

User Guide

Vaisala Radiosonde
RS41-SGM



VAISALA

PUBLISHED BY

Vaisala Oyj

Street address: Vanha Nurmijärventie 21, FI-01670 Vantaa, Finland

Mailing address: P.O. Box 26, FI-00421 Helsinki, Finland

Phone: +358 9 8949 1

Fax: +358 9 8949 2227

Visit our Internet pages at www.vaisala.com.

© Vaisala 2017

No part of this manual may be reproduced, published or publicly displayed in any form or by any means, electronic or mechanical (including photocopying), nor may its contents be modified, translated, adapted, sold or disclosed to a third party without prior written permission of the copyright holder. Translated manuals and translated portions of multilingual documents are based on the original English versions. In ambiguous cases, the English versions are applicable, not the translations.

The contents of this manual are subject to change without prior notice.

Local rules and regulations may vary and they shall take precedence over the

information contained in this manual.

Vaisala makes no representations on this manual's compliance with the local rules and regulations applicable at any given time, and hereby disclaims any and all responsibilities related thereto.

This manual does not create any legally binding obligations for Vaisala towards customers or end users. All legally binding obligations and agreements are included exclusively in the applicable supply contract or the General Conditions of Sale and General Conditions of Service of Vaisala.

Table of Contents

1. About This Document	5
1.1 Version Information	5
1.2 Related Manuals	5
1.3 Documentation Conventions	6
1.4 Trademarks	6
1.5 Regulatory Compliances	6
2. Product Overview	9
2.1 Introduction to Vaisala Radiosonde RS41	9
2.2 Unwinder	10
2.3 Packing	11
2.4 Product-Related Safety Precautions	12
2.5 ESD Protection	13
2.6 Lithium Battery-Related Precautions	14
3. Operation	15
3.1 Preparing the Sounding	15
3.2 Preparing the Radiosonde Balloon	15
3.2.1 Handling the Balloon	16
3.2.2 Filling the Balloon	16
3.3 Preparing Optional Sounding Accessories	20
3.3.1 Totex Parachute 5710-5	21
3.3.2 Non-Totex Parachute	21
3.4 Preparing RS41 Unwinder	22
3.4.1 Detaching Unwinder Stick	22
3.4.2 Handling the Unwinder String	23
3.4.3 Attaching the Unwinder to the Balloon	24
3.5 Preparing the Radiosonde	26
3.6 Preparing RS41 Sensor Boom	29
3.7 Checking the LED Light	30
4. Storage and Transportation	31
4.1 Storage	31
4.2 Transportation	31
4.2.1 Transporting RS41 Radiosondes with Lithium Batteries	31
Appendix A: Safety Instructions for Balloon Operators	33
Appendix B: Radiosonde Warranty	35
Technical Support	37
Recycling	37

List of Figures

Figure 1 Vaisala Radiosonde RS41 with Unwinder..... 10

Figure 2 RS41 Unwinder..... 11

Figure 3 RS41 Radiosondes and Unwinders in a Delivery Package..... 11

Figure 4 Radiosonde RS41 Optional Accessories..... 20

Figure 5 RS41 Unwinder Details..... 23

Figure 6 Unwinder Clip Is Level with the Unwinder Bottom Plate..... 24

Figure 7 Lithium Battery Handling Label..... 32

List of Tables

Table 1	Manual Versions.....	5
Table 2	Related Manuals.....	5
Table 3	Unwinder Properties.....	11
Table 4	RS41 LED Lights.....	30

1. About This Document

1.1 Version Information

This document provides information for operating Vaisala Radiosonde RS41-SGM, referred to as RS41 in this manual. For information on the sounding software, see the appropriate sounding system documentation.



In this manual, RS41 refers to Radiosonde RS41-SGM, unless otherwise mentioned. RI41 refers to both RI41 and RI41-B, unless otherwise mentioned.

Table 1 Manual Versions

Manual Code	Description
M211752EN-D	June 2017. Updated for the improved cover version of RS41.
M211752EN-C	November 2016. Updated with the new User Guide template.
M211752EN-B	December 2015. Updated information on preparing the radiosonde.
M211752EN-A	March 2015. First version of this manual.

1.2 Related Manuals

Table 2 Related Manuals

Manual Code	Description
DOC231720	Vaisala RS41 Unwinder Quick Guide
M211069EN	Vaisala MARWIN Sounding System MW32 User Guide
M210977EN	Vaisala MARWIN Sounding System MW32 Technical Reference
M210978EN	Vaisala MARWIN Sounding System MW32 Maintenance Manual
M211415EN	Vaisala DigiCORA Sounding System MW41 Technical Reference
-	On-line help for Vaisala DigiCORA [®] Sounding System MW41, available in the sounding software user interface

Visit www.vaisala.com/RS41 to watch short videos on how to use the RS41 unwinder.

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

DigiCORA[®] and MARWIN[®] are registered trademarks of Vaisala Oyj.

1.5 Regulatory Compliances

Vaisala Radiosonde RS41 complies with the following performance and environmental test standards:

- 2004/108/EC Electromagnetic Compliance: EN 61000-4-2, EN 61000-4-3 and EN 55022 / EN 302 054-2
- ERM Electromagnetic Compatibility and Radio Spectrum Matters: ETSI EN 302054-1 and ETSI EN 302054-2

- RoHS compliance: RoHS Directive (2011/65/EC)



2. Product Overview

2.1 Introduction to Vaisala Radiosonde RS41

Vaisala Radiosonde RS41 offers excellent data availability and accuracy of humidity, temperature, pressure, and wind measurement. The radiosonde is fast and stable with individual, SI-standard traceable calibration.

Vaisala Radiosonde RS41 temperature sensor utilizes linear resistive platinum technology. The small size of the sensor results in low solar radiation error and guarantees fast response. Wind data, height and pressure are derived from Vaisala Radiosonde RS41 GPS data combined with differential corrected GPS data from the ground station.

Robust design, Physical Zero Humidity Check and In-built Functional Temperature Check ensure reliable performance in every situation. The radiosonde is also easy to use. For example, there is no need for the user to connect the batteries to the radiosonde to activate it. The radiosonde is automatically activated when placed on the ground check device. To make it easier to check the status of the radiosonde, the radiosonde has LED light indicators visible on the cover.

Radiosonde RS41-SGM features radio silence, which means that the radiosonde can be launched in radio silence up to a specified height. All data is recorded also during the radio silence and, when the radio silence ends, transmitted to the ground equipment. All transmitted data is encrypted, and surface observations can be obtained directly from the radiosonde.



To further improve the design of Radiosonde RS41, the radiosonde now has EPS covers with plastic fasteners. This makes the radiosonde's look and feel slightly different from before, but the radiosonde performance is still on the same high level. The plastic covers have been removed to decrease the total plastic amount of RS41.

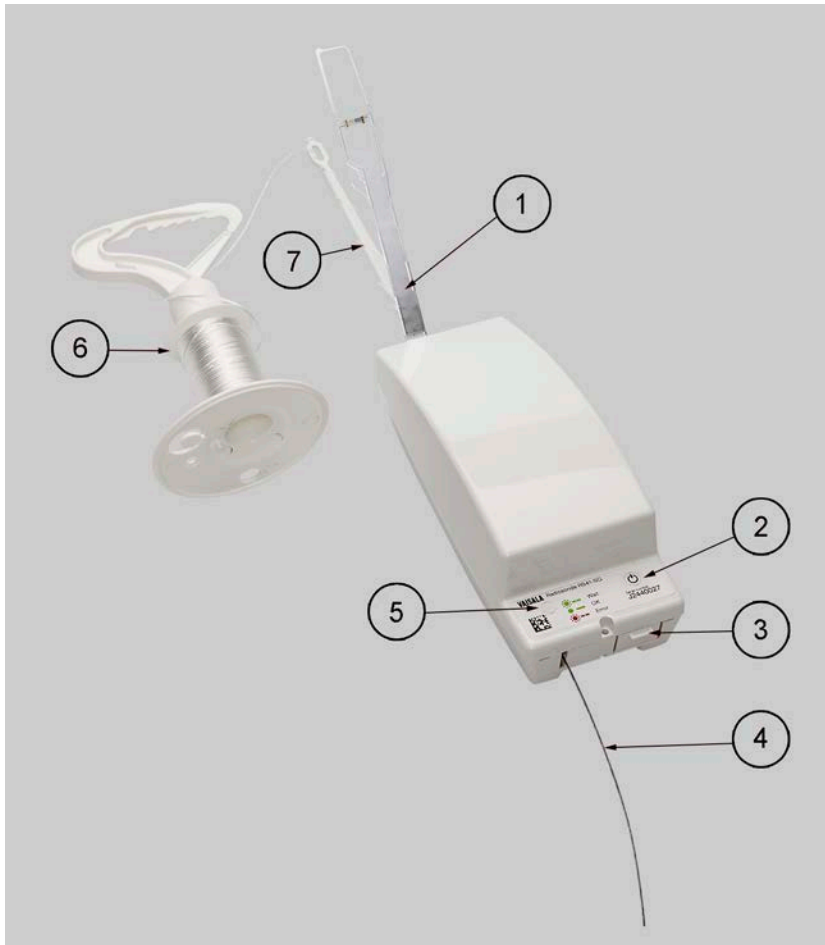


Figure 1 Vaisala Radiosonde RS41 with Unwinder

- 1 Sensor boom
- 2 Power switch
- 3 Additional sensor interface connector
- 4 Antenna
- 5 LED light
- 6 Unwinder
- 7 Unwinder stick

2.2 Unwinder

The unwinder is specifically designed for use with Radiosonde RS41. The unwinder is installed to the radiosonde so that it bends the sensor boom to the correct sounding position, ensuring repeatable results in the soundings.

Table 3 Unwinder Properties

Object	Property
Material of the string	Non-UV treated polypropylene
Tenacity	<115 N
Length of the string	55 m
Unwinder weight with stick	29 g



Figure 2 RS41 Unwinder

2.3 Packing

For easy transport and extra protection in the field, Radiosonde RS41-SGM is delivered in small shipping packages containing three radiosondes in their handling packages and three unwinders. The package has been tested to comply with MIL-STD 810G for transit drop, vibration and low pressure.

- The shipping box size is 740 x 400 x 320 mm (length x width x height), and it weights 8.68 kg.
- The radiosonde handling package size is 375 x 300 x 70 (length x width x height), and it weights 0.85 kg.



Figure 3 RS41 Radiosondes and Unwinders in a Delivery Package

2.4 Product-Related Safety Precautions



WARNING! Conduct soundings in a safe environment and in accordance with all applicable restrictions and regulations.



WARNING! Do not use the radiosonde in an area with power lines or other obstructions overhead. Make sure that you check the area for such obstructions before using the radiosonde.



WARNING! Do not use the radiosonde without consultation and cooperation with local and other applicable aviation authorities.



WARNING! Vaisala recommends the use of a parachute even if it is not required by applicable restrictions.



CAUTION! Do not modify the unit. Improper modification can damage the product or lead to malfunction.



CAUTION! Do not use the radiosonde for any purpose other than for soundings.

2.5 ESD Protection

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

To avoid delivering high static voltages to the product:

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

2.6 Lithium Battery-Related Precautions



CAUTION! Do not place the lithium battery in fire or apply heat to the battery.

Do not pierce the battery with nails, strike the battery with a hammer, step on the battery, or otherwise damage the outer casing.

Do not subject the battery pack to strong impacts or shocks.

Do not expose the battery to water or salt water, or allow the battery to get wet.

Do not disassemble or modify the battery. The battery contains safety and protection devices which, if damaged, may cause the battery to generate heat, rupture or ignite.

Do not leave the battery in direct sunlight, or use or store the battery inside cars in hot weather. Doing so may cause the battery to generate heat, rupture, or ignite. Using the battery in this manner may also result in shortened life expectancy and loss of performance.

Never short circuit, reverse polarity, disassemble, damage, or heat the battery over 100 °C (212 °F). If an exposed lithium battery does not start on fire, it will burn even more violently if it comes into contact with water or even moisture in the air.

DO NOT SPILL WATER ON A BURNING BATTERY. A fire extinguisher must be used.

3. Operation

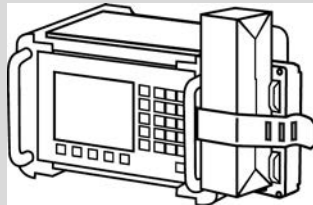
3.1 Preparing the Sounding

You must carry out the pre-launch steps as instructed and always in the same way. The workorder for a sounding is listed below. See the following sections for details.

- ▶ 1. Unpack and fill the balloon. Prepare the optional sounding accessories.
2. Unpack the radiosonde and the unwinder. Attach the unwinder to the balloon. See *RS41 Unwinder Quick Guide* for illustrations.
3. Prepare the radiosonde with the ground check device.



When the radiosonde is prepared outdoors with Ground Check Device MWH322, Vaisala recommends that the radiosonde is prepared in its cardboard package to provide extra protection for the radiosonde sensor. Remove the foil bag before the preparations.



4. Attach the radiosonde to the unwinder.
5. Launch the radiosonde balloon.
6. Monitor the sounding with the sounding system. See the sounding system documentation for more information.

3.2 Preparing the Radiosonde Balloon



WARNING! Read the safety instructions in [A. Safety Instructions for Balloon Operators \(page 33\)](#) before proceeding. Normally the balloon-lifting gas (hydrogen or helium) is supplied in gas bottles, but hydrogen can also be produced with a hydrogen generator. Carefully study the operation and safety instructions for the gas bottle facilities or the hydrogen generator. Take extreme caution when handling the inflated balloon.

3.2.1 Handling the Balloon



WARNING! It is recommended that the balloon be prepared in a balloon-filling shed. The balloon-filling shed must be well ventilated so that possible gas leaks do not remain inside the shed, even in situations when there is no electricity.

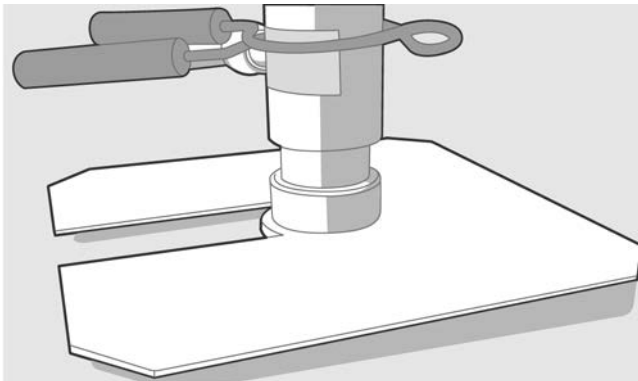


When handling the balloon, use protective gloves to avoid damaging the balloon surface. Even minor grease stains can damage the balloon, causing premature balloon burst.

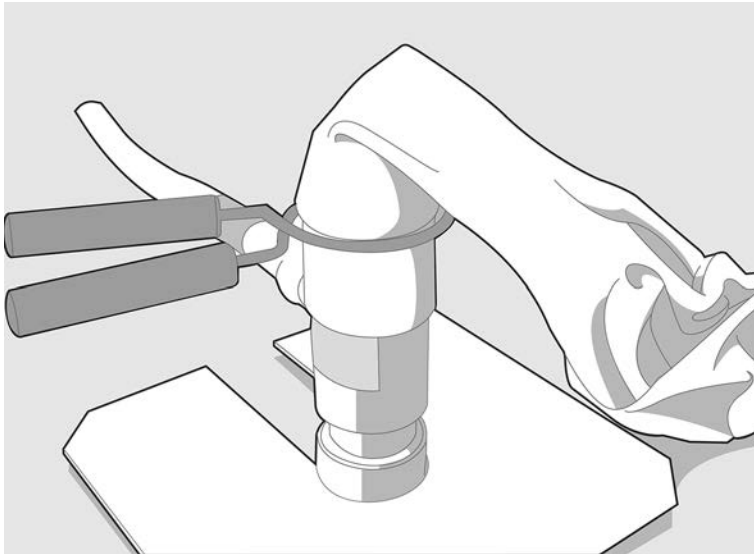
- ▶ 1. Open the balloon package carefully. To avoid damaging the balloon, do not use a knife or other sharp objects to open the package.
- 2. Check visually that the balloon is structurally sound and has no perforations or other apparent defects in the nozzle section.

3.2.2 Filling the Balloon

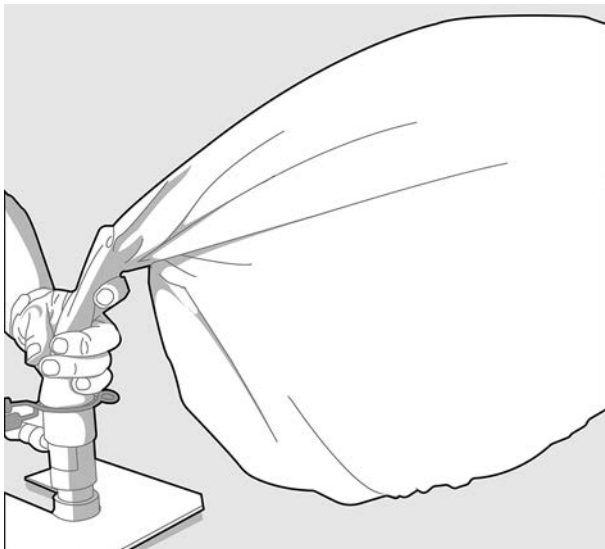
- ▶ 1. Connect the side tube of the filling balance to the pressure reducing valve on the gas cylinder (or hydrogen generator) with a flexible plastic hose.
- 2. Select the nozzle which best fits into the neck of the balloon.
- 3. Load the additional weights that are needed to obtain the required lift, for example, Vaisala Filling Balance FB13 weights as in the figure below.



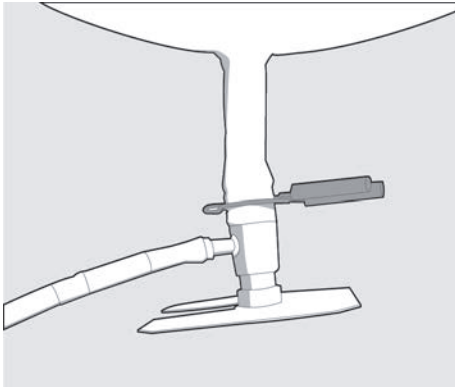
4. Secure the neck of the balloon to the balance nozzle with a clamp as shown in the figure below. Look out for sharp objects near the filling balance so that no damage is caused to the relaxed balloon.



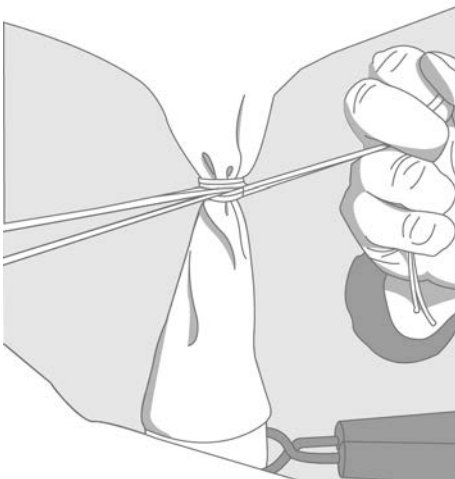
5. Turn on the gas from the pressure reducing valve. Let the gas flow slowly into the balloon. Do not leave the balloon-filling shed while inflating the balloon. Follow the balloon manufacturer's instructions when inflating the balloon.



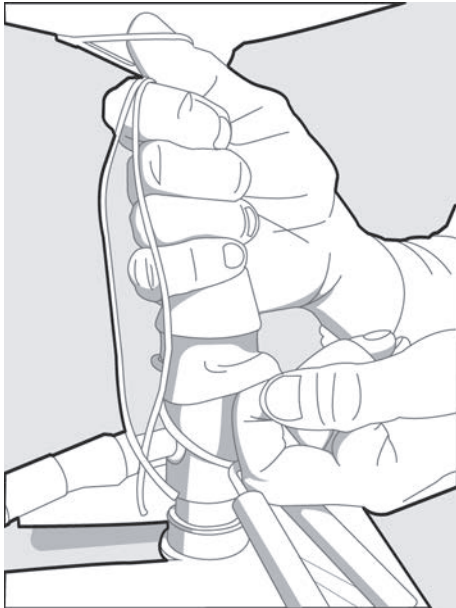
6. When the balloon is sufficiently filled, in other words, the balloon just raises the gas nozzle, close the gas valve.



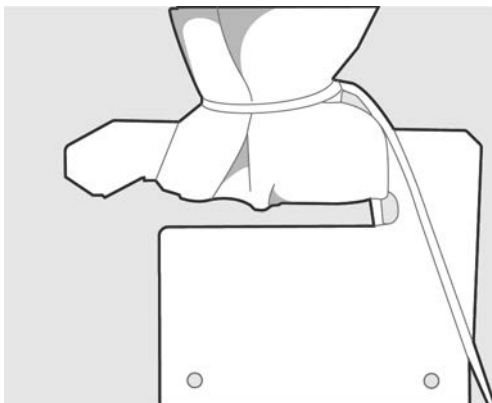
7. Before removing the balloon from the gas nozzle, tie the neck of the balloon tightly above the balance nozzle with approximately 0.5 m (2 ft) bit of string.



8. Remove the balloon from the gas nozzle.



9. Fold the neck of the balloon over and secure firmly. Cut off any extra string. The figure below shows an example of a secured balloon neck. In the figure, the balloon is attached to a balloon holder hook.



10. When the balloon is ready, make sure it does not touch anything. Hold the inflated balloon by the neck.

3.3 Preparing Optional Sounding Accessories

The unwinder is designed to be attached directly to the folded balloon neck, but in case you cannot attach the unwinder to the balloon, the unwinder can also be used with optional sounding accessories which provide the necessary support during the sounding. The sounding accessories are needed to restrict the movement of the unwinder. In this section, optional sounding accessories refer to a hanger board or a parachute.

The unwinder must always be attached to a relatively firm support. The support must not let the unwinder twist freely, or otherwise the suspension string might unwind at too high a speed and the radiosonde hit the ground during the launch. However, the unwinder must be able to swing slightly during the sounding.

Similar to the balloon, the unwinder and the optional sounding accessories must be prepared before launching the radiosonde. See [Figure 4 \(page 20\)](#) for the different options.

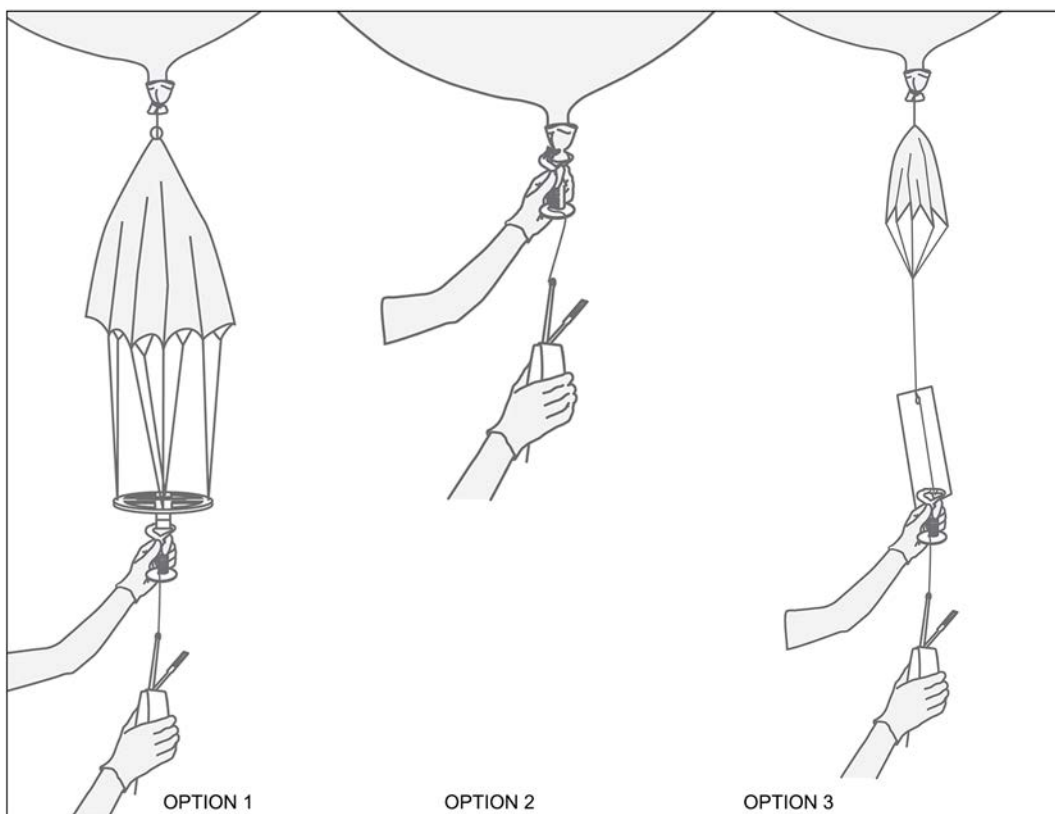


Figure 4 Radiosonde RS41 Optional Accessories



CAUTION! The strength of all the strings used during soundings must not exceed 23 kp (230 N). Knots in the strings weaken the strength to the minimum of 45 % of the original string strength. This results in a string strength of 10 kp (100 N) which is sufficient for soundings with Radiosonde RS41.

Attach all optional sounding accessories next to the balloon, otherwise they disturb the measuring environment of the radiosonde and no proper temperature and humidity measurements can be made.



Visit www.vaisala.com/RS41 to watch short videos on how to make a hanger board and how to attach the unwinder to the hanger board, and how to attach the unwinder to the parachute.

3.3.1 Totex Parachute 5710-5

The recommended parachute is Totex type 5710-5 (Vaisala code 15045). See option 1 in [Figure 4 \(page 20\)](#).

Totex parachute 5710-5 has an elastic ribbon loop below the spreader. Attach the unwinder to the loop by pushing the hook out the other side in the same fashion as with the folded balloon neck.

3.3.2 Non-Totex Parachute

If you are using a parachute that has no firm objects to prevent the unwinder from twisting, use a hanger board. The hanger board provides more stability during the sounding. See option 3 in [Figure 4 \(page 20\)](#).

3.3.2.1 Making a Hanger Board

The string used with the hanger board must have a diameter of > 1.5 mm and the strength must be 250 ... 350 N.

See the steps below for instructions on how to make a hanger board out of the radiosonde cardboard package. See also the video in www.vaisala.com/RS41.



To make the hanger board, you need the following items:

- Radiosonde handling box cardboard package
- Scissors
- Some string

- ▶ 1. Cut the radiosonde cardboard package to one whole piece that is big enough to make a hanger board.
2. Make one hole at one end of the hanger board, four holes at the other. Make the four holes so that two holes are on top of each other.

3. Tie a string on the unwinder hook.
4. Thread the string through the four holes so that the unwinder is firmly attached to the other end of the hanger board.
5. Pull the same string through the hole at the other end of the hanger board and attach the string to the parachute. The string now runs across the hanger board.

3.4 Preparing RS41 Unwinder

When you perform a sounding with no optional accessories, the radiosonde unwinder is attached directly to the balloon. See option 2 in [Figure 4 \(page 20\)](#).

Visit www.vaisala.com/RS41 to watch a short video on how to attach the unwinder to the balloon.



It is very important to prepare the unwinder carefully, following the instructions below. Correct handling of the unwinder ensures a successful sounding.

3.4.1 Detaching Unwinder Stick

To start using the RS41 unwinder, you must first detach the unwinder stick from the unwinder body.

- ▶ 1. The unwinder stick (number 1 in [Figure 5 \(page 23\)](#)) is attached between two plastic clips in the unwinder hook (number 2). Detach the stick from between the plastic clips and pull it out from the unwinder bottom plate (3).



If the unwinder stick is tightly attached to the bottom plate, it is a good idea to slightly twist the unwinder stick before pulling it out.

2. When you pull the unwinder stick out, make sure that the string unwinds and that it is not tangled.

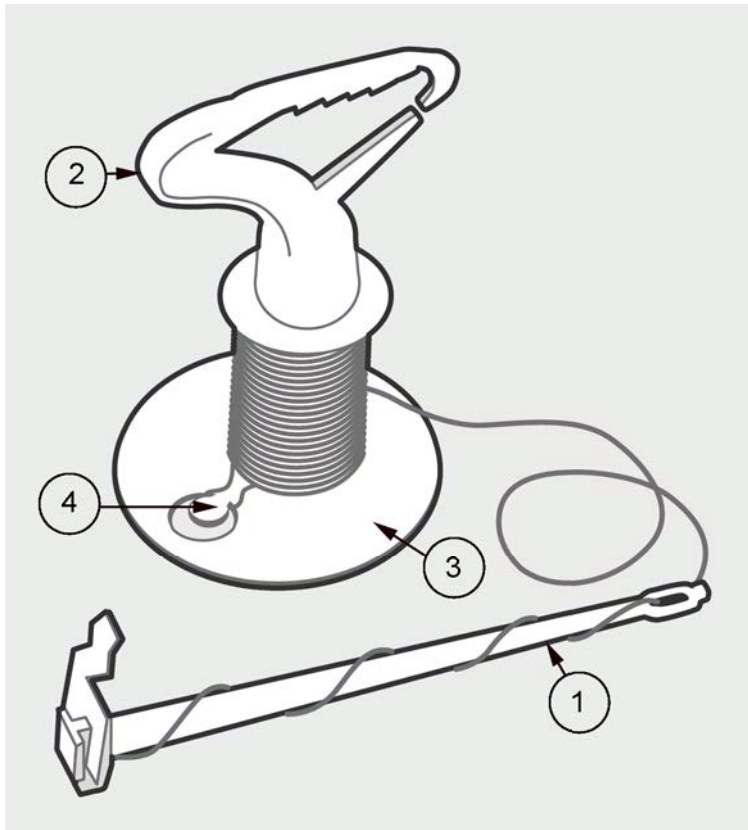


Figure 5 RS41 Unwinder Details

- 1 Unwinder stick
- 2 Unwinder hook
- 3 Unwinder bottom plate
- 4 Unwinder clip

3.4.2 Handling the Unwinder String

In the unwinder body, the unwinder string runs under a round plastic clip (number 4 in [Figure 5 \(page 23\)](#)) on the bottom plate. This keeps the string attached to the unwinder, and the radiosonde attached to the balloon.

- ▶ 1. To prevent the string from getting tangled in the clip during the sounding, make sure the round plastic clip is level with the unwinder bottom plate.

2. If the clip is bent up, bend it gently back to level position as shown in [Figure 6](#) (page 24).

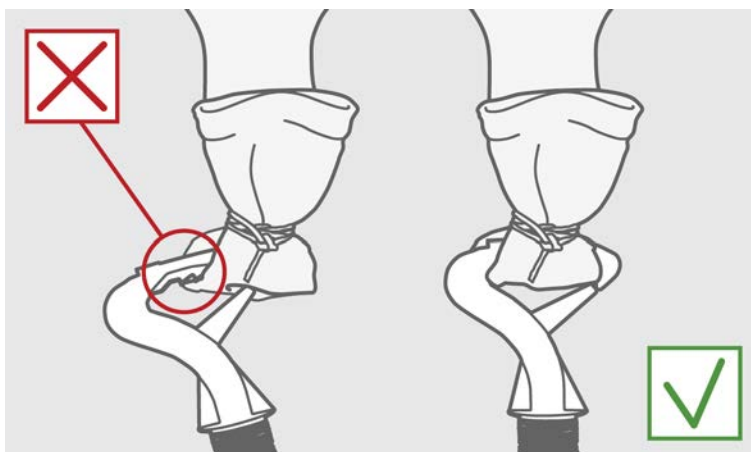


Figure 6 Unwinder Clip Is Level with the Unwinder Bottom Plate

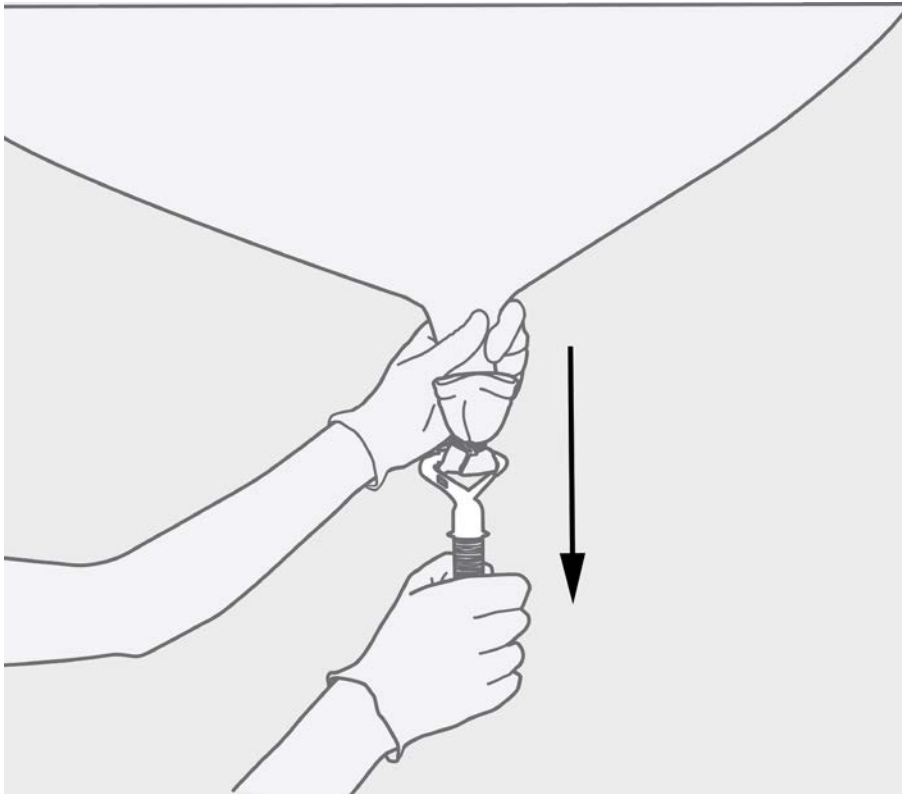
3.4.3 Attaching the Unwinder to the Balloon

The unwinder must be attached firmly, so that it is not able to twist freely, or the suspension string might unwind at too high a speed and the radiosonde hit the ground during the launch. However, the unwinder must be able to swing slightly during the sounding. Follow the steps and figures below to attach and align the unwinder correctly when it is attached directly to the balloon.

1. Pass the unwinder hook through the loop created by the tied balloon neck.
2. Make sure the hook comes out the other side as shown in the figure below. The unwinder is now firmly attached to the balloon.



3. Align the unwinder so that it points directly downwards from the balloon neck, as illustrated in the figure below.



CAUTION! To ensure a successful sounding, align the unwinder so that it points downwards from the balloon neck.

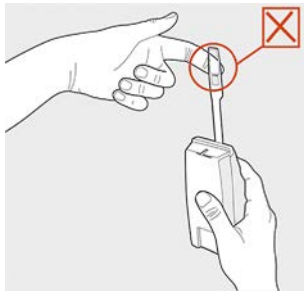
3.5 Preparing the Radiosonde



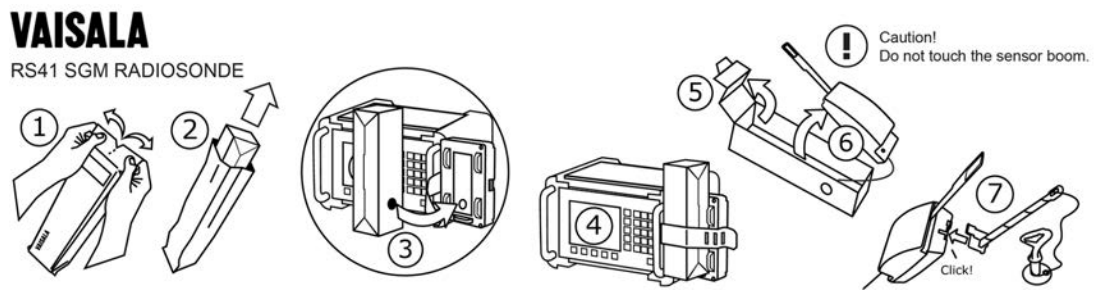
CAUTION! Do not touch the radiosonde sensors, they are fragile and can be easily contaminated.



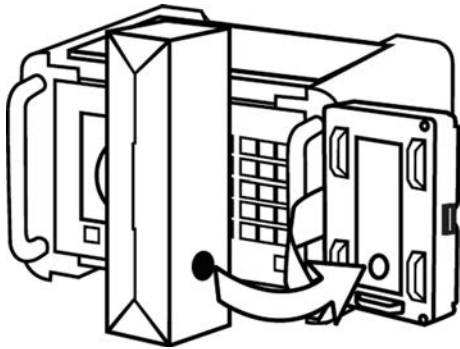
During radiosonde regeneration, the temperature of the sensor boom is about 150 °C for three (3) minutes.



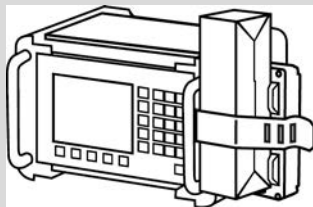
1. Open the radiosonde package and follow the instructions printed on the foil bag to prepare the radiosonde. The figure below provides an example of the instructions.



2. Place the radiosonde on the ground check device. Check the markings on the cardboard box and the device for the correct placement of the radiosonde.



When the radiosonde is prepared outdoors with Ground Check Device MWH322, Vaisala recommends that the radiosonde is prepared in its cardboard package to provide extra protection for the radiosonde sensor. Remove the foil bag before the preparations.

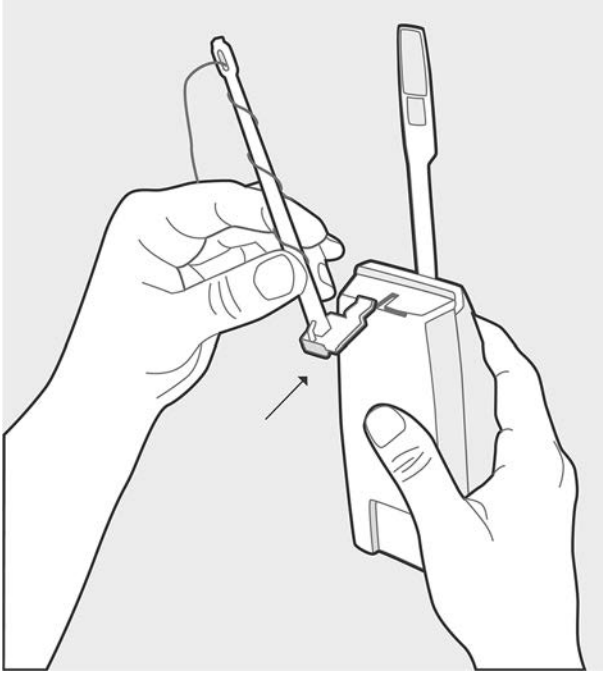


3. Pull the strap over the radiosonde. The radiosonde is switched on automatically. The sounding software automatically detects the radiosonde and begins the sounding preparations.
4. During the radiosonde pre-flight preparation phase, several steps are carried out. These consist of ground check procedures for sensors, as well as optional features for setting the radiosonde in-flight operation parameters, such as a timer for turning the radiosonde power off after a desired time or altitude.
5. After the ground check is finished, the sounding software indicates the results with a message. Remove the radiosonde from the ground check device.
6. If you have prepared the radiosonde in its cardboard box, remove the radiosonde from the box when the ground check is finished.
Before you launch the radiosonde, you can return to the preparation phase by releasing the strap around the radiosonde. The sounding software automatically returns to the ground check phase.
If there is any delay in starting the sounding, for example, if you must wait before launching the sounding balloon, you can switch the radiosonde off by pressing the power switch. When you are ready to launch the balloon, switch the radiosonde back on.

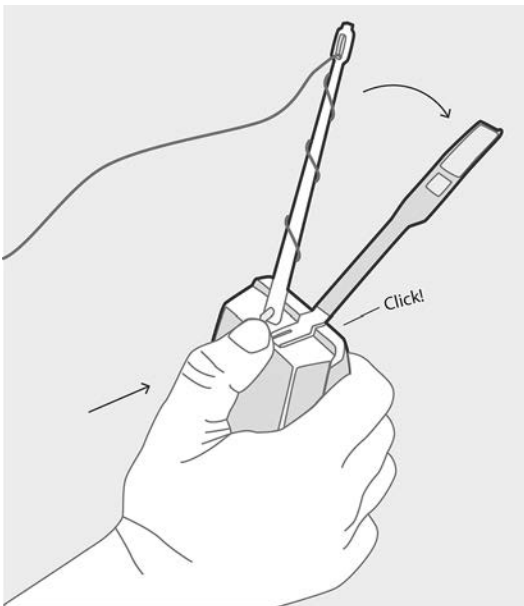
3.6 Preparing RS41 Sensor Boom

Before launching the radiosonde, bend the sensor boom to the correct sounding position using the unwinder stick. This also attaches the radiosonde to the unwinder and the balloon.

1. Push the unwinder stick to its position at the end of the radiosonde.



2. As you push, the unwinder stick pushes the sensor boom to the bent position and the unwinder snap lock clicks into place.



3. Make sure that the unwinder is firmly attached to the radiosonde.

3.7 Checking the LED Light

After preparing the radiosonde for the sounding, check the radiosonde status by checking the LED light on the radiosonde cover. When the green LED light is steady, the radiosonde is ready for the release. The LED light will switch off automatically after the launch. See the table below for more detailed information.

Table 4 RS41 LED Lights

LED Light	Meaning
Green LED is blinking.	When the green LED is blinking, the reconditioning of the humidity sensor and sensor checks are in progress and/or the radiosonde is not receiving GPS signal. To receive the GPS signal, take the radiosonde outside with line of sight to GPS satellites.
Green LED is steadily lit.	1. The radiosonde is ready and works fine, determined by the radiosonde in-built diagnostics. The diagnostics cover, for example, temperature and humidity sensors. 2. GPS satellites are detected. Once GPS signal has been found after radiosonde start up, the LED light becomes steady green. The LED may start blinking again due to possible GPS blind spots (for example, inside a balloon shelter), indicating that the radiosonde should be taken outside with line of sight to GPS satellites before launch. 3. The steady green LED indicates that the telemetry from RS41 is working.
Red LED is lit.	Error. Check the sounding software for any error messages.

4. Storage and Transportation

4.1 Storage

Radiosondes must be stored and used in accordance with applicable instructions, the User Guide, and specifications issued by Vaisala.

Radiosondes must be kept in their original packaging (unopened vacuum envelopes) in a dry, ventilated indoor storage space, and within the following key environmental limits (ref. IEC 60721-3-1 class 1K2):

- Temperature +5 °C to +40°C
- Relative humidity below 85%



CAUTION! The unwinder string is not resistant to prolonged exposure to sunlight. Store the unwinders in their original unopened packages.

4.2 Transportation

Vaisala radiosondes must be transported in their original shipping packages. These packages are designed and built to survive and protect their contents in the environmental conditions described herein with the terminology and standards per standard IEC 60721-3-2. The transportation of radiosondes requires climatic conditions 2K2 and mechanical conditions 2M1 of this standard:

- Transportation in weather-protected conditions.
- Transportation using conventional means (car, truck, and / or aircraft), with free fall not exceeding 0.25 m in any circumstances.
- Following additional markings on packaging.

4.2.1 Transporting RS41 Radiosondes with Lithium Batteries

RS41 radiosondes with lithium batteries are classified as:

- UN 3091 Lithium metal batteries contained in equipment

Consignments must be packed, labeled, and documented according to the IATA packing instructions.

When transporting the radiosondes with lithium batteries, take the following requirements into account:

- The package must display a lithium battery handling label, similar to the one shown in the following example. The original radiosonde shipping package must be used for transport, and it already has the lithium battery handling label.

- The consignment must include a document indicating the lithium content, describing proper handling and procedures for damaged packages, and a telephone number for additional information. The original radiosonde consignment includes a SHIPPER'S DECLARATION FOR ARTICLES NOT REGULATED AS DANGEROUS GOODS, which should be reused for this purpose after updating the appropriate information.



Figure 7 Lithium Battery Handling Label



If the lithium battery is faulty, do not transport it.

Appendix A. Safety Instructions for Balloon Operators

Photocopy these instructions and place the list in clear view in the balloon filling shed and in the sounding compartment.



WARNING! New operator! Carefully study the instructions for using the hydrogen generator and for the correct method of inflation.

- ▶ 1. No smoking or naked flame allowed.
2. If possible, avoid wearing clothing made of nylon or other synthetic fibers to prevent a build-up of static charges. Do not wear shoes with rubber soles.
3. Wear protective glasses.
4. Regularly check that the gas tube fits securely to the gas cylinder or generator nozzle and to the balloon inflation nozzle.
5. Take care to prevent a gas leak in the shed when interrupting inflation to replace a gas cylinder.
6. Never use a repaired balloon.
7. Should a leak develop in the balloon during inflation, do not let gas escape from the balloon inside the shed if possible. Instead, release the defective balloon without load. It is not advisable to deflate the balloon, even outside the shed.
8. Do not touch the balloon with bare hands except when holding it by the neck. Wear soft cotton gloves.
9. Ensure that there are no pointed objects in the shed. Nails, hooks, hinges, padlocks, etc., are dangerous as they might scratch the inflated balloon. The balloon film is only 0.05 ... 0.1 mm thick upon launch; the slightest scratch could cause the balloon to burst prematurely.
10. Keep the doors of the shed shut while inflating the balloon on a windy day. However, ensure that the shed is properly ventilated.
11. No unauthorized person shall be allowed admittance to the shed while the hydrogen generator is in operation or balloon inflation is going on.
12. Ensure that all tools and other implements not essential for balloon inflation have been removed from the shed.
13. Do not take any electrical devices (cell phone etc.) to the balloon filling shed or close to the balloon inflated with hydrogen. Safe distance when outdoors is typically 1.5 meters.

14. Always keep the radiosonde at least 50 cm below the level of the gas nozzle and the inflated balloon, and at least 1.5 meters away from the gas cylinder/hydrogen generator, connectors, and tubing. Avoid taking the radiosonde inside the balloon filling shed, if possible.
15. Follow all regulations concerning hydrogen safety.

Appendix B. Radiosonde Warranty



This document is an integral part of "General conditions of sale of Vaisala Oyj, Ref. DOC223573-A 2011-07-01". In case of discrepancy, the provisions of the Vaisala radiosonde warranty prevails.

Vaisala Radiosonde RS41 Warranty

Vaisala repairs or, at its discretion, replaces any Vaisala Radiosonde RS41 that is proven, with reasonable satisfaction, to have failed within 13 months of shipment by reason of faulty materials or workmanship, under the following conditions and provided that radiosonde is transported, stored and used properly in accordance with applicable instructions and manuals issued by Vaisala.

Storage Conditions

Vaisala Radiosonde RS41 shall be stored indoors in its original unopened vacuum envelope within the following environmental limits:

- temperature +5 °C to +40 °C
- relative humidity below 85 %

Transportation and Handling

Radiosondes shall be transported in the original shipping packaging, which is designed and built to survive and protect the contents in the environmental conditions specified in standard IEC 60721-3-2: climatic conditions of class 2K2, and mechanical conditions of class 2M1 of the standard are applied. Instructions on the packaging for transportation and handling shall be followed.

Criteria for Radiosonde Failures

Pre-flight failures under warranty:

- Radiosonde fails during the sounding preparation
- Ground check with RI41 exceeds one of the following limits:
 - T: Gross error detected (OK/not OK, ± 3 °C, stable indoor conditions)
 - U: ± 2 % RH (at RS41 generated physical zero humidity, stable indoor conditions)
- Ground check of radiosonde's pressure sensor exceeds the following limit:
 - P: ± 3 hPa (against precision barometer, e.g., Vaisala RI41-B)

In-flight failures below altitude of 100 hPa under warranty:

- Radiosonde stops transmitting one or more parameters
- Radiosonde transmits clearly erroneous data
- There is a continuous telemetry link failure exceeding 2 minutes

Early termination of sounding caused by balloon burst, user error, or any external cause, e.g., icing, is not covered by this warranty.

Making Warranty Claims

A failure report shall be provided for each failed radiosonde stating the radiosonde serial number, a description of the failure, and sounding site and date. A template provided by Vaisala should be used for this.

A radiosonde found defect prior to launch shall be returned to the Vaisala office as instructed by Vaisala Helpdesk.

Failure report of an in-flight failure shall be accompanied by sounding data file and preferably with the sounding quality report (generated by MW41 sounding system).

Failure report, the quality report and any radiosonde failed prior to launch shall be sent to Vaisala within 180 days after the failure or within a year from extremely remote or shipborne stations.

When returning radiosondes that contain lithium batteries, refer to the shipping instructions in the applicable radiosonde User's Guide.

Technical Support



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

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

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

Recycling



Recycle all applicable material.



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

VAISALA

