aircom

Gateway
WTP05

User Manual

Aircom User Manual

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Important Symbols

Electrical hazard

General hazard

Information

Table of Contents

Part I Welcome

1.1 About this document

Welcome to the Aircom Gateway user manual. This manual will guide you through the hardware and software configuration of an Aircom Gateway and other important technical information.

1.2 Hazards

Handling of Aircom products should be done by competent persons only. Incorrect use by non-qualified personnel may result in damage, injury or death. Prior to handling the equipment this manual should be reviewed and correct safety precautions taken.

The Aircom Gateway is an electrical device which is powered either by DC or AC power. Care should be taken and the instructions in this manual should be observed to ensure safe operation.

1.3 Intended use

This product is designed as a communications device for various IOT, IIOT, instrument and telemetry applications.

DO:

- Carefully read all manuals and certification prior to use.
- Use this product for its intended use.
- Follow the correct installation and wiring for appropriate instruments as per 2.6 Electrical Installation.

DO NOT:

- Misuse or use for unintended purposes.
- Use this device in hazardous areas.
- Wire incorrectly.
- Use a power supply not within the specified parameters, see 2.6.3 Power Terminals.

1.4 Responsibility of the user

It is the responsibility of the user to use Aircom products only within the scope it has been designed for. Prior to installation and operation, it is imperative to observe all the relevant documentation and ensure only competent personnel operate the equipment. Should any assistance be required please contact YZ Systems, *see page 2*.

Part II Getting started

2.1 About The Aircom Gateway

The **Aircom™** Gateway is a highly configurable, robust and secure, industrial LoraWAN gateway. It can be set up as a conventional packet forwarder either via an Ethernet port or an integrated 4G router. Alternatively, it can be configured with an internal server to decode the LoRa packets into a Modbus map which can be polled either via RS485 or TCP. The Modbus TCP connection can be either via an Ethernet port or the integrated 4G cellular connection.

2.2 Manufacturer's label

Every gateway supplied will have a manufacturer's label attached to the left-hand side of the enclosure. The label will be depicted as below:

Part Code

Serial Number

Date of Manufacture

Manufacture Address
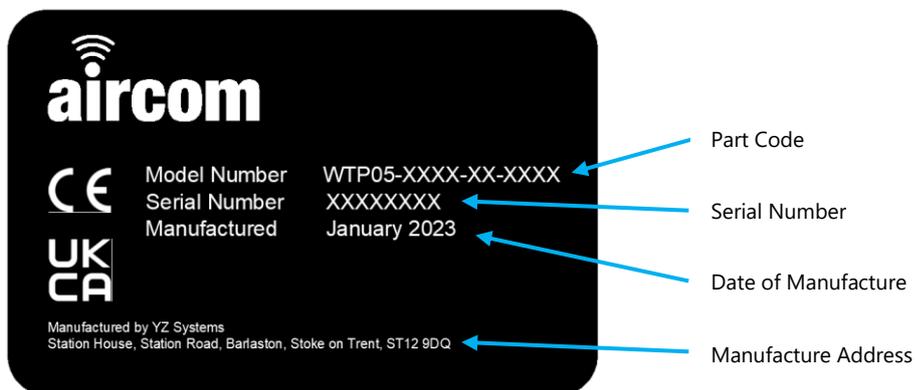
2.3 Constituent parts

Your new Aircom device should arrive assembled, tested, and ready for installation. Each standard unit should be supplied with all the following components:
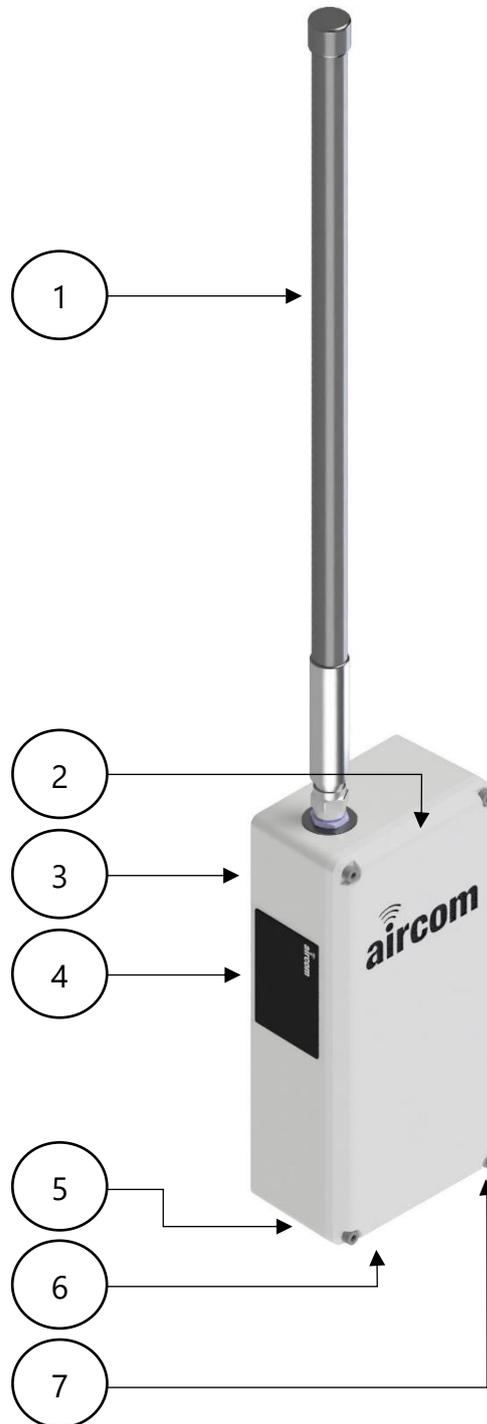
Item	Qty	Part No.	Material	Description
1	1	AC-0014 **Or** AC-0015	Fiberglass	6dBi Antenna (868Mhz **Or** 915-923Mhz)
2	1	ZE-0001	ABS	Enclosure Lid
3	1	CG-0009	ABS	Enclosure
4	1	DA-0050	Polyester Metal Film	Product Label
5	4	CD-7000	Nylon 6 (Polyamide 6)	IP68, M20x1.5 Blanking Plug
6	2	CD-7001	Nylon 6 (Polyamide 6)	IP68, M20x1.5 Cable Gland
7	4	CE-0007	304 SS	M5 x 20mm Socket Cap Screw

2.4 Product range

2.4.1 Part code builder

Part Code Builder								
Example Code	**WTP05**	-	**F00**	-	**DC**	-	**EU868**	-	**S**

Product Code	
Aircom Gateway	WTP05

Backhaul Communications - *See Notes*	
Packet Forwarder*[1]	F
Modbus & I/O*[2]	M
No Cellular*[3]	0
4G Global*[3]	A
4G EU*[3]	B
4G US*[3]	C
Standard	0
Special*[4]	S

Power	
9-36VDC	DC
110-240VAC	AC

LoRaWAN Communications	
EU868-870MHz	EU868
US902-928MHz	US915
AU915-928MHz	AU915
AS920-923MHz	AS1
AS923-925MHz	AS2

LoRaWAN Antenna	
Standard External Fixed	S
Without Antenna	0

Option "M" I/O	
Analogue Inputs, 2 Channels (500V Galvanically Isolated)	4-20mA Passive (15V @ 50mA) **or** 4-20mA Active **or** 0-30V*[5]
Digital Inputs, 2 Channels (500V Galvanically Isolated)	Volt-Free Input (powered 15V @ 50mA) **or** Voltage Input 5-30V*[5]
Serial Comms, 1 Channel (500V Galvanically Isolated)	RS485, 2-wire

ⓘ Notes:

1. Option F *"Packet Forwarder"* is a typical style LoRaWAN packet forwarding gateway.
2. Option M *"Modbus & I/O"* includes LoRaWAN to Modbus functionality along with the I/O detailed in the above table *"Option M I/O"*. Local gateway I/O is populated into Modbus communications.
3. Options 0, A, B and C choose between cellular backhaul options for either LoRaWAN or Modbus communications (e.g. LoRaWAN to server via 4G or Modbus to server via TCP/IP over 4G).
4. Option S *"Special"* is for bespoke requested features.
5. Both the analogue and digital I/O have two channels each with configurable options. E.g. Analogue inputs can be 4-20mA Passive or 4-20mA Active or a 0-30V input.

2.4.2 Accessories

Code	Description	
ZC-0006	Wall Mount, includes: ▪ x2 304SS wall brackets ▪ x8 304SS thread forming screws.	
ZC-0005	Post Mount, includes: ▪ x2 304SS post brackets ▪ x4 304SS M6 machine screws & nyloc nuts ▪ x2 304SS jubilee clips ▪ x8 304SS thread forming screws	
DD-0002	Terminal Tool	
CD-7001	IP68 M20x1.5 Cable Gland	
CD-7000	IP68 M20x1.5 Plug	
AJ-8000	2m Antenna Cable	
AJ-8001	5m Antenna Cable	
AJ-8002	10m Antenna Cable	
CF-0016	Antenna Post mount, includes: • Antenna clamp • x2 50mm U-bolts • x4 fixing nuts and bolts	

2.5 Mechanical installation

2.5.1 Dimensions
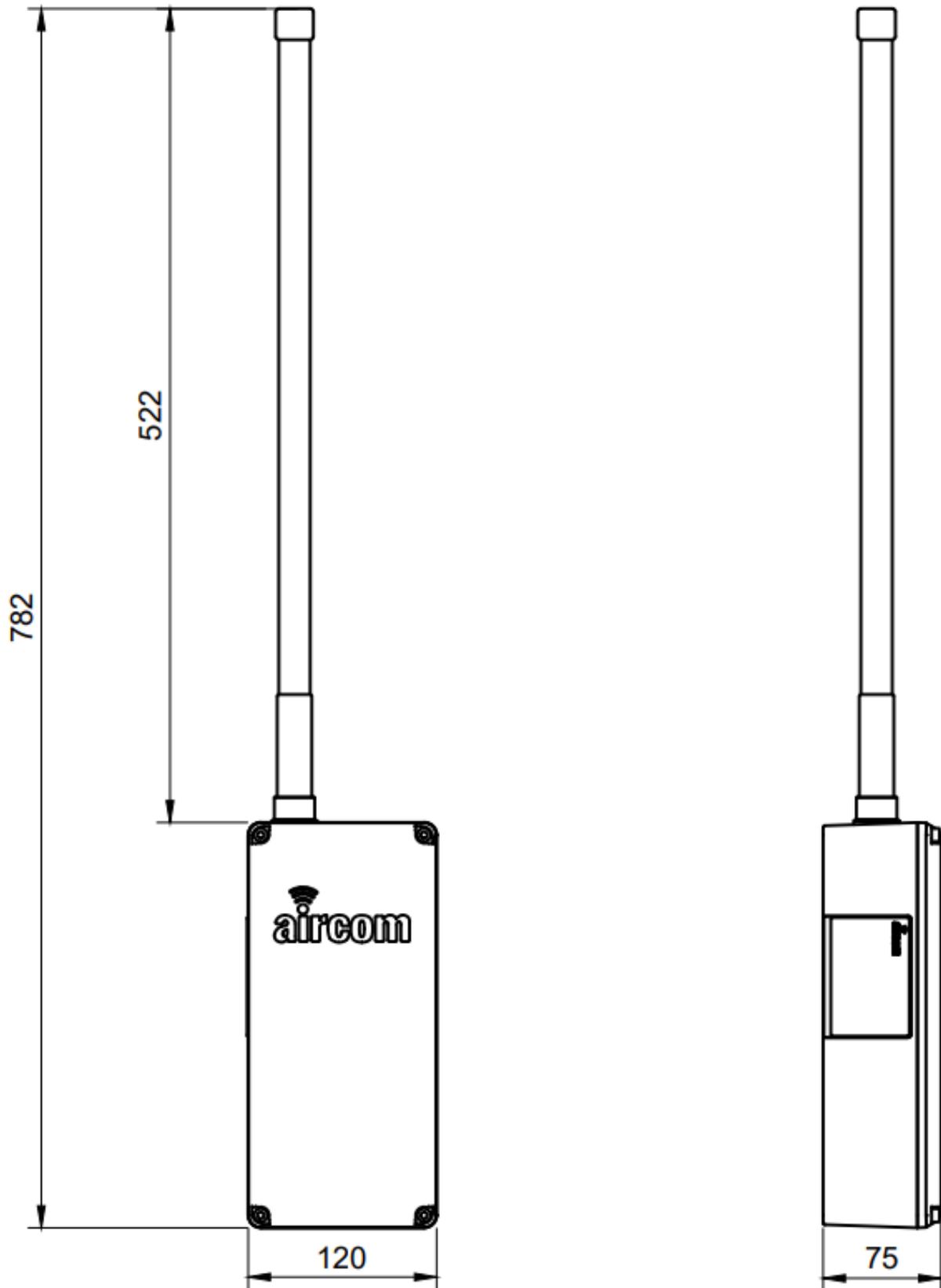
2.5.2 Mounting brackets

Within the Aircom range two brackets are available:

ZC-0006:

Wall mount bracket includes:

- x2 304SS mounting plates
- x8 304SS thread forming screws, 3x16mm, Pozi
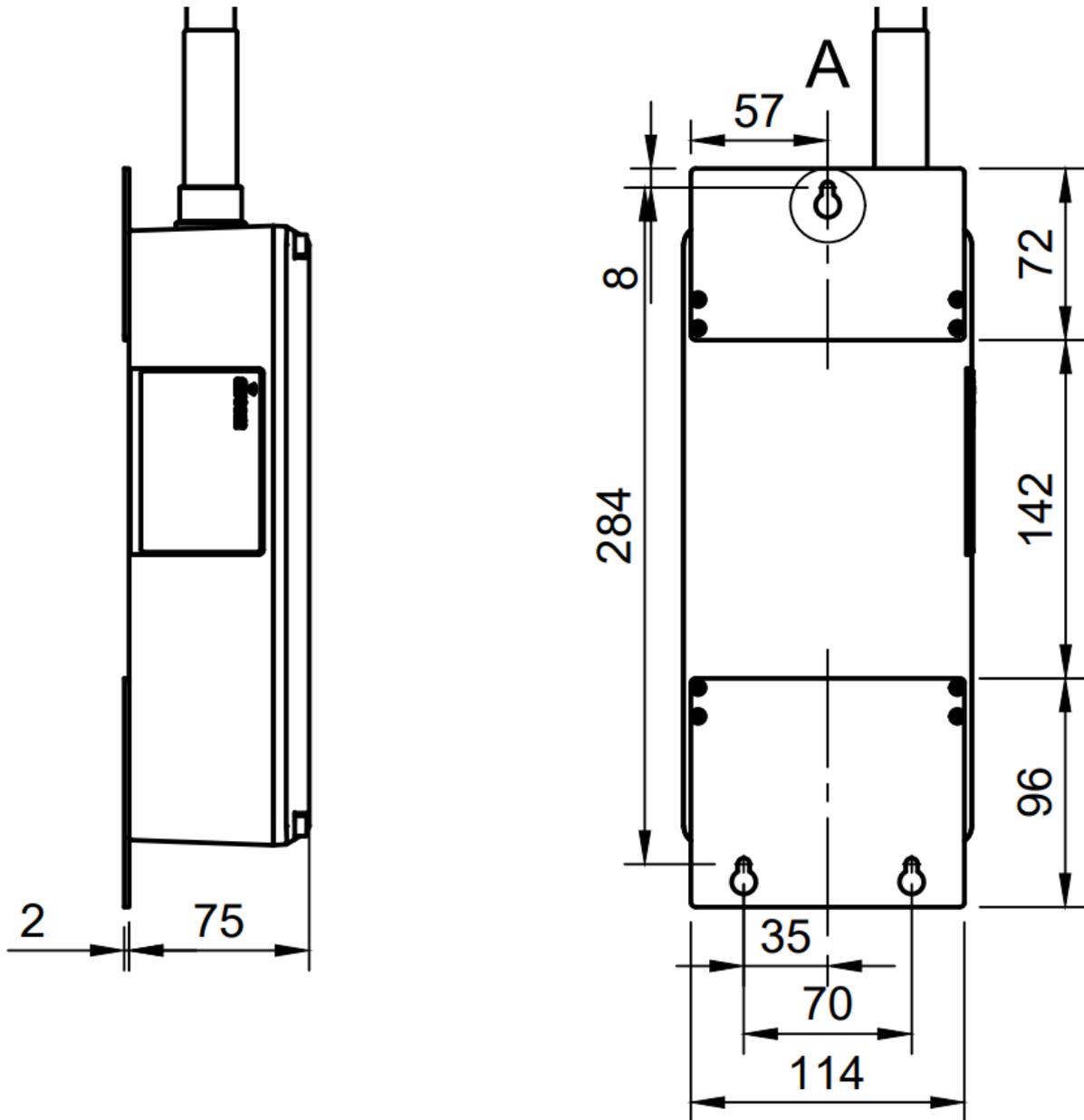
ZC-0005:

Post mount bracket includes:

- x2 304SS post brackets
- x4 M6 machine screws & nyloc nuts
- x2 304SS jubilee clips
- x8 304SS thread forming screws, 3x14mm, Pozi
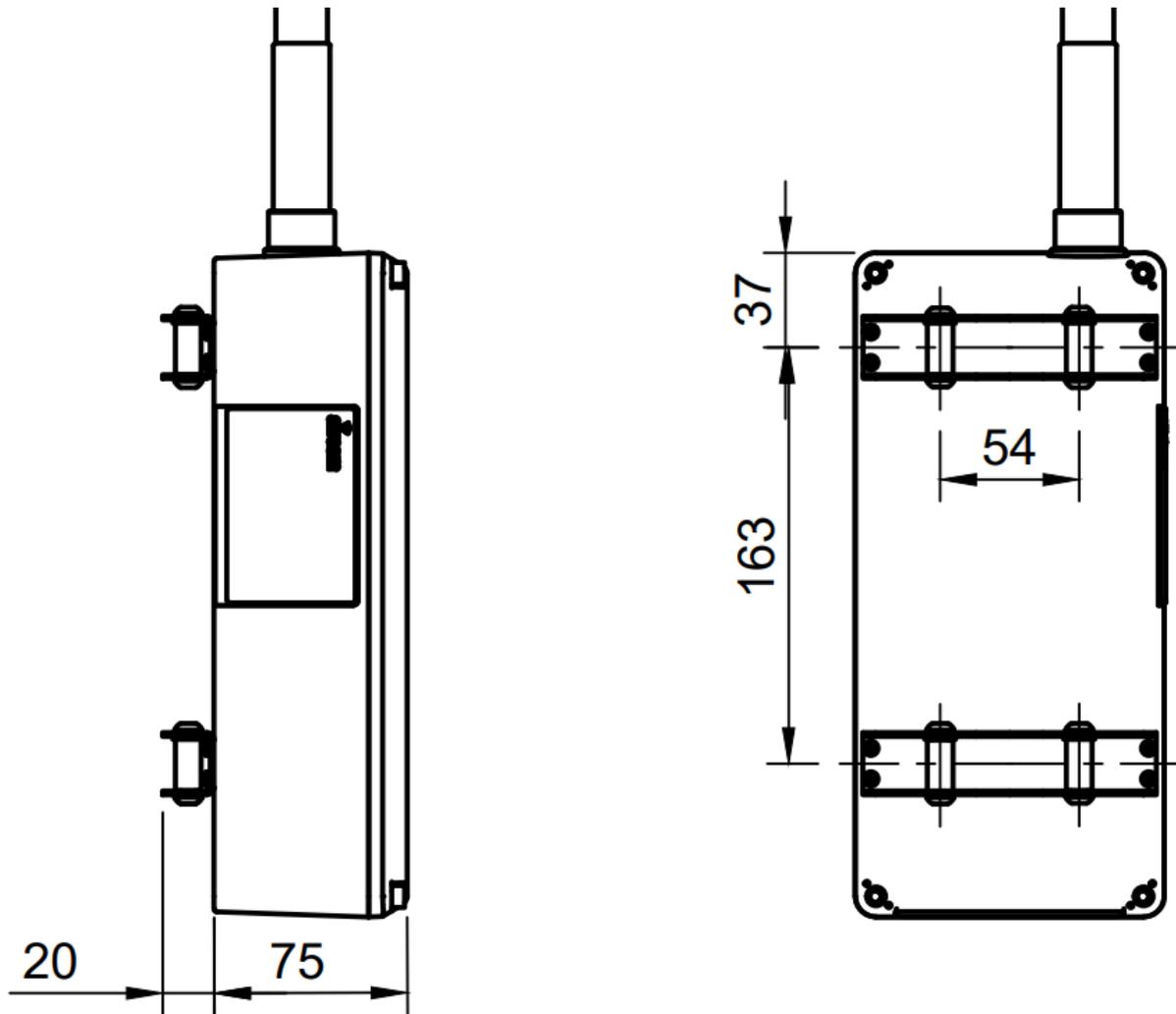
2.6 Electrical installation

The Aircom Gateway is an electrical device which is powered either by DC or AC power. Care should be taken and the instructions in this manual should be observed to ensure safe operation.

IMPORTANT: The Aircom Gateway **MUST NOT** be powered without the LoRaWAN antenna attached. Powering the device without the antenna attached will potentially cause catastrophic failure.

IMPORTANT: It is the user's responsibility to ensure the Aircom Gateway is correctly installed in compliance with local electrical and wiring regulations.

2.6.1 Antenna

Please note prior to powering the Aircom Gateway the Antenna must be connected to avoid potential damage to the internal circuitry. The standard Aircom gateway is supplied with a 6 dBi Omni Directional Antenna, this antenna can be directly mounted to the gateway which is the recommended installation method. Alternatively, the antenna (or suitable alternative) can be connected to a cable for mounting the antenna at a higher point than the gateway. Please utilise one of the Aircom cable accessories to ensure compatibility.

For installation it is recommended to apply silicon grease and an additional weather seal to the N Type Female and N Type Male Antenna connectors.

Standard Antenna Specification

Item	Value
Frequency range	865-870 MHz 902-929 MHz
Gain	6 dBi
HPBWh (Deg)	360 degrees
HPBWv (Deg)	35 +/- 1 degrees
Tilt (Deg)	0 degrees
Polarisation	Vertical
Input impedance	50 Ω
Typical VSWR @ EU868MHz	1.33:1
Typical VSWR @ US915MHz	≤1.5
Maximum Power	50 Watts
Antenna Connector	N Type Male
Gateway Connector	N Type Female
Lightning Protection	DC Ground
Antenna Height	550 mm
Antenna Diameter	20 mm
Weight	0.8 Kg
Material	Fiberglass
Rated Wind Speed	120 km/h 75m/h
Temperature Range	-40°C - 60°C -40°F - 140°F

2.6.2 Cable entries

The Gateway has 5 cable entries to the bottom of the enclosure. Each unit will be supplied with:

DC Version:

- x4 IP68 M20x1.5 Blanking Plugs
- x2 IP68 M20x1.5 Cable Glands

AC Version:

- AC 2-Pin Socket and Plug with 2m flying lead
- x4 IP68 M20x1.5 Blanking Plugs
- x2 IP68 M20x1.5 Cable Glands
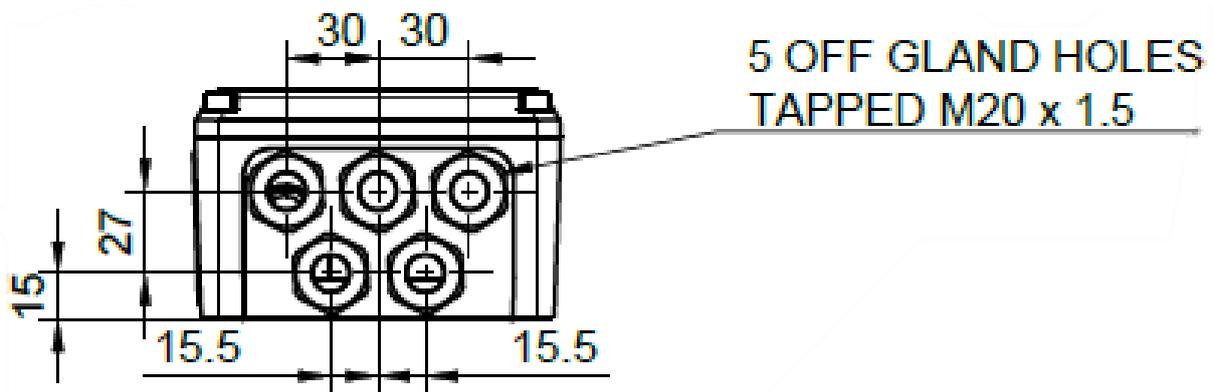
2.6.3 Power terminals

The Gateway has two power options, DC and AC. The connection for each option is depicted as follows:

DC Power Supply

9-36VDC, 753mA Max

15W Peak

4-6W Average

Connection

2.5mm^2 screw terminals

Left hand terminal **+V**

Right hand terminal **0V**

+V   0V

AC Power Supply

80-264VAC, 47-440Hz
15W Peak
4-6W Average

Typical Load

0.6A @ 115VAC
0.3A @ 230VAC

Inrush Load

20A @ 115VAC
45A @ 230VAC

Connection

2-Pin Connector c/w 2m flying lead

2-Pin Connector

2.6.4 I/O Terminals / RJ45 Port

The Gateway wiring terminals are located inside the enclosure at the bottom. There is a single RJ45 port located towards the bottom of the gateway above the power supply module.

Terminals

2mm² spring terminals

AI2: +15V	AI2: VIN	AI2: 4-20mA	AI2: ⏚	AI1: +15V	AI1: VIN	AI1: 4-20mA	AI1: ⏚	
2	4	6	8	10	12	14	16	Top
1	3	5	7	9	11	13	15	Bottom
RS: ⏚	RS485: A	RS485: B	N/A	DI: V+	DI1	DI2	DI: ⏚	

Ethernet RJ45
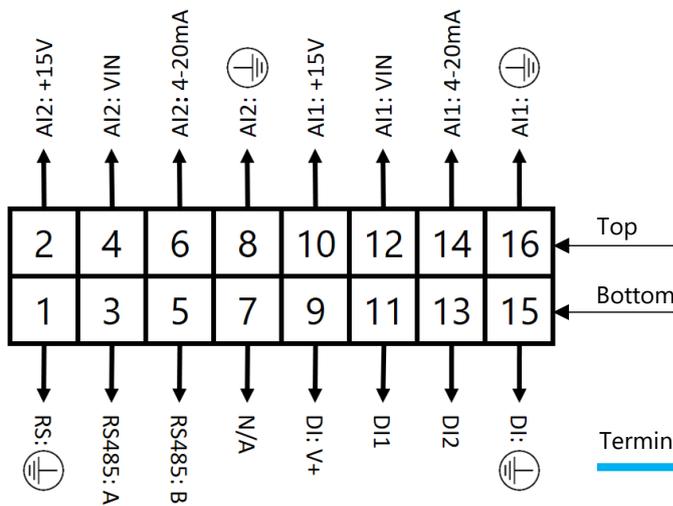
Terminals

ⓘ The terminals are spring type and require the use of a flat head screwdriver to install / remove wires. It is recommended that the Aircom accessory DD-0002, terminal tool be utilised.
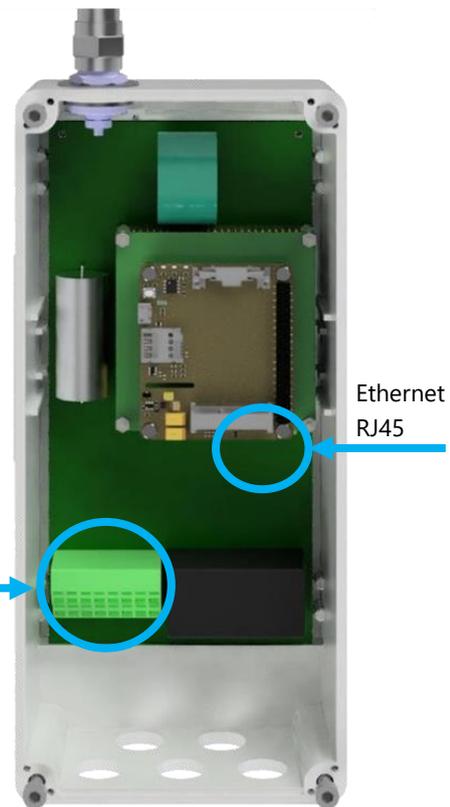
2.6.5 I/O Enabling switches

ℹ The I/O enabling switches are only present on the type "M" variant within the "Backhaul Communications" options of the Aircom Gateway. See, 2.4.1 Part code builder.

Digital I/O Switch:

To power on PWR-DI or DI-3 move the switch in the upward position. The diagram to the right depicts the downward or "off" position.

M type:
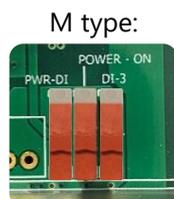
PWR-DI: Enables supply voltage for volt-free digital input channels.

DI-3: N/A

Analogue I/O:

To power on S1 or S2 move the switch in the upward position. The diagram to the right depicts the downward or "off" position.

S1: Enables analogue channel 1.

S2: Enables analogue channel 2.

R31: Calibration / scaling POT for analogue channel 1.

R47: Calibration / scaling POT for analogue channel 2.

Battery Switch

WD* Indicators

Power Indicators

Analogue I/O

Power / Digital I/O Switches

Shutdown / Reboot
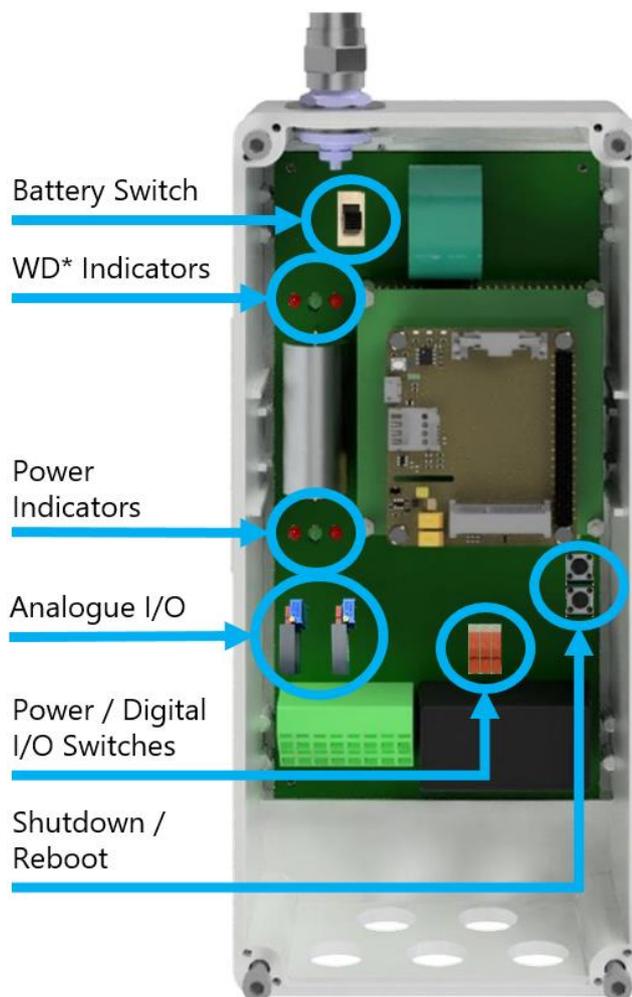
*WD – Watchdog

2.6.6 Wiring diagrams

The following diagrams depict the standard wiring arrangements:

Analogue 1 (AI1):

4-20mA – 2 Wire Passive

Terminals:

10: **V+**

14: **V0**

S1 Switch must be enabled

Characteristics:

15V @ 50mA

500V Galvanically Isolated
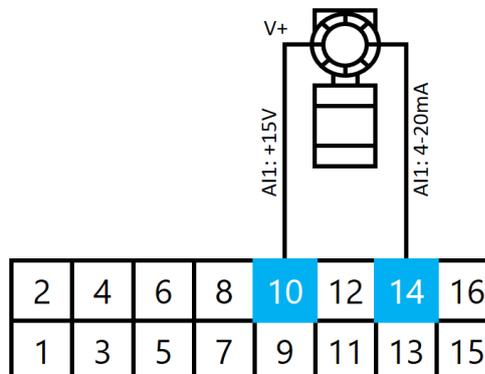
4-20mA – 2 Wire Active

Terminals:

14: **V+**

16: **V0**

S1 Switch must be enabled

Characteristics:

Max 30Vin

500V Galvanically Isolated
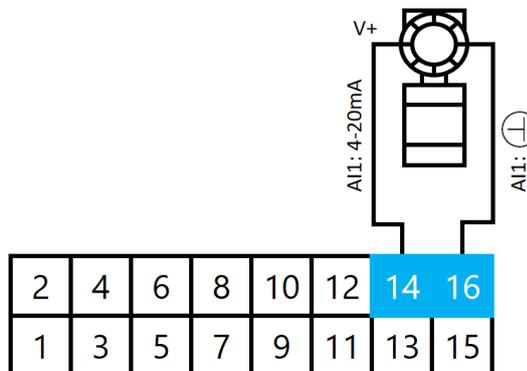
4-20mA – 3 Wire

Terminals:

10: **Supply V+**

14: **Signal V+**

16: **GND**

S1 Switch must be enabled

Characteristics:

15V @ 50mA

500V Galvanically Isolated
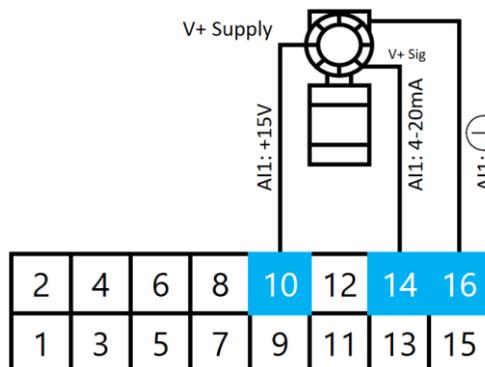
0-10V – 2 Wire

Terminals:

12: V+

16: V0

S1 Switch must be enabled

Characteristics:

500V Galvanically Isolated
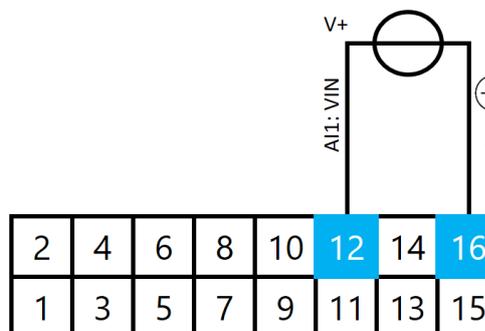
Analogue 2 (AI2):

4-20mA – 2 Wire Passive

Terminals:

2: **V+**

6: **V0**

S2 Switch must be enabled

Characteristics:

15V @ 50mA

500V Galvanically Isolated
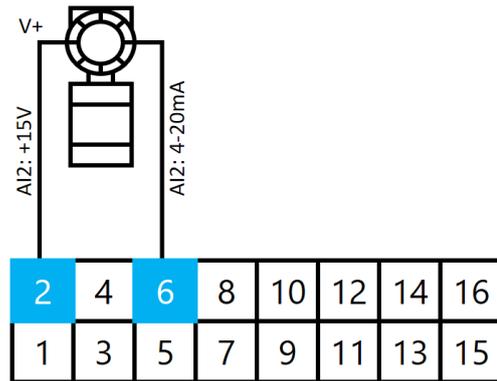
4-20mA – 2 Wire Active

Terminals:

6: **V+**

8: **V0**

S2 Switch must be enabled

Characteristics:

Max 30Vin

500V Galvanically Isolated
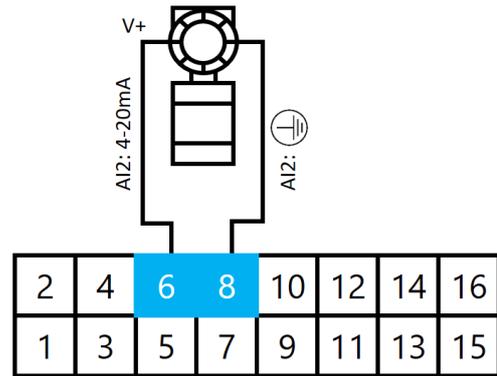
4-20mA – 3 Wire

Terminals:

2: **Supply V+**

6: **Signal V+**

8: **GND**

S2 Switch must be enabled

Characteristics:

15V @ 50mA

500V Galvanically Isolated
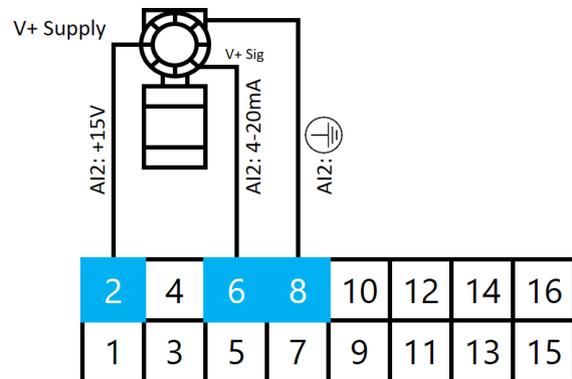
0-10V – 2 Wire

Terminals:

4: **V+**

8: **V0**

S2 Switch must be enabled

Characteristics:

500V Galvanically Isolated
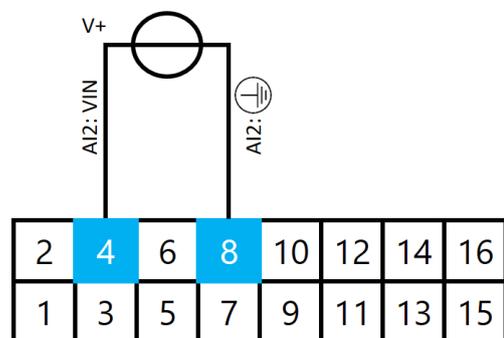
Digital 1 (DI1):

Voltage Free Input

Terminals:

9: **V+**
11: **V0**

PWR-DI Switch must be enabled

Characteristics:

15V @ 50mA

500V Galvanically Isolated

2	4	6	8	10	12	14	16
1	3	5	7	9	11	13	15

DI: V+   DI1
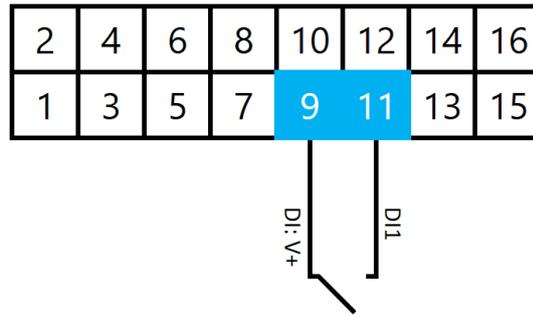
Voltage Input

Terminals:

11: **V+**
15: **V0**

Characteristics:

5-30Vin

500V Galvanically Isolated

2	4	6	8	10	12	14	16
1	3	5	7	9	11	13	15

DI1   DI:

V+
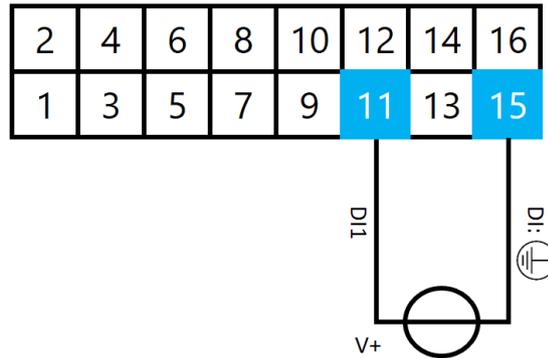
Digital 2 (DI2):

Voltage Free Input

Terminals:

9: **V+**
13: **V0**

PWR-DI Switch must be enabled

Characteristics:

15V @ 50mA

500V Galvanically Isolated

2	4	6	8	10	12	14	16
1	3	5	7	9	11	13	15

DI: V+   DI2
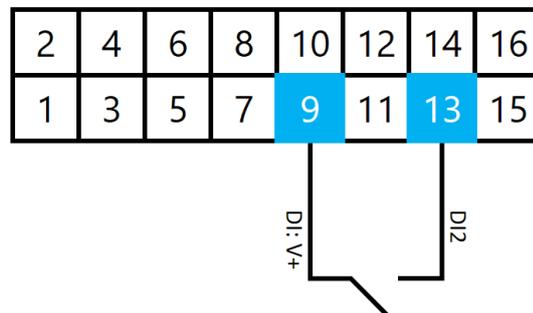
Voltage Input

Terminals:

13: **V+**
15: **V0**

Characteristics:

5-30Vin

500V Galvanically Isolated

2	4	6	8	10	12	14	16
1	3	5	7	9	11	13	15

DI2   DI:

V+
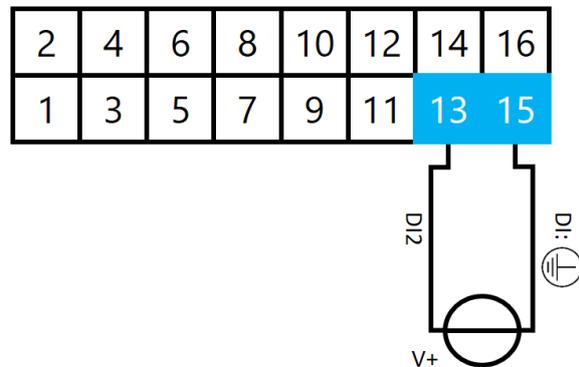
Serial Comms (RS):

RS485 – 2 wire

Terminals:

1: Ground / Screen
3: RS485 – A+
5: RS485 – B-

Characteristics:

500V Galvanically Isolated

2	4	6	8	10	12	14	16
1	3	5	7	9	11	13	15

RS: ⏚
RS485 - A
RS485 - B
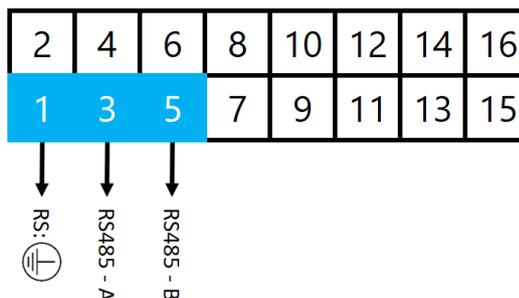
2.7 Power up / shutdown

⚡ The Aircom Gateway is an electrical device which is powered either by DC or AC power. Care should be taken and the instructions in this manual should be observed to ensure safe operation.

⚠ **IMPORTANT:** The Aircom Gateway **MUST NOT** be powered without the LoRaWAN antenna attached. Powering the device without the antenna attached will potentially cause catastrophic failure.

⚠ **IMPORTANT:** The Aircom Gateway power switch **MUST NOT** be turned off during operation, this may cause corruption to the system. To power down follow the correct shutdown procedure, then the power switch can be turned off.

Power Switch:

Dependant on the gateway type there will be a single or bank of three switches. In both cases the **centre** switch is the power on switch. The other two switches are for "M" type gateways, see 2.6.5 I/O Enabling Switches. To power on the gateway, move the switch in the upward position. The diagrams to the right depict the downward or "off" position.

F type:

M type:
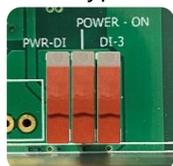
Power Indicators:

The power indicators will illuminate to confirm the following:

+5V: Confirms gateway supply voltage is available.

CHG: Confirms the safe shutdown battery is on / charging.

PWR: Confirms main DC or AC power is present.

Battery Switch

WD* Indicators

Power Indicators

Analogue I/O

Power / Digital I/O Switches

Shutdown / Reboot
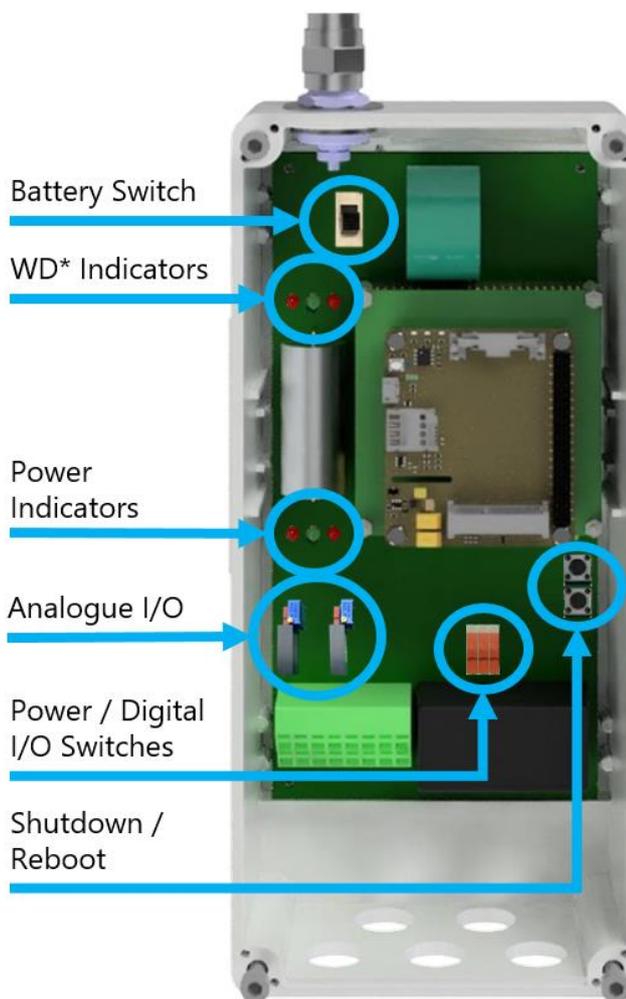
*WD – Watchdog

Battery Switch:

All Aircom Gateways will be complete with a 3.6V, 600mA battery. This battery facilitates a safe shutdown in a power loss situation. To power on the battery move the switch in the upward position. The diagram to the right depicts the downward or "off" position.

Watchdog Indicators:

All Aircom Gateways are supplied with a discrete watchdog circuit (WD). The gateway CPU sends a health pulse to the WD circuit to reset its timer (every 2 seconds). After 10 minutes if no pulse is received the WD will reboot the gateway.

TX / RX: Confirms Modbus RS485 communications (if utilised).

WD: Will pulse every 2 seconds to confirm healthy status. If the gateway is shutting down the WD will flash quickly for circa 60 seconds. TX, RX and WD lights will then illuminate for 3 seconds then switch off, which indicates the gateway has shut down. When the gateway is shut down the +5V, CHG and PWR indicators may or may not be illuminated, dependant on their state.
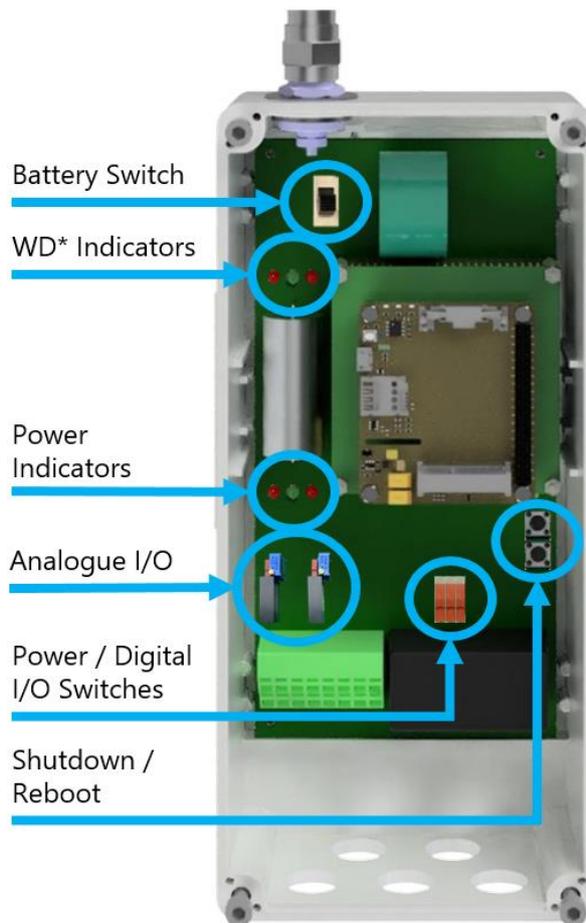
Shutdown / Reboot

Reboot: Restarts the gateway after circa 60 seconds. The WD indicator will flash as indicated above.

Shutdown: Shuts down the gateway after circa 60 seconds. The WD indicator will flash as indicated above. To power on the gateway after shutdown a power cycle of the power switch will be required.

*WD – Watchdog

With the battery switch enabled the Aircom Gateway will perform a safe shutdown in a power loss situation. Additionally, the gateway will automatically reboot and continue its configured operation when power is returned.

2.7.1 Power up procedure

⚠️ **IMPORTANT:** The Aircom Gateway **MUST NOT** be powered without the LoRaWAN antenna attached. Powering the device without the antenna attached will potentially cause catastrophic failure.

To power on the gateway please adhere to the following procedure:

Step 1:

As per section "2.6 Electrical Installation" wire AC or DC power to the gateway. Ensure the terminals are correctly and securely connected. Apply the supply power. The **PWR** LED should illuminate to confirm power is available.

Step 2:

Switch the power on switch in the upward position. Following this action, the +5V and CHG LEDs should illuminate and the gateway will fully boot within 60 seconds.
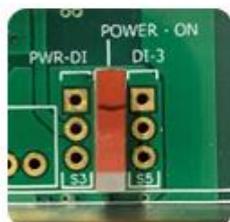
Step 3:

If the UPS safe shutdown functionality is desired switch the battery switch to the upward position.
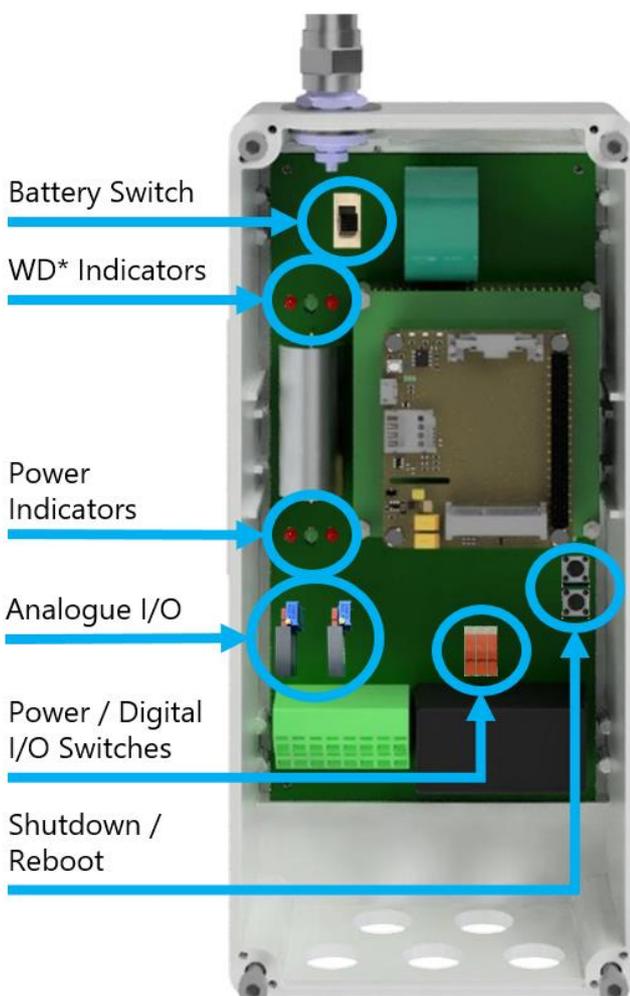
*WD – Watchdog

2.7.2 Shutdown / reboot procedure

To shut down the gateway please adhere to the following procedure:

Step 1:

If the UPS safe shutdown service is enabled switch the battery switch to the downward position.
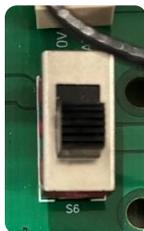
Skip this step if rebooting

Step 2:

Press the Shutdown (or reboot) button. After this action the WD LED will flash quickly for circa 60 seconds. TX, RX and WD lights will then illuminate for 3 seconds then switch off, which indicates the gateway has shut down. When the gateway is shut down the +5V, CHG and PWR indicators may or may not be illuminated, dependant on their state.
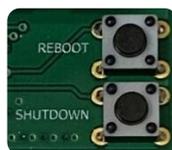
If the reboot button was pressed, after the above sequence the gateway will then automatically begin the power up sequence.

Step 3:

Switch the power on switch to the downward position. Following this action, the +5V and CHG LEDs should switch off. The PWR indicators will be illuminated while the supply power is present. The gateway is now powered down and ready to be electrically disconnected.

Battery Switch

WD* Indicators

Power Indicators

Analogue I/O

Power / Digital I/O Switches

Shutdown / Reboot
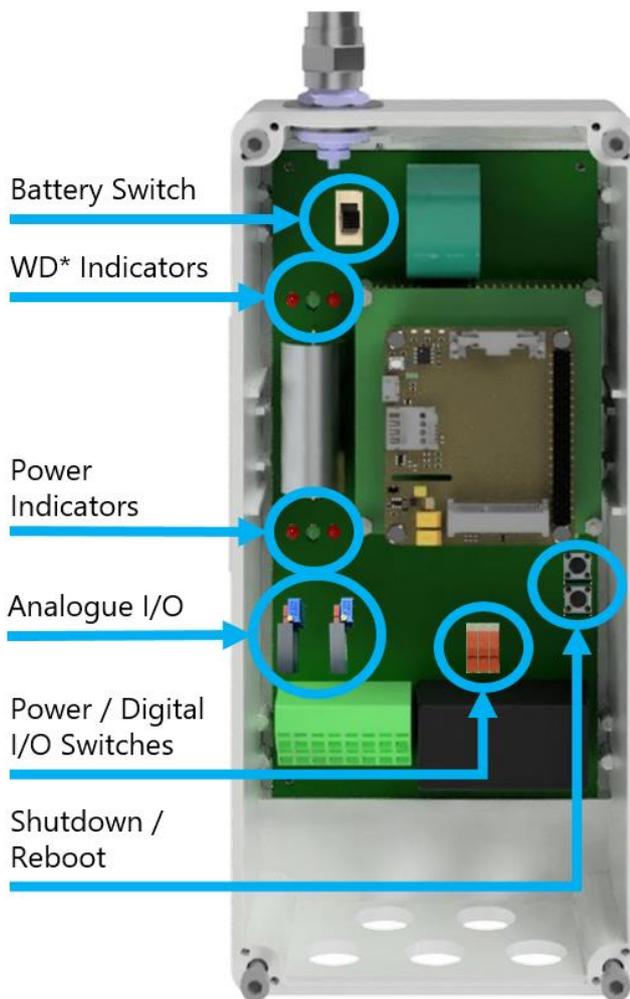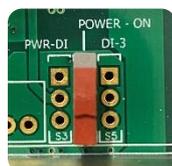
*WD – Watchdog

Part III Configuration portal

3.1 Accessing the Gateway

The Gateway configuration interface is accessed via a web browser. This portal can be accessed as detailed in the following sections utilising a Wi-Fi or Ethernet connection.

3.1.1 Wi-Fi

The factory set configuration will have a hidden Wi-Fi network. To access this network, connect with a Wi-Fi enabled device such as a laptop, phone or tablet. The network does not broadcast its SSID and will require the network to be manually added. The network credentials are as follows:

SSID: AircomGW
Security: WPA2
Password: Aircom-GW-2022

Once connected to the Wi-Fi network of the gateway open your device web browser and enter the following address to access the configuration interface:

http://192.168.10.1:8081

Notes:
1. Only one device can be connected to the gateway at one time. If one device is unknowingly connected it will prevent other devices from connecting to the gateway.
2. When connecting to the gateway from devices such as mobile phones please note that mobile devices are designed to prioritise internet access. When connecting to the gateway a mobile device will recognise a lack of internet connectivity and may prioritise a different Wi-Fi or cellular connection to gain internet connectivity. It is advisable to disable cellular settings or Wi-Fi auto-join features while configuring the gateway.

3.1.2 Ethernet

The gateway configuration interface can be accessed by utilising the Ethernet port. The factory set configuration will utilise DHCP for the Ethernet connection. To access this, connect the gateway to a DHCP enabled switch or router and identify the assigned IP address. Once the IP address is identified enter the IP address into the browser of a computer connected to the same network with **:8081** added to the end of the IP address. Example:

http://192.168.10.1**:8081**

Once the portal is accessed the gateway can be re-configured to a fixed IP as an alternative to the standard DHCP configuration.

3.2 Default password

After connecting to the gateway as per the previous sections the user will be greeted by the Home Page. The user will be prompted for a password to access the configuration interface; the default factory set password is as follows:

Default Password: aircom

The factory set password can be changed once the configuration interface is accessed.

3.3 Home page

After logging into the gateway the user will be greeted by the Home Page.

The home page features the following:

System Overview:
Highlights which system functions are operational. E.g. the image to the right depicts all services active.

Navigation Drawer:

Opens the navigate drawer to access other configuration pages.

Buttons:
Shutdown or restart
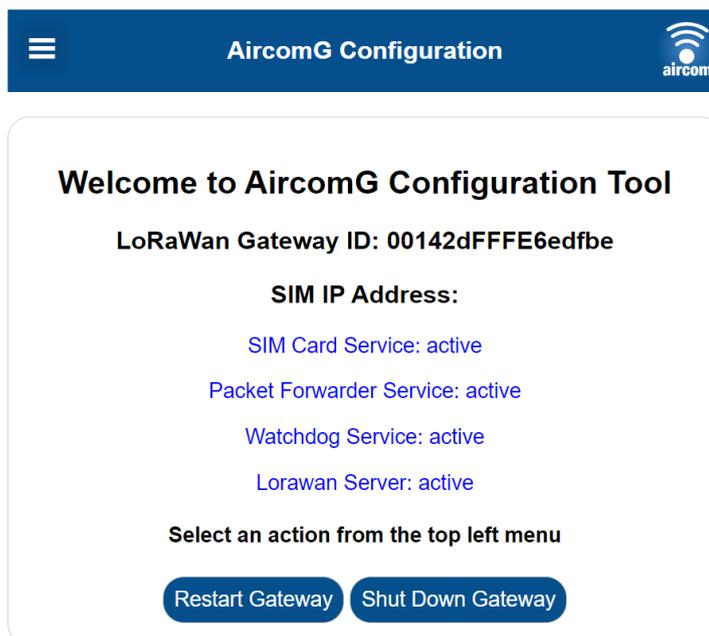
3.4 Navigation drawer

To navigate through the configuration pages, tap the Navigation Drawer button:

After tapping the button, the Navigation Drawer will open:

Home:

Opens the Home page

Devices:

This page is for adding LoRaWAN devices to Modbus variants of the Gateway.

Config:

This page is the location to configure Modbus or cellular services.

Update:

This page is utilised for updating the gateway firmware.

Debug:

Shows live LoRaWAN frames for Modbus type variants of the gateway.

MB Map:

Shows the full configured Modbus Map for Modbus type variants of the gateway.
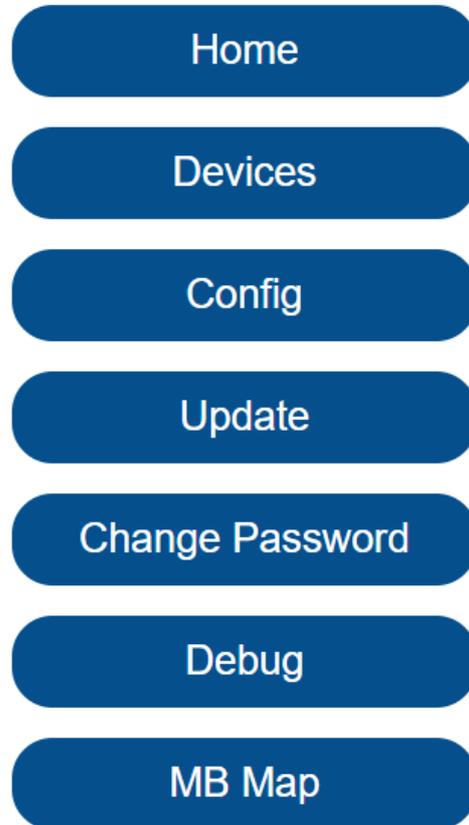
Certain types of gateway will have less pages available. For example, the Packet Forwarder (Type F) Gateway will only require / have the Home, Config, Update and Change Password pages.

3.5 Devices page

ℹ️ The devices page is only utilised for "M" type or Modbus type gateways. This function allows for LoRaWAN devices to be added to the Aircom Gateway local server. The LoRaWAN data for these devices is then converted to Modbus RTU or TCP/IP.

The Devices page allows for LoRaWAN devices to be added and configured to the Modbus Type LoRaWAN gateway. This page will display all the devices currently added and will allow the following functions.

Add Device

Allows the user to add new LoRaWAN devices.

Edit device.

Delete device.

3.5.1 Adding a device

After tapping the add device button the new device configuration page will open. The user will then be required to enter:

Device EUI:
The LoRaWAN device EUI that the user intends to add.

Device Name:
The name that the gateway will assign the device.

Type:
The device make / model. The Aircom gateway will include a library of pre-configured device types.

ℹ️ The Aircom gateway comes pre-configured with a library of LoRaWAN devices (Type). If the user wishes to use a device not on the library, please contact our team to have the device added to the library.

3.5.2 Configuring a device

Once a device is added a new configuration page for that device will be created. This page will differ dependant on the device but the key items to configure are:

1. LoRaWAN EUI and App Key
2. Assign values to Modbus registers*
3. Other specific features of the device

ℹ️ The Modbus / "M" type Aircom gateway is designed to convert LoRaWAN data to Modbus. When configuring devices, the values from said devices will require assigning to Modbus registers. See **Assigning Modbus Registers**.

LoRaWAN EUI & App Key

Device EUI:

The LoRaWAN device EUI that the user intends to add.

Device Name:

The name that the gateway will assign the device.

App Key:

128-bit Hexadecimal encryption key. Standard LoRaWAN AES128 App Key.

Type:

The device make / model. The Aircom gateway will include a library of pre-configured device types.

Device Configuration

Device EUI: `9200CBFEFFE70FFE`

Device Name: `Test`

App Key: `79C9731C4EBF128F864231DD28DFD2`

Type: `Aircom ⌄`

Assigning Modbus Holding Registers

Each device type will require its data (e.g. sensor data) assigned to Modbus registers. The image to the right depicts a typical Aircom type device. The Aircom has 32bit values that will occupy two registers per value. Hence each value will be spaces by two registers as show on the image.

The assigned holding registers will occupy registers from 40001 – 49999 (mirrored for 30001 – 39999).

Each device type will have guidance on the configuration page for how to define the Modbus registers.

PV1 (2 Regs) : `29`

PV2 (2 Regs) : `31`

PV3 (2 Regs) : `33`

PV4 (2 Regs) : `35`

PV5 (2 Regs) : `37`

Counter 1 (2 Regs) : `39`

Counter 2 (2 Regs) : `41`

Battery Voltage (2 Regs) : `43`

Temperature (2 Regs) : `45`

Device Time (2 Regs) : `47`

Assigning Modbus Discrete Input Registers

Some devices will utilise discrete inputs (e.g. digital inputs). The example to the right shows the Aircom type device.

The assigned registers will occupy registers from 10001 – 19999 (mirrored for coils table 00001 – 09999).

Each device type will have guidance on the configuration page for how to define the Modbus registers.

Digital 1 : 5

Digital 2 : 6

Digital 3 : 7

Digital 4 : 8

Other Functions

Some devices may have additional features to configure. For example, the image to the right shows the digital fault detection for an Aircom type device. This feature works as follows:

Fault Detection

Digital Fault Value: 0

Register Fault Value: 65535

Timeout (min): 0

Please enter "0" to disable

Digital Fault Value:

The digital input condition that is defined as a fault. In the example image to the right 0 is defined as the fault condition.

Register Fault Value:

The value that will be assigned to the Modbus register in fault condition. In the example image to the right 65535 is defined as the fault value.

Timeout (min):

Time period for loss of data. For example, if this was set as 10, after 10 minutes of no data the gateway would assign registers to the above defined fault values. If 0 is entered in this field it disables the Fault Detection feature. If this is set as 0 the gateway will continue to report the values contained in the last LoRaWAN packet received.

Saving the Configuration

Once the user is happy with the configuration tap the "Save" button at the bottom of the page.

A blue text indication will confirm the device has been added / saved.

Save

Device successfully added.

3.6 Config page

Depending on the type of gateway the configuration page will have different features. The key differentiators are as follows:

- **Type F – Pack Forwarder –** Allows access to the "Setup Packet Forwarder" page, for configuration of conventional packet forwarding type LoRaWAN gateways. Please note the packet forwarding gateway supports Semtech UDP packet forwarding protocol (others possible on request).
- **Type M – Modbus –** Allows access to the Modbus configuration, this option includes for the LoRaWAN server to be hosted locally on the gateway and to convert LoRaWAN packets into Modbus TCP/IP or RTU. The local server run on the Gateway is Chirpstack 3 and configured to work with devices that support LoRa 1.0.3.
- **Any Cellular option –** Allows access to the "Setup SIM Card" page, for gateways using cellular as a backhaul communication method.

Navigation

The Config page has additional sub-pages which are as follows:

Setup Packet Forwarder – Allows the user to define the LoRaWAN packet forwarding settings. See 3.6.2 Packet Forwarder.

Setup WiFi – Allows the user to change the WiFi Password. See 3.6.5 WiFi.

Setup SIM Card – Allows the user to set-up the SIM card. See 3.6.4 Cellular.

Restart Gateway – Restarts the gateway, this may be required for some configuration changes. The gateway will provide an indication when required.

3.6.1 Gateway Restart

The "Gateway Restart" function provides a watchdog on back haul communications. This function allows for the gateway to periodically check communication health and in the event of a failure, perform a restart on the communications service. This service is typically used for cellular applications in the event the cellular provider changes carrier settings which can result in communication issues. A typical remedy is for the cellular device to re-negotiate the connection, which the gateway restart function provides.

To access the gateway restart functions, on the config page tap the mode drop down list and select from the following options:

Do not restart:

Turns off the backhaul communications health check.

Set intervals:

The user defined a set time to periodically reset the backhaul communications. Typically used if other functions can't be.

Unsuccessful ping:

The user defines time intervals for the gateway to perform a ping test (over cellular or Ethernet) to a defined IP address. If the ping test is unsuccessful the gateway will restart the backhaul communications service.

No Modbus polls:

The user defines a time period for the gateway to monitor if a Modbus poll has been received. If after the set time period no Modbus poll has been received the gateway will restart the backhaul communications service.
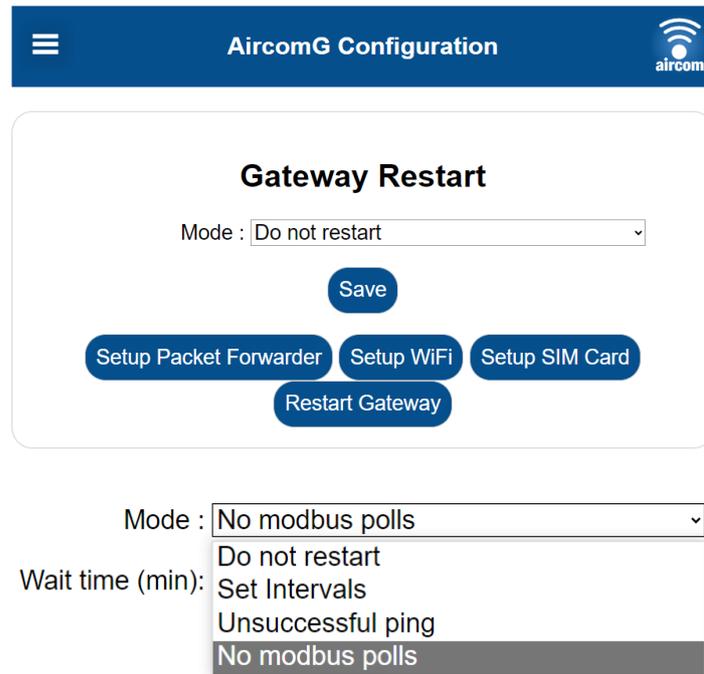
<table>
<tr><td colspan="2">≡   AircomG Configuration</td></tr>
<tr><td colspan="2">Gateway Restart

Mode : Do not restart

Save

Setup Packet Forwarder   Setup WiFi   Setup SIM Card
Restart Gateway</td></tr>
</table>

Mode : No modbus polls

Wait time (min):
- Do not restart
- Set Intervals
- Unsuccessful ping
- No modbus polls

Once the user has selected the preferred restart gateway function they will be required to define the "wait time" in minutes. The Gateway will check for fault criteria every 1 minute. The wait time is the time the gateway will restart after constant fault conditions. For example, if this time is set as 10 minutes the gateway will check status every 1 minute but will only restart if the fault persists for 10 minutes. At any time the health check is positive the wait time will reset. The unsuccessful ping test will additionally require a designated IP address to test the communications. This IP address can be a user's server or other service. It is advisable to use a reliable service for this test (e.g. a google ping test server can be utilised to test internet connectivity).

After the parameters are defined the user will need to tap the save button and restart the gateway.

Set intervals:

Mode : Set Intervals

Wait time (min): 60

Save

Unsuccessful ping:

Mode : Unsuccessful ping

Wait time (min): 60

Ping Hostname or IP: 127.0.0.1

Save

No Modbus polls:

Mode : No modbus polls

Wait time (min): 60

Save

3.6.2 Packet Forwarder

The packet forwarder configuration page allows the user to configure the destination for received LoRaWAN packets.

To access the packet forwarder configuration page, tap the "Setup Packet Forwarder" button at the bottom of the config page.

On this page the user will be able to define:

LoRaWAN Server:

The address of the targeted LoRaWAN server.

Port Up:

The server port for LoRaWAN uplinks.

Port Down:

The server port for LoRaWAN downlinks.

After the parameters are defined the user will need to tap the save button and restart the gateway.
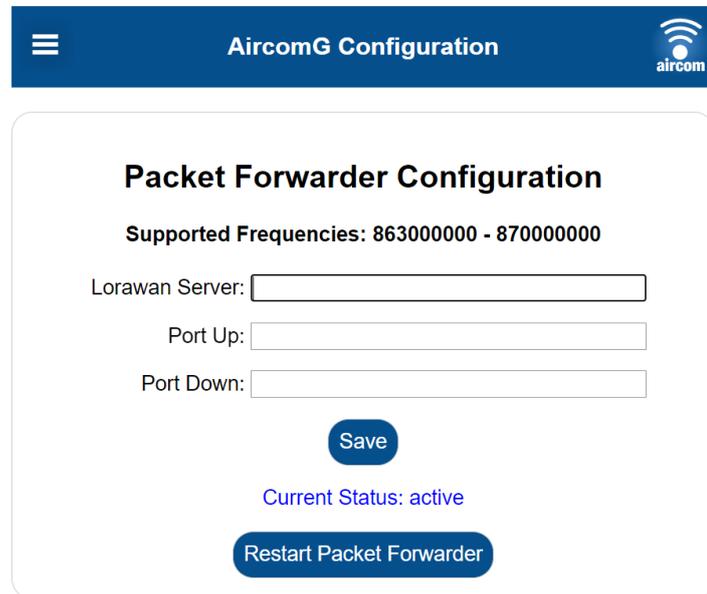
3.6.3 Modbus

Type "M" or Modbus gateways will include a Modbus configuration facility on the config page. This facility is to set the Modbus communication parameters for converting the LoRaWAN devices added to the gateway to Modbus. See 3.5 Devices Page.

Protocol:

The user can select between Modbus TCP/IP or Modbus RTU. The TCP/IP protocol can be connected either via Wi-Fi, Ethernet or Cellular. The Modbus RTU protocol will be connected over 2-wire RS485, See 2.6.4 I/O Terminals / RJ45 Port.

Modbus TCP/IP or RTU Settings:

This section allows the user to configure the TCP/IP Modbus settings, if the user selects Modbus RTU this section will change to "Serial Settings" and the user will be able to define the following settings for Modbus RTU:

Baudrate:	9600
Databits:	8
Stopbits:	1
Parity:	None
Timeout (sec):	1

Fault Detection:

The user can define values for unused registers and alarm set-points in the event communications is lost from the LoRaWAN devices:

- Unused Register (or Digital) Value – defines the value for all non-configured registers
- Radio Silence – defines a time period to stop Modbus communications in the event a LoRaWAN device stops communicating.
- Stop Modbus – If the "Radio Silence" defined time period expires the gateway will stop Modbus communications. If this is set as "No" the gateway will continue to report the last LoRaWAN packet received.

Gateway Restart:

See 3.6.1 Gateway Restart.

≡ AircomG Configuration

Modbus

Protocol:	Modbus over TCP/IP
Slave ID:	1
32bit Values Byte Order :	2143

TCP/IP Settings

Port:	502
Use RTU Framer:	No

Fault Detection

Unused Register Value:	65535
Unused Digital Value:	0
Radio Silence (min):	60
Stop Modbus:	No

Gateway Restart

Mode :	Do not restart

Save

Setup Packet Forwarder   **Setup WiFi**   **Setup SIM Card**
Restart Gateway

3.6.4 Cellular

Gateways with a cellular option will include a SIM Card Configuration page which will allow the user to define the Access Point Name for their desired SIM card / cellular provider.

APN:
Field to define the Access Point Name.

Username:
Field to define username if required.

Password:
Field to define password if required.

Refresh Refreshes SIM Card Status. The Gateway will display the following two messages for status:

Not Connected:
No ip found. There may be an issue with the SIM card. Please try to restart the service

Connected:
IP Address assigned to SIM card:
(user IP will be shown)

Restart Service Restarts the cellular service.
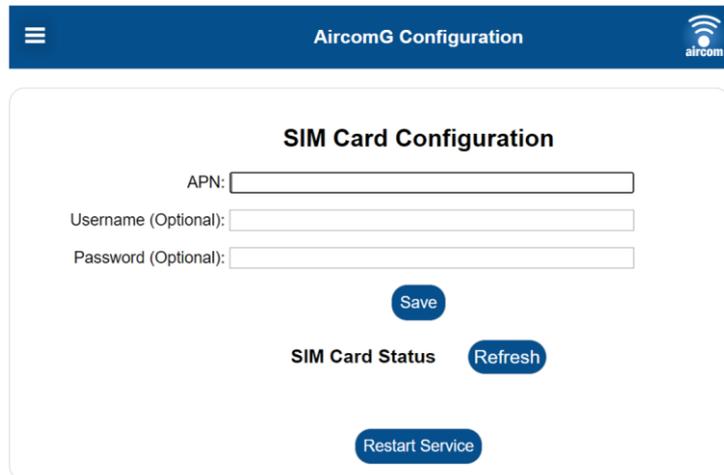
3.6.5 Wi-Fi

The Wi-Fi page allows the user to change the Wi-Fi access password.
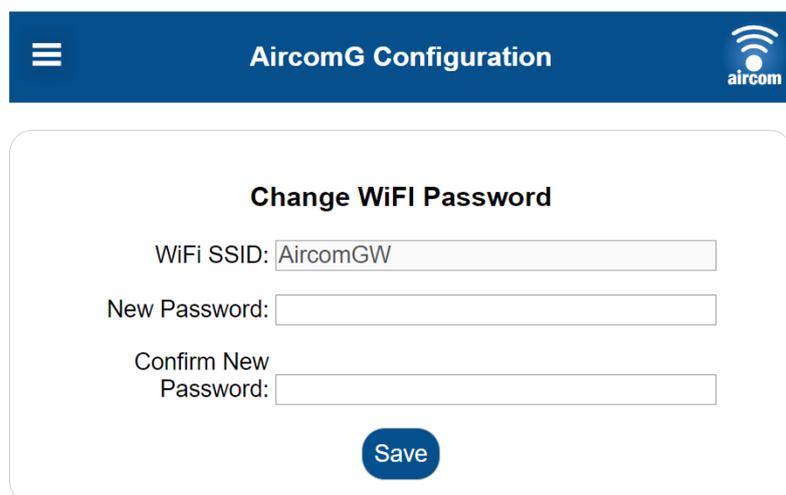
3.7 Update page

The firmware update page allows the user to manually update the gateway.

To update the firmware only use a firmware file provided by YZ Systems. Tap the "Choose File" button and navigate the connected devices file browser to the firmware file location. Once selected tap the Upload button and the gateway will prompt the user to apply. Once the apply button is tapped the gateway will perform the update and then automatically restart.
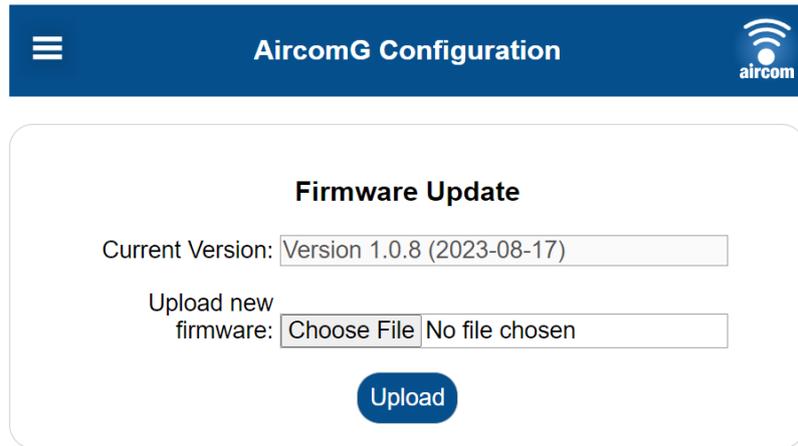
≡   AircomG Configuration

Firmware Update

Current Version: Version 1.0.8 (2023-08-17)

Upload new firmware: [Choose File] No file chosen

Upload

3.8 Change password page

The change password page allows the user to change the configuration portal (web browser) access password.
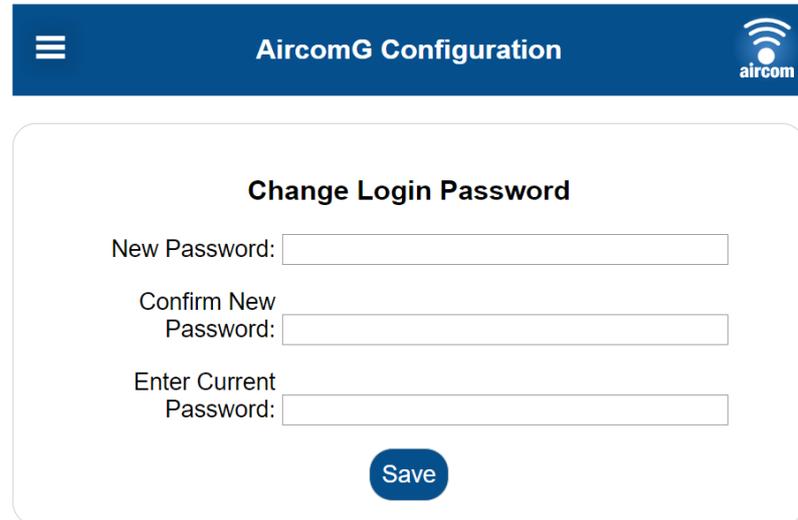
≡   AircomG Configuration

Change Login Password

New Password: [   ]

Confirm New Password: [   ]

Enter Current Password: [   ]

Save

3.9 Debug page

The debug page allows the user to see the latest LoRaWAN packets. To update the page while viewing tap the refresh button. The data is displayed in the table depicted to the right in order of the most recent packet.
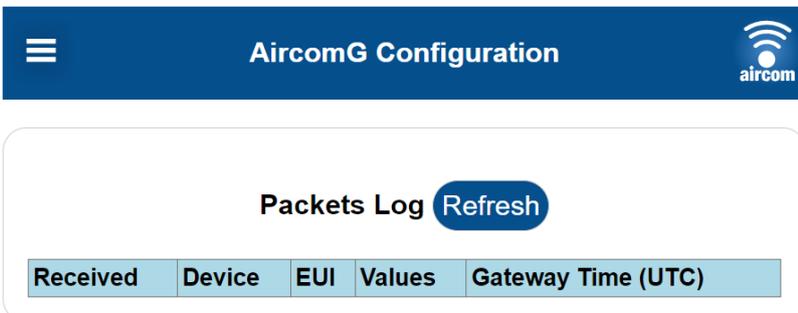
≡   AircomG Configuration

Packets Log Refresh

Received	Device	EUI	Values	Gateway Time (UTC)

3.10 MB map page

The MB map page (Modbus Map) shows the Modbus map for all the configured devices for a Modbus type Gateway. This page is not available on packet forwarding type gateways. The image to the right depicts an example map.

AircomG Configuration

Configured Modbus Map

Input and Holding Registers Tables (3xxxx / 4xxxx)

Register No	Device	Value
1	VEGAPULS_Air_41	NAMUR Status
2	VEGAPULS_Air_41	Measured Value
3	VEGAPULS_Air_41	Measured Value
4	VEGAPULS_Air_41	Unit
5	VEGAPULS_Air_41	Battery Capacity
6	VEGAPULS_Air_41	Temperature
7	VEGAPULS_Air_41	Angle
9	Aircom-1	PV1
10	Aircom-1	PV1
11	Aircom-1	PV2
12	Aircom-1	PV2

Coils and Discrete Inputs Tables (0xxxx / 1xxxx)

Coil/Input No	Device	Value
1	Aircom-1	Digital 1
2	Aircom-1	Digital 2
3	Aircom-1	Digital 3
4	Aircom-1	Digital 4

Part IV Maintenance

The Aircom Gateway has been designed to function with almost no maintenance. The only maintenance requirements are:

Terminals

It is recommended (but not essential) to check all wired terminals every 5 years to confirm secure and safe electrical termination.

Cable Entries

It is recommended to check all cable entries every 5 years to confirm all seals are secure and water tight.

External Antenna Connection

It is recommended to check the external antenna connection every 5-10 years to confirm all seals are secure and water tight. It is also recommended to check for signs of corrosion on the antenna connection, corrosion can reduce the signal strength and in some extreme cases result in a break of connection.

Battery

The internal watchdog battery has a design life of 10-15 years. This will depend on usage and may require replacement after the design life has expired.

Part V Troubleshooting

5.1 Common problems

Problem	Solutions
Can't connect to Gateway Wi-Fi	There are a few common issues that may arise when connecting to the Gateway Wi-Fi: • Has the gateway finished its start-up? Try waiting a further 60 seconds. • Only one device can connect to the Gateway Wi-Fi at a time, has another device automatically connected?
My device keeps disconnecting from the Gateway Wi-Fi	If using a mobile device to connect to the Gateway Wi-Fi it may have switched services. Mobile devices are designed to find internet connection and may switch from the Gateway Wi-Fi to find internet connectivity. Try turning off other services to avoid this issue (e.g. cellular, automatic Wi-Fi switching).
Services are shown as not active	Typically, on start-up certain services may take additional time to turn on. Try refreshing the screen to see an update. If the problem persists try rebooting the gateway.
The Gateway hasn't saved my configuration changes	Some configurations require the Gateway to be rebooted after the changes are saved. Try making the change again, save and reboot. The gateway will prompt the user to reboot / restart.
I'm trying to change certain configurations but the gateway is not updating.	Try refreshing the page.
My device won't join the local LoRaWAN network	There are a few possible scenarios which will cause this fault: • Is the gateway powered on and working? • Is the LoRaWAN service active? • Has the device been added properly? For Example: Ensure no accidental spaces have been added to the EUI or App Key, has the correct key been added to the LoRaWAN device.

5.2 Messages / warnings

Here is some further information about messages, warnings and how to resolve them.

Messages / Warnings	Screen(s)	Comments
Not Authorised	Multiple	Indicates a problem with the internal LoRaWAN server, try a software reboot.
-1 An error occurred with APIs authorization	Multiple	Indicates a problem with the internal LoRaWAN server, try a software reboot.
-2 Device not found	Multiple	When trying to edit the configuration of existing devices, it may indicate the gateway database of devices is not in sync with the internal LoRaWAN server. Try to remove the device and add it again.
-3 An error occurred while removing the device	Multiple	Indicates a problem with the internal LoRaWAN server, try again or, if persisting, try a software reboot.
-4 Unavailable	Multiple	When trying to add/edit devices, access the debug page or any other feature reserved to Modbus versions. It may indicate the LoRaWAN server is not yet active or has paused. Try again or if persisting, try a software reboot.
-5 LoRaWAN Server Unavailable	Multiple	Indicates that the internal LoRaWAN server is not running/accessible. This is normal for the first minute or so after boot-up, as the LoRaWAN server takes a moment to start up. However, after a few minutes it may indicate an issue with the LoRaWAN server. Try a software reboot.
The file uploaded is invalid or corrupted	Multiple	When uploading a firmware file. Indicates the file has been tampered with, discard and contact YZ Systems.
An error occurred while uploading the new firmware	Multiple	When uploading a firmware file. Try to upload the file again. If persists, send file to YZ Systems for inspection.
Update failed.	Multiple	When applying a firmware update. Try to upload the file again. If persists, send file to YZ Systems for inspection.

Part VI Declaration of conformity

DECLARATION OF CONFORMITY

YZ SYSTEMS®

Declaration Number:	WTP05-EDC-001, Rev 1.1

Address: Station House, Station Road, Barlaston, Stoke on Trent, ST12 9DQ

Product: **Aircom Gateway**

Aircom Gateways act as a bridge between Aircom® and a server so that data can be collected remotely from Aircom® end nodes.

Trade Mark: **Aircom** ®

Applicable Standards:

Reference	Description
EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 60215:1989/A1:1992 EN 60215:1989/A2:1994	Safety requirements for radio transmitting equipment
EN 301 489-1 V2.2.3 EN 301 489-3 V2.2.1	Protection requirements with respect to electromagnetic compatibility.
EN 300 220-1 V3.1.1 EN 300 220-2 V3.1.1	Means of the efficient use of the radio frequency spectrum

CE UKCA

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Part VII Technical data

7.1 Data sheet

General

Material	ABS
Weight	1.3kg
Dimensions (Without Antenna)	260mm H x 120mm W x 75mm D
Dimensions (With Antenna)	782mm H x 120mm W x 75mm D
Ingress Protection	IP68, NEMA 4X*
Permissible ambient temperatures	-40°C - 60°C / -40°F - 140°F

Approvals / Certification

Directives	CE, UKCA, FCC, IC, GCF & others
Standards	EN 301 489-1 V2.2.3, EN 301 489-3 V2.1.1, EN 300 220-1 V3.1.1, EN 300 220-2 V3.2.1

Power

AC	110-240VAC, 15Wpeak (4-6W average)
DC	9-36VDC, 15Wpeak (4-6W average)
UPS	3.6V, 600mAh. 5mins autonomy for safe shutdown in LOP situation

Communications

LoRaWAN	EU 868MHz, US 915MHz, AS 923MHz, 6DBI Antenna
Cellular	3G, 4G LTE 150Mbps (DL) / 50Mbps (UL)
Modbus	RTU and TCP/IP
Wi-Fi	IEEE 802.11 ac/a/b/g/n, Dual Band 2/4/5 GHz
Ethernet	10/100 MBits

Inputs / Outputs

x2 Analogue Channels	x2 4-20mA Passive (15V @ 50mA)/Active or 0-30V (500V Galvanically Isolated)
x2 Digital Input Channels	x2 Volt-Free Input (powered channel 15V @ 50mA) or x2 Voltage Input (500V Galvanically Isolated)
x1 Serial Comms Channel	RS485 2-wire (500V Galvanically Isolated)
x1 Ethernet Comms Channel	RJ45 socket

Inputs / Outputs

CPU	Arm Cortex-A35, 2 Core, 1.2GHz
RAM	1 GByte, 2400 MT/s, 1x16bit
Memory	4 GByte
Operating System	Linux

Note: *IP68 only if IP68 glands and plugs are correctly installed.*

GATEWAY USER MANUAL
WTP05

An Ingersoll Rand Business