M212988EN-A

User Guide

Vaisala Ground Check Device
RI41

VAISALA

PUBLISHED BY

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1. About this document

1.1 Version information

This document provides instructions for Vaisala Ground Check Device RI41.

Table 1 Document versions (English)

Document code	Date	Description
M212988EN-A	October 2023	First version.

1.2 Related manuals

Table 2 Related manuals

Document code	Name
M212750EN	*MW51 Installation Guide*
M212675EN	*MW51 Technical Reference*
M212751EN	*MW51 User Guide*
M212718EN	*MW51 Product Description*

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.

Highlights important information on using the product.

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

Vaisala® and DigiCORA® are registered trademarks of Vaisala Oyj.

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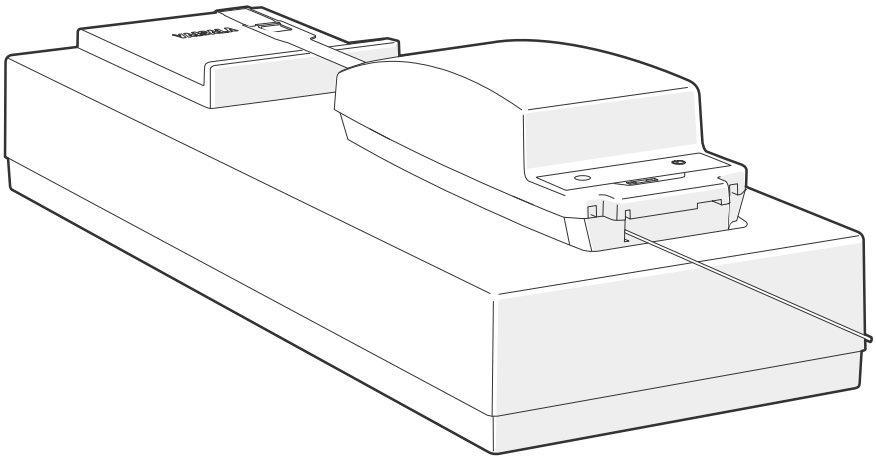
2. Product overview

2.1 Vaisala Ground Check Device RI41



Vaisala Ground Check Device RI41 is available in 2 models: RI41, and the similar RI41-B, which is equipped with a barometer module. The RI41-B is used together with RS41 radiosondes with in-built pressure sensors, such as the RS41-SGP. During the ground preparation procedure, the reference barometer in the RI41-B is used to adjust the measurement of the in-built pressure sensor in the radiosonde.

RI41 requires no cable for radiosonde configuration and is powered on automatically when connected to the sounding workstation with a USB cable.

The radiosonde is automatically switched on when placed on RI41. During the preparations, the status is clearly indicated by DigiCORA Software.

RI41 transmits the results of the radiosonde ground check to the ground equipment and allows the user to configure the radiosonde. Configuration is performed automatically using a wireless short-range communication link. A short-range wireless communication link is also used for turning the radiosonde power on. The communication link is based on RF technique with a range of about 5 cm.

3. Creating connections

3.1 Connecting RI41

Make sure you have installed DigiCORA before connecting RI41.

1. Connect the ground check device USB cable to the computer's USB port.

   The ground check device is powered on when it is connected to the computer.
   For more information on how to configure RI41 as the ground check device to be used as the connection between the radiosonde and the sounding workstation, see *MW51 User Guide (M212751EN)*.

4. Preparing a sounding

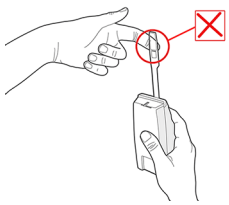
4.1 Preparing radiosonde with ground check device

4.1.1 Connecting radiosonde with RI41

Before you connect the radiosonde to the ground check device, connect the ground check device to the sounding workstation by using a USB cable and turn on the computer and log in to DigiCORA. For installation instructions, see *MW51 Installation Guide (M212750EN)*.

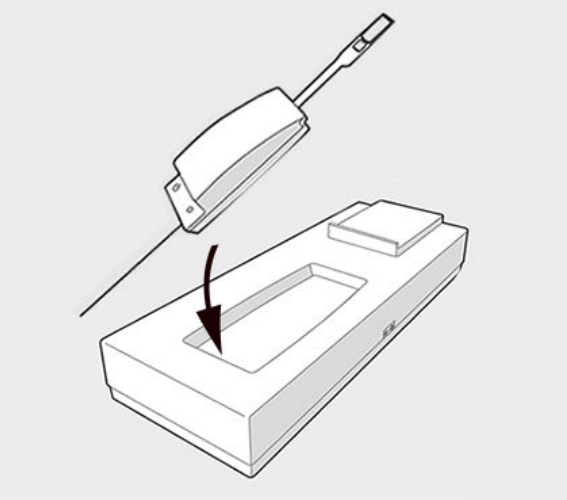
CAUTION! Do not touch the radiosonde sensors.
The sensors are fragile and can be easily contaminated.

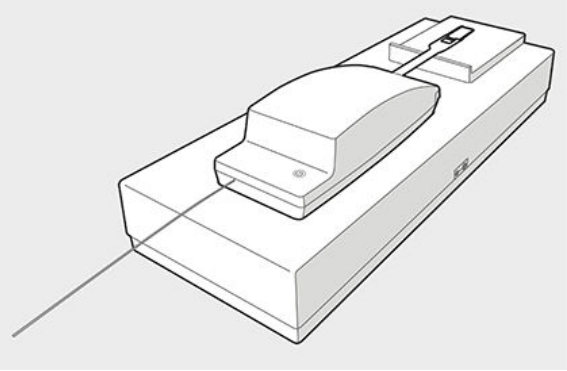
During humidity sensor reconditioning, the temperature of the sensor boom is about 150 °C for 3 minutes.



1. Place the radiosonde on the ground check device carefully. Make sure that you place the radiosonde on so that you place the back end (antenna end) of the radiosonde on the device first.

> **CAUTION!** Make sure that the radiosonde sensor boom does not hit the support plate on the ground check device, as this may damage the sensor boom.





The radiosonde is automatically switched on when placed on the ground check device. The sounding software automatically detects the radiosonde and begins the preparations.
During the radiosonde preparations, the sounding software performs several steps. These consist of ground check procedures for sensors, as well as optional features for setting the radiosonde inflight operation parameters. The preparation procedure depends on the radiosonde and ground check device model.

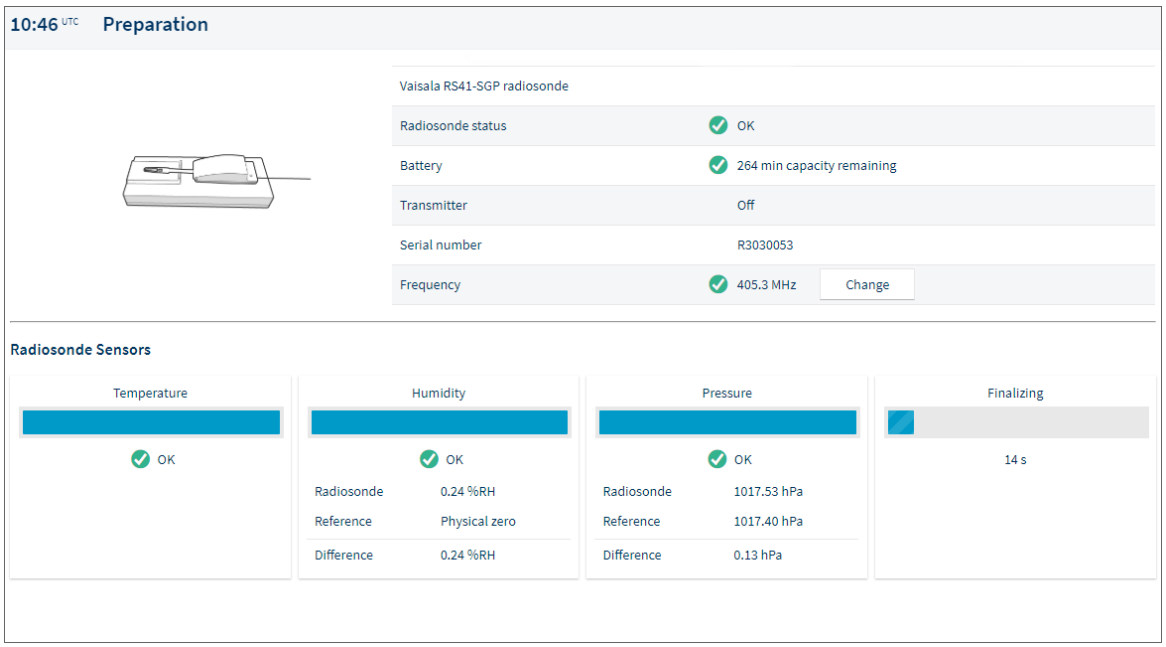
2. After the sounding software has indicated that the ground check is finished, remove the radiosonde from the ground check device.

3. If there is any delay in starting the sounding, for example, if you must wait before releasing the radiosonde balloon, switch the radiosonde off by pushing the power switch. When you are ready to release the balloon, switch the radiosonde back on.

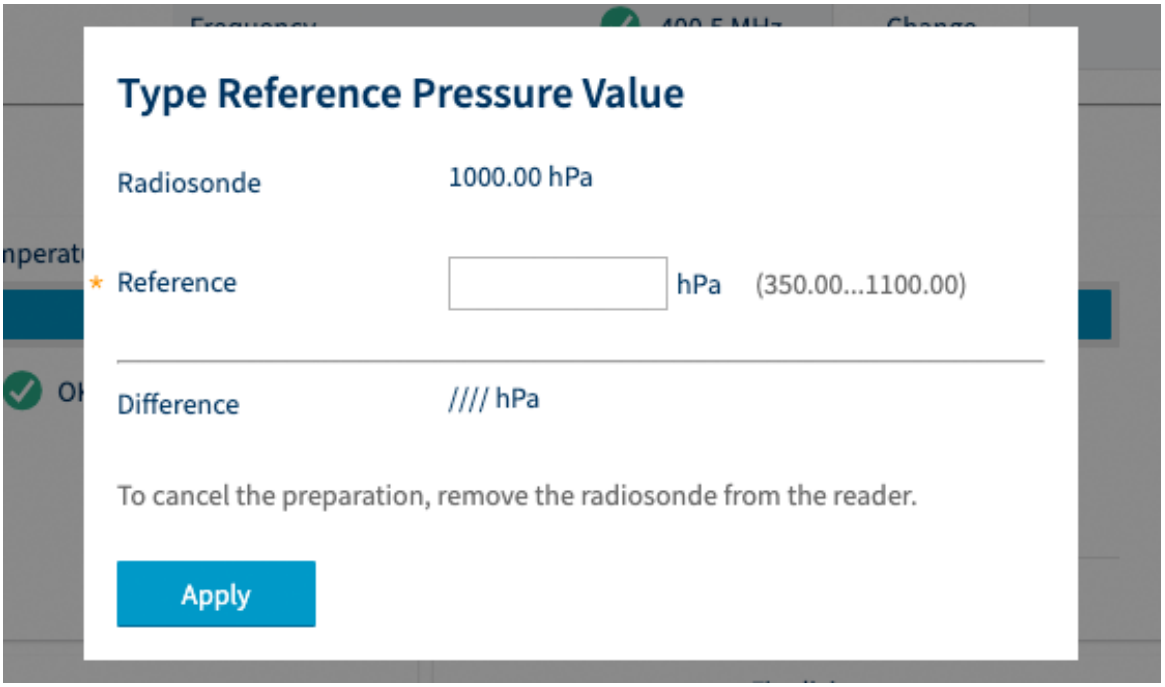
4.1.2 Displaying ground check status for RS41-SGP(E) using RI41

The ground check phases are slightly different depending on the radiosonde model and the ground check device.

When the ground check device detects the radiosonde, DigiCORA automatically goes to the preparation phase. The status is indicated with progress bars for each step of the preparation phase.



If the ground check device you are using to prepare RS41-SGP(E) does not include a pressure sensor, type the reference pressure and select **Apply**. If the pressure sensor is included, the value is obtained automatically.



During the ground check, the following preparation steps are performed for the radiosonde:

- **Temperature**: In-built functional temperature check
- **Humidity**: Preparation of humidity sensor, cooling, and physical zero humidity check
- **Pressure**: Manual entry of the pressure reference value, or with RI41-B, retrieve pressure reference value automatically from barometer module in the ground check device
- **Finalizing**: Parameters and ground check device results updated to radiosonde

The preparation status changes to **Preparation completed** when all the preparation steps are successful and it is then safe to remove the radiosonde from the ground check device.

The **Radiosonde status** shows if any error occurs and causes the preparation to fail.

4.1.3 Displaying ground check status for RS41-SG(E) with RI41

The ground check phases are slightly different depending on the radiosonde model and the ground check device.

When the ground check device detects the radiosonde, DigiCORA automatically goes to the preparation phase. The status is clearly indicated with progress bars for each step of the preparation phase.

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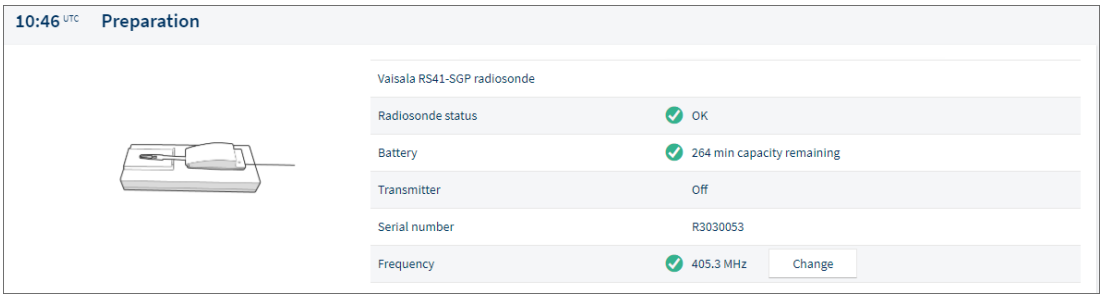
The preparation status changes to **Preparation completed** when all the preparation steps are successful and it is then safe to remove the radiosonde from the ground check device.

The **Radiosonde status** shows if any error occurs and causes the preparation to fail.

4.1.4 Tuning radiosonde frequency

If needed, you can manually tune the radiosonde frequency while DigiCORA is preparing the radiosonde.

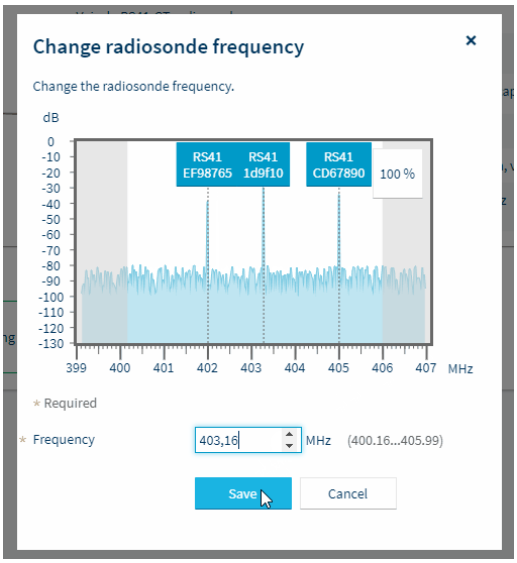
1. In the **Preparation** window, on the **Frequency** row, select **Change**.



   The **Change radiosonde frequency** window opens.

2. If there is a transmission peak in the spectrum, select another frequency away from the peak. The recommended minimum frequency difference between radiosondes is 200 kHz.

   If the spectrum is flat and there are no peaks, you can set the radiosonde to any frequency.



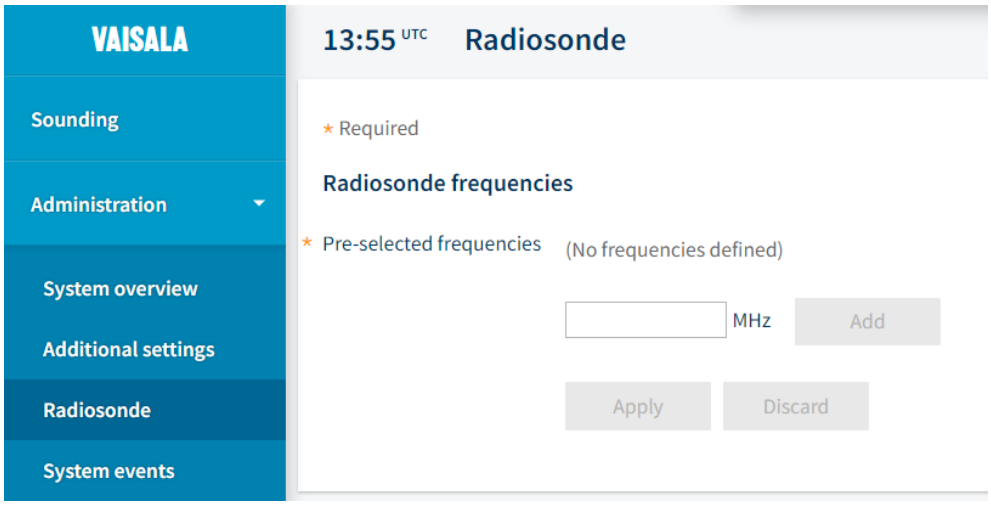
3. To set the new frequency, use the arrow buttons or select the correct frequency in the radio spectrum, and select **Save**.

If you want to set pre-selected frequencies, see Configuring radiosonde frequencies (page 14).

4.1.5 Configuring radiosonde frequencies

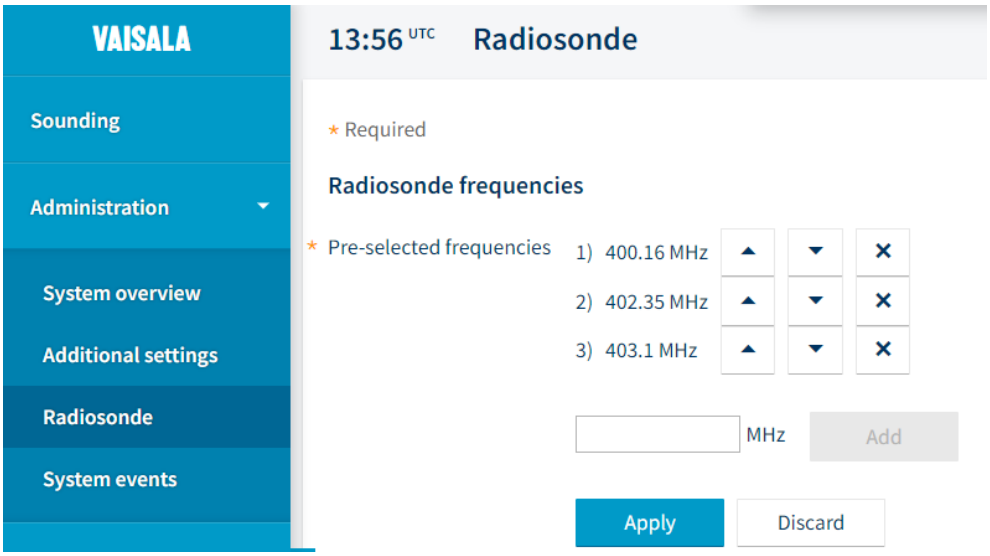
You can configure pre-selected (default) frequencies for the radiosonde. During ground check, DigiCORA automatically sets the frequency to the radiosonde. You can configure more than one frequency as backup.

1. Select **Administration > Radiosonde**.



2. To add frequencies, type a value in the input field and select **Add**.

   The values must be within 400.16–405.99 range, (maximum of 2 decimal places).



   You can remove frequencies by selecting the remove button X.
   If you want to reorder the list, use the arrow up and arrow down buttons.

> DigiCORA uses the first free frequency from the list. If DigiCORA cannot set any frequency, it prompts the user to select one manually.

3. After you have added the pre-selected (default) frequencies, select **Apply**.

   If you want to discard the changes, select **Discard** to clear the list.

5. Maintaining hardware

5.1 Updating RI41

All the necessary tools are on the installation package in the *Tools* directory. After installation, they can be found from *C:\DigiCORA\Tools*.

To start the update, go to *C:\DigiCORA\Tools\RI41FirmwareUpdate* and run *UpdateGC41.exe*.

To update the firmware, the ground check device must be connected to the sounding workstation computer with the USB cable during the entire update process.

CAUTION! Do not disconnect the ground check device USB cable from the sounding workstation computer during the update, or interrupt the update in any way. Switching the ground check device off before the update is finished may cause serious malfunction.

If the ground check device already contains the firmware version you are about to update, select **Exit** to cancel the update.
If you wish to update the firmware anyway, select **Update anyway**.

If the message `Cannot find any connected GC41 device` is shown, connect the ground check device to the sounding workstation computer with the USB cable and select **OK**.
If the message is displayed again after you have connected the cable, wait a while and then select **OK** again.
Also, make sure that you have not configured RI41 into use in DigiCORA. In that case, disable RI41 from the DigiCORA settings in **Administration > System overview > Ground check device**, and run the RI41 software update again.

1. In the GC41/RI41 **Updater** window, select **Update**.
2. The update command has now been sent to RI41 and you must wait for 10 seconds.
3. The update begins. A progress bar is displayed in the **Updater** window.
4. When the software has been successfully updated, select **Close**.

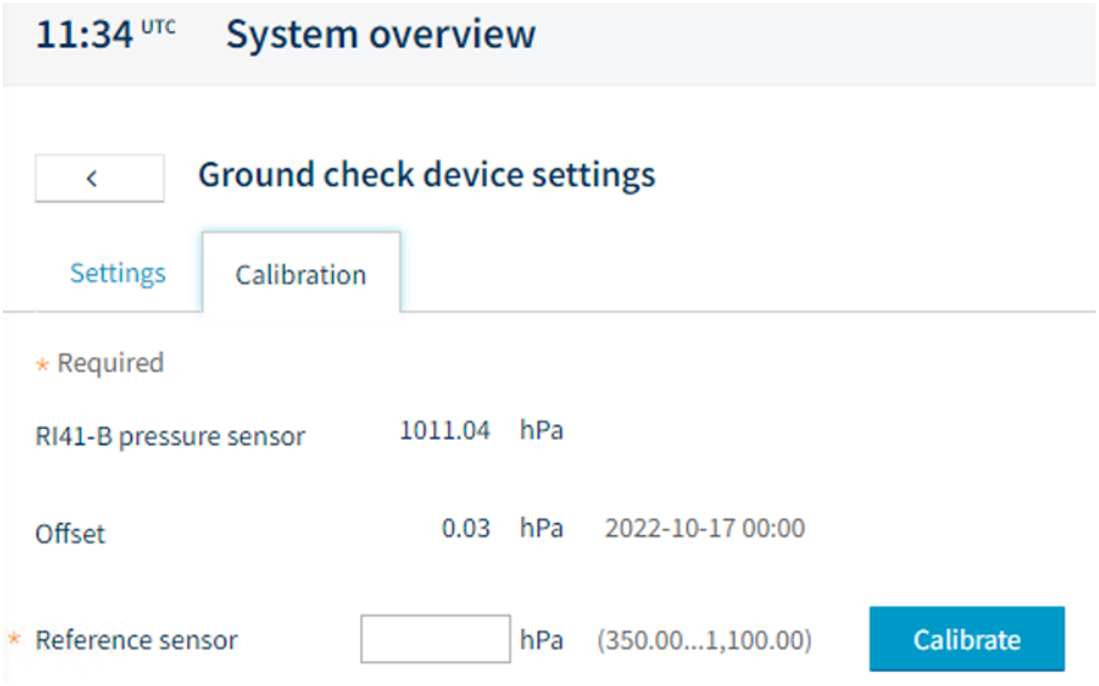
   A pop-up window displaying information on the updated device is shown.
5. Select **OK** to close the pop-up window.

The firmware has now been updated.

5.2 Calibrating RI41-B barometer module

To calibrate RI41-B barometer module you need to have a reliable reference barometer.

1. Log in to DigiCORA as **DigiCORA Administrator**.
2. Go to **Administration > System overview > Ground check device** and select **Calibration**.



   The system shows you the current barometer pressure reading, offset value, and date of the last calibration.

3. Type a reference sensor value from the reference barometer and select **Calibrate**.

   The system calculates new offset values and sends the calculated offset value to the barometer module.
   New pressure and offset values are shown.

4. In case of an error, calibrate again.

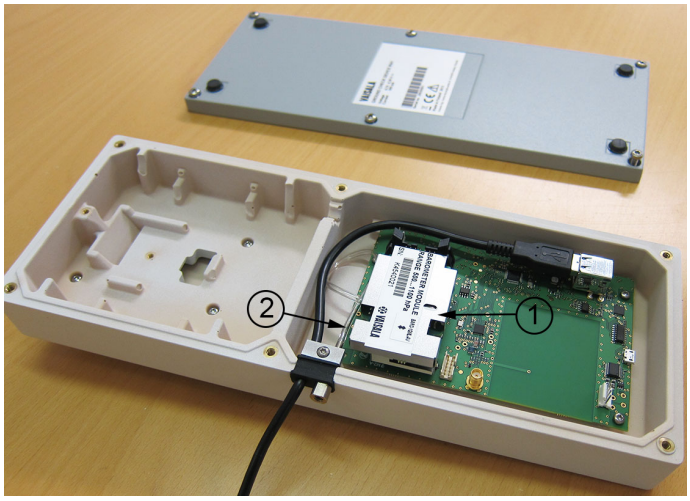
5.3 Replacing RI41-B barometer module

- Flathead screwdriver
- Torx T20 screwdriver

5.3.1 Removing old barometer module

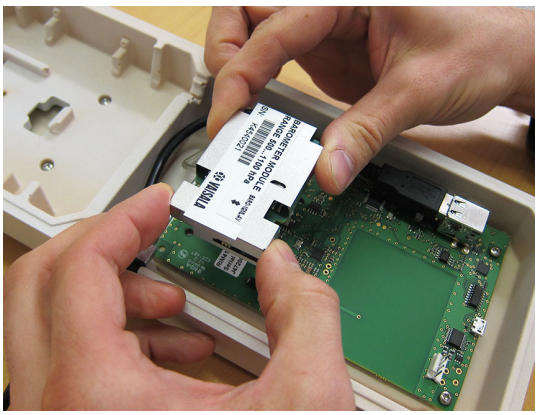
CAUTION! Disconnect RI41-B from the workstation before replacing the barometer module.

1. Remove screws (6 pcs) on the bottom of RI41-B with the Torx screwdriver and remove the bottom cover.

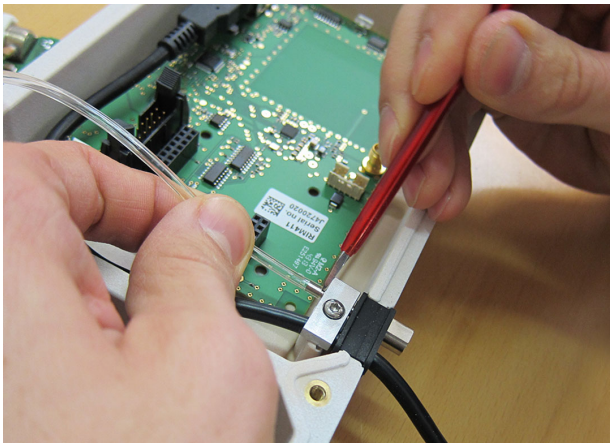


1 Barometer module inside RI41-B
2 Barometer module pressure tube

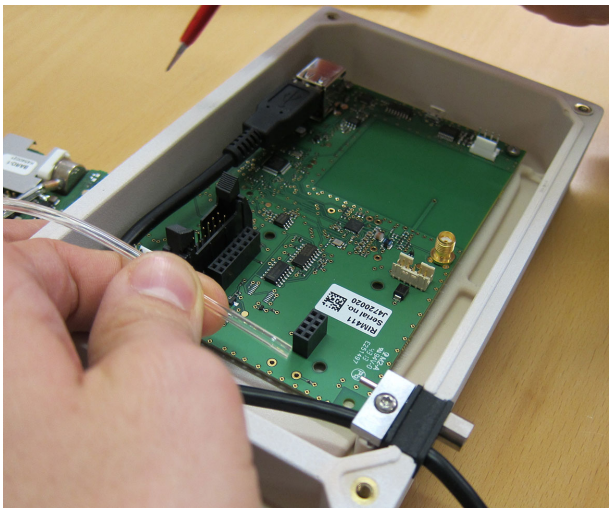
2. Remove the barometer module.



3. Use the flathead screwdriver to loosen the pressure tube.

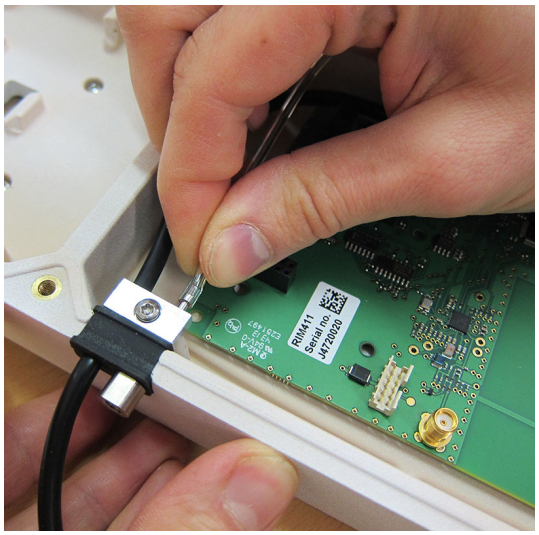


4. Pull the pressure tube out of the tube fitting piece

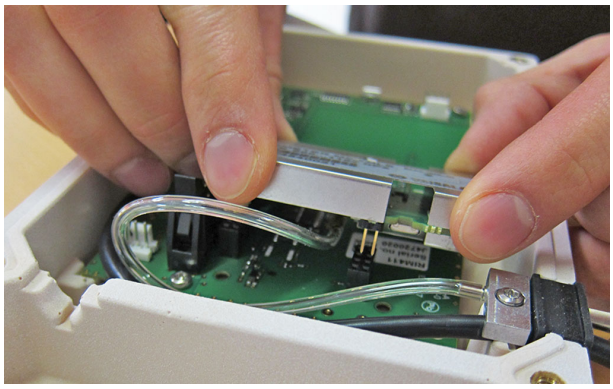


5.3.2 Attaching new barometer module

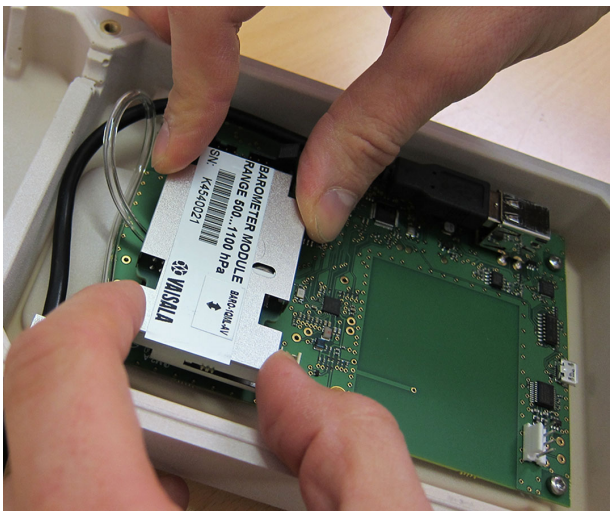
1. Attach the new barometer module's pressure tube by pushing it to the tube fitting piece.



2. Check the connector positions on the barometer module and place the barometer module in the correct position in RI41-B.



3. Push the barometer module in place.



4. Attach the RI41-B bottom cover using the Torx T20 screwdriver and reconnect RI41-B to the workstation.

6. Spare parts

6.1 RI41 spare parts

RI41 is replaced as a whole device. In RI41-B, the barometer module is available as a spare part.

Table 3 RI41 spare parts

Code	Description
RI41	Ground check device
RI41-B	Ground check device with barometer module
BARO-1QML-AVSP	Barometer module BARO-1QML-AV (A-class)

7. Technical data

Table 4 RI41 operating environment

Property	Description/Value
Operating temperature	+10 ... +45 °C (+50 ... +113 °F)
Storage temperature	−40 ... +65 °C (−40 ... +149 °F)
Operating humidity	10–90 %RH
Storage humidity	5–95 %RH
Operating frequency (carrier)	13.56 MHz
Short range wireless communication	RF technique
Communication link range	0.04 m (1.57 in)
Electrical interface	USB 1.1/2.0
Cable with connector	USB

Table 5 RI41 inputs and outputs

Property	Description/Value
Power supply	
Input	Through USB interface
Voltage	5 V DC
Typical current	300 mA

Table 6 RI41 mechanical specifications

Property	Description/Value
Dimensions (H × W × L)	63 × 125 × 327 mm (2.48 × 4.92 × 12.87 in)
Weight	1.1 kg (2.43 lb)
Material	Polyurethane
Cable length	1.8 m (5 ft 11 in)

Table 7 RI41 reference sensors

Property	Description/Value
Pressure	Only in the RI41-B model
Calibration of the module	Class A, NIST traceable
Uncertainty [1)]	0.15 hPa

Property	Description/Value
Long term stability	0.1 hPa/year

1) *The recommended in-field calibration interval for barometer module is one year*

Table 8 RI41 compliance

Property	Description/Value
EU directives and regulations	Radio Equipment Directive, RED (2014/53/EU) RoHS Directive (2011/65/EU) amended by 2015/863
Electromagnetic compatibility (EMC)	CISPR 32 / EN 55032, Class B FCC part 15 B, Class B EN 61326-1, industrial environment EN 301 489-1 EN 301 489-3 EN 301 489-19 ICES-3 / NMB-3 (Class B)
Radio compatibility	EN 300 220-1 EN 300 220-2
Electrical safety	IEC 62368
Compliance marks	CE, RCM, RoHS China, UKCA

8. RI41 regulatory statements

8.1 FCC compliance statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION! This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING! Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

WARNING! This equipment complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

8.2 ISED compliance statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.

2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

WARNING! This equipment complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

WARNING! Cet appareil est conforme aux limites d'exposition aux rayonnements de l'ISDE pour un environnement non contrôlé. L'antenne doit être installée de façon à garder une distance minimale de 20 centimètres entre la source de rayonnements et votre corps. L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.

Warranty

For standard warranty terms and conditions, see www.vaisala.com/warranty.

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

Technical support

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

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

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

Recycling

Recycle all applicable material according to local regulations.

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