



# HPD2

# training

# HPD2 - Training

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HPD2

# Product Overview

# HPD2 - Training

## Overview

- Optical sensor
- Up to 100 m<sup>2</sup> coverage
- Counts people in defined detection zones
- Integrated temperature & humidity sensor



## Variants

IP



- Connects directly to IT infrastructure
- REST API, BACnet, MQTT
- PoE powered
- Up to 10 detection zones
- Settings via web-interface

KN



X

- Connects to KNX Bus-Systems
- Powered via additional KNX voltage
- Up to 5 detection zones
- Settings via web interface and ETS
- Integrated constant light control

# HPD2 - Training

## KEY FACTS



110° sensor max.  
10m



air humidity



brightness



movement



number of people



presence



temperature



IP20

110° angle of coverage with a reach of up to 10 m from a maximum mounting height of 6 m. Integrated, state-of-the-art neuronal network compares 150,000 positive images and 7 million negative images in real time.

Ideal for managing meeting rooms, because it identifies actual room use, or for detecting unused office workstations for flexible desk management.

Certified IT security and privacy compliance:



**European  
Privacy Seal**

EP-P-KV9TOB / Valid till 2022-11  
- Criteria Catalogue v201701 -

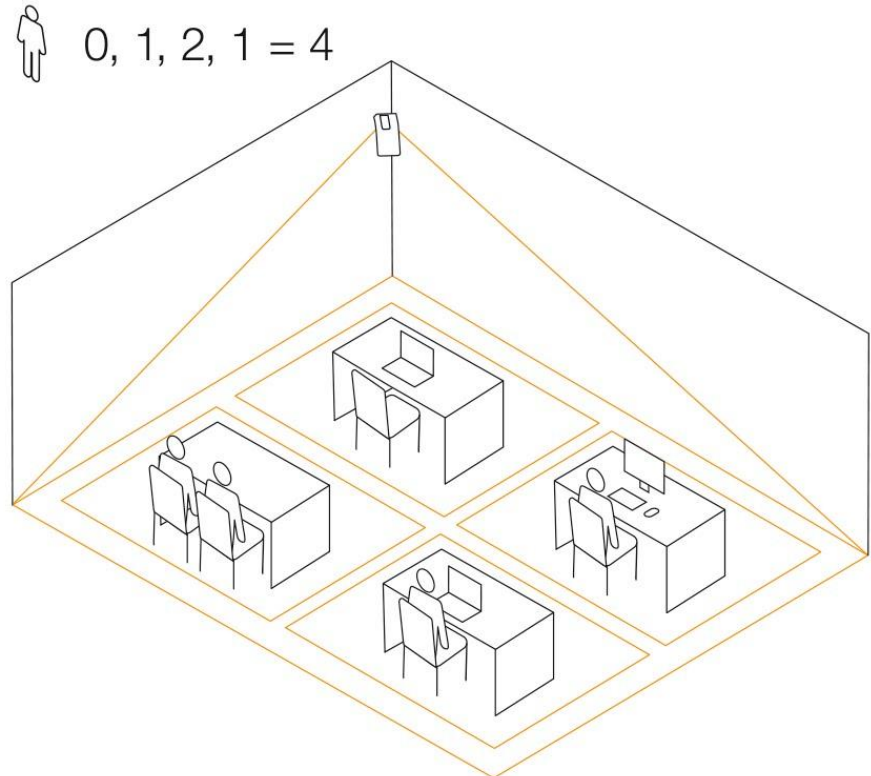
HPD2

# Positioning Mounting Wiring



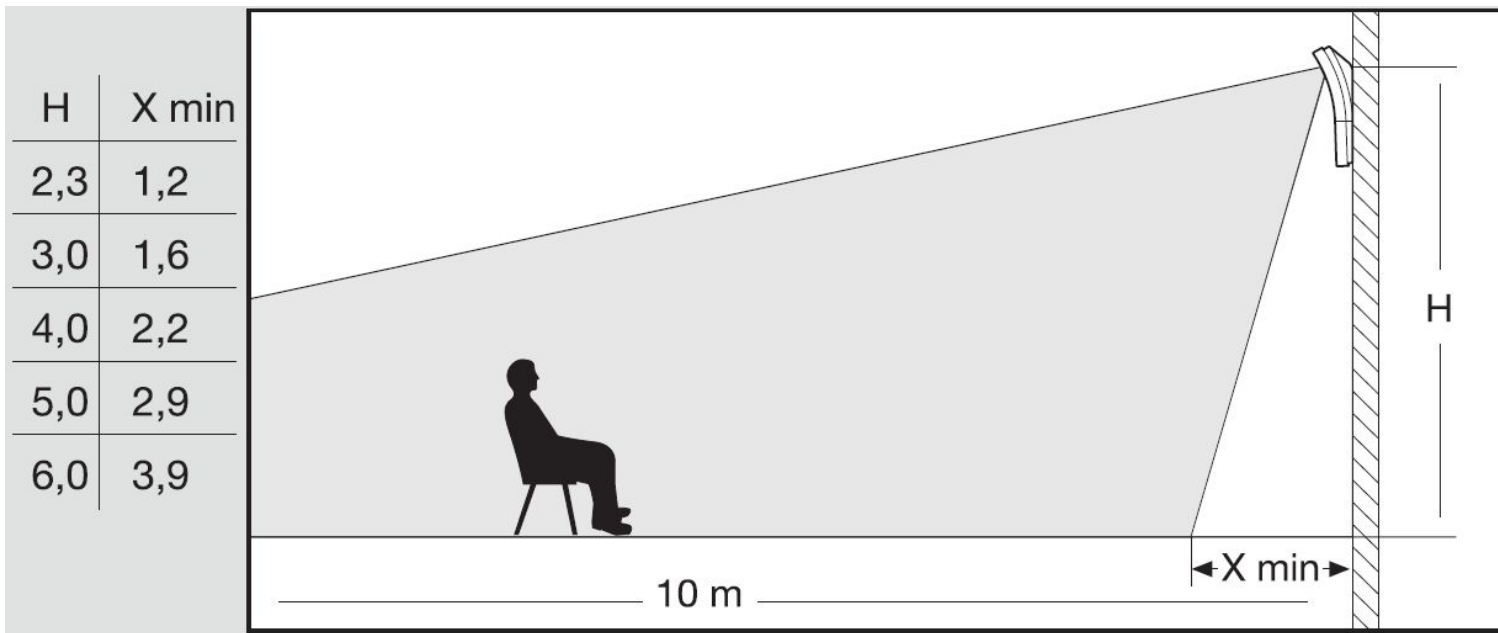
## Positioning of the Sensor

- HPD2 needs undistracted view to area of interest
- Ideally placed in room corner with no disturbing glare from windows, sunlight, or indirect luminaires
- Consider amount of different detection zones per HPD2



## Positioning of the Sensor

- Minimal detection area depends on mounting height

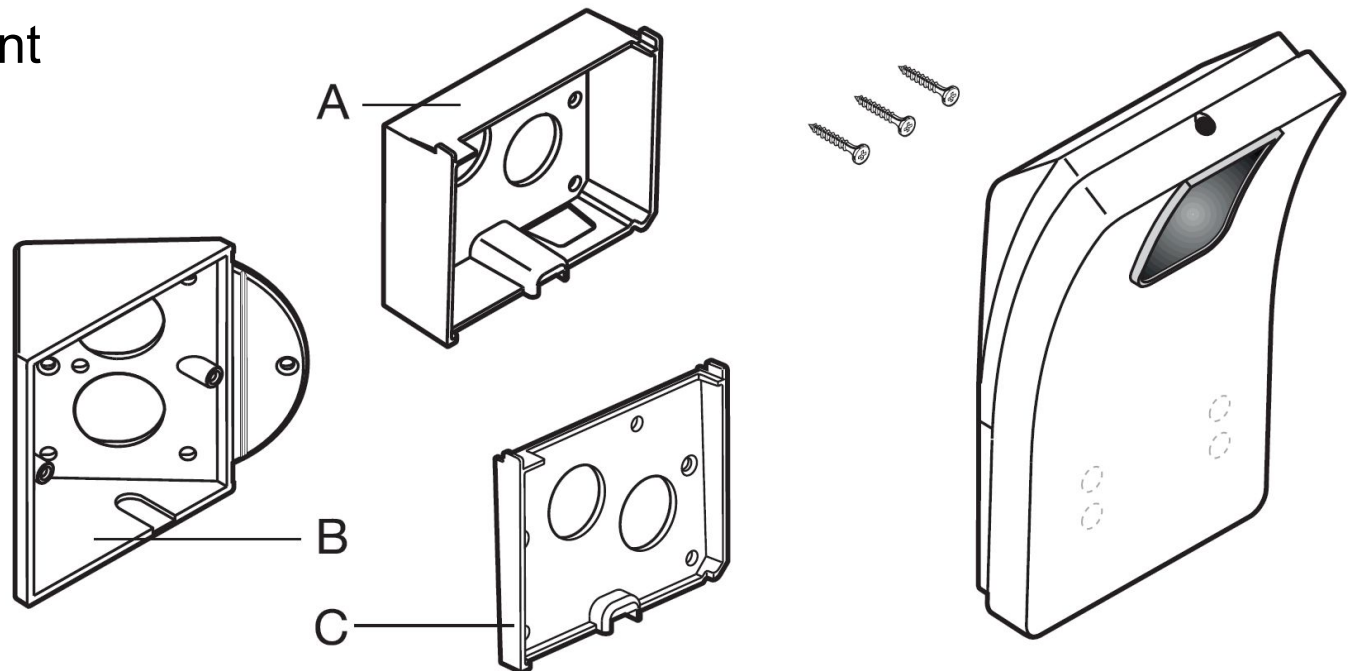


# HPD2 - Training

## Mounting

The HPD2 is to be mounted on a wall (indoor). It comes with three different mounting brackets.

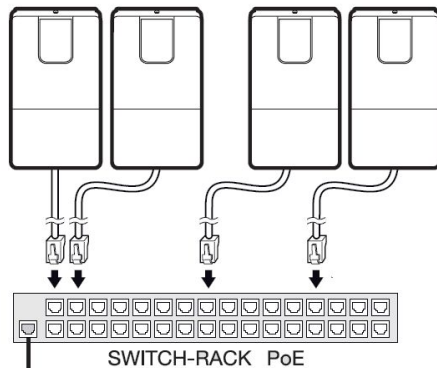
- A: surface mount
- B: corner mount
- C: flush mount



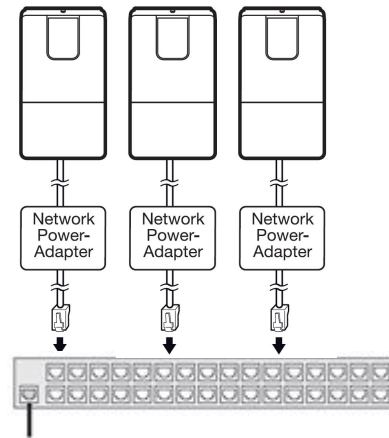
## Wiring IP version

HPD2 IP can be connected to IT infrastructure in two different ways:

Direct connection to  
PoE ethernet switch



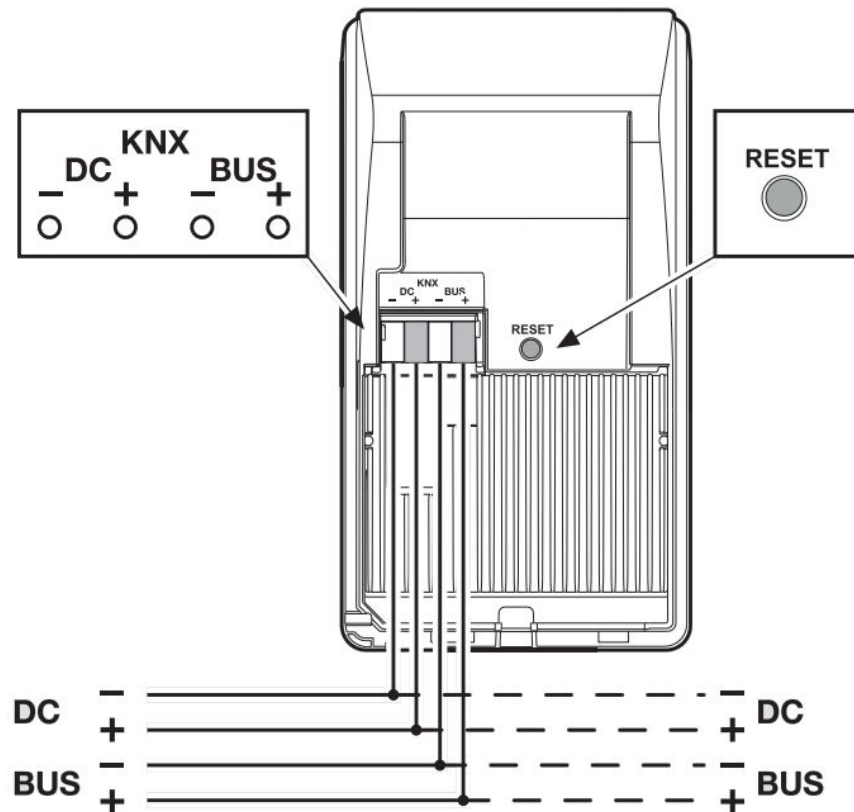
Connection via PoE Injector to  
non PoE ethernet switch



## Wiring KNX version

Connection to existing KNX infrastructure via standard KNX cable. HPD2 needs additional power supply (21V-32V).

- KNX Bus current: 10 mA
- Supply current: 200 mA



HPD2

# First Setup

## First Setup - IP version

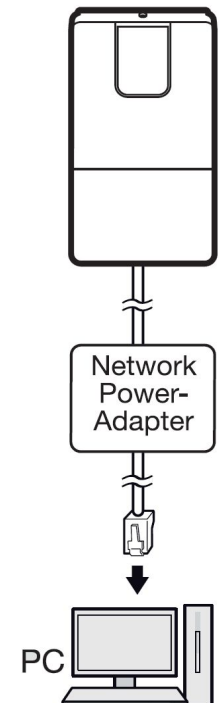
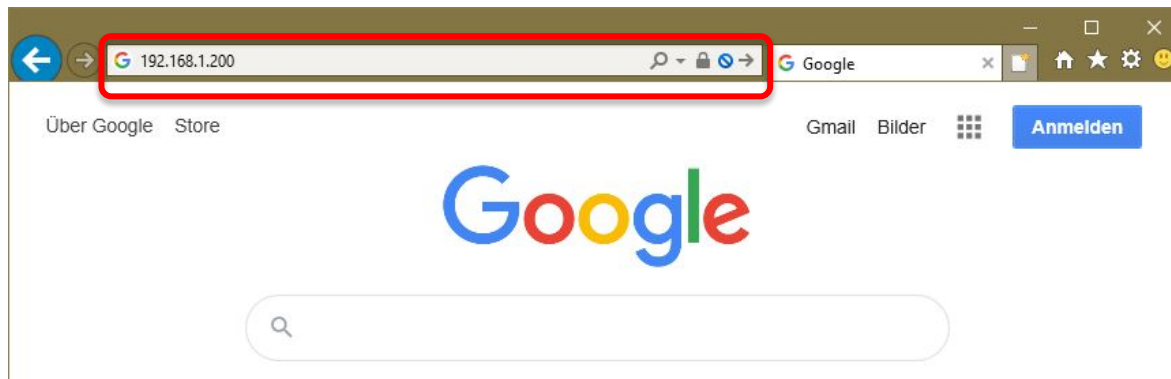
Each new HPD2 sensor has the same factory configuration.

Standard IP address: **192.168.1.200**

It is recommended to configure each sensor to its desired configuration before installing it.

To do so:

- connect a computer to one HPD2 with PoE injector
- Set computers IP address to be in the same range as HPD2
- Open a web-browser and enter HPD2 IP address

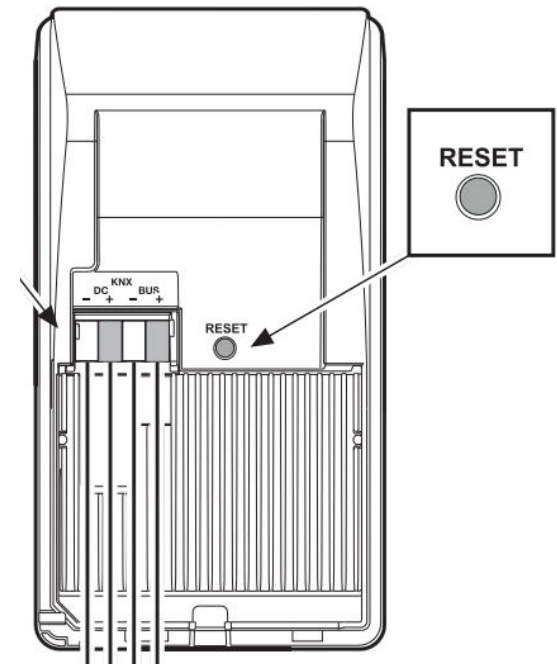


## First Setup – KNX version

In a KNX system, every device has a unique physical address. Setting up this address can be done with KNX commissioning software ETS.

Therefore, the programming mode must be activated.

- Press, and hold RESET button for 5s-10s to activate programming mode
- Press, and hold RESET button for <5s to deactivate programming mode





# Picture access via micro-USB

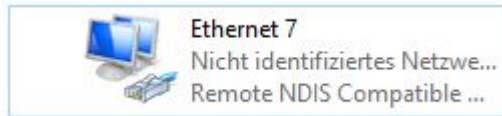
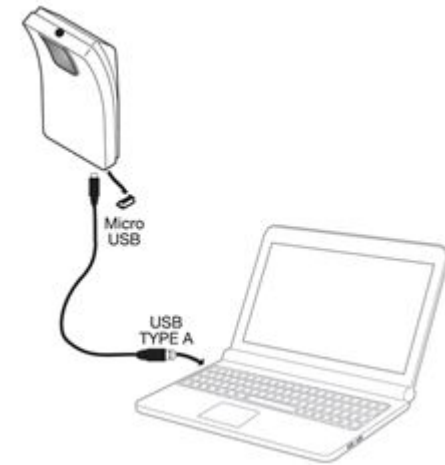
Both, KNX and IP version of HPD2 provide a micro-USB interface for initial commissioning of the sensor. It is the only way getting access to live image data of the sensor.

The USB connector is covered with a small cover. It is located at the bottom of HPD2 sensor.

For security reasons, the USB interface is only active for a period of 30 minutes after power on.

## Configuration via micro-USB

- Power HPD2 either via KNX, or via PoE
- Connect HPD2 to a computer with proper USB cable
- The sensor will appear in your control center as network card



(Example)

- Change the IP address of this new network card to be 10.88.0.1
- Open a web-browser and enter HPD2 USB IP address
- HPD2 IP address of USB port is always: **10.88.0.2**

## First login - Change password

The factory default password for first login is: **adm123**

Default password for live picture access is: **steinel**

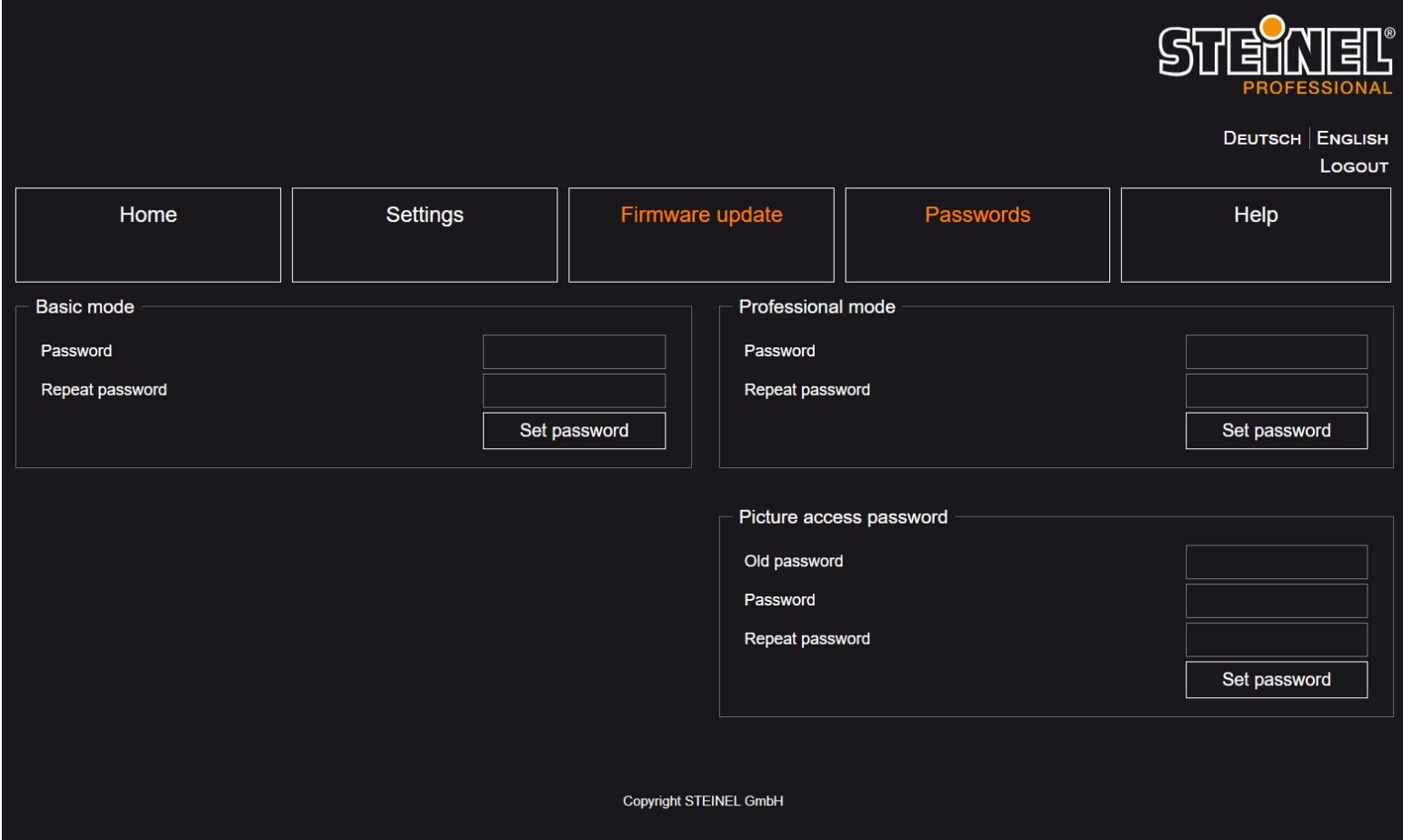
Both passwords must be changed to your own (safe) ones.

Password requirements:

- Minimum 8 characters
- At least 3 different character types ( lower case, upper case, numbers, special characters)
- Professional password and picture password must be different

## First login - Change password

Password settings page:



STEINEL<sup>®</sup>  
PROFESSIONAL

DEUTSCH | ENGLISH  
LOGOUT

Home Settings **Firmware update** **Passwords** Help

**Basic mode**

Password

Repeat password

Set password

**Professional mode**

Password

Repeat password

Set password

**Picture access password**

Old password

Password

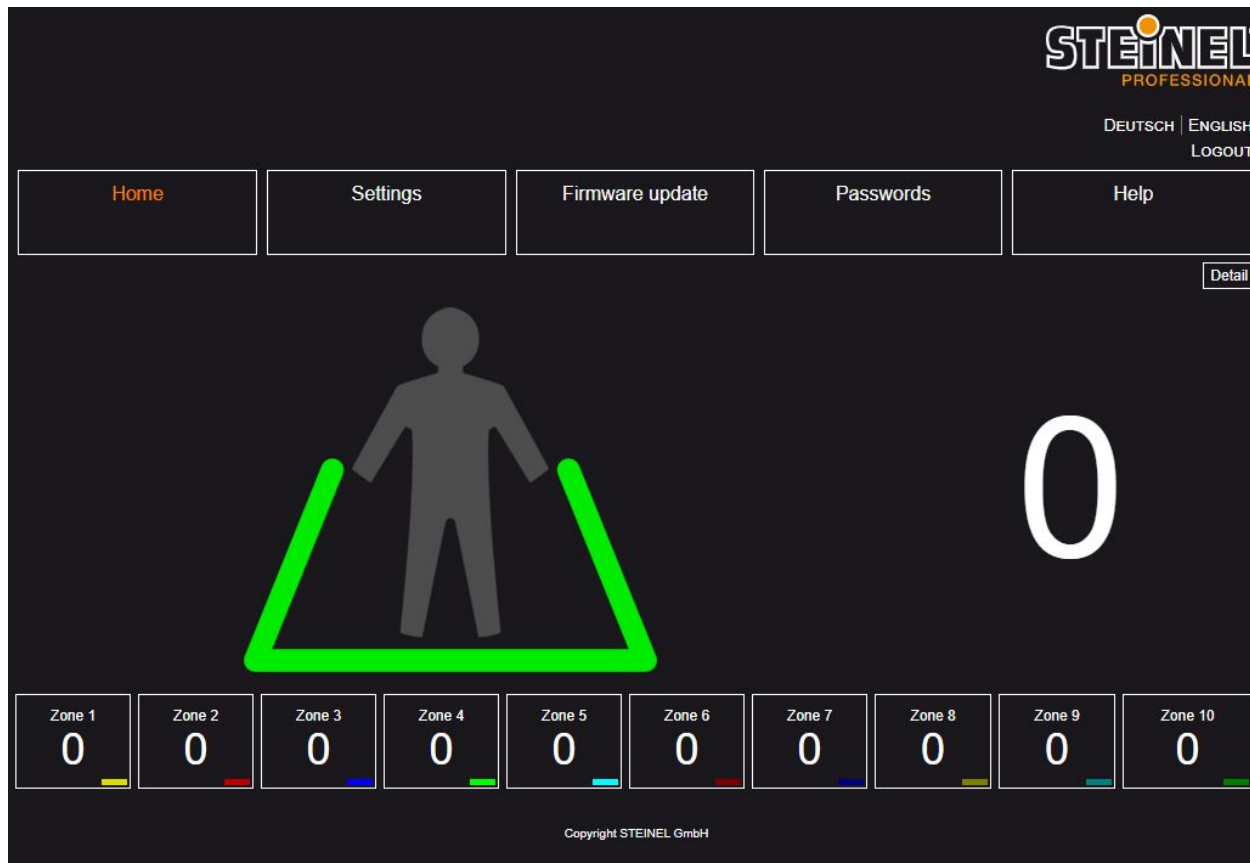
Repeat password

Set password

Copyright STEINEL GmbH

## First login – Main page

After you have changed your password, you will be redirected to the main page of HPD2 webserver:



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# Zone Configuration

## Zone configuration

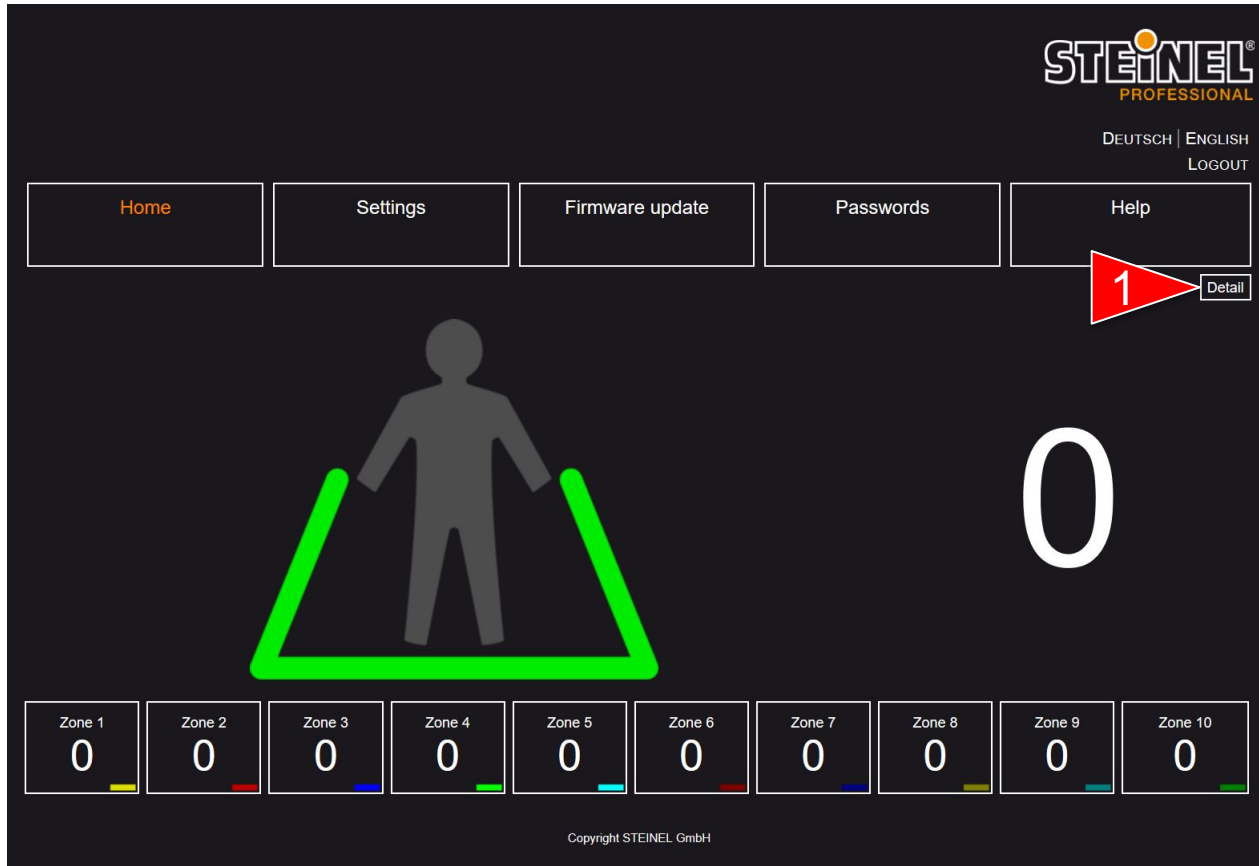
Initial zone configuration can only be done via USB connection.

Zone configuration or adjustments via LAN connection can be done with a saved picture of the detection area.

The picture of the detection area can be permanently saved on HPD2 via USB connection.

- Make sure you are connected via USB cable
- Login with professional password

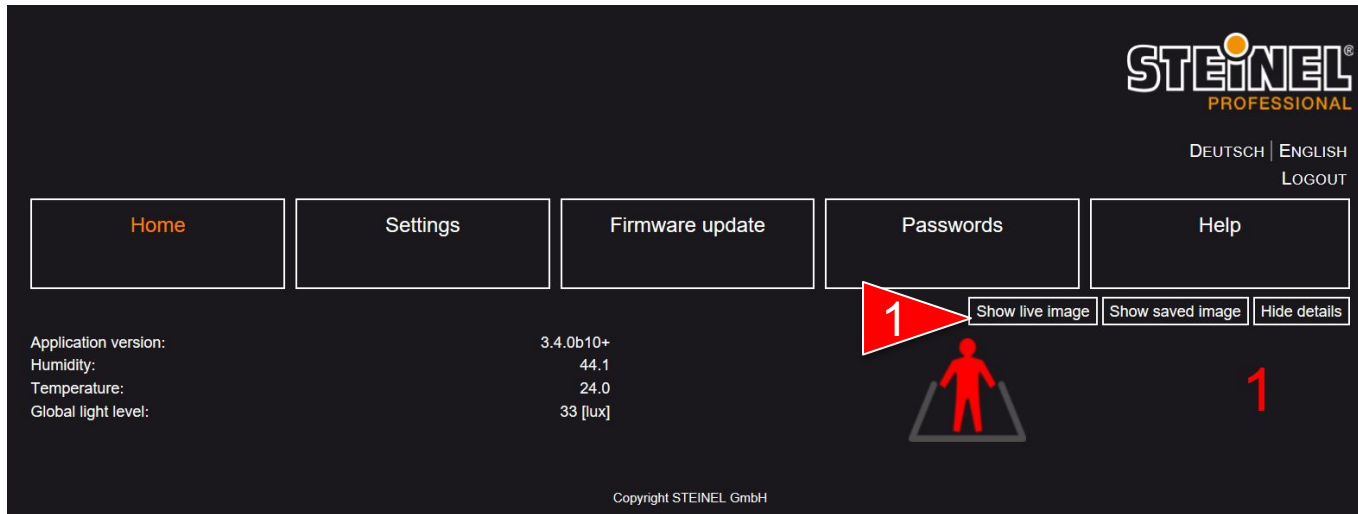
## Zone configuration



1. Click on  
“Detail”



## Zone configuration



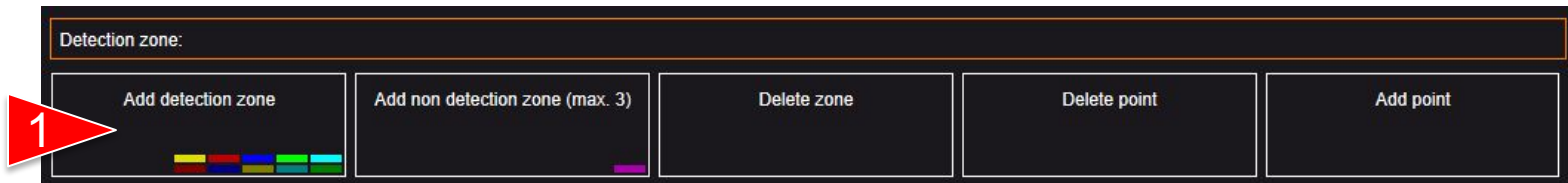
1. Click on “Show live picture” (This button is only available via USB connection. )

Enter picture access password.



## Zone configuration

1. Click “Add detection zone” in the toolbox below live picture



2. Every zone is represented by an individual color. Click on zone number that you want to configure

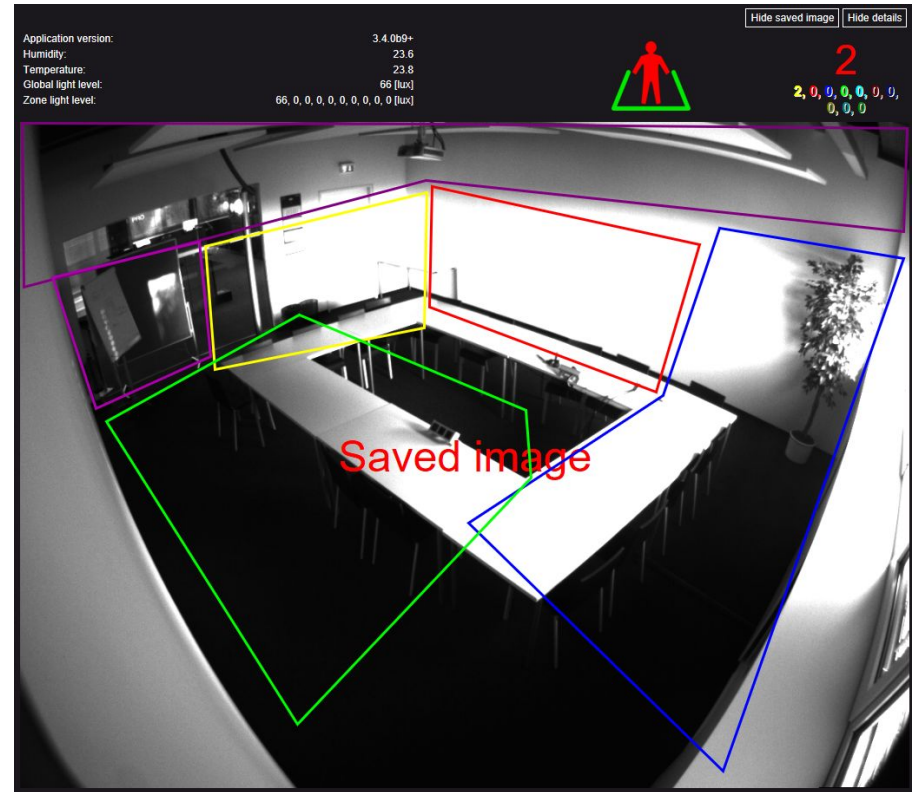


## Zone configuration

Zones are created by clicking its limiting endpoints inside the picture

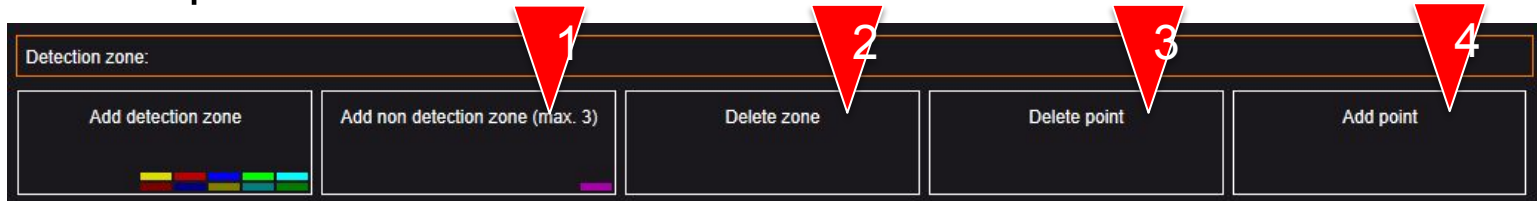
A zone area can have a maximum of 8 corner - points

On the right side you can see an example picture with 4 different detection zones and 2 non detection zones



## Zone configuration

Toolbox explanation:



1. Non detection zones can be used to exclude areas where no person counting should be performed
2. Delete active (marked) zone
3. Delete one corner point. The corner point must be clicked subsequently
4. Add corner point to a specific zone. Click on zone border subsequently to add new point


HPD2

# Settings

## Settings

Device settings can be seen and changed within settings tab

Settings are grouped by its category



The screenshot shows the 'Settings' tab of the HPD2 device interface. The interface is dark-themed and features a top navigation bar with tabs for 'Home', 'Settings', 'Firmware update', 'Passwords', and 'Help'. The 'Settings' tab is active, displaying various configuration sections:

- Network:** Includes checkboxes for IPv4 enabled, DHCP, IPv6 enabled, and DHCPv6 enabled. Text input fields are provided for IP (192.168.1.200), Network mask (255.255.255.0), Gateway (192.168.1.1), DNS (192.168.1.1), Manual address/prefix, and Hostname (hpd2). A 'Submit' button is at the bottom.
- HTTP server SSL certificate:** Features an 'Alternative name' field (hpd2) with a 'Generate self signed' button. Below are 'PEM Certificate file' and 'PEM Certificate chain' fields, each with a 'Datei auswählen' button and a 'Keine ausgewählt' label. An 'Upload' button is at the bottom.
- MQTT:** Includes a checked 'Enable MQTT' checkbox. Text input fields are provided for Broker hostname (192.168.1.133), Broker port (1883), Username, Password, Client id (hpd), and Topic (hpd).
- Sensor:** Contains sliders for 'Detection threshold' (set to 35), '50/60Hz antiflicker' (set to 50hz), 'Celsius/Fahrenheit' (set to Celsius), 'Picture brightness during daytime' (set to 90), 'Picture brightness during nighttime' (set to 100), and 'Gamma value' (set to -0.4). 'Reset values' and 'Submit' buttons are at the bottom.
- Offsets:** Features sliders for 'Temperature offset' (0) and ten 'Zone lux offset' settings (all set to 0). 'Reset values' and 'Submit' buttons are at the bottom.

At the bottom right of the interface, there is an 'Enable night mode' button.

## Settings - Network

Network interface configuration:  
IP address, subnet mask,  
gateway, DHCP, ...

### Network

|                                       |                                     |
|---------------------------------------|-------------------------------------|
| IPv4 enabled                          | <input checked="" type="checkbox"/> |
| DHCP                                  | <input type="checkbox"/>            |
| IP                                    | 192.168.1.200                       |
| Network mask                          | 255.255.255.0                       |
| Gateway                               | 192.168.1.1                         |
| DNS                                   | 192.168.1.1                         |
| IPv6 enabled                          | <input checked="" type="checkbox"/> |
| DHCPv6 enabled                        | <input checked="" type="checkbox"/> |
| Manual address/prefix                 |                                     |
| Hostname                              | hpd2                                |
| <input type="button" value="Submit"/> |                                     |

Settings for secured  
communication via SSL / TLS

### SSL certificate

|   |   |
|---|---|
| Alternative name                                    | hpd2  |
| <input type="button" value="Generate self signed"/> |   |
| PEM Certificate file                                | <input type="button" value="Datei auswählen"/> Keine ausgewählt |
| PEM Certificate chain                               | <input type="button" value="Datei auswählen"/> Keine ausgewählt |
| <input type="button" value="Upload"/>               |   |



## Settings - MQTT

Activate MQTT if needed

Configure MQTT typically settings like Broker IP, port and authentication (if used)

Data will be published automatically if values change, or with a fixed publish interval

### MQTT

Enable MQTT

Broker hostname

Broker port

Username

Password

Client id

Topic

Qos

Publish on value change

Publish interval [s]

PEM Certificate file  Keine ausgewählt

MQTT server certificate chain  Keine ausgewählt

Trust all server certificates

Dynamic ID

Dynamic topic

Append id

Subscribe to settings

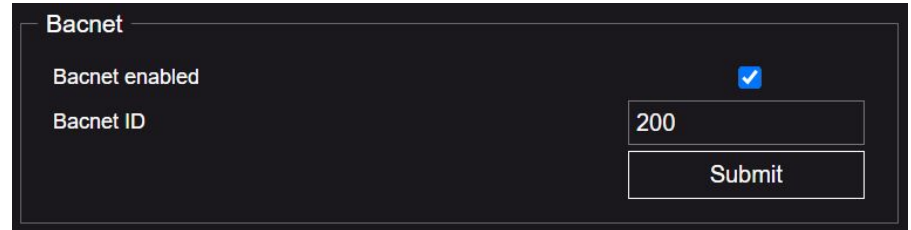
Retain message

## Settings - BACnet

Activate BACnet if needed

Configure BACnet ID to be unique  
in your BACnet system

Additional information regarding  
BACnet can be found within PICS  
document on our [website](#)



The screenshot shows a dark-themed settings panel titled "Bacnet". It contains two rows of controls. The first row, "Bacnet enabled", has a blue checkmark in a box to its right. The second row, "Bacnet ID", has a text input field containing the number "200". Below the input field is a "Submit" button.

## Settings - Sensor

Detection threshold is used as threshold for recognition of persons. It can be adjusted if miscounts occur.

Camera brightness and gamma settings can be modified if required

Change offsets to calibrate temperature and brightness values



The screenshot displays the configuration interface for the HPD2 camera's sensor and offsets. It is divided into two main sections: 'Sensor' and 'Offsets'.

**Sensor Settings:**

- Detection threshold: A slider set to 35.
- 50/60Hz antiflicker: A dropdown menu set to 50hz.
- Celsius/Fahrenheit: A dropdown menu set to Celsius.
- Picture brightness during daytime: A slider set to 90.
- Picture brightness during nighttime: A slider set to 100.
- Gamma value: A slider set to -0.4.

Buttons for 'Reset values' and 'Submit' are located at the bottom right of the Sensor section.

**Offsets Settings:**

- Temperature offset: A slider set to 0.
- Global lux offset: A slider set to 0.
- Zone 1 lux offset: A slider set to 0.
- Zone 2 lux offset: A slider set to 0.
- Zone 3 lux offset: A slider set to 0.
- Zone 4 lux offset: A slider set to 0.
- Zone 5 lux offset: A slider set to 0.
- Zone 6 lux offset: A slider set to 0.
- Zone 7 lux offset: A slider set to 0.
- Zone 8 lux offset: A slider set to 0.
- Zone 9 lux offset: A slider set to 0.
- Zone 10 lux offset: A slider set to 0.

Buttons for 'Reset values' and 'Submit' are located at the bottom right of the Offsets section.

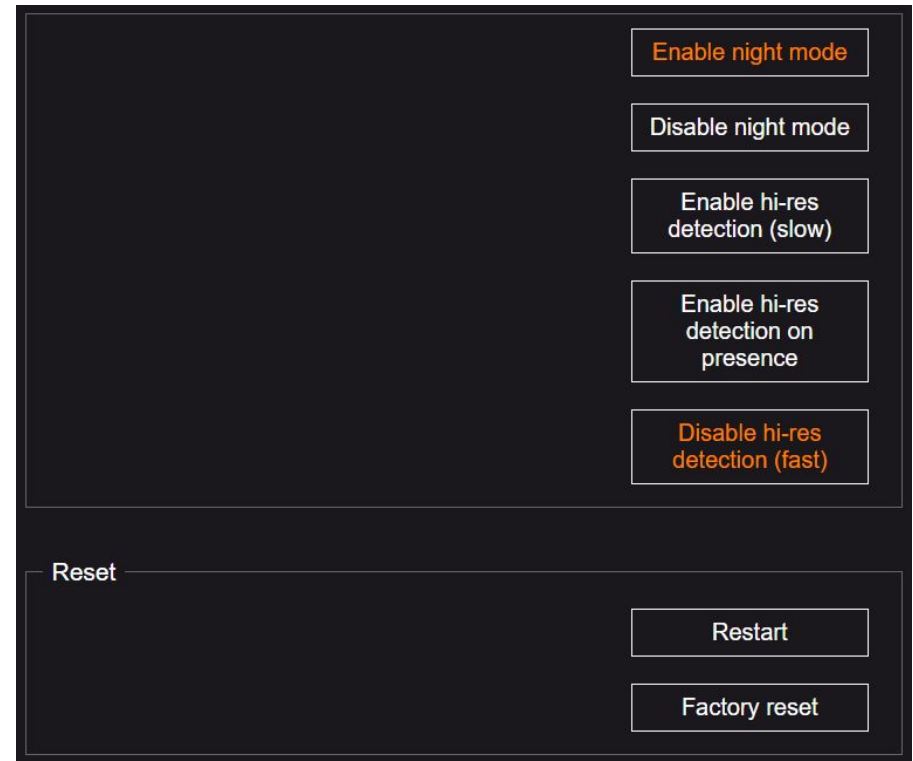
## Settings – Modes & Reset

Enable/Disable Night vision (IR – LED's inside HPD2 housing)

Detection modes can be changed if more precise counting is needed (slower)

Restart HPD2 or set it back to factory settings

(A factory reset can also be performed by pressing RESET button on HPD2 for 15 sec.)



HPD2

# Firmware Update

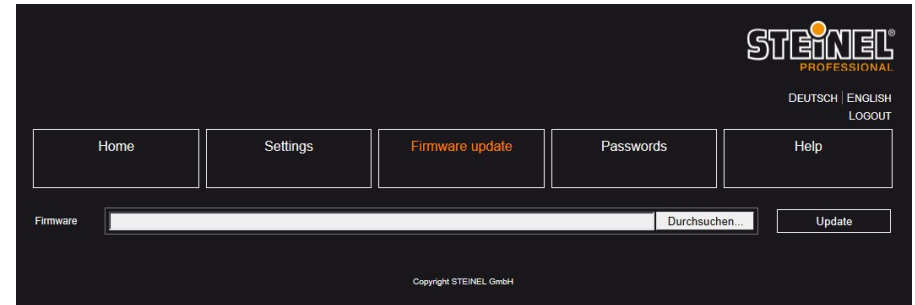
## Firmware update

The latest HPD2 firmware file can be found on our [website](#)

Download firmware to your computer and select this file on HPD2

The update will start with a click on “Upload”

Firmware can only be updated. A downgrade to an older version is not possible



HPD2

# Data Access

## Data access – REST API

REST API interface is available on integrated HPD2 webserver. It can be accessed via URL: **<https://hpd2ipaddress/api/sensorstatus.php>**

“**hpd2ipaddress**” is the IP address of the sensor that you want to connect to

Data is provided by sending GET request to HPD2. (polling)

Basic access authentication is used for authentication.

User: not required - leave blank

Password: professional mode password, or basic mode password

Response is provided in JSON format: (example)

```
{"SensorType": "HPD2", "MessageType": "HPD2", "AppVersion": "3.4.0b8", "ModelName": "v3-rb22-xr", "IrLedOn": 0, "DetectedPersons": 0, "PersonPresence": 0, "DetectedPersonsZone": [0, 0, 0, 0, 0, 0, 0, 0, 0, 0], "PersonPresenceZone": [0, 0, 0, 0, 0, 0, 0, 0, 0, 0], "DetectionZonesPresent": 2, "GlobalIlluminanceLux": 98, "LuxZone": [53, 118, 0, 0, 0, 0, 0, 0, 0, 0], "GlobalLightValue": 86, "Temperature": "25.8", "Humidity": "36.6", "MqttConnected": 0, "final": "OK"}
```



## Data access – REST API

Detailed description of data objects inside JSON response:

| Parameter             | Access | Data type               | Description   | Example                 | Range |
|-----------------------|--------|-------------------------|---|-------------------------|-------|
| SensorType            | R      | string                  | Sensor type   | "HPD2"                  |       |
| MessageType           | R      | string                  | Message type  | "HPD2"                  |       |
| AppVersion            | R      | string                  | Current version of HPD application  | "3.4.0b8"               |       |
| ModelName             | R      | string                  | Detection model label   | "v3-rb22-xr"            |       |
| IrLedOn               | R      | bool                    | State of IR leds  | 0                       | 0-1   |
| DetectedPersons       | R      | unsigned int            | Number of detected persons  | 5                       |       |
| PersonPresence        | R      | bool                    | Presence status   | 1                       | 0-1   |
| DetectedPersonsZone   | R      | unsigned int array [10] | Number of detected persons in each zone   | [0,5,0,0,0,0,0,0,0,0]   |       |
| PersonPresenceZone    | R      | bool array [10]         | Presence status for each zone   | [0,1,0,0,0,0,0,0,0,0]   |       |
| DetectionZonesPresent | R      | unsigned int            | Number of configured detection zones  | 2                       | 0-10  |
| GlobalIlluminanceLux  | R      | unsigned int            | Luxes measured from whole picture or from zones union if there are any zone defined | 123                     |       |
| LuxZone               | R      | unsigned int array [10] | Illuminance levels in zones   | [45,66,0,0,0,0,0,0,0,0] |       |
| GlobalLightValue      | R      | Int                     | Average brightness in frame   | 128                     | 0-255 |
| Temperature           | R      | string (float)          | Measured temperature in °C or °F depending on HPD settings                          | "23.6"                  |       |
| Humidity              | R      | string (float)          | Measured humidity in %  | "55.6"                  |       |
| MqttConnected         | R      | Bool                    | True if MQTT is connected to a broker   | 0                       | 0-1   |
| final                 | R      | String                  | Always present  | "OK"                    |       |

## Data access – MQTT

HPD2 can publish its data to MQTT broker in different ways:

- Publish data if value has changed
- Publish data based on configurable time interval
- Mix of both above methods

The Messages topic depends on MQTT settings you made.  
A subtopic is added based on the data name.

Example Topic: `hpd_office1/DetectedPersons`  
(Topic)            (Subtopic)

Message payload is provided in JSON format:  
Example: `{"DetectedPersons":0}`

## Data access – MQTT

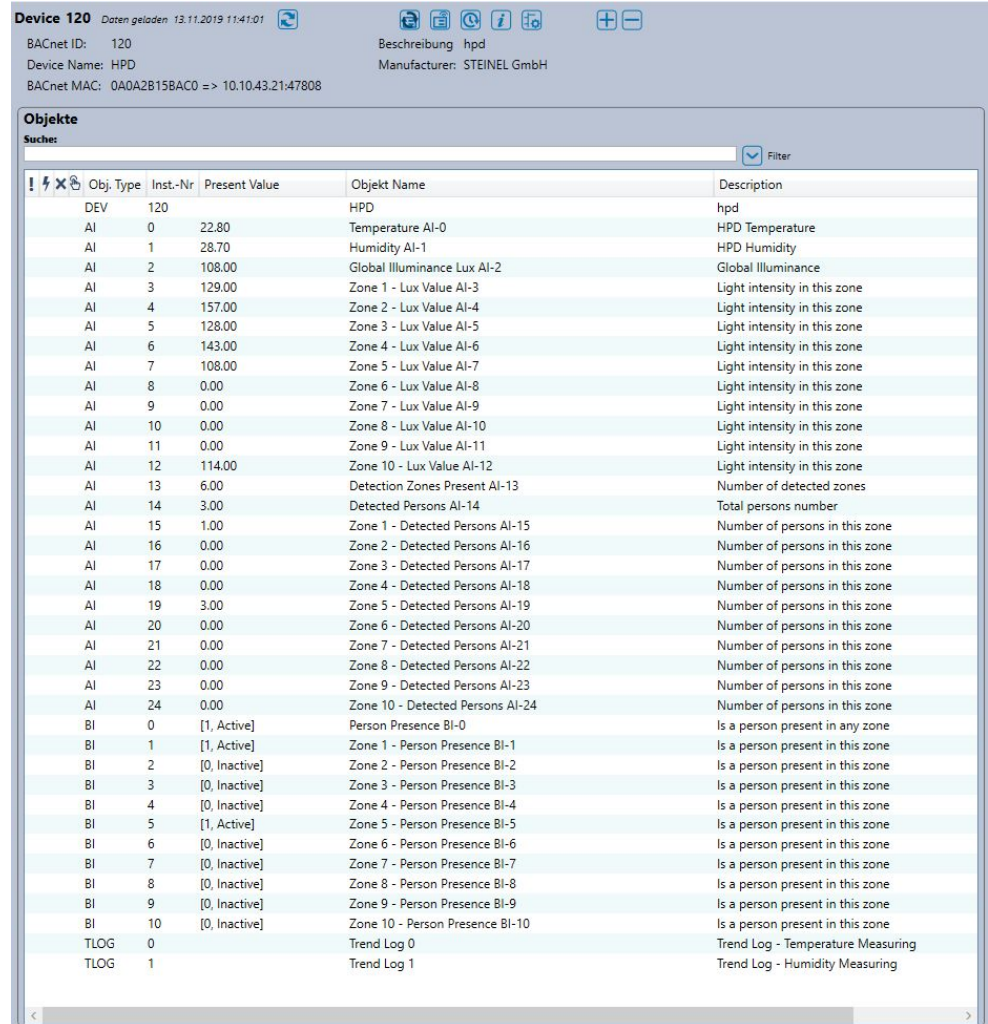
Detailed description of MQTT subtopics exists on HPD2:

| Subtopic              | Data type               | Description   | Example                 | Range |
|-----------------------|-------------------------|---|-------------------------|-------|
| DetectedPersons       | unsigned int            | Number of detected persons  | 5                       |       |
| DetectedPersonsZone   | unsigned int array [10] | Number of detected persons in each zone   | [0,5,0,0,0,0,0,0,0,0]   |       |
| DetectionZonesPresent | unsigned int            | Number of configured detection zones  | 2                       | 0-10  |
| GlobalIlluminanceLux  | unsigned int            | Luxes measured from whole picture or from zones union if there are any zone defined | 123                     |       |
| LuxZone               | unsigned int array [10] | Illuminance levels in zones   | [45,66,0,0,0,0,0,0,0,0] |       |
| Temperature           | float                   | Measured temperature in °C or °F depending on HPD settings                          | 23.6                    |       |
| Humidity              | float                   | Measured humidity in %  | 55.6                    |       |

## Data access - BACnet

Once integrated into a BACnet installation, all HPD2 data-points can be accessed via standardized BACnet communication.

The screenshot on the right shows an example of all data-points read out with a BACnet – sniffer tool.



Device 120 Daten geladen 13.11.2019 11:41:01

BACnet ID: 120 Beschreibung hpd  
Device Name: HPD Manufacturer: STEINEL GmbH  
BACnet MAC: 0A0A2B15BAC0 => 10.10.43.21:47808

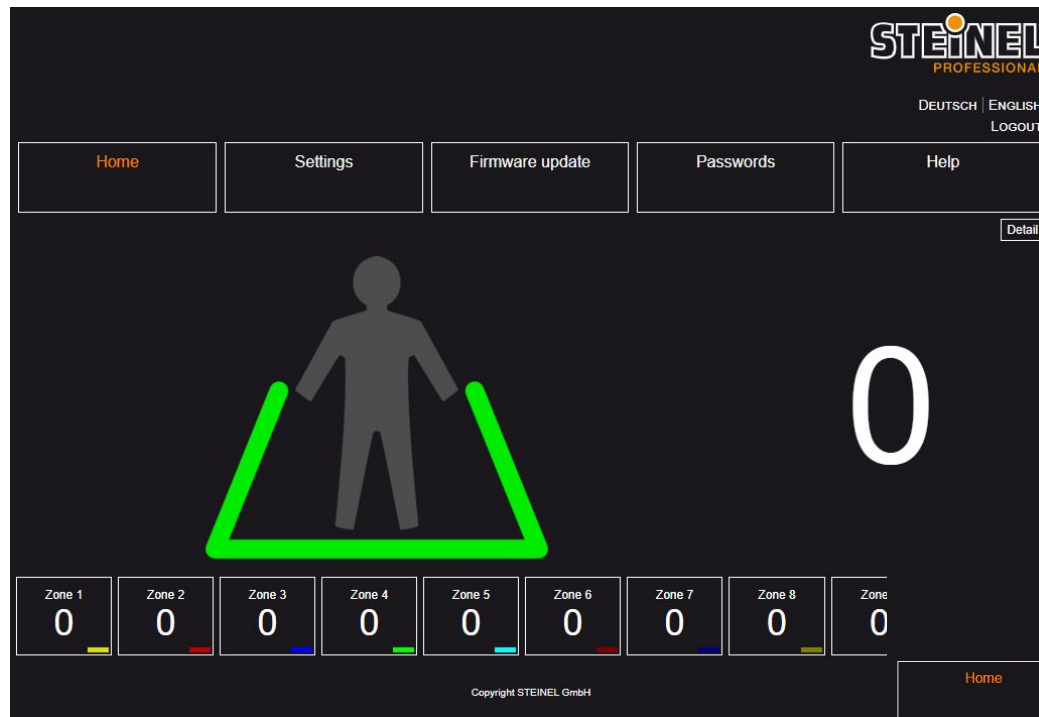
Objekte

Suche:  Filter

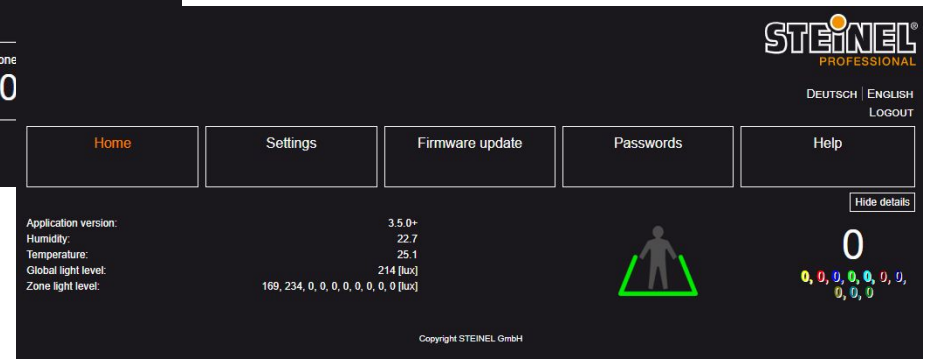
| Obj. Type | Inst.-Nr | Present Value | Objekt Name                      | Description                       |
|-----------|----------|---------------|----------------------------------|-----------------------------------|
| DEV       | 120      |               | HPD                              | hpd                               |
| AI        | 0        | 22.80         | Temperature AI-0                 | HPD Temperature                   |
| AI        | 1        | 28.70         | Humidity AI-1                    | HPD Humidity                      |
| AI        | 2        | 108.00        | Global Illuminance Lux AI-2      | Global Illuminance                |
| AI        | 3        | 129.00        | Zone 1 - Lux Value AI-3          | Light intensity in this zone      |
| AI        | 4        | 157.00        | Zone 2 - Lux Value AI-4          | Light intensity in this zone      |
| AI        | 5        | 128.00        | Zone 3 - Lux Value AI-5          | Light intensity in this zone      |
| AI        | 6        | 143.00        | Zone 4 - Lux Value AI-6          | Light intensity in this zone      |
| AI        | 7        | 108.00        | Zone 5 - Lux Value AI-7          | Light intensity in this zone      |
| AI        | 8        | 0.00          | Zone 6 - Lux Value AI-8          | Light intensity in this zone      |
| AI        | 9        | 0.00          | Zone 7 - Lux Value AI-9          | Light intensity in this zone      |
| AI        | 10       | 0.00          | Zone 8 - Lux Value AI-10         | Light intensity in this zone      |
| AI        | 11       | 0.00          | Zone 9 - Lux Value AI-11         | Light intensity in this zone      |
| AI        | 12       | 114.00        | Zone 10 - Lux Value AI-12        | Light intensity in this zone      |
| AI        | 13       | 6.00          | Detection Zones Present AI-13    | Number of detected zones          |
| AI        | 14       | 3.00          | Detected Persons AI-14           | Total persons number              |
| AI        | 15       | 1.00          | Zone 1 - Detected Persons AI-15  | Number of persons in this zone    |
| AI        | 16       | 0.00          | Zone 2 - Detected Persons AI-16  | Number of persons in this zone    |
| AI        | 17       | 0.00          | Zone 3 - Detected Persons AI-17  | Number of persons in this zone    |
| AI        | 18       | 0.00          | Zone 4 - Detected Persons AI-18  | Number of persons in this zone    |
| AI        | 19       | 3.00          | Zone 5 - Detected Persons AI-19  | Number of persons in this zone    |
| AI        | 20       | 0.00          | Zone 6 - Detected Persons AI-20  | Number of persons in this zone    |
| AI        | 21       | 0.00          | Zone 7 - Detected Persons AI-21  | Number of persons in this zone    |
| AI        | 22       | 0.00          | Zone 8 - Detected Persons AI-22  | Number of persons in this zone    |
| AI        | 23       | 0.00          | Zone 9 - Detected Persons AI-23  | Number of persons in this zone    |
| AI        | 24       | 0.00          | Zone 10 - Detected Persons AI-24 | Number of persons in this zone    |
| BI        | 0        | [1, Active]   | Person Presence BI-0             | Is a person present in any zone   |
| BI        | 1        | [1, Active]   | Zone 1 - Person Presence BI-1    | Is a person present in this zone  |
| BI        | 2        | [0, Inactive] | Zone 2 - Person Presence BI-2    | Is a person present in this zone  |
| BI        | 3        | [0, Inactive] | Zone 3 - Person Presence BI-3    | Is a person present in this zone  |
| BI        | 4        | [0, Inactive] | Zone 4 - Person Presence BI-4    | Is a person present in this zone  |
| BI        | 5        | [1, Active]   | Zone 5 - Person Presence BI-5    | Is a person present in this zone  |
| BI        | 6        | [0, Inactive] | Zone 6 - Person Presence BI-6    | Is a person present in this zone  |
| BI        | 7        | [0, Inactive] | Zone 7 - Person Presence BI-7    | Is a person present in this zone  |
| BI        | 8        | [0, Inactive] | Zone 8 - Person Presence BI-8    | Is a person present in this zone  |
| BI        | 9        | [0, Inactive] | Zone 9 - Person Presence BI-9    | Is a person present in this zone  |
| BI        | 10       | [0, Inactive] | Zone 10 - Person Presence BI-10  | Is a person present in this zone  |
| TLOG      | 0        |               | Trend Log 0                      | Trend Log - Temperature Measuring |
| TLOG      | 1        |               | Trend Log 1                      | Trend Log - Humidity Measuring    |

## Data access – Web Interface

HPD2 data can also be accessed using integrated web interface. You can use password for “basic mode” to get read only access.



Main view



Detailed view

## Protocol comparison

| Feature                    | BACnet IP  | MQTT   | REST API  |
|----------------------------|--|--|---|
| Data format (Steinel)      | <ul style="list-style-type: none"> <li>- Standardized BACnet objects</li> </ul>  | <ul style="list-style-type: none"> <li>- JSON</li> </ul>   | <ul style="list-style-type: none"> <li>- JSON</li> </ul>  |
| Direction of communication | <ul style="list-style-type: none"> <li>- Push: Automatic transmission at change of value (COV)</li> <li>- Polling</li> </ul>                 | <ul style="list-style-type: none"> <li>- Push: Automatic transmission at change of value, or at fixed time interval</li> </ul> | <ul style="list-style-type: none"> <li>- Polling</li> </ul>   |
| Advantages                 | <ul style="list-style-type: none"> <li>- Widely used in the market</li> <li>- Standardized</li> <li>- Certified test laboratories</li> </ul> | <ul style="list-style-type: none"> <li>- Low resources usage</li> <li>- Flexible</li> <li>- Easy to use</li> </ul>             | <ul style="list-style-type: none"> <li>- Good scalability</li> <li>- Uses standardized HTTP methods</li> <li>- Easy to use</li> </ul> |

HPD2

# Use case examples

## Use case examples

HPD2 can be used in many different applications

Here are some examples:

- Smart Workspace
  - Flex Desk Management
  - Meeting Room Management
- HVAC control based on actual number of people
- Covid 19 Assistance – Limit number of people in specific areas
- Wait queue optimization
- Analyze space usage and identify optimization potential



## Use case examples

### Smart Workspace System @ Steinel HQ:

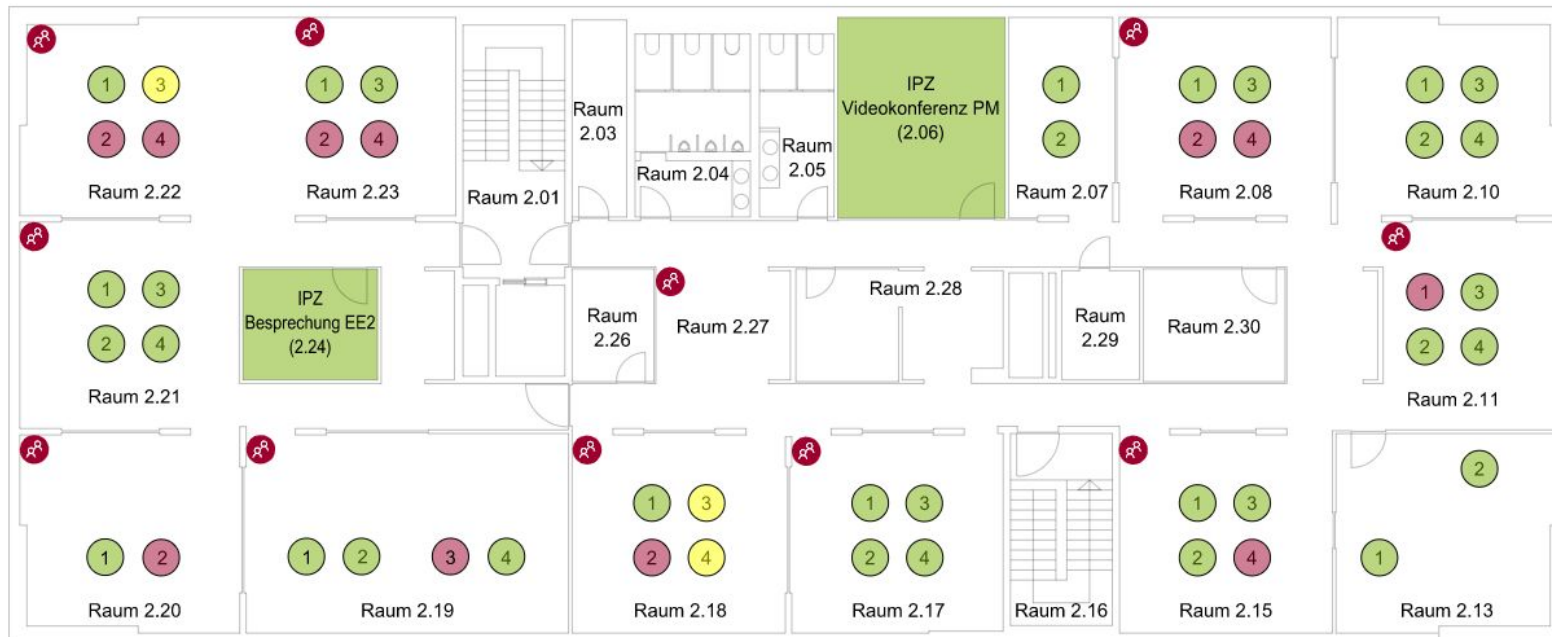
Locations > Herzebrock > IPZ 2. OG

2 | 2 Meeting rooms

32 | 47 Flexdesks

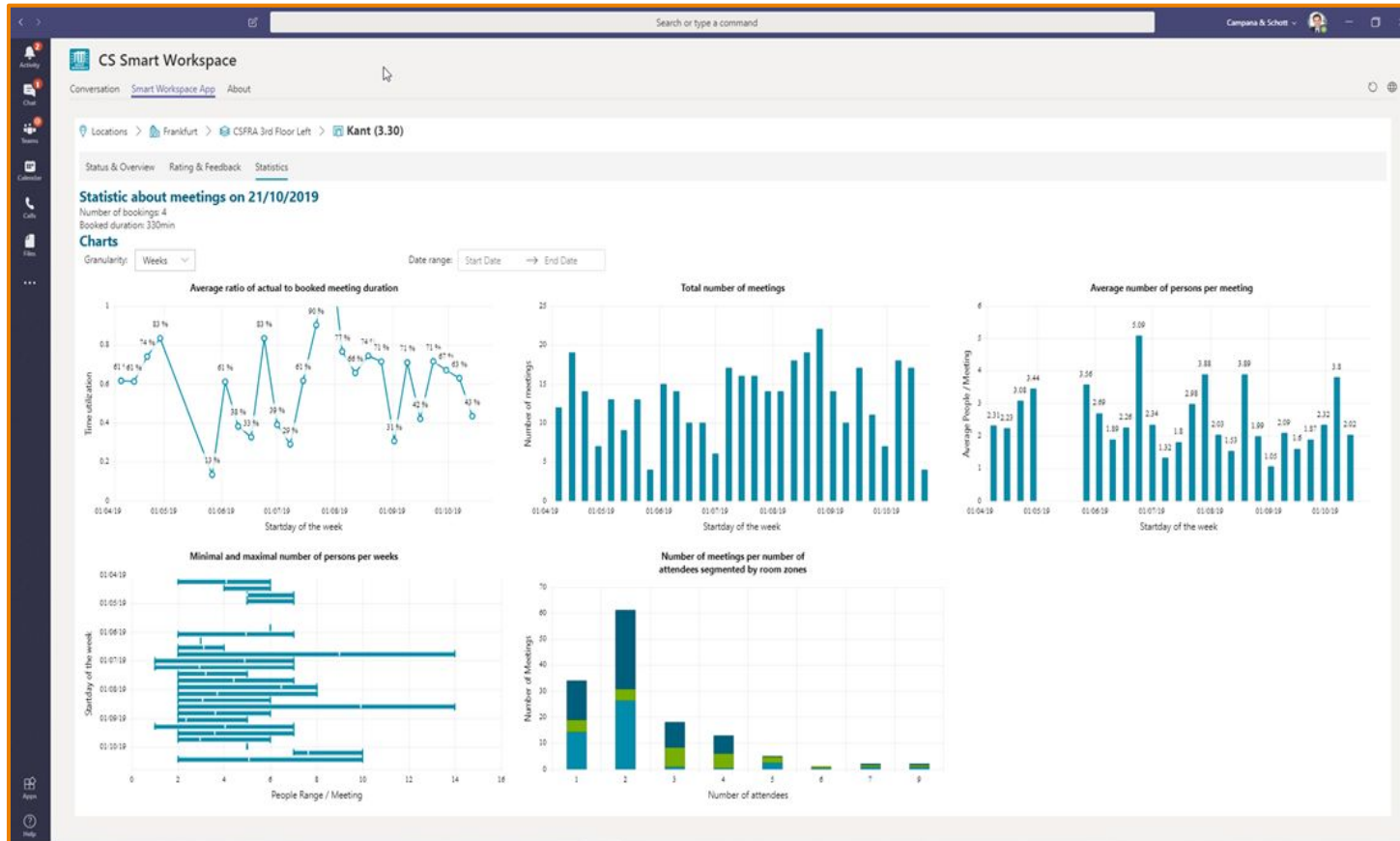
Rooms (2) [Floor map](#)

Click on a room or desk to see details



## Use case examples

Analyze meeting room usage:



## Use case examples

Covid-19 Assistance for small shops:



Thank

You!

invent

we