

# WindCube - Vertical Profiler Lidar

Technical Support & Service Information  
WindCube v2.1 - 2024/11/12



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PUBLISHED BY

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# 1. Prior notice

## 1.1 Prior notice

Vaisala is a member of Vaisala Group, where Vaisala OYJ (a stock listed company at Helsinki's Nasdaq) is head of group company. Therefore, Vaisala as mentioned hereafter shall include any of its affiliates (including Vaisala OYJ as its mother company so as any other). For the sake of clarity, any mention to "Vaisala" refers irrespectively to Vaisala Group.

## 1.2 Confidentiality

The present document contains several Vaisala proprietary and restricted information which is released to a business or technical partner or Customer for a strict internal purpose. Its submission is performed under the frame of a strong duty of confidentiality so as any possible Non-Disclosure Provisions in force between the Parties and/or any affiliate of Vaisala Group (hereafter "Vaisala Group").

The disclosure of any information contained in that document is subject to Vaisala prior written approval.

## 1.3 Applicability with regards to General Conditions of Sale and Service of Vaisala France SAS

Provision 1.1 of General Conditions of Sale and Service of Vaisala France SAS states dated April 2021 states that *"Products, services, prices and other relevant information are set out in our quotation or acknowledgment of order. Products and Services, together with associated additional conditions, may be further detailed in Product specific documentation ("Product Information") and/or Service specific documentation ("Service Information") attached to our quotation or acknowledgment of order, or otherwise made available to you."*

For the sake of clarity, the present document shall be construed as the "Service Information" mentioned in that provision. In case of contradiction, the following documents shall supersede in decreasing order of priority:

- The quotation addressed to the Customer;
- Specific Conditions if relevant;
- The WindCube Product Information;
- The WindCube Technical Support and Service Information (meaning the present document);
- General Conditions of Sale and Service of Vaisala France SAS.

## 1.4 Specific Conditions

Depending on business needs, Vaisala reserves the right to discuss and accept specific conditions which shall complete and supersede that Product Information (hereafter the “Specific Conditions”). In such a case, such Specific Conditions shall be materialized in a specific document (the “Umbrella Agreement”), which will integrate them so as any document to be attached to the sales contract.

## 2. Vaisala unique servicing capabilities

### 2.1 Vaisala company





Vaisala is the leading provider of ground-based and nacelle-mounted Lidar (Light Detection and Ranging) solutions. The company designs, develops, manufactures, sells and services new turnkey remote-sensing instruments allowing wind measurement and aerosol characterization.

Lidar technology is at the crossroads of several atmospheric environmental applications. Vaisala addresses four different markets:

- wind power
- air quality
- weather and climate
- aviation weather

For the wind industry, Vaisala has a unique product range allowing optimizing wind farm projects value at all stages, from development to operations and maintenance.

Table 1 Vaisala's products

WindCube® Vertical Profiler Lidar	WindCube® Offshore Vertical Profiler Lidar	WindCube® Scan Long Range Scanning Lidar	WindCube® Nacelle Turbine Mounted Lidar
			

Today with thousands of successful deployments, Vaisala has a large experience both offshore and onshore with solutions provided to the wind energy, weather, airport, ... industries. Our Customers and partners in wind industry are developers, turbine manufacturers, operators, owners, consultants, experts, service providers, finance groups and research organizations.

## 2.2 An industrial organization to ease our Customers' operations

To best serve our Customers and ease their operations with WindCube Onshore and Offshore, Vaisala industrial and servicing capabilities are developed following three pillars:

- An International footprint to locally serve our Customers:
  - 2 strategic production sites: Paris-Saclay in France, Shanghai in China
  - 3 service hubs : Europe and Rest of the World, Asia-Pacific and North America
  - Local partners trained by Vaisala
  - Local spare parts' stock
- A wide range of services
  - On-site: installation, site survey, training, Site Acceptance Test (SAT), repair, preventive maintenance
  - In workshop: Factory Acceptance Test (FAT), repair, preventive maintenance
  - Online: remote refresher training & monitoring, E-learning (Mooc)
  - 3<sup>rd</sup> Party verification
  - Specific engineering & scientific support
  - Door to door logistic services in Europe and APAC (other countries are decided case by case)
- An experienced Service Team:
  - Field engineer Teams located in Europe, US, China and Australia
  - Over 20 field engineers available
  - High technical level & flexibility
  - Worldwide online Technical Support 24/7
  - Multilingual speakers

## 2.3 A unique Network of Service Centers for Lidars

Our Customers can rely on a unique and dense network of Service Centers composed of Vaisala network, trained local partners and Vaisala factories. Wherever a WindCube is being operated, one can rely on local services brought with the same global quality.





# 3. WindCube Services description

## 3.1 WindCube Services description

Formal Commitment of Vaisala meaning the standard of services attached to WindCube (hereafter the “LIDAR System” or “WindCube”) is defined hereafter in part 3 of the Document “WindCube Services Description” in accordance with provision 1.1 of General Conditions of Sale and Service of Vaisala France SAS.

## 3.2 Customer Support Process

Any Customer (hereafter referred to as “Customer” or “Client”) technical request may be addressed to Vaisala Technical Support and is carefully treated and traced following an efficient Care Process to deliver fast, transparent answer and short closing time. Technical repair services are involved by Technical Support when needed.

Client can access our Technical Support services in order to follow up on cases by registering on the My Vaisala Online Technical Support Portal. The My Vaisala portal will allow Customer to:

- Request technical support
- Follow up and view previous Cases (request to Technical Support)
- Review frequently asked questions and answers by product line
- Communicate with Vaisala Technical Support experts through a secure password-protected online portal

To register go to [www.vaisala.com](http://www.vaisala.com) and click on 'Get Support', following [https://vaisala.my.site.com/myvaisala/MV\\_SelfRegistration](https://vaisala.my.site.com/myvaisala/MV_SelfRegistration).

### 3.2.1 Request Technical Support

Once Customer has contacted Technical Support with relevant information, a corrective plan will be proposed by Technical Support (TS) within 3 business days (Customer waiting time excluded). This implies a WindCube **remote access**.

Corrective actions will be decided in agreement between Technical Support and end-users and may imply an intervention on-site by end-users with an online support from Vaisala Technical Support. If further actions are required, the Technical Support will propose two solutions to the Client:

- A Lidar system return to a Vaisala or Partner Service Center (“Back to Base”).
- An intervention on-site onshore by a Vaisala or Partner technician with additional cost and under specific conditions.

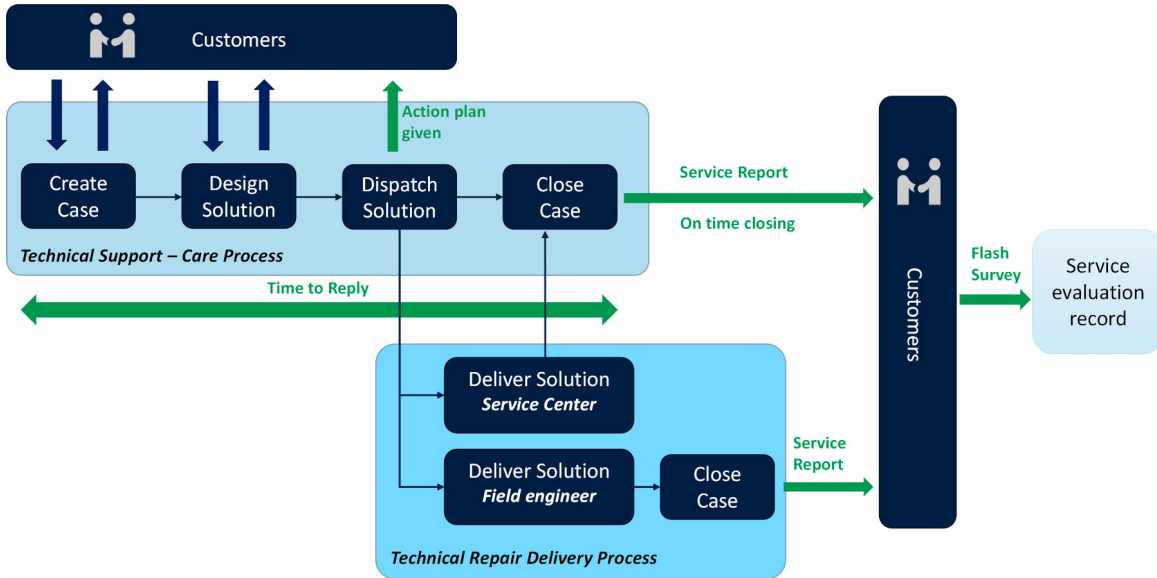


Figure 1 Customer Support process

### 3.2.2 Remote access

The Client has the possibility to accept or deny the remote access of the LIDAR System by the support team for check-ups and repairs. This remote access allows getting a full access to the Client wind data and parameters for the purpose of diagnosis and troubleshooting. All the data and parameters are kept confidential and cannot be used for any other purpose than check-up and repair without prior Customer’s approval to let Vaisala make any other use. Client is informed each time a LIDAR System is remotely accessed by the support team after agreement. Collected wind data remains the Client’s property.

### 3.2.3 Data Management

Vaisala shall not be liable for any loss of data occurring during a reparation and/or maintenance. For such purpose, the Client is liable to save any Lidar Data before the start of any service operations.

Vaisala reserves the right to collect performance monitoring information. The collection of such information is performed for internal purposes or performance improvement for Customers.

### 3.2.4 End-User on-site intervention

In some cases, it is required by Vaisala Technical Support to have a Client’s representative physically accessing the LIDAR System for diagnosis purposes.

### 3.2.5 Restriction for on-site repair

If casing needs to be changed, repair will be possible on-site only if it has been diagnosed so that casing is sent as spare parts before Field Engineer arrival. Otherwise, repair cannot be done on-site.

### 3.2.6 Vaisala or Partner on-site Onshore intervention

The LIDAR System is designed to allow for on-site repair and maintenance. In case Vaisala Technical Support provides the choice between Factory repair and on-site Intervention (under specific cost and duration conditions), the Client shall communicate its decision within 3 business days. Cost and duration quoted for the on-site intervention are linked to the Travel and Expenses of Vaisala employees, availability of field engineers and duration to ship spare parts to the country of destination.

The LIDAR System shall be made available at an Onshore location with an easy access ensuring field engineer works in safe condition (no risk of personal injury or WindCube damage, WindCube operating temperature range). The environment must allow physical access to all sides of the Lidar, to enable diagnosis and repair. Once repair or preventive maintenance is performed, location must allow the WindCube to be checked for full operation: access to wind measurements in the open air (without obstructions).

Travel costs and expenses incurred by the Vaisala technician or Service Partner are charged to the Customer.

Vaisala organizes and pays for shipment to the Customer of spare parts required prior to on-site intervention using Incoterm DAP or CIP depending on country of destination.

The Client is responsible to pay and ship the deteriorated parts back to Vaisala using DAP Incoterm ICC 2020.



Technical Support may also propose to organize this shipment from Customer to Vaisala and quote this freight to the Customer. If Customer accepts the offer, he will have to make the parts available for pick-up and pay the freight organized by Vaisala.

## 3.3 Logistics conditions

In any case, if the WindCube cannot be repaired remotely, it shall be shipped back to Vaisala local Service Center or repaired via an on-site intervention, depending on the Client choice.

### 3.3.1 Return to Vaisala

No component of the LIDAR System shall be returned to Vaisala without Vaisala's prior written approval. In any event, such a return can only be made of LIDAR System components that have not been modified or altered and must be made in the original packaging. In all cases, **the transportation and restocking costs shall be borne by the Client.**

For any factory intervention, a RMA (Return Material Acceptance) document must be filled by the Client and sent to Vaisala Technical Support before shipping the Lidar to the Service Center. The RMA form will be provided by Technical Support.

Without this RMA, Service Center will not be able to proceed to the service on Client's WindCube.

### 3.3.2 Shipment back to Client

**Preventive Maintenance service** attached to any LIDAR System **includes** its shipping one-way Delivery At Place (or CIP Incoterm ICC 2020 depending on country of destination) from Vaisala to the Client onshore premises adapted for the reception of the LIDAR System (which must be, without Vaisala prior approval, the Client's initial place of delivery stated in the Quotation). Such shipping concerns either the LIDAR System or the spare parts concerned by the repair or maintenance.

### 3.3.3 Travel and expenses

If the on-site intervention is possible and has been selected, Travel and expenses and cost of shipping parts back to Vaisala shall be borne by the Client.

## 3.4 Vaisala Warranty

### 3.4.1 Duration

With more than 15 years of industry developments and products deployments, our Lidar technology relies on a robust industrial process ensuring a continuous reliability and stability of our systems. Considering this, WindCube products, instruments and software together are warranted for five (5) years (parts and labor) from the date of delivery or availability of the LIDAR System (depending on the chosen Incoterm - hereafter the "Warranty Period").

### 3.4.2 Scope

Initial and Warranty extension cover the LIDAR System, as initially delivered by Vaisala, including accessories necessary for its operating, as initially configured in the purchase quote: power supply converter (original ACDC or DCDC), PTH, water pump, 3G/4G modem and antenna. Consumables (such as wiper blades) are not under warranty. Warranty does not include options that may be chosen by the Client, in addition to the LIDAR System itself, such as external autonomous Power supply, Satellite Modem ... The repair costs of those options are borne by the Client.

Vaisala shall, during the validity of the Warranty, replace components that may be defective. As a principle, in no case shall the replacement be of the entire LIDAR System. No repair nor maintenance extends the Warranty. Warranty extension and conditions are described in [Warranty extension \(page 17\)](#) paragraph. As a specific condition to General Conditions of Sale and Service of Vaisala France SAS, Parts repaired are warranted for six (6) months from completion of the repair.

If the LIDAR System is verified by a third party, Vaisala standard warranty neither covers the continuity of this verification, nor includes a new verification. Special request shall be made by Customer.

### 3.4.3 Reminder of logistics conditions under Warranty conditions

Vaisala shall, during the validity of the Warranty, use its best efforts to correct any LIDAR dysfunction. To this effect, Vaisala shall conduct a diagnostic of the dysfunctions first remotely with the local support of the Client technical coordinator and supply a corrective if deemed necessary.

May the LIDAR System or the related components need to be **sent back to Vaisala premises**, the Client is responsible and pays to send "Delivery at place" the LIDAR System or the related components back to Vaisala premises (DAP Incoterm ICC 2020).

Where the Warranty is rightfully invoked, the eventual cost of shipment of material **to the Client site** (including the LIDAR System and/or dedicated spare parts), packaging, insurance shall be borne by Vaisala. As an exception to the present provision, Vaisala shall in no case bear any cost (parts and persons) linked to the commissioning and/or decommissioning of the LIDAR System (including travel of employees by any means) in an offshore environment (such as but not limited to LIDAR System deployed on oil and gas platforms, buoy, offshore wind turbines and/or vessels). Furthermore, Vaisala reserves the right to apply the same restrictions in case the onshore access of the LIDAR System needs specific support (such as the request of specific authorization and the deployment of specific material).

After performance of the Warranty operation, Vaisala is responsible and pays to send back the LIDAR System and/or dedicated spare parts to the Client onshore premises by using the same Incoterm as agreed at initial delivery of the LIDAR System. Unless otherwise priory agreed by Vaisala, the delivery place shall be the Client's initial place stated in the quotation.

LIDAR System design offers the possibility that, as a principle, all type of repair can be made at the Customer site of operation. However, if repair cannot be performed on-site, Technical Support will inform customer. For more information, refer to [End-User on-site intervention \(page 10\)](#) and [Restriction for on-site repair \(page 11\)](#) chapters.

### 3.4.4 Warranty conditions

If the user invokes the warranty the following conditions must be met for the warranty contract to be valid.

- The Warranty is applicable only to the extent that the LIDAR System has been exclusively manipulated by (Client or third party) personnel trained and certified by Vaisala and maintained according to Vaisala instructions and recommendations.
- The Warranty does not cover replacement and/or repairs resulting from normal wear and tear of the machines, deterioration, and accidents resulting from negligence, lack of supervision, maintenance or stocking, manipulation or use not conforming to User's Manual.
- Vaisala reserves the right to void the Warranty in case non-trained certified third parties has performed operations on the LIDAR System.

## 3.5 Factory Service level

Vaisala has optimized the WindCube maintenance flow process in its technical centers. This enables reducing maintenance duration down to fifteen (15) business days on average, from the opening of a Technical Support case to unit shipped back from Service Center (Customer waiting time excluded).

This accelerated maintenance process is available for all under warranty LIDAR System worldwide and is today operated in the two Vaisala factory workshops, in Paris-Saclay and Shanghai.

This accelerated flow process particularly reduces LIDAR System downtime during a preventive maintenance or a repair and brings an efficient standard solution for LIDAR System support.

## 3.6 Preventive maintenance program

In order to enhance the lifetime of WindCube and reduce the risk of breakdown, it is strongly recommended to subscribe to a preventive maintenance contract to ensure the system reliability and its lifetime.

For any LIDAR System purchased by the Client, a list of operations realized during the Preventive Maintenance service is available upon request to Vaisala through a dedicated service report.

- The maintenance is performed either in factory or on-site after five (5) years. On-site maintenance is a unique service option for WindCube V2.1 Lidars. At year ten (10), the maintenance is conducted in factory (Vaisala or partner Service Center).
- A warranty extension can be purchased in addition to a preventive maintenance after five (5) years. The warranty extension is granted only if the preventive maintenance program is properly followed. See "Warranty" service description.
- Without warranty extension, as a specific condition to General-Conditions of Sale and Service of Vaisala France SAS, a WindCube is warranted for six (6) months following completion of the preventive maintenance.

Both the warranty and maintenance service agreements are designed to meet our Customers' needs and ensure that the equipment is optimally maintained and total cost of ownership predictable.

For preventive maintenance program beyond ten (10) years of ownership, a customized maintenance program and specific offer will be agreed with Vaisala Technical Service Center.

### 3.6.1 Factory Preventive Maintenance

Preventive maintenance can be planned in advance and purchased at the same moment as the LIDAR System. The Client is responsible and pays for the inbound transport (to Vaisala factory) and Vaisala is responsible and pays for the outbound transport (to the Client) using Incoterm DAP or CIP depending on the country of destination.

A RMA document must be filled by the Client and sent to Vaisala Technical Support before shipping the Lidar to the Service Center. The Preventive Maintenance service cannot be conducted if the document has not been sent beforehand.

## 3.6.2 On-site preventive maintenance

WindCube has been specifically designed to perform maintenance at Customer's site. It is a unique feature for WindCube to improve operational continuity and reduce Customer logistic. The on-site preventive maintenance duration is one (1) day on average. Vaisala is responsible and pays for the inbound transport of the new parts using Incoterm DAP or CIP depending on the country of destination (to Client onshore site) and Client organizes and pays the outbound transport of the old parts (to Vaisala).



Technical Support may also propose to organize the shipment of the customer's used parts to Vaisala and quote this freight to the Customer. If the Customer accepts the offer, he will have to make the parts available for pick-up and pay the freight organized by Vaisala.

The above described maintenance conditions also apply to the on-site preventive maintenance<sup>(1)</sup>. In addition, the Customer should ensure that the site has:

- A shelter to protect the Lidar and field engineer from environmental conditions such as rain
- Access to power supply from the grid for the field engineer
- Sufficient power supply for the Lidar operation (as specified in user manual section 4.3)
- A robust internet connection by either Ethernet, WiFi or Router

The following maintenance steps apply for the Client and the Service Center :

1. Once a date of intervention and location have been agreed upon, the Service Center secures the required validated parts for the maintenance.
2. Two weeks before the intervention, the Client should ensure that the LIDAR system is operating correctly. The objective is to ensure the intervention will be successful, and there is no major damage outside of the parts that needs maintenance.
3. The Service Center sends parts to the Client using DAP or CIP Incoterm ICC 2020 depending on the country of destination.
4. Before intervention of Vaisala field engineer, as before the start of any service operation, the Customer is required to save all Lidar data.
5. On the agreed date, a Service Center field engineer arrives at the site along with the required parts.
6. Once on-site, the field engineer performs a quick check on the LIDAR System to verify if the system operates correctly and to check if everything is in order for maintenance.
7. The field engineer replaces the LIDAR system core sub-components with validated parts, for instance a validated Laser Chain. Additional parts that need maintenance are also changed if needed, based on Client diagnostic at step 2.
8. The field engineer performs an acceptance test to verify the system is working properly.
9. The Client organizes and pays for the shipment of the parts back to the Service Center premises using DAP Incoterm ICC 2020.
10. Once back in factory, the defective parts are refurbished and stored, whenever possible.

1) *On-site preventive maintenance is only available at year three (3). A factory maintenance (Vaisala or service partner) is required at year six (6)*

## 3.7 Lidar Software update

Lidar Software will be updated :

- During preventive maintenance, for any intervention at Vaisala factory, last LIDAR Software updates, compatible with considered Hardware, will be applied to the system directly.
- For any repair requesting Laser Chain change, and for on-site preventive maintenance, Laser Chain is replaced by latest version including latest Software release
- On specific customer demand to Technical Support.
- For Quality Reason, VAISALA may wish to update WindCube fleet (LIDAR in operation). If update needs to be performed out of maintenance (as described above), Technical Support will contact Customer to ask its approval.

Software update can be performed by L1 trained person, with relevant equipment. Technical Support should be contacted in all cases.

Detailed content of each LIDAR Software release is described in Software release note, available at Technical Support.

No Software downgrade is possible (only upgrade to latest version is possible, if Hardware is compatible).

### 3.7.1 How are software updates carried out ?

#### Remotely

Once Customer gives his consent, if WindCube is online (connected to WindCube Insights Fleet) and **without** the “low data consumption mode” activated, Technical Support can update the Software (remotely).

If the WindCube is offline, Technical Support will ask Customer to put it online and to connect it to WindCube Insights Fleet software, so that Technical Support can update Software (remotely).

#### On-site

If WindCube cannot be connected to WindCube Insights Fleet (no communication available) or has the “low data consumption mode” activated, Software update requires a direct access to WindCube. Technical Support can send Maintenance Tool + update installer to L1 trained Customer. L1 Trained Customer can then update Software once he will have direct access to the WindCube. For Traceability reason, Customer must always contact Technical Support to inform them the updated WindCube Serial Number.

For any repair requesting Laser Chain change, and for on-site preventive maintenance, by Vaisala field Engineer or L3 trained partner, Laser Chain is replaced by latest version including latest Software release.

#### In Vaisala service center

During preventive maintenance, for any intervention at Vaisala factory, last LIDAR Software updates, compatible with considered Hardware, will be applied to the system directly.



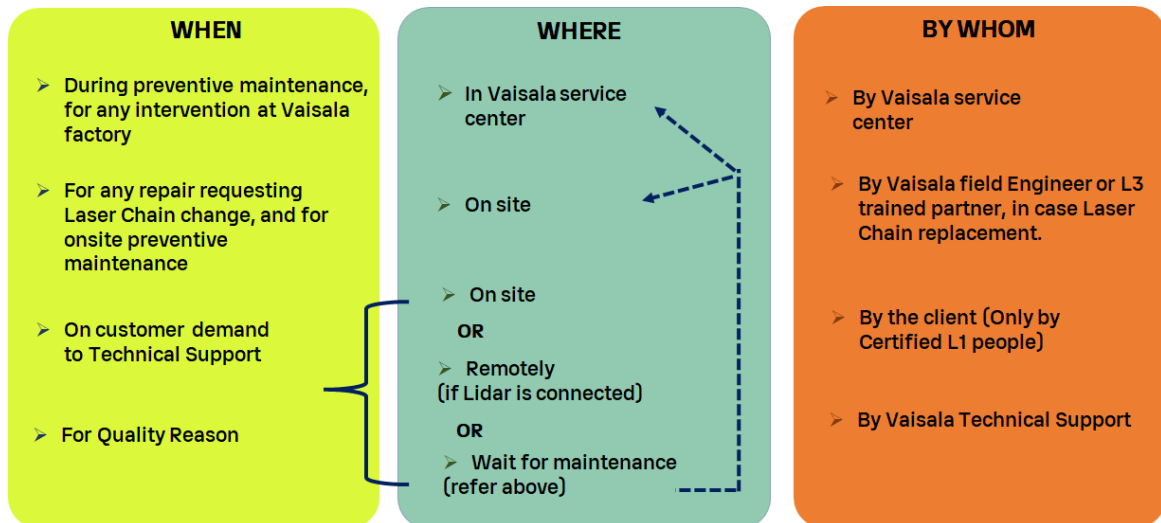


Figure 2 Software updates process

## 3.8 Warranty extension

At the end of the Warranty Period, the Client may continue to receive the services provided in this article on condition that the Client subscribes to a warranty extension service (hereafter the “Warranty Extension”). The Warranty Extension may be subscribed by the Client at any time from the date of order of the LIDAR System and up to 3 months after the end of the Warranty period. It can be subscribed only if the preventive maintenances have been performed according to the Lidar maintenance program and schedule.

All conditions described in the Warranty section also apply for the Warranty Extension contract.

VAISALA reserves the right to refuse or void the Warranty Extension if the preventive maintenance of the LIDAR System has not been completed in a time frame later than three (3) months following the end of current warranty duration. Events non attributable to Customers can be discussed on a case by case basis.

Warranty Extension can be up to a maximum of 10 years of LIDAR System warranty. For longer warranty extension, a customized maintenance program and specific offer might be agreed with Vaisala Technical Service Center.

The following figure summarizes the durations to be considered for conducting a Preventive Maintenance or a Warranty Extension.

Flexibility on maintenance date does not impact warranty end of date and possible warranty extension starting date.

## 3.9 Vaisala training program

WindCube training program is divided into levels of skills :

Level	Objectives
L1 <sup>1)</sup>	In addition to L1 Online module, a trainee passing Level 1 will have opportunity to know: <ul style="list-style-type: none"> <li>- Technical architecture of the Lidar</li> <li>- Setting-up and checking the good working operation of the Lidar</li> <li>- Q&amp;A with an experience engineer</li> <li>- Perform a 1st installation with support of an experience engineer</li> </ul>
L1 Online <sup>2)</sup>	A trainee passing Level 1 Online will learn how to perform: <ul style="list-style-type: none"> <li>- Installation</li> <li>- Performing basic routine maintenance of the Lidar</li> <li>- Performing basic failure diagnosis of the Lidar</li> </ul>
TT1 (optional)	A trainee passing the Trainer Training 1 (TT1) level is able to train people to L1 <u>inside its own organization</u> <sup>3)</sup> . TT1 training can be given only by Vaisala. TT1 trainee can provide L1 training but NOT TT1 training.
L2	A trainee passing Level 2 will learn to: <ul style="list-style-type: none"> <li>- conduct trouble shooting using advanced diagnostics</li> <li>- perform components advanced repairs, except for optical components</li> </ul>

- 1) L1 training can also be provided by a Vaisala certified expert which cover all operation in detail including software, configuration and support for your installation, such training is quoted separately.
- 2) L1 Online is by default included and provided online using our E-Learning course (Mooc) and cover the key points required to install the Lidar.
- 3) Only Vaisala official distributors, with valid delegation contract, once trained TT1, are allowed to provide training outside their organization.

All training courses end with a theoretical and practical evaluation test that will validate the acquired skills. A training certificate is issued for each trainee who passed the evaluation test. This certificate has a limited validity period and VAISALA reserves the right to modify the validity of such certificates by prior information to the Client.

The content of each training is given in the following table. This caption is used:

Domain	Item/subset/test	L1 Online (E-Learning, Mooc)	L1	TT1	L2
Basics	Doppler Lidar technology	✓	✓	✓ <i>Advanced training</i>	
	WindCube design architecture		✓	✓	
	Security and hazards	✓	✓	✓	✓

Domain	Item/subset/ test	L1 Online (E- Learning, Moc)	L1	TT1	L2
Installation and set-up	Physical installation	✓	✓	✓	
	Electrical connection	✓	✓	✓	
	Network connection	✓	✓	✓	
	Lidar configuration		✓	✓	
	Software update	✓	✓	✓	
	Fine leveling and orientation to the north	✓	✓	✓	
	Data access		✓	✓	
	Switch on	✓	✓	✓	
	Options configurations		✓ <i>For options purchased</i>	✓ <i>For all options</i>	
	WindCube unpacking	✓	✓	✓	
General checks	System status check	✓	✓	✓	
	General check and cleaning	✓	✓	✓	
	Routine maintenance	✓	✓	✓	

Domain	Item/subset/test	L1 Online (E-Learning, Mooc)	L1	TT1	L2
Components replacement	Sprinkler pump and tubing	✓◆👤	✓◆👤	✓	
	Casing air filters	✓◆👤	✓◆👤	✓	
	Wiper Blade	✓◆👤	✓◆👤	✓	
	Wiper Engine				✓◆👤
	Fuses				✓◆👤
	Options replacement or installation		✓	✓	
	Electronic boards				✓◆👤
Measurement	Noise spectrum analysis		✓	✓	✓
	Signal acquisition analysis		✓	✓	✓
	Lidar signal analysis (CNR)	✓	✓	✓	✓
Advance Check up	Laser system (output power, pulse shape, range gating)				✓
	Acquisition				✓
	Electrical check				✓
<p>  learning/diagnose   replace/maintain   Spare parts  <i>Upon Customer's request, Vaisala Technical Support can send spare parts for repair or a particular installation. These spare parts may only be used with an appropriate level of training.</i> </p>					

The training courses are executed by a Vaisala certified expert except for the L1 online training (E-Learning, Mooc). Training or assistance services provided that require Vaisala personnel to travel to the Client are quoted separately, including travel expenses.

### 3.9.1 Training program conditions

- If the training is performed by Vaisala certified expert, the language is either English or French according to the Client requirement. If the training is performed online using our E-Learning course (Mooc), the language is in English.
- Vaisala maintains a list of accredited users with their level and the validity date of their accreditation. Regular refresher training sessions must be performed by Vaisala to maintain the right level of skills for each staff involved at each level of use.
- The Lidar System cannot be operated by non-qualified and non-accredited staff.
- The transfer of skills is possible only after having duly trained and been qualified to train other internal users (inside trainer's own organization).
- If relevant, training participants shall be subject to a confidentiality agreement intended to protect Vaisala's know-how.

The profile of the trainee candidates must be submitted by the Client in advance and approved by Vaisala prior to the commencement of the training program. The following table states the required skills to attend each training level:

#### Training location

Online L1 training is provided using our E-Learning course (Mooc) and is performed by Customer at their location by connecting to our E-Learning website using internet access. For trainings provided by Vaisala certified expert, the conditions of the training location are detailed hereafter.

Assuming below conditions are fulfilled, L1, TT1, L2 training can be done either on-site, at Customer location, or in factory, at Vaisala location. Some official Vaisala partner, with valid contract and expertise level, may also offer L1 training at their location.

It can be advised to perform L1 training at Customer location, to ensure good understanding of Customer usage, and provide personalized advices and support for WindCube installation, considering Customer and environmental constraints.

During L2 training, trainer will operate and exercise on WindCube. When performed at Customer location, training will be performed using Customer WindCube. Therefore it might be recommended to perform L2 training at Vaisala location. Although unlikely to occur, any involuntary damage created to WindCube by trainee at Vaisala location, could be repaired locally, with no impact on Customer's own asset.

Level	Skills
L1	<ul style="list-style-type: none"> <li>- English</li> <li>- Elementary computing and IT skills</li> <li>- Elementary mechanical skills</li> <li>- Elementary electrical skills</li> <li>- Use of basic tools</li> </ul>
TT1	<ul style="list-style-type: none"> <li>L1 skills +</li> <li>- Advanced skills in signal processing</li> </ul>
L2	<ul style="list-style-type: none"> <li>L1 skills +</li> <li>- Mechanical and electrical engineering</li> </ul>

Level	Duration	Maximum attendees	Certificate validity duration	Refresher training duration	Means
L1 Online	0.5 day (Mooc)	1 (Mooc)	3 years	0.5 day (Mooc)	Vaisala E-Learning (Mooc) website by internet after requesting access from Vaisala
L1	1.5 days	5	3 years	0,5 day (MooC)	Fully available Lidar system. Room with video-projector.
TT1	2 days (L1 included)	3	3 years	2 days	Easy access to outdoor location.
L2	1 day	5	2 years	1 day	Fully available Lidar system + spares. Room with video-projector. Outdoor location enabling wind speed measurement, with no Lidar laser beams obstruction. Easy access to outdoor location. Toolbox L2+ Workshop + 1 dedicated PC per attendee. Including ESD protection (grounded ESD wristband) and clean areas (contamination free) for handling electronic board.

### 3.9.2 E-Learning (Mooc) - Level 1 (L1) Online Training

This online training is conducted using our E-Learning courses and is intended to train the users on the key points required to unbox and install the Lidar, including routine maintenance.

The training is provided using our E-Learning website and user must request access from Vaisala website (<https://www.vaisala.com/en/services/training>). After being granted access by Vaisala, an automatic email will be sent to the email provided by the user with the credentials and link to our E-Learning website.

At the end of the training, a Level 1 certificate is given to the participant. This certificate grants the right to the trainee to install, operate a WindCube system in the frame of the system warranty.

The certificate is valid for a period of three (3) years after the training. This certificate is renewed with performance of a new training online (E-Learning, Mooc) or can be extended with the performance of a L1 training by Vaisala certified expert, such training is quoted separately.

### 3.9.3 Level 1 (L1) Training

The Level 1 (L1) Training is intended to train users to the basic use of Lidar, but also to routine maintenance operations, installations and deployments (Level 1 training).

Below a typical training schedule description:

1st day		2st day
<b>Morning</b>	<b>Welcome and presentation of the training</b>	<b>Welcome</b>
	-Inspection of the system -First installation -Preliminary performance check	-Night's data analysis (if possible) -Data format practical demonstration -Performances verification (depending on atmospheric conditions)
	-Theoretical presentation	-Questions and discussion -Acceptance and warranty signing
<b>Noon</b>	<b>Lunch</b>	<b>Lunch - end of the training</b>
<b>Afternoon</b>	- Installation practical demonstration - Software practical demonstration - Options practical demonstration (remote control, Geofencing...) - Switching-Off procedure - Night operation (if possible)	
<b>Evening</b>	<b>End of 1st day</b>	

The training is provided by WindCube technical expert from Vaisala as well as the installation supervision. At the end of the training, a Level 1 certificate is given to each participant. This training grants the right to the trainee to install, operate a WindCube system in the frame of the system warranty.

The certificate is valid for a period of three (3) years after the training. This certificate is renewed with performance of new training or can be extended following completion of the online refresher course (refer to [E-Learning \(Mooc\) - Online refresher \(page 24\)](#) section).

### 3.9.4 Trainers Training (TT1)

A Trainers Training enable a Company to autonomously train its own employees to operate a WindCube and perform the routine maintenance (Level 1) in the frame of the LIDAR System warranty. At the end of the training, a certificate is given to each participant. The certificate is valid for a period of three (3) years after the training. This certificate is renewed with performance of new training.

Prior to a new training, the TT1 trainer will need to send to Vaisala ([helpdesk@vaisala.com](mailto:helpdesk@vaisala.com)) the training information:

- Participants details (first and last names, email, title, company name, company country). Only people within their own organization
- Training date and location
- Once trained, the TT1 trainer must follow the recommendations, training contents and duration as learned during the TT1. After the training, Vaisala will record the training information provided by the TT1 trainer and issue the L1 certificates to the trainees.

TT1 trainer shall remind L1 trainee to send to Vaisala ([helpdesk@vaisala.com](mailto:helpdesk@vaisala.com)) installation report with WindCube serial number, each time they install a WindCube.

### 3.9.5 Training for Level 2 (L2) maintenance

This training for Level 2 maintenance provides users with the capability to perform advanced failure diagnosis and basic repair at module level at a workshop and on-site when possible. Basic repair includes replacement and configuration of wiper motor, fuse, or electronic boards.

A specific toolbox for Level 2 maintenance is required to perform this level of diagnosis and repair. It must be purchased separately, with reception before training date to be used during training.

At the end of the training, a certificate is given to each participant. The certificate is valid for a period of two (2) years after the training. This certificate is renewed with performance of new training.

### 3.9.6 E-Learning (Mooc) - Online refresher

Any L1 certified user will have access to an online refresher course focused on installation and maintenance for WindCube. The online refresher (Mooc) must be completed within 3 years (after completion of initial L1 training) to maintain skills learned during the L1 training course. After completion of the online refresher, the L1 certification is extended for 3 years. The L1 certification can also be extended by performance of a new classroom L1 training.

After the L1 training by Vaisala certified trainer, L1 certified users are added on Vaisala E-Learning website by Vaisala. If the L1 training has been provided by partner or customer TTI certified trainer, the list of certified trainees must be provided to Vaisala helpdesk (helpdesk@vaisala.com) and they will be added to Vaisala E-Learning website. L1 certified user can also request access directly from Vaisala website (<https://www.vaisala.com/en/services/training>) and they will be granted access upon verification of their L1 certificate validity by Vaisala.

## 3.10 Golden Validation by DNV

Every WindCube is tested and validated against a reference WindCube Lidar “Golden WindCube” during the manufacturing phase and after each preventive maintenance and repairs. These process and validation criteria applied ensure each unit is performing nominally with a high degree of accuracy and repeatability. A validation report is delivered with each LIDAR System.

This Lidar-to-Lidar data validation is also conducted on each unit by DNV and a factory certificate called “Golden Validation by DNV” is delivered. This third-party validation ensures that the highest level of quality is performed before releasing WindCube to Customers.

## 3.11 Third Party IEC Compliant verification

As an additional service, a WindCube can be fully verified according to the IEC by a third-party including but not limited to Deutsche WindGuard, DNV, Pavana or UL. These independent wind specialists are accredited to certify the measurement quality and traceability to National Standards of a WindCube.



An IEC Compliant Verification is the result of a measurement campaign of a Lidar against an IEC Compliant Met Mast.

A verification report, which includes an assessment of measurement uncertainties, is issued by the certifier and is transmitted to the Client along with the LIDAR System. Criteria are set out by the independent third party so no specification of the Client will be taken into account.

Verification sites and conditions may vary from one third-party to another. Further information about the available verification sites and service terms can be provided upon request.

Vaisala is not responsible for the execution of such service, its duration and regarding any deterioration that could occur during the carrying out of this service. Furthermore, such service shall not extend the Warranty Period, meaning that, the Warranty starts at availability / delivery to such third party. It is understood that Vaisala has no power in the choice of the location where such service will be provided. Therefore, it could take place either in the premises of the independent service provider or in any other place that it designates as appropriate.

In the event the independent third party express any reservation on the verification of the LIDAR System, Vaisala commits to mitigate to those reservations under the conditions stipulated in the Technical Support and Service Information document. In the event that, following subscription by the Client of a verification service provided by an independent third party, such service is executed, the LIDAR System subject to the verification process shall be deemed as delivered to the Client as for the date of its reception by the independent third party.

## 3.12 Delivery of an IEC Compliant pre-verified WindCube

Vaisala proposes as an option an IEC Compliant Pre-Verified WindCube thanks to a unique and exclusive process of DNV. By holding a stock of DNV Verified laser chains, Vaisala is now able to supply Third-party verified WindCube with a very short Lead-time. The full verification report from DNV will be supplied along with the LIDAR System.

Purchase of a Pre-Verified WindCube must be accompanied with the purchase of a Verification Continuity Warranty described below.

## 3.13 IEC Compliant verification continuity warranty

Repairs or Maintenances that impact the Lidar measurement chain usually voids the initial third-party IEC compliant verification of the WindCube. Vaisala continuity warranty option ensures that the LIDAR System is repaired or maintained with an IEC Compliant Verified Laser Chain.

This fast-track service is conducted thanks to a unique and exclusive process of DNV Compliant Verified Laser chain swap. This offer significantly improves the operational continuity linked to re-verification process and saves Customers up to two months in their Wind Resource Assessment or Power Performance test campaigns.

Verification Continuity Warranty is proposed for a period of (1) year or more and is only applicable for LIDAR System under warranty for the considered period of time.

### 3.14 Specific scientific training, data analysis and data processing

Upon request and Vaisala scientific team availabilities, a specific scientific support can be designed. It may be a specific deep-dive training on Lidar measurement principles, data outputs, the performance of a specific data analysis or processing, or the development of a customized data processing tool. This service may be performed after or before a WindCube purchase.

### 3.15 Other Services

At the Client's request, Vaisala may provide any other service, including consulting, audit, scientific support, research projects, technical engineering and/or maintenance. These services and their applicable rates shall be agreed upon by the Parties separately.



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