SY3 System Users Manual

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GENERAL SAFETY SUMMARY

Please review the following safety precautions carefully before putting the system into operation, so as to avoid any personal injury or damage to the instrument and any product connected to it. To prevent potential hazards, please use the instrument only as specified in this manual.

Use the Proper Power Cord

Use only the power cord designed for the instrument and authorized by your local country.

Ground the Instrument

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of the power cord to the Protective Earth terminal before connecting any inputs or outputs.

Connect the Antenna Correctly

When connecting the Antenna to the Analytics Tower, ensure that all connections are fastened securely. Utilize both screws on the DB-25 connecter to prevent accidental disconnection of the cable during use.

Observe All Terminal Ratings

To avoid fire or shock hazard, observe all ratings and markers on the system and check your manual for more information about ratings before connecting the instrument.

Do Not Operate Without Covers

Do not operate the system with covers or panels removed.

Do Not Insert Anything into Vent Holes

Do not insert anything into the vent holes on the system to avoid damaging components.

Avoid Circuit or Wire Exposure

Do not touch exposed junctions and components when the unit is powered.

Keep Well Ventilated

Inadequate ventilation may cause an increase of temperature or damage to the system. Please keep the system well ventilated and inspect the intake and vent holes regularly

Do Not Operate with Suspected Failures

If you suspect damage to the system has occurred, have it inspected by qualified service personnel before further operation. Any maintenance, adjustment, or replacement, especially to circuits or accessories, must be performed by SteppIR authorized personnel.

Keep Product Surfaces Clean and Dry

To avoid the influence of dust and/or moisture in the air, please keep the surface of the device clean and dry.

Electrostatic Prevention

Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

GENERAL SAFETY SUMMARY

Operate Only Within an EMC Chamber

Under normal operations, this system emits high levels of RF radiation. The system is intended to be used in an EMC chamber only to prevent personal injury or damage to instruments.

Maintain a Proper Distance Between Antenna Elements and Conductive Surfaces

High voltages on the elements can occur when operating the antenna with an amplifier. All conductive surfaces, such as the walls, ceiling, or floor of the EMC chamber, should be kept at least 15” (38 cm) from the antenna elements to avoid arcing.

Observe Antenna Power Ratings

The SY3 antenna is rated to 2500 Watts at 2.5:1 VSWR. Operating at higher wattage or higher VSWR values can result in damage to the system.

Burn Prevention

The SY3 Antenna enclosure underside surface may be hot during and immediately after transmitting. Use caution when handling the device to avoid burns.

Trip Hazard

The system components are connected via long lengths of cable. Use caution when moving between components to avoid tripping and causing personal injury or damage to the equipment.

Handling Safety

Please handle with care during transportation to avoid tipping or dropping the system components to avoid personal injury or damage to the equipment.

This product is intended to be used and operated exclusively within an EMC chamber by trained professionals. If the product is used in a manner not specified by the manufacturer the protection may be impaired.

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SY3 SYSTEM ASSEMBLY: SY3 STAND

Section 1:

The SY3 Stand allows for quick levelling and adjustments of the SY3 Antenna. It uses a PanaVise head to tilt the SY3 Antenna between horizontal and vertical polarizations, as well as four levelling feet for fine tuned control.

Figure 1 demonstrates how the four legs are inserted into the base of the antenna

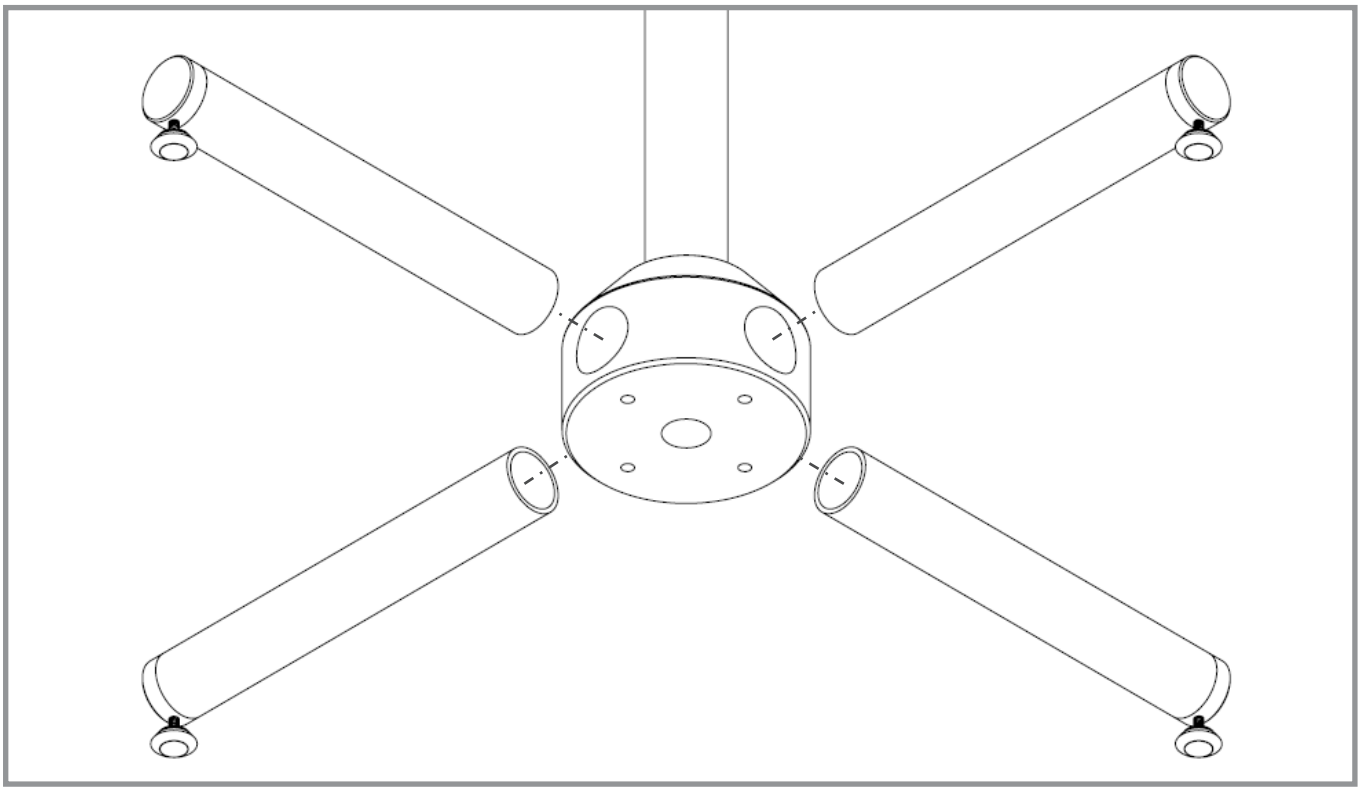

Figure 1

Section 2:

Using a 3/16” hex key, secure the four legs by tightening the set screws as shown in **Figure 2**.

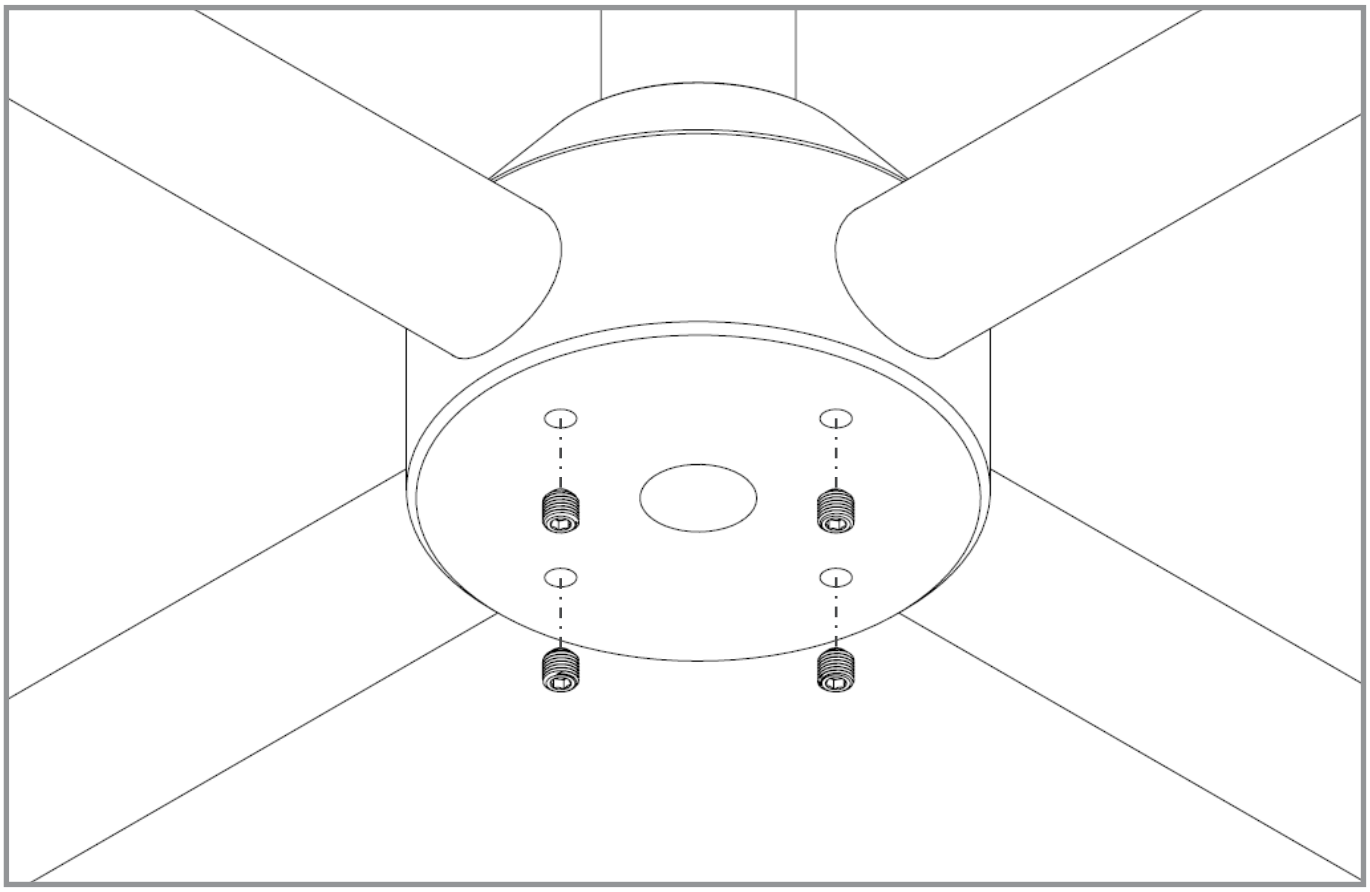

Figure 2

SY3 SYSTEM ASSEMBLY: SY3 ANTENNA

Section 1:

The SY3 Antenna boom is attached to the PanaVise mount using four Phillips head screws. These screws are fastened into the SY3 Antenna boom during shipping.

Remove the four mounting screws from the bottom of the antenna boom, as shown in **Figure 3**.

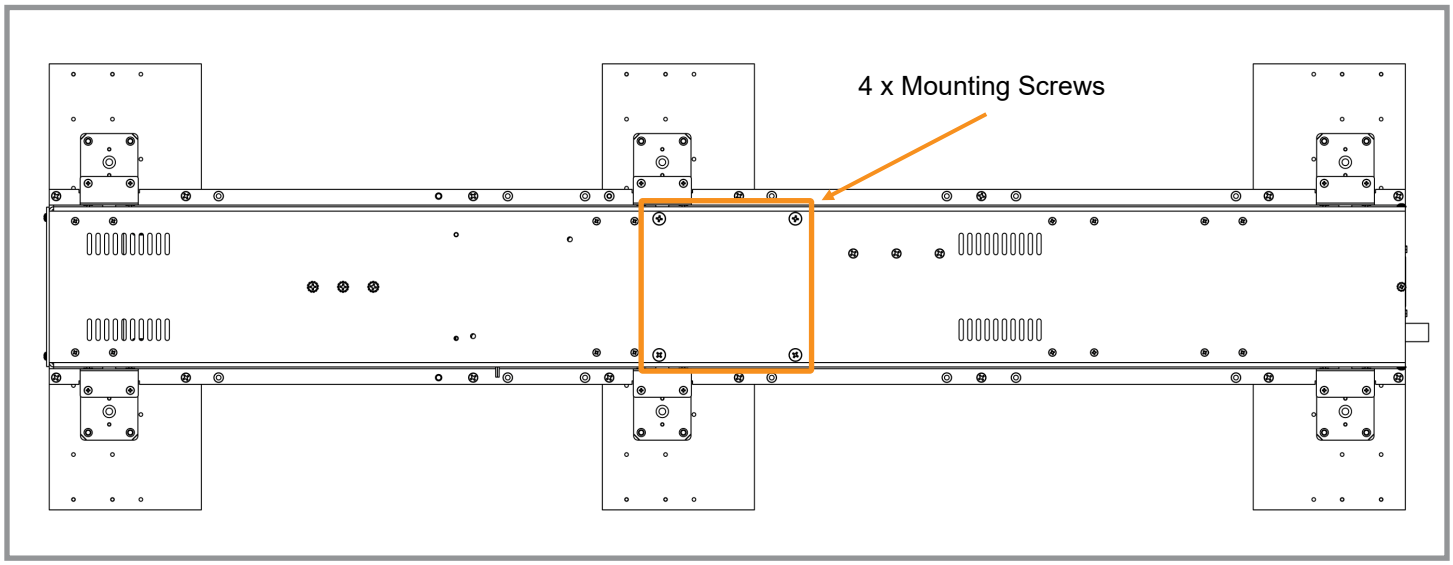

Figure 3

Place the antenna boom on top of the PanaVise Mount, and secure it in place using the four mounting screws, as shown in **Figure 4**.

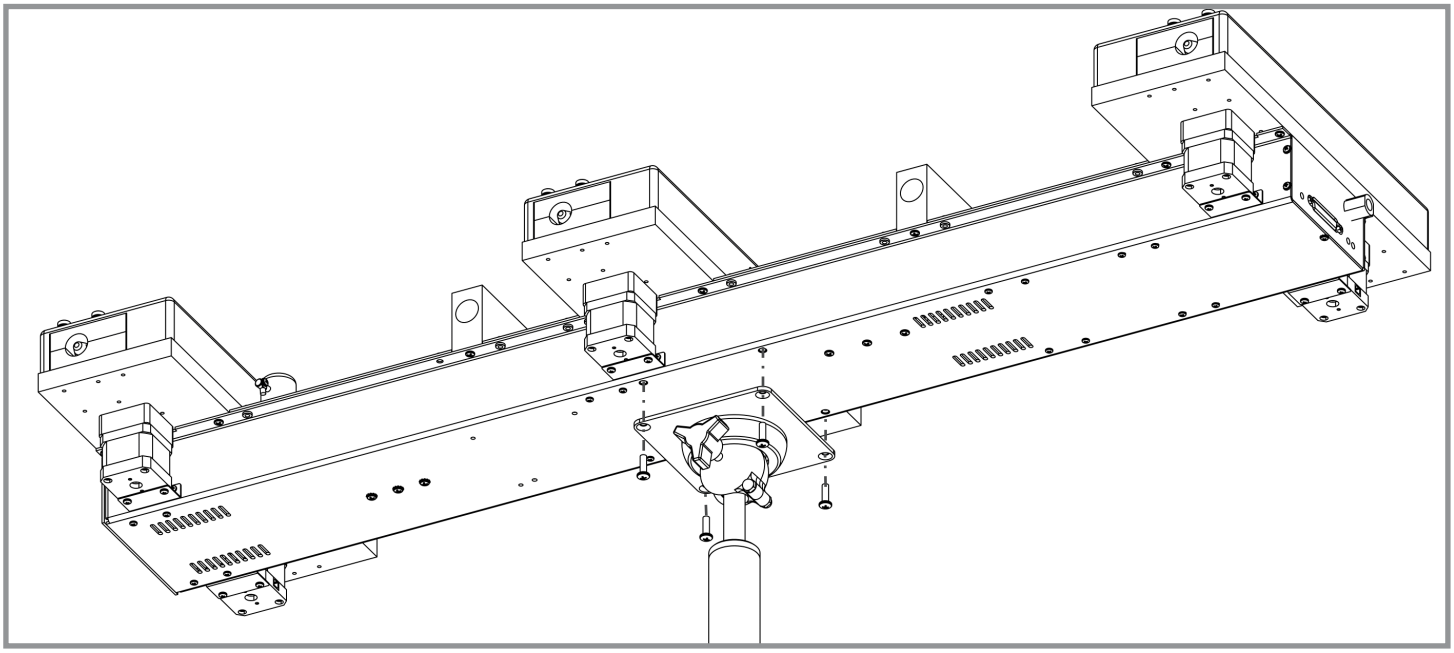

Figure 4

Section 2:

Remove the two black plastic thumbscrews on the center element, and insert a straight element fiberglass support into each side of the center element, as shown in **Figure 5.**

⚠ *Make sure each fiberglass support is fully seated within the element*

Reinstall each plastic thumbscrew, fastening them against the fiberglass support tube .

⚠ *Do not overtighten! Doing so may crush or otherwise damage the fiberglass support tube*

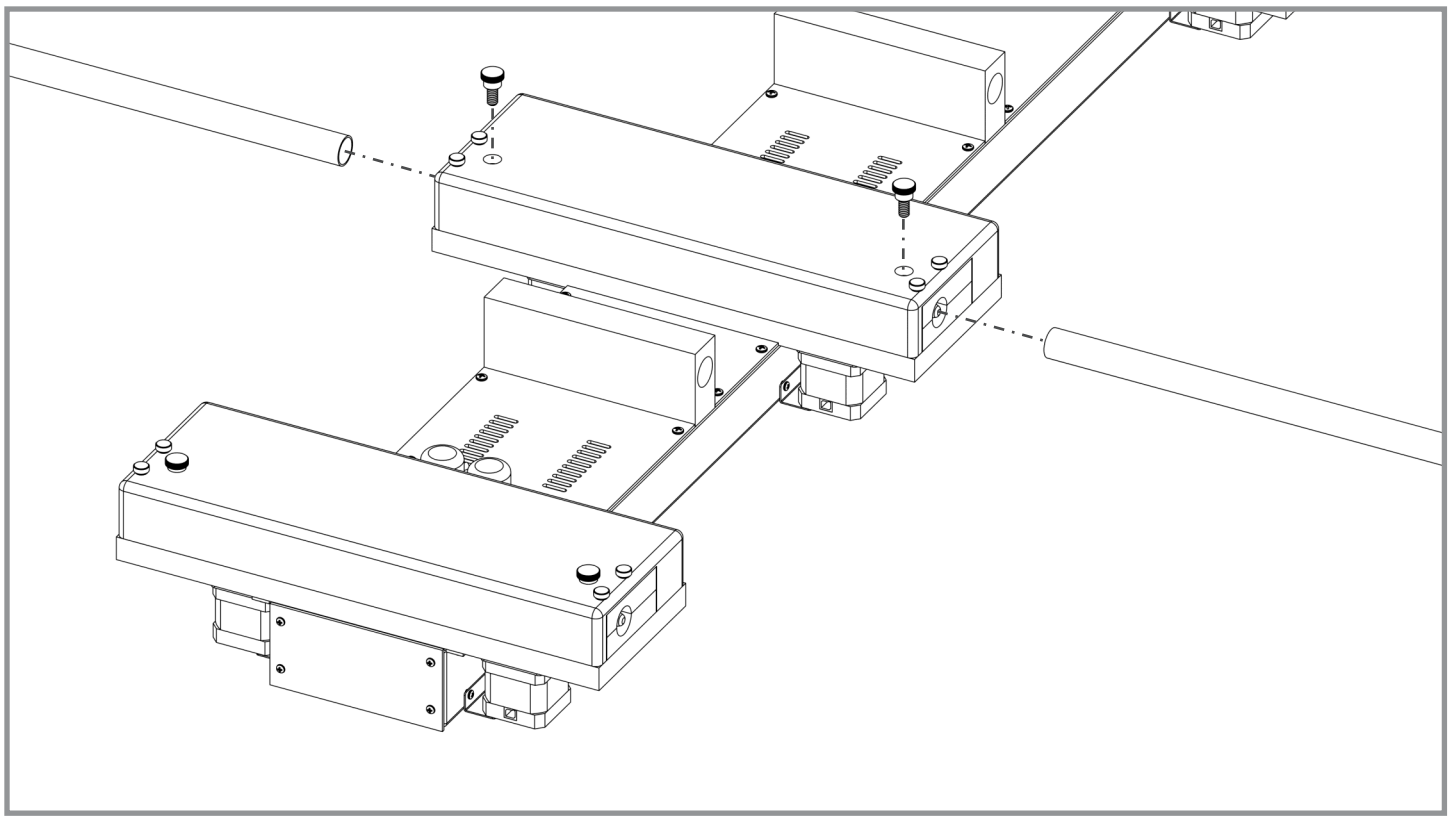

Figure 5

Section 3:

Remove the two black plastic thumbscrews on the front and rear element, and insert a folded element fiber-glass support into each side of the elements, as shown in **Figure 6.** The folded element fiberglass supports are ***not*** symmetrical, please refer to **Figure 7** for the correct orientation.

⚠ *Make sure each fiberglass support is fully seated within the element*

Reinstall each plastic thumbscrew, fastening them against the fiberglass support tube.

⚠ *Do not overtighten! Doing so may crush or otherwise damage the fiberglass support tube*

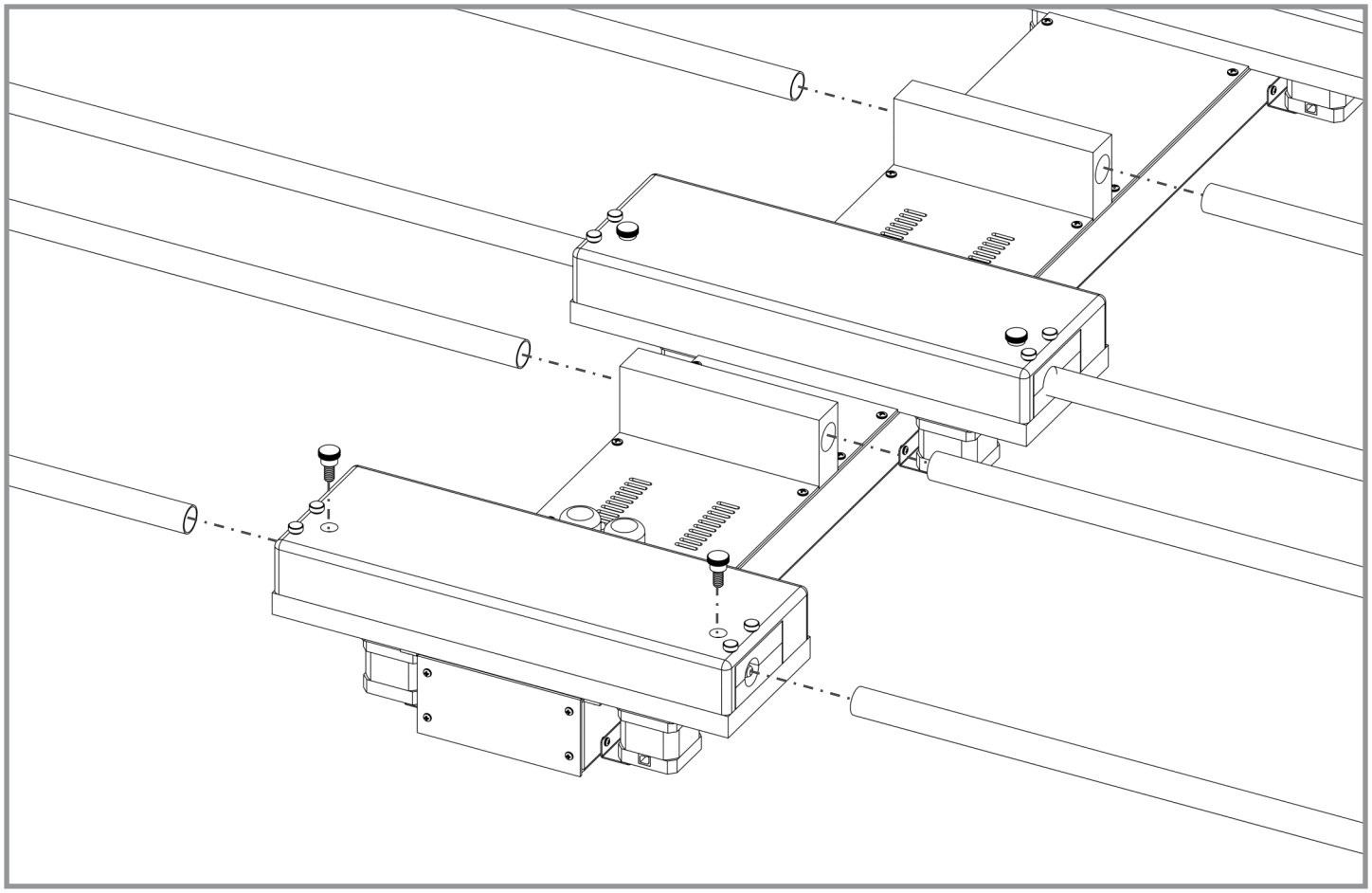

Figure 6

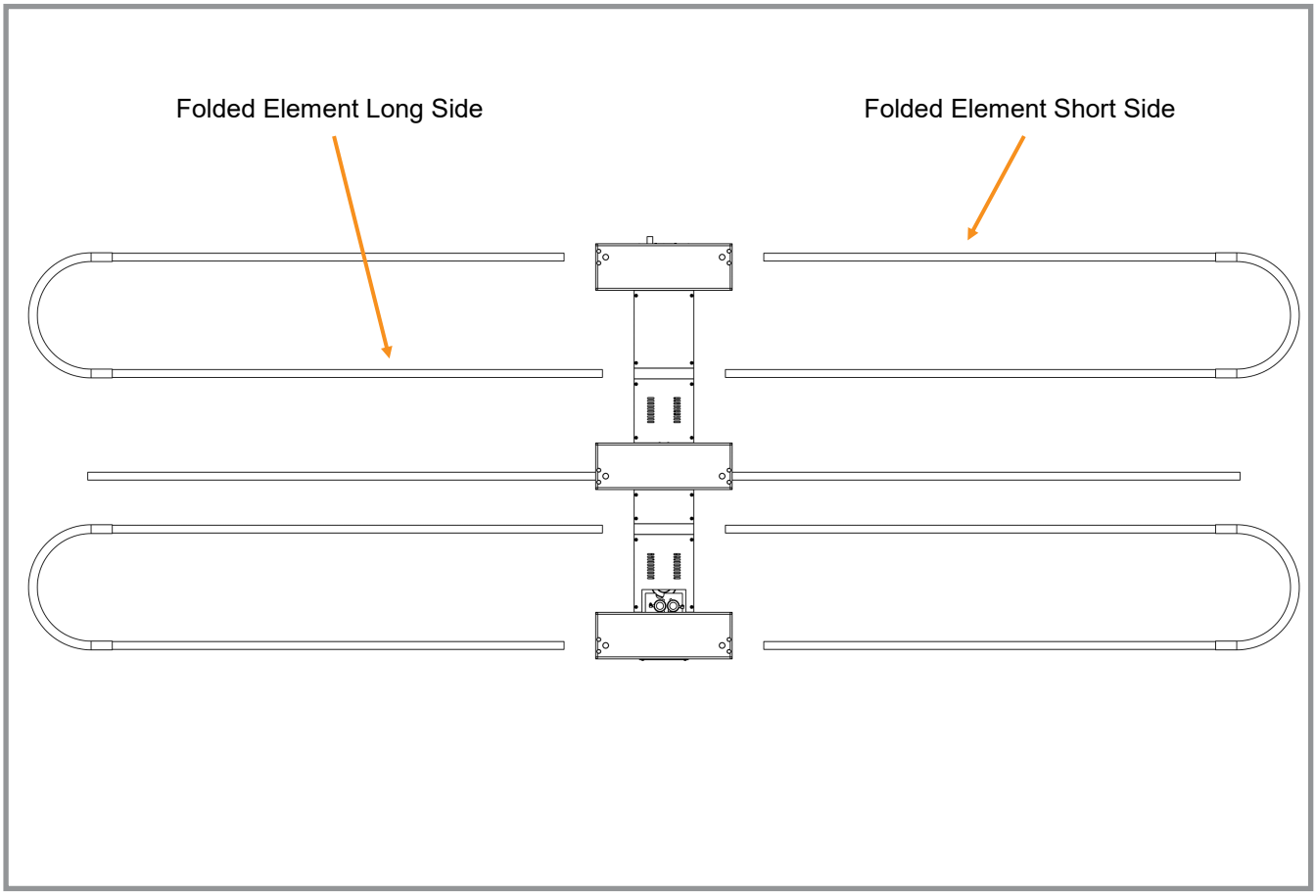

Figure 7

SY3 SYSTEM ASSEMBLY: RECEIVE ANTENNA AND STAND

Section 1:

The SY3 System uses a 0.03—1 GHz Biconical Antenna and non-conducting stand to measure and optimize for signal strength while tuning.

Figure 8 demonstrates how the non-conducting stand is assembled

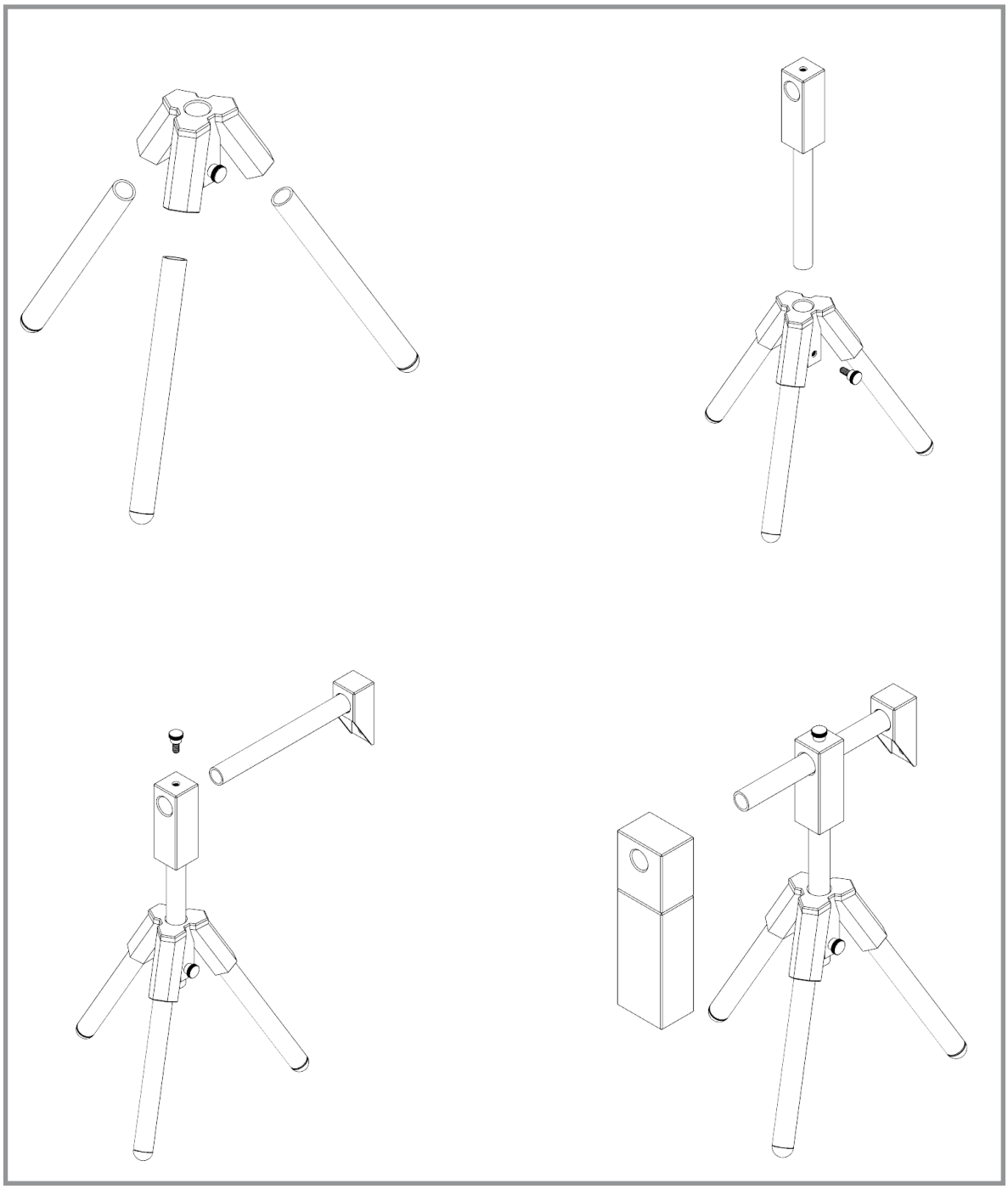

Figure 8

Section 2:

Fasten the Receive Antenna to the stand's horizontal arm using the black plastic thumbscrew, as shown in **Figure 9**

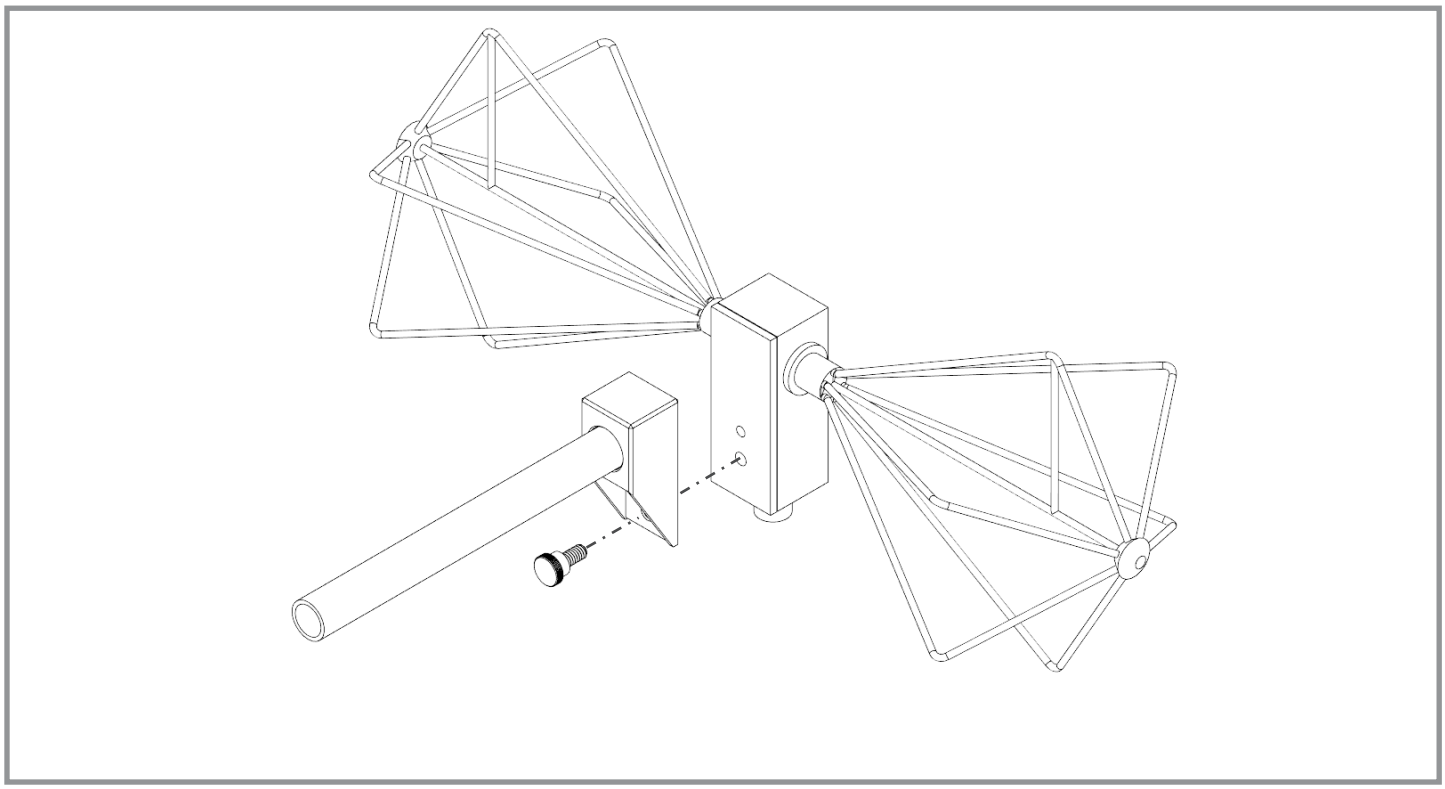

Figure 9

⚠ *Adjust the Receive Antenna position and counterweight as needed.*

SY3 SYSTEM USER GUIDE: THEORY OF OPERATION

The SY3 System uses a mechanically adjustable antenna and analytics tower to determine optimal antenna lengths for a given frequency in a given environment.

Before use, the SY3 system is calibrated to the room that it is in, essentially "auto tuning" the antenna. This process takes approximately 2.5 hours, and needs to be repeated for both horizontal and vertical polarization.

SY3 SYSTEM USER GUIDE: SETUP FOR TUNING

When tuning, the SY3 System uses 3 separate components:

1. The SY3 Antenna
2. The Mini-Bicon Receive Antenna
3. The analytics tower and cables

The SY3 Antenna

The SY3 Antenna should be placed **1 meter** from the EUT, as described in MIL-STD 461-G.

⚠ *This measurement should be taken from the center of the front element tube.*

In the Horizontal Polarization, the center of the front element tube should be **57"** from the ground of the chamber. This height adjustement can be made using the handwheel on the stand. The antenna can then be levelled side to side using the handwheel on the PanaVise attachment. The antenna can be levelled front to back using the adjustable feet on the stand.

In the Vertical Polarization, the center of the front element tube should ideally be at least **17"** from the floor and ceiling of the chamber, and must be **at least 10"** from the floor and ceiling of the chamber to avoid performance loss.

The Receive Antenna

The Mini-Bicon Receive Antenna should be placed **12"** above the EUT, as measured from the center body of the Biconical antenna, in horizontal and vertical polarization.

⚠ *The polarization of the Receive Antenna should match the polarization of the SY3 Antenna*

We recommend that the Receive antenna should also be positioned 24" to the right of the SY3 Antenna.

⚠ *After extensive testing, we found that this placement yielded best results in our test chambers*

The Analytics Tower

The Analytics Tower connects to the SY3 antenna using the N-Type to N-Type LMR-400 low loss coaxial cable and the DB-25 Control Cable. The Analytics Tower connects to the Receive Antenna using the BNC to N-Type LMR-400 low loss coaxial cable.

⚠ *The Receive Antenna must be connected to the "PROBE" connection on the OptimizIR EMC, and the SY3 Antenna must be connected to the "ANTENNA" connection on the OptimizIR EMC. Double check these connections!*

⚠ *If the SY3 is being used in a new location, it is necessary to create an Antenna Configuration for both the Horizontal and Vertical Polarization.*

Section 2:

Creating, selecting, and modifying an antenna configuration is done using the OptimizIR EMC on the Analytics Tower. After the device is powered on, you will see the interface shown in **Figure 10**

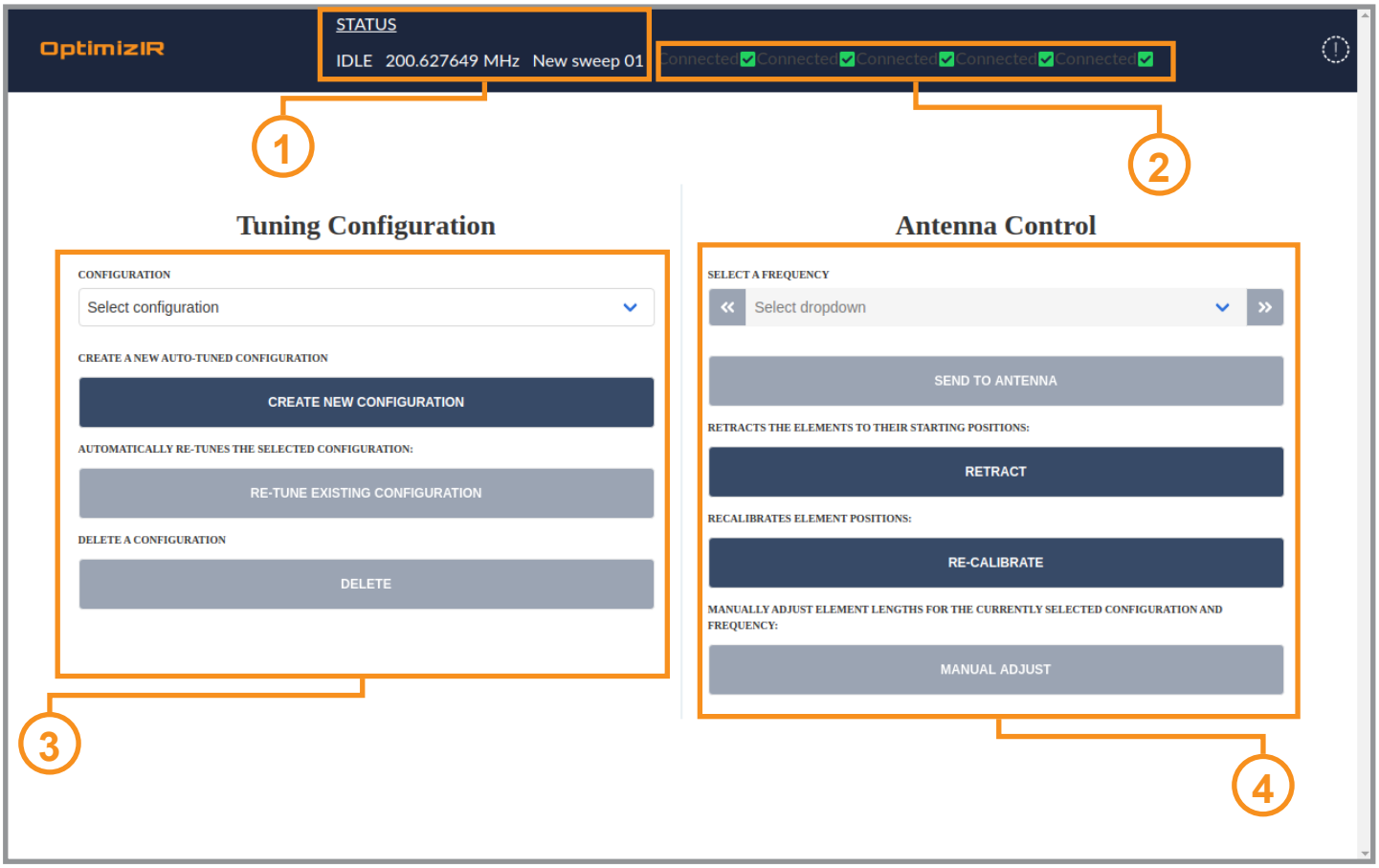

Figure 10

1. Status Menu. Shows current device state, frequency, and configuration.
2. Connection Status.
3. Configuration Control. Select, create, and delete configurations.
4. Antenna Control. Go to a specific frequency, retract or recalibrate elements, or fine tune element lengths.

Section 3:

Create a new tune by selecting the "**CREATE NEW CONFIGURATION**" button, as shown in Figure 11. Enter a descriptive name and select the proper tuning preset, according to the polarization of the antenna.

> ⚠ *Horizontal and Vertical Presets use different parameters when tuning the SY3 System. Selecting an incorrect preset for your antenna's polarization can lead to poor antenna performance!*

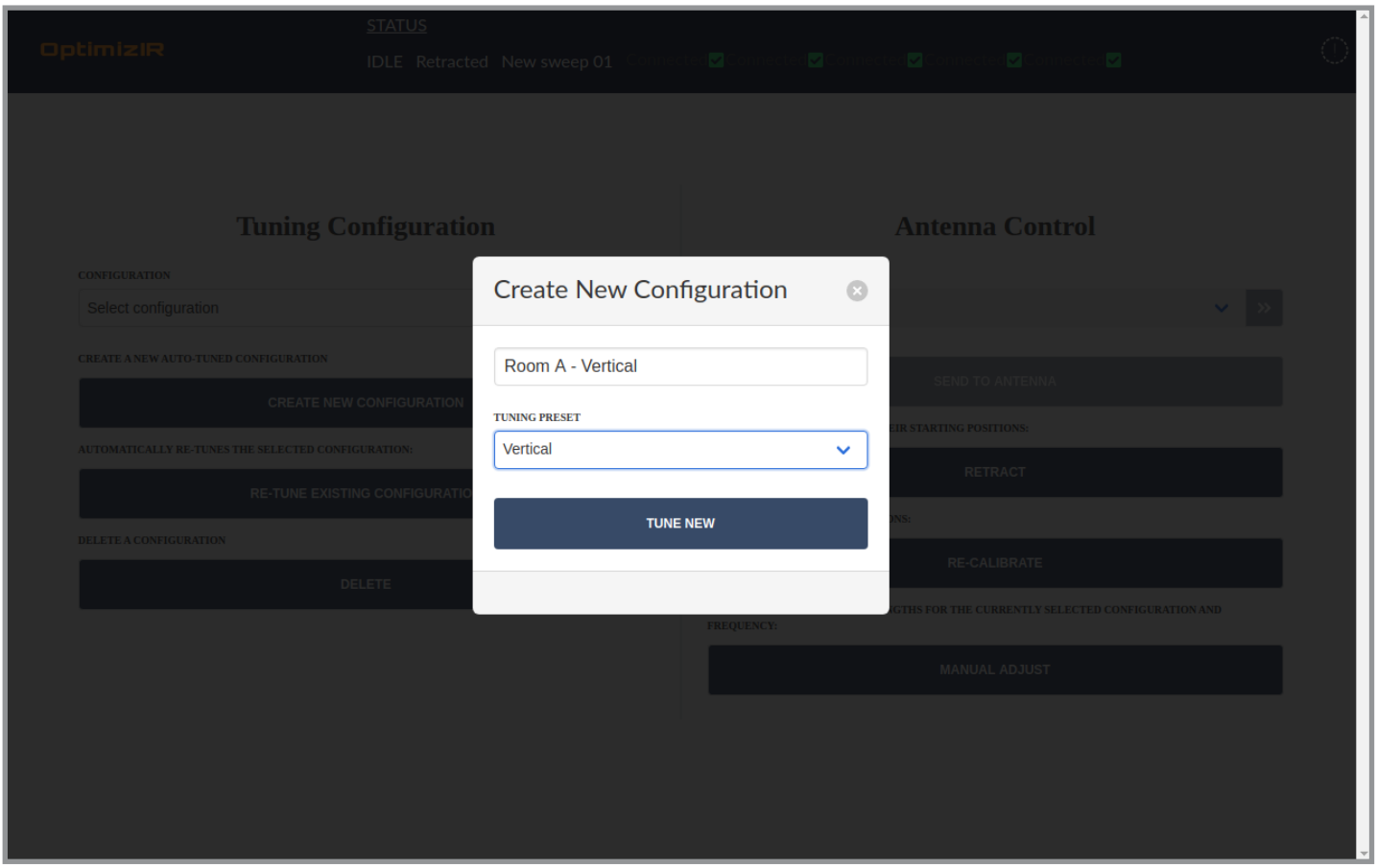

Figure 11

Press the "**TUNE NEW**" button to begin the tuning process. The OptimizIR EMC will update to show the time and percentage remaining (**Figure 12**). The tune can also be canceled from this screen.

> ⚠ *This cancellation requires confirmation, to avoid accidental interruptions (**Figure 13**).*

Once the tune progress has completed, the OptimizIR EMC will automatically return to the screen shown on **Figure 10**. It is now possible to select the newly created tune and begin testing.

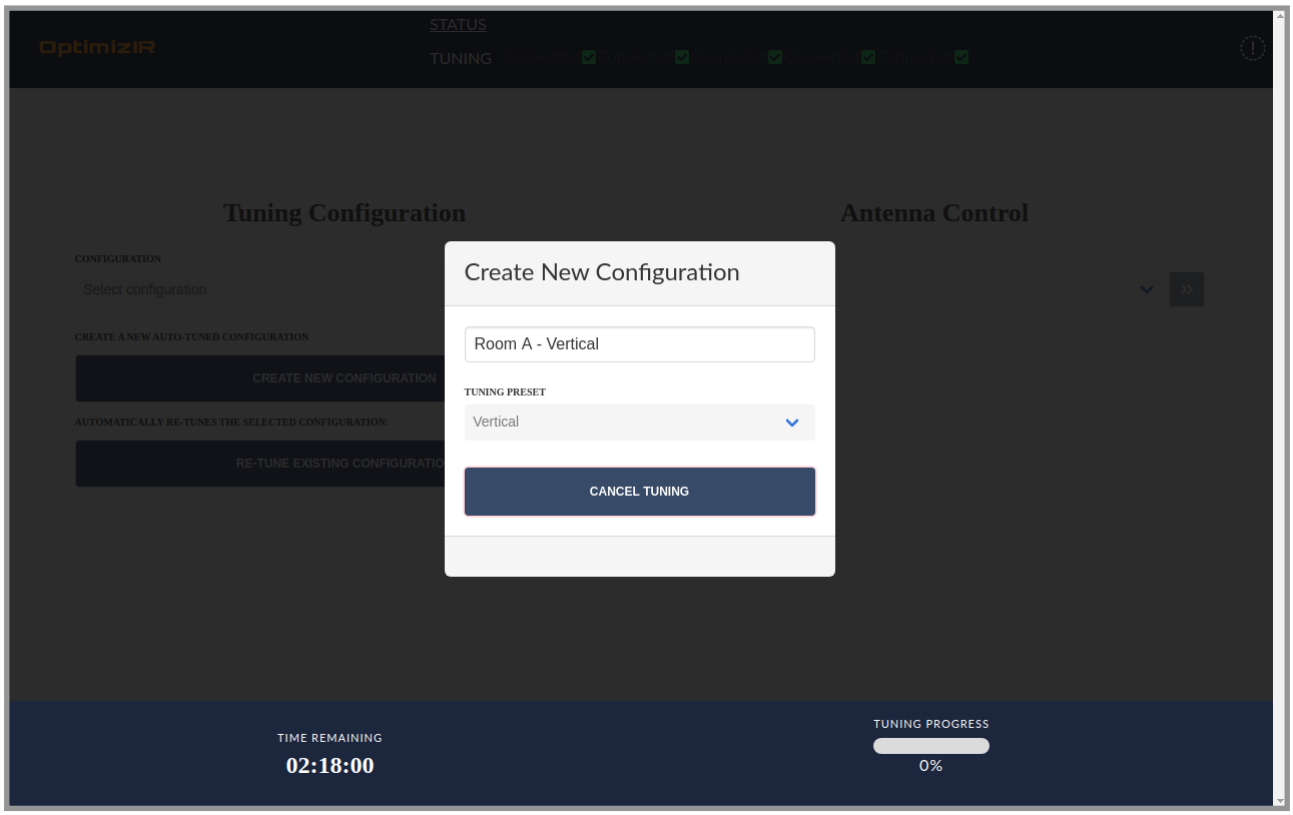

Figure 12

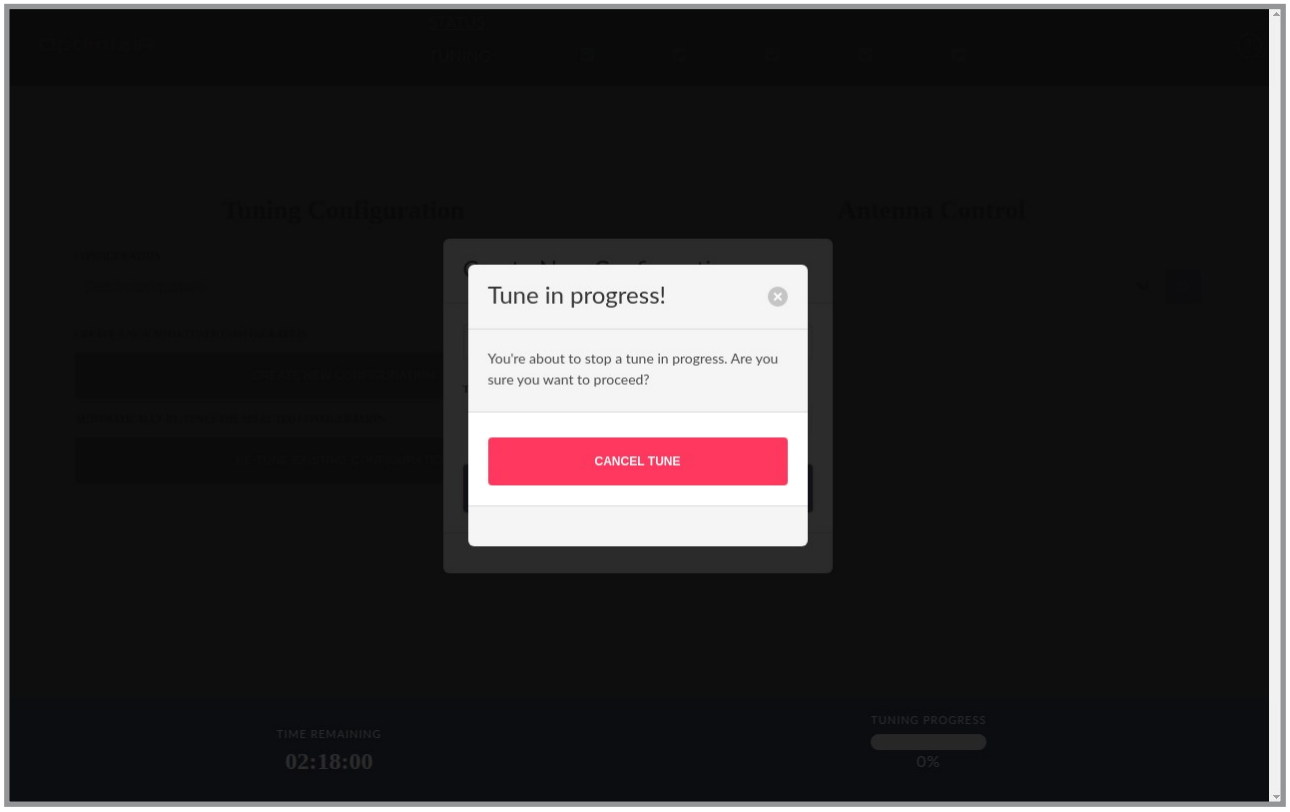

Figure 13

SY3 SYSTEM USER GUIDE: SETUP FOR TESTING

When tuning, the SY3 System uses 3 separate components:

1. The SY3 Antenna
2. The Analytics Tower and cables
3. EMC Field Probes

The SY3 Antenna

The SY3 antenna should be in the same location and polarization as the antenna configuration that it is using.

> ⚠ *Moving the antenna to another location and polarization may cause an increase in VSWR and antenna performance.*

The Analytics Tower

The Analytics tower should only have the DB-25 control connected during testing. This cable is necessary for controlling the SY3 Antenna element lengths.

> ⚠ *To prevent damage while testing, disconnect all coaxial cables from the OptimizIR EMC while testing*

EMC Field Probes

Optimal placement of field probes will vary depending on the frequency and polarization of the SY3 Antenna.

We recommend the use of multiple field probes to accurately map the field generated by the SY3 Antenna, if possible.

In Horizontal Polarization:

> We recommend positioning the field probe(s) up to **48”** to the right or left of the SY3 Antenna from **30 MHz—75 MHz**.
>
> We recommend positioning the field probe(s) **18”** to the right or left of the SY3 Antenna from **75 MHz—200 Mhz**.

In Vertical Polarization:

> We recommend positioning the field probe(s) **6”** to the right or left of the SY3 Antenna from **30 MHz — 200 MHz**.

⚠ *Optimal field probe position will depend on the chamber geometry and resulting SY3 antenna configurations. Your experience may vary.*

Section 2:

Select the appropriate configuration using the dropdown shown in **Figure 14**.

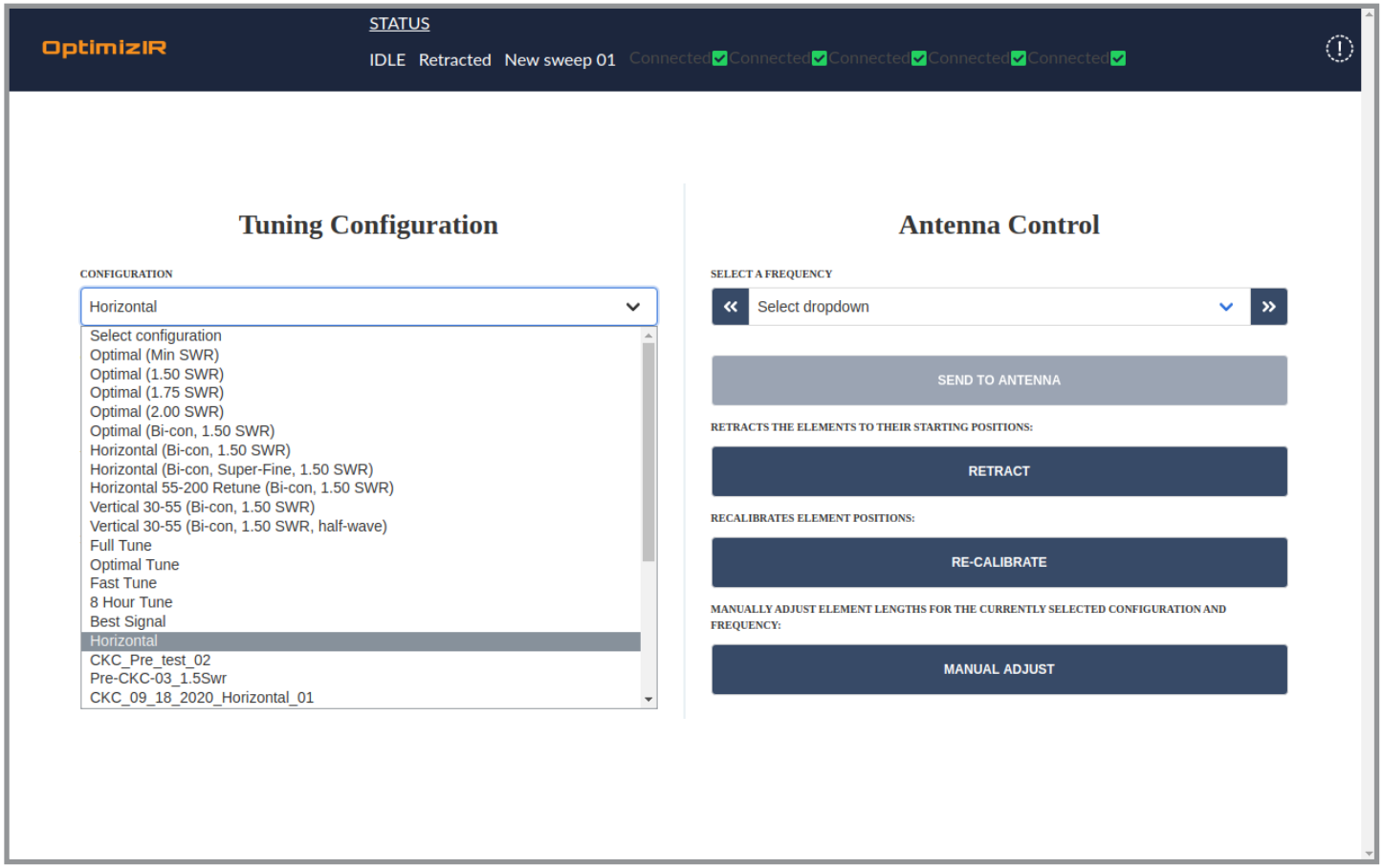

Figure 14

Section 3:

Select the appropriate frequency using the dropdown shown in **Figure 15**. You can also change frequencies by clicking the "**<<**" or "**>>**" buttons shown below.

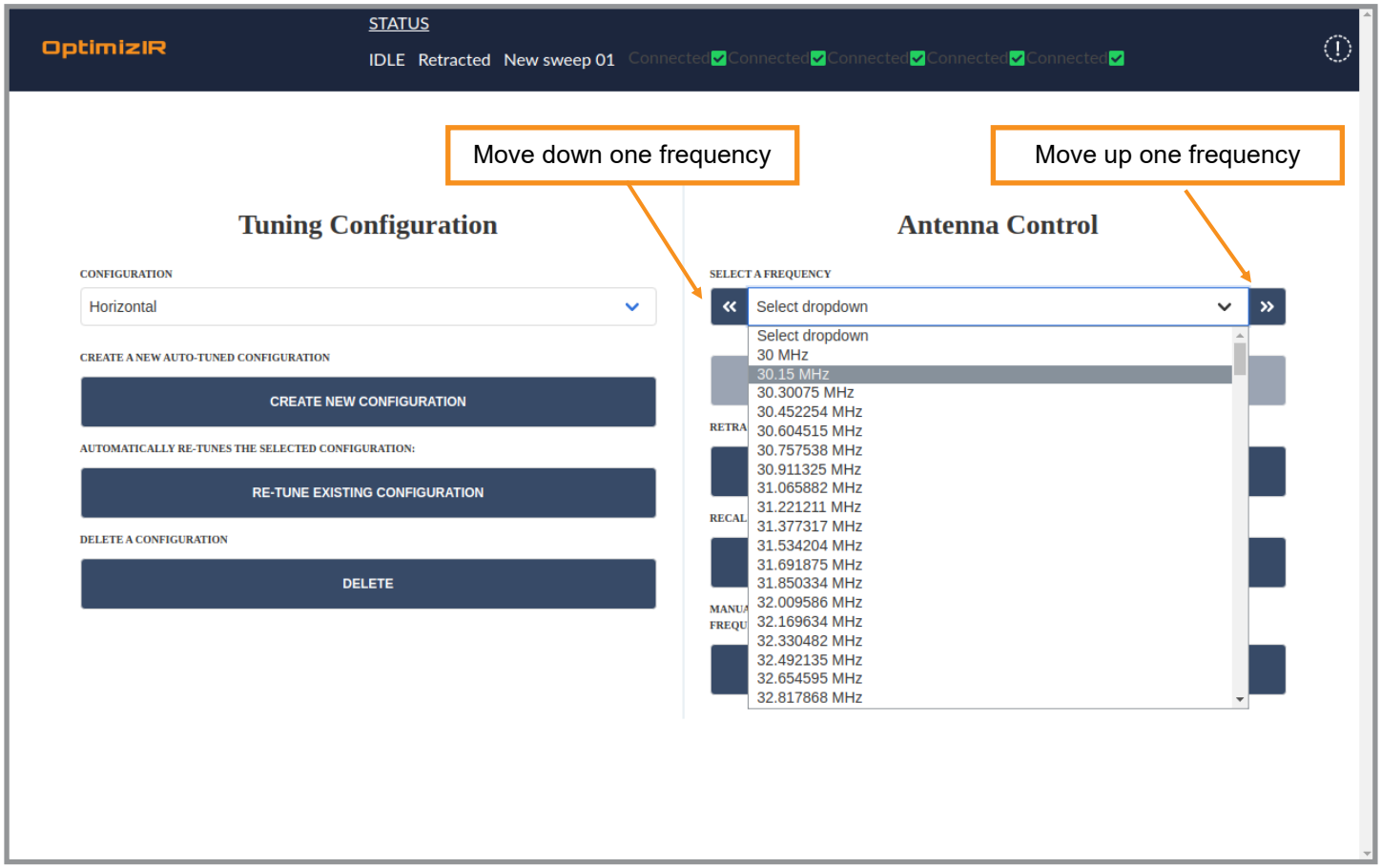

Figure 15

Section 4:

After selecting a configuration and a frequency, click the "**SEND TO ANTENNA**" button to instruct the antenna to adjust its elements to the correct length.

> ⚠ ***Figure 16*** *shows the interface* ***before*** *pressing "SEND TO ANTENNA". Though the selected configuration is "Horizontal" and the selected frequency is "30.757 MHz", the Status Menu shows that the antenna is "Retracted".*

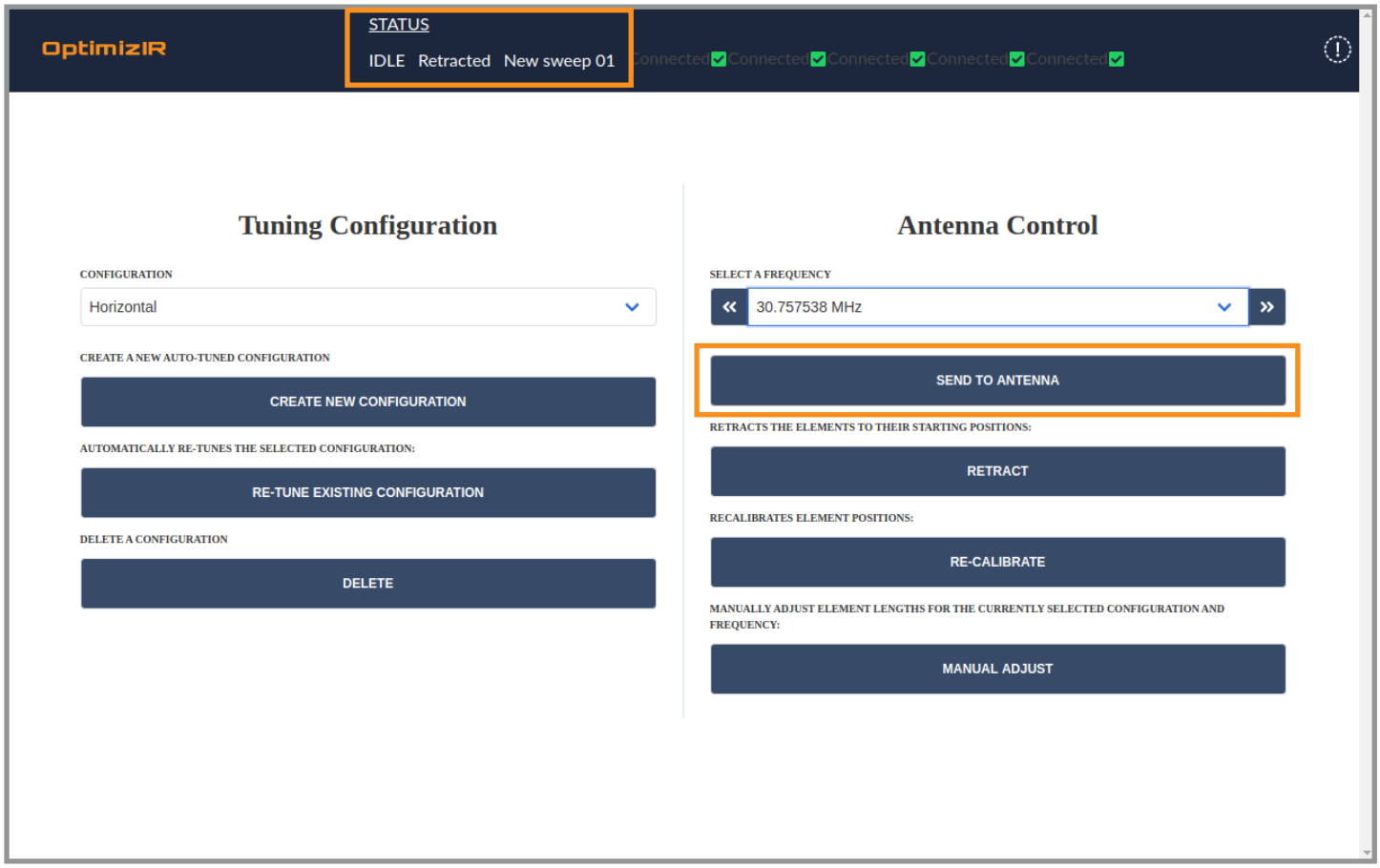

Figure 16

When "**SEND TO ANTENNA**" is clicked, the interface will show that the SY3 Antenna is adjusting (**Figure 17**), then will show the new Configuration and Frequency on the Status Menu when done (**Figure 18**).

> ⚠ *The Status Menu can only track the SY3 Antenna element lengths while the OptimizIR EMC is powered on. After loss of power or on first start, it is recommended to use the "****RE-CALIBRATE****" button to regain positional data.*

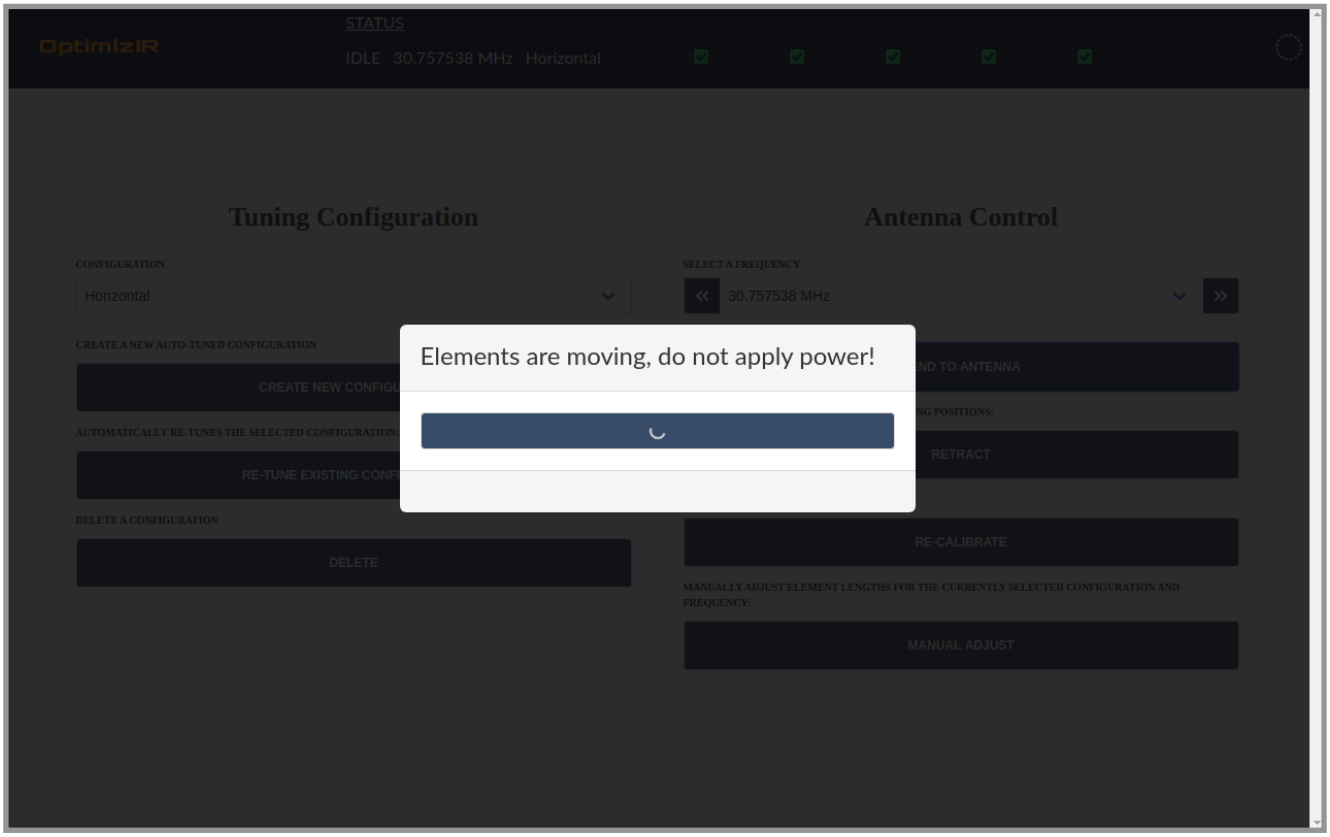

Figure 17

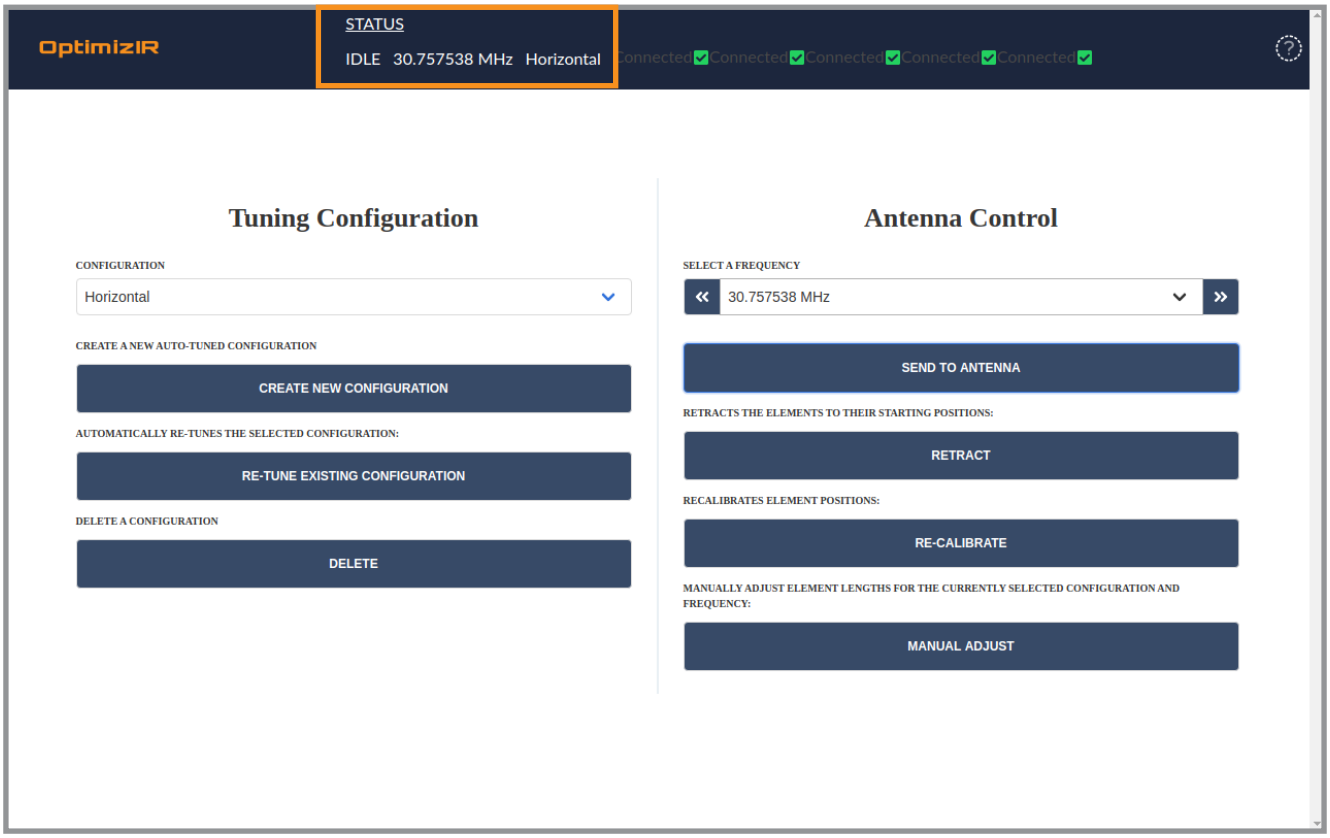

Figure 18

Before applying power to the SY3 antenna, you must ensure that the proper configuration is loaded and that the antenna is sent to the same frequency that the amplifier is outputting. Failing to do either of these will result in a mis-matched antenna and high VSWR, and may damage your system!

During testing, we recommend monitoring the VSWR of the SY3 antenna. If the VSWR goes above 2.5 : 1 SWR, we recommend ensuring that you are using the correct configuration. If high VSWRs persist, you may need to tune the SY3 antenna again to create a new configuration. If high VSWRs persist even after multiple tunes, please refer to our troubleshooting guide.

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