

# VAISALA

## USER'S GUIDE

### Vaisala Radiosonde RS92-SGP



PUBLISHED BY

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# CHAPTER 1

## GENERAL INFORMATION

This chapter provides general notes for the manual and the product.

### About This Manual

This manual provides information for operating Vaisala Radiosonde RS92-SGP.

### Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information: This chapter provides general notes for the manual and the product.
- Chapter 2, Product Overview: This chapter introduces the features and advantages of the radiosonde.
- Chapter 3, Operation: This chapter contains information that is needed to operate this product.
- Chapter 4, Storage and Transportation: This chapter provides information for the transport and storage of the product.
- Chapter 5, Failure Report and Warranty: This chapter presents information about the failure report and radiosonde warranty.
- Appendix A, Safety Instructions for Balloon Operators: This appendix contains details of safe and proper balloon preparation.

## Version Information

**Table 1** Manual Versions

Manual Code	Description
M210295EN-J	January 2015. Updated information on optional sounding accessories. Removed information on water-activated battery and radio activity soundings.
M210295EN-H	October 2012. Updated for MW41.
M210295EN-G	May 2010. Contains RS92-SGPL.
M210295EN-F	October 2009.
M210295EN-E	Old version.

## Related Manuals

**Table 2** Related Manuals

Manual Code	Manual Name
DOC219110	Vaisala Radiosonde RS92 Quick Guide
M210507EN	AUTOSONDE AS14 User's Guide
M210329EN	Ground Check Set GC25 User's Guide
M210488EN	Vaisala DigiCORA® MW31 User's Guide
M210547EN	Ozonesonde RS92 User's Guide
M010024EN	DigiCORA II MW15 User's Guide
M210811EN	Configuring and Operating MW11/15 Systems, RS92 Radiosonde, and GC25 Using Cable Connection
M211044EN	Vaisala Radiosonde Add-on Sensor Interface Technical Reference

## Documentation Conventions

Throughout the manual, important safety considerations are highlighted as follows:

**WARNING**

Warning alerts you to a serious hazard. If you do not read and follow instructions very 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**

Note highlights important information on using the product.

## 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.

**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.

## Recycling



Recycle all applicable material.



Dispose of batteries and the unit according to statutory regulations.  
Do not dispose of with regular household refuse.

## Regulatory Compliances

Vaisala Radiosondes RS92-SGP and RS92-D are in conformity with the following EU directive and with national legislation implementing this directive:

- 1995/EEC (Radio and Telecommunications Terminal Equipment)

The conformity is shown by compliance with the following standards:

ERM:

- ETSI EN 302 054-1 V1.1.1. and
- ETSI EN 302-054-2 V1.1.1

EMC:

- ETSI EN 301 489-1 V1.8.1 and
- ETSI EN 301 489-3 V1.4.1

[EN 61000-4-2 and EN61000-4-3]



## License Agreement

This product contains software developed by Vaisala. Use of the software is governed by license terms and conditions included in the applicable supply contract or, in the absence of separate license terms and conditions, by the General License Conditions of Vaisala Group.



## CHAPTER 2

# PRODUCT OVERVIEW

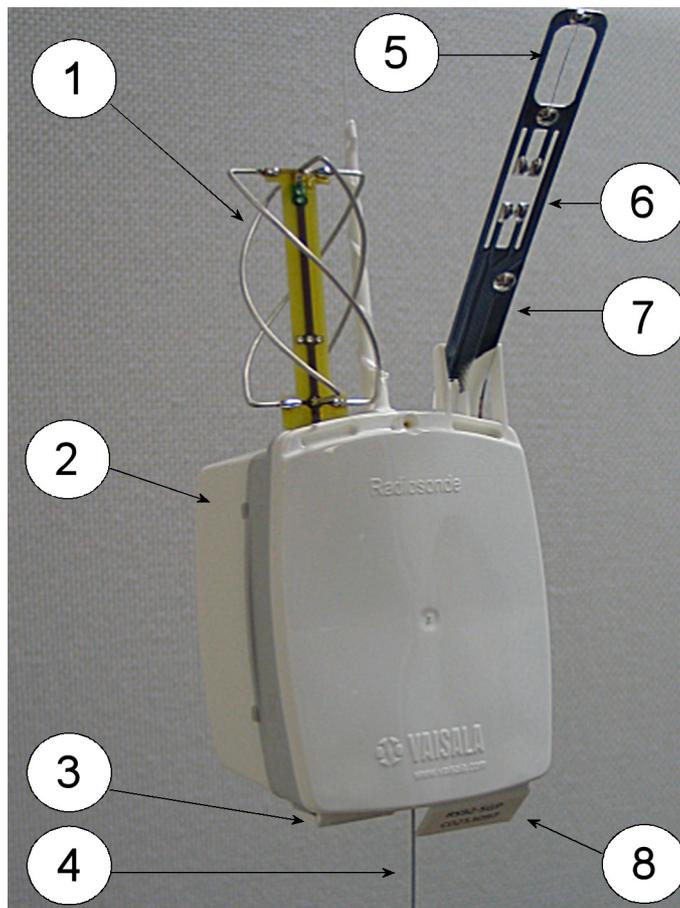
This chapter introduces the features and advantages of the radiosonde.

## Introduction to Vaisala RS92-SGP

Vaisala Radiosonde RS92-SGP offers excellent data availability, accuracy of humidity, pressure, temperature, and wind measurement.

This radiosonde type features a GPS receiver for wind finding. RS92-SGP has a silicon pressure sensor, heated twin humidity sensor and a small, fast temperature sensor. RS92-SGP features easy additional sensor capability. The synthesizer-based transmitter is stable and uses a narrow bandwidth. RS92-SGP is compliant with the European ETSI standard for digital radiosondes operating in the 400 MHz band, EN 302 054.

In addition to regular soundings, RS92-SGP radiosondes can be used to conduct ozone soundings and additional sensor soundings. When conducting, for example, an ozone sounding, an ozone sensor with an interface unit is connected to the radiosonde. Follow the procedures and guidelines in the appropriate manual to conduct additional sensor soundings.



**Figure 1 Vaisala Radiosonde RS92-SGP**

- 1 = GPS antenna
- 2 = Battery case
- 3 = Additional sensor interface connector
- 4 = Antenna
- 5 = Temperature sensor
- 6 = Humidity sensors
- 7 = Sensor boom
- 8 = GC25 interface

Vaisala Radiosonde RS92-SGP can be used with Vaisala Sounding Systems MW41, MW32, MW31 and MW21, and with MW11, MW12, and MW15.

## CHAPTER 3

# OPERATION

This chapter contains information that is needed to operate this product.

### General

It is essential that you carry out the pre-launch steps as instructed and always in the same way. Follow the instructions in the sections below and refer to [Appendix A on page 47](#) for proper and safe balloon preparation.

The workorder for a sounding is as follows:

1. Prepare the balloon and optional sounding accessories.
2. Unpack the radiosonde.
3. Prepare the sounding.
4. Connect the battery.
5. Launch the radiosonde.
6. Monitor the sounding with the sounding system.

When conducting additional sensor soundings (for example, ozone), follow the procedures and guidelines in the relevant manuals.

## Preparing the Balloon and Optional Sounding Accessories

The balloon and the optional sounding accessories must be prepared before connecting the radiosonde battery and thereby activating the radiosonde. This is necessary because the radiosonde should be launched within 15 minutes of battery connection.

### WARNING

Read the safety instructions in Appendix A 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.

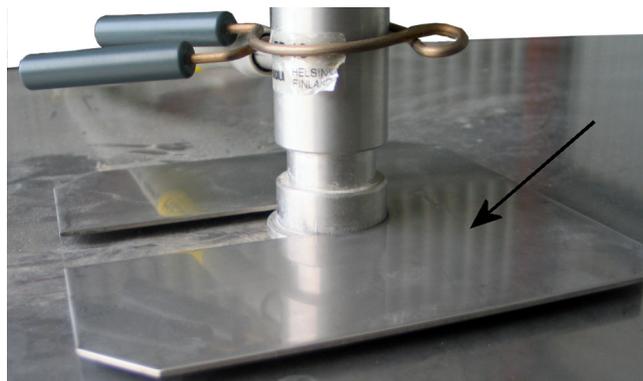
Take extreme caution when handling the inflated balloon.

## Balloon Preparation

### 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.

1. Load weights that are needed to obtain the required lift onto the gas nozzle.



**Figure 2** Loading Weights onto the Gas Nozzle

2. Attach the balloon to the gas nozzle by securing the balloon with a piece of string or a clamp.



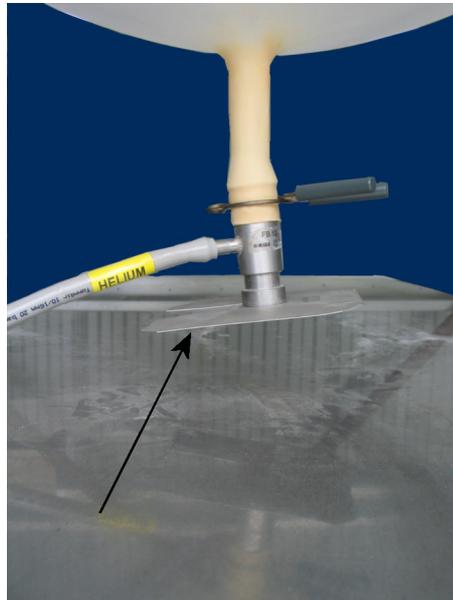
**Figure 3 Attaching the Balloon to the Gas Nozzle**

3. Inflate the balloon following the balloon manufacturer's inflation instructions. Do not leave the balloon-filling shed while inflating the balloon.



**Figure 4 Inflating the Balloon**

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

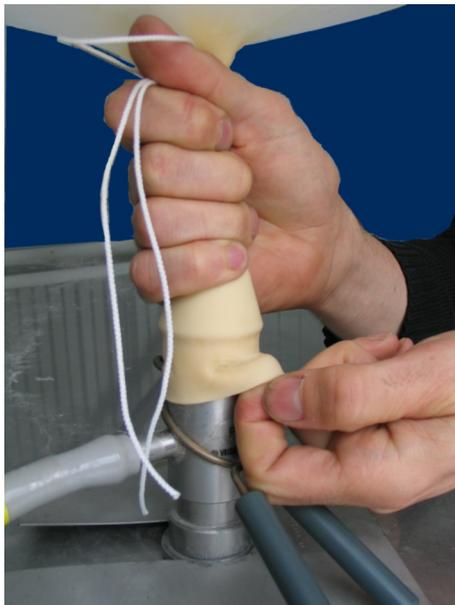


**Figure 5 Balloon Raises the Gas Nozzle**

5. Secure the neck of the balloon tightly with a string before removing the balloon from the gas nozzle.



**Figure 6 Securing the Neck of the Balloon**



**Figure 7 Removing the Balloon from the Gas Nozzle**

6. Fold the neck of the balloon over and secure it firmly. Tie the string high enough to ensure that the unwinder fits easily. The unwinder is attached before the launch, see section [Attaching the Unwinder to the Balloon on page 36](#).



**Figure 8 Folding the Neck of the Balloon**

7. Leave the balloon waiting in the balloon-filling shed while you prepare the radiosonde. Make sure the balloon does not touch anything. Hold the balloon by the neck.

**NOTE**

When using a balloon with an integrated parachute, make sure that a sufficiently long piece of the parachute string is poking out of the balloon neck in order to fasten the string to the radiosonde unwinder.

## Optional Sounding Accessories

The RS92 unwinder RSU911 is designed to be attached directly to the folded balloon neck. However, you can use the same unwinder if you use optional sounding accessories, such as a parachute.

Always attach the unwinder to a relatively firm support, such as the balloon or the parachute spreader. 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. The unwinder must also be able to swing slightly during the sounding.

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

**CAUTION**

The strength of all the strings used during soundings must exceed 25 kp (250 N). Knots in the strings weaken the strength to the minimum of 40 % of the original string strength. This results in a string strength of 10 kp (100 N), which is sufficient for RS92 soundings.

**Table 3**      **Ordering Codes for Optional Sounding Accessories**

Item	Code	Note
Totex parachute	15045	
Hanger board	RS46157	Used with a non-Totex parachute

### Totex Parachute 5710-5

The recommended parachute is the Totex type 5710-5 (Vaisala code 15045). In the Totex parachute, an elastic ribbon loop hangs the unwinder securely under the spreader.

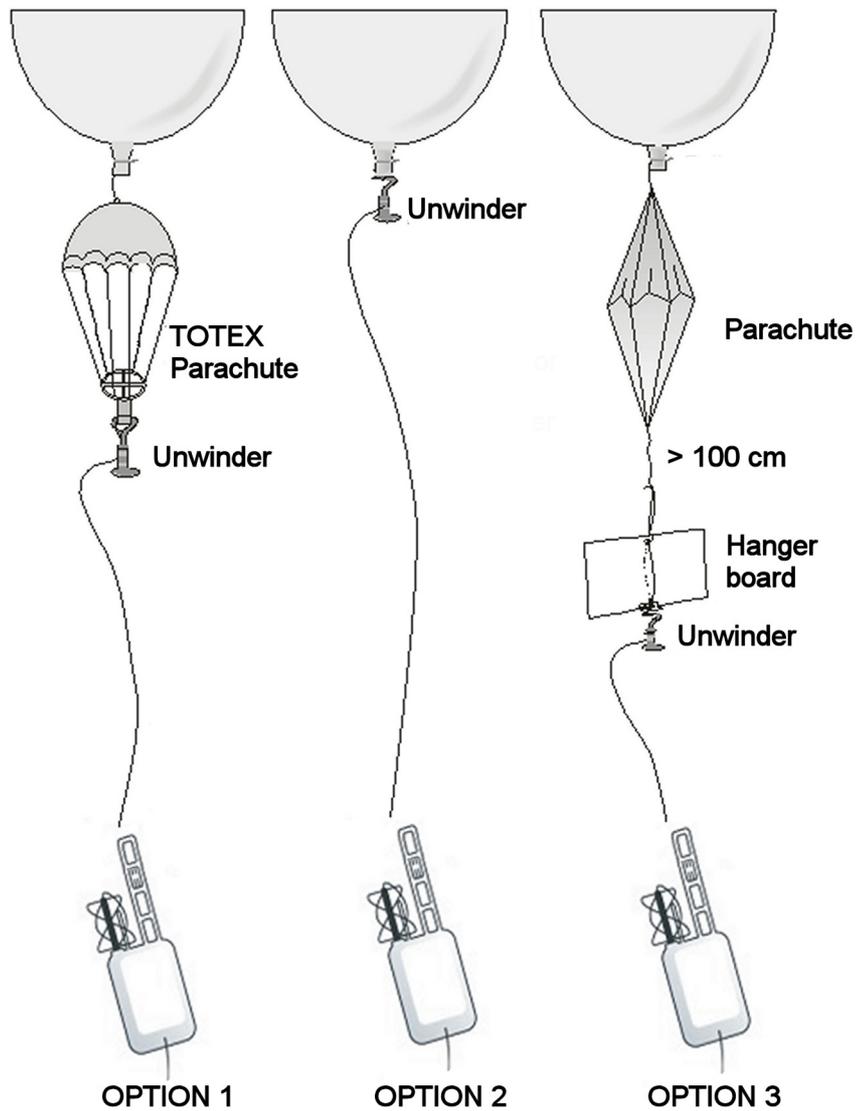
Attach the parachute directly to the balloon with the parachute string.

## Non-Totex Parachute

If you are using a parachute that has no firm objects to prevent the unwinder from twisting, you have to use a hanger board (Vaisala code RS46157).

1. Tie the parachute to the balloon with a string.
2. Tie the hanger board to the parachute with a string of approximately 20 cm in length.

See [Figure 9 on page 22](#) for details. For unwinder attaching instructions, see section [Non-Totex Parachute on page 37](#).



**Figure 9 Vaisala Radiosonde RS92 Sounding Accessories**

- Option 1 = Sounding with a Totex parachute
- Option 2 = Sounding with no sounding accessories
- Option 3 = Sounding with a non-Totex Parachute

Now you can proceed to unpack the radiosonde.

## Unpacking the Radiosonde

**CAUTION**

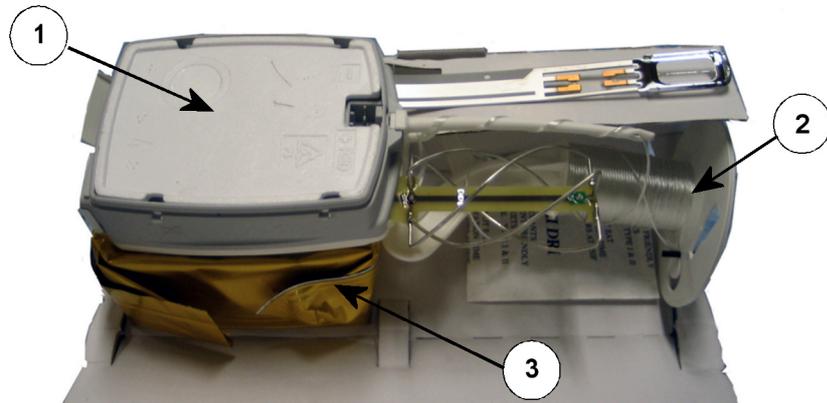
Do not touch or hit the sensors on the sensor boom. Be careful not to bend the GPS antenna. By carefully handling the radiosonde and the sensor boom as well as the GPS antenna, you ensure that the radiosonde functions properly during the sounding.

1. Open the foil bag as indicated on the bag.



**Figure 10** Opening the Foil Bag

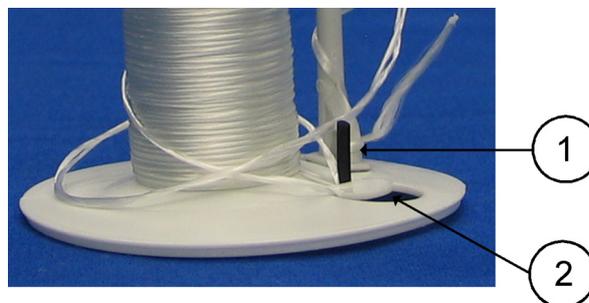
2. Lift the cardboard flap protecting the sensor boom. Be careful to avoid touching or hitting the sensors on the sensor boom. See [Figure 11 on page 24](#) for information on the contents of the radiosonde package.



**Figure 11 Contents of the Radiosonde Package**

- 1 = Radiosonde
- 2 = Unwinder
- 3 = Battery

3. Remove the radiosonde from the package, free the antenna, and take the unwinder out of the package.
4. Remove the small plastic rubber wire from the unwinder.



**Figure 12 Unwinder Details**

- 1 = Rubber wire
- 2 = Unwinder lip

5. Make sure the plastic lip under which the string runs is level with the unwinder bottom plate. If the lip is bent, bend it gently back to level the position.

Proceed to prepare the sounding.

## Preparing the Sounding

When preparing the sounding, Vaisala Ground Check Set GC25 is connected to the sounding system via cable and operated with the help of the sounding software.

### NOTE

If you are using DigiCORA Sounding System MW21, software version < 3.12, or MW15, MW12 or MW11, software version < 8.311, refer to the Ground Check Set GC25 User's Guide for information on using the GC25 in stand-alone mode.



**Figure 13** Vaisala Ground Check Set GC25

- 1 = Chamber
- 2 = Display
- 3 = Buttons
- 4 = Communication cable
- 5 = Radiosonde tray
- 6 = Power switch

Follow these steps to prepare the sounding:

1. Open the chamber of the ground check set and place the radiosonde onto the radiosonde tray. Close the chamber.

2. Connect the communication cable to the ground check set interface in the radiosonde. Text "UP" on the connector faces upwards.



**Figure 14 Radiosonde in the GC25 with the Communication Cable Connected**

3. Switch on the sounding workstation and start a new sounding with the sounding system software. For detailed instructions, see the sounding system documentation.
4. Switch on the ground check set by pressing the power switch. The green LED in the power switch is lit.  
The sounding software goes through reconditioning, frequency tuning, timer setting, and ground checking.

**CAUTION**

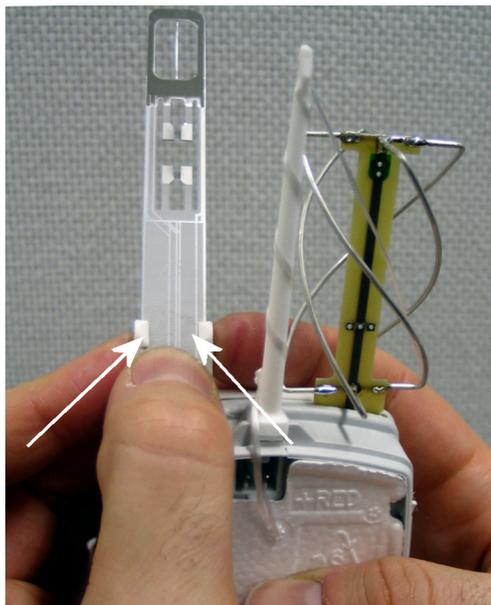
Do not press any buttons in the ground check set while the sounding software is performing.

5. When the sounding software is finished, it indicates that it is ready for radiosonde release by displaying a message. Remove the radiosonde from the ground check set and disconnect the communication cable.

6. The back of the radiosonde facing you, press the sensor boom gently forward with your thumbs until the plastic clips on both sides click (you may have to spread the plastic clips slightly) and the sensor boom sits firmly in the bent position.

**CAUTION**

Only touch the bottom of the boom. Do not touch or hit the sensors.



**Figure 15** Placing the Sensor Boom into Flight Position

The sensor boom is now in the flight position and remains so throughout the sounding.

Now proceed to connect the radiosonde battery.

**NOTE**

The timer countdown is different for analog (RS92-KL and RS92-K) and digital radiosondes (RS92-SGP, RS92-D): For analog radiosondes, the timer countdown starts on the ground, beginning when the radiosonde is connected to the Ground Check Set. Therefore, you have to add some extra time to the timer to be able to activate and connect the battery and launch the radiosonde. For digital radiosondes, the timer countdown starts from launch detect, and, therefore, no extra time is required.

# Connecting the Battery Set

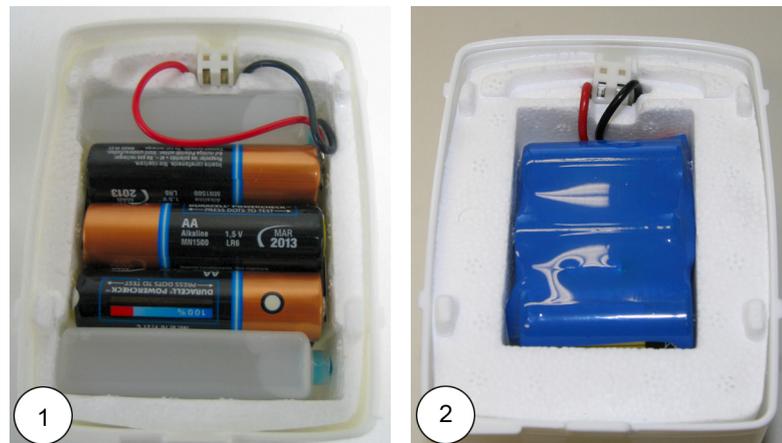
## General

RS92-SGP can be powered by the battery sets listed in [Table 4 on page 28](#). See [Figure 16 on page 28](#) for an example.

The RS92-SGP ordering codes differ depending on the battery type. For instructions on using the Dry-cell Battery Set with switch with AUTOSONDE, see AUTOSONDE AS14 User's Guide.

**Table 4 RS92-SGP Battery Sets**

Ordering Code	Battery	Description
RS92-SGPD	RSB511	Dry-cell Battery Set
RS92-SGPA	RSB521	Dry-cell Battery Set with switch
RS92-SGPL	RSB611	Lithium Battery Set
RS92-SGPJ	RSB521	Japan-specific model



**Figure 16 RSB511 Dry-cell Battery Set (Number 1) and RSB611 Lithium Battery (Number 2)**

## Connecting the Battery

Follow these steps to connect the battery to the radiosonde:

1. Open the foil bag as indicated on the bag.



**Figure 17** Battery Package

2. Take out the battery connector (number 1 in [Figure 18 on page 29](#)) by gently pulling the wires.



**Figure 18** Battery Connector Shown with RSB611

3. Connect the battery connector to the radiosonde.



**Figure 19 Connecting the Battery Connector to the Radiosonde**

4. The radiosonde has now been activated. Close the battery case.
5. Check from the sounding system software that the telemetry link is working well. For detailed instructions on using the sounding software, refer to the sounding system documentation.

The radiosonde is now prepared for launch. In order to ensure 120 minutes of flight time, it is recommended that the radiosonde is launched within 15 minutes of battery connection.

## Connecting the Dry-cell Battery Set with Switch

Follow these steps to connect the Dry-cell Battery Set with switch:

1. Open the foil bag as indicated on the bag.



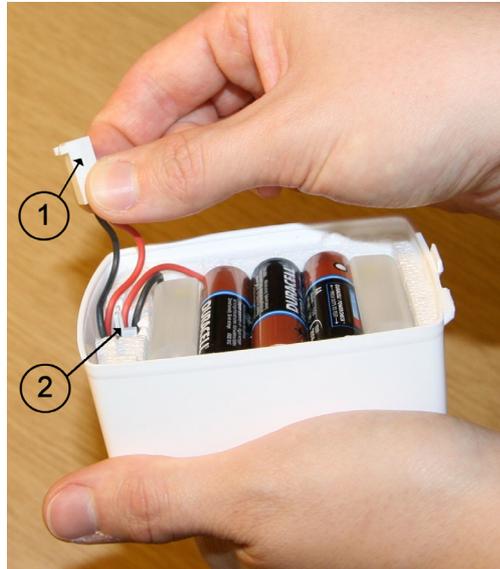
**Figure 20** Battery Package for Dry-cell Battery Set with Switch

2. Take out the battery connector by gently pulling the wires.



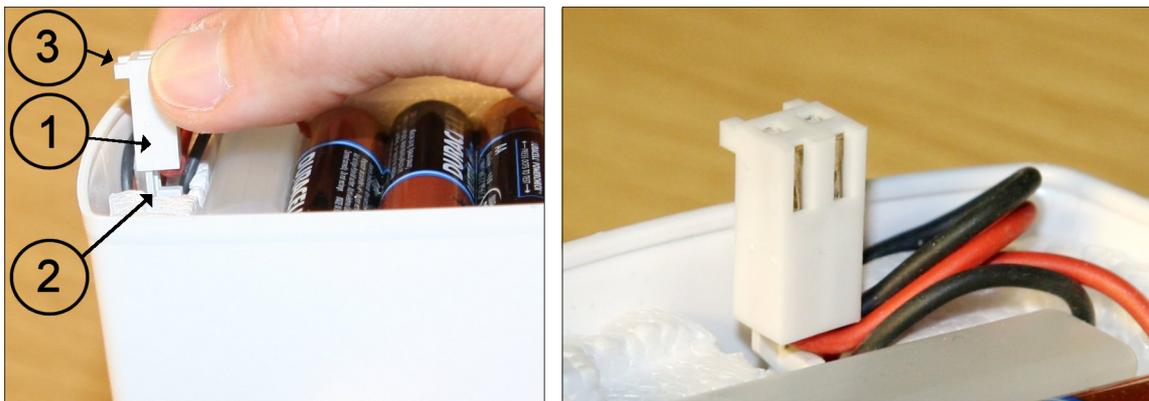
**Figure 21** Battery Connector

3. Take hold of the battery connector (number 1 in the following figures) and fold the wires to the side as shown in [Figure 22 on page 32](#)).



**Figure 22** Placing Battery Connector into Connector Holder, Part 1

4. Place the battery connector (1) onto the connector holder pins (2) of the battery case. The white pins (3) must face away from the batteries.



**Figure 23** Placing Battery Connector into Connector Holder, Part 2

**CAUTION** The white plastic pins must face away from the batteries, see [Figure 23 on page 32](#).

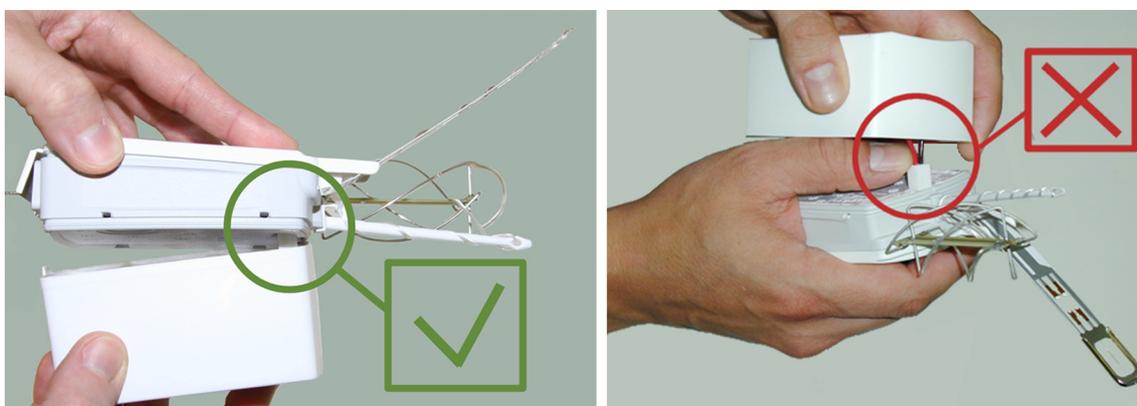
**CAUTION**

The wires at the connector end must be located between the connector holder and the batteries, as shown in [Figure 23 on page 32](#), not between the connector holder and the outer wall of the battery case.

5. Connect the battery connector to the radiosonde, see [Figure 24 on page 33](#).

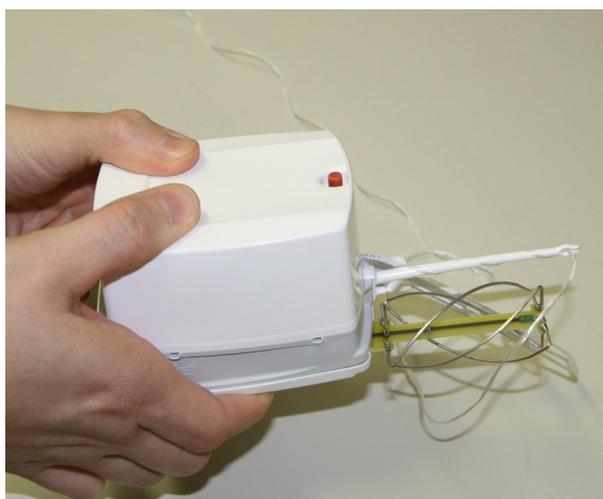
**NOTE**

Make sure the battery connector stays connected into the connector holder all the time. If it becomes loose, battery activation will not work properly.



**Figure 24** Connecting the Radiosonde to the Battery Case

6. Close the battery case by snapping the battery case and the radiosonde together so that all sides are closed tightly.



**Figure 25** Pressing Battery Case and Radiosonde Together

7. Press the red switch on the battery case to activate the battery. The green LED next to the red switch is lit, indicated with an arrow in [Figure 26 on page 34](#). Make sure the LED stays lit.



**Figure 26** Green LED Light is Lit

If the LED is not lit, see the instructions in section [Checking the Connection on page 34](#).

8. Check from the sounding system software that the telemetry link is working well. For detailed instructions on using the sounding software, refer to the sounding system documentation.

## Checking the Connection

If the LED is not lit when you press the switch, the battery connector may not be properly connected to the connector holder in the battery case. To check this, do the following:

1. Remove the radiosonde and the battery case from each other, for example using a small coin. See section [Removing the Battery Case on page 35](#) for details.
2. Connect the battery again carefully following the instructions in section [Connecting the Dry-cell Battery Set with Switch on page](#)

31, making sure the connector is properly connected to the connector holder in the battery case.

## Removing the Battery Case

If you need to remove the battery case from the radiosonde, use, for example, a small coin to loosen the battery case. Push the coin into the small opening between the radiosonde and the battery case to loosen the case and remove it. See [Figure 27 on page 35](#).



**Figure 27** Removing the Battery Case

## Launching the Radiosonde

The radiosonde is now ready for launch.

### Attaching the Unwinder

The unwinder is used to unwind the suspension string gently and slowly. To do this, the unwinder must be attached firmly, so that it does not rotate relative to the balloon. If the unwinder moves freely, the suspension string unwinds too quickly, and it is possible that the radiosonde hits the ground upon launch.

The unwinder is designed to be tied directly to the balloon.

If you cannot attach the unwinder directly to the balloon, for example, when using a parachute, sounding accessories are needed to restrict the movement of the unwinder. For instructions, refer to section [Optional Sounding Accessories on page 20](#).

### Attaching the Unwinder to the Balloon

Follow these steps to attach the unwinder directly to the balloon:

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

If you are using a balloon with an integrated parachute, fasten the parachute string poking out of the balloon neck to the unwinder.

If you use optional sounding accessories, follow these instructions to attach the unwinder.

## Totex Parachute

The 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.

## Non-Totex Parachute

There is a hanger board tied to the parachute. Attach the unwinder to the bottom of the hanger board.

## Releasing the Balloon

In order to ensure 120 minutes of flight time, the radiosonde should be launched within 15 minutes of battery connection.

Follow these steps to release the balloon:

1. Make sure the suspension string is not tangled.
2. Hold the unwinder to prevent the string from running out before the release.
3. Release the balloon and allow the radiosonde to lift from your hand. Keep the string length between the radiosonde and the unwinder as short as possible.

## Checking the Reception

Immediately after the release, check the reception of the radiosonde frequency on the receiver.

Proceed to monitor the sounding with the sounding system.

## Monitoring the Sounding with the Sounding System

If you have not already done so, enter the surface observation information in the sounding system. Refer to the sounding system documentation for detailed instructions on using the sounding software.



## CHAPTER 4

# STORAGE AND TRANSPORTATION

This chapter provides information for the transport and storage of the product.

## Storage

Radiosondes must be stored and used properly in accordance with the applicable instructions given in the Vaisala manuals, e.g., User's Guide.

Proper storage conditions must fulfill the following requirements:

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%

Vaisala AUTOSONDE storage compartment requirements are:

- The maximum number of days a radiosonde can be loaded in AUTOSONDE is 24
- Relative humidity below 50 %
- Temperature +15 °C to +35 °C

**CAUTION**

The suspension string is not resistant to prolonged exposure to sunlight. Store the radiosondes in their original unopened vacuum envelopes.

**CAUTION**

When using the RSB511 or RSB521 Dry-cell Battery Set, we recommend that you store the radiosondes above +15 °C for at least two days before the sounding. If the radiosonde's temperature before the sounding is close to 0 °C, the flight time may be compromised.

## 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.

Do not transport the radiosonde with the battery connected.

## Transporting Lithium Batteries and RS92 Radiosondes

RSB611 lithium batteries and RS92 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, see [Figure 28 on page 41](#) for an example. The original radiosonde shipping should 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 28** Lithium Battery Handling Label

**NOTE**

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



## CHAPTER 5

# FAILURE REPORT AND WARRANTY

This chapter presents information about the failure report and radiosonde warranty.

## Technical Support

For technical questions, contact the Vaisala technical support by e-mail at [helpdesk@vaisala.com](mailto:helpdesk@vaisala.com).

Follow the instructions below to speed up the repair process and to avoid extra costs to you.

1. Read the warranty information.
2. Contact Vaisala technical support via e-mail and request for RMA (Return Material Authorization) and shipping instructions.
3. Proceed as instructed by Vaisala technical support.

## Product Returns

**NOTE**

RMA must always be requested from Vaisala technical support before returning any faulty material.

If the product must be returned for service, see [www.vaisala.com/returns](http://www.vaisala.com/returns).

For contact information of Vaisala Service Centers, see [www.vaisala.com/servicecenters](http://www.vaisala.com/servicecenters).

## Radiosonde Warranty

The following Vaisala Radiosonde general warranty statement is effective as of 02/2007. However, please refer to the applicable supply contract for the specifics of your warranty terms. If there is a discrepancy between the general radiosonde warranty statement and the radiosonde warranty statement in the supply contract, the provisions of the official radiosonde warranty statement in the supply contract prevail.

### Vaisala Radiosonde Warranty Statement

Vaisala repairs or, at its discretion, replaces any Vaisala RS92 radiosonde 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 stored and used properly in accordance with applicable instructions and manuals issued by Vaisala.

#### Storage Conditions

Radiosonde 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 %

Additional storage requirements for Vaisala AUTOSONDE:

- the maximum number of days radiosonde can be loaded in AUTOSONDE is 24
- relative humidity below 50 %
- temperature +15 °C to +35 °C

## **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 required. 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, or ground check correction exceeds one of the following limits:

P:  $\pm 3$  hPa

T:  $\pm 1$  °C

U:  $\pm 4$  %RH (at 0 % RH)

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, 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 can be used for this.

A radiosonde found defect prior to launch shall be returned to the nearest Vaisala office.

Report of an in-flight failure shall be accompanied by either 1) sounding data file (MW21, MW31, MW41 and AUTOSONDE systems) or 2) sounding status report printout (MW11/MW12/MW15 systems) for each failed sounding.

Failure 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.

## APPENDIX A

# SAFETY INSTRUCTIONS FOR BALLOON OPERATORS

This appendix contains details of safe and proper balloon preparation.

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

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.

**WARNING**

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

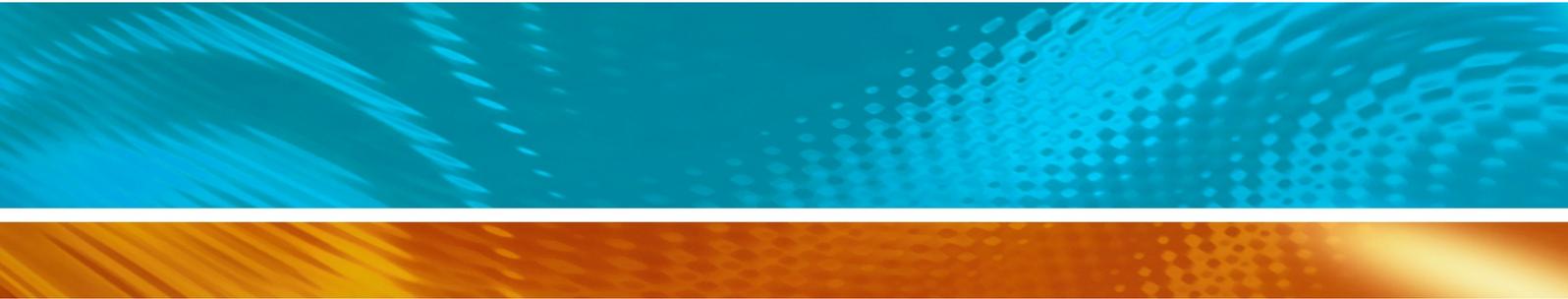
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