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User Manual

BKT EMS Environmental Condition Monitoring System

Version 6

Table of contents

Warning:
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

1 OVERVIEW

The BKT EMS system is designed to monitor environmental parameters (temperature, humidity, etc.) in a telecommunications cabinet or small rooms. Its purpose is to warn users about possible emergency situations and report any failures. The single system controller can support: up to 4 analogue sensors, 4 sensors with potential-free contacts and two signalling devices. With expansion modules there are up to 28 analogue sensors, 68 sensors with potential-free contacts, up to 20 1-wire sensors can be supported. To keep a satisfactory system performance, it is not recommended to connect more than 40 sensors to the controller.

2 SYSTEM COMPONENTS

2.1 EC335 controller

Hardware	
Analogue inputs	4 inputs (RJ12 sockets) for compatible analogue sensors. Any combination of 4 sensors can be connected to the device. Some sensors can be connected in stacks. The type of a sensor is detected automatically.
Inputs for potential-free contacts	4 inputs (removable 6-pin terminal strip) for any sensors with potential-free contacts
Outputs	2x 12V/250mA voltage outputs (removable 3-pin terminal strip)
CAN connector	Connector (RJ12 socket) for up to 8 extension modules for additional analogue EE321 inputs and additional EE322 inputs for potential-free contacts
Other connectors	10/100Mbps (RJ45 socket) Ethernet port, USB 2.0 port (Mini-B socket)
Other	Optional card of a GSM module.
Power supply	External 12V/1A plug adapter, power consumption ≤ 10W
Dimensions	206x80x33 (width x depth x height)
Operating conditions	Temperature: 0°C - 60°C, Humidity: 0% - 90% RH (no condensation)
Storage conditions	Temperature: -25°C - 85°C, Humidity: 0% - 95% RH (no condensation)
Weight	1200g
Index	122EC003352
Software	
Operating system	Linux
Configuration	Through a web interface
Supported protocols	HTTP, HTTPS, PING, DHCP, RADIUS, SYSLOG, FTP, SNTP, SMTP, SNMP (v1,v2c,v3)
Alarm notification	E-mail, SNMP trap, internet SMS gateway, SMS (optionally with GSM modem)

2.2 Analogue sensors

Any sensors from the table below can be connected to 4 analogue inputs (A1-A4) of the controller or inputs (A1-A8) in additional EE321 extension modules (extension module with additional 8 analogue inputs). One controller can support up to 28 analogue sensors. If longer than included cable is needed, it is a UTP Cat5e cable suggested wit terminated RJ14 (6P4C) plugs. Warning: some analogue sensors eg. ES363 require 6-wire cable terminated with RJ12 (6P6C) cable

Type	Description	Index
 Front Rear	**ES350** – Temperature sensor Measurement range: -10°C - +100°C Measurement uncertainty: ±1°C Measurement resolution: 0,1°C Power consumption: 60mW Connectors: 1x RJ12 socket Cable: RJ14(6P4C)-RJ14(6P4C), included 2m, maximum allowed length of a connection cable: 100m Dimensions: 60x18x18	122ES003500
 Front Rear	**ES351** – Humidity sensor Measurement range: 0% - 100% RH Measurement uncertainty: ±5% RH for 10% - 95% RH Measurement resolution: 0,01% RH Power consumption: 60mW Connectors: 1x RJ12 socket Cable: RJ14(6P4C)-RJ14(6P4C) included 2m, maximum allowed length of a connection cable: 50m Dimensions: 60x18x18	122ES003510
	**ES352** – 230V AC voltage sensor Measurement range: 90VAC - 250VAC Power consumption: 60mW Connectors: 1x USB-A socket Cable: USB-A-RJ14(6P4C) included 1,8m, maximum allowed length of a connection cable: 100m Dimensions: 63x66x30	122ES003520
 Front Rear	**ES353** – Door sensor (reed relay + magnet) Stack connection of up to 10 sensors Power consumption: 60mW Connectors: 2x RJ12 socket Cable: RJ14(6P4C)-RJ14(6P4C) included 2m, maximum allowed length of a connection cable: 150m Dimensions: 60x18x18	122ES003530
 Front Rear	**ES354** – Vibration sensor Stack connection of up to 10 sensors Power consumption: 60mW Connectors: 2x RJ12 socket Cable: RJ14(6P4C)-RJ14(6P4C) included 2m, maximum allowed length of a connection cable: 150m Dimensions: 60x18x18	122ES003540
	**ES356** – Optical smoke sensor Stack connection of up to 10 sensors Power consumption: 100mW Connectors: 2x RJ12 socket Cable: RJ14(6P4C)-RJ14(6P4C) included 2m, maximum allowed length of a connection cable: 150m Dimensions: ϕ100x45	122ES003560
	**ES357** – Passive infrared sensor Movement detection range: 100° x 12m Power consumption: 100mW Connectors: 2m long cable from the casing, terminated with a RJ14 (6P4C) plug, maximum allowed length of a connection cable: 50m Dimensions: 105x57x40	122ES003570
	**ES358** – External temperature sensor Measurement range: -40°C - +100°C Measurement uncertainty: ±1°C Measurement resolution: 0,1°C Power consumption: 60mW Connectors: 15m long cable from the casing, terminated with a RJ14 (6P4C) plug, maximum allowed length of a connection cable: 100m Dimensions: ϕ7x30 + 15 m cable	122ES003580

	**ES359** – Flood sensor Detection delay: 1s, Power consumption: 60mW, Dimensions: 60x18x18 Connectors: 2m long cable from the casing, terminated with a RJ14 (6P4C) plug, maximum allowed length of a connection cable: 100m WARNING: The sensor should be mounted in such a way that the liquid touches only to the metal contacts during flooding. Liquid entering the sensor housing will damage it.	122ES003590
 Front Rear	**ES360** – Flood sensor for a water detection cable Detection delay: 15s Power consumption: 60mW Connectors: 1x RJ12 socket, 1x 2pin terminal block for ES361 wire Cable: RJ14(6P4C)-RJ14(6P4C) included 2m, maximum allowed length of a connection cable: 100m Dimensions: 60x18x18	122ES003600
	**ES361** – Sensor detecting water and other conductive liquids An ES360 sensor is required for connection Connector: 1x 2pin terminal block for connecting to ES360 Dimensions: ϕ3 Available lengths: 6m, 10m, 17m, 25m, 50m	122ES003610
 Front Rear	**ES362** - 4-20mA sensor Any sensors with 4-20mA output can be connected to the controller. Galvanic insulation 1kV between the input and the output. Measurement uncertainty: 2% (0,4mA) Measurement resolution: 0,1mA Power consumption: 100mW Input voltage: 5V Maximal input current: 24mA Connectors: 1x RJ12 socket, 1x 2pin terminal block for 4-20mA sensor Cable: RJ14(6P4C)-RJ14(6P4C) included 2m, maximum allowed length of a connection cable: 50m Dimensions: 60x18x18	122ES003620
 Front Rear	**ES363** - 75V DC voltage sensor Galvanic insulation 1kV between the input and the output. Measurement range: 0VDC - 75VDC Measurement uncertainty: ±1% (0,75V) Measurement resolution: 0,1V Power consumption: 100mW Connectors: 1x RJ12 socket, 1x 2pin terminal block as DC voltage input Cable: RJ12(6P6C)-RJ12(6P6C) included 2m, maximum allowed length of a connection cable: 50m Dimensions: 60x18x18	122ES003630

2.3 1-wire digital sensors

The 1-wire sensors can be connected to the controller only via an additional EE323 extension module (1-wire module). The 1-wire is a serial bus and allows connecting sensors in a daisy chain (from sensor to sensor). One controller can support up to 20 1-wire sensors. The length of the 1-wire bus should not exceed 100m. It is a UTP Cat5e suggested as a 1-wire bus cable. The 1-wire bus is not immune to external interference, therefore it is not recommended for use in an environment with strong sources of interference.

Type	Description	Index
 Front Rear NOTE: Sensor available until December 2020	**ES365** - 1-wire temperature sensor Measurement range: -50…+105°C Measurement uncertainty: ±0,5°C at T=-10…+85°C; ±1°C at T=-30…+100°C Measurement resolution: 0,01°C Possibility to connect up to 20 sensors in a daisy chain Power consumption: 20mW Connectors: 2x RJ9 socket Cable: RJ9(4P4C)-RJ9(4P4C), included 2m, maximum allowed length of 1-wire bus: 100m Dimensions: 60x18x18	122ES003650

	**ES366** - Outdoor 1-wire temperature sensor Measurement range: -50…+105°C Measurement uncertainty: ±0,5°C at T=-10…+85°C; ±1°C at T=-30…+100°C Measurement resolution: 0,01°C Power consumption: 20mW Connectors: 1x RJ9 plug Cable: included 15m of cable terminated with RJ9(4P4C) plug, maximum allowed length of 1-wire bus: 100m Dimensions: ϕ7x30 + 15m cable	122ES003660

2.4 CAN digital sensors

These sensors are connected to the CAN interface of the EC335 4DC controller. The CAN interface is a serial bus and allows connecting devices in a daisy chain (from device to device). A maximum of 8 devices can be connected to the controller via the CAN interface. The length of the CAN bus should not exceed 200m. It is a UTP Cat 5e suggested as a CAN bus cable.

Type	Description	Index
	**ES340** - Integrated smoke, humidity, temperature sensors; CAN bus Temperature measurement range: -10 - +85°C Measurement uncertainty: ±0,5°C Measurement resolution: 0,1°C Humidity measurement range: 0% - 100% RH Measurement uncertainty: ±3% RH for 10-95% RH Measurement resolution: 1% RH Possibility to connect up to 8 devices in a daisy chain (sensor has 2 CAN ports) Power consumption: 1000mW Connectors: 2x RJ12 socket of CAN bus Cable: RJ12(6P4C)-RJ12(6P4C), included 2m, maximum allowed length of CAN bus: 200m Dimensions: ϕ100x45	122ES003400

2.5 Extension modules and accessories

Expansion modules increase the number of available ports for sensors connected to one controller. The EE321 and EE322 modules must be connected to the CAN interface of the EC335 4DC controller. The CAN interface is a serial bus and allows connecting in a daisy chain (from device to device). A maximum of 8 devices can be connected to the controller via the CAN interface. The length of the CAN bus should not exceed 200m. It is a UTP Cat5e suggested as a CAN bus cable. The EE323 module is to be mounted inside the controller. This module provides a 1-wire bus for up to 20 1-wire sensors. The length of the 1-wire bus should not exceed 100m. It is a UTP Cat5e suggested as a 1-wire bus cable.

Type	Description	Index
 Front  Rear	**EE321** – Extension module with additional 8 analogue inputs. The module is connected to a CAN controller connector. The controller supports up to 3 EE321 devices. The module has no 19” brackets. Connectors: 2x RJ12 socket of CAN bus, 8xRJ12(6P6C) for analogue sensors, power socket 12V@1A Dimensions: 110x68x40	122EE003210
 Front  Rear	**EE322** – Extension module with additional 32 inputs for potential-free contacts. The module is connected to a CAN controller connector. The controller supports up to 32 inputs of potential-free contacts. 19” brackets included. Connectors: 2x RJ12 socket of CAN bus, 32 terminal blocks for potential-free contacts Dimensions: 215x40x40	122EE003220

	**EE323** – 1-wire extension module The module is mounted inside the controller. Connectors: 1x RJ9(4P4C) socket Dimensions: 44x23x15 The module is supplied with a ribbon connection cable and set of screws for mounting in the controller housing.	122EE003230
	**EE324** – Modbus RTU module The module is mounted inside the controller. Connectors: 3pin terminal block Dimensions 44x23x13 The module is supplied with a ribbon connection cable and set of screws for mounting in the controller housing.	122EE003240
 Front Rear	**EA313** - Relay 30VDC/5A Maximal contact voltage: 30VDC Maximal contact load: 5A Coil voltage: 12VDC Dimensions: 60x18x18	122EA003130
	**EA314** – 1U 19" bracket for EC335 (index 122EC003352) Dimensions: 482x44x80	122EA003140
	**EA315** – Light signal Flashing frequency: 1Hz Power supply 12V, 80mA Connectors: 1x 2pin terminal block Cable: 1.5m 2-wire cable included Dimensions: ϕ73x45	122EA003150
	**EA316** – 1U 19'' bracket for 3xEE321 Dimensions: 482x44x80	122EA003160
	**EA317** - GSM modem for EC3xx Dimensions: 60x50x15 A modem for SMS communication operating in GSM 850/900/1800/1900 MHz networks. The modem is supplied with a set of screws for mounting in the controller housing.	122EA003170
	**EA318** - 125kHz card reader with 1-wire interface. Dimensions: 82x82x22 UNIQUE 125kHz card reader. The reader has a 1-wire interface for communication with the controller. To connect to the controller, the EE323 module - 1-wire expansion module is required.	122EA003180

3 SYSTEM STRUCTURE

3.1 Number of sensors and wiring

In order to maintain optimal system performance, the number of sensors supported by the controller should be limited to 40.

NOTE: Use only the original cables supplied with the sensor or the UTP cat.5e cable when a longer cable is required.

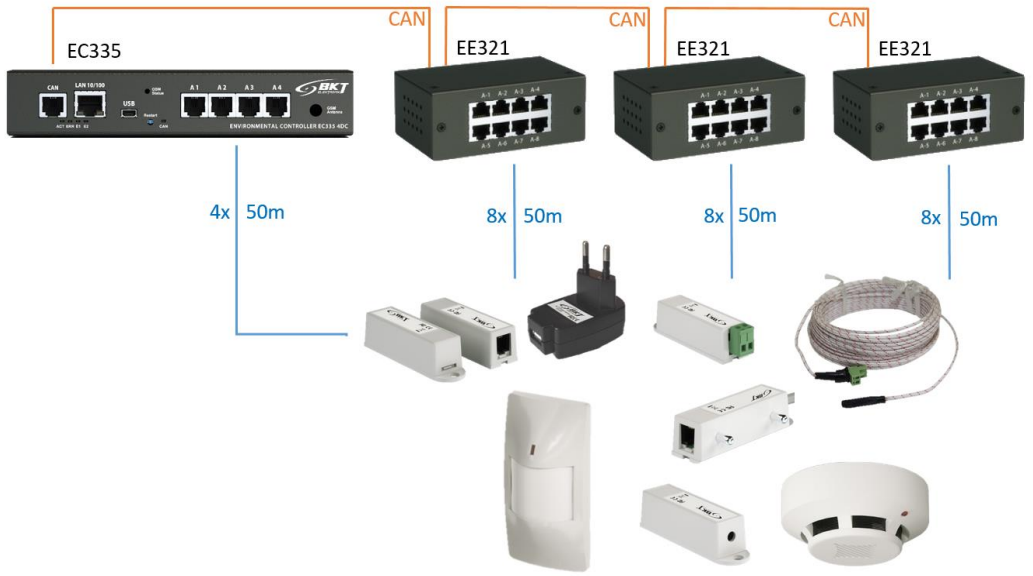
<table>
<tr><th>Device connected to the EC335 controller</th><th>Restrictions</th><th>Type of connection cable</th><th>Maximum cable length</th></tr>
<tr><td>All sensors</td><td>Maximum 40 sensor of any type</td><td></td><td></td></tr>
<tr><td>Analogue sensors</td><td>Up to 28 analogue sensors of any type connected directly to the controller and via extension modules EE321.</td><td>UTP kat5e with RJ14 (6P4C) -RJ14 (6P4C) connectors
 

1 NC
2 12V
3 Sensor detection
4 Signal output
5 GND
6 NC
For the ES363 sensor, use UTP kat5e cable with RJ12 (6P6C) -RJ12 (6P6C) connectors
 
</td><td>A minimum of 50m. See the description of individual sensors 2.2 Analogue sensors</td></tr>
<tr><td>CAN devices</td><td>Up to 8 CAN devices (up to 3x EE321 and up to 2x EE322 and up to 8x ES340).</td><td>UTP kat5e with RJ14 (6P4C) -RJ14 (6P4C) connectors
 
</td><td>The entire bus is up to 200m.</td></tr>
<tr><td>1-wire devices</td><td>Maximum 1 extension 1-wire module EE323 and 20 1-wire temperature sensors.</td><td>UTP cat5e with RJ9 (4P4C) -RJ9 (4P4C) connectors
 

1 NC
2 1-wire
3 5V
4 GND</td><td>The entire bus is up to 100m, but shorter may be required, depending on the level of electromagnetic interference in the installation environment.</td></tr>
<tr><td>Sensors with potential-free contacts</td><td>Up to 68 sensors with potential-free contacts connected directly to the controller and via the EE322 extension modules. It should be assumed that each sensor with a potential-free output loads the controller as much as 0.5 analogue sensor.</td><td>UTP Cat 5e or other with 0.5mm wire diameter</td><td>50m for each sensor.</td></tr>
</table>

3.2 Example 1. Extension modules EE321

Up to three EE321 modules (extension module with an additional 8 analogue inputs) can be connected to one controller.



CAN bus terminator must be enabled

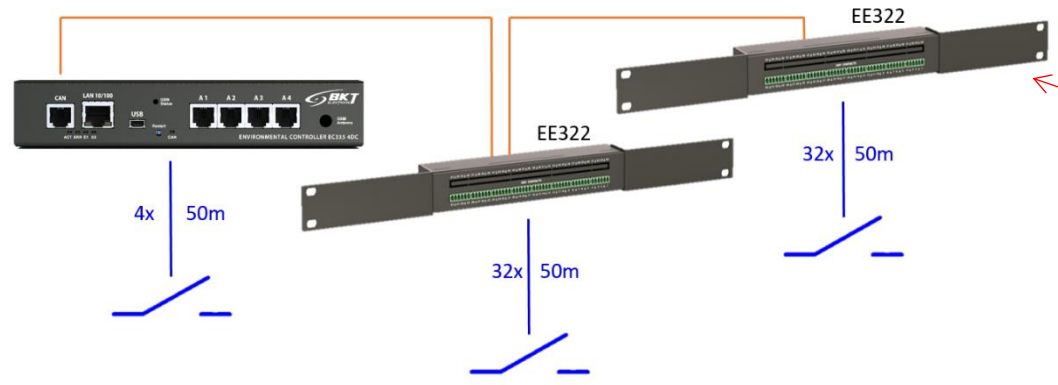
The CAN bus connection, the length of the entire bus is up to 200m

The connection of an analogue sensor, the length for each sensor: minimum 50m

Sensor type	Number of sensors as a load for the controller
Analogue sensors connected directly to the controller	4
Analogue sensors connected via EE321 extension modules	24
Total	28

3.3 Example 2. Extension modules EE322

A maximum of two EE322 modules (extension module with an additional 32 inputs for potential-free contacts) can be connected to one controller. It should be assumed that each sensor with a potential-free output loads the controller as much as 0.5 analogue sensors.



CAN bus terminator must be enabled

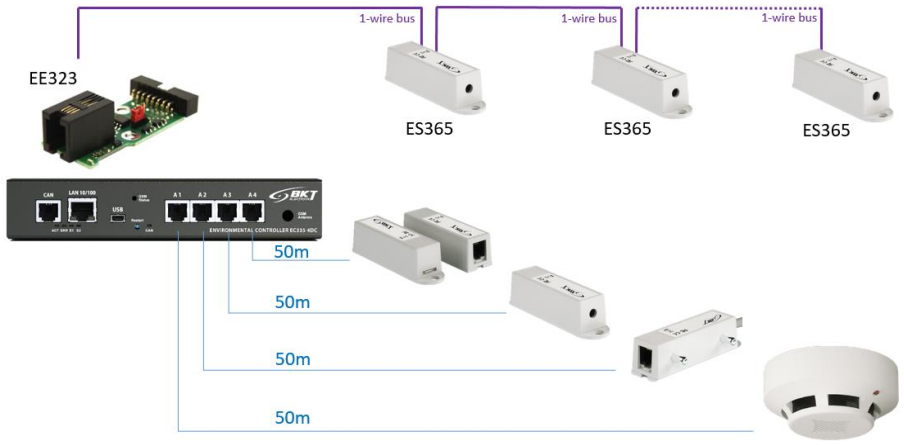
The CAN bus connection, the length of the entire bus is up to 200m

The connection of sensors with potential-free contacts. Cable length for each connection up to 50m.

Sensor type	Number of sensors as a load for the controller
Sensors with potential-free contacts connected directly to the controller	2 (in real 4)
Sensors with potential-free contacts connected via EE322 extension modules	32 (in real 64)
Total	34

3.4 Example 3. Extension modules EE323

A maximum of one EE323 module (1-wire expansion module) can be connected to one controller, which enables connection of up to 20 1-wire temperature sensors.



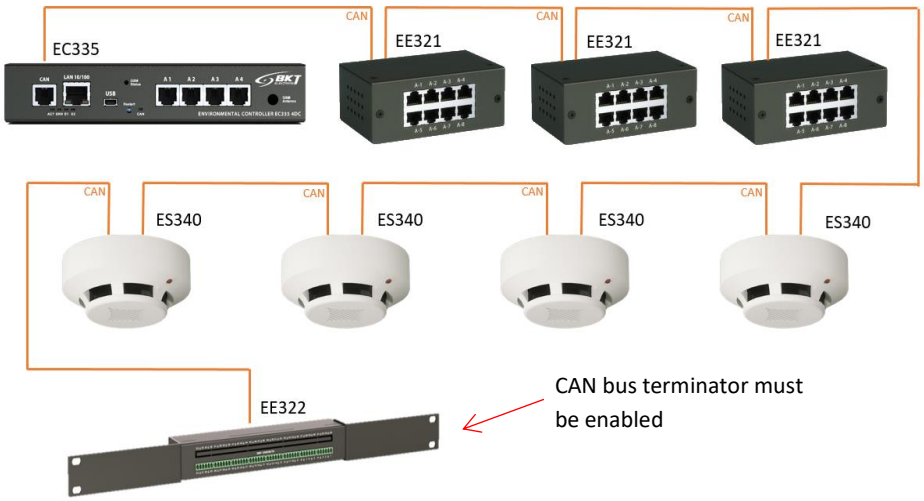
The connection of the 1-wire bus. The length of the entire bus must not exceed 100m, but may be shorter depending on the level of electromagnetic interference in the the installation environment.

The connection of an analogue sensor, the length for each sensor: minimum 50m

Sensor type	Number of sensors as a load for the controller
Analogue sensors connected directly to the controller	4
1-wire sensors connected via the EE323 extension module	20
Total	24

3.5 Example 4. CAN devices

Up to 8 CAN devices can be connected to one controller, but maximum 3 units EE321, 2 units EE322 and 8 units ES340.



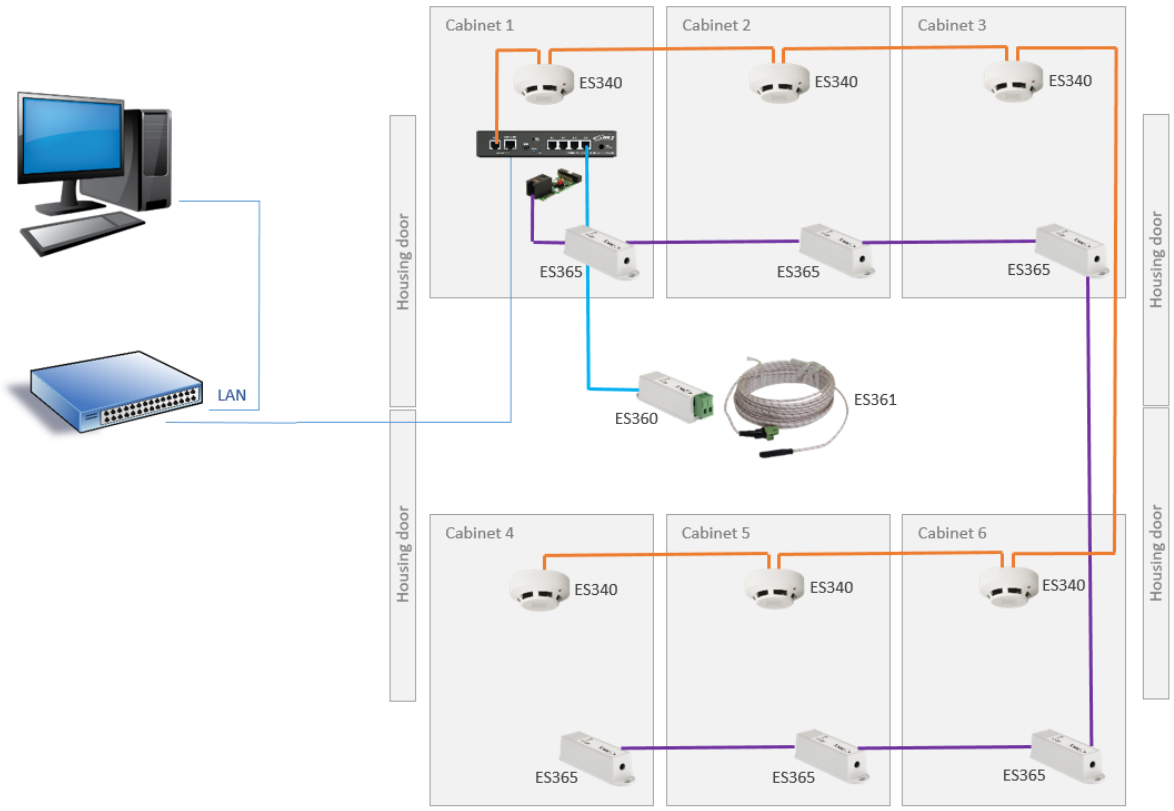
The CAN bus connection, the length of the entire bus is up to 200m

The connection of an analogue sensor, the length for each sensor: minimum 50m

Sensor type	Number of sensors as a load for the controller
Analogue sensors connected via EE321 extension modules	24
ES340 CAN sensors (temperature, humidity, smoke)	12 (4x3)
Sensors with potential-free contacts connected via EE322 extension modules	16 (in real 32)
Total	52 (over suggested 40)

3.6 Example 5. IT cabinet monitoring

An example of an environmental conditions monitoring system in 6 IT cabinets: temperature at the bottom of the cabinet (ES365), temperature at the top of the cabinet, humidity and presence of smoke (ES340). A flood detection sensor was placed under the floor (ES360 + ES361).



- The CAN bus connection, the length of the entire bus is up to 200m
- The connection of an analogue sensor, the length for each sensor: minimum 50m
- The connection of the 1-wire bus. The length of the entire bus must not exceed 100m, but may be shorter depending on the level of electromagnetic interference in the the installation environment.

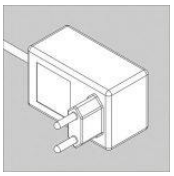
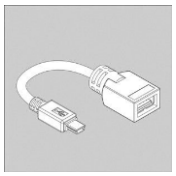
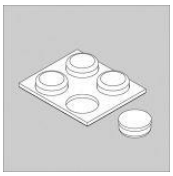
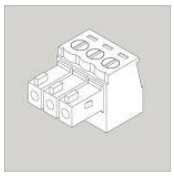
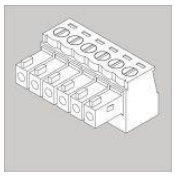
Sensor type	Number of sensors as a load for the controller
Analogue sensors connected directly to the controller	1
ES340 CAN sensors (temperature, humidity, smoke)	18 (6x3)
1-wire sensors connected via the EE323 extension module	6
Total	25

4 INSTALLATION OF DEVICES

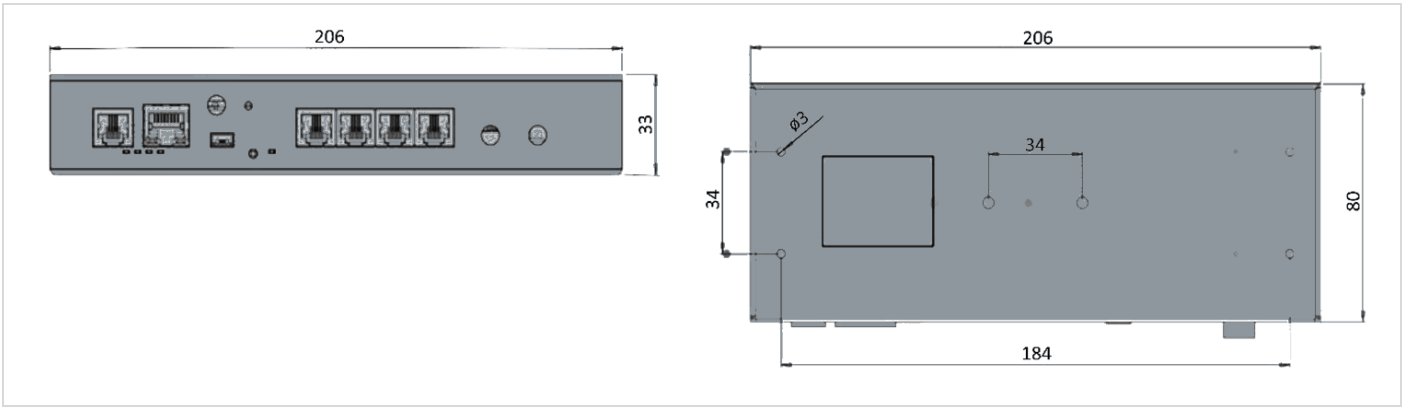
4.1 EC335 controller installation

4.1.1 Package contents

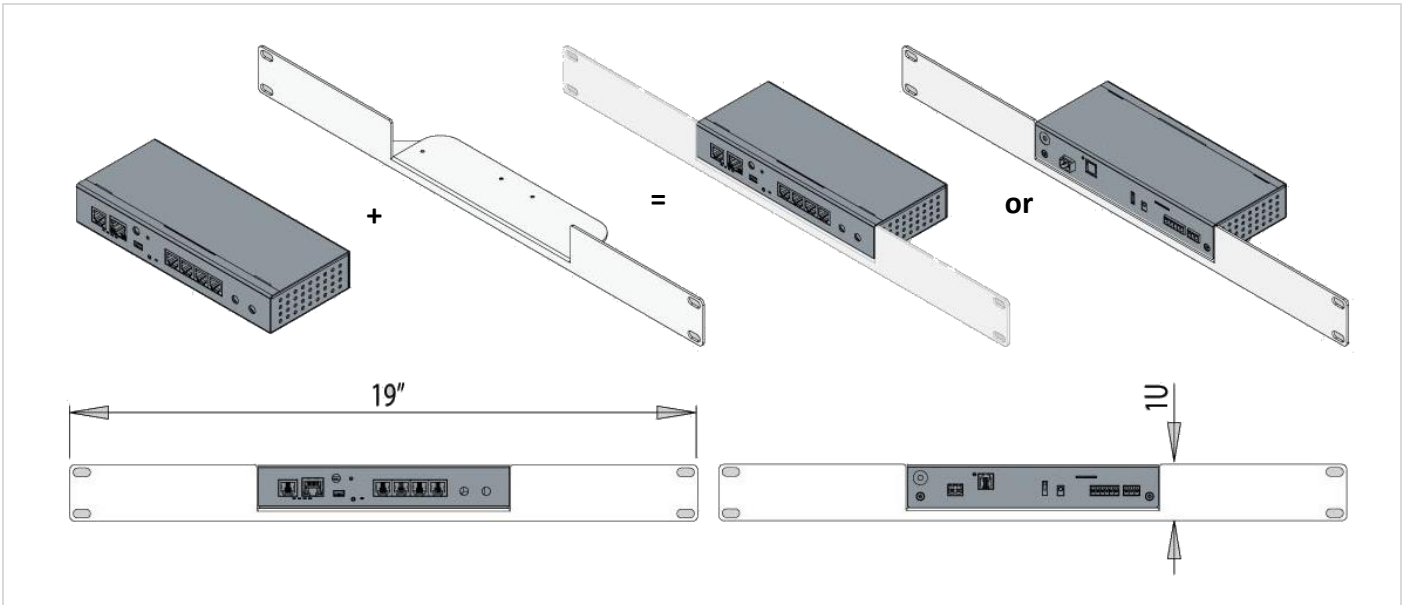
EC335 box contains:

						
EC335 controller – 1pc.	Power supply 230V AC, 12V DC 1A – 1pc.	RJ45-RJ45 patchcord – 1pc.	USB cable: mini B USB plug – USB A socket – 1pc.	Self-adhesive foot – 4pcs.	3-pin terminal block – 1pc.	6-pin terminal block – 1pc.

4.1.2 Controller dimensions



4.1.3 1U 19'' bracket installation



4.1.4 Device connectors

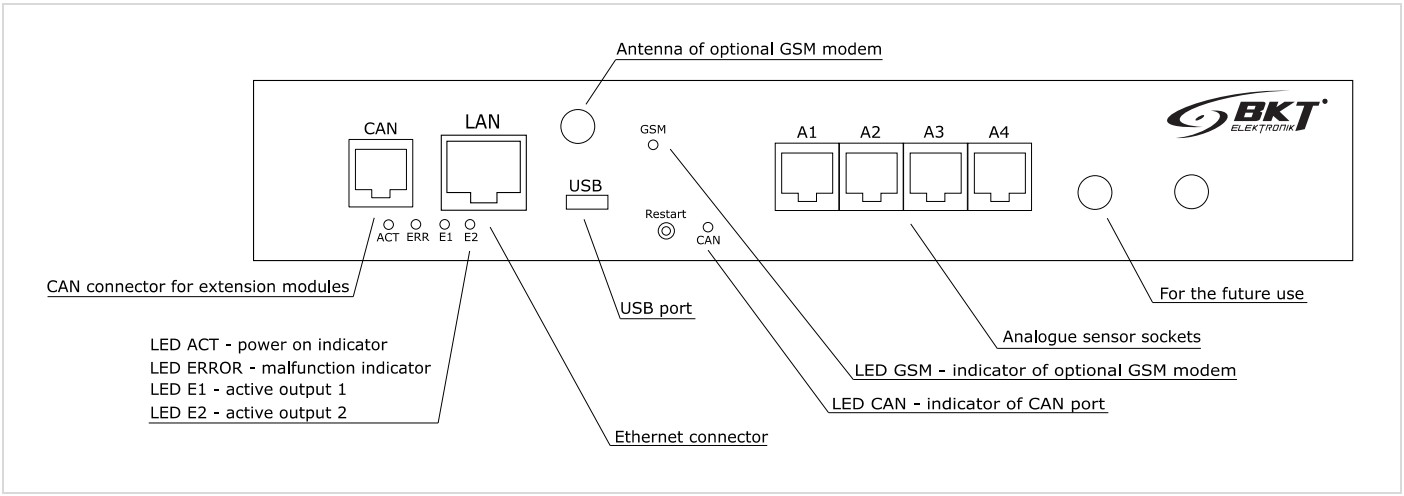


Figure 1. Front view

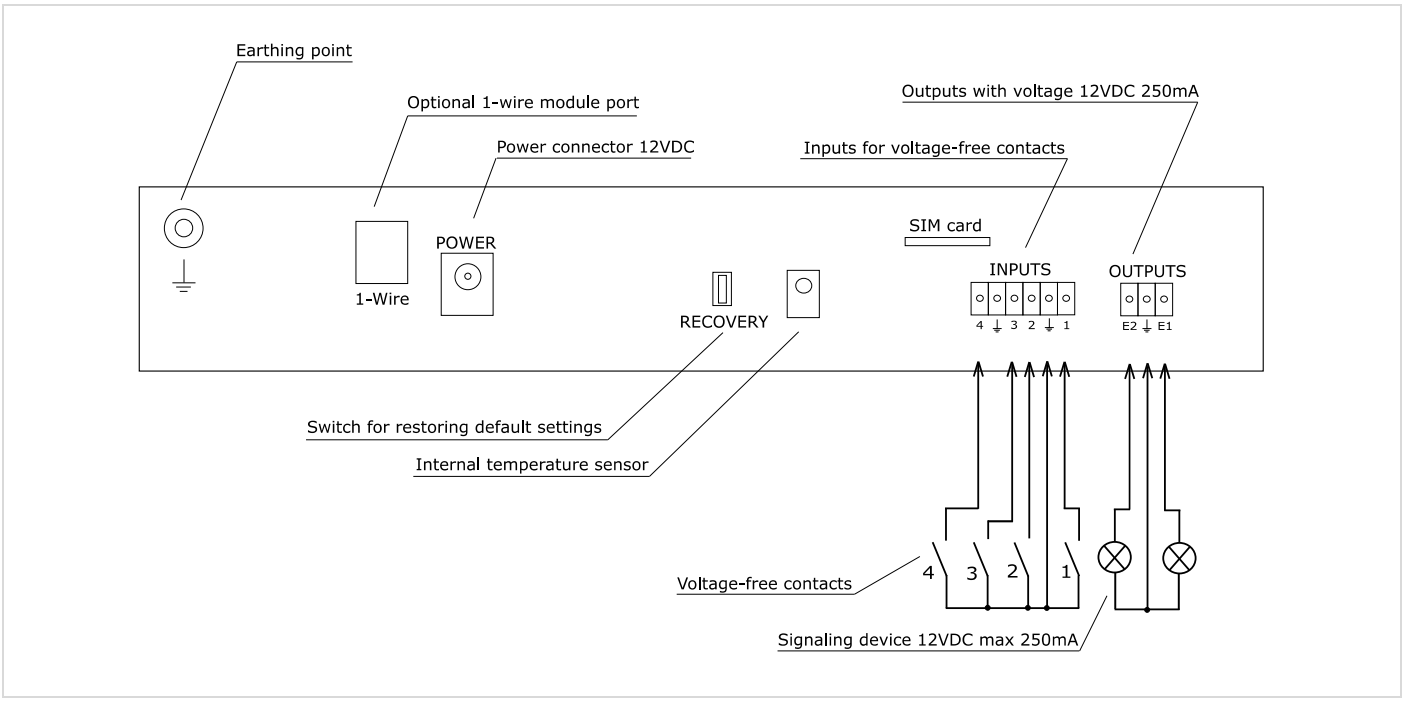
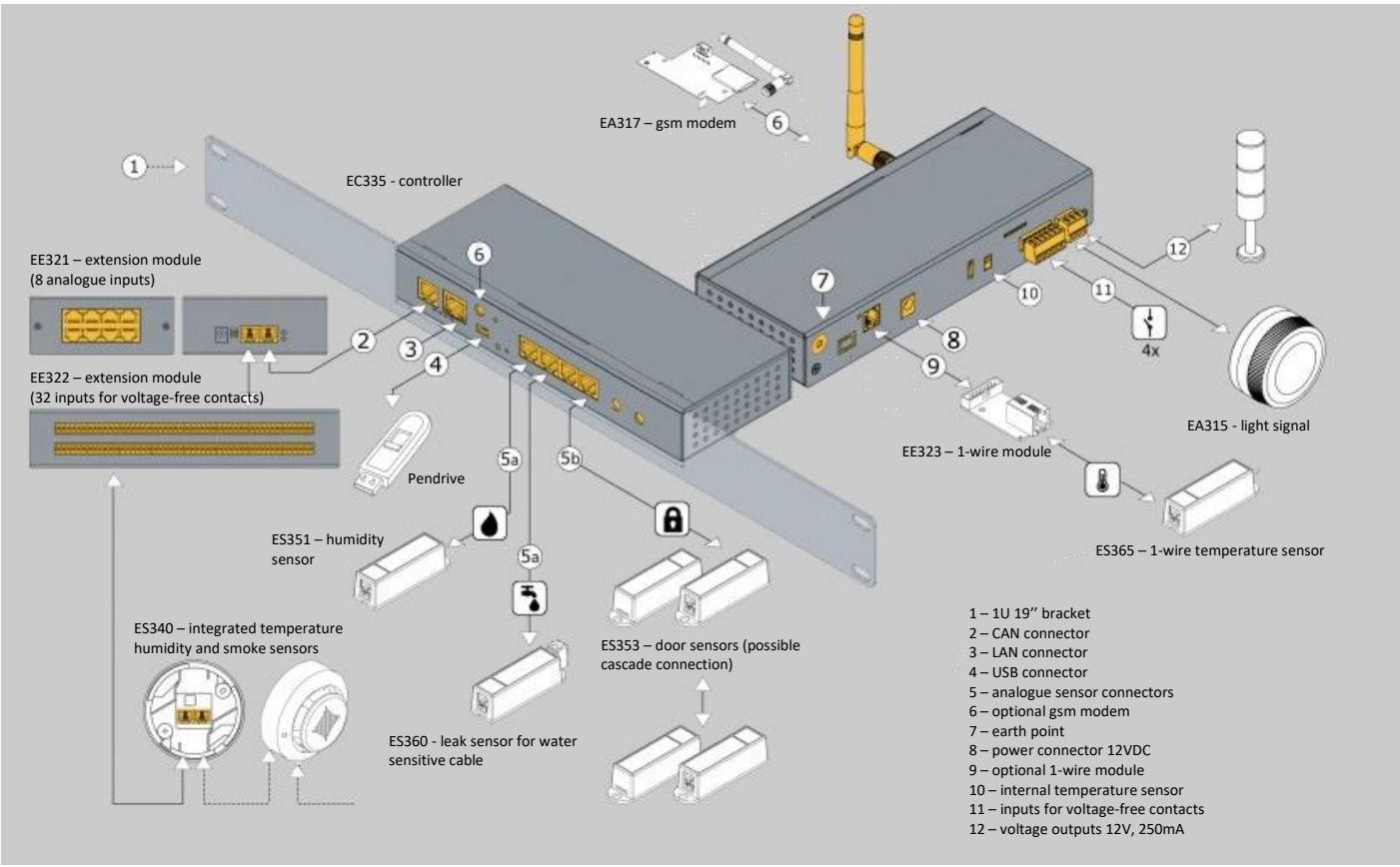


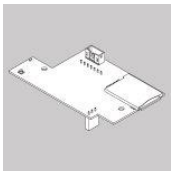
Figure 2. Rear view

4.1.5 Connecting the controller



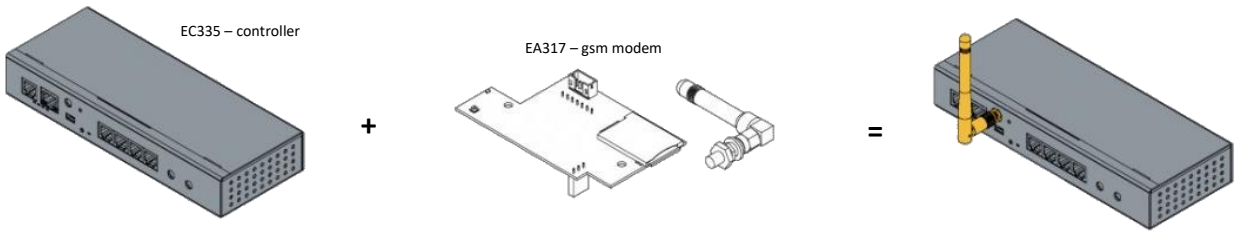
4.2 Installation of EA317 – GSM modem

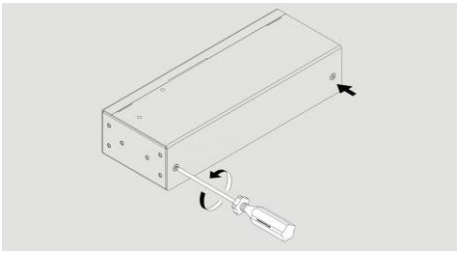
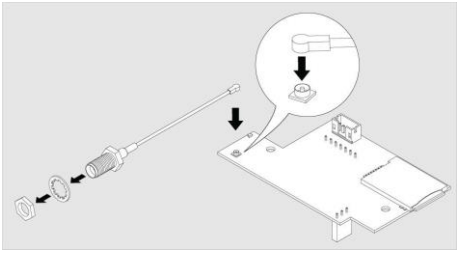
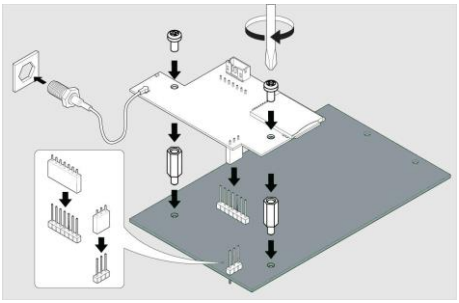
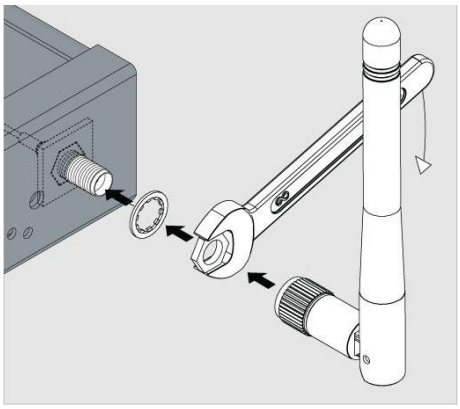
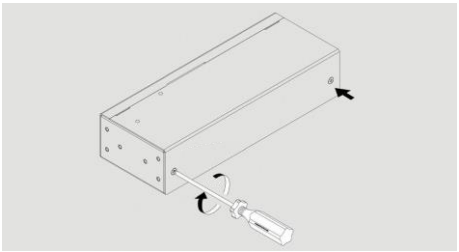
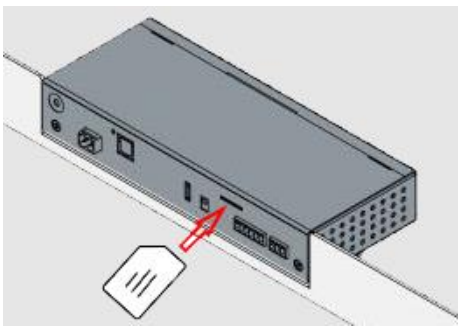
4.2.1 Package contents

	 Module pcb board – 1pc.	 Antenna – 1pc.	 Antenna wire – 1pc.	 M3x5 bolts – 2pcs.

4.2.2 Assembly procedure

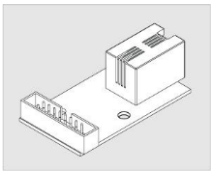
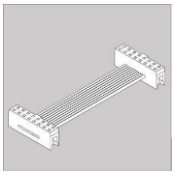
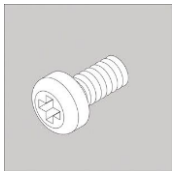
The method of assembling the module inside the controller is shown below.



	Disconnect the power supply from the controller. Loosen the screws that fix the housing cover and carefully remove the cover.
	Connect the antenna cable to the modem pcb.
	Place the modem board on the controller's motherboard by connecting it to two pin connectors. Insert the fastening screws.
	Attach the other end of the antenna cable to the controller housing. Then install the antenna.
	Close the housing cover and tighten the mounting screws.
	Place the standard size SIM card in the module - the contacts face down, the notch inside the controller. Push the card until it clicks. To remove the card, push it again until it clicks.

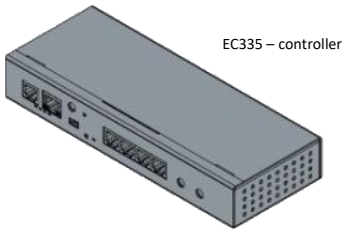
4.3 Installation of EE323 module – 1-wire extension

4.3.1 Package contents

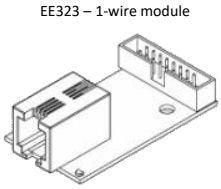
		
Module pcb board – 1pc.	Connecting wire – 1pc.	M3x5 bolts – 2pcs.

4.3.2 Assembly procedure

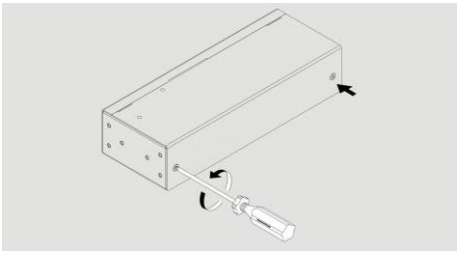
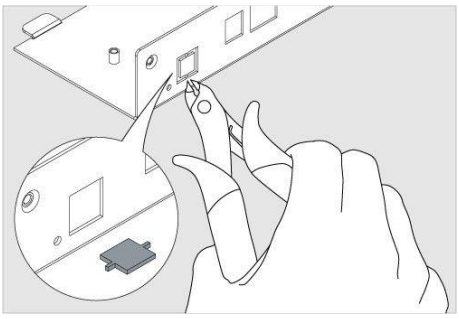
The method of assembling the module inside the controller is shown below.

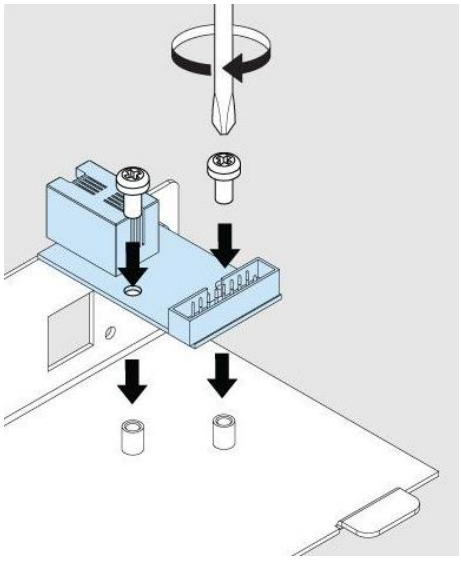
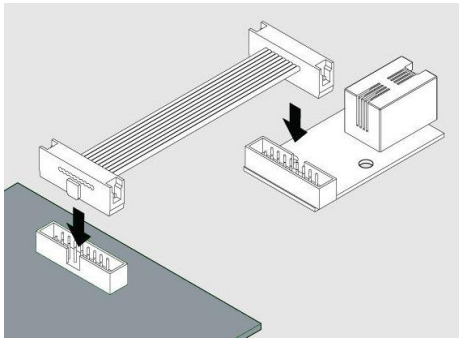
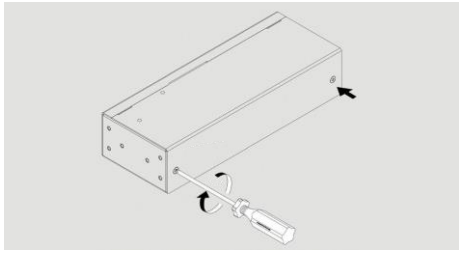


+



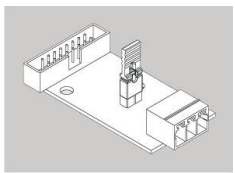
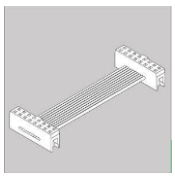
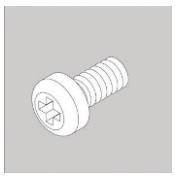
=

	Disconnect the power supply from the controller. Loosen the screws that fix the housing cover and carefully remove the cover.
	Cut out the hole in the controller cover.

	Attach the module to the cover by screwing it in with two screws.
	Connect the cable between the module and the controller
	Close the housing cover and tighten the mounting screws.

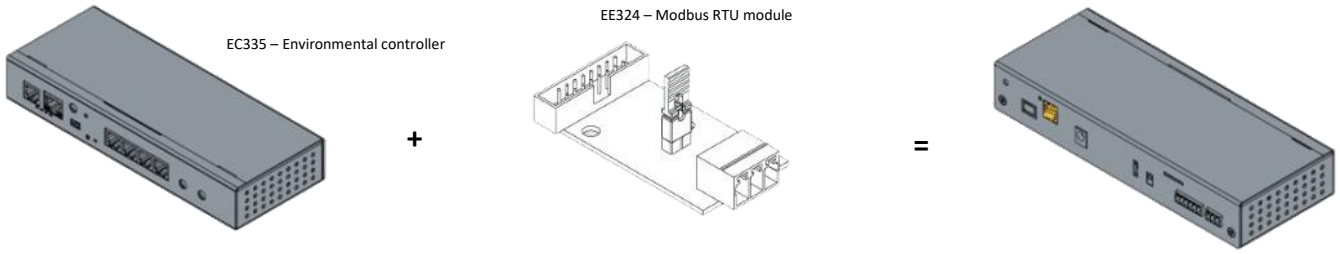
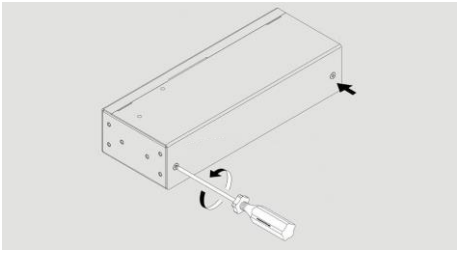
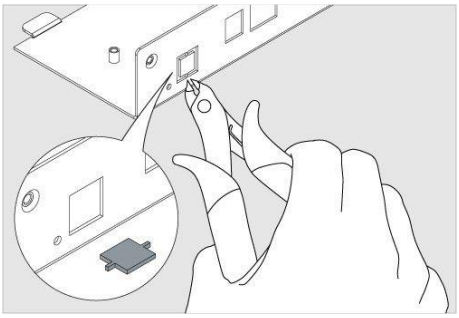
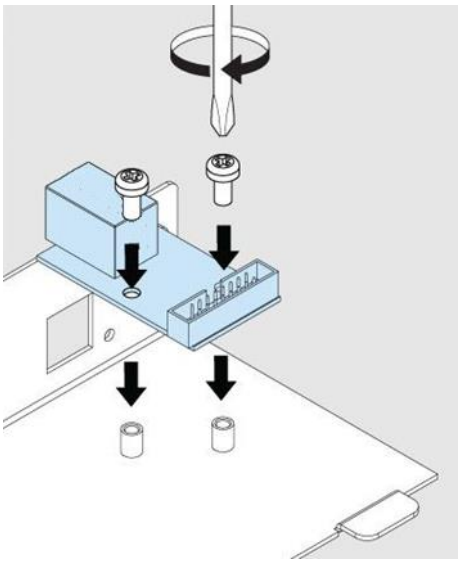
4.4 Installation of EE324 module – Modbus RTU extension

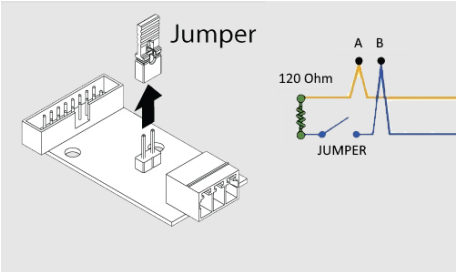
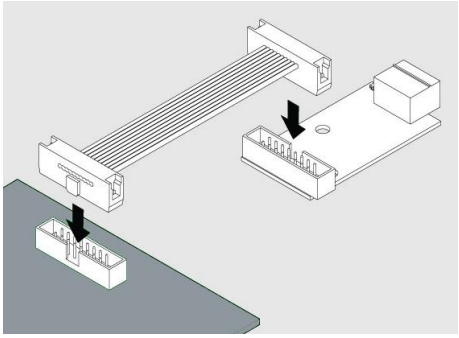
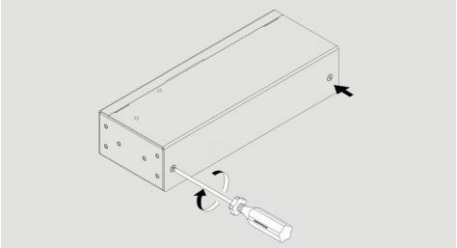
4.4.1 Package contents

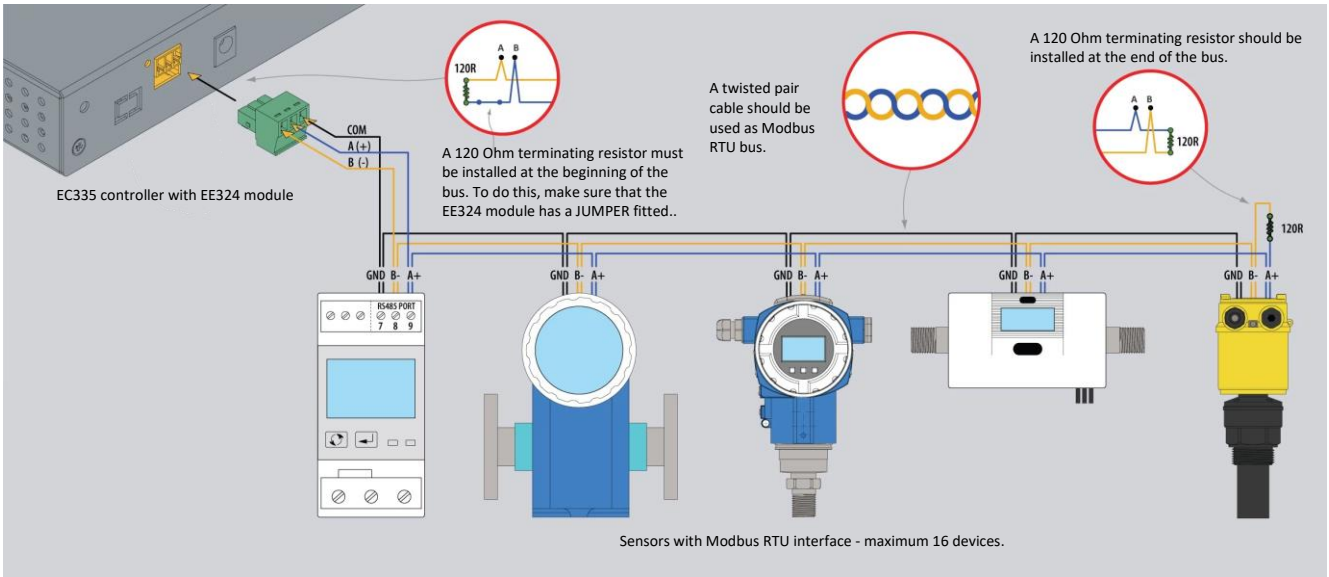
		
Module pcb board – 1pc..	Connecting wire – 1pc.	M3x5 bolts – 2pcs.

4.4.2 Assembly procedure

The method of assembling the module inside the controller is shown below. Only one EE323 or EE324 module can be installed in the controller.

<table>
<tr><td colspan="2"> 
</td></tr>
<tr><td>  </td><td>Disconnect the power supply from the controller.
Loosen the screws that fix the housing cover and carefully remove the cover.</td></tr>
<tr><td>  </td><td>Cut out the hole in the controller cover.</td></tr>
<tr><td>  </td><td>Attach the module to the cover by screwing it in with two screws.</td></tr>
</table>

	If the module will be at the end of the Modbus bus, then a jumper should be installed, It will terminate this end of the bus with a 120 Ohm resistor. At the other end of the Modbu bus, also install a 120 Ohm 0.25W resistor between A and B wires.
	Connect the cable between the module and the controller
	Close the housing cover and tighten the mounting screws.



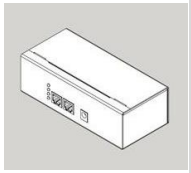
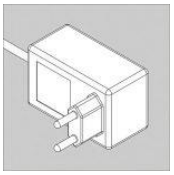
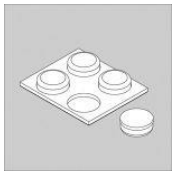
Connecting devices with Modbus RTU interface

4.5 Installation of EE321 module – 8 analogue inputs extension

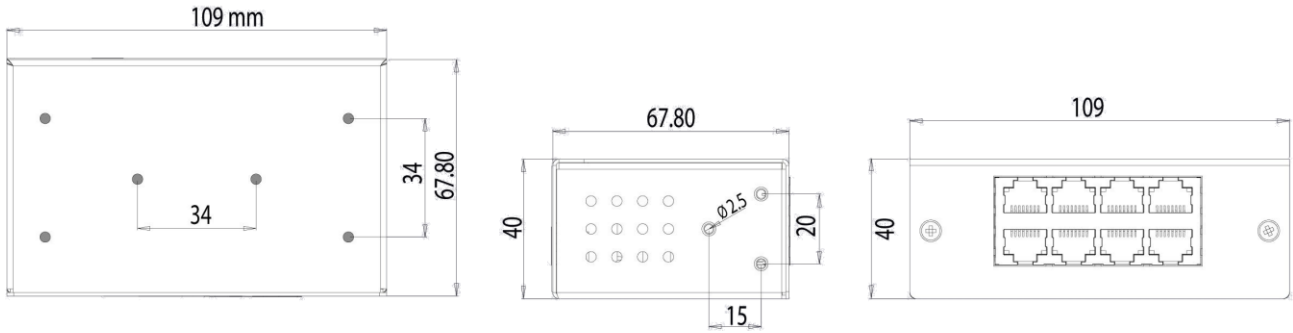
You can connect 3 EE321 devices that extend the number of analogue ports to the controller.

4.5.1 Package contents

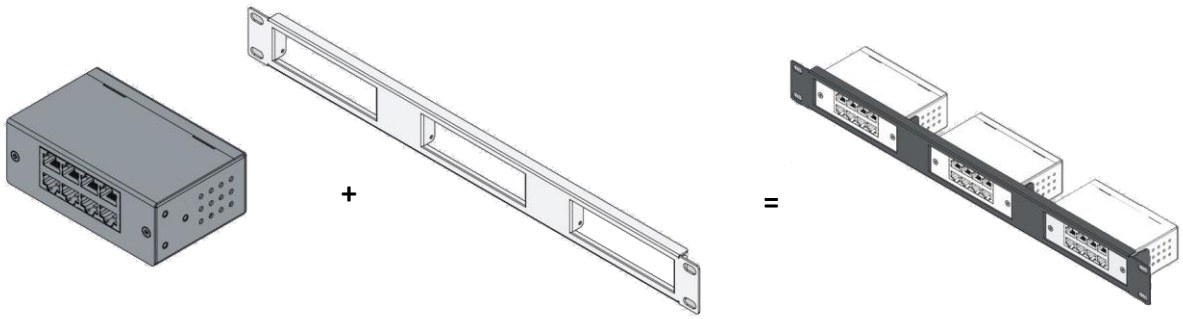
The packaging of the EE321 module includes:

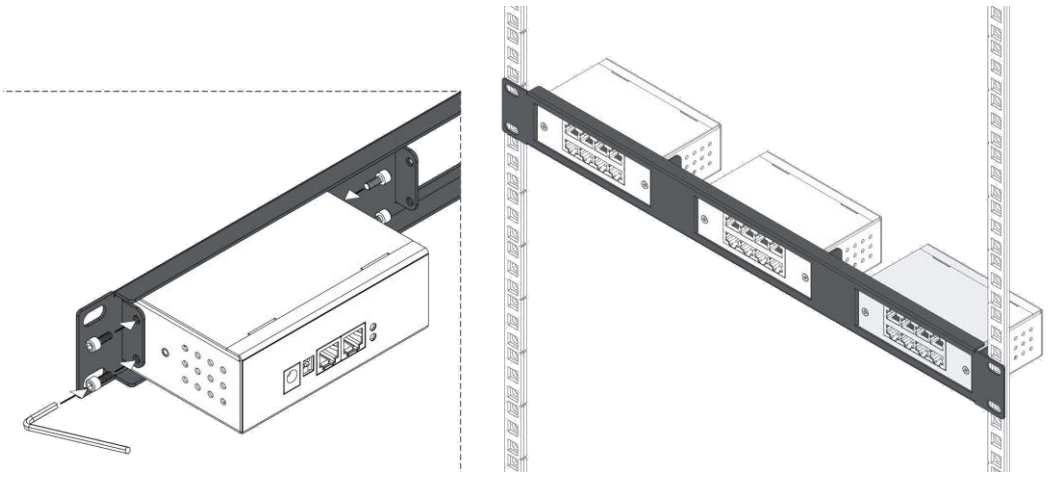
			
EE321 module – 1szt.	Power supply 230VAC, 12VDC 1A – 1pc.	Cable RJ14(6P4C)-RJ14(6P4C), 2m – 1pc.	Self-adhesive foot – 4pcs.

4.5.2 EE321 dimensions

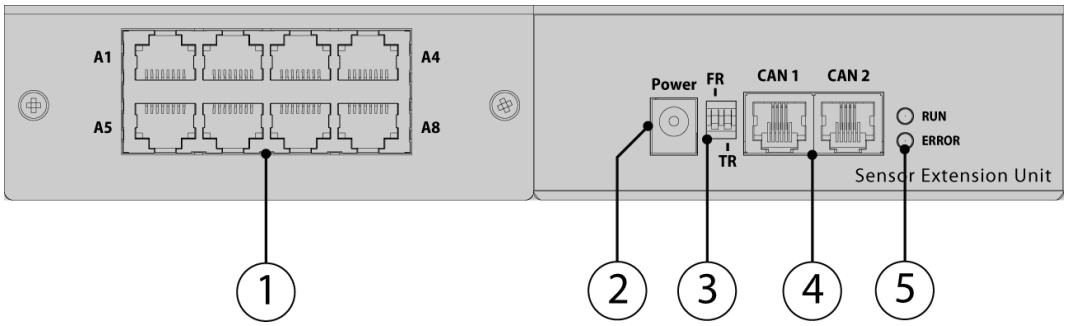


4.5.3 1U 19’’ bracket installation



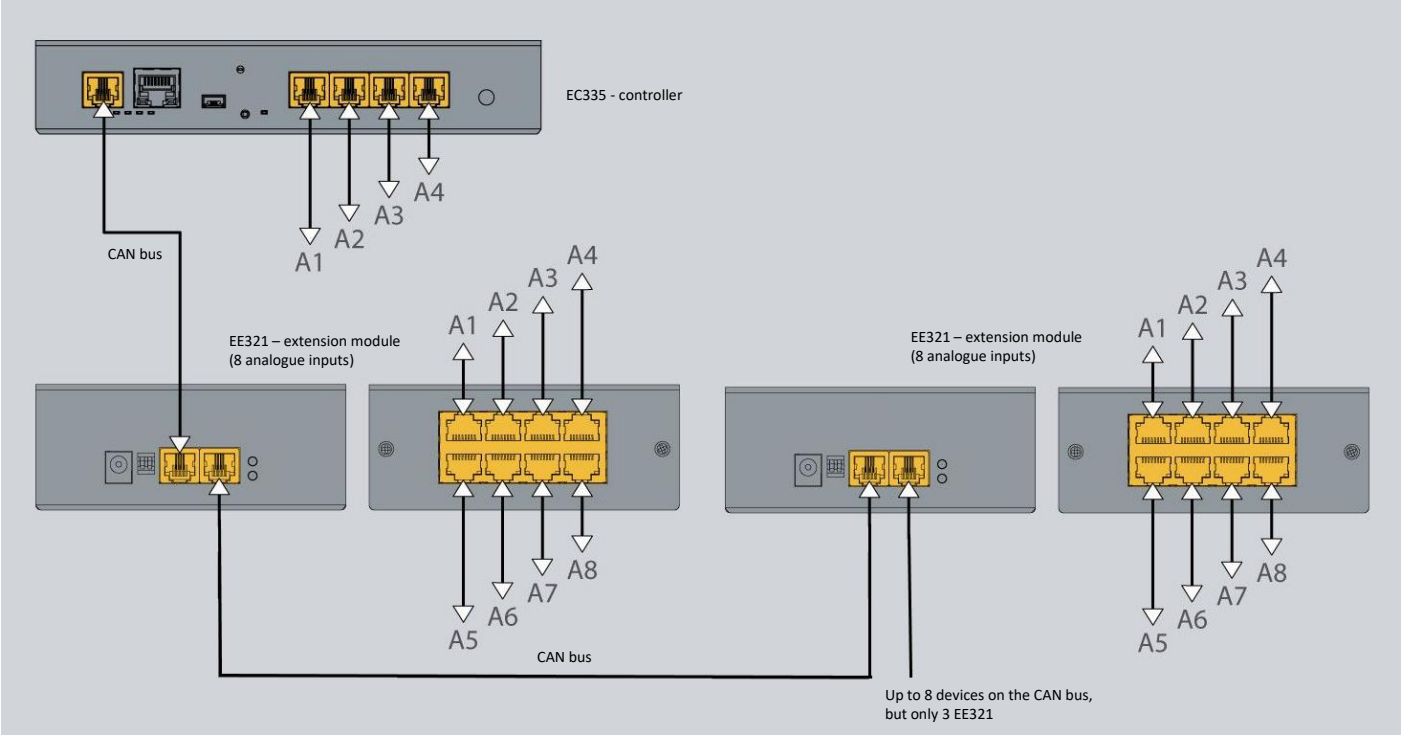


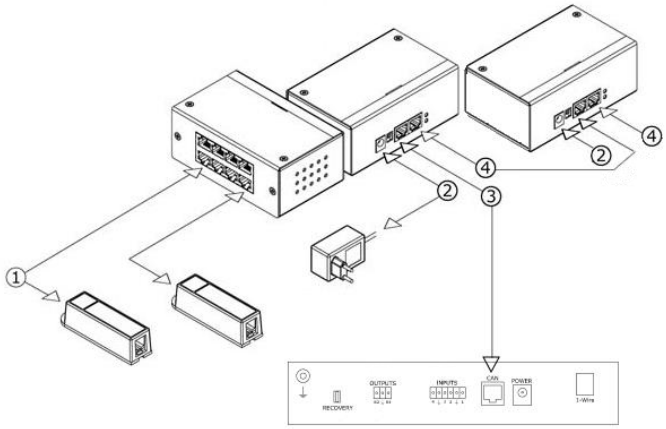
4.5.4 Device connectors



1. 8 inputs for analogue sensors
2. Power connector 12VDC/1A
3. Switches: FR - firmware update and TR – bus terminator (see in the table 4.5.5 Connecting the EE321)
4. CAN bus connectors
5. Signal LEDs (see in table 4.5.5 Connecting the EE321)

4.5.5 Connecting the EE321 module

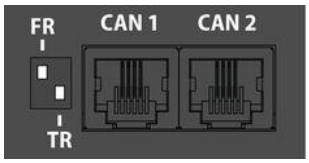




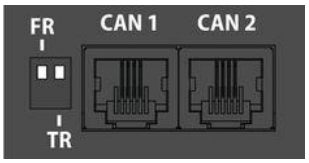
The devices should be connected in a cascade (from one device to another). The CAN socket number is irrelevant, either CAN1 or CAN2 can be used. The maximum CAN bus length is 200 m.

1. Connection of sensors to a device extending the number of analogue inputs.
2. Connection of 12VDC/1A power supply.
3. Connection of a CAN bus to the EC335 controller.
4. Cascade connection of the CAN bus (from one device to another).

For CAN bus connections, UTP cat5e cable terminated with RJ14(6P4C) - RJ14(6P4C) plugs.



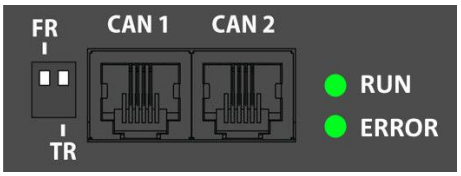
FR-off, TR-on



FR-off, TR-off

The bus terminator in the last device (from the controller) must be enabled. The bus terminator in the other devices must be disabled. The TR switch (activating the terminator) in ON and OFF position is shown in the drawing on the left.

The FR switch is for servicing and must be in OFF position during normal operation.



The EE321 module has two LEDs that signal the states:

ERR is on, RUN flashes - the EE321 module is not connected to the controller

ERR is on, RUN is off - the EE321 module is connected to the EC335 controller but is not configured correctly in the controller

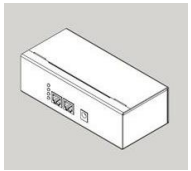
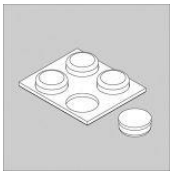
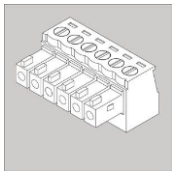
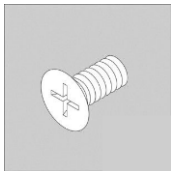
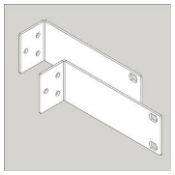
ERR is off, RUN is on - the EE321 module is connected to the EC335 controller and is correctly configured in the controller

4.6 Installation of EE322 module– extension of 32 inputs for voltage-free contacts

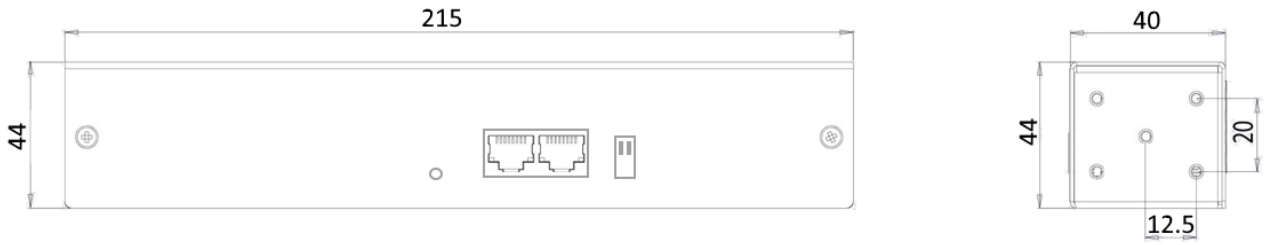
Up to two EE322 devices, that extend the number of inputs for potential-free contacts, can be connected to the controller.

4.6.1 Package contents

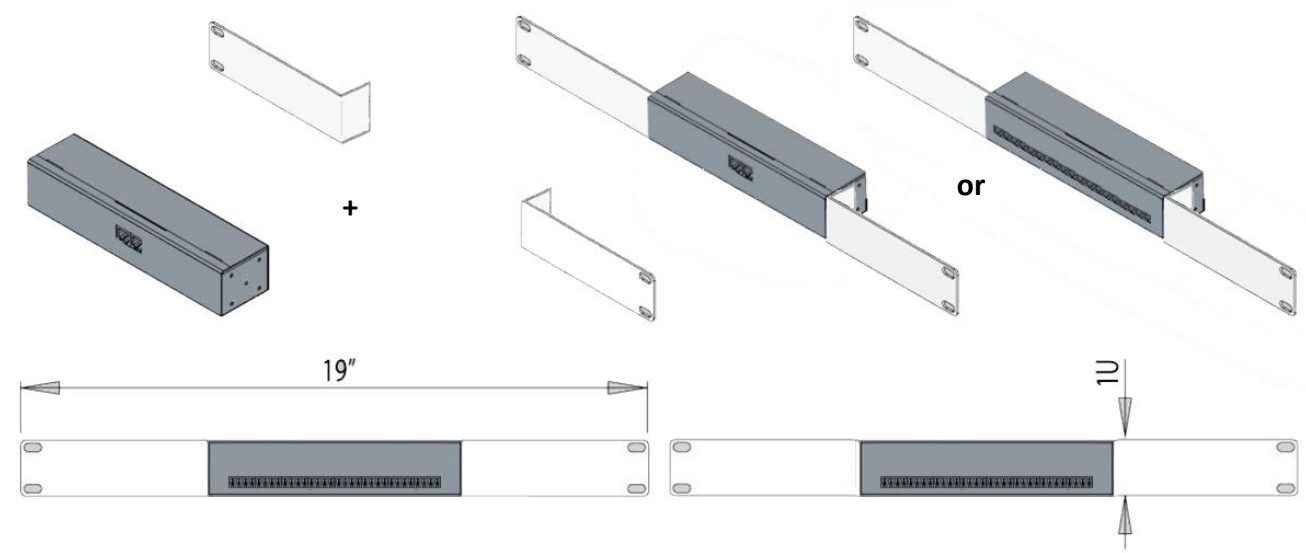
The packaging of the EE322 module includes:

					
EE322 module – 1pc.	Cable RJ14(6P4C)-RJ14(6P4C), 2m – 1pc.	Self-adhesive foot – 4pcs.	6-pin terminal block– 1pc.	M3x8 bolts – 6pcs.	1U 19’’ bracket - 2pcs.

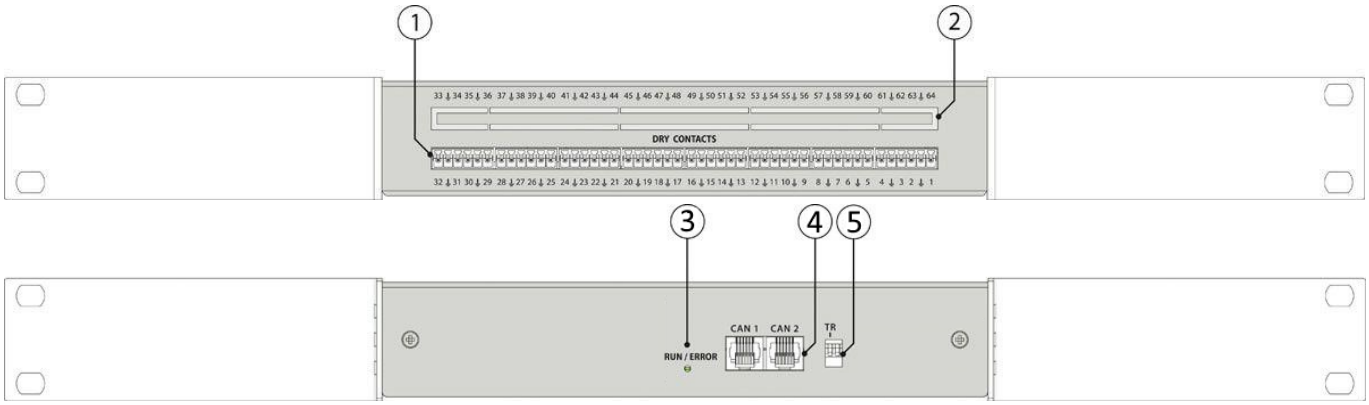
4.6.2 EE322 dimensions



4.6.3 1U 19'' bracket installation

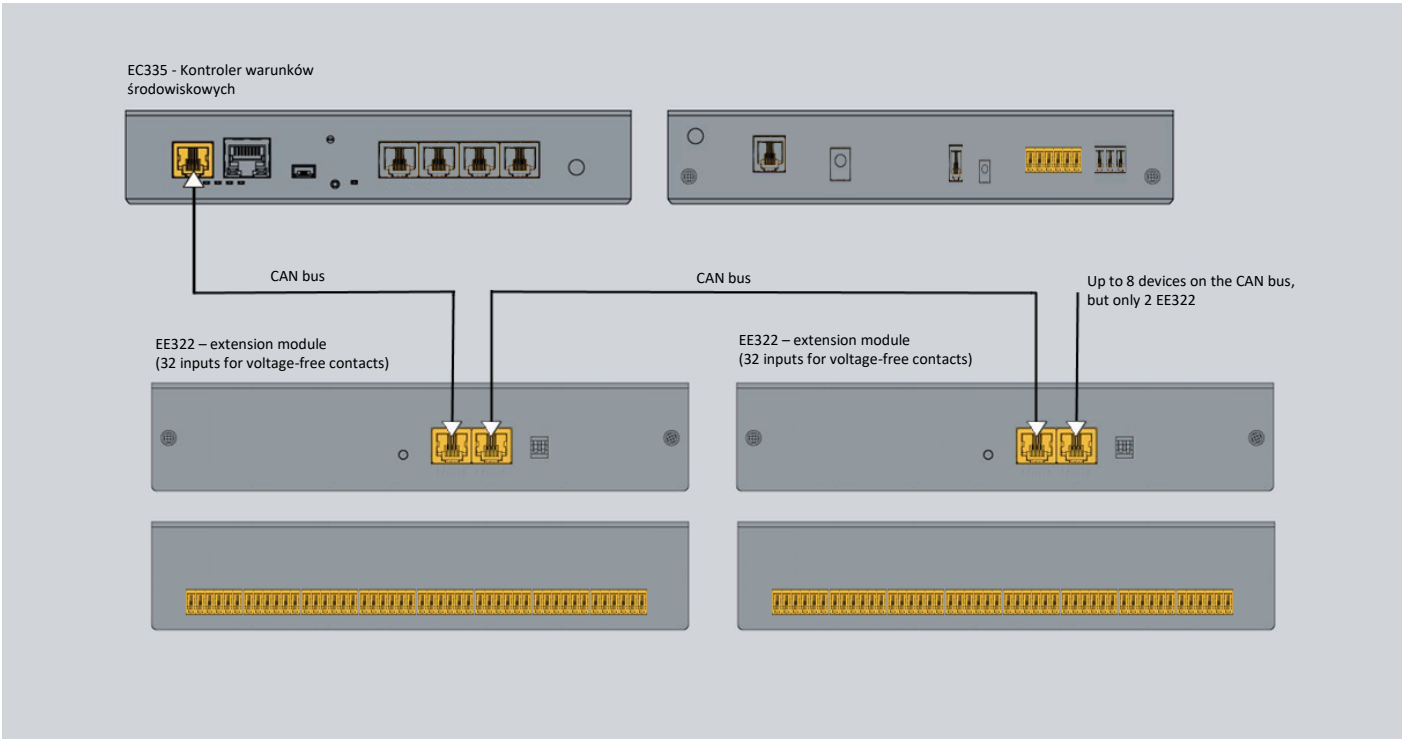


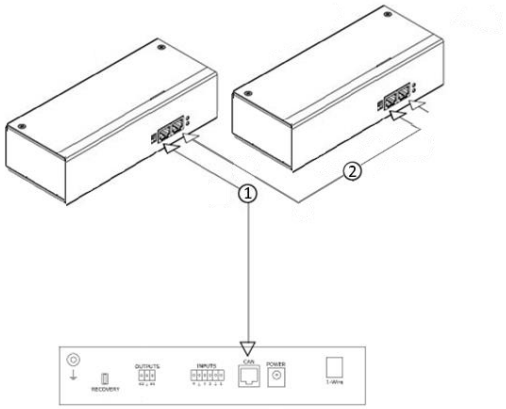
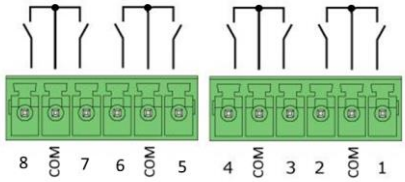
4.6.4 Device connectors

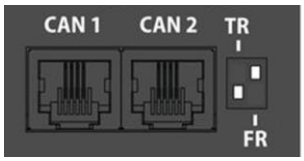
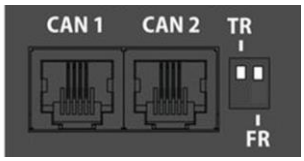
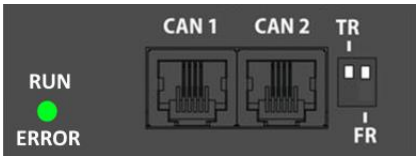


1. 1. Inputs for 32 sensors with potential-free contacts
2. 2. Optional additional inputs
3. 3.LED indicating connection error with the EC335 controller
4. 4. CAN bus inputs
5. 5. FR switches - firmware update and TR - bus terminator (see in the table 4.6.5 Connecting the EE322 module)

4.6.5 Connecting the EE322 module

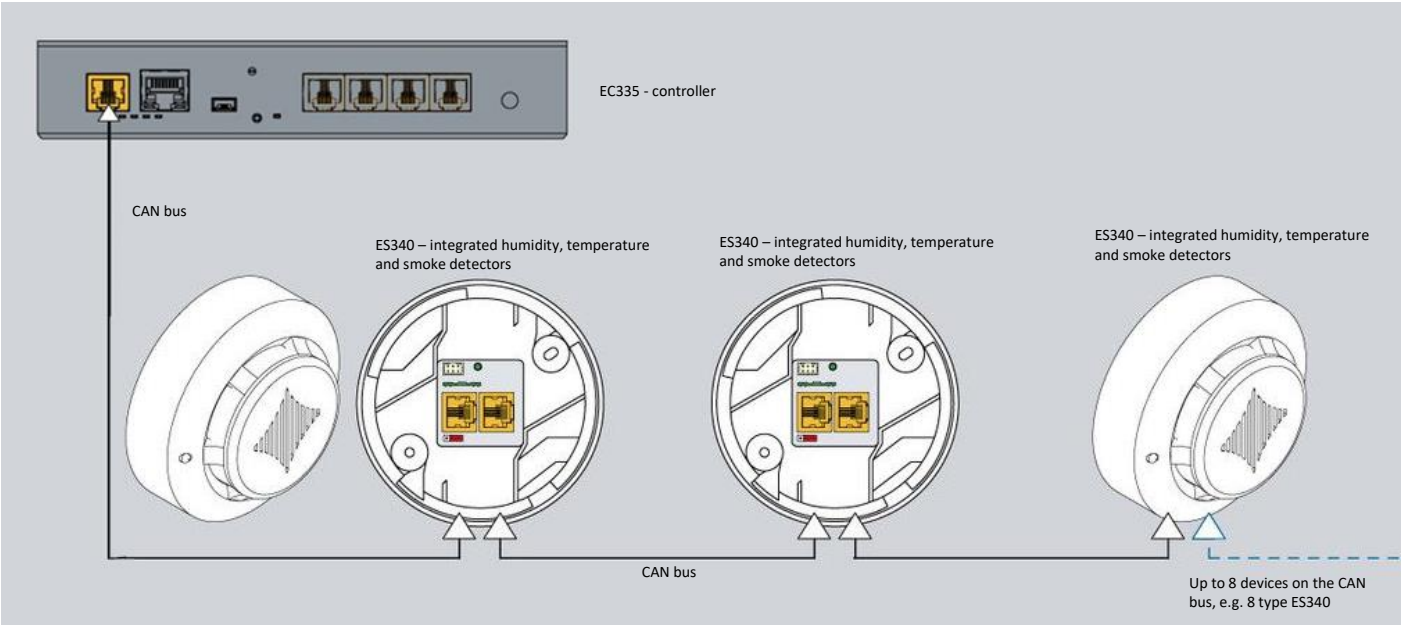


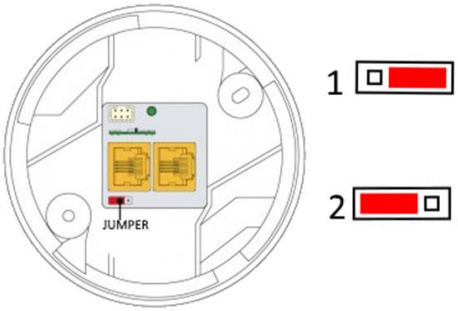
	The devices should be connected in a cascade (from the EC335 controller to the next EE322 device, etc.). The CAN socket number does not matter, you can use any CAN1 or CAN2. The maximum length of the CAN bus can be 200m. 1. Connection of the CAN bus to the EC335 controller 2. Cascade connection of the CAN bus (from the device to the device) EE322 devices do not require an additional power supply - they are powered from the CAN bus.
	A way to connect voltage-free contacts to the EE322 module.
	For CAN bus connections, use UTP cat5e cable terminated with RJ14 (6P4C) - RJ14 plugs (6P4C).

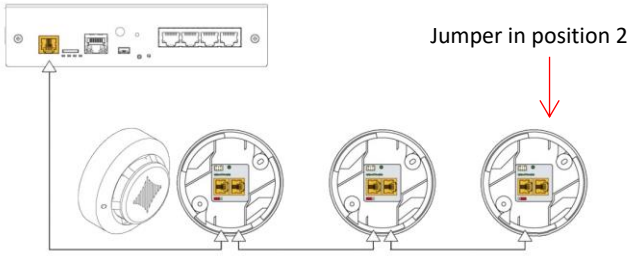
 TR-on, FR-off  TR-off, FR-off	The last (from the controller) device must have the bus terminator turned on. The other devices must have the terminator turned off. The TR switch (activating the terminator) in the on and off position is shown in the drawing on the left. The FR switch is for service and must always be in the off position during normal operation.
	The EE322 module has one LED indicating the status: LED off - the EE322 module is not connected to the controller Lights up in red - the EE322 module is connected to the EC335 controller but is not configured correctly in the controller Lights up green - the EE322 module is connected to the EC335 controller and is correctly configured in the controller

4.7 Installation of ES340 sensor – smoke, humidity, temperature

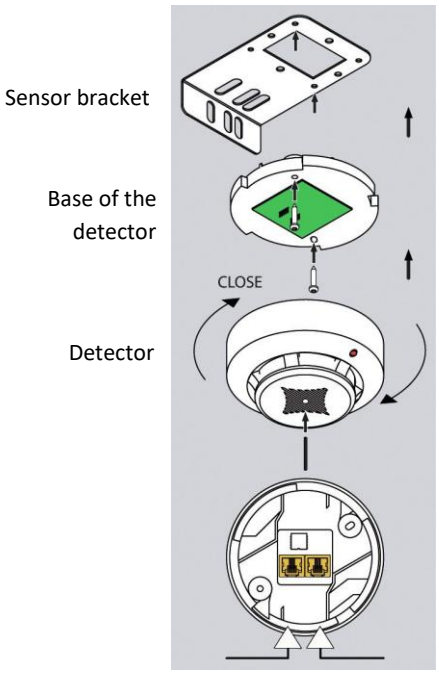
ES340 is a detector with three sensors integrated in one housing: optical smoke, temperature and humidity. The sensor is connected to the CAN bus connector on the EC335 controller.



	The devices should be connected in a cascade (from the EC335 controller to the next ES340 sensor, etc.). The CAN socket number does not matter, you can use any CAN1 or CAN2. The maximum length of the CAN bus can be 200m. In the ES340 sensor, place the jumper in the appropriate position: 1 – CAN bus terminator disabled 2 – CAN bus terminator enabled. Only the last device on the CAN bus should have a jumper in position 2.



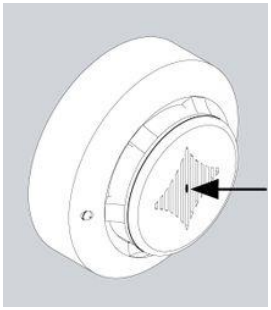
For CAN bus connections, use UTP cat5e cable terminated with RJ14 (6P4C) - RJ14 plugs (6P4C).



The detector should be mounted in a horizontal position - with CAN connectors facing up.

For mounting in the cabinet, you can use the attached bracket to which the detector base should be screwed, and then place the detector in it and lock it by a small rotation.

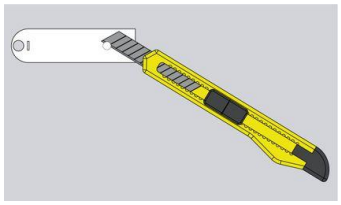
To avoid false alarms, the mounting location should be chosen accordingly: - away from ventilation openings, dusty places, smoky areas, etc.

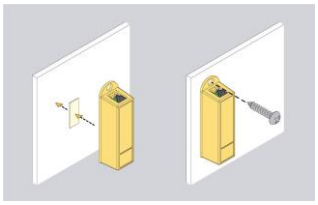


It is possible to test the operation of the optical smoke sensor by inserting, for example, an office paper clip into the hole shown in the picture. The detector should react by permanently lighting the LED. It is an alarm condition of the detector and to turn it off, disconnect the detector for a moment from the power supply or perform a reset via the web interface of the controller.

4.8 Installation of analogue sensors

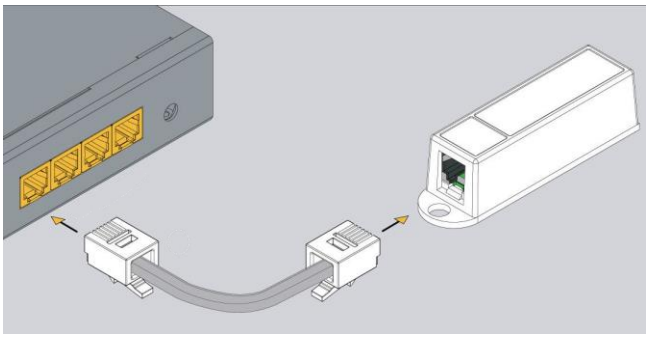
Installation





The assembly of most analogue sensors is uncomplicated and consists in mounting the sensor in the selected location. You can use the hole in the sensor housing with a diameter of 5.5mm or an adhesive double-sided tape.
For mounting in IT cabinets, use a cage nuts and bolts with M4 or M5 size.

Connection

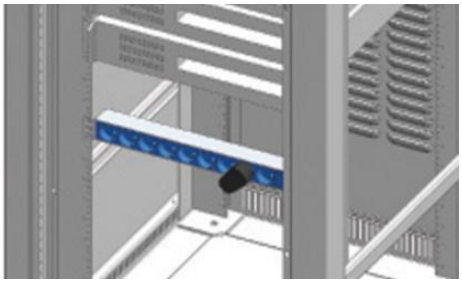


Analog sensors should be connected to the analogue inputs of the controller or inputs of the EE321 extension module. Use the cable supplied with the sensor or cable:
Supplied cable or UTP cat5e with RJ14 (6P4C) -RJ14 (6P4C) connectors

For the ES363 sensor, use supplied cable or UTP cat5e cable with RJ12 (6P6C) -RJ12 (6P6C) connectors

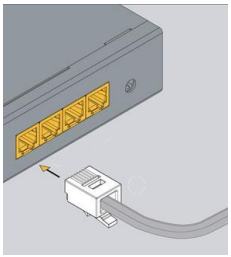
4.8.1 ES352 - 230VAC voltage sensor

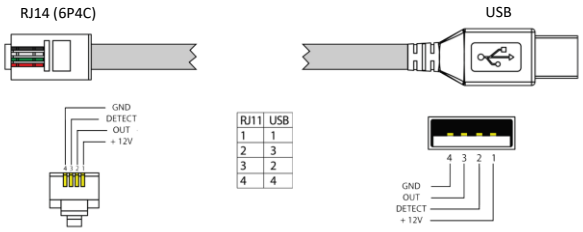
Installation



The ES352 sensor should be placed in a socket, eg in a power strip.

Connection

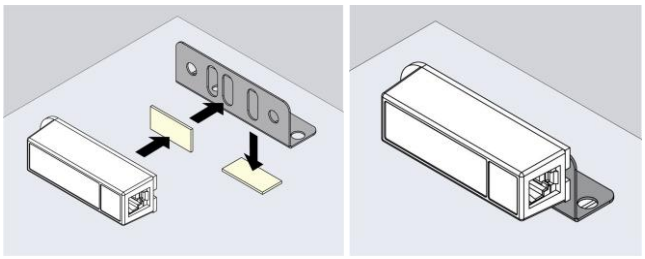




To connect with the controller, use the supplied cable, which can be extended to a maximum of 100m. The sensor should be connected to one of the analogue inputs of the controller or the EE321 extension module.

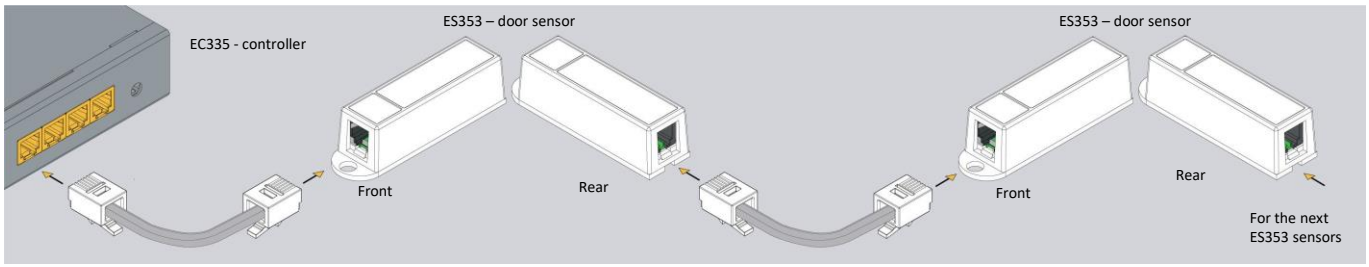
4.8.2 ES353 – door sensor

Installation



The ES353 door sensor additionally has a metal bracket that allows the sensor to be mounted in a different plane from the magnet, if necessary.

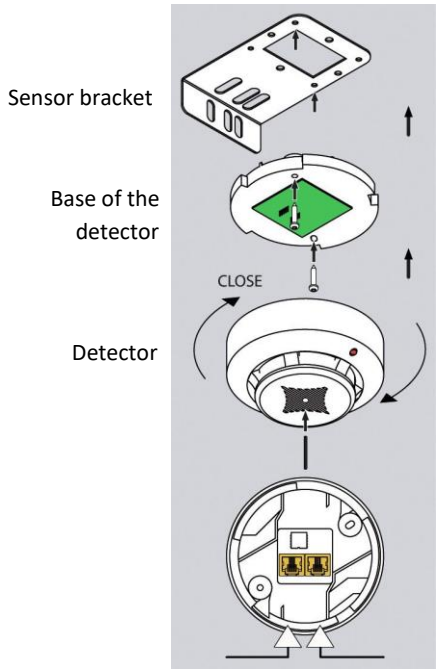
Connection



Sensors ES353 - door sensor, ES354 - vibration sensor, ES356 - a smoke detector can be connected in a cascade, that is, from the sensor to the sensor. Up to 10 sensors can be placed in one cascade. The entire cascade occupies only one analogue port in the controller, but the controller is then unable to distinguish the sensors in the cascade and determine from which of them an alarm was generated.

4.8.3 ES356 – smoke sensor

Installation

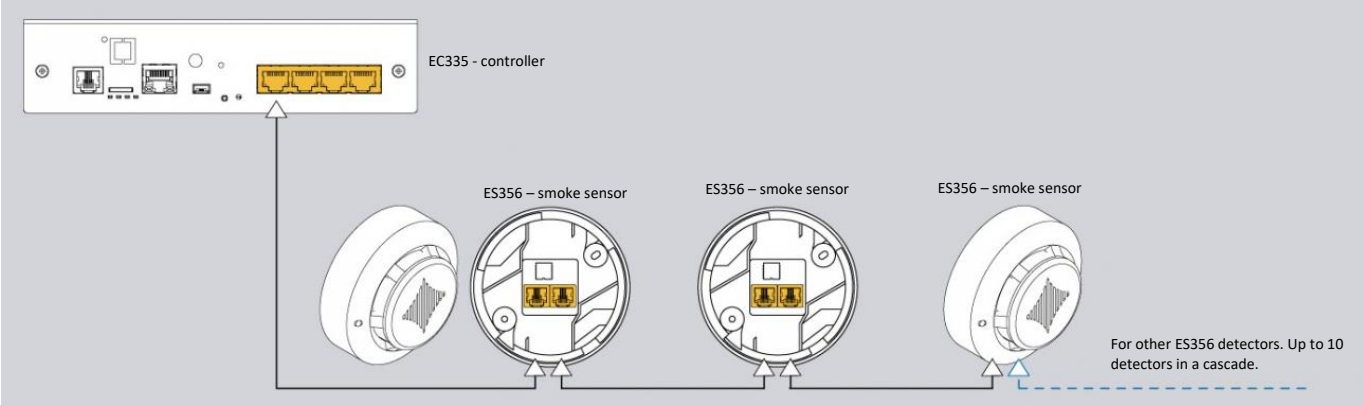


The detector should be mounted in a horizontal position - with RJ12 connectors facing up.

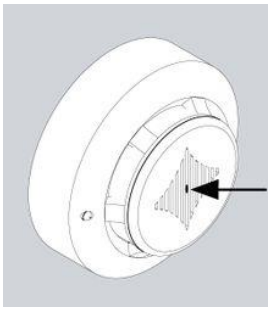
For mounting in the cabinet, you can use the attached bracket to which the detector base should be screwed, and then place the detector in it and lock it by a small rotation.

To avoid false alarms, the mounting location should be chosen accordingly: - away from ventilation openings, dusty places, smoky areas, etc.

Connection



The ES356 smoke detectors can be connected in a cascade, i.e. from the detector to the detector. Up to 10 detectors can be placed in one cascade. The entire cascade occupies only one analogue port in the controller, but the controller is then unable to distinguish the sensors in the cascade and determine from which of them an alarm was generated.



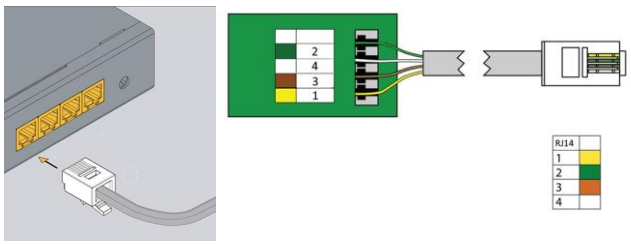
It is possible to test the operation of the optical smoke sensor by inserting, for example, an office paper clip into the hole shown in the picture. The detector should react by permanently lighting the LED. It is an alarm condition of the detector and to turn it off, disconnect the detector for a moment from the power supply or perform a reset via the web interface of the controller. Reset via the web interface disconnects power from all analogue sensors, which may result in additional alarms being generated during this time.

4.8.4 ES357 – PIR sensor

Installation

The detector should be mounted to the wall at a height of about 2.2 m using the attached adjustable handle.
Do not install the detector in the vicinity of heat or cold sources, or in direct sunlight, which may cause false alarms.

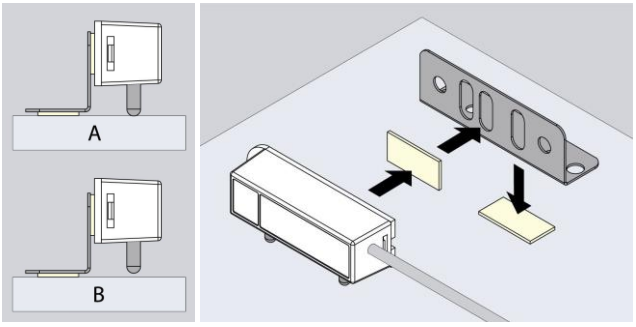
Connection



The ES357 detector has a cable permanently connected to the detector, which should be connected to the analogue input of the controller. This cable can be extended to a maximum of 50m.

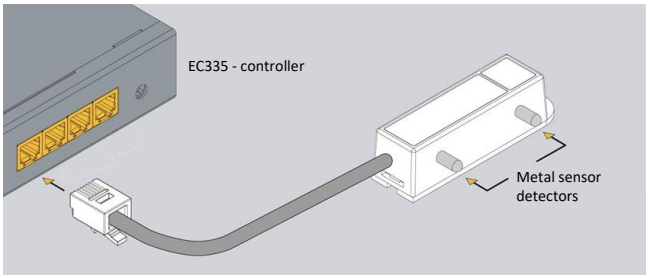
4.8.5 ES359 – point leak sensor

Installation



The ES359 sensor should be mounted in such a way that its metal detectors are shorted with liquid during a leak. If the surface is not conductive, the detectors can touch it (figure A). Otherwise, the sensor must be mounted in such a way that the detectors are slightly above the surface (figure B). The attached metal angle bracket can be used for mounting.
The sensor can be damaged if it is completely immersed in the liquid. Then it will be necessary to replace it.

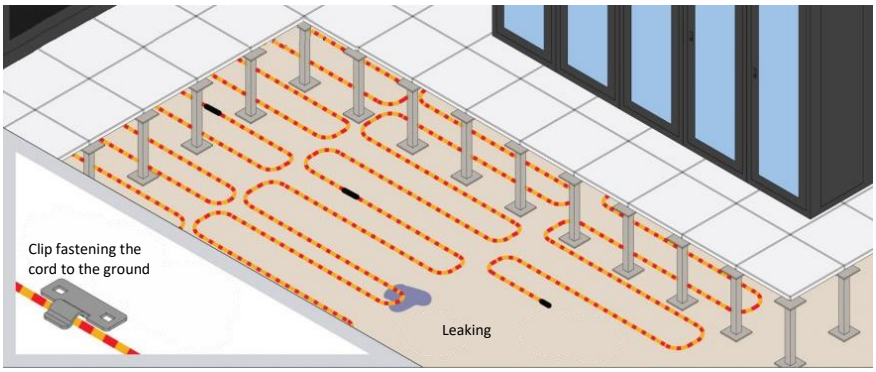
Connection



The sensor has a wire permanently connected to the detector, which should be connected to the analogue input of the controller. This cable can be extended to a maximum of 100m,

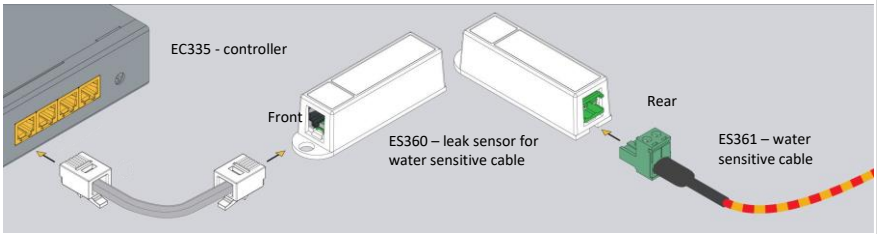
4.8.6 ES360 + ES361 - linear leak sensor

Installation



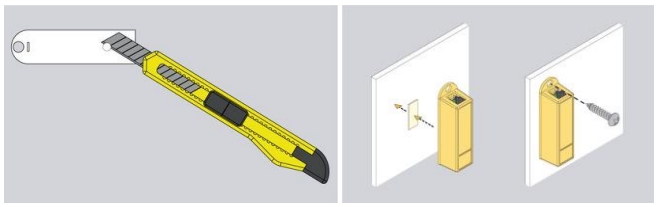
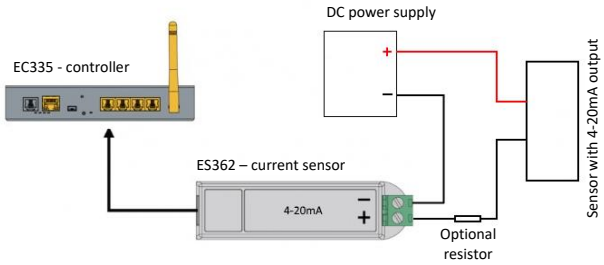
The ES361 water detection cable should be placed on the monitored surface, eg under the technical raised floor of the server room. The cable can be distributed evenly over the whole surface of the floor or only in sensitive parts, eg under air conditioning modules.
Use non-metallic fastening brackets to fasten the cable. You can use the attached plastic handles. Together with the cable, 1 holder is provided for every 2 m of cable. The conduit is even sensitive to condensed air when the air humidity is high and the temperature is around the dew point. This situation can cause false flood alarms.

Connection

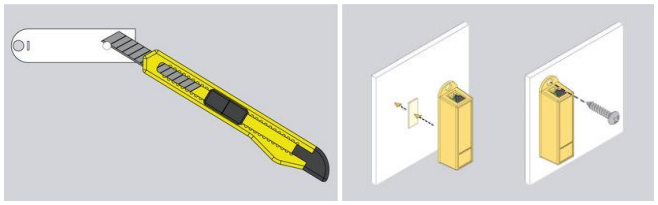
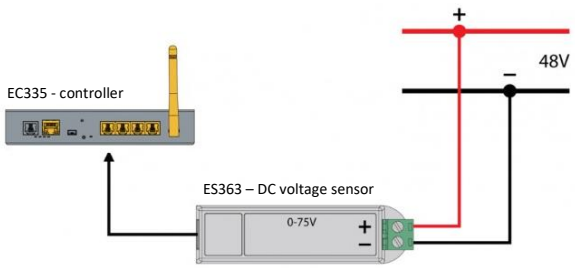


For the ES360 sensor (flood sensor for the water sensitive cable), connect the ES361 water sensitive cable using the terminal block provided.

4.8.7 ES362 - 4-20mA current sensor

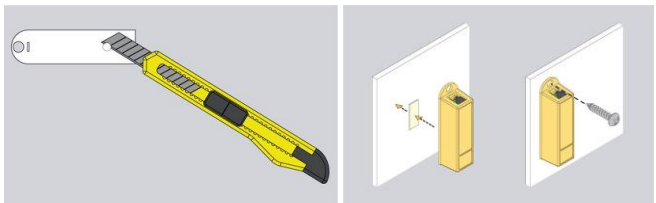
Installation	
	The sensor can be installed using a hole in its housing with a diameter of 5.5mm or use a double-sided adhesive tape. For mounting in IT cabinets, use a cage nuts and bolts with M4 or M5 size.
Connection	
	The ES362 sensor should be connected to one of the analogue inputs of the controller using the supplied cable. A circuit in which the current from the 4-20 mA range will be monitored should be connected to the sensor's connector terminal, paying attention to the correct polarity. Use a 1mm^2 wire. ES362 input voltage: 5V ES362 maximum input current: 24mA

4.8.8 ES363 - 0-75VDC voltage sensor

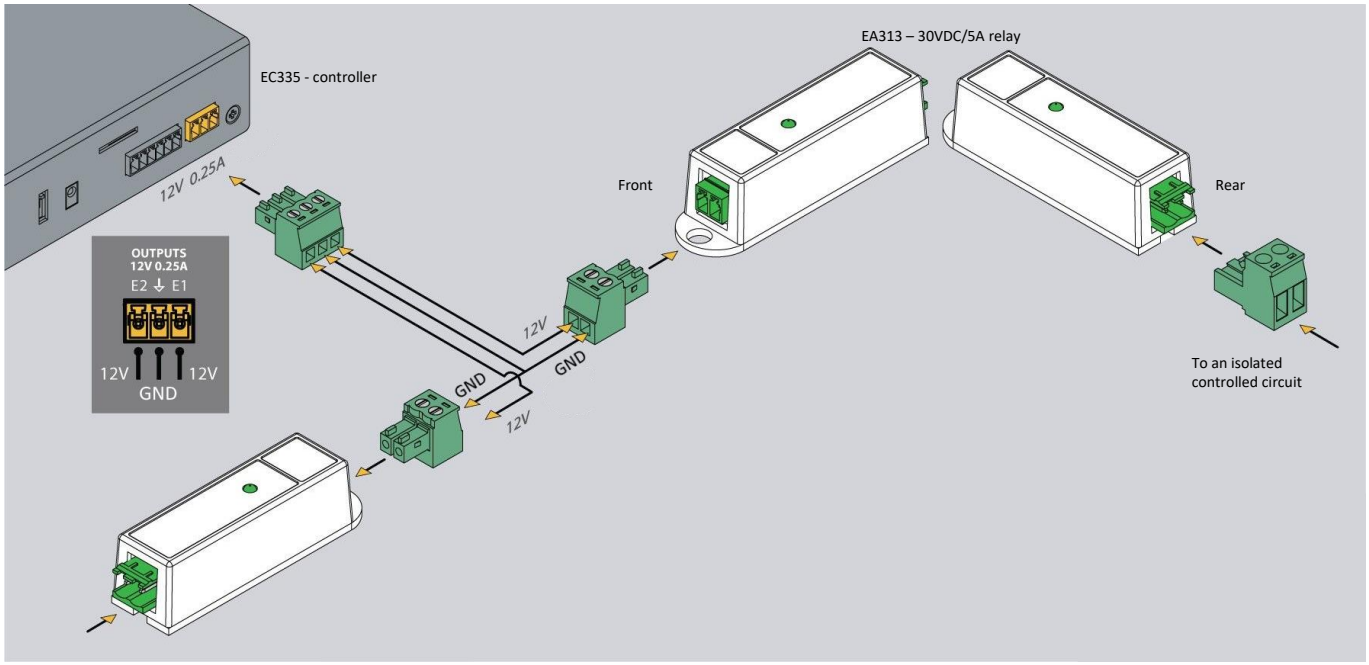
Installation	
	The sensor can be installed using a hole in its housing with a diameter of 5.5mm or use a double-sided adhesive tape. For mounting in IT cabinets, use a cage nuts and bolts with M4 or M5 size.
Connection	
	The ES363 sensor should be connected to one of the analogue inputs of the controller using the supplied wire or wire terminated with RJ12 (6P6C) -RJ12 (6P6C) plugs with a maximum length of 50m. A monitored voltage should be connected to the sensor's connector terminal, observing the correct polarity. Use a 1mm^2 wire.

4.9 Installation of accessories

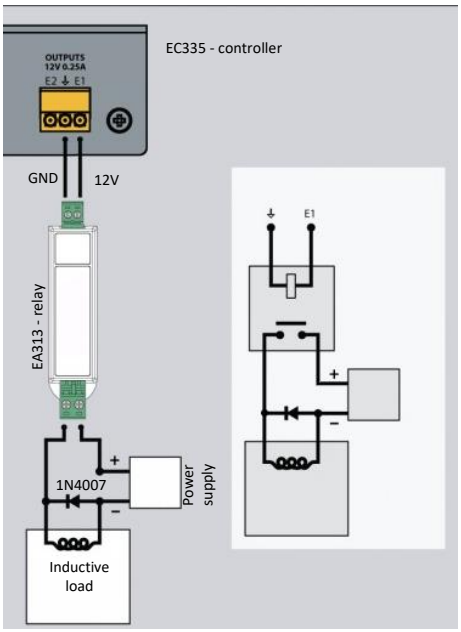
4.9.1 EA313 - 30V/5A relay

Installation	
	The installation of the relay is similar to the installation of analogue sensors in the same housing. You can use the hole in the sensor housing with a diameter of 5.5mm or adhesive double-sided tape. For mounting in IT cabinets, use a cage nuts and bolts with M4 or M5 size.

Connection



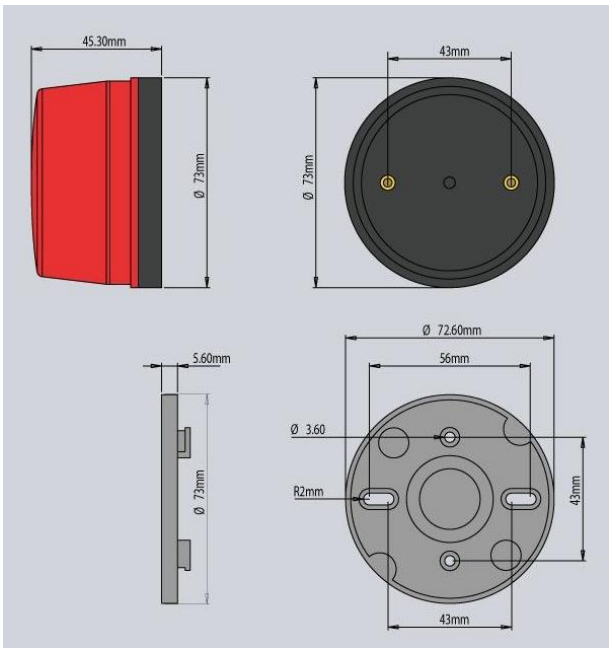
The EA313 relay is used to isolate the EC335 controller output circuit from the circuit of the controlled device. To connect between the controller and EA313, use a wire with a cross-section of 1mm^2. The cable should not be longer than 100m



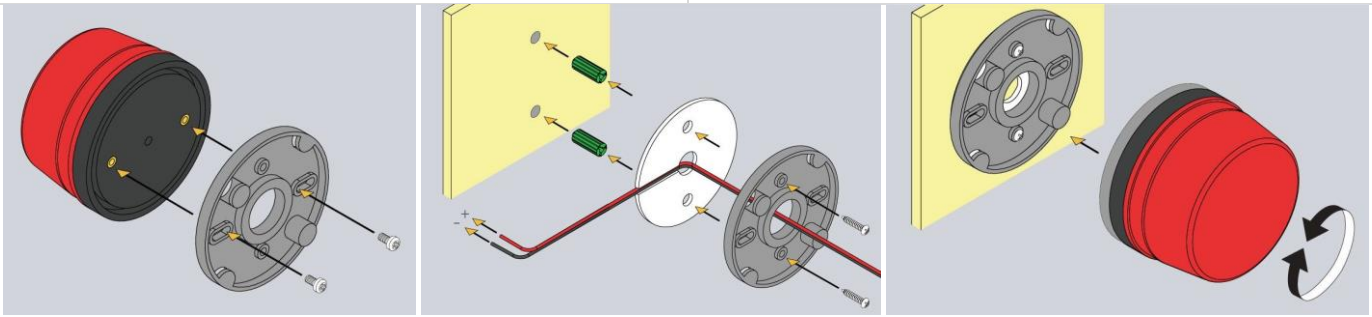
In the case of controlling an inductive load (e.g. an electromagnetic lock of the door), a diode connected in parallel with the load should be used. It protects the contacts of the relay against overvoltage.

4.9.2 EA315 - light signal

Installation

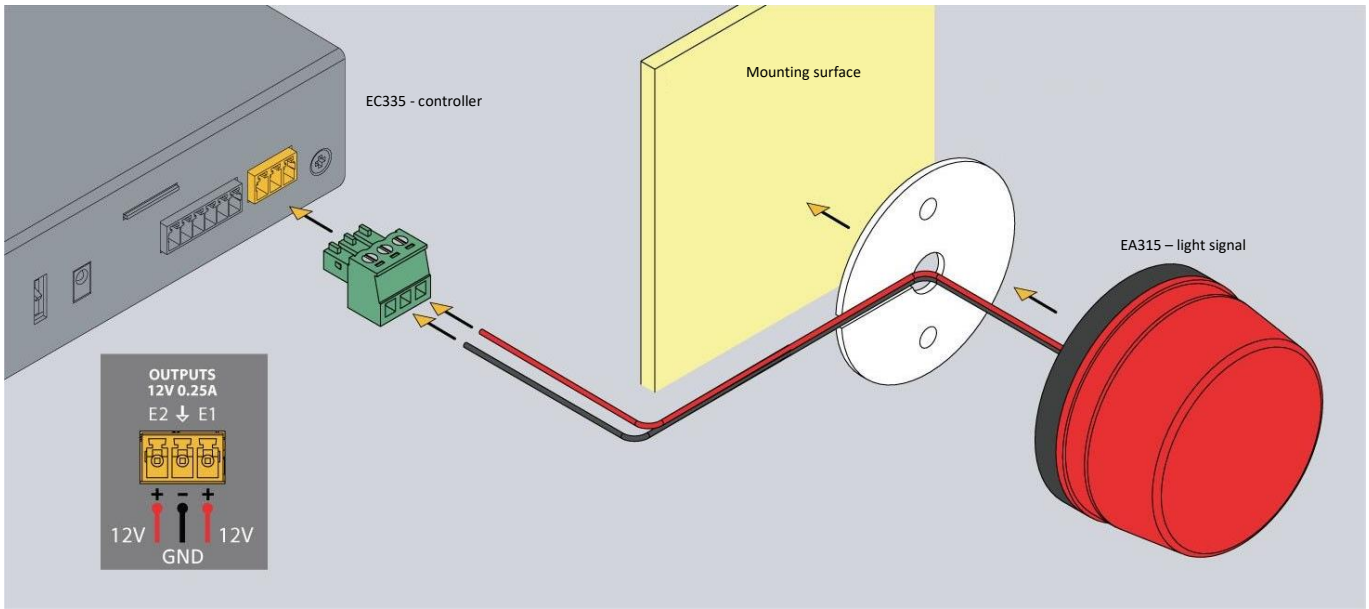


The dimensions of the device are shown in the figure on the left.



The method of mounting the device is shown in the above drawings.

Connection



The light signal should be connected to one of the controller voltage outputs. Use the attached wire or cable with a cross-section of 1mm^2. The maximum length of the connecting cable should not exceed 100m.

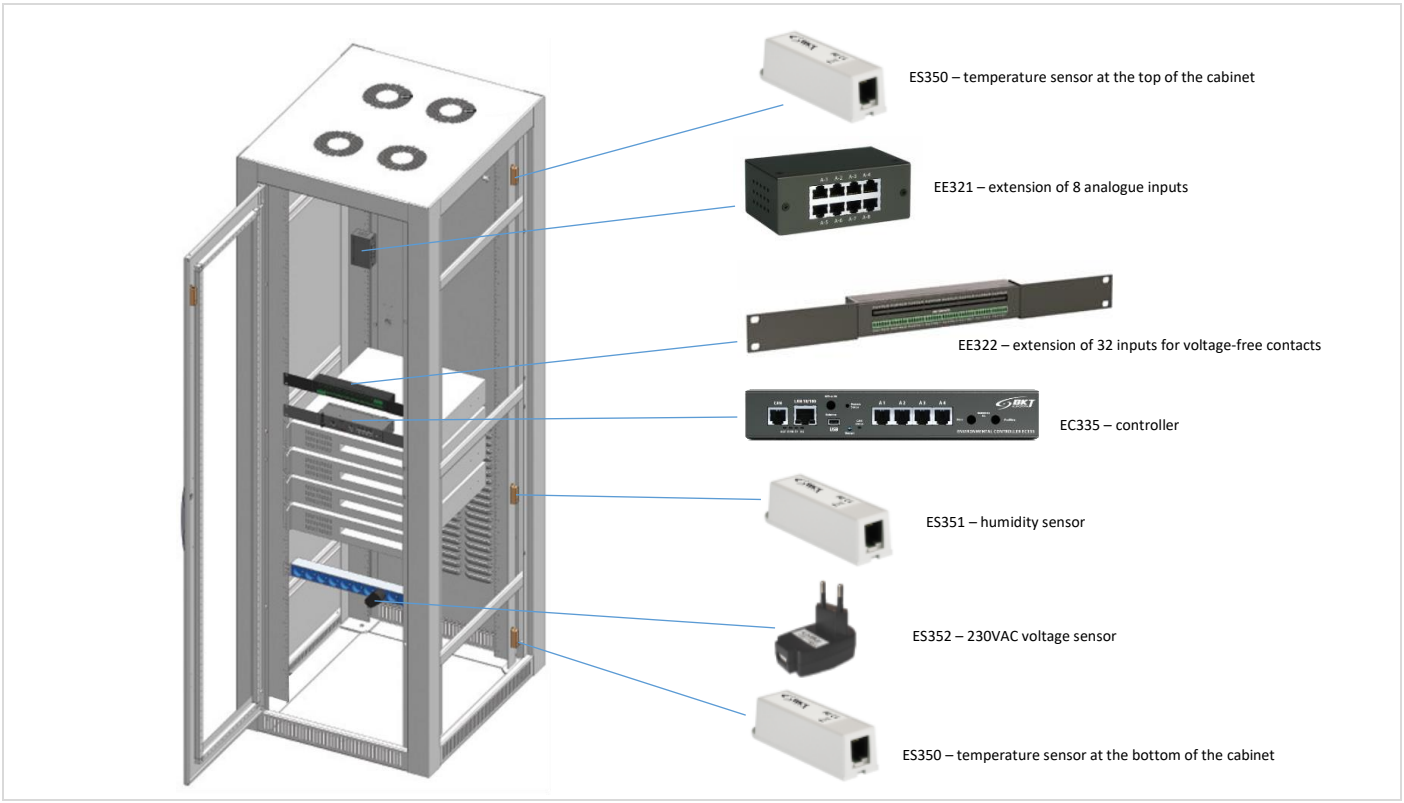
4.10 An example of placing devices in the cabinet

The number and type of sensors in the cabinet should be selected depending on the parameters to be monitored and the conditions in which the devices in the cabinet operate. For example, if a rack is completely filled with high-power appliances or there is no forced ventilation, two or more temperature sensors may be appropriate. In server racks, sensors installed at the front of the rack will measure the temperature of the air entering the rack, and sensors at the back will measure the air leaving the rack. The temperature measurement on the back of the rack may be corrupted if the temperature sensor is installed directly in front of the active device fan.

Proposed arrangement of temperature sensors in the cabinet

Number of temperature sensors	Cabinet installation location
1	At the front, half the height of the cabinet
2	At the front and back of the cabinet halfway up
4	Two at the front and two at the rear of the cabinet at 1/3 and 2/3 of its height

The figure below shows a proposed arrangement of devices in the cabinet



5 QUICK START GUIDE

5.1 Connection

1. Connect the analogue sensors to any A1-A4 socket.
2. Connect the RJ45-RJ45 patchcord to the LAN socket and the other end to the computer.
3. Connect the power adapter to the POWER socket.

5.2 Restoring default settings

In order to make sure that all settings have default values, it is recommended to reset the default setting before the first start-up.

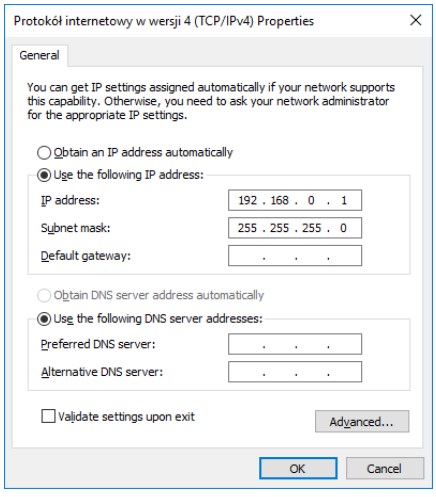
NOTE: All current settings will be deleted.

1. Disconnect power supply.
2. Make sure that the Normal/Recovery is in the NORMAL position. 

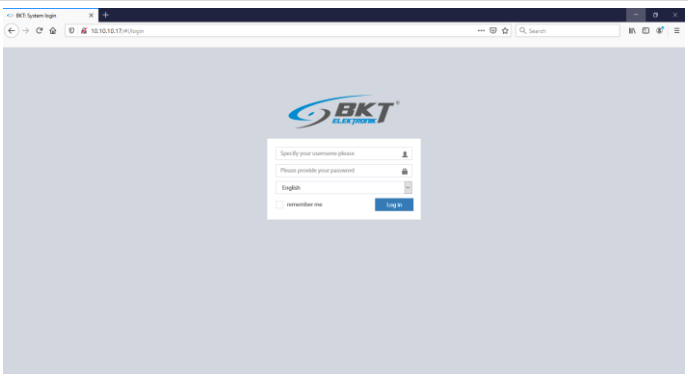
3. Connect the module power supply.
4. Wait for ACT LED flashing.
5. Switch the Normal/Recovery button to the RECOVERY position and wait until the LED ERROR indicator starts to flash (approx. 10 second).
6. When the LED ERROR indicator is still on, restore the button to the NORMAL position and wait until the device restarts.
7. The default settings have been restored.

Default settings	
IP address	192.168.0.193
Network mask	255.255.255.0
Network gate	192.168.0.1
DNS server	192.168.0.1
DHCP client	Disabled
Passwords	User: guest; password: guest

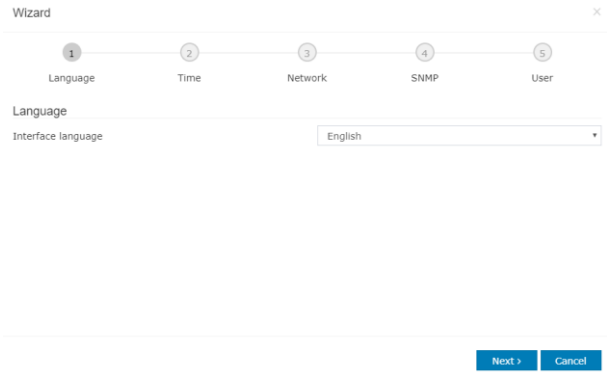
5.3 Initial configuration



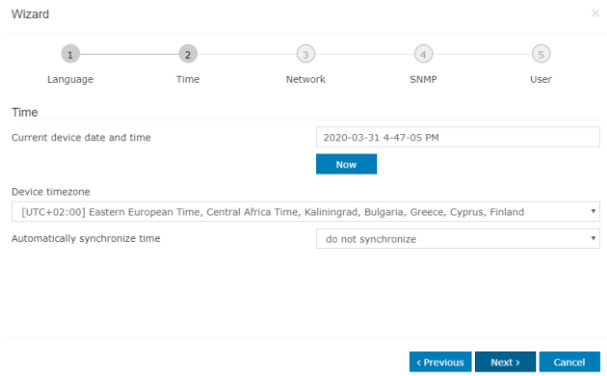
Configure the computer network card for operation in the same network as EC335. For example, you can use settings as shown in the figure.



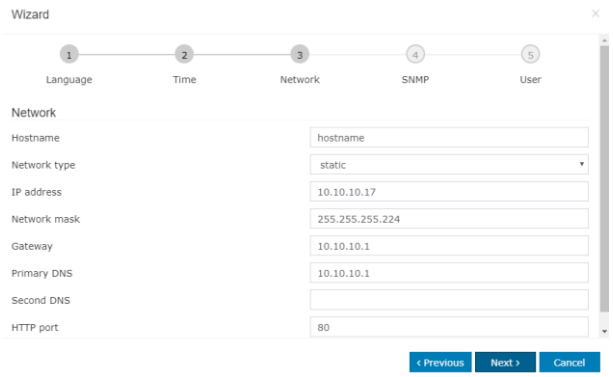
Run the browser and enter http://192.168.0.193 in the address bar.
Enter the following in the login window:
user: guest
password: guest.
Use the displayed wizard for initial configuration.



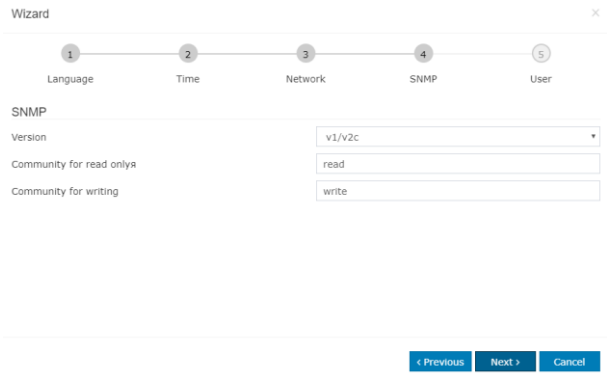
Choose the interface language.



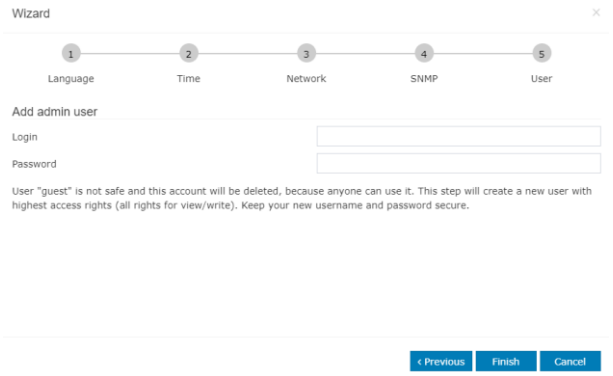
Set the date and time.



If necessary, change the network settings.

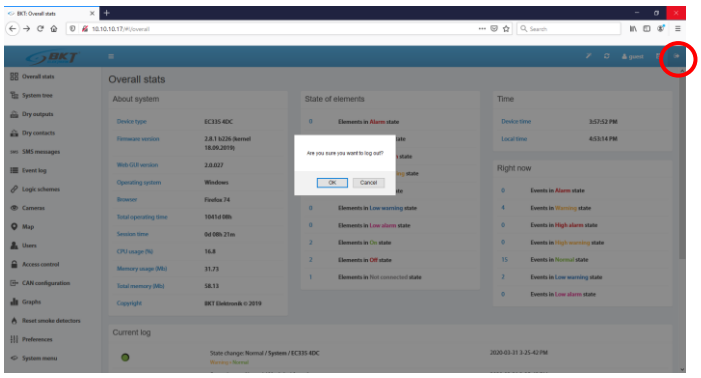


If necessary, change the SNMP protocol communication settings.



Create a new user. Click *Finish* and wait until the configuration is saved.

5.4 User Logging out



You can log out when you click on the *Logout* button from horizontal menu.

6 CONFIGURATION

The configuration information provided is related to firmware version 2.8.2.b177. Devices with a different version of the firmware may have a user interface that is slightly different from the one described here.

6.1 Horizontal menu

Show and hide the vertical menu.

Run the initial configuration wizard.

Add a new element. This function is available only on certain screens selected from the vertical menu.

Refresh the view.

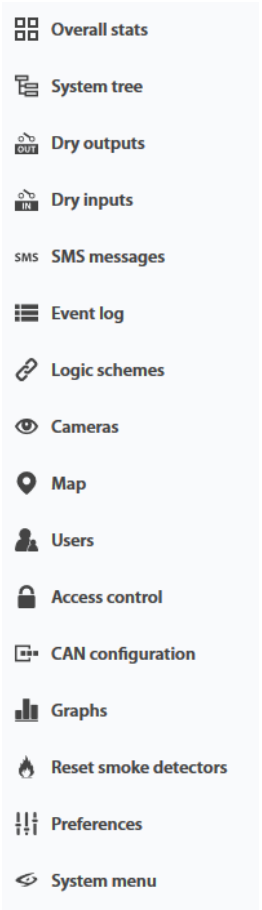
Additional settings. This function is availeble only on certain screens selected from the vertical menu.

Reset the smoke sensors. This function is available only after selecting ‘Reset the smoke sensors’ from the vertical menu.

Write the configuration to non-volatile memory of the module. Any configuration changes must be written to non-volatile memory, if they need to be kept after resetting the device.

Log out.

6.2 Vertical menu



General view of the system status.

View of all system components, incl. sensor values.

View of the relay outputs status (not available in EC335).

View of the potential-free contact status.

Text message settings

View of the system event history.

Creating relations between the sensors and potential alarms.

Camera image preview.

View of sensotr parameters against the room layout.

User management.

Access Control settings

Configuration of extension modules.

Displaying sensor values on charts.

Resetting the smoke sensors following an alarm.

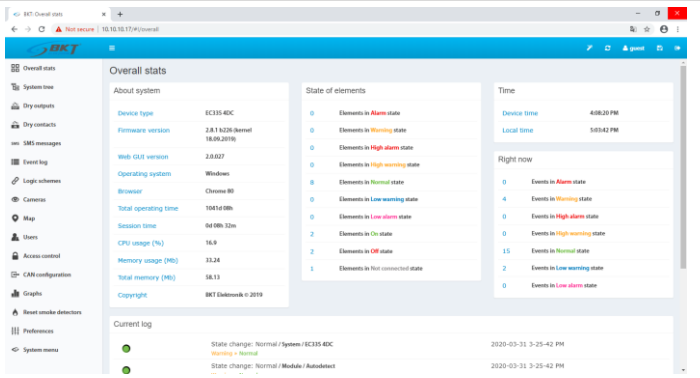
System settings.

Firmware update and data export.

6.3 Saving settings into non-volatile memory

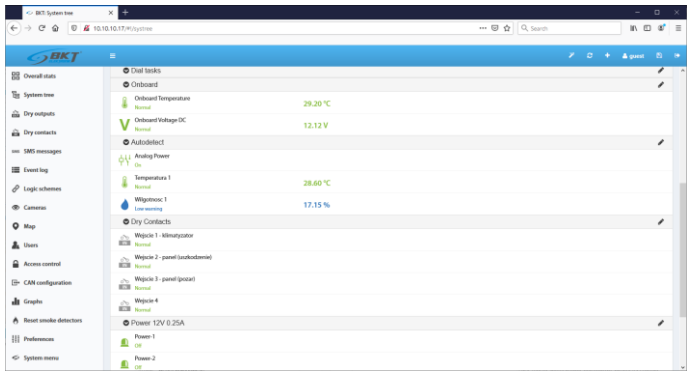
All new setting must be saved into FLASH non-volatile memory. Otherwise they will only be valid until the next reboot.

6.4 General statistics

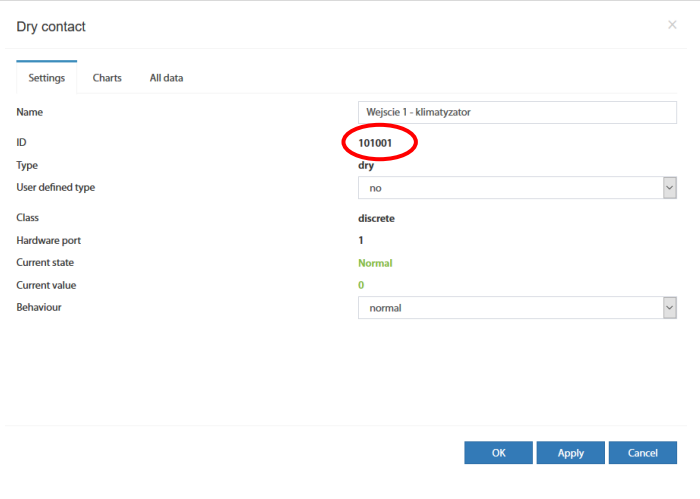


Select *Overall Stats* from the vertical menu to display basic data on the system status.

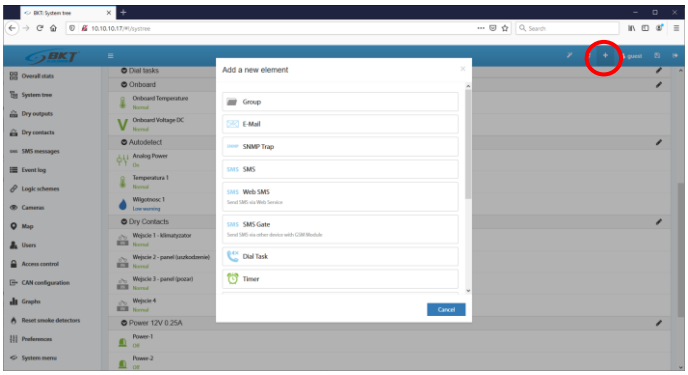
6.5 System tree (system components)



Select *System tree* from the vertical menu to display all system components. On this page, you can add, remove and modify settings of individual components.



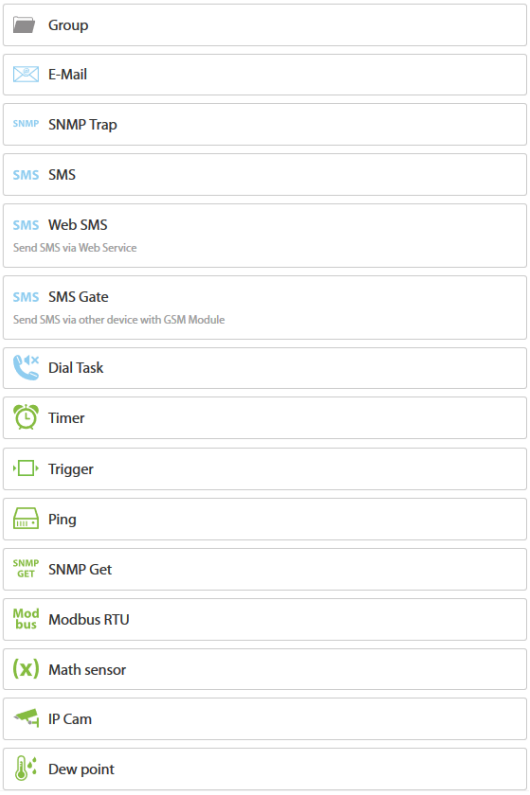
Each element of the system has an individual 6-digit ID number. This number can be used when configuring email or text messages. The first 3 digits indicate the type of element, and the remaining three the consecutive number of element of such type:
101xxx - input for potential-free contacts
201xxx - temperature sensor
202xxx - humidity sensor
203xxx - voltage sensor
etc.
The item ID number can be read after clicking on the item in the system tree.



In order to add a new component, click the '+' button in the horizontal menu.

To maintain proper performance of the device, it is recommended to use max 100 components in the system.

To maintain the settings after restarting the controller, write them to non-volatile memory.



Creating sensor groups

Configuring email notification content

Configuration of SNMP Trap notifications

Configuration of SMS (text message) notifications

- sent by the WEB gateway

- sent by a modem installed in another device

Creating phone notification

Creating time ranges for schedules

Creating triggers (flags)

Creating PING queries

Creating SNMP queries

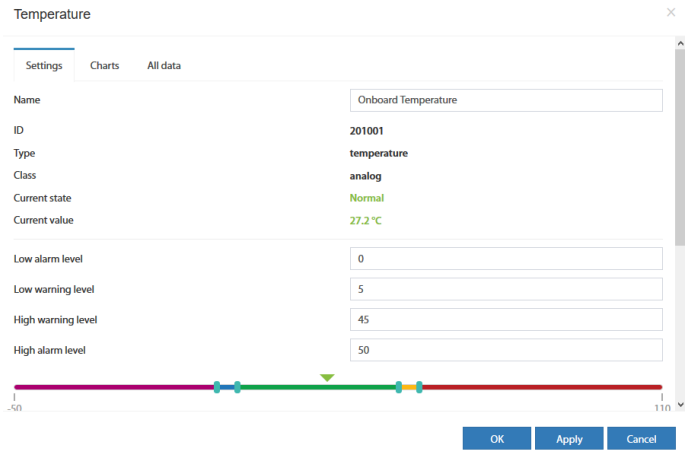
Creating Modbus RTU object

Creating virtual mathematical sensor

Configuring the IP camera

Configure virtual dew point sensors

6.5.1 Setting the sensor parameters



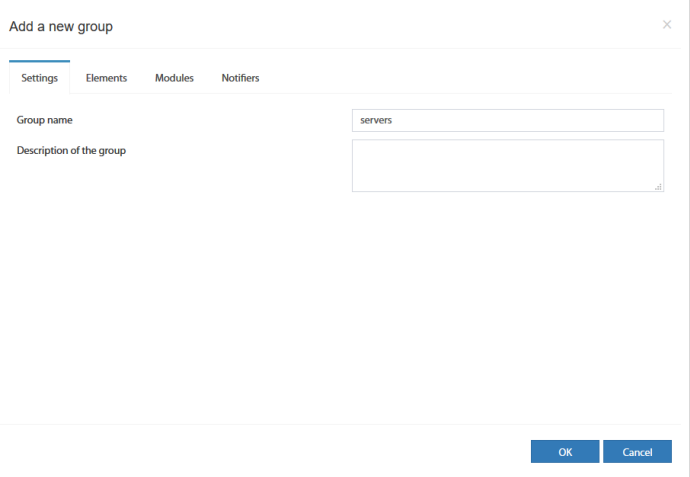
Analog sensors and 1-wire sensors are automatically recognized by the controller shortly after they are connected to the appropriate ports and then they are displayed in the system tree. In order for the sensors connected to the CAN bus to be visible in the system tree, the procedure *6.14 CAN configuration (extension module)* must be carried out beforehand.
After clicking on the sensor symbol in the system tree a window will pop up, where you can configure the basic parameters of the sensor.

Field	Description
Name	Name of the element in the system
Low alarm level	Threshold for low value alarm
Low warning level	Threshold for low value warning
High warning level	Threshold for high value warning
High alarm level	Threshold for high value alarm
Hysteresis type	**Disabled** – hysteresis and delay deactivated. The alarm will be generated immediately after exceeding the threshold value **Value** – hysteresis is on. The alarm will be generated immediately after exceeding the value = threshold value ± hysteresis value. **Time** – alarm delay is on. The alarm will be generated with a defined delay after exceeding the threshold value. The alarm will not be generated if the measured value falls below the alarm threshold within the specified delay.
Value	The hysteresis value in the unit of a given sensor
Low alarm	Delay time in seconds before low state alarm signalling
Low warning	Delay time in seconds before the low state warning signalling
Normal	Delay time in seconds before the normal state signalling
High warning	Delay time in seconds before the high state warning signalling
High alarm	Delay time in seconds before the high state alarm signalling
K z (k*x + b)	The **k** value of the function y = kx + b that allows to recalculate the value read from the sensor before comparing it with the threshold values
B z (k*x + b)	The **b** value of the function y = kx + b that allows to recalculate the value read from the sensor before comparing it with the threshold values

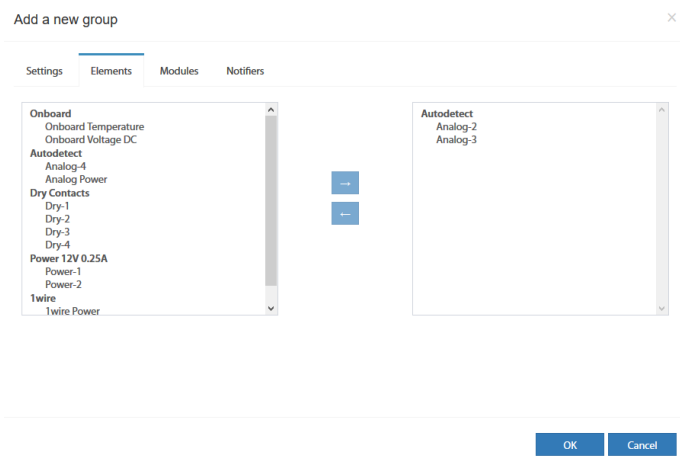
After clicking on the *Charts* tab, the graphs of the measurement values from the last 100 seconds (reading every 1s), 100 minutes (reading every 1 minute), 100 hours (reading every 1h) and 100 days (reading every 1 day) are available.
It is possible to export this data to xml or csv files.

6.5.2 Adding a new group

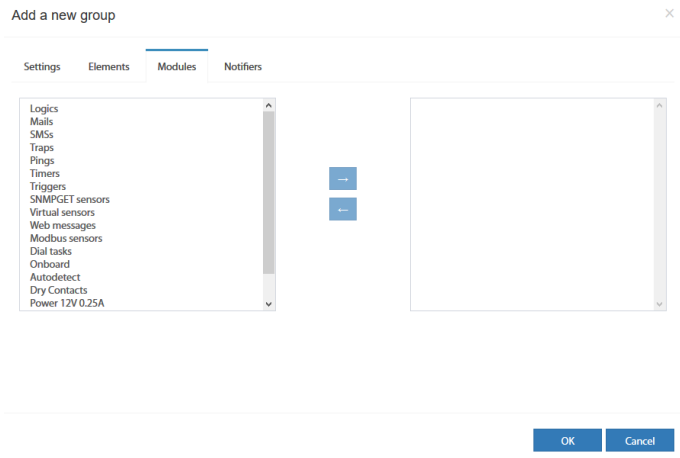
To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



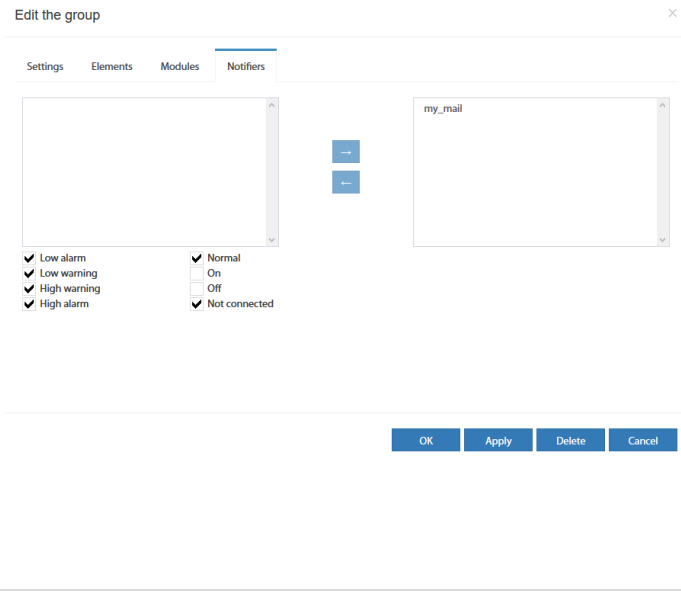
By default, there is one group of devices in the system (system group). Additional groups divide the system into parts. It is then possible to assign individual elements (sensors) to the appropriate groups. You can give the user permission to manage a specific group. It is also possible to set individual email or text messages for individual groups.
In the *Settings* tab, enter the unique name of the created group.



In the *Elements* tab, select individual system elements (sensors) that will belong to the given group.



In the *Modules* tab it is possible to add to the group entire modules present in the system tree.

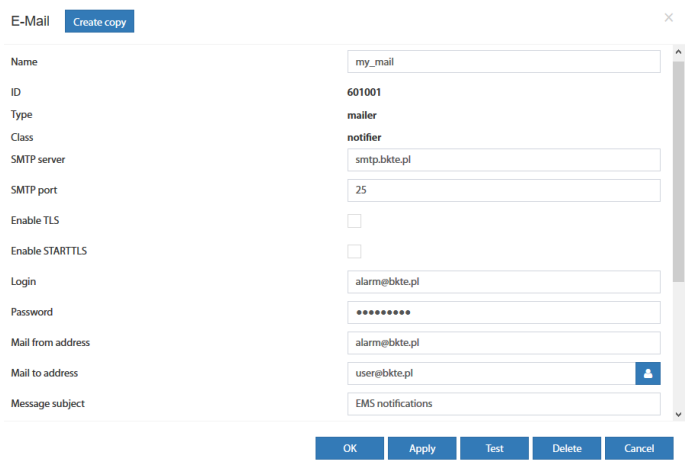


In the *Notifications* tab, you can choose how to notify about any alarm conditions of any sensor in a given group.
You must configure e-mail, sms or snmp trap notifications to make them visible in this window (see chapter *6.5.3 Adding an email notification* and *6.5.5 Adding an SMS notification*).
Using tickboxes, you can choose in which emergency situations you want to send a notification.

Low alarm	Exceeding the low alarm threshold
Low warning	Exceeding the low warning threshold
High warning	Exceeding the high warning threshold
High alarm / Alarm	Exceeding the high alarm threshold or alarm (for sensors without alarm thresholds)
Normal	Normal state of element
On	Element on (eg. Power output)
Off	Element off (eg. Power output)
Not connected	Element disconnected from controller

6.5.3 Adding an email notification

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



The system allows you to configure notifications that will be used to inform about alarm situations.
Each notification contains a configuration of the e-mail account and the content of the message.
In order for the notification to be sent during an alarm, it should be placed in a logic scheme diagram (see chapter 6.9 Logical schemes) or in a group notification (see chapter 6.5.2 Adding a new group).

Configuration of email notification

Field	Description
Name	The name of the notification. The system can have many different notifications. It is to facilitate their recognition.
SMTP server	The name or IP number of the SMTP mail server
SMTP port	Communication port of the mail server
Enable TLS	Use an encrypted connection
Enable STARTTLS	Start with an unencrypted connection and negotiate encryption
Login	The username of the e-mail account
Password	The password of the user of the e-mail account
Mail from address	The Email address of user
Mail to address	Email addresses of recipients. Up to 10 addresses to be separated by semicolon ";"
Message subject	Subject of email
Message text	The content of the email. The text of the message is limited to 1024 characters. The content may contain variables that will be inserted dynamically when the notification is activated. Dynamic variables:

%1	Definition of logic scheme (see chapter 6.9 Logical schemes) or name of the group generating the notification (see chapter 6.5.2 Adding a new group).
%2	The status of system elements that have been entered as a condition of the logic scheme or state of the element in the element group which generated notification.
%3	Date and time of the event
%4	The name of the logical scheme or name of the group generating the notification
%5{id}	Sensor name with id or %8
%6{id}	Sensor status with id or %8
%7{id}	The value read from the sensor with id or %8
%8	The identifier of the sensor that generated the notification
\n	New line character

Examples of the dynamic content of an email notification message

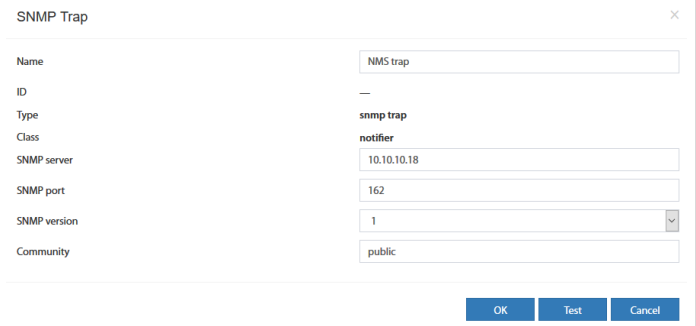
Notification with information about the activated logic diagram, and the state of the system elements that were entered as the conditions of the logic scheme.

The content of the email notification configured	The content of the sent email
Logic activated:\n %4\n System element status:\n %2	Logic activated: 'Warning state' System element status: 'Onboard Temperature' (id=201001) in state 'normal' 'EC335 4DC' (id=100) in state 'warning'

Notification with information on the status of selected sensors:	
The content of the email notification configured	The content of the sent email
Status of system sensors:\n %5{201002} - %7{201002} - %6{201002}\n %5{201003} - %7{201003} - %6{201003}\n %5{202001} - %7{202001} - %6{202001}\n	Status of system sensors: 'Temperature in cabinet 1' - '18,2°C' - 'normal' 'Temperature in cabinet 2' - '17,1°C' - 'low warning' 'Humidity' - '42%' - 'normal'
By default, a notification similar to the following is proposed in the notification:	
The content of the email notification configured	The content of the sent email
Logic %4:\n --\n Definition:\n %1\n Current sensor state:\n %2\n --\n System time: %3	Logic 'Warning state': -- Definition: if 'Onboard Temperature' (id=201001) in state 'high warning' or 'EC335 4DC' (id=100) in state 'warning' then 'email-service' (id=601001) changes to state 'on' immediately, once Current sensor state: 'EC335 4DC' (id=100) in state 'warning' -- Czas systemowy: 12:18:04 2020/11/25

6.5.4 Adding a trap notification

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



Trap is an alarm message used in the SNMP protocol. Such a message can be sent to the master monitoring system.
In order for the notification to be sent during an alarm, it should be placed in a logic scheme diagram (see chapter 6.9 Logical schemes) or in a group notification (see chapter 6.5.2 Adding a new group).

Example Trap message
Source: 192.168.0.193 Timestamp: 191 hours 30 minutes 1 second SNMP Version: 1 Enterprise: .iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification Community: public Specific: 201002 Generic: enterpriseSpecific Variable Bindings: Name: .1.3.6.1.4.1.47394.2.2.1.1 (.iso.org.dod.internet.private.enterprises.bkt.ctlNotifiers.ctlNotifiersTrapsTable.ctlNotifiersTrapsEntry.ctlNotifiersTrapId.602001) Value: [Integer] 602001 Name: .1.3.6.1.4.1.47394.1.5 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification) Value: [OctetString] Trap (name: trap, ID: 602001) was worked. Time: 14:30:00 2019/05/06 Logic: 'grupa-temp', Element: 'Analog-3', in state: 'normal', value: '21.40' Name: .1.3.6.1.4.1.47394.1.5.1 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroLogicDefinition) Value: [OctetString] group 'grupa-temp' notification Name: .1.3.6.1.4.1.47394.1.5.2 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroStateOfSensors) Value: [OctetString] 'Analog-3' (id=201002) in state 'normal' Name: .1.3.6.1.4.1.47394.1.5.3 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroDataAndTime) Value: [OctetString] 14:30:00 2019/05/06 Name: .1.3.6.1.4.1.47394.1.5.4 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroLogicName) Value: [OctetString] grupa-temp

Name: .1.3.6.1.4.1.47394.1.5.5 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroSensorName)
Value: [OctetString] Analog-3

Name: .1.3.6.1.4.1.47394.1.5.6 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroSensorState)
Value: [OctetString] normal

Name: .1.3.6.1.4.1.47394.1.5.7 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroSensorValue)
Value: [OctetString] 21.40

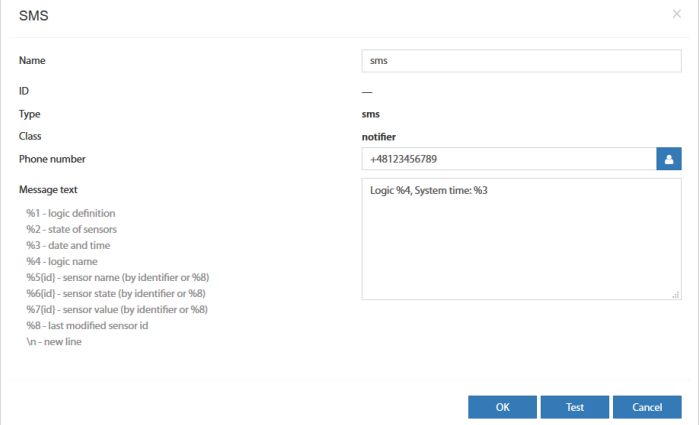
Name: .1.3.6.1.4.1.47394.1.5.8 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.macroLastModifiedSensorID)
Value: [Integer] 201002

Name: .1.3.6.1.4.1.47394.1.5.20 (.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.trapID)
Value: [Integer] 602001

Name: .1.3.6.1.4.1.47394.1.5.21(.iso.org.dod.internet.private.enterprises.bkt.ctlUnit.ctlUnitTrapNotification.trapName)
Value: [OctetString] trap

6.5.5 Adding an SMS notification

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



If an optional GSM modem is installed in the controller, it is possible to send an SMS notification. After installing the modem, configure it, see chapter *6.7 GSM modem settings*.

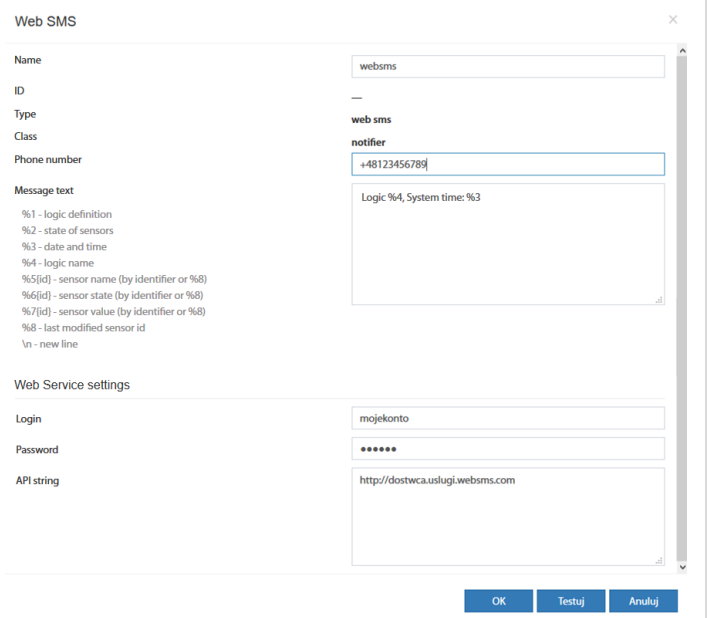
In order for the notification to be sent during an alarm, it should be placed in a logic scheme diagram (see chapter 6.9 Logical schemes) or in a group notification (see chapter 6.5.2 Adding a new group).

Configuration of SMS notification

Field	Description
Name	The name of the notification. The system can have many different notifications. It is to facilitate their recognition.
Phone number	Up to 10 numbers in one notification, which should be separated by semicolon ";" The numbers should be in the format + 48xxxxxxxxx
Message text	The content of the text message. The content may contain variables that will be inserted dynamically when the notification is activated. Dynamic variables: %1 – Definition of logic scheme (see chapter 6.9 Logical schemes) or name of the group generating the notification (see chapter 6.5.2 Adding a new group). %2 – The status of system elements that have been entered as a condition of the logic scheme or state of the element in the element group which generated notification. %3 – Date and time of the event %4 – The name of the logical scheme or name of the group generating the notification %5{id} – Sensor name with id or %8 %6{id} – Sensor status with id or %8 %7{id} – The value read from the sensor with id or %8 %8 – The identifier of the sensor that generated the notification \n – New line character Examples of the use of dynamic variables are similar to those used in email notifications. See chapter *6.5.3 Adding an email notification*.

6.5.6 Adding an WEB SMS notification

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



SMS notifications can also be sent via an SMS web gateway. A GSM modem is not required then.

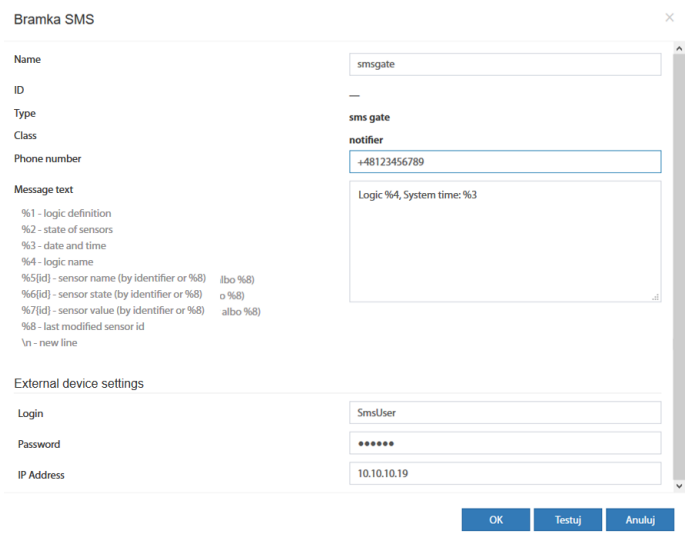
Configuration of web sms notification

Field	Description
Name	The name of the notification. The system can have many different notifications. It is to facilitate their recognition.
Phone number	Up to 10 numbers in one notification, which should be separated by semicolon ";" The numbers should be in the format + 48xxxxxxxxx
Message text	See chapter *6.5.5 Adding an SMS notification*.
Login	The username of the web-> sms service
Password	The user password of the web-> sms service
API string	The service provider's url, which sends an SMS message, for example: https://api.smsglobal.com/http-api.php?action=sendsms&user=user&password=secret&to=12345678&text=Hello The following variables can be used in the url address:

$LOGIN$	User name from the ***Login*** field
$PASSWORD$	User's password from the **Password** field
$PASSWORD_MD5$	User password encrypted with the MD5 algorithm
$PASSWORD_SHA1$	The user's password is encrypted with the SHA-1 algorithm
$PHONES$	The telephone number of the SMS recipient from the **Phone number** field
$MESSAGE$	Message text from the **Message text** field

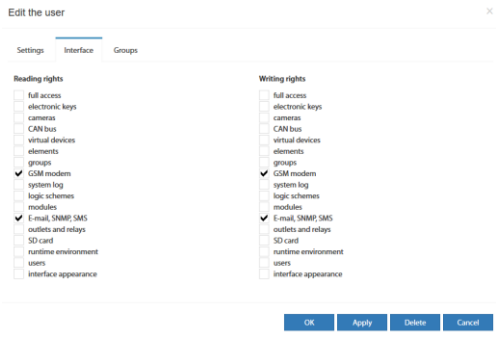
6.5.7 Adding an sms gate notification

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



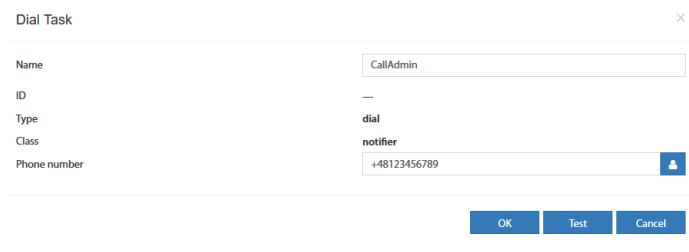
It is also possible to send SMS via a GSM module installed in another controller (SMS Gate option).

Configuration of sms gate notification

Field	Description
Name	The name of the notification. The system can have many different notifications. It is to facilitate their recognition.
Phone number	Up to 10 numbers in one notification, which should be separated by semicolon ";" The numbers should be in the format + 48xxxxxxxxx
Message text	See chapter *6.5.5 Adding an SMS notification*.
Login	The name of the user who can log in to another EC335 device where a GSM modem is installed. Such user must have read and write permissions for the GSM modem and E-mail, SNMP and SMS notifications. See chapter *6.12 Users*. 
Password	The password of this user
IP Address	The IP address of the EC335 device with the GSM modem installed

6.5.8 Adding phone call

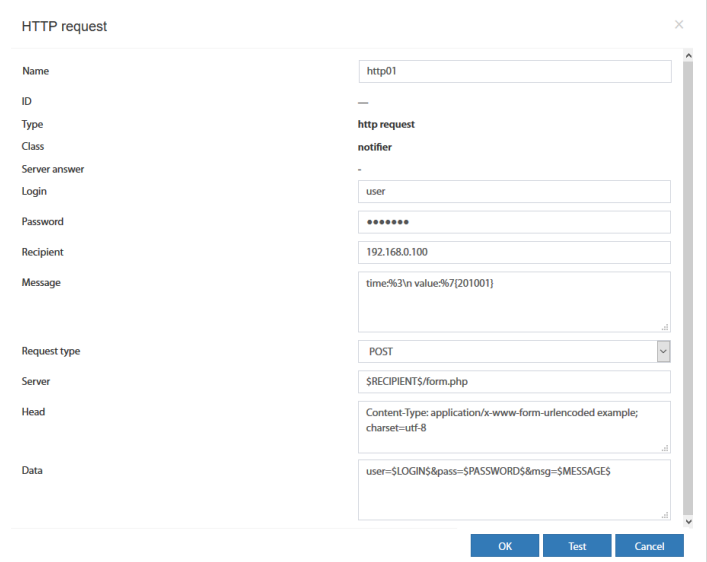
To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



It is also possible to get the user's attention by making a call to him. It is only a ringing tone. The device does not have a voice communicator, e.g. playing a voice message.

6.5.9 Adding HTTP Request

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



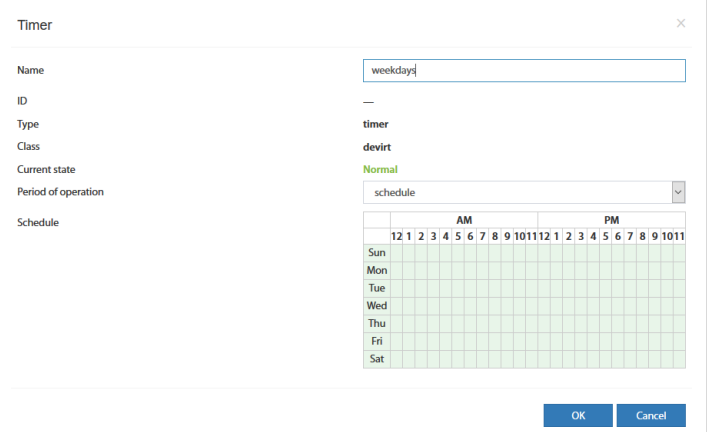
The controller enables sending an HTTP Request (GET, POST, DELETE, PUT) to a defined server. It can be used to send e.g. an alarm value of defined sensor. Such feature can be used together with Logical schemes *(6.9 Logical schemes*).

Field	Description
Name	Element name.
Login	User name – to the http query can be entered as: $LOGIN$
Password	User password – to the http query can be entered as: $PASSWORD$
Recipient	Server address – to the http query can be entered as: $RECIPIENT$
Message	Message content - to the http query can be entered as: $MESSAGE$ The message may contain the following characters:
Request type	Type of HTTP request: GET, POST, DELETE, PUT
Server	Server path – may contain definitions: $LOGIN$, $PASSWORD$, $RECIPIENT$, $MESSAGE$
Head	Header of HTTP request – may contain definitions: $LOGIN$, $PASSWORD$, $RECIPIENT$, $MESSAGE$
Data	Body of HTTP request - may contain definitions: $LOGIN$, $PASSWORD$, $RECIPIENT$, $MESSAGE$

%1	Definition of logic scheme (see chapter 6.9 Logical schemes) or name of the group generating the notification (see chapter 6.5.2 Adding a new group).
%2	The status of system elements that have been entered as a condition of the logic scheme or state of the element in the element group which generated notification.
%3	Date and time of the event
%4	The name of the logical scheme or name of the group generating the notification
%5{id}	Sensor name with id or %8
%6{id}	Sensor status with id or %8
%7{id}	The value read from the sensor with id or %8
%8	The identifier of the sensor that generated the notification
\n	New line character

6.5.10 Adding a timer

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.

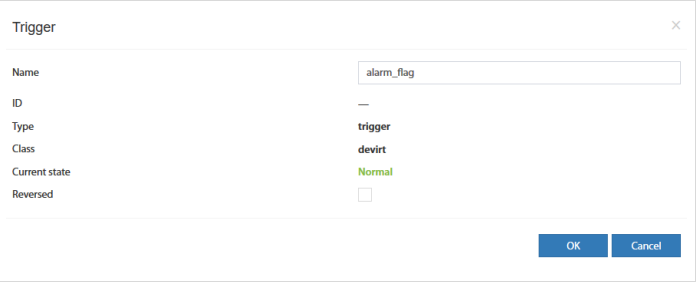


Time dependencies can be added to the system. Timers (schedulers) are used for this. The timer can be in an active (alarm) or normal state at defined times. The timer can be configured as one-time or periodical weekly or monthly.

In logical schemes, they can be used as conditions for the execution of instructions.

6.5.11 Adding a trigger

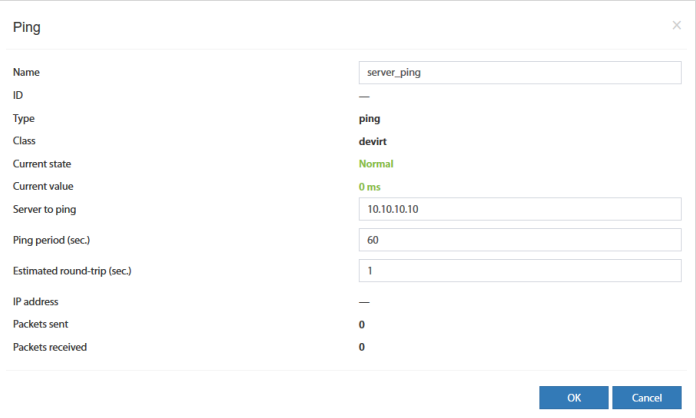
To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



Trigger has a similar function as the flag. It can be in two states: alarm and normal state. It allows you to link two independent logic schemes.

6.5.12 Adding PING functions

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.

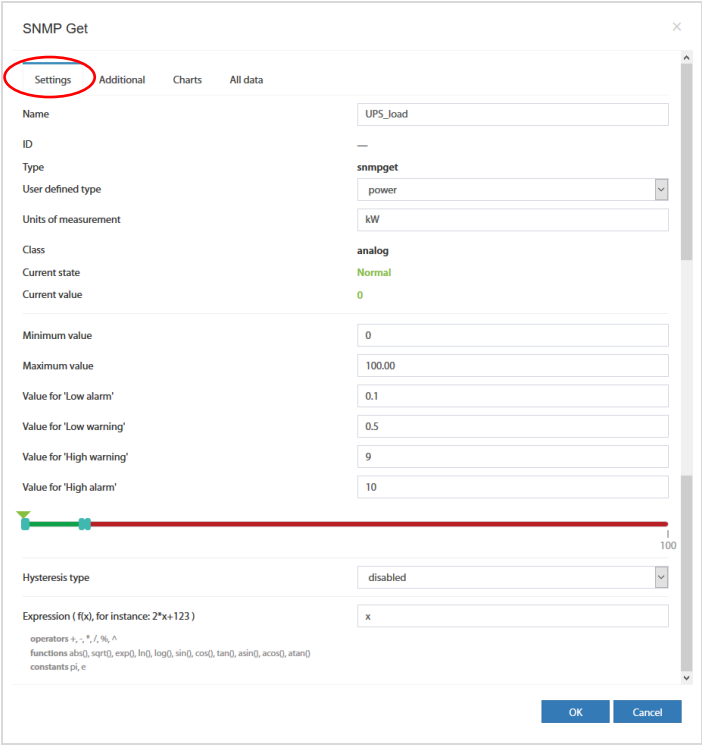


The controller can control external devices by sending PING periodically. In logic diagrams (see chapter *6.9 Logical schemes*) or in notifications for groups (see chapter *6.5.2 Adding a new group*), you can define eg. sending an alarm email when the external device stops responding to PING.

6.5.13 Adding an SNMP Get

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.
The controller can query the external device for its parameters using the SNMP v1 or v2 protocol. The values of this parameter deviating from the defined one can generate notifications. There are two types of read variables – analogue and discrete:

***Settings* Tab of SNMP Get (analogue value)**

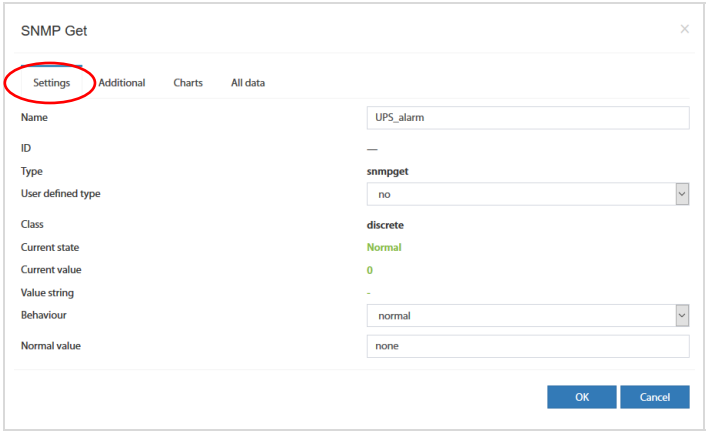


Analogue value – the read integer or String type numerical variable. After being recalculated with the formula contained in the *Expression* field, it is comparable to the four alarm thresholds and on this basis the normal or alarm condition of the SNMP Get element is determined.

Field	Description
Name	SNMP Get element name.
User defined type	Sets adequate icon for this element.
Unit	Unit of read variable.
Minimum value	Defines the range of changes of the read value.
Maximum value	Defines the range of changes of the read value.
Value for low alarm	Threshold for low value alarm.
Value for low warning	Threshold for low value warning.
Value for high warning	Threshold for high value warning.
Value for high alarm	Threshold for high value alarm.
Hysteresis type	**Disabled** – hysteresis and delay deactivated. The alarm will be generated immediately after exceeding the threshold value **Value** – hysteresis is on. The alarm will be generated immediately after exceeding the value = threshold value ± hysteresis value. **Time** – alarm delay is on. The alarm will be generated with a defined delay after exceeding the threshold value. The alarm will not be generated if the measured value falls below the alarm threshold within the specified delay.
Value	The hysteresis value in the unit of a given sensor.
Low alarm	Delay time in seconds before low state alarm signalling.
Low warning	Delay time in seconds before the low state warning signalling.
Normal	Delay time in seconds before the normal state signalling.
High warning	Delay time in seconds before the high state warning signalling.
High alarm	Delay time in seconds before the high state alarm signalling.
Expression f(x)	Field available for the Analog variable type. The function enables the conversion of the read analogue value "x" before comparison with the alarm thresholds. The expression can contain the following characters:

	operators: "+", "-", "*", "/", "%" (the remainder), "^" (exponentiation); functions: "abs()","sqrt()","exp()","ln()","log()","sin()","cos()","tan()","asin()","acos()","atan()"; constants: "pi" (3.1415926...), "e" (2.7182818...)

***Settings* Tab of SNMP Get (discrete value)**

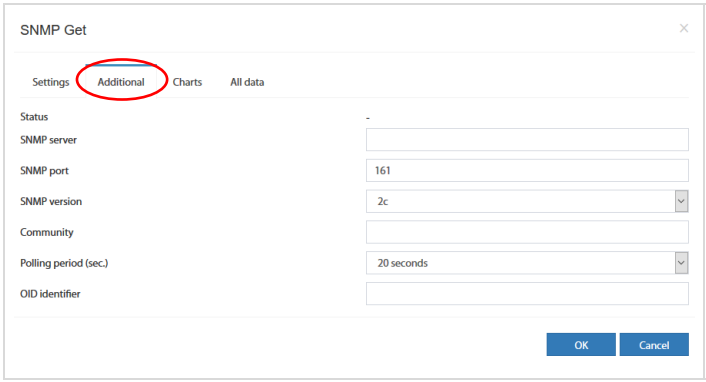


Discrete (binary) – this variable can exists only in two states: normal or alarm. The current state is defined using *Normal value* field entered on *Additional* tab.

The read Integer or String variable is compared to the string contained in the *Normal value* field. Then depending on *Behaviour* field the SNMP Get element status is set.

Field	Description
Name	SNMP Get element name.
User defined type	Sets adequate icon
Behaviour	Normal - normal state of Get SNMP element is when the read value contains a string of characters, which is in the *Normal value* field, otherwise the GET SNMP element is in the alarm state. Reverse – alarm state of Get SNMP element is when the read value contains a string of characters, which is in the *Normal value* field, otherwise the GET SNMP element is in the normal state.
Normal value	Field available for a discrete variable. In this field, enter the string that the read variable must contain in order for the SNMP Get element to be in the normal state.

***Additional* Tab**

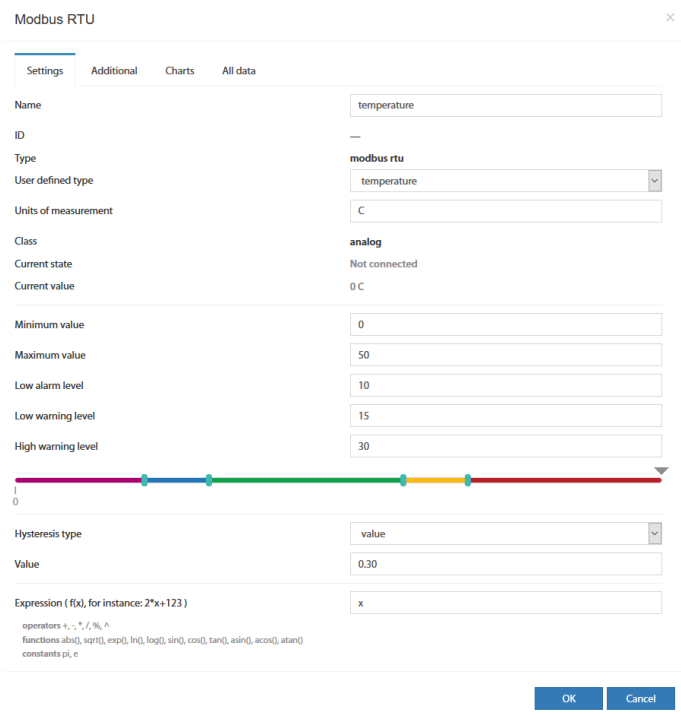


In Additional tab enter SNMP parameters described in the table below.

Field	Description
SNMP Server	The IP address of the device being polled.
SNMP Port	Communication port of the device being polled (usually 161).
SNMP version	Version 1 or 2c can be chosen.
Community	SNMP password to read (read-only community string).
Polling period (sec.)	The frequency of sending queries to the device being polled (in seconds).
OID identifier	The identifier of the SNMP variable in the format „.1.3.6.1.2.1.1.3.0”.

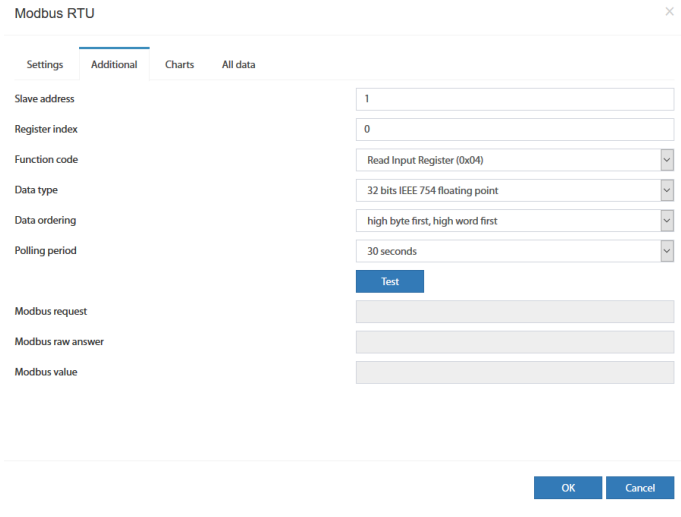
6.5.14 Adding Modbus RTU element

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



The controller can query the external device about its parameters using the Modbus RTU protocol. An additional EE324 module is then required.

In the Settings tab, perform a configuration similar to the sensor configuration in chapter *6.5.1 Setting the sensor parameters.*



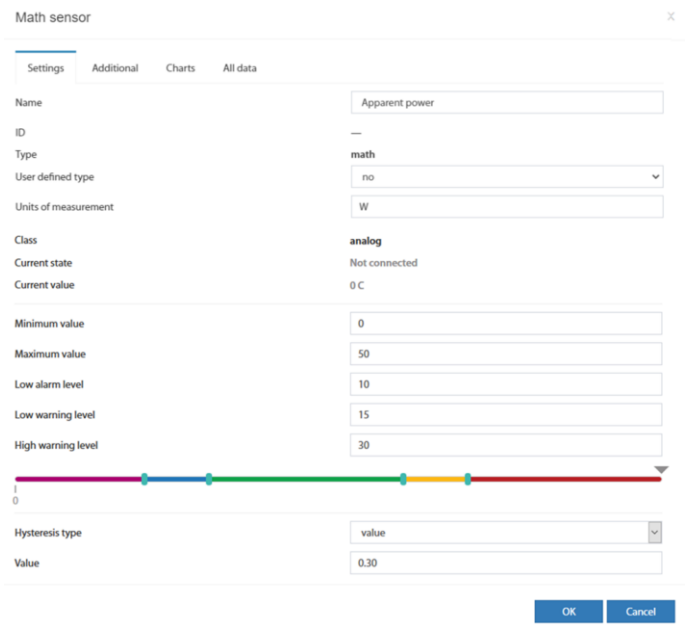
Configure the Modbus RTU protocol parameters in the *Additional* tab. The meaning of each field is described in the table below.

Field	Description
Slave address	Device address on the Modbus bus.
Register index	Address of the register being polled
Function code	Modbus function code 0x01 – reading a single bit of the output register 0x02 – reading a single bit of the intput register 0x03 – reading the output register 0x04 – reading the intput register
Data type	Type of the date being polled 16 bit unsigned int – 2-byte unsigned integer data (values from 0 to 65535) 16 bit signed int - 2-byte signed integer data data (values from −32768 to +32 767 32 bit unsigned int – 4-byte unsigned integer data (values from 0 to 4294967295) 32 bit signed int – 4-byte signed integer data data (values from −2147483648 to 2147483647) 32 bit IEEE 754 floating point – 4 byte floating point data according to the IEEE 754 standard

Data order	The order of reading bytes from the register low byte first, low word first – first least significant byte and least significant word low byte first, high word first – first least significant byte and most significant word high byte first, low word first – first most significant byte and least significant word high byte first, high word first – first most significant byte and most significant word
Polling period	The frequency of sending queries to the device being polled (in seconds).
Test	The button enables checking the communication with the entered parameters.

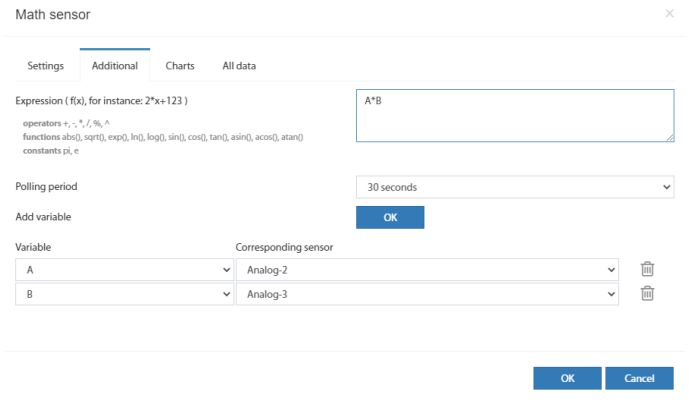
6.5.15 Adding virtual mathematical element

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



The controller enables monitoring of a virtual variable created from the conversion of the values of other variables monitored in the system. In this way, you can, for example, monitor the power consumed by a device, with the following variables available: current consumption and voltage.

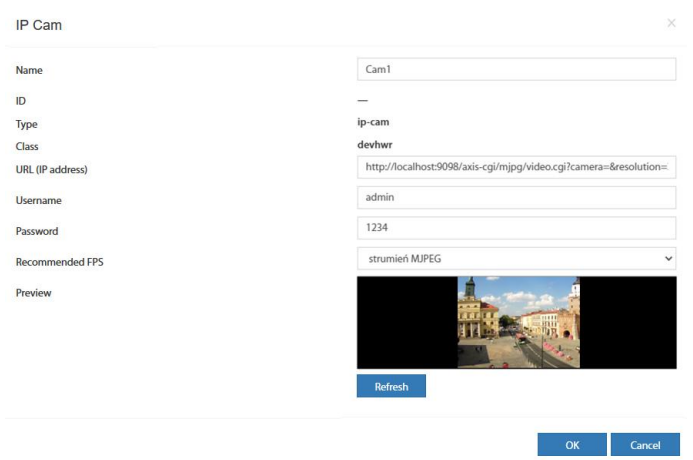
In the Settings tab, perform a configuration similar to the sensor configuration in chapter *6.5.1 Setting the sensor parameters.*



In the *Additional* tab, select variables that will be used as input data and enter a mathematical operation with these variables.

6.5.16 Adding a camera

To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



The camera's handling function is treated as a gadget and is not recommended for larger installations because it can affect system performance. In very small installations this gadget may be desirable.

The controller automatically recognizes a UVC (USB Video Class) camera connected to a USB port that supports MPEG compression. It is recommended to use Logitech type C210, C270, C310, C510 cameras.

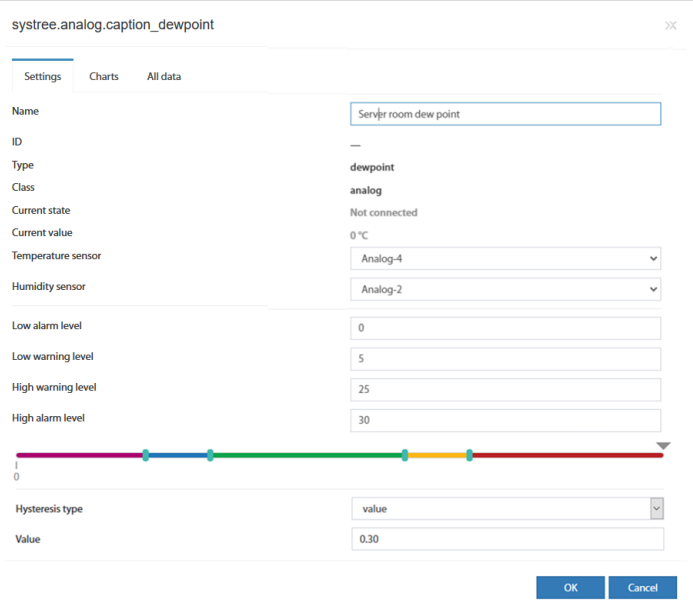
The controller also allows you to configure IP cameras transmitting JPEG images or an MJPEG stream. The controller can handle up to 4 cameras.

The preview of the image from the cameras is available after selecting the Cameras button from the vertical menu.

Field	Description
Name	Camera name.
URL	The address for the video stream of the camera available via the http or https protocol.
Username	Username, if necessary.
Password	User password.
Recommended FPS	The frame rate refresh of the JPEG image or the direct MJPEG stream.

6.5.17 Adding a dew point

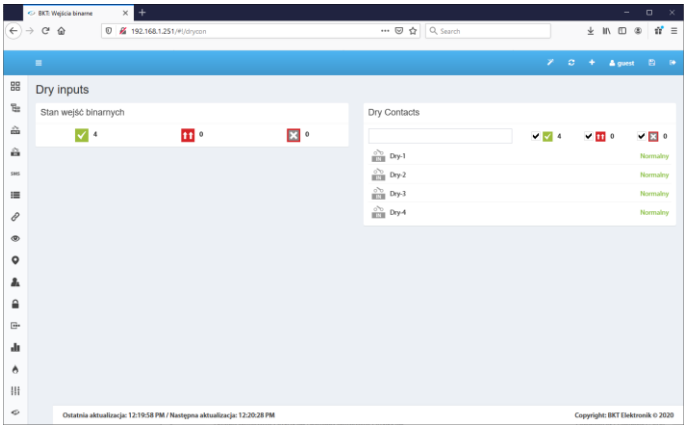
To add a new element, select System tree from the vertical menu, and then click on + in the horizontal menu.



It is possible to add a virtual dew point sensor that calculates the condensing temperature based on temperature and humidity sensors selected connected to the system.

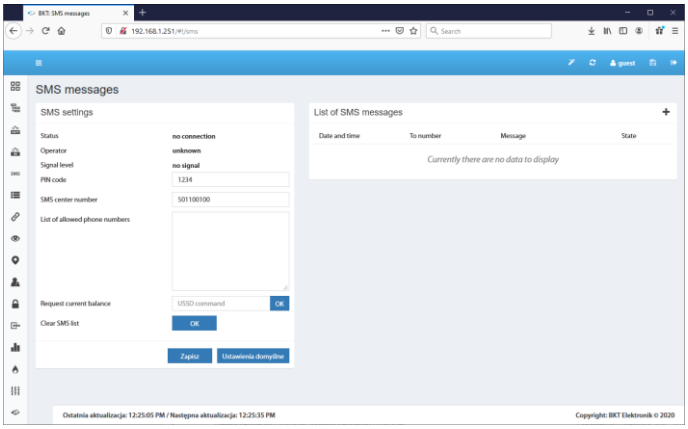
Field	Description
Name	Element name.
Temperature sensor	Selected temperature sensor.
Humidity sensor	Selected humidity sensor.
Low alarm level	Threshold for low value alarm.
Low warning level	Threshold for low value warning.
High warning level	Threshold for high value warning
High alarm level	Threshold for high value alarm.
Hysteresis type	**Disabled** – hysteresis and delay deactivated. The alarm will be generated immediately after exceeding the threshold value. **Value** – hysteresis is on. The alarm will be generated immediately after exceeding the value = threshold value ± hysteresis value. **Time** – alarm delay is on. The alarm will be generated with a defined delay after exceeding the threshold value. The alarm will not be generated if the measured value falls below the alarm threshold within the specified delay.
Value	The hysteresis value in °C
Low alarm	Delay time in seconds before low state alarm signalling
Low warning	Delay time in seconds before the low state warning signalling
Normal	Delay time in seconds before the normal state signalling
High warning	Delay time in seconds before the high state warning signalling
High alarm	Delay time in seconds before the high state alarm signalling

6.6 Dry contacts (binary inputs for potential-free contacts)



Select *Dry contacts* from the vertical menu to view the state of binary inputs for potential-free contacts.

6.7 GSM modem settings



The modem allows sending text messages by the device and receive SMS commands sent from authorized phone numbers.

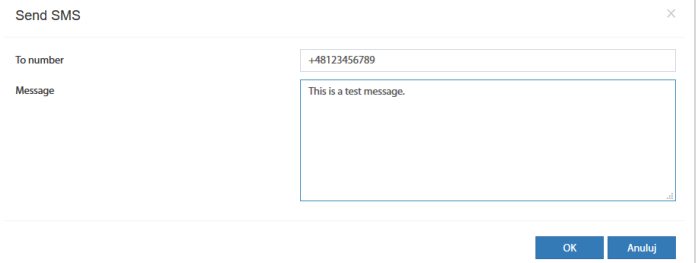
The configuration of the GSM/SMS modem can be done by selecting *SMS Messages* from the vertical menu. This button is visible only when the modem is installed in the controller and the correct SIM card PIN has been entered.

The modem configuration window is also available after entering http://192.168.0.193/#!/sms address in the web browser.

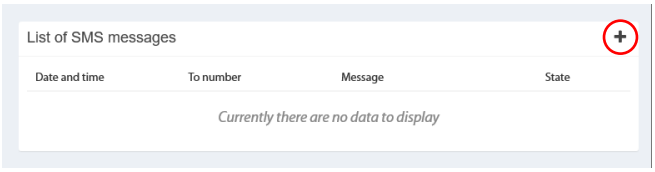
There was a problem observed with SIM cards from some GSM providers that were protected with a PIN code. In this case, it is suggested to remove the PIN code from the SIM card before inserting it in the controller.

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>PIN code</td><td>The PIN code must be entered before inserting the SIM card.</td></tr>
<tr><td>List of allowed phone numbers</td><td>List of telephone numbers from which you can send commands to the controller. The list can contain a maximum of 10 phone numbers separated by a semicolon ";". The numbers should have format +48xxxxxxxxx

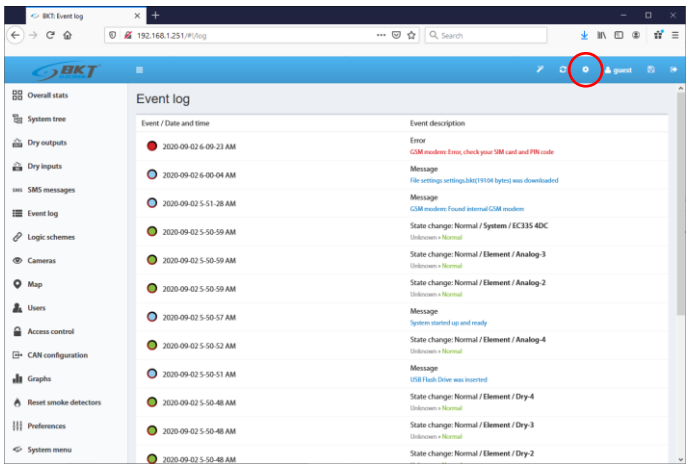
Available commands:
<table>
<tr><th>Command</th><th>Example</th><th>Response</th></tr>
<tr><td colspan="3">Sensor status reading</td></tr>
<tr><td>get ‘sensor ID’
get ‘sensor-name’</td><td>get 201001
get Onboard-Temperature</td><td>Onboard-Temperature[201001]
state=normal value=23.5</td></tr>
<tr><td colspan="3">Switching on the Power-1 output</td></tr>
<tr><td>set ‘sensor ID’ on
set ‘sensor-name’ on</td><td>set 304001 on
set ‘Power-1’ on</td><td>The element was switched on</td></tr>
<tr><td colspan="3">Switching off the Power-1 output</td></tr>
<tr><td>set ‘sensor ID’ off
set ‘sensor-name’ off</td><td>set 304001 off
set ‘Power-1’ off</td><td>The element was switched off</td></tr>
</table></td></tr>
<tr><td>Request current balance</td><td>In the case of prepaid phones, you can enter the balance inquiry code here.</td></tr>
<tr><td>Clear SMS list</td><td>Clears the list of sent text messages</td></tr>
</table>



The device also allows you to send any SMS to any recipient directly from the web interface.
The function is available after clicking on the ‘+’ button.



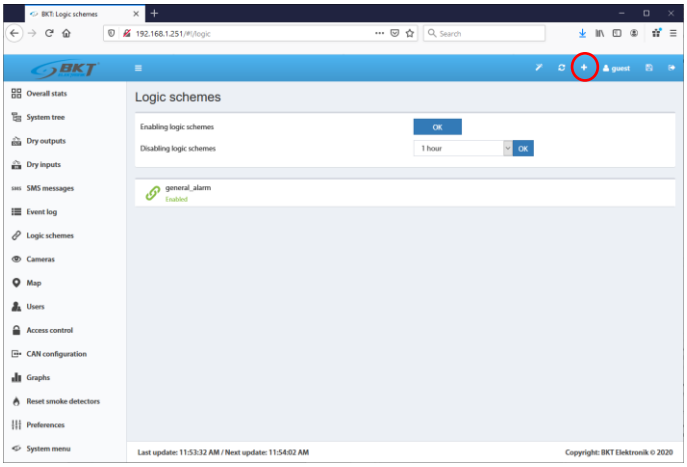
6.8 Event log



After selecting the Event Log from the vertical menu, logs of all system events are displayed. See also the chapter *6.17.4Saving of events and measured values on a USB disk*.

The export of events to the file is possible after selecting 

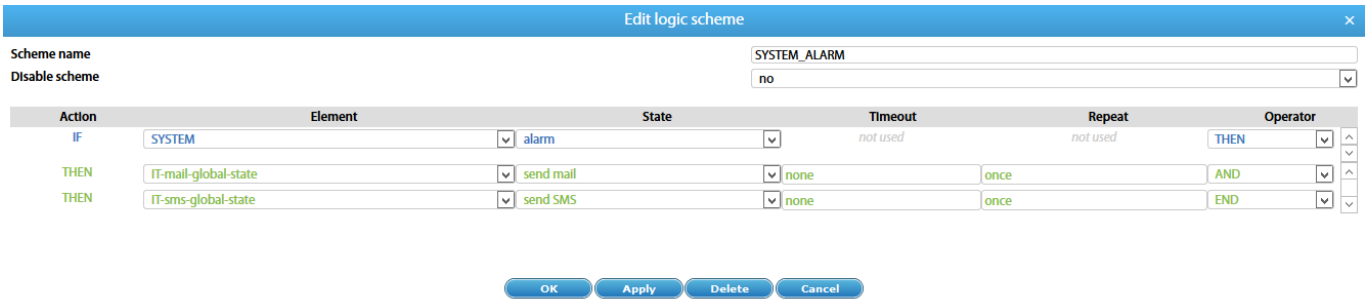
6.9 Logical schemes



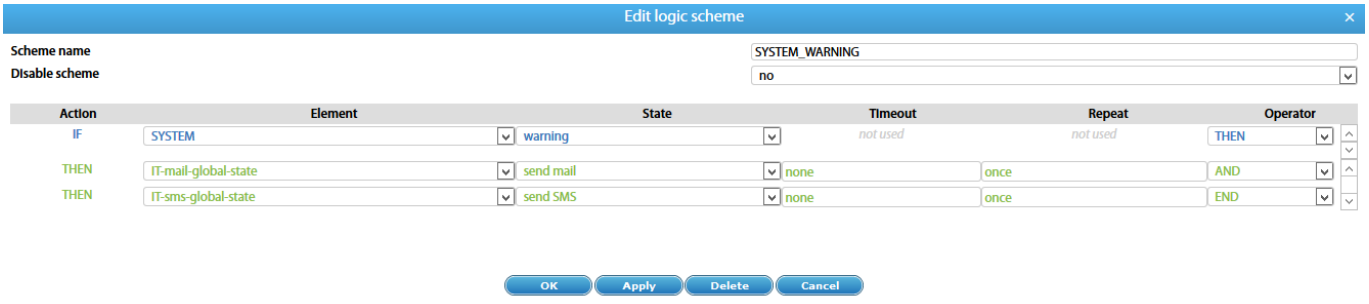
Creating links between system elements (sensors, inputs, outputs, etc.) is possible after selecting the *Logic Schemes* from the vertical menu. To add a new logical dependence, click on the "+" button in the horizontal menu. The IF THEN conditional sentence is used, as well as the logical functions AND and OR. The Timeout function means a delay in the execution of instructions. The Repeat function allows you to repeat the execution of an instruction after a defined time if the logic diagram still remains active. This can be, for example, for resending an email with information about the alarm.

In order for the settings to be kept after restarting the controller, they should be saved to non-volatile memory.

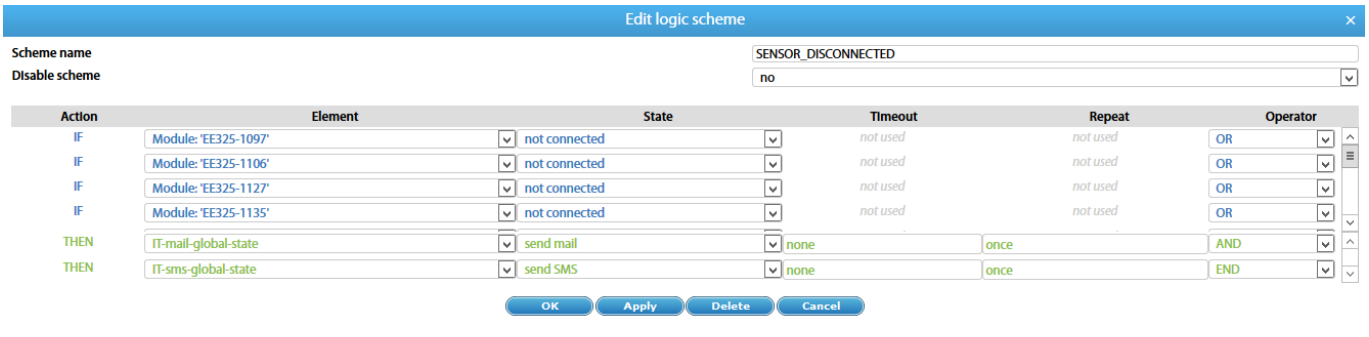
An example of the simplest logical scheme that sends an email notification and sms when an alarm condition occurs in the system.



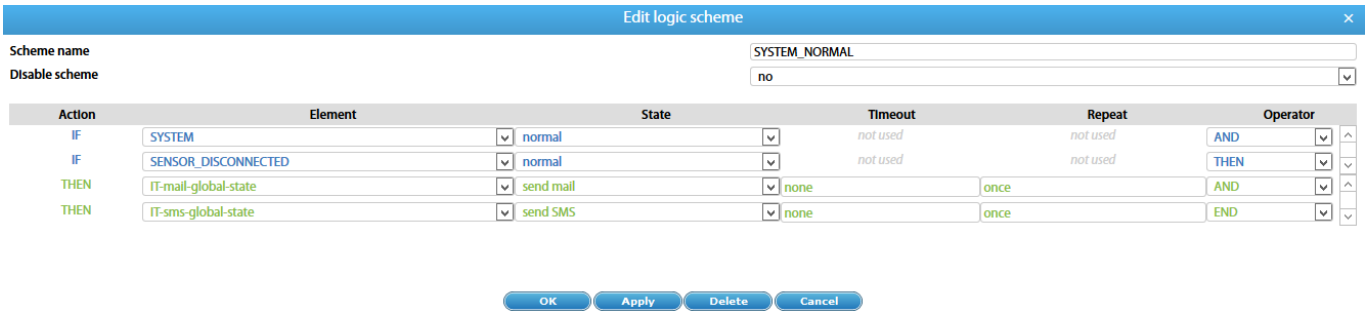
An example of a logic scheme that sends an email and sms notifications when a warning state occurs in the system.



An example of a logic scheme that sends an email and sms notification when the sensors are disconnected from the controller.



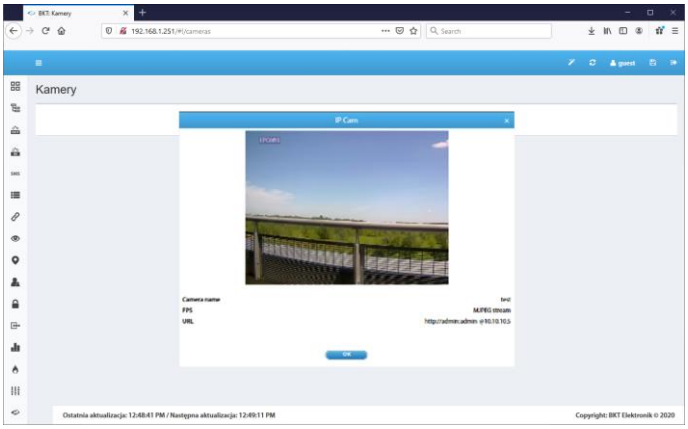
If the system returns to normal, you must create the logical scheme below to notify the user.



In the above examples, as the text of the sms and email messages the status of all sensors was entered, as shown in the table below. See also chapter *6.5.3 Adding an email notification*.

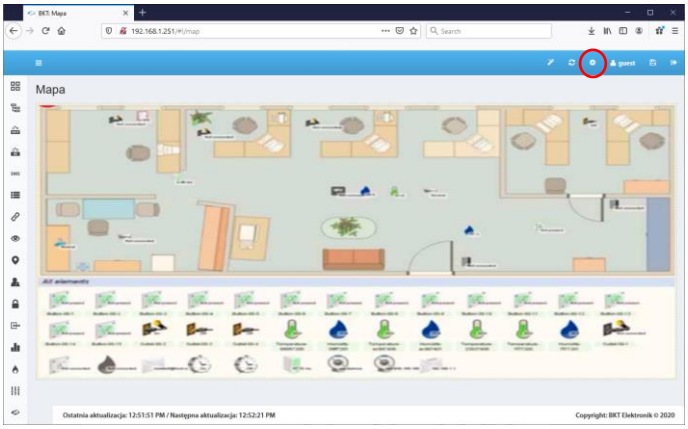
The content of the email notification configured	The content of the sent email
Server room status: %4\n CONTROLLER\n %5{201001}-%7{201001}°C-%6{201001}\n %5{203001}-%7{203001}V-%6{203001}\n SERVER ROOM\n %5{107001}-%6{107001}\n CABINET GDP\n %5{201006}-%7{201006}°C-%6{201006}\n %5{201023}-%7{201023}°C-%6{201023}\n %5{202009}-%7{202009}%-%6{202009}\n %5{106009}-%6{106009}\n CABINET SG\n %5{201016}-%7{201016}°C-%6{201016}\n %5{201021}-%7{201021}°C-%6{201021}\n %5{202008}-%7{202008}%-%6{202008}\n %5{106008}-%6{106008}\n	Server room status: 'SYSTEM_NORMAL' CONTROLLER 'Onboard-Temperature'-'27.80'°C-'normal' 'Onboard-Voltage DC'-'12.00'V-'normal' SERVER ROOM 'Leak under raised floor'-'normal' CABINET GPD 'Cab_GPD__temp_dn'-'23.06'°C-'normal' 'Cab_GPD__temp_up'-'24.50'°C-'normal' 'Cab _GPD__humi'-'27.00'% 'normal' 'Cab _GPD__smoke'-'normal' CABINET SG 'Cab_SG__temp_dn'-'22.69'°C-'normal' 'Cab_SG__temp_up'-'24.20'°C-'normal' 'Cab_SG__humi'-'28.00'% 'normal' 'Cab_SG__smoke'-'normal'

6.10 Cameras



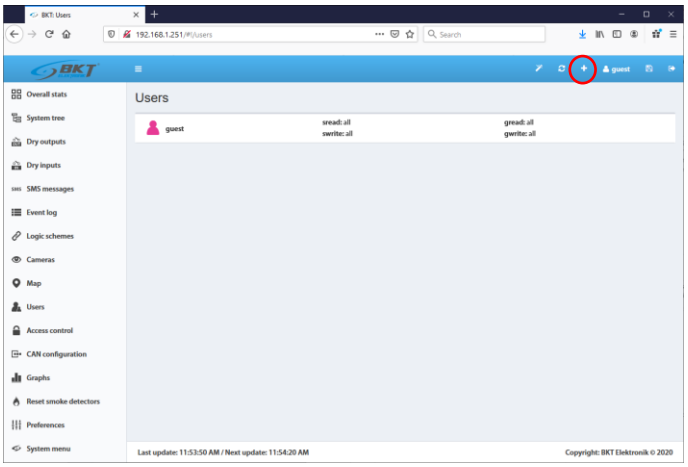
Select *Cameras* from the vertical menu to view the image captured from installed cameras. Select *System tree* to configure the cameras. See chapter *6.5.16 Adding a camera*.

6.11 Map



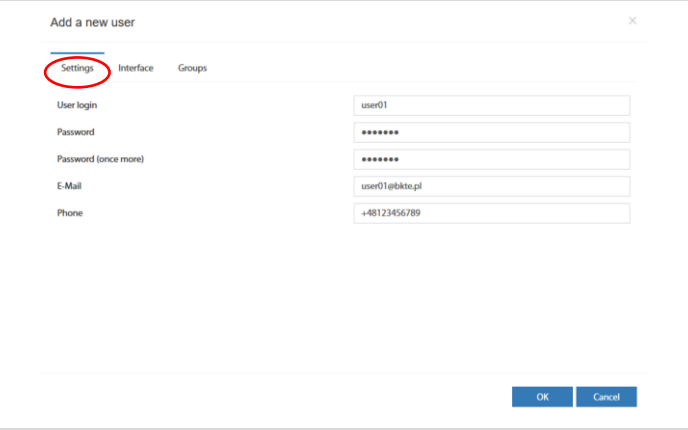
The system provides a function of displaying the state of sensors against the building layout. Select *Map* from the vertical menu.
Click *Settings* in the horizontal menu to configure this page.
To maintain the settings after restarting the controller, write them to non-volatile memory.

6.12 Users

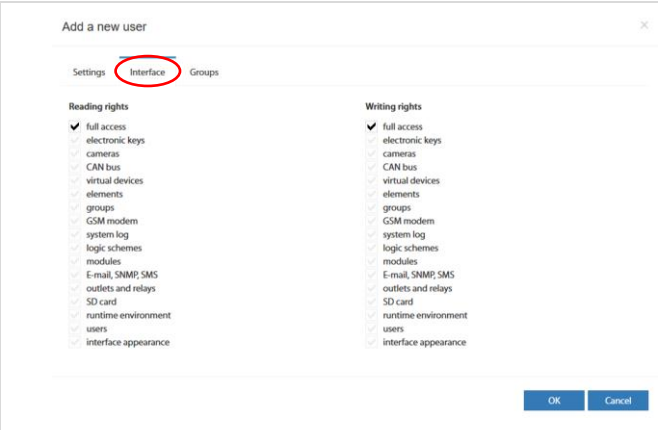


Select *Users* from the vertical menu to manage system users, create new users, remove users and grant rights.

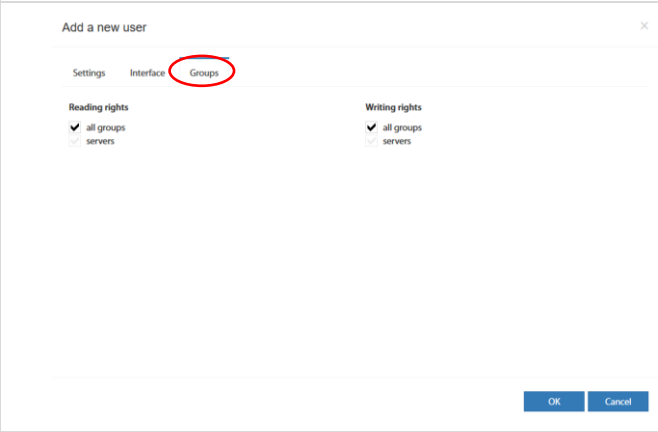
Click the '+' button in the horizontal menu to add a new user.



Enter the user name and password in the pop-up window and grant it appropriate right.



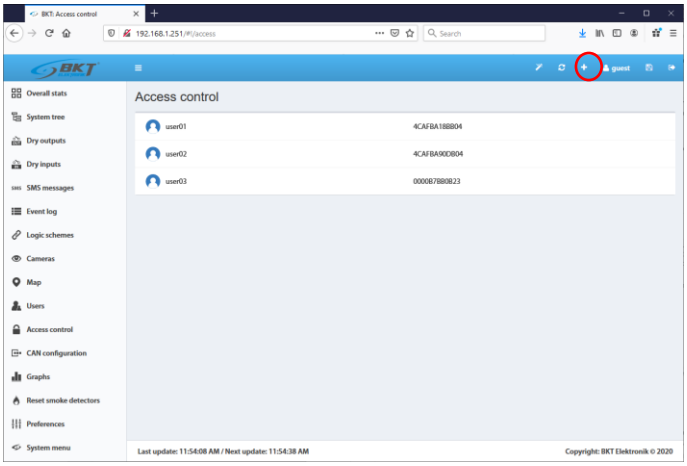
On the second tab give the user permission to read and/or write to individual parts of the system.



The last tab allows you to grant read and/or write permissions to individual groups of elements defined in chapter 6.5.2 Adding a new group.

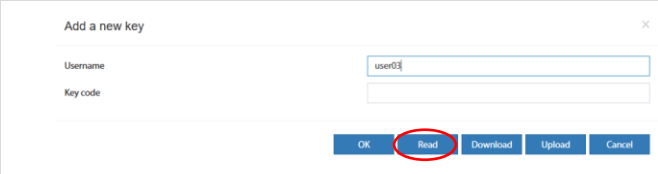
To maintain the settings after restarting the controller, write them to non-volatile memory.

6.13 Access control

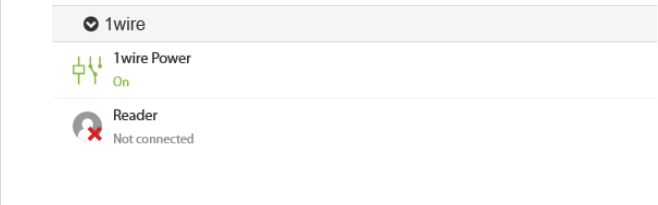


The system enables the identification of authorized users through assigned RFID identifiers. A dedicated EA318 reader is required to service the identifiers. Selecting *Access Control* from the vertical menu allows you to manage RFID tags.

To add a new identifier, click on the '+' button in the horizontal menu.



In the pop-up window, enter the user name (identifier name) and enter the number of the RFID identifier. It is also possible to read the identifier number after clicking on the *Read* button and applying the identifier to the reader.



The meaning of the Reader item statuses is as follows:

Not connected - there is no identifier within the reader range

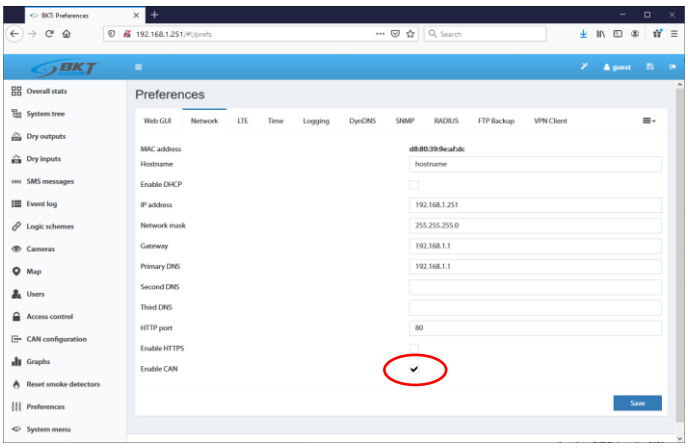
Normal - a defined identifier has been applied to the reader

Alarm - an undefined identifier has been applied to the reader

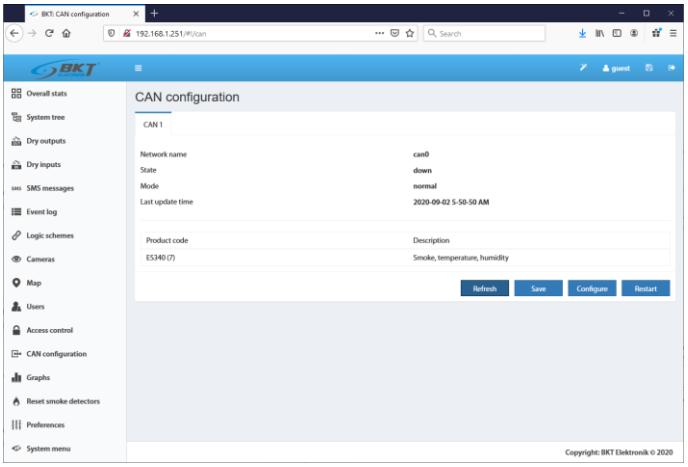
This status can be used when configuring logic diagrams.

6.14 CAN configuration (extension module)

Devices extending the number of analogue ports - EE321, binary input ports for potential-free contacts - EE322 and ES340 sensors can be connected to the controller.



Activate the CAN bus. Select Preferences→*Network* from the vertical menu. Check the *Enable CAN* box and click *Save*.



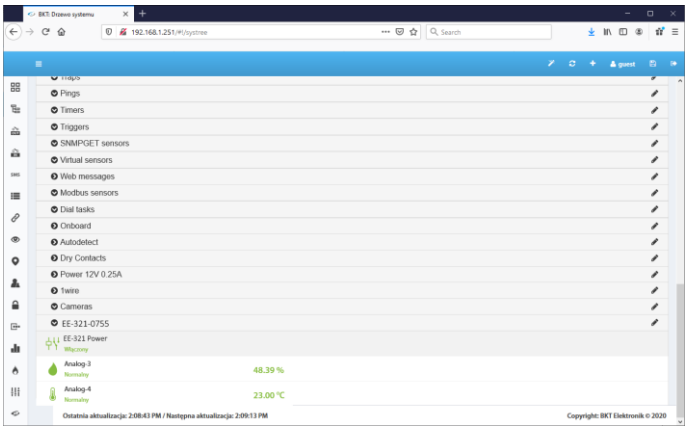
Select *CAN configuration* from the vertical menu, then click the *Configure* button and wait approx. 2 minutes until the CAN bus is scanned and the device is configured. When the device appears on the list, click the *Save* button.

Refresh – refresh the list of devices on the bus and their status.

Save – write CAN settings to non-volatile memory.

Configure – search for extension modules on the bus.

Restart – restart the CAN bus.



Following configuration, the extension module and sensors connected to it will be automatically detected and displayed in the system tree. Select *System tree* from the vertical menu.

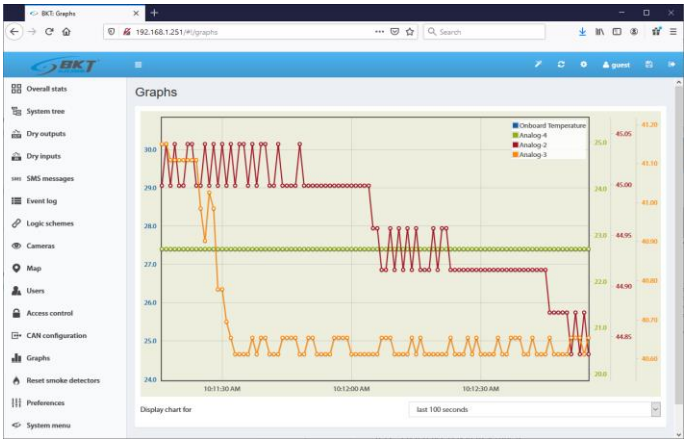
The operating status of the CAN bus is signalled on the controller with the CAN indicator light.

CAN is off – the CAN bus has not been activated in the configuration.

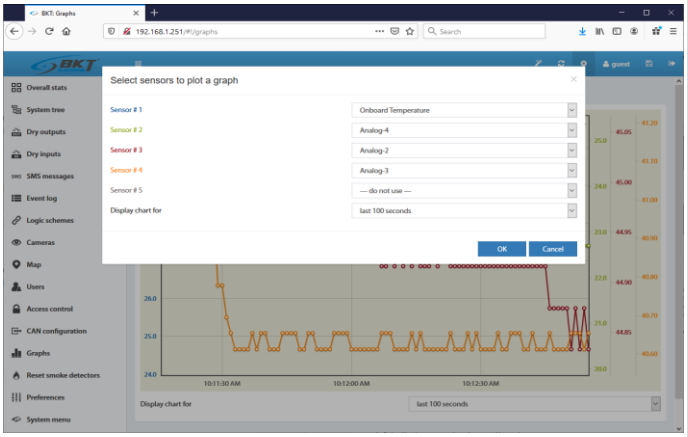
CAN flashes – the CAN bus is active, but there is no communication with the extension module.

CAN is on – the CAN bus is active and there is communication with the extension module.

6.15 Graphs

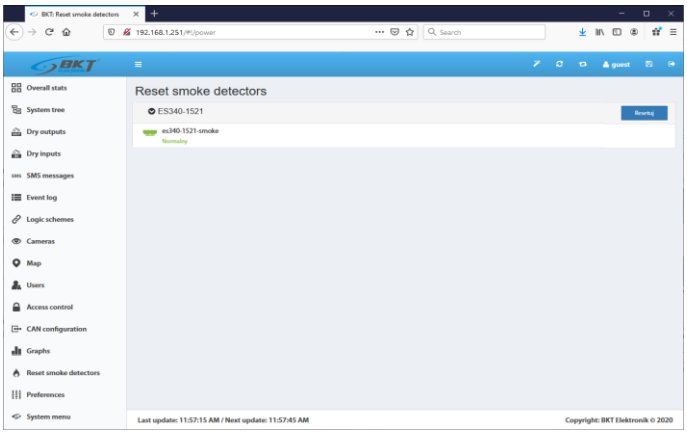


It is possible to display changes of values from the sensors on a chart. Select *Graphs* from the vertical menu.



To add the sensor to a chart, use the '+' button from the horizontal menu.

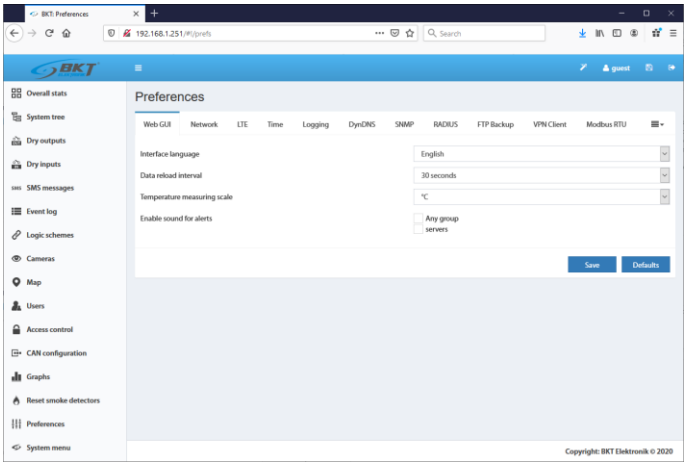
6.16 Reset smoke detectors



Once triggered (smoke detection), the sensors require a manual restart. This can be done through the controller web interface. Select *Reset smoke detectors* from the vertical menu. Resetting involves disconnecting the power supply from the sensors for a few seconds. All analogue sensors connected to the device where smoke is will be disconnected from the power supply for a moment.

6.17 Preferences (system settings)

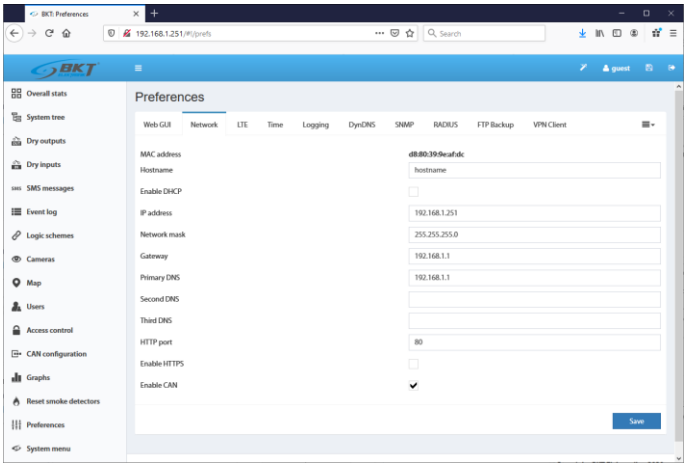
6.17.1 Web interface settings



Select *Preferences→Web GUI* from the vertical menu.
Set the following web interface parameters:

- language
- automatic refresh rate
- temperature unit (Celsius or Fahrenheit degrees)
- activate an acoustic signal via the website when the alarms are active

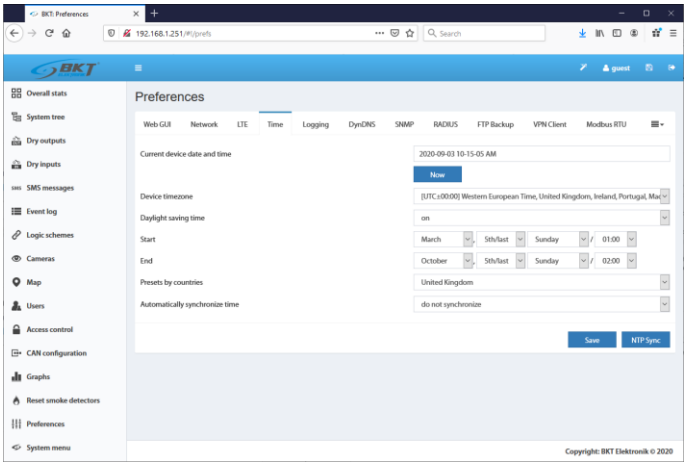
6.17.2 Network settings



Select *Preferences→Network* from the vertical menu.

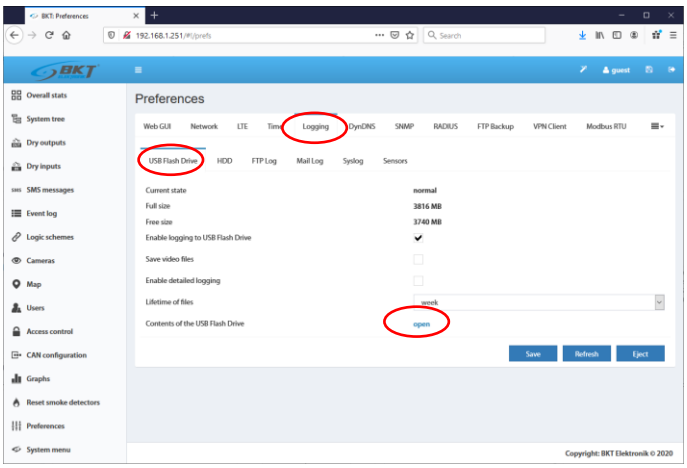
- IP address, subnetwork mask, broadcast, gate, DNS – to enter static network settings.
- HTTP port – it determines an access port to the device via a browser (default: 80).
- Enable HTTPS – activate encrypted connection via a browser.
- Enable DHCP – activate automatic import of network settings from a DHCP server.
- Enable CAN – this function must be checked if extension modules are to be used in the system.

6.17.3 Time settings

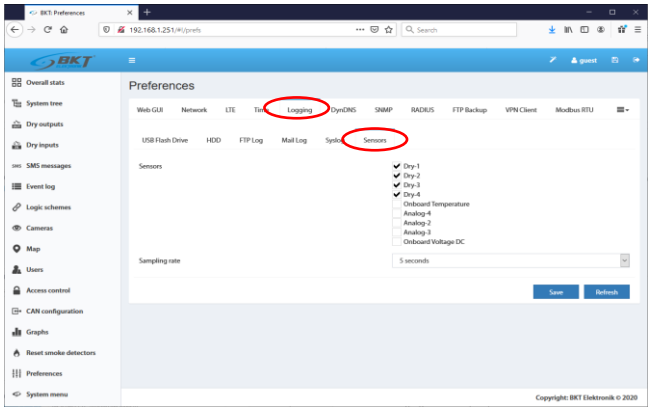


It is possible to set the device clock time manually and to set cyclical synchronisation with NTP servers. Select *Preferences→Time* from the vertical menu.

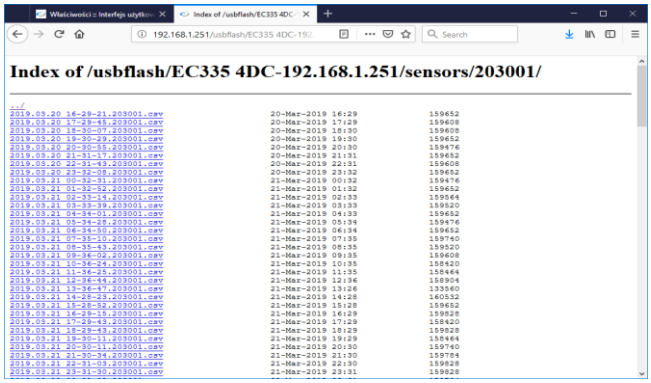
6.17.4 Saving of events and measured values on a USB disk



In the vertical menu select: *Preferences->Logging->USB Flash Drive*
Values read from the sensors and system logs can be saved to files on a USB disk previously formatted to the FAT32 system.
After installing the USB drive you will be able to view its contents directly from the device's web interface after clicking on *Open Contents of the USB Flash Drive.*

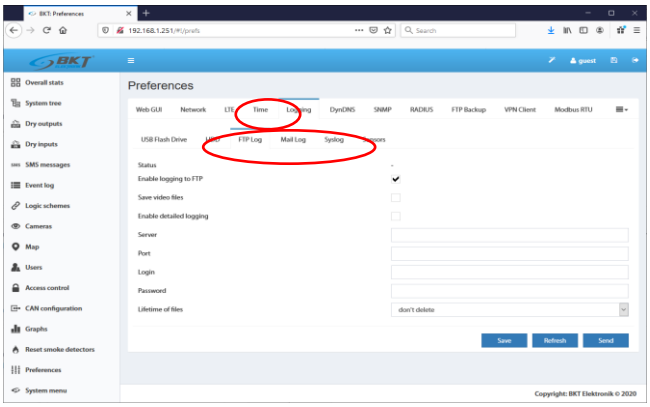


To save the values read from the sensors on the USB disk, on the *Preferences*->Logging->Sensors tab, select required sensors and specify the measurement interval.



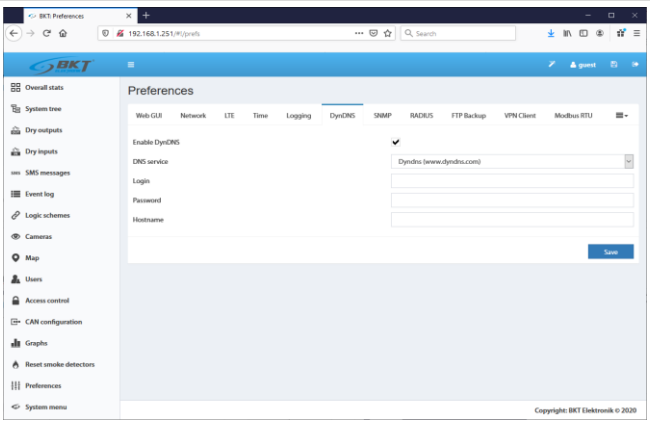
The values read from the sensors are stored on a USB disk in csv files.

6.17.5 Saving logs to SYSLOG, FTP, MAIL



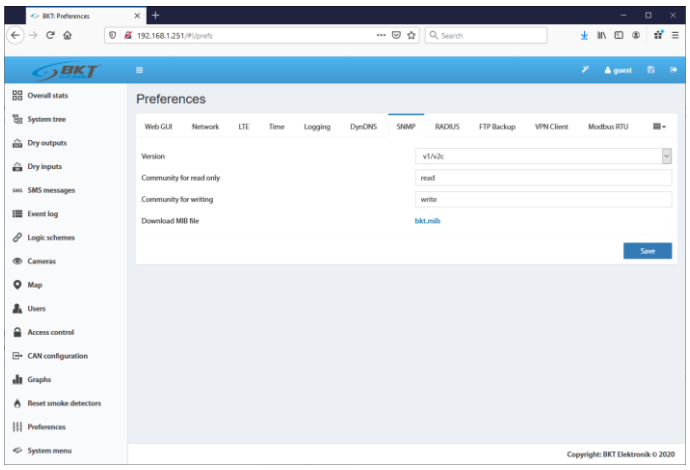
The device also allows you to transfer only system events to the FTP server, SYSLOG or e-mail.
Preferences->Logging-> FTP Log
Preferences->Logging-> Mail Log
Preferences->Logging-> Syslog

6.17.6 DynDNS settings



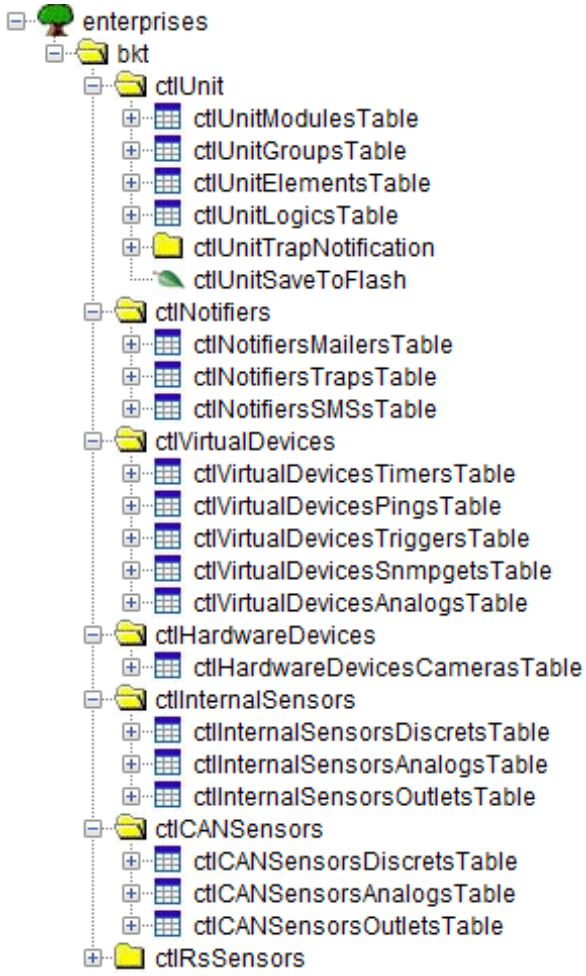
The DynDNS (www.dynDNS.com) or no-IP (www.no-ip.org) services can be used with the device. Select *Preferences→DynDNS* from the vertical menu.

6.17.7 SNMP settings



The device supports the SNMP (Simple Network Management Protocol) in versions 1, 2 and 3. In this tab, a MIB (Management Information Base) with communication data can be downloaded. Select Właściwości→*SNMP* Preferences→*SNMP*) from the vertical menu.

Baza MIB systemu



The SNMP MIB database is a reflection of the system tree available from the vertical menu. All information required to establish communication with the controller is located in the MIB database.

ctlUnit – units in the system tree
ctlUnitModulesTable – modules in the system tree
ctlUnitGroupsTable – created groups of units
ctlUnitElementsTable – elements (sensors)
ctlUnitLogicsTable – created logical schemes
ctlUnitTrapNotification – system SNMP Trap messsage
ctlUnitSaveToFlash – saving settings to flash memeory
ctlNotifiers – created notifications
ctlNotifiersMailersTable – created mail notyfications
ctlNotifiersTrapsTable - created SNMP Trap notyfications
ctlNotifiersSMSsTable - created text message notyfications
ctlVirtualDevices - virtual elements
ctlVirtualDevicesTimersTable – timers
ctlVirtualDevicesPingsTable – pings
ctlVirtualDevicesTriggersTable – triggers
ctlVirtualDevicesSnmpgetsTable - SNMP Get (virtual sensors)
ctlHardwareDevices – other devices
ctlHardwareDevicesCamerasTable – USB and IP cameras
ctlInternalSensors – details of system sensors
ctlInternalSensorsDiscretsTable – inputs for potential-free contacts
ctlInternalSensorsAnalogsTable – analogue sensors
ctlInternalSensorsOutletsTable – output modules (relays)
ctlCANSensors – details of CAN sensors
ctlCANSensorsDiscretsTable - inputs for potential-free contacts
ctlCANSensorsAnalogsTable - analogue sensors
ctlCANSensorsOutletsTable – output modules (relays)
ctlRsSensors – not available in current firmware

Section **ctlUnit** – system tree

This section contains the full system tree. Chapter 6.5 System tree (system components).

ctlUnitModulesTable – information about modules in the system tree, ie: Logics, Mails, SMSs, Traps, Pings, Timers, Triggers, etc.

ctlUnitGroupsTable – information about created groups of elements. Chapter *6.5.2 Adding a new group*.

ctlUnitElementsTable – basic information about sensors in the system tree. Chapter 6.5.1 Setting the sensor parameters.

ctlUnitLogicsTable – information about created logic diagrams. Chapter *6.9 Logical schemes*.

ctlUnitTrapNotification – object identifier OID of system SNMP Trap notification.

ctlUnitSaveToFlash - saving settings to the flash memory when set to "1"

Section **ctlNotifiers** – created notifications

This section contains notifications that were created while programming the controller.

ctlNotifiersMailersTable – created MAIL notifications. Chapter *6.5.3 Adding an email notification*.

ctlNotifiersTrapsTable - created SNMP Trap notifications. Chapter *6.5.4 Adding a trap notification.*

ctlNotifiersSMSsTable – created SMS notifications. Chapter *6.5.5 Adding an SMS notification.*

Section **ctlVirtualDevices** - virtual elemnets

This section contains elements that were created while programming the controller.

ctlVirtualDevicesTimersTable – created timers. Chapter *6.5.10 Adding a timer.*

ctlVirtualDevicesPingsTable – created pings. Chapter 6.5.12 Adding PING functions.

ctlVirtualDevicesTriggersTable – created triggers. Chapter *6.5.11 Adding a trigger.*

ctlVirtualDevicesSnmpgetsTable - created SNMP Get (virtual sensors). Chapter *6.5.13 Adding an SNMP Get.*

Section **ctlHardwareDevices** – other devices

This section contains other elements that have been connected to the system.

ctlHardwareDevicesCamerasTable – USB and IP cameras. Chapter 6.5.16 Adding a camera.

Section **ctlInternalSensors** – details of system sensors

This section contains detailed information about sensors connected to the system, except for CAN sensors.

ctlInternalSensorsDiscretsTable – inputs for potential-free contacts.

ctlInternalSensorsAnalogsTable – analogue sensors.

ctlInternalSensorsOutletsTable - output modules (relays).

Section **ctlCANSensors** - details of CAN sensors

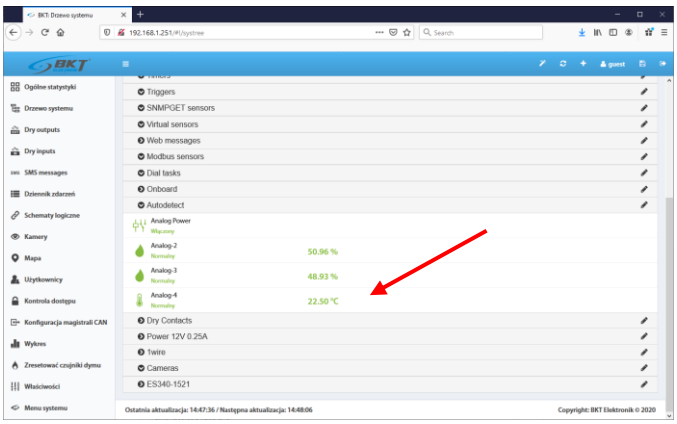
This section contains detailed information about CAN sensors connected to the system.

ctlCANSensorsDiscretsTable - inputs for potential-free contacts of CAN modules.

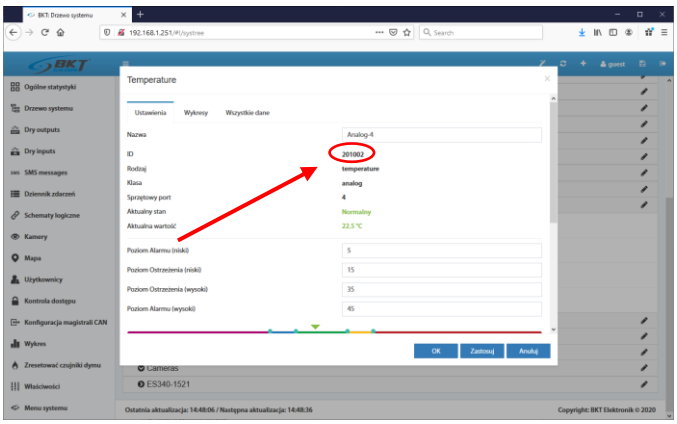
ctlCANSensorsAnalogsTable – analogue sensors of CAN modules.

ctlCANSensorsOutletsTable – output modules (relays) of CAN modules.

Example of query for a temperature sensor installed inside the controller



The required temperature sensor in the system tree.



Identifier of required sensor.

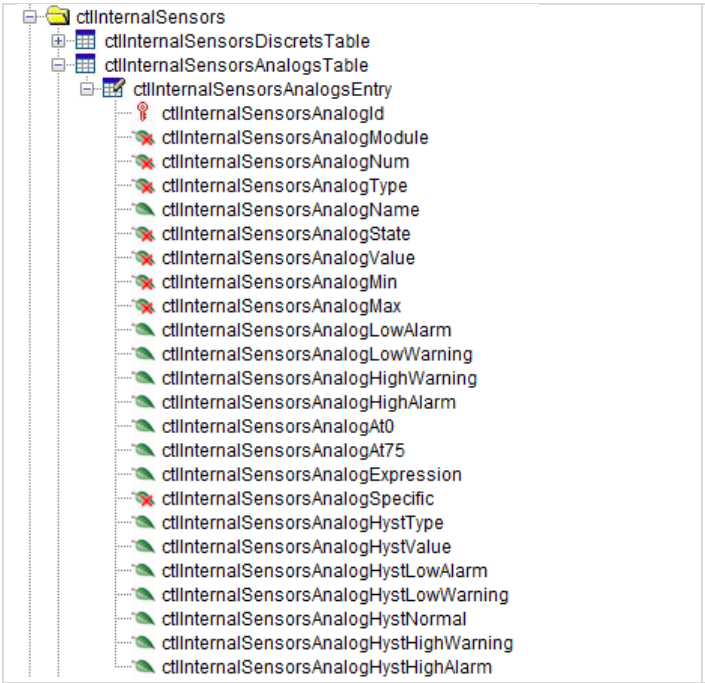


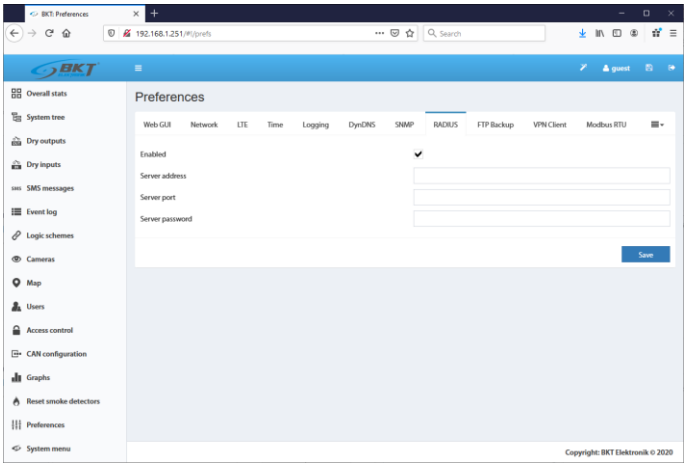
Table **ctlInternalSensorsAnalogsTable** from section **ctlInternalSensors.**

To ask for the sensor, use the SNMP object identifier (OID) extended after the dot with the sensor identification number, eg: ctlInternalSensorsAnalogValue.201001 - value read from sensor 201001

The complete query table for the 201001 sensor is given below.

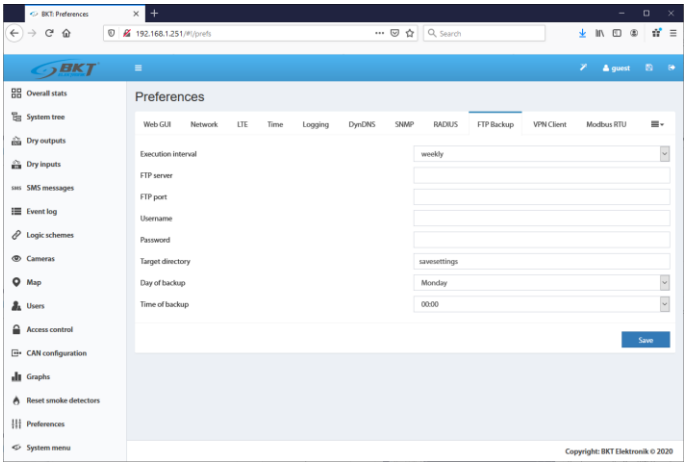
OID – SNMP object identifier	Value	Desription
ctlInternalSensorsAnalogId.201001 .1.3.6.1.4.1.47394.5.2.1.1.201001	201001	Identifier of the element in the system
ctlInternalSensorsAnalogModule.201001 .1.3.6.1.4.1.47394.5.2.1.2.201001	2020	The identifier of the module to which this element belongs (onboard sensors)
ctlInternalSensorsAnalogNum.201001 .1.3.6.1.4.1.47394.5.2.1.3.201001	-1	Consecutive number of element in the module
ctlInternalSensorsAnalogType.201001 .1.3.6.1.4.1.47394.5.2.1.4.201001	temperature	Type of element (temperature sensor)
ctlInternalSensorsAnalogName.201001 .1.3.6.1.4.1.47394.5.2.1.5.201001	Onboard Temperature	Name of element
ctlInternalSensorsAnalogState.201001 .1.3.6.1.4.1.47394.5.2.1.6.201001	normal	Element current status
ctlInternalSensorsAnalogValue.201001 .1.3.6.1.4.1.47394.5.2.1.7.201001	28.6	Temperature value read from sensor
ctlInternalSensorsAnalogMin.201001 .1.3.6.1.4.1.47394.5.2.1.8.201001	-50.0	Permissible minimum value of the alarm threshold
ctlInternalSensorsAnalogMax.201001 .1.3.6.1.4.1.47394.5.2.1.9.201001	110.0	Permissible maximum value of the alarm threshold
ctlInternalSensorsAnalogLowAlarm.201001 .1.3.6.1.4.1.47394.5.2.1.10.201001	0.0	Set value of the low alarm threshold
ctlInternalSensorsAnalogLowWarning.201001 .1.3.6.1.4.1.47394.5.2.1.11.201001	5.0	Set value of the low warning threshold
ctlInternalSensorsAnalogHighWarning.201001 .1.3.6.1.4.1.47394.5.2.1.12.201001	45.0	Set value of the high warning threshold
ctlInternalSensorsAnalogHighAlarm.201001 .1.3.6.1.4.1.47394.5.2.1.13.201001	50.0	Set value of the high alarm threshold
ctlInternalSensorsAnalogExpression.201001 .1.3.6.1.4.1.47394.5.2.1.16.201001	x	A function that converts the value read from the sensor into a value that will be processed in the system
ctlInternalSensorsAnalogSpecific.201001 .1.3.6.1.4.1.47394.5.2.1.17.201001	um="°C"	A unit of value read from the sensor
ctlInternalSensorsAnalogHystType.201001 .1.3.6.1.4.1.47394.5.2.1.18.201001	value	Hysteresis type (value – hysteresis enabled)
ctlInternalSensorsAnalogHystValue.201001 .1.3.6.1.4.1.47394.5.2.1.19.201001	0.30	Hysteresis value (0.30°C)

6.17.8 RADIUS settings



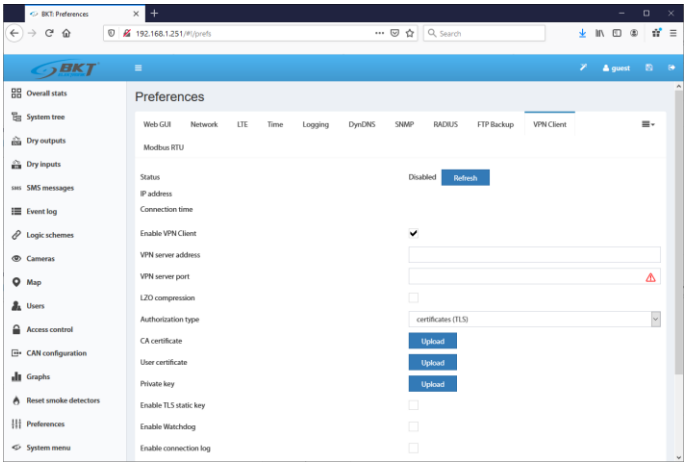
The device supports the RADIUS (Remote Authentication Dial-In User Service) protocol. Select *Preferences→RADIUS* from the vertical menu.

6.17.9 FTP backup settings



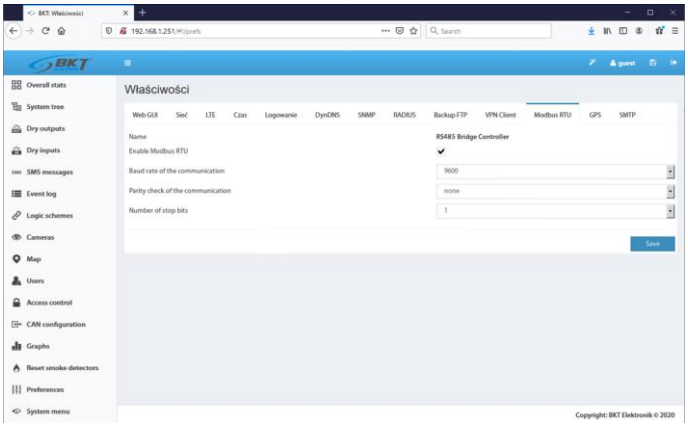
Device settings can be saved to a file on an FTP server on a regular basis. Select *Preferences→FTP Backup* from the vertical menu.

6.17.10 VPN client settings



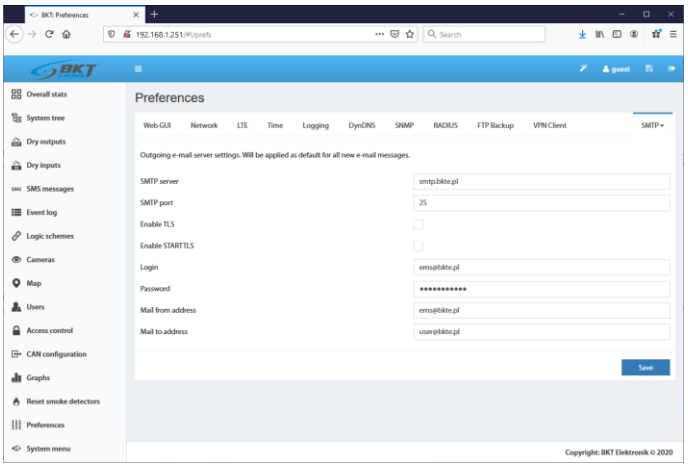
The device uses the OpenVPN library to provide a VPN client. The service configuration is available after selecting Preferences-> VPN Client from the vertical menu.

6.17.11 Modbus RTU settings



Enter the basic settings for the Modbus module in the Preferences-> Modbus RTU menu.

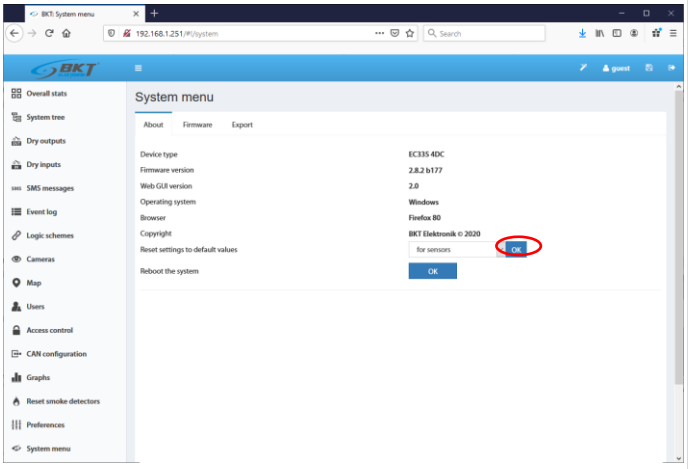
6.17.12 SMTP settings



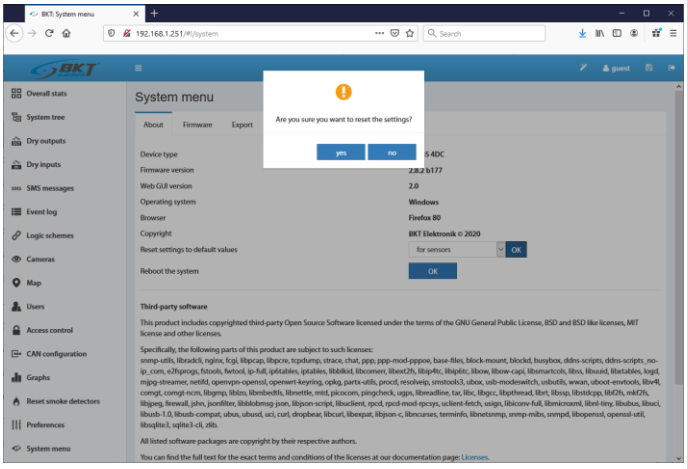
In the Properties-> SMTP menu it is possible to set the default mail server configuration for the email notifications created later.

6.18 System menu (system management)

6.18.1 Restoring default settings through a website

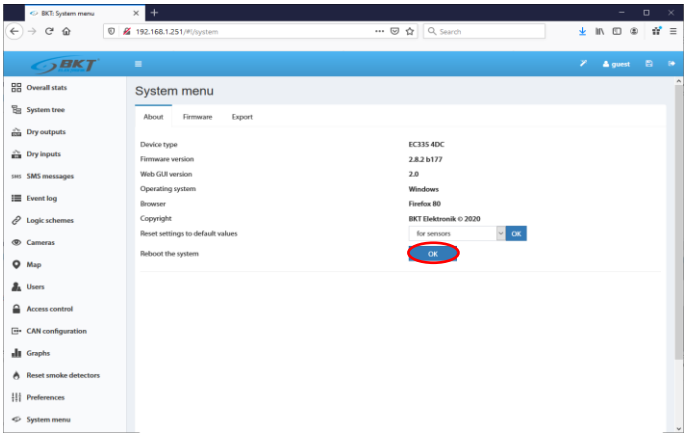


Select *System menu→About* from the vertical menu, select *Sensors* or *All settings* and click *OK* next to *Reset settings to default values*.

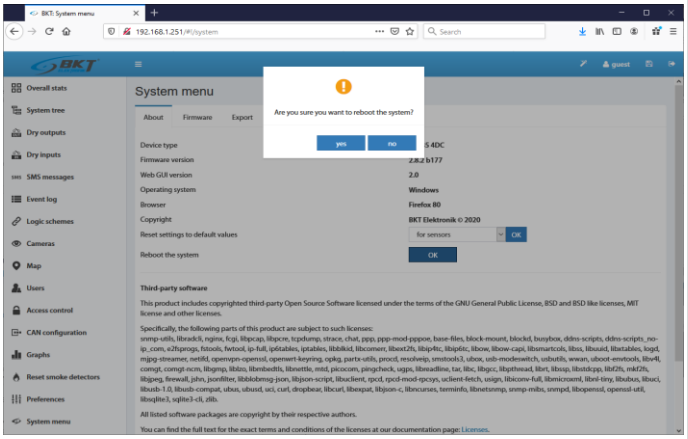


Confirm to reset default values and wait until the process is completed. When resetting all settings, the device's IP number will be changed to the default (192.168.0.193).

6.18.2 Restarting the device



Select *System menu→About* from the vertical menu and click *OK* next to Reboot the system.

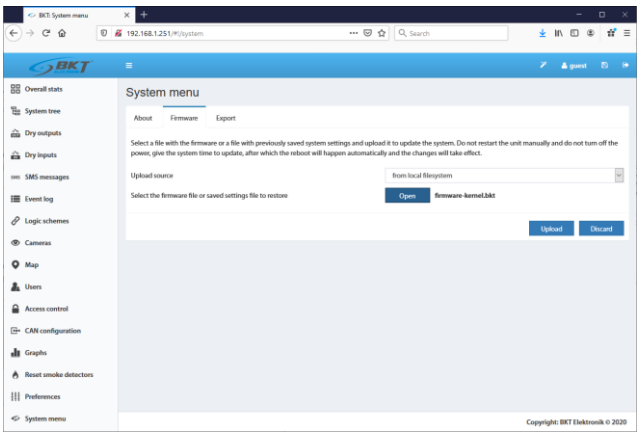
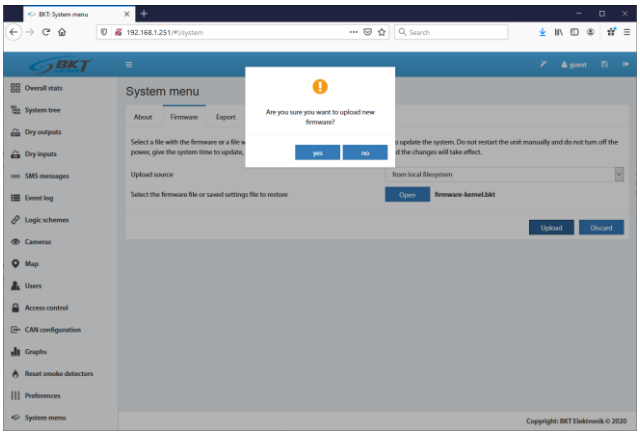


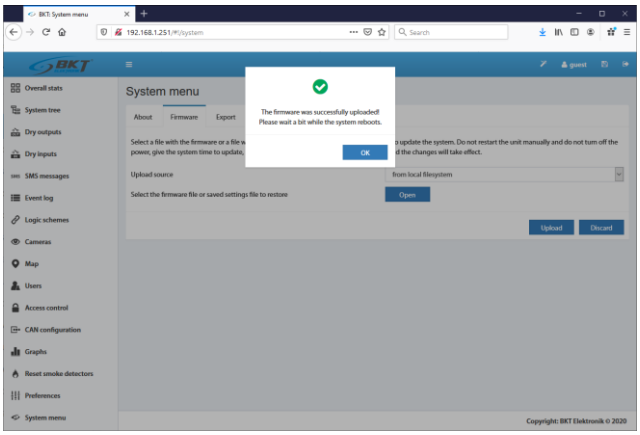
Confirm to restart the device and wait until the restarting process is completed.

6.18.3 Firmware update

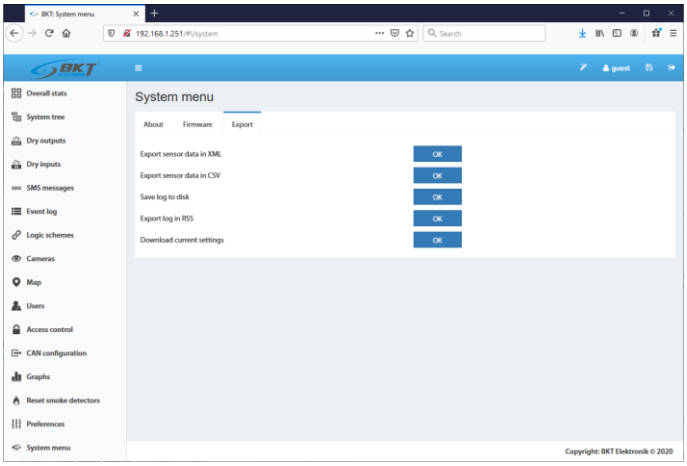
Note:

- A file with a firmware update is available on http://www.bkte.pl.
- Make sure that the device will not be disconnected from the power supply while updating the software.
- After the upgrade, the device may need to be manually reconfigured.

1		Back up the current system settings, see chapter *6.18.4 Export data to a file*.
2		Sometimes the firmware updates consist of two files: • system kernel update, e.g. *firmware-kernel.bkt* • firmware update, e.g. *bkt_2.8.2-b177.bkt* In this case, begin the update from the kernel file. From the vertical menu, select Menu system->Firmware and after clicking on Browse, point to the file with the firmware file update, eg *firmware-kernel.bkt*
3		Click the *Upload* button and confirm to upload new firmware.

4		Wait until information on the completed update is displayed and the device is restarted. Then, the automatic firmware update process will start, and the device will be restarted after the update is completed. The firmware replacing process is signaled by the flashing red ERR LED. The whole process can take several minutes. Do not disconnect the power supply at this time. If you are updating remotely and are unable to observe the indicator LEDs, do not refresh the page for more than a few minutes. After a few minutes, refresh the browser using the CTRL + F5 keys.
5		If the update consists of two files, repeat the procedure with the second file (eg. bkt_2.8.2-b177.bkt) from point 3.
6		It is recommended to restore the factory settings before uploading the configuration from the backuped file, see 5.2 Restoring default settings.
7		Restore the previous configuration. Try to use a file with a backup copy of the system settings, see section *6.18.5 Restoring settings from a file* or manually enter reqaired settings.

6.18.4 Export data to a file



Select *Menu_Systemu→Export* from the vertical menu.

Export sensor data in XML – save the sensor data to an XML file. The file contains max 400 readins from each sensor:
100 readings (every second) from the last 100 seconds
100 readings (every minute) from the last 100 minutes
100 readings (every hours) from the last 100 hours
100 readings (every day) from the last 100 days

Export sensor data in CSV – save the sensor data in a CSV file.

Save log to disk – save system events to a TXT file.

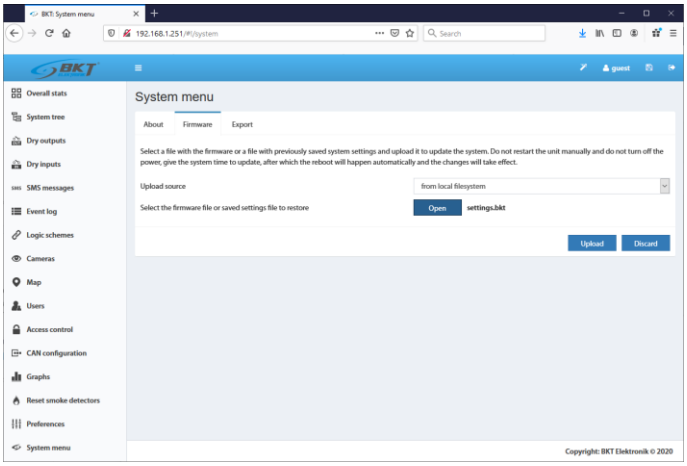
Export log in RSS – system events in the RSS format.

Download current settings – save the current device settings to the settings.bkt file.

6.18.5 Restoring settings from a file

The method of saving data to a file is described in 6.18.4 Export data to a file.
NOTE: The current setting will be overwritten by the settings included in the file. The IP address of the device will not be changed.

METHOD 1.



Select *System menu→Firmware* from the vertical menu, click *Browse* and choose a settings file *settings.bkt*

Click the *Upload* button and confirm to upload new firmware.

Wait until the information about the file upload appears, then update and restart the device. Refresh the browser using the CTRL+F5 keys.

METHOD 2.

To restore the settings:

1. Copy the settings.bkt file to a USB flash drive (pendrive).
2. Connect the flash drive (pendrive) to the mini-B USB socket of the controller using an attached cable and wait for a while.
3. Start of the setting restoration process is indicated by the ERROR light, whereas successful completion of the same is indicated by the ACT light flashing.
4. Restart the device.
5. The device settings have been restored from the file.

7 DOCUMENT REVISIONS

Version	Changes	Date
1	Initial version	May 2017
2	Updated with hardware modifications	January 2018
3	System structure section. General update	June 2018
4	EC335 controller in a new housing. Hardware part has been extended - assembly and connection of devices	February 2019
5	The device configuration description has been extended	May 2019
6	Updated with new software functionalities 2.8.2b177	September 2020