

GG–24–Cloud

Network gateway

User guide

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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1 Introduction

This manual describes the functions, configuration, operating instructions and troubleshooting of the GG-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

APN (Access Point Name) – packet data network ID
PC – personal computer
DNS (Domain Name System) – distributed service that provides a naming system for network domains
akYtec Cloud – cloud-based SaaS (Software as a Service) service for remote monitoring, control, and management of on-site emergencies in any industry sectors
GPRS (General Packet Radio Service) – mobile data transmission standard using packet data over radio channels
GSM (Global System for Mobile Communications) – general mobile network standard
SIM card (Subscriber Identification Module) – ID module of a mobile network subscriber
SMS (Short Message Service)– service for delivering brief text messages over mobile networks
TCP (Transmission Control Protocol) – TCP/IP stack transport level protocol

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 GG-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 GPRS.

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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 isolation	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	GSM / 2G
GSM frequency bands	GSM-850, E-GSM-900, DCS-1800, PCS-1900
Output power class	– 4 for GSM-850, E-GSM-900 – 1 for DCS-1800, PCS-1900
SMS	MT, MO, CB, Text, PDU mode. Storage SMS on SIM card
Antenna	External, SMA connector
Interface	GSM
Antenna cable length, max.	3 m
SIM card	
Standard	SIM, USIM
Format / Quantity	Micro SIM /1 pcs
Voltage	1.8V / 3V
Cellular subscription	2G support, internet access
Mechanical	
Dimensions (without antenna)	55 × 106 × 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

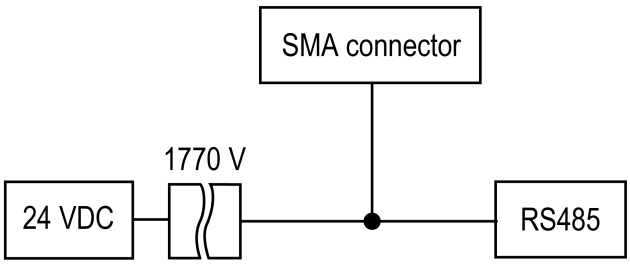


Fig. 3.1 Galvanic isolation

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 environment 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 to 95% (non-condensing)
Altitude	up to 2000 m above sea level
EMC emission / immunity	conforms to IEC 61131-2
Vibration / shock resistance	

NOTE
The operating temperature range of the SIM card must correspond to the operating conditions of the device.

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4 Startup

To start the gateway:

1. Install a SIM card (see *Section 7.3*).
2. Mount the gateway (see *Section 5.3*).
3. Configure APN settings for the SIM card, if needed (see *Section 8.1*).
4. 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.
5. Add the gateway and all devices connected to the gateway to akYtec Cloud (see *Section 8.2*).
6. Power on the gateway and all connected devices.
7. Ensure the connection to akYtec Cloud is established checking the LEDs on the gateway front cover (see *Table 5.1*).

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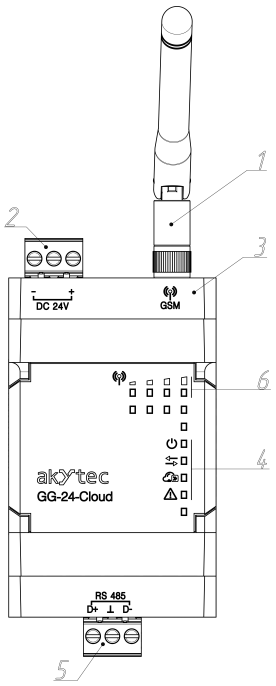
5 Operation and design

5.1 Operation

At startup the gateway establishes the GPRS connection through the user-specified (see *Section 8.1*) or default access point (APN).
Once connection is established, the gateway connects to the akYtec Cloud server using its domain name or IP address. If connection attempt is unsuccessful, the gateway reboots (see *Table 5.3*).
Once the gateway is added to akYtec Cloud (see *Section 8.2*) and the 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 temporary memory (a buffer), and transmits to the akYtec Cloud server.
The gateway reboots automatically if cellular network connection is not available for 10 minutes.

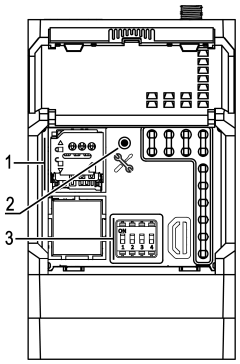
5.2 Design

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 enclosure
4 — Gateway state indicators
5 — Detachable part of RS485 terminal block
6 — Indicators which display signal level during operation, connection to the Internet and akYtec Cloud at startup, error codes (+⚠) at emergency

Fig. 5.1 Front view



1 — SIM card slot
2 — Service button (to reset the gateway and restore factory settings)
3 — 4 DIP switches

Fig. 5.2 Under the front cover

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5.3 Indication and control

There are 8 LEDs on the front cover:
– 4 LEDs display status of connection to cellular network and akYtec Cloud
– 4 LEDs display gateway status.

Table 5.1 LED indicators

LED	State	Description
	ON (GSM 1...4)	GSM signal level
	flashing	Establishing connection to the Internet and akYtec Cloud
	ON	Power is on
	flashing	Data transfer over RS485 interface
	flashing	Command transfer from akYtec Cloud
	ON	Internet and akYtec Cloud connection error (see *Table 5.3*)
	OFF	No error

Table 5.2 Startup steps indication

LED	State	Description
	flashing (GSM 1)	Configuration
	flashing (GSM 1, 2)	Establishing connection to GSM network
	flashing (GSM 1...3)	GPRS activation
	flashing (GSM 1...4)	Establishing connection to the akYtec Cloud

Table 5.3 Error indication and remedy

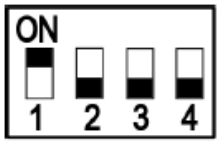
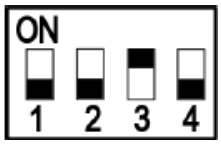
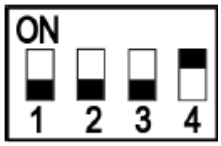
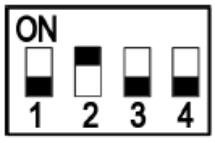
LED	State	Description	Remedy
	ON (⚠ and GSM **1**)	GSM module errors:	
		- module does not respond - module responds incorrectly - module is not powered	Contact akYtec service staff
	ON (⚠ and GSM **1, 2**)	SIM card or cellular network errors:	
		- no SIM card detected	Ensure SIM card is installed correctly
		- no network signal detected	Ensure GSM signal is available and antenna is connected
		- SIM card is PIN-locked	Disable PIN code check

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LED	State	Description	Remedy
	ON (⚠ and GSM **1 — 3**)	GPRS errors:	
		GPRS access blocked	Check SIM card balance. Check whether you have been granted access to GPRS / 2G.
		Cannot connect to GPRS network (invalid APN settings)	Get GPRS settings from your ISP (see. *Section 8.1*)
	ON (⚠ and GSM **1 — 4**)	Connection terminated by server	Check whether the gateway has been added and configured in akYtec Cloud. Check whether the GG–24–Cloud ID is set as device ID in akYtec Cloud. Check if there is at least one added parameter for sampling in the device.

NOTE
DIP switch positions are read in ascending order starting from 1. When the DIP switch is turned on/off, the gateway must be rebooted to apply the settings.

Table 5.4 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

Service button 🔧 usage:

1. To restart the device, press the service button 🔧 shortly.
2. To reset the device to the factory settings, press and hold the service button 🔧 or at least 12 s (see *Section 8.3*).

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6 Installation

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. Install a SIM card into its slot (see *Section 7.3*).
2. Ensure the sufficient space for mounting the gateway and accompanying cables.
3. Attach the antenna.
4. Mount the gateway on the DIN rail using a clip.

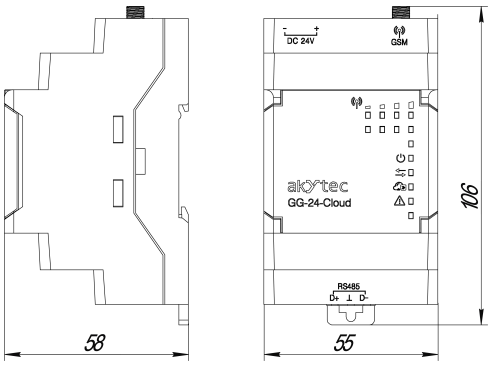


Fig. 6.1 Dimensions

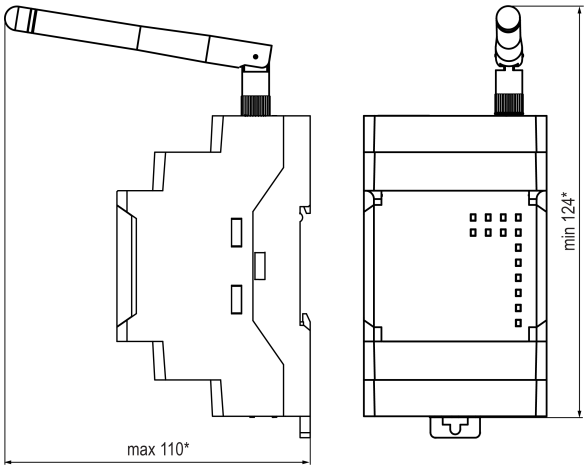


Fig. 6.2 Dimensions with antenna attached

The antennas compatible with the device are listed at *site*.

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.

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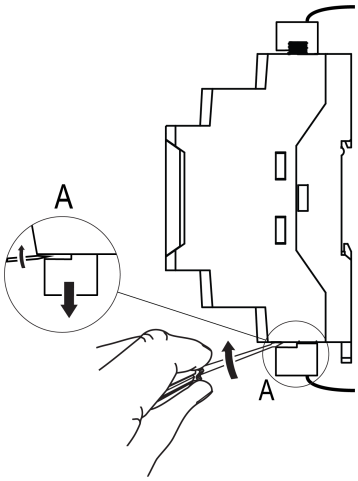


Fig. 6.3 Quick replacement

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 the gateway on.
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 8.2*) and click the **Save** button.

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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 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 SIM card installation

CAUTION
Before installing the SIM card:

– Disable PIN code check on start. To do this, install the SIM card in any cellular phone and disable PIN code check as described in the phone's user guide.
– Configure APN settings, if needed (see *Section 8.1*).
– It is recommended to register the SIM card in your account on your mobile provider's website. You can easily check the account balance and manage your mobile services online.

To install SIM card in the gateway:

1. Power off the gateway.
2. Open the front cover (see *Fig. 7.1*, 1).

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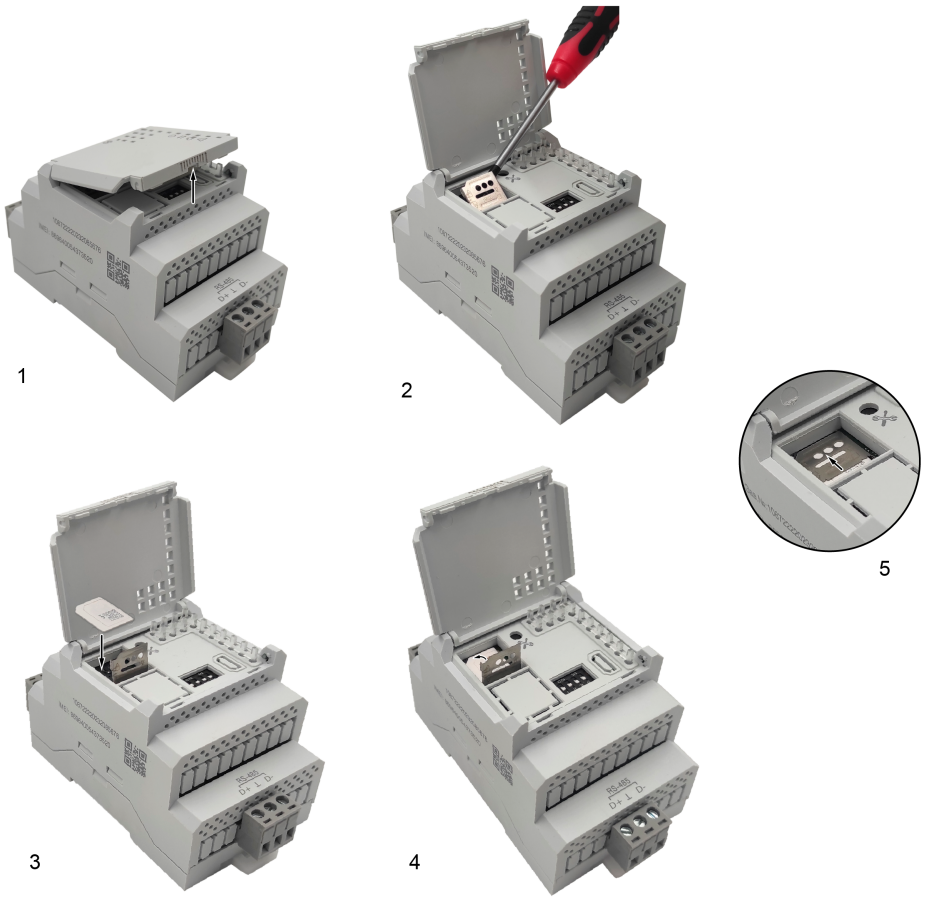


Fig. 7.1 SIM card installation

3. Push the SIM card holder in the direction marked by arrow ▽ (see *Fig. 7.1*, 2). Lift the holder.
4. Insert the SIM card into the tray with the contacts facing down and the corner cut mark away from you (see *Fig. 7.1*, 3).
5. Lower the holder (see *Fig. 7.1*, 4).
6. Push the holder in to secure the SIM card (see *Fig. 7.1*, 5).
7. Close the front cover.

7.4 RS485 network

When connecting over 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.
– 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 5.4*).

The diagram how to connect the gateway to the device over RS485 interface is given the figure below.

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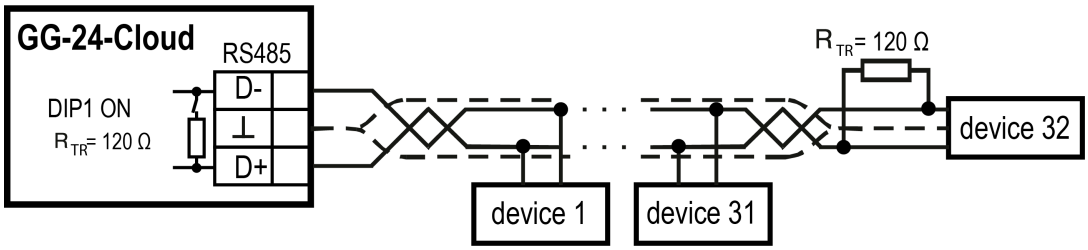


Fig. 7.2 RS485 network

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8 Configuration

8.1 APN configuration

The default APN access point settings are compatible with most cellular service providers. Do not change the default settings until necessary.
Make sure your cellular subscription plan supports:

– Data exchange over 2G
– Connectivity to smart devices.

The default APN access point settings are:

$$A = internet; U =; P =;$$

To modify the default settings:

1. Send SMS with the following text to the SIM card's number:

   $$A = ; U = yyy; P = zzz$$

   where **A** — access point name (APN) depending on the cellular service provider; **U** — user name; **P** — password (APN).

   NOTE
   – The device can receive settings from only one SMS.
   – Do not use too long login and/or password, it may cause SMS to split during transmission and cause misconfiguration.
   – SMS can contain only Latin alphabet letters and digits and must not contain spaces.
   – It is allowed to send only part of the settings, for example: "A=internet;".

2. When the SMS is received successfully, the device will apply the new settings and restart.

8.2 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, select **Add device** and specify parameters of the device connected to the gateway over the RS485 interface:
   – Type of the connected device;
   – Gateway ID (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 equipment 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 theR S485 interface.

   It is recommended to set the following network parameters in RS485 settings of the connected device and in akYtec Cloud:
   – Address of the device connected to the gateway over RS485
   – Baud rate
   – Bitness — 8 (required)
   – Number of stop bits — 1 (recommended)
   – Parity — none (recommended)
   – Entire message timeout — 600 (recommended)
   – Timeout between characters — 100 (recommended).
4. Review and, if necessary, correct the list of sampling parameters for the connected device.

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

8.3 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.
3. Power off and then power on the gateway.

The gateway settings and RS485 port settings will be reset to default factory 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

— GG-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.

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

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