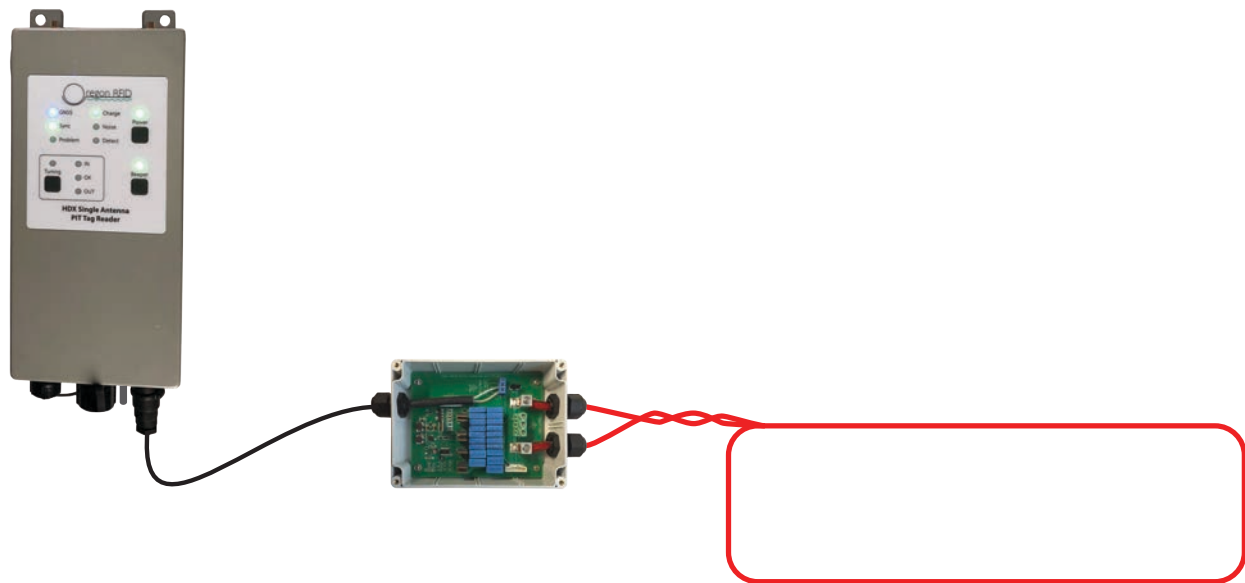


# HDX Autotuner User Guide



# Introduction

The Autotuner automatically tunes HDX antennas with our ORSR Single Antenna reader and ORMR Multiple Antenna reader. Capacitors are used to tune an antenna to 134.2 kHz, the international standard frequency for animal tracking.

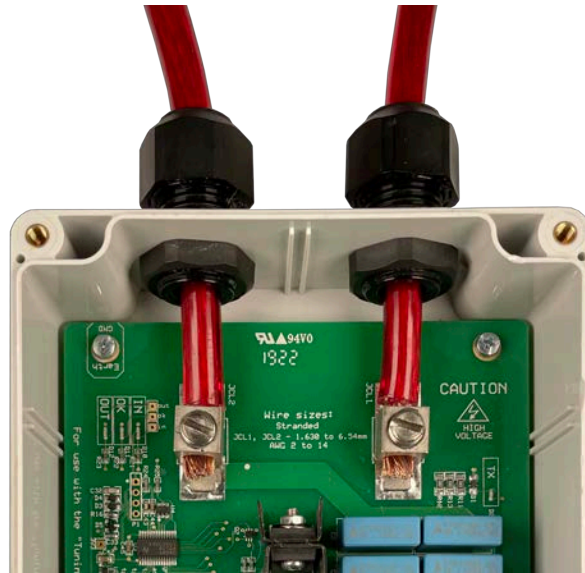


The AutoTuner has individual capacitors that are connected in 512 combinations to produce a capacitance range from 11 to 85 microFarads. This corresponds to an inductance range from 11 to 135 microHenries. Twinax adds a small amount of capacitance per meter which decreases the inductance range a little depending on the cable length.

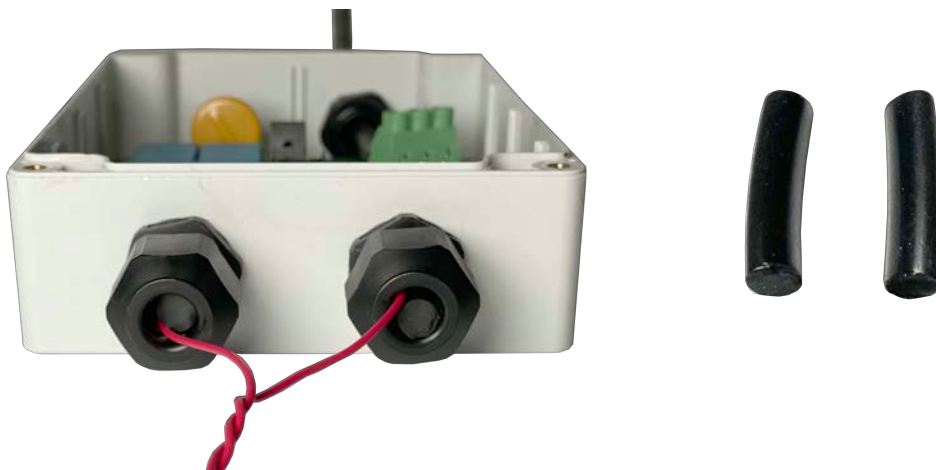
It's best to use antennas that have an inductance away from the high and low values for dependable operation. The inductance can change if the loop shape is altered, requiring retuning. The autotuner can only tune if the inductance stays within range.

# Wiring the Antenna

The antenna cables are attached to two large terminals. Pass them through the grip holes, then tighten to make a watertight seal. Besides blocking water, a tight grip prevents the wire from twisting and breaking off.



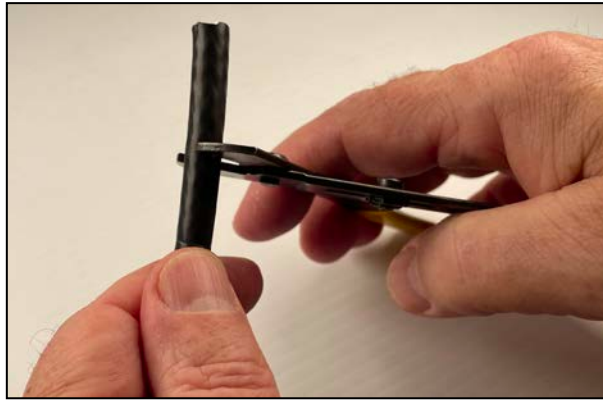
If the wires are too thin and the grips cannot seal, short pieces of rubber cord can be used to fill the gap.



## Attaching the Twinax Cable

Twinax cable connects the Autotuner to the reader. It supplies power for the antenna to resonate. The cable can be up to 130 meters long.

Strip 1.25" x 3 cm of the outer insulation to expose the shield.



Separate the shield from the two inner wires and trim 0.375" / 1 cm from the ends.



## Attaching the Twinax Cable

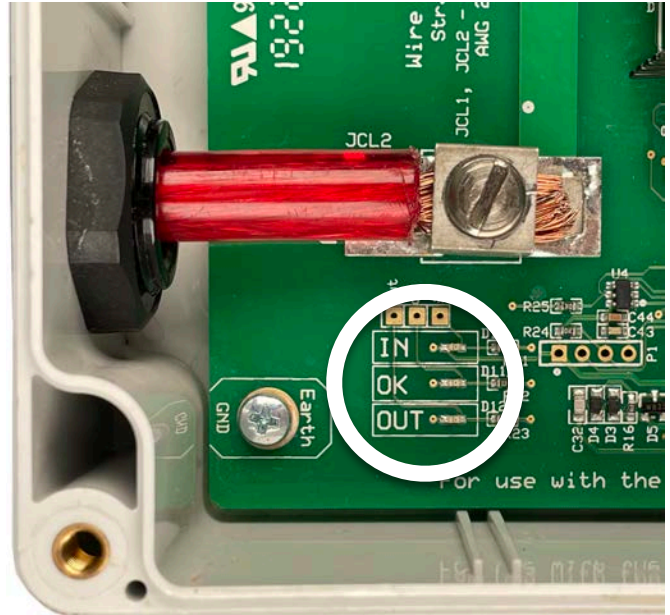
Pass the twinax through the grip and tighten. Attach the wires to the terminals marked RFM1 and RFM2 on the circuit board. The polarity is not significant; it doesn't matter which wire is connected to RFM1 or RFM2.

The twinax shield can be connected to the third terminal if the system will be in a noisy environment.

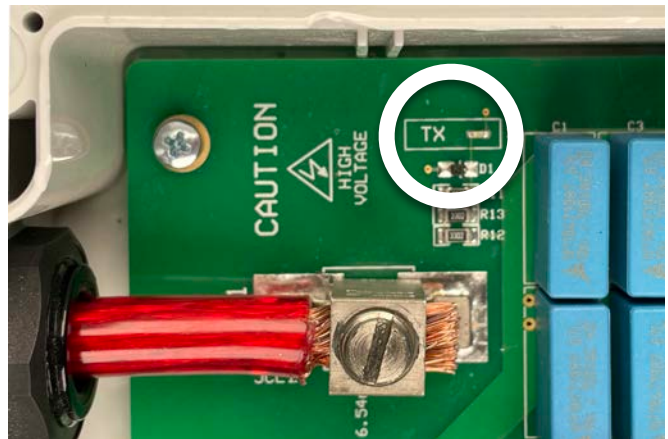


# LED Indicators

The IN/OK/OUT LEDs will flash as the capacitor values are adjusted. When tuning is finished all three LEDs will flash a couple of times.

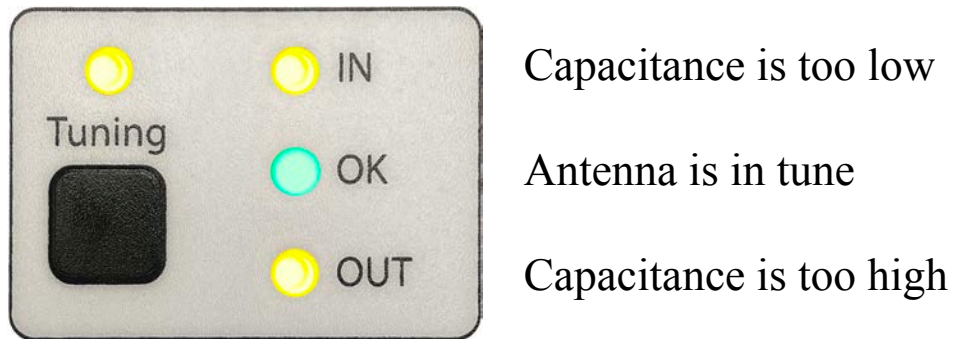


The TX LED indicates there is power on the antenna. It will flash when the charge pulse is on and scanning for tags. The brightness will change while tuning, getting brighter as it gets closer to 134.2 kHz.



## Tuning with the Pushbutton

While tuning, there are 3 LED that indicate the status as it adjusts the capacitor value:



If the tuning only shows IN or OUT, the antenna inductance is out of the range of the capacitors. An inductance meter can be used to measure the antenna inductance to verify this.

If the antenna is broken or has been disconnected, the tuning will also stay on IN or OUT. An inductance meter in this case can show that this is the cause.



# Tuning with Console Command

Press the Tune button or use the TU command.

If the command is used, when the tuning is complete it will show the antenna inductance, capacitance of the autotuner, the antenna voltage and current.

```
HSG*> TU
I..
Tuned: 2023-01-14 09:42:30
28.4 uH, 49.5 nF, 107 V, 3.1 A
```

## Antenna Analysis

The Autotuner is also used to analyze the antenna by measuring the antenna Q and the antenna Effective Series Resistance of the antenna at the operating frequency.

```
HSG*> MQ
This will take 60 to 80 seconds
Are you sure? (Y/N) Y
.....
.....
.....
.....
.....
.....
.....
.....
.....
Q measurement: 2023-01-14 09:45:07
Q 74.6
R 316 milliohms
```

When measuring Q, the antenna voltage for each of the 512 capacitance steps is saved. The values can be displayed with the SM command and can be plotted in a spreadsheet or using our Android app to see the Q curve.

## **Periodic Autotuning**

The reader has a timer feature to periodically tune the antennas. If the antenna can change shape, the feature keeps the antenna in tune. See the AP command in the reader User Guide.

## **Broken Antenna Detection**

A reader should not be operated for a long time without an antenna. The MP command is used to detect when an antenna is disconnected or the wire is broken to stop scanning. See the User Guide to configure this feature.

# Troubleshooting

## The display only flashes rapidly between IN and OUT

This can happen if the tuner has a small gap between capacitor steps. Changing the antenna shape a little will change the inductance which will move the tuning point. Another solution is to use a different autotuner.

## The display shows a constant IN or OUT

If the LEDs are stuck on IN or OUT, measure the antenna's inductance to be sure that it is within the tuning range. Disconnect the antenna when measuring the loop inductance.

The autotuning process will not work if something is mis-wired. Verify that everything is correctly wired and try again.

A lot of metal near the antenna can also prevent the antenna from tuning, such as if the antenna is placed against a metal surface. Screws and mounting brackets are too small to affect the tuning but metal that is close to an extended portion of the antenna can affect the tuning.



**Oregon RFID manufactures equipment for tracking fish and wildlife (and rocks!) using low frequency passive RFID tags and readers. Our products are used worldwide for scientific research and commercial operations.**

***support@oregonrfid.com***

**4080 SE International Way B105  
Milwaukie OR 97222  
(503) 788-4380**

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GMT-8 (summer GMT-7)

