

Give Zabbix smell, touch and feel

Environment Monitoring in Server Rooms and Industry

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BV Grupa

Server hardware becomes more and more reliable – environment becomes a more important outage factor, all compliance rules include environmental factors

- Zabbix – typically IT infrastructure monitoring
- Current needs:
 - Server room: Power supply, HVAC, physical access, temperature, smoke, etc.
 - Industrial IT: Sensors beyond traditional needs
 - Business process monitoring
 - Including human factor in monitoring (people movement/tampering/actions)
 - IOT, and other

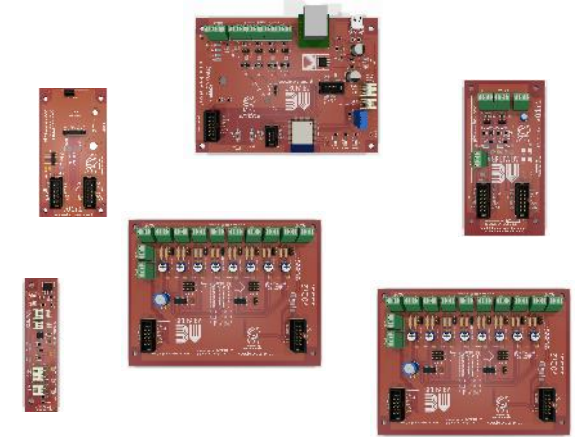
With the help of a little bit of custom hardware, or innovative thinking

...

Zabbix can be used in situations far beyond typical IT infrastructure monitoring.

- Innovative Zabbix implementations
- A custom hardware system dedicated for integrating Zabbix with external sources
- Use cases

Zabbix hardware system

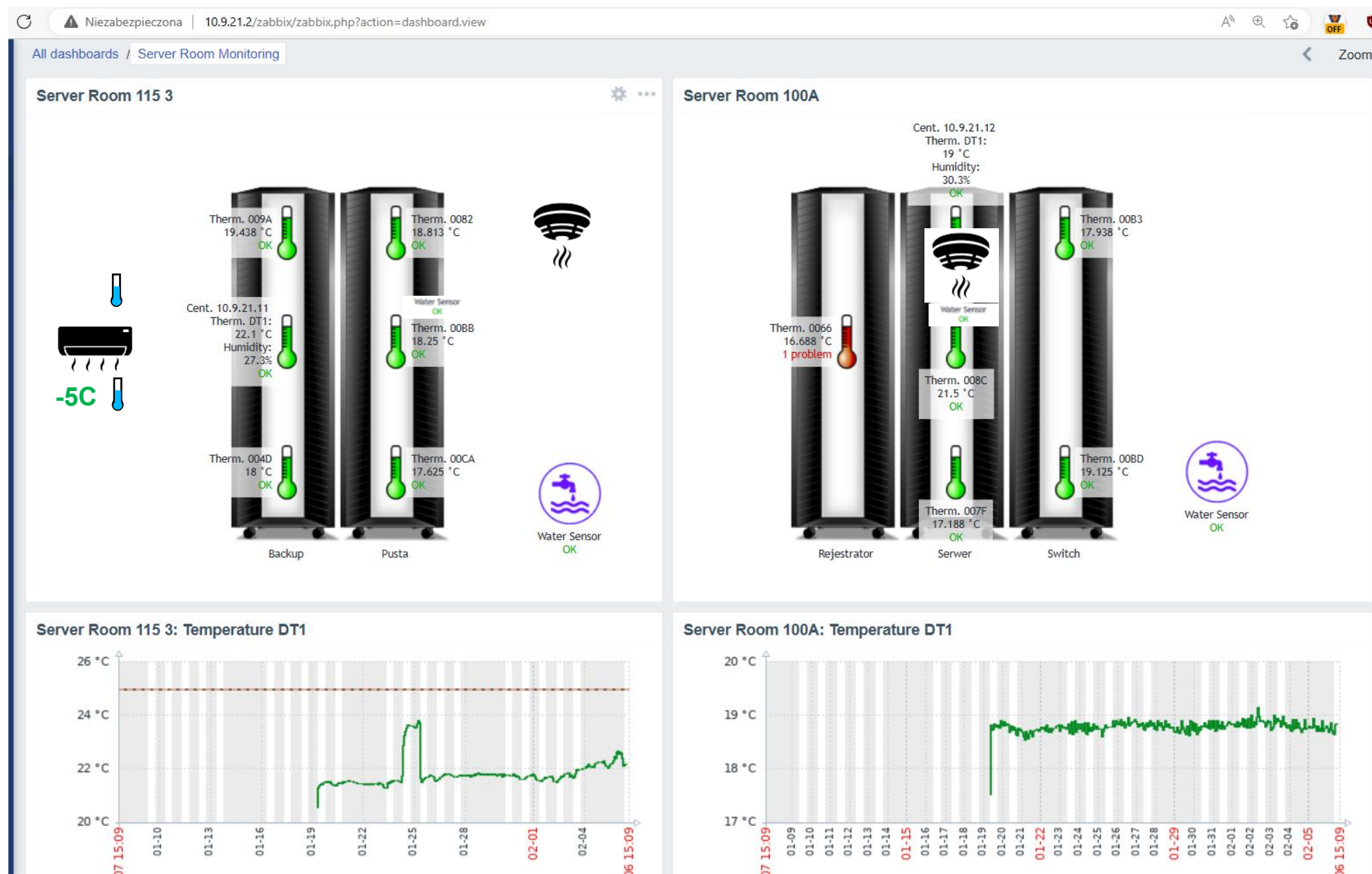


- Manufactured and designed in the EU by BV Grupa
- Adding full non-IT environment monitoring capabilities to Zabbix
- Allowing users to connect sensors, machines, digital inputs, outputs, etc. to Zabbix
- Designed for Zabbix (out-of-the-box compatible)

What can it be used for?

- Environment and industrial monitoring
 - Temperature, pressure, humidity, level of gases in atmosphere, level of liquids in tanks, etc.
- IOT monitoring
 - Alarm, HVAC, building automation systems, etc.
- Energetic system monitoring
 - Energy counters, Energy flow (several parameters), SLA, redundancy, availability, state of infrastructure (generators, batteries, compensators, transformers)
- Human workflow monitoring
 - How many cases on which stage / in which status
 - Productivity of factory workers

Zabbix dashboard:

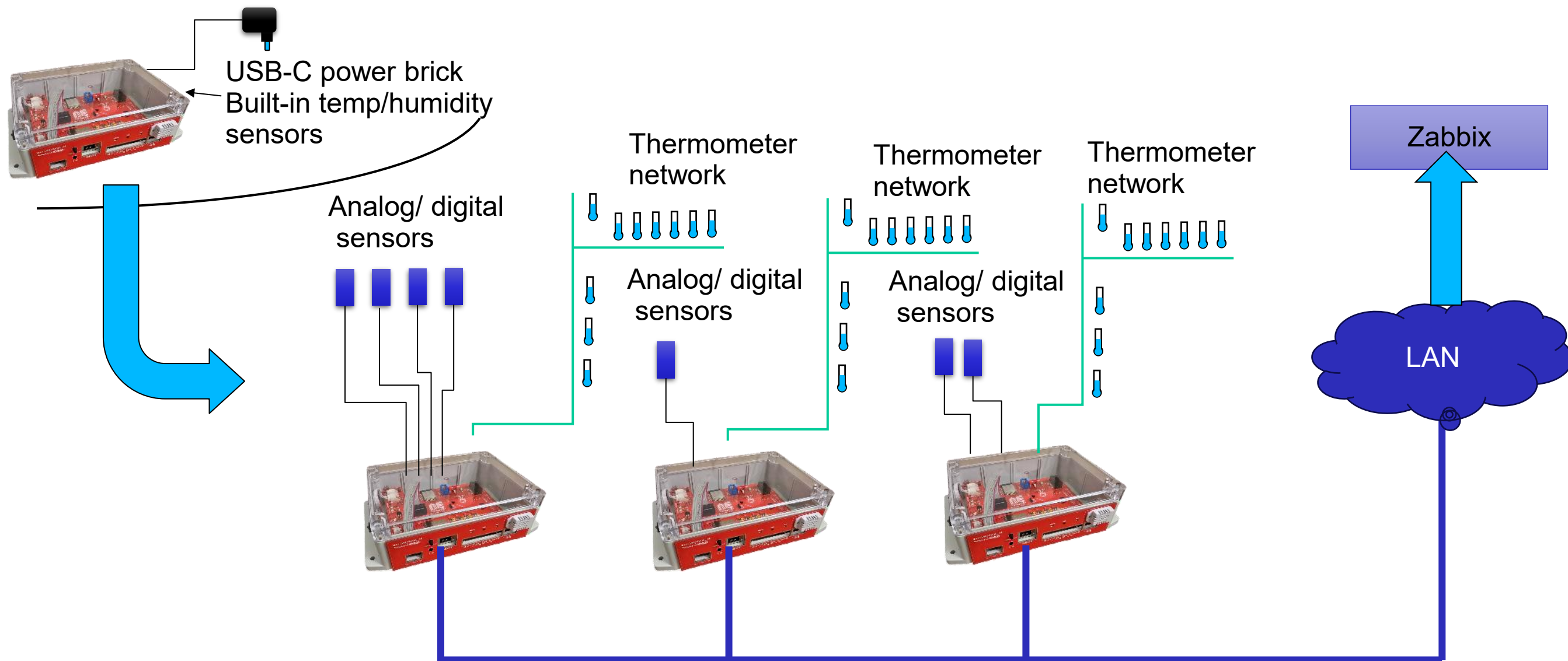


Ethernet, WiFi and LoRa versions

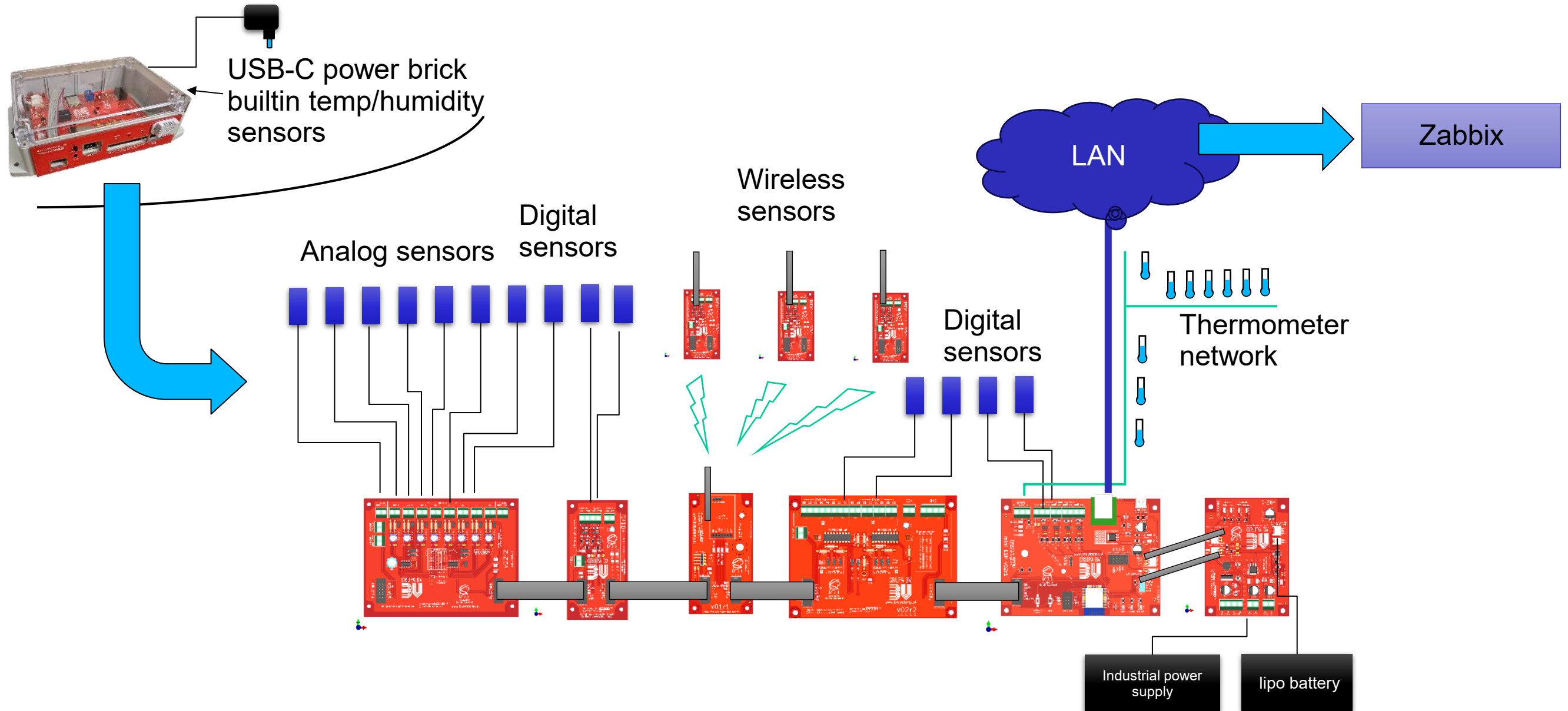


Everything you need to monitor a mall server room in one kit

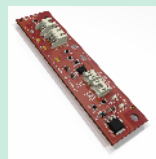
Scaling from a single board to a large server room / industrial installation



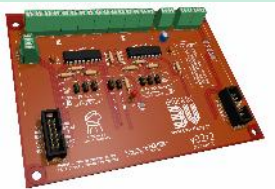
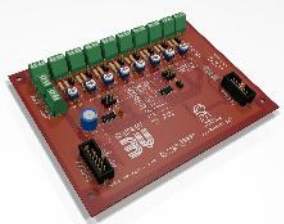
Scaling from a single board to a large server room / industrial installation



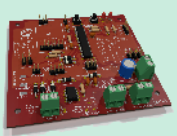
Ecosystem: Main boards + accessories

Board	Photo	Purpose	Remarks
Black-Box Micro		Ready solution for small server room monitoring. Built-in: 4 x digital inputs and humidity/temperature sensor + up to 20 external thermometers. Non-expandable. Power option: USB-C, WiFi, or Ethernet version	Comes with case, ready to use.
Mainboard Standard		4 x digital inputs, built-in humidity/temperature sensor, thermometer network input (up to 30 external thermometers), expandable, Power options: USB-C, battery module and external power supply, 1x analog/battery level input. Ethernet or WiFi version	Comes with small case for standalone installation or big industrial case if expanders needed
Battery charger module		LiPo / LiIon battery charger module for battery backup power. Can be installed in small case.	
External power supply module		Industrial type 6-24V power supply board including LiPo / LiIon battery charger module for battery backup power.	

Ecosystem: extension boards

Board	Photo	Purpose	Remarks
2x non-isolated digital inputs		D5+D6 or D7+D8 settable by jumpers. Adds 2 extra digital inputs to board.	Up to 2 per system. Cannot be used together with wireless sensors.
8x optoisolated digital inputs		8 x optoisolated digital inputs. Multiple expanders can be installed simultaneously.	Up to 64 digital inputs on expansion boards can be installed in one system in any combination.
16 x non-isolated digital inputs		16x non-isolated unprotected digital inputs. Pullup option, 3V3 and 5V compatible	See above
8 x analog inputs		8 x differential analog inputs. Settable as: Direct inputs (up to 2V) or with built-in voltage divider up to 48V. Can be used for 4..20mA current loop sensors.	Up to 64 analog inputs on expansion boards can be installed in one system.

sensors

Board	Photo	Purpose	Remarks
Leak sensor (water presence)		For leak detection in server rooms, etc.	Each sensor uses 1 digital input
Smoke/fire detector		8 x optoisolated digital inputs. Multiple expanders can be installed simultaneously.	Each sensor uses 1 digital input
Voltage presence detector		16x non-isolated unprotected digital inputs. Pullup option, 3V3 and 5V compatible.	Uses 1 digital input
Power quality sensor		110/230V AC mains sensor measuring voltage, and quality parameters like %THD etc.	* Availability fall 2025
High voltage sensor		Pulse voltage measurement up to 10,000V. Can be used for electric fence monitoring. Wireless, battery operated. Range up to 10km	Uses 4 wireless sensor slots.
Custom sensors		We can design and manufacture any type of sensor	

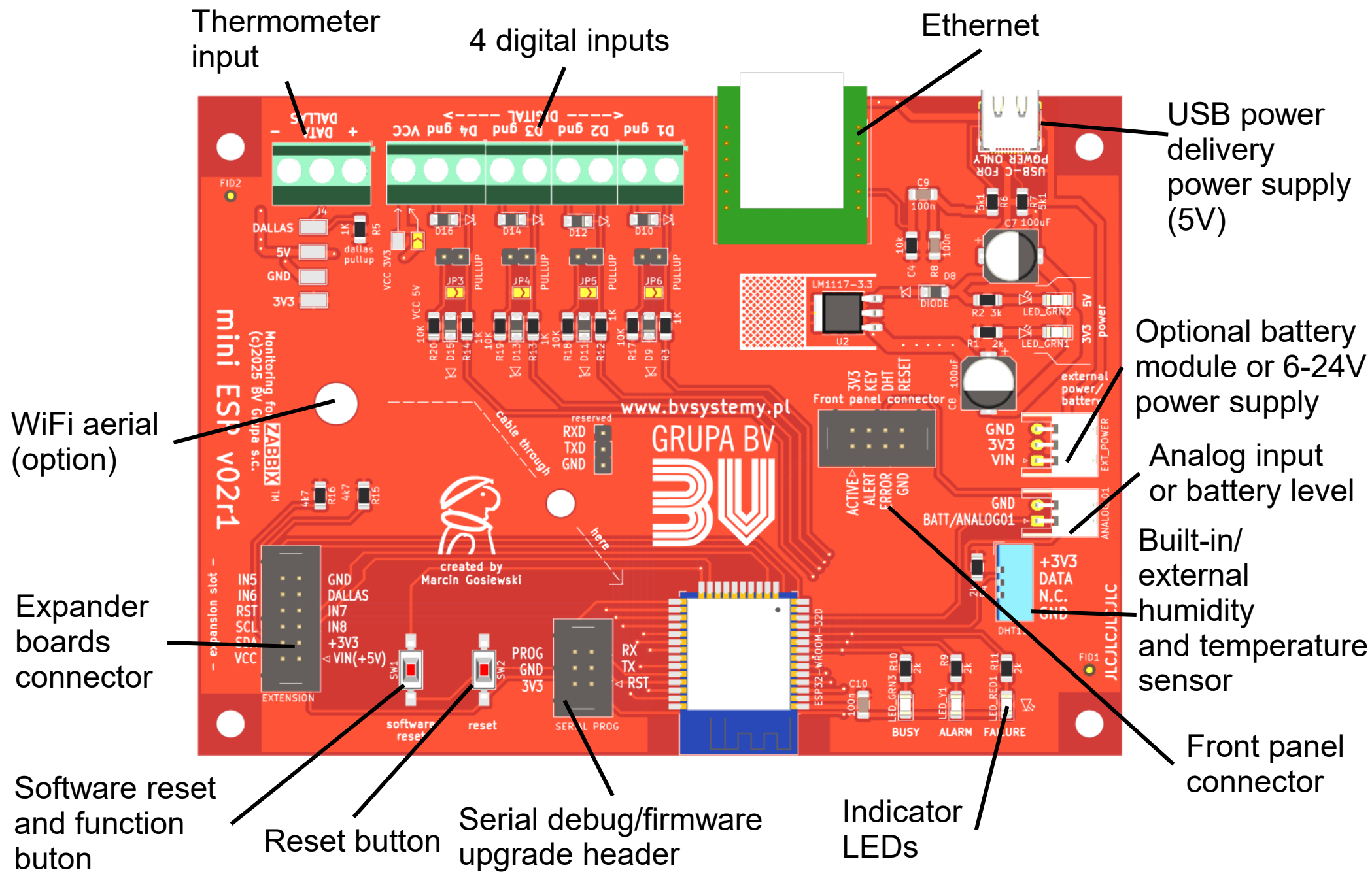
Maximum system configuration

A single mainboard can be equipped with:

- 70 digital inputs
 - 4 x built-in, 4 on small expanders, 64 on large expander boards
- 65 analog inputs
 - 1 x built-in, 64 on expander boards
- 31 thermometers
 - 1x built-in, 30 on cable
- 1 humidity sensor (built-in)
- Multiple wireless sensors
- I2C and / or RS-232/RS-485 sensors
- Industrial power supply, battery, JTAG board, and more...

You can install multiple mainboards but each will use one IP address.

Mini board



Assumptions:

- Self-documenting system
- Autoconfiguration
- All sensor **names** should appear in Zabbix
- Minimal configuration effort
- Self-diagnostic and reliability

Discovery rules

✓

Discovery rule updated

[All templates](#) / [IOT BVMonitoring Environment Mo...](#)
[Items 12](#)
[Triggers 6](#)
[Graphs 2](#)
[Dashboards 1](#)
[Discovery rules 6](#)
[Web scena](#)

Host groups

Select

Type

all

Templates

IOT BVMonitoring Environment Monitoring BV G...

×

Select

Update interval

Name

Keep lost resources period

Key

Apply

Reset

☐ Template	Name ▲	Items	Triggers	Graphs
☐ IOT BVMonitoring Environment Monitoring BV Grupa	Discover analog	Item prototypes 1	Trigger prototypes	Graph prototypes 1
☐ IOT BVMonitoring Environment Monitoring BV Grupa	Discover digital	Item prototypes 1	Trigger prototypes 1	Graph prototypes
☐ IOT BVMonitoring Environment Monitoring BV Grupa	Discover humidity sensors	Item prototypes 1	Trigger prototypes	Graph prototypes 1
☐ IOT BVMonitoring Environment Monitoring BV Grupa	Discover humidity sensors v2	Item prototypes	Trigger prototypes	Graph prototypes
☐ IOT BVMonitoring Environment Monitoring BV Grupa	Discover output	Item prototypes 1	Trigger prototypes 1	Graph prototypes
☐ IOT BVMonitoring Environment Monitoring BV Grupa	Discover thermometers	Item prototypes 1	Trigger prototypes	Graph prototypes 1

Configuration in Zabbix

- 1. Configure device and test connected sensors

BV Monitoring for Zabbix

App Version: 1.1 Hardware Version: NODEMCU Compilation Date: Jul 8 2024 00:52:44

Free Memory (kB): 261 Free Stack (bytes): 4996 Flash Free (kB): 1024

Mac address: 78:21:84:80:41:10 Error Code: 0 since 12h 50m 33s Alert Code: 0 since 12h 50m 33s

Uptime: 0d 12h 50m 33s

Current state: NO_ERRORS
Error history: NO_ERRORS

SENSORS SETTINGS SENSORS SETUP DEBUG INFO MAINTENANCE CLEAR ERRORS HELP HIDE STATUS

Host name: BVMonitoring

Mac address:

☒ custom 78 21 84 80 41 10

☐ default - 78:21:84:32:E8:17

☐ DHCP ☒ Static IP address

IP: 10.0.22.1

Gateway: 10.0.0.1

Subnet mask: 255.255.0.0

Primary DNS: 10.0.0.31

Secondary DNS: 8.8.4.4

8.07.2024 13:49:05

10.0.22.1/setup

Current state: ERROR_DALLAS_MISSING, ALERT_DHT11_READ_TEMP, ALERT_DHT11_READ_HUMIDITY
Error history: ERROR_DALLAS_MISSING, ALERT_DHT11_READ_TEMP, ALERT_DHT11_READ_HUMIDITY

SENSORS SETTINGS SENSORS SETUP DEBUG INFO MAINTENANCE CLEAR ERRORS HELP

SHOW STATUS

Sensor values					
dht11					
name	address	value	status	error %	
dht_temp	DHT0	nan	● Alert	1	
dht_humidity	DHT1	nan	● Alert	1	

dallas					
name	address	value	status	error %	
Serwerownia1	286006C210220B45	-127.00	● Missing	1	
Serwerownia2	28388FD60B00003F	22.19	● OK	0	
Serwerownia3	280AC99A21230B71	-127.00	● Missing	1	
28FA548310220B42	28FA548310220B42	-127.00	● Missing	1	
T28EE60292E1601AE	28EE60292E1601AE	22.13	● OK	0	
T28EEFA4B2E160133	28EEFA4B2E160133	21.94	● OK	0	
T28EED65D2E1601DB	28EED65D2E1601DB	22.19	● OK	0	
T28EE77560E1601B4	28EE77560E1601B4	22.19	● OK	0	

8.07.2024 13:51:46

- 2. Assign meaningful names for sensors (will be used in Zabbix items)

SENSORS	SETTINGS	SENSORS SETUP	DEBUG INFO	MAINTENANCE	CLEAR ERRORS	HELP	SHOW STATUS
dallas							
Enabled	Name	Address	Detected	Status			
☒	Serwerownia1	286006C210220B45		OK			
☒	Serwerownia2	28388FD60B00003F		OK			
☒	Serwerownia3	280AC99A21230B71		OK			
☒	28FA548310220B42	28FA548310220B42		OK			
☒	T28EE60292E1601AE	28EE60292E1601AE		OK			
☒	T28EEFA4B2E160133	28EEFA4B2E160133		OK			
☒	T28EEFA4B2E160133	28EEFA4B2E160133		OK			

Zabbix side: 1) Template

- Download and install template:

IOT BVMonitoring Environment Monitoring BV Grupa

The screenshot shows the Zabbix 'Templates' page. At the top right, there are buttons for 'Create template' and 'Import'. A blue arrow points to the 'Import' button. Below these buttons is a search bar with a 'Filter' icon. The main form contains fields for 'Host groups' (with a search input 'type here to search' and a 'Select' button), 'Linked templates' (with a search input 'type here to search' and a 'Select' button), and 'Name' (with the value 'environment'). There are also 'Tags' and 'Add' options. Below the form are 'Apply' and 'Reset' buttons. At the bottom, there is a table with columns: Name, Hosts, Items, Triggers, Graphs, Dashboards, Discovery, Web, Linked templates, Linked to templates, and Tags. The first row shows the template 'IOT BVMonitoring Environment Monitoring BV Grupa' with 5 hosts, 12 items, 6 triggers, 2 graphs, 1 dashboard, and 6 discovery scripts. It also shows tags 'class: IOT' and 'target: BVMonitoring'. A blue arrow points to the 'Name' column header. The bottom right corner indicates 'Displaying 1 of 1 found'.

Name ▲	Hosts	Items	Triggers	Graphs	Dashboards	Discovery	Web	Linked templates	Linked to templates	Tags
IOT BVMonitoring Environment Monitoring BV Grupa	Hosts 5	Items 12	Triggers 6	Graphs 2	Dashboards 1	Discovery 6	Web			class: IOT IOT target: BVMonitoring ...

Displaying 1 of 1 found

- Create host, add interface address:

Hosts

All hosts / Ogródowa BV New Environment M... Enabled ZBX Items 70 Triggers 30 Graphs 25 Discovery rules 6 Web scenarios

Host Templates 2 IPMI Tags 4 Macros 1 Inventory Encryption Value mapping

* Host name

Visible name

* Groups
type here to search

Interfaces	Type	IP address	DNS name	Connect to	Port
Agent		10.0.22.1		<input checked="" type="button" value="IP"/> DNS	10050

[Add](#)

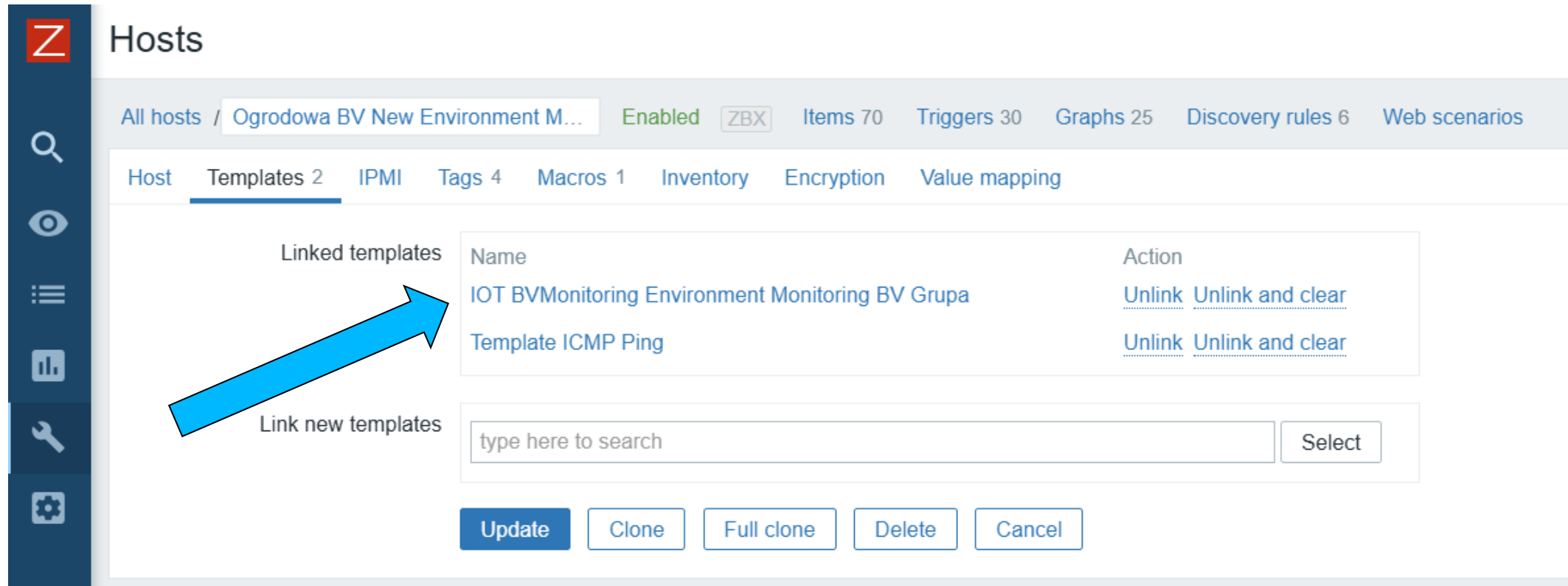
Description

Monitored by proxy

Enabled ☒

port not used

- Link template to added host



The screenshot shows the Zabbix web interface for a host configuration. The left sidebar contains navigation icons. The main content area is titled 'Hosts' and shows the configuration for 'Ogrodowa BV New Environment M...'. The 'Templates' tab is selected, showing a list of linked templates. A blue arrow points from the 'Link new templates' section to the 'Linked templates' table.

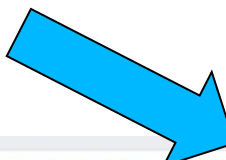
Name	Action
IOT BVMonitoring Environment Monitoring BV Grupa	Unlink Unlink and clear
Template ICMP Ping	Unlink Unlink and clear

Link new templates

type here to search [Select](#)

[Update](#) [Clone](#) [Full clone](#) [Delete](#) [Cancel](#)

- Wait for autodiscovery. Some sensor types can be unsupported if they are not connected:

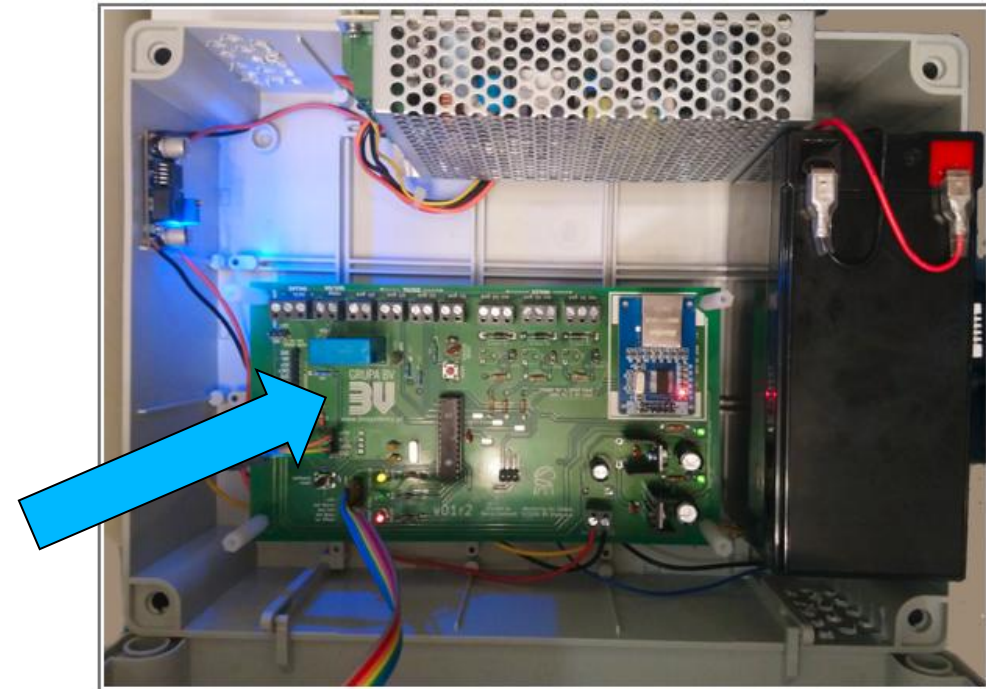


☐	Host	Name ▼	Items	Triggers	Graphs	Hosts	Key	Interval	Type	Status	Info
☐	Ogrodowa BV New Environment Monitoring Test	IOT BVMonitoring: Discover thermometers	Item prototypes 1	Trigger prototypes	Graph prototypes 1	Host prototypes	bvmonitoring.discover.thermo meters	3m	HTTP agent	Enabled	
☐	Ogrodowa BV New Environment Monitoring Test	IOT BVMonitoring: Discover output	Item prototypes 1	Trigger prototypes 1	Graph prototypes	Host prototypes	bvmonitoring.discover.output	3m	HTTP agent	Not supported	
☐	Ogrodowa BV New Environment Monitoring Test	IOT BVMonitoring: Discover humidity sensors	Item prototypes 1	Trigger prototypes	Graph prototypes 1	Host prototypes	bvmonitoring.discover.humidit y sensors	3m	HTTP agent	Enabled	
☐	Ogrodowa BV New Environment Monitoring Test	IOT BVMonitoring: Discover digital	Item prototypes 1	Trigger prototypes 1	Graph prototypes	Host prototypes	bvmonitoring.discover.digital	3m	HTTP agent	Enabled	
☐	Ogrodowa BV New Environment Monitoring Test	IOT BVMonitoring: Discover analog	Item prototypes 1	Trigger prototypes	Graph prototypes 1	Host prototypes	bvmonitoring.discover.analog	2m	HTTP agent	Not supported	

Displaying 5 of 5 found

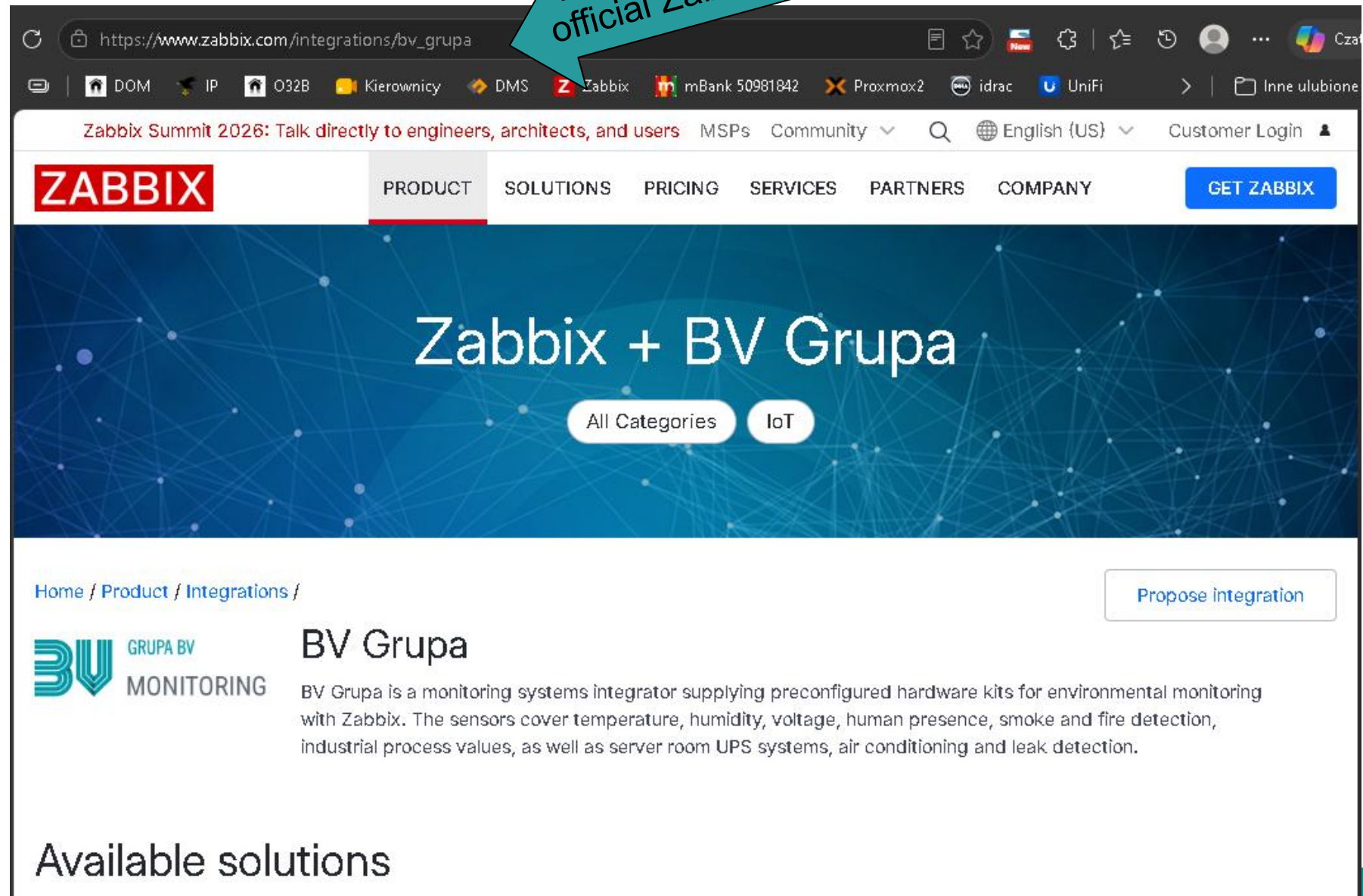
Advantages

- The only solution with Zabbix in mind from the design stage
- Very scalable horizontally or vertically
- Without a need of electric / mechanical skills (any IT guy can install)
- Easily serviceable (schematics and application binaries available for external repair personnel)
- Self documenting (no hidden layers)
- With self diagnostics
- Customizable (we can add customer specific functionalities)
- Mature solution



Official Zabbix Partnership

- Zabbix is an official partner of BV Grupa
- Templates available via Zabbix web page
- We ensure forward compatibility



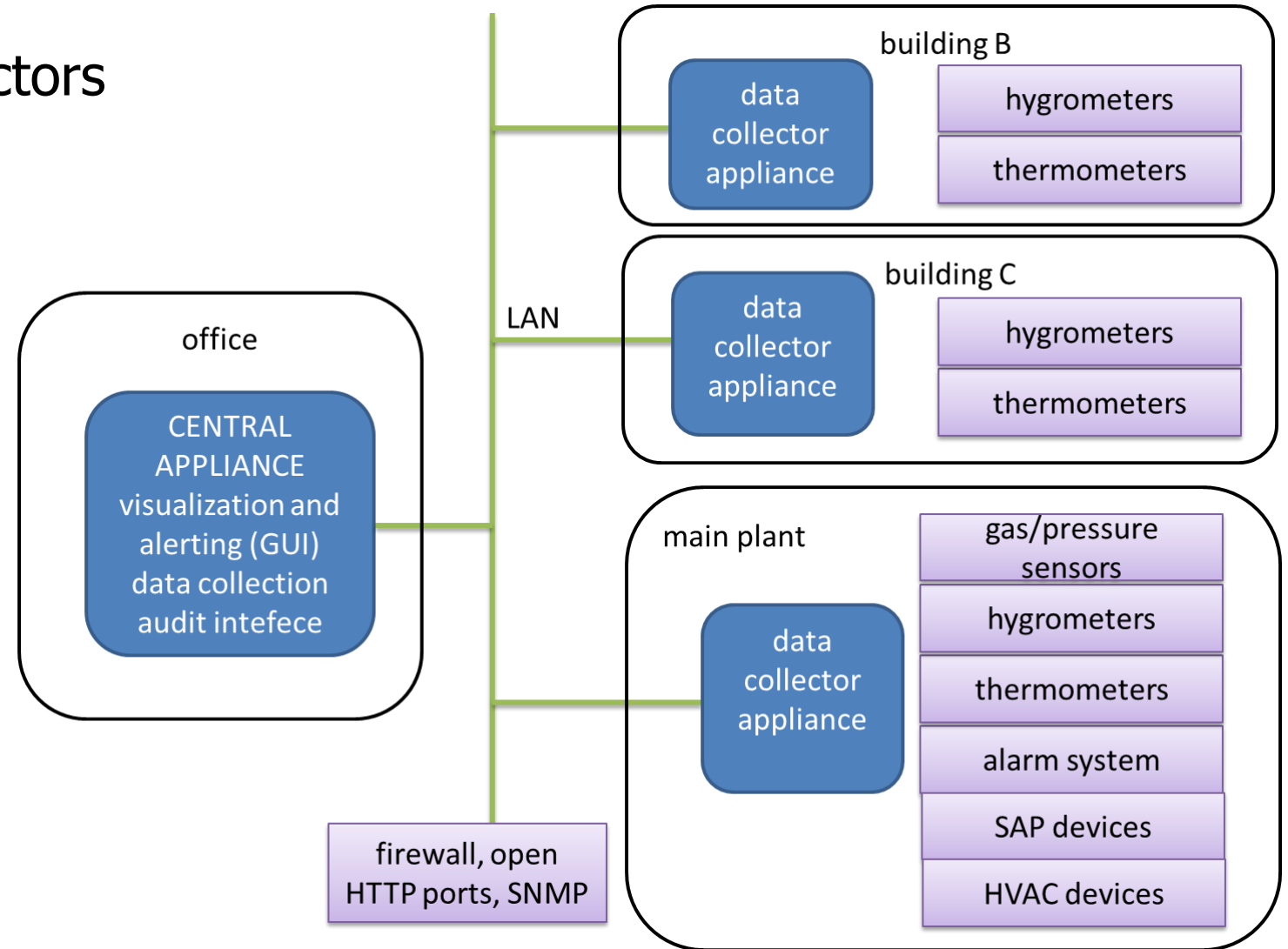
The screenshot shows the Zabbix website at the URL https://www.zabbix.com/integrations/bv_grupa. A teal arrow points to the URL bar with the text "official Zabbix site". The website features a navigation bar with links to ZABBIX, PRODUCT, SOLUTIONS, PRICING, SERVICES, PARTNERS, and COMPANY, along with a "GET ZABBIX" button. The main header displays "Zabbix + BV Grupa" with buttons for "All Categories" and "IoT". The breadcrumb trail reads "Home / Product / Integrations /". The BV Grupa logo is shown next to the text "BV Grupa". Below this, a description states: "BV Grupa is a monitoring systems integrator supplying preconfigured hardware kits for environmental monitoring with Zabbix. The sensors cover temperature, humidity, voltage, human presence, smoke and fire detection, industrial process values, as well as server room UPS systems, air conditioning and leak detection." A "Propose integration" button is located in the top right corner. The section "Available solutions" is partially visible at the bottom.

Hardware solution – usage scenarios

- Server room monitoring:
 - Temperature and humidity (outside servers)
 - State of AC / HVAC devices (real unreported state)
 - State of power management infrastructure elements (real presence of power at PDU level)
 - Integration with access control
 - Integration with security (personnel presence detection)
 - Water presence on the floor (leak detection)

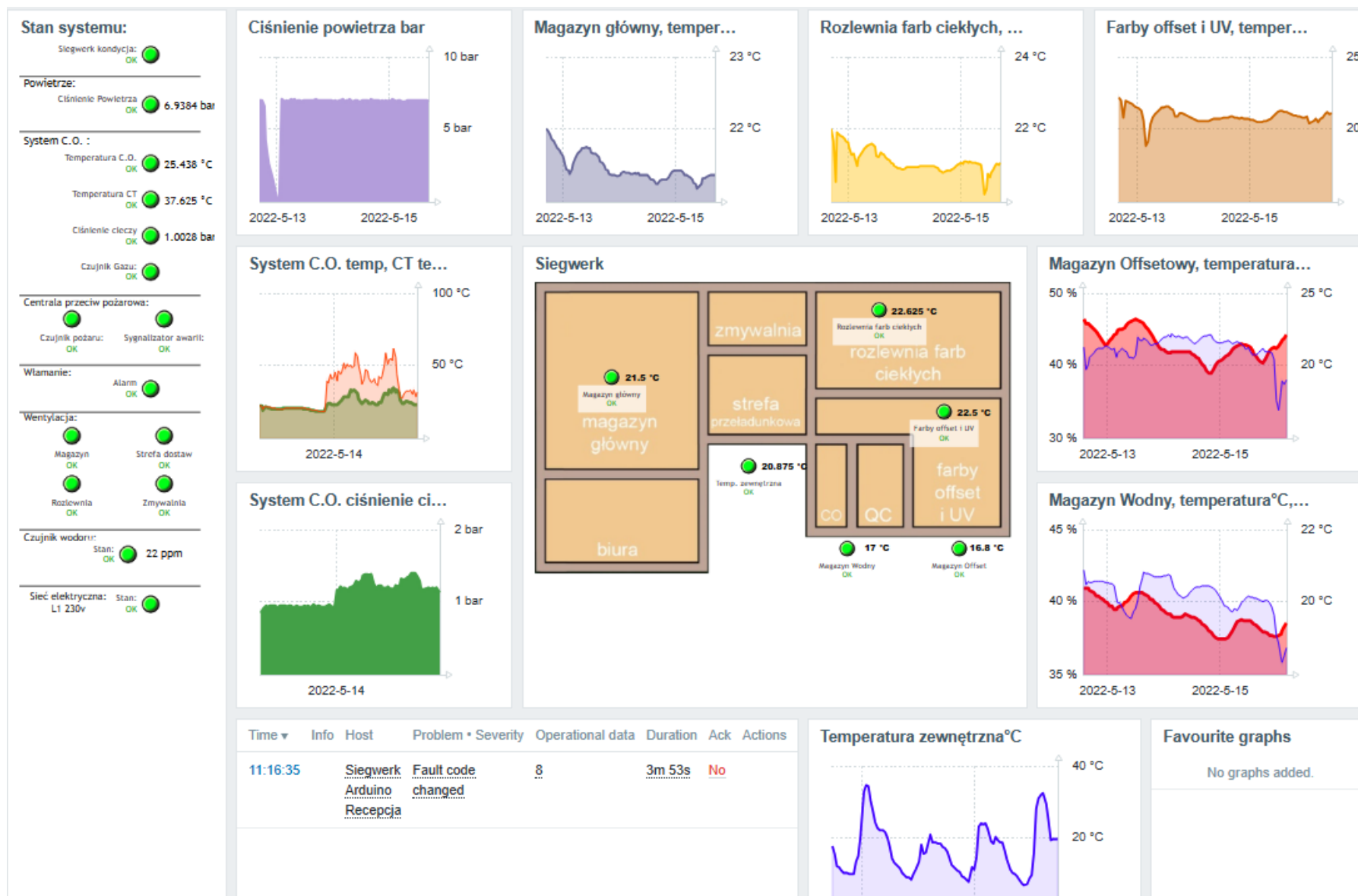
Industrial paints factory

- Hardware appliances as data collectors
- HVAC integration
- Alarm system integration
- Gas pressure
- Hydrogen level
- Heating system integration
- Alarm correlations:
low external temperature +
(low heating pressure | temp)
= alarm ...





Industrial paints factory environment monitoring



- Industrial paints factory:
- Items mostly from autodiscovery

☐	Discover thermometers: Thermometer - Serwerownia2	bvmonitoring.thermometer. [Serwerownia2]	3m	90d	365d	HTTP agent	Enabled	Application: Thermom...
☐	Discover thermometers: Thermometer - Serwerownia1	bvmonitoring.thermometer. [Serwerownia1]	3m	90d	365d	HTTP agent	Enabled	Application: Thermom...
☐	Discover thermometers: Thermometer - 28FA548310220B42	bvmonitoring.thermometer. [28FA548310220B42]	3m	90d	365d	HTTP agent	Enabled	Application: Thermom...
☐	... IOT BVMonitoring Environment Monitoring BV Grupa:	bvmonitoring.sys.version	1h	90d		HTTP	Enabled	application: system

- Item names given in device configuration visible for Zabbix operator/administrator

Use case: Energy monitoring

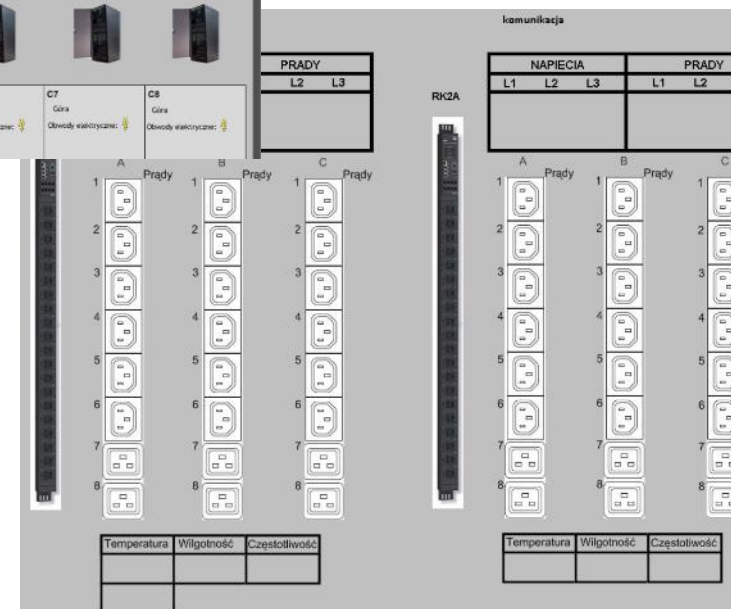
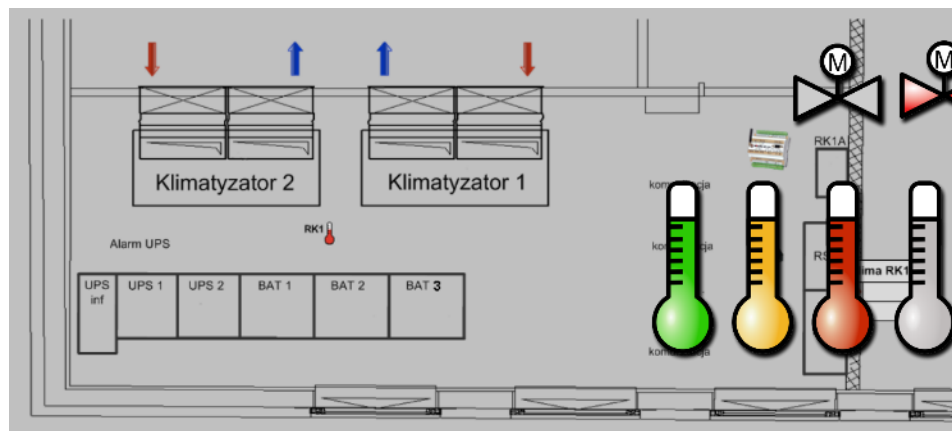
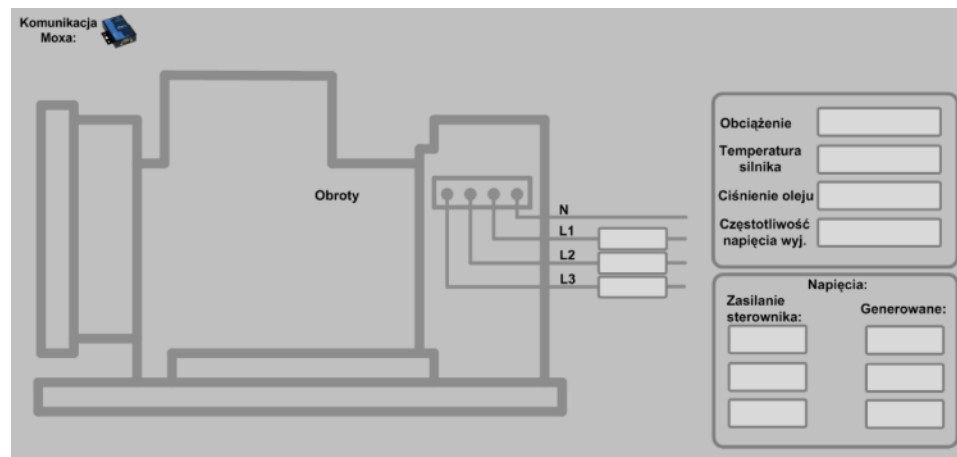
- Critical infrastructure organization in Poland
- A couple of server rooms in separate buildings
- 2 independent power sources dedicated to this organization (high voltage)
- Zabbix used for monitoring of all critical environment elements:
 - 100's of power infrastructure parameters (ups systems, energetic lines, generators, energy meters, etc.)
 - HVAC systems
 - Environment (over 100 measurement points of temperatures, humidities, leak detection, etc.)
 - Building automation systems (integration with KNX)
 - Ca 15 BV Grupa devices, 30-40 other devices connected

Really large project



Use case: Energy monitoring

- Zabbix maps examples:
(without data due to NDA)
- Over 40 maps, dashboards



- Worker efficiency on production line (custom package production)
- Monitoring of package sorting machines at courier service
 - both (vibration, etc.)
 - ... and human behavior (are output slots full?)

Questions?



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