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MICROSENS


MICROSENS
Bridging the gap between industrial automation and smart building with innovative IOT solutions

About Microsens

Microsens GmbH & Co. KG is a medium-sized technology company

Founded in 1993
- European R&D centers in Hamm, Frankfurt and Wroclaw;
- German production line (Hamm);
- More than 1.000.000 active ports installed

Our solutions:
- IP infrastructure solutions
From optical transport, Industrial networks, FTTO, to smart building.

Rooted in Germany, international footprints:
- Represented in 3 countries;
- Sales activities in more than 50 countries

120
Employees

Specialized in the fields of
- High reliable industry network
- Fiber-To-The-Office (FTTO) solution
- IP-based Digital Buildings

Medium-sized structures
Short decision lines
- Rapid response time
Global partner structures

Made in Germany

ZECH GROUP

Part of the Zech Group

MICROSENS

PRODUCT LINES

MICROSENS

Network Components | **Smart Building Solutions**

Management Software

Network Management Platform (NMP) | **Smart Building Manager**

Enterprise Networks

- Fiber to the Office (FTTO)
- Basic Fiber Optic Products (BFOP)

Industrial Solutions

- For harsh environments
- Industrial reliability

Optical Transport

- Wide area location interconnection
- Data center interconnection

Smart Lighting & Smart Automation

MICROSENS

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Network Components | **Smart Building Solutions**

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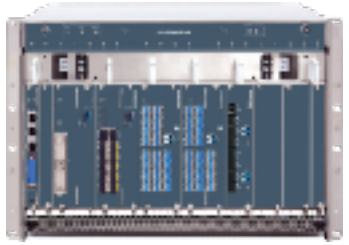

- Wide area location interconnection
- Data center interconnection

Smart Lighting & Smart Automation

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Usage areas

- Energy suppliers
- Conventional power plants
- Wind power plants
- Railways
- Production / Automation
- Monitoring
- Intelligent traffic control systems
- Mines



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General requirements

- Difficult conditions
- High level of electromagnetic interference
- Difficult access
- Long distances between locations
- Integration of various services
- Redundancy, performance, reliability
- Low costs and easy modernization
- Advanced management

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Hardware requirements

- No fans, which greatly improves reliability
- Wide operating temperature range
- Fiber optic ensuring reliable transmission
- No moving parts
- Power redundancy (AC and DC)
- Reinforced metal housing
- Protection against electrical shock and overvoltage
- Mounting in a rack cabinet or on a DIN rail

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Standards defined

- **IEC 61850:** standard for communications in energy substation environments
- **IEC 61850-3:** specifies the level of immunity to environmental and electromagnetic interference for networks and energy systems
- **IEEE 1613:** Provides operating environment and test requirements for devices

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Profiline G6 family

Profi Line Rack
16x 10/100/1000B-T + PSE (PoE+)
1x 10/100/1000B-T + PD (PoE+)
8x SFP Dual Media (Dual Ring)

Profi Line Modular
+ 6/12 Ports Expansion Module
8/12/16x 10/100/1000B-T + PSE (PoE+)
1x 10/100/1000B-T + PD (PoE+)
4/6/8x SFP Dual Media (Dual Ring)

Profi Line+
4x 10/100/1000B-T + PSE (PoE+)
1x 10/100/1000B-T + PD (PoE+)
2x SFP Dual Media (Ring)
No Module Expansion Port

Micro Switch G6 Ruggedized
5(4)x 10/100/1000B-T + PSE (PoE+)
1(2)x SFP (Ring)

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Profi Line Rack

- Highest Gigabit performance with smallest dimensions and fan-less cooling
- Industrial design for maximum reliability in harsh environments
- 25 Gigabit (8 of them with fiber) ports on only 1U in 19” racks
- Optimized architecture for increased performance with parallel ring topology
- Integrated PoE+ PSE provides up to 16x 30W power to Ethernet network devices (max. 480W PSE Budget (MS400895MX))
- Range of ambient operation temperature from -40 up to +85°C
- Exchangeable SD-card for firmware and configuration
- Flexible firmware architecture for simple software upgrades

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Profi Line Modular

- Highest Gigabit performance with smallest dimensions
- Industrial design for maximum reliability in harsh environments
- Modular expandable up to 25 ports (including 8 fiber ports)
- Optimized architecture for increased performance with ring topology
- PoE+ (max. 30W) integrated, (optional variant with max. 60W)
- Range of ambient operation temperature from -40 up to +75°C
- Exchangeable SD-card for firmware and configuration included
- Flexible firmware architecture for simple software upgrades
- Redundant power inputs

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Ruggedized micro Switch

- Full gigabit performance with energy-efficient Ethernet
- Compact design
- 5 GbE ports , up to two SFP ports
- Power over Ethernet+ (802.3at)
- Exchangeable SD-card for firmware and configuration included
- Fanless design
- Extended temperature range from -20 up to +65°C
- Redundant power inputs
- Optimized cost and size

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Ruggedized micro Switch

IP67 mast box with Ruggedized Micro-Switch ready for use (Image: MS71 1030-7308.T48)

Mounting in Mast

Use of the mast hook

Outdoor mounting on mast

IP67 mast box closed with additional PG13 gland

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Profiline G6 family - new 10G MACsec unit

MACsec (IEEE 802.1AE)
GCM-AES encrypted 10G LAN communication

10G uplinks (IEEE 802.3ae)
2 x 1/10G uplink ports with SFP+

Network ring redundancy
Feature set for fail-safe redundancy topologies

IT security
Feature set for high level of IT security

Extended operating temperature range
Ambient temperature range -40°..+75°C

Industrial fanless design
Easy to maintain, no noise emission for use in the workstation area

MICROSENS NMP integrated*
Integrated with MICROSENS NMP software for clear administration and easy group configurations

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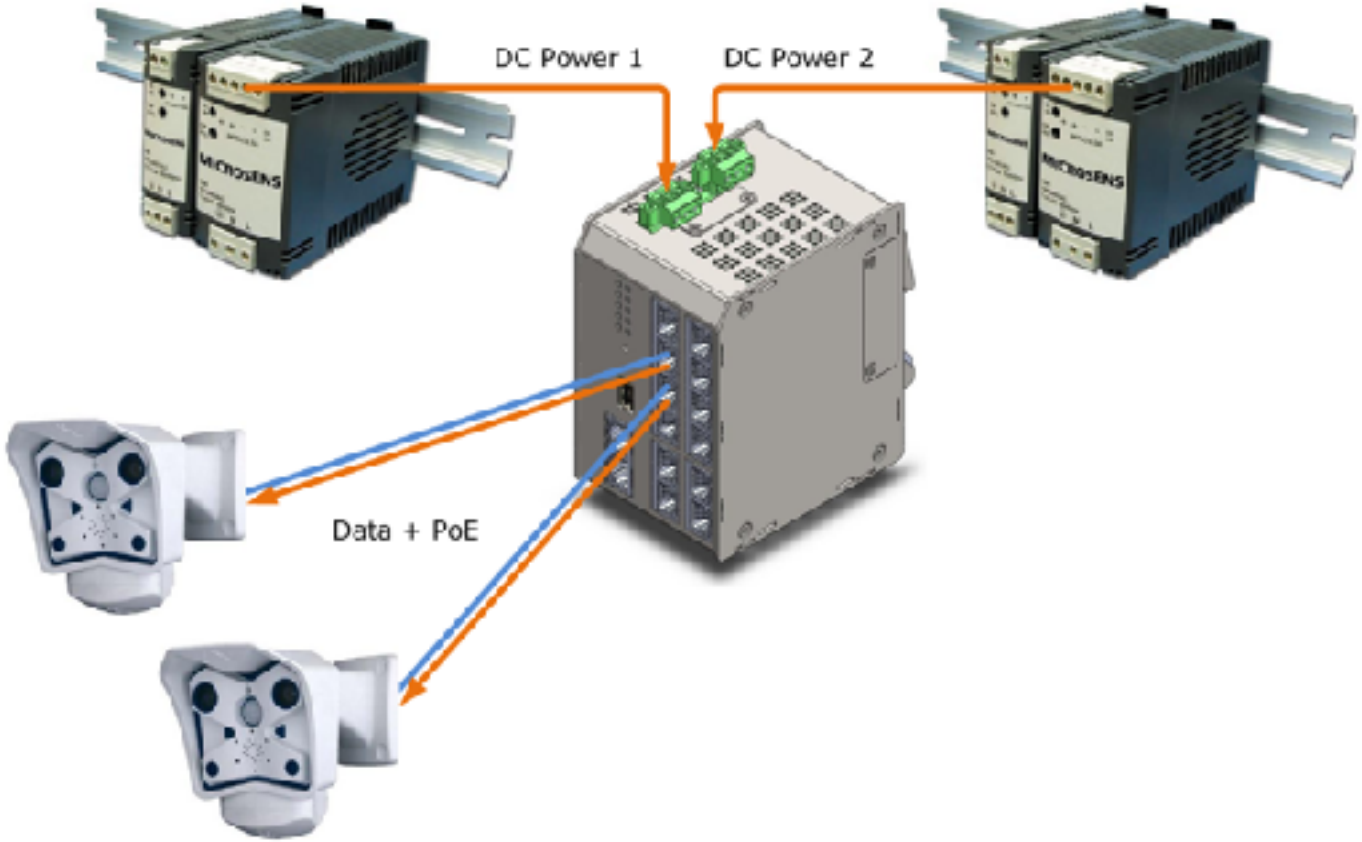
Failure tolerant powering

- Redundant power supply for switch
- Power supply for connected devices



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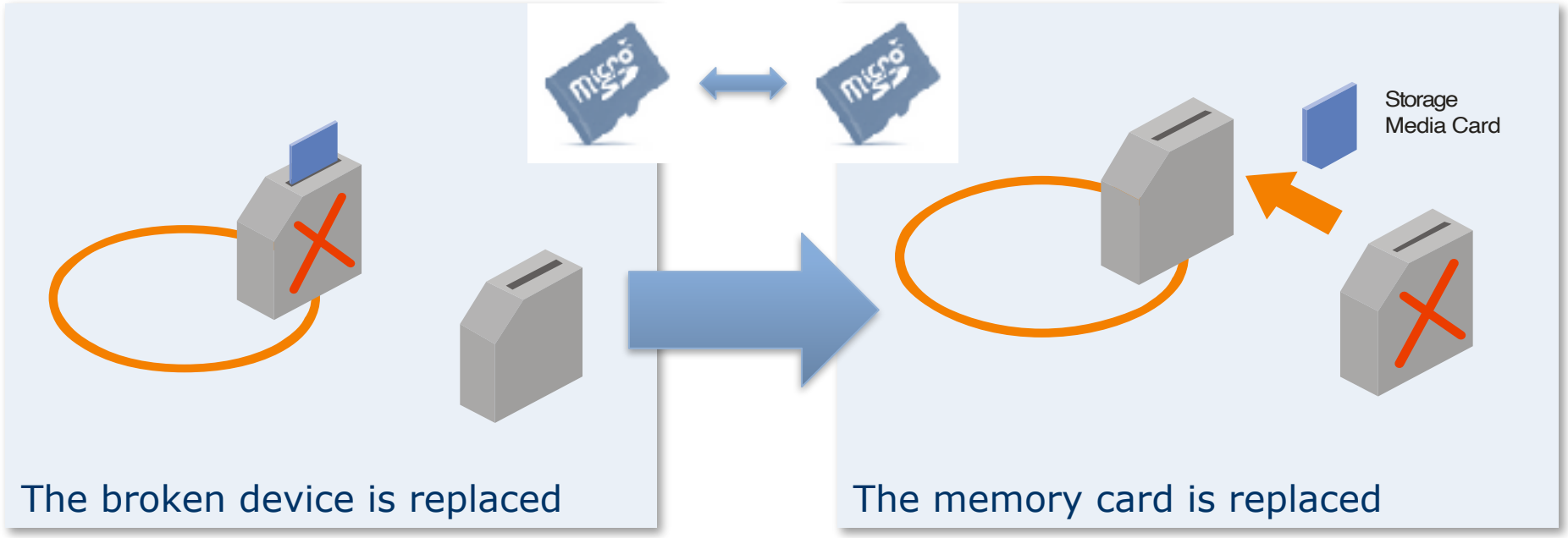
Easy firmware and configuration restore

- The removable memory card contains the firmware and switch configurations
- Type: SD-Card for profiline, microSD-Card for microSwitches
- Simplified card replacement method
- Ability to clone the entire configuration, including the MAC address (optional)



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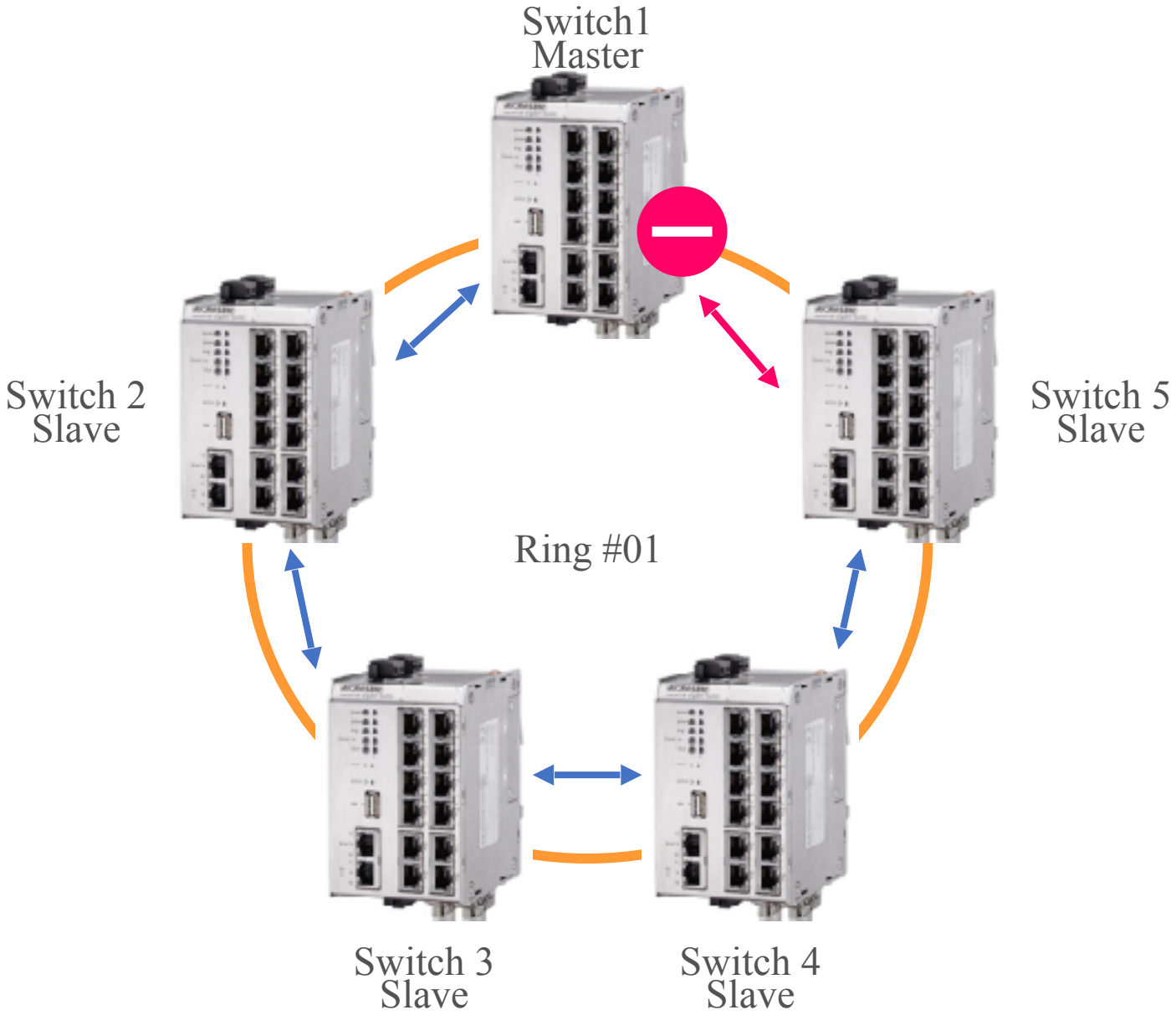
Ring support

- Normal working mode:



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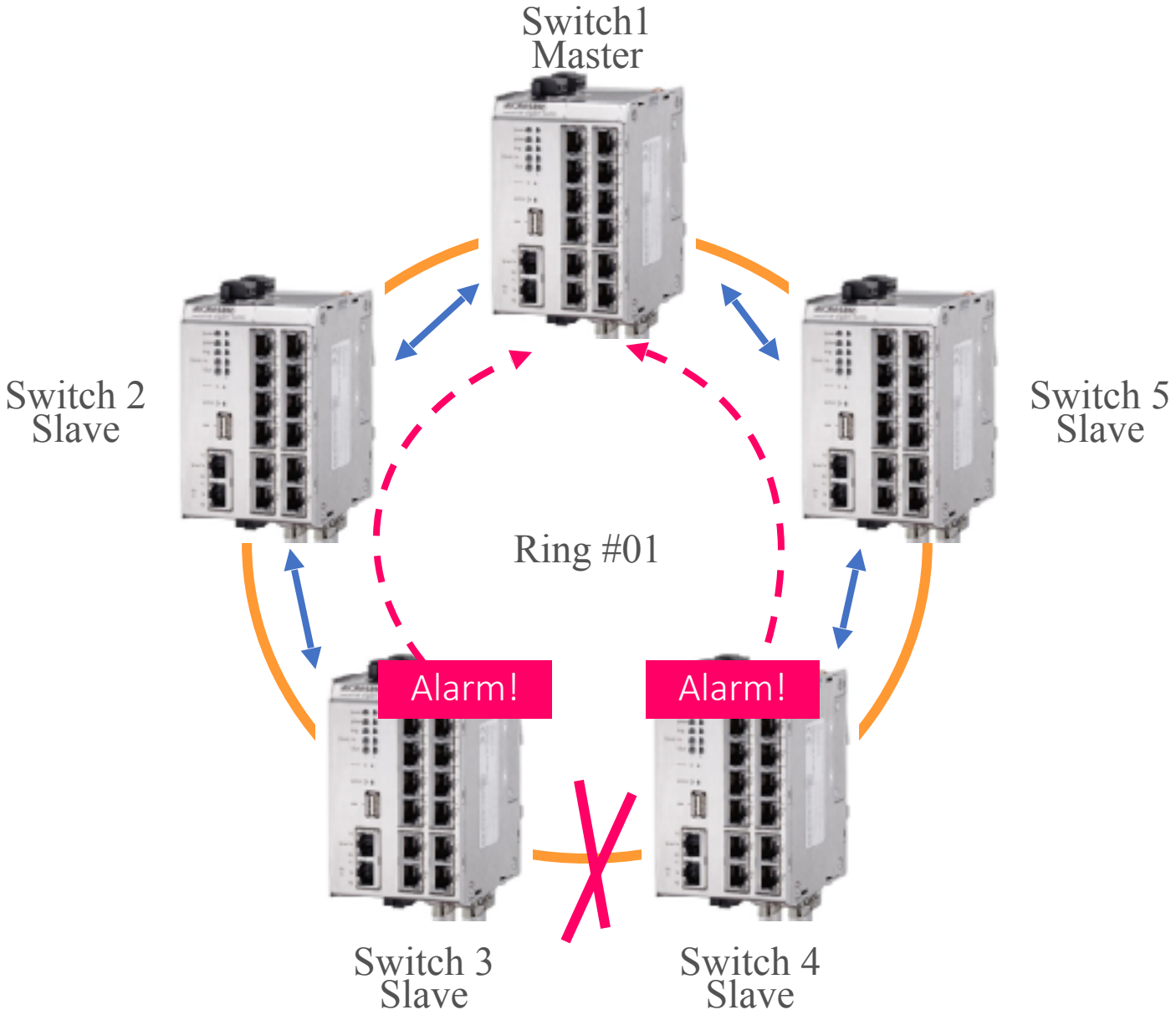
Ring support

- Emergency operation mode:



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Switch functionalities

- Redundant Ring Coupling
- Fiber Guard
- Port Access Control
- Access Control List
- CDP /LLDP
- IGMP Snooping , MLD Snooping
- QOS
- STP /RSTP/MSTP
- Possibility to upload your own scripts to automate processes
- LACP

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Profi Line Flex 24 (PLF24)

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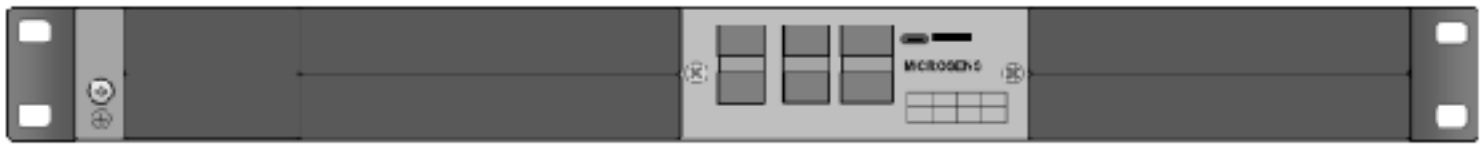
Description	Article No.
Switch Chassis with 3 module slots, 4x 1/10GBase-X, 2x RS485, Console Port, SD-Card slot	MS401880MX
PTP module for IEC 1588v2 time synchronization for MS401880MX	MS401882MX
8x 100/1000Base-X module for MS401880MX und MS401881MX	MS401883MX
8x 10/100/1000Base-T module for MS401880MX und MS401881MX	MS401884MX
Plug-in power supply for MS401880MX 60W, Prim. 80...300 VDC	MS401880DC
Plug-in power supply for MS401880MX 60W, Prim. 100...240 VAC	MS401880AC
Plug-in power supply for MS401880MX 60W, Prim. 20...70 VDC	MS401881DC
Blind cover for power supply module slot for MS401880MX and MS401880MX-BS	MS40188xx
Blind cover for module slot for MS401880MX and MS401880MX-BS	MS40188xx
RS-485 cable RJ-45 to open ends 0.5m	MS180285

Modular 24-port Industrial Switch

- 4x 10 Gigabit fiber uplink
- Flexibility through 3 slots for media line modules
- 8-port 1G RJ-45 media line modules available
- 8-port 1G fiber media line module available
- Up to 24 x 1 Gigabit RJ 45 or SFP ports on only 1U in 19" racks
- Slot for PTP module
- Range of ambient operation temperature from -40 up to +70 °C
- Two power supply slots for redundancy, supporting hot-swap
- Various power supply options (48 VDC, 80-300 VDC, 230 VAC)

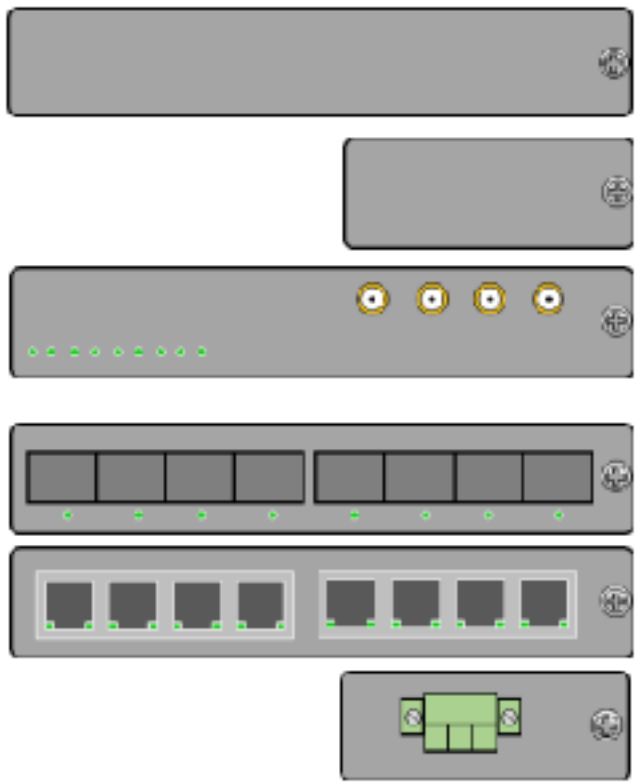
PLF24

MICROSENS



Profi Line Flex 19" L3 3-Slot+PTP Chassis

4x 1/10GBase-X SFP+ Slots, 2x RS-485,
1x console port USB-C, microSD-Slot,
3x module slots, 1x PTP-Slot, 2x power supply slots,
fanless, industrial temp -40..+75°C



Profi Line Flex 19" Cover

Module slot cover

Profi Line Flex 19" Cover

Power supply slot cover

Profi Line Flex 19" PTP module

1x ClockIn (SMA), 1x ClockOut (SMA)
1x GPSIn (SMA), 1PPSOut (SMA)

Profi Line Flex 19" SFP switch module

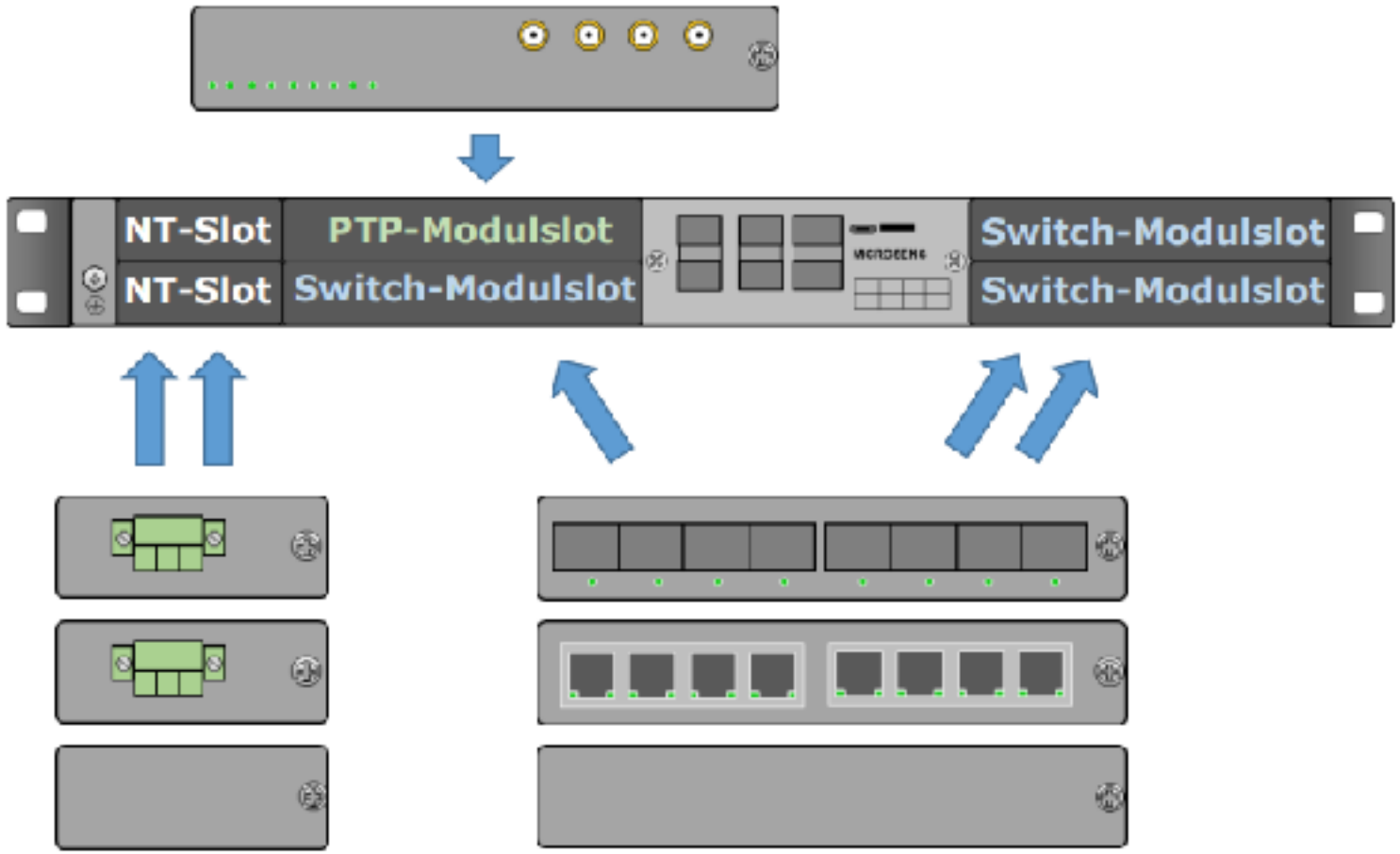
8x 100/1000Base-X SFP-Slots

Profi Line Flex 19" TP switch module

8x 10/100/1000Base-T RJ-45

Profi Line Flex 19" Power supply module

1x 100..240VAC / 80..300VDC (60W) / 20..70VDC



Switchvarianten 28-Port

4x 1/10GBase-X + 24x SFP -> Multifiberversion
4x 1/10GBase-X + 24x RJ-45 -> TP-Version
4x 1/10GBase-X + 16x SFP + 8x RJ-45 -> Mixversion #1
4x 1/10GBase-X + 8x SFP + 16x RJ-45 -> Mixversion #2

PLF24

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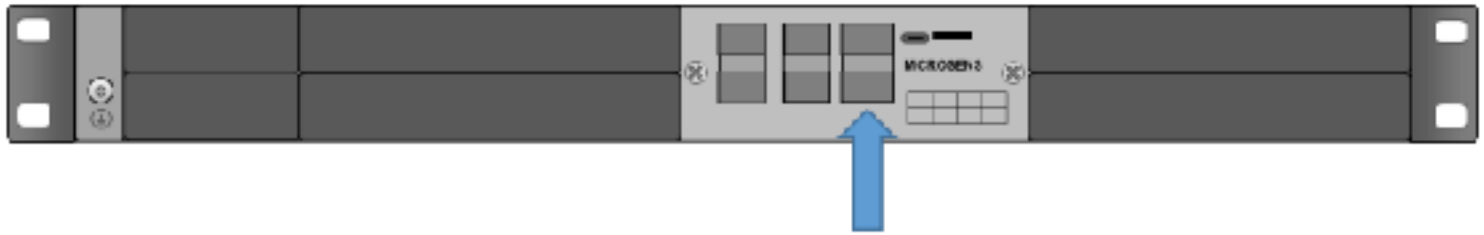

RS485 interfaces

- The switch is equipped with two physical RJ-45 RS-485 interfaces
- Using the RS485 cable results in up to four logical RS485 outputs
- In Substation applications RS485 is typically used for
    - Energy meters and measuring devices
    - Protection relay (e.g. overcurrent protection relay)
    - Circuit-breakers and switchgear
    - Transformer monitoring systems

Profi Line Flex 48 (PLF48)

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New modular 48-port Industrial Switch

- 2x QSFP slot with 40G
- Flexibility through 6 slots for media line modules
- Up to 48 x 1 Gigabit RJ-45 or SFP ports on only 1U in 19" racks
- Certified for Power Substation applications
- Range of ambient operation temperature from -40 up to +70 °C
- 8-port 1G fiber media line module available
- 8-port 1G RJ-45 media line module
- 8-port 1G RJ-45 media line module 802.3at 30W
- Various power supply options (48 VDC, 80-300 VDC, 230 VAC)

Description	Article No.
Switch Chassis with 6 module slots, 4x 1/10GBase-X / 2x40GBase-X Combo ports, Serial Port, SD-Card	MS401881MX
8x 100/1000Base-X module for MS401880MX und MS401881MX	MS401883MX
8x 10/100/1000Base-T module for MS401880MX und MS401881MX	MS401884MX
8x 10/100/1000Base-T module, 802.3at 30W for MS401881MX	MS401885MX

PLF48

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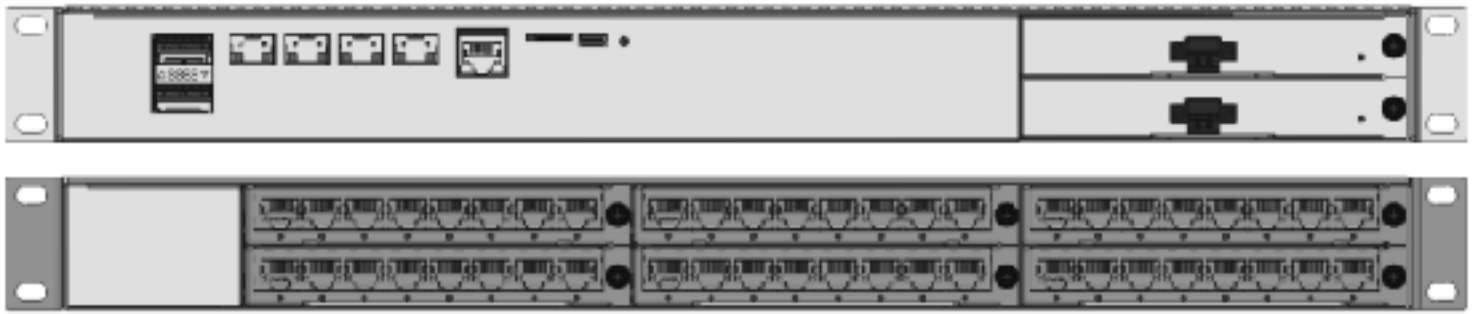
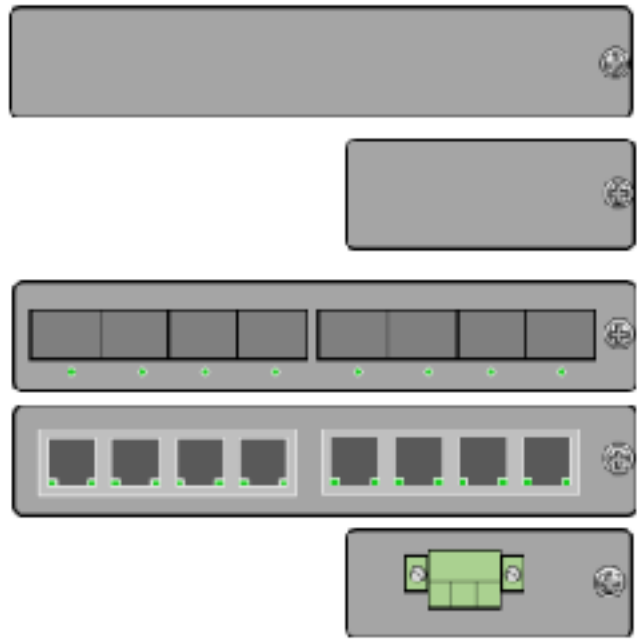


Profi Line Flex 19" L3 6-Slot

4x 1/10GBase-X SFP+ Slots, 2x RS-485,
1x console port USB-C, microSD-Slot,
6x module slots, 2x power supply slots,
fanless, industrial temp. -40..+75°C



Profi Line Flex 19" Cover

Modulslot Cover

Profi Line Flex 19" Cover

Netzteilmodulslot Cover

Profi Line Flex 19" SFP-Switchmodul

8x 100/1000Base-X SFP-Slots

Profi Line Flex 19" TP-Switchmodul

8x 10/100/1000Base-T RJ-45

Profi Line Flex 19" Netzteilmodul

1x 100..240VAC / 80..300VDC (60W)

PTP 1588 Introduction

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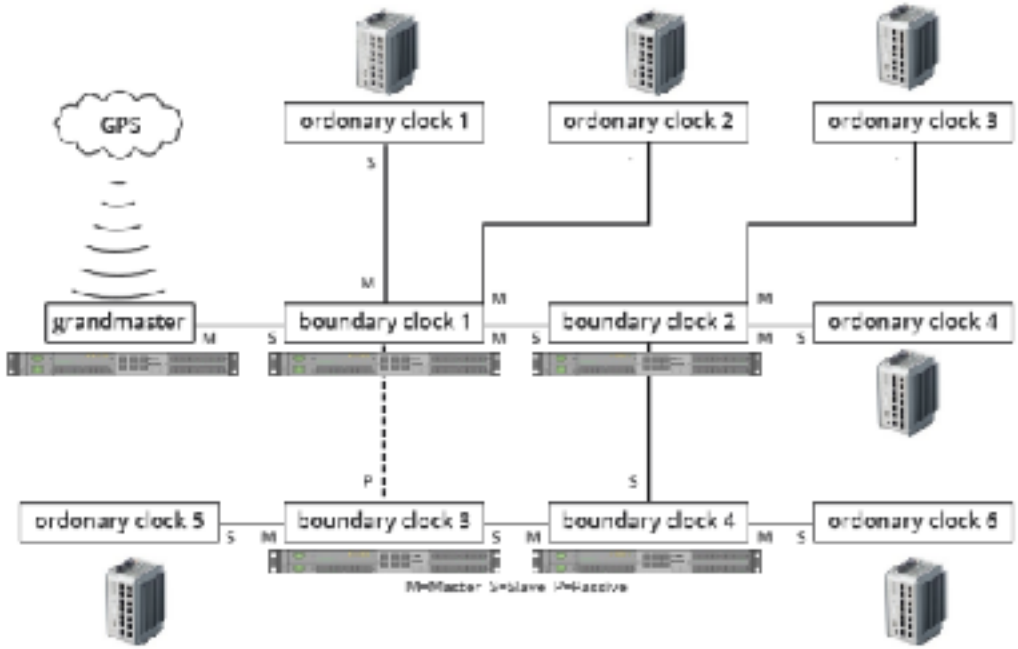
PTP (Precision Time Protocol) is supported on the hardware side with the equipable PTP module, which synchronizes the network devices in the nanosecond range. This supports

- Realtime communication
- Fault diagnosis and rectification
- Coordination of distributed systems
- Avoidance of data loss

PLF24 can be used as Master Device for high precision applications such as

Smart Grids

- PTP synchronizes generators, substations, and distribution networks in power systems to ensure the stability and efficient operation of the grid.
- Compliance with standards (e.g. in energy supply IEC61850-9-3)

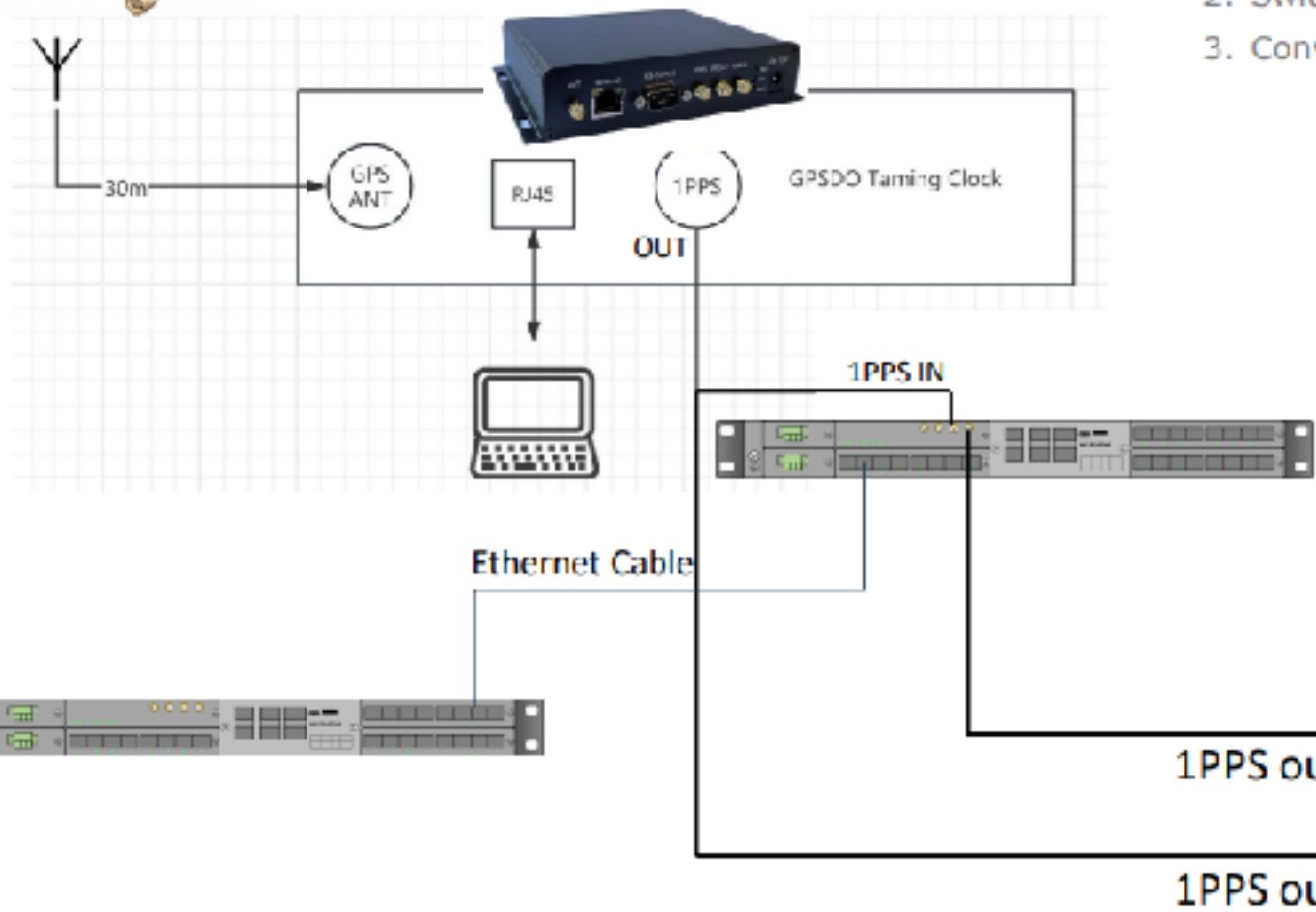


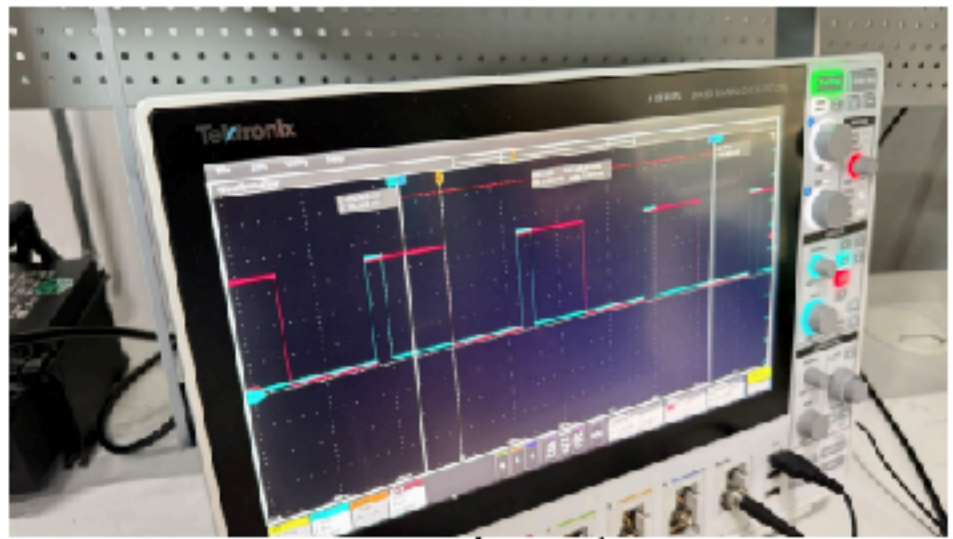
PTP 1588 Test Case

MICROSENS

PTP – Precision Time Protocol IEEE 1588

1. Max. PTP offset and time inaccuracy compared to a reference directly attached are within 50 ns.
2. Switchover from one master clock to another in 30s.
3. Convergence time at start-up is about 160s.





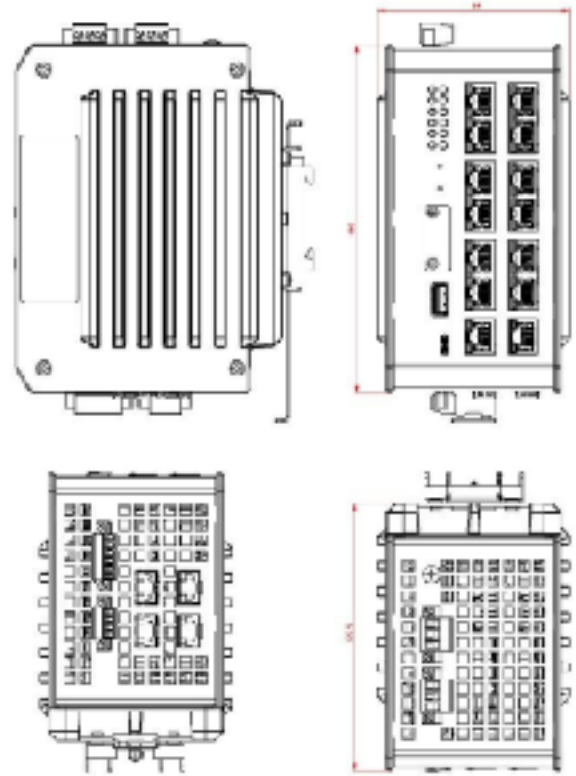
G8 Profi Line X - Summary

MICROSENS

MS652819PMX

16-Port 10G Industrial Switch Multigigabit PoE+/++

- 2x SFP/SFP+ Slot 1/10GBase-X
- 12x 10/100/1000Base-T (RJ-45) AutoNegotiation
  PoE+ Ports up to 30W Combo Ports (PoE++)
- 2x Combo
  either 1/2.5/5/10GBase-T (RJ-45) PoE++ Ports up to 90W or SFP/SFP+ Slot 1/10GBase-X
- USB-C Console Port for CLI access (outband management)
- USB-A Extension Port for optional accessories
- Alarm Contacts / I/O-Ports for potential free digital input/output ports
  2x output (relay)
  2x input (optocoupler)
- Operation -40..+75 °C



Compact, High Quality, Microsens Design

MICROSENS

Compact Design:
- 127.5 mm x 88 mm x 160 mm.

Wide Operational Temperature Area:
- -40°C – 75°C

Conformal Coating:
- Conformal coatings can prevent problems such as the ingress of dirt, moisture, dust, and protect against rust, abrasion, chemical damage, mechanical stress, and vibration. This extends the life of the device and reduces failure rates.

Designated MTBF:
- 400.000h

USP – Rings & RealTime

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Ring topology

- 10G Uplink ports allow ring topologies, even with demanding end devices such as cameras or WiFi Access Points
- MICROSENS Ring protocol
- ERPS G.8032v2 (Q1 2025)
  Ethernet Ring Protection Switching (ERPS) is an effort at ITU-T under G.8032 Recommendation to provide sub-50ms protection and recovery switching for Ethernet traffic in a ring topology and at the same time ensuring that there are no loops formed at the Ethernet layer. This ITU-T specification is directly based on and derived from the Ethernet Automatic Protection Switching technology developed and patented by Extreme Networks. G.8032v1 supported a single ring topology and G.8032v2 supports multiple rings/ladder topology.
- MRP (Q1 2025)
  Media Redundancy Protocol (MRP) is a data network protocol standardized by the International Electrotechnical Commission as IEC 62439-2. It allows rings of Ethernet switches to overcome any single failure with recovery time much faster than achievable with Spanning Tree Protocol.[1] It is suitable to most industrial Ethernet applications.
- PTP 1588V2 Client (Q2 2025)
  The Precision Time Protocol (PTP) is a protocol for clock synchronization throughout a computer network with relatively high precision and therefore potentially high accuracy. In a local area network (LAN), accuracy can be sub-microsecond – making it suitable for measurement and control systems.[1] PTP is used to synchronize financial transactions, mobile phone tower transmissions, sub-sea acoustic arrays, and networks that require precise timing but lack access to satellite navigation signals.[citation needed]

USP - IOT

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IoT Switch

The PLX comes with a bunch of different IoT and Smart building protocols on board.

- MQTT broker for exchange of data from different devices via MQTT protocol. The internal broker makes separate broker devices obsolete.
- Modbus/TCP for a seamless integration in the building automation
- Apps – User defined programs, programmed by Microsens
- Scripting – Integrated CLI scripting for the automation of routine processes
- Smart Office – Application for room automation and lighting based on MICROSENS Smart building hardware
- BACnet compatibility: Integration of third-party products into building automation. (Q2 2025)

Application - Airport

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Purpose:
Deploy WLAN access points across the airport to enable high-speed wireless connectivity for passengers, staff, and operations.

Key Features:
- Sufficient PoE++ powers WIFI 7 Aps up to 90W
- Multi-gigabit support for high-bandwidth Wi-Fi 7 APs up to 10GB data transmission.
- 480W power budget to handle numerous PoE devices.
- Redundancy features (e.g., ERPS) for seamless and uninterrupted connectivity.

Advantages:
- Fanless design reduces noise in public areas.
- Advanced IT security ensures protection for critical communication channels.
- Reliable and secure performance tailored for demanding airport environments.

Application – Train Station

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Purpose:

Ideal for train stations requiring efficient control of video surveillance systems and ventilation fans.

Key Features:

- High-capacity ports (up to 90W on two ports) for high-demand devices like surveillance cameras.
- Multi-gigabit support for 8k high resolution cameras
- 10G uplinks ensure the transmission between the devices and the center system
- Built-in redundancy features ensure uninterrupted operation.

Design Advantages:

- Fanless design reduces maintenance efforts and costs.
- Wide operational temperature ensures the reliable outdoor operations

Extensions:

- Extensive I/O ports and alarm contacts for real-time monitoring and control of station equipment.
- Support for automation protocols such as MQTT to enhance system integration.

Application – Tunnel (Anatoli abstimmen)

Purpose:
Suited for tunnel environments connecting two locations with distinct networks for critical railway operations and additional services (e.g., surveillance, telephony).

Redundancy:
- ERPS (Ethernet Ring Protection Switching) ensures continuous connectivity during link failures. The recovery time is < 50ms

High-Performance Uplinks:
- 10G uplinks enable rapid data transfer, optimizing separation and security between critical and non-critical networks.

PoE++ Support:
- Multi-gigabit PoE++ ports power devices like cameras and sensors, supporting efficient operation of supplementary services.

Design:
- Fanless, industrial-grade design ensures reliable performance in extreme tunnel conditions.
- Conformal coatings prevent problems such as the ingress of dirt, moisture, dust, and protect against rust, abrasion, chemical damage, mechanical stress, and vibration.

Application – Smart Building

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Purpose:
Perfect for smart building solutions and providing edge intelligence computing for IOT applications

PoE++ Support:
- Powers multiple devices for illumination, automation, eliminating the need for additional power infrastructure.

High-Performance Data Transfer:
- Supports multi-gigabit speeds (1/2.5/5/10G), ideal for bandwidth-intensive devices like Wi-Fi 7 APs and high-resolution cameras.

Fanless Design:
- Ensures noise-free operation, ideal for indoor smart environments.

Compatibility with IoT Protocols:
- Supports BACnet (2025), MQTT, and MODBUS for seamless integration with building management systems, enabling centralized control of HVAC, lighting, and security systems.

Application – Large Building

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Purpose:
Ideal for large area environments like Hotel, School, Sport Stadium etc., supporting high-capacity, reliable connections and intensive network usage.

High Bandwidth:
- 10G uplinks ensure ample bandwidth for intensive building network needs.

PoE++ Power:
- 480W PoE++ power budget and POE++ support high-powered applications such as IP cameras and Wi-Fi 7 access points.

Quiet Operation:
- Fanless design with low power consumption ensures quiet operation, essential for guest comfort.

Building Automation Compatibility:
- MQTT/BACnet support enables seamless integration with HVAC, lighting, and security systems for efficient building management.

Network Redundancy:
- ERPS G.8032v2 redundancy ensures continuous operation, recovering swiftly from failures.

Application – Real Time PTP Client

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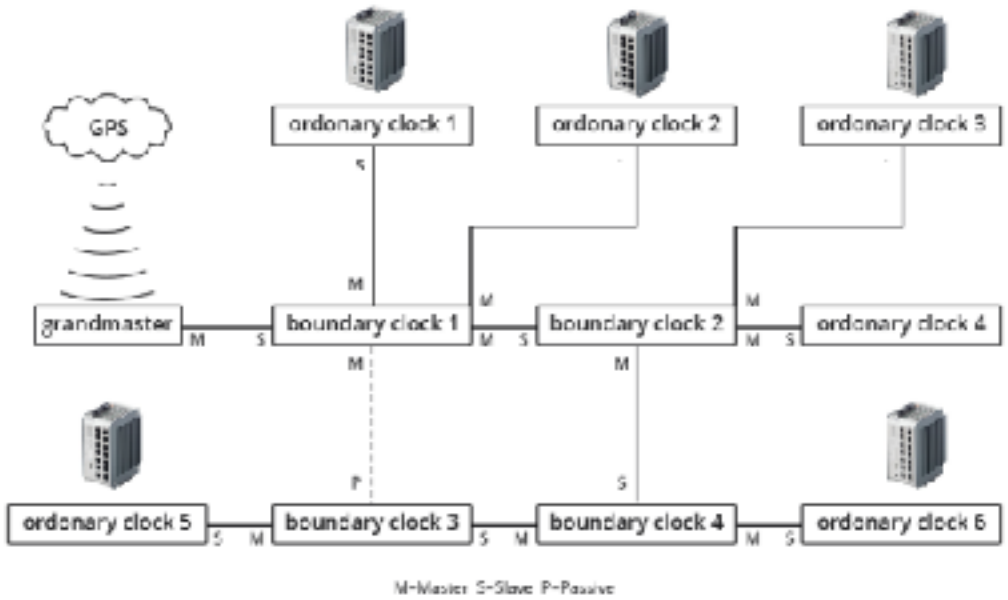

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Purpose:

PLX can be used as Slave Deevice for high precision applications such as

Financial Transactions

- PTP is used to synchronize timestamps in trading systems, ensuring the sequence and transparency of high-frequency trades, meeting regulatory precision requirements.

Industrial Automation

- PTP is utilized in factory automation to synchronize sensors and controllers, ensuring coordinated operation of devices and improving efficiency and accuracy.

Sub-Sea Acoustic Arrays

- In marine exploration, PTP is used to synchronize multiple acoustic sensors for accurate signal measurement and positioning.

Smart Grids

- PTP synchronizes generators, substations, and distribution networks in power systems to ensure the stability and efficient operation of the grid.

Fiber optic transceivers

- We offer a wide range of fiber optic inserts: **SFP**, **SFP+**, **SFP28**, **XFP**, **QSFP**, **QSFP+**, **QSFP28**, **CFP**, etc.
- Available in various variants such as: **Multimode**, **Singlemode** , **CWDM**, **DWDM**, **BiDi**, **DWDM Tunable**, **Copper**, **Industrial**, etc.
- In various optical ranges and budgets, from **100m** to even **160km**
- With the possibility of cooperation with various connectors: **LC**, **SC**, **RJ-45**, **MPO-connectors**, etc.
- Compatible with various manufacturers: **Cisco**, **Aruba**, **Brocade**, **Juniper**, **Palo Alto**, **Siemens** and many others

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PRODUCT LINES

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Network Components

Smart Building Solutions

Management Software

Network Management Platform (NMP)

Smart Building Manager

Enterprise Networks

- Fiber to the Office (FTTO)
- Basic Fiber Optic Products (BFOP)

Industrial Solutions

- For harsh environments
- Industrial reliability

Optical Transport

- Wide area location interconnection
- Data center interconnection

Smart Lighting & Smart Automation

MICROSENS

Network Management Platform (NMP)

Network Management Platform

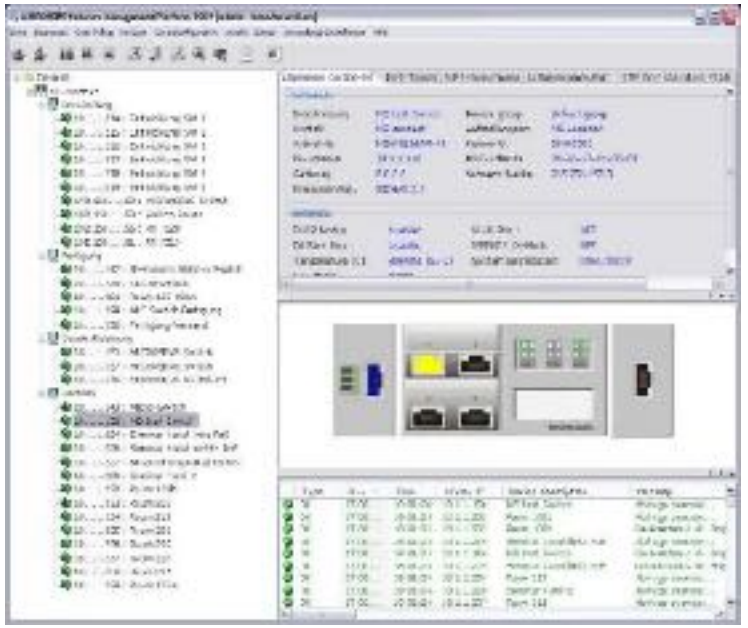
- Platform-independent system
- Automatic configuration, management and supervision of devices
- Version: Professional, Enterprise

Network Element Manager

- Configuration, management
- Graphical representation of devices

Network Topology Manager

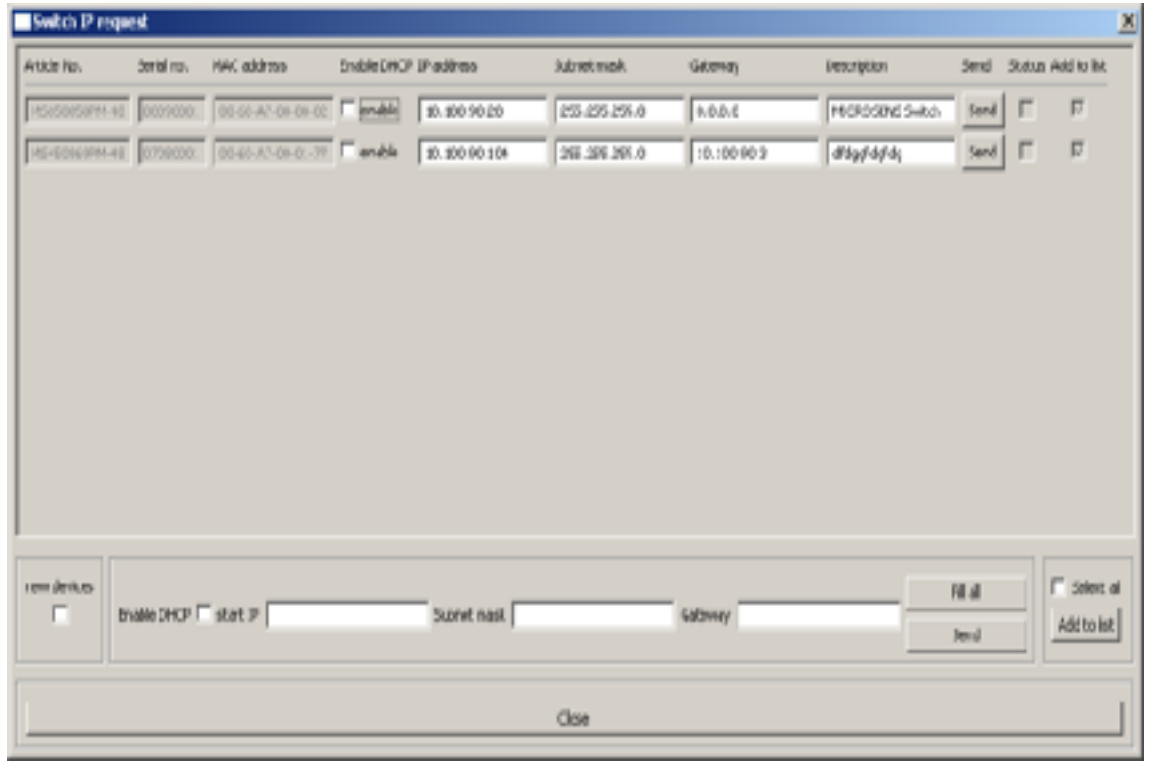
- Network structure visualization
- Graphical display of errors and alarms (integrated trap receiver)



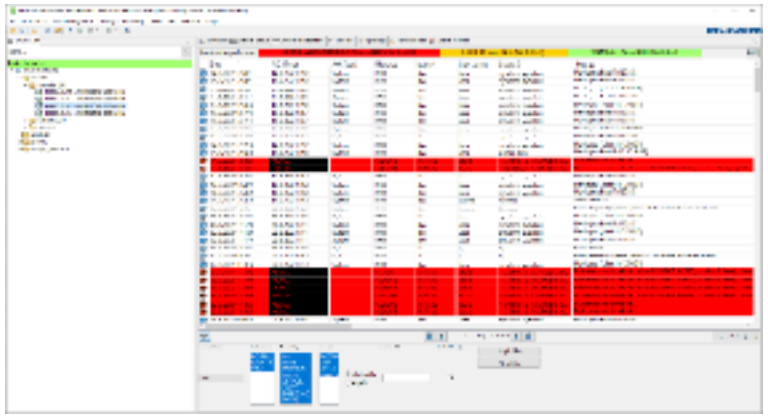
MICROSENS

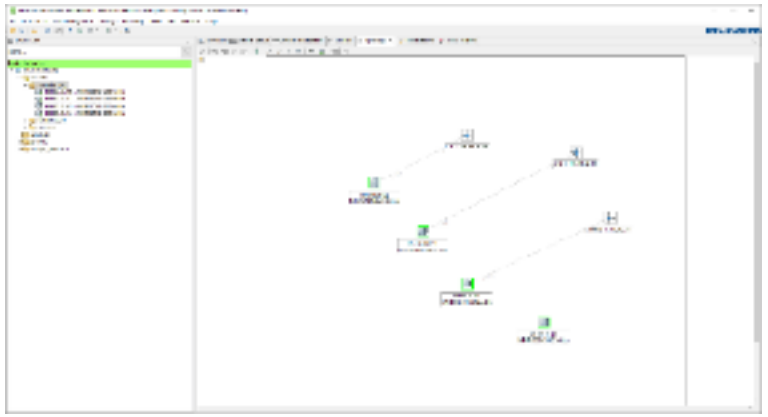
Automatic device discovery

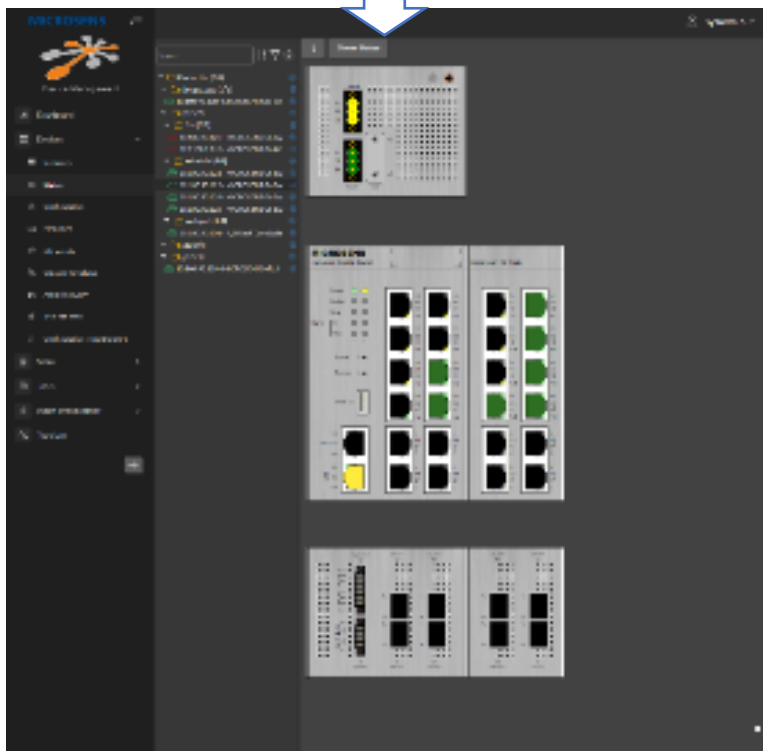
- Searching for all devices on the network
- Searching for devices with an unconfigured IP address
- No initial setup required



NMP-WEB, the new network management platform







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PRODUCT LINES

MICROSENS

Network Components

Smart Building Solutions

Management Software

Network Management Platform (NMP)

Smart Building Manager

Enterprise Networks

- Fiber to the Office (FTTO)
- Basic Fiber Optic Products (BFOP)

Industrial Solutions

- For harsh environments
- Industrial reliability

Optical Transport

- Wide area location interconnection
- Data center interconnection

Smart Lighting & Smart Automation

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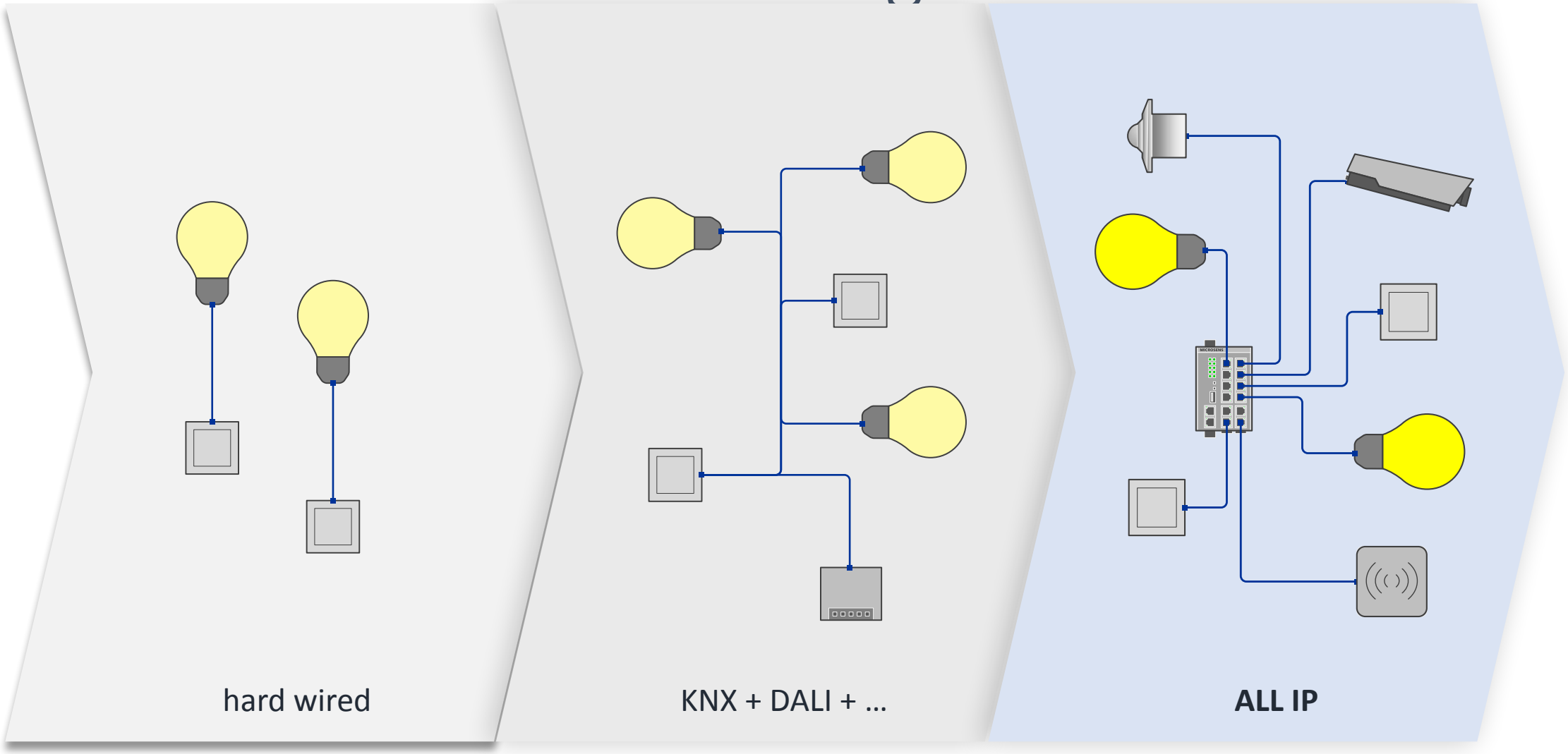
What does a smart building look like?

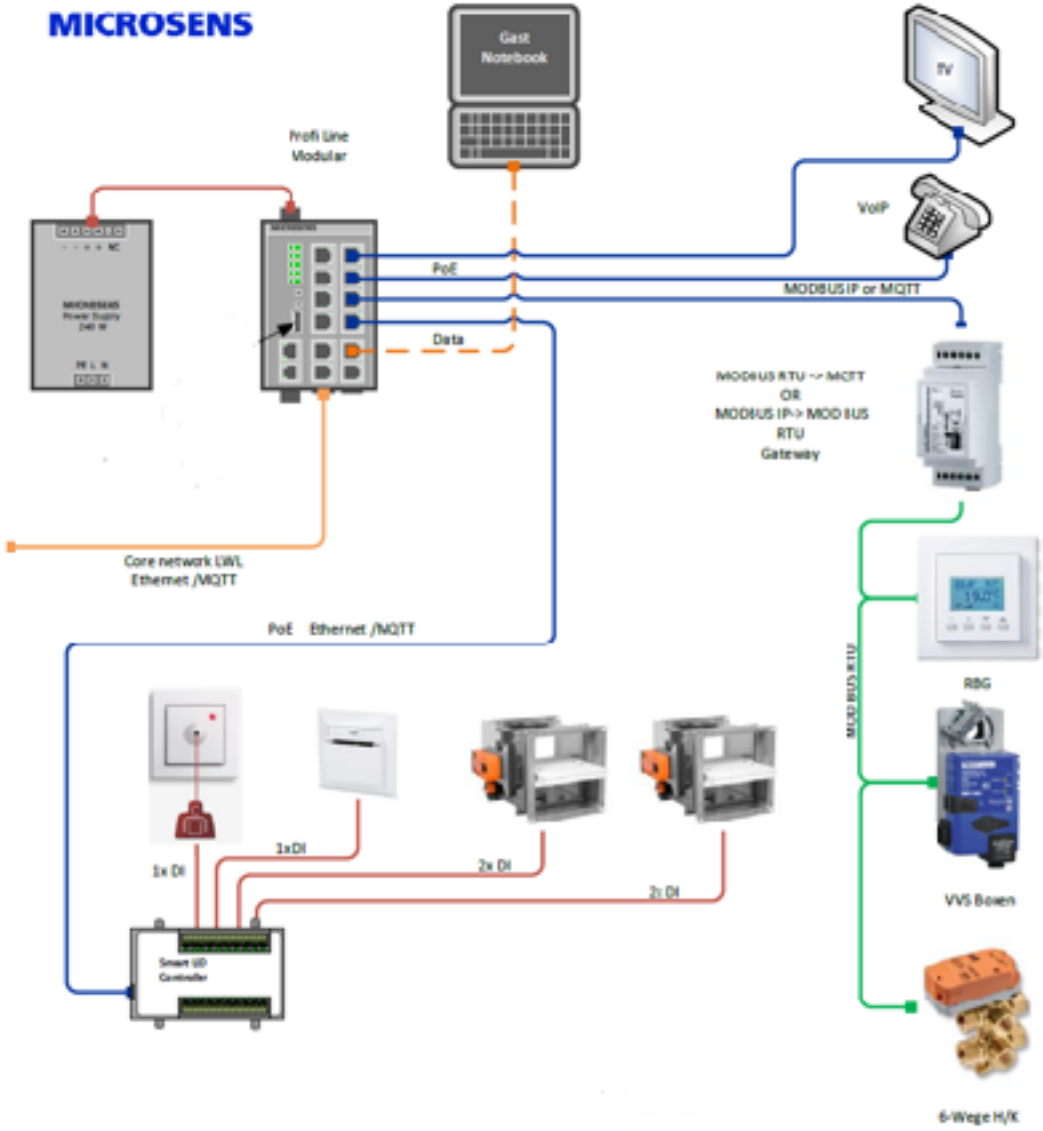


MICROSENS

Room automation

Regulating and monitoring HVAC
VSV-Boxes + sensors.
Shutting of HVAC or lowering Cooling/
Heating when no person is in the room/
building (similar to lights)

- Same software platform
- 100% customizable and tailored to needs of customer/building



Lighting

Manual operation
- Dim level
- Color

Auto Dimming
- Daylight harvesting

Human Centric Lighting

Occupancy
- Room Timeout
- Minimum Brightness

Follow-Me Light
for corridors

Heating/Cooling

Valve Control
- Room Temperature
- Day/Night/Standby
- Dew Point Detection

Graphical Web Interface

1 2
3 4

- Global/per room
- Scenes/Direct operation
- Statistics
- Easy customizable

Smart Director App

v100

Blinds

- Manual Up/Down/Tilt
- Scene controlled

Switched Outlets

- Manual operation
- Scene controlled
- via Occupancy

Smart Devices

64

Sensor Values

500

LED Lights

250

Light Zones

12

Rooms

12

Satisfaction

100%

PRODUCT LINES

MICROSENS

Network Components

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Smart Lighting & Smart Automation

MICROSENS

Puro Hotel Warsaw

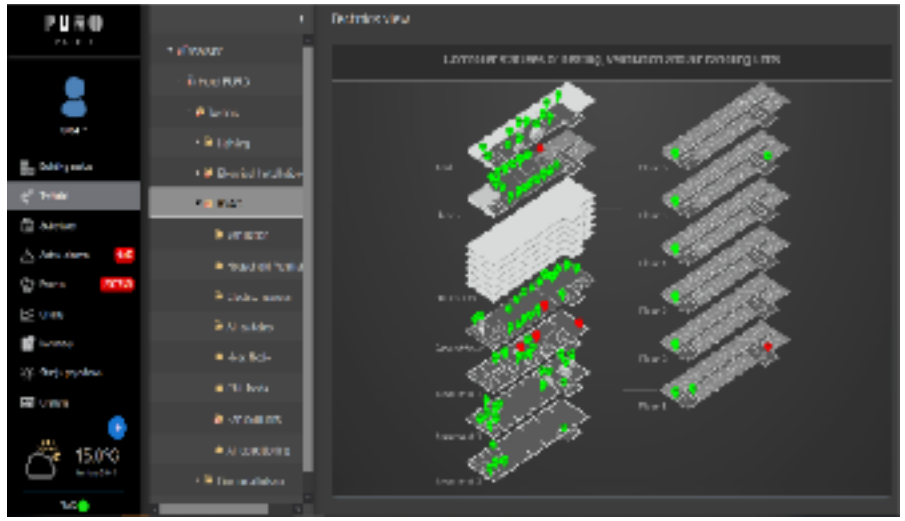
- 132 Standard Rooms
- 12 Corner Apartments
- 2 Luxus Suite

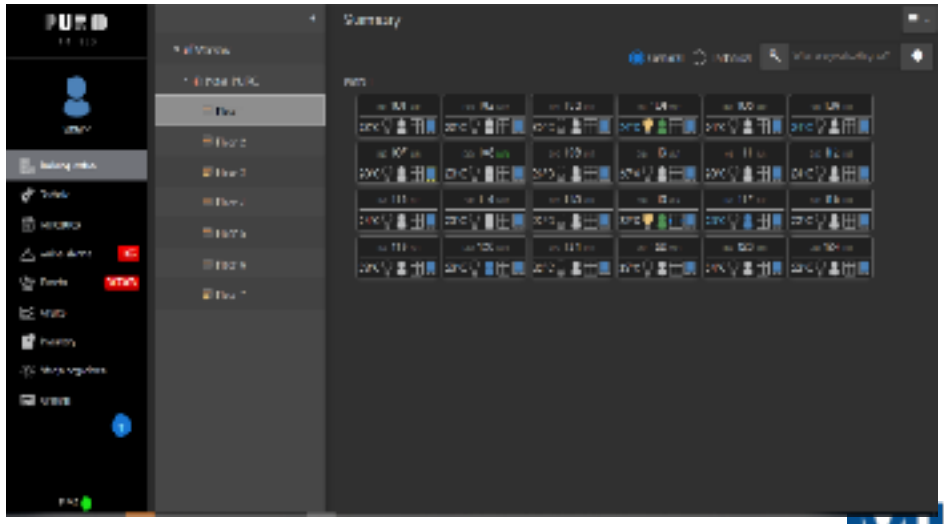
- Approx. 25.000 Datapoints
- Room automation
- Integration of entire 3rd party HVAC into Smart Building Manager
- Integration of entire DALI Lighting into Smart Building Manager
- Integration of Hotel Management over FIAS
- Smart Lighting over PoE

MICROSENS

Smart Building Manager

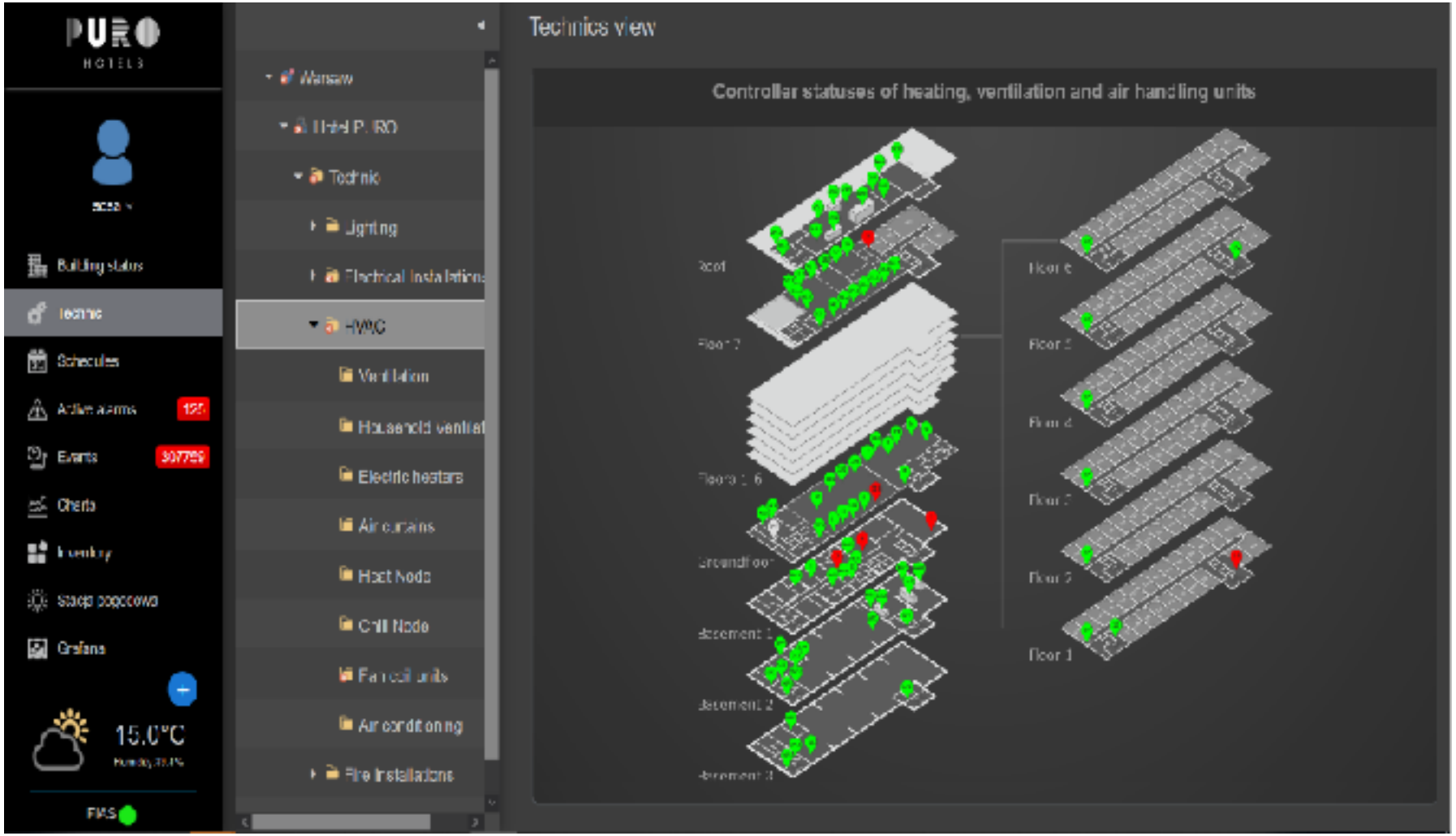
- Management of IT-Network & Automation in 1 tool
- Convergence of network and building automation
- Visualize all components in the building (Light, HVAC, Actuators etc.)
- Alarms can be triggered and Events pre-installed
- Not just offices, but e.g. car parks can be monitored





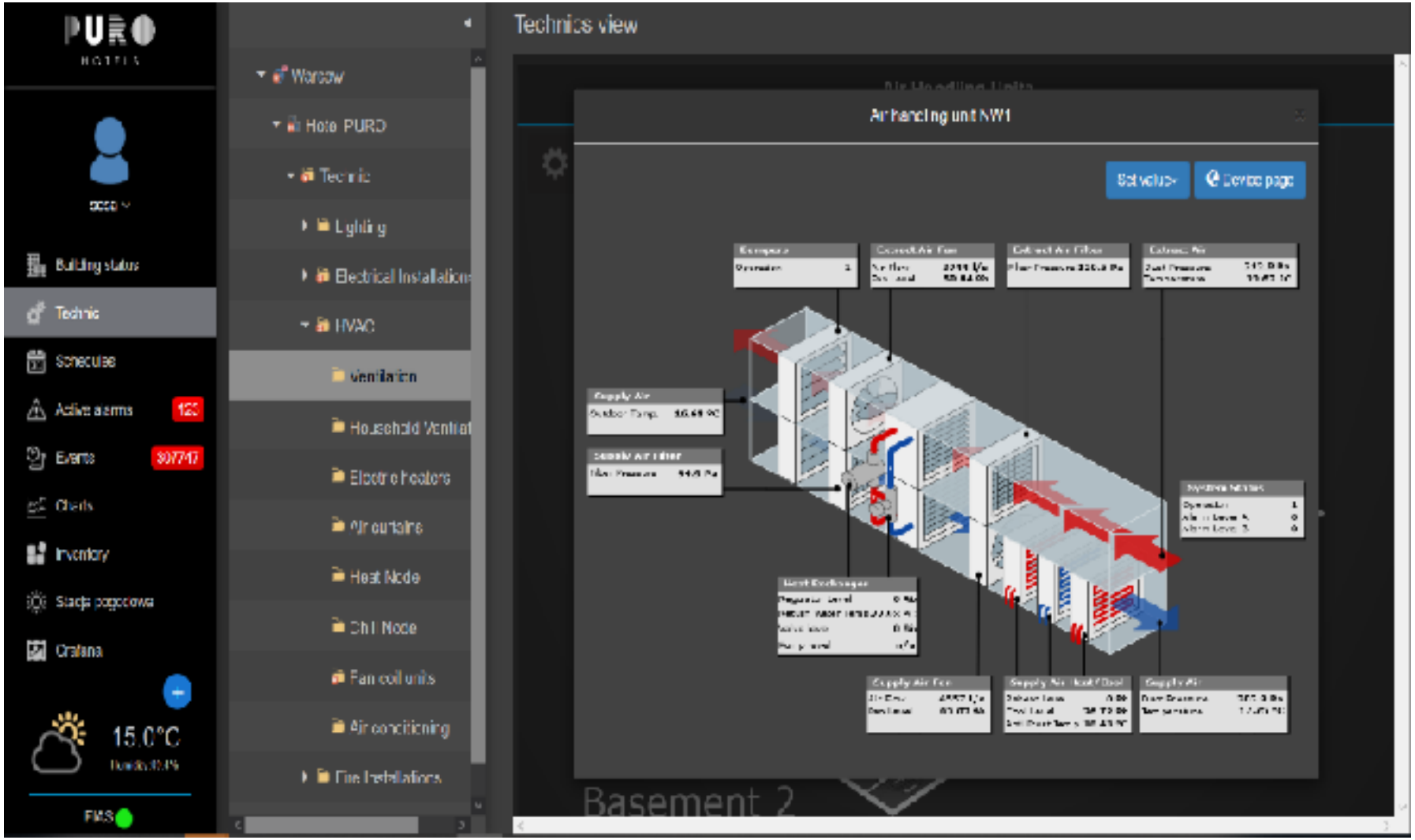
MICROSENS

- **Smart Building Manager**



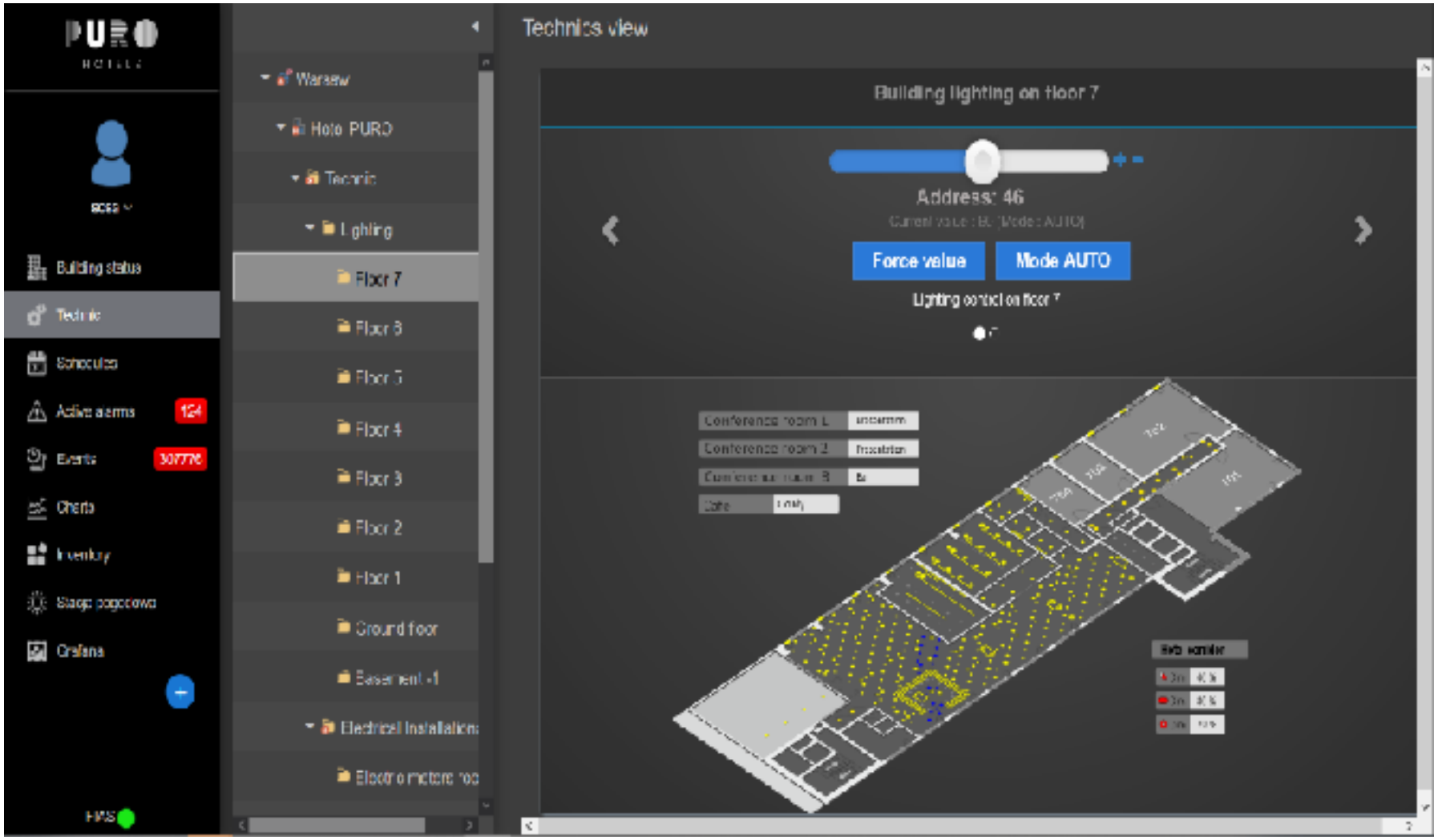
MICROSENS

- **Smart Building Manager**



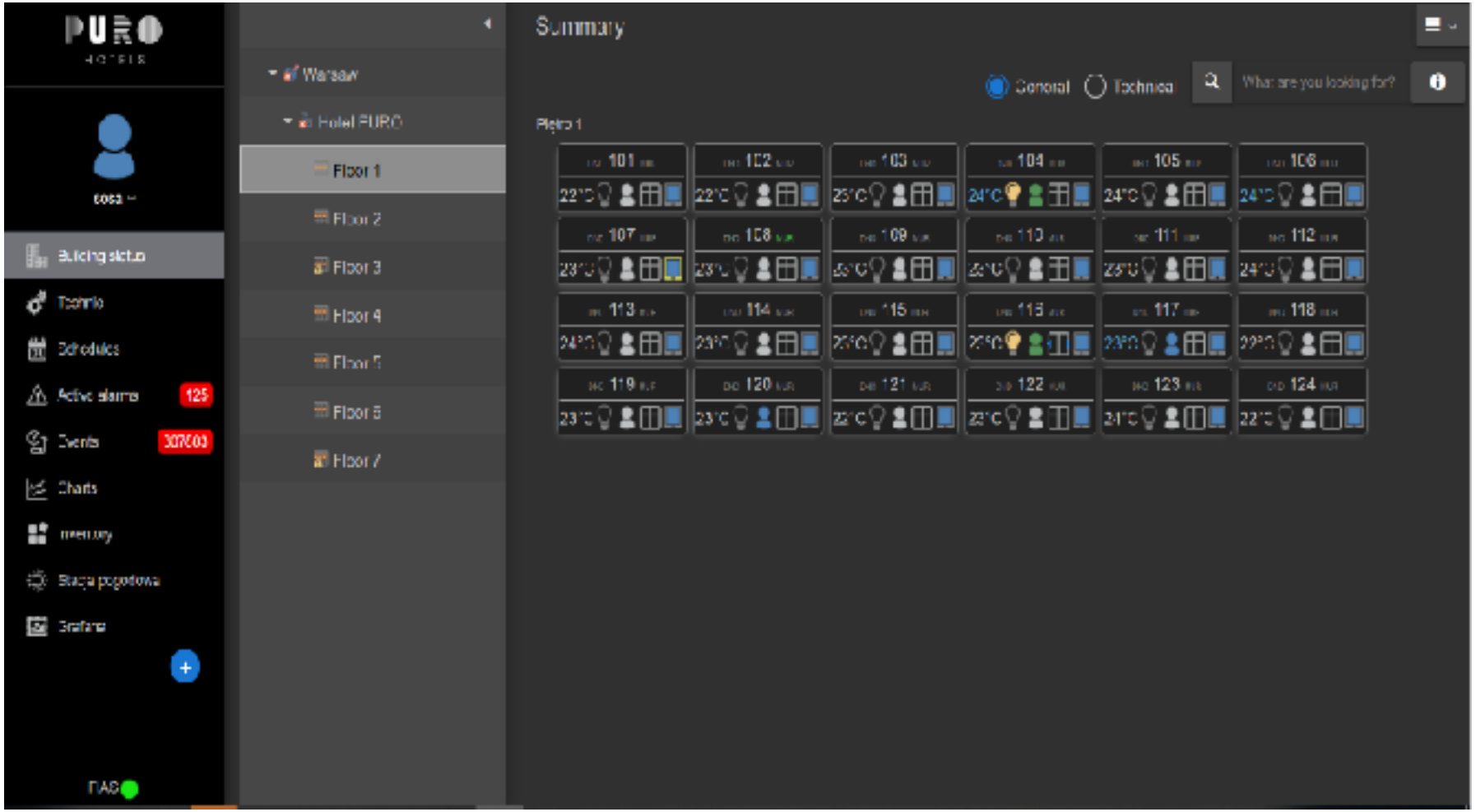
MICROSENS

- **Smart Building Manager**



MICROSENS

- **Smart Building Manager**



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- **Smart Building Manager**

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Thank you for your time!

Presenters

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