



Trimble R4s

GNSS Receiver

User Guide

Version 1
Revision C
January 2019

Legal Notices

©2018-2019 Trimble Inc. All rights reserved.

All product and brand names mentioned in this publication are trademarks of their respective holders.

R4s User Guide, Rev. C, January 2019.

Limited Warranty Terms and Conditions

Product Limited Warranty. Subject to the terms and conditions set forth herein, Trimble Inc. ("Trimble") warrants that for a period of (1) year from date of purchase this product (the "Product") will substantially conform to our publicly available specifications for the Product and that the hardware and any storage media components of the Product will be substantially free from defects in materials and workmanship.

Product Software. Product software, whether built into hardware circuitry as firmware, provided as a standalone computer software product, embedded in flash memory, or stored on magnetic or other media, is licensed solely for use with or as an integral part of the Product and is not sold. The terms of the end user license agreement govern the use of the Product Software, including any differing limited warranty terms, exclusions and limitations, which shall control over the terms and conditions set forth in the limited Product warranty.

Warranty Remedies. If the Product fails during the warranty period for reasons covered by this limited warranty and you notify us of such failure during the warranty period, we will repair OR replace the nonconforming Product with new, equivalent to new, or reconditioned parts or Product, OR refund the Product purchase price paid by you, at our option, upon your return of the Product in accordance with our product return procedures then in effect.

Notices

This device complies with RF radiation exposure requirements set forth for the general population (uncontrolled exposure).

This device must not be collocated or operated in conjunction with any other antenna or transmitter and it must be installed to provide the following separation distances from all persons:

- 45 cm for R4s with UHF radio
- 20 cm for R4s without UHF radio

USA

<p>Supplier's Declaration of Conformity</p> <p>We, Trimble, declare under sole responsibility that the product: R4s GNSS receiver complies with Part 15 of FCC Rules.</p> <p>Operation is subject to the following two conditions:</p> <p>(1) this device may not cause harmful interference, (2) and this device must accept any interference received, including interference that may cause undesired operation.</p> <p>Trimble Inc. 10368 Westmoor Dr. Westminster, CO 80021</p>
--

Class B Statement - Notice to Users. 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 communication. However, there is no guarantee that 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 the 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.

Changes or modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Canada

The digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

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.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

NCC英文警語:

According to "Administrative Regulations of Low Power Radio Waves Radiated Devices:

Article 12 The low-power radio-frequency devices must not be altered by changing the frequency, enhancing emission power, adding external antenna, and modification of original design characteristic as well as function.

Article 14 The operation of the low-power radio-frequency devices is subject to the conditions that no harmful interference is caused. The user must stop operating the device immediately should harmful interference is caused and shall not resume until the condition causing the harmful interference has been corrected.

Moreover, the interference must be accepted that may be caused by the operation of an authorized communications, or ISM equipment.

Europe



Hereby, Trimble, declares that the R4s GNSS receiver is in compliance with the following directives:

- RED 2014/53/EU
- RoHS Directive 2011/65/EU.

Information about included radio modules:

- Bluetooth radio: Frequency band 2400-2483 MHz, max RF radiated output power +21 dBm.
- UHF radio: Frequency band 403-473 MHz, max RF radiated output power +40 dBm.

If external UHF antennas are used together with the product, the following antennas shall be used:

- Whip 1/4 wave, connected directly to the internal UHF module.
 - Trimble part number: 44085-42 for low frequency band: 410-430 MHz.
 - Trimble part number: 44085-46 for high frequency band: 430-470MHz.
- UHF whip antenna Procom half-wave, if connected through a TNC cable to an external antenna:
 - Trimble part number: C3310190 for 410-430MHz
 - Trimble part number: C3310196 for 430-450MHz
 - Trimble part number: C3310188 for 450-470MHz

If the R4s is used with UHF radio the following UHF radio module shall be used:

- Trimble part number: 89941-02 (UHF Unit).

The products covered by this guide may be operated in all EU member countries (BE, BG, CZ, DK, DE, EE, IE, EL, ES, FR, HR, IT, CY, LV, LT, LU, HU, MT, NL, AT, PL, PT, RO, SI, SK, FI, SE, UK), Norway, and Switzerland.

European Union Customers: WEEE



Recycling in Europe: To recycle WEEE (Waste Electrical and Electronic Equipment products that run on electric power), call +31 497 53 24 30 and ask for the "WEEE Associate". Or, mail a request for recycling instructions to:

Trimble Europe BV
c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL

Rechargeable Lithium-ion Battery

This receiver uses a rechargeable Lithium-ion battery.

WARNING - Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage. To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
- Do not expose the battery to fire, high temperature, or direct sunlight.
- Do not immerse the battery in water.
- Do not use or store the battery inside a vehicle during hot weather.
- Do not drop or puncture the battery.
- Do not open the battery or short-circuit its contacts.

WARNING - Avoid contact with a rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage. To prevent injury or damage:

- If a battery leaks, avoid contact with the battery fluid.
- If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!
- If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.

WARNING - Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury or/and equipment damage. To prevent injury or damage:

- Do not charge a battery if it appears to be damaged or leaking.
- USE EXCLUSIVELY the dual-battery charger (P/N 53018010-SPN) with the AC/DC power block (model ADP-65JH AB, P/N 78650) to charge the R4s Lithium-ion battery. See instructions in this guide. These two devices are part of the R4s standard accessories list.



CHARGE THE BATTERY ONLY IN THE TEMPERATURE RANGE 0° to +40°C (32° to 104°F), at a maximum altitude of 2,000 meters (6,562 feet).

- Discontinue charging a battery that gives off extreme heat or a burning odor.
- Use the battery only in Trimble equipment that is specified to use it.
- Use the battery only for its intended use and according to the instructions in the product documentation.

Disposing of Rechargeable Lithium-ion Battery

Discharge Lithium-ion battery before disposing of it. When disposing of a battery, be sure to do so in an environmentally sensitive manner. Adhere to any local and national regulations concerning battery disposal or recycling.

Receiver Use and Care

The receiver can withstand the rough treatment that typically occurs in the field. However, the receiver is a high-precision electronic instrument and should be treated with reasonable care.

CAUTION - Operating or storing the receiver outside the specified temperature range can damage it. For more information, see Physical Specifications in this guide.



High-power signals from a nearby radio or radar transmitter can overwhelm the receiver circuits. This does not harm the instrument, but it can prevent the receiver from functioning correctly. Do not use the receiver within 400 meters (1312 feet) of powerful radar, television or other transmitters. Low-power transmitters such as those used in cell phones and two-way radios do not normally interfere with receiver operations.

For more information, contact your Trimble distributor.

Bluetooth Radio

The radiated output power of the wireless radio is far below the FCC radio-frequency exposure limits. Nevertheless, the wireless radio shall be used in such a manner that the Trimble receiver is 20 cm or further from the human body.

The internal wireless radio operates within guidelines found in radio-frequency safety standards and recommendations, which reflect the consensus of the scientific community. Trimble therefore believes the internal wireless radio is safe for use by consumers.

The level of energy emitted is far less than the electromagnetic energy emitted by wireless devices such as mobile phones. However, the use of wireless radios may be restricted in some situations or environments, such as on aircraft. If you are unsure of restrictions, you are encouraged to ask for authorization before turning on the wireless radios.

COCOM Limits

The US Department of Commerce requires that all exportable GNSS products contain performance limitations so that they cannot be used in a manner that could threaten the security of the United States.

The following limitation is implemented on the receiver: Immediate access to satellite measurements and navigation results is disabled when the receiver's velocity is computed to be greater than 1000 knots, or its altitude is computed to be above 17,000 meters (59,055 feet). The receiver continuously resets until the COCOM situation is cleared.

Technical Assistance

If you have a problem and cannot find the information you need in the product documentation, contact your local distributor. Alternatively, request technical support.

UHF Radios

Regulations and Safety. The receiver may be fitted with an internal radio as an option. It can also be connected to an external UHF radio.

Regulations regarding the use of Ultra High Frequency (UHF) radio-modems vary greatly from country to country. In some countries, the UHF kit may be used without obtaining an end-user license. Other countries require end-user licensing. For licensing information, consult your local Trimble dealer.

Before operating the receiver with the UHF kit, determine if authorization or a license to operate the UHF kit is required in your country. It is the end-user's responsibility to obtain an operator's permit or license for the location or country of use.

Exposure to RF energy is an important safety consideration. The FCC has adopted a safety standard for human exposure to radio-frequency electromagnetic energy.

Proper use of this radio modem results in exposure below government limits. The following precautions are recommended:

- DO NOT operate the transmitter when someone is within 45 cm (17.7 inches) of the antenna.
- DO NOT collocate (place within 20 cm) the radio antenna with any other transmitting device.
- DO NOT operate the transmitter unless all RF connectors are secure and any open connectors are properly terminated.
- DO NOT operate the equipment near electric blasting caps or in an explosive atmosphere.
- All equipment must be properly grounded according to Trimble installation instructions for safe operation.
- All equipment should be serviced only by a qualified technician.



Declaration of Conformity

Issuer's name: Trimble Europe BV
Meerheide 45
5521 DZ Eersel
NETHERLANDS

Objects of declaration: Trimble SPS785 GNSS Receiver,
p/n 116377-00
Trimble R4s GNSS Receiver,
p/n 114038-00
Trimble R4s LE GNSS Receiver,
p/n 114038-10
Spectra Precision SP60 GNSS Receiver,
p/n 101861-00

Approved accessory: UHF unit p/n 89941-02 valid for SPS785 (116377-00).
UHF unit p/n 89941-01 valid for R4s (114038-10) and
SP60 (101861-00).

This declaration of conformity is issued under the sole responsibility of the manufacturer. The object of declaration described above is in conformity with the essential requirements of directives 2014/53/EU (RED) and 2011/65/EU (RoHS) based on the following European harmonised standards:

- EN 50385:2002
- EN 60950:2006+A11:2009 + A1:2010
+ A12:2011 + A2:2013
- EN 301 489-1 V2.2.0
- EN 301 489-5 V2.1.1
- EN 301 489-17 V3.2.0
- EN 301 489-19 V2.1.0
- EN 300 328 V2.1.1
- EN 303 413 V1.1.1
- EN 300 113 V2.2.1

Signed for and on behalf of: Trimble Europe BV
Date: January 16, 2019

Igor Grechkin, Senior Director of Engineering



Doc no. 57101038 Rev. C

Table of Contents

About Trimble R4s.....	1
R4s Packout	2
Standard Items.....	2
Installed Firmware Options	3
UHF Kit	3
Office Power Kit	4
Trimble RTX Corrections Services.....	4
Discover Your New Equipment	5
Front Panel	5
Phase Center Location	6
Height Mark	7
Buzzer	8
Using R4s for the First Time.....	9
Charging the Battery	9
Inserting the Battery	10
Setting up the R4s	11
Running a Survey	11
Ending a Survey	11
R4s Control Panel Description	12
Introducing R4s as Rover	15
Network Rover.....	15
Rover Using Local Base.....	15
L-Band Rover (Trimble RTX)	16
Introducing R4s as Local Base.....	17
Possible Local Base Configurations	17
Internal vs. External Power Source	17
Using the UHF Kit.....	18
Installing the UHF Module into the Receiver	19
Configuring the UHF Module	20
Completing Rover Radio Setup.....	21
Completing Base Radio Setup With External UHF Antenna	22
Completing Base Radio Setup With Internal UHF Antenna.....	23
Collecting Raw Data Files	24
Raw Data Logging in Standalone Mode	24
Downloading Raw Data Files to a USB Key.....	24
Downloading Raw Data Files Directly to a Computer.....	25
Post-Processing Raw Data Files.....	25
Appendix	26
R4s Loader Software Utility	26
Installing R4s Loader	26
Getting Started With R4s Loader	26
Upgrading Receiver Firmware	27
Installing a Firmware Option	28

Validating RTX Subscription	29
R4s File Manager Software Utility	30
Installing R4s File Manager.....	30
Connecting R4s to your Computer	30
Getting Started With R4s File Manager.....	33
Establishing a Connection with the Receiver	34
Copying Files to the Office Computer	34
Deleting Files from the Receiver	35
Restoring Factory Settings	35
Technical Specifications.....	36
GNSS Characteristics	36
Real-Time Accuracy (RMS)	36
Subscriptions to Trimble RTX Corrections Services	
Supported by R4s	37
Real-Time Performance	37
Post-Processing Accuracy (RMS)	37
Data Logging Characteristics	37
Physical Characteristics	37
Standard & Optional System Components.....	38
Data Collectors and Software.....	38

About Trimble R4s



Challenging environments will no longer be a nightmare for you or your crew: The Trimble R4s is a new generation GNSS receiver offering a high level of flexibility. It is designed to cover any survey demand from simple post-processing, through standard UHF or unique Long-Range Bluetooth base and rover systems to sophisticated RTK and Trimble RTX rover solutions.

Combining the unique all-signals tracking and processing Z-Blade GNSS centric technology and L-band capability for satellite-delivered Trimble corrections RTX service, the R4s receiver provides the most reliable measurements and the highest possible accuracy under any conditions anywhere in the world.

The key features of the R4s are:

- Extended survey capability
- New 240-channel 6G ASIC
- Z-Blade GNSS-centric
- Internal TRx UHF radio (option)
- Long-Range Bluetooth
- Anti-theft and startup protections

R4s Packout

NOTE: Trimble reserves the right to make changes to the lists of items provided below without prior notice.

Standard Items







The R4s L1/L2 GNSS receiver kit includes the following items.

Item	Picture
R4s GNSS receiver, with up to 13 pre-installed firmware options (see <i>page 3</i>)	
Li-Ion Battery, 7.4 V, 2800 mAh	
Dual Li-Ion Battery Charger (does not include AC/DC power supply and cable)	
AC/DC Power Block, 65 W, 19 V, 3.43 A, 100-240 VAC, Class VI	
Power Cord Kit (four types) for use with AC/DC Power Block	
Tape Measure, 3.6 m (12 feet)	
Pole Extension, 7 cm, for use on tripod	
USB-to-USB mini OTG Cable	
USB data cable	
Standard USB-mini to USB A cable, 2 meters long	
Soft bag, field transport	
UHF Kit (see <i>page 3</i>)	-
UHF Whip Antenna, 6 ", rubber duck, 425-475 MHz	
Office Power Kit (see <i>page 4</i>)	-




Installed Firmware Options

[@1]	NO GEOFENCING
[N]	GPS, SBAS, QZSS
[G]	GLONASS
[O]	GALILEO
[B]	BEIDOU
[X]	L1 TRACKING
[Y]	L2 TRACKING
[S]	L3 TRACKING
[L]	L-BAND
[6]	10 HZ
[J]	RTK ROVER
[K]	RTK BASE
[R]	RECORD

UHF Kit

Item	Picture
UHF Module (Does not include the UHF antenna)	
Base Pole Extension, 25 cm (9.5") long, with oblong aperture	
Coaxial adapter cable (for use with P/N 95672)	
Rover Range Pole, 1.75 m (5.75 ft) long, carbon fiber, two parts, with specific tapping on top part	
Soft Bag for Range Pole	
T25 Torx Screwdriver, "L" shaped	

Office Power Kit

Item	Picture
Power/Data cable, 1.5 m, DB9-f to OS/7P/M to SAE	
Adapter cable, 0.15 m, SAE to DC socket (2.1 mm)	
RS232-to-USB adapter cable	

Trimble RTX Corrections Services

The services below can be used in the R4s after you have subscribed to one of them:

- CenterPoint RTX®
- FieldPoint RTX®
- RangePoint RTX®
- ViewPoint RTX®

Refer to *Technical Specifications on page 36* and next ones so you can choose the type of Trimble RTX service you should subscribe to, depending on the level of accuracy you need.

To subscribe to one of these services, do the following:

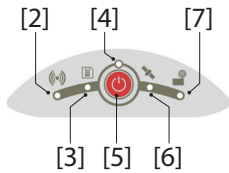
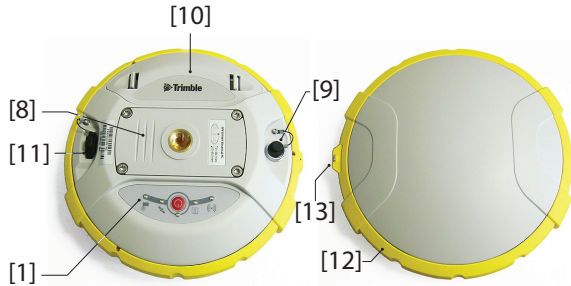
- Contact your dealer, who will help you make the necessary steps to get an RTX subscription from Trimble.
- Once you get your subscription, refer to *Validating RTX Subscription on page 29* to make it active in your R4s.

IMPORTANT: The best accuracy the R4s can deliver depends on the RTK option installed, regardless of the subscribed RTX service. For example, it wouldn't make sense to purchase a subscription to CenterPoint RTX if the receiver can only operate in 30/30 RTK.

Discover Your New Equipment

Take a few minutes to discover your new R4s.

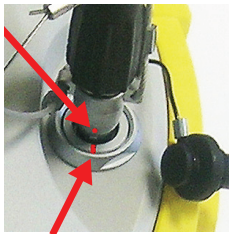
Front Panel



- **[1]:** Control panel, consists of the following items, from left to right (see picture):
 - **[2]:** Bluetooth LED
 - **[3]:** Data recording LED
 - **[4]:** Power LED
 - **[5]:** Power/Configuration button
 - **[6]:** Satellite tracking/Position LED
 - **[7]:** UHF Radio LED

See *R4s Control Panel Description* on page 12 for more information.

- **[8]:** 5/8" threaded insert for rod mounting. This part is securely mounted on a removable plate, thus making up an assembly that can be replaced with a UHF module (optional accessory) fitted with its own, specific threaded hole and central coaxial socket for antenna connection (see *Using the UHF Kit* on page 18).
- **[9]:** Power/data connector (DC input + RS232 serial port A). The connector socket is protected by a black rubber cap attached to the receiver case. Always keep the protection cap on when the connector is not used. This cap is a non-polarized one.



IMPORTANT: When you connect a cable to that connector, be sure you align the red markings (a red dot on the plug, a red line on the socket) before pushing the Lemo plug in.

Conversely, when it's time to disconnect the Lemo plug, please use the attached metal strap to pull the plug out.

- [10]: Battery compartment.

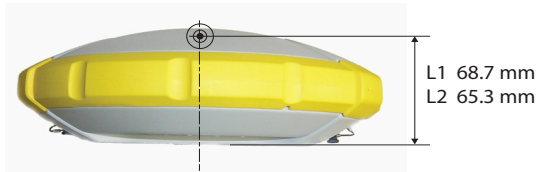
CAUTION - THE TRAPDOOR SHOULD BE REMOVED ONLY FOR INSERTING OR REPLACING A BATTERY. THE REST OF THE TIME, PLEASE ALWAYS KEEP FULLY CLOSE.



- [11]: Mini-USB connector (standard USB 2.0, up to 12 MHz, OTG (host & device)).
- [12]: Shock absorber making up a robust protection belt for the receiver against drops to the ground. The height mark is nested in the shock absorber. See below.
- [13]: Height mark.

Phase Center Location

See diagram below. These are relative measurements.



The field software usually calculates the real height of the instrument, based on the location of the L1 phase center. Whether you provide a vertical or slant measurement of the antenna base (ARP), the field software you are using should be able to deduce the real height of the instrument, using the pre-loaded dimensional parameters (antenna radius, etc.) specific to the model of GNSS antenna used.

In the case of a slant measurement, the software will also use the radius of the antenna to determine the instrument height.

Height Mark

The height mark ([8]) is nested in the shock absorber, near the serial connector.



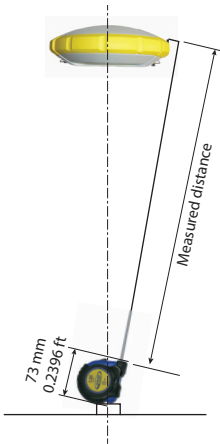
When the receiver is mounted on a tripod – for use as a base for example – making a slant measurement to determine the instrument height is often more convenient than making a vertical measurement from the ground mark to the antenna base.

In this case, the height mark can be used to hook the measure tape (standard accessory) so you can unroll the tape down to the ground mark and conveniently measure the distance between these two points. However because the housing of the measure tape is inserted in the path between the two points, you should make the following correction to obtain the real value of slant measurement:

$$\text{Slant Measurement} = \text{Measured Distance} + \text{Delta L}$$

Where "Delta L" is the length of the tape measure housing.

Delta L = 0.073 m or 0.2396 ft (2 7/8 inches), as mentioned on the housing.



When the field software requests your input to determine the instrument height, you will then choose to enter the slant measurement, rather than the vertical one. The software will then be able to deduce the real height of the instrument from the known dimensional parameters of the antenna and the slant measurement you will have entered.

Buzzer The buzzer can be heard in the following cases:

- **Bluetooth:**
 - When the data collector establishes a Bluetooth connection with the receiver,
 - When this connection gets lost.
- **Internal battery:** When the internal battery gets low (less than 20% of nominal charge), the buzzer sounds briefly. When less than 10% is left, the buzzer sounds continuously for a few seconds until the receiver safely shuts down.
- **Power button:** After a long press (2-3 seconds) on this button:
 - To start or stop data logging (see also below).
 - To enter the radio mode
 - To power off the receiver.

In all three cases, hearing the buzzer means your request has been acknowledged and you can release the button.

- **When entering the radio mode.**
- **Enabling/Disabling Data Logging** from the Power button: The buzzer will sound at the end of the 2 or 3 seconds of holding down the Power button to either start or stop data logging (see also *Raw Data Logging in Standalone Mode on page 24*).
- **Downloading Files:** After connecting a USB key to the receiver, the buzzer will first sound when the USB key is ready for use, and then after you have pressed briefly the Power button to start downloading files to the USB key. Another beep will finally be heard when the file transfer is complete (see *Downloading Raw Data Files to a USB Key on page 24*).

Using R4s for the First Time



WARNING - This receiver uses a rechargeable Lithium-ion battery. To avoid personal injury or equipment damage, make sure that you read and understand the safety information at the front of this guide.

The battery is shipped partially charged. Depending on the time elapsed since then, the remaining charge may be even less. For this reason, you should first recharge the battery completely before first use. (See warnings and safety information at the front of this guide.)

Charging the Battery

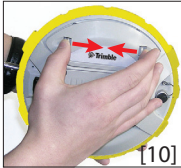


1. Set up the battery charger as follows:
 - Connect the output cable ([1]) of the AC/DC power block ([2]) to the battery charger input ([3]).
 - Choose the power cord ([4]) that is suitable for your country.
 - Connect the end of the power cord to the AC/DC block input ([5]), and the other to a power outlet ([6]). This powers up the battery charger, causing the two LEDs [8] to turn solid red.
2. Insert the battery ([7]) into one of the two slots on the battery charger (give the right orientation to the battery). When the battery is detected, the corresponding red LED ([8]) will go off and the nearby LED ([9]) will start blinking green to indicate that the battery is being charged.



3. Charging the battery will take a few hours. When the battery reaches full charge, the LED ([9]) will turn solid green (see also printed instructions provided with the charger).
4. Remove the battery from the charger when fully charged.
NOTE 1: The battery may be left on the charger for an indefinite period of time without causing any damage to the charger or the battery.
NOTE 2: If you also have a spare battery, the two batteries can be inserted onto the charger. The batteries will be charged one after the other.

Inserting the Battery



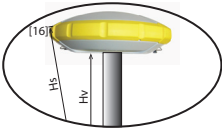
As opposed to previous receiver models, the battery trapdoor of the R4s can entirely be detached from the receiver case.


As explained below, the battery is first inserted into the inner side of the trapdoor and then inserted into the receiver case, together with the trapdoor.

- Open the battery trapdoor: Using your thumb and middle finger, press on the two locks to free and remove the trapdoor ([10]).
 - Place the trapdoor upside down on a horizontal plane, curved edge to the right. Place the battery nearby, electric contacts upward, and as shown ([11]).
 - Take the battery and insert one of its end into the trapdoor ([12]), then gently push the other end until the battery is fully inserted ([13]).
- The trapdoor is fitted with an auto-locking system ([14]) at both ends of the battery that will keep the battery firmly in position once fully inserted.
- Hold the receiver case upside down in one hand, take the battery and trapdoor in the other hand and insert them into the battery compartment ([15]). A click can be heard when the trapdoor gets locked into the receiver case.

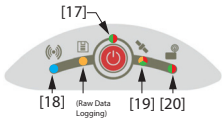
Note: To remove the battery from the trapdoor, gently push aside one of the locking legs to free that end of the battery. Then it's easy taking the battery out of the trapdoor.

Setting up the R4s



1. Mount the receiver and data collector on a range pole (rover), or a tripod (base).
2. Measure and write down the vertical (*Hv*) or slant (*Hs*) distance from the ground mark to respectively the lower part of the receiver (ARP) (rover) or to the height mark (base) (see [16]). This measurement will be required by your field software in a further step.
3. Turn on the R4s by holding  depressed for about 3 seconds. The Power LED ([17]) turns solid orange for about 15 seconds (receiver booting...), then solid green (with internal battery) or solid red (if an external power supply is used). The receiver is ready to use.
4. Meanwhile, turn on the data collector and run your field software.


Running a Survey



1. Follow the instructions provided by your field software to use the R4s as desired (rover or base). The receiver will beep, and the Bluetooth LED ([18]) will stay solid blue, when a Bluetooth connection is established with the data collector.
In a rover, the Satellites/Position LED ([19]) will stay solid green when a fixed position solution is computed. With a rover using the internal radio (option), the Radio LED ([20]) will turn green when corrections are being received.
2. Start your survey job when ready.
3. From time to time, take a look at the Power LED ([17]) on the control panel.

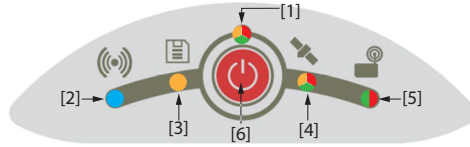
When the Power LED starts blinking green – first at a slow rate (1 sec), then at a faster rate (5 flashes a second) – that will mean the battery is too low and the receiver will soon shut down.

Ending a Survey

1. After your field survey is complete, hold  depressed for about 3 seconds. Release it when the Buzzer emits a sound. The Satellites/Position LED ([19]) starts blinking at a fast rate. The receiver will shut down after about 10 seconds.
2. Don't forget to charge the battery at the end of your day. The battery will charge overnight.

NOTE: Need to download raw data files from the receiver?
Refer to *Collecting Raw Data Files on page 24*.

R4s Control Panel Description



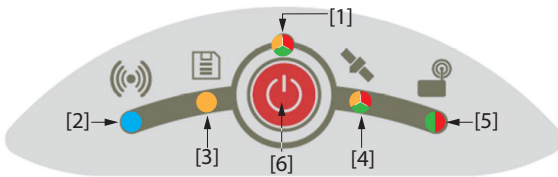
No.	Blinking Rate*	Color	Meaning
Power LED [1]	<ul style="list-style-type: none"> On Slow Fast 	●	<ul style="list-style-type: none"> Internal battery is used. Remaining charge > 20%. Internal battery is used. 10% < remaining charge < 20%. Short beep heard at 20% Internal battery is used. Remaining charge < 10%. Buzzer emits continuous sound. Only a few seconds left before R4s safely shuts down.
	<ul style="list-style-type: none"> On Fast 	●	<ul style="list-style-type: none"> External power source is used. Input voltage is within expected range. External power source is used. Input voltage is out of range. Please change the power source immediately.
	<ul style="list-style-type: none"> On 	●	<ul style="list-style-type: none"> Power-on sequence in progress.
Bluetooth LED [2]	<ul style="list-style-type: none"> Slow On <p>Base***:</p> <p>Rover***:</p>	●	<ul style="list-style-type: none"> Bluetooth is on but no connection is active yet. Bluetooth connection to communicate with a data collector is active. <p>Base:</p> <ul style="list-style-type: none"> Two Bluetooth connections are active: Long-range Bluetooth and data collector. One Bluetooth connection is active: Long-range Bluetooth (sending corrections to rover). <p>Rover:</p> <ul style="list-style-type: none"> Two Bluetooth connections are active: Long-range Bluetooth and data collector. One Bluetooth connection is active: Long-range Bluetooth (receiving corrections from base).
	<ul style="list-style-type: none"> Off On Slow Fast 	●	<ul style="list-style-type: none"> No data logging is in progress. Data is being logged to internal memory. Space available in internal memory is getting low. No more space is available in memory. End of data logging is imminent.
Sat/Pos LED [4]	<ul style="list-style-type: none"> Slow Fast 	●	<ul style="list-style-type: none"> No satellites are tracked. During a power-off sequence, starting when the buzzer emits a sound.
	<ul style="list-style-type: none"> Mixed 	●	<ul style="list-style-type: none"> Satellites are tracked but no position is available yet. Green flashes indicate the number of satellites tracked. 5 green flashes means 5 or more satellites tracked. Red flash is just a delimiter.
	<ul style="list-style-type: none"> On 	●	<ul style="list-style-type: none"> Autonomous, DGPS or SDGPS position solution is available
Radio LED [5]	<ul style="list-style-type: none"> Slow On 	●	<ul style="list-style-type: none"> Floating position solution is available. Fixed position solution is available.
	<ul style="list-style-type: none"> Off Variable 	●	<ul style="list-style-type: none"> No corrections data are received. Corrections data are being received.**
Radio LED [5]	<ul style="list-style-type: none"> Off Variable 	●	<ul style="list-style-type: none"> No corrections data are sent out. Corrections data are being sent out.**

*: All the terms used to describe blinking rates are clarified in the table on the next page.

** LED stays lit from beginning to end of data reception / transmission.

*** Does not necessarily mean corrections are being received or sent.

Blinking Rate	Description	General Meaning
Off	LED is off	Receiver or function turned off
On	LED permanently lit (solid color)	Normal operation
Slow	0.5 s (equal On/Off times)	Normal operation
Very slow	1.5 s (equal On/Off times)	Radio configuration mode (see flowchart below)
Fast	0.1 s (equal On/Off times)	Alert
Variable	LED stays lit for a certain time	Refer to radio LED; See previous page.
Mixed	Mixed colors: red and green alternate	See satellite/position LED on previous page.
ON OFF	Off but with one brief blue flash every 3 sec.	Specific to Bluetooth LED; See previous page.
ON OFF	Solid blue with one brief "off" time every 3 sec.	
ON OFF	Off but with two brief blue flashes every 3 sec.	
ON OFF	Solid blue with two brief "off" times every 3 sec.	



Power button [6] is primarily used to control receiver power:

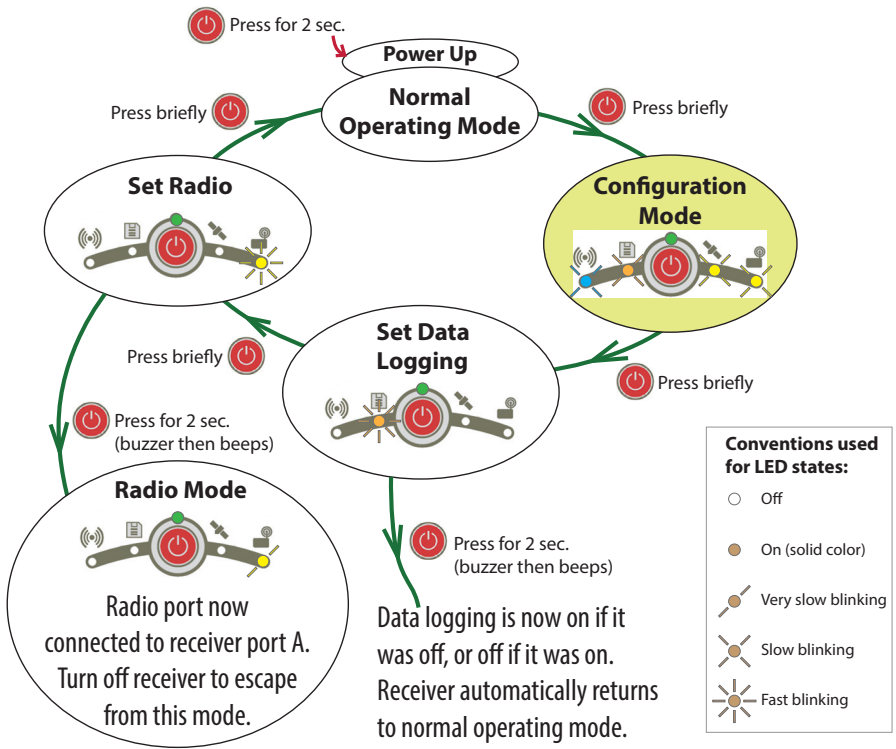
- **Turning On the Receiver:** Hold the button depressed until the Power LED turns solid orange (this takes about 2 to 3 seconds). Then release the button. This starts a power-on sequence. A few seconds later, the Power LED will turn solid green (with internal battery) or solid red (with external power supply), meaning the receiver is on and ready for use.
- **Turning Off the Receiver:** Hold the button depressed for about 2 to 3 seconds, until the buzzer emits a sound, then you *must* right away release the button. This starts a power-off sequence, with the Satellites/Position LED blinking red at a fast rate. The LED will go off a few seconds later, meaning the receiver is off.

Power button [6] is also used to reset the receiver (see *Restoring Factory Settings on page 35*) and to download raw data files to a USB key (see *Downloading Raw Data Files to a USB Key on page 24*).

Power button [6] is also used to access the two functions below. This is achieved by combining short and long presses on the button.

- **Raw Data Logging:** Enabling/disabling raw data logging.
- **Radio Configuration:** If an internal radio is used, making its port accessible through receiver port A for radio configuration (later you will need to turn off the R4s to exit this mode).

For more details on these two settings, see flowchart below.



On the flowchart, each step is identified by a particular combination of LED states. Whatever the step, normal operating mode is restored after 10 seconds of user inactivity.

NOTE: Other actions are possible from the control panel. See *Downloading Raw Data Files to a USB Key* on page 24 and *Restoring Factory Settings* on page 35.

Introducing R4s as Rover

Network Rover

The R4s has no network connectivity device of its own, but the data collector, to which it is connected over Bluetooth to run the field software, may have this capability (internal modem operated in GPRS mode, using a suitable SIM card). So network corrections received using the data collector modem will be forwarded to the R4s over Bluetooth as well. In this case of use, the R4s will be able to deliver RTK positions using one of the following standard network connection types:

- NTRIP
- Direct IP (TCP/IP Direct)

Additionally, the R4s can compute and deliver positions using one of the possible Trimble RTX corrections services, also through a network connection called “RTX”. This option is a special case of Direct IP connection where the preset corrections provider is *Trimble RTX Services*. A subscription is needed to operate the receiver in this mode.

Rover Using Local Base

The expression “local base” refers to a base you own and can fully control (operating sessions, location, etc.).

The rover can receive RTK corrections from the local base via:

- Long-range Bluetooth
- Radio (internal at the rover, internal or external at the base). See *Using the UHF Kit* on page 18.



L-Band Rover (Trimble RTX)

The R4s is L-band ready (no firmware option needed), which means it can receive corrections from a *Trimble RTX corrections service*, via an L-band geostationary satellite, provided you have subscribed to this service. With a currently valid subscription, the R4s will be able to compute and deliver positions with the announced accuracy for the chosen service, provided it is in line with the RTK option installed. For more information about Trimble RTX corrections services, refer to *Trimble RTX Corrections Services on page 4* and *Technical Specifications on page 36*.

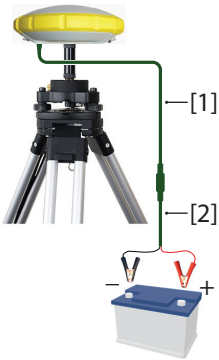
Introducing R4s as Local Base

Possible Local Base Configurations

The R4s can be used as a local base, delivering its corrections through one of the following devices:

- Long-Range Bluetooth: For baselines less than 800 meters (0.5 mile), the local base will be able to deliver its corrections to a rover over a long-range Bluetooth connection.
- UHF radio (optional accessory): The local base may be fitted with an internal radio module (internal UHF radio, 2 W TRx), or an external radio delivering more RF power. For more information on the internal radio module, see *Using the UHF Kit on page 18*.

Internal vs. External Power Source



Consider the following before setting up a local base:

- If the base is left unattended for the whole day, you may want to power it from an external power source that will provide enough power for your work day.

In this case, you may use specific cables (not provided) to connect the receiver to an external 12-Volt battery. See diagram in which [1] is cable P/N 95715 and [2] is cable P/N 83223-02.

NOTE: If you need to change the fuse on cable P/N 83223-02, please use the same type of fuse as the one originally provided (15 A @32 V). This is mandatory.

- If you intend to work close enough to the base, or someone is in charge of keeping the base running throughout the day, you may decide to power the base from its internal battery.

For a day's work, you may need two batteries: A fresh one inserted in the receiver at the beginning of the day, and the second one may be needed sometime before the end of the day.

Using the UHF Kit

The UHF kit is used to implement a radio-based, standalone RTK base/rover system (see *UHF Kit on page 3* for more details on all the items provided in this kit).

With this configuration, you have full control of your base as you can choose where and when to install and operate it.

You will need two UHF kits to implement a complete radio-based RTK base/rover system. One kit will be installed on base side, the other on rover side.

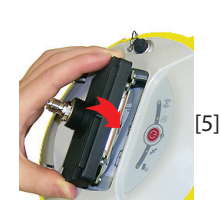
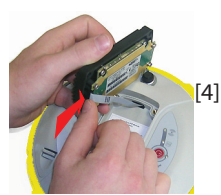
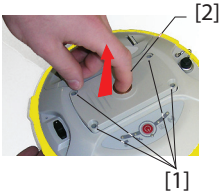
You will also need two UHF whip antennas, one at the base, one at the rover. UHF antennas may be ordered separately, or as part of specific accessories kits that you may need if you wish to install the UHF antenna used at the base on a separate pole.

Configuring your radio modules is required before you can use them. This procedure is discussed in *Configuring the UHF Module on page 20*.

Internal vs. External Power Source for a Base Using a UHF Radio Transmitter: This point has already been discussed when introducing the possible base setups. Please refer to *Internal vs. External Power Source on page 17*.

When a radio is used at the base, there is more power needed than in any other base setup. In this case, the use of an external power source (a 12 V battery) is recommended, especially if the base is operated unattended for a full day's work.

Installing the UHF Module into the Receiver



- Power off the R4s and turn it upside down.
- Use the L-shaped Torx screwdriver provided in the R4s UHF kit to loosen and remove the four screws ([1]) securing the 5/8" threaded insert plate.
- Insert a finger into the 5/8" threaded hole ([2]), then gently pull the plate out of the receiver, making sure you free the ribbon cable anchored to the plate without damaging it ([3]).
- Put away the 5/8" threaded insert plate in a safe place, possibly for subsequent use.
- Take a look at the instructions printed on the label located in the bottom of the recess.
- Connect the end of the ribbon cable (a 12-contact flat connector) to the UHF module ([4]) as instructed on the label (point 1).
- Insert the UHF module into the recess ([5]) as instructed on the label (point 2).
- Re-use the four screws and Torx screwdriver to secure the UHF module onto the receiver. Tighten the screws to preserve receiver watertightness (torque meter: 3 N.m). **IMPORTANT:** After installing (or removing) the internal radio, you must reset the receiver (through hard reset or via field software).

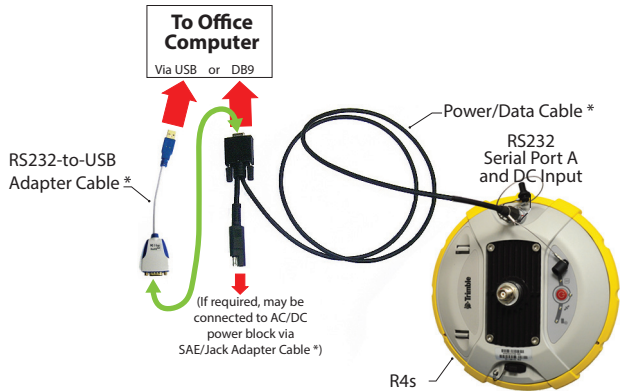
NOTE: The insertion of the UHF module DOES NOT modify the ARP (*Antenna Reference Point*) of the GNSS antenna.

Configuring the UHF Module

The standard settings of the UHF module can easily be changed from the field software.


For more advanced radio settings, use the procedure below:

- Use cable P/N59044-10-SPN from the Office Power Kit to connect the receiver to the computer (see diagram below).



*: All these items are part of the Office Power Kit P/N 94336 (option).
Use the RS232-to-USB adapter cable if your computer is fitted with USB connectors (and no DB9 connector).

NOTE: Cable P/N59044-10-SPN is a Y-shaped cable also allowing you to power the receiver from an AC outlet (via the AC/DC power block) rather than from the receiver battery (see also *Connecting R4s to your Computer on page 30*). When applied to the receiver's DC input, the external power source has priority over the internal battery, which means the battery can be left safely inside the receiver (it won't be drained).

- Make three brief presses on , then hold this button depressed for about 2 seconds until the buzzer beeps. As a result, the receiver switches to radio mode, providing direct access to the UHF module via the receiver's port A.
- Run Pacific Crest *ADLCONF* software on the computer and configure the radio to meet your requirements. Refer to *ADLCONF* instructions to complete this step.

Completing Rover Radio Setup

Once the UHF module has been secured to the receiver (see *Installing the UHF Module into the Receiver on page 19*) and properly configured, do the following:

- Screw the UHF whip antenna onto the coaxial connector of the UHF module ([6]). The antenna will therefore be oriented vertically upside down when used.

NOTE: Being placed in vertical position, the UHF antenna will stay as sensitive as if it were oriented the other way round.

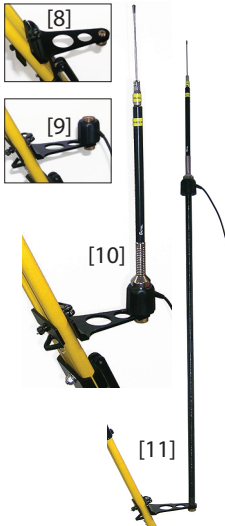
- Take the top rod of the fiberglass range pole provided in the UHF kit. Insert first its end with special tapping, not 5/8" tapping, around the UHF antenna ([7]).

CAUTION - This special tapping uses a thinner thread compared to the standard 5/8" one. For this reason, be careful when you start screwing the rod into the UHF module. Make sure the rod fits well in the threaded part of the UHF module.

- Screw the top rod onto the threaded part of the UHF module. Spin the rod, rather than the receiver, when doing this.
- The receiver + top rod assembly can then be mounted on top of the other part of the range pole (the bottom rod).
- Complete the setup of your R4s + UHF radio rover system by attaching the data collector onto the range pole. You are now ready for a survey.



Completing Base Radio Setup With External UHF Antenna



Two types of base setups are possible with an external UHF antenna:

- **The UHF antenna may be installed in vertical position on the same tripod as the base receiver.**

For this setup, you may use a PacCrest radio.

Follow the instructions below:

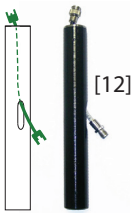
- Secure the bracket onto one of the legs of the tripod (see [8]).
- If you wish to keep GNSS reception optimum, you may keep the UHF antenna below the GNSS receiver by fastening the counterpoise of the antenna directly onto the bracket (see [9]). (The antenna counterpoise is part of, and is located at one end of the coaxial cable provided.)

Then screw the antenna support onto the counterpoise and mount the UHF antenna on top of it (see [10]).

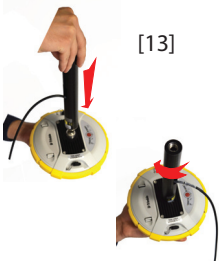
- If you prefer to optimize the radio range with this setup, raise the UHF antenna by inserting the two-element pole provided between the bracket and the antenna counterpoise (see [11]).

- **The UHF antenna may be installed on a separate tripod at some distance from the base receiver,** but still remaining compatible with the length of the coaxial cable you will be using. The UHF antenna should be installed at the highest possible height.





[12]



[13]

On receiver side, after the UHF module has been secured to the receiver and properly configured, do the following whatever your choice of antenna setup:

- Pass the male connector of the coaxial adapter cable (PN 96845) through the oblong hole of the pole extension (PN 95672) and make it go out of it at its upper end (see [12]).
- Connect it to the coaxial output of the UHF module.
- Screw the pole extension to the threaded part on the UHF module (see [13]). Spin the pole extension, rather than the receiver, taking care not to jam the coaxial cable extension when doing this.
- Secure the receiver/pole extension assembly onto the tripod.
- Connect the other end (female connector) of the coaxial cable extension to the coaxial cable coming down from the UHF antenna.
- Set up the base on the chosen reference point.

Completing Base Radio Setup With Internal UHF Antenna

The UHF antenna is connected directly to the UHF module and is hidden in the pole. The pole is installed on top of a tripod. Follow the same instructions as with a rover (see *Completing Rover Radio Setup on page 21*) to install the internal UHF antenna, but this time you will be using:




- A quarter-wave antenna.
- The pole extension with the oblong hole (from the UHF kit). You don't need to use the coaxial adapter cable.



Collecting Raw Data Files

Raw Data Logging in Standalone Mode

You can control raw data logging sessions directly from the R4s, without the need for a data collector. After turning on the receiver, do the following to enable raw data logging:

- Make a brief press on . The receiver enters the configuration mode (LEDs are all in slow blinking state).
- Make another brief press on . The data logging LED starts blinking amber at a fast rate.
- Hold  depressed for about 2-3 seconds until the buzzer emits a sound. Data logging is then started and you will see the data logging LED now solid amber. The receiver has automatically escaped from the configuration mode and is now operating in normal mode.

To stop data logging, repeat exactly the previous three steps. See also flowchart on *page 14*. This will turn off the data logging LED.

Downloading Raw Data Files to a USB Key

The first time you connect the USB port to a computer, the required driver is installed automatically on the computer. After the driver has been installed, follow the instructions below.

- Connect the USB key to a mini-USB-to-USB adapter (see picture). (This adapter is not provided.)
- Connect the other end of the adapter to the R4s. After about 2 seconds, the buzzer sounds briefly, meaning the USB key is ready for use, and the Log LED starts flashing amber at a fast rate. If you do nothing in the next 4 seconds, the Log LED will turn off and you won't be able to start the download sequence.
- So while the Log LED is still flashing, press the Power button. This causes the buzzer to sound briefly meaning the receiver is now downloading all its G-files to the USB key. The buzzer will emit another brief sound when the file transfer is complete.
- Disconnect the mini-USB-to-USB adapter from the R4s.

NOTE: This procedure will not delete the downloaded files from the receiver.



**Downloading Raw
Data Files Directly
to a Computer**

Use *R4s File Manager*. See page 30.

**Post-Processing
Raw Data Files**

This can be done using *Trimble Business Center (TBC)* software.

R4s Loader Software Utility

Use *R4s Loader* software to:

1. Upgrade the receiver firmware
2. Install new firmware options
3. Validate RTX subscription.
4. Read the warranty expiration date of a GNSS receiver.

Installing R4s Loader

The install file is an exe file which you can get for free from your local dealer. Simply double-click on this file to start installation. Follow the instructions on the screen to complete the installation.

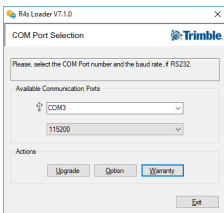
Getting Started With R4s Loader

R4s Loader will use either a serial (RS232), Bluetooth or USB connection to communicate with the receiver. USB is recommended

1. Connect your computer to the R4s using a USB connection.
2. Run R4s Loader on your computer.
3. Select the computer's port ID used to communicate with the receiver. This port ID should correspond to the computer's USB port.

NOTE: An easy way to identify which port ID on your computer is the USB port is to run R4s Loader first without the USB connection and read the list of available ports in R4s Loader. After restoring the USB connection with the receiver, check that list again. An extra port ID will then be listed, being the one assigned to the USB port. Select that port. (You don't need to define a baud rate for a USB port.)

4. To upgrade receiver firmware, install a new firmware option or validate an RTX subscription, see sub-sections below.



Upgrading Receiver Firmware

Firmware upgrades will be downloadable from the Trimble website in the form of compressed “.tar” files. The name of the “.tar” file, as well as the step-by-step upgrade procedure will be given in the accompanying *Release Note*.

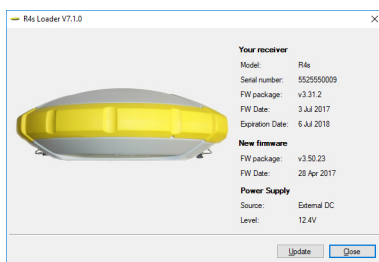
You are not allowed to upgrade a receiver if anti-theft or/and start up protection is active or if the receiver is operated with an in-progress or expired validity period.

Completing a firmware upgrade procedure will take up to 10 minutes. For this reason, it must be run with the receiver powered from either a properly charged internal battery or using an external power source.

Unless otherwise specified in the *Release Note* attached to the upgrade package, follow the instructions below to complete the upgrade of your receiver:

1. Follow the first three steps described in *Getting Started With R4s Loader* on page 26.
2. Click **Upgrade**. Wait until R4s Loader has detected the receiver.
3. Browse your computer in search of the upgrade file.
4. Select the file and click **Open**. R4s Loader then provides information on the currently installed firmware, the new firmware as well as the current state of the battery (if the internal battery is used).

This should tell you if you can run the upgrade with the battery, or rather use a fresh one or an external power supply.



5. When you are ready, click on the **Update** button.
6. Let the receiver proceed with the upgrade (a status window is displayed showing a progress bar). **Take care not to turn off the receiver while the upgrade is in progress.**
7. After successful completion of the upgrade, click **Close** to close the status window. Check that the new firmware is now installed (version and date displayed in the R4s Loader main window).
8. Click **Close** again, then **Exit** to quit R4s Loader.

Installing a Firmware Option

Before you start this procedure, make sure you have received an email from Trimble containing the POPN corresponding to the firmware option you have purchased.

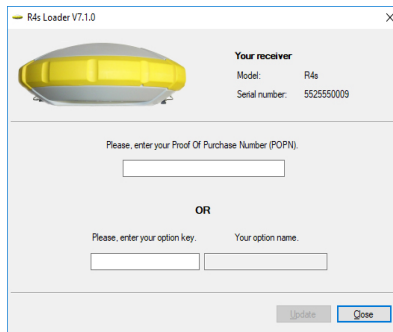
NOTE : Your computer needs an Internet connection to install a firmware option using a POPN.

With the POPN now in your possession, do the following to install a new firmware option:

- Follow the first three steps described in *Getting Started With R4s Loader* on page 26.
- Click **Option**. Wait until R4s Loader has detected the receiver.

R4s Loader then displays the serial number of your receiver and prompts you to enter the POPN.

(There is an alternate method to activate a firmware option, which is to enter the option key (provided by Trimble) corresponding to the desired firmware option, and to specify that option in the nearby field.)



- Enter the POPN and then click on **Update**. Let the receiver proceed with the installation of the firmware option (a status window is displayed showing a progress bar). **Take care not to turn off the receiver while the installation is in progress.**
- After successful completion of the installation, click **Close** to close the status window.
- Click **Close** again, then **Exit** to quit R4s Loader.

Validating RTX Subscription

After you have purchased an RTX subscription, *Trimble Positioning Services* will email you a validation code. You may purchase a subscription for working in:

- CenterPoint RTX
- FieldPoint RTX
- RangePoint RTX
- ViewPoint RTX

Use the same procedure as the one used to install a firmware option (see *Installing a Firmware Option on page 28*); the available RTX subscriptions are listed as firmware options). The only difference is that no POPN is provided for this procedure. Just enter the code provided by *Trimble Positioning Services* and specify the type of subscription you purchased before you click **Update**.

R4s File Manager Software Utility

R4s File Manager allows you to copy “log” files and G-files directly from the receiver’s internal memory to the desired folder on your office computer.

Additionally you can delete any G-file or “log” file from the receiver’s internal memory.

G-files are GNSS raw data files in proprietary format (ATOM). “Log” files are editable text files listing all the operations performed by the receiver in one day.

The install file of *R4s File Manager* is an exe file which you can get for free from your local dealer.

Installing R4s File Manager

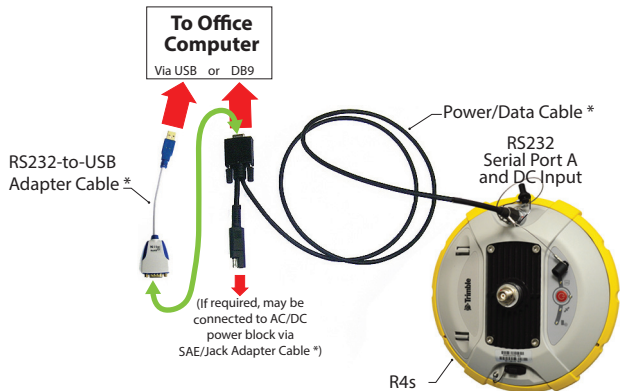
R4s File Manager is very easy to install:

- Download the exe file from the Trimble website (use above link).
- Double-click on the exe file to complete the installation.

Connecting R4s to your Computer

There are different ways of communicating with the receiver:

- **Through Bluetooth.**
- **Through an RS232 line,** using port A on the receiver, and a DB9 or USB socket, on computer side (see illustration below). The default speed for port A on receiver side is 115200 Bd.



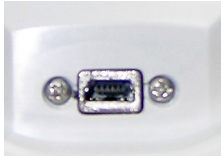
*: All these items are part of the Office Power Kit P/N 94336 (option).

The Office Power Kit required for this serial connection is designed to let you power the receiver from an AC outlet rather than from the receiver battery (see illustration above).



When applied to the receiver's DC input, the external power source has priority over the internal battery, which means the battery can be left safely inside the receiver (it won't be drained).

IMPORTANT: Be sure you align the red markings (a red dot on the connector, a red line on the socket) before pushing the Lemo connector in. Conversely, when it's time to disconnect the Lemo connector, please use the attached metal strap to pull the connector out.

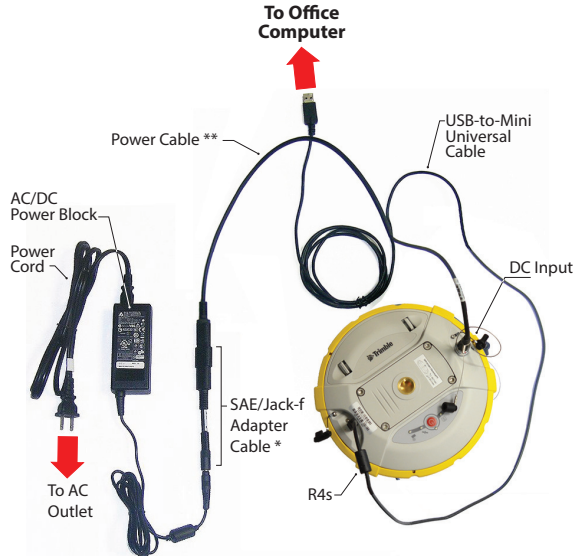


- **Through USB.** Connect the R4s to the computer via the USB-to Mini Universal cable provided.

The first time you make this connection, the required USB driver will be installed automatically on the computer to make that connection possible.

When using the receiver's USB port, you can still use the previous setup to power the receiver through its DC input (in this case, you don't need to connect the DB9 connector of the Power/Data cable to the computer).

In this setup, you can alternately replace the Power/Data cable (P/N 59044-10) from the Office Power Kit with cable P/N 95715 from the Field Power Kit (option). See diagram below.




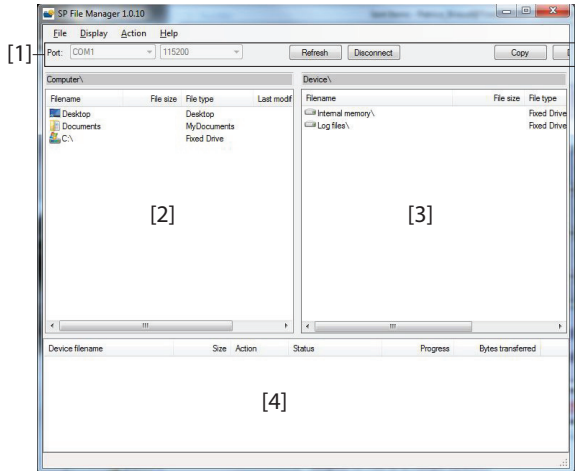
*: This item is part of the Office Power Kit P/N 94336 (option).

** : This item is part of the Field Power Kit P/N 94335 (option)

IMPORTANT: After removing the USB cable, and before going back to the field with your receiver, please place the protection lid back on the USB connector.

Getting Started With R4s File Manager

Double-click on . The *R4s File Manager* window which then appears is detailed below.



[1]: R4s File Manager toolbar. This toolbar consists of the following items:

- **Port** and baud rate scroll-down lists: Let you choose which serial port is used on computer side for the connection with the receiver (baud rate only makes sense when an RS232 serial line is used). Use 115200 Bd to communicate with R4s.
- **Connect / Refresh** button: **Connect** allows you to activate the connection between the computer and the receiver via the chosen serial line.

When the connection is established, the button is changed into **Refresh**, which allows you to update the content of the two *R4s File Manager* panes ([2] and [3] described below)

- **Disconnect** button: Allows you to deactivate the connection currently established between the computer and the receiver.
- **Copy** button: Copies the file(s) selected in pane [3] to pane [2]. In pane [2], you have to open the folder where to copy to before clicking on the **Copy** button.


NOTE: Copied files have different creation dates and times compared to those of their respective original files. The new dates and times are those corresponding to when the files were copied.

- **Delete** button: Deletes the files currently selected in pane [2] or [3].

[2]: Pane showing the content of the currently open folder on computer side.

[3]: Pane showing the content of the currently open folder on receiver side. The receiver's root folder contains two or three sub-folders:

- **Internal memory**: Lists all G-files recorded by the receiver in its internal memory
- **Log files**: Contains log files (one per day). Each log file lists all the actions performed by the receiver in one day.
- **USB key**, if one is currently connected to the receiver.

To open a folder, double-click on it. To go back to the parent folder, click on  ..

[4]: Pane showing copy/delete operations in progress, and all those completed since the connection with the receiver was established. This pane is cleared at the beginning of each new working session of *R4s File Manager*.


Establishing a Connection with the Receiver

- Set up the physical connection (RS232 or USB as explained in *Connecting R4s to your Computer on page 30*)
- Turn on the receiver.
- Launch *R4s File Manager* on your computer. This opens the *R4s File Manager* window.
- For an RS232 connection, first edit the line settings (default baud rate for receiver is 115200 Bd) then click on the **Connect** button. For a USB connection, select the right COM port (see also the Note in *Getting Started With R4s Loader on page 26*) and then click on the **Connect** button.

As a result, the pane on the right-hand side of the window lists the two or three folders that can be seen on the receiver.


Copying Files to the Office Computer

- In the right-hand side of the window, double-click on the sub-folder containing the files you want to copy to the computer.

(If needed, click on  .. to go back to the parent folder and open another sub-folder.)

- In the left-hand side of the window, browse your computer to the folder where to copy the files (recipient folder).
- In the right-hand side of the window, highlight the file(s) you want to copy.
- Click on the **Copy** button. Files are then copied, as requested. The lower part of the screen provides reports information on the copy operations in progress.

Deleting Files from the Receiver

- In the right-hand side of the window, double-click on the sub-folder containing the files you want to delete from the receiver.
(If needed, click on  to go back to the parent folder and open another sub-folder.)
- Still in the right-hand side of the window, highlight the file(s) you want to delete.
- Click on the **Delete** button. Files are then deleted. The lower part of the screen provides reports information on the delete operations in progress.

Restoring Factory Settings

This can be done starting from a powered-off receiver. Just hold down the Power button for about 10 seconds. This causes a reset procedure to be started. At the end of this procedure, all factory settings are restored, except the following, which are kept unchanged:

- Bluetooth
 - PIN code
 - Receiver's Bluetooth name
- Anti-Theft & startup protections
 - Current states (enabled or disabled)
 - Password
 - Anti-Theft position
 - Last position computed

Restoring factory settings is not allowed if one of these cases:

- Anti-theft protection is active
- Startup protection is active
- A validity period is active (whether still in progress or over). (Validity periods are designed to let users work with the receiver in a predefined configuration and for a limited period of time.)

Technical Specifications

GNSS Characteristics

- 240 GNSS channels
 - GPS L1 C/A, L1P (Y), L2P (Y), L2C
 - GLONASS L1 C/A, L2 C/A, L1P, L2P
 - QZSS L1 C/A, L2C, L1Z, L1C
 - BeiDou B1, B2, B1C
 - Galileo E1, E5b
 - SBAS L1 C/A
 - L-Band MSS
- Patented Z-Blade technology for optimal GNSS performance:
 - Full utilization of signals from all 6 GNSS systems (GPS, GLONASS, BeiDou, Galileo, QZSS and SBAS)
 - Enhanced GNSS-centric algorithm: Fully independent GNSS signal tracking and optimal data processing, including GPS-only, GLONASS-only or BeiDou-only solution (Autonomous to full RTK)
 - Fast Search engine for quick acquisition and re-acquisition of GNSS signals.
- Patented SBAS ranging for using SBAS code & carrier observations and orbits in RTK processing
- Patented Strobe™ Correlator for reduced GNSS multi-path
- Up to 10 Hz real-time raw data (code & carrier and position output)
- Supported data formats: ATOM, CMR, CMR+, RTCM 2.1, 2.3, 3.1 and 3.2 (including MSM). In rover only: CMRx and sCMRx.
- NMEA 0183 messages output

Real-Time Accuracy (RMS)

(1) (2)

SBAS (WAAS/EGNOS/MSAS/GAGAN):

- Horizontal: < 50 cm (1.64 ft)
- Vertical: < 85 cm (2.79 ft)

Real-Time DGPS Position:

- Horizontal: 25 cm (0.82 ft) + 1 ppm
- Vertical: 50 cm (1.64 ft) + 1 ppm

Real-Time Kinematic Position (RTK):

- Horizontal: 8 mm (0.026 ft) + 1 ppm

- Vertical: 15 mm (0.049 ft) + 1 ppm

Subscriptions to Trimble RTX Corrections Services Supported by R4s

(1) (2)

Service	Horizontal Accuracy (RMS)	Initialization Time	GNSS Frequencies
CenterPoint RTX	< 4 cm	< 30 min, or <5 min (*)	L1+L2
FieldPoint RTX	< 10 cm	< 15 min, or <5 min (*)	L1+L2
RangePoint RTX	< 30 cm	<5 min (**)	L1+L2
ViewPoint RTX	< 50 cm	<5 min (**)	L1

(*) First figure is without RAM available (RAM: Regional Atmospheric Model), second figure is with RAM available.

(**) With or without RAM available.

Real-Time Performance

- Instant-RTK® initialization
 - Typically 2 seconds for baselines less than 20 km
 - Reliability: up to 99.9%
- RTK initialization range: over 40 km

Post-Processing Accuracy (RMS)

(1) (2)

Static & Fast Static:

- Horizontal: 3 mm (0.118") + 0.5 ppm
- Vertical: 5 mm (0.196") + 0.5 ppm

High-precision Static (3):

- Horizontal: 3 mm (0.118") + 0.1 ppm
- Vertical: 3.5 mm (0.137") + 0.4 ppm

Data Logging Characteristics

Recording Interval: 0.1 - 999 seconds

Physical Characteristics

- Size: 21 x 21 x 7 cm (8.3 x 8.3 x 2.3")
- Weight: 0.930 kg (2.08 lb)
- User interface: Five LEDs for power, tracking, Bluetooth, data logging and radio
- I/O interface:
 - RS232 serial link
 - USB 2.0/UART and USB OTG

- Bluetooth 2.1 + EDR, long range: class 1 (19 dBm)
- Memory:
 - 256 MB internal memory NAND Flash
 - Over a month of 15 sec. raw GNSS data from 14 satellites
- Operation:
 - RTK rover & base
 - RTK network rover: VRS, FKP, MAC
 - CenterPoint RTX (IP and satellite)
 - NTRIP, Direct IP
 - Post-processing
- Environmental characteristics:
 - Operating temperature: -40° to +65°C (-40° to +149°F) (4) (7)
 - Storage temperature: -40° to +85°C (-40° to +185°F) (5)
 - Humidity: 100% condensing
 - IP67 waterproof, sealed against sand and dust
 - Drop: 2 m pole drop on concrete
 - Shocks MIL STD 810 (fig. 516.5-10)(01/2000) (8)
 - Vibrations: MIL-STD-810F (fig 514.5C-17)(01/2000) (8)
- Power characteristics:
 - Li-Ion battery, 7.4 V, 2600 mAh
 - Battery life time: 10 hrs (GNSS On, and UHF Rx Off); or 8 hrs (GNS On, UHF Rx On)
 - External DC power: 9-28 V
- Optional system Components:
 - UHF kit (410-470 MHz, 2 W, TRx)
 - Field Power Kit
 - Office Power Kit
 - Data collectors: Ranger 3, T41, MobileMapper 20, ProMark 120
 - Field Software: Trimble Access

Standard & Optional System Components

See *R4s Packout* on page 2.

Data Collectors and Software

The following options are available for use with R4s.

Data collectors:

- Ranger 3
- T41
- MobileMapper 20
- ProMark 120

Field software:

- Trimble Access

(1) Accuracy and TTFB specifications may be affected by atmospheric conditions, signal multipath, satellite geometry and corrections availability and quality.

(2) Performance values assume minimum of five satellites, following the procedures recommended in the product manual. High multipath areas, high PDOP values and periods of severe atmospheric conditions may degrade performance.

(3) Long baselines, long occupations, precise ephemeris used

(4) At very high temperatures, the UHF module should not be used in the transmitter mode.

(5) Without battery. Battery can be stored up to +70°C.

(6) Receiver convergence time varies, based on GNSS constellation health, level of multipath, and proximity to obstructions such as large trees and buildings.

(7) With the UHF module (optional kit), used as a transmitter and radiating 2 W of RF power, the operating temperature range is limited to -40° to +55°C (-40° to +131°F)

(8) 3D vibrations & shocks were tested resulting in no mechanical or GNSS performance issues detected.

A

AC/DC power block *2*
Adapters *4*
ADLCONF *20*
ARP *6, 19*

B

Battery charger *2*
Battery LEDs *11*
Battery LEDs Statuses *12*
Buzzer *8*

C

CenterPoint RTX *4, 16, 29*
Control panel *5*

D

Data collectors *39*
Direct IP *15*
Download data to USB key *24*

E

External power for a base *17*

F

Field software *39*
FieldPoint RTX *4, 29*
Firmware upgrade *27*
Flowchart *14*

G

Galileo *36*
GNSS centric *36*
GPS *36*

H

Height mark *6, 7*

I

Install firmware option *28*

L

L-Band *16*
Li-Ion battery *2, 9*
Local base *17*
Long-range Bluetooth *1, 15, 17*

N

NTRIP *15*

P

Phase center location *6, 19*
Pole extension, 15 cm *3*
Pole extension, 7 cm *2*
Power button *11*
Power cord kit *2*
Power/data cable *4*

Q

QZSS *36*

R

R4s File Manager *30, 33*
R4s File Manager (copy files) *34*
R4s File Manager (delete files) *35*
R4s Loader *26*
Radio *13, 15, 17*
Range pole, 2 m *3*
RangePoint RTX *4, 29*
Raw data logging *13*
RTX subscription *29*

S

SBAS *36*
Screwdriver *3*
Service mode *20*
Slant measurement *7, 11*
Soft bag *2*
Soft bag for range pole *3*

T

Tape measure *2, 7*
TBC *25*
Trimble CenterPoint RTX *1*
Trimble RTX *16*
Trimble RTX Corrections Services *16*
Turn on/off receiver *13*

U

UHF kit option *18*
UHF module *3*
UHF module (configuring) *20*
UHF module (installing) *19*
UHF option (base setup) *22*
UHF option (rover setup) *21*
Upgrade procedure (firmware) *27*
Upgrade receiver firmware *27*
USB key *24*
USB-to-mini universal cable *2*

V

Vertical measurement (instrument height)
11
ViewPoint RTX *4, 29*

Z

Z-Blade *1, 36*