

GW-24-Cloud

Network gateway

User guide

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1 Introduction

This manual describes the functions, configuration, operating instructions and troubleshooting of the GW-24-Cloud network gateway (hereinafter referred to as the “device” or “gateway”).
Connection, configuration and maintenance of the device must be performed only by fully qualified personnel after reading this user guide.

1.1 Terms and abbreviations

PC – Personal computer
DHCP (Dynamic Host Configuration Protocol) – Network management protocol used for automatically assigning IP addresses and other communication parameters
akYtec Cloud – Cloud-based SaaS (Software as a Service) service for remote monitoring, control, and management of on-site emergencies in any industry sectors
USB (Universal Serial Bus) – Serial communication interface
Wi-Fi – Wireless local network protocol based on IEEE 802.11 standard
MTBF – Mean Time Between Failures

1.2 Symbols and key words

WARNING
WARNING indicates a potentially dangerous situation that could result in death or serious injuries.

CAUTION
CAUTION indicates a potentially dangerous situation that could result in minor injuries.

NOTICE
NOTICE indicates a potentially dangerous situation that could result in damage to property.

NOTE
NOTE indicates helpful tips and recommendations, as well as information for efficient and trouble-free operation.

1.3 Intended use

The device has been designed and built solely for the intended use described here, and may only be used accordingly. The technical specifications contained in this document must be observed.
The device may be operated only in properly installed condition.

Improper use

Any other use is considered improper. Especially to note:
– The device may not be used for medical applications.
– The device may not be used in explosive environment.
– The device may not be used in atmosphere in which there are chemically active substances.

1.4 Limitation of liability

Our company does not bear any responsibility with respect to breakdowns or damages caused by using the product in a manner other than described in the Manual or in violation of the current regulations and technical standards.

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1.5 Safety

WARNING
Ensure the mains voltage matches the voltage marked on the nameplate. Ensure the device is provided with its own power supply line and electric fuse.

WARNING
The device terminals may be under a dangerous voltage. De-energize the device before working on it. Switch on the power supply only after completing all work on the device.

NOTICE
Supply voltage may not exceed 48 VDC. Higher voltage can damage the device.
If the supply voltage is lower than 10 VDC, the device cannot operate properly but will not be damaged.

NOTICE
If the device is brought from a cold to a warm environment, condensation may form inside the device. To avoid damage to the device, keep the device in the warm environment for at least 1 hour before powering on.
The device should be mounted in a specialized cabinet access to which is limited to qualified personnel.

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2 Overview

The GW-24-Cloud network gateway is designed to connect the network devices working with the Modbus protocol over the RS485 interface to the cloud service akYtec Cloud via Wi-Fi.

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3 Specifications

3.1 Specifications

Table 3.1 Specifications

Parameter	Value
Power supply	
Power supply	24 (10…48) VDC
Power consumption, max.	6 W
Galvanic insulation	see *Section 3.2*
Network interface	
Interface	RS485
Protocols	Modbus RTU, Modbus ASCII, akYtec*
Baud rate	1200...115200 bps
Cable length, max.	1000 m
Cloud interface	
Interface	Wi-Fi 802.11 b/g/n
Operating frequency	2.4...2.5 GHz
Protocols	TCP, DNS, DHCP
Antenna	External, SMA connector
Antenna cable length, max.	3 m
Configuration interface	
Interface	USB 2.0 (Micro-USB) Wi-Fi 802.11 b/g/n
Mechanical	
Dimensions (without antenna)	55 × 96 × 58 mm
IP code	IP20
Average service life	10 years
Weight	approx. 150 g

NOTE
Only devices listed in the library can be connected via the akYtec protocol.

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3.2 Galvanic isolation

For the diagram of galvanically isolated components and galvanic isolation, see *Fig. 3.1*.

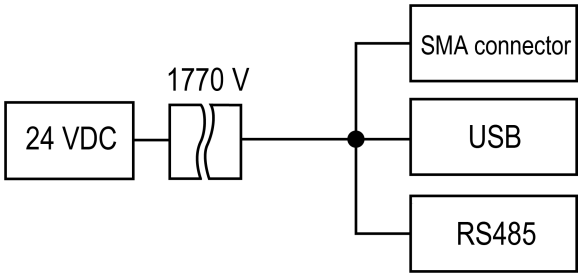


Fig. 3.1 Galvanic isolation

The test voltages shown in the figure correspond to the tests carried out under normal operating conditions with one minute exposure time.

3.3 Environmental conditions

The device is designed for natural convection cooling which should be taken into account when choosing the installation site.
The following environmental conditions must be observed:

– clean, dry and controlled environment, low dust level
– closed non-hazardous areas, free of corrosive or flammable gases

Table 3.2 Environmental conditions

Condition	Permissible range
Ambient temperature	-40…+55 °C
Transportation and storage	-25 … +55 °C
Relative humidity	10…95 % (non-condensing)
Altitude	up to 2000 m ASL
Vibration / shock resistance	conforms to IEC 61131-2
EMC emission / immunity	

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4 Startup

To start the gateway:

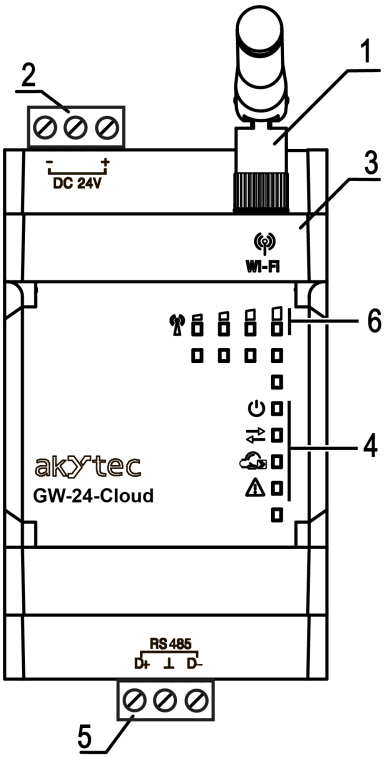
1. Mount the gateway (see *Section 6.1*).
2. Power on the gateway (see *Section 7.2*).
3. Connect the gateway to a PC over USB.
4. Set up the gateway network parameter (see *Section 8.3*).
5. Connect the gateway to the Wi-Fi network (see *Section 7.3*).
6. Power off the gateway.
7. Connect devices to the gateway (see *Section 7.4*). Ensure all devices are configured before being connected. All devices connected over RS485 must be in the Modbus Slave mode.
8. Power on the gateway and all connected devices.
9. Add the gateway and all devices connected to the gateway to akYtec Cloud (see *Section 8.4*).
10. Ensure the connection to akYtec Cloud is established checking the LEDs on the gateway front cover (see *Table 5.1*).

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5 Design and operation

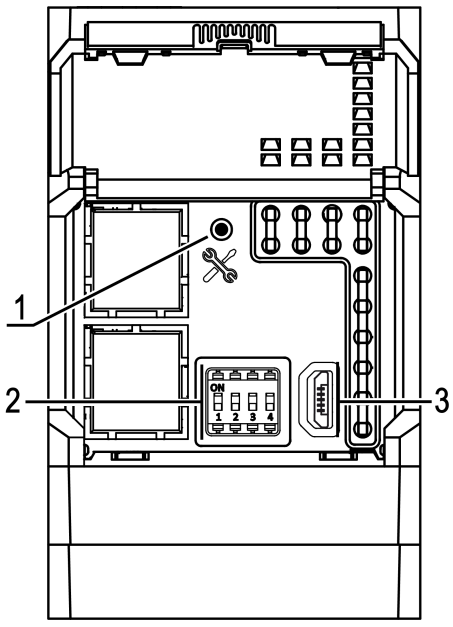
5.1 Design

The gateway is designed in a plastic case for DIN rail mounting. Main components are shown in *Fig. 5.1*.



1 – Antenna
2 – Detachable part of power terminal block
3 – Gateway case
4 – Indicators
5 – Detachable part of RS485 terminal block
6 – Wi-Fi signal indicators

Fig. 5.1 Front view



1 – Service button (to reset the gateway and restore factory settings)
2 – 4 DIP switches
3 – Micro-USB connector

Fig. 5.2 Under the front cover

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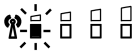
5.2 Operation

At startup the gateway connects to an internet-enabled Wi-Fi network and accesses the akYtec Cloud server. To establish Wi-Fi connection, use the unique ID marked on the gateway's case.
Once Wi-Fi connection is established, the gateway attempts to access the akYtec Cloud server. If 4 attempts are unsuccessful, the gateway reboots (see *Table 5.2*).
Once the gateway is added in akYtec Cloud (see *Section 8.4*) and connection is established, the gateway listens for incoming server commands and transmits them to the RS485 line. At the same time, the gateway listens for incoming data over the RS485 line, stores it in the data buffer, and transmits to the akYtec Cloud server.
The gateway reboots automatically every 12 hours after power-on, unless data is being transmitted at the moment.

5.3 Indication and control

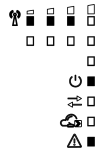
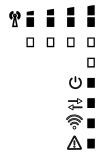
There are 8 LEDs on the front cover.

Table 5.1 LED indicators

LED	State	Description
	ON	Power is on
	Flashing	Data transfer over RS485 interface
	Flashing	Command transfer from akYtec Cloud
	OFF	No error
	ON	Error (see *Table 5.2*)
	ON (Wi-Fi 1...4)	Wi-Fi signal level
	Flashing (Wi-Fi 1)	Wi-Fi module configuration
	Flashing (Wi-Fi 1, 2)	Connection to Wi-Fi network
	Flashing (Wi-Fi 1...4)	Connection to akYtec Cloud
	ON one after the other ("ticker") (Wi-Fi 1...4)	Connection to Wi-Fi access point not configured
		Device has created own access point for configuration

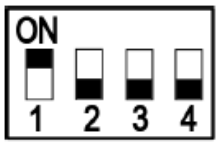
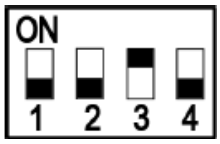
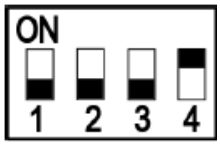
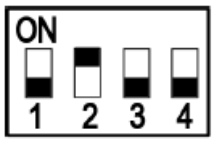
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Table 5.2 Error indication and remedy

LED	State	Description	Remedy
	ON (⚠ and Wi-Fi 1)	Wi-Fi module errors: – Module does not respond – Module responds incorrectly – Module is not powered	Contact akYtec service staff
	ON (⚠ and Wi-Fi 1, 2)	Access point connection errors: – Incorrect configuration – Access point rejects connection requests	Ensure correctness of Wi-Fi network name
			Ensure correctness of password
			Check antenna connection
	ON (⚠ and Wi-Fi 1–3)	Server connection configuration errors: – Error setting static IP address – Error setting dinamic IP address (DHCP mode)	Check network settings of the device and access point
	ON (⚠ and Wi-Fi 1–4)	Connection terminated by server	Ensure the device is added and configured in akYtec Cloud
			Contact akYtec service staff
	ON (All LEDs)	Firmware boot error	Restart the device. Repeat firmware update

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Table 5.3 DIP switches

DIP switch	Description
 DIP1 = ON	120 Ω terminating resistor is connected
 DIP3 = ON	Write commands via RS485 interface are disabled
 DIP4 = ON  DIP2 = ON	Only for akYtec service staff. The switch must be turned **off** during normal operation

NOTE
DIP switch positions are read in ascending order starting from 1.

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6 Intstallation

6.1 Mounting

The safety measures specified in *Section 1.5* must be observed during the device mounting. The device is to be mounted in enclosures, cabinets, etc. with protection of the device from dust, moisture and foreign objects.

NOTICE
Configure and program the device prior to montage and wiring.

CAUTION
Do not use the device power terminals for powering any other equipment!

To mount the gateway:

1. Ensure the sufficient space for mounting the gateway and cables.

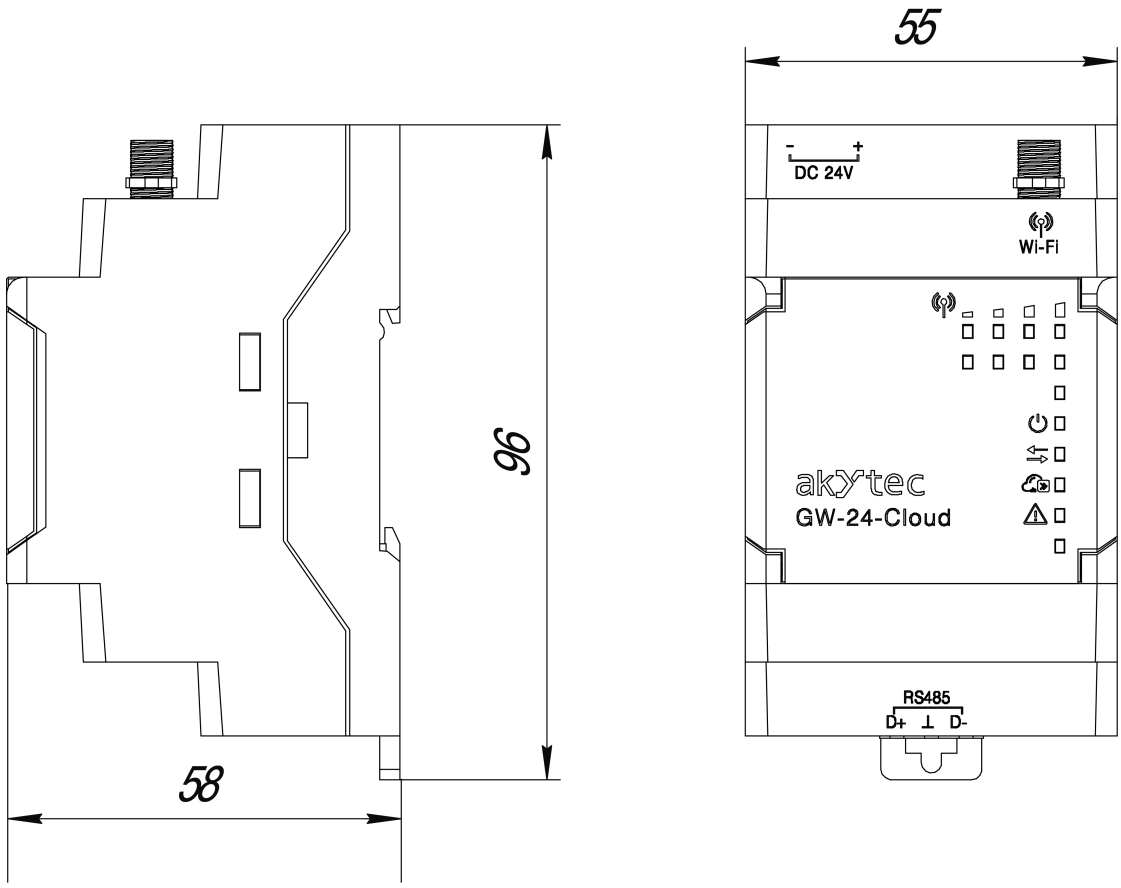


Fig. 6.1 Dimensions

2. Mount the gateway on the DIN rail.
3. Connect the provided antenna as shown below:

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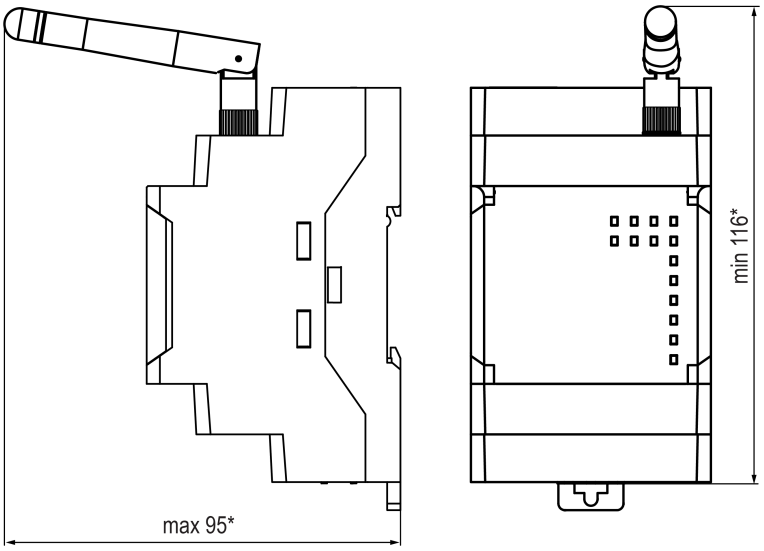


Fig. 6.2 Dimensions with the antenna connected

6.2 Quick replacement

The gateway is equipped with plug-in terminal blocks which enable quick replacement of the device without disconnecting the existing wiring.

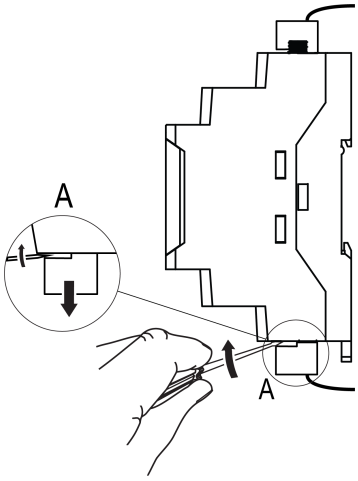


Fig. 6.3 Quick replacement

For the device quick replacement, follow the steps below:

1. Power off all connected lines including power supply.
2. Detach the antenna.
3. Using a screwdriver or a similar tool, unplug the terminal blocks with existing wiring connected (see *Fig. 6.3*).
4. Remove the device from the DIN rail and mount another gateway of the same modification (with the terminal blocks unplugged).
5. Attach the removable parts to the mounted gateway.
6. Plug the terminal blocks with existing wiring into mating connectors of the gateway installed.
7. Attach the antenna and power on the gateway.
8. In akYtec Cloud, go to the gateway settings and enter the serial number of the mounted gateway in the **New ID** field (see *Section 8.4*).

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7 Wiring

7.1 Terminal assignments

Table 7.1 Terminal assignments

Marking	Description
–	Power terminal «–», 24VDC
+	Power terminal «+», 24VDC
D+	Terminal D+ for RS485 line
⊥	Terminal to connect RS485 shield
D-	Terminal D- for RS485 line

7.2 Power connection

The following requirements must be observed when connecting the power supply:
– Do not connect more than one wire to one terminal.
– The wire cross-section must be within 0.35 – 0.75 mm². Use cable lugs in case of twisted wires.
– Do not use gateway power terminals to power on other devices.
Power the gateway from its power supply of 24 VDC. The cable length should not exceed 30 m.

CAUTION
Do not power the gateway from the distributed 24 VDC power supply line.

7.3 Wi-Fi connection

To connect the gateway to a Wi-Fi network, use a router with IEEE 802.11 support.

NOTE
To connect to the akYtec Cloud server, use the local port 25001.

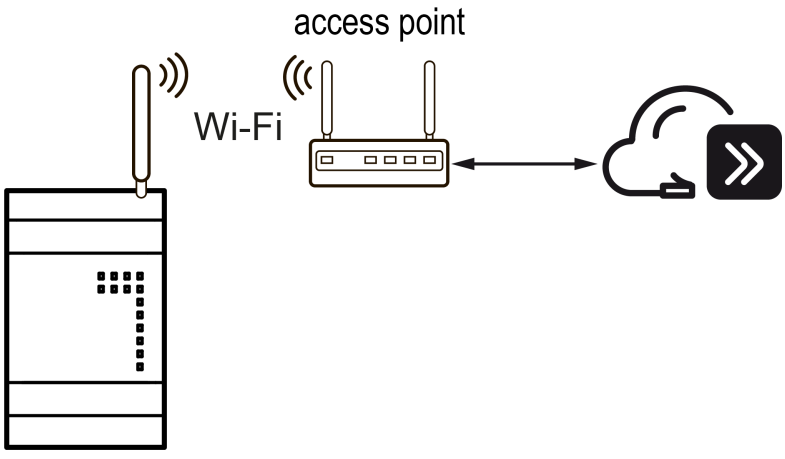


Fig. 7.1 Connection to akYtec Cloud over Wi-Fi

7.4 RS485 network

When connecting via the RS485 interface:
– Ensure all devices are configured before being connected.
– Observe the polarity: Connect line D+ to terminal D+ , line D- to terminal D- .
– Use a shielded twisted-pair cable with the wire cross section of at least 0.2 mm² and a maximum linear capacitance of 60 pF/m.

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– The total length of the RS485 line should not exceed 1000 m.
– If the RS485 line is over 10 m, use terminating resistors. The gateway has the in-built terminating resistor which can be connected with the DIP switch (see *Table 5.3*).

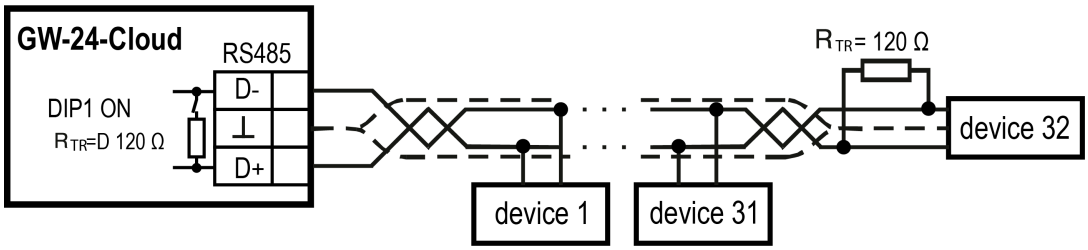


Fig. 7.2 RS485 network

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8 Configuration

You can configure the following gateway parameters (see *Section 8.3*):

- Access points:
  - Primary for connection to akYtec CIloud
  - Secondary for connection to akYtec CIloud
  - Delay before switching to the primary access point
- Using static IP address, or getting IP address from DHCP server (selected by default)
- Additional DNS server addresses
- **Safety mode** parameters (see *Section 8.5*).

You can configure the gateway using one of the followings:

- akYtec Tool Pro:
  - Over USB (recommended)
  - Over Wi-Fi
- Web interface

8.1 Connection to PC and configuration using akYtec Tool Pro

To configure the gateway:

1. Download and install *akYtec Tool Pro* on your PC.
2. Connect the gateway to the PC over USB or Wi-Fi.
3. Add the gateway to a project in akYtec Tool Pro considering the method of gateway connection to the PC.
4. Set up the network parameters (see *Section 8.3*).
5. Add the gateway and the devices connected to the gateway to akYtec Cloud (see *Section 8.4*).

8.1.1 Connection over USB

To add the gateway to a *akYtec Tool Pro* project:

1. Connect the gateway to a PC over USB.
2. Start *akYtec Tool Pro*.
3. On the **Project** tab, click the **Add devices** toolbar item. A window will appear:

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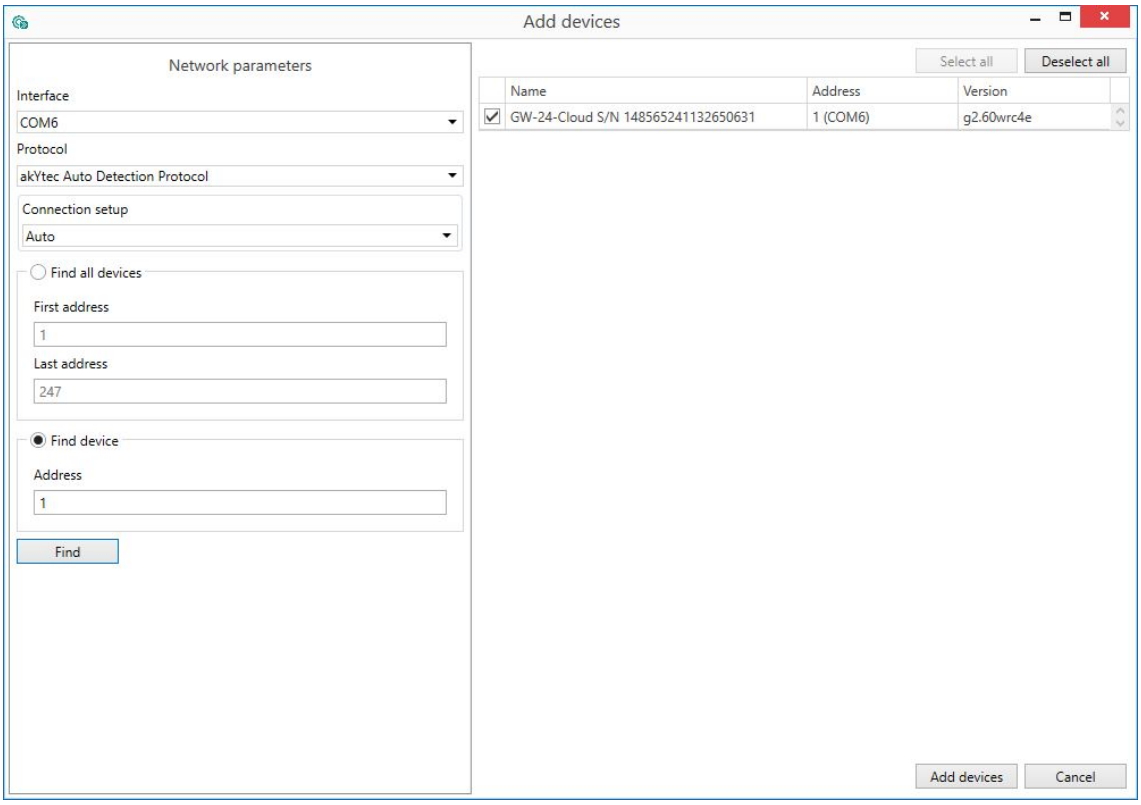


Fig. 8.1 Interface menu

– In the **Interface** field, select the COM port assigned to the gateway You can check the port number and name in Windows Device Manager.
– In the **Protocol** field, select **akYtec Auto Detection Protocol**.
– Select **Find device**.
– Enter the address of the connected device (factory setting – **1**).
– Click the **Find** button. The gateway with the address will be displayed in the field on the right.
– Select the checkbox next to the gateway and click the **Add devices** button. The device will be added to the project.

8.1.2 Connection over Wi-Fi

NOTE
Before connecting over Wi-Fi, ensure the gateway is connected to a power supply.

You can connect the gateway to a PC over Wi-Fi using:
– Gateway's access point
– External Wi-Fi network

Connection via the gateway's access point

To add the gateway connected via its own access point to a project in akYtec Tool Pro:

1. In Windows settings on the PC, go to **Network & internet** settings, select the gateway's access point and enter password **12345678**.

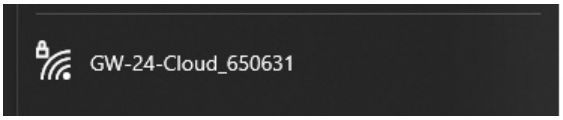


Fig. 8.2 Access point

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NOTE
The gateway's access point is named «**GW–24–Cloud_xxxxxx**», where **xxxxxx** are 6 6 last digits of the gateway's serial number.

2. Start *akYtec Tool Pro*.
3. On the **Project** tab, click the **Add devices** toolbar item. The window to select the interface and search devices will appear.
4. Select wireless network (could be "Wi-Fi", "Wireless 80211", or otherwise) from the **Interface** drop-down menu.



Fig. 8.3 Menu to select Wi-Fi interface

Set parameters:

– In the **Interface** field, select **Wi-Fi**.
– Select **Find device** and enter **IP address**. The default IP address is 192.168.1.99.

NOTE
If you do not know the IP address of the gateway, select **Find all devices** instead and enter IP address range.

– Click the **Find** button, the gateway with this address will be displayed.
– Select checkbox next to the gateway's name and click the **Add devices** button. The gateway will be added to the project.

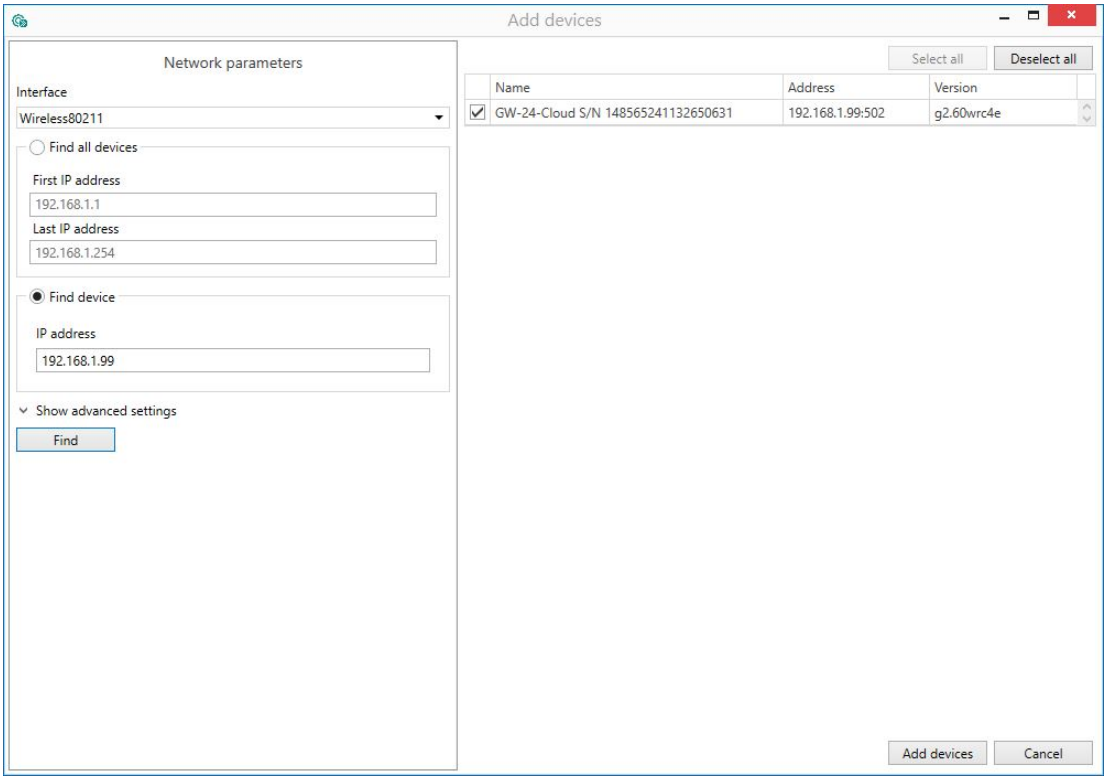


Fig. 8.4 Adding the gateway

Connection over external Wi-Fi
To connect to an external Wi-Fi:

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1. Connect the gateway to akYtec Tool Pro using its own access point or over USB (see *Section 8.1.1*).
2. In the **Network settings** menu, select the **Wi-Fi settngs** tab.

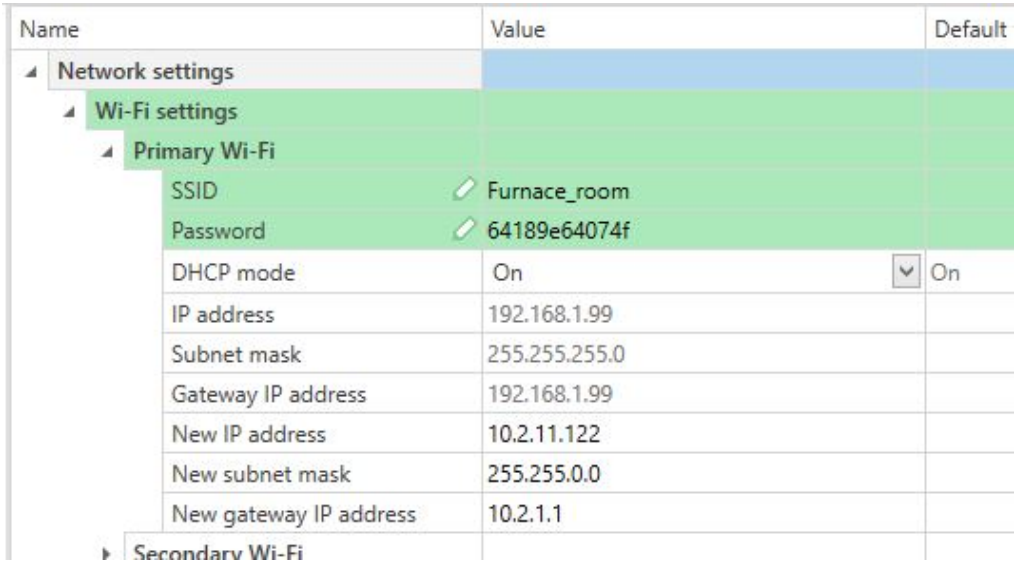


Fig. 8.5 Network settings

3. In the **SSID** field, enter the name of the access point.
4. In the **Password** field, enter the password for the access point.
5. In the **Project** menu, click **Write parameters**.

After saving the access point parameters, you can connect the gateway to your PC using the external Wi-Fi. The device and PC with akYtec Tool Pro installed must be in the same Wi-Fi network.

8.2 Configuration via web interface and viewing logs

Configuration via web interface

To configure the gateway via web interface, first connect to an access point:

– If you choose to connect to the gateway's own access point, the settings web page will probably open automatically. If it does not, enter **192.168.1.99** in the address line of your preferred browser.
– If you choose to connect to an external access point, enter the IP address of that access point in the address line of your preferred browser.

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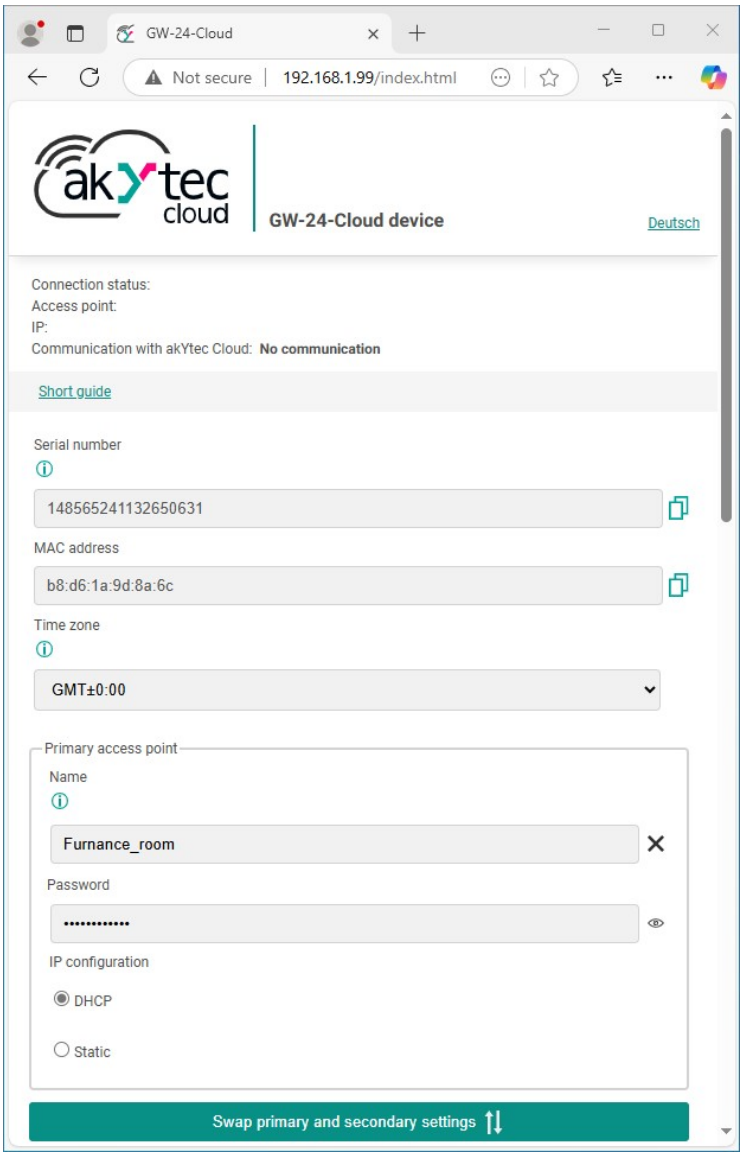


Fig. 8.6 Gateway settings

You can configure the following parameters via web interface:

– Primary access point for connection to akYtec Cloud
– Secondary access point for connection to akYtec Cloud
– Delay before switching to the primary access point
– Additional DNS server addresses (regardless of addresses provided by router)
– Name and password of the gateway's access point.

If the device you use to access the web interface does not support JavaScript or the Wi-Fi connection is slow, use the "light" web interface instead. To access the "light" web interface, follow the **Go to "light" page** hyperlink. Functionally, the "light" web interface is identical to the standard one.

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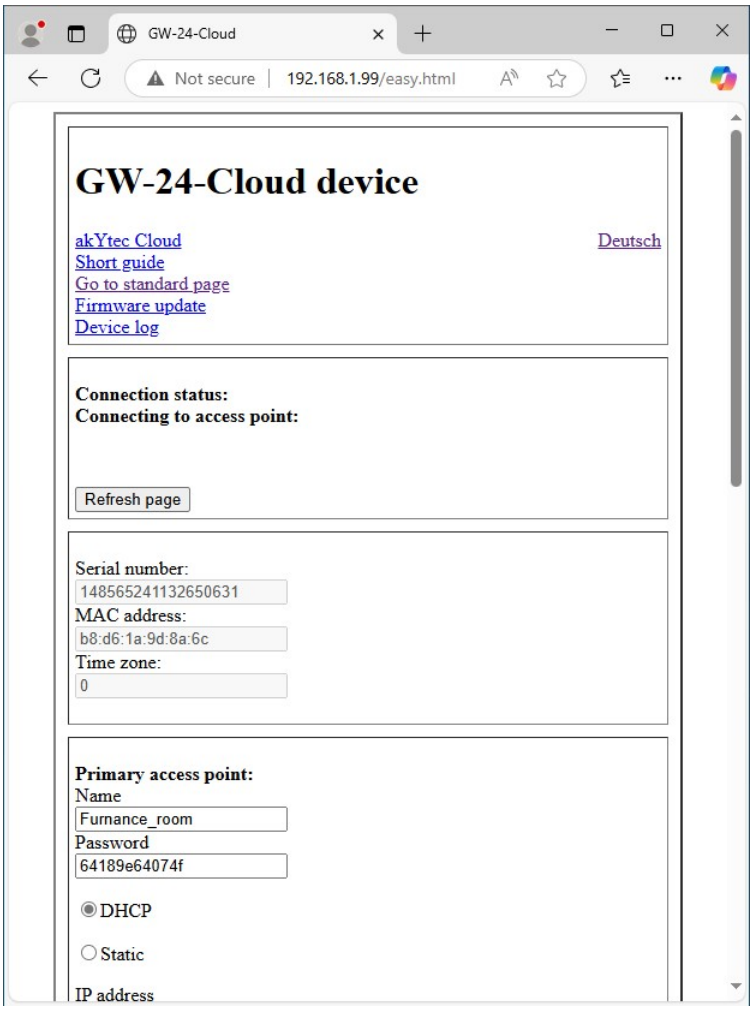


Fig. 8.7 “Light” web interface

Viewing gateway logs

Logs collect time-stamped status data for the gateway and store it in non-volatile memory.
To view the logs, follow the **Device log** hyperlink.
Each log entry is time-stamped. A time-stamped format depends on the Wi-Fi time synchronization status:

– If synchronization has been performed, a time stamp is saved in format «dd. mm. yy hh: mm: ss».
– If synchronization hasn’t been performed, a time stamp is saved in format «hh:mm:ss» (time since the Wi-Fi module booted up).

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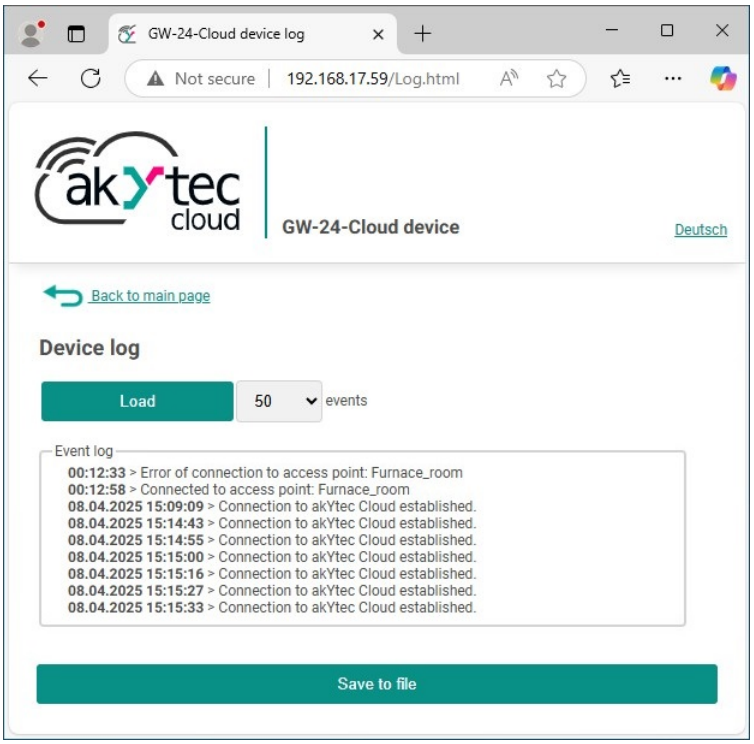


Fig. 8.8 Gateway log

Log stores up to 1000 entries.
To save the log to a text file (***.txt***), click the **Save to file** button.

8.3 Setting up network parameters

Open the gateway settings, go to the **Network settings** / **Wi-Fi settings** node and set the followings:

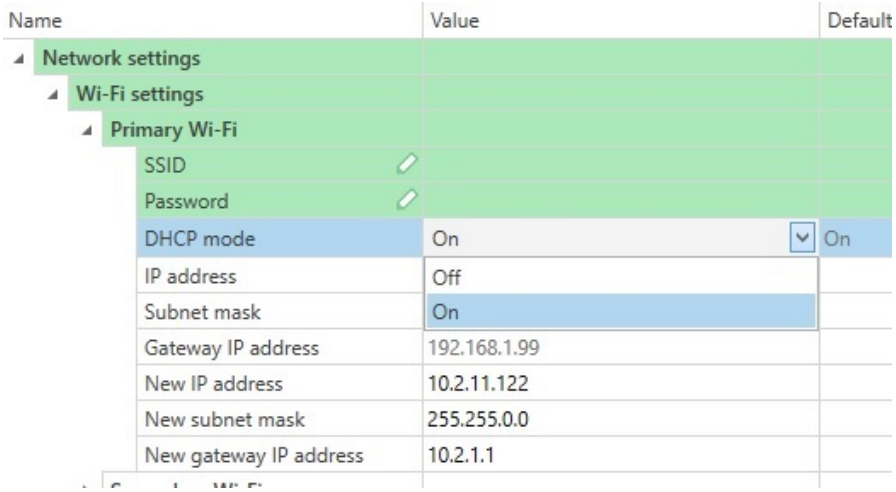


Fig. 8.9 Wi-Fi settings

Configure two access points, primary and secondary, for the gateway. When the primary access point is unavailable, the gateway switches to the secondary access point.
Enter the following parameters:

– **SSID** – Access point name
– **Password** – Access point password
– **DHCP mode** – Mode for assigning dynamic IP addresses, can be set to:

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  - OFF – Static IP address. Enter the parameters: IP address, IP address mask, gateway IP address
  - ON (default) – Dynamic IP address. Assigned by DHCP server
- **DNS servers 1, 2** – Enter IP addresses of DNS servers if needed. The default values are: 77.88.8.1 and 8.8.8.8.

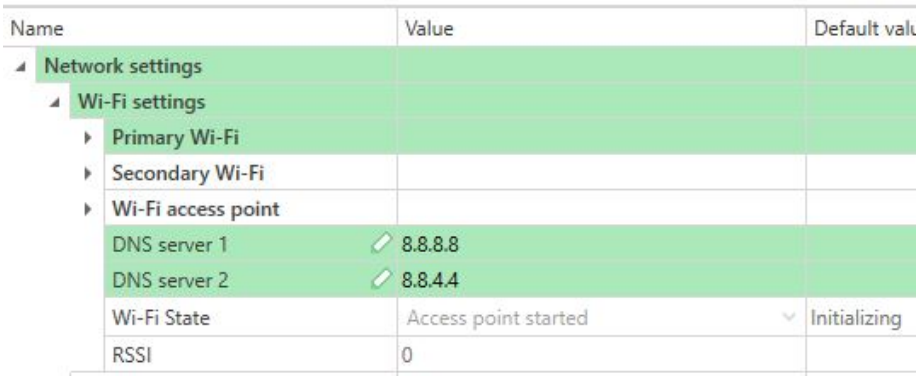


Fig. 8.10 DNS servers

You can also set the delay after which the gateway will attempt to reconnect to akYtec Cloud using the primary access point. (If you set 0, the gateway will not attempt to reconnect via the primary access point).

8.4 Adding the gateway and connected devices to akYtec Cloud

To add the gateway and connected devices to akYtec Cloud:

1. Go to website *akYtec Cloud*.
2. In the **Administrating** section, click **Add device** and specify parameters of the device connected to the gateway over the RS485 interface:
   - Type of the connected device
   - ID (gateway serial number) marked on the gateway's enclosure
   - Address of the device connected to the gateway
   - Serial number of the connected device
   - Name of the connected device to display in akYtec Cloud
   - Time zone in which the device is physically located
3. Configure RS485 settings.

   NOTE
   The gateway only supports 8-bit data exchange over the R S485 interface.

   It is recommended to set the following network parameters in the bRS485 settings of the connected device and in akYtec Cloud:
   - Address of the device connected to the gateway over RS485
   - Baud rate
   - Data bits – 8 (required)
   - Stop bits – 1 (recommended)
   - Parity – none (recommended)
   - Overall timeout – 600 (recommended)
   - Symbol timeout – 100 (recommended)
4. Review and, if necessary, correct the list of polling parameters for the connected device.

Repeat steps 2-4 for each device connected to the gateway, device addresses should be unique, other network settings should be the same. If the device was connected correctly, the data received from the device will be displayed in your akYtec Cloud account.

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The detailed description how to connect devices to akYtec Cloud is given in the *akYtec Cloud* user guide.

8.5 Restricting data exchange over akYtec Cloud

If you have devices connected to the gateway over the RS485 interface, you can restrict access to the devices over akYtec Cloud. You can set up access restrictions in akYtec Tool Pro or in web-interface.
Open the **Network settings / akYtec Cloud** node.

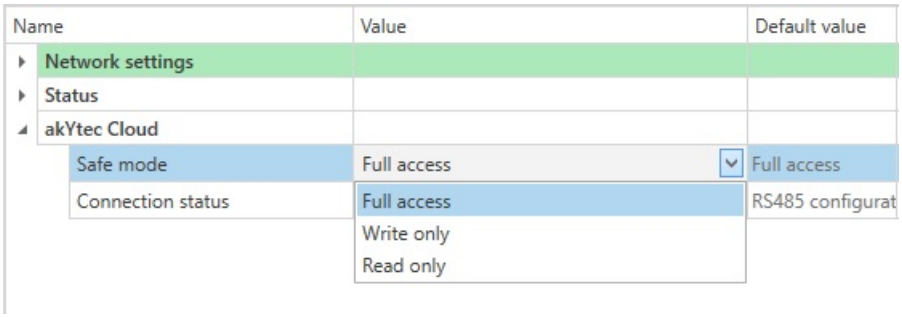


Fig. 8.11 Data exchange restriction

Select one of following:
– **Full access (default)** – Write and read commands are enabled
– **Write only** – Only write commands are enabled
– **Read only** – Only read commands are enabled

8.6 Firmware update

You can update firmware using any of these methods:
– akYtec Tool Pro
– Web-interface

8.6.1 Firmware update using akYtec Tool Pro

To update firmware using *akYtec Tool Pro:*

1. Connect the gateway to a PC (see *Section 8.1*).
2. Click  in the context menu of the device or on the control panel.
3. Select a firmware update file (.fw). Wait for the file is uploaded in the gateway and firmware update is complete (during update, signal level LEDs indicate update progress).

8.6.2 Firmware update using Web interface

To update firmware using web interface:

1. Open the gateway's web interface page in your browser (see *Section 8.2*).
2. Go to the **Firmware update** page.
3. Select a firmware update file (.fw). Wait for the file is uploaded in the gateway and firmware update is complete (during update, signal level LEDs indicate update progress).

8.7 Factory settings restoration

To restore the factory settings:

1. Open the front cover.
2. Press and hold the service button for at least 12 s.

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After powering on the gateway will work with default settings.
You can also restore the factory setting in web-interface by clicking **Reset settings**.

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9 Maintenance

The safety requirements (see *Section 1.5*) must be observed when the maintenance is carried out.

WARNING
Cut off all power before maintenance.

The maintenance includes:

– Cleaning of the housing and terminal blocks from dust, dirt and derbis
– Checking the device fastening
– Checking the wiring (connecting wires, terminal connections, absence of mechanical damages)

NOTICE
The device should be cleaned with a dry or slightly damp cloth only. No abrasives or solvent-containing cleaners may be used.

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10 Transportation and storage

Pack the device in such a way as to protect it reliably against impact for storage and transportation. The original packaging provides optimum protection.
If the device is not taken immediately after delivery into operation, it must be carefully stored at a protected location. The device should not be stored in an atmosphere with chemically active substances.
The environmental conditions must be taken into account during transportation and storage.

NOTICE
The device may have been damaged during transportation.
Check the device for transport damage and completeness!
Report the transport damage immediately to the shipper and akYtec GmbH!

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11 Scope of delivery

– GW-24–Cloud network gateway	1 pc.
– Short guide	1 pc.
– 2EGTK-5-03P-11 terminal block	2 pc.
– External antenna with SMA connector	1 pc.

NOTICE
The manufacturer reserves the right to make changes to the scope of delivery.

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