

# AirChain485 Config Tool

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## User Manual

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## 1. Introduction

### 1.1 What is the AirChain485 Config Tool?

The AirChain485 Config Tool is a Windows desktop application that configures and monitors the AirChain485 Industrial 4G Gateway — an RS485-to-cloud bridge used to poll Modbus meters and publish their data to an MQTT broker.

With this tool you can:

- Connect to a gateway directly over TCP (IP address mode).
- Connect through the cloud using a saved or new Device ID.
- Configure network (LAN) settings such as static IP, subnet and gateway.
- Configure the Wi-Fi connection, Bluetooth name/PIN, and SIM/APN settings.
- Configure the cloud connection: MQTT server, port, user, password and all six MQTT topics.
- Set the RS485 baudrate for Port 1 and Port 2.
- Add, modify and delete Modbus polling devices (rs485add / rs485mod/rs485del).
- Start, stop and restart the gateway's RS485 data service.
- Write to single or multiple Modbus holding registers.
- View live RS485 terminal logs for diagnosis.

### 1.2 Starting the Application

Launch AirChain485\_Pro.exe .

The Choose Device screen opens first — this is the entry point for all sessions.

## 2. Connectivity

### 2.1 Connection Modes

The tool supports two ways to reach a gateway:

| Mode | How it works                                                                                           | When to use                                               |
|------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| TCP  | You enter the gateway's IP address. The tool opens a direct TCP socket to the gateway on port 8881 and | The gateway is on your local network and you know its IP. |

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|      |                                                                                                                 |                                                                  |
|------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|      | exchanges plain-text commands.                                                                                  |                                                                  |
| MQTT | You select or enter a Device ID. The tool reaches the gateway through the cloud broker, using the topics below. | The gateway is remote (4G/cloud) or you only know its Device ID. |

The mode is chosen on the Choose Device screen. The two modes are independent; the tool keeps separate device lists and status indicators for each.

### 2.2 TCP Ports Used

| Port | Protocol | Purpose                                                                             | Used by                                                                 |
|------|----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 8881 | TCP      | Gateway configuration — GETALL, SET, SAVE, REBOOT, GET rs485list, rs485add/mod/del  | Network, Settings, Baudrate, Devices pages; auto-connected on page load |
| 8880 | TCP      | Live RS485 terminal / register log stream ([RS485] OK, [RS485] DATA, [0x...] lines) | System → Logs (TCP mode)                                                |
| 1883 | TCP      | MQTT broker, used by the desktop app for cloud mode and cloud diagnostics           | MQTT mode, "Send to Cloud" panel                                        |

Each page that needs a TCP connection opens the port it requires automatically, and disconnects again when you leave the page. Because the connection is port-specific, switching pages may briefly disconnect and reconnect.

### 2.3 MQTT Broker and Topics (Cloud Mode)

In MQTT mode the desktop app connects to the IONICKS broker:

Broker: `iot.ionicks.cloud`

Port: 1883

Topic root: `AirChain485/<deviceid>/...`

The topics used by the tool are:

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| Topic                            | Direction         | Content                                               |
|----------------------------------|-------------------|-------------------------------------------------------|
| AirChain485/<deviceId>/config    | Desktop → gateway | Configuration commands (e.g. rs485add ..., SAVE)      |
| AirChain485/<deviceId>/response  | Gateway → desktop | Command replies, OK: saved to flash, device list data |
| AirChain485/<deviceId>/pub/port1 | Gateway → desktop | Live data published for RS485 Port 1                  |
| AirChain485/<deviceId>/pub/port2 | Gateway → desktop | Live data published for RS485 Port 2                  |
| AirChain485/<topic>/sub          | Desktop → gateway | Structured register-write requests (JSON)             |

Notes:

- The six topics shown on the Cloud → Topics page (port1Topic, port2Topic, errorTopic, configTopic, responseTopic, offlineTopic) are the topics stored in the gateway and published by the gateway's own MQTT client. They are independent of the desktop app's own subscriptions.
- The desktop app subscribes to pub/port1, pub/port2 and response for the selected Device ID to display logs and device lists.

### 2.4 Saved Device IDs

Device IDs you enter in MQTT mode are stored and can be re-selected from the "Select Device ID" drop-down on the next session.

## 3. Choose Device Screen

The Choose Device screen is the first screen shown when the application starts. It lets you select how to reach the gateway and connect to it.

### 3.1 Selecting the Connection Mode

Two radio buttons at the top switch between the modes:

| Option        | Effect                                                                       |
|---------------|------------------------------------------------------------------------------|
| TCP (default) | Enter the gateway's IP address and connect directly to port 8881.            |
| MQTT          | Select a saved Device ID or enter a new one, then connect through the cloud. |

### 3.2 TCP Mode — "Enter Device IP Address"

IP field — enter the gateway's IPv4 address (example placeholder: 192.168.1.101). The field is pre-filled with the default IP.

Connect — validates the address and opens the connection.

Behavior:

- While connecting, the screen shows a spinner with "Connecting to <IP> ...".
- If no address is entered, the button does nothing and the field border turns red.
- If the address is not a valid IPv4 address, the message "Please enter a valid IP address" appears in red.
- If the gateway cannot be reached within 10 seconds, the connection is aborted and the message "Connection timed out. Could not reach <IP> within 10 seconds." is shown.
- If the socket reports an error, the error text is shown in red below the field and cleared when you edit the address again.
- On success the tool switches to the "Gateway - Network" page and the TCP side menu appears. (Note: the tool connects to the exact address typed; the example address 192.168.1.101 is only a hint.)

### 3.3 MQTT Mode — "Select/Enter Device ID"

Selecting the MQTT radio shows two additional controls:

Select from Saved Devices — a drop-down listing Device IDs stored from previous sessions (placeholder text: "Select Device ID"). Choosing one fills the Device ID.

Enter New Device — a text field where you can type a new Device ID.

Press Connect to continue. The new Device ID is saved for future sessions, and the tool opens the Devices - Add Device page with the MQTT side menu.

The app also starts subscribing to the device's pub/port1, pub/port2 and response topics so logs and device lists can be displayed.

### 3.4 What Happens After Connecting

| Mode | Page that opens      | Menu shown                                      |
|------|----------------------|-------------------------------------------------|
| TCP  | Gateway - Network    | TCP side menu (Network, Cloud, Devices, System) |
| MQTT | Devices - Add Device | MQTT side menu                                  |

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|  |  |                                               |
|--|--|-----------------------------------------------|
|  |  | (Start/Stop, Devices, Write Parameters, Logs) |
|--|--|-----------------------------------------------|

Use Choose Device in the side menu at any time to return to this screen and connect to a different gateway. Returning here closes the current connection.

## 4. Navigation

After connecting to a gateway, a side menu appears on the left and the header bar at the top shows the current page title. Clicking a menu item swaps the content area to the corresponding page.

### 4.1 TCP Side Menu (direct IP mode)

Shown after a successful TCP connection.

| Menu item           | Page title                   | Page loaded                          |
|---------------------|------------------------------|--------------------------------------|
| Choose Device       | Choose Device                | Returns to the connection screen     |
| — GATEWAY (section) | —                            | —                                    |
| Network             | Gateway - Network            | LAN static IP configuration          |
| Cloud               | Gateway - Cloud              | MQTT cloud settings and topics       |
| — DEVICES (section) | —                            | —                                    |
| Add Device          | Devices - Add Device         | Add a Modbus polling device          |
| Device List         | Devices - Device List        | List / edit / delete devices         |
| Baudrate            | Devices - Device Baudrate    | RS485 baudrate for Port 1 and Port 2 |
| — SYSTEM (section)  | —                            | —                                    |
| Settings            | Wi-Fi/Bluetooth/SIM Settings | Wi-Fi, Bluetooth and SIM settings    |
| Logs                | System - Logs                | Live RS485 terminal log (port 8880)  |

At the bottom of the menu:

Device IP — the address of the connected gateway (green).

Status — Connected (green) or Not Connected (orange), based on the live TCP connection to port 8881.

Reboot (red button) — asks for confirmation ("Are you sure you want to reboot the device?" with Yes / No), then sends the REBOOT command. Reboot is useful after changing settings.

### 4.2 MQTT Side Menu (cloud / Device ID mode)

Shown after connecting with a Device ID in MQTT mode.

| Menu item                    | Page title                    | Page loaded                                   |
|------------------------------|-------------------------------|-----------------------------------------------|
| Choose Device                | Choose Device                 | Returns to the connection screen              |
| — START/STOP (section)       | —                             | —                                             |
| Start/Stop                   | Device - Start/Stop           | Start, stop or restart the RS485 data service |
| — DEVICES (section)          | —                             | —                                             |
| Add Device                   | Devices - Add Device          | Add a Modbus polling device (via cloud)       |
| Device List                  | Devices - Device List         | List / edit / delete devices (via cloud)      |
| — WRITE PARAMETERS (section) | —                             | —                                             |
| Single Register              | Registers - Single Register   | Write one Modbus register                     |
| Multiple Register            | Registers - Multiple Register | Write several consecutive registers           |
| — SYSTEM (section)           | —                             | —                                             |
| Logs                         | System - Logs                 | MQTT event log                                |

At the bottom of the menu:

Device ID — the connected Device ID (green).

Status — Connected / Not Connected, based on the desktop app's MQTT connection to the broker.

There is no Reboot button in MQTT mode. To restart a device reached by Device ID, use Start/Stop → RESTART.

### 4.3 Page Titles and Highlighting

The header bar shows the current page title (e.g. "Gateway - Network").

The active menu item is highlighted in teal.

Each page manages its own TCP connection: pages that need configuration (port 8881) connect automatically when they open and disconnect when you leave them. The Logs page uses port 8880.

## 5. Gateway Pages (TCP Mode)

This page configures the gateway's wired LAN network settings. It communicates with the gateway on TCP port 8881. When the page opens, the current network settings are loaded automatically. After saving, the page reloads the settings to confirm the changes.

### 5.1 Network — "LAN Static IP Configuration"

Configures the gateway's wired LAN address. Reachable via GATEWAY → Network.

| Field           | Placeholder   | Meaning                                    |
|-----------------|---------------|--------------------------------------------|
| Static IP       | 192.168.1.100 | Fixed IP address of the gateway on the LAN |
| Subnet Mask     | 255.255.255.0 | Subnet mask                                |
| Default Gateway | 192.168.1.1   | Router / default gateway address           |

Validation:

- All fields are loaded automatically when the page opens.
- Click Save to write the network settings.
- If any required field is empty, the message "Please enter all values" is displayed.
- If an invalid IPv4 address is entered, the message "Please enter valid IP addresses" is displayed. The corresponding field also shows one of the following: "Invalid IP Address", "Invalid Subnet Mask", "Invalid Gateway Address".

Save Messages:

- While saving, a spinner and "Saving Network Settings..." are shown.
- On success: "Network settings saved successfully" (green).
- On failure: "Failed to save Network settings" (red).

- **WARNING:** Changing the network address applies after a reboot. If you change the static IP, the gateway may become unreachable at the old address. Write down the new address before saving.

### 5.2 Settings — Wi-Fi / Bluetooth / SIM

Reachable via SYSTEM → Settings.

The Settings page contains three tabs: Wi-Fi (default), Bluetooth, SIM.

Select a tab using the radio buttons. Each tab provides Save and Clear buttons. If any required field is left empty, the message "Enter all values" is displayed in red.

Wi-Fi tab

| Field    | Placeholder          | Notes                                                |
|----------|----------------------|------------------------------------------------------|
| SSID     | Enter Wi-Fi SSID     | Wi-Fi network name                                   |
| Password | Enter Wi-Fi Password | Hidden by default; select Show Password to reveal it |

Save sequence: SET wifiSSID ... → SET wifiPass ... → SAVE.

Messages: "Saving Wi-Fi Settings...", "Wi-Fi settings saved successfully" (green), "Failed to save Wi-Fi settings" (red).

- Bluetooth tab

| Field | Placeholder          |
|-------|----------------------|
| Name  | Enter Bluetooth Name |
| Pin   | Enter Bluetooth Pin  |

Save sequence: SET bleName ... → SET blePin ... → SAVE.

Messages: "Saving Bluetooth Settings...", "Bluetooth settings saved successfully" (green), "Failed to save Bluetooth settings" (red).

- Sim tab

| Field     | Options / placeholder |
|-----------|-----------------------|
| SIM Slot  | 1 (SIM1) or 2 (SIM2)  |
| Sim 1 APN | Enter SIM-1 APN       |
| SIM 2 APN | Enter SIM-2 APN       |

Save sequence: SET simSlot ... → SET apnSim1 ... → SET apnSim2 ... → SAVE.

Messages: "Saving SIM Settings...", "SIM settings saved successfully" (green), "Failed to save SIM settings" (red).

### 5.3 Baudrate — RS485 Ports

Open DEVICES → BaudRate.

This page configures the baud rate for the gateway's two RS485 communication ports. The current settings are loaded automatically when the page opens.

| Field           | Options                                                       |
|-----------------|---------------------------------------------------------------|
| Port 1 Baudrate | 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 |
| Port 2 Baudrate | same list                                                     |

Behavior:

- The current baud rate for both ports is loaded automatically when the page opens.
- Click Clear to reset both baud rates to 9600.
- Click Save to save the baud rate for both ports.
- If either baud rate is not selected, the message "Select all values" is displayed.

Save sequence: SET rs485\_1\_baud ... → SET rs485\_2\_baud ... → SAVE

- A 2-second delay is applied between each command.

Messages: "Saving Baudrate Settings...", "Baudrate settings saved successfully" (green), "Failed to save Baudrate settings" (red).

### 5.4 Add Device — "Modbus Devices"

Open DEVICES → Add Device

This page registers a Modbus device with the gateway. Once added, the gateway polls the device automatically at the configured interval.

| Field | Placeholder / options | Notes                      |
|-------|-----------------------|----------------------------|
| Port  | Port 1 / Port 2       | Which RS485 port the meter |

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|                   |                               |                                                     |
|-------------------|-------------------------------|-----------------------------------------------------|
|                   |                               | is on                                               |
| CRC (Auto/Manual) | 1 (Auto CRC) / 0 (Manual CRC) | Auto CRC is the default                             |
| Hex Command       | e.g. 02 04 00 00 00 67        | Modbus request as hex bytes (spaces optional)       |
| Seconds           | seconds                       | Polling interval; must be between 5 and 300 seconds |
| Name              | Device name                   | A friendly name for the meter                       |

Click Add Device to register the device.

Validation:

- "Enter all values" — One or more required fields are empty.
- "Seconds should be between 5 and 300"
- "Hex command must contain only hex digits (0-9, A-F)"

Save sequence: rs485add <port>,<crc>,<seconds>,<hex>,<name> → SAVE

- Messages : "Device Added", "<Device Name> has been added successfully".

After the device is added: Click Done to open the Device List. Click Close to remain on the current page.

### 5.5 Device List — "Available RS485 Devices"

Open DEVICES → Device List.

This page displays all configured RS485 devices and their communication settings. The header displays the total number of configured devices.

The table includes the following columns: Device Name, Port, Auto CRC, Poll Seconds, Hex Command, Edit, Delete.

Behavior:

- While the device list is loading, "Waiting for RS485 device list..." is displayed.
- If no devices are configured, "No Devices Found" is displayed.

Edit Device:

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Click Edit to open the Modify RS485 Device page. The existing device settings are loaded automatically. After making the required changes, click Save Changes. The gateway updates the device using: (rs485mod ... → SAVE.)

On success, the message "Device Modified" is displayed. Click Back to return to the device list without saving.

Delete Device:

Click Delete to open the confirmation dialog. As a safety measure, type DELETE (in uppercase) to enable the Delete button. The gateway removes the device using: (rs485del ... → SAVE.)

On success, the message "<Device Name> has been deleted successfully." is displayed. Click Cancel to close the dialog without deleting.

After every edit or delete operation, the device list is refreshed automatically.

### 5.5 Cloud Settings & Topics — "Cloud Settings"

Open GATEWAY → Cloud.

This page is also available when connecting to a gateway using its Device ID.

The page contains two tabs: Cloud Settings (default), Topics.

Cloud Settings tab:

This tab configures the MQTT broker that the gateway connects to.

| Field    | Placeholder    | Notes                                |
|----------|----------------|--------------------------------------|
| Server   | Enter Server   | MQTT broker host                     |
| Port     | Enter Port     | Broker port, 1 – 65535               |
| User     | Enter User     | MQTT username                        |
| Password | Enter Password | Hidden; tick Show Password to reveal |

Validation:

- If any required field is empty, the message "Enter all values" is displayed.

Save sequence:

- SET mqttServer ... → SET mqttPort ... → SET mqttUser ... → SET mqttPass ... → SAVE

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- Each command is sent only after the previous command has been acknowledged by the gateway.

Messages:

- "Saving Cloud Settings...", "Cloud settings saved successfully" (green), "Failed to save Cloud settings" (red).

Topics tab:

This tab configures the six MQTT topics used by the gateway for publishing and subscribing to messages.

| Field          | Placeholder          |
|----------------|----------------------|
| Port 1 topic   | Enter Port1 Topic    |
| Port 2 topic   | Enter Port2 Topic    |
| Error topic    | Enter Error Topic    |
| Config topic   | Enter Config Topic   |
| Response topic | Enter Response Topic |
| Offline topic  | Enter Offline Topic  |

Press Save. The sequence writes all six topics one by one.

Validation:

- If any required field is empty, the message "Enter all values" is displayed.

Save sequence:

- SET port1Topic ... → SET port2Topic ... → SET errorTopic ... → SET configTopic ... → SET responseTopic ... → SET offlineTopic ... → SAVE
- Each topic is written approximately 3 seconds after the previous one. The complete save operation typically takes about 20 seconds.

Messages:

- "Saving Topic Settings...", "Topic settings saved successfully" (green), "Failed to save Topic settings" (red).

## 6. Cloud / MQTT Pages (Device ID Mode)

These pages are available after connecting to a gateway using its Device ID. Most pages communicate with the gateway through MQTT (cloud).

### 6.1 Add Device — "Modbus Devices" (cloud)

Open DEVICES → Add Device.

This page registers a Modbus device with the gateway. The fields, validation, and user interface are the same as described in Section 5.4.

Cloud Mode Behavior :

Instead of sending commands directly over TCP, the application publishes the following command to the gateway's MQTT configuration topic: `rs485add <port>,<crc>,<seconds>,<hex>,<name>`.

After the gateway acknowledges the request, the application automatically publishes a SAVE command.

Messages : "Device Added", "<Device Name> has been added successfully".

After the device is added: Click Done to open the Device List. Click Close to remain on the current page.

### 6.2 Device List — "Available RS485 Devices" (cloud)

Open DEVICES → Device List.

This page displays all configured RS485 devices. The layout and functionality are identical to Section 5.5.

Cloud Mode Behavior:

The device list is requested by publishing: (GET rs485list) to the MQTT configuration topic.

Editing and deleting devices also use MQTT:

Edit → (rs485mod ... + automatic SAVE).

Delete → type DELETE → Delete (rs485del ... + automatic SAVE).

If no devices are configured, the page displays: "Waiting for RS485 device list...", "No Devices Found".

### 6.3 Start/Stop — "Industrial 4G Gateway"

Open START/STOP → Start/Stop. This page controls the gateway's RS485 polling service. No configuration values are entered. Three large buttons start, stop or restart the service.

| Tile        | Command sent                             | Result popup               |
|-------------|------------------------------------------|----------------------------|
| START (▶)   | config:rs485/start                       | "✓ Data Started" (green)   |
| STOP (■)    | config:rs485/stop                        | "Data Stopped" (orange)    |
| RESTART (↺) | opens confirmation, then gateway:restart | "Device Restarting" (blue) |

Behavior:

- During execution, the page displays: "Starting...", "Stopping...", "Restarting...".
- If no response is received within 5 seconds, the message "⚠ Try again later" is displayed.
- Before restarting, a confirmation dialog is shown: "Are you sure you want to restart the device?" Options: Yes / No.

### 6.4 Write Parameters — Single & Multiple Register

Open WRITE PARAMETERS in MQTT mode. These pages write Modbus register values through the gateway using MQTT. The application publishes the request to the gateway's MQTT topic and waits for a response. The request is published to the cloud (AirChain485/<deviceId>/sub topics) and the result is reported back by the gateway.

Single Register — "Add Single Register"

| Field         | Placeholder     | Notes                                           |
|---------------|-----------------|-------------------------------------------------|
| Port          | Port 1 / Port 2 | RS485 port                                      |
| Slave ID      | 1               | Modbus slave address (e.g. meter address)       |
| Function Code | Function Code   | Modbus function code (e.g. 06 for single write) |
| Address       | Address         | Register address (0-based, decimal)             |
| Value         | Value           | Value to write (decimal)                        |

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Click Write. On success the popup "Parameters Written" appears ("Parameters has been written successfully.").

Multiple Register — "Add Multiple Registers"

This page is similar to Single Register, except the Value field accepts a comma-separated list of values for consecutive registers.

Example: 1000,0,50,400. Only positive whole numbers are accepted.

If the format is wrong: "Values should be like: 100,40,20", appears.

On success: popup "Parameters Written", appears.

## 7. Diagnostics

The application provides diagnostic tools for monitoring gateway communication and RS485 activity. Event Logs (TCP and MQTT variants)

### 7.1 Event Logs

TCP mode — SYSTEM → Logs

Opens a live log stream from the gateway on TCP port 8880. Shows the RS485 terminal activity: header lines ([RS485] OK, [RS485] DATA) and register lines ([0x...]).

Click Clear All to clear the displayed log. The log also clears itself automatically when it reaches 2000 lines.

While no log entries are available, the message "Event logs will appear here" is displayed.

MQTT mode — SYSTEM → Logs

Displays the event log received through the cloud for the selected Device ID (data arriving on the pub/port1 and pub/port2 topics).

Click Clear All to clear the displayed log. The log is automatically cleared when it reaches 2,000 lines.

## 8. Settings Reference

The table below lists every setting the tool can read or write. "Page" refers to the screen where the setting is edited; all pages load their values from the gateway with GETALL when they open.

| Setting key   | Meaning                        | Page                        | Notes                                |
|---------------|--------------------------------|-----------------------------|--------------------------------------|
| staticIP      | Gateway LAN static IP          | Network                     | Applies after reboot                 |
| gateway       | Default gateway / router       | Network                     | Applies after reboot                 |
| subnet        | Subnet mask                    | Network                     | Applies after reboot                 |
| wifiSSID      | Wi-Fi network name             | Settings → Wi-Fi            |                                      |
| wifiPass      | Wi-Fi password                 | Settings → Wi-Fi            | Applies asynchronously               |
| bleName       | Bluetooth device name          | Settings → Bluetooth        |                                      |
| blePin        | Bluetooth PIN                  | Settings → Bluetooth        |                                      |
| simSlot       | Active SIM slot (1 or 2)       | Settings → Sim              | Selected from the SIM Slot drop-down |
| apnSim1       | APN for SIM 1                  | Settings → Sim              |                                      |
| apnSim2       | APN for SIM 2                  | Settings → Sim              |                                      |
| mqttServer    | MQTT broker host               | Cloud → Cloud Settings      |                                      |
| mqttPort      | MQTT broker port               | Cloud → Cloud Settings      | 1 – 65535                            |
| mqttUser      | MQTT username                  | Cloud → Cloud Settings      | Applies asynchronously               |
| mqttPass      | MQTT password                  | Cloud → Cloud Settings      | Applies asynchronously               |
| mqttClientId  | MQTT client ID                 | (read-only in this version) |                                      |
| port1Topic    | Publish topic for RS485 Port 1 | Cloud → Topics              |                                      |
| port2Topic    | Publish topic for RS485 Port 2 | Cloud → Topics              |                                      |
| errorTopic    | Error reporting topic          | Cloud → Topics              |                                      |
| configTopic   | Configuration command topic    | Cloud → Topics              |                                      |
| responseTopic | Command response topic         | Cloud → Topics              |                                      |
| offlineTopic  | Offline / status topic         | Cloud → Topics              |                                      |
| deviceId      | Gateway device ID              | (shown in menus)            | Used for cloud addressing            |

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|              |                       |                    |              |
|--------------|-----------------------|--------------------|--------------|
| rs485_1_baud | RS485 Port 1 baudrate | Devices → Baudrate | 300 – 115200 |
| rs485_2_baud | RS485 Port 2 baudrate | Devices → Baudrate | 300 – 115200 |

### Device List Fields

Each entry in the device list (both TCP and MQTT versions) contains:

| Field        | Example               | Meaning                                       |
|--------------|-----------------------|-----------------------------------------------|
| Device Name  | MyMeter               | Free-text name entered when adding            |
| Port         | port1 / port2         | Which RS485 port polls the device             |
| Auto CRC     | 1 (auto) / 0 (manual) | CRC calculation mode                          |
| Poll Seconds | 10s                   | Polling interval                              |
| Command hex  | 020400000067          | The raw Modbus request bytes (spaces removed) |

### Register Write Fields

Used by Single / Multiple Register pages:

| Field         | Example               | Meaning                                                  |
|---------------|-----------------------|----------------------------------------------------------|
| Port          | 1                     | RS485 port                                               |
| Slave ID      | 2                     | Modbus slave address                                     |
| Function Code | 6                     | Modbus function code for the write                       |
| Address       | 0                     | Start register address (decimal, 0-based)                |
| Value(s)      | 1000 or 1000,0,50,400 | Value, or comma-separated list for consecutive registers |

## 9. Command Protocol

This chapter documents how the tool talks to the gateway. It is useful for understanding what happens behind the scenes.

## 9.1 Transport

Configuration commands are exchanged as plain-text lines terminated with carriage-return + line-feed over TCP.

The configuration port is 8881; the RS485 log stream is port 8880.

In MQTT mode the same commands are published to AirChain485/<deviceId>/config and replies are received on AirChain485/<deviceId>/response.

## 9.2 Commands

| Command                                                 | Example                                   | Purpose                                                                   |
|---------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------|
| GETALL                                                  | GETALL                                    | Read all configuration keys; replies are key=value lines                  |
| SET <key> <value>                                       | SET mqttPort 1883                         | Write one configuration key                                               |
| SAVE                                                    | SAVE                                      | Persist all pending changes to flash; success reply is OK: saved to flash |
| REBOOT                                                  | REBOOT                                    | Restart the gateway (TCP mode only)                                       |
| GET rs485list                                           | GET rs485list                             | List configured RS485 polling devices                                     |
| rs485add<br><port>,<crc>,<seconds>,<hex>,<name>         | rs485add<br>1,1,10,020400000067,MyMeter   | Add a polling device                                                      |
| rs485mod<br><index>,<port>,<crc>,<seconds>,<hex>,<name> | rs485mod<br>0,1,1,10,020400000067,MyMeter | Modify a polling device                                                   |
| rs485del <index>                                        | rs485del 2                                | Delete a                                                                  |

|                    |   |                                          |
|--------------------|---|------------------------------------------|
|                    |   | polling device                           |
| config:rs485/start | — | Start the RS485 data service (MQTT mode) |
| config:rs485/stop  | — | Stop the RS485 data service (MQTT mode)  |
| gateway:restart    | — | Restart the gateway (MQTT mode)          |

### 9.3 Reply Formats

| Reply                                             | Meaning                                           |
|---------------------------------------------------|---------------------------------------------------|
| key=value lines                                   | GETALL dump of the current configuration          |
| OK: saved to flash                                | SAVE succeeded; settings are stored               |
| dev[(n)] <name> <port> CRC=<c> poll=<s> cmd=<hex> | One entry of GET rs485list                        |
| OK: device[n] added / added                       | rs485add acknowledged                             |
| OK: device[n] modified / modified                 | rs485mod acknowledged                             |
| OK: device[n] deleted / deleted                   | rs485del acknowledged                             |
| OK:RS485/start / OK:RS485/stop / OK:restart       | Start/stop/restart results                        |
| [RS485] OK, [RS485] DATA, [0x...]                 | Live RS485 terminal / register lines on port 8880 |

### 9.4 How Saves Work

Every page follows the same pattern: write each field with SET, then persist everything with a final SAVE. If the gateway replies OK: saved to flash, the tool shows the green "saved successfully" popup; anything else shows the red "Failed to save ..." popup.

Timing differs by page:

| Page    | Sequence                                       | Timing            |
|---------|------------------------------------------------|-------------------|
| Network | SET staticIP → SET subnet → SET gateway → SAVE | 2 s between steps |

## AirChain485 PRO by IONICKS

|                          |                                                                    |                                                                           |
|--------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------|
| Wi-Fi                    | SET wifiSSID → SET wifiPass → SAVE                                 | ACK-sequenced (advances ~0.6 s after each acknowledged SET, 5 s fallback) |
| Cloud settings           | SET mqttServer → SET mqttPort → SET mqttUser → SET mqttPass → SAVE | ACK-sequenced                                                             |
| Bluetooth                | SET bleName → SET blePin → SAVE                                    | 2 s between steps                                                         |
| SIM                      | SET simSlot → SET apnSim1 → SET apnSim2 → SAVE                     | 2 s between steps                                                         |
| Baudrate                 | SET rs485_1_baud → SET rs485_2_baud → SAVE                         | 2 s between steps                                                         |
| Topics                   | SET port1Topic ... six topics ... → SAVE                           | 3 s between steps                                                         |
| Add/modify/delete device | rs485add/mod/del → (on ack) SAVE                                   | signal-driven                                                             |

### 9.5 Important Device Behavior

Reboot to apply. Network and cloud changes are fully applied after the gateway restarts, so a reboot is the final confirmation step.

### 9.6 MQTT Write Parameters (Single / Multiple)

The desktop app itself maintains an MQTT session to cloud and send commands to the selected Device ID. Register writes are published as JSON on AirChain485/<deviceId>/sub with a payload such as:

```
{"key":"AirChain485","port":1,"slave":2,"fc":6,"addr":0,"value":1000}
```

A successful write is reported back as {"write":"OK"}.

## 10. Troubleshooting

### 10.1 Cannot Connect — "Connection timed out"

The tool aborts the connection after 10 seconds and shows "Connection timed out. Could not reach <IP> within 10 seconds."

Check:

- The gateway is powered on and its LEDs indicate normal operation.
- The PC and gateway are on the same network.

## 10.2 "Please enter a valid IP address"

The field must contain a full IPv4 address with four octets.

## 10.3 Save Shows Green But Settings Revert After Power Cycle

Symptom: You save MQTT user / MQTT password / Wi-Fi password, the tool shows "saved successfully", but after a reboot the old value is back.

Why: The gateway applies credential keys asynchronously.

Recommended workflow:

- Change only one credential at a time.

## 10.4 "Failed to save ..." (red popup)

The gateway did not reply OK: saved to flash.

## 10.5 Wi-Fi Password with Special Characters

Passwords containing spaces or unusual characters are entered as-is.

## 10.6 Device List Is Empty

The list is fetched with GET rs485list shortly after the page opens.

## 10.7 Deleting a Device Requires Typing "DELETE"

This is intentional protection against accidental deletion.

## 10.8 SIM Slot Selection

The SIM slot drop-down shows 1 (SIM1) and 2 (SIM2).

## 10.9 Restarting a Cloud Device

MQTT mode has no Reboot button — use Start/Stop → RESTART.

## 10.10 Logs Are Empty or Disappear

TCP logs appear only while the Logs page is open.

## 10.11 After Changing the Static IP the Gateway Is Unreachable

Network settings apply after reboot. Write down the new address before saving.

## 10.12 General Checklist

Device status in the side menu shows Connected.

You pressed Save and waited for the final green popup.