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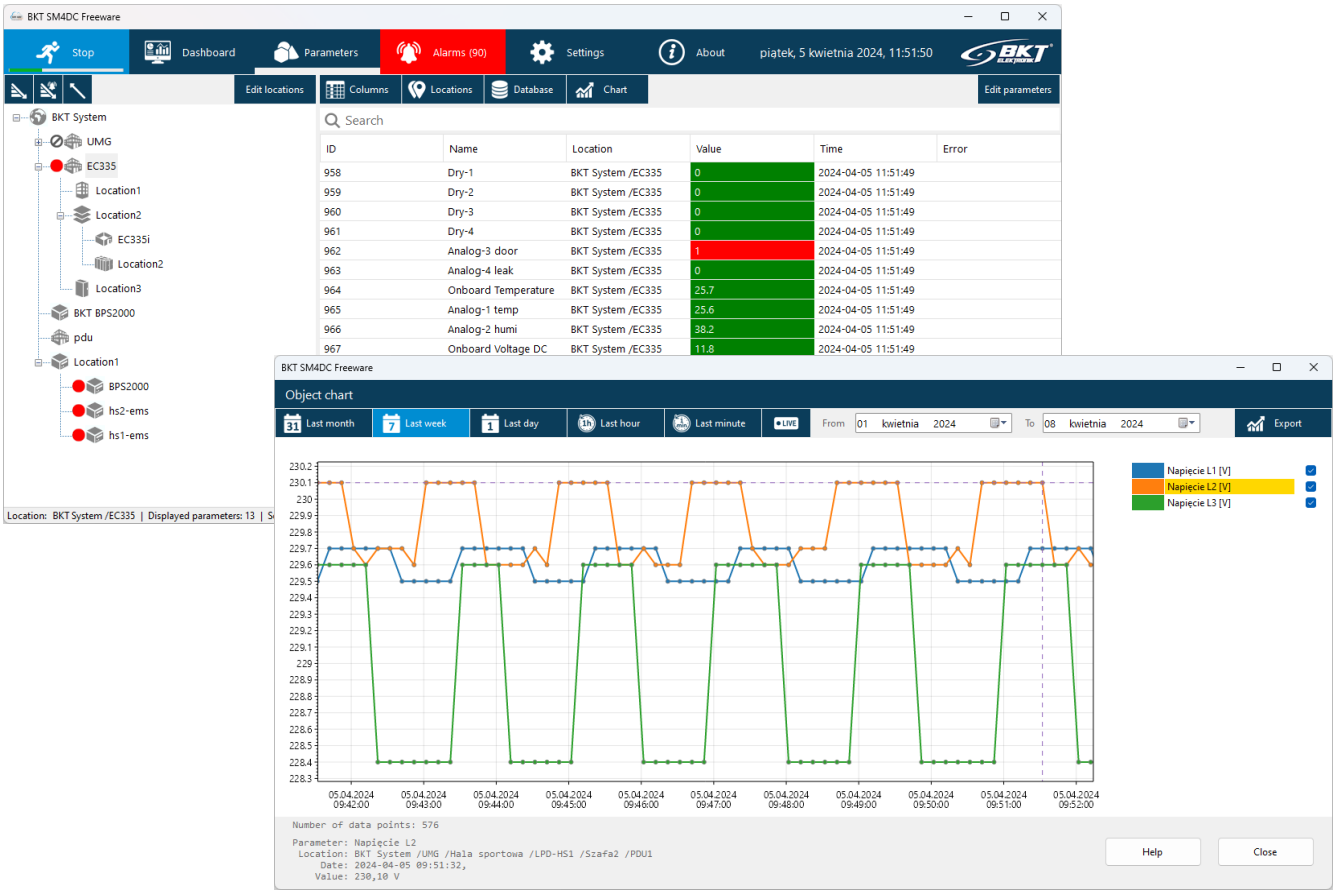
BKT SM4DC Freeware

IT monitoring application

- manual
- version 0.14



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1 INTRODUCTION

1.1 General information

This is the manual for BKT SM4DC Freeware (System Manager for data Center) designed to monitor devices of IT infrastructure. It enables periodic querying of devices for selected parameters and reporting defined irregularities to the user. The software is designed to support devices manufactured by BKT Elektronik, but it can also support devices from other manufacturers. The program uses the SNMP protocol version 1 and 2c for communicating with devices.

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1.3 Basic program characteristics

This is a Windows based software, which allows:

- Monitoring the parameters of devices communicating with the SNMP protocol version 1 and 2c;
- Supporting for an unlimited number of devices. The only limitation is system performance (computer and network hardware);
- Reading an unlimited number of parameters from devices (voltage, temperature, humidity values, etc.);
- Creating device models with parameters for easy duplication in the system;
- Creating a tree structure of device location in the system, e.g. BuildingA-> Server room-> Cube1-> Cabinet01-> PDU1;
- An easy way to change the location of devices in the system tree structure by drag and drop;
- Easily move individual parameters in the tree structure of the system by drag and drop
- Reading numeric (voltage temperature, etc.) and text parameters (e.g. "normal", "battery operation", "failure" etc.)
- Reading device parameters with a defined interval from a minimum of 10 seconds;
- Saving the read values to the csv file database;
- Conversion of values of read numeric parameters according to the function f (x) = ax + b;
- Setting 4 alarm thresholds for each numerical parameter;
- Setting of alarm threshold hysteresis for each numerical parameter;
- Setting 2 alarm states for text parameters (eg UPS status "battery operation", "failure");
- Setting two categories of alarm thresholds: warning, failure;
- Displaying of current alarm states with a detailed description;
- Email notification of system alarms;
- Exporting alarm history to csv files for the selected period;
- Displaying on charts the value changes of any parameter over a selected period;
- Exporting the history of read parameter values to csv files from the selected period.

2 INSTALLING

2.1 Hardware and software requirements

The program is designed to work in the environment of Windows 10, 11, Windows Server 2016, 2019, 2022.
Computer requirements depend on the number of devices monitored. It is recommended to use minimum requirements only for up to several dozen monitored parameters.

	Minimal	Recommended
Computer	PC	PC
Operating system	Windows 10, 11; Windows Server 2016, 2019, 2022	Windows 11; Windows Server 2019, 2022
Processor	1 GHz	2,5 GHz Dual Core
RAM memory	8 GB	16 GB
Hard drive	64GB and additional for the database	512GB
Screen resolution	1920x1080	1920x1080
Network card	100Mbps	1Gbps
Platform	.NET 8	.NET 8

2.2 Installation process

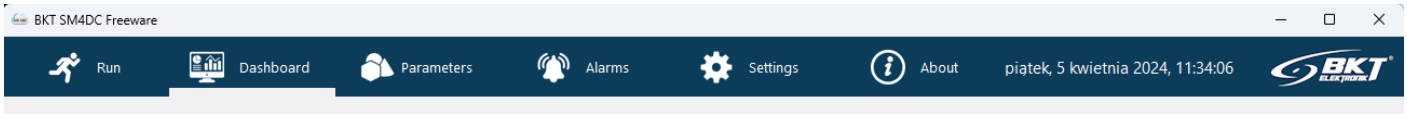
Installation requires .NET 8 platform. The installer must have administrator rights in Windows. Run the program installer - file *BKT_SM4DC_Freeware_version_setup.exe*, then accept the license terms and continue the process according to the installer messages.

3 CONFIGURATION AND OPERATION

3.1 Opening / Closing / Saving the project

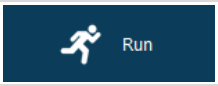
The project opens automatically when the program starts. At the first start, the program will find that the project file is missing and it will display the appropriate message. After accepting the intention to create a new project, the program will create a sm4dcproject.xml file in the *C:\ProgramData\BKT Elektronik\BKT SM4DC Freeware* directory. The project file contains the settings entered in the Settings window (see section *3.7 Application settings*) and data of all monitored objects defined in the program. The project is saved automatically when the program is closed. It is also possible to save the project to a file earlier by saving the Settings -> Save.

3.2 Main menu

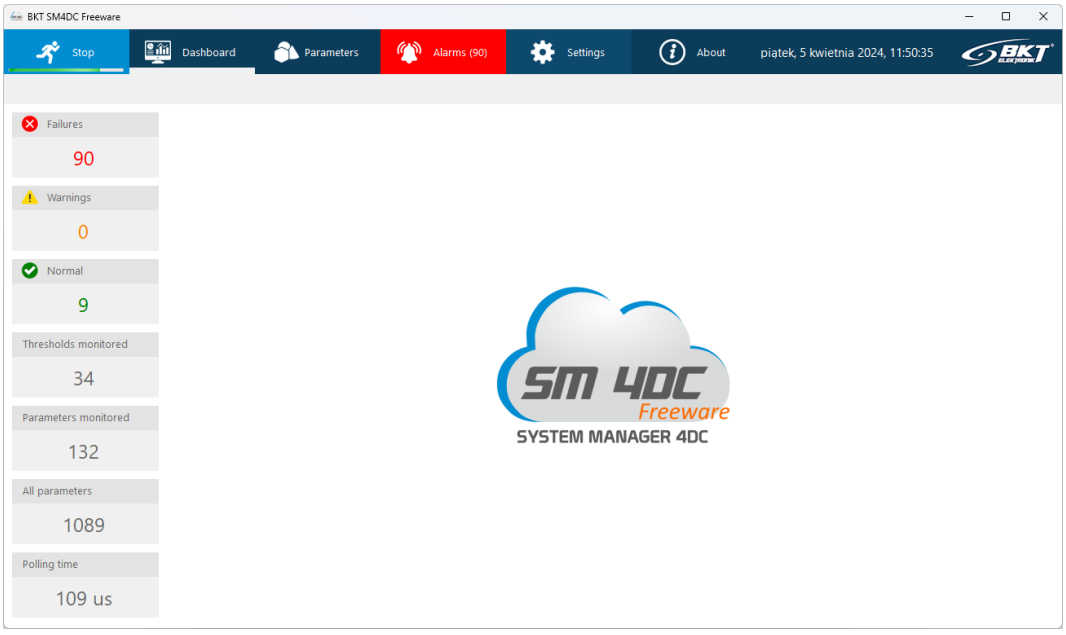


Run/Stop	Starts / stops active polling of devices for defined parameters.
Dashboard	Opens a tab with current basic system statuses.
Parameters	Opens a tab on which monitored devices and their parameters are configured.
Alarms	Opens a tab that displays current and historical alarms.
Settings	Opens a window with program settings.
About	Opens a windows with program information.

3.3 Start and stop monitoring

	Monitoring is stopped. The program does not poll devices for current parameter values; does not write these values to the database.
	Monitoring is active. The program periodically polls all devices. The progress bar shows the time to the next polling.

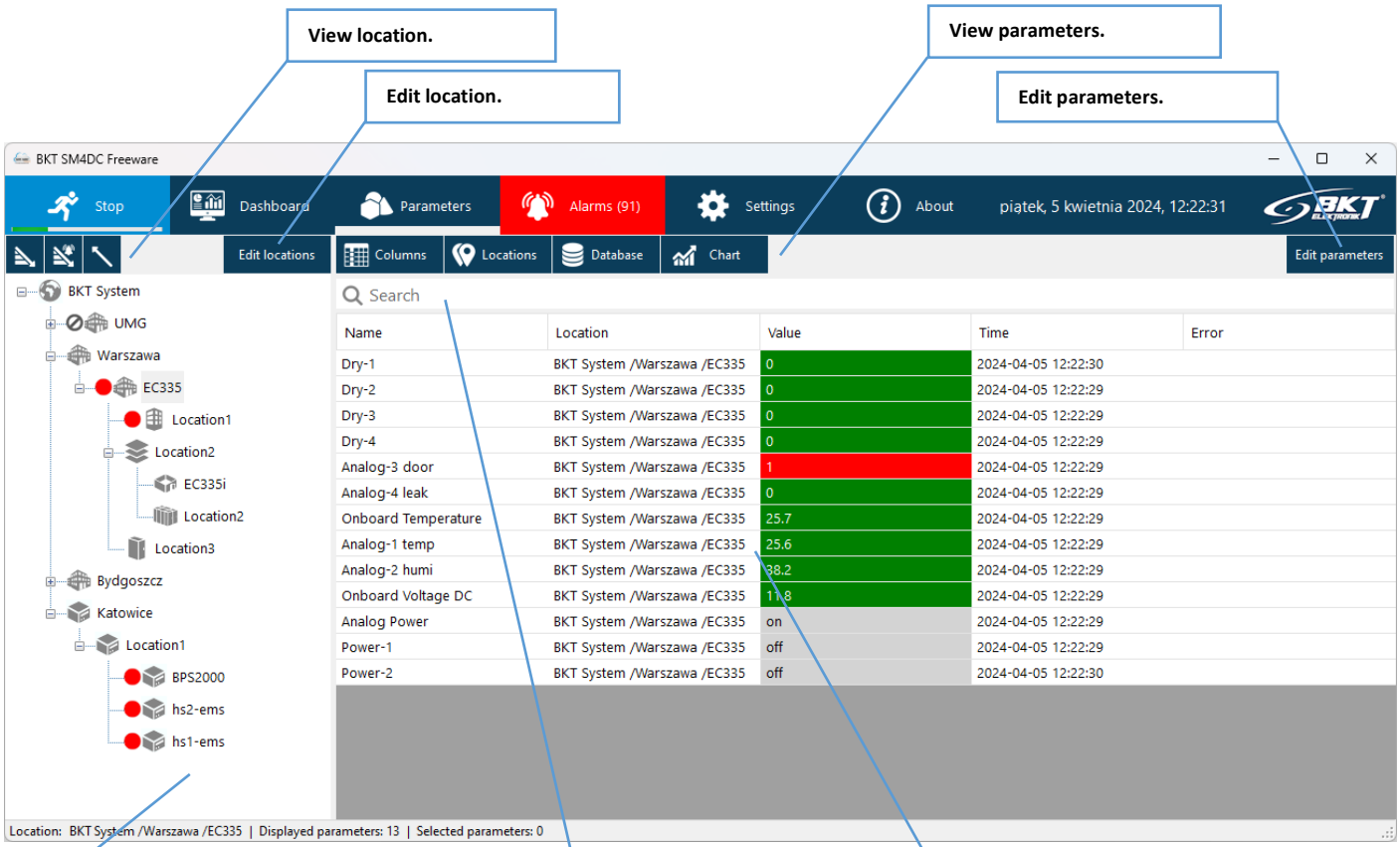
3.4 Dashboard



All objects	Displays the number of all device parameters defined in the program.
Failures	Displays the number of device parameters that are in a failure state - they have exceeded the defined failure alert thresholds.
Warnings	Displays the number of device parameters that are in the warning state - they have exceeded the defined warning alert thresholds.
Normal	Displays the number of device parameters that are in the normal state - have not exceeded the defined alarm thresholds.
Thresholds monitored	Displays the number of parameters that are read from devices and for which alarm thresholds have been defined and their monitoring has been enabled.
Parameters monitored	Displays the number of parameters that are read from devices.
All parameters	Displays the number of all device parameters defined in the program.
Polling duration	Displays the polling duration of all monitored parameters.

3.5 Parameters

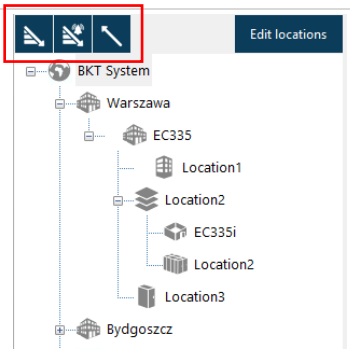
The object is the device parameter. It can be temperature, humidity or any other parameter that the device can be polled for.



3.5.1 View location

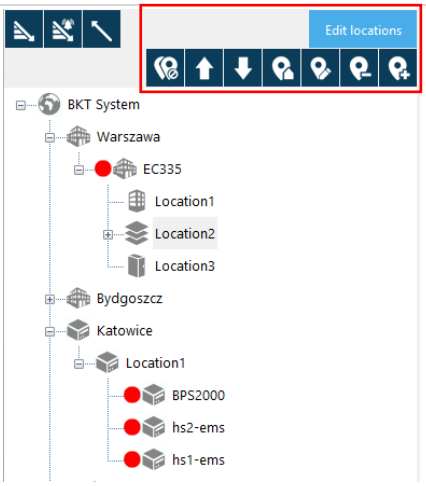
Location is where the device/parameter is located. The program allows you to create a structure of dependencies between individual devices. Managing locations is similar to managing folders in Windows. After creating the system tree and starting monitoring, measurement data from the parameters read from the devices will be saved on the computer disk in the *C:\ProgramData\BKT Elektronik\BKT SM4DC Freeware\Data* directory. The directory structure on the computer's disk will be identical to the structure of the constructed location tree, which facilitates navigation and user access to all data stored on the disk.

	**Expand all locations.** Expands the tree of all locations from the selected one.
	**Expand locations with alarms.** Expands all locations where alarms are displayed.
	**Collapse all locations.** Collapses all locations under the selected one.

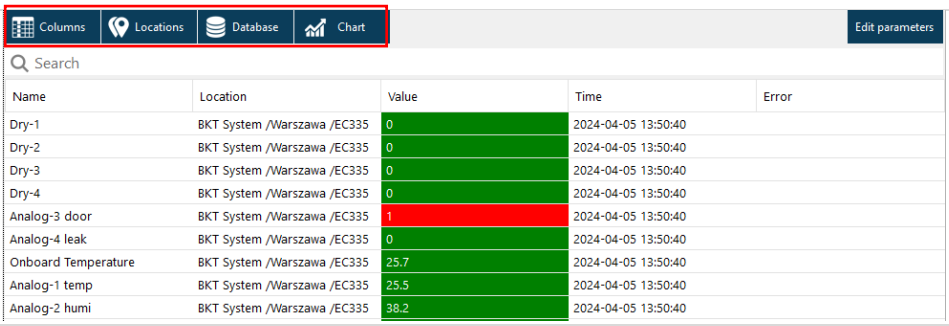


3.5.2 Configure location

Edit locations	**Show/hide edit buttons.** Shows or hides the following buttons for editing locations.
	**Add location.** Adds a new location to the selected one.
	**Delete location.** Deletes the selected location. ATTENTION Deleting a location will also delete the directory on disk with measurement data saved in that location.
	**Edit location name.** Allows changing the name for the selected location.
	**Set location icon.** Sets the image to the selected location.
	**Move location down.** Moves the selected location down one position within the parent location.
	**Move location up.** Moves the selected location up one position within the parent location.
	**Activate/deactivate location.** Enables or disables monitoring of parameters in the selected and all subordinate locations.
	Moving locations. Locations can be moved by drag and drop.

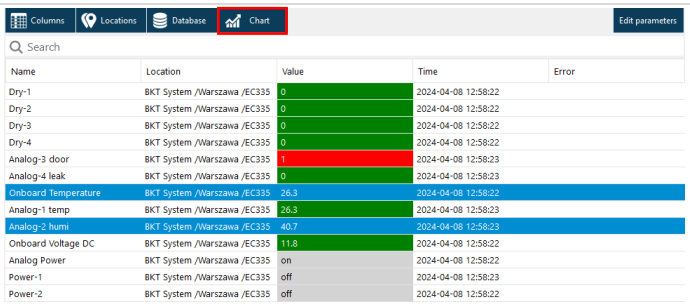


3.5.3 View parameters



Columns	**Displaying list columns.** Displays additional columns providing information about other parameter properties.
Locations	**Show parameters from sub-locations.** Displays in a list the parameters from the selected location and all sublocations.
Database	**Show database.** Opens an explorer window with the folder of the selected location, where *.csv files with data are located. More in the chapter *3.8 Database.*
Chart	**Show charts.** Opens a window with charts. More in the chapter *3.5.4 View values in charts*.
	Sorting parameters. By left-clicking on the column header, you can sort the parameters relative to the selected column.
	Copying to Excel. By selecting the selected parameters and copying CTRL+C, you can then paste them CTRL+V into the Excel-sheet.

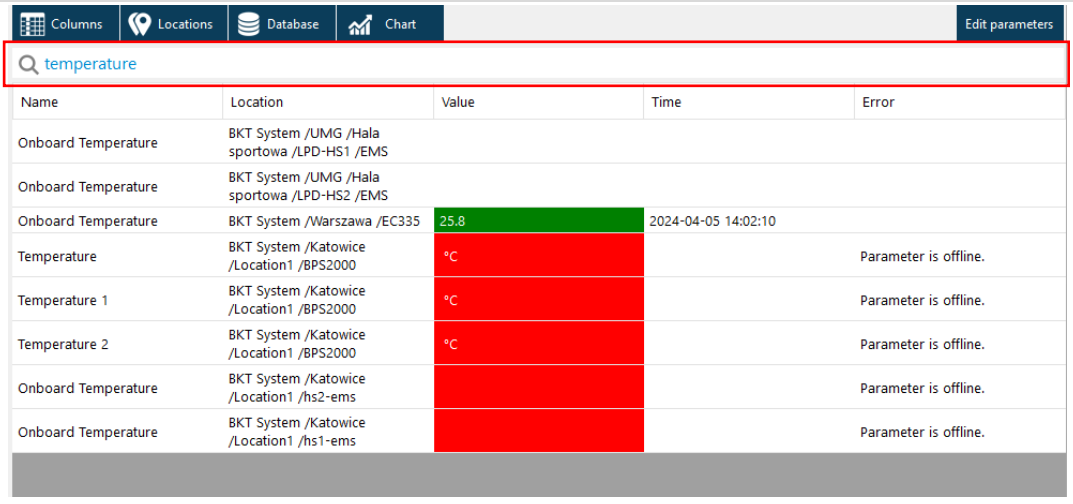
3.5.4 View values in charts



View charts
It is possible to display a single or a group of parameters on the chart. Select one or use the CTRL or SHIFT keys to select a group of parameters in the list that are to be displayed on the chart.
Then click the *Chart* button.

	Zoom Use your mouse scroll wheel to zoom in or out on the charts.
	Move Click on the chart and move your mouse to move the enlarged chart.
LEFT ALT	**Select and enlarge** Use left ALT and select the area on the graph that you want to enlarge.
SHIFT	**Zoom in/out on the value axis** Use SHIFT to change the scope of the value axis only.
CTRL	**Zoom in/out on the timeline** Use CTRL to change the scope of the timeline only.

3.5.5 Parameter search

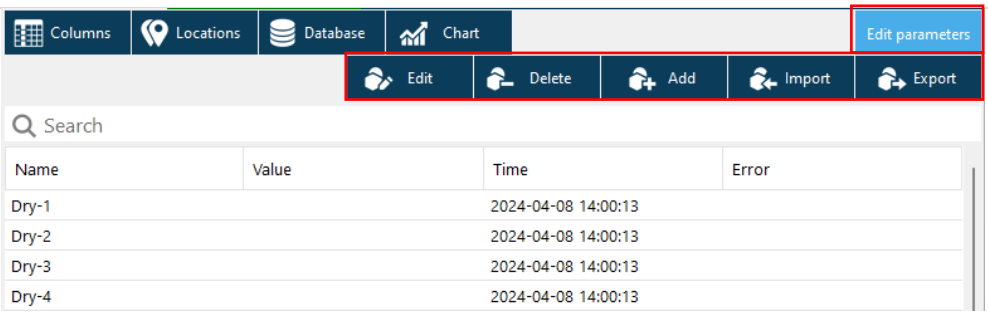


It is possible to search for the desired parameter from the group currently displayed in the right window.
The search result will display parameters that contain the string of characters entered in the search field:

- name of the object or
- the full path of the object's location or
- name of the device assigned to the object or
- IP address

Letter case does not matter when searching.

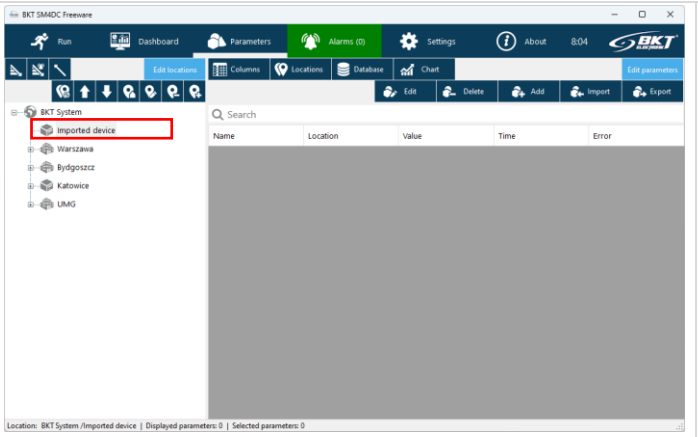
3.5.6 Configure parameters

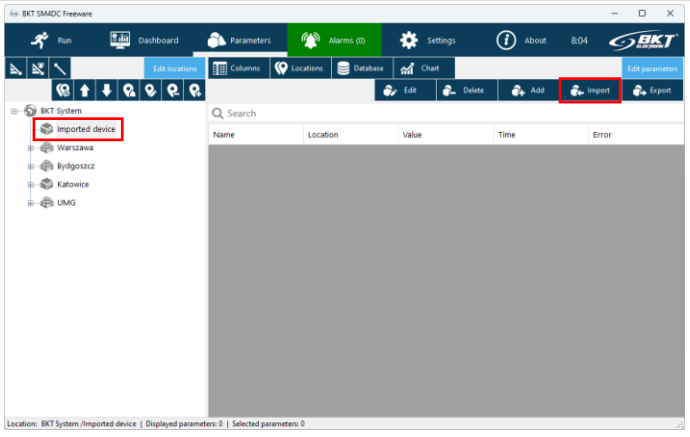


Edit parameters	**Show/hide edit buttons.** Shows or hides the following buttons for editing parameters.
Edit	**Edit parameter.** Opens the editing window for one or more selected parameters. See chapter *3.5.9 Editing parameters*.
Delete	**Remove parameter.** Deletes one or more selected parameters. See chapter *3.5.10 Deleting parameters.*
Add	**Add a parameter.** Adds one parameter. See chapter *3.5.8 Adding a single parameter*
Import	**Import device.** Imports parameters from any device supporting the SNMP protocol. See chapter *3.5.7 Import device*.
Export	**Export device.** From the selected parameters, it creates a device model that can be used when importing devices. See chapter *3.5.11 Exporting - creating a device model*.

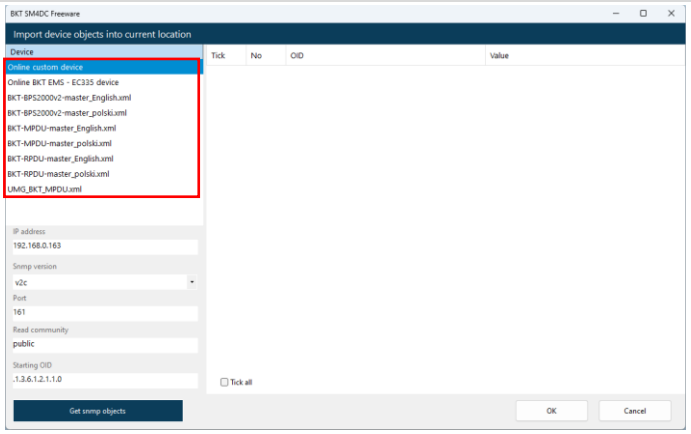
3.5.7 Import device

The program allows you to add many device parameters at the same time. It is possible to add parameters from any type of device supporting the SNMP version 1 or version 2c protocol or from previously defined devices.

	Create a new location with the name of the device to be imported. See chapter *3.5.2 Configure location*.

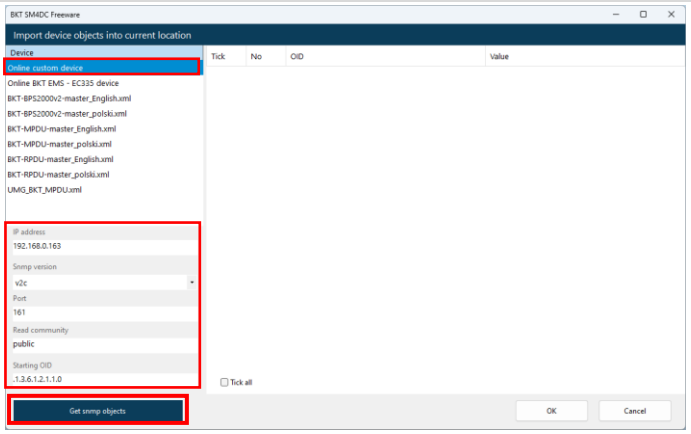


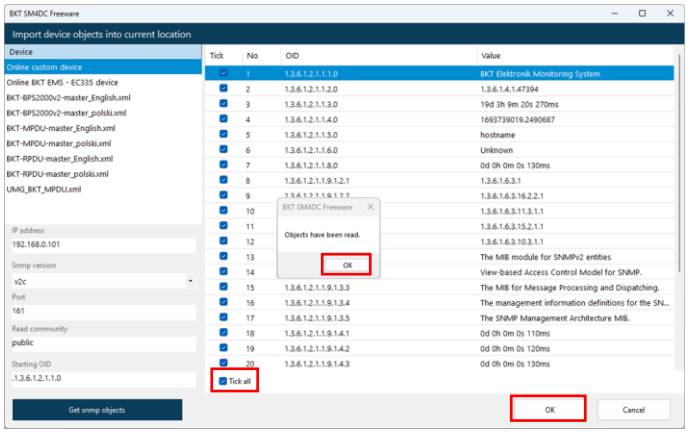
Click on the created location (device) and then select *Import* in the right window.



Select the type of device to be imported. If it is not on the list, select *Online custom device* (any device connected to the network).

Adding parameters from custom device.

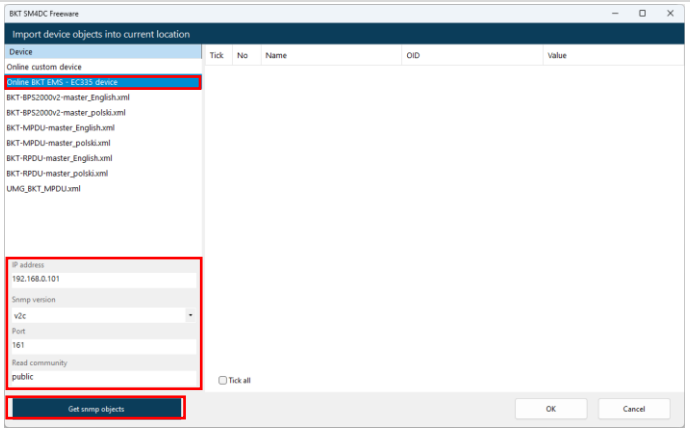


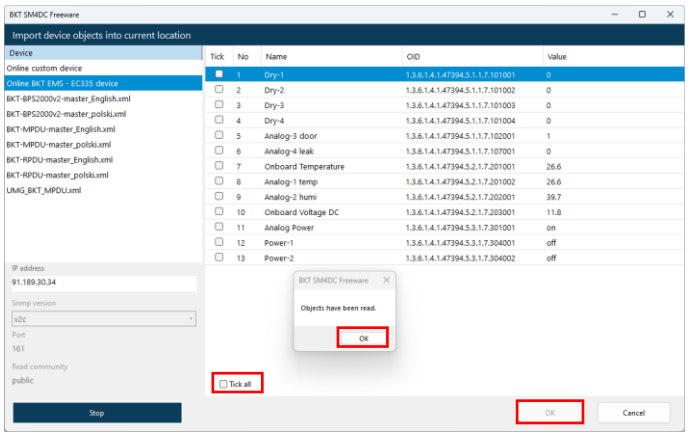


Select *Online custom device*. Enter basic connection settings according to your device configuration:
- SNMP protocol version 1 or 2c
- IP address of the device
- communication port
- Read community, i.e. access password
- OID, i.e. the identifier of the SNMP object from which the program is to start reading the device using the Get Next command of the SNMP protocol.

The default values for these parameters are already entered, but may vary depending on the device. Check your device's user manual.
Click *Get snmp objects* to start the process of reading parameters from the device. Select the objects to be added or select all. Confirm by clicking OK.
Then edit individual parameters, giving them appropriate names and, if necessary, set alarm thresholds. See chapter *3.5.6 Configure parameters*.

Adding EC335 device parameters





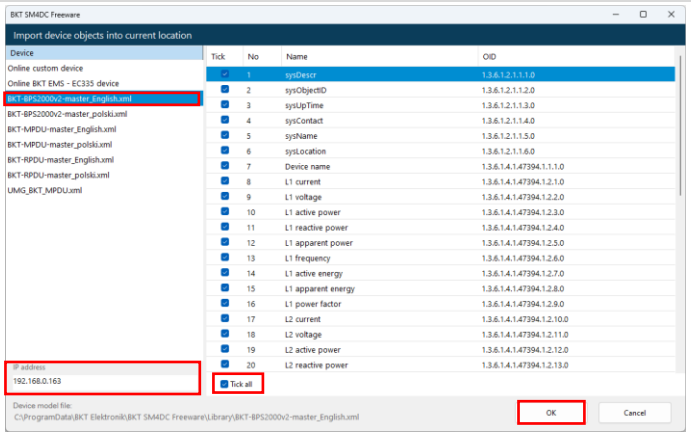
The program defines the EC335 controller of the BKT EMS system used to measure environmental conditions.
Select *Online BKT EMS – EC335 device*. This allows you to download the following measured values online from the EC335 controller:
- analogue sensors connected to the controller and expansion modules
- inputs for potential-free contacts of the controller and expansion modules
- controller and expansion module outputs

The settings previously configured in the controller itself will be automatically assigned to these values:
- sensor names
- alarm thresholds for analogue sensors

Click *Get snmp objects* to start the process of reading parameters from the device. Select the objects to be added or select all. Confirm by clicking OK.

Parameters may require further configuration. See chapter *3.5.6 Configure parameters*.

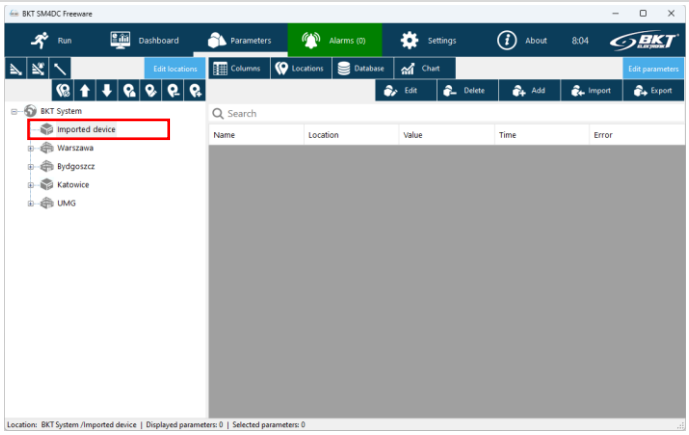
Adding parameters from defined device models.



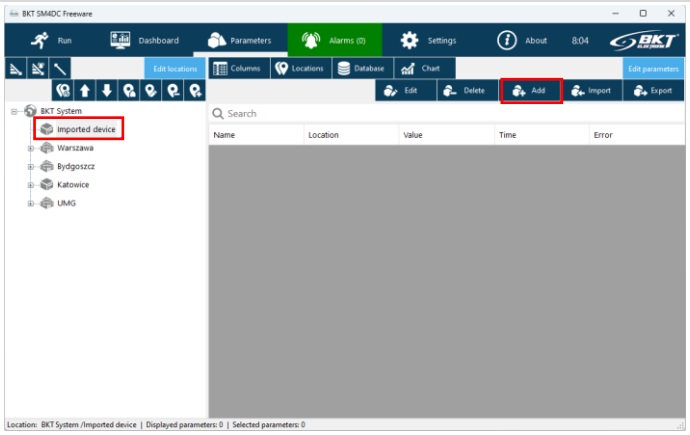
The files of the defined device models are located in the *C:\ProgramData\BKT Elektronik\BKT SM4DC Freeware\Library* directory
Select the model of the device to be added to the system. Enter the device's IP address if it is different from the factory one. Select the objects to be added or select all. Confirm by clicking OK.

Parameters may require further configuration. See chapter *3.5.6 Configure parameters*.

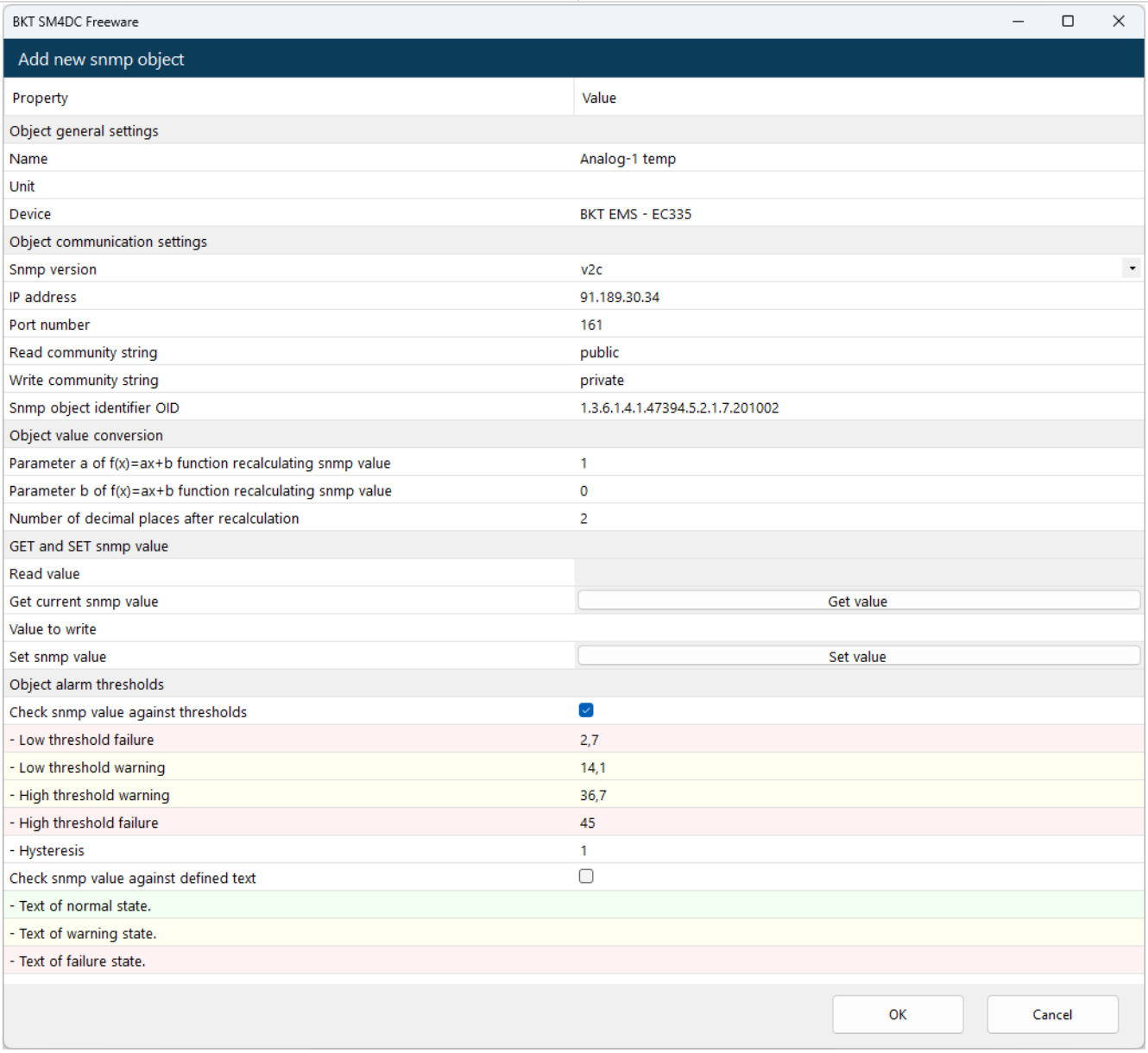
3.5.8 Adding a single parameter



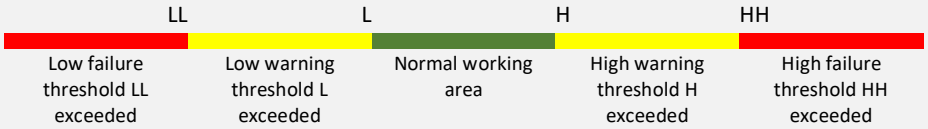
Create a new location for the new parameter. See chapter *3.5.2 Configure location.*

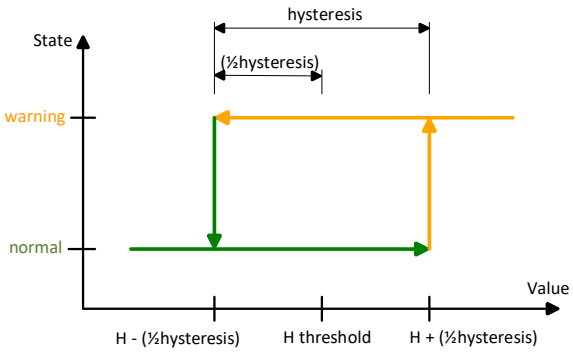


Click on the location you created and then click *Add* button in the right window.

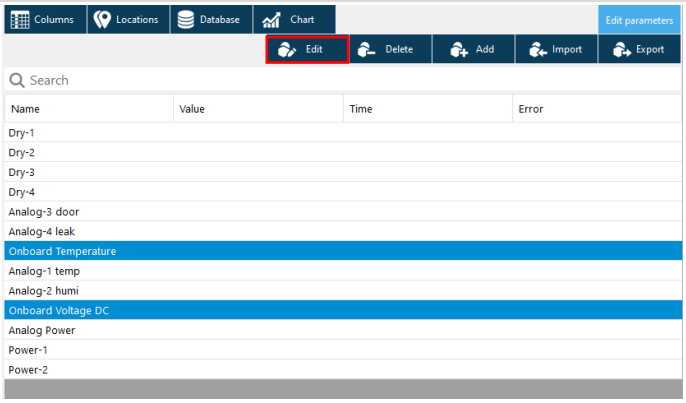


In the opened window, enter the parameter settings according to the instructions of the device to be monitored. Then confirm by clicking OK. The description of individual parameters is provided in the table below.

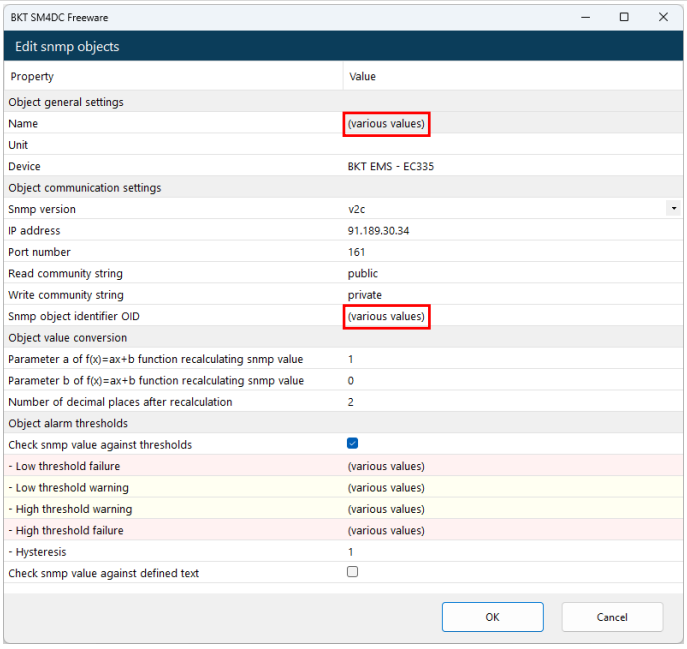
Object general settings	Basic SNMP parameter settings of the monitored device
Name	Name of the monitored object. The name must be unique in the current location.
Unit	Unit of the object, e.g. V (Volt), A (Ampere), etc.
Device	Name of device, which the parameter is monitored, for example UPS.
Object communication settings	They define the way of communication with the device in order to read the value of a given object
Snmp version	The version of the SNMP protocol used to communicate with the device. Possible settings version 1 or version 2c.
IP address	IP address of the monitored device.
Port number	SNMP communication port number. By default 161. Acceptable range (1-65535).
Read community string	Password enabling the parameter to be read from the device.
Write community string	Password for saving the parameter value to the device.
Snmp object identifier OID	Identifier of the monitored parameter in the device.
Object value conversion	It enables the conversion of the value read from the device into the value to be monitored. Of course, the read value must be numeric in order to convert it. The conversion is carried out in accordance with the linear function f (x) = ax + b. If the value is not to be converted, set the values of the following parameters to a = 1 and b = 0.
Parameter a of f(x)=ax+b function	Some devices provide only integer values, e.g. 2385 voltage, which should be divided by 10 to get the real voltage value of 238.5V. In this case, a = 0.1 will convert and display the correct voltage. Default value a = 1. Any numerical value is allowed.
Parameter b of f(x)=ax+b function	Sets the measurement offset from the real value. E.g. measured temperature t_m = 19.7 ° C, while real t_r = 18.9 ° C. In this case, b = -0.8 will convert and display the correct temperature. Default value b = 0. Any numerical value is allowed.
Number of decimal places after recalculation	Specifies with what precision (number of digits after the decimal point) the value after conversion is to be displayed. Acceptable range (0-15).
GET and SET snmp value	It allows checking entered settings, reading a parameter from the device as well as writing a new value to the device.
Read value	Value read from the device.
Get current snmp value	Clicking the button sends a query to the device for the parameter value that will be displayed in the cell above.
Value to write	The value to be saved to the device.
Set snmp value	Clicking the button sends the value from the above cell to be saved in the device.
Check snmp value against thresholds	Checking the box will cause that after each reading of the value from the device and its conversion according to the function f (x) = ax + b it will be compared with the defined alarm thresholds and the corresponding alarm will be signalled. The value must be numeric for this comparison to be possible. It is possible to set 4 alarm thresholds: two signalling low level and two signalling high level. In addition, warning and emergency conditions are distinguished as shown in the figure below. 
Low threshold failure	Specifies the LL value, the exceeding of which will be signalled as: "value below the failure threshold"
Low threshold warning	Specifies the L value, the exceeding of which will be signalled as: "value below the warning threshold"
High threshold warning	Specifies the H value, the exceeding of which will be signalled as: "value above the warning threshold"
High threshold failure	Specifies the HH value, the exceeding of which will be signalled as: "value above the failure threshold"

Hysteresis	Hysteresis is the difference between the value that causes a change in state (e.g. from normal to warning) and the value that causes the state to return to the original state (from warning to normal). Hysteresis prevents frequent changes in states when the value oscillates around a defined threshold. The hysteresis applies to all thresholds, i.e. LL, L, H and HH.  Example: The temperature threshold H is set to 25°C and the hysteresis to 2°C. The parameter will switch from normal state to warning state at a temperature of 26°C and return to normal at a temperature of 24°C.
Check snmp value against defined text	Checking the box will cause that after each reading of the value from the device it will be compared with the defined text values. This functionality is provided for parameters which values are not numerical. For example, some sensors send the text "ALARM" at the time of the alarm and the message "NORMAL" in normal operation. The logic comparing the texts is as follows: FAILURE ALARM, if read text = Text of failure state else WARNING ALARM, if read text = Text of warning state else NORMAL STATE, if read text = Text of normal state else FAILURE ALARM which means that if the read value is not the same as normal or warning text, it will always be a failure condition.
Text of normal state	If the read value is the same as with the text entered in this field, the normal state will be signalled, unless a warning or failure condition is already signalled.
Text of warning state	If the read value is the same as the text entered in this field, a warning alarm will be signalled, regardless of the text in the “Text of normal state” field, unless failure state is already signalled.
Text of failure state	If the read value is the same as the text entered in this field, a failure alarm will be signalled, regardless of the text in the “Text of normal state” and “Text of warning state”.

3.5.9 Editing parameters



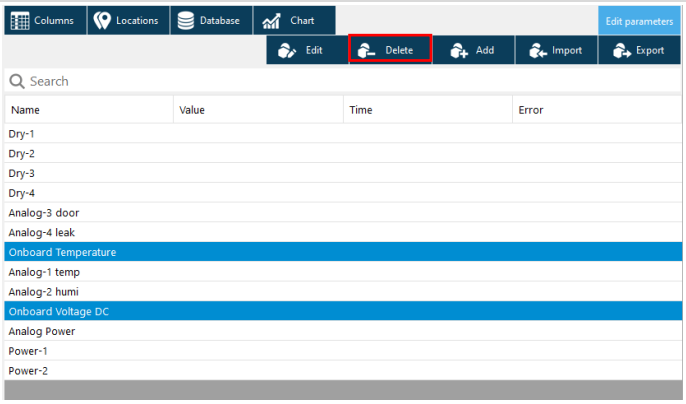
It is possible to edit a single or a group of selected parameters. Select one or use the CTRL or SHIFT keys to select a group of objects on the list that are to be edited. Click the *Edit* button.



In the opened window, modify the parameter properties and confirm by clicking OK. The description of individual properties is identical to that given in section *3.5.8 Adding a single parameter*. The change will be applied to all previously selected objects. Various values means that not all selected objects had the same value for a given property. If (various values) remains unchanged, the given property will not be overwritten in any object.

ATTENTION
Since the saved measurement data of the SNMP parameter is related to its location and name, changing the parameter name means that the existing measurement data (charts) will not be visible in the program. Only measurement data will be visible from the moment the parameter name was changed. However, historical data is still available under the old name, but only in csv files. See section *3.8 Database*.

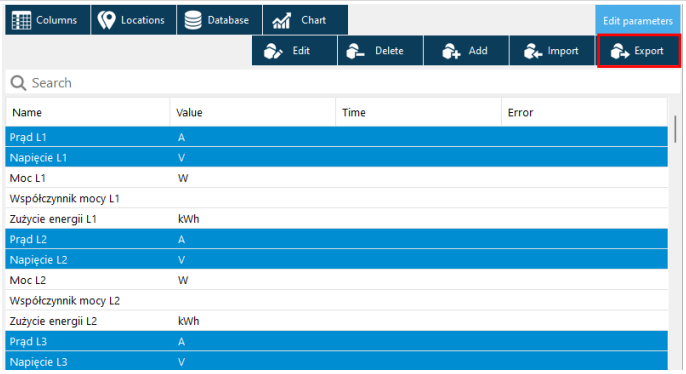
3.5.10 Deleting parameters



It is possible to delete a single or a group of selected parameters. Select one or use the CTRL or SHIFT keys to select a group of parameters on the list that are to be removed from the system. Click the *Delete* button and confirm your intention to delete.

3.5.11 Exporting - creating a device model

The program allows you to create a device template that will contain information about SNMP parameters that can be monitored in a given type of device. Such parameters can be pre-parameterized, i.e. have names, SNMP connection data, alarm thresholds and other values that can be assigned to the parameter. This device model can be used to duplicate devices in the system. Then it will only be necessary to update one parameter characterizing the new device - (e.g. IP address)



Preparing objects for export to the model

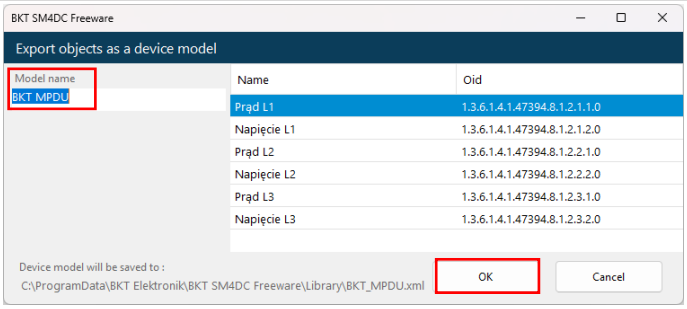
Configure the group of objects that will form the device model. Use the instructions from the chapters:

3.5.8 Adding a single parameter

3.5.9 Editing parameters3.5.9 Editing parameters

Then select one or use the CTRL or SHIFT keys to select a group of objects on the list that are to form the device model.

Click the *Export* button.



Giving a name to the model and saving

In the opened window, enter the unique name of the device model and confirm by clicking OK.

The device model will be saved to an xml file in the C:\ProgramData\BKT Elektronik\BKT SM4DC Freeware\Library directory

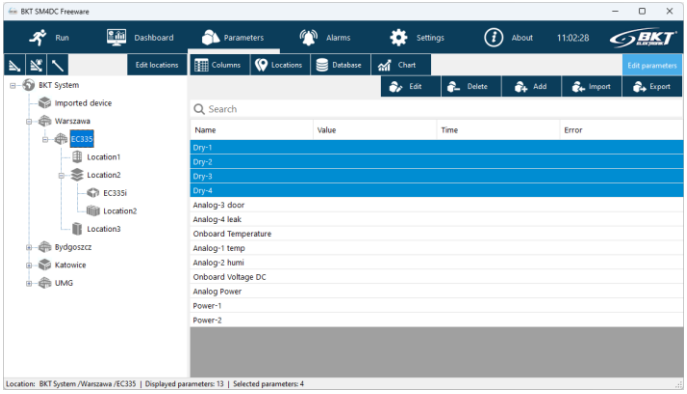
The model saved in this way will be visible in the window of models to be imported (see chapter *3.5.7 Import device*)

3.5.12 Moving parameters between locations

The program allows you to move parameters between locations using drag and drop. Using the same method, you can also change the system structure by dragging the entire location from one location to another. The changes introduced will also be made on the computer's disk in the structure of subdirectories in the *C:\ProgramData\BKT Elektronik\BKT SM4DC Freeware\Data* directory.

ATTENTION

When making modifications to the system structure, make sure that no folder with data saved in the *C:\ProgramData\BKT Elektronik\BKT SM4DC Freeware\Data* directory is currently open. In this case, the program may report that the disk cannot be accessed.



Moving parameters

Select one or, using the CTRL or SHIFT keys, a group of parameters. Drag the selected parameters using the CTRL key to the target location and confirm your intention to move.

ATTENTION

Since the saved measurement data of a parameter is related to its location and name, moving objects means that the existing measurement data (charts) will not be visible in the program. Only measurement data from the moment the objects were moved will be visible. However, historical data is still available in the old location, but only in csv files. See section *3.8 Database*.

Moving locations

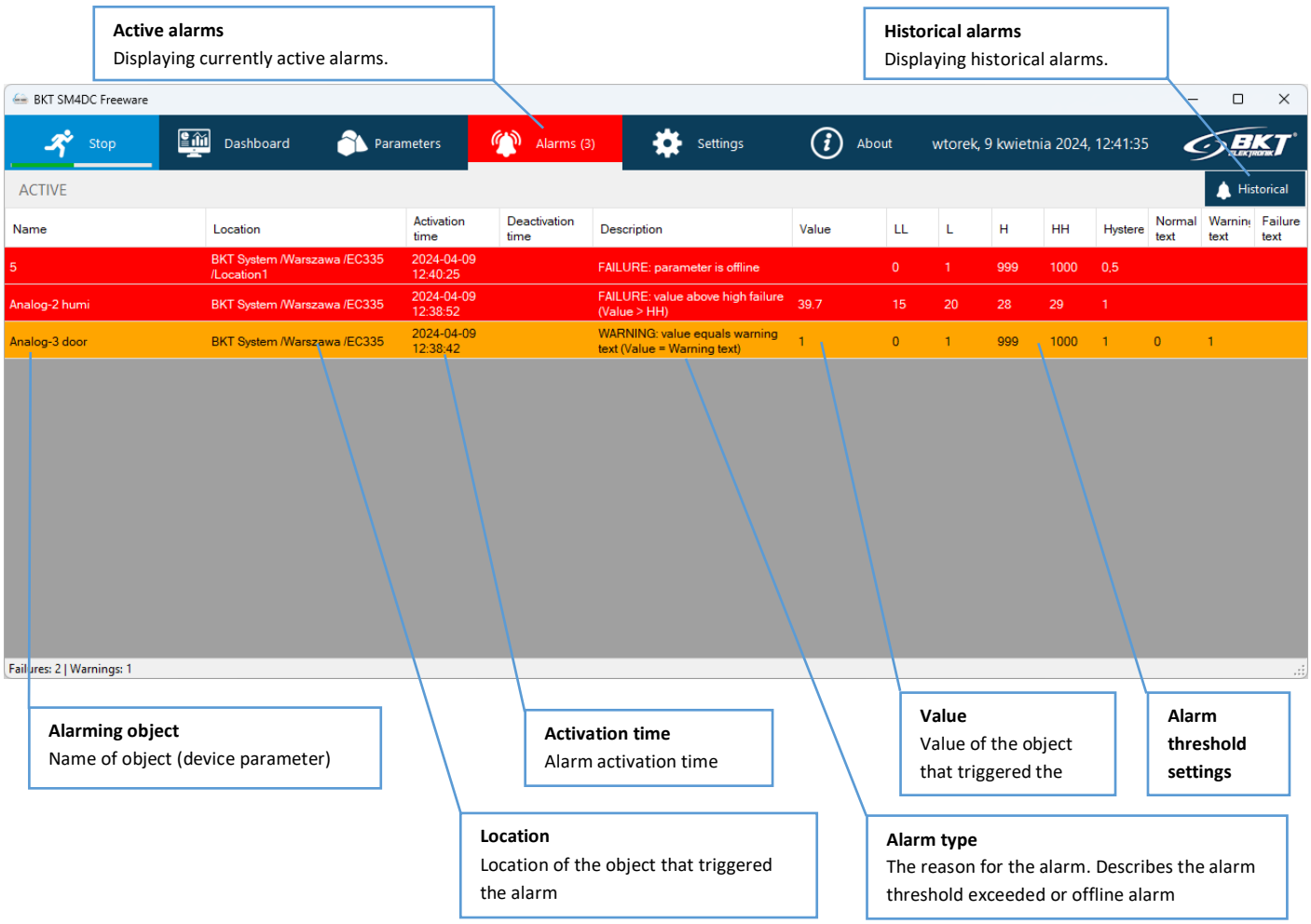
Select the location to be moved and drag it to the new location. Moving a location retains all previous measurement data.

3.6 Alarms

All exceedances of defined alarm thresholds are displayed on a separate tab - alarm tab. When clicking on this tab, the currently active alarms are visible. Alarm threshold can be modified by editing the individual objects (see chapter 3.5.9 Editing parameters).

3.6.1 Active alarms

Red colour means exceeding failure thresholds, and yellow exceeding warning thresholds.



Alarm examples

Alarm type	Description
FAILURE: parameter is offline	FAILURE. Object did not respond for 5 consecutive requests.
FAILURE: value below low failure (Value < LL)	FAILURE. The parameter value read from the device is below the set low failure threshold.
FAILURE: value above high failure (Value > HH)	FAILURE. The parameter value read from the device is above the set high failure threshold.
WARNING: value below low warning (Value < L)	WARNING. The parameter value read from the device is below the set lower warning threshold.
WARNING: value above high warning (Value > H)	WARNING. The parameter value read from the device is above the set high warning threshold.
WARNING: value equals warning text (Value = Warning text)	WARNING: The parameter value read from the device is identical to the warning text

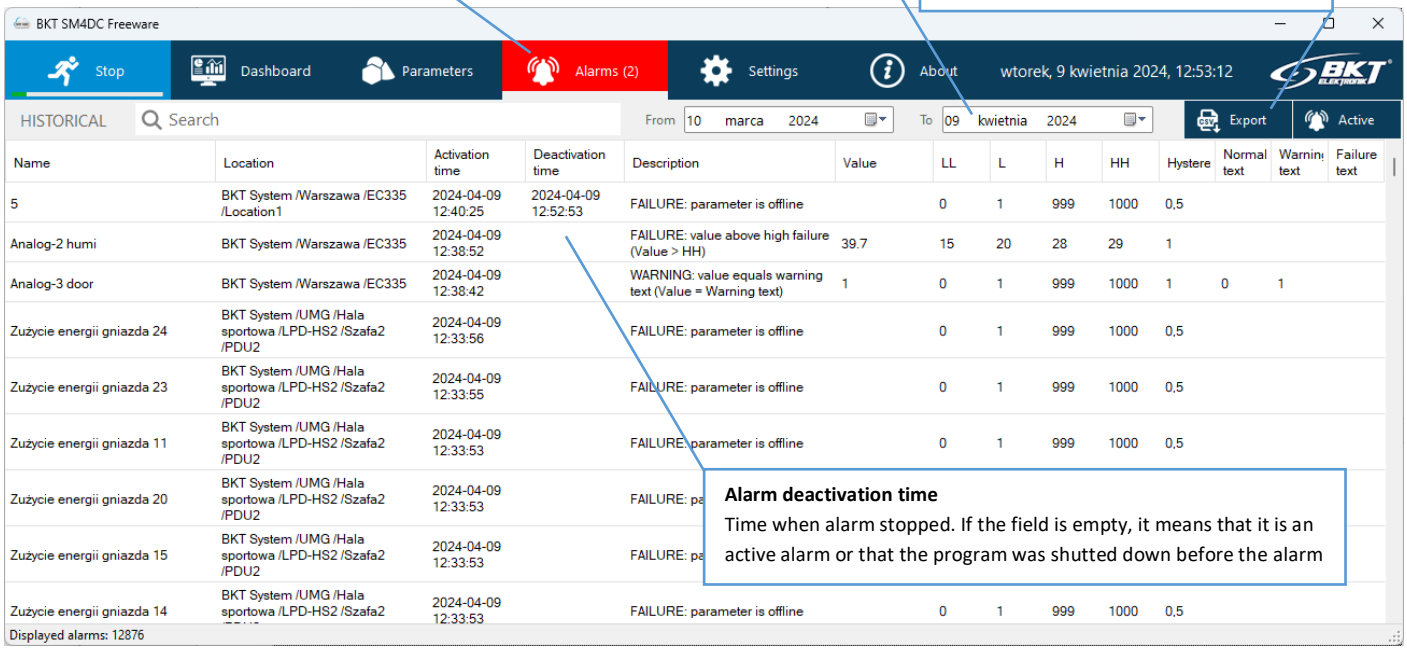
3.6.2 Historical alarms

It is possible to view the alarm history, display only those within the specified time period and matching the search criteria. Then it is possible to export the currently displayed list to the csv file. The list view is similar to the view of list of active alarms.

Active alarms
Button to display active alarms

Alarm dates
Alarm time range to display.

Alarms export
Export to csv file currently displayed historical alarms

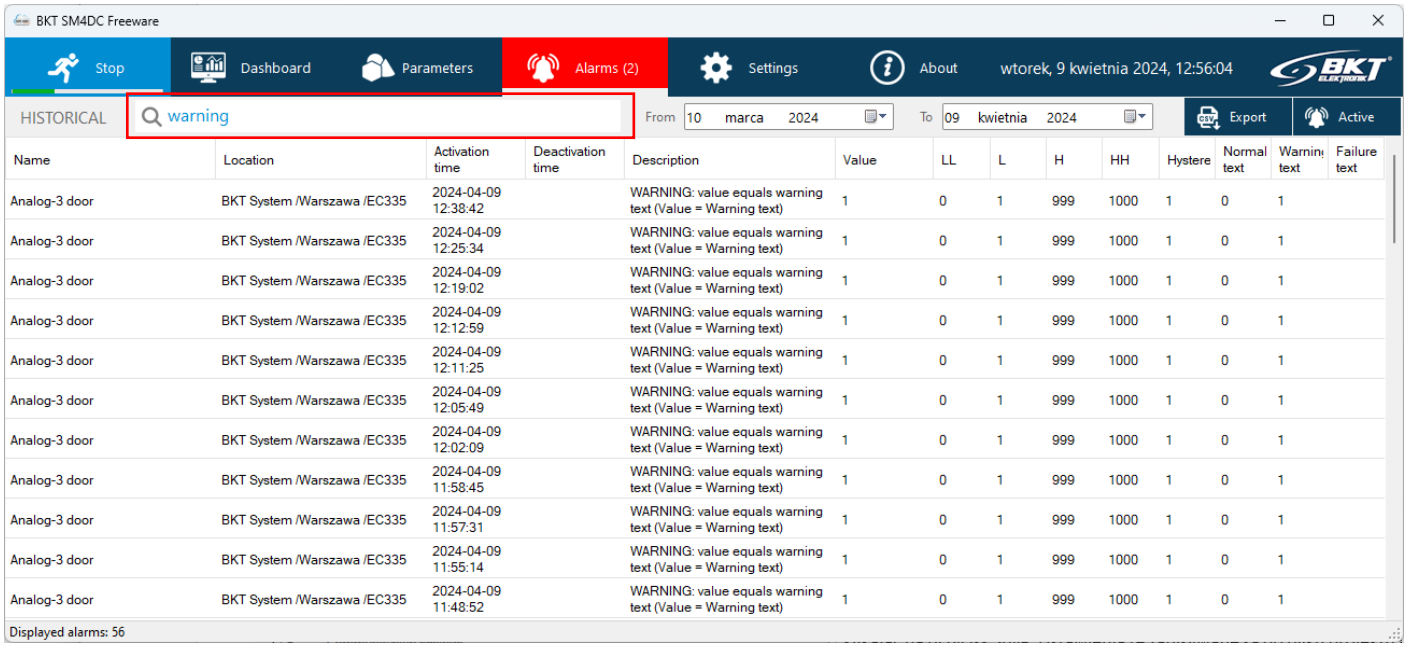


3.6.3 Search for historical alarms

It is possible to search for the desired historical alarms from the list of currently displayed ones.
The search result will display alarms that contain the string of characters entered in the search field:

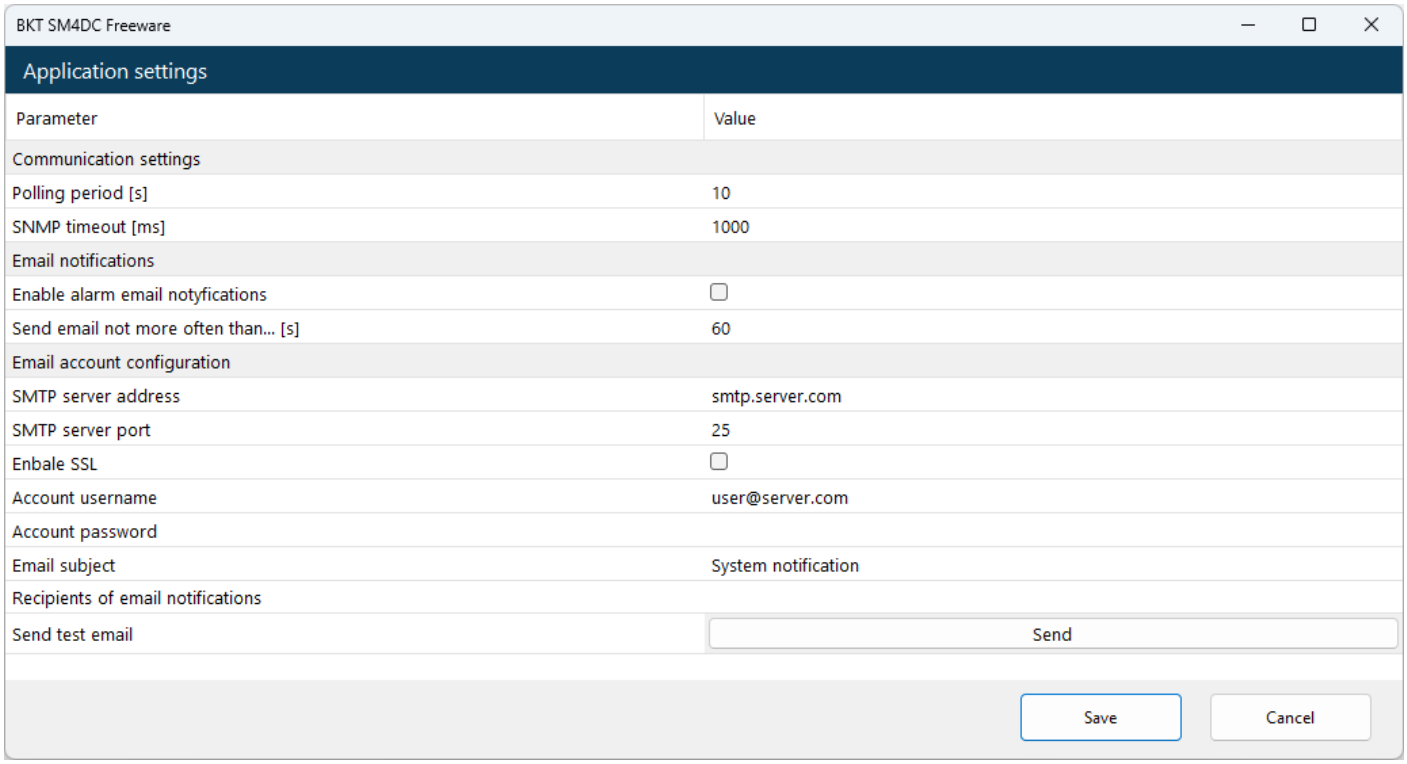
- name of the object or
- the full path of the object's location or
- alarm type

Letter case does not matter when searching.



3.7 Application settings

The main application settings are available under the *Settings* button. Enter the settings as described in the table below and save by clicking the *Save* button. These settings are saved to the project file (see chapter *3.1 Opening / Closing / Saving the project*).



Communication settings	Define the way of communication with devices.
Polling period	The interval with which the program polls devices and save the results to the database. Value in seconds. By default every 10s. Acceptable range (10 - 3600s).
SNMP timeout	The time the program will wait for a response from the device. Value in milliseconds. The default is 1000 ms. Acceptable range (100-10000ms).
Email notifications	Define email alerts
Enable alarm email notification	Checking will enable the service of notifying about alarm states in the whole system.
Send email not more often than …	Limits the number of email notifications in a defined period. In avalanche failure situations, when one failure causes a second, the number of notifications would exceed human perception. This parameter limits the number of emails to one for a defined time. If other alarms occur during this time, they will be reported to the next email. Value in seconds. Default 60s. Acceptable range (60-3600s).
Email account configuration	They define the email account settings used to generate notifications. These settings must match the settings of the mail server.
SMTP server address	The address of the mail server that supports SMTP.
SMTP server port	SMTP server port that supports connections.
Enable SSL	Checking will enable encrypted communication with the mail server.
Account username	Username of the email account.
Account password	Email account user password.
Email subject	Subject of the message sent by the program. It can be e.g. the name of the monitored system.
Recipients of email notifications	Notification recipient email addresses separated by a semicolon.
Send test email	It allows checking entered e-mail server settings by sending a test email to defined recipients.

3.7.1 Email notifications

Properly configured email notifications will allow you to receive messages in HTML format about any changes in the system. The message contains information about the general system status and the last 5 active alarms. Email examples are below.

Email 1

System information

System status:	WARNING
Server IP address:	10.10.10.32
Server name:	BKTWAWLAP015
Server time:	2024-04-09 13:42:11
Active failures:	0
Active warnings:	1

5 most recent active alarms

No.	Location	Parameter	Value	Description	Activation time
1	BKT System /Warszawa /EC335	Analog-3 door	1	WARNING: value equals warning text (Value = Warning text)	2024-04-09 13:42:11
2	no alarm				
3	no alarm				
4	no alarm				
5	no alarm				

Email 2

System information

System status:	FAILURE
Server IP address:	10.10.10.32
Server name:	BKTWAWLAP015
Server time:	2024-04-09 13:43:11
Active failures:	12
Active warnings:	1

5 most recent active alarms

No.	Location	Parameter	Value	Description	Activation time
1	BKT System /Katowice /Location1 /BPS2000	L1 voltage		FAILURE: parameter is offline	2024-04-09 13:43:11
2	BKT System /Katowice /Location1 /BPS2000	L1 active power		FAILURE: parameter is offline	2024-04-09 13:43:11
3	BKT System /Katowice /Location1 /BPS2000	L1 reactive power		FAILURE: parameter is offline	2024-04-09 13:43:11
4	BKT System /Katowice /Location1 /BPS2000	sysUpTime		FAILURE: parameter is offline	2024-04-09 13:43:10
5	BKT System /Katowice /Location1 /BPS2000	sysName		FAILURE: parameter is offline	2024-04-09 13:43:10

Email 3

System information

System status:	NORMAL
Server IP address:	10.10.10.32
Server name:	BKTWAWLAP015
Server time:	2024-04-09 13:44:11
Active failures:	0
Active warnings:	0

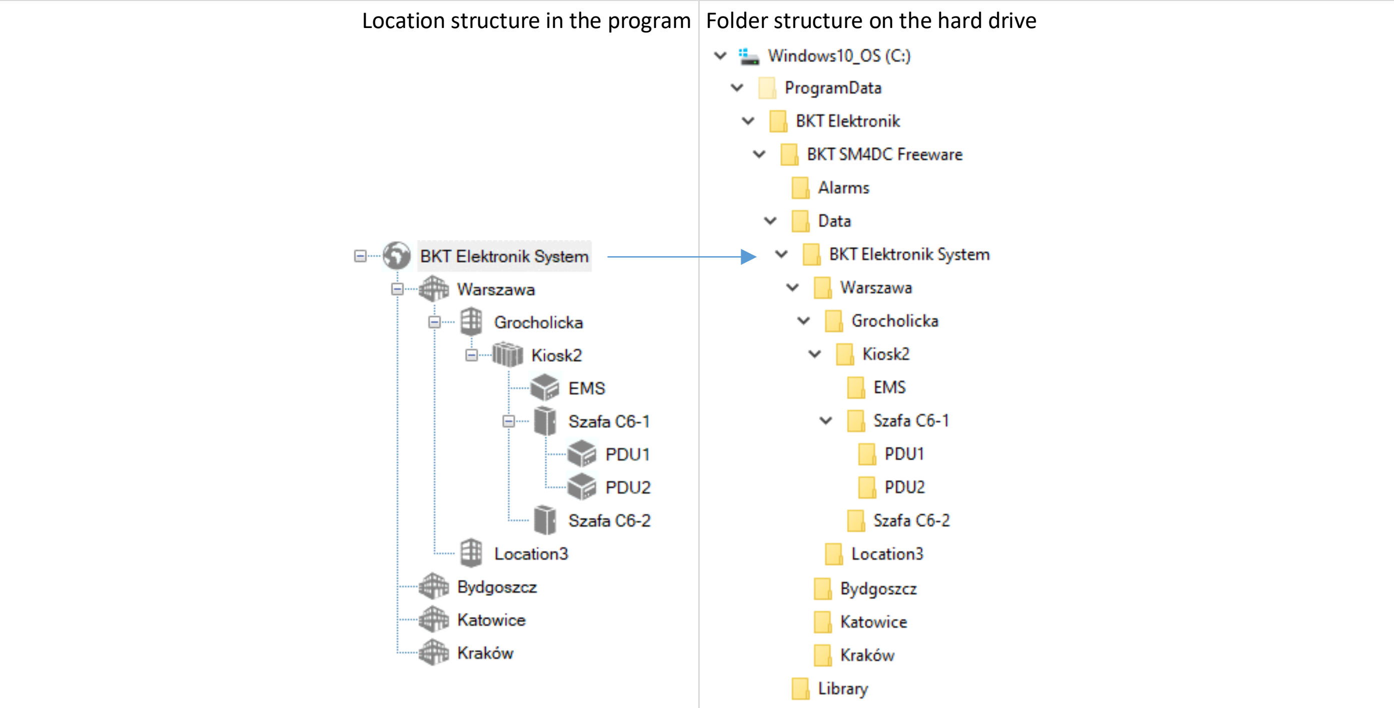
5 most recent active alarms

No.	Location	Parameter	Value	Description	Activation time
1	no alarm				
2	no alarm				
3	no alarm				
4	no alarm				
5	no alarm				

3.8 Database

3.8.1 Directory structure

Measurement data read from devices are saved to csv files in the *C:\ProgramData\BKT Elektronik\Data* directory. The folder structure in this directory reflects the location structure created in the program.



3.8.2 Measurement data files

Files with measurement data are located in folders in the *C:\ProgramData\BKT Elektronik\Data* directory. Each folder contains measurement data files of objects (parameters) assigned to a given location. Each file contains measurements from a maximum of one day of all objects (parameters) placed in a given location. The data in the file is separated by a comma. The program automatically deletes data older than 60 days.

Data files in the location folder

- 2020-02-28_00-00-01.csv
- 2020-02-29_00-00-02.csv
- 2020-03-01_00-00-01.csv
- 2020-03-02_00-00-01.csv
- 2020-03-03_00-00-01.csv
- 2020-03-04_00-00-01.csv

Sample content of the measurement data file opened in Notepad.

```
#BKT SM4DC Freeware - Data of Location: BKT Elektronik System /EMS
Time,Dry-1,Dry-2,Dry-3,Dry-4,Onboard Temperature,Cube1 Temperature1 1W,Cabinet1 Temperature A2,Cube1 Humidity2 A4,Cube1 Humidity1 A3,Cabinet1 Humidity A1,
2020-03-12 12:50:51,,,,,,,,,,,,,,,
2020-03-12 12:50:57,0,0,0,0,28.9,24.6,23.4,37.0,30.7,31.8,12.1,on,on,off,on
2020-03-12 12:51:08,0,0,0,0,28.9,24.6,23.4,37.0,30.7,31.8,12.1,on,on,off,on
2020-03-12 12:51:15,0,0,0,0,28.9,24.5,23.4,37.1,30.7,31.8,12.1,on,on,off,on
2020-03-12 12:51:25,0,0,0,0,28.9,24.5,23.4,37.1,30.7,31.8,12.1,on,on,off,on
2020-03-12 12:51:35,0,0,0,0,28.9,24.5,23.4,37.1,30.7,31.8,12.1,on,on,off,on
2020-03-12 12:51:46,0,0,0,0,28.9,24.5,23.4,37.1,30.7,31.8,12.1,on,on,off,on
2020-03-12 12:51:55,0,0,0,0,28.9,24.5,23.4,37.1,30.7,31.8,12.1,on,on,off,on
```

The same file opened in Excel.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	#BKT SM4DC Freeware - Data of Location: BKT Elektronik System /EMS															
2	Time	Dry-1	Dry-2	Dry-3	Dry-4	Onboard Temperature	Cube1 Temperature1 1W	Cabinet1 Temperature A2	Cube1 Humidity2 A4	Cube1 Humidity1 A3	Cabinet1 Humidity A1	Onboard Voltage DC	Analog Power	1wire Power	Power-1	Power-2
3	2020-03-12 12:50:51															
4	2020-03-12 12:50:57	0	0	0	0	28.9	24.6	23.4	37.0	30.7	31.8	12.1	on	on	off	on
5	2020-03-12 12:51:08	0	0	0	0	28.9	24.6	23.4	37.0	30.7	31.8	12.1	on	on	off	on
6	2020-03-12 12:51:15	0	0	0	0	28.9	24.5	23.4	37.1	30.7	31.8	12.1	on	on	off	on
7	2020-03-12 12:51:25	0	0	0	0	28.9	24.5	23.4	37.1	30.7	31.8	12.1	on	on	off	on
8	2020-03-12 12:51:35	0	0	0	0	28.9	24.5	23.4	37.1	30.7	31.8	12.1	on	on	off	on

3.8.3 Files with alarm data

Historical alarms are saved to the sm4dc_alarms.csv file located in the *C:\Program Data\BKT Elektronik\Alarms* directory. The program automatically deletes data older than 60 days.

Sample contents of a file with historical alarms opened in Notepad.

```
#BKT SM4DC Freeware file - Alarm history
Name,Location,Activation time,Deactivation time,Type,Value,Thresholds enabled,ValueLL,ValueL,ValueH,ValueHH,Hysteresis,Text matching enabled,Normal text,W
Prąd obciążenia gniazda 23,BKT System /pdu,2020-01-13 08:55:09,,WARNING: Value < ValueL,0.0,True,0,1,8,10,0.5,False,,,
Prąd obciążenia gniazda 22,BKT System /pdu,2020-01-13 08:55:09,,WARNING: Value < ValueL,0.0,True,0,1,8,10,0.5,False,,,
Prąd obciążenia gniazda 21,BKT System /pdu,2020-01-13 08:55:09,,WARNING: Value < ValueL,0.0,True,0,1,8,10,0.5,False,,,
Prąd obciążenia gniazda 20,BKT System /pdu,2020-01-13 08:55:09,,WARNING: Value < ValueL,0.0,True,0,1,8,10,0.5,False,,,
Prąd obciążenia gniazda 19,BKT System /pdu,2020-01-13 08:55:10,,WARNING: Value < ValueL,0.0,True,0,1,8,10,0.5,False,,,
Prąd obciążenia gniazda 18,BKT System /pdu,2020-01-13 08:55:10,,WARNING: Value < ValueL,0.0,True,0,1,8,10,0.5,False,,,
Prąd obciążenia gniazda 17,BKT System /pdu,2020-01-13 08:55:10,,WARNING: Value < ValueL,0.0,True,0,1,8,10,0.5,False,,,
Prąd obciążenia gniazda 16,BKT System /pdu,2020-01-13 08:55:10,,WARNING: Value < ValueL,0.1,True,0,1,8,10,0.5,False,,,
```

The same file opened in Excel.

	#BKT SM4DC Freeware file - Alarm history													
2	Name	Location	Activation time	Deactivation time	Type	Value	Thresholds enabled	ValueLL	ValueL	ValueH	ValueHH	Hysteresis	Text matching enabled	Nor tex
3	Prąd obciążenia gniazda 23	BKT System /pdu	2020-01-13 08:55:09		WARNING: Value < ValueL	0.0	True	0	1	8	10	0.5	False	
4	Prąd obciążenia gniazda 22	BKT System /pdu	2020-01-13 08:55:09		WARNING: Value < ValueL	0.0	True	0	1	8	10	0.5	False	
5	Prąd obciążenia gniazda 21	BKT System /pdu	2020-01-13 08:55:09		WARNING: Value < ValueL	0.0	True	0	1	8	10	0.5	False	
6	Prąd obciążenia gniazda 20	BKT System /pdu	2020-01-13 08:55:09		WARNING: Value < ValueL	0.0	True	0	1	8	10	0.5	False	
7	Prąd obciążenia gniazda 19	BKT System /pdu	2020-01-13 08:55:10		WARNING: Value < ValueL	0.0	True	0	1	8	10	0.5	False	
8	Prąd obciążenia gniazda 18	BKT System /pdu	2020-01-13 08:55:10		WARNING: Value < ValueL	0.0	True	0	1	8	10	0.5	False	
9	Prąd obciążenia gniazda 17	BKT System /pdu	2020-01-13 08:55:10		WARNING: Value < ValueL	0.0	True	0	1	8	10	0.5	False	
10	Prąd obciążenia gniazda 16	BKT System /pdu	2020-01-13 08:55:10		WARNING: Value < ValueL	0.1	True	0	1	8	10	0.5	False	

4 PROGRAM CHANGES

Changes to the program can be found in the BKT-SM4DC-Freeware_version_history.txt file attached to the program.

5 DOCUMENT REVISIONS

Version	Changes	Data
0.12	Initial version	January 2020
0.13	General upgrade to the new version	March 2020
0.14	Upgrade to the new version	April 2024