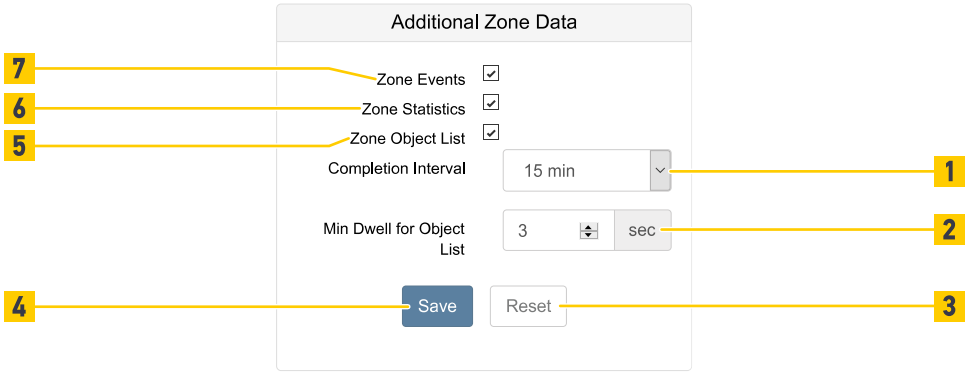


Fig. 106: Zone Statistics

- To activate the logging of events entering or leaving a zone, tick the Zone Events checkbox (Fig. 106 /7).
- To activate the generation of the statistical values, tick the Zone Statistics checkbox (Fig. 106 /6).
- To change the interval during which the statistics are collected, select a Completion Interval (Fig. 106 /1) from the drop-down list.
- To activate the generation of object lists, tick the Zone Object List checkbox (Fig. 106 /5).
- Each object needs a minimum time in the zone to be placed on the object list. To change this time set the Min Dwell for Object List (Fig. 106 /2) in seconds
- To go back to the last saved settings click the Reset button (Fig. 106 /3).
- To save all the settings in the device click the Save button (Fig. 106 /4).

6.7.3 Monitoring Filter

The device classifies objects as adult persons, persons up to 130 cm (children) and non-person objects (such as shopping carts). These non-person objects can be either ignored or monitored (as adult persons).

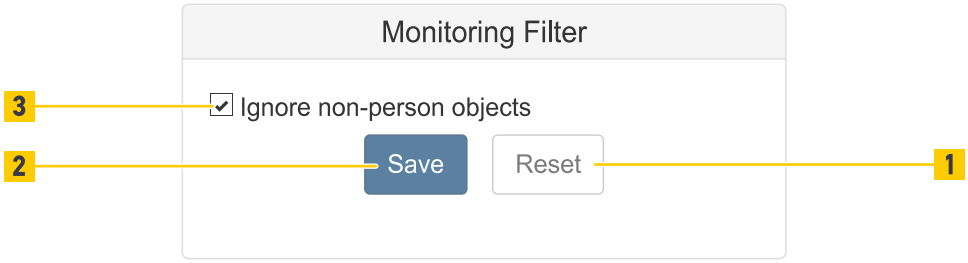


Fig. 107: Monitoring Filter

- To suppress counting of shopping carts and other objects tick the Ingnore non-person objects checkbox (Fig. 107 /3).
- To go back to the last saved settings click the Reset button (Fig. 107 /1).
- To save all the settings in the device click the Save button (Fig. 107 /2).

6.8 Video

> ***Optional function***
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

To go to the Video Service Settings page click the Video icon (Fig. 108 /1).

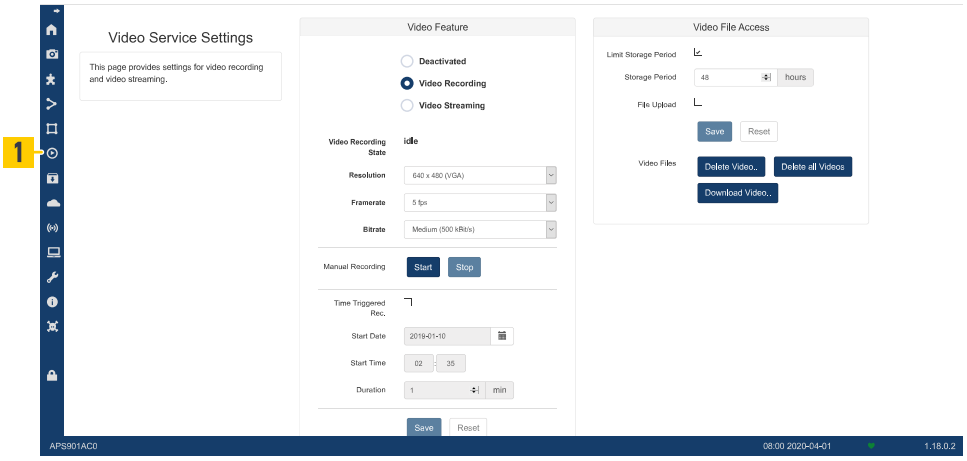


Fig. 108: Video Service Settings

6.8.1 Video recording

The Devices can store video files locally. This includes count, zone monitoring and tracking data. These video files can be downloaded via the user interface or uploaded automatically to a ftp/sftp server after recording. To ensure that the files don't become too large, they are split automatically every 30 minutes (without stopping recording).

The recording can be started and stopped immediately in the user interface - or delayed by setting a time trigger and duration time.

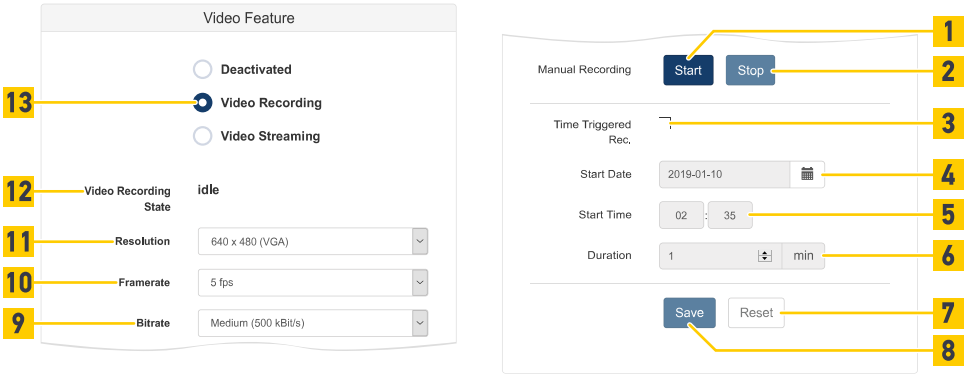


Fig. 109: Video Feature - Video Recording

- To activate Video recording select Video Recording (Fig. 109 /13) on.
- See the state of recording (Fig. 109 /12).
- Choose a Resolution (Fig. 109 /11) from the drop down list.
- Choose a Frame rate (Fig. 109 /10) from the drop down list.
- Choose a Bitrate (Fig. 109 /9) from the drop down list.
- To start a manual recording click the Start button (Fig. 109 /1).
- To end a manual recording click the Stop button (Fig. 109 /2).
- To activate an automatic recording tick Time Triggered Rec. checkbox (/3).
- Set up a Start Date (Fig. 109 /4) and the Start Time (Fig. 109 /5) for automatic recording.
- Set up a Duration (Fig. 109 /6) in minutes. This duration sets the maximum time that the counter will record. The value must be between 1 and 1000 min.
- To go back to the last saved settings click the Reset button (Fig. 109 /7).
- To save all the settings in the device click the Save button (Fig. 109 /8).

6.8.2 Video streaming

The device can stream live camera images over the network. Configure the video mode, resolution, rates and the used port for the stream.

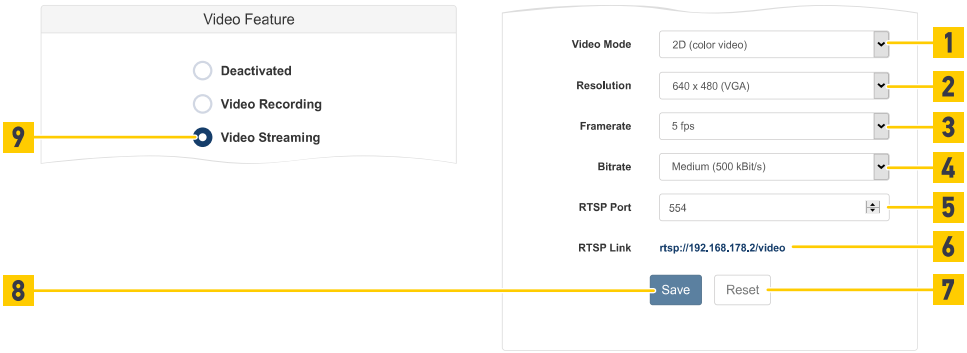


Fig. 110: Video Feature - Video Streaming

To activate Video Streaming select the mode Video Streaming (Fig. 110 /9).

- Choose a Video mode (Fig. 110 /1) from the drop down list. 2D (color video) and 3D (disparity image) is possible.
- Choose a Resolution (Fig. 110 /2) from the drop down list. 320x240 (QVGA) and 640x480 (VGA) is possible.
- Choose a Frame rate (Fig. 110 /3) from the drop down list. 5 or 10 frames per seconds is possible.
- Choose a Bitrate (Fig. 110 /4) from the drop down list.
- Set up the RTSP port (Fig. 110 /5).
- See the complete link (Fig. 110 /6) to connect for streaming.
- To go back to the last saved settings click the Reset button (Fig. 110 /7).
- To save all the settings in the device click the Save button (Fig. 110 /8).

6.8.3 Video File Access

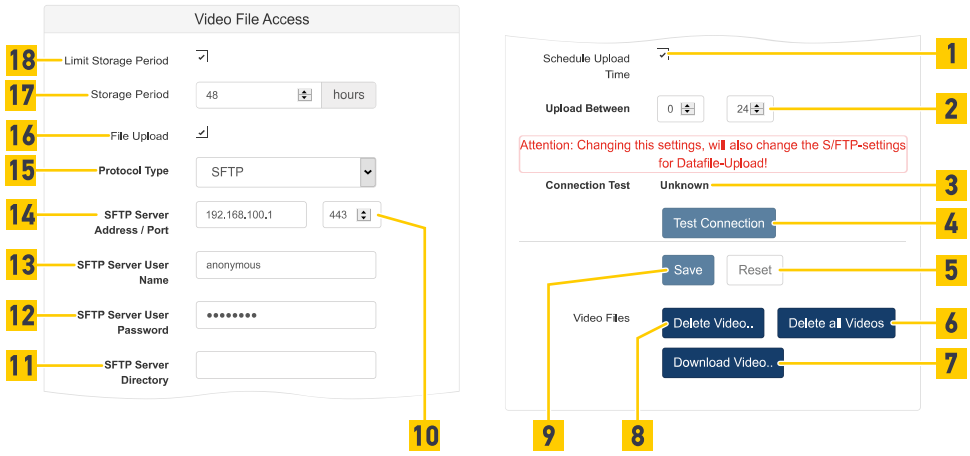


Fig. 111: Video File Access

- To limit the storage time tick Limit Storage Period checkbox (Fig. 111 /18).
- For automatic deletion set up a Storage Period (Fig. 111 /17). The period must be between 1 and 8760 hours.
- For automatic upload of completed files tick File Upload checkbox (Fig. 111 /16).
- For automatic upload select a Protocol Type (Fig. 111 /15) and set the Server Address (Fig. 111 /14) and the Server port (Fig. 111 /10).
- To access the upload server set the Server User Name (Fig. 111 /13), the Server User Password (Fig. 111 /12) and the Server Directory (Fig. 111 /11).
- The upload starts when the file is completed. To restrict the upload to a time period activate Schedule Upload Time (Fig. 111 /1) and set the time Upload Between (Fig. 111 /2).
- To test the connection click Test Connection button (Fig. 111 /4) and see the result of the test (Fig. 111 /3).
- To go back to the last saved settings click the Reset button (Fig. 111 /5).
- To save all the settings in the device click the Save button (Fig. 111 /9).
- To delete a specific video file from the device click Delete Video... (Fig. 111 /8). Choose the file from the drop down list.
- To delete all video recordings from the device click Delete all Videos (Fig. 111 /6). By default the oldest file is deleted automatically if memory is full.
- For immediate download of a video file from the device to the PC click Download Video... (Fig. 111 /7). Choose a file from the drop down list.

6.9 Data Interface

To go to the Data Interface Settings page click the Data Interface icon (Fig. 112 /1).

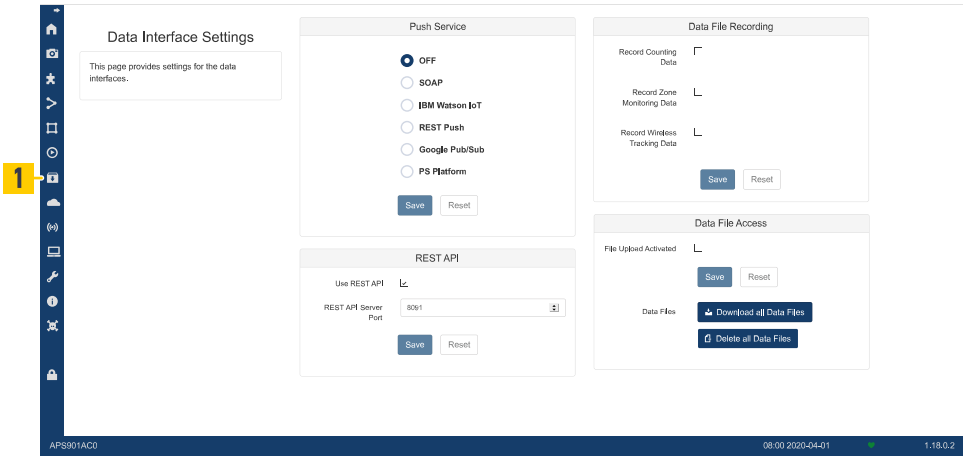


Fig. 112: Data Interface Settings

6.9.1 Push service

If a Push Service is used, the device sends (pushes) data to a server to which the device has established a connection. Upon initial contact the server informs the device of the required data and transmission times. The device then sends them accordingly. This allows communication with the device behind routers and firewalls.

6.9.1.1 SOAP

To enable push service via SOAP activate SOAP (Fig. 113 /8).

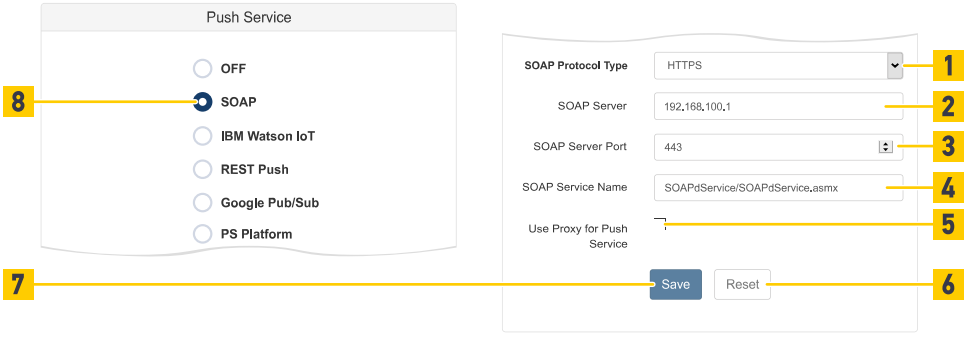


Fig. 113: Push Service - SOAP

- Set the SOAP Protocol Type as a standard HTTP connection or as a secured HTTPS connection (Fig. 113 /1).
- Set the address for the SOAP Server (Fig. 113 /2) and SOAP Server Port (Fig. 113 /3).
- Enter SOAP Service Name as path to the server URL (Fig. 113 /4).
- Check Use Proxy for Push Services (Fig. 113 /5) if required.
- To go back to the last saved settings click the Reset button (Fig. 113 /6).
- To save all the settings in the device click the Save button (Fig. 113 /7).

6.9.1.2 IBM Watson IoT

To enable push service to the IBM Watson platform activate IBM Watson IoT (Fig. 114 /7).

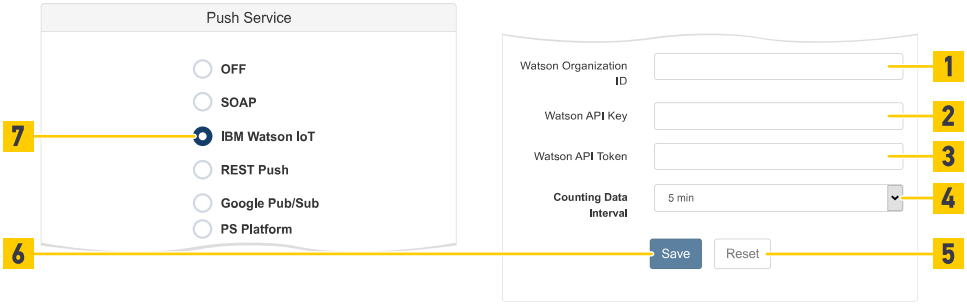


Fig. 114: Push Service - IBM Watson IoT

- To add the sensor to an IBM Watson IoT Platform account enter the Watson Organization ID (Fig. 114 /1).
- To add the sensor to a group of sensors at the IBM Watson IoT Platform account enter the Watson API Key (Fig. 114 /2) and Watson API Token (Fig. 114 /3).
- To send accumulated counting data in these time frames set the Counting Data Interval (Fig. 114 /4).
- To go back to the last saved settings click the Reset button (Fig. 114 /5).
- To save all the settings in the device click the Save button (Fig. 114 /6).

6.9.1.3 REST Push

To enable push service via REST activate REST Push (Fig. 115 /8).

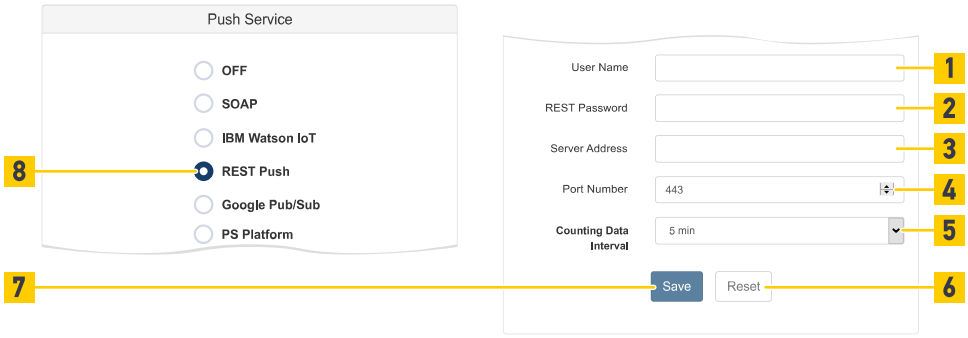


Fig. 115: Push Service - REST Push

- Set the User Name (Fig. 115 /1).
- Set the REST Password (Fig. 115 /2).
- Set the address for the Server (Fig. 115 /3) and the Server Port (Fig. 115 /4).
- To send accumulated counting data in these time frames set the Counting Data Interval (Fig. 115 /5).
- To go back to the last saved settings click the Reset button (Fig. 115 /6).
- To save all the settings in the device click the Save button (Fig. 115 /7).

6.9.1.4 Google Pub/Sub

To enable push service to the Google platform activate Google Pub/Sub (Fig. 116 /8).

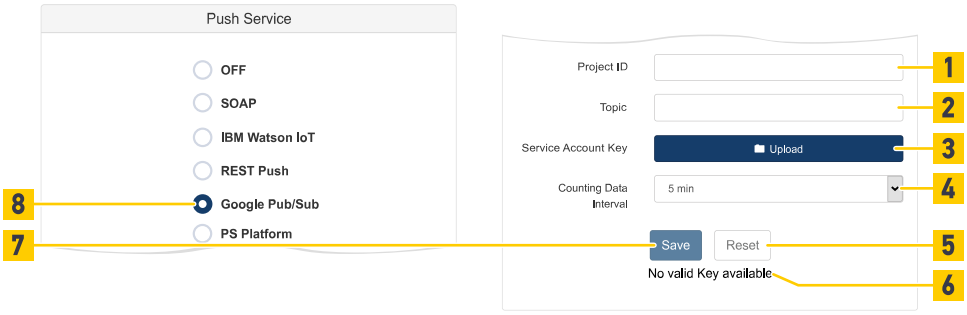


Fig. 116: Push Service - Google Pub/Sub

- To add the sensor to an Google Platform account enter the Project ID (Fig. 116 /1) and Topic (Fig. 116 /2).
- To upload a Service Account Key click Upload button(Fig. 116 /3). If the key is valid see the state (Fig. 116 /6).
- To send accumulated counting data in these time frames set the Counting Data Interval (Fig. 116 /4).
- To go back to the last saved settings click the Reset button (Fig. 116 /5).
- To save all the settings in the device click the Save button (Fig. 116 /7).

6.9.1.5 PS Platform

To enable push service to the PS Platform activate PS Platform (Fig. 117 /5).

Fig. 117: Push Service - PS Platform

- To connect the sensor to the PS Platform enter the URL (Fig. 117 /1).
- To send accumulated counting data in these time frames set the Counting Data Interval (Fig. 117 /4).
- To go back to the last saved settings click the Reset button (Fig. 117 /3).
- To save all the settings in the device click the Save button (Fig. 117 /4).

6.9.2 REST API

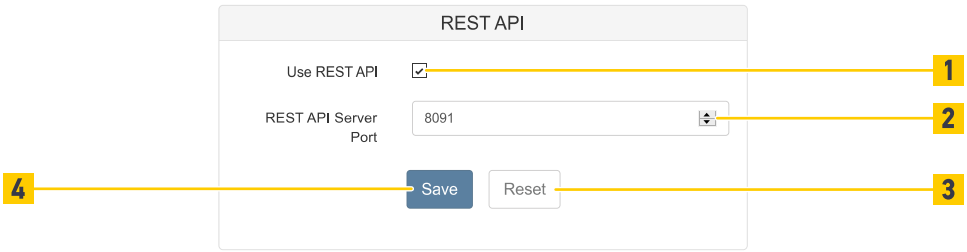


Fig. 118: REST API

If Use REST API is activated (Fig. 118 /1), a server can pull the device to send data.

- Set the REST API Server Port (Fig. 118 /2).
- To go back to the last saved settings click the Reset button (Fig. 118 /3).
- To save all the settings in the device click the Save button (Fig. 118 /4).

6.9.3 Data File Recording

The device can save data to CSV files.

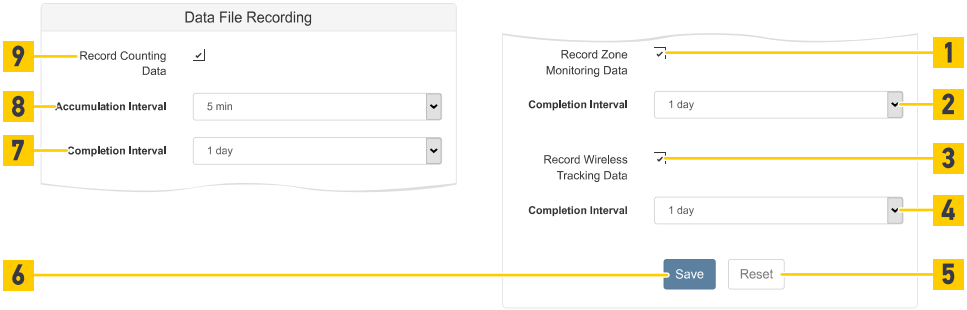


Fig. 119: Data File Recording

> ***Optional function***
>
> *This recording of zone monitoring data and wireless track data can only be enabled if the corresponding license files are installed on the device.*

- To activate the recording of counting data tick the Record Counting Data checkbox (Fig. 119 /9).
- To define the period within which counts are accumulated and new data lines are attached to the current data file set a Accumulation Interval (Fig. 119 /8).

  Choose a rate between 1 min and 15 min from the drop down list.
- To define the period for a data file set a Completion Interval (Fig. 119 /7). After this period each data file is completed. New data is recorded in a subsequent file.

  Choose an interval between 15 min and 1 day from the drop down list.
- To activate the recording of zone monitoring data tick the Record Zone Monitoring Data checkbox (Fig. 119 /1).
- To define the period for a data file set a Completion Interval (Fig. 119 /2). After this period each data file is completed. New data is recorded in a subsequent file.

  Choose an interval between 15 min and 1 day from the drop down list.
- To active the recording of wireless tracking data tick the Record Wireless Tracking Data checkbox (Fig. 119 /3).
- To define the period for a data file set a Completion Interval (Fig. 119 /4). After this period each data file is completed. New data is recorded in a subsequent file.

  Choose an interval between 15 min and 1 day from the drop down list.
- To go back to the last saved settings click the Reset button (Fig. 119 /5).
- To save all the settings in the device click the Save button (Fig. 119 /6).

6.9.4 Data File Access

The device can save the counting, zone monitoring and wireless tracking data to CSV files and automatically upload the completed files.

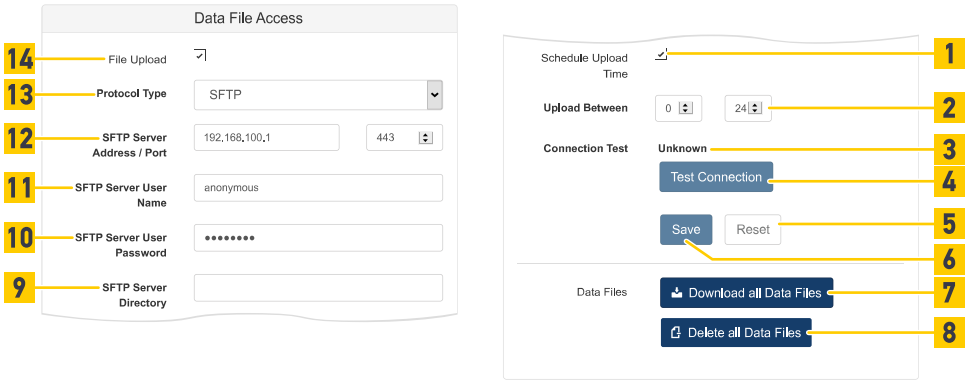


Fig. 120: Data File Access

To activate the automatic upload tick the File Upload checkbox (Fig. 120 /14).

- For automatic upload select a Protocol Type (Fig. 120 /13) and set the Server Address and the Server port (Fig. 120 /12).
- To access the upload server set the Server User Name (Fig. 120 /11), the Server User Password (Fig. 120 /10) and the Server Directory (Fig. 120 /9).
- The upload starts when the file is completed. To restrict the upload to a time period activate Schedule Upload Time (Fig. 120 /1) and set the time Upload Between (Fig. 120 /2).
- To test the connection click Test Connection button (Fig. 120 /4) and see the result of the test (Fig. 120 /3).
- To go back to the last saved settings click the Reset button (Fig. 120 /5).
- To save all the settings in the device click the Save button (Fig. 120 /6).
- For immediate download of all data files from the device to the PC click Download all Data Files (Fig. 120 /7).
- To delete all data files from the device click Delete all Data Files (Fig. 120 /8). By default the oldest file is deleted automatically if memory is full.

6.10 Network

To go to the Network Communication Settings page click the Network icon (Fig. 121 /1).

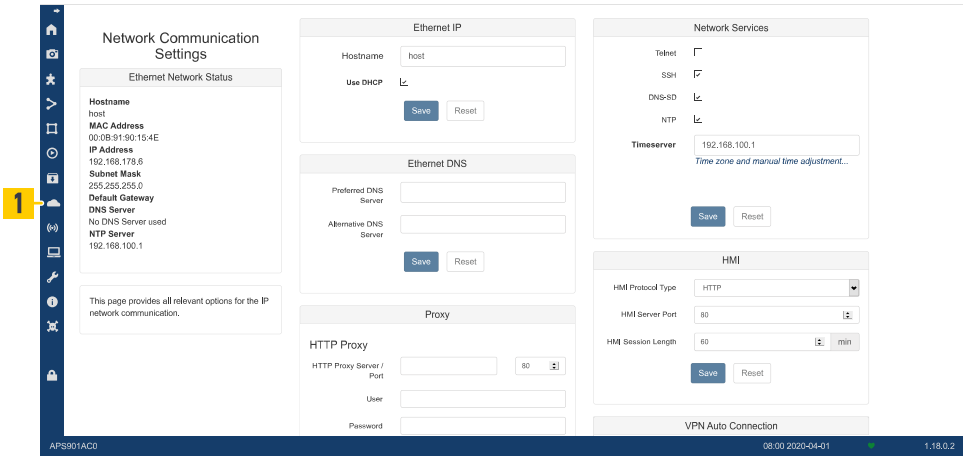


Fig. 121: Data Interface Settings

Use the Network Communication Settings to set up the IP communication of the device inside your network and to your data server.

6.10.1 Ethernet Network Status

This topic block shows the Ethernet network settings which have either been assigned automatically by a DHCP server or have been set manually.

6.10.2 Ethernet IP

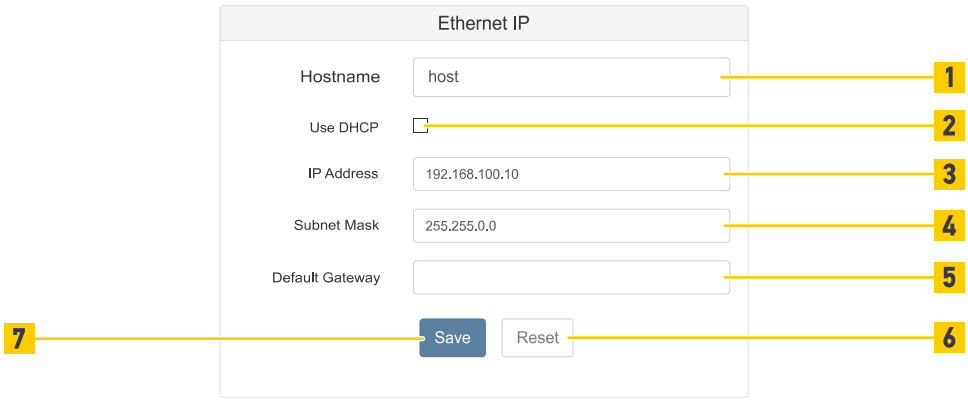


Fig. 122: IP

The device is usable with dynamic IP by DHCP or static IP.

- The Hostname (Fig. 122 /1) identifies the device in the network, data recording files and protocols. Select the input field and type a name that represents the installation location.
- For automatic assigned IP addresses, subnet mask, gateway, DNS and so on select Use DHCP (Fig. 122 /2). A DHCP server is required. Use DHCP is default upon delivery.
- Static IP Address (Fig. 122 /3) is available if Use DHCP is unchecked.
- Subnet Mask (Fig. 122 /4) is available if Use DHCP is unchecked.
- Default Gateway (Fig. 122 /5) is available if Use DHCP is unchecked.
- To go back to the last saved settings click the Reset button (Fig. 122 /7).
- To save all the settings in the device click the Save button (Fig. 122 /6).

6.10.3 Ethernet DNS

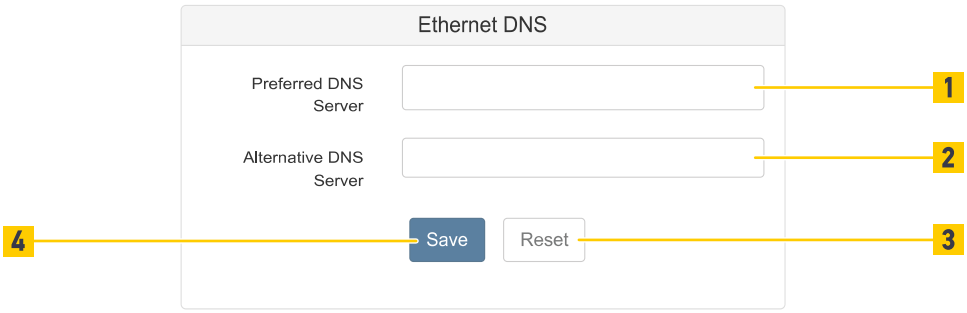


Fig. 123: DNS

Domain Name System servers translate FQDN like "www.people-sensing.com" to an IP address. Typically it is received from the DHCP server. If you use fixed IP addresses and also use FQDN (instead of IP addresses) you need to set the DNS.

- Select the input field and type an IP address for the preferred (Fig. 123 /1) and alternative (Fig. 123 /2) DNS Server.
- To go back to previous settings click the Reset button (Fig. 123 /3).
- To save all the settings in the device click the Save button (Fig. 123 /4).

6.10.4 Proxy

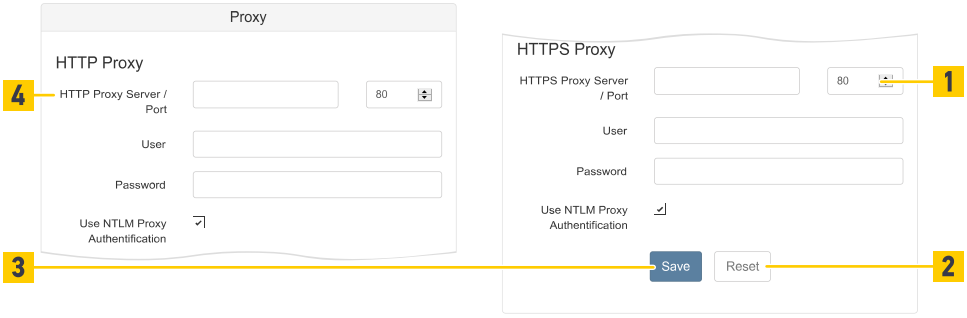


Fig. 124: Proxy

Sometimes the internet cannot be reached directly but through a so called proxy server. If this is the case in your installation, set the Proxy Settings accordingly. Set them as a standard HTTP connection (Fig. 124 /4) or as a secured HTTPS connection (Fig. 124 /1).

- If required enter the username and password for the proxy usage.
- Click the 'Use NTLM Proxy Authentification' checkbox to transmit the username and password in a secure manner if NTLM is available on your proxy server.
- To save all the settings in the device click the Save button (Fig. 124 /3).
- To go back to the last saved settings click the Reset button (Fig. 124 /2).

6.10.5 Network Services

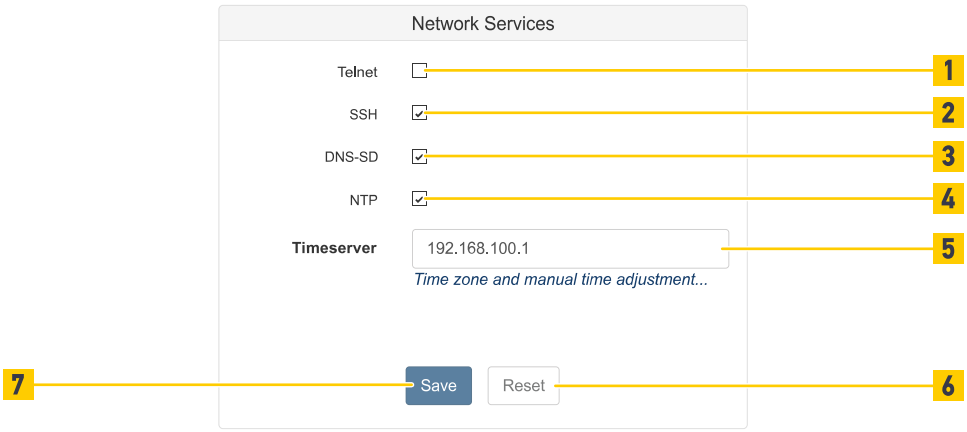


Fig. 125: Network Services

For reasons of IT security, it is recommended to disable all network services that are not needed.

- To activate/deactivate Telnet to the device (in most cases only required for maintenance) use the checkbox Telnet (Fig. 125 /1). Telnet access is not encrypted and is not safe.
- To activate/deactivate Linux secure shell and secure sftp file access to the device (activated by default) use the checkbox SSH (Fig. 125 /2).
- To activate/deactivate DNS Service Discovery use the checkbox DNS-SD (Fig. 125 /3). This service is used to find sensors automatically in a network.
- To activate/deactivate the time server synchronization (this should be activated to set the correct time and date automatically) use the checkbox NTP (Fig. 125 /4). Using NTP requires specifying the Time Server address (Fig. 125 /5).
- To go back to the last saved settings click the Reset button (Fig. 125 /6).
- To save all the settings in the device click the Save button (Fig. 125 /7).

6.10.6 HMI

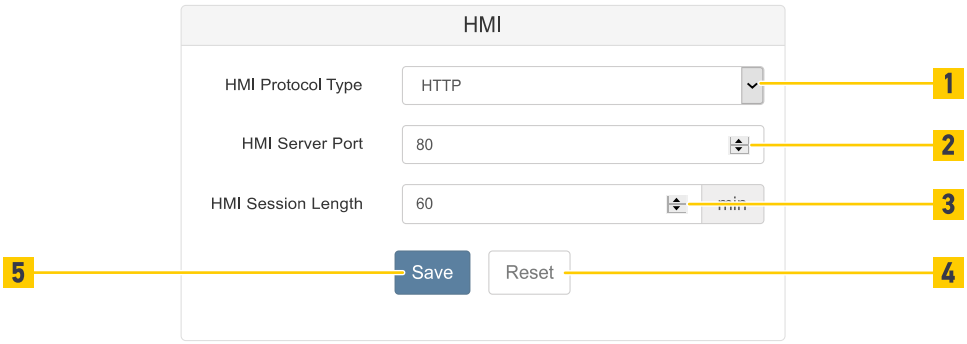


Fig. 126: User interface access

- Set the HMI Protocol Type as a standard HTTP connection or as a secured HTTPS connection (Fig. 126 /1).
- Set the HMI Server Port (Fig. 126 /2).
- Enter the HMI Session Length (Fig. 126 /3). This is the time in minutes without any activity in the interface to disconnect the access.

  The value must be between 1 and 1440 minutes.
- To go back to the last saved settings click the Reset button (Fig. 126 /4).
- To save all the settings in the device click the Save button (Fig. 126 /5). The device restarts its webserver and the connection is closed.

6.10.7 VPN Auto Connection

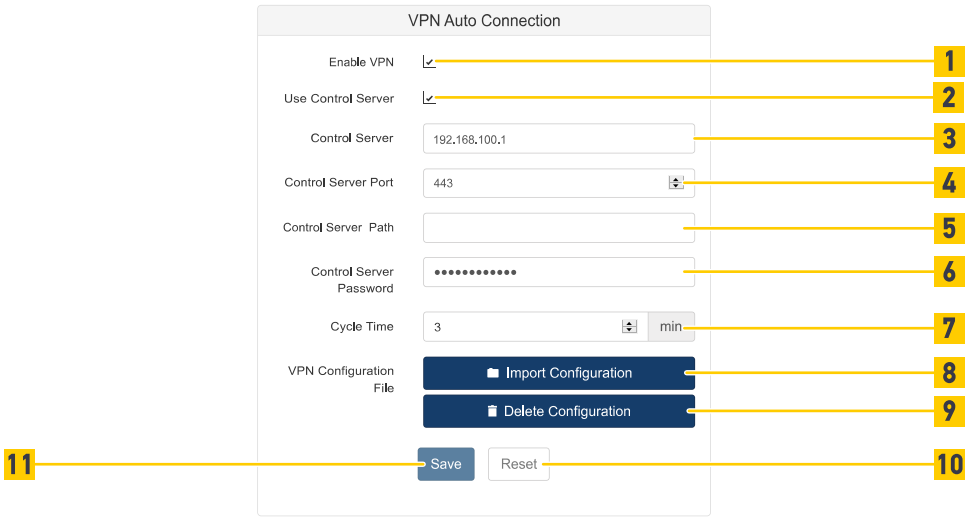


Fig. 127: VPN Auto Connection

- To connect to the device via a VPN connection, activate Enable VPN (Fig. 127 /1)
- If Use Control Server is activated (Fig. 127 /2) the device checks periodically the defined VPN flag server whether a VPN connection is requested.
- To define the connection set the Control Server IP address (Fig. 127 /3), the Control Server Port (Fig. 127 /4) and the Control Server Path (Fig. 127 /5).
- Set the Control Server Password (Fig. 127 /6).
- The device checks periodically whether a VPN connection is requested. Use the default time of 3 min or change the Cycle Time (Fig. 127 /7).
- To upload a configuration file click Import Configuration (Fig. 127 /8).
- To remove a configuration file from the device click Delete Configuration (Fig. 127 /9).
- To go back to the last saved settings click the Reset button (Fig. 127 /10).
- To save all the settings in the device click the Save button (Fig. 127 /11).

6.11 Wireless Services

> ***Optional function***
>
> *This function can only be enabled if a corresponding license file is installed on the device.*

To go to the Wireless Services Settings page click the Wireless Services icon (Fig. 128 /1).

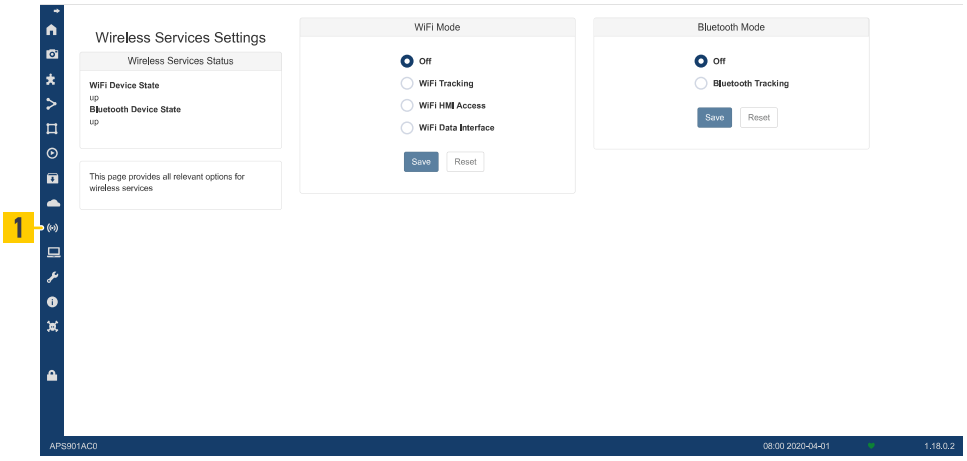


Fig. 128: Wireless Services Settings

Use Wireless Services menu to set up the usage of the wireless USB adapter. This can be used to track wireless devices like mobile phones, to access the sensor using WiFi or transmit counting data and others wireless.

6.11.1 Wireless Services Status

This topic block shows the WiFi network settings.

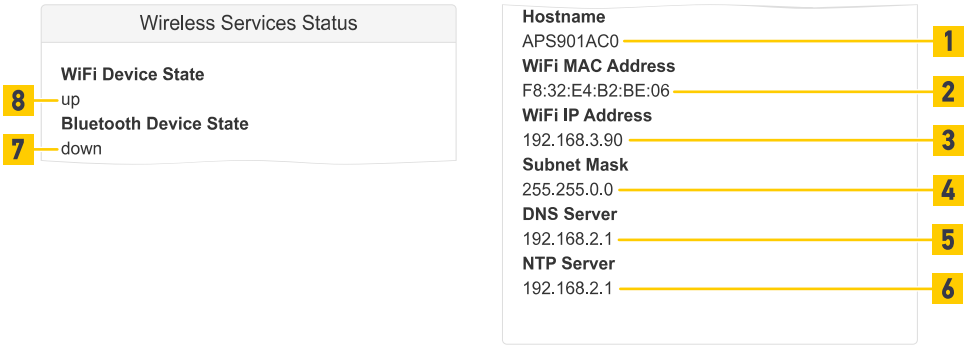


Fig. 129: Wireless services status

- If the wireless USB adapter is attached to the sensor at startup and is working, the WiFi Device State (Fig. 129 /8) shows *<up>*.
- If the Bluetooth USB adapter is attached, the Bluetooth Device State (Fig. 129 /7) shows *<up>*.
- Using the WiFi Mode WiFi HMI Access or WiFi Data Interface some additional network information are displayed. The Hostname (Fig. 129 /1), WiFi MAC Address (Fig. 129 /2), WiFi IP Address (Fig. 129 /3) and the Subnet Mask (Fig. 129 /4) is displayed in both modes.
- The DNS Server (Fig. 129 /5) and NTP Server (Fig. 129 /6) is displayed in WiFi Data Interface mode.

6.11.2 WiFi Mode

The APS can use the wireless USB adapter in different modes.

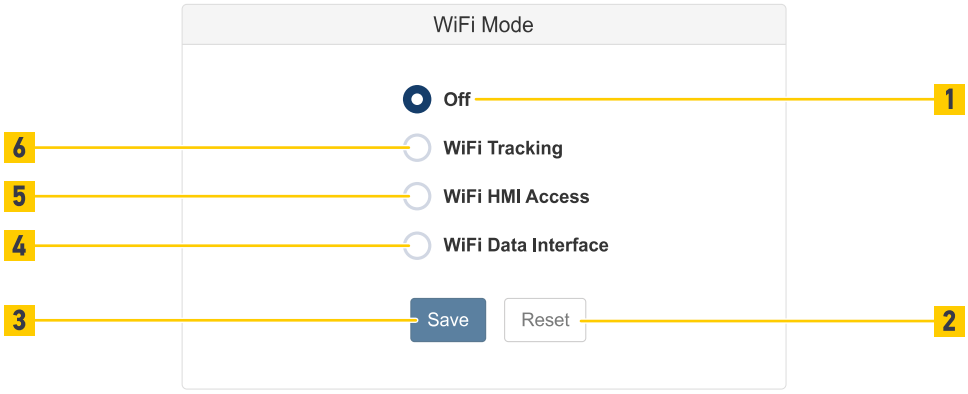


Fig. 130: WiFi Mode

- To deactivate the wireless USB adapter choose the WiFi Mode Off (Fig. 130 /1).
- To track wireless devices such as mobile phones choose the WiFi Mode WiFi Tracking (Fig. 130 /6).
- To access the sensor via WiFi choose the WiFi Mode WiFi HMI Access (Fig. 130 /5).
- To send counting data to a wireless network choose the WiFi Mode WiFi Data Interface (Fig. 130 /4).
- To go back to the last saved settings click the Reset button (Fig. 130 /2).
- To save all the settings in the device click the Save button (Fig. 130 /3).

6.11.3 WiFi Mode Tracking

The device can track wireless devices such as smartphones. The device can save this tracking data to CSV files.

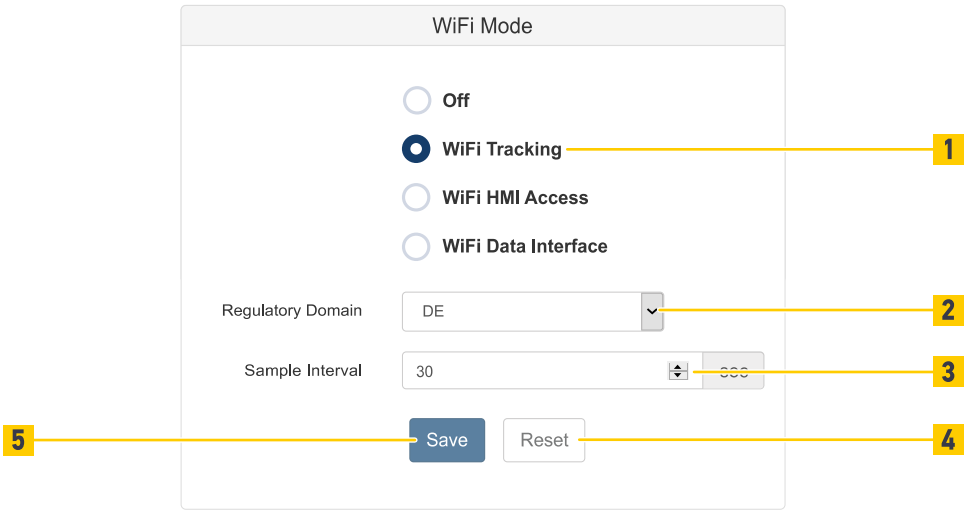


Fig. 131: Wireless tracking

- To track wireless devices such as mobile phones choose the WiFi Mode WirFi Tracking (Fig. 131 /1).
- To choose legal frequency spectrum select your region code ("US" = USA or "DE"=Germany) at the Regulatory Domain drop down list (Fig. 131 /2). Default region code 00 is used for worldwide roaming - and uses only a legal and restricted subset of all - so it will not use all of the local possible frequencies.
- Set a Sample Interval (Fig. 131 /3) to define how often a new scanning should start.

  The value must be between 5 sec and 1000 sec.
- To go back to the last saved settings click the Reset button (Fig. 131 /4).
- To save all the settings in the device click the Save button (Fig. 131 /5).

6.11.4 WiFi HMI Access

Set up the details for use as an access point:

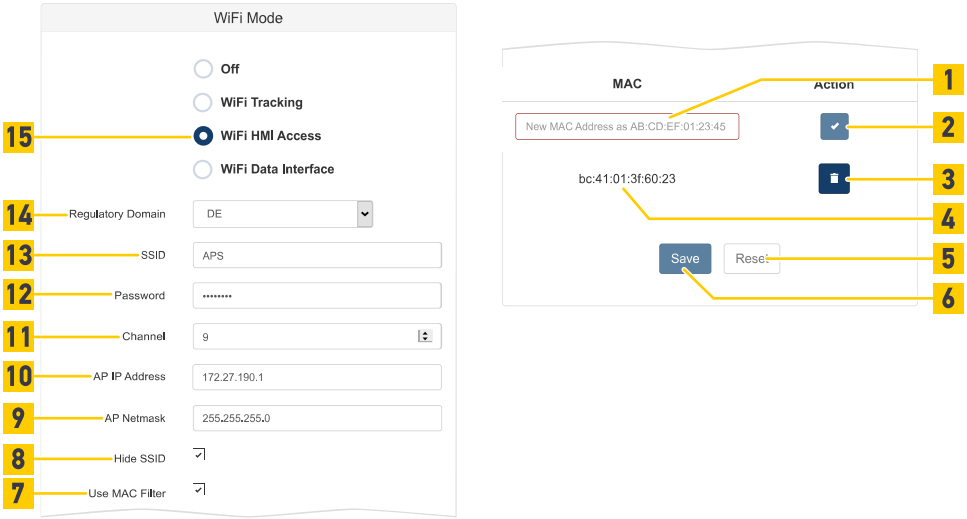


Fig. 132: WiFi HMI Access

- To access the HMI with wireless devices choose the WiFi Mode WirFi HMI Access (Fig. 132 /15).
- To choose legal frequency spectrum select your region code ("US" = USA or "DE"=Germany) at the Regulatory Domain drop down list (Fig. 132 /14). Default region code 00 is used for worldwide roaming - and uses only a legal and restricted subset of all - so it will not use all of the local possible frequencies.
- To identify the sensor WiFi access point set a SSID (Fig. 132 /13).
- For save access set a Password (Fig. 132 /12). The default is *<People_Sensor>*.
- Select a WiFi Channel (Fig. 132 /11) to be used
- Set the IP address for the access point (Fig. 132 /10).
- To define the logical network segment of your network set a AP Netmask (Fig. 132 /9).
- To make the SSID name invisible to others activate Hide SSID (Fig. 132 /8).
- To allow only stored MAC addresses to have access to the device activate Use MAC Filter (Fig. 132 /9).
- By activating Use MAC Filter the editing of MAC addresses becomes visible. To add a MAC address set the address in the field (Fig. 132 /1) and click the accept button (Fig. 132 /2).
- To remove a MAC address from the list (Fig. 132 /4) click the delete button (Fig. 132 /3).
- To go back to the last saved settings click the Reset button (Fig. 132 /5).
- To save all the settings in the device click the Save button (Fig. 132 /6).

To connect to the device in Access Point mode, choose the device SSID in the WiFi list e.g. of your notebook and connect with your password (default is *<People_Sensor>*). To open the user interface use the AP IP address (Fig. 132 /10).

6.11.5 WiFi Data Interface

To send counting and other data wirelessly the device must login to a wireless network.

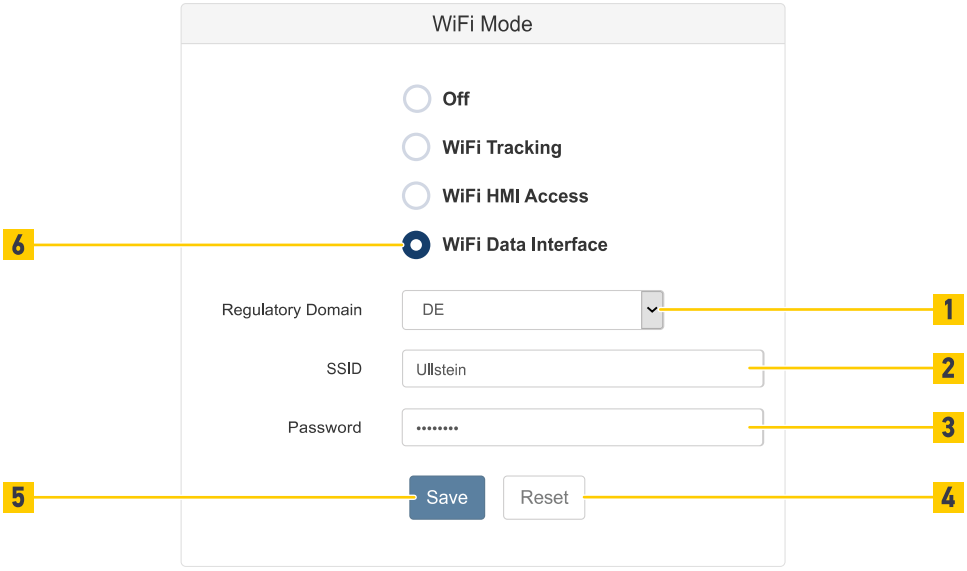


Fig. 133: WiFi Data Interface

- To send counting and other data wireless choose the WiFi Mode WirFi Data Interface (Fig. 133 /6).
- To choose legal frequency spectrum select your region code ("US" = USA or "DE"=Germany) at the Regulatory Domain drop down list (Fig. 133 /1). Default region code 00 is used for worldwide roaming - and uses only a legal and restricted subset of all - so it will not use all of the local possible frequencies.
- Enter the SSID (Fig. 133 /2) of the wireless network.
- Enter the Password (Fig. 133 /3) of the wireless network.
- To go back to the last saved settings click the Reset button (Fig. 133 /4).
- To save all the settings in the device click the Save button (Fig. 133 /5).

6.11.6 Bluetooth Mode

The APS can use the Bluetooth USB adapter to track Bluetooth devices.

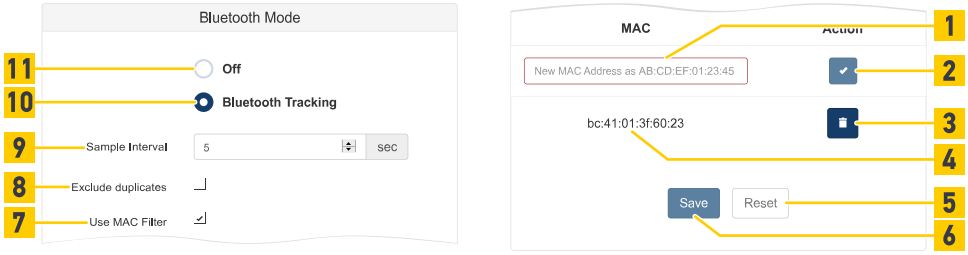


Fig. 134: Bluetooth Mode

- To track Bluetooth devices such as mobile phones choose the Bluetooth Mode Bluetooth Tracking (Fig. 134 /10).
- To deactivate the Bluetooth USB adapter choose the Bluetooth Mode Off (Fig. 134 /11).
- Set a Sample Interval (Fig. 134 /3). The value must be between 1 sec and 60 sec.

  The Sample Interval determines the time period after a scan is completed and transmitted. The scan rate is set internally.
- During a sample interval, a Bluetooth device can be detected more often. To get only one entry for each Bluetooth device, activate Exclude duplicates (Fig. 134 /8).
- To track only stored MAC addresses activate Use MAC Filter (Fig. 134 /7).
- By activating Use MAC Filter the editing of MAC addresses becomes visible. To add a MAC address set the address in the field (Fig. 134 /1) and click the accept button (Fig. 134 /2).
- To remove a MAC address from the list (Fig. 134 /4) click the delete button (Fig. 134 /3).
- To go back to the last saved settings click the Reset button (Fig. 134 /5).
- To save all the settings in the device click the Save button (Fig. 134 /6).

6.12 Other Settings

To go to the Other Settings page click the Other Settings icon (Fig. 135 /1).

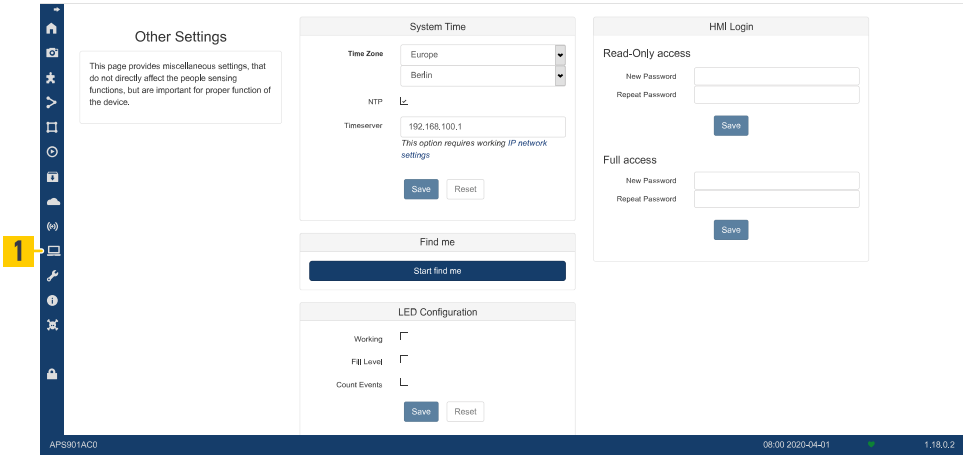


Fig. 135: Other Settings

Use the Other Settings page to set date and time manually, to locate the sensor, to set the usage of the LED or to change the login passwords.

6.12.1 System time

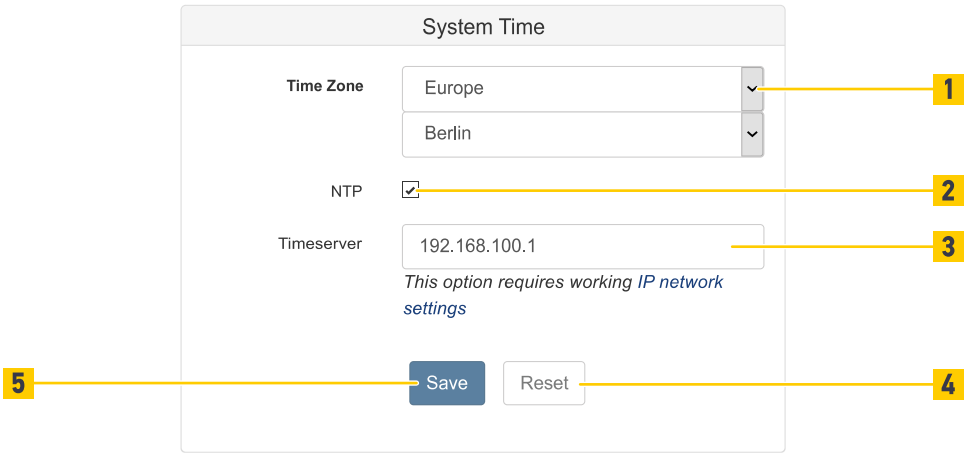


Fig. 136: Using NTP for setting date and time

Date and time is used for time stamps in data recording and protocols.

The device has a clock that can work up to three days without power supply. This is not available for APS-90-OUTDOOR devices. After that, date and time is reset to UNIX zero time 1970-01-01 T00:00:00 UTC (or 31.12.1969 localtime depending to the time zone settings).

- Set the time zone by choosing region and location (Fig. 136 /1) from the dropdown boxes.
- NTP (Fig. 136 /2) should be activated to set the correct time and date automatically after reboot. Using NTP the IP address of the timeserver (Fig. 136 /3) has to be defined.

  If no NTP time server is activated the time and date can be set using the Push Services protocol or manually.
- To go back to the last saved settings click the Reset button (Fig. 136 /4).
- To save all the settings in the device click the Save button (Fig. 136 /5).

6.12.2 Find me

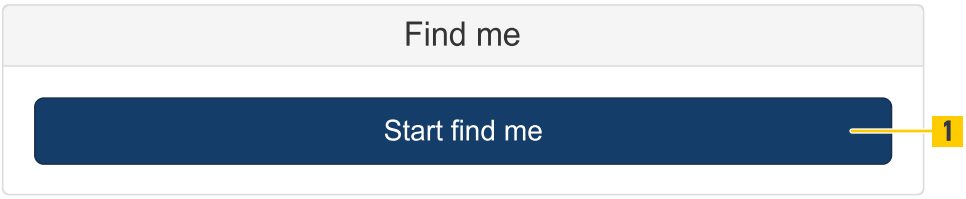


Fig. 137: Find me

- To locate the device click Start find me button (Fig. 137 /1). The status LED starts flashing with a blue light and will stop flashing automatically after 5 min.
- Click again to stop the flashing LED immediately.

6.12.3 LED Configuration

The status LED is switched off after start-up. With the LED Configuration the status LED can be activate for some events.

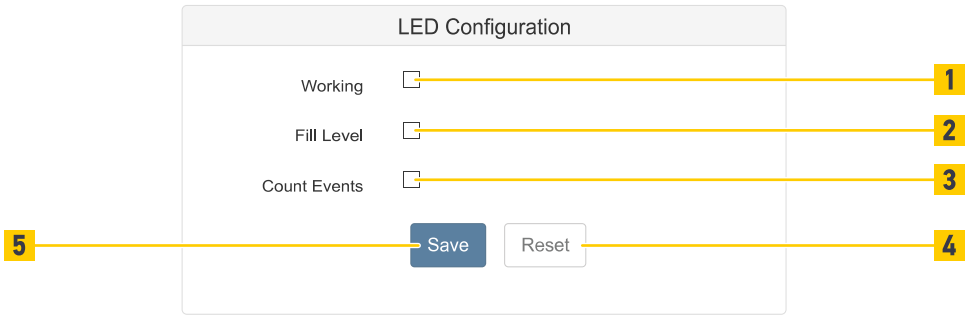


Fig. 138: LED Configuration

- To display the operation of the device activate Working (Fig. 138 /1). The LED lights up continuously green after start-up.
- To display a fill level >0 in a monitored zone activate Fill Level (Fig. 138 /2). The LED lights up continuously yellow if the fill level in a zone is greater than 0.
- To display a count event activate Count Events (Fig. 138 /3). The LED lights up blue for 1 s if a person is counted.
- To go back to the last saved settings click the Reset button (Fig. 138 /4).
- To save all the settings in the device click the Save button (Fig. 138 /5).

6.12.4 HMI Login

Here you can change the passwords for the two login modes.

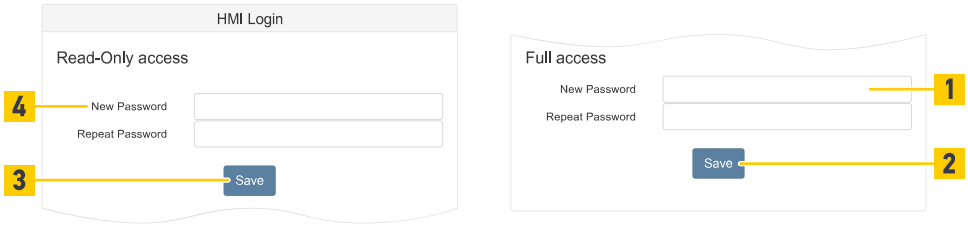


Fig. 139: Changing Passwords

- Enter the new password for Read-Only access (Fig. 139 /4) twice.
- Confirm the modifications with the Save button (Fig. 139 /3).
- Enter the new password for Full access (Fig. 139 /1) twice.
- Confirm the modifications with the Save button (Fig. 139 /2).

6.13 Service Tools

To go to the Service Tools page click the Service Tools icon (Fig. 140 /1).

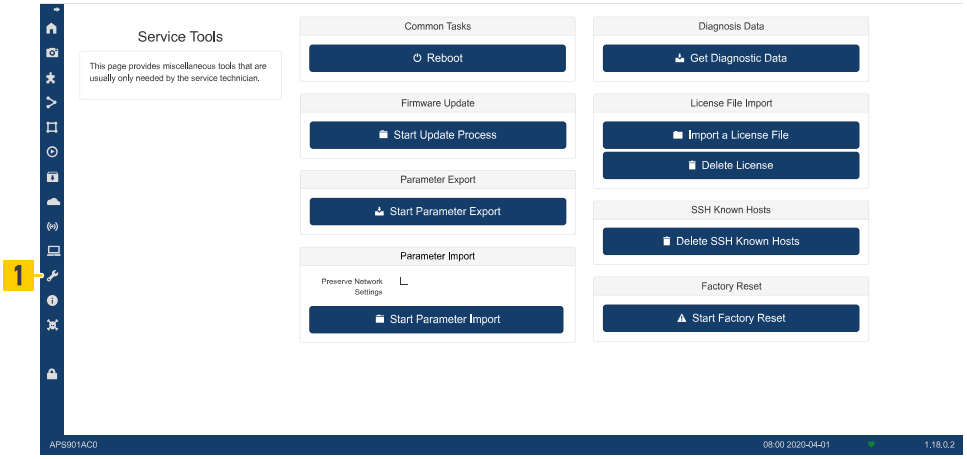


Fig. 140: Service Tools

This page provides miscellaneous tools that are usually only needed by the service technician.

6.13.1 Common tasks

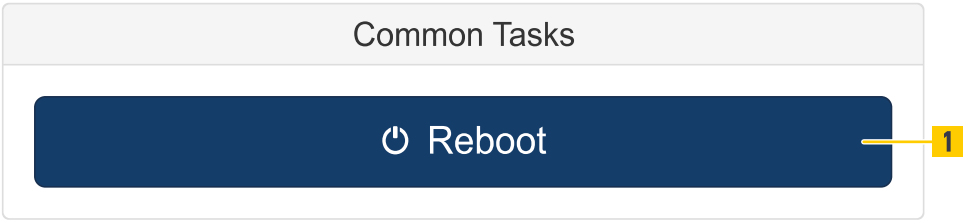


Fig. 141: Common Tasks

- Some configuration changes take effect only after a restart (reboot). To restart the device click Reboot (Fig. 141 /1). The connection to the user interface is closed. Reconnect to continue the configuration.

6.13.2 Firmware Update

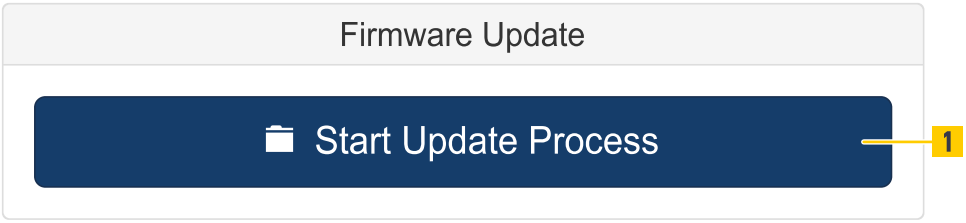


Fig. 142: Firmware Update

- The firmware can be updated with a firmware file provided by Hella Aglaia. To start the update click Start Update Process (Fig. 142 /1) and select the firmware file (*.tar) on the PC.

  Follow the displayed instructions. After update and restart, the user interface usually opens up automatically to enable further configuration.

> ***Clearing browser cache***
>
> *We recommend clearing the browser cache after an update.*

6.13.3 Parameter Export

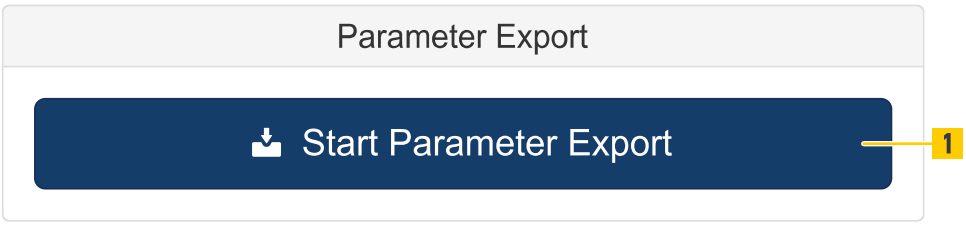


Fig. 143: Parameter Export

- Parameter settings from one device can be exported as a backup and can be imported into a different device. That makes it easier to deploy complex settings (e.g. network server settings). To download the file click Start Parameter Export (Fig. 143 /1).

6.13.4 Parameter Import

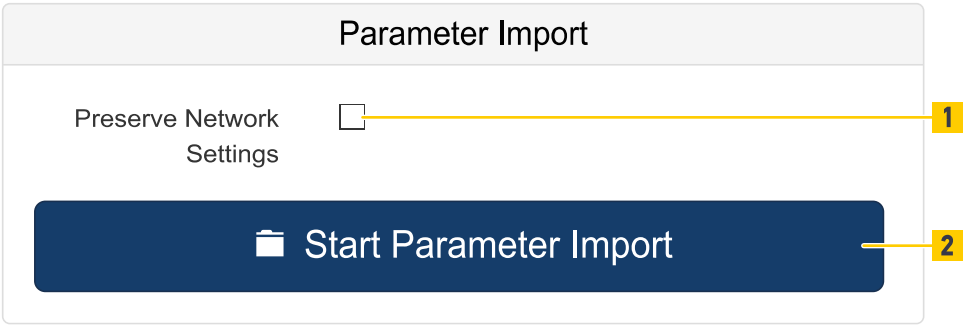


Fig. 144: Parameter Import

- Parameter settings can be imported from a backup or from an export of a different device (see ↗ Chapter 6.13.3 Parameter Export on page 136).
- If you want to keep the current network settings, then tick the Preserve Network Settings (Fig. 144 /1) checkbox.
- To start the upload click Start Parameter Import (Fig. 144 /2) and select the parameter file (*.tar.gz) on the PC.
- Follow the displayed instructions. After import, the device restarts and usually opens up the user interface automatically to enable further configuration. Parameters sets that were exported from older firmware releases will be automatically updated during the import.

6.13.5 Diagnosis Data

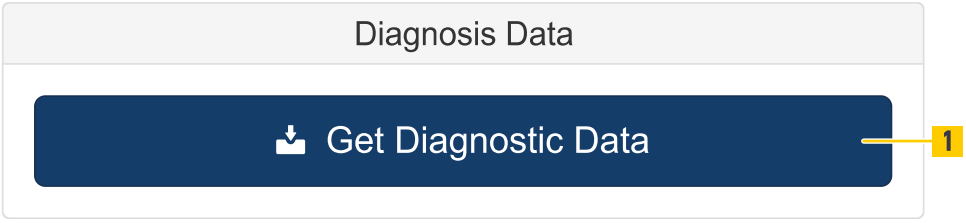


Fig. 145: Diagnosis Data

- For HELLA Aglaia customer support, it can be useful to provide diagnostic data that can be exported from the device. To download the file click Get Diagnosis Data (Fig. 145 /1).

6.13.6 License File Import

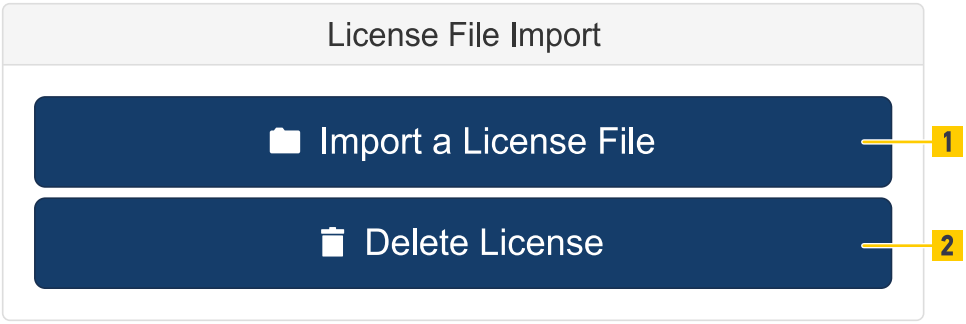


Fig. 146: License File Import

- Some additional features of the device require installed licenses. In order to enable these features, you need to copy the corresponding license files to the device.
- To upload the file click Import a License File (Fig. 146 /1).
- To remove a license from the device click Delete License (Fig. 146 /2).
- A reboot (see ↗ Chapter 6.13.1 Common tasks on page 135) is required to enable the new features.

6.13.7 SSH Known Hosts

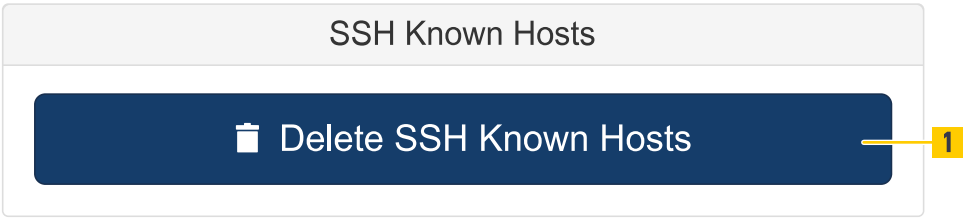


Fig. 147: SSH Known Hosts

- Under certain circumstances it might be necessary to delete the known hosts in the device. This is necessary, for example, if the sftp server is set up again and the security keys are changed.
- To delete the known hosts in the device click Delete SSH Known Hosts (Fig. 147 /1).

6.13.8 Factory reset

Fig. 148: Factory Reset

- Under certain circumstances it might be necessary to reset all the parameter settings of the device to their factory default settings.
- To reset the parameters to the default settings of the installed firmware version click Start Factory Reset (Fig. 148 /1).
- Follow the instructions. After reboot, the user interface usually opens up automatically to enable further configuration. This doesn't happen with network setting changes.
- A factory reset can also be done using the reset button or reset pin on the I/O-port (↗ Chapter 3.1.5 Factory reset button/pin on page 23).

6.14 About

To go to the General Information page click the About icon (Fig. 149 /1).

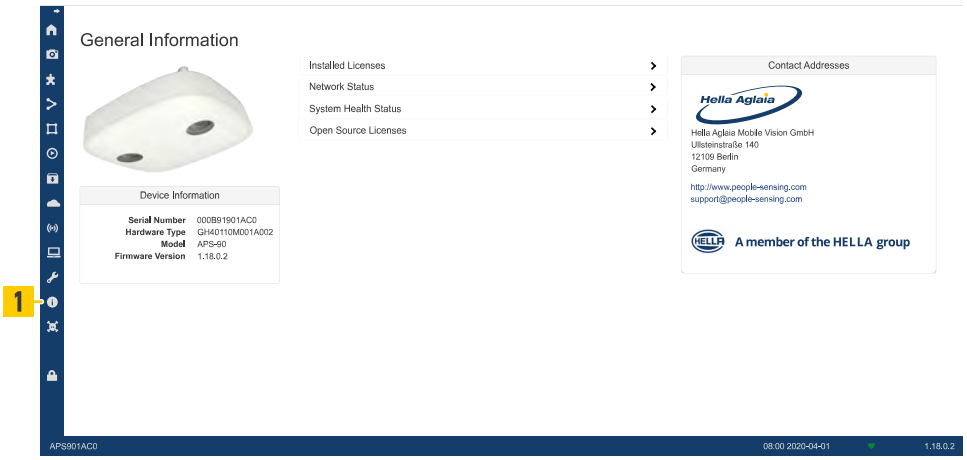


Fig. 149: Service Tools

The About category gives system information. Combined with Diagnosis Data ,this can be very useful for customer support purposes.

6.14.1 Device information

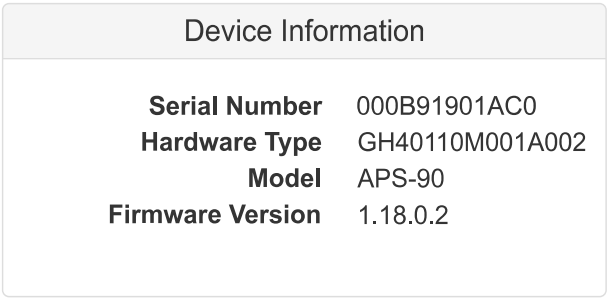


Fig. 150: Device Information

Device Information shows the Serial Number (same as MAC hardware address), Hardware Type (circuit board), Model and Firmware Version.

6.14.2 Installed licenses

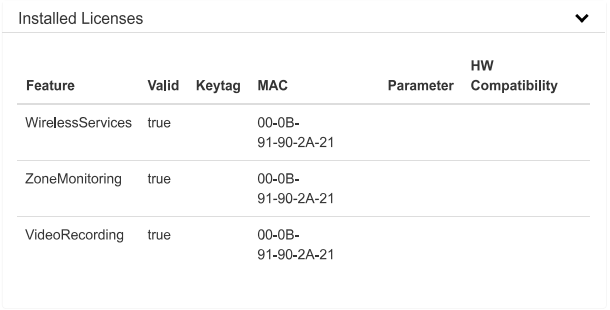


Fig. 151: Installed Licenses

Some additional features of the device require installed licenses. Installed License shows all licenses with their status of validity.

6.14.3 Network status

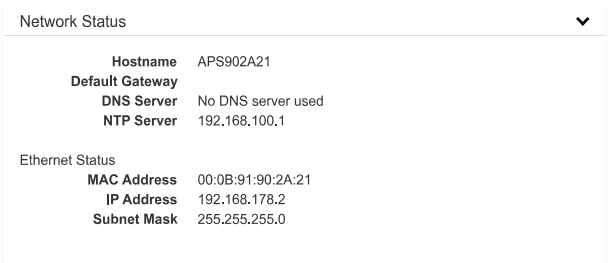


Fig. 152: Network Status

Although some settings can be manually set, when using DHCP some of the network settings are received from the router or other DHCP servers.

- The Hostname identifies the device by a given name and is also used in protocols and saved files.
- The Default Gateway is the numerical path used to connect the device to other parts of the network.
- The DNS Server translates FQDN (readable server names like "www.people-sensing.com") to an IP address.
- The NTP Server fetches the current time from a server.

Ethernet Status

- The MAC Address is a unique ID for the device.
- The IP Address is a numerical label used by the device to communicate over Ethernet.
- The Subnet Mask is used to direct network traffic between devices.

WiFi Status

- The MAC Address is the unique ID of the wireless USB adapter.
- The IP Address is a numerical label used by the device to communicate over wireless network.
- The Subnet Mask is used to direct network traffic between devices.

6.14.4 System health status

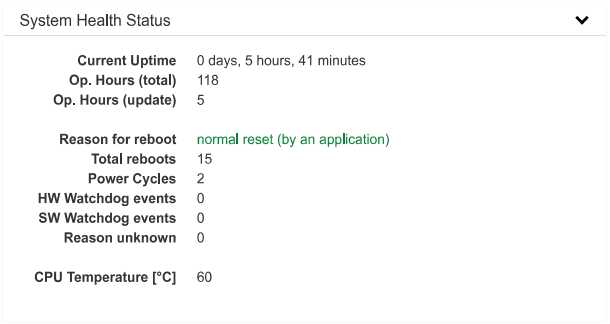


Fig. 153: System Health Status

This information shows:

- Operating time since last start.
- Overall operating time.
- Operating time since last firmware update.
- Type of last system reset or reboot/restart.
- Total number of system resets.
- Number of system power-ups.
- Number of hardware watchdog events.
- Number of software watchdog events.
- Number of unknown reset events.
- Current CPU Temperature [°C] ; this is the temperature (°Celsius) inside the controller on the mainboard.

6.14.5 Open Source Licenses

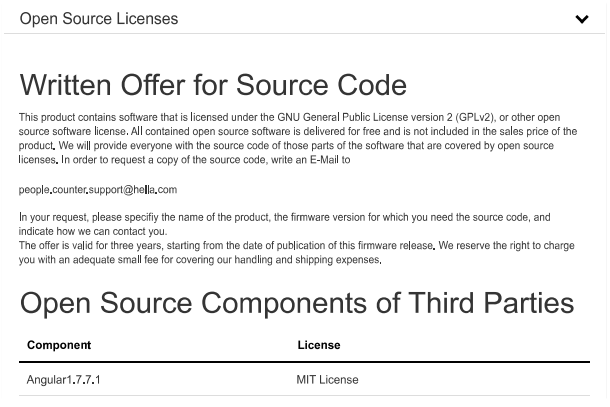


Fig. 154: List of open source licenses

License information about used open source components in the firmware 1.18.0.

6.14.6 Contact Addresses

Fig. 155: Contact Addresses

The manufacturer and customer support can be contacted via these addresses.

6.15 Diagnostics

To go to the Diagnostics and Test Images page click the Diagnostics icon (Fig. 156 /1).

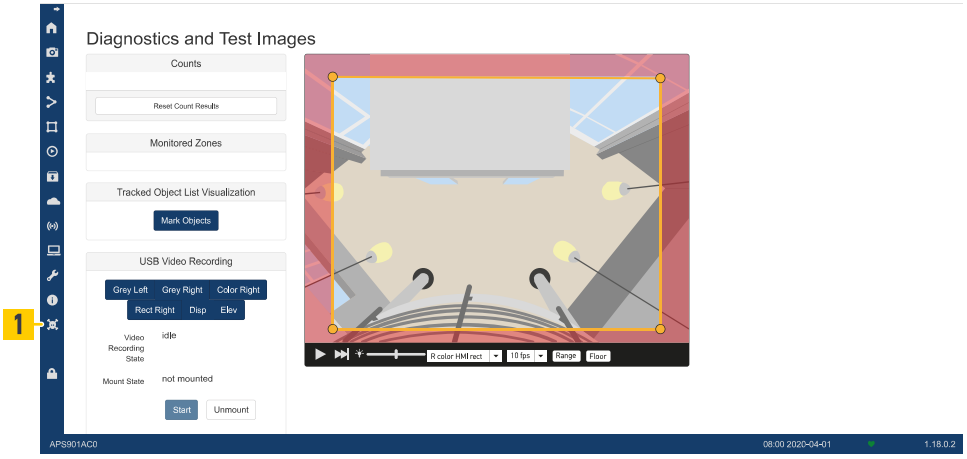


Fig. 156: Diagnostics and Test Images

This screen is used to select what diagnostic information is to be made visible. These settings are not stored and are only used in the 'Diagnostics' view.

6.15.1 Counts

Shows the counting data depending on the configuration and the installed license.

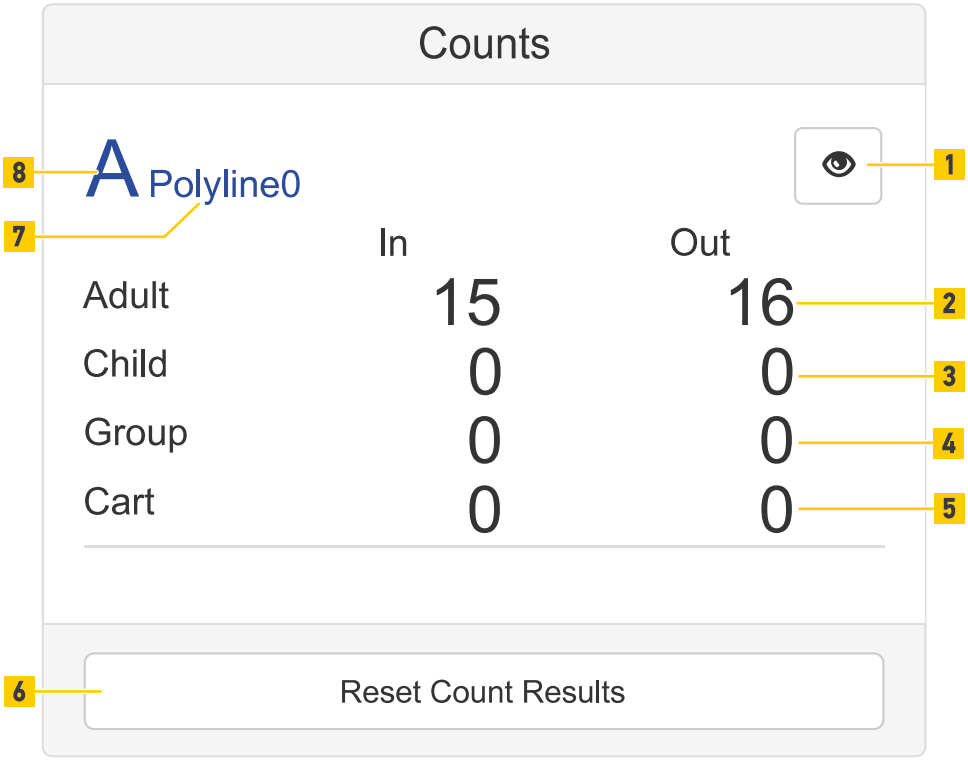


Fig. 157: Counts with 1 counting line

- The counting line is specified with its identifier (Fig. 157 /8) and its name (Fig. 157 /7).
- To show or hide the counting line in the live view click the button (Fig. 157 /1).
- See the data for incoming and outgoing adults (Fig. 157 /2).
- See the data for incoming and outgoing children (Fig. 157 /3).
- See the data for incoming and outgoing groups (Fig. 157 /4).
- See the data for incoming and outgoing carts (Fig. 157 /5).
- To set the count information to 0 in the user interface click the Reset Count Results button (Fig. 157 /6). Reset has no effect on internal counts or data protocols.

6.15.2 Monitored Zones

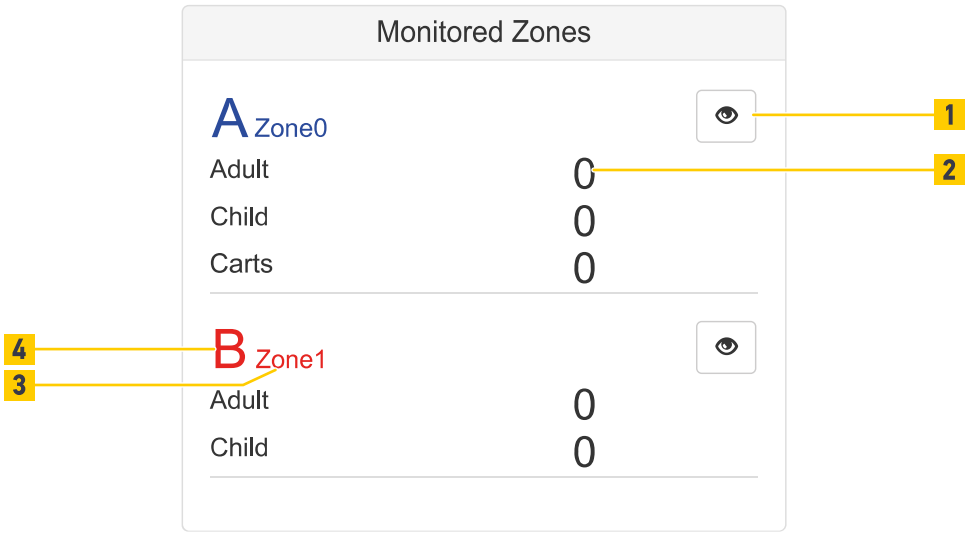


Fig. 158: Monitored zones

- Click the button (Fig. 158 /1) to show or hide the monitored zone in the live view.
- See the actual number of objects in the monitored zones (Fig. 158 /2). The data is split into adult, child and carts, if the license for object classification is installed and cart counting is activated.
- The monitored zone is specified with its identifier (Fig. 158 /4) and its name (Fig. 158 /3).

6.15.3 Tracked Objects

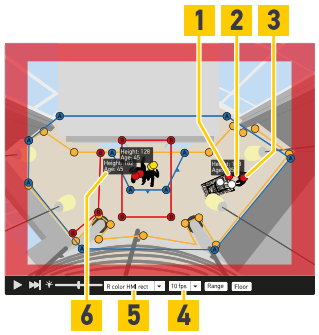


Fig. 159: Live view with tracked objects

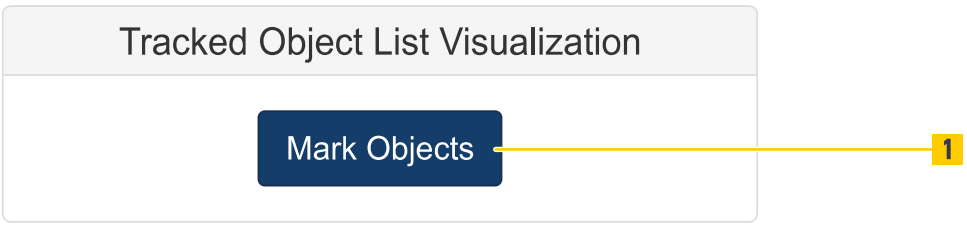


Fig. 160: Tracked Object List Visualization

To see information about the tracked objects click Mark Objects (Fig. 160 /1).

- See a point at the detected head (Fig. 159 /3) of a person.
- See a point of an object/person at the floor (Fig. 159 /1).
- See a line (Fig. 159 /2) between top and ground point.
- See a box with text information (Fig. 159 /6) of the detected object/ person.
- Choose the display rate (Fig. 159 /4) from the list.
- Choose the type of video information (Fig. 159 /5) from the list.

6.15.4 USB Video Recording

The USB Video Recording function is for connecting USB memory devices but is aimed at HELLA Aglaia development issues (not for customer use). This video recording does not include any counting or tracking data.

The customer video recording is located at the menu icon *<Data Recording>*.

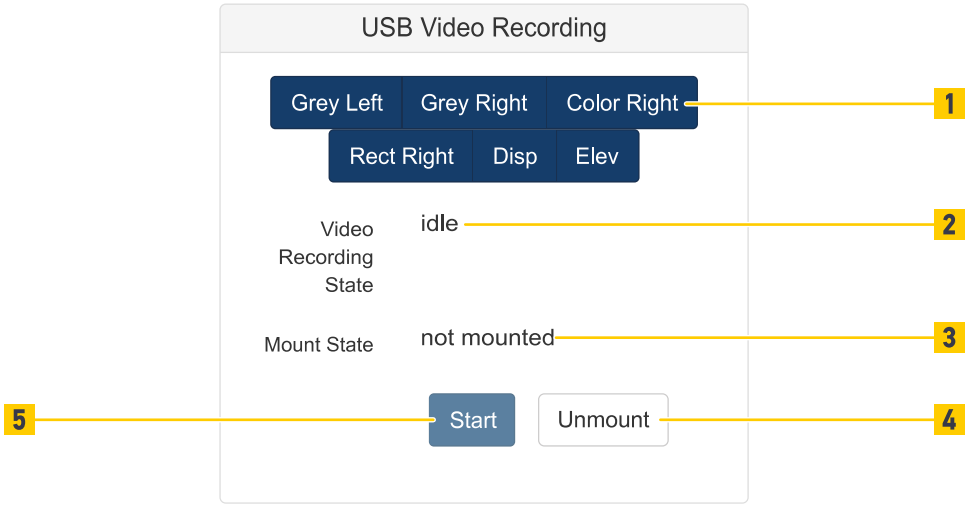


Fig. 161: USB video recording

- Choose the kind of image (Fig. 161 /1) to record.
- Check if the USB memory device is already mounted. The Mount State (Fig. 161 /3) should display *<mounted>*.

  Please note, that a USB memory device should be mounted before starting up the device.
- To start recording click the Start button (Fig. 161 /5). The Video Recording State (Fig. 161 /2) changes to *<recording>*. The Start button toggles to a Stop button.
- To finish the recording click the Stop button.
- After finishing recording click the Unmount button (Fig. 161 /4) before physically disconnecting the USB memory device.

7 Cleaning, maintenance and trouble-shooting

7.1 Cleaning

Materials:

Lint-free cloth

Commonly available neutral cleaners diluted with water

Optimal counting accuracy can be achieved only if the view of the cameras is not obstructed.

1. Check the lens cover plate or outside housing for dirt, scratches and stickers at regular intervals.

NOTICE

Reduced transparency by cleaning with solvents

Solvents can reduce the transparency of the lens cover plate.

– Do not use cleaning agents containing solvents (such as gasoline, acetone, petroleum and turpentine)

2. Clean the lens cover plate or the housing if necessary.

7.2 Maintenance

The device does not require any preventive maintenance.

7.3 Troubleshooting

First try to solve problems using the following table. Apply the measures listed here.

If the problem cannot be resolved or your problem is not listed, contact the support team. Service requests regarding the device can be sent to the following e-mail address:

support@people-sensing.com

Fault description	Cause	Remedy
Status LED lights permanently red	Fallback System is active.	Find out the IP address and connect to the device. Or reboot the device by power off/on.

Fault description	Cause	Remedy
Status LED blinks permanently yellow	Device is in DHCP mode and receives no IP address.	Check the DHCP server in the network.
Device has no connection to the master system	Power supply interrupted	Check power supply.
	Wrong or defective wiring	■ Check Ethernet cabling. ■ Check status LED of Ethernet switch. ■ Check status LED of the device after connecting with power. LED red on starting up for approx. 10 sec, blinking green during startup, blinking yellow while waiting for DHCP, LED green for approx. 6 sec and then off.
	Incorrectly configured network router	■ Check DHCP settings (if device uses DHCP). ■ Check DNS settings. ■ Check firewall settings.
	Unknown (after reboot)	■ Factory reset. ■ If necessary, replace the device.
Optical Self Diagnosis (OSD) status error	status: Covered	Check the optics condition. ■ Is there damage to the optics. ■ Are the optics covered e.g with stickers. ■ Is the camera view obstructed.
	status: Too dark	Weak illumination. Illuminate the scenery with at least 3 lx.
No counting results	Wrong configuration	Check in the user interface: ■ If counting lines are defined and correct in the passageways. ■ Counting lines are in the defined floor area. On both sides are at least 40 cm (1.31 ft) distance to the edge of the floor area.
Inaccurate counting results	Modified environment	Check in the user interface: ■ If counting lines are placed correctly. ■ If In/Out-direction is correctly set. ■ If static environment is masked correctly in floor area. ■ If obstructions are masked correctly.

Fault description	Cause	Remedy
		If checks are negative, reconfigure the device.
	Modified mounting position	Check in the user interface: ■ If the adjusted pitch and yaw angle still correspond to the values measured on the device. ■ If the applied height still corresponds to the value measured on the device. If the checked values differ, reconfigure the device.
	Dirty lens cover plate	Clean lens cover plate.

8 Disposal

After decommissioning, the product shall be recycled as electronic waste in an environmentally safe way. In the European Union, the WEEE Directive 2012/19/EU applies. HELLA Aglaia will recollect its own electronic products free of charge and take care of the further processing.

Decommissioned devices can be sent to the address:

HELLA Aglaia Mobile Vision GmbH
Ullsteinstraße 140
12109 Berlin
Germany

Please clearly mark the goods as **waste**.

9 Appendix

9.1 Detection area

Instal. Height (cm)	Low and Standard mode				Extended mode			
	APS-90	APS-180	Width (cm)	Depth (cm)	APS-90	APS-180	Width (cm)	Depth (cm)
200	APS-90		185	160				
220	APS-90		225	195				
240	APS-90		270	230				
260	APS-90		310	265				
280	APS-90		350	300				
290	APS-90		370	315				
300	APS-90	APS-180	390	330				
320	APS-90	APS-180	435	370				
340	APS-90	APS-180	475	400				
350	APS-90	APS-180	495	420	APS-90		220	190
360	APS-90	APS-180	515	440	APS-90		230	200
380	APS-90	APS-180	555	470	APS-90		245	215
400	APS-90	APS-180	600	505	APS-90		265	225
410		APS-180	620	520	APS-90		270	230
420		APS-180	640	540	APS-90		280	240
440		APS-180	680	575	APS-90		295	255
460		APS-180	720	610	APS-90		315	270
480		APS-180	765	645	APS-90		330	280
490		APS-180	785	660	APS-90		340	290
500		APS-180	800	680	APS-90	APS-180	345	295
520		APS-180	800	715	APS-90	APS-180	365	310
540		APS-180	800	750	APS-90	APS-180	380	325
560		APS-180	800	780	APS-90	APS-180	395	335
580		APS-180	800	800	APS-90	APS-180	415	350
600		APS-180	800	800	APS-90	APS-180	430	365
610						APS-180	440	370
620						APS-180	445	380
640						APS-180	465	395
660						APS-180	480	405
680						APS-180	495	420
700						APS-180	515	435
720						APS-180	530	450
740						APS-180	545	460
760						APS-180	565	475
780						APS-180	580	490
800						APS-180	595	505
820						APS-180	610	515
840						APS-180	630	530
860						APS-180	645	545
880						APS-180	660	560
900						APS 180	680	570

Fig. 162: Detection area lengths in cm

Instal. Height (Inch)	Low and Standard mod				Extended mode			
	APS-90	APS-180	Width (Inch)	Depth (Inch)	APS-90	APS-180	Width (Inch)	Depth (Inch)
79	APS-90		73	63				
87	APS-90		89	77				
94	APS-90		106	91				
102	APS-90		122	104				
110	APS-90		138	118				
114	APS-90		146	124				
118	APS-90	APS-180	154	130				
126	APS-90	APS-180	171	146				
134	APS-90	APS-180	187	157				
138	APS-90	APS-180	195	165	APS-90		87	75
142	APS-90	APS-180	203	173	APS-90		91	79
150	APS-90	APS-180	219	185	APS-90		96	85
157	APS-90	APS-180	236	199	APS-90		104	89
161		APS-180	244	205	APS-90		106	91
165		APS-180	252	213	APS-90		110	94
173		APS-180	268	226	APS-90		116	100
181		APS-180	283	240	APS-90		124	106
189		APS-180	301	254	APS-90		130	110
193		APS-180	309	260	APS-90		134	114
197		APS-180	315	268	APS-90	APS-180	136	116
205		APS-180	315	281	APS-90	APS-180	144	122
213		APS-180	315	295	APS-90	APS-180	150	128
220		APS-180	315	307	APS-90	APS-180	156	132
228		APS-180	315	315	APS-90	APS-180	163	138
236		APS-180	315	315	APS-90	APS-180	169	144
240						APS-180	173	146
244						APS-180	175	150
252						APS-180	183	156
260						APS-180	189	159
268						APS-180	195	165
276						APS-180	203	171
283						APS-180	209	177
291						APS-180	215	181
299						APS-180	222	187
307						APS-180	228	193
315						APS-180	234	199
323						APS-180	240	203
331						APS-180	248	209
339						APS-180	254	215
346						APS-180	260	220
354						APS 180	268	224

Fig. 163: Detection area lengths in inch

Instal. Height (Feet)	Low and Standard mod				Extended mode			
	APS-90	APS-180	Width (Feet)	Depth (Feet)	APS-90	APS-180	Width (Feet)	Depth (Feet)
6,56	APS-90		6,07	5,25				
7,22	APS-90		7,38	6,40				
7,87	APS-90		8,86	7,55				
8,53	APS-90		10,17	8,69				
9,19	APS-90		11,48	9,84				
9,51	APS-90		12,14	10,33				
9,84	APS-90	APS-180	12,80	10,83				
10,50	APS-90	APS-180	14,27	12,14				
11,15	APS-90	APS-180	15,58	13,12				
11,48	APS-90	APS-180	16,24	13,78	APS-90		7,22	6,23
11,81	APS-90	APS-180	16,90	14,44	APS-90		7,55	6,56
12,47	APS-90	APS-180	18,21	15,42	APS-90		8,04	7,05
13,12	APS-90	APS-180	19,69	16,57	APS-90		8,69	7,38
13,45		APS-180	20,34	17,06	APS-90		8,86	7,55
13,78		APS-180	21,00	17,72	APS-90		9,19	7,87
14,44		APS-180	22,31	18,86	APS-90		9,68	8,37
15,09		APS-180	23,62	20,01	APS-90		10,33	8,86
15,75		APS-180	25,10	21,16	APS-90		10,83	9,19
16,08		APS-180	25,75	21,65	APS-90		11,15	9,51
16,40		APS-180	26,25	22,31	APS-90	APS-180	11,32	9,68
17,06		APS-180	26,25	23,46	APS-90	APS-180	11,98	10,17
17,72		APS-180	26,25	24,61	APS-90	APS-180	12,47	10,66
18,37		APS-180	26,25	25,59	APS-90	APS-180	12,96	10,99
19,03		APS-180	26,25	26,25	APS-90	APS-180	13,62	11,48
19,69		APS-180	26,25	26,25	APS-90	APS-180	14,11	11,98
20,01						APS-180	14,44	12,14
20,34						APS-180	14,60	12,47
21,00						APS-180	15,26	12,96
21,65						APS-180	15,75	13,29
22,31						APS-180	16,24	13,78
22,97						APS-180	16,90	14,27
23,62						APS-180	17,39	14,76
24,28						APS-180	17,88	15,09
24,93						APS-180	18,54	15,58
25,59						APS-180	19,03	16,08
26,25						APS-180	19,52	16,57
26,90						APS-180	20,01	16,90
27,56						APS-180	20,67	17,39
28,22						APS-180	21,16	17,88
28,87						APS-180	21,65	18,37
29,53						APS 180	22,31	18,70

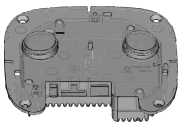
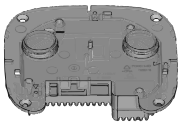
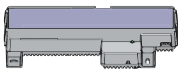
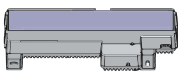
Fig. 164: Detection area lengths in feet

9.2 Ordering Information

The device and the accessories listed can be ordered from HELLA Aglaia using the following order numbers.

> ***Contact***
>
> *Please contact HELLA Aglaia for other versions and accessory parts.*
>
> *info@people-sensing.com*
>
> *www.people-sensing.com*

Product

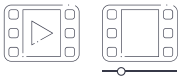
Product	Description	Order no.	
APS-90E	Advanced People Sensor for ceiling heights from 2.0 m - 3.50 m (6.5 ft - 12 ft) with memory for video recording	013.927-047	
APS-90E-IO	Advanced People Sensor for ceiling heights from 2.0 m - 3.50 m (6.5 ft - 12 ft) with memory for video recording with digital inputs and outputs	013.927-057	
APS-180E	Advanced People Sensor for ceiling heights from 3.0 m - 6.00 m (10 ft - 20 ft) with memory for video recording	013.926-047	
APS-180E-IO	Advanced People Sensor for ceiling heights from 3.0 m - 6.00 m (10 ft - 20 ft) with memory for video recording with digital inputs and outputs	013.926-057	

Product	Description	Order no.	
APS-90-Outdoor-PoE	Advanced People Sensor outdoor sensor (IP65) for ceiling heights from 2.0 m - 4.00 m (78.74 in - 157.48 in) with digital inputs	013.929-037	

Discontinued products

Product	Description	Order no.	*Old order no.*
APS-90	Advanced People Sensor for ceiling heights from 2.0 m - 3.50 m (6.5 ft - 12 ft)	013.927-007	510228
APS-90-8GB	Advanced People Sensor for ceiling heights from 2.0 m - 3.50 m (6.5 ft - 12 ft) with addional 8GB Flash	013.927-017	510230
APS-90-IO-8GB	Advanced People Sensor for ceiling heights from 2.0 m - 3.50 m (6.5 ft - 12 ft) with digital inputs and outputs with addional 8GB Flash	013.927-037	510231
APS-180	Advanced People Sensor for ceiling heights from 3.0 m - 6.00 m (10 ft - 20 ft)	013.926-007	510208
APS-180-8GB	Advanced People Sensor for ceiling heights from 3.0 m - 6.00 m (10 ft - 20 ft) with addional 8GB Flash	013.926-017	510226
APS-180-IO-8GB	Advanced People Sensor for ceiling heights from 3.0 m - 6.00 m (10 ft - 20 ft) with digital inputs and outputs with addional 8GB Flash	013.926-037	510227

Software Options

Option	Description	Order no.	
Object Classification	Separate count values e.g. for adults, children, groups and shopping carts.	921.700-13B	
Zone Monitoring	Amount of people in visible areas.	921.700-14B	
Object List	Actual and/or historical list of detected objects with location, height and other parameters sent via Push Services (SOAP/XML).	921.700-11B	
Video Recording	Synchronous recording of tracking, counting and zone monitoring data inside the sensor. Streaming of video data.	921.700-17B (included in the scope of delivery for some devices)	
Wireless Services	Wireless and Bluetooth tracking of devices or WiFi connection	921.700-22B (use requires a USB adapter for WiFi and/or Blue-tooth)	

Accessories

Accessory	Description	Order no.	
Wireless USB adapter	Wireless tracking of devices or WiFi connection	226.167-007	
USB WiFi Bluetooth Adapter	Wireless tracking of devices or WiFi connection and Bluetotth tracking	226.167-017	
APS-90 faceplate white	Installation kit	226.140-007	
APS-90 faceplate black	Installation kit	226.140-017	
APS-90 surface mount box white	Installation kit	226.141-007	
APS-90 surface mount box black	Installation kit	226.140-017	
APS-90 1/4" camera mount adapter	Adapter plate for mounting an APS-90 with surface mount box on a standard 1/4" camera mount or tripod	226.164-007	
APS-180 surface mount hood white	Installation kit	193.718-007	
APS-180 surface mount hood black	Installation kit	193.718-017	
APS-180 installation kit recessed white	Installation kit	193.719-007	
APS-180E installation kit outdoor	Installation kit outdoor	193.719-017	
APS-180 1/4" camera mount adapter	Adapter plate for mounting an APS-180 on a standard 1/4" camera mount or tripod	193.719-027	
APS-90-Outdoor installation kit outdoor	Installation kit outdoor	226.164-017	
Ethernet connection cable M12 - RJ45	Length of 2 m (6.6 ft)	189.077-007	
Ethernet connection cable M12 - RJ45	Length of 5 m (16.4 ft)	189.077-017	

9.3 Menu structure

Menu	View	Comment
Welcome	Login	Login as read-only or full setup user

Menu	View	Comment
Home	Device Information	Status of the visible range and the configuration of the programmable inputs
	Counts	Counting Information for up to 10 counting lines
	Monitored Zones	Live amount results
	Camera view	Live view with counting lines and tracking objects
Camera Position	Camera Position	Adjust the mounting angles
	Height Range	Choose the height range according to the installation height.
	Camera view	Mark floor area polygon and hide obstructions in camera view
	Floor Area	Mark floor area of interest
	Obstructions	Mark obstructing objects that people may walk under
	Coordinate System	Define replacement and rotation for coordinates in the Object List feature
Multi Sensor Fusion	Multi Sensor Fusion	Select the kind of sensor in the fusion.
	Slave Devices	Select the slave devices
	Master Device	Select the master device
Counting	Counting Lines	Define and name counting lines and set up counting delays
	Counting Filter	Ignore non-person objects
	Camera view	Mark counting polygon lines in camera view
Zone Monitoring	Monitored Zones	Name zones and setup
	Zone Statistics	Activation and completion interval for statistics
	Monitoring Filter	Ignore non-person objects
	Camera view	Mark polygon areas in camera view
Video	Video Feature	Activation and settings for video recording and video streaming
	Video File Access	Usage of automatic file upload and manual access to stored videos
Data Interface	Push Service	Push Service protocol settings for SOAP, IBM Watson IoT, Rest Push or Google Pub/Sub
	REST API	Settings for REST API

Menu	View	Comment
	Data File Recording	File completion interval for counting data, zone monitoring data and wireless tracking data
	Data File Access	Settings and usage of automatic file upload and manual access to stored files
Network	Ethernet Network Status	Current network status
	Ethernet IP	DHCP or static IP address
	Ethernet DNS	Domain name server in case of static IP address
	Proxy	Intranet proxy settings
	Network Services	Use of telnet, ssh, DNS-SD and ntp
	HMI	Settings for the user interface
	VPN Auto Connection	Activation and settings for VPN auto connection
Wireless Services	Wireless Services Status	Current wireless network status
	Wireless Mode	Choose mode of WiFi services
	Wireless Tracking	Tracking wireless devices such as mobile phones
	WiFi HMI Access	Accessing the user interface by WiFi
Other Settings	System Time	Time and time zone
	Find me	Locate the device
	LED Configuration	Settings for use
	HMI Login	Passwords for read-only and full access
Service Tools	Common Tasks	Reboot
	Firmware Update	Update the device firmware
	Parameter Export	Export of all parameters to a file on the PC
	Parameter Import	Import of all parameters from a file on the PC
	Diagnosis Data	Save all diagnosis data to a file at the PC
	License File Import	Activate features with a license file or delete a license
	VPN ConfigFile Import	Import or delete a VPN-Configuration File
	Factory Reset	Reset to factory settings
About	Device Information	MAC, hardware type and firmware version
	Installed Licenses	Installed and valid licenses

Menu	View	Comment
	Network Status	IP, Gateway, DNS, etc.
	System Health Status	Uptime, CPU temperature, cause of last reboot, etc.
	Open Source Licenses	Information about used components in the firmware
	Contact Addresses	HELLA Aglaia contact data
Diagnostics	Counts	Live counting results
	Monitored Zones	Live amount results
	Tracked Object List Visualization	Display options for tracked objects inside the camera view
	USB Video Recording	Record videos for developer issues
	Camera view	Adjustable camera view
Logout		

9.4 List of used IP ports

This list provides all network ports that are used by the APS. Most of them are needed only with optional functions. Consult this list for your firewall and router configuration.

Establishing communication direction

- *➨APS*

  APS as server listens on the corresponding port for incoming connection requests.

- *APS➨*

  APS as client requests a connection to the corresponding port of a server.

- *➨APS➨*

  APS listens for and requests connections on the same port.

Use	Direction	Port	TCP/UDP	Description
HTTP (user interface)	➨APS	80 configurable	TCP	Internal web server

Use	Direction	Port	TCP/UDP	Description
HTTPS (user interface)	➡APS	443 configurable	TCP	Internal web server
DNS (Domain Name System)	APS➡	53	UDP/TCP	Resolving IP for FQDN
NTP (Network Time Protocol)	APS➡	123	UDP	Clock synchronization
Push Services (SOAP/XML)	APS➡	80 configurable	TCP	Push data to server via http
Push Services (SOAP/XML)	APS➡	443 configurable	TCP	Secure push data to server via https
REST API (Poll)	➡APS	8091 configurable	TCP	External request of data via https
REST Push	APS➡	443 configurable	TCP	Secure push data to server via https
FTP (File Tranfer Protocol)	APS➡	21 configurable	TCP	Data recording upload
SFTP (Secure File Tranfer Protocol)	APS➡	22 configurable	TCP	Data recording secure upload
MQTT	APS➡	1883	TCP	Push heart beat for the RAS server
OpenVPN (Virtual Private Network)	APS➡	443	UDP	Establish virtual point-to-point connection to the RAS server
OpenVPN (Virtual Private Network)	APS➡	8445 configurable	UDP	REST API call to check, if Open VPN is requested
OpenVPN (Virtual Private Network)	APS➡	1194 configurable	UDP	Establish virtual point-to-point connection to a server
telnet	➡APS	23	TCP	Terminal access to device
SSH (Secure SHell)	➡APS	22	TCP	Secure terminal access to device
SFTP (Secure File Transfer Protocol)	➡APS	22	TCP	E.g. logfile download

Use	Direction	Port	TCP/UDP	Description
RTSP (Real Time Streaming Protocol)	➡APS	554 configurable	TCP	External control of Video Streaming
Watson IoT	APS➡	443	TCP	Authentifizierung für MQTT
Watson IoT	APS➡	8883	TCP	MQTT Datenübertragung

9.5 CE Declaration of Conformity

Hella Aglaia

CE

EU Konformitätserklärung / EU *Declaration of Conformity (DoC)*

Wir / *We,*

Hella Aglaia Mobile Vision GmbH

(Name des Herstellers / seines Vertreters | *manufacturer / authorised representative)*

Ullsteinstraße 140, 12109 Berlin, Deutschland

(Adresse | *address*)

erklären auf eigene Verantwortung, dass das Produkt /
declare under our own responsibility that the product

Automatic People Sensor; APS-90E, APS-90E-IO

(Produktbeschreibung; Modellnamen | *product description; model names*)

auf das sich diese Erklärung bezieht, die Anforderungen nach den folgenden Normen einhält:
to which this declaration refers complies with the following standards:

EMC ; EN 55024:2010,
EN 55032:2012+AC:2013
RoHS ; EN 50581:2012

(Richtlinie; Nummern : Ausgabedatum der referenzierten Dokumente | *directive, number: date of issue of the referenced documents*)

Gemäß den Bestimmungen von:
According to the requirements of:

2014/30/EU : Elektromagnetische Verträglichkeit - EMV Richtline | *Electromagnetic Compatibility (EMC) Directive*
2011/65/EU : RoHS Richtline | *Restriction of the use of certain Hazardous Substances (RoHS) Directive*

(falls zutreffend | *if applicable*)

Geschehen am: *Done on:*	verantwortliche Personen: *responsible persons:*	
Berlin, 2017-11-22	Matthias Nerling	Stefan Gliem
	Head of Business Unit	Head of Hardware development

Fig. 165: APS-90E CE declaration

Hella Aglaia

CE

EU Konformitätserklärung / EU *Declaration of Conformity (DoC)*

Wir / *We,*

Hella Aglaia Mobile Vision GmbH

(Name des Herstellers / seines Vertreters | *manufacturer / authorised representative)*

Ullsteinstraße 140, 12109 Berlin, Deutschland

(Adresse | *address*)

erklären auf eigene Verantwortung, dass das Produkt /
declare under our own responsibility that the product

Automatic People Sensor; APS-180E, APS-180E-IO

(Produktbeschreibung; Modellnamen | *product description; model names*)

auf das sich diese Erklärung bezieht, die Anforderungen nach den folgenden Normen einhält:
to which this declaration refers complies with the following standards:

EMC ; EN 55024:2010,
EN 55032:2012+AC:2013
RoHS ; EN 50581:2012

(Richtlinie; Nummern : Ausgabedatum der referenzierten Dokumente | *directive; number: date of issue of the referenced documents)*

Gemäß den Bestimmungen von:
According to the requirements of:

2014/30/EU : Elektromagnetische Verträglichkeit - EMV Richtline | *Electromagnetic Compatibility (EMC) Directive*
2011/65/EU : RoHS Richtline | *Restriction of the use of certain Hazardous Substances (RoHS) Directive*

(falls zutreffend | *if applicable)*

Geschehen am:
Done on:

Berlin, 2017-11-22

verantwortliche Personen:
responsible persons:

Matthias Nerlich
Head of Business Unit

Stefan Grimm
Head of Hardware development

Fig. 166: APS-180E CE declaration

CE

EU- Konformitätserklärung / EC-*Declaration of Conformity*

Wir / *the undersigned*

Hella Aglaia Mobile Vision GmbH

(Name des Herstellers / seines Vertreters | *manufacturer / authorised representative)*

Treskowstraße 14, 13089 Berlin, Deutschland

(Adresse | *address*)

erklären in alleiniger Verantwortung, dass das Produkt /
declare under the sole responsibility that the product

Automatic People Counter, type APS-R-PoE

(Modellname, Bezeichnung, Version | *name of product, type or model*)

auf das sich diese Erklärung bezieht, mit den folgenden Normen und technischen Anforderungen übereinstimmt.
to which this declaration refers, conforms with the following standards and technical requirements.

EN 50498:2010-07

(Titel, Nummern, Ausgabedatum der referenzierten Dokumente | *title, number , date of issue of the referenced documents)*

Gemäss den Bestimmungen von:
according to the requirements of:

EMC Directive *2014/30/EU*, 2014-02-26

(falls zutreffend: Richtlinien, übergeordnete Bestimmungen | *if applicable: Regulation*)

Datum der Ausstellung:
Date of issue:

Berlin, 2016-02-03

Hella Aglaia Mobile Vision GmbH
Treskowstr. 14
13089 Berlin, Germany
mail@aglaia-gmbh.de
Tel.: +49 (0)30 [illegible]-429 - 0
Fax: +49 (0)30 [illegible]29 - 109

verantwortliche Personen:
responsible persons:

Kay Talmi
Managing Director

i.A. Stefan Gliem
Head of Hardware development

Fig. 167: APS-90-Outdoor-PoE (alias APS-R-PoE) CE declaration

CE

EU- Konformitätserklärung / EC-*Declaration of Conformity*

Wir / *the undersigned*

Hella Aglaia Mobile Vision GmbH

(Name des Herstellers / seines Vertreters | *manufacturer / authorised representative)*

Treskowstraße 14, 13089 Berlin, Deutschland

(Adresse | *address*)

erklären in alleiniger Verantwortung, dass das Produkt /
declare under the sole responsibility that the product

Automatic People Counter, type APS-90

(Modellname, Bezeichnung, Version | *name of product, type or model*)

auf das sich diese Erklärung bezieht, mit den folgenden Normen und technischen Anforderungen übereinstimmt.
to which this declaration refers, conforms with the following standards and technical requirements.

EN 50498:2010-07

(Titel, Nummern, Ausgabedatum der referenzierten Dokumente | *title, number , date of issue of the referenced documents)*

Gemäss den Bestimmungen von:
according to the requirements of:

EMC Directive *2014/30/EU*, 2014-02-26

(falls zutreffend; Richtlinien, übergeordnete Bestimmungen | *if applicable: Regulation*)

Datum der Ausstellung:
Date of issue:

Berlin, 2016-10-31

verantwortliche Personen:
responsible persons:

Kay Talmi
Managing Director

i.A. Stefan Gliem
Head of Hardware development

Fig. 168: APS-90 CE declaration

CE

EG- Konformitätserklärung / EC-*Declaration of Conformity*

Wir / *the undersigned*

Hella Aglaia GmbH

(Name des Herstellers / seines Vertreters | *manufacturer / authorised representative)*

Treskowstraße 14, 13089 Berlin, Deutschland

(Adresse | *address*)

erklären in alleiniger Verantwortung, dass das Produkt /
declare under the sole responsibility that the product

Automatic People Counter, type APS-180

(Modellname, Bezeichnung, Version | *name of product, type or model*)

auf das sich diese Erklärung bezieht, mit den folgenden Normen und technischen Anforderungen übereinstimmt.
to which this declaration refers, conforms with the following standards and technical requirements.

EN 50498:2010-07

(Titel, Nummern, Ausgabedatum der referenzierten Dokumente | *title, number , date of issue of the referenced documents)*

Gemäss den Bestimmungen von:
according to the requirements of:

EMC directive 2004/108/EC , 2004-12-15

(falls zutreffend: Richtlinien, übergeordnete Bestimmungen | *if applicable: Regulation*)

Datum der Ausstellung: *Date of issue:*	verantwortliche Personen: *responsible persons:*	
Berlin, 2016-02-03	**Kay Talmi**	**i.A. Stefan Gliem**
	Managing Director	Head of Hardware development

Fig. 169: APS-180 CE declaration

9.6 FCC Statement of Verification

Hella Aglaia Mobile Vision GmbH
Ullsteinstraße 140
12109 Berlin

Hella Aglaia

Product Change Notification
Comment to FCC Statement of Verification

Dear Customer!

This is the announcement of changes to the APS-90 series products. The change affects the internal flash memory available on all the APS-90 models. To mark the modification, the product name has been changed from APS-90 to APS-90E. The APS-90E series is thus the successor to the APS-90 series.

Description of Change

I. The boot sequence of the device has been changed in such a way that the device no longer starts from the internal flash memory as before but now from an internal SD card. For the FCC approved models APS-90-8GB and APS-90-IO-8GB a SD card was also available but it was only used for the storage of data.

II. With the APS-90E models the flash memory is no longer needed and therefore no longer populated.

III. The modified configuration signal for defining the boot behavior is an input signal of the SoC. From the point of view of the EMC risk assessment this signal and the omitted flash memory were classified as non-critical. Thus, a negative effect on the EMC characteristics of the device is not expected.

The FCC conformity (Ref. Eurofins G0M-1606-5709, 17.10.2016) is not influenced and still valid. The device continues to comply with the applicable technical rules.

Geschehen am:
Done on:

Berlin, 2017-11-29

verantwortliche Personen:
responsible persons:

Matthias Nerling
Head of Business Unit

Stefan Gliem
Head of Hardware development

Fig. 170: APS-90E FCC Statement of Verification

Hella Aglaia Mobile Vision GmbH
Ullsteinstraße 140
12109 Berlin

Hella Aglaia

Product Change Notification
Comment to FCC Statement of Verification

Dear Customer!

This is the announcement of changes to the APS-180 series products. The change affects the internal flash memory available on all the APS-180 models. To mark the modification, the product name has been changed from APS-180 to APS-180E. The APS-180E series is thus the successor to the APS-180 series.

Description of Change

I. The boot sequence of the device has been changed in such a way that the device no longer starts from the internal flash memory as before but now from an internal SD card. For the FCC approved models APS-180-8GB and APS-180-IO-8GB a SD card was also available but it was only used for the storage of data.

II. With the APS-180E models the flash memory is no longer needed and therefore no longer populated.

III. The modified configuration signal for defining the boot behavior is an input signal of the SoC. From the point of view of the EMC risk assessment this signal and the omitted flash memory were classified as non-critical. Thus, a negative effect on the EMC characteristics of the device is not expected.

The FCC conformity (Ref. Eurofins G0M-1601-5322, 10.02.2016) is not influenced and still valid. The device continues to comply with the applicable technical rules.

Geschehen am:
Done on:

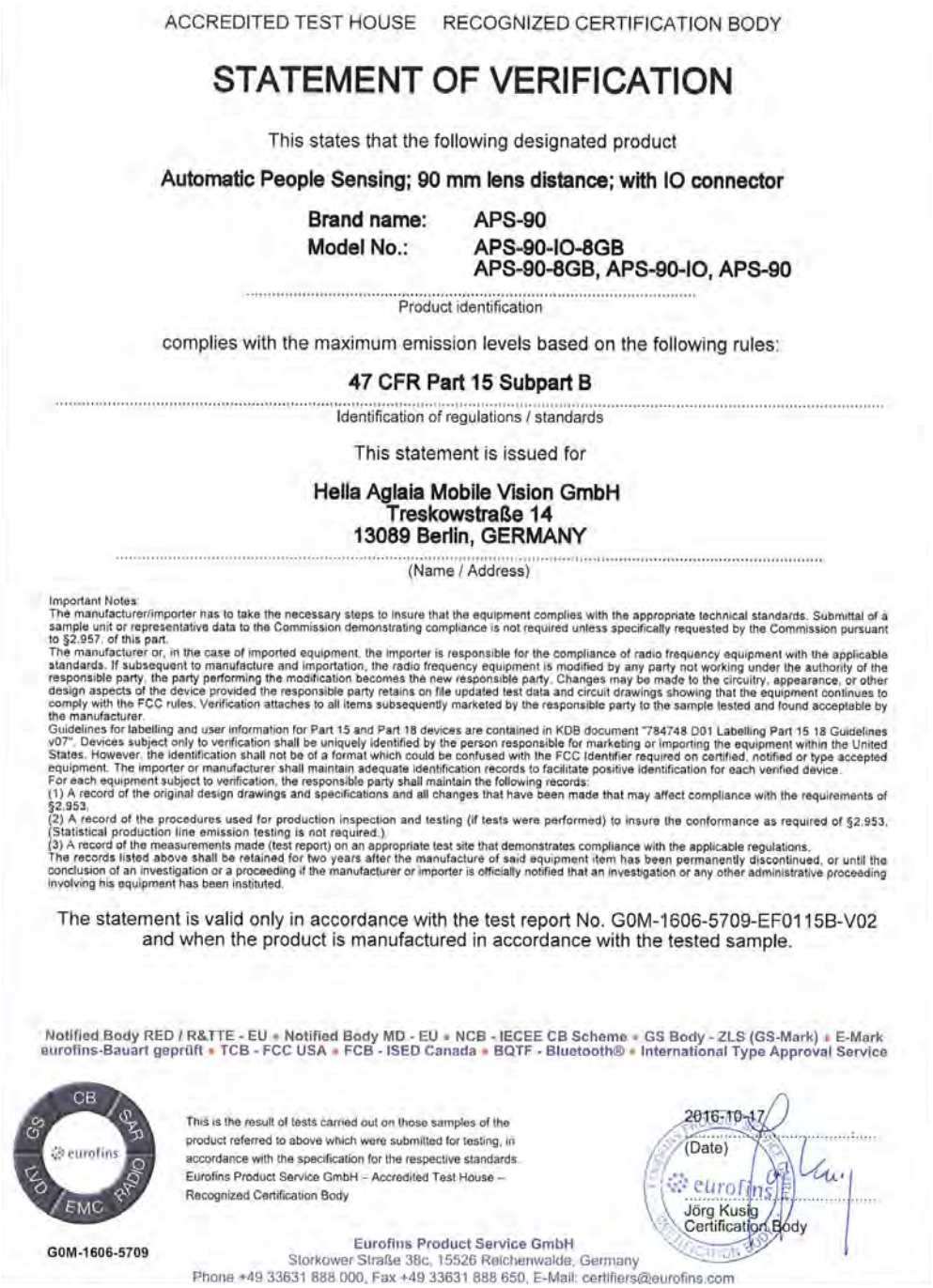
Berlin, 2017-11-29

verantwortliche Personen:
responsible persons:

Matthias Nerling
Head of Business Unit

Stefan Gliem
Head of Hardware development

Fig. 171: APS-180E FCC Statement of Verification



ACCREDITED TEST HOUSE RECOGNIZED CERTIFICATION BODY

STATEMENT OF VERIFICATION

This states that the following designated product

Automatic People Sensing; 90 mm lens distance; with IO connector

Brand name: APS-90
Model No.: APS-90-IO-8GB
APS-90-8GB, APS-90-IO, APS-90

Product identification

complies with the maximum emission levels based on the following rules:

47 CFR Part 15 Subpart B

Identification of regulations / standards

This statement is issued for

Hella Aglaia Mobile Vision GmbH
Treskowstraße 14
13089 Berlin, GERMANY

(Name / Address)

Important Notes:
The manufacturer/importer has to take the necessary steps to insure that the equipment complies with the appropriate technical standards. Submittal of a sample unit or representative data to the Commission demonstrating compliance is not required unless specifically requested by the Commission pursuant to §2.957. of this part.
The manufacturer or, in the case of imported equipment, the importer is responsible for the compliance of radio frequency equipment with the applicable standards. If subsequent to manufacture and importation, the radio frequency equipment is modified by any party not working under the authority of the responsible party, the party performing the modification becomes the new responsible party. Changes may be made to the circuitry, appearance, or other design aspects of the device provided the responsible party retains on file updated test data and circuit drawings showing that the equipment continues to comply with the FCC rules. Verification attaches to all items subsequently marketed by the responsible party to the sample tested and found acceptable by the manufacturer.
Guidelines for labelling and user information for Part 15 and Part 18 devices are contained in KDB document "784748 D01 Labelling Part 15 18 Guidelines v07". Devices subject only to verification shall be uniquely identified by the person responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.
For each equipment subject to verification, the responsible party shall maintain the following records:
(1) A record of the original design drawings and specifications and all changes that have been made that may affect compliance with the requirements of §2.953.
(2) A record of the procedures used for production inspection and testing (if tests were performed) to insure the conformance as required of §2.953. (Statistical production line emission testing is not required.)
(3) A record of the measurements made (test report) on an appropriate test site that demonstrates compliance with the applicable regulations.
The records listed above shall be retained for two years after the manufacture of said equipment item has been permanently discontinued, or until the conclusion of an investigation or a proceeding if the manufacturer or importer is officially notified that an investigation or any other administrative proceeding involving his equipment has been instituted.

The statement is valid only in accordance with the test report No. G0M-1606-5709-EF0115B-V02 and when the product is manufactured in accordance with the tested sample.

Notified Body RED / R&TTE - EU • Notified Body MD - EU • NCB - IECEE CB Scheme • GS Body - ZLS (GS-Mark) • E-Mark eurofins-Bauart geprüft • TCB - FCC USA • FCB - ISED Canada • BQTF - Bluetooth® • International Type Approval Service

CB SAR RADIO EMC LVD GS eurofins

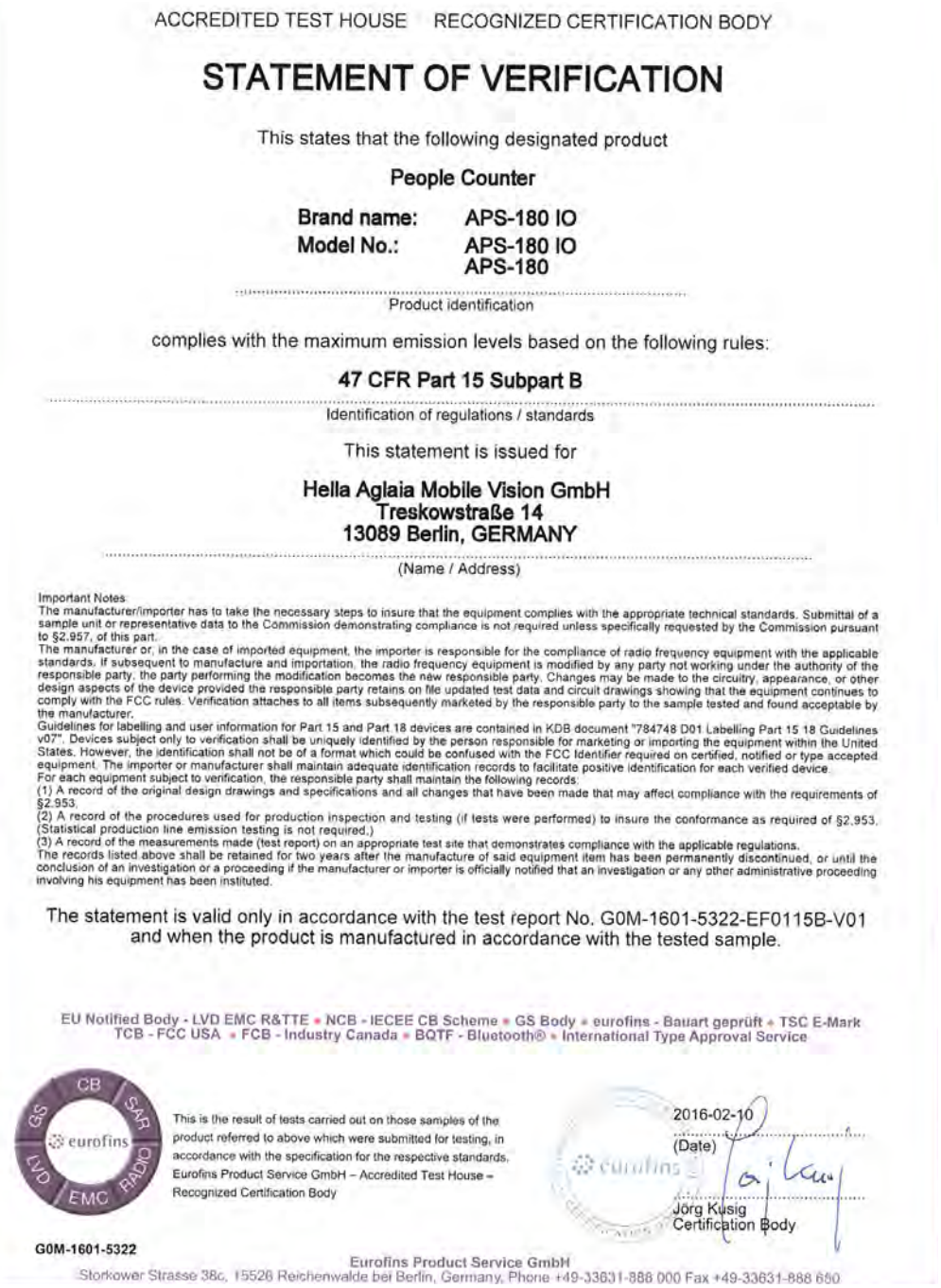
G0M-1606-5709

This is the result of tests carried out on those samples of the product referred to above which were submitted for testing, in accordance with the specification for the respective standards.
Eurofins Product Service GmbH – Accredited Test House – Recognized Certification Body

2016-10-17
(Date)
eurofins
Jörg Kusig
Certification Body

Eurofins Product Service GmbH
Storkower Straße 38c, 15526 Reichenwalde, Germany
Phone +49 33631 888 000, Fax +49 33631 888 650, E-Mail: certifiers@eurofins.com

Fig. 172: APS-90 FCC Statement of Verification



ACCREDITED TEST HOUSE RECOGNIZED CERTIFICATION BODY

STATEMENT OF VERIFICATION

This states that the following designated product

People Counter

Brand name: APS-180 IO
Model No.: APS-180 IO
APS-180

Product identification

complies with the maximum emission levels based on the following rules:

47 CFR Part 15 Subpart B

Identification of regulations / standards

This statement is issued for

Hella Aglaia Mobile Vision GmbH
Treskowstraße 14
13089 Berlin, GERMANY

(Name / Address)

Important Notes:
The manufacturer/importer has to take the necessary steps to insure that the equipment complies with the appropriate technical standards. Submittal of a sample unit or representative data to the Commission demonstrating compliance is not required unless specifically requested by the Commission pursuant to §2.957, of this part.
The manufacturer or, in the case of imported equipment, the importer is responsible for the compliance of radio frequency equipment with the applicable standards. If subsequent to manufacture and importation, the radio frequency equipment is modified by any party not working under the authority of the responsible party, the party performing the modification becomes the new responsible party. Changes may be made to the circuitry, appearance, or other design aspects of the device provided the responsible party retains on file updated test data and circuit drawings showing that the equipment continues to comply with the FCC rules. Verification attaches to all items subsequently marketed by the responsible party to the sample tested and found acceptable by the manufacturer.
Guidelines for labelling and user information for Part 15 and Part 18 devices are contained in KDB document "784748 D01 Labelling Part 15 18 Guidelines v07". Devices subject only to verification shall be uniquely identified by the person responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.
For each equipment subject to verification, the responsible party shall maintain the following records:
(1) A record of the original design drawings and specifications and all changes that have been made that may affect compliance with the requirements of §2.953.
(2) A record of the procedures used for production inspection and testing (if tests were performed) to insure the conformance as required of §2.953. (Statistical production line emission testing is not required.)
(3) A record of the measurements made (test report) on an appropriate test site that demonstrates compliance with the applicable regulations.
The records listed above shall be retained for two years after the manufacture of said equipment item has been permanently discontinued, or until the conclusion of an investigation or a proceeding if the manufacturer or importer is officially notified that an investigation or any other administrative proceeding involving his equipment has been instituted.

The statement is valid only in accordance with the test report No. G0M-1601-5322-EF0115B-V01 and when the product is manufactured in accordance with the tested sample.

EU Notified Body - LVD EMC R&TTE • NCB - IECEE CB Scheme • GS Body • eurofins - Bauart geprüft • TSC E-Mark
TCB - FCC USA • FCB - Industry Canada • BQTF - Bluetooth® • International Type Approval Service

CB SAR RADIO EMC LVD GS eurofins

This is the result of tests carried out on those samples of the product referred to above which were submitted for testing, in accordance with the specification for the respective standards. Eurofins Product Service GmbH – Accredited Test House – Recognized Certification Body

2016-02-10
(Date)

Jörg Kusig
Certification Body

G0M-1601-5322

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Storkower Strasse 38c, 15526 Reichenwalde bei Berlin, Germany, Phone +49-33631-888 000 Fax +49-33631-888 650

Fig. 173: APS-180 FCC Statement of Verification

10 Glossary and abbreviations

APS	**A**dvanced **P**eople **S**ensor Second generation people sensor, successor of the APC.
APS-RS	**APS** for **R**etail & **S**ecurity and other stationary applications.
AVI	**A**udio **V**ideo **I**nterleave Audio Video Interleave is a multimedia container format from Microsoft that allows synchronous audio-with-video playback.
CSV	**C**omma **s**eparated **v**alues File format where values are separated by commas. Those files can be imported into Microsoft Excel.
DHCP	**D**ynamic **H**ost **C**onfiguration **P**rotocol Protocol and service dynamically distributing network configuration parameters, such as IP address and servers.
DNS	**D**omain **N**ame **S**ystem Resolves queries for FQDN host names into IP addresses
DNS-SD	**D**omain **N**ame **S**ystem-**S**ervice **D**iscovery DNS Service Discovery is a way of using standard DNS programming interfaces, servers, and packet formats to browse the network for services.
FQDN	**F**ully **Q**ualified **D**omain **N**ame Address of a device or server using DNS instead of an IP address
FTP	**F**ile **T**ransfer **P**rotocol Protocol for data transfer; used for transferring the counting data registered by the APS
H.264	Video compression standard. This is used by APS video storing and streaming.
HAGL	**H**ELLA **Agl**aia
HDR	**H**igh-**D**ynamic-**R**ange imaging Technique used in imaging to reproduce a greater dynamic range of luminosity.
HMI	**H**uman **M**achine **I**nterface e.g. the web-based configuration interface of the APS
HTML5	**H**ypertext **M**arkup **L**anguage, fifth revision Markup language used for structuring and presenting content on the World Wide Web since 2014. This is used by the user interface of the APS.
HTTP	**H**ypertext **T**ransfer **P**rotocol

	Application protocol for data transmissions in networks. HTTP is the basis for data communications in the World Wide Web.
HTTPS	**H**yper**t**ext **T**ransfer **P**rotocol **S**ecure
	Application protocol for secure communication in networks
IBM Watson IoT Platform	IBM cloud platform for **I**nternet **o**f **T**hings including APS by MQTT protocol.
IEC	The **I**nternational **E**lectrotechnical **C**ommission is an international standards organization that prepares and publishes International Standards for all electrical, electronic and related technologies.
IoT	**I**nternet **o**f **T**hings
	The Internet of things is the network of devices, sensors and servers which allows these things to connect, interact and exchange data.
IP address	**I**nternet **P**rotocol address
	Manually or dynamically assigned in the network
JSON	**J**ava**S**cript **O**bject **N**otation
	Used by the APS REST interface.
MAC address	**M**edia **A**ccess **C**ontrol address
	Unique hardware address of a network device.
MQTT	**M**essage **Q**ueuing **T**elemetry **T**ransport
	ISO standard 20922 publish-subscribe-based messaging protocol
NAT	**N**etwork **A**ddress **T**ranslation
	Process of modifying IP address information during transit across a traffic routing device
NTLM	**NT** LAN **M**anager
	Security protocol for authentification at http proxy
NTP	**N**etwork **T**ime **P**rotocol
	Protocol for the synchronization of time and date settings
OSD	**O**ptical **S**elf **D**iagnosis
	Software function for checking the visual range
PoE	**P**ower **o**ver **E**thernet
	Procedures for powering network devices over the eight-wire Ethernet cable
PS.P	The **P**eople **S**ensing **P**latform is a cloud based service of HELLA Aglaia to config devices and analyze data.
Push service	Sending data from the APS to a data server (the connection is established by the APS)
RAS	**R**emote **A**ccess **S**ervice

	Web service to remote access sensors
REST	**RE**presentational **S**tate **T**ransfer
	Web (http or https) based data communication typically today with JSON data container.
RTSP	**R**eal **T**ime **S**treaming **P**rotocol
	Typically used for Video Streaming
SFTP	**S**ecure **F**ile **T**ransfer **P**rotocol
	Network protocol used for secure file transfer over secure shell.
SOAP	**S**imple **O**bject **A**ccess **P**rotocol
	Network protocol for exchanging data between systems and implementing remote procedure calls
SSID	**S**ervice **S**et **Id**entifier
	A Service Set Identifier is a freely selectable name which is also referred to as the (radio) network name of the WLAN.
TCP	**T**ransmission **C**ontrol **P**rotocol
	One of the core data transfer protocols of the Internet Protocol suite and with ordered data transfer
UDP	**U**ser **D**atagram **P**rotocol
	One of the core data transfer protocols of the Internet Protocol suite
URL	**U**niform **R**esource **L**ocator
	Reference to a web resource including protocol, server, file path, etc.
USB	**U**niversal **S**erial **B**us
	An industry standard that establishes specifications for cables, connectors and protocols for connection, communication and power supply between personal computers and their peripheral devices.
UTC	**U**niversal **T**ime **C**oordinated
	Coordinated Universal Time is the main time standard by which the world regulates clocks and time.
VPN	**V**irtual **P**rivate **N**etwork
	Technology using the Internet to connect computers to isolated remote computer networks that would otherwise be inaccessible
WebSocket	Protocol providing full-duplex communication between web browsers and web servers. This is used by the web browser user interface of the device.
XML	E**x**tensible **M**arkup **L**anguage
	Defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. XML has been employed as the base language for communication protocols.

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