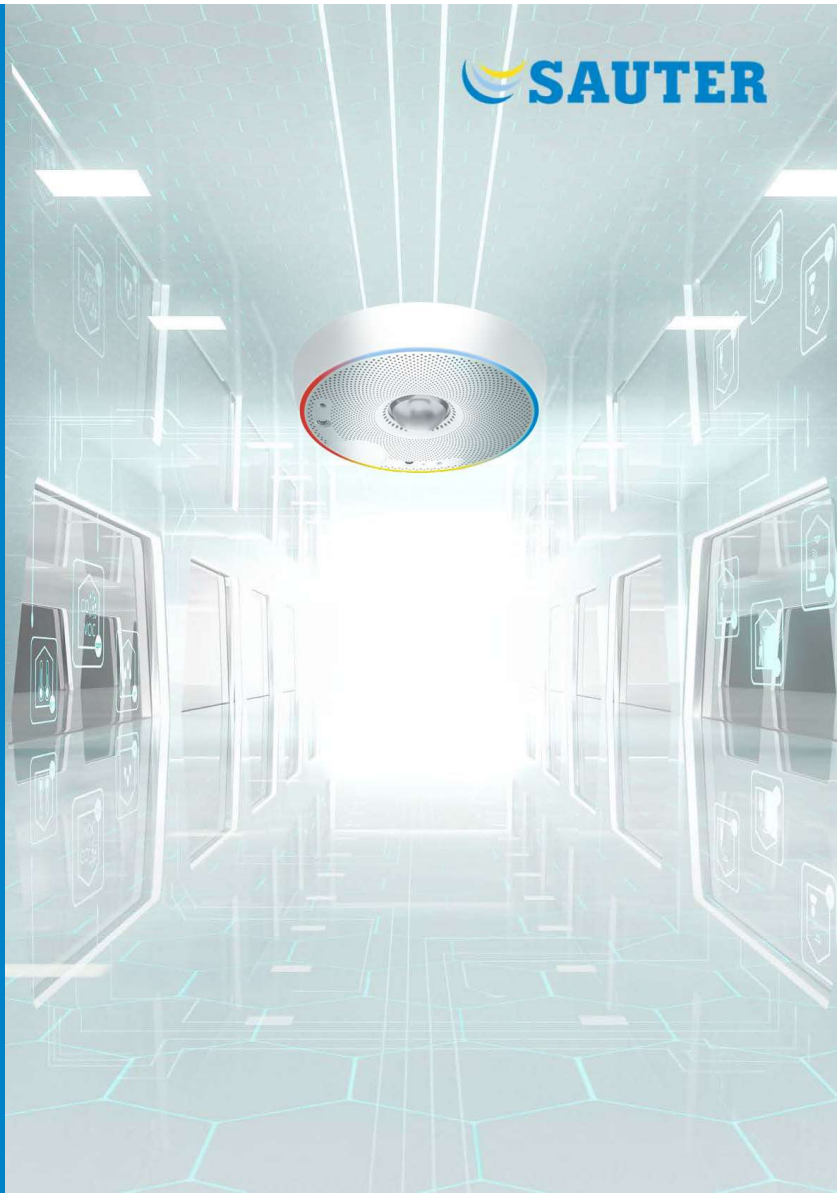
Smart Sensor viaSens

2023 - Roadshow

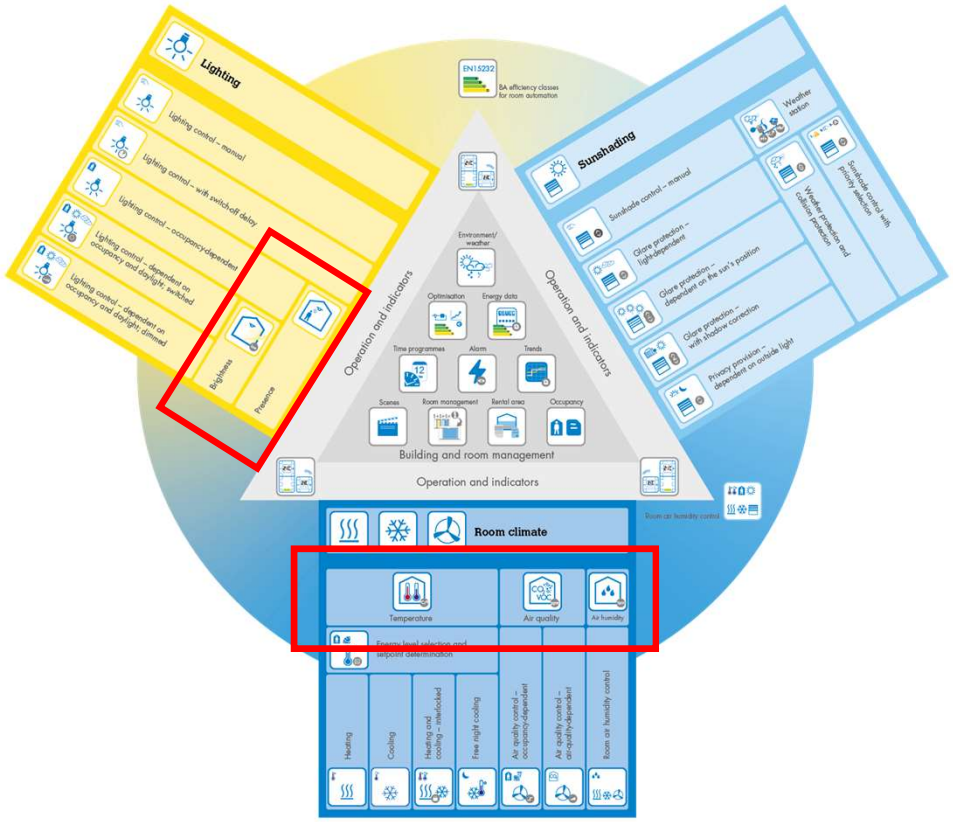


Roadshow 2023 - Agenda

- **Product**
- **Applications**
- **Engineering**
  - Mounting – Accessories
  - Bluetooth – Planning (Ranges PIR, Bluetooth)
  - Commissioning – Engineering (Integration with ecos)
  - First projects
- **Marketing Mix**
  - Outlook: CO_2
- **Q&A**

Integrated room automation

Individual room control of temperature, humidity, lighting and window blinds



Application examples

Flexible use of Smart Spaces

The common rooms are bustling with activity.
Anyone looking for a free office is quickly notified:

Green LED ring = the desk is free.

Application examples

Further applications

Air quality in schools

In full classrooms, the air quality quickly decreases.

Red LED ring = classroom should be ventilated.

Constant-light control at the workplace

Based on the brightness sensor, the lighting is adjusted to the natural daylight.

Hotel: Control of room functions with the app

The smartphone detects the room and allows users to perform the various functions for controlling the atmosphere.

→ Mobile Room Control app

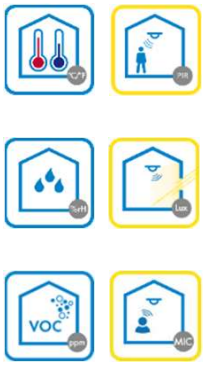
Facility Management

Facility Management optimises the use of cleaning staff.

Blue LED ring = rooms that were occupied need to be cleaned.

Smart Sensor

Multi-sensor for the room automation



Sensors:

- Temperature (TEMP)
- Humidity (HUM)
- Volatile Organic Compounds (VOC)
- Presence / motion (PIR)
- Brightness (LUX)
- Sound pressure level (SPL) / Noise level (MIC)

Status signalling:

- Visual display (RGB LED ring)

Indoor room quality

Relevant measured values

Values	
Room temperature	
Measuring range	0…60 °C
Measuring accuracy	1.0 °C
Measuring resolution	0.1 °C
Field of view (FOV for FIR)	50°(…70°)
Room humidity	
Measuring range	0...100% rel. humidity
Measuring accuracy	3%
Measuring resolution	1%
Room air quality	
Measuring range	0...500 (VOC index)
Measuring resolution	1 VOC index

Sensors

- 1st measuring element: digital I²C sensor
- 2nd measuring element: Far-Infrared Sensor (FIR)
- Note: As of now only, either or.

- Measuring element: digital I²C sensor
- Option to calculate enthalpy
- Note: Needs to be calculated in ecos

- Measuring element: digital I²C VOC sensor
- Sensitivity to ethanol and other volatile organic compounds
- VOC index is the index for room air quality
- Note: Adapting during first hour to average value

Indoor room quality

Relevant measured values

Values	
Presence and motion detection	
Passive Infrared Sensor	Diameter: ~ 9 m @ 2.5 m Area: ~ 64 m^2 @ 2.5 m, 360°
Field-of-View (FOV)	~120°
Fitting height	2.5…5 m
Brightness in the room	
Measuring range	0…16,000 lx (@FOV~140°)
Measuring accuracy	10 lx
Measuring resolution	1 lx
Noise level	
Measuring range	35...120 dB
Measuring accuracy	3 dB
Measuring resolution	1 dB

Sensors

- PIR (Passive Infrared Sensor) reacts to moving people based on temperature changes
- Note: Sensitivity can be parametrized

- Sensor for daylight-dependent control of lighting, including control of window blinds
- Note: Measurement can be calibrated (offset, slop) to illumination on desk

- Sound pressure level for WELL-certified indoor environment quality

Indoor air quality

VOC air pollutants and where they come from

Volatile Organic Compounds (VOC)	Source
Acetone	Wall paint, adhesives
Toluene	Upholstered furniture
Ethanol	Detergents, fragrances
Hydrogen sulphide	Decaying food residues
Ammonia	Urine from pets, sweat
Benzene	Cigarette smoke

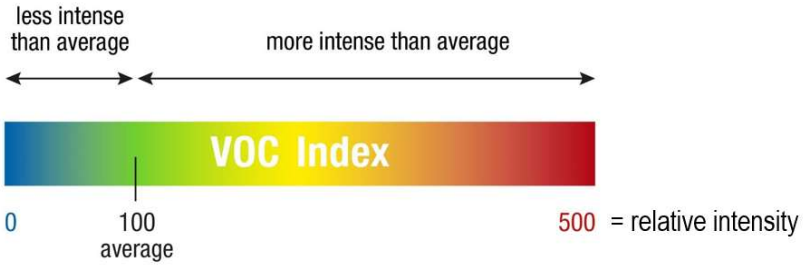
Indoor air quality

Volatile organic compounds measurement - VOC

VOC air pollutants and where they come from

Examples of air pollutants and their source

Harmful gases	❑ Acetone (paints, glues) ❑ Toluene (furniture, mattresses, building products)
Other gases	❑ Ethanol (alcohol, cleaner, perfume)
Odors	❑ Hydrogen sulfide, volatile sulfuric compounds (rotten food, farts) ❑ Ammonia, amines (pet pee)
Smoke	❑ Benzene, nitrosamines (cigarette smoke)



Indoor air quality

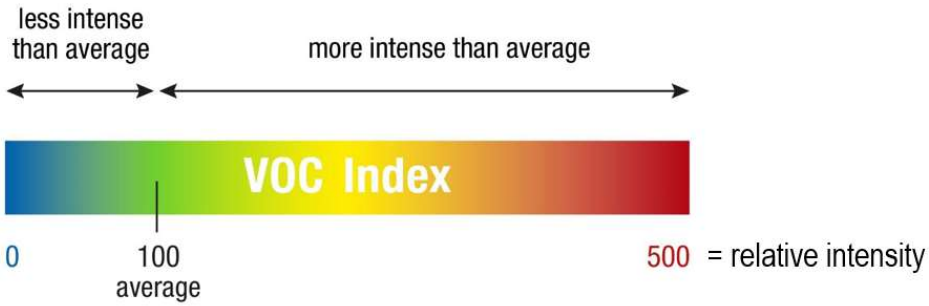
Volatile organic compounds measurement – VOC

Note:

→First hour the VOC index is adapting its measurement algorithm

→Demand led air quality control strategy should consider this

How intense?



VOC Index…

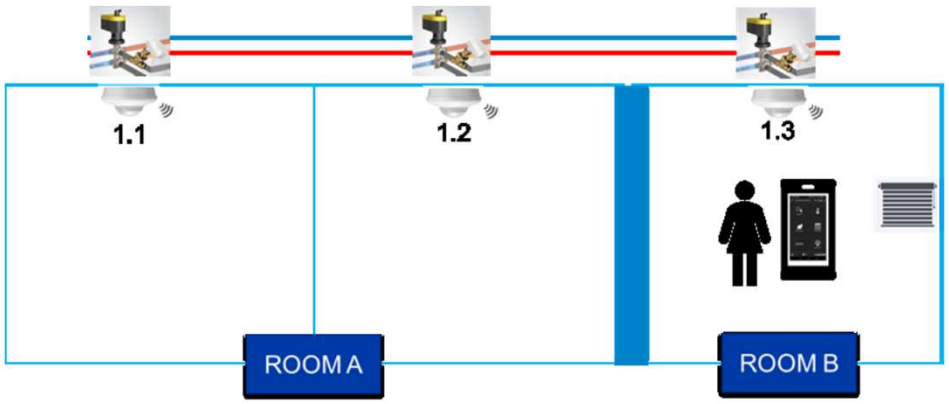
- ❑ …shows changes of intensity relative to the history in the room
- ❑ …is referenced to the average of VOCs present over the last 24 h in the room
- ❑ …behaves similar to a human nose, a MOX sensor is not able to detect the absolute VOC concentration
- ❑ …starts going back to average VOC Index after 3 h for very long events – adapts to background

Smart Sensor

Localisation with iBeacon

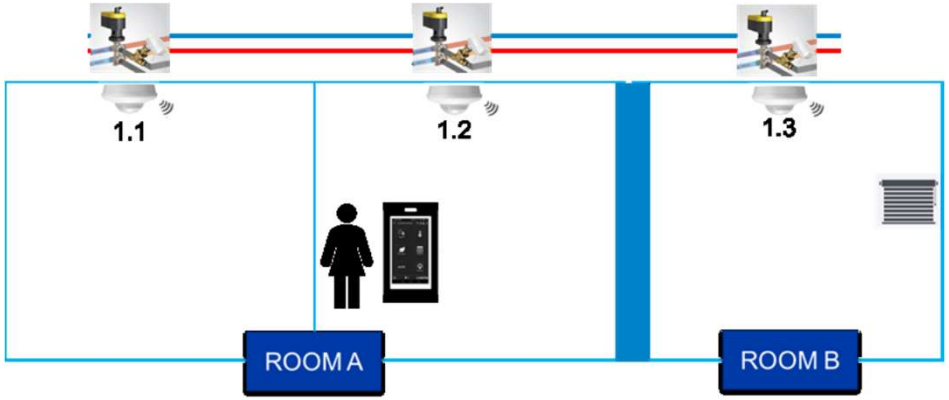
Users in the room:

- iBeacon localisation
- MRC app loads room configurations
- Local room operation



Room change:

- New iBeacon localisation
- New room configuration from MBS
- Operation in other room



Smart Sensor

Room status signalled with LED ring

Examples					
Room occupancy		Reserved	Free		
Air quality	Poor	Medium	Good		
Cleaning				Necessary	

Using the coloured light signal, the state/status of the room is visualised.

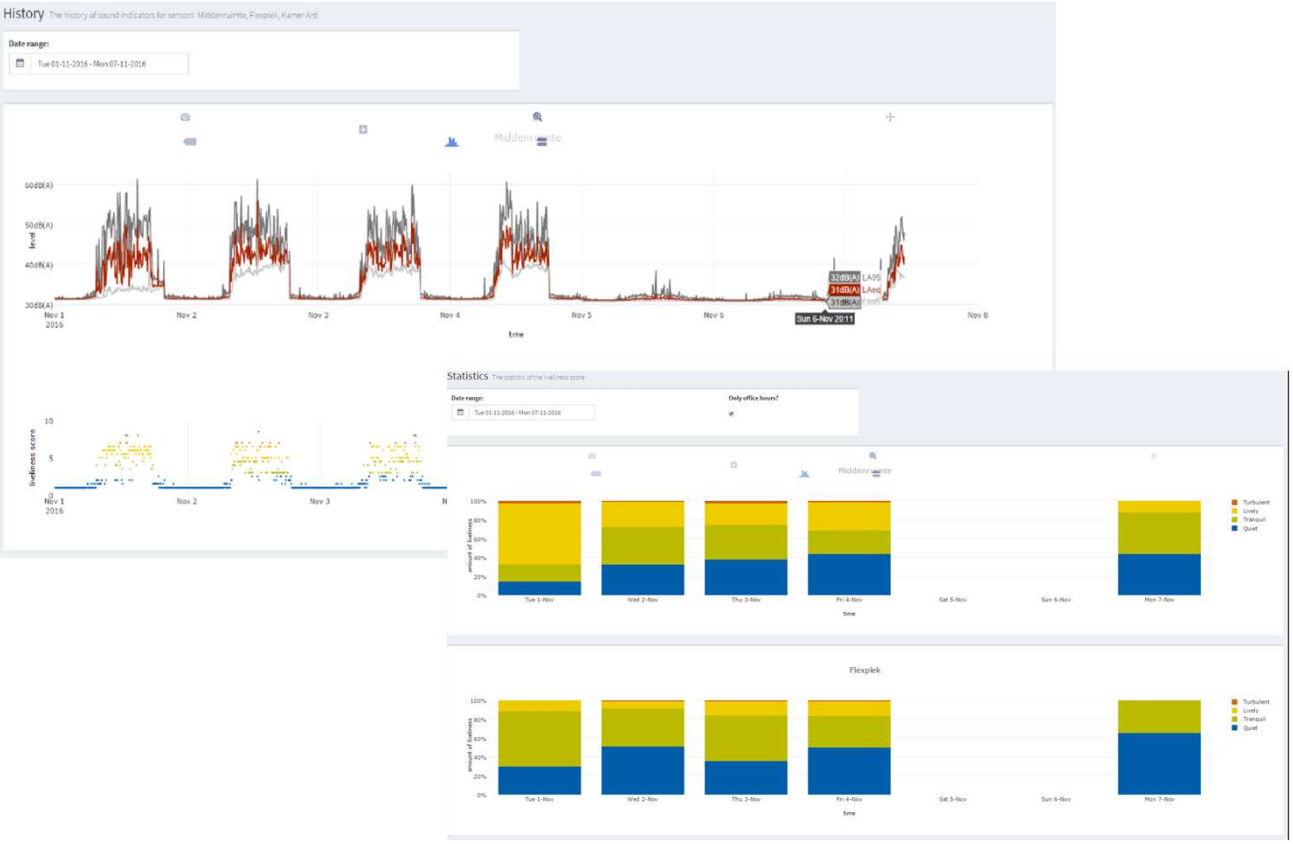
Features:

- RGB ring with 12 RGB LEDs
- Controllable / configurable for different scenes
- On/Off, constant or flashing

Examples of use:

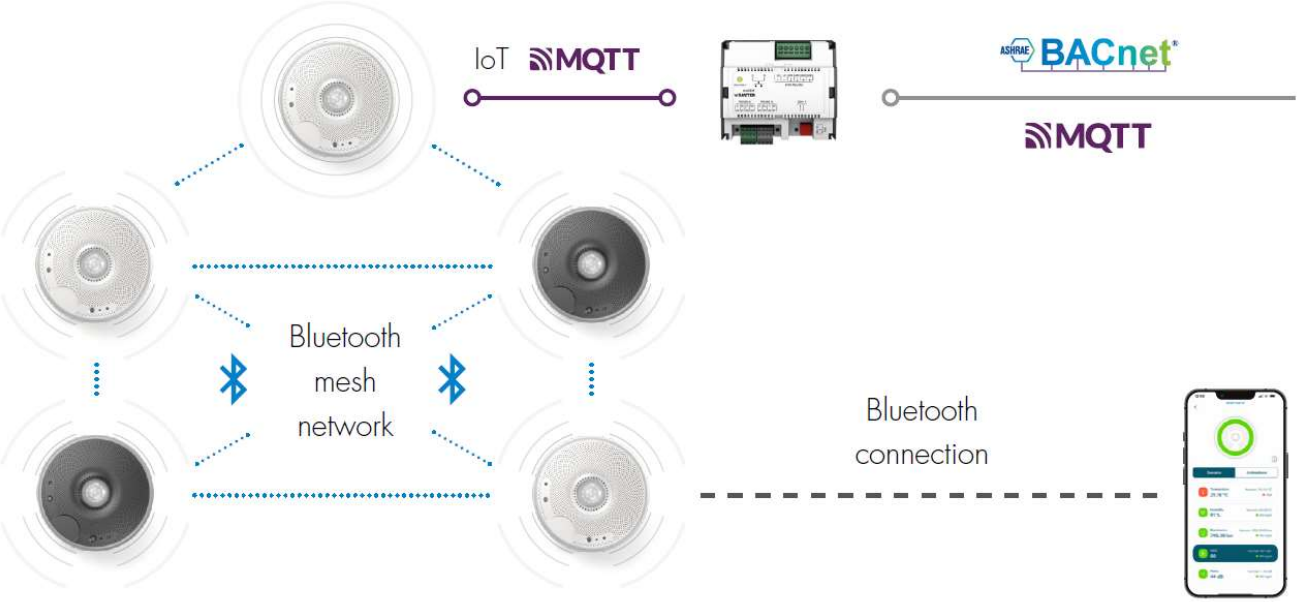
- Room occupancy
- Air quality
- Room cleaning

Noise Level Map



- WELL “Sound”: https://v2.wellcertified.com/en/v/sound
- Limiting the noise level in the background: https://v2.wellcertified.com/en/v/sound/feature/2

Bluetooth Mesh network and communication



- Sensors connect to each other and form a mesh network with the gateway sensor
- Indoor geolocalisation using Bluetooth beacon technology (iBeacon)
- Gateway sensor forwards all values of the sensor mesh network with MQTTS (WSS/TLS) via Ethernet (IP) to SAUTER-compatible products such as ecos504/505

Smart Sensor types



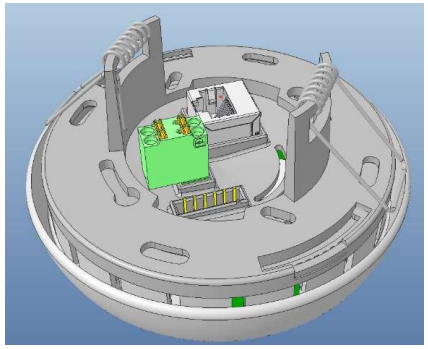

	FMS116F121	FMS116F121A	FMS196F121	FMS196F121A
Interfaces	Bluetooth Mesh Relay, Beacon, NFC		**Ethernet**, Bluetooth Mesh, Beacon, NFC	
Ethernet protocol	-		**MQTT** client, MQTT WSS/TLS	
Profile/model Bluetooth Mesh	Sensor server		Sensor server and client	

Installation and connectivity

Advantages of wireless technology

Simple installation

- Ceiling mounting (installation height: 2.5...3.5 m)
- Power supply: 24 V DC pluggable push-in terminal
- Accessories for hollow ceilings or surface mounting
- Wireless communication



Bluetooth Mesh technology

- Bluetooth Mesh for extended network in up to 16 smart sensors
- Bluetooth beacon for identification and communication with mobile app
- Integration with gateway sensor to local room automation station

Competitors

Multi-sensors – “IAQ and presence” ceiling sensors

STEINEL Multi-sensor AIR (KNX / DALI-2)

- Very comprehensive, incl. CO_2 and new with DALI-2
- Variants with Bluetooth mesh

LOYTEC MS2 / MS4 (DALI-2)

- Without CO_2, but IR operation, digital inputs
- good value

LUNATONE DALI-2 CS Integration THP-AQ (DALI-2)

- Without CO_2 (only eCO_2), but in 3 colors
- Mechanically not so stable

ESYLUX PD-ATMO 360i/8 O (KNX)

- Without CO_2, but with an acoustic sensor

SIEMENS WIDE multi UP258D51 (KNX)

- With CO_2 (ABC logic)

Competitors

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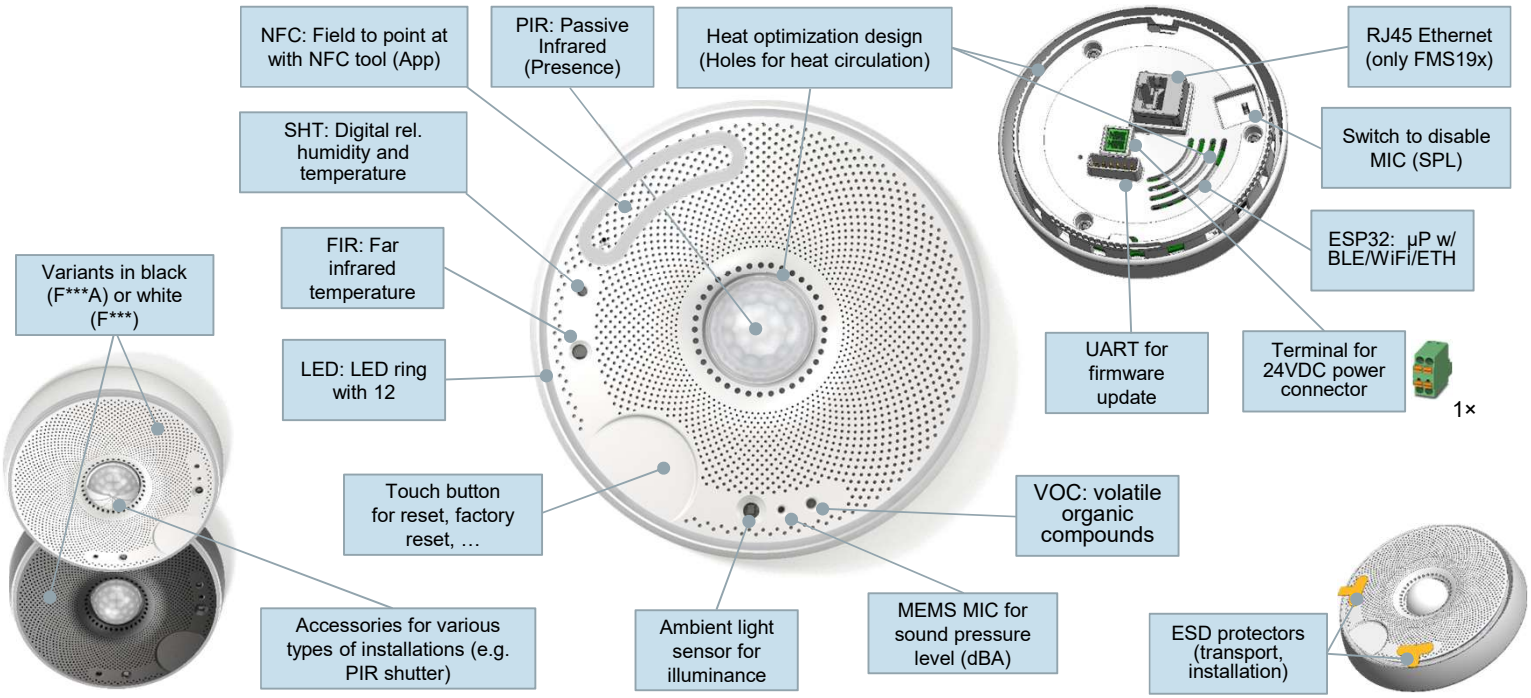
SAUTER Smart Sensor viaSens – Unique selling points

- Ethernet communication of a "wireless" communicating sensor network
- Simple integration into the SAUTER ecos room automation system
- LED ring for signaling room statuses
- …

Product Design

Features – Overview (in detail)



Product Design

Advanced Electronic Design (in detail)

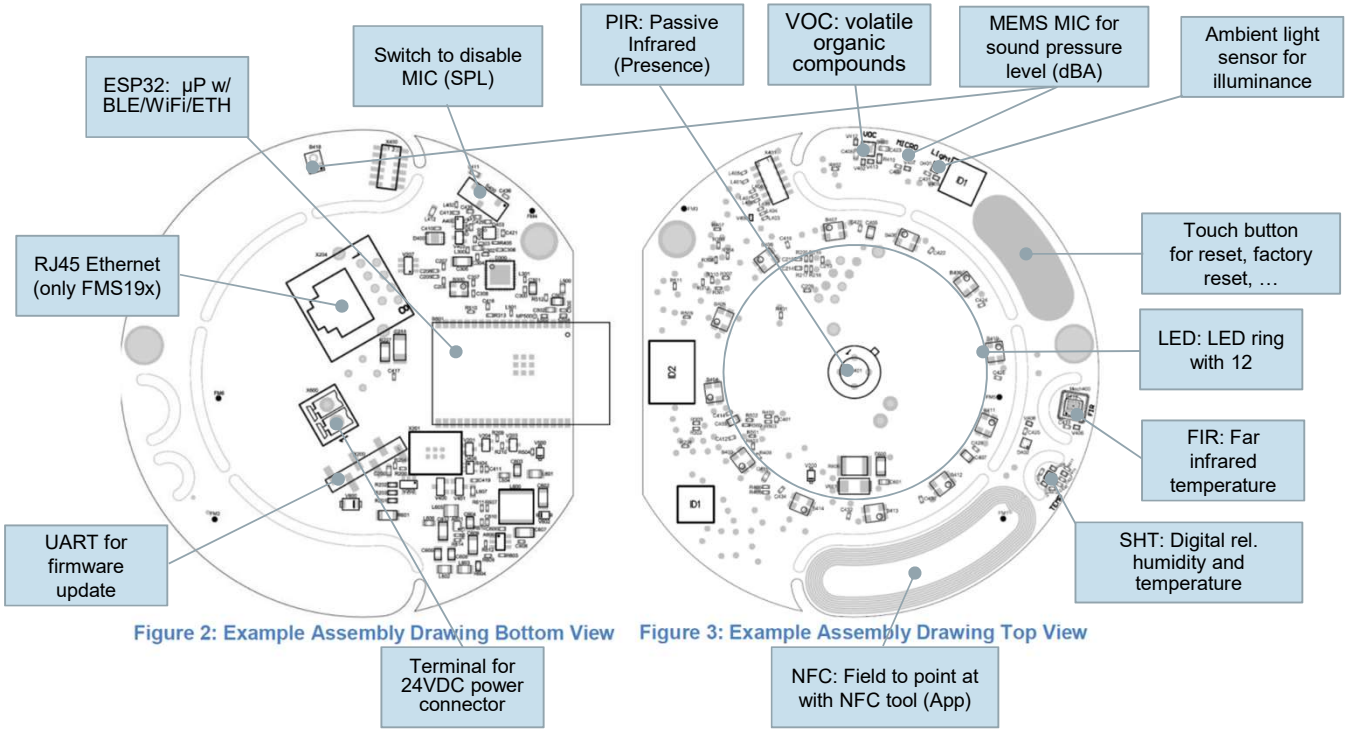
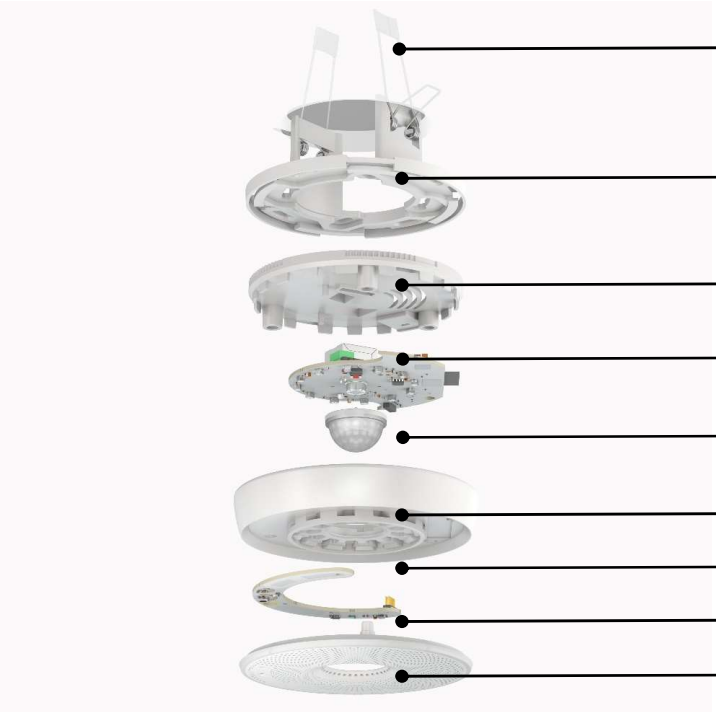


Figure 2: Example Assembly Drawing Bottom View

Figure 3: Example Assembly Drawing Top View

Product Design

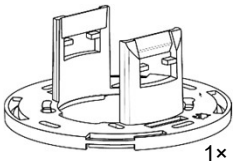
Advanced Electronic Design



- Spring clamp for ceiling mounting with cut-out hole
- Mounting plate for ceiling hole
- Smart base housing allows different mounting types with accessories
- Highly integrated electronics and microprocessor technology on densely packed circuit board
- Fresnel lens for sensitive detection of motion with PIR sensor
- Smallest sensor housing dimension despite a lot of technology
- Optimized LED light guide for "smooth" LED ring animations
- State-of-the-art sensor electronics on separate sensor printed circuit board (PCB)
- Round sensor design optimized for precise sensor measurements

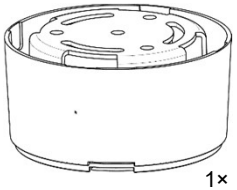
Product Accessories

Mounting – Installation – Accessories

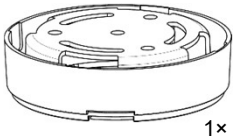


Mounting plate, flush, …	…white, 1 pcs	…black, 1 pcs	…white, 10 pcs	…black, 10 pcs
Order number / Type	0940241101	0940241101A	0940241110	0940241110A

Mounting spring, suspended ceiling, …	… 20 pcs (10 pairs)
Order number / Type	0940241420



Mounting box, surface, 53mm, …	…white, 1 pcs	…black, 1 pcs	…white, 10 pcs	…black, 10 pcs
Order number / Type	0940241201	0940241201A	0940241210	0940241210A



Mounting box, surface, 28mm, …	…white, 1 pcs	…black, 1 pcs	…white, 10 pcs	…black, 10 pcs
Order number / Type	0940241301	0940241301A	0940241310	0940241310A

PIR shutter, semi, …	…white, 1 pcs	…black, 1 pcs	…white, 10 pcs	…black, 10 pcs
Order number / Type	--	--	0940241510	0940241510A

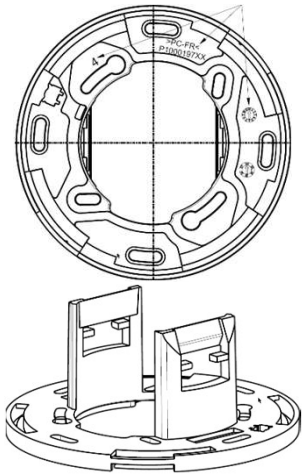
Product Accessories

Mounting – Installation – Accessories

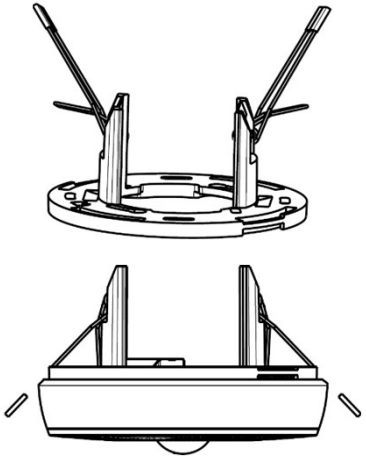
- Due to ecological reasons required mounting parts needs to be purchased as accessory
- Four different possibilities to mount Smart Sensor in the ceiling

Note: Good preparation of a suitable installation location

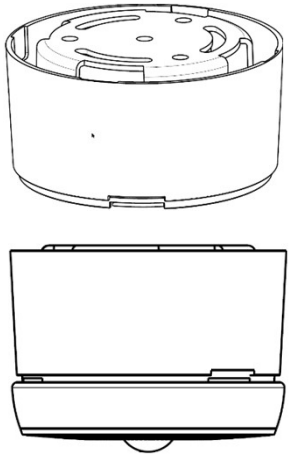
a) Mounting Plate with screws into flush-mounted box



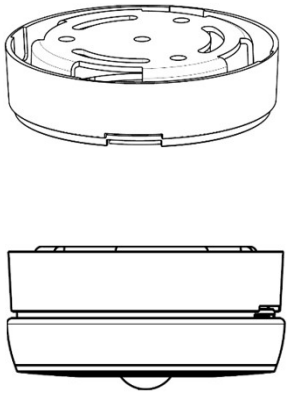
b) Mounting Plate **with spring clamps and mounting plate** into ceiling hole



c) Surface-mounted box for on ceiling installation (FMS196 – with Ethernet cable)



d) Surface-mounted box for on ceiling installation (FMS116 – w/o Ethernet cable)

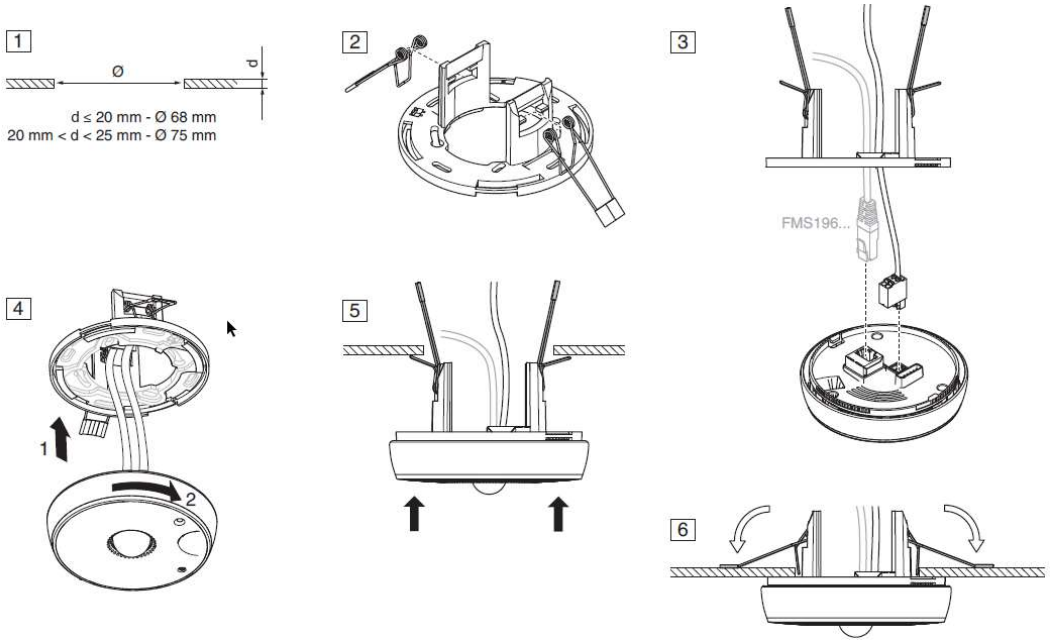


Product Accessories

Mounting – Installation – Accessories

- Preparation of mounting location → **see "MV"**

b) Mounting Plate with spring clamps and mounting plate into ceiling hole



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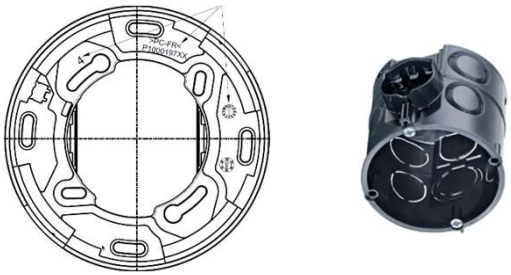
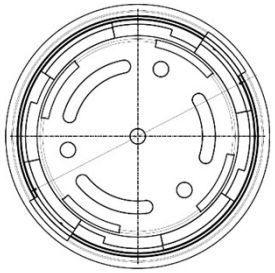
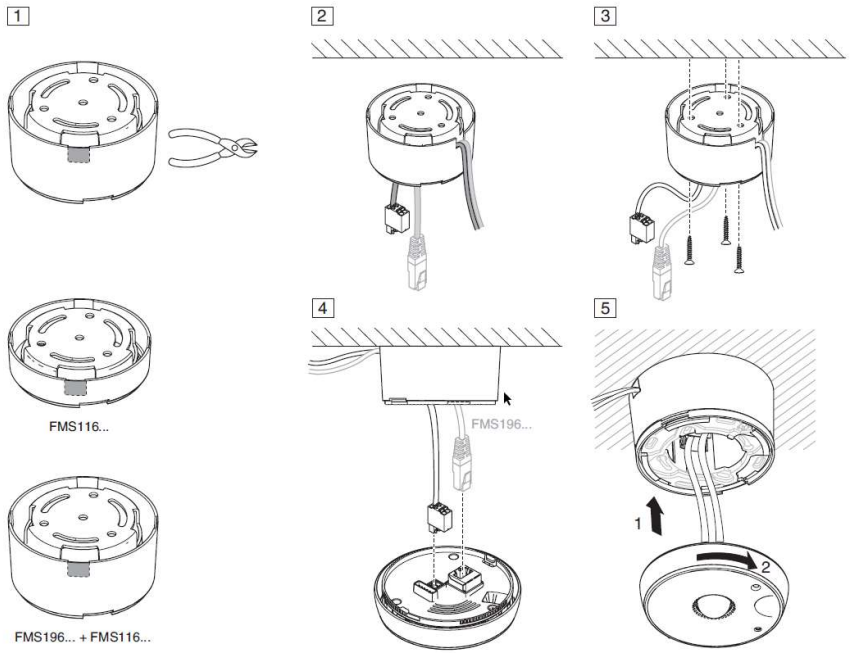


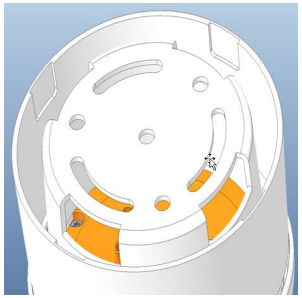
c) / d) Surface-mounted box for on ceiling installation

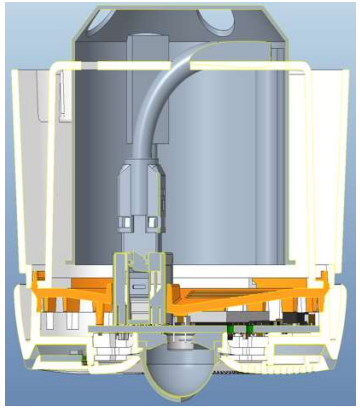


Product Accessories

Mounting – Installation – Accessories







Engineering – Planning

Planning – System and Integration (Planning the right location)

Network Topology: Up to **16 sensors** per ecos (with presence detection)

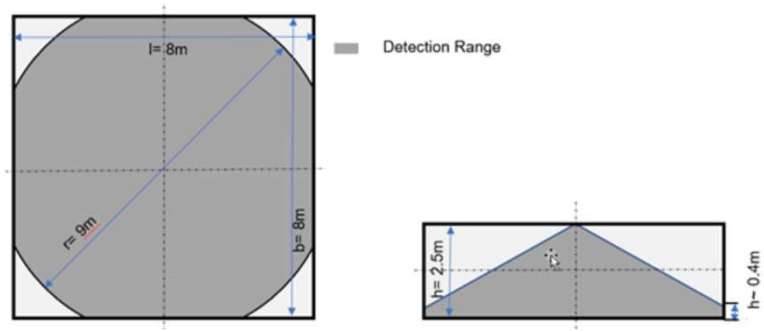
- max. 7 BTmesh hops (e.g. 4×4…2×8, gateway in center reduces hops)
- at least, one viaSens196 required as BTmesh gateway,
- no IoT-MQTT license required on ecos
- direct integration with "FMS module" in CASE Engine

Bluetooth Mesh - wireless and range:

- up to 10..15 m (node-to-node)
- Planning recommendation: max. 10 m (depends on building material, extension standard)
- e.g. max. 1 light wall; not trough concrete ceilings (only vertical or in-room radio propagation)
- overlapping recommended for network/device resilience
- choose Bluetooth mesh "Relay" node functionality appropriate

Presence detection and Field-of-Views ("on sight")

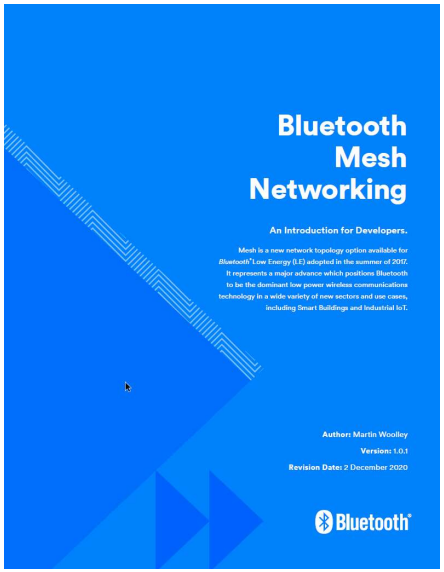
- ~8 × 8 meters, Ø 9 meters @ 2.5 m installation height
- PIR element and Fresnel lens, field of view (FOV): ~120° (installation "on sight")
- FIR detection area (FOV): ~50° (installation "on sight" for 70°)
- LUX measurement area (FOV): ~140° (no direct light, reflections)



Engineering – Planning

Bluetooth Basics

- Bluetooth Classic, Bluetooth LE (Low Energy), Bluetooth mesh → see Bluetooth SIG
- Bluetooth mesh «Overview» and «Protocol»
- Bluetooth mesh terminology



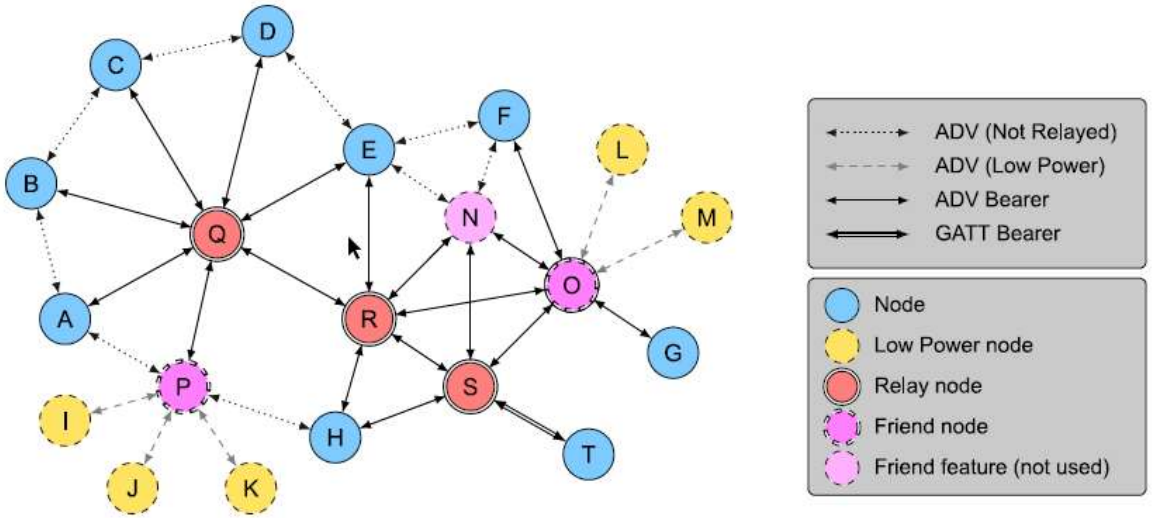


Figure 2.8: Example topology of a mesh network

Engineering – Planning

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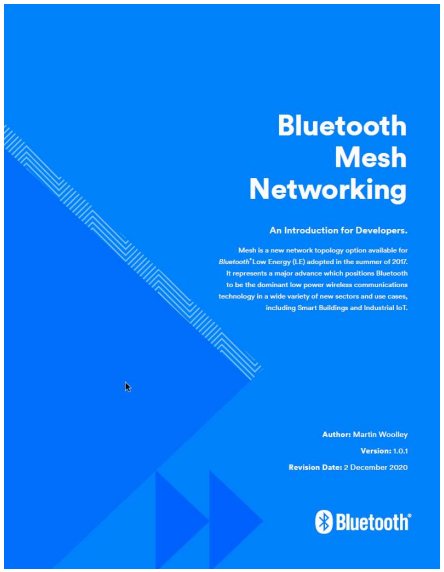

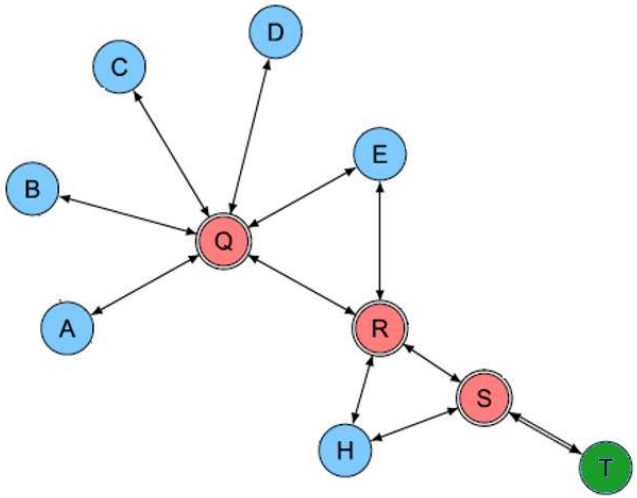

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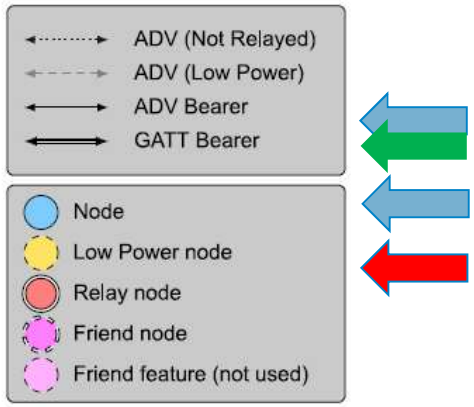


Engineering – Planning

Bluetooth mesh - «Theoretical examples»

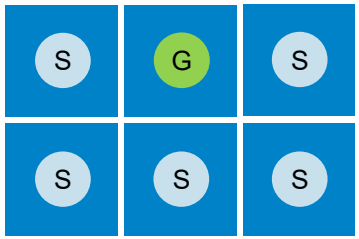
G Gateway Sensor FMS196

S Sensor FMS116

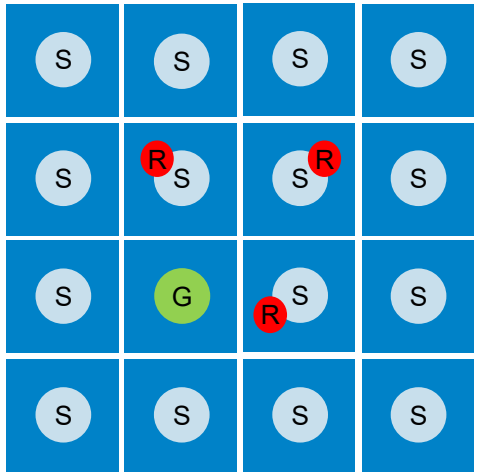
S R Sensor (+Relay) FMS116

S R Sensor (+Relay optional) FMS116

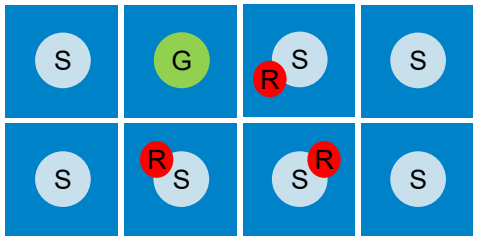
1G+5S [2 x 3]



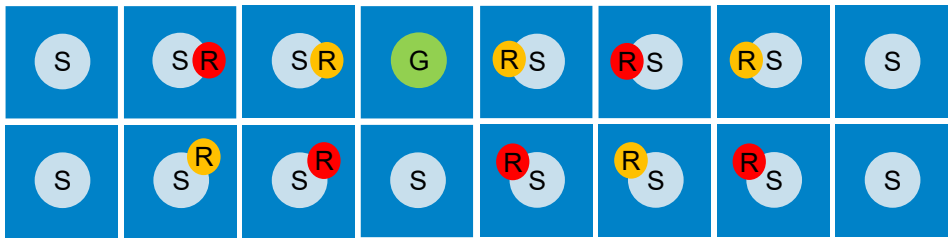
1G+15S [4 x 4]



1G+7S [2 x 4]

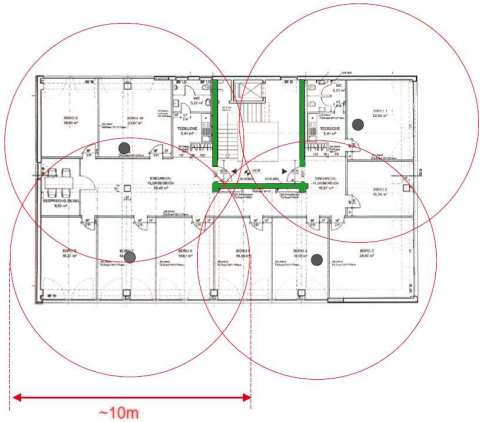


1G+15S [2 x 8]

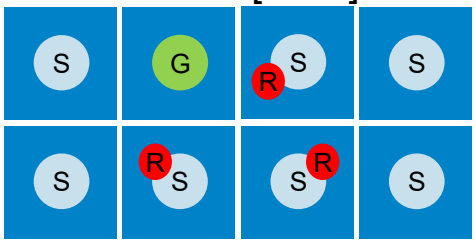


Engineering – Planning

Planning – System and Integration (Planning the right location)



1G+7S [2 x 4]



Bluetooth Mesh - wireless and range: Bluetooth radio range planning

- Floor plan of the rooms / room segments
- Placement of all sensors - in the scheme of “eight rooms”
- Definition of Bluetooth mesh networks
  - ideally 1 network per ecos (8 rooms)
  - max. 15 nodes (sensors)
- Definition of the sensor gateway (FMS196)
  - **RULE 1:** needs Ethernet, place in the middle of the area
- Definition of the sensor nodes (FMS116)
  - **RULE 2:** central nodes need relay enabled
  - **RULE 3:** border nodes might have relay disabled

Hints:

- Ration formula: FMS196 : FMS116 = 1 : 15 up to 16 : 0 per ecos
- If you use segmentation/axis on ecos, use at least **one FMS196 gateway per ecos**
  → do not use e.g. <u>one</u> FMS196 gateway for <u>two</u> ecos (16 axis)

Engineering – Insights

Planning – System and Integration

Motion detection - PIR

- Coverage, radial 360°: Ø 9 m @ 2.5m mounting height (63 m^2)
- Field of view: ~120° (122°/119°)
- Lens: 4 x 34-zone Fresnel = 136 zones
- PIR sensor parameter: 3 sensitivities

Mounting Hight	PIR Sensing Range
h = 2.5 m	Ø = 9.0 m
h = 2.7 m	…(?)
h = 3.0 m	…(?)
h = 5.0 m (max.?)	Ø = 18.0 m (?)

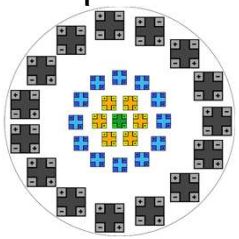
Notes:

→ set sensitivity to “high“, and reduce to “medium”, “low” if environment affords it

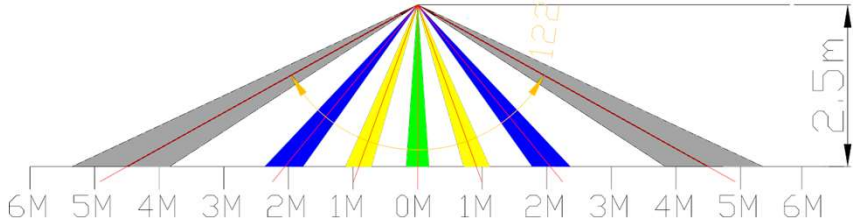
→ add accessory “PIR shutter” to reduce (half/quarter) 360° coverage (e.g. PIR for desk light at the edge to corridor)

→ PIR + SPL “fusion-ing” for “occupancy” is not yet implemented (use only “PIR“ for “OccMode”)

Top View



Side View



Engineering – Insights

Planning – System and Integration

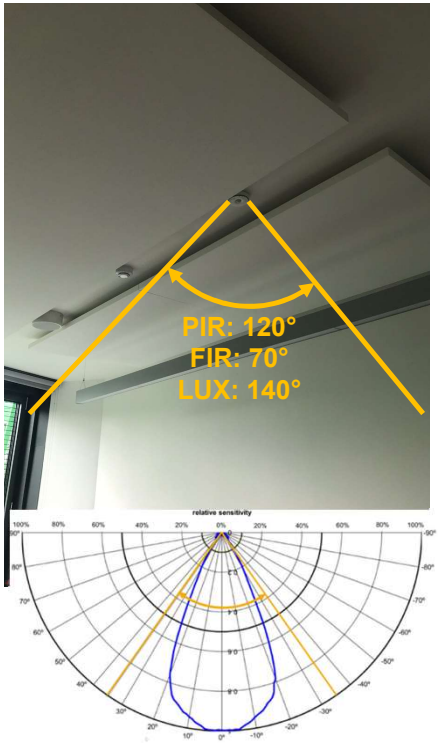
Temperature measurement – "TFIR"

- Far infrared (FIR) temperature sensor measures all heating sources around and gives a good perceived room temperature, independent on air flow or self-heating of device
- Accuracy: ± 1°C (@15…45°C)
- Field of view of 50° (with sensitivity of 50%)
- To increase accuracy, take care that the field of view is not obstructed by the installation, by objects (e.g. cooling ceiling panels).
  Take care that no obstruction is in a cone of at least 70° wide (e.g. heating/cooling sources, larger amount of people, …)

Notes:

→ Situation adapted obstruction/disturbances might need "a filter" on FIR temp measurement

→ Emissivity parameter "TmpIREmis" of 90…95% is at first a good practicable value



Note on "TDIG" (SHT):

The I²C digital temperature element (SHT) measures too high, caused by self-heating of whole sensor device (static offset "TmpOfs" could be used). This temperature measurement cannot be used without restrictions.

Engineering – Insights

SAUTER

Planning – System and Integration

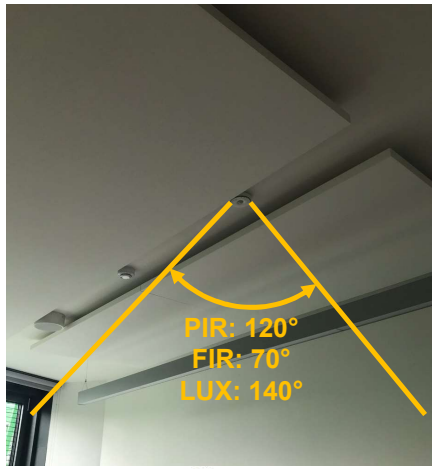
Ambient Light Sensor – Brightness – Illumination (LUX)

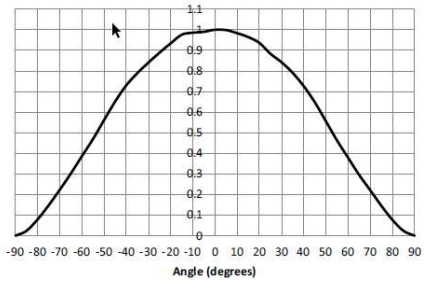
- The “LUX” sensor measures the influence on brightness all the light and gives a illumination value of the light available at the ceiling.
- Accuracy:
- Field of view is ~140° as be product design (hole on cover). FOV of the sensor element is 180°, but with decreasing sensitivity. Relevant FOV<120°…140°.
- Light sources or light reflections within a FOV of up to about 120°(..140°) can significantly influence the value measurement
- …

Note:

→ LUX sensing element is not in the center; mounting and orienting of the hole might be important if FOV with its angle needs to be optimized.

→ To adapt the LUX value measured on the ceiling to its LUX measurement at the office desk, you might make a linearization calibration with the FMS function block parameters “LghtCalSl” (Slope a) and “LghtCalOfs” (Offset b)





Engineering – Insights

Planning – System and Integration

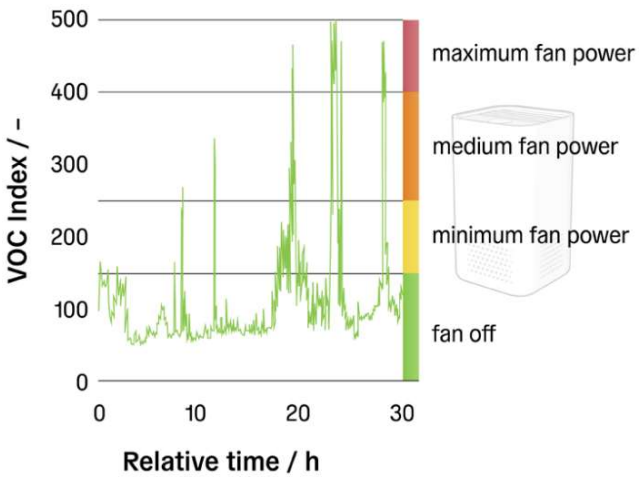
VOC sensor for indoor air quality applications

- Sensirion MOX sensor (SGP40)
- …

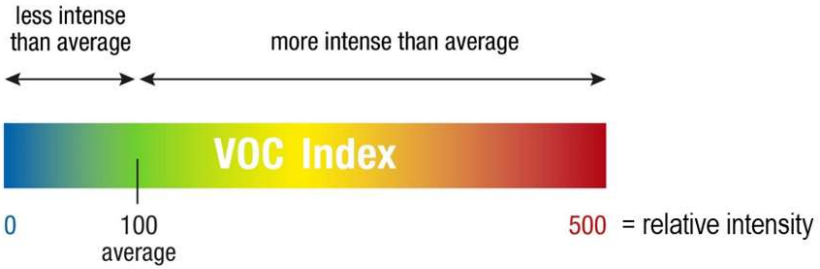
Notes:

→ First hour the VOC index is adapting its measurement algorithm

→ Demand led air quality control strategy should consider this



How intense?



Engineering – Step-by-Step

Commissioning

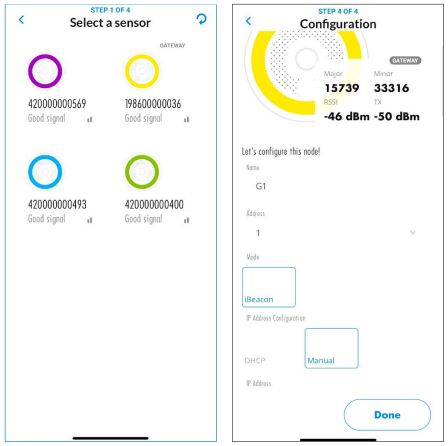
Commissioning is done with **CASE Engine** (Parametrization) and **viaSens-Cx App** (Addressing)

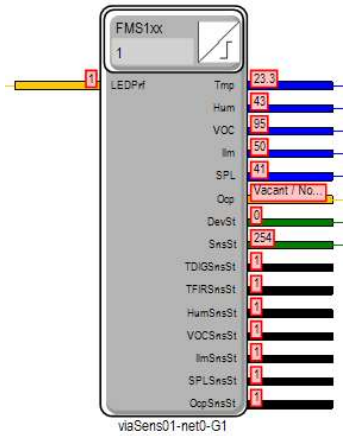
The sensor needs to be «provisioned» **from Bluetooth to a Bluetooth mesh** network. Once the sensor is lock'd into Bluetooth mesh it does not communicate 1:1 with the viaSens-Cx App. The App generates all the mesh security keys (net, node) which is mandatory for BTmesh.

There might be **two principles**: *Top-Down* or *Bottom-Up* – most likely in project top-down is used

- Collecting all the data about topology (wireless), devices-to-location, … (Hint: write down maybe S/N-to-location)
- Define a addressing-naming-location schema; share (manually) the configuration data between CASE Engine and viaSens-Cx App

Synchronization between viaSens app and CASE Engine modules





DEMO

Engineering – Step-by-Step

Commissioning

Commissioning is done with **CASE Engine** (Parametrization) and **viaSens-Cx App** (Addressing)

The sensor needs to be «provisioned» **from Bluetooth to a Bluetooth mesh** network. Once the sensor is lock'ed into Bluetooth mesh it does not communicate 1:1 with the viaSens-Cx App. The App generates all the mesh security keys (net, node) which is mandatory for BTmesh.

There might be **two principles**: Top-Down or Bottom-Up – most likely in project top-down is used

- Collecting all the data about topology (wireless), devices-to-location, … (Hint: write down maybe S/N-to-location)
- Define a addressing-naming-location schema; share with CASE Engine/viaSens-Cx App

Bottom-Up principle:

1. Start with viaSens-Cx App
2. Enter new project, network
3. Search for devices and assign (manually) proper addresses
4. Lock devices to the meshNet
5. Export configuration to be used within CASE Engine
6. Create corresponding CE plan with FMS blocks
7. Extend CE plan with full room automation functions

Top-Down principle:

1. Start with CASE Engine (V5.1) – [CB not yet supported]
2. Create CE plan with sensors and FMS block (parameters, addresses)
3. Export viaSens-Configuration for viaSens-Cx App
4. Import configuration file in viaSens-Cx App – [not yet supported]
5. Search for devices and assign (manually) addresses to the sensors
6. Lock devices to the meshNet
7. Extend CE plan with full room automation functions

Engineering – Step-by-Step

Commissioning

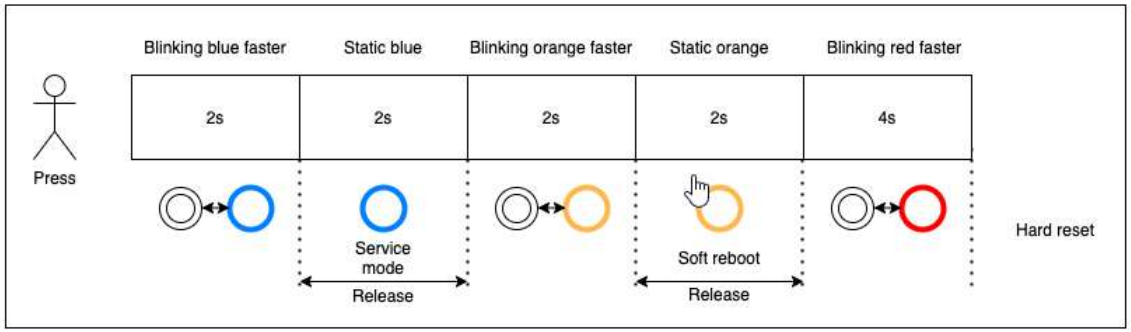
Touch button functions

Resetting or Testing the sensor

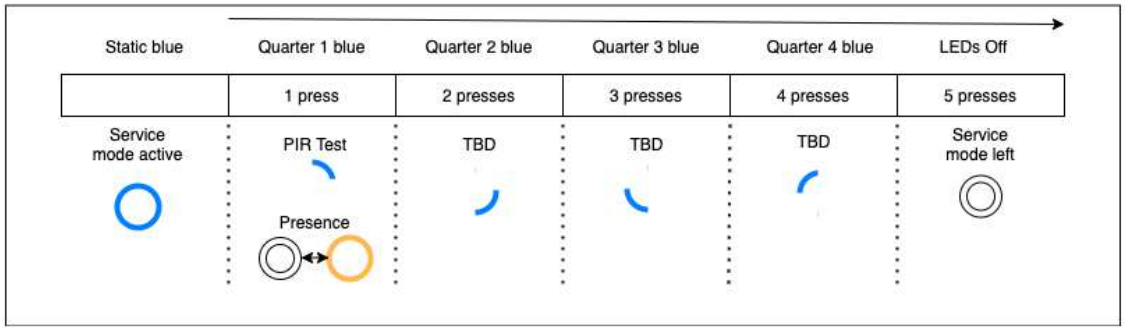
- Hard reset
  - Push button for >12 sec
  - Note: Is required to bring device back from Bluetooth mesh to Bluetooth (1:1)

- PIR testing
  - Push button 2..4 sec (=Service mode)
  - Push again to be in “menu 1” (=PIR Test)
  - Note: PIR testing with sensitivity “high”

Reboot/Reset sequence



LED menu details



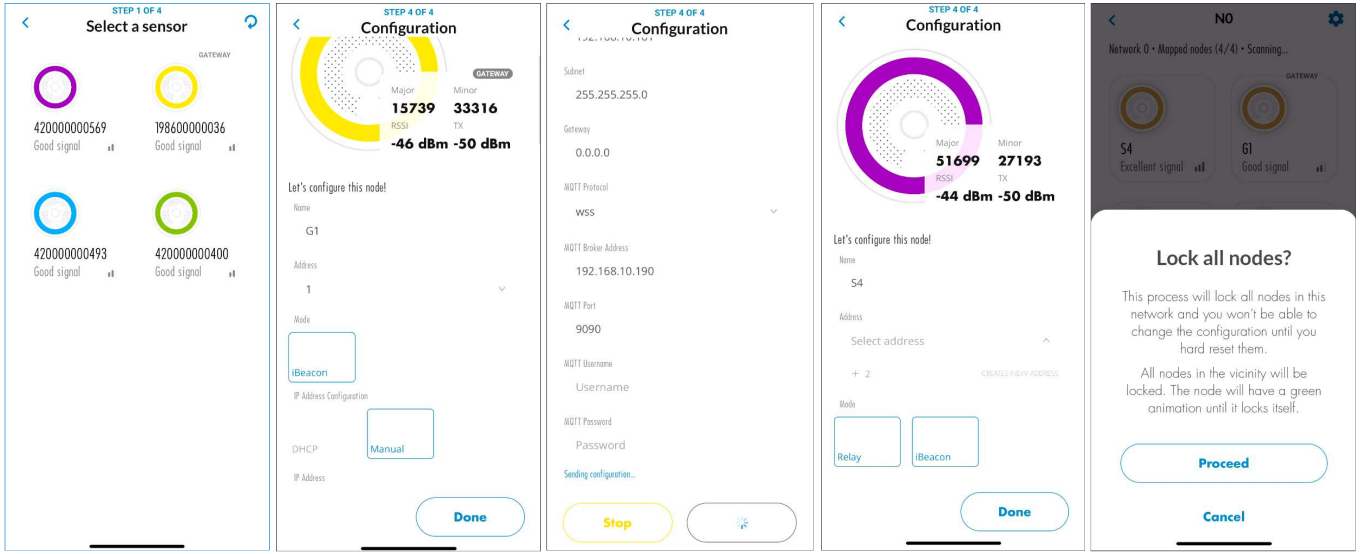
Engineering – Step-by-Step

Engineering

viaSens Cx-App

Screenshots to the important parameters:

1. Select a sensor
2. Confirm
3. Verify correct sensor
4. Configure parameters
5. Lock nodes to Bluetooth mesh



Hints:

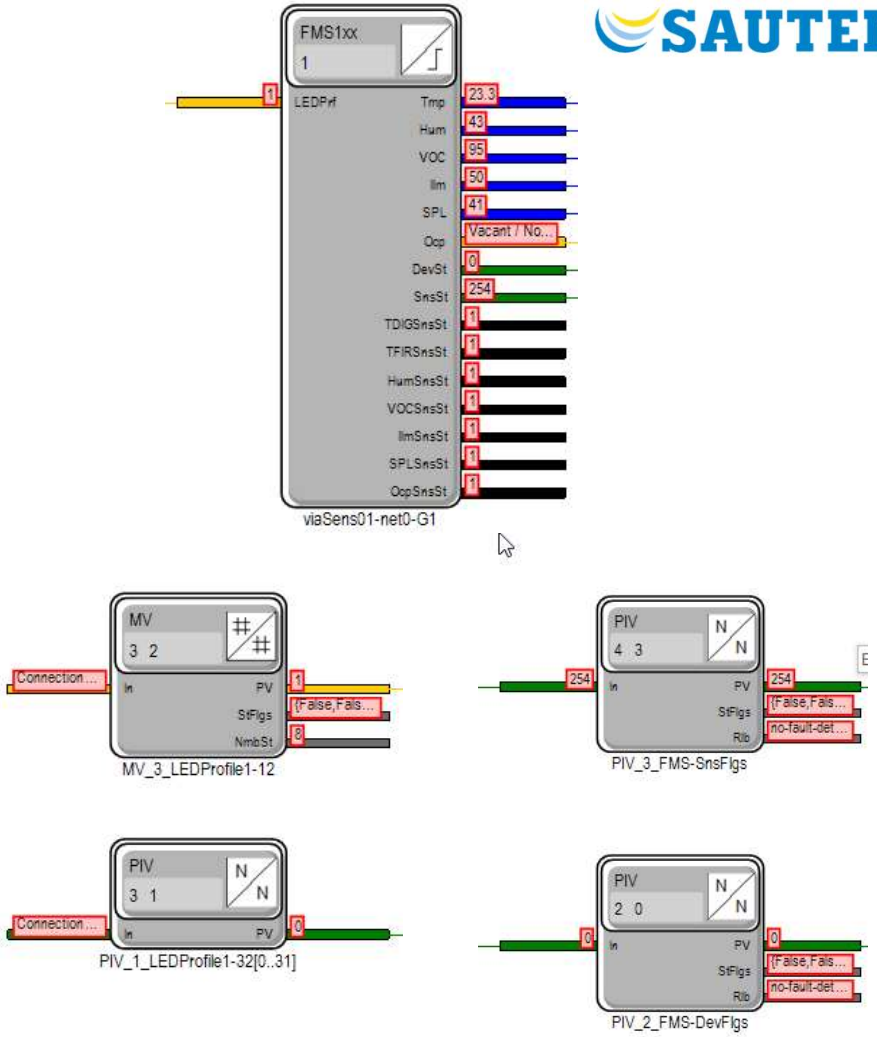
- Choose MQTT protocol «wss», by scrolling down in the app
- Use MQTT port 9090 (or as configured in CASE Sun)
- Do not (yet) use any «user» or «password» entries to be connected to ecos (V5.0)
- Bluetooth mesh function «Relay» can be set only during provisioning

Engineering – Step-by-Step

Engineering

CASE Suite 5.1

- Smart Sensor requires ecos504/505 firmware version 5.0.0 and CASE Engine 5.1 (CASE Sun 5.1)
- Easy integration with **"FMS1xx"** function block (with FI=23)
- Up to 16 FMS blocks are possible per ecos504/505



Hints:

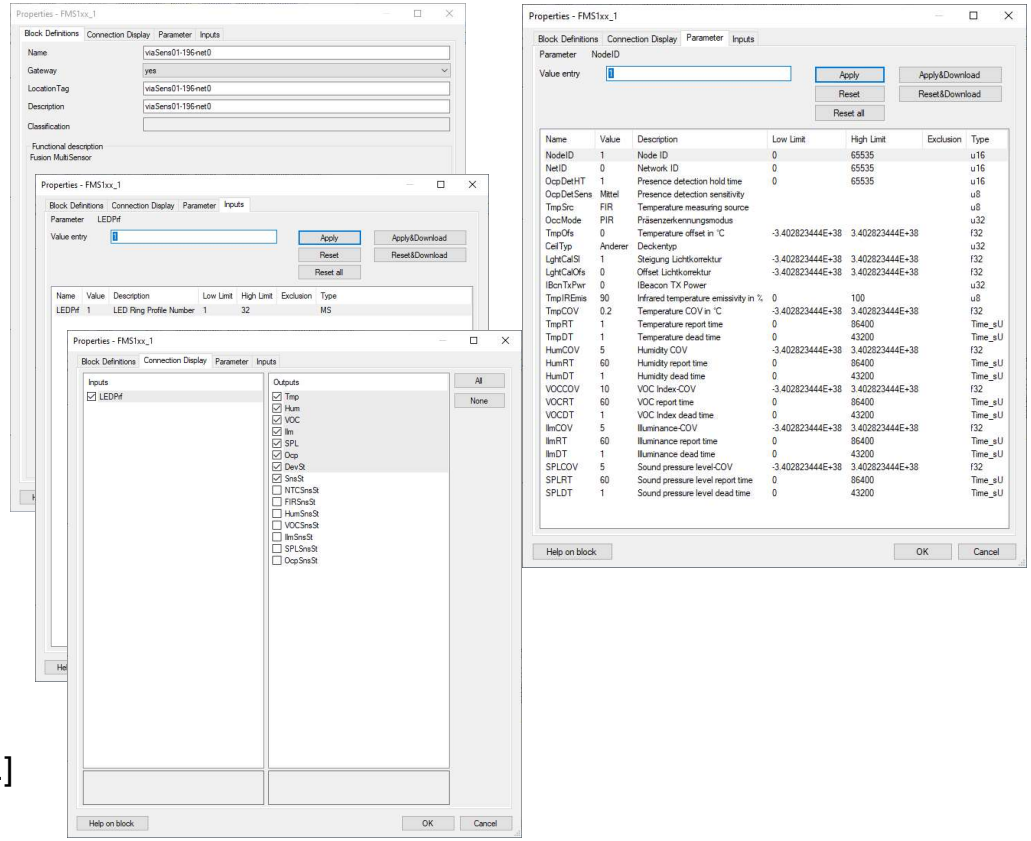
- Use beta versions only for labor testing, evaluation of sensor, teaching and for specific pilot projects
- Use CASE Suite 5.1 for projects with ecos504/505 and Smart Sensor; it is recommended to convert projects used with beta versions to release versions, when versions are available.

Engineering – Step-by-Step

Engineering

CASE Suite 5.1

- Important **properties**
- Bluetooth mesh network (NetID) and node addresses (NodeID)
- Parameters for different modes, for all 6 sensors
- Parameters for analog measurement values:
  - Change-of-value (COV)
  - Dead Time (DT: fastest update with COV changes) → e.g. 1s
  - Report Time (RT: resending value without COV) → e.g. 60s



Hint:

- Choose relaxed values to «control» mesh flooding, depending on the control applications this could be, e.g.:
  - COV:: TMP=0.5, HUM=5, VOC=25, LUX=50, SPL=5
  - DT:: TMP=(1..)5, HUM=10, VOC=10, LUX=(1..)5, SPL=10 [sec.]
  - RT:: 60 (for all) [sec.]

Engineering – Step-by-Step

Engineering

CASE Suite 5.1

- **Device status** and **sensor status** are outputs of the FMS function block.
  It can be used to observe the health of the MQTT communication and the Bluetooth nodes and validity of the sensor values.
- Note: device/sensor status is transmitted every 5 min. – Fault detection on ecos needs two cycles (→ 10 min.)
- DevSt (Byte-Integer) :=
  - 0 → device is alive and working (payload is OK and timely, presence topic = 1)
  - 1 → network communication error (presence topic = 0)
  - 2 → node communication error (packet not received on time)
- SnsSt (Byte-Integer) :=
  - bit7 - temperature NTC
  - bit6 - temperature FIR
  - bit5 - humidity
  - bit4 - VOC
  - bit3 - illuminance
  - bit2 - noise level
  - bit1 - occupancy
  - bit0 – (n/a)

Examples: SnsSt

126 (0111’1110) = all actual sensors “okay”, with FIR
110 (0110’1110) = most sensors “okay”, VOC improving
(adjusting first hour after power on device)

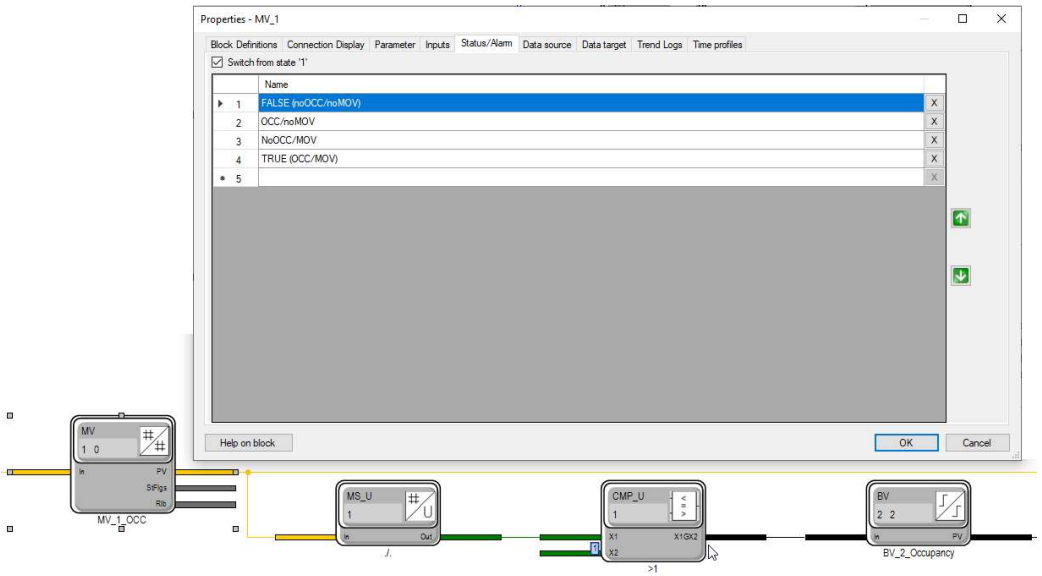
Engineering – Step-by-Step

Engineering

CASE Suite 5.1

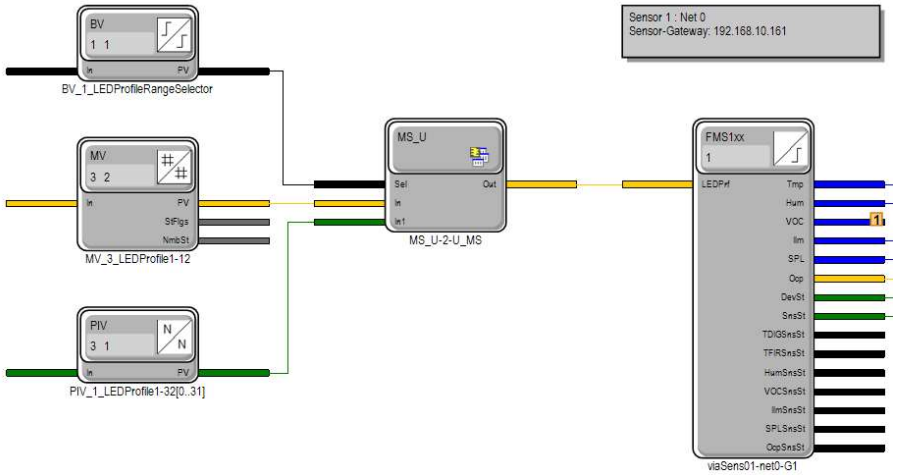
- «Occupancy» Ocp: Multi-state (similar to «DALI»)

  1: no occupancy / no movement (FALSE)
  2: occupancy / no movement
  3: no occupancy / movement
  4: occupancy / movement (TRUE)



- «LED Profile» LEDPrf:

  1..12: with Multi-state
  1..32: with PIV (conversion U_MS)

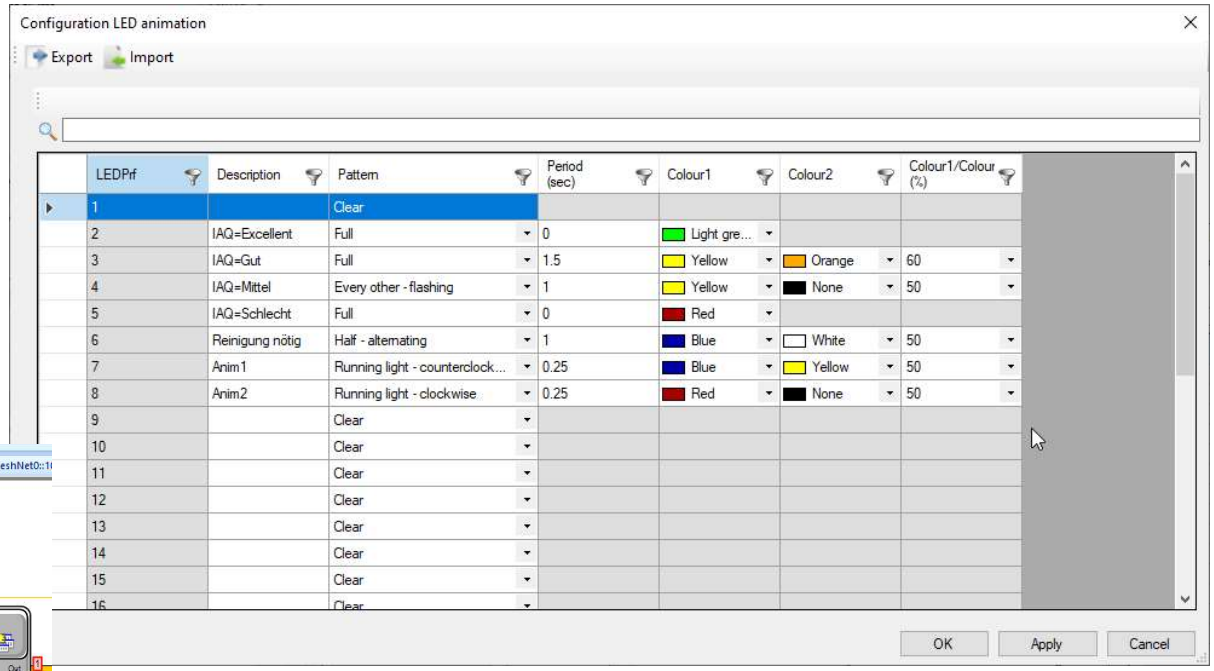


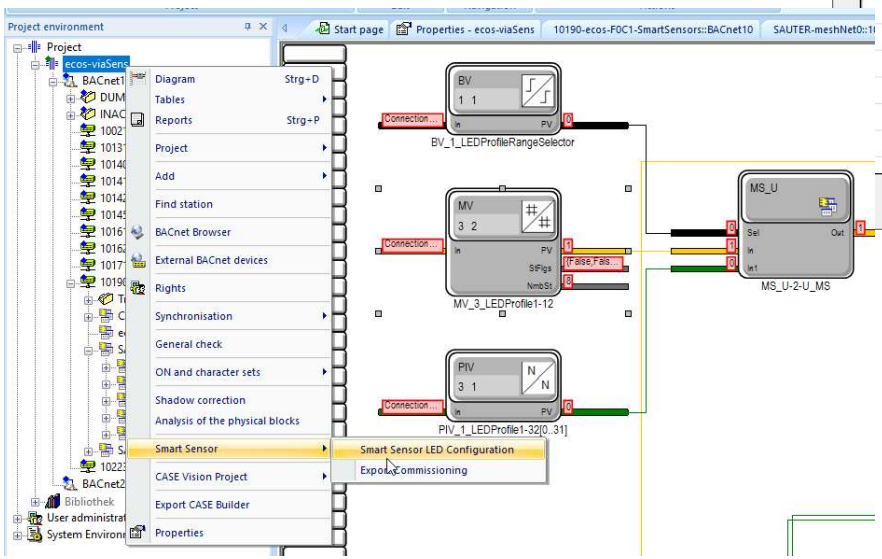
Engineering – Step-by-Step

Engineering

CASE Suite 5.1

- «LED Profile» LEDPrf:
- Configuration unique for the whole project





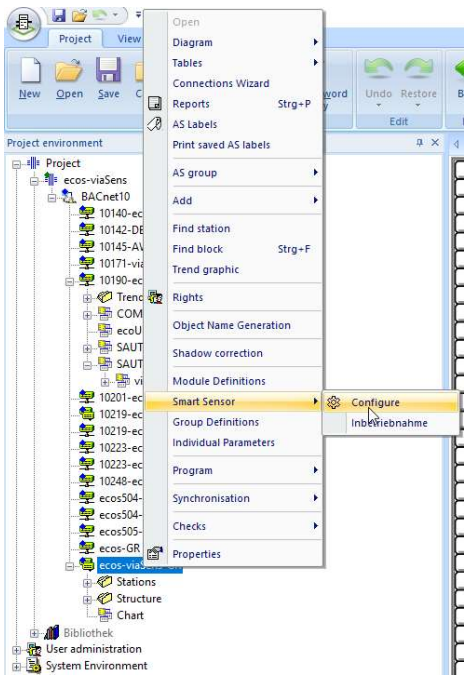
Engineering – Step-by-Step

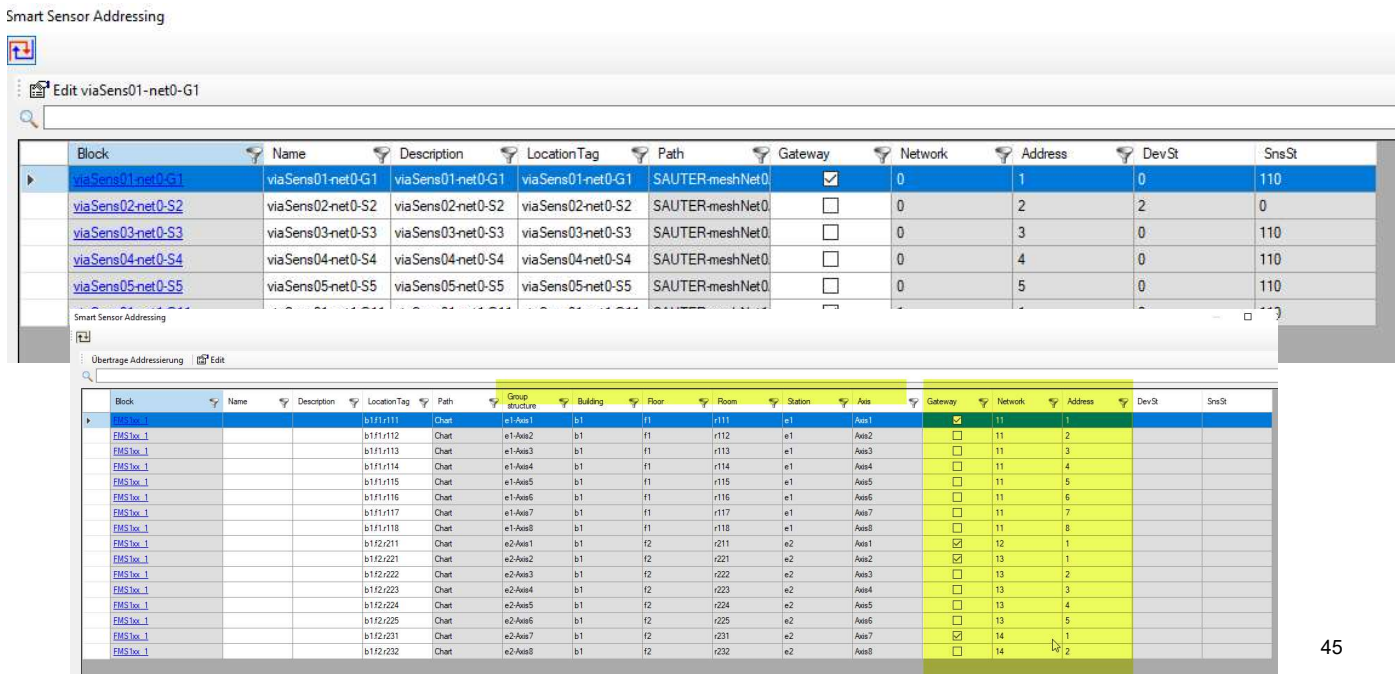
SAUTER

Engineering

CASE Suite 5.1

- FMS1xx Table view
- Configuration and overview of FMS addresses in Smart Sensor table (incl. Group structure)
- Online view supported in Smart Sensor Addressing table



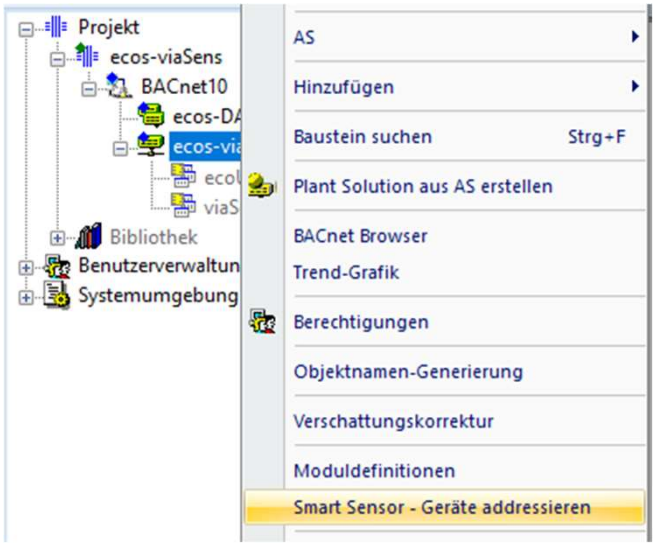


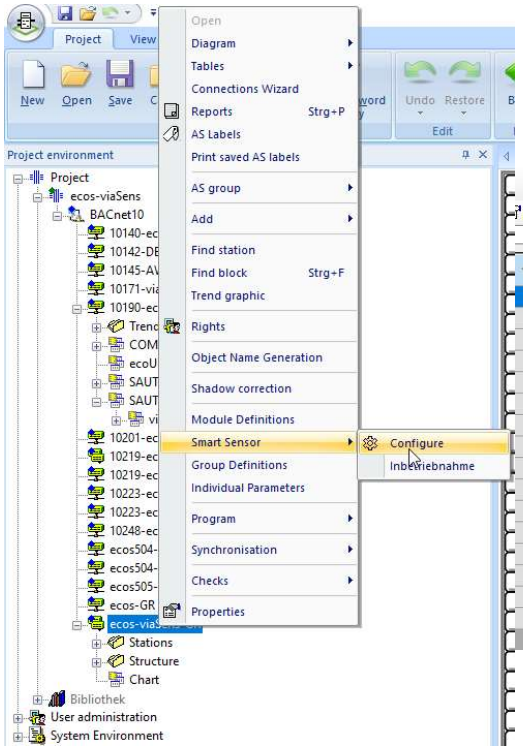
Engineering – Step-by-Step

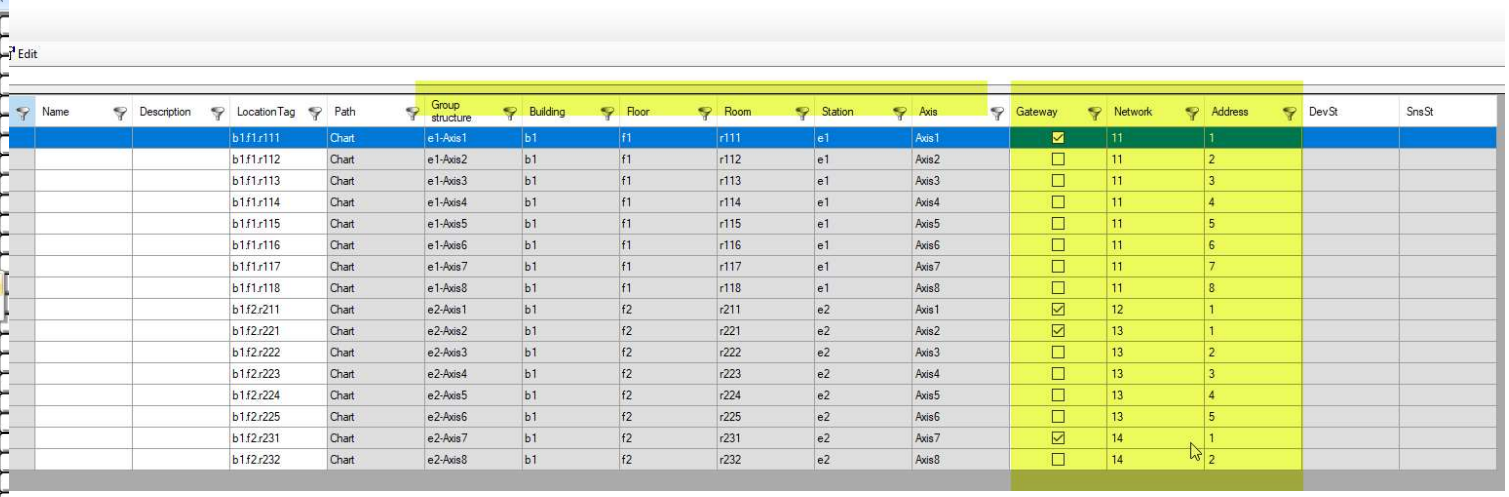
Engineering

CASE Suite 5.1

- FMS1xx Table view
- Sensor FMS block can be addressed for AS groups







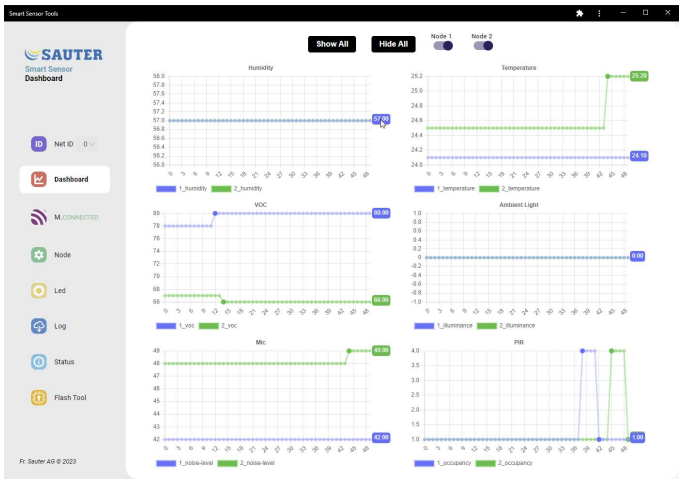
Name	Description	LocationTag	Path	Group structure	Building	Floor	Room	Station	Axis	Gateway	Network	Address	DevSt	SnsSt
		b1.f1.r111	Chart	e1-Axis1	b1	f1	r111	e1	Axis1	☑	11	1		
		b1.f1.r112	Chart	e1-Axis2	b1	f1	r112	e1	Axis2	☐	11	2		
		b1.f1.r113	Chart	e1-Axis3	b1	f1	r113	e1	Axis3	☐	11	3		
		b1.f1.r114	Chart	e1-Axis4	b1	f1	r114	e1	Axis4	☐	11	4		
		b1.f1.r115	Chart	e1-Axis5	b1	f1	r115	e1	Axis5	☐	11	5		
		b1.f1.r116	Chart	e1-Axis6	b1	f1	r116	e1	Axis6	☐	11	6		
		b1.f1.r117	Chart	e1-Axis7	b1	f1	r117	e1	Axis7	☐	11	7		
		b1.f1.r118	Chart	e1-Axis8	b1	f1	r118	e1	Axis8	☐	11	8		
		b1.f2.r211	Chart	e2-Axis1	b1	f2	r211	e2	Axis1	☑	12	1		
		b1.f2.r221	Chart	e2-Axis2	b1	f2	r221	e2	Axis2	☑	13	1		
		b1.f2.r222	Chart	e2-Axis3	b1	f2	r222	e2	Axis3	☐	13	2		
		b1.f2.r223	Chart	e2-Axis4	b1	f2	r223	e2	Axis4	☐	13	3		
		b1.f2.r224	Chart	e2-Axis5	b1	f2	r224	e2	Axis5	☐	13	4		
		b1.f2.r225	Chart	e2-Axis6	b1	f2	r225	e2	Axis6	☐	13	5		
		b1.f2.r231	Chart	e2-Axis7	b1	f2	r231	e2	Axis7	☑	14	1		
		b1.f2.r232	Chart	e2-Axis8	b1	f2	r232	e2	Axis8	☐	14	2		

Engineering

Engineering – Support, Troubleshooting

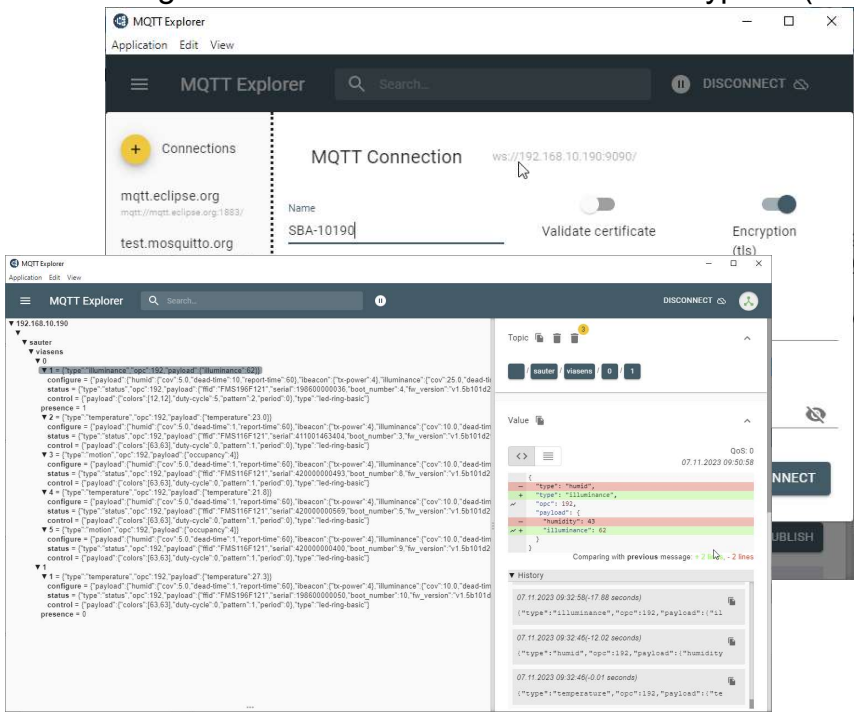
Smart Sensor Dashboard

- Internal Tool - MQTT Client as PWA
- Progressive Web Application (PWA)
- Supports **firmware update** (USB-UART)
- Supports MQTT subscription to MQTT broker for online sensor value view



Troubleshooting tools – any MQTT Client

- MQTT Client, e.g. MQTT Explorer
  e.g. with ws://192.168.10.190 with Encryption (TLS)



Engineering

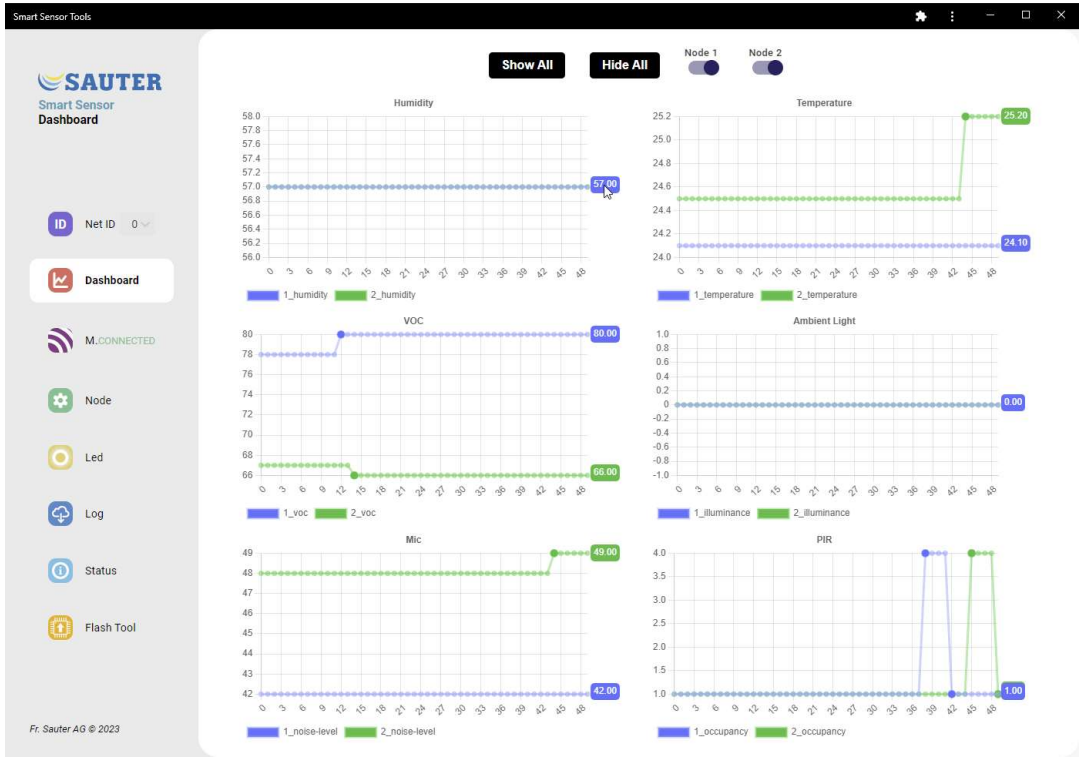
Engineering – Support, Testing

Smart Sensor Dashboard

- Internal Tool - MQTT Client as PWA
- Progressive Web Application (PWA)
- Supports **firmware update** through UART (FTDI cable required - TTL-232R-3V3)
- Supports MQTT subscription to MQTT broker for online sensor value view

- As of now: https://fms.iot.sauter-cloud.com/
- Not yet defined if it will be public

- **Next:** viaSens App supports WiFi FW Update

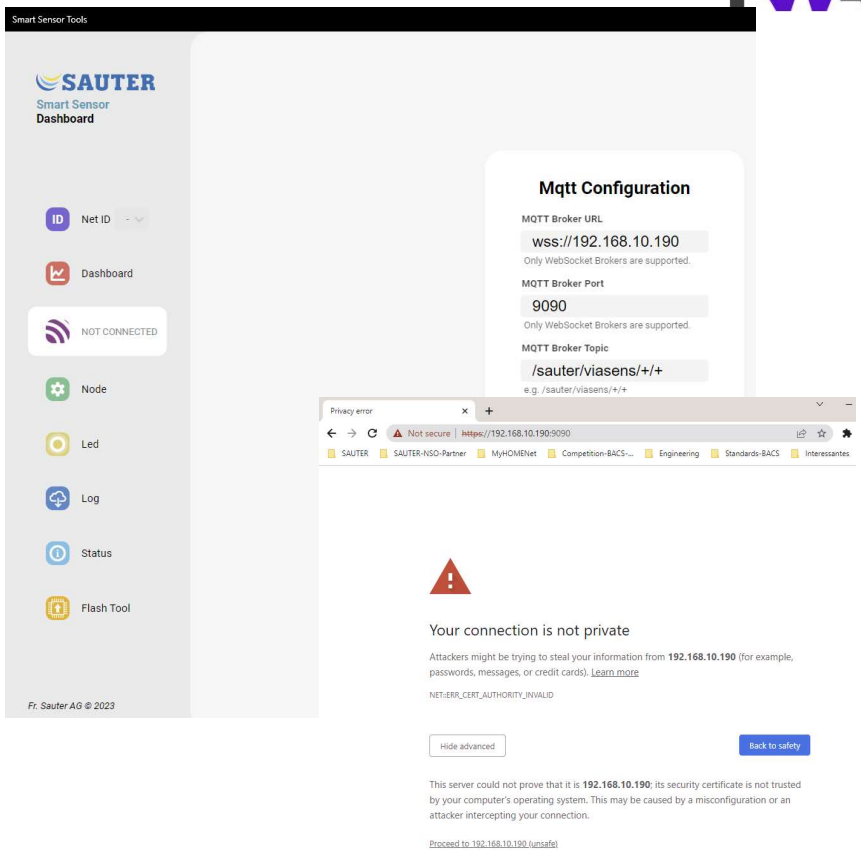


Engineering

Engineering – Support, Testing

Smart Sensor Tool

- Workaround «Security»
- Following steps are required:
    1. Enter «https://<ecos-IP:9090>» e.g. https://192.168.10.190:9090/
    2. Proceed to <IP> (unsafe)
       This accepts «unsecure» web certificate for the PWA App
    3. Call: https://fms.iot.sauter-cloud.com/
    4. Set IP (MQTT broker) from ecos

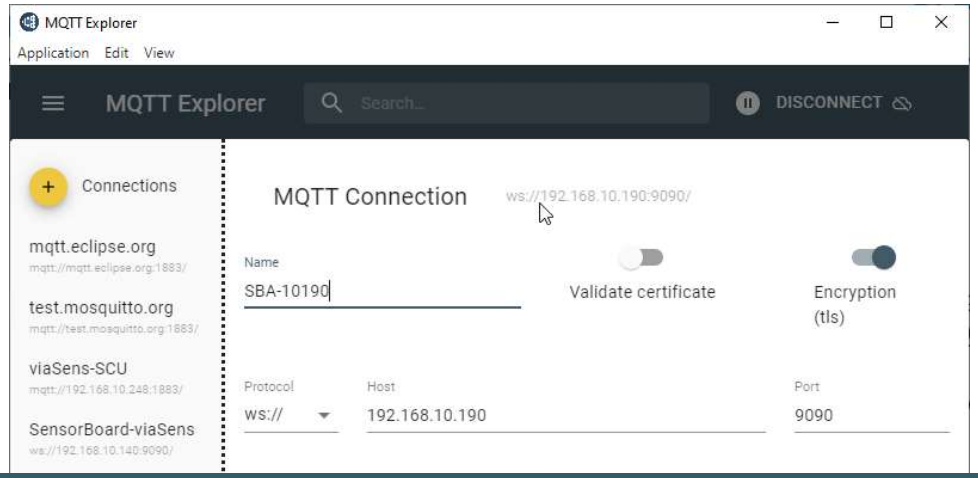


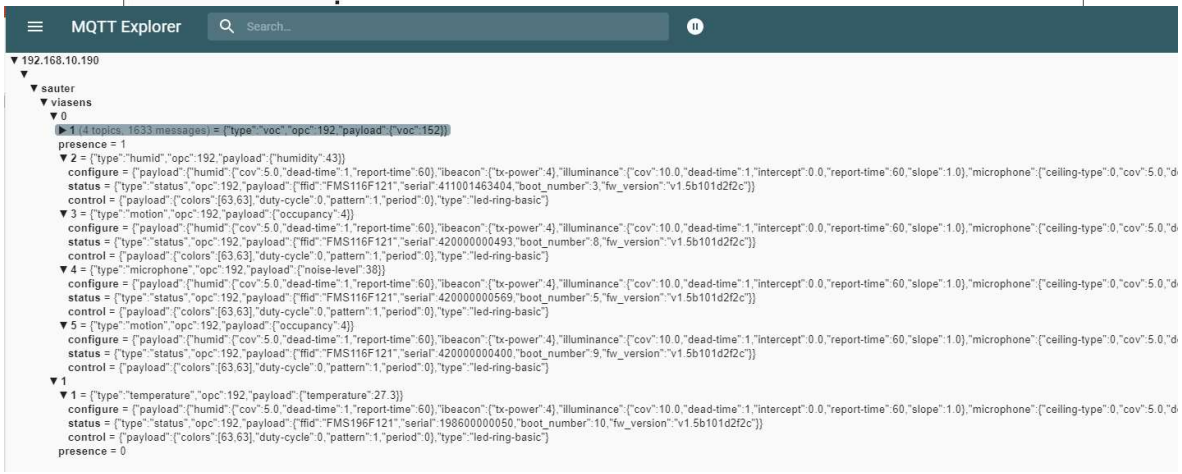
Engineering

Engineering – Support, Testing

Troubleshooting tools

- MQTT Client, e.g. MQTT Explorer ws://192.168.10.190 with Encryption (TLS)
- Topics are structured into
  - \sauter\viasens\...
  - meshNet ID
  - Node ID
- **Payloads** are transmitted in structured **topics**
  - latest changed value (see history)
  - «configure» payload (FMS Block)
  - «control» payload (LED command)
  - «status» payload (device information)





Engineering

First Projects / Pilot Projects

- For **testing, pilot or first projects** we need qualified feedback; please report following:
  - Pilot plant: (Name, Location, Customer)
  - Time window: (From...To)
  - Project manager: (PL of NVO/NL)
  - Technician: (Names of involved technicians)
  - Topology: Which, how many ecos504/505, smart sensors and other hardware will be used
    IMPORTANT: Floor layout with dimensions and wall construction, planed Bluetooth mesh topology, …
  - Application: Which applications/functions will be realized
    (constant light control with DALI, additionally publishing MQTT to the "cloud"...).
- Once, you've provided those information, we help and advise for proper design, recommendation for parameters…
- Use following versions: CASE Suite 5.1 – Release; ecos504/505 FW V5.0.0 – Release; viaSens116/196 FW V1.6 – Release

Hint (for technicians):

- Once, you are up to install the sensor, please ask about the latest firmware ("shipping" V1.2 → V1.6 is now released)
- viaSens App (actual version 1.0.0 commit "f87b576", with OTA WiFi Update support for V1.2 and higher)
  - will be soon available on app stores

Engineering

Known Issues – Not yet available

Known Issues for **pilot projects, testing projects** :

- PIR sensor does not fulfill FOV of 120° → fixed with viaSens-FW V1.4 or higher **(V1.6 is released)**
- Bluetooth mesh Relay function is not yet optimized for up to 16 (4x4 topo) sensors → next version (>V1.6, April 24)

Good to know:

- External PIR testing as of IEC 63180:2020 was successful
- Tested Bluetooth mesh topologies: 1G+3S, 1G+9S(w/o fast LED), 1G+5S
- Bluetooth mesh communication tested: up to 10..12 meters even through 2 glass doors, up to 6...8 meters even through 1 concrete wall (30 cm)

Not yet tested, approved:

- Full mesh network topology with up to 16 sensors (15 nodes + 1 gateway with up to 7 hops)
- Installation height of up to 5 m (working up to 3m)

Not yet implemented

- MBS or other iBeacon Tools might require fully configurable iBeacon ID (UUID/Major/Minor) → (>V1.6, April 24)
  [automatic generated, fixed: UUID = Fr.SauterAG ¦ Major + Minor = Serial number]
- NFC Read/Write not supported with Cx-App viaSens

Engineering – Firmware Update

Firmware Update on Sensor

There are two possible ways to update the sensors.

Option 1: UART Update via FDTI cable

This option is for sensors not yet provisioned, out from the box or initialized with a hardware reset (touch button >15s)

Option 2: WiFi Update via commissioning app “viaSens” and smartphone’s WLAN-hotspot function

This option is for sensors already provisioned and working in the field

Notes:

- Only latest firmware is provided, for normal use cases and are recommended to be used
- No downgrade is supported via WiFi Update
- To “downgrade” a sensor you need to use Option 1

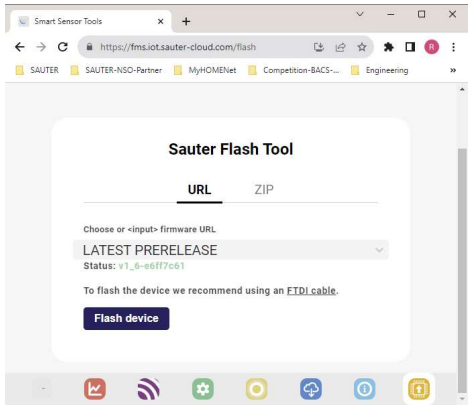
Engineering – Firmware Update

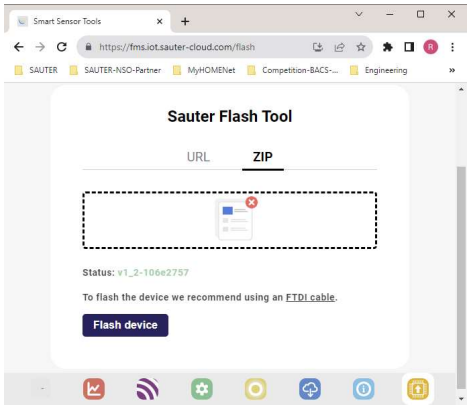
Firmware Update on Sensor – UART (1)

Option 1: UART Update (1-by-1 with “USB-FTDI cable”)

Prerequisite: Sensor is not yet provisioned, not in Bluetooth mesh network

- Get a FTDI cable (https://ftdichip.com/products/ttl-232r-3v3/)
- Get Chrome browser’s PWA plug-in “SmartSensor Dashboard” (https://fms.iot.sauter-cloud.com/), go to “Flash Tool”
- Do not power sensor with 24VDC (!), but connect FTDI cable to sensor (“black” wire to Service pin ▲, at the back of the sensor)
- Use “LATEST RELEASE” (or “LATEST PRERELEASE”) via “URL” and click “Flash device”
  (optionally via “ZIP” menu a specific version, provided as .zip file can be loaded to the flash tool – Use cases: a) for downgrading to an older version, b) for testing beta versions, not yet available on dashboard URL/app)



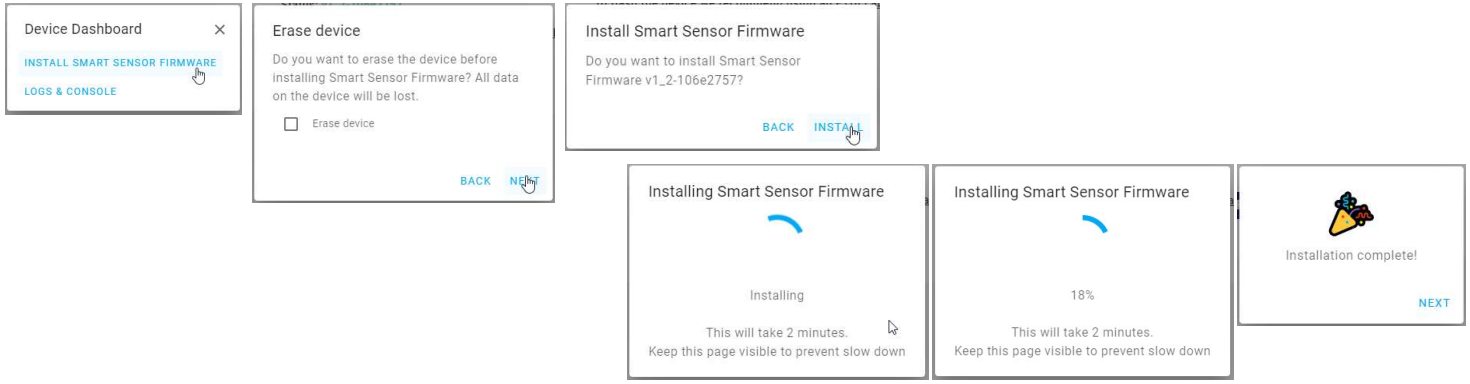


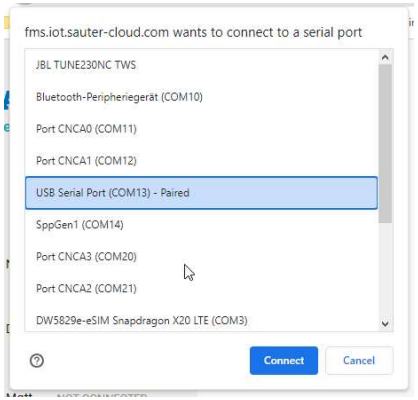
Engineering – Firmware Update

Firmware Update on Sensor – UART (2)

Option 1: UART Update (1-by-1 with “USB-FTDI cable”)

- Follow the instruction, “Connect” USB Serial Port (check on “Paired”),
- Follow instruction step-by-step (do not select “Erase device”)…, last about 2 minutes.





Note: If update does not start within couple of seconds, start over and plug-in UART cable to the sensor again

Engineering – Firmware Update

Firmware Update on Sensor – WiFi (1)

Option 2: WiFi Update (1-to-many with smart phone “hotspot”)

Prerequisites:

- Sensor is provisioned, in Bluetooth mesh network, e.g. already running in the field
- Smartphone needs to support WiFi-Hotspot “to be a temporary WiFi access point” (usually this requires a SIM card in your smartphone)
- **VERY IMPORTANT:**
  Hotspot needs to have following **name:** sauteriot, and **password:** sauteriot

Notes:

- In case of iPhone you need to change (temporarily) the iPhone device name to “sauteriot”
- Make sure only one technician around WiFi radio distance has enable this “hotspot”

Engineering – Firmware Update

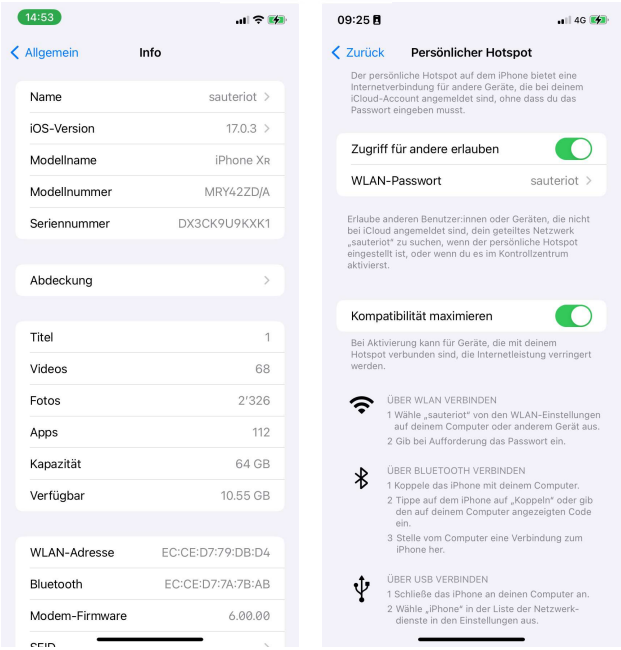
Firmware Update on Sensor – WiFi (2)

Option 2: WiFi Update (1-to-many with smart phone “hotspot”)

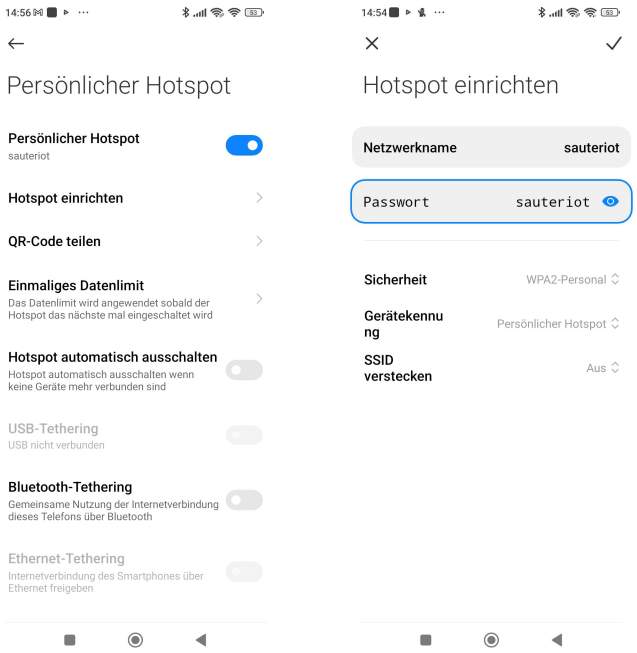
Prerequisites: **VERY IMPORTANT: Hotspot** needs to have following **name:** sauteriot, and **password:** sauteriot

Example screenshots:

iPhone



android



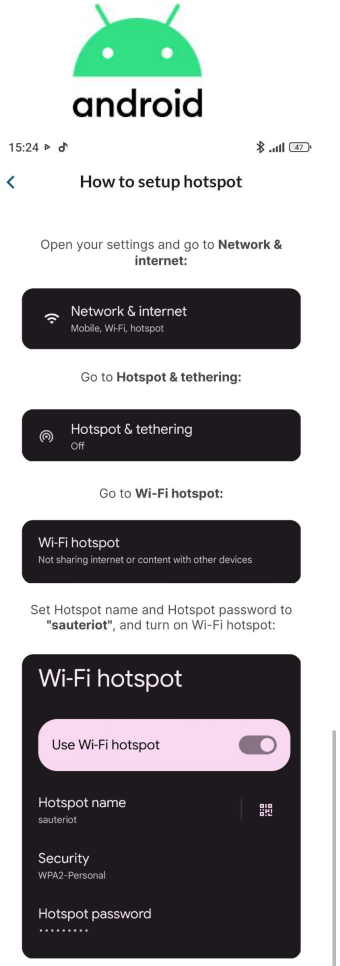
Engineering – Firmware Update

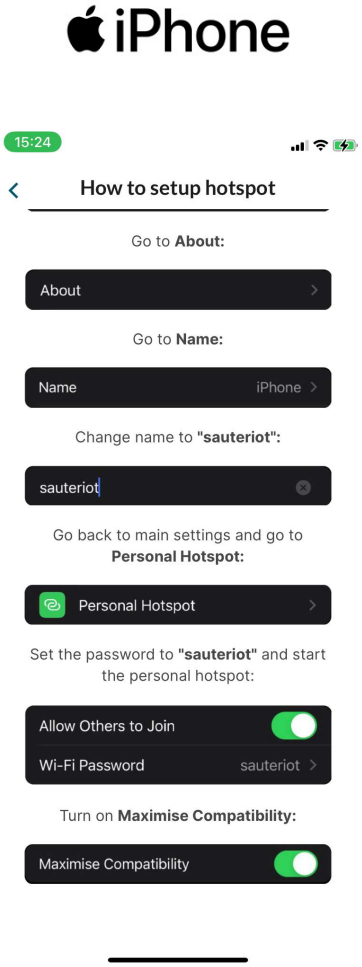
Firmware Update on Sensor – WiFi (3)

Option 2: WiFi Update (1-to-many with smart phone “hotspot”)

Prerequisites: **VERY IMPORTANT: Hotspot** needs to have following **name:** sauteriot, and **password:** sauteriot

Smartphone hints:





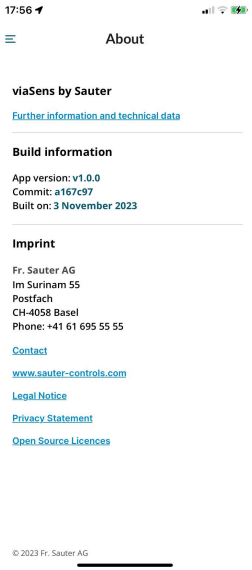
Engineering – Firmware Update

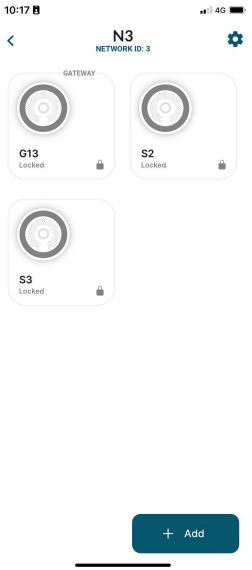
Firmware Update on Sensor – WiFi (4)

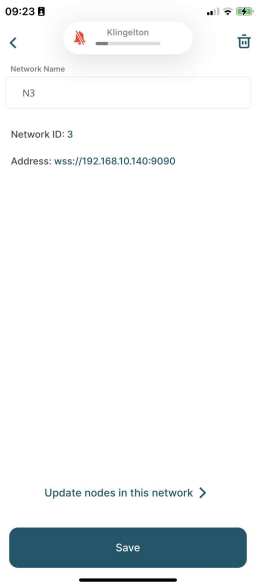
Option 2: WiFi Update (1-to-many with smart phone “hotspot”)

Following steps can be taken to update via WiFi:

- Get latest Cx-App “viaSens” from the app store
- Choose Bluetooth mesh network, in the project, where sensors needs to be updated (Note: each mesh network (=sensors per gateway sensor) needs to be initiated for an update individually)
- Click on “Update nodes in this network >”







Engineering – Firmware Update

Firmware Update on Sensor – WiFi (5)

Option 2: WiFi Update (1-to-many with smart phone “hotspot”)

Following steps can be taken to update via WiFi:

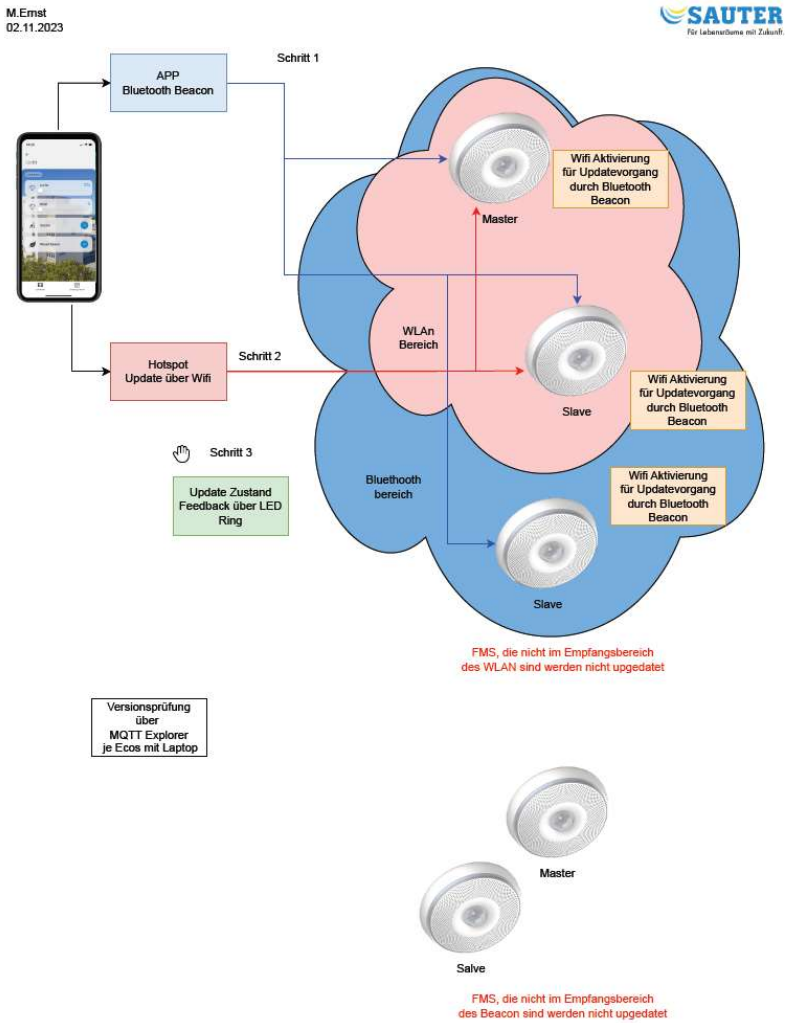
- Get latest firmware from “Cloud” (needs access to internet) with “Download latest”, and continue with “Cancel”
  Note: Delete cached firmware before downloading
- Choose version you want to upgrade to (v1.6)
- Enable Hotspot (make sure it is still active)
- **Start update process**
  - This triggers with a beacon signal (Bluetooth LE) all the sensor in this net to enable WiFi function on the sensor
  - Sensor connect with the hotspot of smartphone (WiFi) and pulls down the firmware (→ flashing sensors)
  - Sensors reboots automatically after update process (→ Sauter colors during reboot of sensor)
- **“Stop update” manually** after couple of minutes

Note: If sensor do not flash, they where not in BLE trigger range or do not connect to WiFi hotspot, or have already appropriate, latest version → Retry, Redo, check version

Engineering – Firmware Update

Firmware Update on Sensor – WiFi (6)

Graphical explanation by ERM@SCU. Thanks.

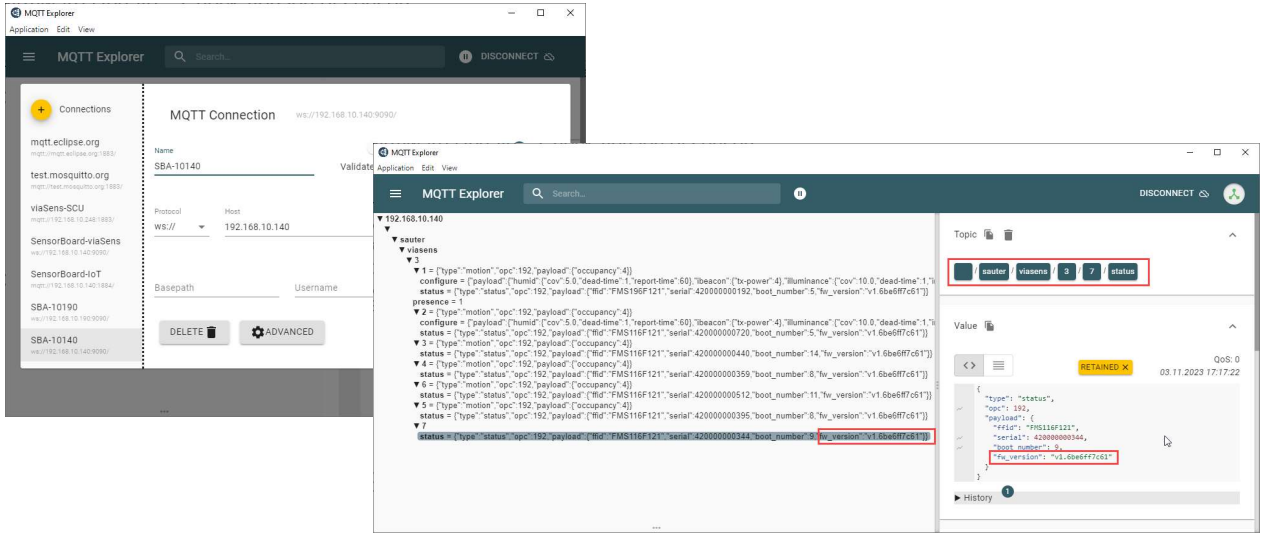


Engineering – Firmware Update

Firmware Update – Check Version of sensors

The only way to check installed firmware version on smart sensor, it via MQTT client, subscribing to the “status” topic.

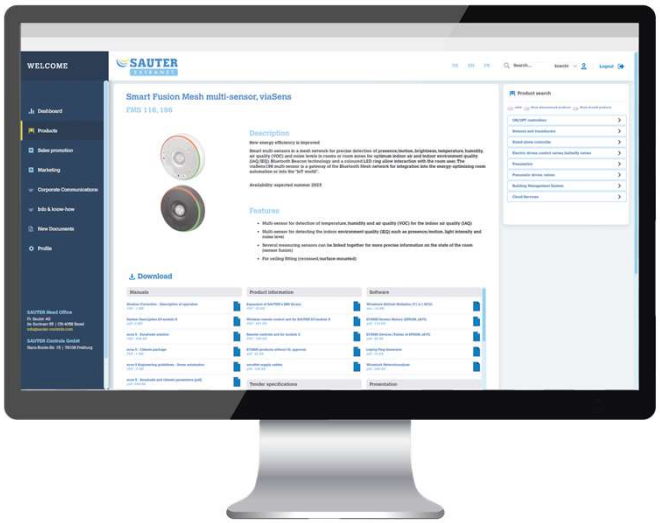
Option 1: MQTT Explorer (Open source MQTT Client connecting to ecos “Local Broker”)

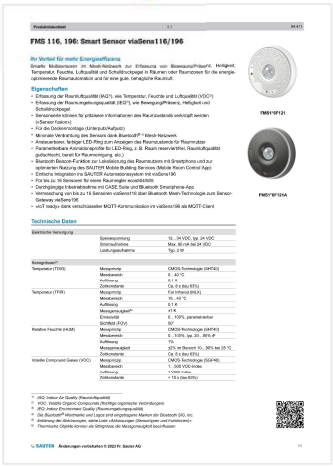


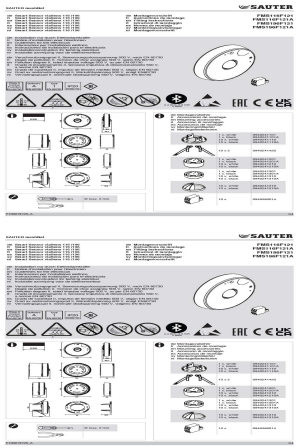
Option 2: SmartSensor Dashboard (SAUTER Tool – browser PWA plug-in – as MQTT client)

Marketing Mix 1/2

Technical Documentation







- Product Data Sheet
- Installation Sheet
- Tender Text
- Product Information
- Price Information
  (only shared by email)
- Manual for engineering and commissioning (incl. App)
  (planed)

Marketing Mix 2/2

Promotion

- Sales Presentation
- Flyer
- Landing Page (www.sautersmartsensor.com)
- Product Video
- Advert, Roll-Up Banner, Web Banner
- Media Release
- FACTS Article (published 2022)
- Sales Demo Kit YXE196F001 (availability planed for Nov ’23)

- www.sauter-digital.com as digital SAUTER booth (will be updated as EN version)

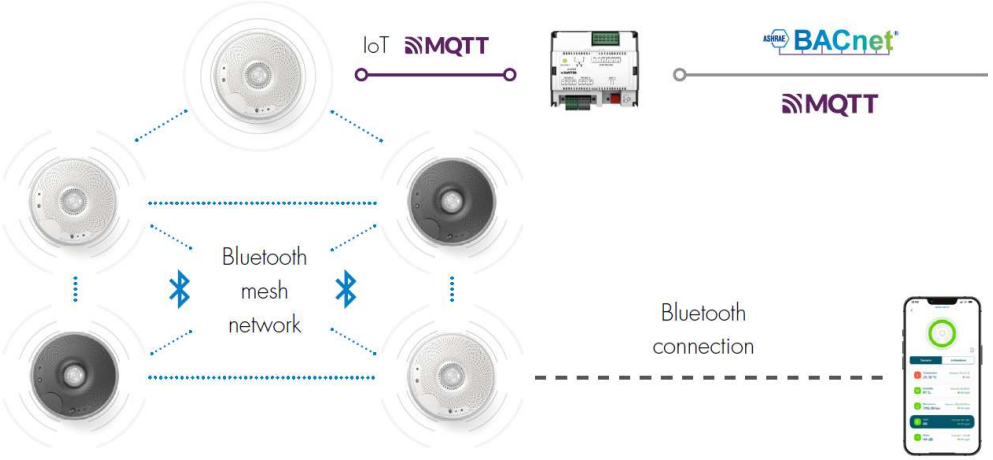
SAUTER Smart Sensor viaSens

Good to Know

Key Facts

- Multi-sensor for
  - temperature, humidity, air quality (VOC)
  - Presence/motion, brightness, sound pressure level
- Bluetooth mesh communication
- iBeacon localization
- Colored LED ring for room status indication
- IoT-Ready (MQTT)
- Provisioning and configuration via smartphone app (BLE, NFC)
- Easy system integration to SAUTER ecos with CASE Suite

System Overview



SAUTER Smart Sensor viaSens

«USP» - Benefit for your customer

The features	→ Your benefit
Multi-sensor	• Sensors as the basis for room automation and digital services • Reduction of devices, reduces commissioning effort • No room units necessary thanks to MRC app via MBS • For "open space" office with "moving wall" of ecos, increases control quality for room climate
LED ring	• Interaction with room users • Room state profiles for different users
Wireless	• Easier commissioning • Less cabling effort
Bluetooth + Beacon	• Use of smartphone app for commissioning • Worldwide frequency band • Implementation of beacon technology for localisation
«IoT Ready» with MQTT	• Integrated in CASE Suite “tool chain”, optimized engineering • Fits SAUTER room automation ecos504/505 • Future potential for „Automation-in-the-Cloud“

SAUTER Smart Sensor viaSens

Outlook

Smart Sensor viaSens with CO2 (FMS1x7)

Smart Sensor with CO_2: viaSens117/197 (FMS117, FMS197)

- Smart Sensor with integrated CO_2 meas. element (SCD40)
- FW V1+: iBeacon configurable, stability, Relay (4x4)

Room air quality (CO_2)	
Range	400…2000 ppm
Accuracy	50 ppm (± 5% MV ppm)
Response time (T63%)	60 s

- Price: not yet defined (is competitive)

Roadmap 2024

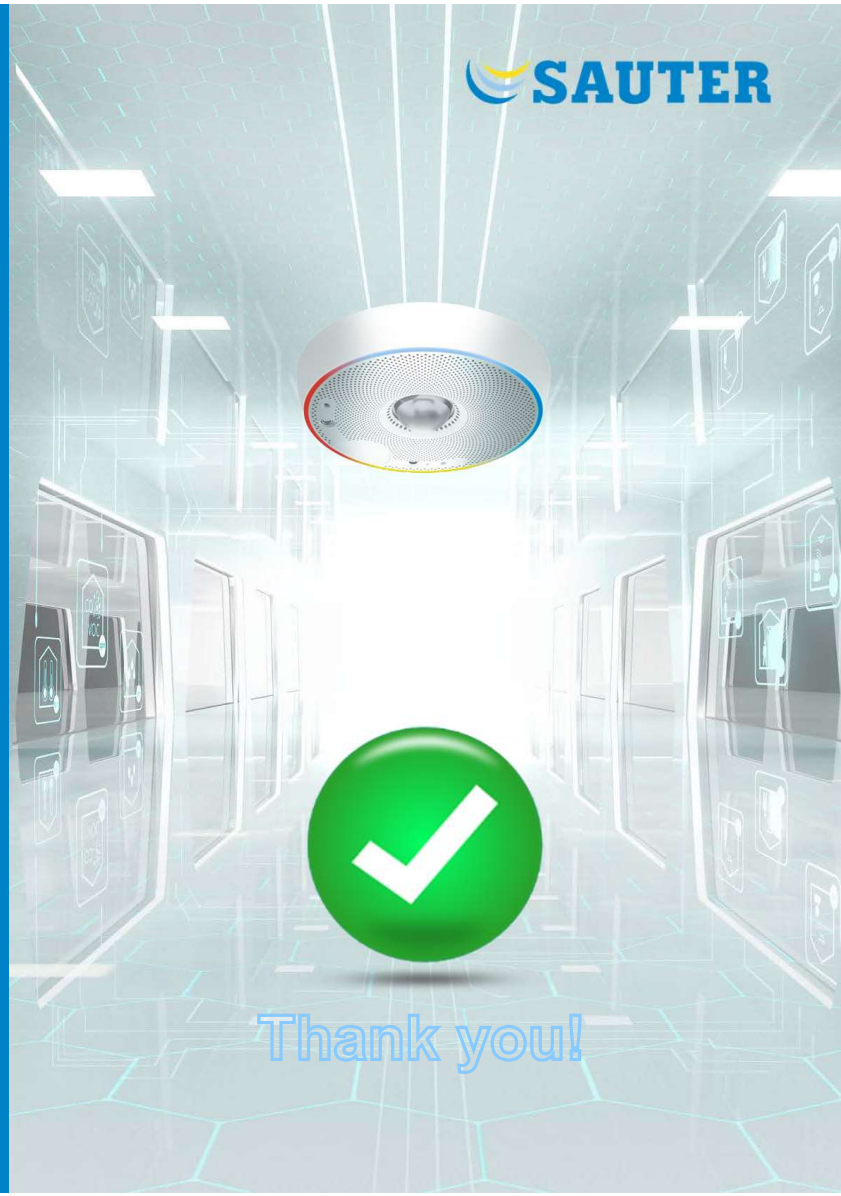
- Q1 / 2024 – first samples for extending sensor firmware
- Q2 / 2024 – first pilot series for internal testing (QA/QS)
- Q3 / 2024 – from summer, pilot plants, first projects
- Sept./Oct. 2024 – Series production release
- November 2024 – Devices ex stock

→ Pilot plants / first projects can be equipped with appropriate pilot devices from summer '24 if required

Smart Sensor viaSens

"SAUTER's sensor, Sith master of might,
LED ring glows, like a lightsaber at night.
Bluetooth Mesh weaves, room status clear,
IoT-ready, viaSens, the space-monitoring seer.“

[As "Darth Vader" aka ChatGPT would say.]



Q&A

Questions and Answers

Thank you!

Contact

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