User Guide

Vaisala Multi-Observation Gateway

MOG100

VAISALA

Table of Contents

1. About This Document

1.1 Version Information

This document provides information about the installation and operation of Vaisala Multi-Observation Gateway MOG100.

Table 1   Document Versions

Document Code	Date	Description
M211951EN-C	June 2018	• Beacon View changed to Beacon Cloud • Beacon Cloud web address update

M211951EN-B	February 2018	• MOG100 registration instructions updated.
		• New 3.5G modem in MOG100.
		• Change of UI application names:
		   • AQ-View changed to Beacon View.
		   • AQT Configuration Tool changed to AQ Tool.

M211951EN-A	February 2017	First version.

1.2 Related Manuals

Table 2   Related Manuals

Document Code	Name
M211942EN	*Vaisala Air Quality Transmitter AQT400 Series User Guide*
M212056EN	*Vaisala Multi-Observation Gateway MOG100 Configuration Guide*
M212019EN	*Vaisala Observation Network Manager NM10 Configuration and Maintenance Manual*
M211840EN	*Vaisala Weather Transmitter WXT530 Series User Guide*

The documentation is available online at www.vaisala.com.

1.3 Documentation Conventions

> **WARNING! Warning** alerts you to a serious hazard. If you do not read and follow instructions carefully at this point, there is a risk of injury or even death.

CAUTION! Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

Note highlights important information on using the product.

Tip gives information for using the product more efficiently.

Lists tools needed to perform the task.

Indicates that you need to take some notes during the task.

1.4 Trademarks

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All other product or company names that may be mentioned in this publication are trade names, trademarks, or registered trademarks of their respective owners.

2. Product Overview

2.1 Vaisala Multi-Observation Gateway MOG100
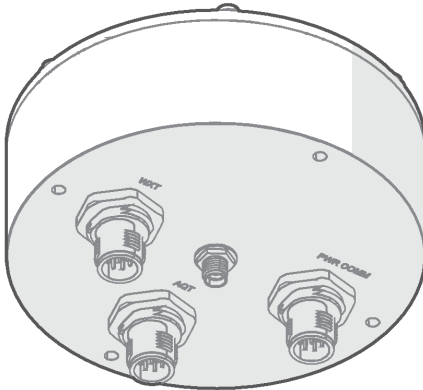
Vaisala Multi-Observation Gateway MOG100 is a gateway and logger device for Vaisala Air Quality Transmitter AQT400 Series and Vaisala Weather Transmitter WXT530 Series. MOG100 includes the following components:

- GSM module for wireless communication
- Battery regulator for solar panel and battery input
- Memory for data logging and local buffering

MOG100 sends the measuring data from the air quality or weather transmitters to Vaisala Beacon Cloud, Vaisala Observation Network Manager NM10, and third-party servers, using the integrated 3.5G (4-band GSM) cellular modem. MOG100 communicates using the secure HTTP over TCP/IP protocol (HTTPS).

MOG100 is enclosed in an IP66-rated weatherproof aluminum casing and can be installed outdoors. The unit has dedicated connectors for AQT400, WXT530, and for power and maintenance.

Table 3 MOG100 Options and Accessories

Option	Details	Order Code
MOG100 unit	-	
4G/3G/2G GSM antenna	-	250327
Mounting kit	-	ASM211983
Sensor cable, M12/8(F)-open for power/maintenance	5 m (16 ft 5 in)	223283

Option	Details	Order Code
Sensor cable, M12/8(F)-M12/8(F) for AQT400/WXT536	0.8 m (2 ft 7 in)	248086
	1.8 m (5 ft 10 in)	248090
Optional Accessories		
Mounting kit for pole mast	For 60 mm (2.36 in) pole	APPKP60-SET1/2
	For 75 mm (2.95 in) pole	APPKP75-SET1/2
	For 86 mm (3.39 in) pole	APPKP86-SET1/2
	For 100 mm (3.94 in) pole	APPKP100-SET1/2
Sensor cable, M12/8(F)-M12/8(F) for WXT536	5 m (16 ft 5 in)	248091
Service cable kit, including adapter, cable, power supply, and USB-RS-232 converter	-	253163SET

2.2 Safety

This product has been tested for safety. Note the following precautions:

WARNING! Do not substitute parts or modify the system, or install unsuitable parts in the system.

WARNING! Do not perform installation or maintenance procedures when there is a risk of thunderstorm or lightning activity in the area.

WARNING! Follow the risk assessments you have carried out for the installation work. To ensure safety, make sure that all work is organized and planned, and carried out by competent persons.

WARNING! Follow local and state legislation and regulations on occupational safety.

> ✋ **WARNING!** Failure to comply with these precautions or with specific warnings elsewhere in these instructions violates safety standards of design, manufacture, and intended use of the product. Vaisala assumes no liability for the customer's failure to comply with these requirements.

> ✋ **WARNING!** If the equipment is used in a manner not specified by Vaisala, the protection provided by the equipment may be impaired.

2.2.1 ESD Protection

Electrostatic Discharge (ESD) can damage electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects in the equipment housing.

To avoid delivering high static voltages to the product:

- Handle ESD-sensitive components on a properly grounded and protected ESD workbench or by grounding yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either precaution, touch a conductive part of the equipment chassis with your other hand before touching ESD-sensitive components.
- Hold component boards by the edges and avoid touching component contacts.

2.3 Regulatory Compliances

This product complies with the following performance and environmental test standards:

- EN/IEC 61326-1
- EN 55032 Class B

2.3.1 Applicable European Directives

The device is in conformity with the following EC directives:

- RoHS Directive 2011/65/EU
- REACH Directive 2006/121/EU
- EMC Directive 2014/30/EU
- RE Directive 2014/53/EU(*)

* When applicable, the product conforms to the corresponding RED articles:

RF spectrum efficiently, Article 3 (2); EMC, Article 3 (1b); Safety, Article 3 (1a)

This product complies with the following test standards:

- IEC/EN 61326-1
- EN 55032 Class B / CISPR 32

Compliance with the following test standards is derived from Telit HE910 cellular module's declaration of conformity:

- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- EN 62311:2008
- EN 301 489-1 V2.1.1, Draft EN 301 489-52 V1.1.0
- Final draft EN 301 489-3 V2.1.1
- EN 300 440 V2.1.1 / EN 301 511 V12.5.1
- EN 301 908-1 V11.1.1 / EN 301 908-2 V11.1.1

To comply with RE directive one must use only the antenna provided with the product package.

2.3.2 FCC Compliance

This product contains a transmitter module FCC ID RI7HE910.

MOG100 complies with FCC Chapter 47 Part 15, 22H, 24E and 27. Operating is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

> This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.3.3 Official Modem Identification

This product contains part identified as follows by national authorities:

- FCC ID: RI7HE910
- IC ID: 5131A-HE910
- GITEKI (MIC) ID: 005-100269
- JATE ID: AD12-0318001

3. Overview to Configuration and Installation

First set up MOG100 configuration and verify that it is sending data. Next, install MOG100 to the selected location.

In configuring MOG100 you need:

- Laptop computer
- Mobile phone or another device for unlocking SIM
- Mobile subscription from service provider, including SIM card
- T10 Torx key

In installing MOG100 you need:

- 5-mm Allen key
- T10 Torx key
- Crosshead screwdriver

4. Configuration

4.1 Installing SIM Card

- Mobile phone or another device for unlocking SIM
- Mobile subscription from service provider, including SIM card
- T10 Torx key

To enable wireless communication, install the SIM card in MOG100.

1. Insert the SIM card in a mobile phone or a similar device and disable the PIN code query (SIM card lock). Remove the SIM card from the phone.

2. Remove the 6 screws that hold the cover of MOG100.
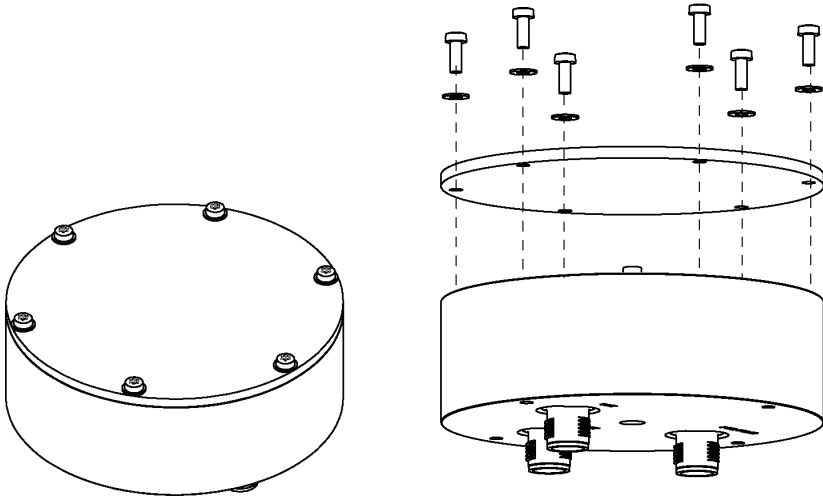
3. To unlock the SIM card holder, push and lift it.

4. Insert the SIM card on the device with the chip facing down.

5. To lock the SIM in place, turn the SIM card holder down and push to locking position.

6. Reattach the cover and tighten the 6 screws.

7. Connect the GSM antenna to the antenna connector in the middle.
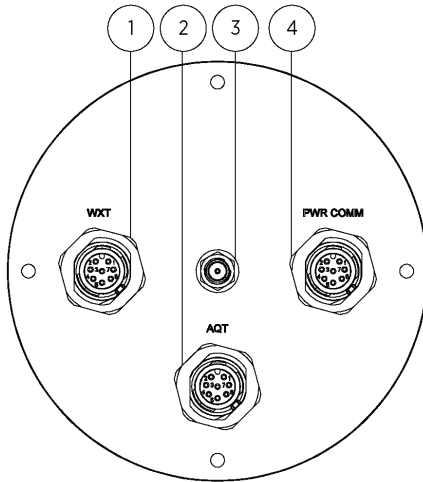
Figure 1   MOG100 Connectors

1	M12 connector for WXT530
2	M12 connector for AQT400
3	SMA connector for GSM antenna
4	M12 connector for power and maintenance

4.2 Installing AQ Tool

You need a computer with one of the following operating systems:

- Microsoft Windows 7
- Microsoft Windows 8
- Microsoft Windows 10

With AQ Tool, you can configure where AQT400 sends measurement data.

1. Search www.vaisala.com downloadable files for "AQT" and save the AQ Tool installer on your computer (AQT Configuration Tool + USB Driver).

2. Unpack the files and double-click the EXE file to start the installer. If prompted about trusting the program, select **Run**.

3. Follow the onscreen instructions and accept the default installation location or select **Browse** to select a different location.

4. To complete the installation, select **Finish**.

4.3 Establishing Maintenance Connection

To change and check MOG100 settings, establish a maintenance connection with RS-232 and AQ Tool.

▶ 1. Use the service cable kit to connect your computer to the **PWR COMM** connector in MOG100.

> ℹ️ Leave the protective caps on the connectors in MOG100 that you are not going to use.
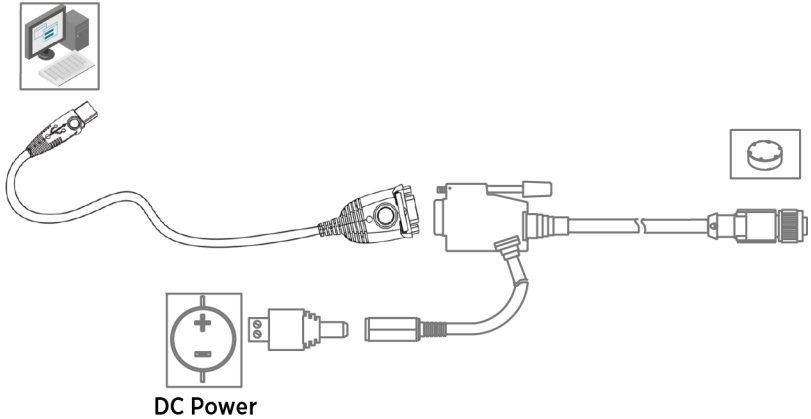
DC Power

2. Connect the open-ended cables of the power source to the adapter and attach the adapter to the DC power connector.

Wire Color	Power
Red	+
Black	−

Alternatively, connect your own power source directly to the DC power connector.

3. On your computer, select **Start > AQ Tool**.

4. To connect to the device, select **Connect** in AQ Tool.

AQ Tool shows the device information in **Communication** and **Configuration**.

4.4 Configuring Wireless Communication

Before configuring wireless communication, make sure that you have installed the SIM card and AQ Tool, and established a maintenance connection.

> ℹ️ Make sure to disable the PIN code query, for example, with a mobile device.

To enable wireless connection, define the APN settings using AQ Tool.

▶ 1. In AQ Tool **Configuration**, set the following parameters:

Parameter	Alias	Description
GSM APN address	gsm_apn	Access point name (APN) supplied by the SIM card provider.
GSM username	gsm_username	Username supplied by the SIM card provider. If not supplied, leave empty.
GSM password	gsm_password	Password supplied by the SIM card provider. If not supplied, leave empty.

2. To save the edited parameters in AQ Tool, select **Write to eeprom**.

3. Connect power and wait for 15 ... 30 minutes for the device to start sending data to Beacon Cloud. The device starts to collect data and you can view the data in Beacon Cloud when you have registered the device.

4.5 Registering MOG100 in Beacon Cloud

Before you start the registration, make sure that MOG100 has been connected to a power source for 15 ... 30 minutes so that the device has started to send data to Beacon Cloud.

Registering MOG100 links the device with a user account in Beacon Cloud.

▶ 1. Locate the test report that is in the product package.

2. In the test report, scan the QR code, for example, with your mobile device.
   Beacon Cloud shows the service number and device key. Check that they match with the ones in the test report.

3. If you are new to Beacon Cloud, select **Create Account** and give the required information.
   Beacon Cloud sends an email that contains the username and password.
   If you have a user account in Beacon Cloud, log in to complete the registration.

4. Alternatively, if you cannot use the QR code, go to http://beacon.vaisala.com/mobile.php.

   a. Give the serial number and device key and select **Next**.

   b. Continue from step 3.

   Beacon Cloud confirms whether the registration was successful.

5. In **Overview** in Beacon Cloud, check that MOG100 is listed and its status is **Active**.

If you have multiple devices, repeat the procedure using the QR code or in Beacon Cloud, select **Overview > Add Device**.

Disconnect the service cable.

5. Installation

5.1 Installing MOG100

> **ℹ** Install MOG100 to a different height and away from the air quality transmitter.

First attach the mounting bracket on a mast, sensor support arm, or wall, depending on your choice of installation, and then attach MOG100 on the mounting bracket:

- Installing Mounting Bracket on 60 ... 100-mm Mast (page 16)
- Installing Mounting Bracket on Sensor Support Arm or 35 ... 40-mm Mast (page 16)
- Installing Mounting Bracket on Wall (page 18)
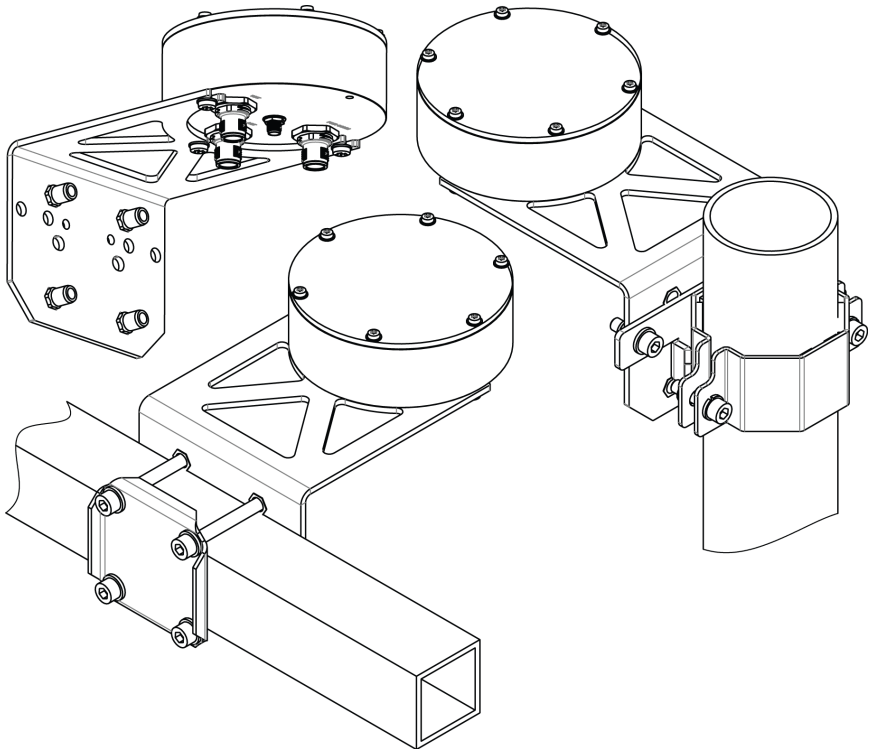- Installing MOG100 on Mounting Bracket (page 18)

Figure 2   MOG100 Installation Options

5.1.1 Installing Mounting Bracket on 60 ... 100-mm Mast

> ✕ • 5-mm Allen key

> ℹ For optimum installation, the material of the tube or mast is a minimum of 3 mm (0.12 in) thick and the outside diameter of the tube or mast is 60 ... 100 mm (2.36 ... 3.94 in).

For masts with a diameter of 60 ... 100 mm (2.36 ... 3.94 in), use the APPKP mounting kit. The options are:

- APPKP60-SET1/2: Ø 60 mm (2.36 in) pole mast
- APPKP75-SET1/2: Ø 75 mm (2.95 in) pole mast
- APPKP86-SET1/2: Ø 86 mm (3.39 in) pole mast
- APPKP100-SET1/2: Ø 100 mm (3.94 in) pole mast

▶ 1. Attach the mounting bracket to the clamp and mount the assembly on the mast.

1   Mounting bracket
2   Clamp
3   Nut DIN985 M6 (2 pcs)
4   Washer DIN125 M6 (4 pcs)
5   Spring washer DIN127 M6 (2 pcs)
6   Hex screw DIN912 M6×16 (2 pcs)
7   Nut DIN929 M6 (2 pcs)
8   Spring washer DIN127 M6 (2 pcs)
9   Hex screw DIN912 M6×25 (2 pcs)

5.1.2 Installing Mounting Bracket on Sensor Support Arm or 35 ... 40-mm Mast
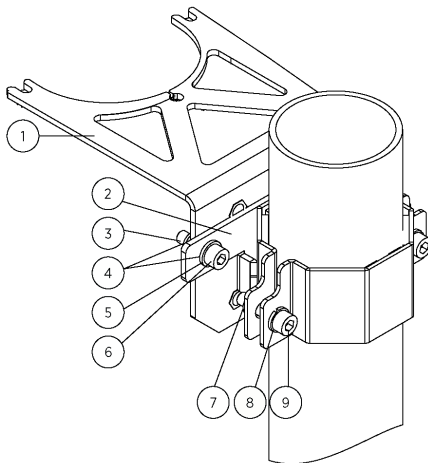
> ✕ • 5-mm Allen key

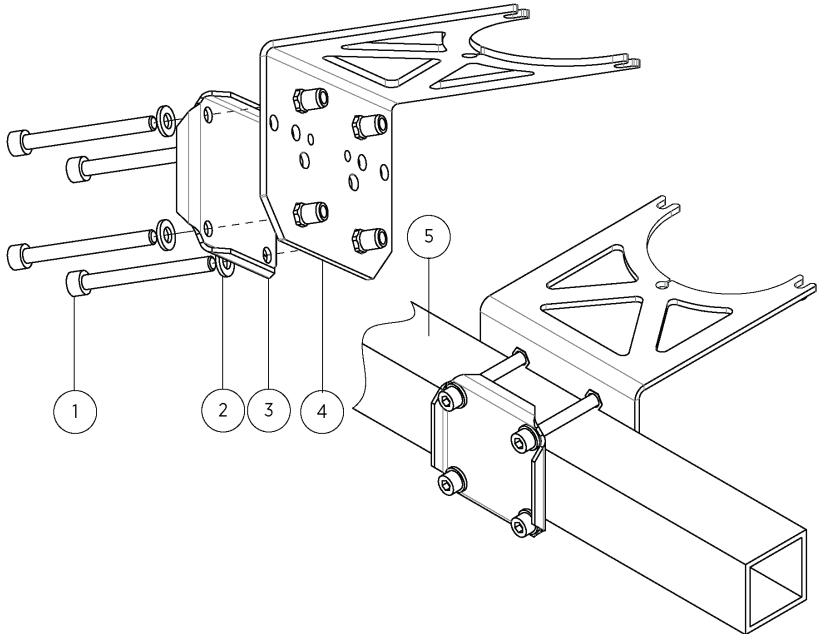> For optimum installation, the material of the tube or mast is a minimum of 3 mm (0.12 in) thick and the outside diameter of the tube or mast is 35 ... 40 mm (1.38 ... 1.57 in).

▶ 1. Attach the mounting bracket on a sensor support arm or mast.

1   Sockethead hex screw M6×60 DIN912 A4 (4 pcs)
2   Flat washer A6,4 DIN125 A4 (4 pcs)
3   Clamp plate
4   Mounting bracket
5   Sensor support arm

5.1.3 Installing Mounting Bracket on Wall

- Screws (2 pcs), suitable for the wall material
- Screwdriver

1. Drill holes into the wall. Use the mounting bracket as a guide.
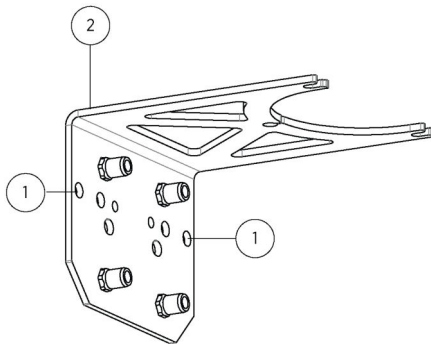
1   Hole for wall mounting (2 pcs)
2   Mounting bracket

2. Attach the mounting bracket on a wall.
   Use wall plugs if necessary, and screws that are suitable for the wall material.

5.1.4 Installing MOG100 on Mounting Bracket

- Crosshead screwdriver
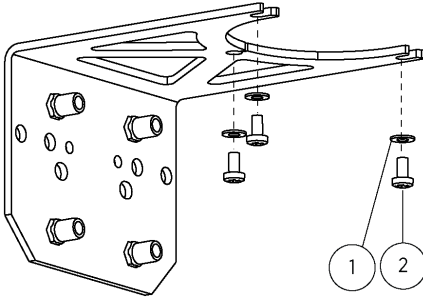
Figure 3   Mounting Bracket Installation Accessories

1   Flat washer A4,3 DIN125 A4 (3 pcs)
2   Crosshead screw M4×8 DIN7985 PZ A4 (3 pcs)

▶   1. Insert 2 screws and washers in the holes next to the **WXT** and **PWR COMM** connectors. Leave the screws about 5 mm (0.20 in) from the surface of the unit.
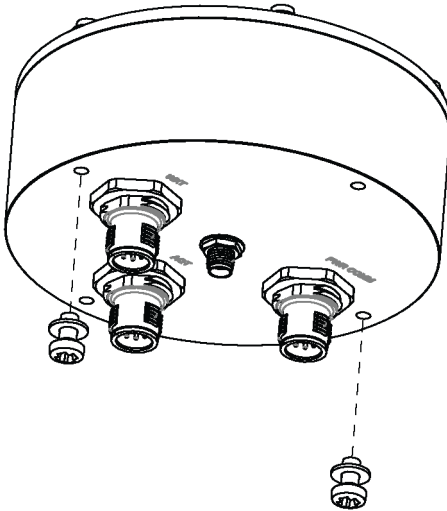
2. With the **AQT** connector facing the mounting kit, push the screws to the corresponding slots in the mounting bracket.
   Make sure that the hole in the mounting bracket aligns with the hole next to the **AQT** connector.
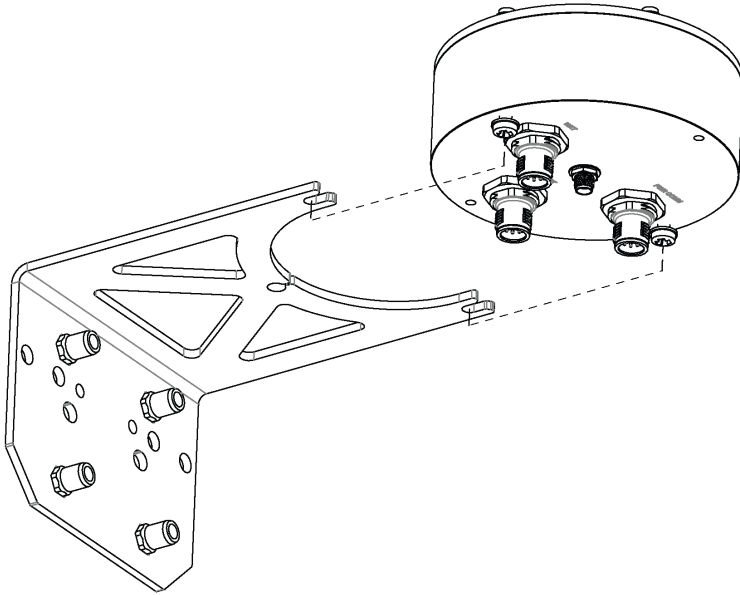
3. Insert the third screw and washer in the hole in the mounting bracket and attach it to MOG100. Tighten the screw.
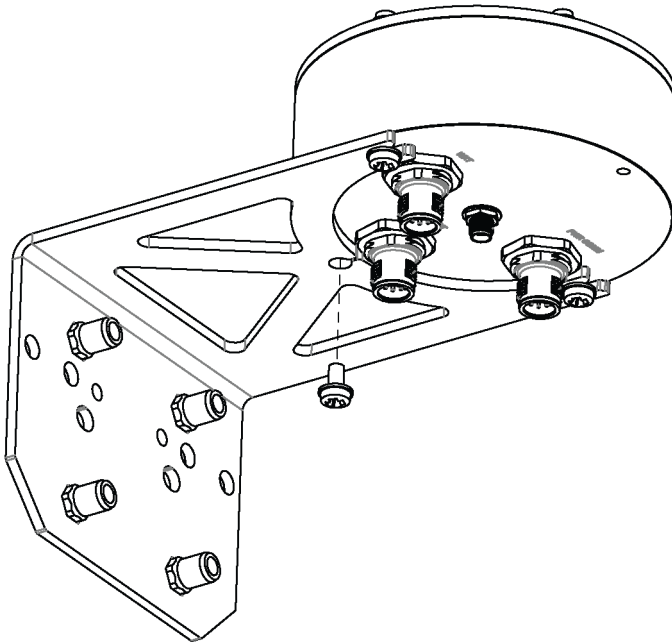
4. Tighten the other 2 screws and make sure that MOG100 is firmly attached to the mounting bracket.

5.2 Installing AQT400/WXT530

1. Install the devices as described in:
   - *Vaisala Air Quality Transmitter AQT400 Series User Guide*
   - *Vaisala Weather Transmitter WXT530 Series User Guide*

5.3 Connecting Cables and Powering

Only use the recommended cable types and lengths.

> ℹ️ Leave the protective caps on the connectors that you are not going to use.
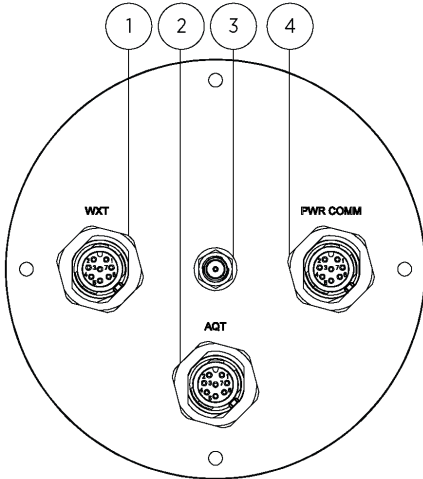
Figure 4   MOG100 Connectors

1   M12 connector for WXT530
2   M12 connector for AQT400
3   SMA connector for GSM antenna
4   M12 connector for power and maintenance

1. Connect AQT400 to the **AQT** connector using the M12 female-to-female sensor cable. Manually tighten the outer sleeve.

2. Connect WXT530 to the **WXT** connector using the M12 female-to-female sensor cable. Manually tighten the outer sleeve.

3. Connect the GSM antenna to the antenna connector in the middle, if you have not already done so.

4. Connect the blue (-) and red (+) wires to the 8 … 30 VDC power input. Connect the sensor cable to the **PWR COMM** connector in MOG100. Manually tighten the outer sleeve.

M12 Pin	Wire Color	PWR COMM
7	Blue	GND IN
8	Red	PWR IN

5. Connect the mains power cable to your powering equipment.

6. Confirm that the system is powered and wait for 15 … 30 minutes for the device to start sending data to Beacon Cloud. The device starts to collect data and you can view the data in Beacon Cloud.

5.4 Verifying Installation

To verify the installation, connect to AQT400/WXT530 with Beacon Cloud.

▶ 1. To use Beacon Cloud, go to https://beacon.vaisala.com/.

2. To log in to Beacon Cloud, type your **Username** and **Password** that are in your email, and select **Log in**.

3. To view measurement data and manage your devices, select **Devices**.

4. For more information, see *Vaisala Air Quality Transmitter AQT400 Series User Guide*.

6. Troubleshooting

If the product does not work as it should, check all cables and connectors for continuity, bad contacts, or corrosion.

If the failure persists, contact Vaisala technical support.

Table 4   Troubleshooting MOG100

Problem	Probable Cause	Remedy
GSM communication does not work.	PIN code checking is enabled.	Disable PIN code checking, for example, with a mobile device. See Installing SIM Card (page 10).
	The APN settings are wrong.	Check the APN settings. See Configuring Wireless Communication (page 13).
	The real-time clock is out of sync.	Connect to MOG100, and select **Set to UTC** in AQ Tool.
Beacon Cloud shows no data after registration.	Linking between device and account was not made in Beacon Cloud.	Turn MOG100 on and wait 15 ... 30 minutes to allow for it to start sending data. Try registering MOG100 again. See Registering MOG100 in Beacon Cloud (page 13). If the registration is still unsuccessful, check GSM communication. See Installing SIM Card (page 10).
Devices are not powered.	-	Check cables and power input.

6.1 Writing Problem Report

When troubleshooting the product, write a problem report including:

- What failed (what worked / did not work)?
- Where did it fail (location and environment)?
- When did it fail (date, immediately / after a while / periodically / randomly)?
- How many failed (only one defect / other same or similar defects / several failures in one unit)?
- What was done when the failure was noticed?
- What was connected to the product and to which connectors?
- Input power source type, voltage, and list of other items (such as lighting, heaters, and motors) that were connected to the same power output.
- Are all parts connected and grounded properly? Take a photo to help the troubleshooting.

7. MOG100 Specifications

Table 5   Operating Environment

Property	Description/Value
Operating temperature	−30 ... +50 °C (−22 ... +122 °F)
Operating humidity	0 ... 100 %RH

Table 6   Inputs and Outputs

Property	Description/Value
Operating voltage	8 ... 30 VDC
Power consumption	Typical: 80 mW Maximum: 5 W
Power and data connector	Standard 8-pin M12 male

Table 7   Data Connection Specifications

Property	Description/Value
Data protocols	Secure HTTP (HTTPS)
Serial data interface	RS-485
Terminal connection interface	RS-232
2G/3G connection for Internet protocols	Quad-band 850/900/1800/1900 MHz GSM/GPRS/EDGE 800/850/900/AWS1700/1900/2100
GSM/UMTS references	FCC 47 parts 15 and 24 EN 301 511 EN 301 489-1/7 EN 60950-1:2006

Table 8   Mechanical Specifications

Property	Description/Value
Dimensions (H × Ø)	50 × 100 mm (1.97 × 3.94 in)
Weight	500 g (1.10 lb)
Housing material	Aluminum

Table 9   Compliance

Property	Description/Value
EMC	EN/IEC 61326-1 EN 55032 Class B
IP rating	IP66

Table 10   Telit Radio Module Specifications

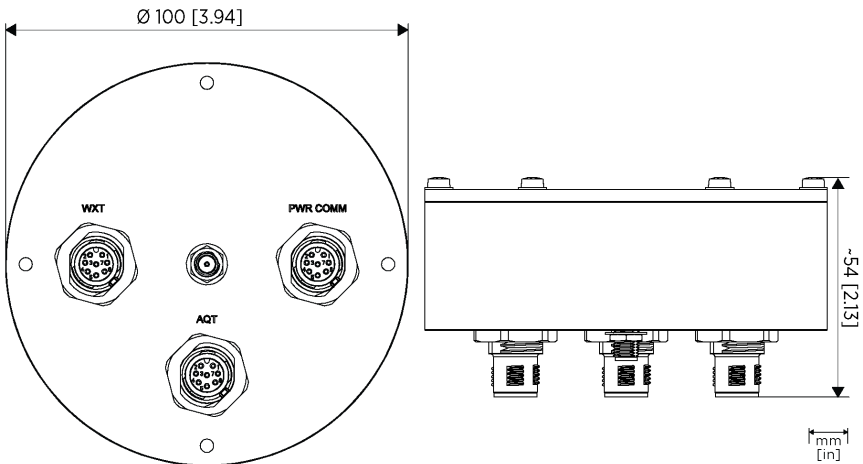| Property	Description/Value
Model	HE910-GL
Frequency bands	800/850, 900, AWS 1700, 1900, 2100 MHz
SIM card type	Micro-SIM
Acceptance	FCC (USA), IC (Canada)
	FCC ID: RI7HE910GL
	IC ID: 5131A-HE910GL

Figure 5   Product Dimensions

Warranty

For standard warranty terms and conditions, see www.vaisala.com/warranty.
Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

Technical Support

Contact Vaisala technical support at helpdesk@vaisala.com. Provide at least the following supporting information:

- Product name, model, and serial number
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see www.vaisala.com/support.

Recycling

Recycle all applicable material.

Follow the statutory regulations for disposing of the product and packaging.

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