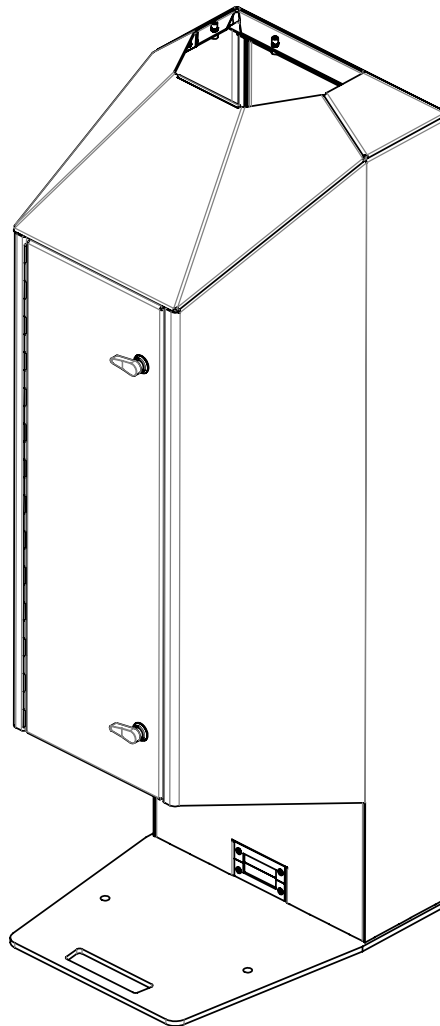


Installation Guide

Vaisala Lidar Ceilometer
CL61



VAISALA

PUBLISHED BY

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1. About this document

1.1 Version information

This document provides instructions for installing and using Vaisala Lidar Ceilometer CL61.

Table 1 Document versions (English)

Document code	Date	Description
M212474EN-D	February 2022	For release 1.1 <ul style="list-style-type: none"> Command list updated with new commands configure sender and e!og Foundation screw installation depth updated FTP server setup instructions added SFTP server setup instructions updated Optional bird deterrent installation instructions added Other changes: <ul style="list-style-type: none"> Overall clarification of instructions
M212474EN-C	October 2021	<ul style="list-style-type: none"> Activation instructions updated SFTP server setup instructions updated Reset instructions added Safety information updated
M212474EN-B	March 2021	Version for full release 1.0

1.2 Related manuals

Table 2 CL61 manuals

Document code	Name
M212499EN	<i>Vaisala Lidar Ceilometer CL61 Product and Package Description</i>
M212474EN	<i>Vaisala Lidar Ceilometer CL61 Installation Guide</i>
M212475EN	<i>Vaisala Lidar Ceilometer CL61 User Guide</i>

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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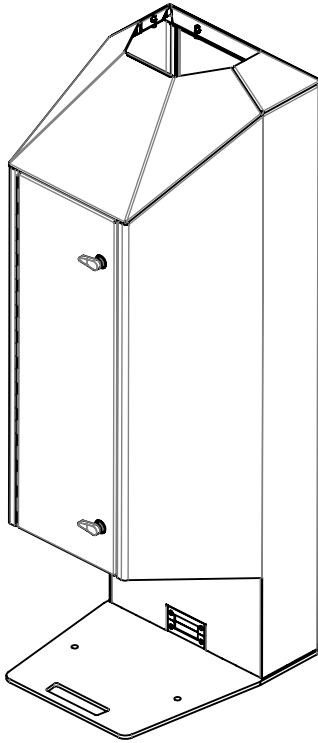
1.5 Patent notice

This product is protected by the following patents and patent applications and their corresponding national rights:

- International Publication Number WO 2011/135183 A1

2. Product overview

2.1 Vaisala Lidar Ceilometer CL61



Vaisala Lidar Ceilometer CL61 is a high-performance light detection and ranging (LiDAR) instrument with depolarization measurement capable of unattended operation 24/7 in all weather conditions. The depolarization measurement capability enables clear liquid/solid differentiation for particles and clouds, providing ready-to-use information for atmospheric characterization.

The ceilometer uses pulsed diode laser LiDAR technology where short, powerful laser pulses are sent out in a vertical or near-vertical direction. The reflection of light, backscatter – caused by clouds, precipitation, virga, haze, fog, and aerosols – is measured as the laser pulses traverse the sky. The ceilometer processes these returns and reports the resulting profiles of attenuated backscatter, linear depolarization ratio and cloud base heights.

The ceilometer detects up to 5 cloud layers simultaneously. If the cloud base is obscured due to heavy precipitation or fog, the ceilometer reports vertical visibility. There is no need for adjustments in the field. The embedded software includes several service and maintenance functions and gives continuous status information from internal monitoring.

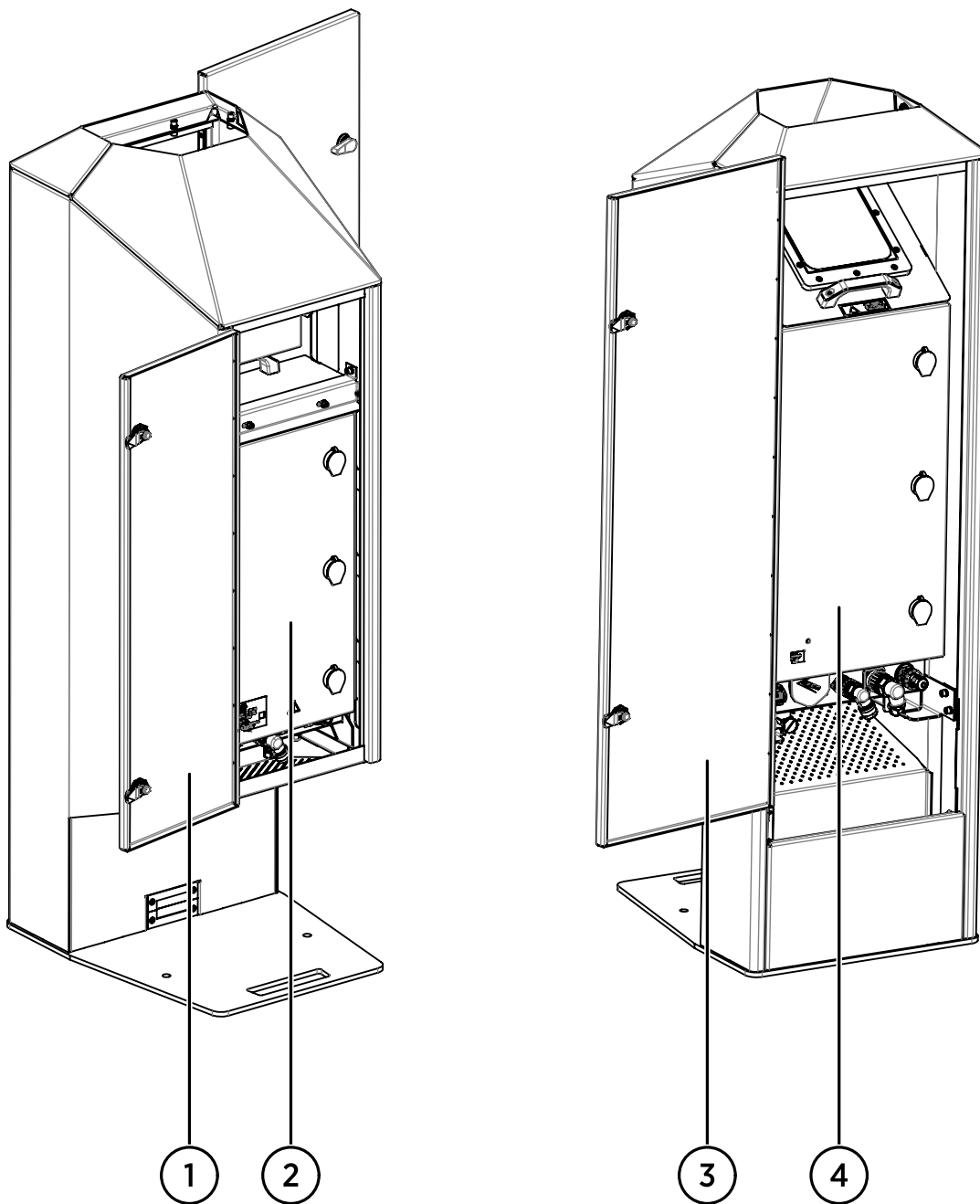


Figure 1 CL61 structure

- 1 Unit front door
- 2 Interface unit
- 3 Unit back door
- 4 Measurement unit

2.2 Product nomenclature

Table 3 Vaisala Lidar Ceilometer CL61 main parts

Code	Common name
CLO611	Optics unit
CLW611	Window
CLT611	Transmitter module
CLR611	Receiver module
CLC611	Device control module
CLP611	Polarization unit
CLS611	Servo drive module
CLL611	Laser power monitor
CLO611CB	Environmental sensor
CLH611	Internal heater module
One of the following: • CLB611-230 • CLB611-115	One of the following: • Window blower module 230 V • Window blower module 120 V
One of the following: • CBL210996 • CBL211048	One of the following: • AC power cable 230 V AC 5 m • AC power cable 120 V AC 5 m
CBL210983-11M	Data cable 10 m
CBL210983-2M	Maintenance cable 2 m
CBL210915	Receiver coaxial cable

Table 4 Vaisala Lidar Ceilometer CL61 optional parts

Code	Common name
ASM214227	Bird deterrent kit
CL61TERMHOOD	Optical termination hood
CL61SHOCKABSORBER	Shock absorber

The complete delivery also includes:

- *Vaisala Lidar Ceilometer CL61 Product and Package Description*
- Installation accessories
- *Vaisala Lidar Ceilometer CL61 Installation Guide*

2.3 Mechanical structure

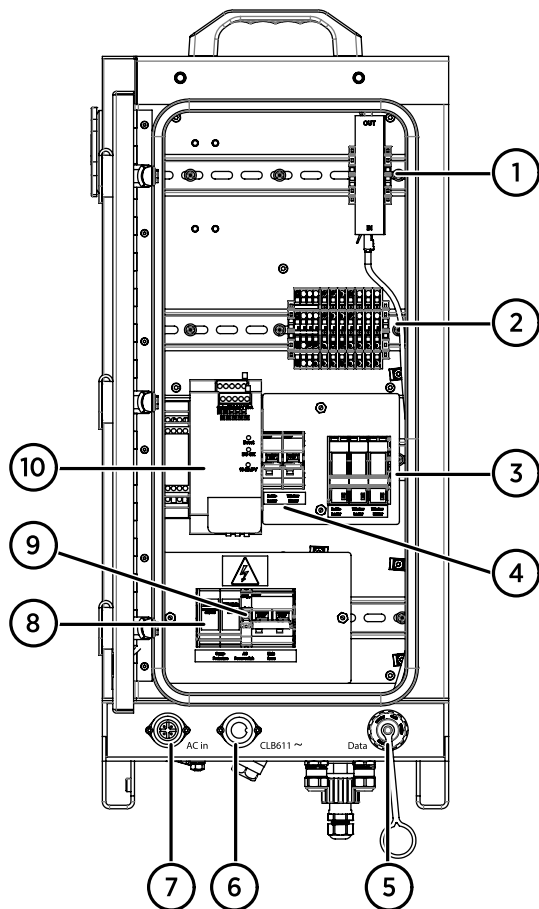


Figure 2 Interface unit

- 1 Data line or Ethernet surge protector
- 2 Terminal strip
- 3 Window blower, window heater and internal heater control
- 4 Window blower and internal heater switch
- 5 Data port
- 6 Window blower port
- 7 AC in
- 8 Surge protectors and fuses
- 9 AC (mains) power switch
- 10 AC/DC power supply

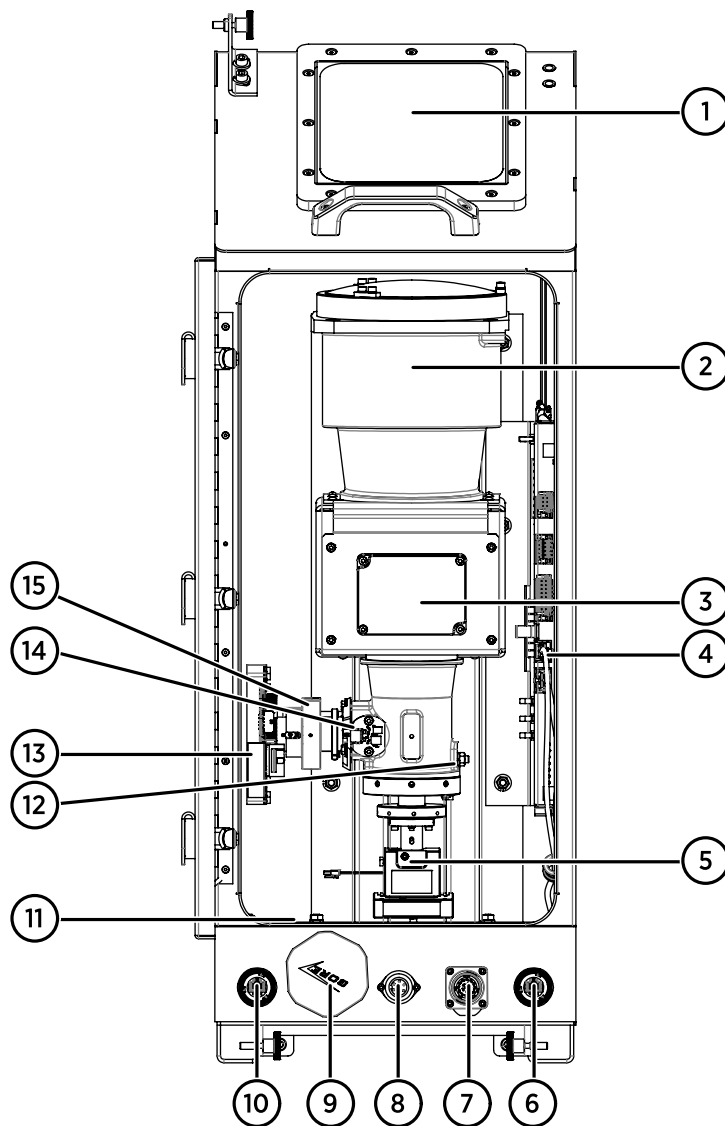


Figure 3 Measurement unit

- 1 Window CLW611
- 2 Optics unit CLO611
- 3 Servo drive module CLS611
- 4 Device control module CLC611
- 5 Transmitter module (including optics) CLT611
- 6 Interface unit (data)
- 7 Interface unit (control)
- 8 AC/DC in
- 9 Ventilation plug
- 10 Maintenance port
- 11 Internal heater module CLH611
- 12 Laser power monitor CLL611
- 13 Receiver module CLR611
- 14 Environmental sensor CLO611CB
- 15 Polarization unit CLP611

2.4 Safety

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



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.



WARNING! Do not substitute parts or modify the system, or install unsuitable parts in the system. Improper modification can damage the product or lead to malfunction.

2.4.1 Eye safety

This Vaisala Lidar Ceilometer CL61 is classified as a Class 1M optical device in accordance with International Standard IEC / EN 60825-1:2014. It complies with 21 CFR 1040.10 and 1040.11 except for the deviations pursuant to the Laser Notice No. 56.

Table 5 Incorporated laser (CLT611 transmitter)

Property	Value
Laser wavelength	910.55 nm
Maximum pulse power	50 W
Maximum average power	70 mW
Typical beam divergence	±7 degrees
Pulse frequency	9.5 kHz
Pulse length	160 ns

Table 6 Radiated pattern emitted from protective housing, from CL61 window

Property	Value
Laser wavelength	910.55 nm typical
Maximum pulse power	40 W
Maximum average power	50 mW

Property	Value
Typical beam divergence	±0.2 mrad × ±0.35 mrad
Pulse frequency	9.5 kHz
Pulse length	160 ns

The device is equipped with the following labels:

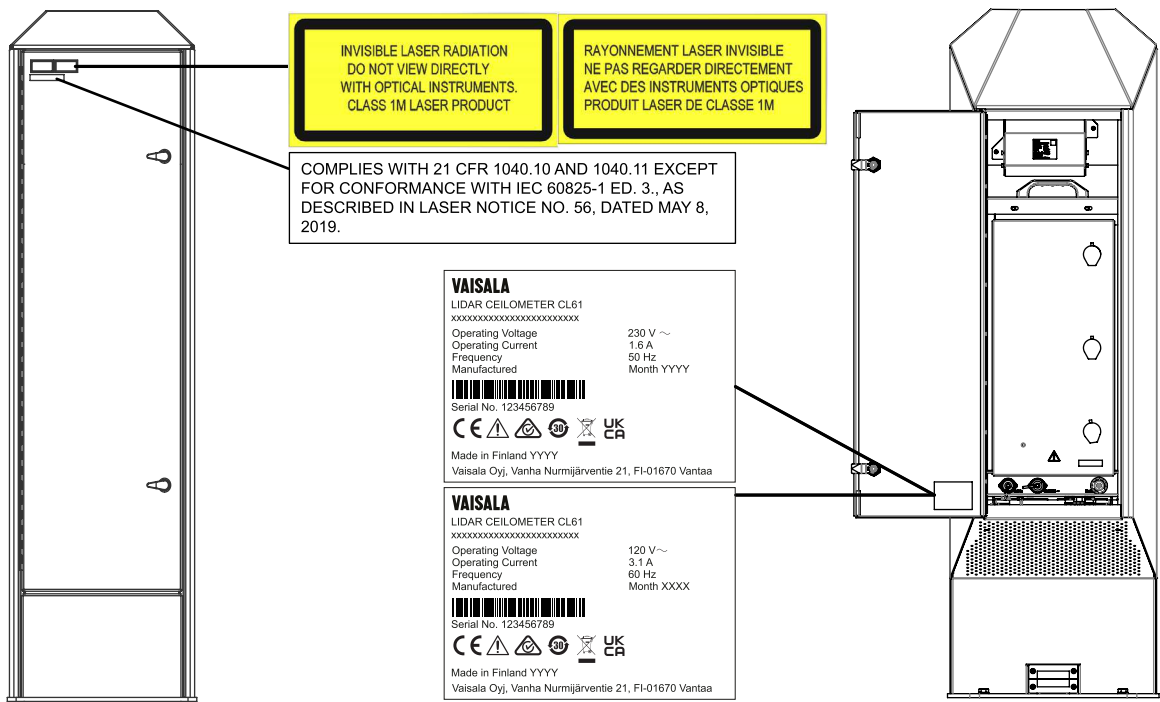




Figure 4 Location of explanatory and certification labels on CL61

Take the following precautions during installation, operation, and maintenance:



WARNING! Viewing the laser output with telescopic optical instruments (for example, telescopes or binoculars) may pose an eye hazard. Do not direct the beam into an area where such instruments are likely to be used.



WARNING! Only qualified maintenance personnel may perform maintenance procedures. Make sure unauthorized persons cannot access the work area during service operations.



WARNING! Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

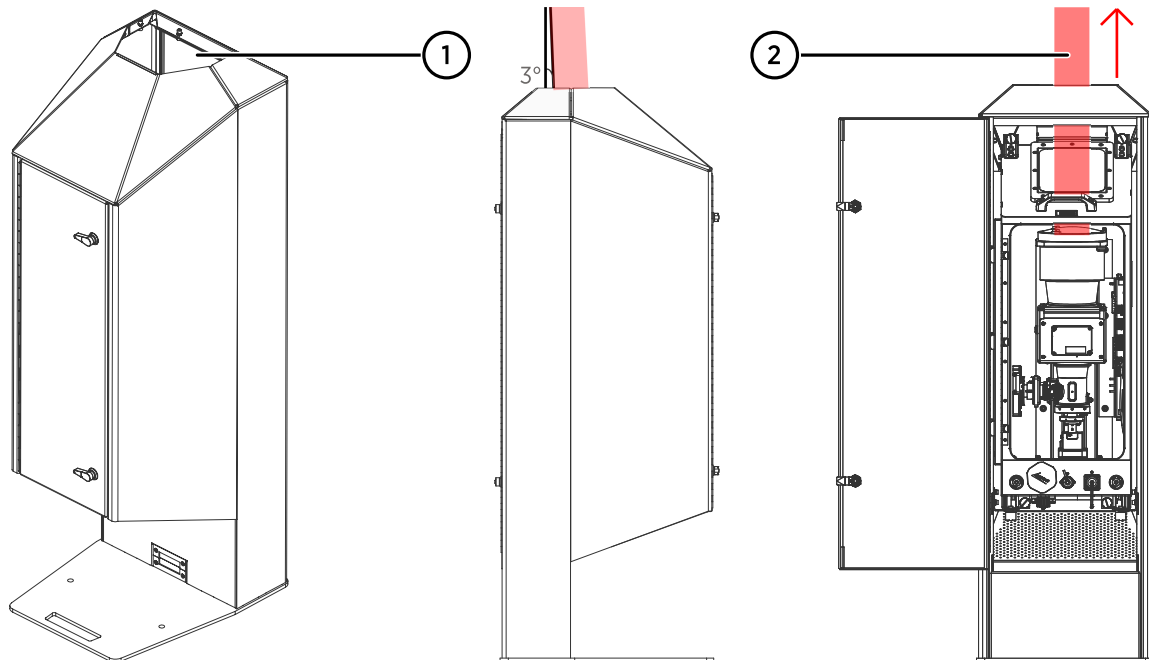


Figure 5 Location of CL61 laser aperture

- 1 Laser aperture
- 2 Laser class 1M, direction of transmitted light



Laser class of the incorporated laser (transmitter module CLT611) is 3B.

The transmitter module has a laser aperture and label as shown in the following figure. Avoid exposure to the beam from the aperture.



WARNING! Do not remove the transmitter module CLT611 from its normal position without first switching off both the AC (mains) line and the battery power.



WARNING! Do not look at the transmitter module CLT611 of the ceilometer from the beam direction when the transmitter is powered.

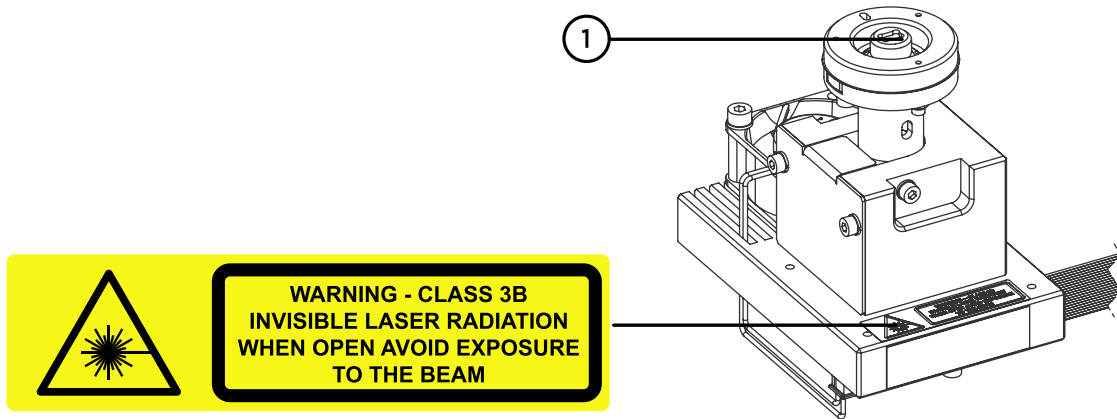


Figure 6 Location of warning and explanatory labels on transmitter module CLT611

1 Laser aperture

2.4.2 Hot surface safety

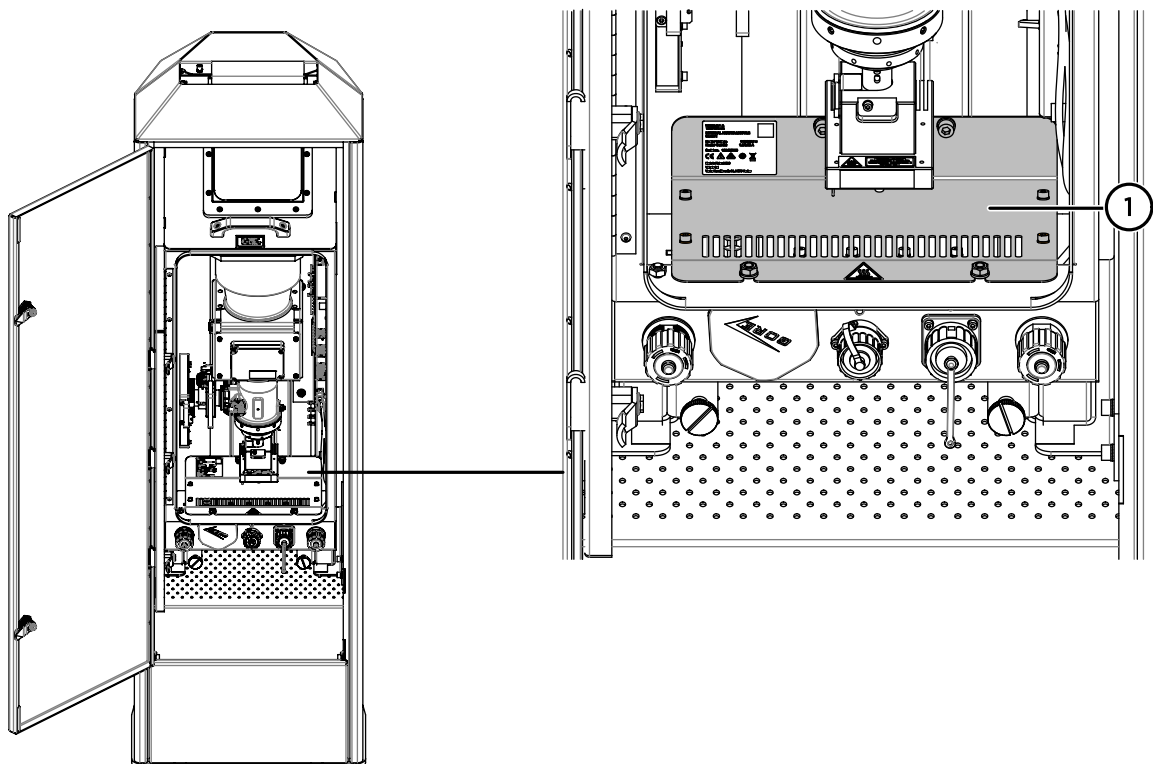
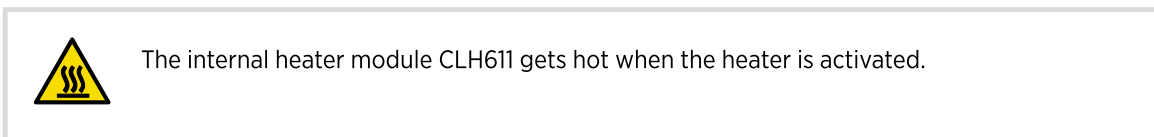


Figure 7 Location of hot surface and label

1 Potentially hot surface and warning label

2.4.3 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.

3. Unpacking and storage

3.1 CL61 package contents



The package contents can vary depending on your order.

The ceilometer is shipped in a package that contains:

- *Vaisala Lidar Ceilometer CL61 Product and Package Description*
- Vaisala Lidar Ceilometer CL61
- 5 m power cable connected to ceilometer
- 10 m data cable connected to ceilometer

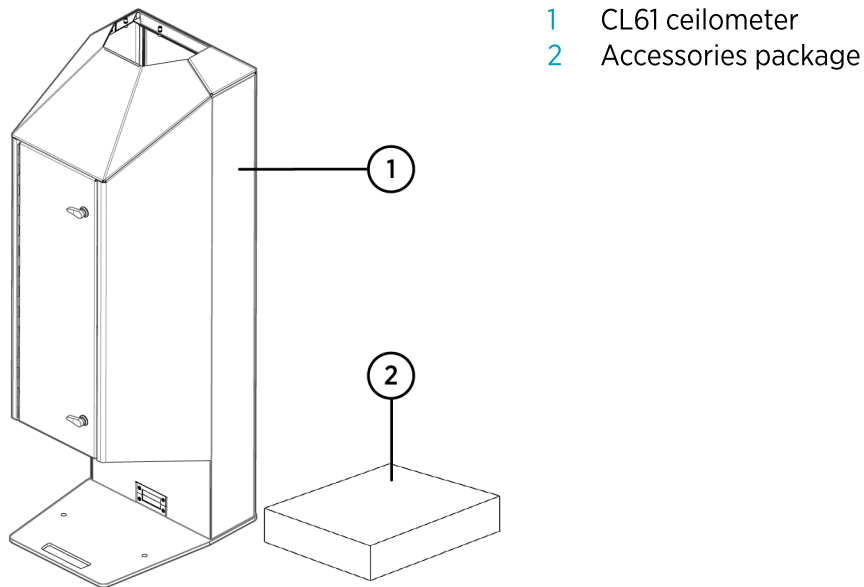
The ceilometer is delivered with its main cabling attached.

Accessories package:

- 2 m Ethernet maintenance cable
- Installation accessories (wedge bolt kit, screwdriver, Allen key)
- Documentation folder, containing:
 - *Vaisala Lidar Ceilometer CL61 Installation Guide*, printed (optional)
 - USB drive for CL61 documents
 - Activation code stickers (2 pcs)
 - Test report, calibration certificate



Keep careful track of this material.



Open the delivery package and compare this paper with the contents of the container.

For more information on unpacking, storage, and installation, see the *Vaisala Lidar Ceilometer CL61 Installation Guide* included in each delivery. The other CL61 documents are provided on a USB drive. You can order printed versions separately.

3.2 Unpacking



Wear protective gloves and clothing against sharp edges.



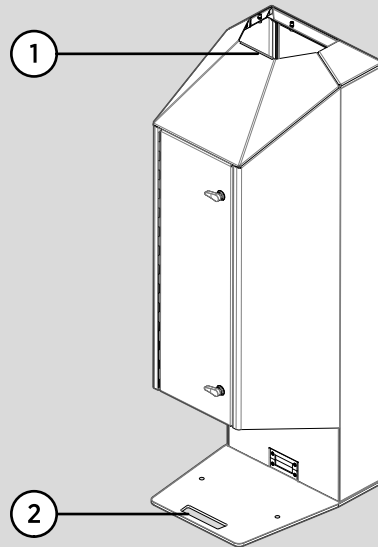
Vaisala recommends that unloading and unpacking is carried out by two people.



CAUTION! When you open the package, place it on a flat surface with the indicated top side up. Open the container from the top side and carefully remove the ceilometer and other equipment.



Lift by the lifting handles and locations provided.



- 1 Window edge, lift ceilometer from this edge
- 2 Lifting handle



CAUTION! Unpack contents with care and place equipment on a flat, smooth surface to prevent scratching.



CAUTION! Avoid touching the window or lens surfaces. Do not remove the protective sheet from the measurement unit window until the installation is ready.



CAUTION! Do not remove the integral protective caps from the unused external connectors.



Store the original packaging for a possible later transportation need.



CAUTION! Before powering the ceilometer, open the transportation lock from the polarization unit.
For more information, see [Installing enclosure \(page 22\)](#).

3.3 Storage

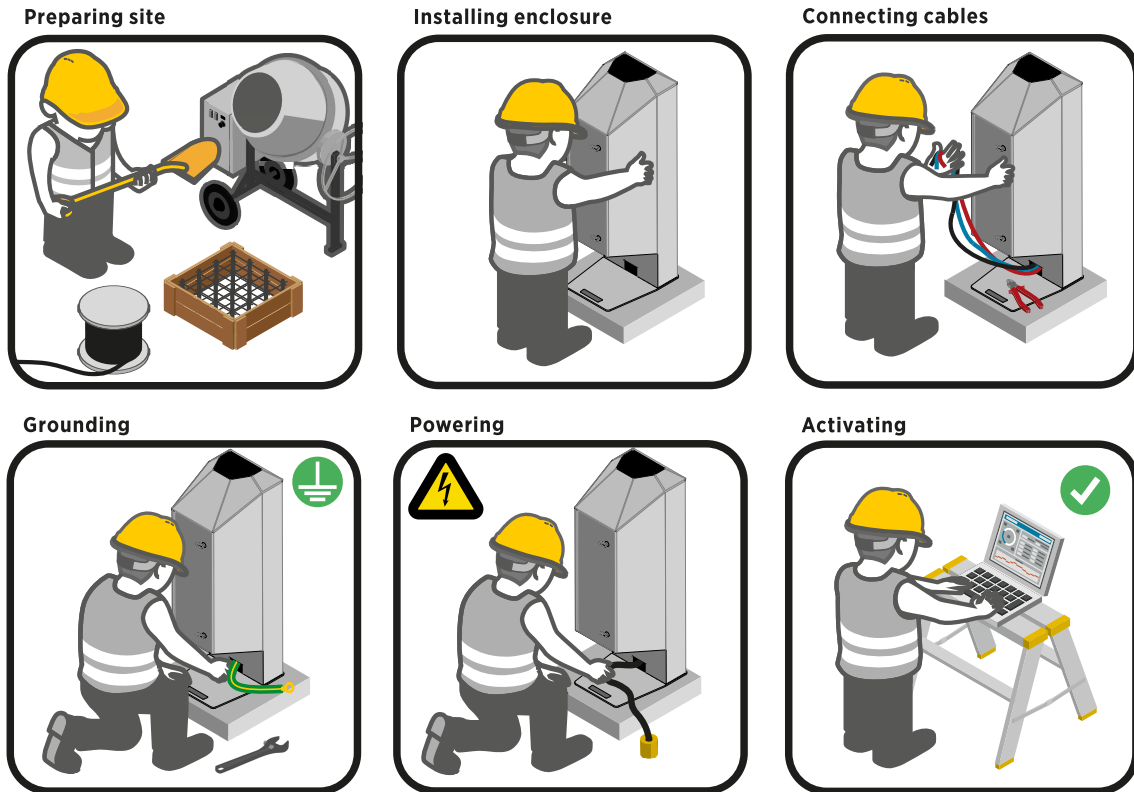
- Handle and store the packages as instructed on the package labeling.
- Handle the equipment and packages with care.
- Store the packages in clean, dry indoor conditions, not outdoors
 - Storage temperature $-55 \dots +60 \text{ }^{\circ}\text{C}$ ($-67 \dots +140 \text{ }^{\circ}\text{F}$), in a non-condensing environment.
 - Relative humidity lower than 95 %RH.
- If your package includes the battery backup option, store the batteries fully charged. Vaisala takes no liability for damage caused by uncharged batteries.
- Store the equipment on a level, even surface.
- Do not pile up the packages or place anything else on top of them.



Save the container for future transport use. For transportation, the equipment must be placed and padded into the container in the same way as initially received.

4. CL61 installation overview

Before you start the installation, plan the installation steps. The following is an example plan that describes how to organize the installation.



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! Always wear a safety helmet during installation.

5. Preparing site



- Designing foundation (page 20)
 - Creating new concrete foundation (page 21)
 - Using existing concrete foundation (page 21)

5.1 Designing foundation

The standard foundation for the ground installation is a concrete foundation. For the recommended minimum dimensions, see the following figure. Mounting screws and bolts are included in the delivery as well as a setting tool for the wedge bolts.

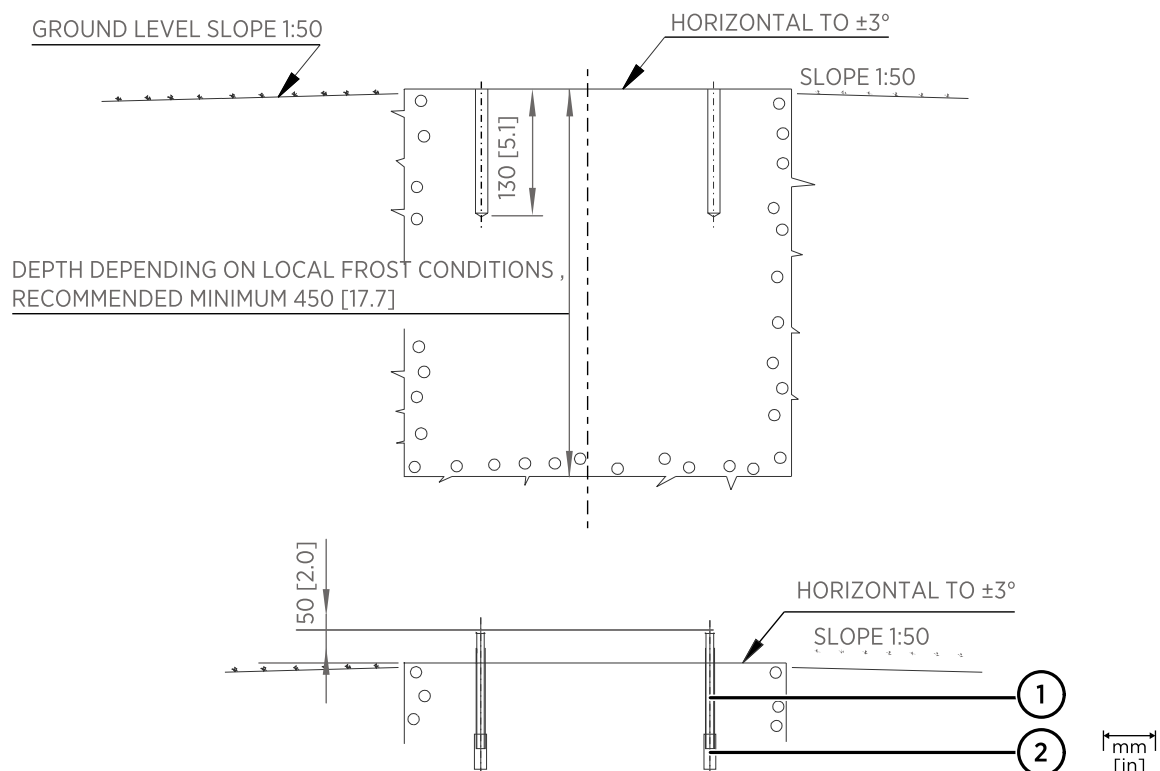


Figure 8 Foundation construction, view from side

- 1 Foundation screw M10×160 AISI316 (4 pcs)
- 2 Wedge bolt M10×40 mm FeZn (4 pcs)

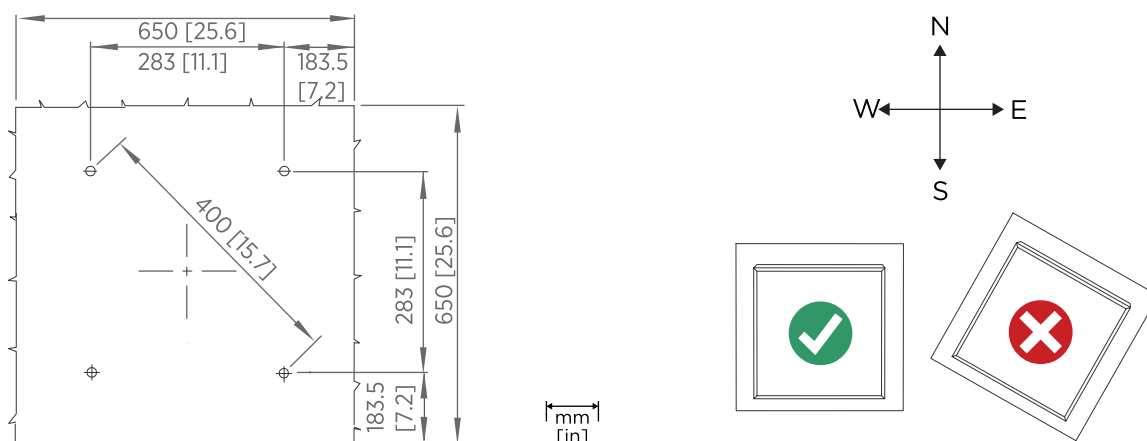


Figure 9 Foundation dimensions and bolt pattern, view from top



Vaisala recommends that the back door of the ceilometer (the side where the measurement unit is) faces north in the northern hemisphere and south in the southern hemisphere. This protects it from midday sun.

You can either use an existing concrete foundation or create a new one.



If CL61 replaces another Vaisala ceilometer using a 4-bolt mounting system, for example CL51, the existing foundation and foundation screws can be used.

5.1.1 Creating new concrete foundation

- ▶ 1. Fasten the M10×40 wedge bolts to the lower ends of the foundation screws (4 each).
2. Fix a drilling template to the upper ends of the foundation screws with nuts.
3. Place the template with the attached foundation screws into the hole so that approximately 50 mm (2.0 in) of the foundation screw threads are above the surface.
4. Pour in the concrete and finish the foundation.

5.1.2 Using existing concrete foundation

- ▶ 1. Drill 4 holes with a diameter of 12 mm (0.5 in) and a depth of 130 mm (5.1 in) into the concrete. Note the bolt pattern and dimensions.
2. Fasten the M10×40 wedge bolts to the lower ends of the foundation screws (4 each).
3. Place the wedge bolt and foundation screw combinations into the holes, with the wedge bolts down, and hammer the protruding threads down.
4. Tighten the foundation screws a few turns to attach the wedge bolts to the hole walls.

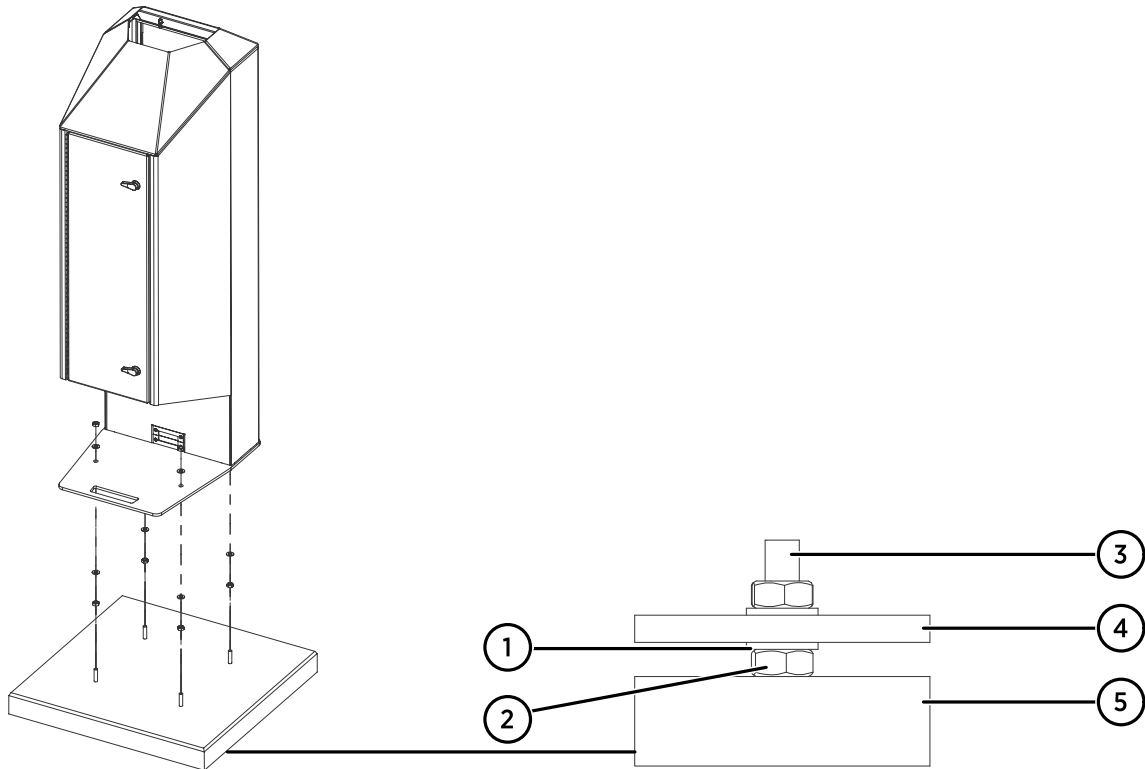
Clear the foundation of extra parts before continuing with the installation.

6. Installing enclosure



- Spirit level
- Wrench 17 mm

The ceilometer is delivered with the measurement unit and interface unit connected inside the radiation shield. Remove the ceilometer from the packaging as shown in *Vaisala Lidar Ceilometer CL61 Product and Package Description*.



- 1 Flat washer M10 DIN125 A4 (8 pcs)
- 2 Hex nut M10 DIN934 A4 (8 pcs)
- 3 Foundation screw
- 4 Enclosure
- 5 Foundation



Vaisala recommends that the back door of the ceilometer (the side where the measurement unit is) faces north in the northern hemisphere and south in the southern hemisphere. This protects it from midday sun.

- ▶ 1. Place 4 nuts and washers on the foundation screws.
Use the nuts and washers to align the ceilometer vertically. Check with a spirit level.
- 2. Mount the enclosure on the foundation screws, washers, and nuts.
- 3. Place 4 washers and nuts on the foundation screws. Tighten the nuts.



Open the back door and remove the bottom cover to make placing washers and tightening nuts easier.

6.1 Mounting bird deterrent



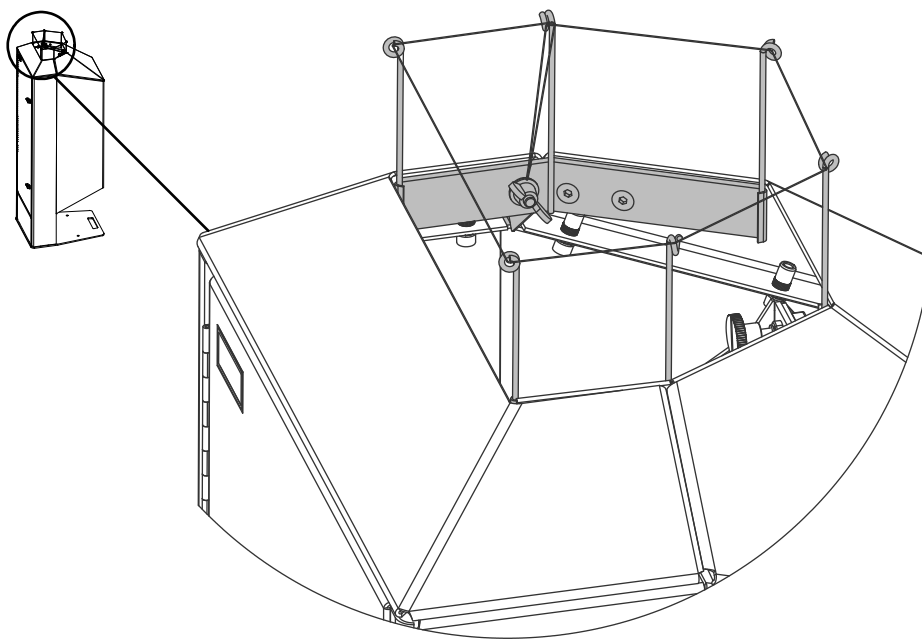
The following tools are needed and provided in the bird deterrent kit:

- Allen key 4 mm
- Allen key 5 mm

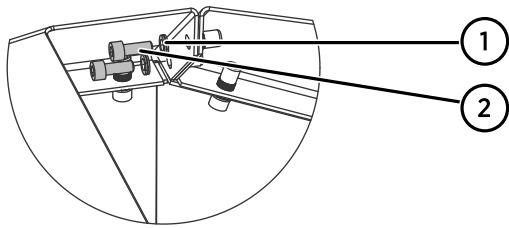
Table 7 Bird deterrent kit contents

Part	Pcs	Part	Pcs
Fastener	2	Wing nut M6 DIN315 A2	1
Bar	2	Fluorocarbon line	1
Hex socket-head screw M6×16 DIN7991 A4	4	Allen key 4 mm	1
Washer with EPDM gasket 6.8/16×1.5 A2 EPDM	1	Allen key 5 mm	1

The optional bird deterrent prevents birds from landing on the ceilometer which could interfere with the measurements. The bird deterrent consists of a metal structure that supports a piece of fluorocarbon line.

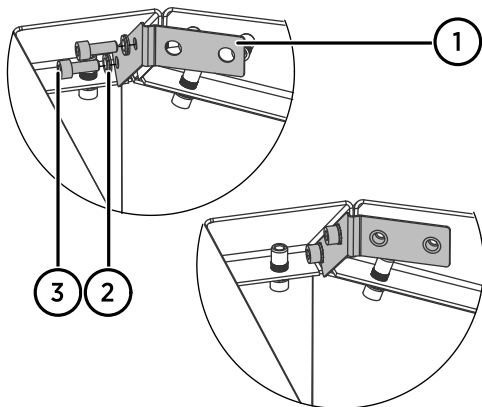


- 1. Open the back door of the ceilometer (the side where the measurement unit is) and remove 2 screws and washers from both sides of the radiation shield cover.



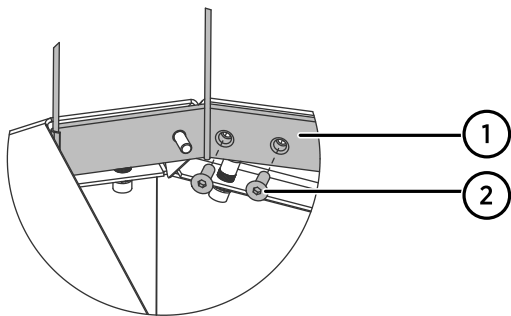
- 1 Existing washers attached to ceilometer (4 pcs)
- 2 Existing screws attached to ceilometer (4 pcs)

2. Install the fasteners with the previously removed washers and screws.



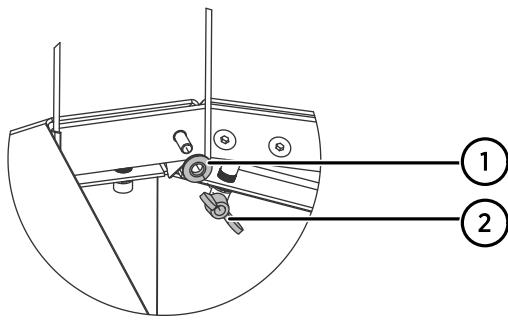
- 1 Fastener (2 pcs)
- 2 Existing washers attached to ceilometer (4 pcs)
- 3 Existing screws attached to ceilometer (4 pcs)

3. Install the bars to the fasteners with the 4 screws.



- 1 Bar (2 pcs)
- 2 Hex socket-head screw M6×16 DIN7991 A4 (4 pcs)

4. Install the washer and wing nut, but do not tighten them yet.



- 1 Washer with EPDM gasket 6.8/16×1.5 A2 EPDM
- 2 Wing nut M6 DIN315 A2

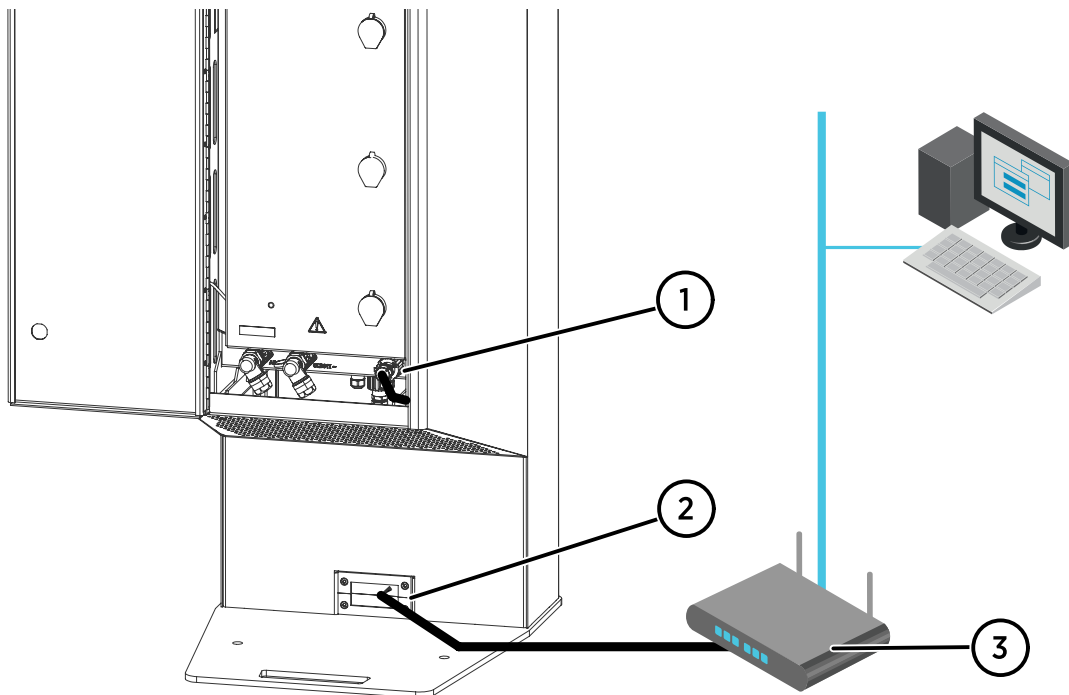
5. Slide a fluorocarbon line through the designated loops, so that the ends of the line meet at the thread of the bar.
Wrap the ends of the line 3 times around the thread, between the washer and the bar, and tighten the wing nut.

7. Connecting cables



7.1 Data line connection

The ceilometer has a LAN (Ethernet) data line connection. The cable is connected already on delivery. Route the cable out of the radiation shield and connect to your data collection system or network.



- 1 Data connection (eth1)
- 2 Cable routed inside radiation shield
- 3 Customer switch / data network

8. Grounding



- Allen key 5 mm

The ceilometer is equipped with a grounding connector at the bottom of the radiation shield for external grounding.

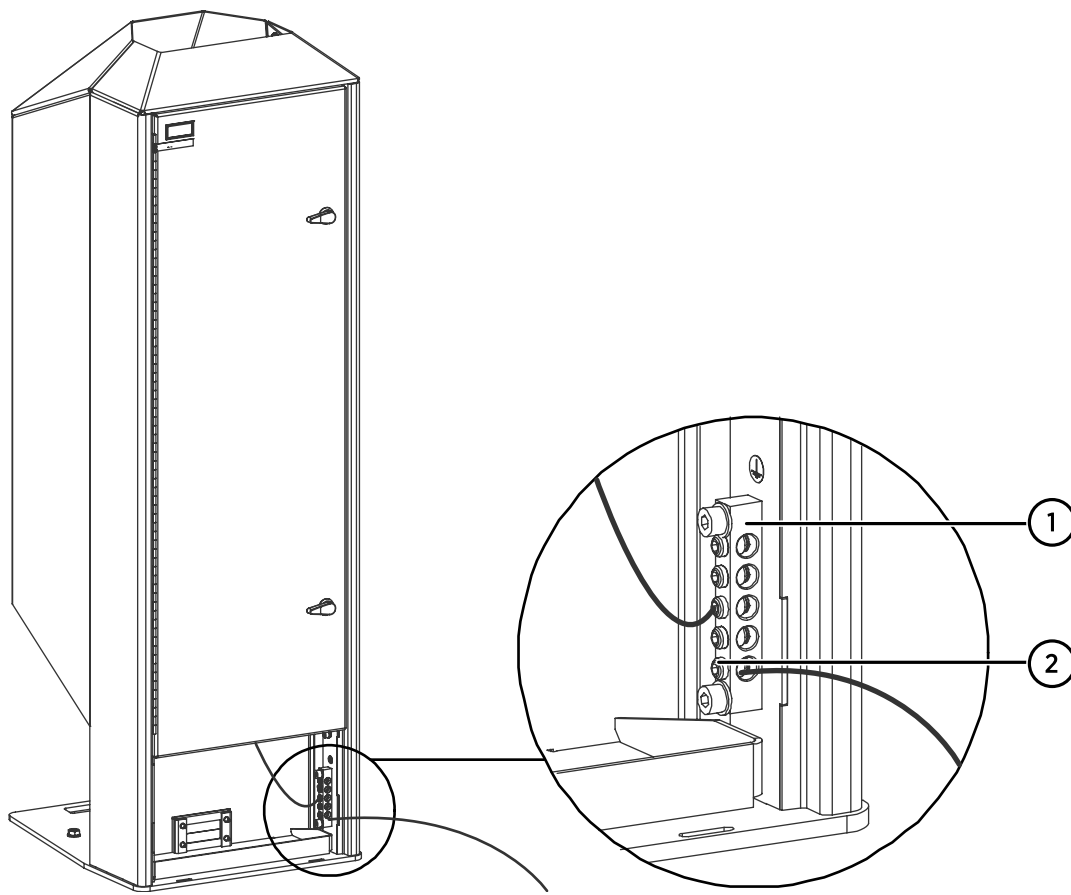


WARNING! At the installation site, a connection to a solid earth ground is mandatory for adequate lightning and transient protection.



WARNING! To minimize shock hazard, the chassis and cabinet must be connected to an electrical ground. The ceilometer is equipped with a three-conductor AC power connector. The power cable must be plugged into an approved three-contact electrical outlet or the ceilometer must be carefully grounded to a low-resistance safety ground.

The ceilometer is designed as protection class I (safety grounded) electrical equipment. For safe use, you must connect the ceilometer AC (mains) power supply cable to a grounded mains socket. The communication line signal ground is also internally connected to the device chassis/safety ground.



- 1 Grounding connector
- 2 Fixing screw

- ▶ 1. Connect the grounding cable to the grounding connector at the bottom of the radiation shield.
- 2. Tighten the fixing screw.
- 3. Route the cable to ground.

8.1 Grounding in floating galvanic installations

If the application requires a “floating” galvanic installation, such as in marine applications with only IT power supply available, and high voltage insulation from AC power and/or signal lines to the chassis, do the following:

- ▶ 1. Use a 500 VA isolation transformer in the AC power input and bond the chassis ground to the installation platform (the metal hull/deck).
- 2. Connect the communication line to the data receiving system through a galvanic signal isolator or use fiber-optic communication.

9. Powering



The power supply must be protected with a fuse. The maximum sizes of the fuses protecting the power line:

- 10 A for 230 V supply
- 15 A for 120 V supply



WARNING! Only licensed experts may install electrical components. Mains-connected equipment, power supplies, and installation accessories must adhere to local and state legislation and regulations.



WARNING! Take precautions before installation. Check that the instrument has not been damaged during transportation. Do not connect the instrument to the AC mains and do not carry out electrical tests before you have made sure that it is safe to power up the instrument.



WARNING! Make sure that you prepare or connect only de-energized wires.



WARNING! Keep away from live circuits. Operating personnel must observe safety regulations at all times.



WARNING! Do not replace components when the system is powered up. Disconnect all power sources before performing maintenance procedures.



WARNING! Do not operate in an explosive atmosphere, for example, when flammable gases or fumes are present. Operation of electrical equipment in such an environment constitutes a safety hazard.



WARNING! Make sure that nobody is viewing the unit from the beam direction with magnifying optics.



CAUTION! Always use the specified cables. The wrong type of cable can damage sensors or the system.



CAUTION! Do not damage or change the wiring. Incorrect wiring can cause damage and prevent or limit operation.

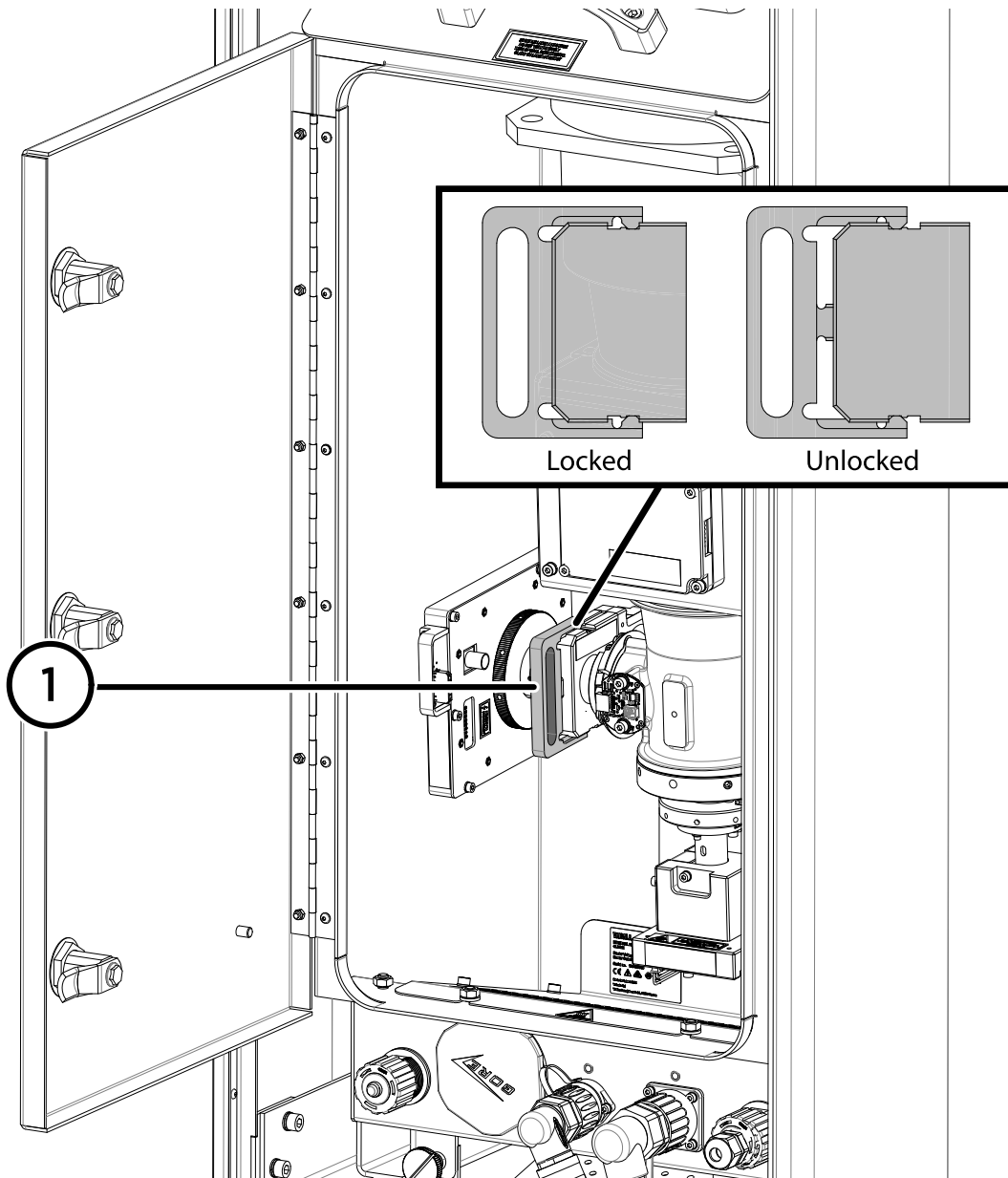


CAUTION! Make sure that the grounding wire is longer than the phase and neutral wires. Under mechanical stress, the grounding wire must be the last to disconnect from the protective ground terminal.



To prevent electrostatic discharge, avoid touching component contacts or connectors.

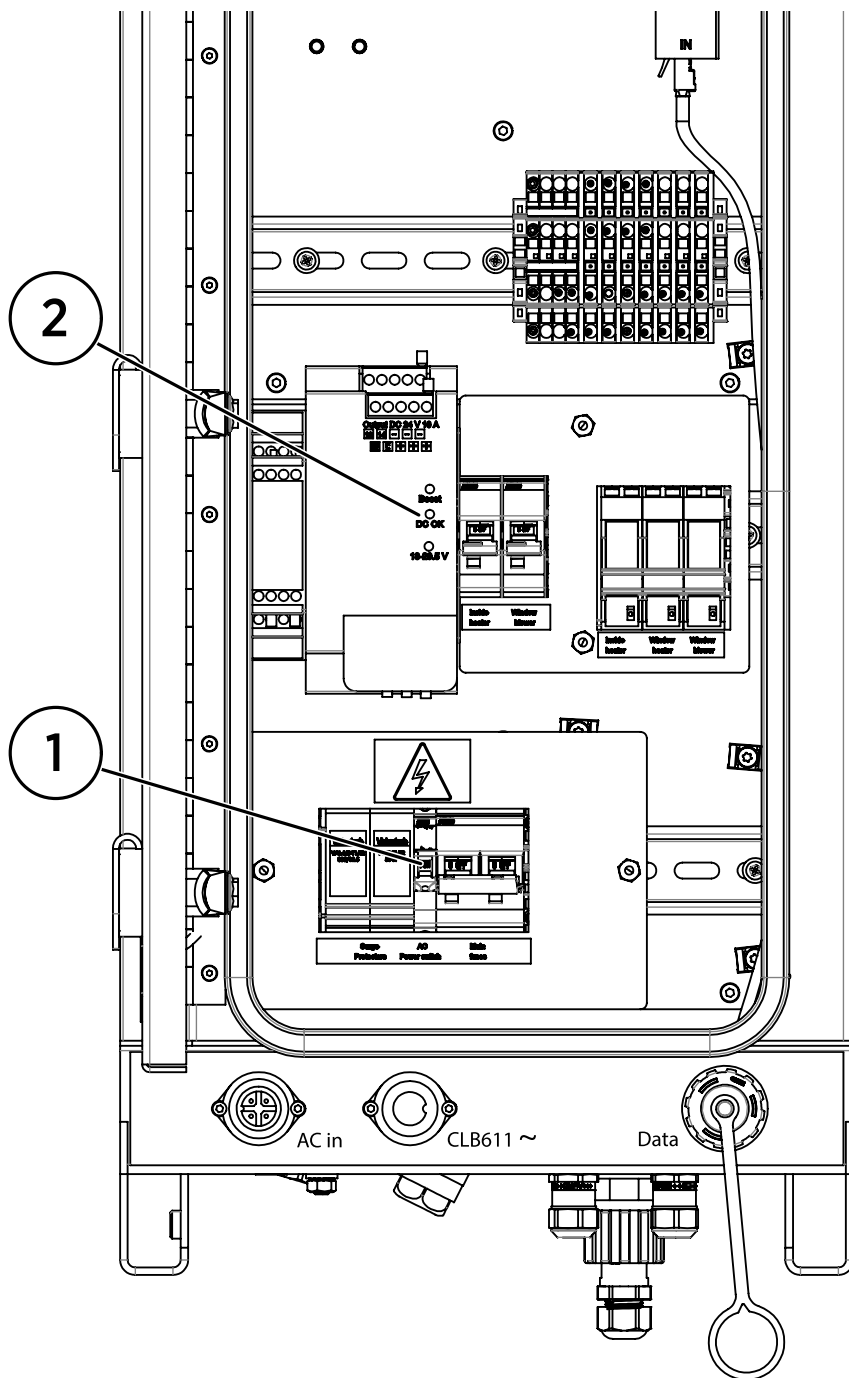
- 1. Before powering the ceilometer, open the transportation lock from the polarization unit.



1 Transportation lock

2. Connect the power cable.

3. On the interface unit (front of the ceilometer), turn the mains switch **ON**.
Check that the power supply status is **OK** (DC power light is green).



- 1 Mains switch
- 2 DC power status light

10. Activating ceilometer and creating credentials



- [Establishing maintenance connection \(page 34\)](#)
- [Activating ceilometer using PuTTY \(page 36\)](#)



The maintenance laptop must support an Ethernet connection.

Make sure that you have the device activation code available. The device activation code is 16 characters long. The delivery includes 2 stickers that contain the device activation code.

Before you can use the device, you must activate the device. After activation, you can create admin user credentials. An admin user profile is needed for maintenance and configuration tasks.

- ▶ 1. Install the terminal software on your laptop.
The following instructions use PuTTY and TeraTerm freeware as examples.

10.1 Establishing maintenance connection



- Laptop with terminal software that supports SSH (for example, freeware TeraTerm or latest version of PuTTY)
- Ethernet maintenance cable



Use of the maintenance connection is allowed only when maintenance operations are performed at qualified locations. CL61 does not comply with EMC standards when the door is open. The door has a conductive gasket to suppress electromagnetic radiation. When CL61 is used for normal operation, the door must always be closed.

The maintenance connection is established with the Ethernet maintenance cable included in the delivery, connecting the PC or laptop to the maintenance port of the ceilometer. The Ethernet maintenance port is located at the bottom of the measurement unit.



Push the plug into the port and turn 90° to lock in place.

- ▶ 1. Connect your laptop to the maintenance port of CL61 with the Ethernet maintenance cable.



Maintenance port: eth0
Data port: eth1

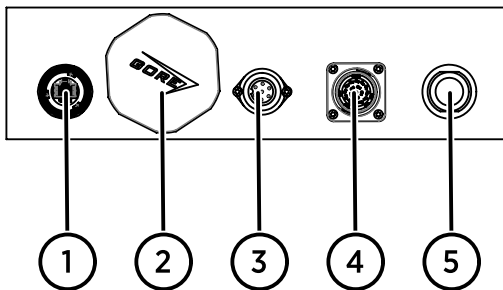


Figure 10 Measurement unit connectors, back of ceilometer

- 1 Ethernet maintenance port (eth0)
- 2 Ventilation plug
- 3 AC/DC in
- 4 Interface unit (control)
- 5 Interface unit (data)



CAUTION! Remove the Ethernet maintenance cable after setup. It is not intended for permanent installation.

2. Configure your computer settings to match the CL61 network settings.
 - a. From your computer **Control Panel**, open **Network and Internet / Network and Sharing Center**.
 - b. Select **Change adapter settings**.
 - c. Right-click **Ethernet** and select **Properties**.
 - d. Double-click **Internet Protocol Version 4 (TCP/IPv4)**.
 - e. Fill in **IP address**, **Subnet mask**, and **Default gateway** using the following computer settings.

Property	Value
IP address	172.17.0.5
Subnet mask	255.255.255.0
Default gateway	172.17.0.1

- f. After configuring your computer settings, select **OK** on both pop-up windows to close them. The settings save and apply when the windows are closed.
3. Open the command prompt app on your laptop.
4. To test the connection to CL61, type the following in command prompt:

```
ping 172.17.0.2
```

10.2 Activating ceilometer using PuTTY

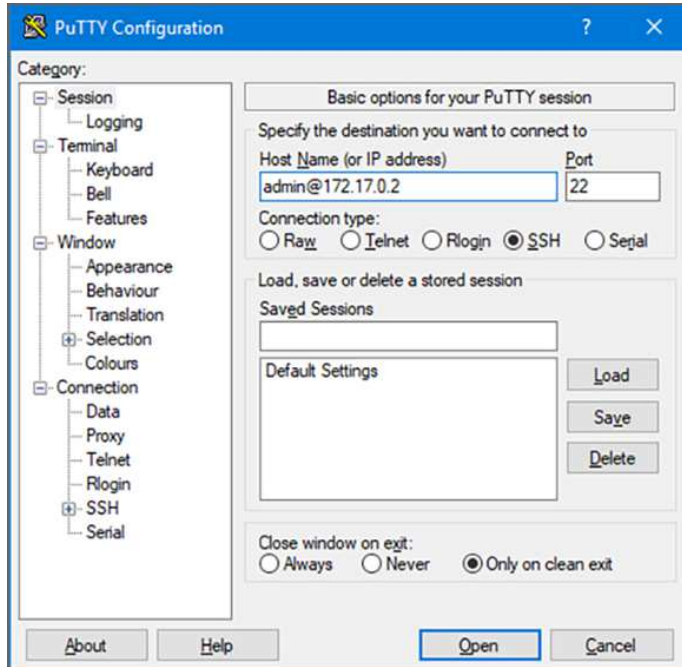


- Laptop with terminal software that supports SSH (for example, freeware TeraTerm or latest version of PuTTY)
- Ethernet maintenance cable

- ▶ 1. Open the terminal software.

2. In the **PuTTY Configuration** window, type in **Host Name** the following:

```
admin@172.17.0.2
```



Do not modify the other settings.
Select **Open**.

3. In the **Security Alert** window, accept the key.
4. The ceilometer asks for a username and a password or only for a password.
If it asks for a username, type **admin**.
When it asks for a password, press **ENTER** to skip the password. The password is defined later on.



If the device does not allow you to skip the password step, it is possible the device is already activated. Type the password set during previous activation. If this password is unavailable, factory reset the device to start the activation process again.

5. When prompted, type the device activation code.
The device activation code is case insensitive. The device activation code may contain hyphens or spaces, but you can type it without them, as one string.

6. When prompted, define a password for the admin user and press **ENTER**.
The password is case sensitive.



For security reasons the password does not display in the interface window as you type it, but the keystrokes register. Type the password as normal.



CAUTION! If you forget the admin password, you cannot retrieve it without factory resetting the device (requires device activation code).



Follow generic principles in creating a good strong password.

When prompted, repeat the password.

7. With the CLI, change the access level to 1:

```
level 1
```


8. Configure CL61 data port (eth1) IP settings for your operating environment according to your known system information.



The maintenance port settings are fixed and cannot be changed.

- If you are using a dynamic IP setup, enable dynamic host configuration protocol (DHCP).

```
set eth1.address.dhcp ON
```

- If you are using a fixed IP setup, disable dynamic host configuration protocol (DHCP), and type the network settings manually.
By default, CL61 uses the following settings:

Table 8 Default connection settings for data line (ETH1)

Property	Value
DHCP	OFF
IP address	192.168.2.102
Network mask	255.255.255.0
Default gateway	192.168.2.1
DNS1	192.168.2.1
DNS2	OFF

If you need to change the settings, use the following commands.

```
set eth1.address.dhcp OFF  
set eth1.address.ip1 <IP address>  
set eth1.address.nm1 <netmask>  
set eth1.address.gw1 <gateway>  
set eth1.address.dns1 <dns1>  
set eth1.address.dns2 <dns2>
```

Depending on your setup, you can set the gateway and one or both of the domain name system (DNS) parameters **OFF**.



Restart the device after changing DNS settings.

9. Set the network time protocol (NTP) source or sources as follows.

```
set time.sync.ntp1 <ntp1>
set time.sync.ntp2 <ntp2>
```

Alternatively, set the NTP parameters **OFF** and give the UTC time manually.

```
set time.sync.ntp1 OFF
set time.sync.ntp2 OFF
set time.unit.now <YYYY-MM-DD HH:MM:SS>
```

By default, CL61 uses the following NTP settings:

Property	Value
NTP1	2.openembedded.pool.ntp.org
NTP2	OFF



Vaisala recommends using NTP time. When using manual setup, the time is reset when the device resets or power is disconnected from the device, after which you need to set parameter **time.unit.now** again.

10. Check the settings.

```
get eth1
get time
```



If you use dynamic IP setup, check the required IP address from the DHCP server, or serial CLI with the **get eth1** command.

11. Reset the system.

```
reset
```

CL61 reboots with the new settings and the terminal software disconnects.

12. Close the terminal software.

13. Disconnect the maintenance cable and connect the CL61 Ethernet cable to your operating environment. If you continue with configuring data transfer settings, keep the maintenance cable connected.

Place the device activation code stickers in a suitable location safe from unauthorized access. The device activation code is needed later on if you have to reset the device.

To continue configuring the ceilometer or to change the defaults if necessary, see *Vaisala Lidar Ceilometer CL61 Configuration and Maintenance Guide*.

11. Getting data from ceilometer

When you have completed the installation and activation, you can set up the data collection. Data collection in the device is automatic once setup is complete.



CAUTION! Both SFTP and FTP can be used, but Vaisala recommends SFTP for security reasons.

Setting up the SFTP server requires support from your IT department. If that is not possible, set up an FTP server.

More information

- [Setting up FTP server \(page 46\)](#)

11.1 Setting up SFTP server



- Laptop with terminal software that supports SSH (for example, freeware TeraTerm or latest version of PuTTY)
- Ethernet maintenance cable

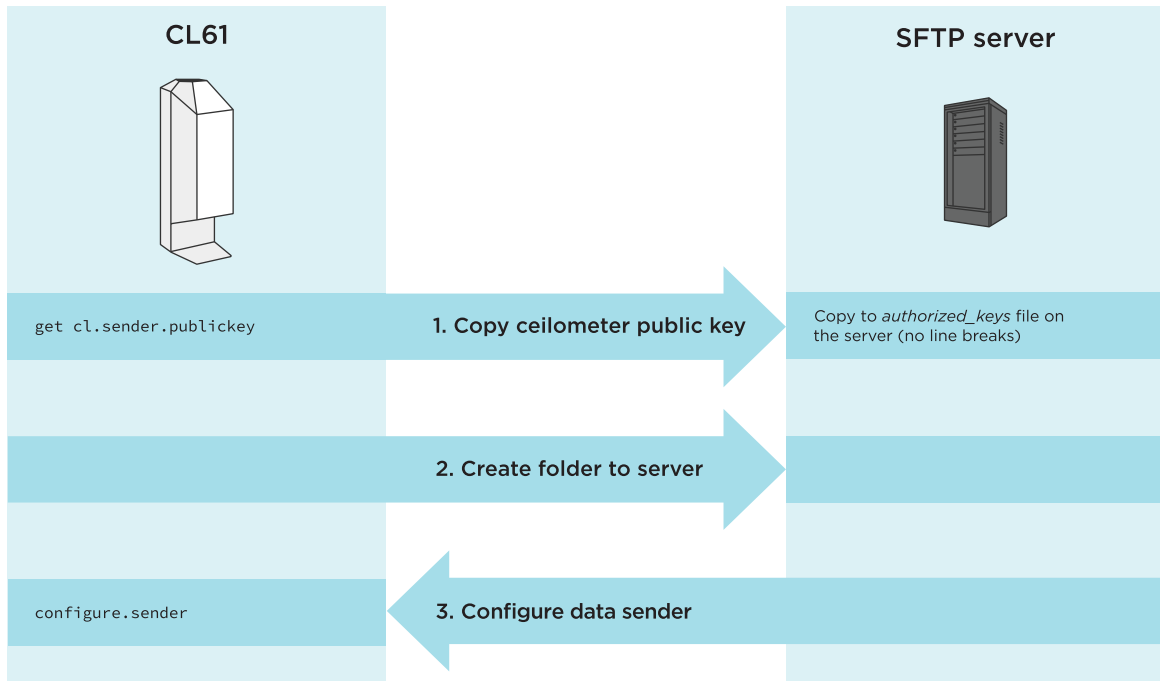
Collecting data from CL61 requires an SSH server with SFTP and public key authentication enabled and configured. The exact setup can vary according to your preferences.

Before you start the setup and go to the site, contact your IT department to make sure that you have the following:

- Secure shell (SSH) server that uses:
 - Secure file transfer protocol (SFTP)
 - RSA host key for server identification (optional when using **configure sender** command)
 - Linux operating system
- SSH/SFTP user created on the server
- Copy of MD5 hash of the SSH server RSA host public key (optional when using **configure sender** command)
- Admin rights on the computer

The SFTP setup includes the following steps:

1. [Copying ceilometer public key to SFTP server \(page 44\)](#)
2. [Creating folder to SFTP server \(page 45\)](#)
3. [Configuring data sender \(page 45\)](#)
4. [Verifying data retrieval \(page 45\)](#)



Data files are sent to the exact folder specified, and you can name it as you wish.



Some servers may have multiple different host key formats. Make sure that the MD5 hash is an RSA-type key.



Check server root by connecting to server with, for example, WinSCP and navigating as close to root as possible. Modify destination address accordingly. SFTP server root is usually not the same as computer root.



For example, you can use WinSCP to find the hash.

- ▶ 1. Connect to the same network where the SFTP server is.

11.1.1 Copying ceilometer public key to SFTP server

Read the public key for key-based authentication from the ceilometer's CLI, and store it in the authorized key location on the SSH server / authorize the server SSH user to receive ceilometer data.

1. Change to access level 1:

```
level 1
```

2. On the ceilometer CLI, read the public key:

```
get cl.sender.publickey
```

Copy the public key information to be stored on the SSH server.

Example public key.

```
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQACI7nJXrTXi7ToV3njvKXWMCCJBuNyksa6b0wVV1lwhkN
Tzh9hxT1dc0fiUTbtffHc0hUDvNtXV/
nbCBLFd06ZdrTx0jWOz7tJSwMCYm3jlmoHDkj9QLWuL7nGDBcsWI/
F6iA1tfhLM7snSY7cdIzj0mro3n2Nlonc+Wmv5bHXtRqbHWSbWdaR8jGOWGm
+AysFibrCCuautF6fqnd4uLq/
FFoNPlhgUk3ZmJ7dExT7DazZAwfSJUuZCC6Sxxk0P0qwkRWpn1rINxpyhKXZaw1vNZc5mNWibch
9ufCjApn8waYzDmqFNUEsay0ENS9252wSjaG2WavBjit250/Di6Bf CL61 SSH key for
SFTP data transmission
```

3. On the SFTP server, go to authorized key location:

```
nano <filepath to folder>
```

For example:

```
nano ~/.ssh/authorized_keys
```

The authorized key file opens.

4. Store the copied public key of ceilometer in the authorized key location.
Go to the end of the file, press **ENTER**, and paste the public key. This is the key you received from the ceilometer, using the **get cl.sender.publickey** command. Make sure that there are no empty lines between the different keys in the file.

11.1.2 Creating folder to SFTP server

Set the SFTP server address for receiving the ceilometer data.

- ▶ 1. Create a folder on your server and define its location.

11.1.3 Configuring data sender

Set the security key of the SSH server host public key with the ceilometer CLI. This enables the ceilometer to trust the SSH server when the connection is negotiated.

- ▶ 1. Open a CLI session to the ceilometer.
- 2. Change the access level to 1:

```
level 1
```

- 3. Configure the sender address and MD5 hash:

```
configure sender
```

The system prints the Ethernet data port settings of the measurement data sender.

- 4. Type the address of the folder that you created on the SFTP server.
Use address format *sftp://<user>@<domain>/<path>/*.
For example: *sftp://username@ssh.company.com/cl61/*.
- 5. When prompted, type **y** to continue.

11.1.4 Verifying data retrieval

After setting up the SFTP server, verify data retrieval in CLI.

- ▶ 1. To check the status, type the **status** command in CLI:

```
status
```

A correctly set status does not include a warning in **Reporting destination URL**. The following is an example status:

```
Data communication Reporting destination URL :0: Reporting destination URL
for output data set
```

- 2. Using an SSH/SFTP client, go to the location specified in [Creating folder to SFTP server \(page 45\)](#).

3. Confirm that netCDF files are generating to this location.
 - Default sending interval is 1 m, a new file each minute.
 - Default naming is **live_<yyyymmdd>_<hhmmss>.nc**.

The reporting parameters start with default values. For more information on configuring parameters, see *Vaisala Lidar Ceilometer CL61 User Guide*.

For more information on the netCDF file structure and contents, see *Vaisala Lidar Ceilometer CL61 User Guide*.

4. Open a file and verify the data.
Use your preferred netCDF reader, for example Vaisala BL-View or Panoply (open source software made by NASA).

Table 9 Troubleshooting

Problem	Probable cause	Actions
Data is not coming through.	SSH is not enabled.	Check that SSH is enabled. Contact your IT department.
	Wrong server key used.	Check that you have the host key of the SFTP server, not the (user/client) public key.
	Measurement unit is not operational.	Check that you have removed the transportation lock inside the measurement unit.
	Wrong hash used.	Check the hash. Configuring data sender (page 45)
	No access to server.	Check server log files.

11.2 Setting up FTP server



- Laptop with terminal software that supports SSH (for example, freeware TeraTerm or latest version of PuTTY)
- Ethernet maintenance cable



CAUTION! FTP server setup can be used but it is not secure. If possible, use SFTP server setup.

- ▶ 1. Create a folder on your server and define its location.

2. On the ceilometer CLI, define the folder that you created on the server:

```
set reporting.destination.address ftp://<username>:<password>@<domain>/  
<path>/
```

For example:

```
set reporting.destination.address ftp://username:password@ssh.company.com/  
cl61/
```



URL validation is not supported. Define the location as a valid URL in the format `ftp://<username>:<password>@<domain>/<path>`.

- Domain is the server IP address or hostname.
- Path is the existing folder to upload netCDF files.

12. Operation

12.1 List of commands

The user commands are divided into the following groups:

- Configuration commands include commands such as **getset**, **level**, **set**, and **swupdate**, as well as the configuration parameters.
- Troubleshooting commands include **elog**, **reset**, **status**, and **system**.

To access the user commands, establish a maintenance terminal connection and provide the password. The command prompt opens.

Table 10 CL61 user commands

Command	Description
configure sender	Stores STFP server settings to ceilometer
elog	Displays event log
get <parameter>	Displays parameter value or parameter list values
getset <parameter> [<value>]	Displays parameter value or parameter list values with SET command included
help	Provides help on the commands and use
level [0 1 2]	Changes the user level (0, 1 or 2) Levels are: <ul style="list-style-type: none"> • 0 = Read access (default) • 1 = Write access to basic parameters • 2 = Write access to advanced parameters
reset	Resets the device
set <parameter> [<value>]	Sets parameter value or parameter list values
status	Displays the functional status on the device
swupdate	Updates the software version
system	Displays information on the device

For more information and the list of parameters, see *Vaisala Lidar Ceilometer CL61 User Guide*.

More information

- [Establishing maintenance connection \(page 34\)](#)

12.2 Factory resetting ceilometer



- Blunt instrument with an approximately 5-mm tip, for example Allen key

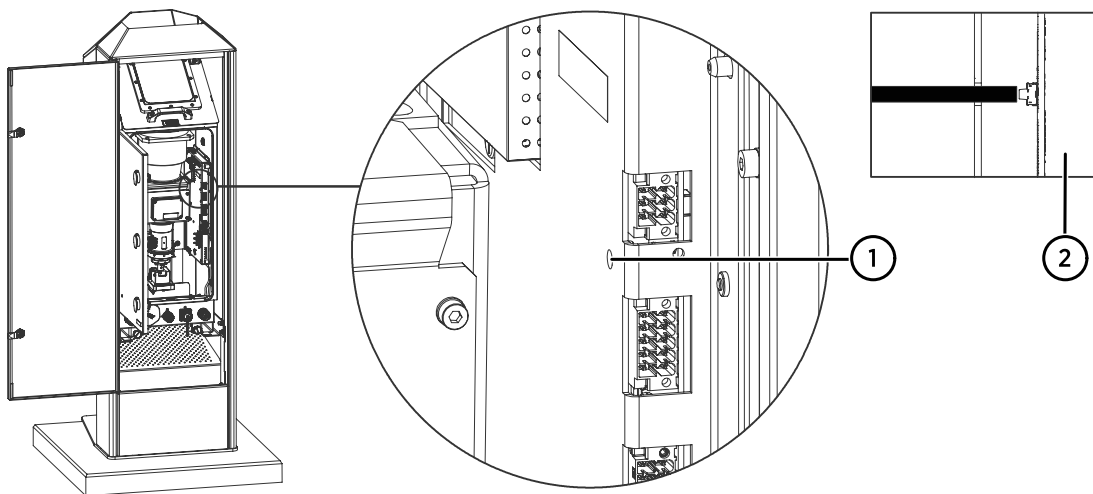
To reset the device, you need the device activation code, which is 16 characters long. The original delivery included 2 stickers that contain the device activation code.

Resetting the device (hard reset) restores factory settings. Reset the device if you have lost or forgotten the admin password or the configuration must be reset back to the original.



CAUTION! Using the device activation code restores factory settings in the device and clears all user and measurement data from the device.

1. Open the door of the measurement unit.
2. Locate the reset button on the device control module CLC611, inside the measurement unit.



- 1 Reset button
- 2 Pressing reset button with blunt instrument, side view

3. Press the button for 15 seconds.
You can hear the device shutting down and starting after approximately 10 seconds, but keep the button pressed for approximately 15 seconds to complete the restart.
4. Close the measurement unit door.
5. Activate the ceilometer and copy the updated public key of the ceilometer to the SFTP server.
6. If the reset does not help, contact Vaisala.

Appendix A. Regulatory statements

A.1 Regulatory compliance

This product complies with the following directives:

- Low Voltage Directive (2014/35/EU)
- EMC Directive (2014/30/EU)
- RoHS Directive (2011/65/EU) amended by 2015/863

A.2 FCC/ISED regulatory notices

Modification statement

Vaisala Oyj has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

Vaisala Oyj n'approuve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

Interference statement

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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 as applicable:

- Product name, model, and serial number
- Software/Firmware version
- 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.

VAISALA

