



User Manual

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User Manual For Tersus Radio RS400H2 Wireless Data Transceiver

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Revision History

Version	Revision Date	Change summary
1.0	20200915	Initial Release

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1. Introduction

This chapter mainly introduces the overview and specification of the Tersus Radio RS400H2.

1.1 Overview

The Tersus Radio RS400H2 is a base radio solution for wireless applications. It provides reliable data communications for mission-critical applications where a combination of stability, superior performance and long range are required.

The RS400H2 provides high speed, high power, wireless data links and has been designed to survive the rigors of GNSS/RTK surveying and precise positioning applications. Up to 25W transmit power maximizes range and supports operation in difficult urban areas. The RS400H2 is equipped with LED display and keypads which are used for checking the operating status, changing the operating channel, and transmitting power level.

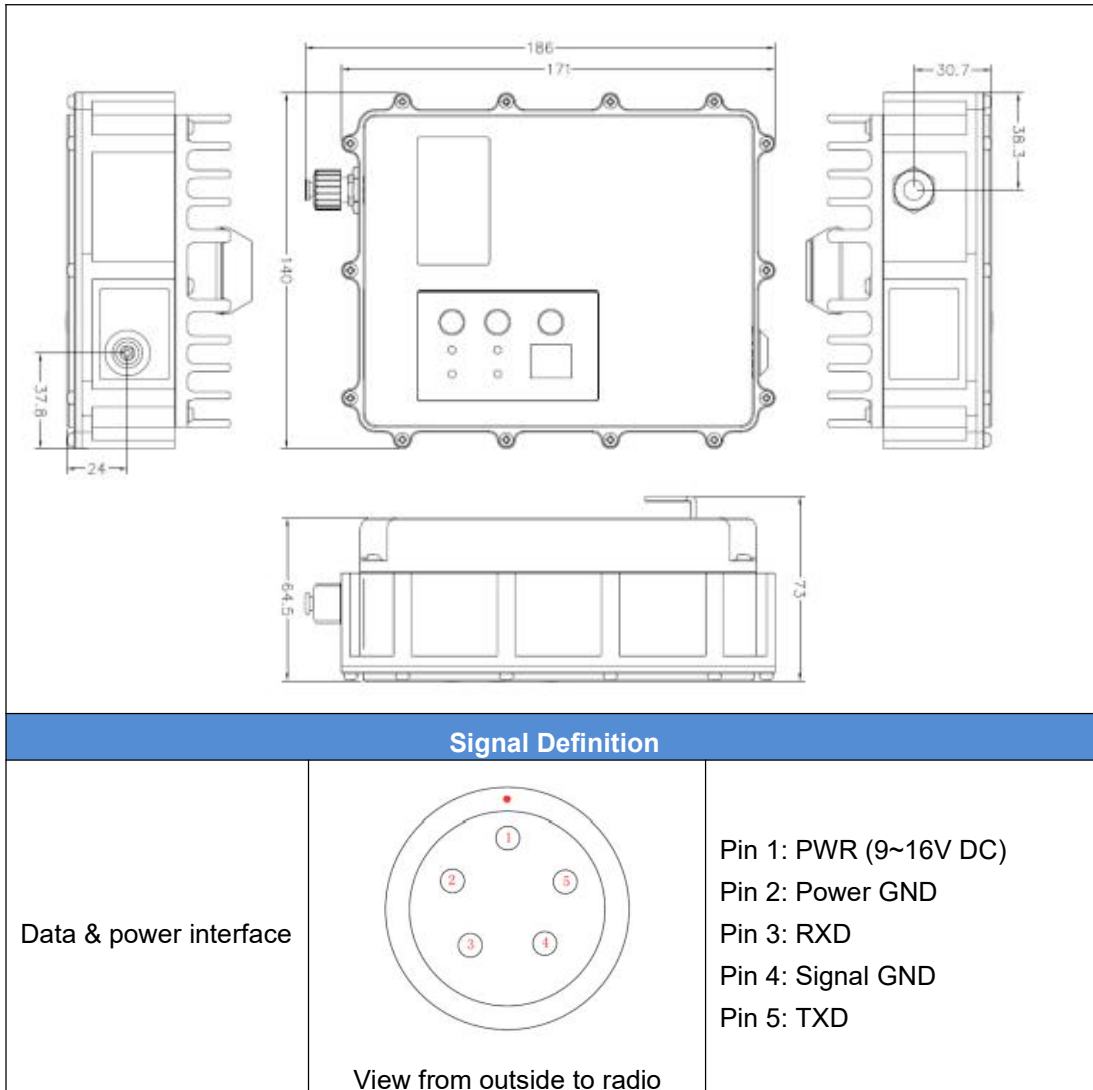


Figure 1.1 External Radio RS400H2

1.2 Specification

Table 1.1 Specifications of Radio RS400H2

General Specification		
Frequency range	410~470MHz	
Channels	8	
Operating mode	Simplex	
Channel width	25KHz, 12.5KHz	
Modulation Type	GMSK	
Operating voltage	9~16V DC	
Power consumption	High power (28W)	75W @ DC 12V
	Low power (5W)	35W @ DC 12V
	Standby	1.5W @ DC 12V
Frequency stability	$\leq \pm 1.0\text{ppm}$	
Transmitter		
RF output power	High level (28W)	$44.0 \pm 0.5\text{dBm @ DC 12V}$
	Low level (5W)	$37.5 \pm 1\text{dBm @ DC 12V}$
Power stability	$\pm 1\text{dBm}$	
Adjacent channel power	$> 50\text{dB}$	
Antenna		
Antenna Impedance	50 Ohm	
Antenna Interface	TNC female	
Modem		
Air baud rate	4800bps, 9600bps, 19200bps	
Modulation Type	GMSK	
Serial port baud rate	9600bps, 19200bps, 38400bps, 57600bps, 115200bps	
Protocol	TrimTalk450, TrimMark3, South, Transparent, Satel	
Environmental		
Temperature	Operating	$-40 \sim +65^{\circ}\text{C}$
	Storage	$-50 \sim +85^{\circ}\text{C}$
Dustproof and waterproof	IP67	
Physical Description		
Dimension	186 x 140 x 73 mm	
Weight	$< 1.5\text{kg}$	
Data & Power interface	LEMO 5pin	
Installation	Hook	
Mechanical Drawing		



The image contains technical drawings of the Tersus Radio RS400H2. The top row shows three views: a side view on the left with dimensions 37.8 and 24; a top view in the center with dimensions 186, 171, and 140; and another side view on the right with dimensions 30.7 and 38.3. The bottom row shows a front view with dimensions 64.5 and 73. Below the drawings is a blue header for a table titled "Signal Definition".

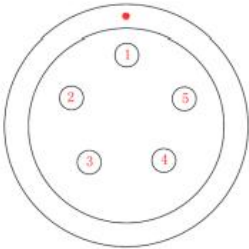
Signal Definition		
Data & power interface	 <p>View from outside to radio</p>	<p>Pin 1: PWR (9~16V DC) Pin 2: Power GND Pin 3: RXD Pin 4: Signal GND Pin 5: TXD</p>

Table 1.2 Default factory configuration for Radio RS400H2

Channel	Frequency
1	458.050MHz
2	458.550MHz
3	459.050MHz
4	459.550MHz
5	460.550MHz
6	461.550MHz
7	462.550MHz
8	463.550MHz

1.3 Accessories

When using Radio RS400H2 to set up a base with Oscar GNSS receiver, a high gain radio antenna and a telescopic pole are needed which are shown as below.



Figure 1.2 High Gain Radio Antenna



Figure 1.3 Telescopic pole for radio antenna

The following Serial-5pin to Ext-Radio-DC-5pin & Bullet-DC Cable and Bullet-DC to Alligator Clips are used to communicate with Oscar and connect to external power supply.



Figure 1.4 Serial-5pin to Ext-Radio-DC-5pin & Bullet-DC Cable



Figure 1.5 Bullet-DC to Alligator Clips

The Serial-5pin to DC JACK & DB9 Male cable and the DC JACK male with two wires below are optional. It is to power Oscar using external power source instead of the BN20 battery.



Figure 1.6 Serial-5pin to DC JACK & DB9 Male cable



Figure 1.7 DC JACK male with two wires

The DB9 Female to USB Type A Male converter cable is to convert DB9 male to USB Type A male connector, so that it can connect to the USB port of a computer.



Figure 1.8 DB9 Female to USB Type A Male converter cable

The configuration cable for external radio below is used to configure parameters of the external radio instead of the default setting.




Figure 1.9 Configuration cable for external radio

2. General Operation

2.1 Basic Operation


1) Power button



Short press the power button  to power on the radio RS400H2 and the power indicator lights on. Short press the power button to power off the radio and the power indicator lights off.


2) Transmit power button



Short press the transmit power button  to switch power between low and high. The indicator L and H will light up accordingly.

3) Channel switch button



Press the channel switch button  to switch channel from 1 to 8. The LED will show the number accordingly.

2.2 Software Configuration

The detailed steps of software configuration are as follows:

1) Hardware connection

Use the accessory 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 12V external power supply.

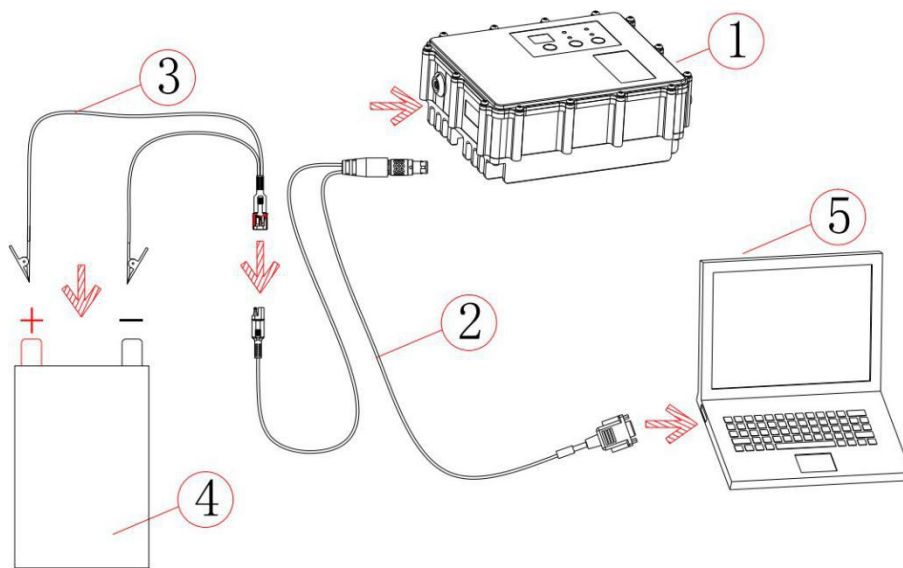


Figure 2.1 Hardware connection for software configuration

Table 2.2 Devices in Figure 2.11

No.	Device Name
1	Radio RS400H2
2	Configuration cable for external radio
3	Bullet-DC to Alligator Clips
4	12V external power supply
5	Computer (Desktop/Laptop)

2) Connect

After completing the above hardware connection, launch the radio configuration tool software, choose correct communication port and 115200 as the baud rate.

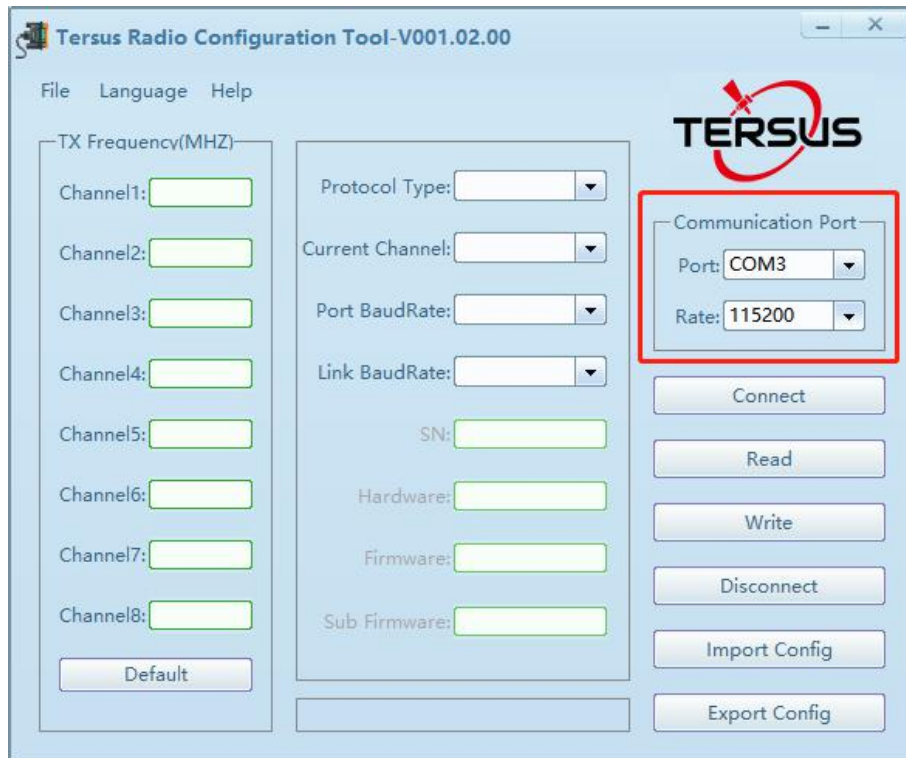


Figure 2.2 Select port and baud rate

Press the ON/OFF button, and click [Connect] on the software at the same time (delay is better no less than 1 second). If not successful, please press the ON/OFF button to turn off the radio, and repeat the above process again, until the software displays “Connect Success”.

3) Read parameters

Click [Read] to read parameters of the radio, if success it will display “Read Success” as below.

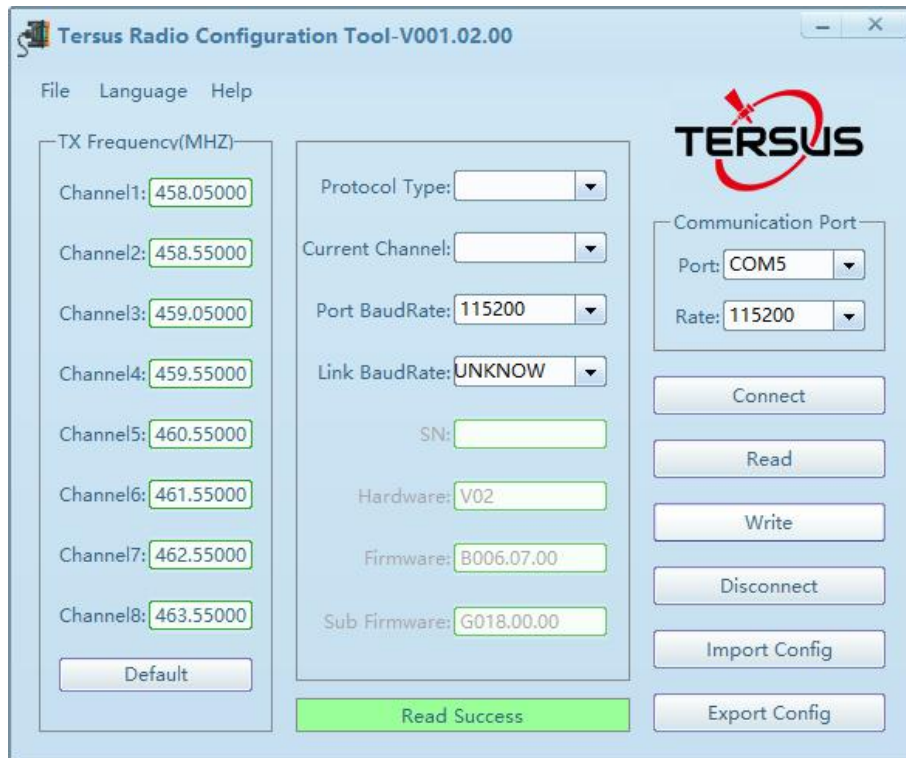


Figure 2.3 Read parameters of the radio

4) Import or modify configuration

If you have an existing configuration file which is exported previously, you can click [Import Config] to import a configuration for the radio RS400H2. If successful, it will display “Import Config Success” at the bottom.

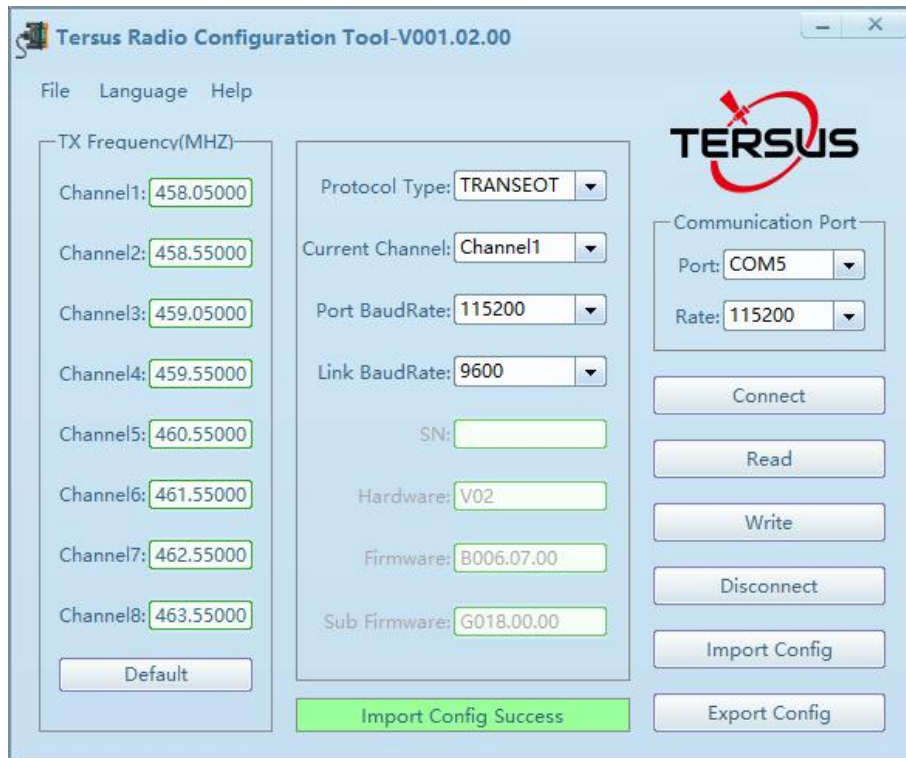


Figure 2.4 Import configurations

If you do not have an existing configuration file and need to change parameters, you can modify transmit frequencies, protocol type, current channel, serial port baud rate, and air link baud rate according to your application.

5) Write parameters

Click [Write] to write parameters to the radio, if success it will display “Write Success” as below.

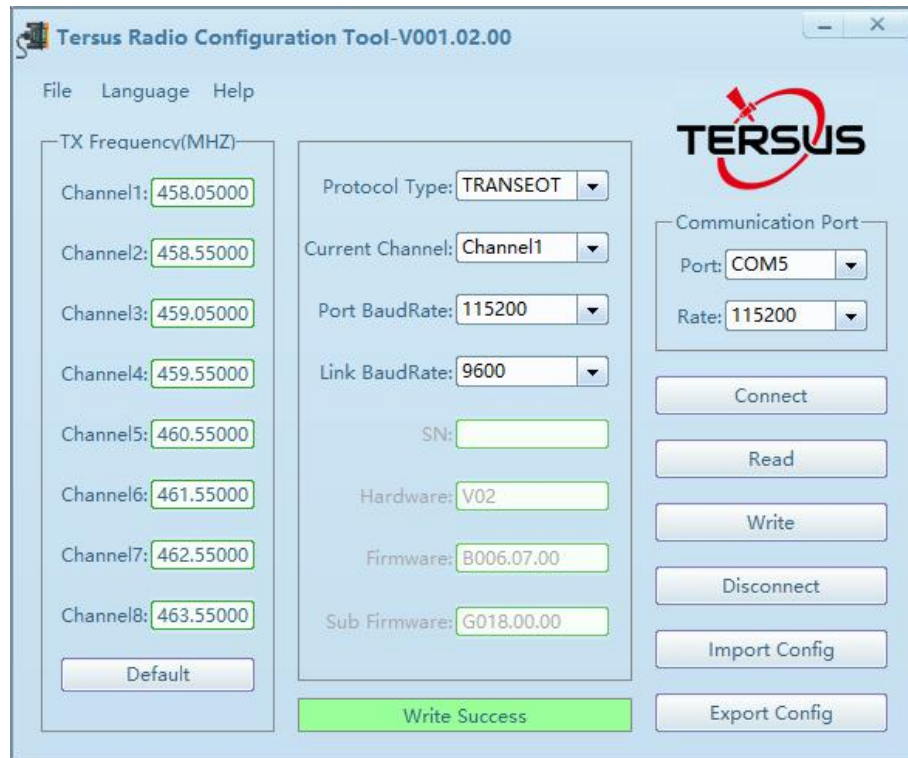


Figure 2.5 Write parameters to the radio

6) Read parameters again

Click [Read] to read parameters of the radio again to confirm the parameter configuration is successfully applied.

7) Disconnect

After the confirmation of the successful parameter configuration, click [Disconnect] to disconnect the communication between the radio and the computer. Then you can use the radio RS400H2 with the new configuration.

2.3 Installation Tips

2.3.1 Radio installation

As a transmission, the radio is hooked on a tripod.

(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.

2.3.2 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
GMSK	Gaussian Filtered Minimum Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IP	Internet Protocol
LED	Light Emitting Diode
RF	Radio Frequency
RTK	Real Time Kinematic
USB	Universal Serial BUS
VSWR	Voltage Standing Wave Ratio

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