

BLDS

BUILDING LEAK DETECTION SYSTEM



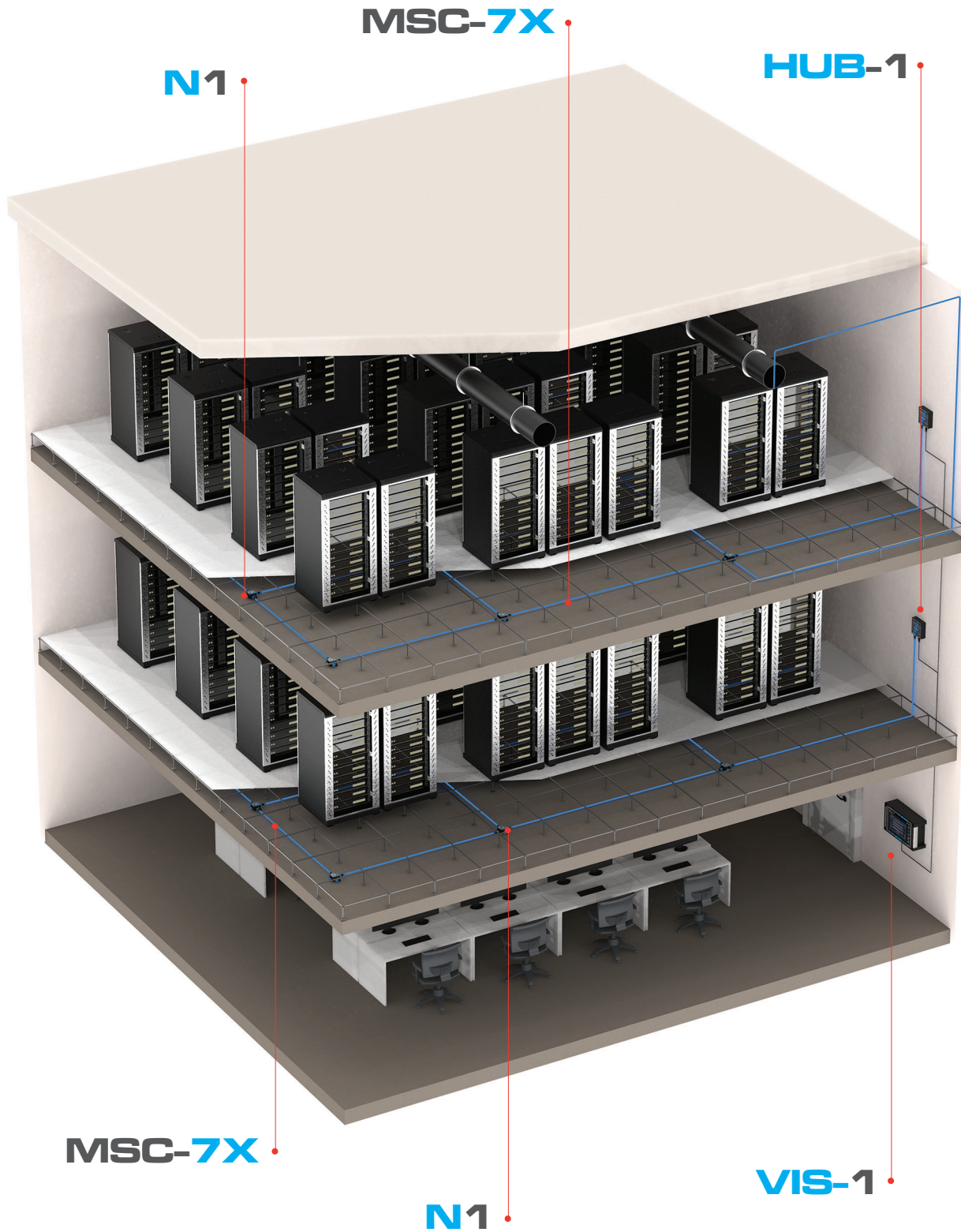
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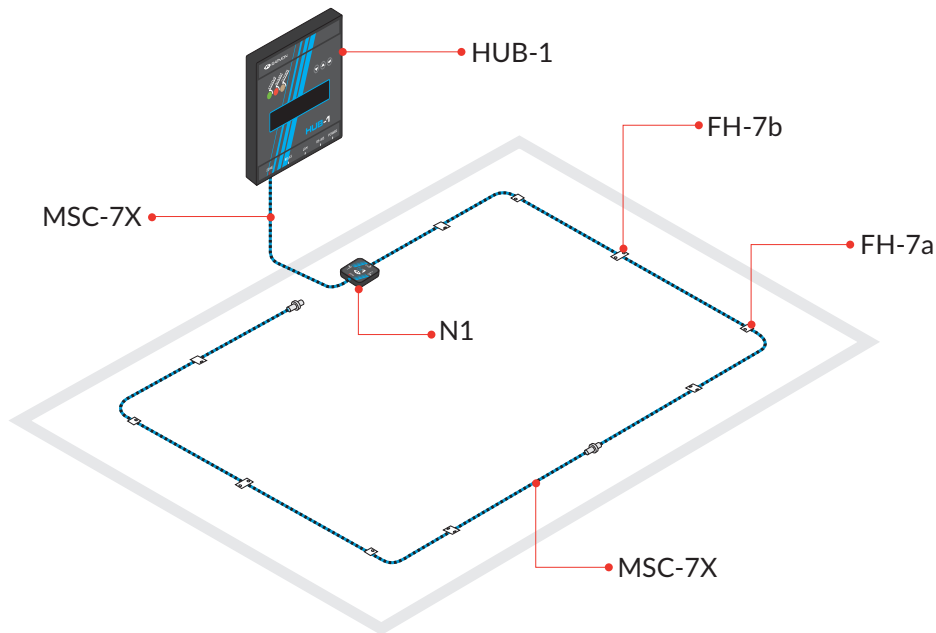
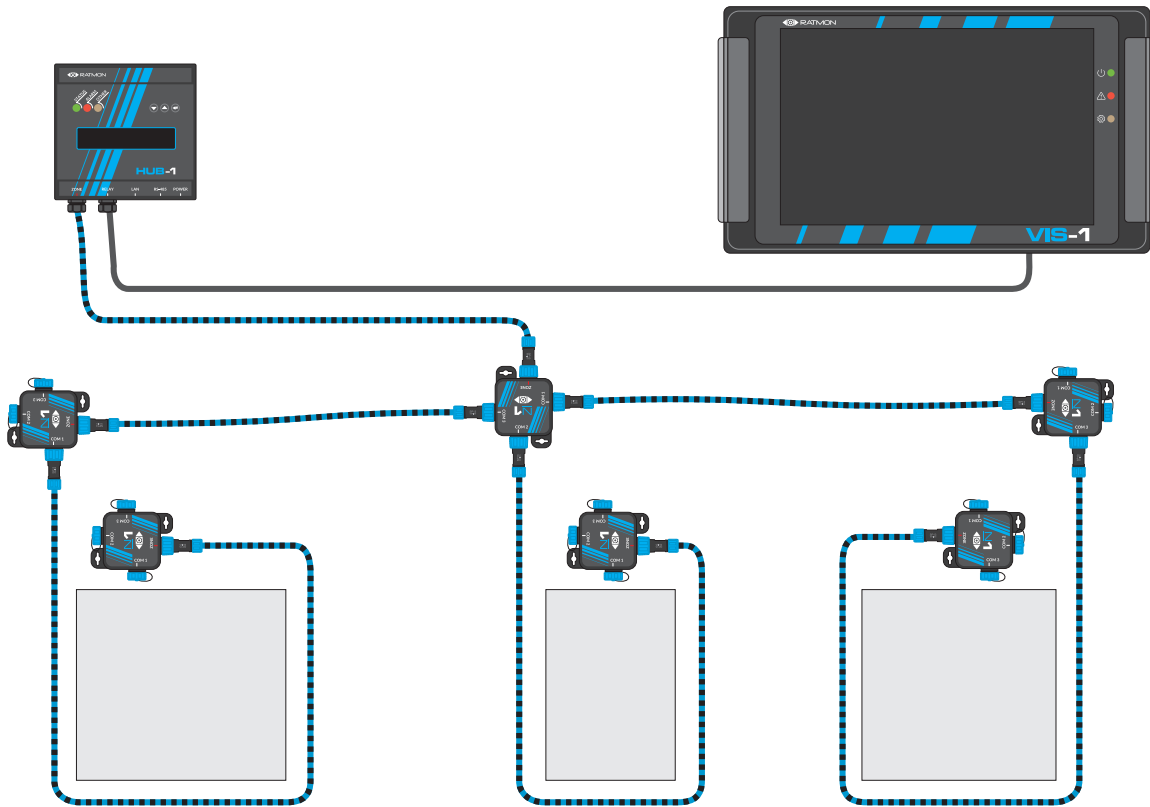
1. INTRODUCTION



1.1 Purpose of the document

This document describes the BLDS Building Leak Detection System, its components, architecture, and configuration.

1.2 System overview



BLDS is a modular liquid leak detection system designed for:

- data centers
- industrial installations
- HVAC systems
- technical rooms

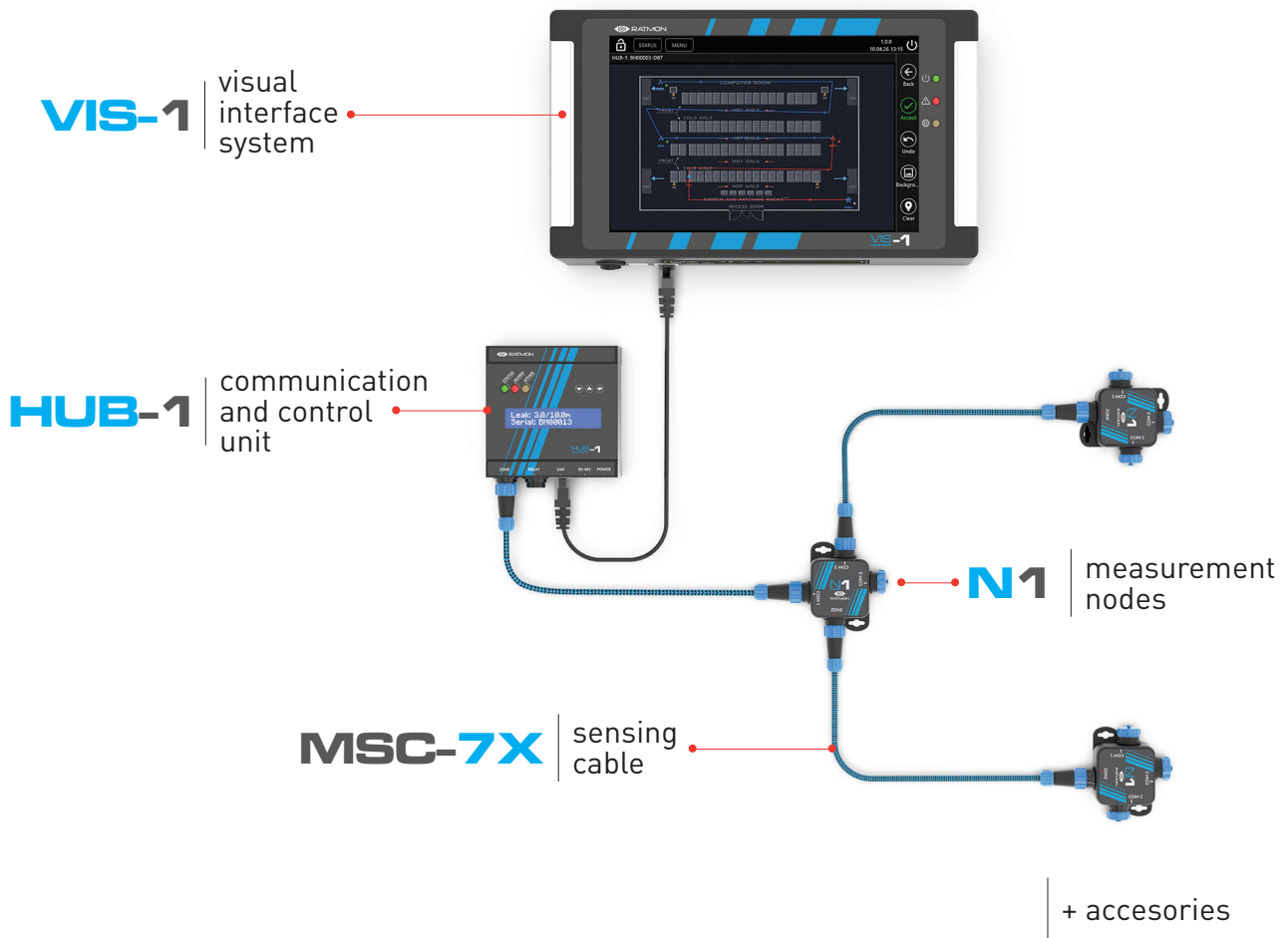
The system enables:

- leak detection
- leak localization (*up to 1 m accuracy*)
- alarm signaling
- remote monitoring and configuration

2. SYSTEM OVERVIEW

2.1 System architecture

The system consists of:



2.2 System architecture

- Communication type: Modbus TCP/IP / RTU
- Max number of devices in system:
 - each VIS-1 can supervise up to 250 HUB-1
 - each HUB supports up to 100 x N1
 - each N1 can support up to 50 m of cable

2.3 Key system capabilities

- Detection of liquid leaks
- Localization of leak position
- Multi-zone monitoring
- Remote access via web interface
- Integration with BMS/SCADA

3. PRODUCT OVERVIEW

3.1 Product list



VIS-1

Visual Interface System
central monitoring unit

Accessories:

- 12V power supply on din rail



HUB-1

Communication and alarm unit

Accessories

- 24v power supply on din rail
- PoE switch on din rail
- router on din rail
- RELAY cable (1 m) - features volt-free contacts



N1

Measurement node



MSC-7X

Leak detection cable

Accessories

- FH-7a
Single-Point Floor Holder Clip
- FH-7b
Double-Point Floor Holder Clip

4. SYSTEM COMPONENTS

4.1 VIS-1 – Visual Interface System



Description:

Central monitoring unit responsible for:

- collecting data from all connected HUBs
- visualization of zones
- system management
- displays the exact location on the floor plan within 1 m

Key features:

- Power supply: 12V / 2A
- Supports up to 250 HUB units
- Zone visualization and mapping
- Data aggregation
- 10 INCH LCD touch screen
- LED light

Working temperature: -20 °C / +70 °C

Housing: IP54

Dimensions: 300 x 170 x 90 mm

Weight: 3,2 kg

Interfaces: Ethernet / LAN - communication with HUB

Communication: MODBUS TCP/IP with HUBs

4.2 HUB-1



Description:	Main communication and alarm unit
Key features:	<ul style="list-style-type: none"> • Power supply: 24V / 1.5A or PoE+ • Web configurator • Communication: Modbus TCP/IP, RTU, RELAY • Supports up to 100 zones • Fast response time up to 10s • Din rail mount • „Buzzer”
Working temperature:	-20 °C / +70 °C
Housing:	IP54
Dimensions:	89 x 105 x 33 mm
Weight:	0,16 kg
Interfaces:	Ethernet / LAN - communication with HUB
Communication:	MODBUS TCP/IP with HUBs
Outputs:	Relay: Status, Alarm
LED indicators:	<p>Status – indicates the current state of the device</p> <p>Alarm – turns red when an alarm is detected</p> <p>Other – turns orange in case of a fault (e.g. short circuit)</p>
Functions:	<ul style="list-style-type: none"> • Data collection from nodes • Alarm displaying • Communication with VIS-1 or BMS/SCADA

4.3 N1 - Measurement Node



Description:	Sensor node responsible for leak detection in a single zone
Working temperature:	-20 °C / +70 °C
Housing:	IP67
Dimensions:	70 x 76 x 30 mm
Weight:	0,06 kg
Interfaces:	<ul style="list-style-type: none"> • ZONE – measurement input of the cable between two nodes • COM 1-3 – communication ports
Functions:	<ul style="list-style-type: none"> • Leak detection • Localization within zone with up to 1 m accuracy
Compatibility:	<ul style="list-style-type: none"> • Works with MSC-7X cable • Max measurement cable length up to 50 m

4.4 MSC-7X – Detection Cable



Description:	Leak detection and localization cable
Number of conductors:	7
Outer layer:	Polyester braid for mechanical protection
Connector:	IP67
Dimensions:	Cable diameter: 5 mm Connector diameter: 18 mm
Features:	<ul style="list-style-type: none"> • Detects liquid presence • Localization accuracy: up to 1 m
Available lengths per zone:	• 10 m • 25 m • 50 m

4.5 Accessories

The following accessories are available to support installation, mounting, and operation of the system.

FH-7a – Single-Point Floor Holder Clip



Function: Cable fixation, installation support.

Description: Single-point mounting clip designed for securing cables to the floor or flat surfaces.

Technical Data:

- Dimensions: 20 x 25 x 8 mm
- Weight: 2 g
- Material: ABS
- Mounting: Single screw mounting or double-side tape

FH-7b – Double-Point Floor Holder Clip



Function: Cable fixation, installation support.

Description: Double-point mounting clip providing enhanced stability for securing cables in fixed installations.

Technical Data:

- Dimensions: 20 x 40 x 8 mm
- Weight: 3 g
- Material: ABS
- Mounting: Two screw mounting or double-side tape

24 V Power Supply (DIN Rail Mounted)



Function: Power supply.

Description: DIN rail-mounted power supply unit providing 24 V DC output for system components.

Technical Data:

- Dimensions: 35 x 93 x 59 mm
- Weight: 190 g
- Material: Plastic
- Input voltage: 100-240 V AC
- Output voltage: 24 V DC
- Output power: 24 V
- Mounting: Standard DIN rail

12 V Power Supply (DIN Rail Mounted)



Function: Power supply.

Description: DIN rail-mounted power supply unit providing 12 V DC output.

Technical Data:

- Dimensions: 35 x 93 x 59 mm
- Weight: 200 g
- Material: Plastic
- Input voltage: 100-240 V AC
- Output voltage: 12 V DC
- Output power: 36 V
- Mounting: Standard DIN rail

PoE Switch (DIN Rail Mounted)



Function: Network communication, power distribution.

Description: Industrial PoE switch for data communication and power supply over Ethernet.

Technical Data:

- Ports: 8 PoE ports
- PoE standard: IEEE 802.3af/at
- Mounting: DIN rail
- Operating temperature: -40 °C to + 75 °C
- Dimensions: 113 x 41 x 75 mm
- Weight: 0,25 kg

Router (DIN Rail Mounted)



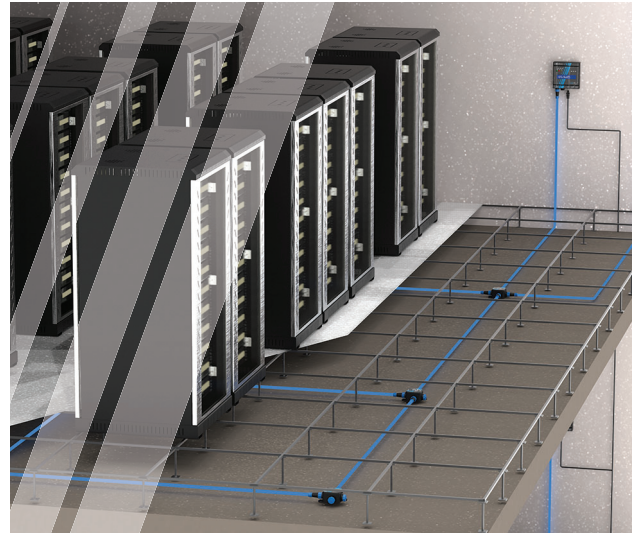
Function: Network connectivity.

Description: Industrial router providing network access and communication between system components.

Technical Data:

- Interfaces: 1 X WAN, 1 X LAN
- Mounting: DIN rail
- Power supply: 9-30 V DC
- Operating temperature: -40 °C to + 75 °C
- Dimensions: 123 x 69 x 25 mm
- Weight: 0,15 kg

5. SYSTEM OPERATION



5.1 Leak detection process

The leak detection process is performed automatically by the system and consists of the following steps:

1. Liquid comes into contact with 1. the sensing cable

When liquid reaches the sensing cable, its electrical properties change at the affected section.

2. The N1 unit detects the signal change

The N1 continuously monitors the connected sensing cable.

Any deviation from the normal electrical characteristics of the cable is recognized as a leak event. The N-1 unit detects the leak and precisely determines its location along the sensing cable.

3. The event is transmitted to the HUB-1

After detecting the leak, the N1 sends the event information to the HUB-1 for further processing.

4. The HUB-1 processes the event

The HUB-1 analyzes the received signal, identifies the alarm condition, and initiates the appropriate system response.

5. An alarm is triggered

Once the leak condition is confirmed, the system activates the alarm state.

This may include visual indication and transmission of alarm information to connected devices.

6. The VIS-1 displays the leak location

The VIS-1 visualizes the detected leak location on the system layout or building plan, allowing the operator to quickly identify the affected area.

5.2 Alarm handling

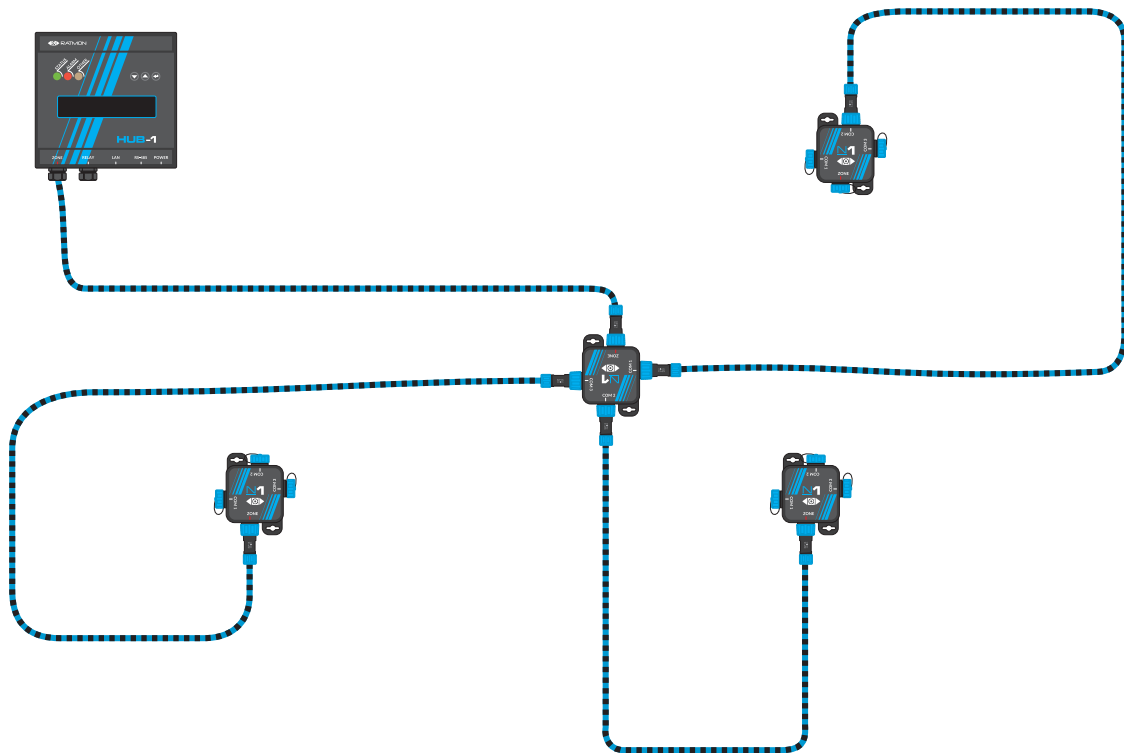
- Audible alarm (HUB-1)
- Visual LED indication on VIS-1 and HUB-1
- Relay and MODBUS TCP/IP or RTU information (HUB-1)

5.3 Fault detection

System detects:

- cable break
- leak
- short circuit

6. CONNECTION ARCHITECTURE



6.1 Basic connection

The system architecture is based on communication between the VIS-1, HUB-1, and N1 units, as well as direct connection to the sensing cable.

VIS-1 <-> HUB-1

The VIS-1 communicates with one or more HUB-1 units.

- **Communication type:** Modbus TCP/IP
- **Topology:** One-to-many (one VIS-1 to multiple HUBs)
- The VIS-1 acts as a supervisory interface, collecting data from all connected HUB units and visualizing system status and alarm locations.

HUB-1 <-> N1

The HUB-1 communicates with all N1 units within the network.

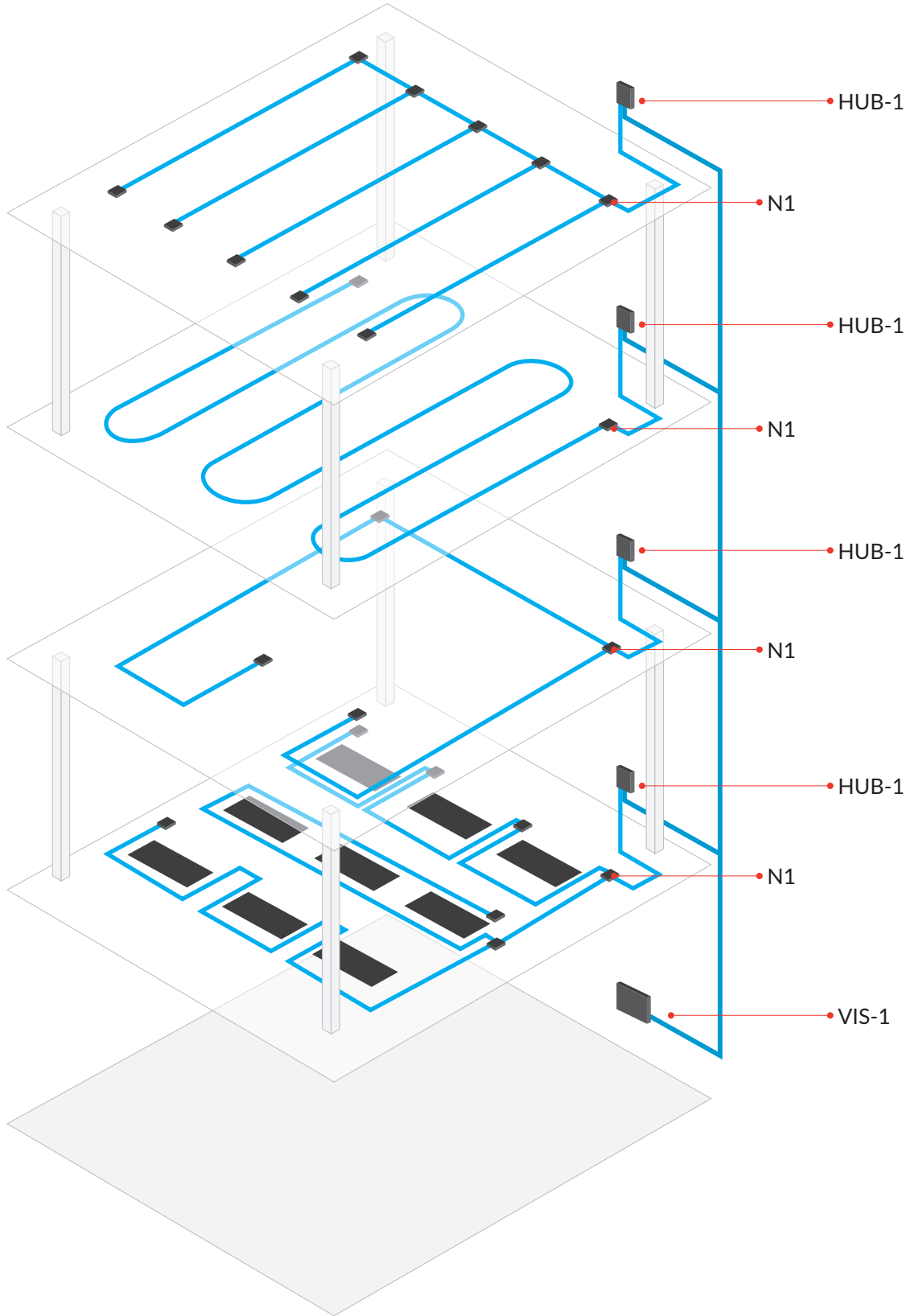
- The HUB-1 acts as a central controller, managing communication with connected N1 units.
- It collects measurement data, processes events, and forwards relevant information to the VIS-1 or BMS/SCADA.
- Multiple N1 units can be connected to a single HUB-1, depending on system configuration.

N1 <-> Sensing Cable

Each N1 unit is directly connected to a sensing cable.

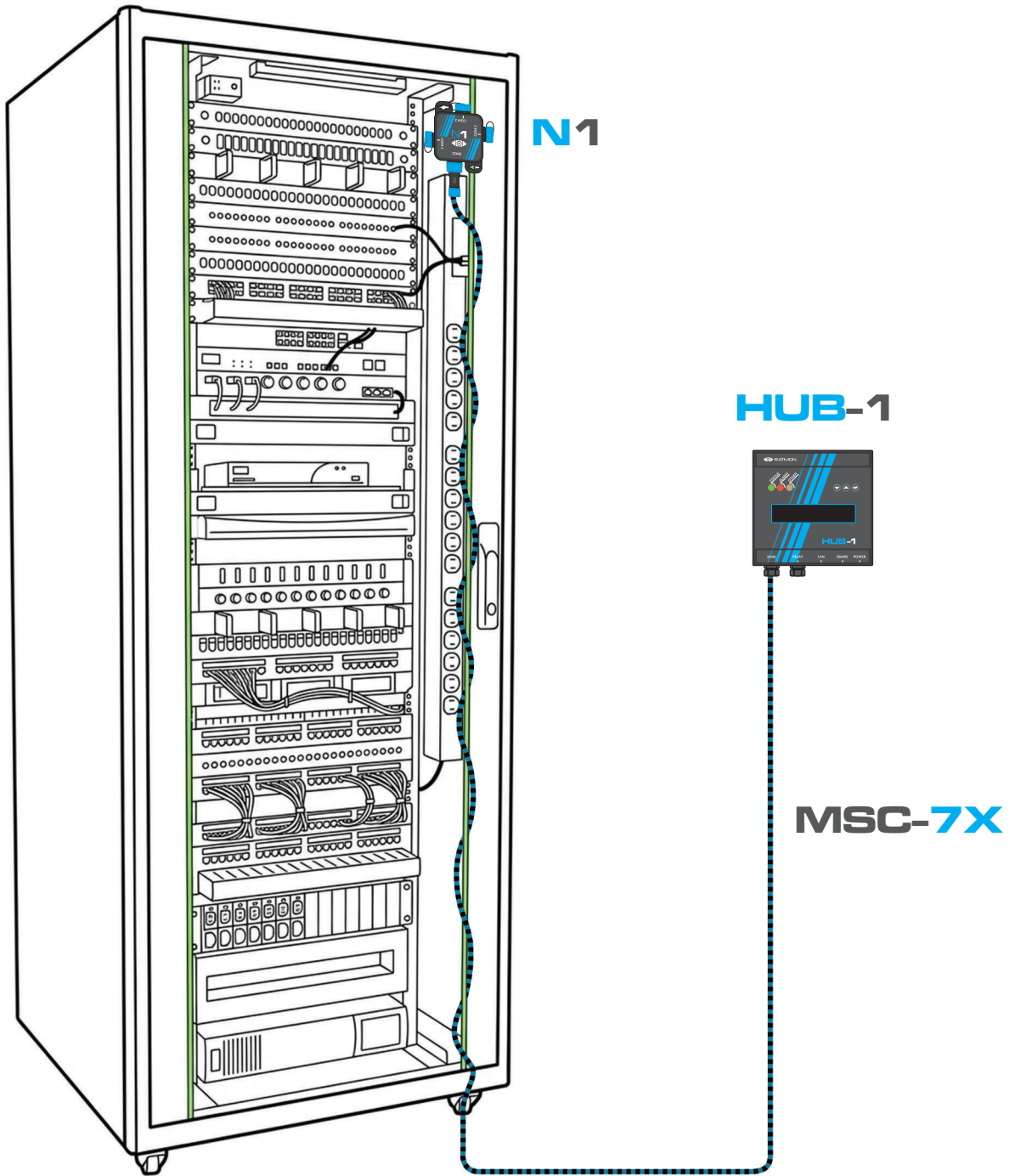
- Each N1 has a **single measurement connection** dedicated to one sensing cable.
- The sensing cable is used for continuous leak detection along its entire length.
- The N1 monitors the cable and detects as well as localizes leak events based on changes in its electrical characteristics.

6.2 Example configurations



6.3 Leak detection in server rack

Dedicated for liquid cooling fluids like PG25.



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