User Manual

Version V1.0-20201208

User Manual
For Tersus RS460H Radio

2W Wireless Data Transceiver

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Revision History

Version	Revision Date	Change summary
1.0	20201208	Initial Release

1. Introduction

This chapter mainly introduces the overview and specification of the Tersus 2W Radio RS460H.

1.1   Overview

The Tersus 2W radio RS460H is a radio solution for both the base and the rover. It provides reliable data communications for mission-critical applications where a combination of stability, superior performance and long distance are required.

The RS460H is a lightweight, ruggedized UHF receiver designed for digital radio communications, which can be used widely in GNSS/RTK surveying and precise positioning system applications. The RS460H is equipped with a LED display and a keypad which is used for checking the operating status, changing the operating channel, and transmitting power level. It is easy to operate.
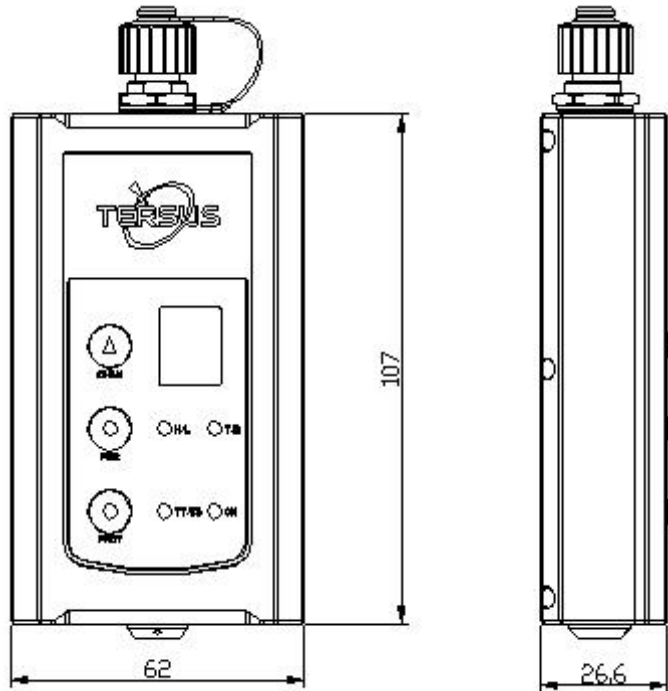

Figure 1.1 2W Radio RS460H

1.2　　Specification

Table 1 Specifications of 2W Radio RS460H

Voltage and Power		
Input voltage	DC 5 ~ 12V	
Power consumption in transmitting	6W (DC 5V, transmitting power 2W) 3.5W (DC 5V, transmitting power 0.5W)	
Power consumption in receiving	0.5W (DC 5V)	
External Antenna		
Impedance	50 ohm	
VSMR	≤ 1.5	
Interface	TNC female	
Transmitter & Receiver		
Frequency range	410MHz – 470MHz	
Channel width	12.5KHz	
Modulation type	4FSK	
Transmission power	High power (2W)	33.5 ± 0.5dBm @ DC5V
	Low power (0.5W)	27.5 ± 1.0dBm @ DC5V
Power stability	$\pm$1dB	
Sensitivity	-115dBm@BER 10^{-3}, 9600bps	
Co-channel rejection	>-12dB	
Modem		
Air baud rate	9600bps	
Serial baud rate	115200/38400/19200/9600bps	
Radio protocol	Satel	
Environment		
Temperature	-30°C - +60°C (operating)	
	-40°C - +85°C (storage)	

Mechanical	
Dimension	107 * 62 * 26.6mm
Weight	≈200g

The serial interface provides power and data communication function for radio equipment.

Figure 1.2 Serial Interface RS232
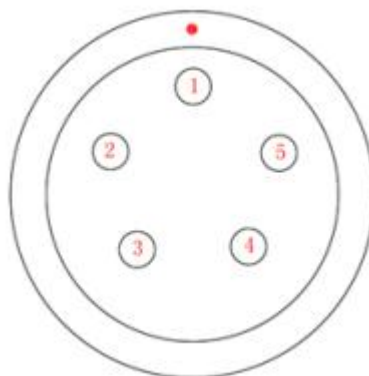
Interface Type: RS232

Each PIN is defined as follows:

Pin 1: Ground

Pin 2: Ground

Pin 3: Power

Pin 4: RXD

Pin 5: TXD

1.3 Accessories

The accessories of 2W Radio RS460H are listed below.

The 2W/460MHz radio antenna is to be installed on 2W/460MHz radio to transmit and receive radio signal.

Figure 1.3 2W/460MHz radio antenna

Figure 1.4 Serial-5pin to DC JACK and DB9 male cable

Figure 1.5 DC JACK male with two wires

Figure 1.6 DB9 Female to USB Type A Male converter cable

Note: The Serial-5pin to DC JACK and DB9 male cable, DC JACK male with two wires and DB9 Female to USB Type A Male converter cable are optional to purchase, they are not included in the package if there is no requirement from customer.

2. General Operation

⚠	Install the radio antenna before switching the radio transceiver to transmit mode, or the radio transceiver will be damaged.

2.1   Basic Operation
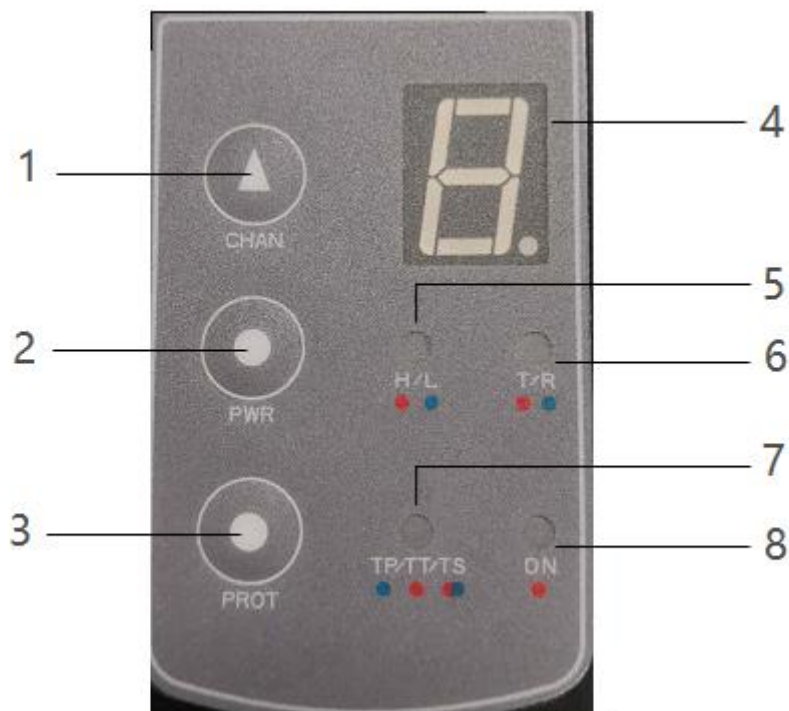
Figure 2.1 Front Panel of the Radio

Table 2 Definition for each button

Serial No.	Definition
1	Channel switching button
2	Power switching button
3	Protocol button
4	Current channel display
5	Power indicator (H/L)
6	Transceiver mode indicator

7	Protocol indicator
8	Power Supply Indicator

The basic operations include:

1) Boot up

The radio module is boot up directly when powered on.

2) Channel switching

Press the channel switching button once, the channel is increased by one; the LED displays the current channel value; the channel display is 0 to 9, and the default is 0.

3) Power switching

Press the power switching button once, the power is switched once; the power indicator is steady red to indicate high power 2W, and indicator is steady green to indicate low power 1W, and the default is high power.

4) Protocol switching

The protocol button represents SATEL

5) Transceiver mode switching

Simultaneously press and hold the channel switching button and power

switching button for 1 second to switch the transceiver mode; T is steady red for transmit mode, and red light is flashing for transmitting data; R is steady green for receive mode, and green light is flashing for receiving data; the default is the receive mode.

6) Restore default configuration

Simultaneously press and hold the power switching button and protocol switching button for 1 second to recover to the default configuration.

The LED definition is shown in the table below.

Table 3 LED Definition

LED	Description
H/L	RED: 2W output is selected, GREEN: 1W output is selected.
T/R	Blink RED: data is transmitting. Blink GREEN: data is receiving.
TP/TT/TS	SATEL protocol is selected.
ON	It is solid on after the power is on.

2.2 Software Configuration

The detailed steps of software configuration are as follows:

1) Hardware connection

Use the accessary cables listed in section 1.3 to connect the radio to the computer following the connection in the figure below. Power on the radio using 5V or 12V external power supply.
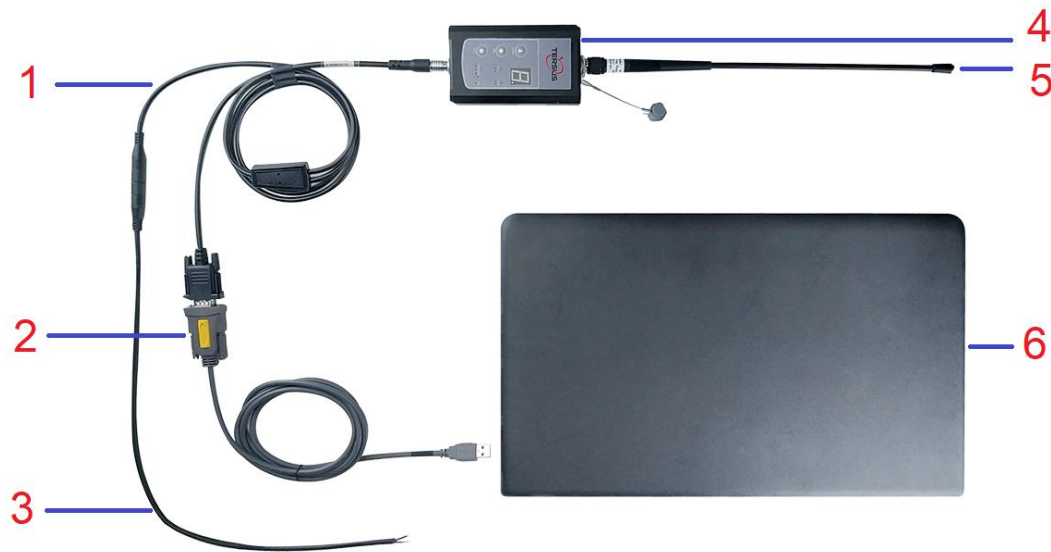
Figure 2.2 Hardware connection for software configuration

Table 4 Devices in Figure 2.2

No.	Device Name
1	Serial-5pin to DC JACK and DB9 male cable
2	DB9 Female to USB Type A Male converter cable
3	DC JACK male with two wires
4	2W Radio RS460H
5	2W/460MHz radio antenna
6	Computer(Desktop/Laptop)

2) Radio Config Tool

Open the radio configuration software 'TersusRadio Config Tool' obtained from Tersus support. Ensure the port is selected correctly, then click [Connect].

3) Read

After the connection is successful, click the [Read] button to read all the configuration information.

4) Write

After the connection is successful, click the [Write] button to write all the configuration information. (Note: SN, PN, and firmware versions are read-only and cannot be written. Other parameters can be configured according to customer needs).

5) Frequency Setting

Click the [Default] button to set all frequencies to the default values.

6) Transmode Setting

If the box before [Reset to receive when reboot] is checked, the radio will be in the receiving mode after it is rebooted. Uncheck it, the radio will be in the transmit mode after it is rebooted. Remember to click [Write] to make this configuration effective.

Note: Transmode Setting function is only available for the firmware

version V1.3.6 or later. Please upgrade radio firmware to use this function.

2.3 Firmware Upgrade

Use the accessary cables listed in section 1.3 to connect the radio to the computer following the connection in the figure below. Power on the radio using 5V or 12V external power supply.

Open the upgrade software 'TersusRadioUpdate' obtained from Tersus Support, select the corresponding port and firmware file, click [Next] and wait for the update to complete according to the progress bar.
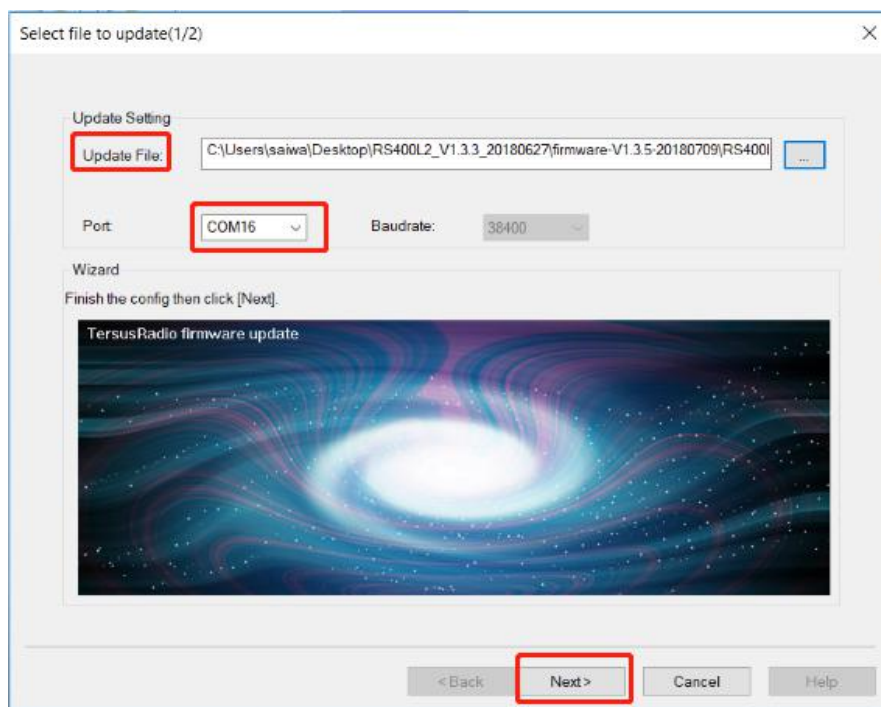
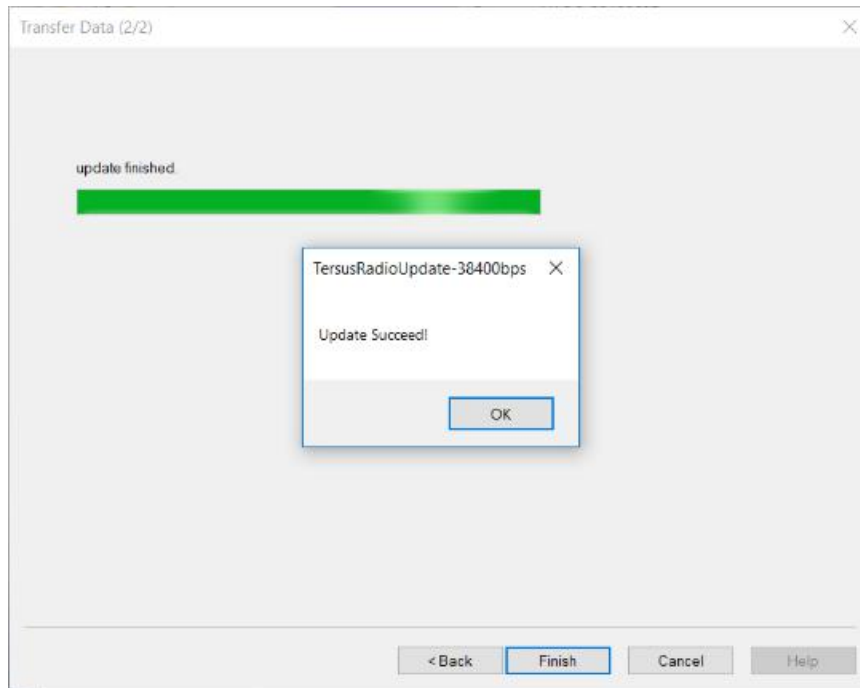Figure 2.3 Firmware upgrade interface

Figure 2.4 Update successful interface

2.4   Installation Tips

2.4.1   Radio installation

As a transmission, the radio is hooked on a tripod; as a rover station, the radio is installed in the rover station bracket.

(1) Large amount of heat would be generated when the radio is in transmission. When the radio is working, please do not place the radio in poor ventilated box, wrap or cover any item on the surface of the radio.

(2) In an environment with a high temperature of more than 40 °C or intense sunlight, the surface of the radio would be hot when it is transmitting at high power. It may cause scald if the surface of the machine is touched directly. Please pay special attention.

2.4.2 Antenna installation

Whether the antenna is properly installed and erected would seriously affect the transmission distance of the radio, hence the correct connection and installation of the antenna is of high importance.

(1) It is strictly forbidden to use a damaged antenna. The output impedance of the antenna interface of this radio is 50 ohms. Please use antennas and feeders with input impedance of 50±2 ohms and VSWR less than 1.5. Using an antenna that is not strictly matched with this radio would result in a shortened transmission distance for the radio, and it is possible to damage the radio if the mismatch is particularly serious.

(2) The original antenna of this radio is strictly matched with this radio, and the performance meets the requirements of this radio. The original antenna of this radio would better play the performance of this radio.

(3) Under normal circumstances, the height of the antenna installed from the ground would significantly increase the transmission distance and improve the transmission effect.

(4) Carefully check the connection of the antenna, feeder, connector and the components of the radio to ensure well contact and reliable connection between the antenna and the connector of the radio.

3. Terminology

DC	Direct Current
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
LED	Light Emitting Diode
SIM	Subscriber Identification Module
USB	Universal Serial BUS
VSWR	Voltage Standing Wave Ratio

Proprietary Notice

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FCC Statement:

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

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.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 35cm between the radiator and your body.

Note: 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 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.