

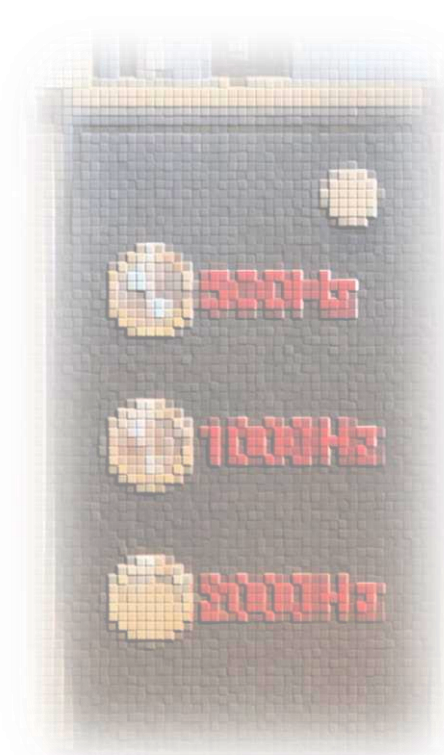
# USERS MANUAL

PZB REMOTE TESTING UNIT



## CONTENTS

1. Function and Construction of the Units .....	2
1.1 Transmitter .....	2
1.2 Receiver .....	3
1.3 Changing of Batteries / Charging the Battery .....	4
1.4 Function of the PZB Remote Testing Unit.....	5
1.5 Transmitter LED Status .....	6
2. Using the Remote Testing Unit for LZB80/PZB90.....	7
2.1 Turning on and testing .....	7
2.2 Connecting the Receiver.....	7
2.3 Testing LZB80 PZB .....	7
3 Using the Remote Testing Unit for EBICAB.....	8
3.1 Turning on and testing .....	8
3.2 Connecting the Receiver.....	8
3.3 Connecting the Transmitter and testing with the HDF-Tool .....	9
4 Miscellaneous .....	10
4.1 Disposal of Batteries.....	10
4.2 Disposal of Units .....	10
4.3 Manufacturers Notice .....	10



## 1. FUNCTION AND CONSTRUCTION OF THE UNITS

### 1.1 TRANSMITTER

The Transmitter consists of a plastic body with three buttons, an LED, an ON/OFF switch, and an external port. The Transmitter has an NFC-Tag which contains a link to the manual and data for identification. Transmitter and Receiver can't be changed between pairs. The pairs can be determined via the serial numbers for example Transmitter A001 belongs to Receiver A001. The Serial Number on the Transmitter is in the battery cover.

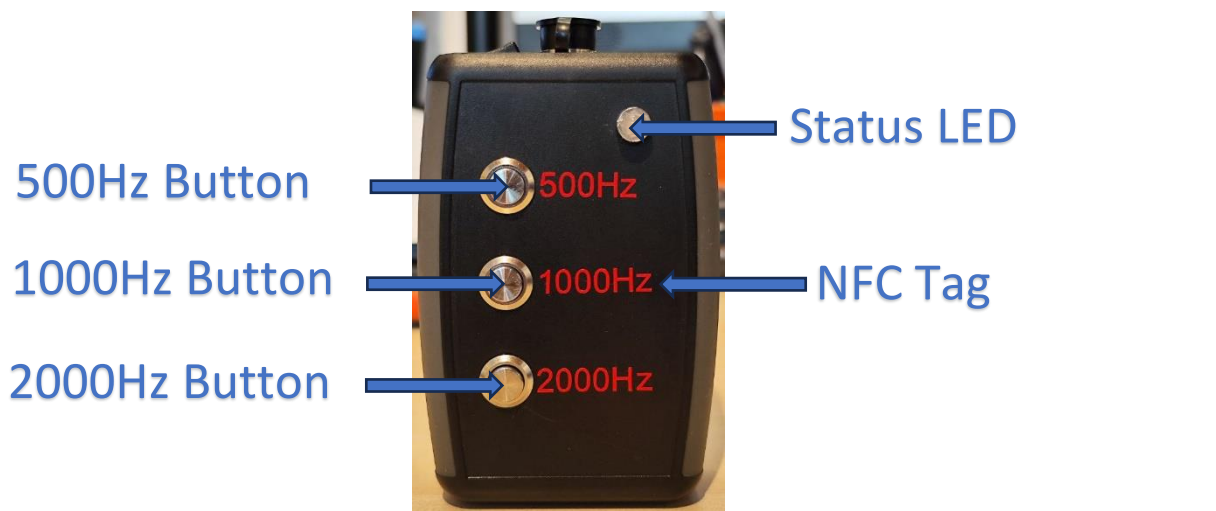


Illustration 1 Transmitter Front view

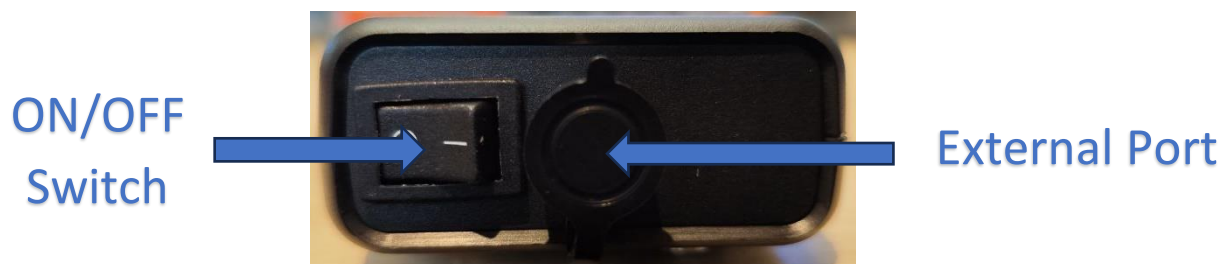


Illustration 2 Transmitter Top view

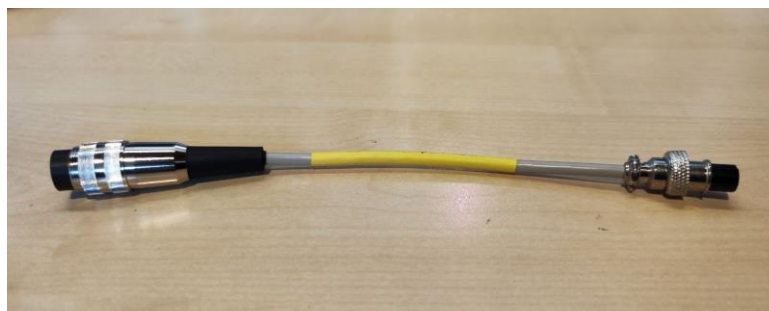


Illustration 3 HDF-Tool Adapter Cable

## 1.2 RECEIVER

The Receiver consists of a plastic case, a cable, a battery indicator, a USB-C port, and an ON/OFF switch. The Receiver has an NFC-Tag which contains a link to the manual and data for identification. The serial number of the Receiver is on the underside of the case. If the sticker is no longer readable or goes missing the serial number must be read from the NFC-Tag via a suitable NFC-App.



Illustration 4 Cable with Connector

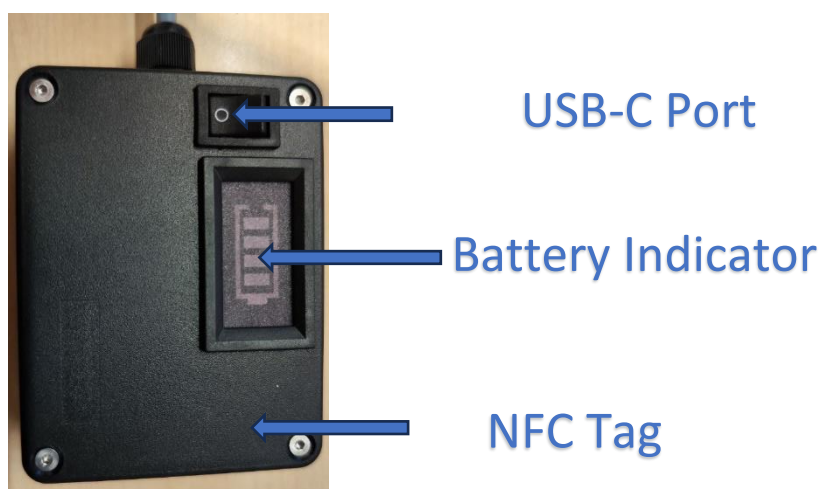


Illustration 5 Receiver Front view

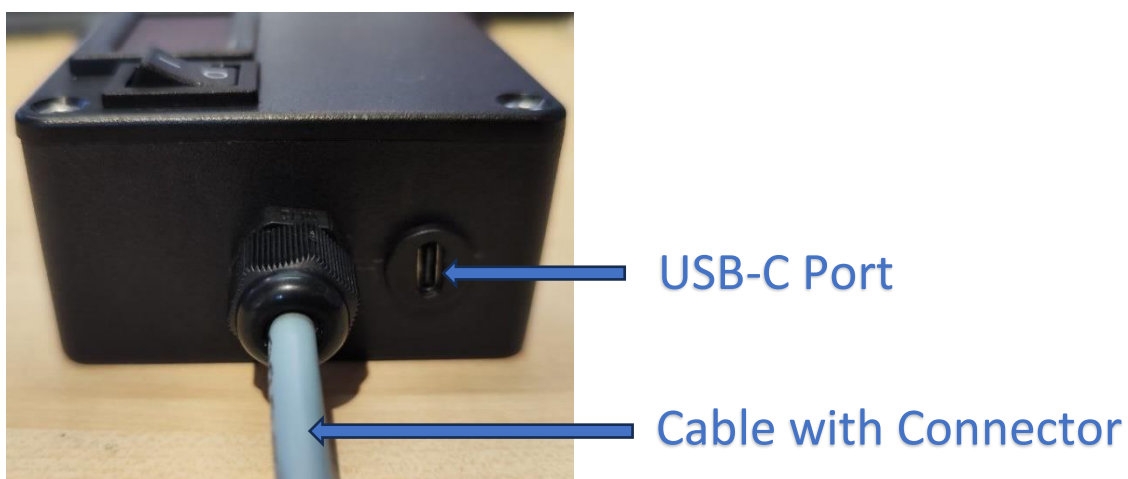


Illustration 6 Receiver Side view

### 1.3 CHANGING OF BATTERIES / CHARGING THE BATTERY

The Transmitter contains a 9V battery which is accessible via the battery cover on the underside of the Transmitter. The battery can be changed by a technician with any 9V battery when the LED starts getting dim or the connection between the units becomes unstable.

Battery Cover with  
Serial Number



Illustration 7 Transmitter Rear view

The Receiver contains a built-in battery with a capacity of 2500mAh and a nominal voltage of 3.6V which can be charged via the USB-C port on the side.



ON/OFF  
Switch

USB-C Port

Illustration 8 Receiver Sideview

**Please notice that the Battery is only being charged if  
the ON/OFF switch is turned to ON!**

The Receiver does not need any special charger any USB Charger with 5V output will do.

#### 1.4 FUNCTION OF THE PZB REMOTE TESTING UNIT

The Remote Testing Unit consists of the above-mentioned Transmitter and Receiver both contain a ESP32 Microprocessor with built-in Wi-Fi and Bluetooth.

The connection between the Transmitter and Receiver is done via Wi-Fi for this to work the Transmitter has to know the MAC Address of the Receiver this is why different pairs can't talk to each other because the MAC Address is hardcoded into the Transmitter.



All the code for the microprocessor is written inside the Arduino IDE and the library used for the communication is called ESP-NOW which allows easy communication over Wi-Fi.

When a button on the Transmitter is pressed the corresponding relay in the Receiver gets activated and closes the circuit inside the test magnet.

This means when you press the 500Hz button the 500Hz circuit gets closed and the train safety system gets influenced and acts accordingly.

**The Transmitter can be used as a wireless remote for the test magnet instead of the wired remote or it can be used as a Wi-Fi bridge when using the adapter cable for the HDF-Tool.**

## 1.5 TRANSMITTER LED STATUS

The built-in LED of the Transmitter shows the status of the Transmitter this helps troubleshooting if something is wrong.

The LED shows a continuous red when the microcontroller was not able to establish a connection to the built-in Wi-Fi chip. This can be a fatal problem which needs repairing.

The LED shows a continuous green when the microcontroller is ready so receive inputs this is the default after turning on the transmitter.

The LED shows a short flash of red after pressing a button when the receiver was not able to be reached, either turn on the receiver or turn it off and on again and try again.

The LED shows a short flash of blue after pressing a button when the receiver received a signal this is the default behaviour for button inputs when the receiver is turned on.



## 2. USING THE REMOTE TESTING UNIT FOR LZB80/PZB90

### 2.1 TURNING ON AND TESTING

To ensure that both units have a connection go on as follows.

1. Turn on the Receiver
2. Turn on the Transmitter
3. Wait for 10 seconds
4. Push the 500Hz button (The Receiver clicks audible)
5. Push the 1000Hz button (The Receiver clicks audible)
6. Push the 2000Hz button (The Receiver clicks audible)

If the test was successful go to the next step which shows how to connect the Receiver

### 2.2 CONNECTING THE RECEIVER

After a successful test the Receiver can be connected to the Test magnet which must be positioned under the train borne antenna which will be tested.



Illustration 9 Receiver connected to the test magnet

### 2.3 TESTING LZB80 PZB

After the Receiver and Test magnet have been placed under the antenna, which is about to be tested, follow the steps in the manual for LZB inspections. The buttons test the circuits as follows:

- 500Hz – tests the 500Hz functionality
- 1000Hz – tests the 1000Hz functionality
- 2000Hz – tests the 2000Hz functionality

In case that the writing on the Transmitter comes off please refer to the pictures above or follow the list above which shows the order of the functions in the right order when the LED is in the upper right corner of the sender while looking at it.



### 3 USING THE REMOTE TESTING UNIT FOR EBICAB

The Transmitter has an external port which can be used for the EBICAB HDF-Tool



Illustration 10 External Port



Illustration 11 Adapter Cable

Using this method, the HDF-Tool is connected to the Transmitter via an Adapter Cable, the signal from the HDF-Tool gets picked up by the Transmitter and is wirelessly transmitted to the Receiver.

#### 3.1 TURNING ON AND TESTING

To ensure that both units have a connection go on as follows.

1. Turn on the Receiver
2. Turn on the Transmitter
3. Wait for 10 seconds
4. Push the 500Hz button (The Receiver clicks audibly)
5. Push the 1000Hz button (The Receiver clicks audibly)
6. Push the 2000Hz button (The Receiver clicks audibly)

If the test was successful go to the next step which shows how to connect the Receiver

#### 3.2 CONNECTING THE RECEIVER

After a successful test the Receiver can be connected to the Test magnet which must be positioned under the train borne antenna which will be tested.



Illustration 12 Receiver connected to the Test Magnet

### 3.3 CONNECTING THE TRANSMITTER AND TESTING WITH THE HDF-TOOL

Connect the Transmitter to the HDF-Tool, the signals from the HDF-Tool get transmitted wirelessly and the HDF-Tool does not need a direct connection to the test magnet anymore.

Go on with the inspection of the EBICAB like you would normally do.

When everything is done turn off the Transmitter, Receiver and disconnect the adapter cable and store them safely.



Illustration 13 Transmitter connected to the HDF-Tool



Illustration 1 Transmitter with Adapter Cable

## 4 MISCELLANEOUS

### 4.1 DISPOSAL OF BATTERIES

Please dispose of batteries at battery drop offs at stores or recycling depots.

### 4.2 DISPOSAL OF UNITS

When a unit gets broken beyond repair, please remove the internal battery from the Transmitter and Receiver and dispose the batteries according to **4.1** and recycle the units at a recycling depot.

### 4.3 MANUFACTURERS NOTICE

The here listed devices were invented, planned, and manufactured by Fabian Witzel.

The unlawful and unlicensed copying of the devices is not allowed.