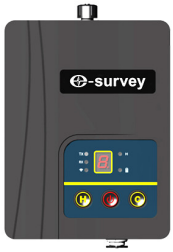

e-survey TRU35 Wireless Data Transceiver User Guide

TRU35 Wireless Data Transceiver
User Manual_V1.2

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Introduction

TRU35 is a high-power, small-size, half-duplex digital radio model which is designed using advanced 32-bit cortex M4 microcontroller technology, wireless transceiver RF technology, and digital communication technology. It uses high-quality RF components, and excellent EMC and EMI processing. The utility model has the advantages

- **High transmission power**
- **Long transmission distance**
- **Integrated transmission and reception**
- **Convenient installation**
- **Easy to use**
- **Stable and reliable**

Figure 1.1

Key features

- **All in one**
  Integrated with transmitting and receiving functions.
- **Radio Relay**
  Increase the transmitting distance by receiving data and transmitting out using different frequencies.
- **Power Protection**
  Two-stage surge protection is used to protect the radio from damage when the input voltage or current exceeds the normal range of positive and negative stages are reversed.
- **Standing Wave Detection Protection**
  Prevent damage caused by long-time open circuits or short circuits.
- **Good Heat Dissipation**
  One-piece molded case makes it easy to perform good heat dissipation.
- **Thermal Protection**
  TRU35 can adjust the transmit power adaptively, automatically reduce the power when the temperature is too high, and increase the power when the temperature decreases. Ensure radio equipment is always in a stable power range and will not be damaged by overheating.
- **IP67 Protection**
- **Bluetooth Function**
  Bluetooth can be used to configure operating mode, protocol, frequency, and power level as well as receive data and transmit it out using radio.
- **16 Channels**
  Users can switch frequencies quickly with 16 radio channels.
- **Long Transmission Distance**
  Transmission distance can reach 14Km with a high power level (Optimal conditions)

Technical Specifications

General Specifications	
Frequency Range	410~470MHz
Operating Mode	Half-duplex
Channel Spacing	12.5KHz/ 25KHz
Channels	16

Modulation	GMSK/ 4FSK	
Operating Voltage	Nominal voltage 12.5V (10.8~15V)	
Power Consumption (Typical)	Transmit (High Power)	91W
	Receive	6.5W
RF Power Stability	≤±1.0ppm	
Dimension	165×125×81mm	
Weight	1680g	
Operating Temperature	-40~+85℃	
Storage Temperature	-45~+90℃	
IP Rate	IP67	
Antenna Interface	TNC, female	
Antenna Interface Impedance	50ohm	
Data Interface	LEMO 5pin	
Transmitter Specifications		
RF Output Power	10W/ 30W (12.5V Input)	
RF Power Stability	±1.5dB	

Adjacent Channel Inhibition	>50dB
Receiver Specifications	
Sensitivity	Better than -116dBm@BER 10^{-5}, 9600bps
Co-channel Inhibition	>-12dB
Block	>70dB
Adjacent Channel Selectivity	>52dB@25KHz
Perturbation Resistance Stray	>55dB
Modulator	
Air Rate	9600bps, 19200bps
Modulation	GMSK/ 4FSK

Product Interface

LED Display

There are 5 LED indicators showing the current working status.

Indicator	**Color**	**Description**	
Voltage 	Green	**Solid green**	Power on
		Flash 1Hz	Low voltage (flash when lower than 11.3V, stop transmitting when lower than 10.5V)
		Flash	Stop working when the temperature is higher than 90℃
High Power 	Green	**On**	Transmitting with high power (30w)
		Off	Transmitting with low power (5W)
Transmitting 	Green	**Off**	Default
		Flash	With transmitting data frequency

Receiving 	Green	**Off**	Default
		Flash	With receiving data frequency
Bluetooth 	Blue	**Solid blue**	With connection
		Flash	Transmitting data
		Off	No connection

Buttons

Users can switch power, channel number, and power on/off devices with buttons.

Buttons	**Function**
Switch low/high power 	Switch transmitting power to low/high level
Power on/off 	Power on/off
Switch channel 	Switch channel (Can only switch TX channel. Need to use software to switch RX channel)

Channel Display

The panel shows the current transmitting channel.

Display	Function
	Show current channel number: 1~9~0: Channel 1~10 a~f: Channel 11~16

Connection Port

There are two ports on TRU35 for the external antenna and power/serial.

Figure 5.1 Radio Antenna Port

Figure 5.2 Power/Serial Port

Port	Function
Radio antenna	TNC, connect to the external radio antenna
Power/Serial	Provide power and connect to 5pin/DB9 serial port

Definition of 5-Pin

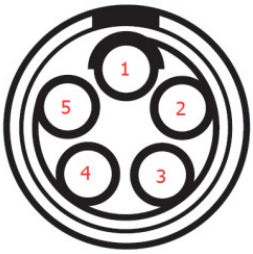


Figure 5.3

5-pin Definition	
Pin No.	**Definition**
1	VCC, 5.5-16V
2	GND
3	RXD
4	GND
5	TXD

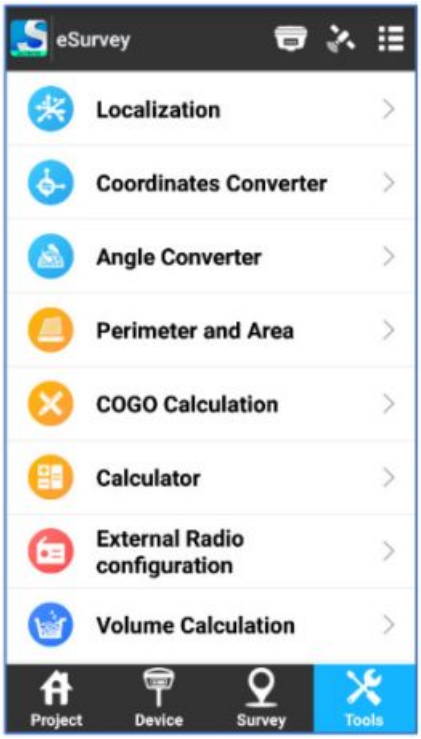
Serial port baud rate setting	9600~25600
Data bits	8
Stop bit	1
Check bit	None

Configuration

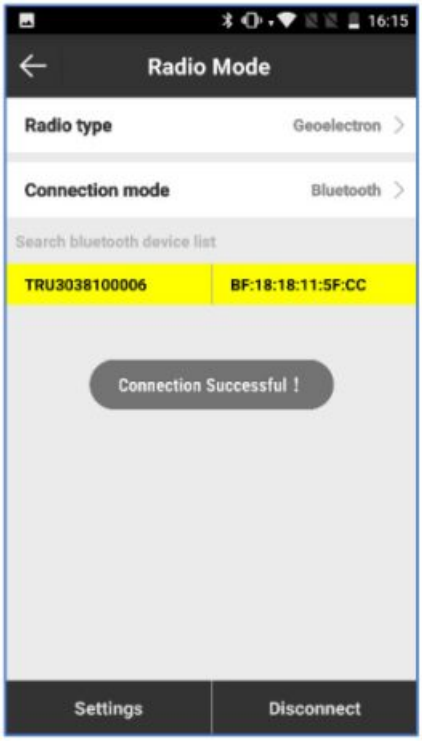
The configuration software has been integrated into SurPad4.0 data collection software.

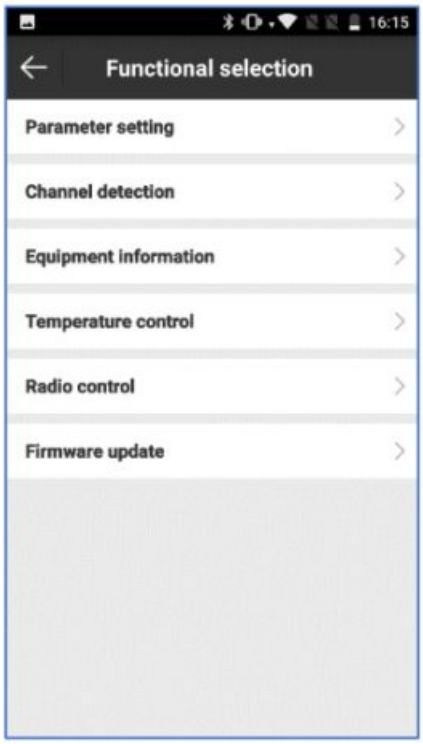
Connect TRU35

➢ Start SurPad4.0 software, then find Tools -> External Radio Configuration



➢ “Radio type” choose “Geoelectron”, “Connection mode” choose “Bluetooth”
➢ Then click “Search” to search the device. You will see the radio serial number in the list
➢ Select the device and click [Connect], the Bluetooth indicator will turn blue
➢ Click “Settings” to show the setting page



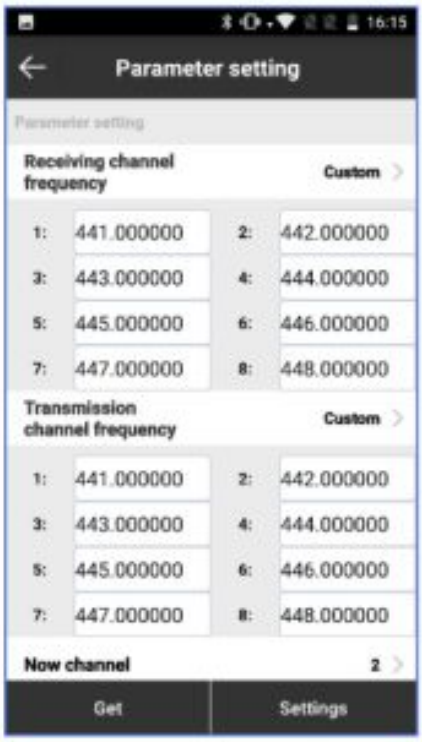


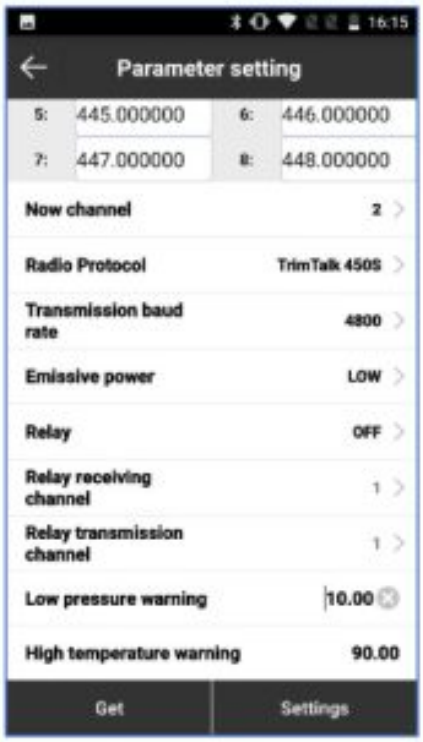
Note:

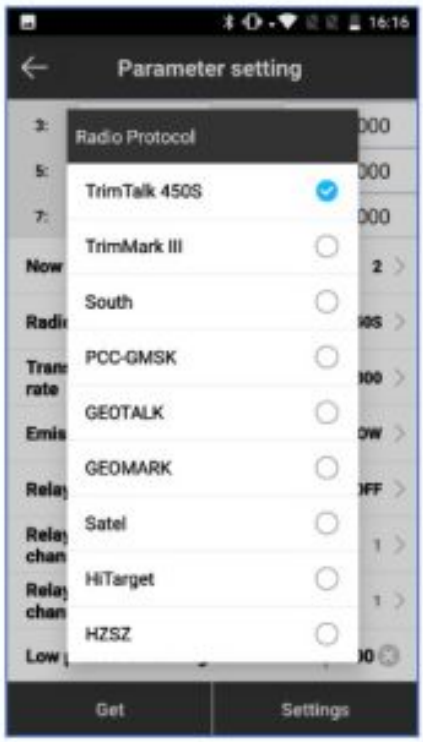
1. Disconnect the GPS receiver before you connect the external radio
2. The first time to connect, it will ask to input pair code: 1234

Parameter Setting

On this page, you can set channels frequency, radio protocol, baud rate, relay function, and alert for low power level/high temperature.







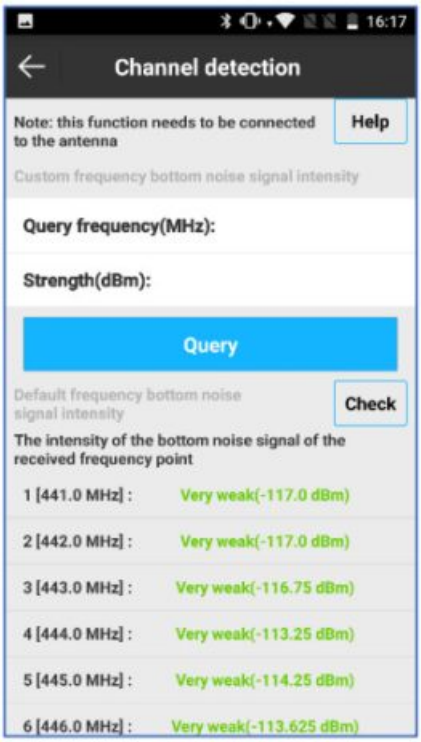
Note:

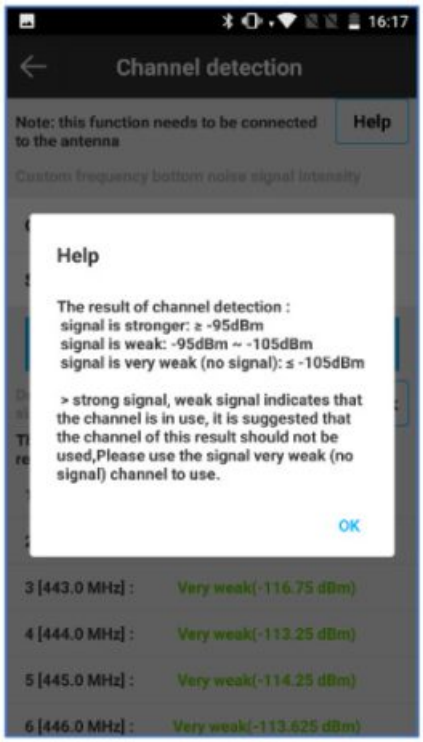
1. The frequency must be supported by an external radio antenna.
2. When the relay function is enabled, receiving channel should be the same as the Base, transmitting channel should be the same as Rover.
3. When the relay function is enabled, the radio protocol should be the same.
4. When the relay function is enabled, receiving and transmitting frequency can't be the same.
5. Low-pressure alert is set to 10.5v by default. When lower than 11.3v, the power indicator will flash but still can transmit data. When lower than 10.5v, the power indicator keeps flashing and stops transmitting data.
6. The high-temperature warning is set to 90℃ by default. The power indicator will flash and stop transmitting data when higher than 90℃.

Channel Detect

On this page, you can detect the strength of predefined/customized frequency.
Note:

1. The external radio antenna is required for this function.
2. If the detected frequency strength is strong, that means some other people may be using this frequency.





Equipment Information

On this page, you can view device information like current temperature and power level.

Temperature Control

On this page, you can set the temperature threshold and power gain. For example, in the below picture, the first level threshold is set to 60°C, and the second-level threshold is set to 85°C. When the temperature achieves the threshold, it will reduce the transmitting power automatically. The level to reduce power is depending on the gain value. The absolute value of gain is higher, the more power level will be reduced.
Note:

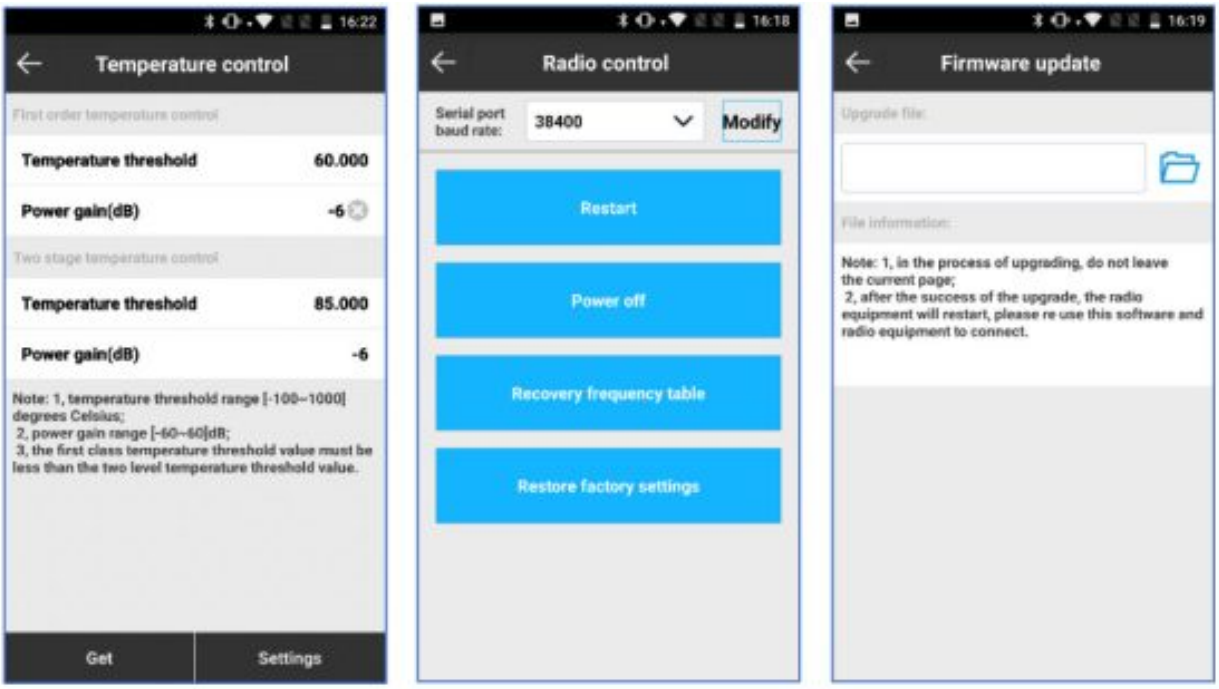
1. Temperature range: -100~1000℃
2. Gain range: -60~60℃
3. The first level's temperature must be lower than the second level.

Radio Control

On this page, you can set the radio baud rate, restart or power off the device and restore the factory setting.

Firmware Update

On this page, you can update radio firmware. In the process of updating, the power indicator will flash with a 5Hz frequency. After finished, the device will restart automatically.



Working Mode

TRU35 have two kinds of working mode: Working with the base station and being used as external radio to transmit correction data; or used as relayed radio to receive correction data, then transmit the data with another frequency.

Serial Mode

To connect the GPS receiver with a serial cable, then set the receiver as external radio mode. After finished, The TX indicator will flash.

Note:

1. The baud rate should be the same with TRU35 when configurate GPS receiver
2. The default baud rate is 38400

Bluetooth Mode

TRU35 support transmitting data without a serial cable. Firstly, log into GPS receiver WebUI. Then set the working

mode as Bluetooth, search the radio serial number and save the setting.
After finished, the Bluetooth indicator and TX indicator will flash which means the radio is receiving data through Bluetooth and transmitting it out with radiofrequency.

Documents / Resources

	e-survey TRU35 Wireless Data Transceiver [pdf] User Guide TRU35, Wireless Data Transceiver